micromeritics®

Elzone™ II 5390 Confirm

Operator's Manual

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1. GENERAL INFORMATION

This manual describes how to operate the Elzone 5390 analyzer. To help you operate the Elzone more efficiently:

- read Chapter 2, User Interface, before operating the analyzer and its software
- use the step-by-step instructions located in Chapter 3 when performing common operations (dialogs used in these procedures are explained in Chapters 4, 5, 6, and 7)

Organization of the Manual

The Elzone operator's manual is organized as follows:

Chapter 1 GENERAL INFORMATION

Provides a general description of the Elzone 5390 system, its features, and specifications.

Chapter 2 USER INTERFACE

Provides basic software and instrument interface.

Chapter 3 OPERATIONAL PROCEDURES

Provides brief step-by-step procedures for the operations you can perform with the analysis program.

Chapter 4 FILE MENU

Provides a description of the commands available on the File menu.

Chapter 5 UNIT MENU

Provides a description of the commands available on the Unit menu.

Chapter 6 REPORTS MENU

Provides a description of the commands available on the Reports menu.

Chapter 7 OPTIONS MENU

Provides a description of the commands available on the Options menu

Chapter 8 **TROUBLESHOOTING AND MAINTENANCE**

Provides information for troubleshooting and for performing routine maintenance procedures.

Chapter 9 **ORDERING INFORMATION**

Provides ordering information and part numbers for system components.

Appendix A **ERROR MESSAGES**

Provides a listing of error messages that may be displayed by the analysis program, as well as causes and actions for each.

Appendix B **DATA REDUCTION**

Contains the calculations used by the software to produce reports.

Appendix C **FORMAT OF EXPORTED DATA**

Provides the format for exported data.

Appendix D **ELECTROLYTES**

Provides information on electrolytes and their preparation for analysis.

Appendix E **THEORY OF OPERATION**

Provides a discussion on the operation theory of the Elzone analyzer.

Appendix F **CONCENTRATION ANALYSES**

Provides information on performing concentration analyses.

Appendix G **CAMERA OPTION**

Provides installation and basic operating instructions for the camera.

Appendix H **OPTIMUM PERFORMANCE FOR STRAY PARTICLE COUNT AND NOISE**

Provides a discussion on methods for obtaining optimum performance for noise-sensitive applications.

Index **INDEX**

Provides quick access to a subject matter.

Conventions

This manual uses the symbols shown below to identify notes of importance, warnings, and cautions:

Notes contain important information pertinent to the subject matter.

Warnings contain information that help you prevent actions that may cause personal injury.

Cautions contain information that help you prevent actions that may damage the analyzer.

Internet Access

Visit **www.micromeritics.com** to learn more about Micromeritics, our products, and applications. Our site is user-friendly, easy to navigate, and informative. Its content is summarized below.

About Micromeritics	A brief history of Micromeritics, office locations, awards/certifications, career opportunities, and a virtual tour of its headquarters
Products	Product information and printable brochures
Applications	Application Notes, Product Bulletins, Tech Tips, Technical Articles/papers, and important application links
Online Catalog	Catalog of instruments and accessories, allowing you to place your order online
News and Press	Press releases, Events calendar, microReports, and latest Micromeritics news updates
Lab Service	Provides laboratory tips and access to the Micromeritics Analytical Services web site
Customer Support	Customer support contacts, product registration, instrument training information, Material Safety Data Sheets, and account registration
Grant Program	Details of the Grant Program established for non-profit organizations and universities
Contact Us	Contact information, office locations, maps and driving directions to the Micromeritics facility, and registration for the microReport newsletter

Be sure to browse our site to see the many ways in which we can assist you.

System Description

The Elzone 5390 Particle Size analyzer uses the electrical sensing method for measuring particles. It is capable of measuring particles (organic and inorganic) ranging from 0.4 to 240 μm in diameter. The Elzone's ability to measure low-concentration samples allows it to produce accurate data where other techniques are limited.

Operation

The Elzone's operation is based on a simple, yet efficient process. The sample, dispersed at a low concentration in an electrolyte solution, is placed in a sample beaker and onto the sample stand of the analyzer. When the sample stand is raised, a tube containing a precision-drilled orifice becomes submerged in the sample beaker. An electrode in the tube provides a current which passes through the orifice by way of the electrolyte to a second electrode in the sample beaker. The dispersed sample is pulled through the orifice. As each particle passes through, it displaces a volume of electrolyte equal to its own volume. This disturbs the electrical field between the two electrodes, producing an electrical pulse for each particle. The Elzone counts and sizes these pulses and reports the data.

Orifice Tubes

A wide range of orifice tubes is available to accommodate many sample sizes. The orifice is drilled in a synthetic jewel which is permanently sealed into the wall of the tube. Each tube is carefully tested, using standard samples of monodispersed polymer spheres, to verify it produces distortion-free measurements. The effective range of particle sizes a typical orifice can measure is from 2% to 60% of its orifice diameter. You can blend (merge) data obtained from multiple orifice tubes to report a continuous distribution for overlapping segments of a broad range of particle sizes.

Analysis Program

The Elzone analysis program is operated in a Windows environment, and includes wizards and intuitive screens enabling you to perform system operations quickly and efficiently.

Also included is a report system which allows you to manipulate and customize reports. You can zoom in on portions of the graphs or shift the axes to examine fine details. Scalable graphs can be copied to the clipboard and pasted into other applications. Reports can be customized with your choice of fonts and a company logo added to the report header for an impressive presentation. Refer to **Onscreen Reports**, page **6-22** for available options.

Camera

An optional camera is offered for capturing and displaying pictures of the orifice jewel on the computer screen. This camera enables you to:

- view particle activity in the orifice
- detect blockages in the orifice
- check the orifice jewel for cracking
- check the orifice for particle build-up

Refer to **Ordering Information** on page **9-1** for ordering information. Installation and operating instructions for the camera are located in Appendix H.

ElectroPrep

The ElectroPrep is designed to recirculate electrolyte through a filter cartridge that retains particles greater than 0.1 to 0.2 micrometers in diameter. The electrolyte is contained in a reservoir, providing a supply of clean electrolyte at all times.

For electrolytes in which sample particles readily disperse (e.g., alumina in saline water) without having to add a dispersing agent, the waste liquid can simply be poured back into the reservoir and used again and again. In typical usage under this circumstance, one preparation of electrolyte will last several months before the filter cartridge has to be replaced. This is also true with saturated electrolytes.

Waste liquid cannot be recycled when the sample material requires a special dispersing agent because placing it back into the electrolyte would change the electrolyte composition. The ElectroPrep is still useful in these situations by affording a ready source of clean electrolyte to fill instrument sample beakers and supply containers. The ElectroPrep can be employed with either aqueous or organic electrolytes by selecting the appropriate cartridge. Refer to **Ordering Information**, page **9-1** for information on ordering the ElectroPrep, or contact your local sales representative.

Volumetric Pump

Also available is a volumetric pump which enables you to measure the concentration of particles.

Refer to **Ordering Information** on page **9-1** for information on placing your order.

Specifications

The Elzone 5390 analyzer has been designed and tested to meet the specifications listed below.

Characteristic	Specification
Analysis	
Electrolyte:	Aqueous- or organic-based liquids
Concentration:	From 1 to 1000 ppm (0.1%) by volume
Sensing rate:	From 1 to over 5,000 particles per second
Size range:	0.4 to 240 μm (20-30: 1 range per orifice)
Analysis time:	Typically 10 to 100 seconds
Performance	
Repeatability:	± 1% (10 measurements from same sample)
Reproducibility:	± 1.5% (instrument to instrument)
Electrical	
Voltage:	100/120/230/240 VAC
Fuse type:	2.0 A, 3 AG, Slow-Blow (100/120 VAC) 1.0 A, 5 x 20 mm Slow-Blow (230/240 VAC)
Power:	150 VA
Frequency:	50/60
Environment	
Temperature:	10 to 45 ºC operating; -10 to 55 ºC storing or shipping
Humidity:	20 to 80% relative, noncondensing
Physical	
Width:	38 cm (15 in.)
Height:	54.5 cm (21.5 in.)
Depth:	40.5 cm (16 in.)
Weight:	28 kg (61 lbs)

Characteristic	Specification
Computer	
Minimum requirements:	• P1 GHz or faster 32 bit (x86) or 64 bit (x64) processor • 2 GB RAM • 40 GB minimum hard drive (formatted in NTFS) (one partition) • Video Adapter capable of 1024 × 768 minimum resolution • One 10 BaseT Ethernet port (can be 10/100) • CD-ROM drive • Windows 7 Professional is recommended for the best user experience.

2. USER INTERFACE

The Elzone 5390 Confirm software is accessed by three different levels of users:

- **Administrator**: installs and maintains software and updates, establishes user accounts and rights (the Administrator responsibilities are covered in a separate manual).
- **Developer**: has access to all functions of the software. A Developer's primary function is to create templates for an Analyst.
- **Analyst**: creates sample files from predefined templates; some fields, such as the **Mass** field, are enabled and can be edited. An Analyst is also allowed to perform other tasks as designated throughout this manual. Tasks not allowed are disabled.

This manual is written for the Developer and Analyst levels of the Elzone 5390 Confirm software. Functions for the Administrator are covered in the Administrator Utility User's Guide.

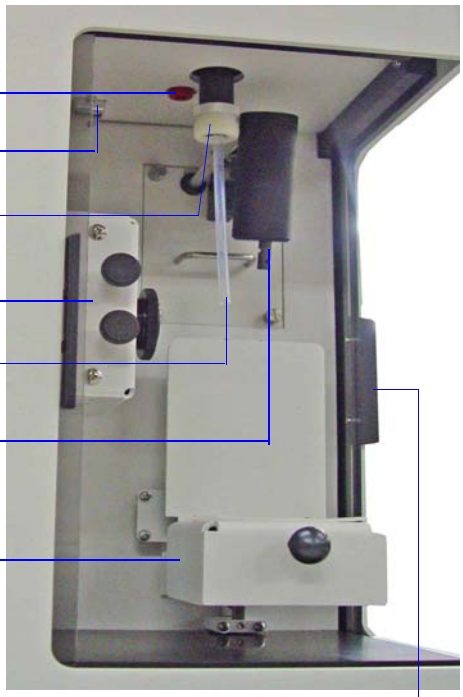
This chapter contains information to familiarize you with the hardware and software of the Elzone system. It is recommended that you read this chapter before attempting to operate the Elzone 5390 analyzer.

Controls, Indicators, and Connectors

This section contains a description of the controls, indicators, and connectors located on the front, side, and rear panels of the analyzer.

Front Panel

Power Indicator (upper left side of front panel)



Electrode (external) connector

Orifice light connector

Sample port

Camera assembly

Exit tube

Stirrer assembly (shows rotary stirrer installed)

Sample Stand

This door contains a reflector (used to diffuse the orifice light when the camera is installed).

Compartment doors — The sample compartment contains two sliding doors. These doors should always be closed during an analysis. The door on the right side contains a reflector which serves to diffuse the orifice light (when the camera option is installed).

Power Indicator — Illuminates when the analyzer is turned on.

Electrode connector — For connecting the external electrode.

Camera assembly — (optional) Enables you to capture pictures of the orifice jewel and display them on the computer screen.

Orifice light connector — For connecting the orifice light (included with the camera option). The orifice light provides a backlight for the orifice when capturing pictures. Also illuminates the sample beaker, providing a clear view of particle suspension.

Sample port

For installing the orifice tube.

Exit tube

This tube is used to remove liquid from the sample beaker to the waste container.

Stirrer assembly

Enables you to maintain dispersion of the sample. Two types of stirrers are available:

- **Propeller**; maintains dispersion by means of a glass propeller. The propeller stirrer is included with the Elzone analyzer.
- **Hydropulser** (optional); maintains dispersion using a pulsing motion. The hydropulser may be desirable for more fragile samples and when using small volumes of analysis liquids.

Sample stand

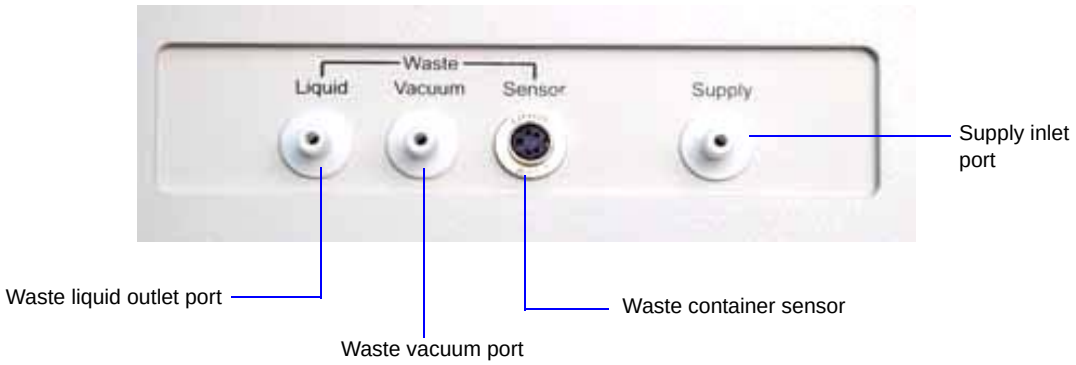
For raising the sample beaker up and around the orifice tube for analysis.

To raise the stand: Pull out the knob and slowly raise the stand to the desired position, then release the knob to lock it into place. Slots are evenly spaced along the sample stand track for this purpose.

Slots are evenly spaced along the track to lock the sample stand into position.

To lower the stand: Pull out the knob and slowly lower the stand to its lowest position, then release the knob to lock it into place.

Side Panel



Waste liquid outlet port — For connecting the waste tubing to the waste container

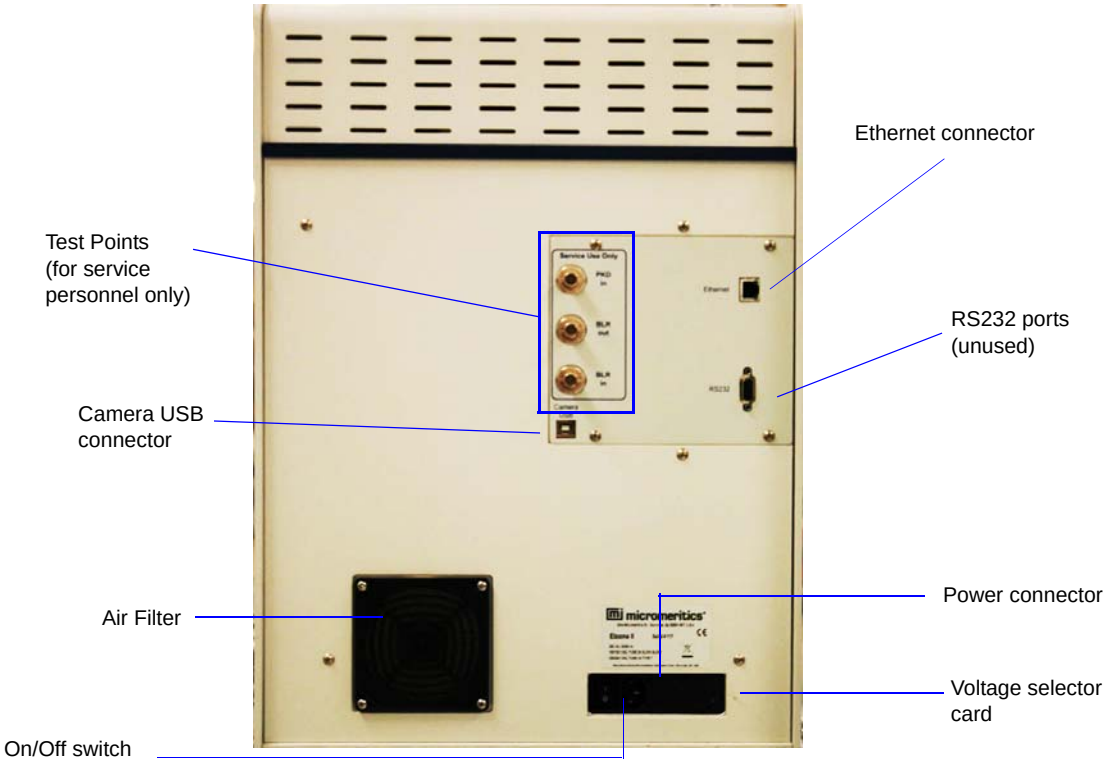
Waste vacuum port — For connecting the vacuum tubing to the waste container

Waste sensor connector — For connecting the overflow sensor cable to the waste container. This sensor senses when the bottle becomes full and automatically cancels any operation in progress; an error message is also displayed. You must empty the waste container before you can proceed.

If the waste sensor cable is not securely plugged in and, therefore, does not detect the full container, a second sensor activates. If the second sensor activates, the internal tubing is filled with liquid and may have spilled into the internal component area. Call your Micromeritics service representative if this occurs. Refer to **Sensors**, page **5-41** for additional information.

Supply inlet port — For connecting the supply tubing from the supply container (analysis liquid)

Rear Panel



Test points	For use by Micromeritics service personnel only
Camera USB port	For connecting the camera
Air Filter	Helps to minimize buildup of dust within the analyzer
On/Off switch	For turning the analyzer on and off
Ethernet connector	For connecting the ethernet cable, allowing communication between the analyzer and the computer
Power connector	For connecting the power cord
Voltage selector card	Enables you to specify the proper operating voltage
Spare 1 and 2 RS-232 ports	Unused

Using the Software

The Elzone 5390 Program operates in a Windows environment and requires familiarity with standard Windows operations such as using the mouse, menus, and dialog boxes. While this manual provides brief instructions for such standard operations, you may have to refer to your Windows documentation or to its online help system to clarify functions which are specific to Windows.

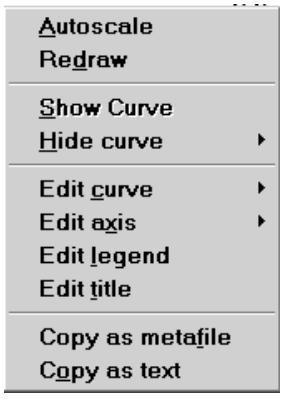
Logging In

Each user — Administrator, Developer, or Analyst — is required to enter a user name and password when opening the application. Initially, the Administrator establishes passwords for the Developer and Analyst(s) when the software is installed. These passwords are temporary and are used for initial log-in; at that time, each user is prompted to specify a password of personal preference.

Your password must consist of at least six characters and expires after a specified time (designated by the Administrator). You will be locked out of the application if you fail to enter the correct password after three (default) tries. This number can be changed by your Administrator. The Administrator is also required to unlock the application in the event it becomes locked after failure to enter the correct password.

Shortcut Menus

Shortcut menus (sometimes referred to as context-sensitive menus or pop-up menus) are available for certain components on the instrument schematic when in manual mode, and for onscreen graphs and tabular reports. These menus are accessed by selecting the item for which you wish to display its menu and clicking the right mouse button. For example, right-click in the graph area of an onscreen report and the following menu is displayed.



Shortcut Keys

Shortcut keys can be used to activate some menu commands. Shortcut keys or key combinations (if assigned) are listed to the right of the menu item. Instead of opening the menu and choosing the command, simply press the key combination. For example, to open a sample information file, press **F2**; the Open Sample Information dialog is displayed.

You can also use shortcut keys to access a menu or any function that contains an underlined letter by pressing **Alt** plus the underlined letter in the command. For example, to access the **File** menu, press **Alt**, then **F**.

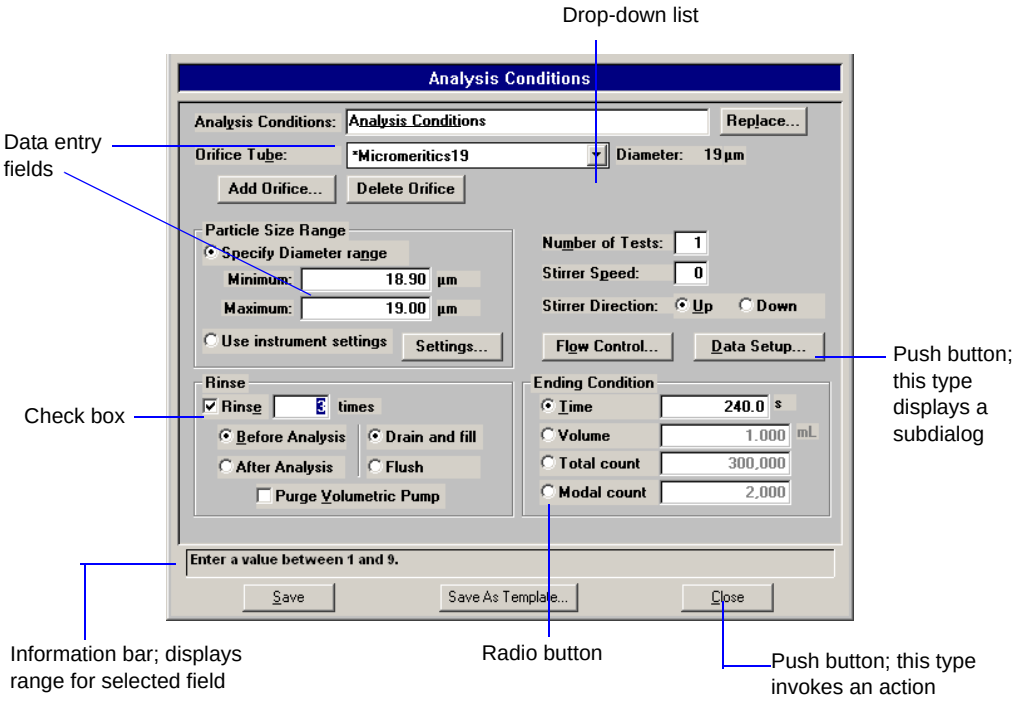
Table 2-1 provides a list of the shortcut keys available in the Elzone 5390 analysis program.

Table 2-1. Shortcut Keys

Key(s)	Function
F1	Access online operator's manual
F2	Open a sample information file
	Clear the field of existing date (Select Dates dialog)
F3	Open an analysis conditions file
	Insert the current date (Select Dates dialog)
F4	Open a material properties file
	Display a calendar from which to choose a date (Select Dates dialog)
F5	Open a report options file
F6	Tile open windows
F7	Cascade open windows
F8	Start report
F9	Close all open reports
Alt + F4	Exit the Elzone program
Shift + F2	List sample information files
Shift + F3	List analysis conditions files
Shift + F4	List material properties files
Shift + F5	List report options files
Shift + F9	Displays the shortcut menu for onscreen reports and for selected components on the instrument schematic

Dialog Boxes and Subdialog Boxes

Dialog boxes are displayed when a item followed by an ellipsis (...) is selected. Subdialog boxes are displayed when certain push buttons are selected. Both types of boxes may contain one or more of the items listed below.



If an item is shown in gray instead of black, the item is currently unavailable.

Data Entry fields

These fields are used to enter text; either numeric (numbers only) or alphanumeric (numbers, letters, or printable characters).

If an invalid entry is made, an error message is displayed; for example, if you attempt to enter an alpha character in a numeric field, or a number outside of the specified range.

Information bar

Some dialog boxes contain information pertinent to the selected field in an information bar across the bottom of the dialog. For example, a range is shown for fields in which numeric entries are required.

Radio button

Radio buttons are provided in groups of two or more and are used to make a choice; only one radio button can be selected.

Check box

Check boxes allow you to choose multiple options from a group of options.

Push button

Typically, a push button is used to display subdialog boxes in which to edit, enter, or specify additional information about the subject matter. Some push buttons, however, are used to invoke an action; for example, **Save** saves entries in the current dialog.

Close

Closes the active dialog. If the dialog box contains unsaved changes, you will be prompted to save them before the dialog box closes.

Any information entered in *subdialog* boxes (refer to the next section of this chapter), is discarded also.

Save

Saves the information entered in the current session; the dialog box remains open.

Replace

Allows you to replace the contents of the current file with those from an existing file. For example, if you are creating an analysis conditions file, you can save time by clicking and choosing a file containing the values you wish to use. The values are *copied* into the current file automatically and, therefore, can be edited as desired. The file from which they were copied remains intact and ready for the next use.

Cancel

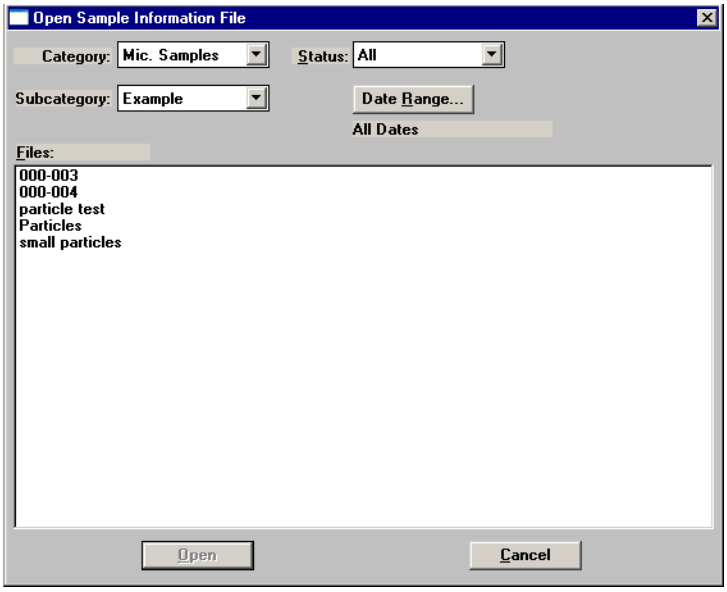
Discards everything you entered in the open dialog and any subdialogs, then closes the dialog. A warning message is displayed before closing.

Drop-down list

A drop-down list contains a list of options and is indicated by a down arrow to the right of the field. If there are more items than can fit in the box, a scroll bar is provided for navigating through the list.

Selecting Files

Sample information is stored in files and saved under file descriptions. Certain dialog boxes contain a **Files** list box which displays a list of files available for that particular operation. For example, the Open Sample Information File dialog.



The files displayed in the window are those contained in the chosen directory (Category and Subcategory fields) and having the status shown in the **Status** field. To select a file, simply double-click on the desired file in the **Files** window.

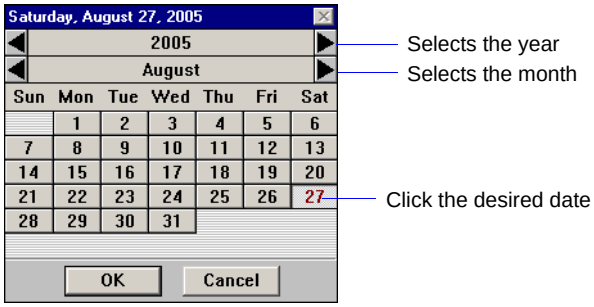
You can use the following options to limit the list of files displayed in the window:

- Enter a range of dates. Click **Date Range**; the Select Dates dialog is displayed.

Select **Show Date Range** to enable the **From** and **To** fields, then enter a beginning and ending date. Or you can double-click in each field to display a calendar to select a date. Only the files falling within the range you specify will display. The range of dates remains the default until you change the dates or select **Show All Dates**. The current range or date option displays just below the **Date Range** push button.

For convenience, the following shortcut keys are available when the Select Dates dialog is displayed:

F2 Clears the field
F3 Inserts the current date
F4 Displays a calendar from which you may select a date



- Select a file status from the **Status** drop-down list (displays only for sample files). The table shown below describes each file status.

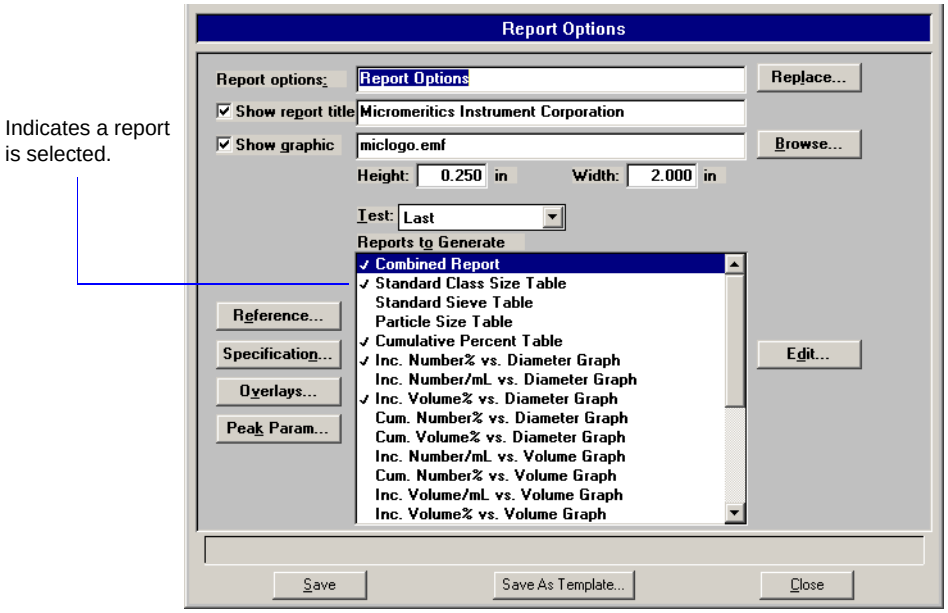
Table 2-2. File Status and Description

Status	Description
All	All sample information files in the specified directory and within the specified range of dates
Analyzing	Sample information files that are currently being used with an analysis
Background	Sample information files that contain background data
Complete	Sample information files that have been used with an analysis
Entered	Sample information files that contain manually entered data
No Analysis	Sample information files that have not been used in an analysis

- Use the **Category** and **Subcategory** drop-down lists to navigate to a different file location.

Selecting Reports

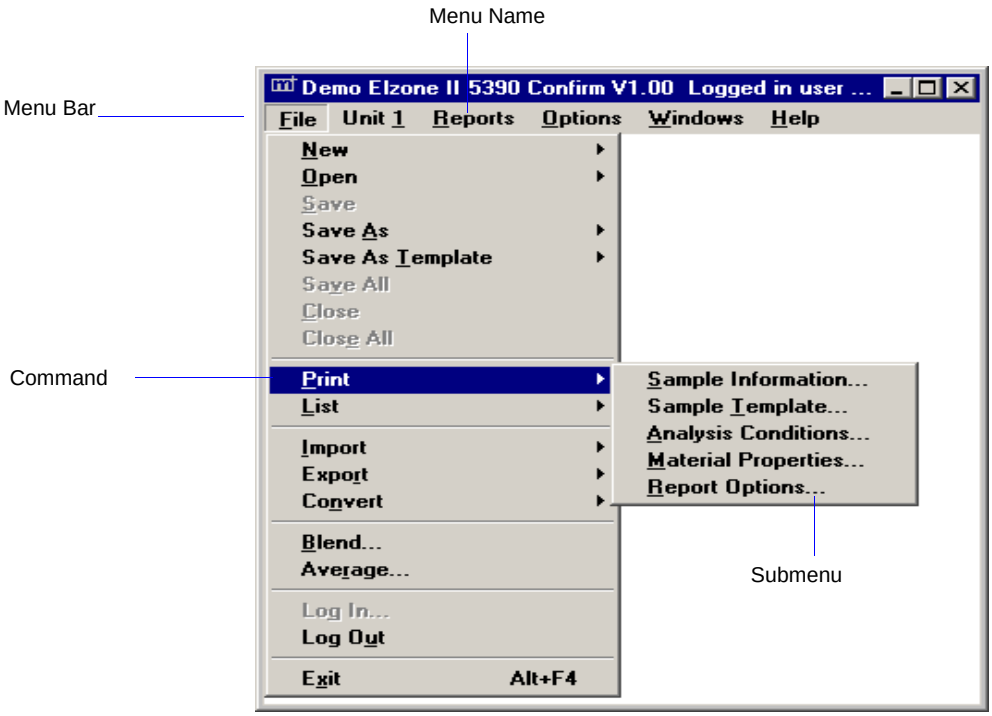
Reports are selected from the Report Options dialog. Simply select (highlight) the report and then double-click, or press the **spacebar**. A report is selected when it is preceded with a check mark. Reports are deselected in the same manner.



You can also edit some reports by selecting the report and click **Edit** (refer to page **4-31** for details on editing reports).

Menu Structure

All functions for the Elzone analyzer are located on menus which are accessed from the Menu bar. Each menu contains commands, and in some cases a submenu. A submenu is indicated when the command is followed by an arrow.



Brief descriptions of each menu are provided below; refer to the chapter given in parentheses for a detailed description of the commands contained on that menu.

File — Enables you to maintain system files. (Chapter 4, **FILE MENU**)

Unit [n] — Enables you to perform analyses and other instrument operations. If you have two analyzers connected to your computer, a unit menu is shown for both. (Chapter 5, **UNIT MENU**)

Reports — Enables you to generate, open, and close reports. Also provides examples of reports. (Chapter 6, **REPORTS MENU**)

Options — Enables you to add archive locations, edit labels for sample files, and select data presentation formats. (Chapter 7, **OPTIONS MENU**)

Windows Enables you to arrange the windows and icons on your screen. It also displays the names of all open files. (this chapter, page **2-14**)

Help Displays information about the Elzone program. Also provides access to the online operator's manual. (this chapter, page **2-15**)

Windows Menu

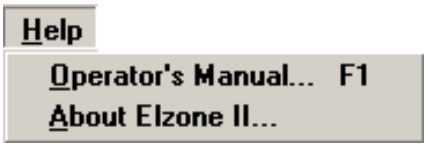
Tile Resizes all open windows and arranges them side by side so that the contents of all open windows are visible.

Cascade Resizes all open windows and arranges them in a stacked fashion. The active window is positioned on top of the stack. Each window's title remains visible, making it easy to select other windows.

Arrange Icons Arranges the symbols for all minimized windows in an orderly manner.

Open Files Displays all open files; the active window is preceded with a check mark

Help Menu



Operator's Manual — Provides a copy of the operator's manual in Adobe Acrobat PDF format. Refer to **Specifications**, page **1-8** for tips on using the online manual.

About Elzone II — Displays information about the Elzone 5390 analysis program.

3. OPERATIONAL PROCEDURES

This chapter contains brief step-by-step instructions on how to:

- create sample and parameter file templates, beginning on this page
- create a parameter file, page **3-3**
- create a sample file, page **3-10**
- perform a background, page **3-14**
- calibrate orifice tubes, page **3-18**
- prepare for an analysis, page **3-26**
- optimize instrument settings, page **3-31**
- perform an analysis, page **3-36**
- print contents of a parameter or sample file, page **3-38**
- list file statistics, page **3-39**
- import sample and parameter files, page **3-40**
- export a sample file, page **3-41**
- convert a file used with a previous version of the Elzone to be compatible with Elzone II, page **3-42**
- generate overlays, page **3-45**

This chapter does not provide detailed descriptions of the fields in the dialogs used to perform these procedures. Refer to Chapters 4 through 7 for field descriptions. Use the table of contents or index to assist you in locating the appropriate dialog.

Some procedures cannot be performed by the Analyst; these procedures are marked accordingly.

Creating File Templates

An Analyst is not authorized to create sample and parameter file templates.

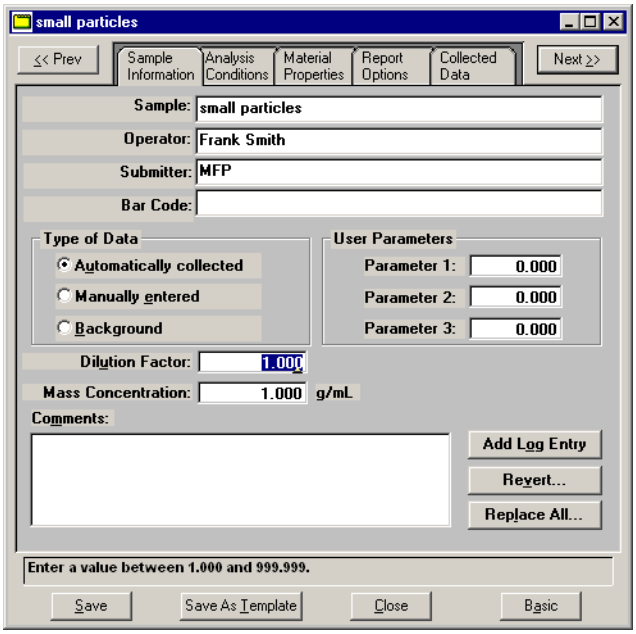
When you create a sample or parameter file, a dialog containing templates is displayed so that you can choose one on which to base your file. Several predefined templates have been included with the Confirm program. A new template can be created using the values from existing sample files. For example, you may wish to create a template from a sample file that you used with a sample material that you analyze on a routine basis.

A template cannot be edited; however, the values in the sample file you create using a template can be edited.

Perform the following steps to create a template using a sample file.

1. Select **File** > **Open** >**Sample information**; the Open Sample Information dialog is displayed.

2. Choose the desired file, then click **Open**; the Sample Information dialog is displayed.



3. Edit the fields of all parameters (click the tabs to access each parameter) as desired.

4. Select **File** > **Save As Template**, then choose:

   - **Sample information** to save all parameters as a sample file template; the Save As Sample Template dialog is displayed. You can also click **Save As Template** on the Sample Information dialog if you are saving all parameters as a template. You cannot save parameter file templates using this push button.

   - a parameter file to save the values of one of the parameters as a parameter file template. For example, select **Analysis conditions** to save the values in the Analysis conditions dialog box as a template for Analysis conditions files; the Save as Analysis Conditions Template dialog is displayed.

You can also create parameter file templates using existing parameter files.

5. Enter an appropriate description in the **ID** field of the dialog for the type of template you are creating; you can use up to 42 characters. Be sure to use an intuitive description.

6. Click **Save** to save the template. If **Save** does not become enabled, a file containing the same description currently exists. Edit the description to enable **Save**. The Confirm program does not allow duplicate file descriptions.

7. Click **Close** on the sample file; the following error message is displayed:

   (file name) has been changed. Save changes before closing?

8. Click **No** (unless you wish to save the changes made) to close the dialog.

Creating Parameter Files

An Analyst is not authorized to create parameter files.

The following file types can exist as part of the sample information file, as well as individual parameter files:

- Analysis conditions
- Material properties
- Report options

Having these files exist independently allows you to use them over and over again.

Several predefined parameter files are included with the Confirm program. Although these files may come close to the needs of your laboratory, you may wish to define additional ones. Or you can use a predefined file as a starting point. You can do this by creating a new file and then selecting **Replace**. A dialog is displayed so that you can select the existing parameter file. The values are copied into the file. You can edit the file in any way desired without affecting the file from which the values were copied.

Analysis Conditions

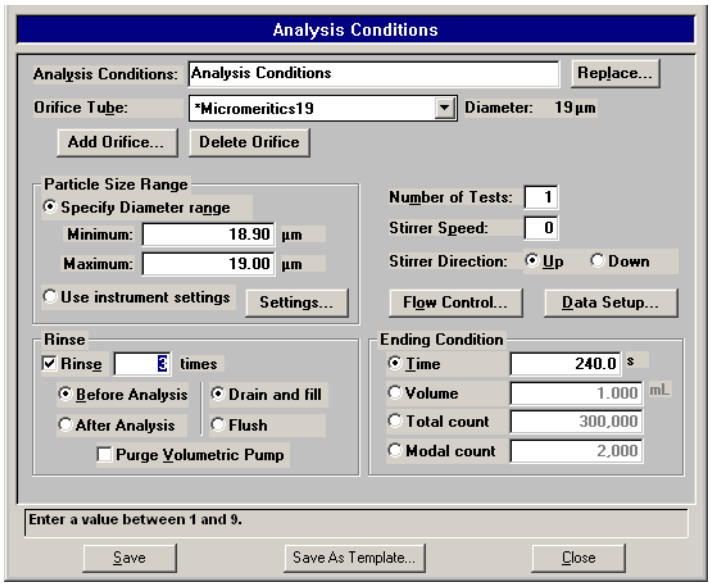
Analysis conditions specify the data used to guide an analysis.

Refer to Analysis Conditions, page 4-12 if you need clarification of the fields on the dialogs used in this procedure.

Perform the following steps to create an analysis conditions file:

1. Select **File >New** > **Analysis conditions**; the Create an Analysis Conditions File dialog containing the available templates is displayed.

2. Choose a template then click **Create**; the Analysis Conditions dialog is displayed:



3. Enter a description in the **Analysis Conditions** field. Be sure to use an intuitive description so that you can recognize it easily. You can use up to 40 characters in this field.

Use Replace to copy values of an existing file into the current one. You can edit the values after they have been copied into the file if desired. This is useful when you have an existing file that contains many of the values that you wish to use in the current file.

4. Choose an appropriate orifice tube from the **Orifice Tube** drop-down list. If the tube you select is preceded with an asterisk, the tube has not been calibrated for the current instrument.

   If the tube you plan to use is not included in the list, use the **Add** push button to add it.

5. Select **Specify Diameter range** and specify a range for the size of particles to be read.

6. Specify rinse options. You can choose to rinse before or after the analysis by draining and filling the system or simply by flushing the system.

7. Select **Purge Volumetric Pump** to have the volumetric pump (if installed) purged during the rinsing operation.

8. In the **Number of Tests** field, enter the number of analyses you plan to perform (this number can be edited in the sample file).

9. Enter the stirrer speed and the direction in which to have the particles circulate.

10. Click **Flow Control** and choose flow and blockage detection options.

11. Click **Data Setup** and specify details on producing the raw data.

12. Specify when you wish to have the analysis end.

13. Click **Save**; the Save As Analysis Conditions File dialog is displayed.

14. Ensure that the description is as desired, then click **Save** to save the file and return to the Analysis Conditions file dialog. If **Save** is disabled, the description is a duplicate one and must be edited. The Confirm program does not allow duplicate descriptions.

15. Click **Close** to close the dialog.

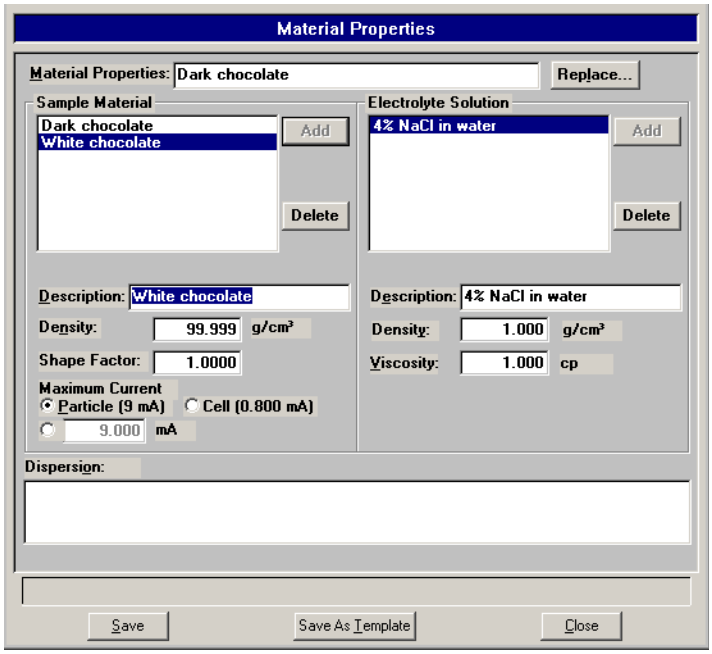
Material Properties

Material properties specify data for the sample material and its electrolyte.

Refer to Material Properties, page 4-22 if you need clarification of the fields on the dialog used in this procedure.

1. Select **File** > **New** > **Material Properties**; the Create a Material Properties dialog containing the available templates is displayed.

2. Choose a template then click **Create**; the Material Properties dialog is displayed:



3. Edit or enter a description in the **Material Properties** field.

Use an intuitive name that will help you identify the type of sample you plan to analyzer using this file. You may want to use a name containing the type of sample material and electrolyte.

4. Select your sample from the **Sample Material** list. If it does not appear in the list, enter its name in the **Description** field, its related properties in the appropriate fields, and click **Add**.

5. Select the electrolyte from the **Electrolyte Solution** list. If it does not appear in the list, enter its name in the **Description** field, its related properties in the appropriate fields, and click **Add**.

6. Use the **Dispersion** window if needed to add any pertinent information. The information you enter in this window displays on the Option report.

7. Click **Save**; the Save As Material Properties File dialog is displayed.

8. Ensure that the description is as desired, then click **Save** to save the file and return to the Material Properties file dialog. If **Save** is disabled, the description is a duplicate one and must be edited. The Confirm program does not allow duplicate descriptions.

9. Click **Close** to close the dialog.

Report Options

Report options files specify the type of reports which can be generated from an analysis or from manually entered data. They also contain report details such as axis scale, axis range, and column headings. These report options files may be used to generate reports automatically at any time during or after the analysis. Of course, reports generated during analysis can only report on data collected up to the time of the report.

Report options files may contain tabular reports only, plots only, or both tabular reports and plots. They may also contain user-defined report tables.

Report options files also may be defined to include overlay options. The Elzone program enables you to overlay:

- one plot type onto a different plot type from the same analysis
- one plot from all tests in the same sample file
- up to eight plots of different samples onto the current plot of the same type, and they don't all have to contain data collected with the Elzone. You can overlay data collected with Micromeritics' Saturn DigiSizer 5200, SediGraph 5100, and SediGraph 5120.

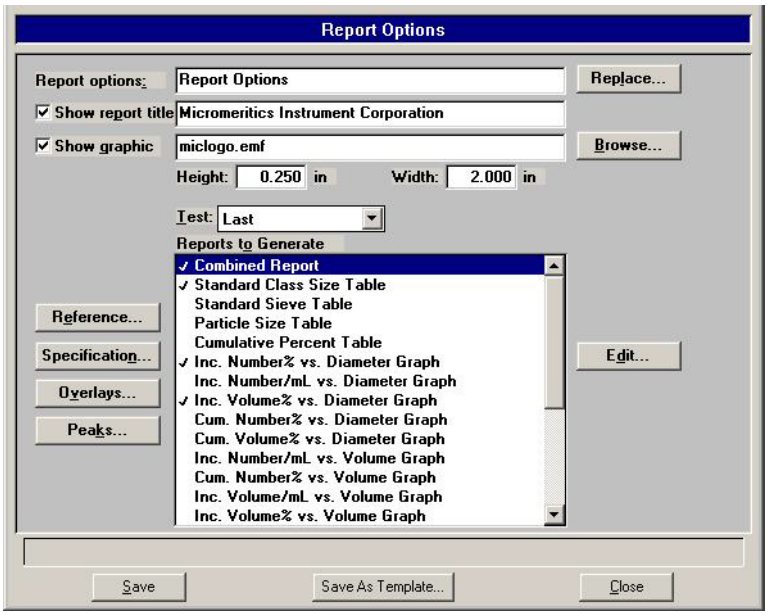
Refer to **Generating Graph Overlays**, page **3-45** for step-by-step instructions on overlaying graphs.

Refer to Report Options, page **4-25** **if you need clarification of the fields on the dialogs used in this procedure.**

Perform the following steps to define a report options file:

1. Select **File** > **New** > **Report Options**; the Create a Report Options File dialog containing the available templates is displayed.

2. Choose a template, then click **Create**; the Report Options dialog is displayed:



3. Enter a description (up to 42 characters) in the **Report options** field. Enter an identifier that gives a more intuitive description of the file's contents. For example, **Particle Diameter, Inc. Volume Options**.

4. Select **Show report title** and enter the title you wish to appear at the top of the report. Or deselect this option if you prefer not to have a report title.

If your company logo exists as a bitmap (bmp) or enhanced metafile (emf), you can have it display in the report header by selecting Show graphic. Click *Browse* to select the file; use the *Height* and *Width* fields to specify the size.

5. Click on the down arrow to the right of the **Test** field and choose which test you wish to have reported. If you choose **Average**, an average for all tests performed using this file will be generated.

6. If you wish to compare analysis results for the current sample to those obtained for a reference sample, click **Reference** and choose the desired file. Results are reflected in the Difference from Reference report.

7. If you wish to determine if the results for the current sample are within coarse and fine specifications, click **Specification** and choose a sample file for each boundary. Results are reflected in the Out of Specification report.

8. If you wish to compare the same type of graph from multiple files, click **Overlays** and choose the files. Then be sure you edit the graph from the **Reports to Generate** window and choose **Samples** from the Overlay drop-down list. (Refer to **Multiple Samples Overlay**, page **3-45** for detailed instructions.)

9. Click **Peaks** if you wish to edit Peak detection settings.

10. From the **Reports to Generate** list, select the reports you wish to have generated. Refer to **Selecting Reports**, page **2-12** for details on selecting reports.

11. Click **Save**; the Save As Report Options File dialog is displayed.

12. Ensure that the description is as desired, then click **Save** to save the file and return to the Report Options file dialog. If is disabled, the description is a duplicate one and must be edited.

13. Click **Close** to close the dialog.

Creating a Sample Information File

A sample information file must be created for each analysis. The sample information file consists of information groups which, collectively, identify the sample, guide the analysis, and specify report options.

A sample file can be created by a Developer or an Analyst.

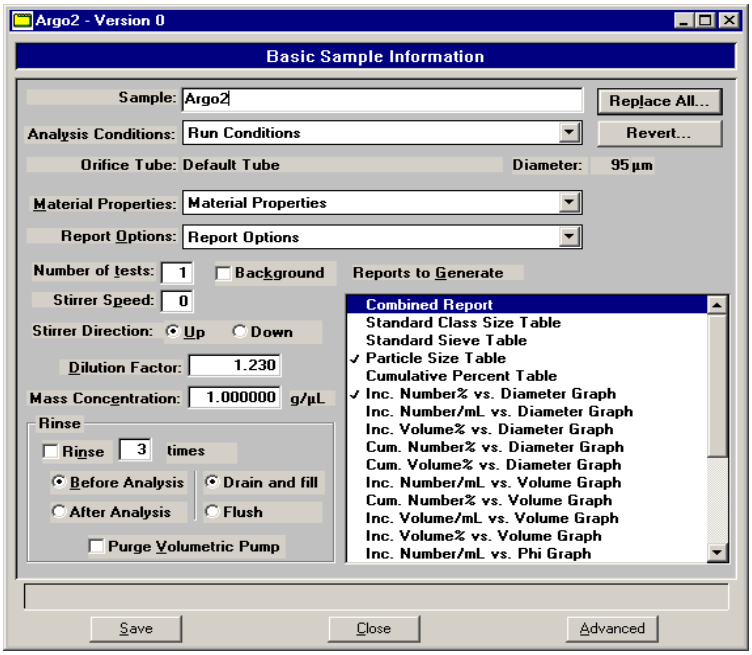
Analyst

An Analyst creates a sample information file by choosing predefined parameters. Parameter details can be viewed by switching to the Advanced format, but editing is not allowed. Perform the following steps to create a sample information file:

Refer to Sample Information, Analyst, page 4-4 if you need clarification of the fields on the dialogs used in this procedure.

1. Select **File > New** > **Sample Information**; the Create a Sample Information File dialog containing the available templates is displayed.

2. Choose the desired template, then click **Create**; the Basic Sample Information dialog is displayed.



3. Edit the description in the **Sample** field; or enter a new one.

4. Click on the down arrow to the right of each of the following fields to choose appropriate parameter files, or you can accept the defaults displayed in the template:

   • Analysis Conditions
   • Material Properties
   • Report Options

   Remember, you can click **Advanced** to view details of parameter files, but you cannot edit them.

5. The remainder of the fields on the dialog display the values entered or chosen in the selected Analysis Conditions file. You may edit any value in an enabled field. This will change only the current file; it does not affect the values in the parameter file chosen from the drop-down list.

6. The **Reports to Generate** window displays the reports to be generated (preceded with a check mark). You may edit the selections, but you cannot edit details of the reports.

7. After you have selected all parameters, click **Save**; the Save As Sample Information dialog is displayed.

   a. Choose the directory into which the file is to be saved.

   b. Ensure that the description is as desired; the Confirm program does not allow duplicate descriptions.

   c. Enter a comment in the **Comment** window; for example, you may wish to enter the date and time the file is created. You must enter a comment; otherwise **Save** will not become enabled.

   d. Click **Save** to return to the Sample Information file dialog.

8. Click **Close** to close the dialog.

Developer

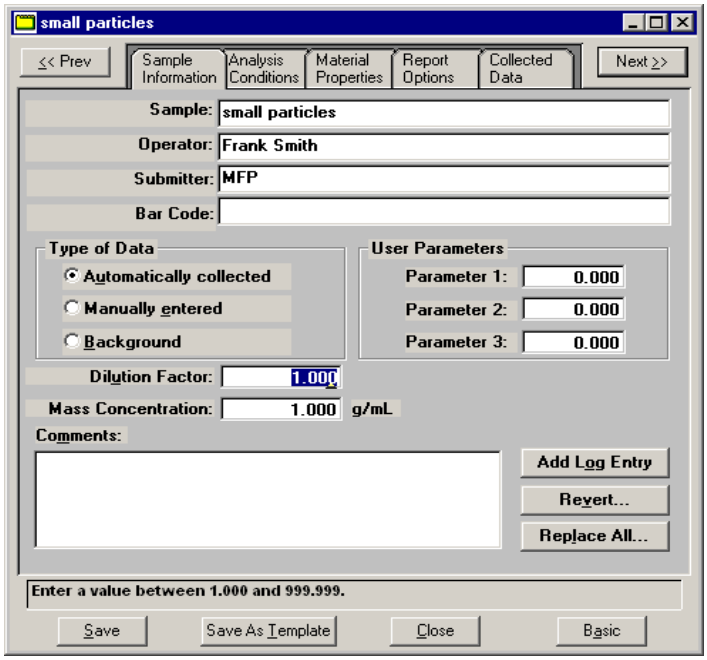
A Developer's view of the sample information dialog is more flexible than that of an Analyst. A Developer is allowed to view and edit (if desired) all parameters of the file.

Refer to Sample Information, Developer, page 4-8 if you need clarification of the fields on the dialogs used in this procedure.

Perform the following steps to create a sample information file:

1. Select **File > New** > **Sample Information**; the Create a Sample Information File dialog containing the available templates is displayed.

2. Choose a template, then click **Create**; the Sample Information dialog is displayed.



3. Edit (or enter) the description in the **Sample** field; you can use up to 50 characters.

4. In the **Operator** field, enter the name of the Analyst who will be performing the analysis.

5. In the **Submitter** field, enter the name of the department, company, etc. submitting the sample for analysis.

6. Enter the bar code (if used). If you are not using bar codes, this line can be omitted from the sample editor or it can be used for some other type of information. Refer to **Edit Labels**, page **7-4** for information on removing or editing this field.

7. Select the type of data for this file; you can have data collected automatically, enter the data manually, or have the data collected and saved for a background.

8. If you have User Parameter fields defined, enter the appropriate values; refer to **Edit Labels**, page **7-4** for additional information on these parameters.

9. Use the **Comments** window or the **Add Log Entry** push button to enter additional information about the sample or analysis conditions. Information entered in the **Comments** window appears in the header of some reports. Information you enter using the **Add Log Entry** push button displays in the Sample Log report.

10. Edit the values for the **Dilution Factor** and the **Mass Concentration** if needed.

11. Use the **Comments** window or the **Add Log Entry** push button to enter additional information about the sample or analysis conditions.Information entered in the **Comments** window appears in the header of some reports. Information you enter using the **Add Log Entry** push button displays in the Sample Log report.

12. After you complete the Sample Information dialog, click on the parameter tabs to open associated dialogs and edit as desired. Instructions for completing these dialogs are explained in **Creating Parameter Files**, page **3-3**.

13. After you have completed all parameters, click **Save**: the Save As Sample Information dialog is displayed.

    a. Choose the directory into which the file is to be saved.

    b. Edit the description; the Confirm program does not allow duplicate descriptions.

    c. Enter a comment in the **Comment** window; for example, you may wish to enter the date and time the file is created. You must enter a comment in the window; otherwise, **Save** will not become enabled.

    d. Click **Save** to complete the save operation and return to the Sample Information file dialog.

14. Click **Close** to close the dialog.

Performing a Background Analysis

Occasionally, the ratio between contaminates in the electrolyte and particles in a sample can be low and, therefore, difficult to tell the difference between the two. When performing an analysis, the desired ratio between sample particles and contamination (sometimes called signal-to-noise ratio) in the electrolyte is approximately 99:1 in 1 mL of electrolyte. In other words, for every 99 sample particles, there should be no more than 1 particle of contamination in the electrolyte.

When the signal-to-noise ratio drops below an unacceptable level, a procedure can be performed to remove the presence of contaminates in the electrolyte from the analysis data.

An Analyst is not authorized to perform background analyses.

Creating the Sample File

1. Select **File > New > Sample Information**; the Create a Sample File dialog is displayed.
2. Choose a template, then click **Create**.
3. On the **Sample Information** dialog:
   a. Enter an appropriate description in the **Sample** field.
   b. Select **Background** as the type of data.
   c. Enter a dilution factor of 1.00.
   d. Enter information in any other fields as desired (Operator, Submitter, etc.).
4. Click the **Analysis Conditions** tab, then:
   a. Click the down arrow to the right of the **Orifice Tube** field and choose the orifice tube you plan to use.
   b. Select **Specify Diameter range**; using the **Minimum** and **Maximum** fields, enter the range you plan to use in your analysis.
   c. Click **Data Setup**; select or enter the following:

      Full resolution as the Data Format
      Logarithmic in **Diameter** for **Size Classes**; class range typically is the same range as specified for diameter range

      Click **OK** to return to the Analysis Conditions dialog.

d. Enter appropriate values for other fields (stirrer speed, etc.) on the Analysis Conditions dialog.

5. Click the **Material Properties** tab; select the electrolyte being used. The sample material selected is irrelevant since only the electrolyte is being used for a background analysis. However, many Elzone users make an entry in the Sample Material list pertinent to the background. For example, you may wish to use "Background particles." This is more relevant on the Background report.

6. Click the **Report Options** tab; select (precede with a check mark):

   Inc. Number/mL% vs. Diameter Graph
   Summary; click **Edit** and ensure that **Total Number** and **Volume-Specific Number** are selected.

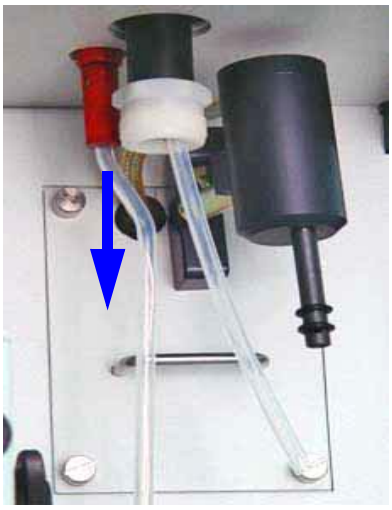
7. Click **Save;** the Save as Sample Information File dialog is displayed.

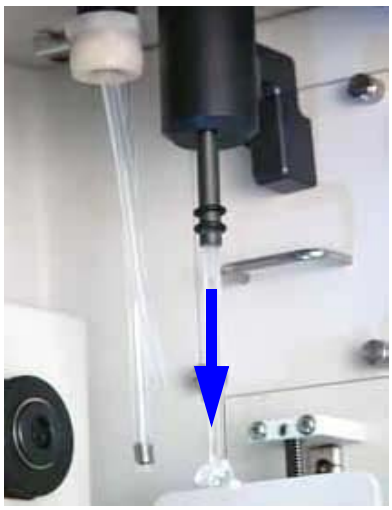
8. Enter an appropriate identification in the **ID** field and a comment in the **Comment** window.

9. Click **Save** to save the file and return to the Sample Information file, then click **Close**.

Performing the Analysis

1. Remove the external electrode and the stirrer propeller (remove the hydropulser tube if the hydropulser is installed) from the analyzer.





2. Using a mild detergent, wash the propeller, the electrode, an appropriate sample beaker (refer to the reference material booklet for the size of sample beaker to use), and the orifice tube. Use the straight brush provided in the accessories kit to scrub the inside and outside of the orifice tube, and the orifice.

It is very important that all components be clean before performing a background analysis.

3. Rinse all items with filtered water or electrolyte.

4. Reattach the electrode and the propeller (or hydropulser tube) to their proper connections.

5. Install the orifice tube onto the sample port (refer to **Choosing and installing an Orifice tube**, page **3-26**).

6. Ensure that the appropriate electrolyte is connected to the Supply port.

7. Clean the installed glassware (orifice tube, electrode, and stirrer) externally.

   a. Fill a squeeze bottle with clean, filtered electrolyte or water.

   b. Place (or hold) a beaker under the glassware. Use the squeeze bottle to thoroughly rinse each piece of glassware, then remove the beaker.

8. Fill the analysis beaker with electrolyte (no sample) and place it on the sample stand; position the electrode next to the orifice tube so that it will be submerged in the beaker.

9. Raise the sample stand.

Be sure the stirrer does not strike the bottom or sides of the beaker when raising the sample stand. The stirrer will not operate if it comes in contact with the beaker.

10. Select **Unit [n] > Fill System** to fill the orifice tube.

11. Adjust and focus the camera if needed (if using the camera).

12. Select **Unit [n] > Sample Analysis** to display the analysis screen. Click **Browse** and choose the sample file you created.

After the analysis is finished, save the background data.

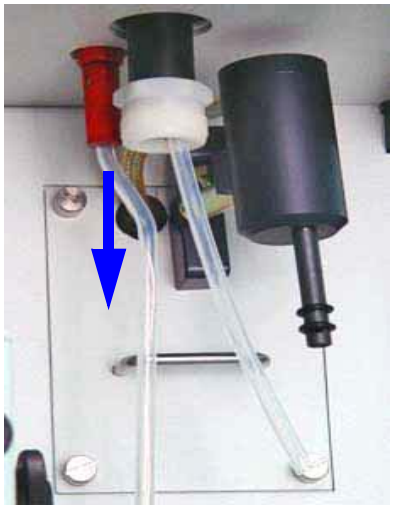
Calibrating an Orifice Tube

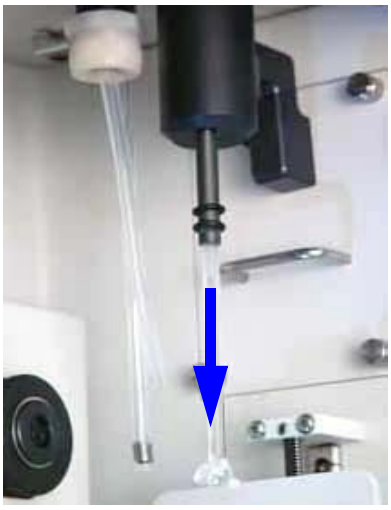
An orifice tube must be calibrated for the instrument on which it is to be used. An orifice tube (in the drop-down list) that has not been calibrated will be indicated with an asterisk. If you use an orifice tube that has not been calibrated, inaccurate data will be produced. An orifice tube is calibrated using reference material(s).

A Developer must create Analysis Conditions templates using the default Analysis Conditions files if an Analyst will be calibrating orifice tubes.

Follow the instructions below to calibrate an orifice tube. Be sure to have your reference materials and the accompanying booklet handy before starting this procedure.

1. Remove the external electrode and the stirrer propeller (remove the hydropulser tube if the hydropulser is installed) from the analyzer





2. Using a mild detergent, wash the propeller, the electrode, an appropriate sample beaker (refer to the reference material booklet for the size of sample beaker to use), and the orifice tube. Use the straight brush provided in the accessories kit to scrub the inside and outside of the orifice tube, and the orifice.

It is very important that all components be clean before calibrating an orifice tube.

3. Rinse all items with filtered water or electrolyte.

4. Reattach the electrode and the propeller (or hydropulser tube) to their proper connections.

5. Install the orifice tube onto the sample port (the instructions on page **3-26** explain how to install an orifice tube).

If you have a camera installed on the analyzer, adjust the lens to display the orifice.

6. Place a beaker (not the sample beaker you washed for the calibration) on the sample stand and raise the stand. Refer to **User Interface**, page **2-3**, if you need assistance on raising and lowering the sample stand.

7. Clean the installed glassware (orifice tube, electrode, and stirrer) externally:

   a. Fill a squeeze bottle with clean, filtered electrolyte or water.

   b. Using the squeeze bottle, thoroughly rinse each piece of glassware.

   c. Lower the sample stand and remove the beaker.

8. Rinse the clean sample beaker with filtered electrolyte or water.

9. Fill the sample beaker with the amount specified for the beaker you are using (refer to the reference material booklet); allow enough room at the top to prevent overflow when glassware is submerged.

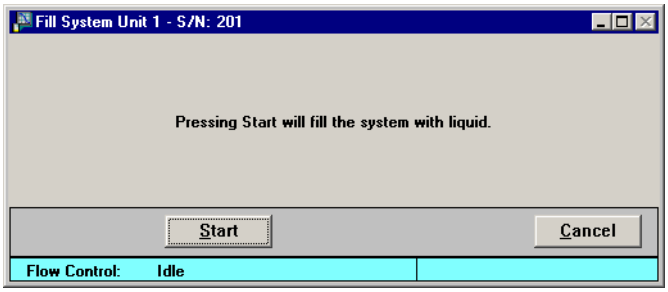
10. Place the beaker on the sample stand; position the electrode next to the orifice tube so that it will be submerged in the beaker.

11. Raise the sample stand using the knob on the front.

Be sure the stirrer does not strike the bottom or sides of the beaker when raising the sample stand. The stirrer will not operate if it comes in contact with the beaker.

12. Close the sample compartment door on the right side; adjust the light and camera if needed.

13. Select **Unit > Fill System**; the Fill System dialog is displayed.



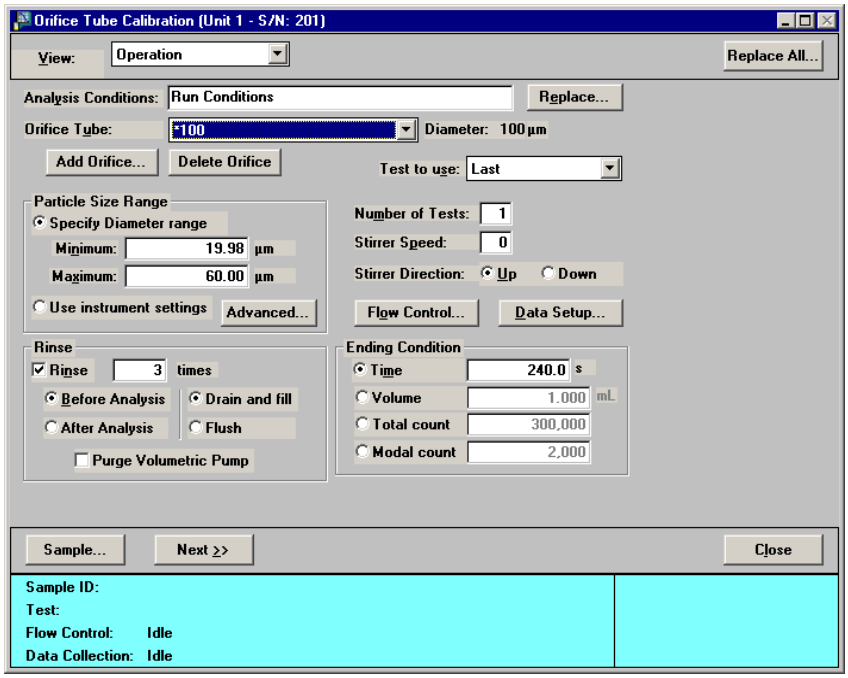
This step fills the internal glassware.

14. Click **Start**; a dialog indicating the operation is in progress is displayed. The dialog closes automatically when the glassware is filled.

15. Add the number of drops specified for each reference material (refer to the booklet) to the sample beaker.

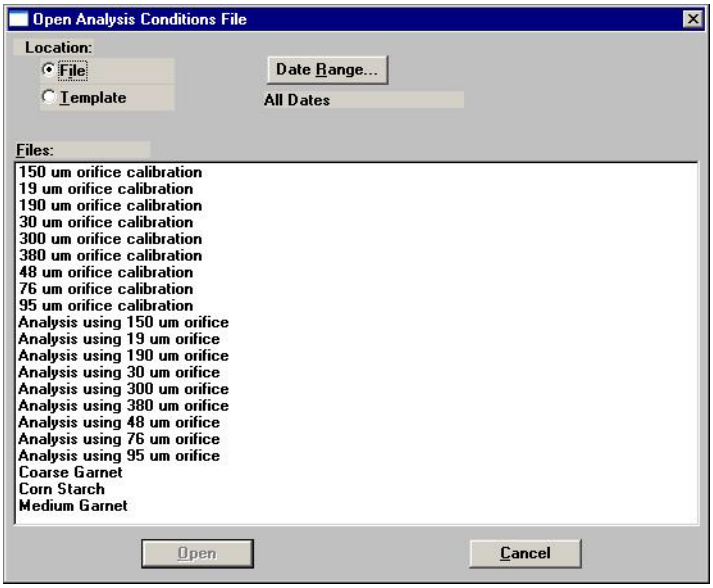
16. Close the sample compartment door on the front side.

17. Click **Unit > Orifice Tube Calibration**; the Orifice Tube Calibration dialog is displayed.



18. Click **Replace**; the Open Analysis Conditions File dialog is displayed.

Developer's view of the Open Analysis Conditions File dialog.

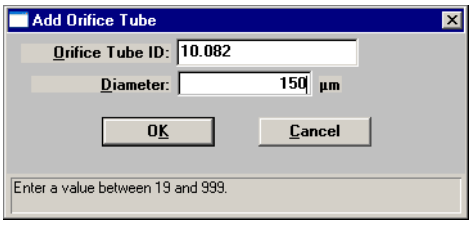


For an Analyst, the Open Analysis Conditions Template dialog containing templates is displayed. Templates must be created by a Developer; have someone with Developer's rights create templates for the orifice tubes you will be using.

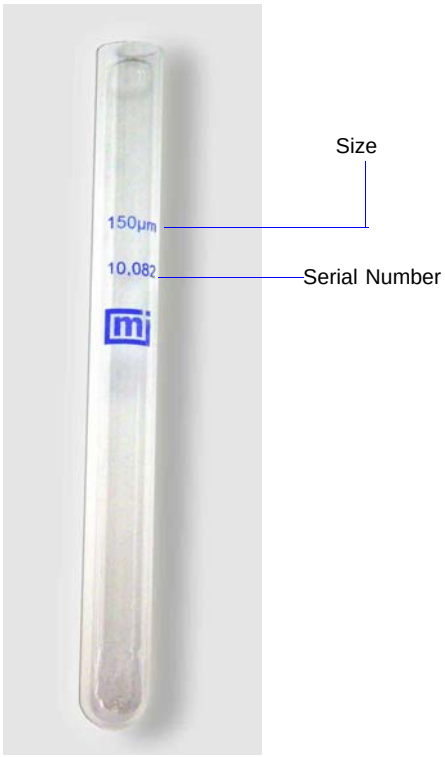
19. Select the appropriate calibration file for the selected orifice tube. Click **OK** to return to the Orifice Calibration dialog; appropriate values for the calibration will be copied into the fields.

20. Click the down arrow to the right of the **Orifice Tube** field and choose the tube you plan to calibrate. If the tube is not in the list, perform the following steps to add it:

    a. Click **Add Orifice**; the Add Orifice Tube dialog is displayed.



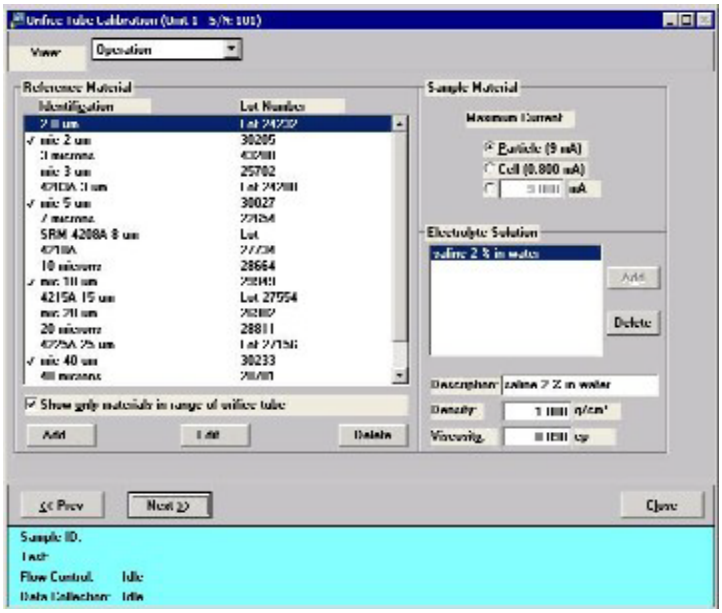
    b. Enter an identification in the **Orifice Tube ID** field. Typically users enter the serial number shown on the orifice tube and the size, making it easy to locate in the **Files** list. However, you may wish to establish your own identification system.



    c. Enter the orifice size in the **Diameter** field.

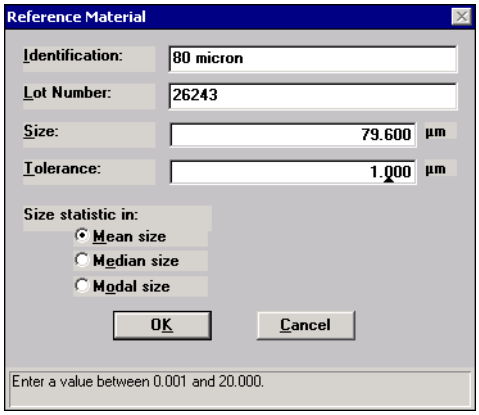
    d. Click **OK** to return to the Orifice Calibration dialog.

21. Click **Next**; the second view of the Orifice Tube Calibration dialog is displayed.



22. The appropriate reference materials should display in the window; if not, add them as follows:

    a. Click **Add**; the Reference Material dialog is displayed.



    b. Enter the **Identification**, **Lot Number**, **Size**, and **Tolerance** in the appropriate fields. (This information is found on the reference material bottle or in its accompanying booklet.)

    c. Select the **Size statistic** (also found on the bottle or its booklet).

    d. Click **OK** to return to the Orifice Tube Calibration dialog.

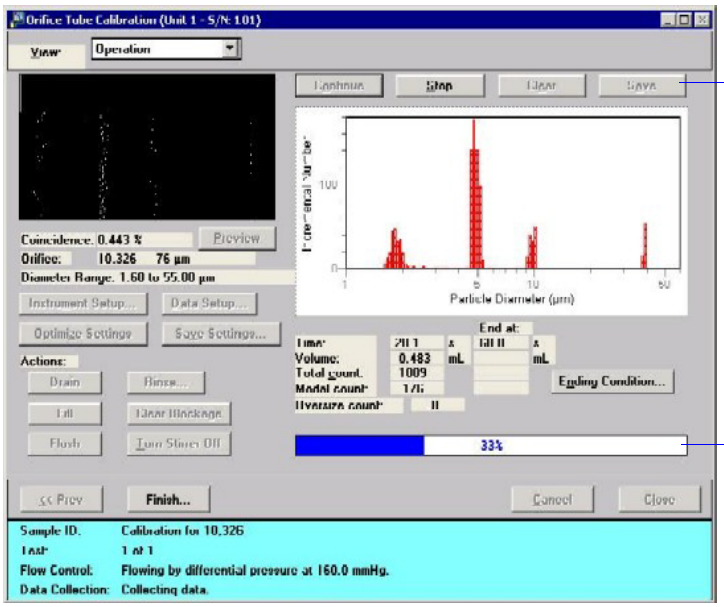
    e. Repeat steps **a** through **d** for each material to be used in the calibration.

23. Be sure that only the reference materials to be used in this calibration are selected (preceded with a check mark). Double-click on a reference material to place (or remove) a check mark.

24. Verify that the appropriate **Electrolyte Solution** is listed and selected. If it is not listed, enter the appropriate information in the **Description**, **Density**, and **Viscosity** fields and click **Add**.

25. Click **Next** to display the Calibrate Orifice Screen, then click **Start**; this screen displays data as collected.

If this is a new tube or if the previous orifice tube was different, error message 6116 will display; click No to close the message.

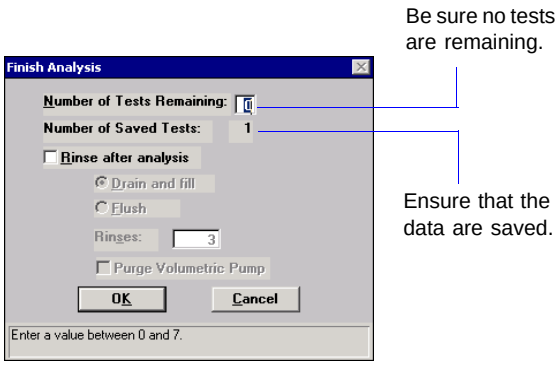


Becomes enabled when calibration is complete.

Progress Bar

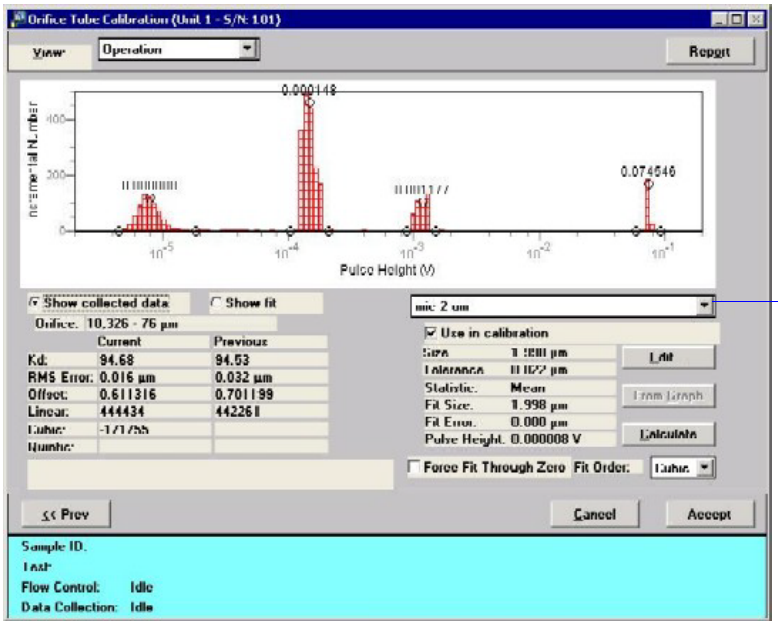
26. When the progress bar reaches 100%, click **Save**. (The example shown in the previous step shows the **Save** push button disabled; it becomes enabled when the calibration is complete.)

27. Click **Finish**; the Finish dialog is displayed.



Ensure that **0** (zero) is in the **Number of Testers Remaining** field and the data are saved.

28. Click **OK**; the final Orifice Tube Calibration screen is displayed.



This screen shows the final parameters of the calibration. It also allows you to define the peaks (information on defining peaks can be found on page **5-29**).

29. Ensure that the values for each reference material are within tolerance; click the down arrow to the right of the drop-down list to access the reference materials.

30. Click **Accept** to save the calibration and close the dialog.

Preparing for an Analysis

Choosing and installing an Orifice tube

1. Choose an orifice tube with an orifice that is approximately two times the diameter of the largest particles in the sample. If available, a microscope can be used to determine particle sizes.

Orifice tubes must be clean to ensure accurate analysis results. Refer to Cleaning Orifice Tubes, page 8-9.

2. Ensure that the orifice tube is calibrated.

   a. Click **Reports** > **Orifice Tube Calibration**.

   b. Click the down arrow to the right of the **Orifice Tube** field to see if the tube is included in the list.

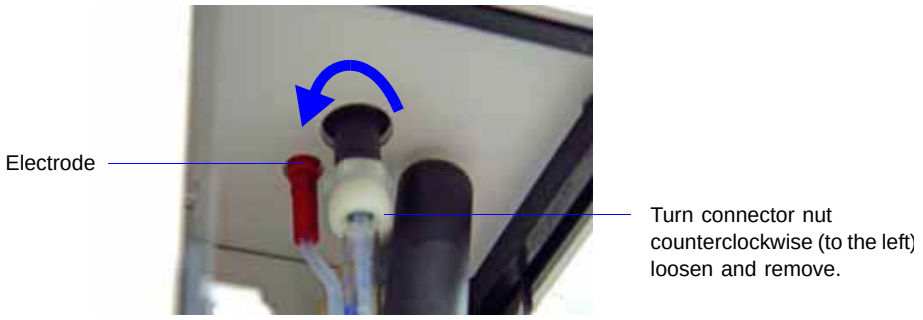
   If it is not in the list, you must calibrate the tube (refer to page **Calibrating an Orifice Tube**, page **3-18**).

3. Install the orifice tube onto the sample port:

To prevent contamination, it is recommended that you wear rubber gloves when handling orifice tubes. Be especially careful not to touch the orifice.

   a. Lower the sample stand (if not in the lowered position).

   b. Turn the sample port connector nut counterclockwise to loosen, then remove the connector nut, ferrule, and O-ring.



c. Holding the orifice tube with one hand, slide the connector nut over the top of the tube. (Your hand will keep the connector nut in place.) Then slide the ferrule over the top of the tube; it will nest down into the connector nut. Now slide the O-ring over the top of the tube (approximately 1/4 in. from the top of the tube).

d. Place the connector nut over the sample port and slide the orifice tube into the port; turn the connector nut clockwise to tighten.

If a camera is installed, be sure the orifice in the tube is aligned with the camera lens. Refer to Appendix G, page G-1 for information and operating instructions for the camera.

Filling the Supply Container

Your supply container should always contain the same electrolyte as the one used to prepare and disperse your sample. Be sure your supply container is filled with *filtered* electrolyte before you begin the analysis. Many Elzone users use the ElectroPrep, a unit designed to provide a continuous supply of filtered electrolyte. Refer to Appendix D, page **D-1** for information on electrolytes, how to filter them, and on the ElectroPrep.

These instructions are for refilling the supply container with the same type of electrolyte as previously used. Refer to **Changing the Liquid in the Supply Container**, page **3-29** if you plan to use a different type of electrolyte.

1. Unscrew the cap on the supply bottle.

2. Remove the cap (and tubing); place the tube in a beaker so that the it will not touch the work surface and pick up dirt particles.

3. Fill the supply bottle with filtered electrolyte (refer to **Preparation of Electrolyte Solutions**, page **D-4** for information on filtering electrolyte).

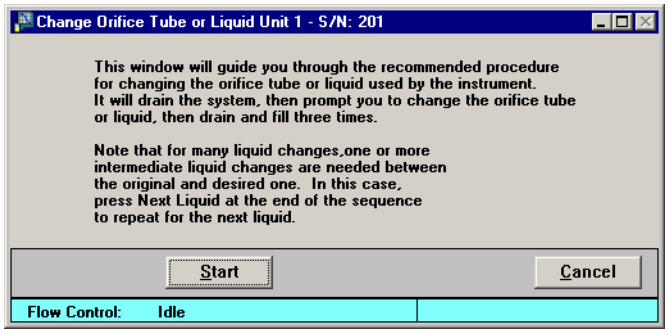
   Reinsert the supply tubing in the container and reattach the cap.

Changing the Liquid in the Supply Container

Your supply container should always contain the same electrolyte as the one used to prepare and disperse your sample.

These instructions are written for changing to a liquid of the same type base; for example, a water-based electrolyte to a different water-based electrolyte. Use the instructions in **Changing Liquids of Different Bases** if you are changing to a different type base; for example, a water-based electrolyte to an alcohol-based electrolyte.

1. Select **Unit** > **Change Orifice Tube or Liquid**; the Change Orifice Tube or Liquid dialog is displayed.



2. Read the text in the dialog, then click **Start**.

3. When prompted to change the liquid:

   a. Remove the supply tube from its container, then remove the cap from the container.

   b. Rinse the container with water (when using water-based electrolytes) or alcohol (when using alcohol-based electrolytes).

   c. Fill the container with the new electrolyte.

   d. Replace the cap and the tube.

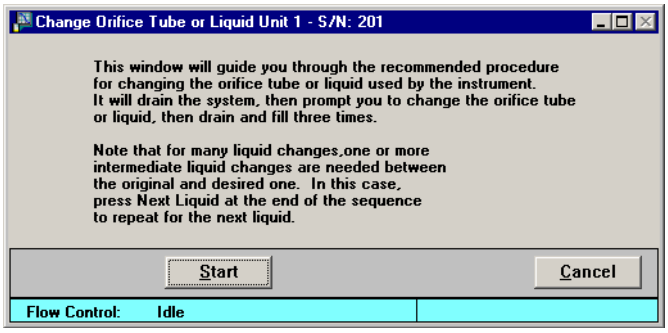
4. Click **Continue** to complete the operation.

5. When the confirmation dialog is displayed, click **Done** to close the dialog.

Changing Liquids of Different Bases

These instructions use an example of changing from a water-based electrolyte to an alcohol-based electrolyte.

1. Select **Unit** > **Change Orifice Tube or Liquid**; the Change Orifice Tube or Liquid dialog is displayed.



2. Read the text in the dialog, then click **Start**.
3. When prompted to change the liquid:
   a. Remove the supply tube from its container, then remove the cap from the container.
   b. Empty the container of the water-based electrolyte, then refill it with water.
   c. Replace the cap and the tube.
4. Click **Continue**.
5. When the confirmation dialog is displayed, click **Next Liquid**.
6. When prompted to change the liquid:
   a. Remove the supply tube from its container, then remove the cap from the container.
   b. Empty the container of the water, then refill it with alcohol (the base for the new electrolyte).
   c. Replace the cap and the tube.
7. Click **Continue**.
8. When the confirmation dialog is displayed, click **Next Liquid**.

9. When prompted to change the liquid:

    a. Remove the supply tube from its container, then remove the cap from the container.

    b. Empty the container of the alcohol, then refill it with the alcohol-based electrolyte.

    c. Replace the cap and the tube.

10. Click **Continue**.

11. When the confirmation dialog is displayed, click **Done** to close the dialog.

Optimizing Instrument Settings

An Analyst is not authorized to optimize instrument settings.

Instrument settings should be optimized:

- at the beginning of each operating shift regardless of whether you have a change in electrolyte
- for the electrolyte you are using in your analysis
- when you mix a new batch of electrolyte (even when it is the same type you have been using)
- when you change types of electrolyte

Since it is best to use a beaker containing electrolyte only (no sample), you can optimize your instrument settings while preparing your sample in a separate beaker. Or you can wait until optimization is complete and add the sample to the beaker used in the optimizing procedure.

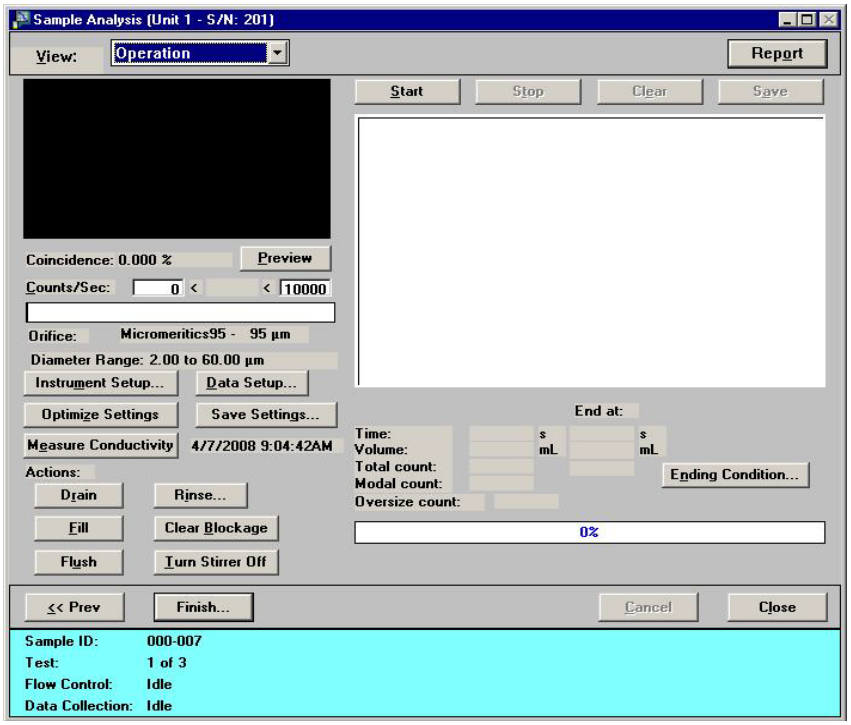
1. Place a beaker of electrolyte onto the sample stand, then raise the stand.

2. Select **Unit > Sample Analysis**; the Sample Analysis dialog is displayed.

3. Click **Browse** and choose the file you plan to use for your analysis.

4. Click **Next**; the User Log in dialog is displayed.

5. Enter your password and click **OK**; the second view of the Analysis dialog is displayed.



6. Click **Instrument Setup** and ensure that **Specify Diameter Range** is selected and a valid range specified; click **OK** to close the dialog.

7. Click **Optimize Settings**. After the analyzer becomes idle, you may:

   - Add sample to the electrolyte and continue with your analysis.
   - Remove the beaker containing the electrolyte and place the beaker containing sample on the sample stand; then continue with your analysis.
   - Click **Close** and restart your analysis when ready.

If you wish to save these settings for future use, click Save Settings to display the Save as Analysis Conditions dialog. Enter an appropriate name and click OK. You can then use the Replace button on the Analysis conditions portion of the sample file to load the settings into your sample file.

Preparing and Loading Your Sample

Sample Dispersion

You must disperse a sample properly before you can analyze it. Use an effective electrolyte and sample dispersion method, obtained from references or by comparative testing, for stable counts. The suggested electrolyte strength is:

Approximate conductivity, m-mho/cm = 3000/D
Approximate equivalent in weight % NaCl = 150/D

where D = μm orifice diameter.

Particle Concentration Guidelines

Coincidence (when two or more particles pass through the orifice at the same time) causes an absent portion of the true distribution and a distorted distribution of oversize, spurious particles. By using the correct concentration of particles or cells, you can keep the coincidence level at a maximum of 1.0%. Any level at or below these concentrations is acceptable. Refer to Table 3-1 to determine the concentration of particles in the sample solution.

Table 3-1. Particle Concentration Guidelines

Orifice Diameter (μm)	N/mL for 1% Coincidence	mL/min @ 166 mmHg
19	1,100,000	0.064
30	280,000	0.18
48	70,000	0.50
76	17,000	1.3
95	8,800	2.1
150	2,200	5.5
190	1,100	8.6
300	280	22.0
380	140	35.0

Where headings are described as:

Orifice Diameter = The diameter (in micrometers) of the orifice being used.

N/mL for 1% Coincidence = The total number of particles or cells in 1 mL of suspension in the sample beaker required for a coincidence level of 1.0%

mL/min @ 166 mmHg = The flow rate of a 1.0% saline solution through the orifice at a vacuum of 166 mmHg.

Procedure

If possible, prepare your sample when you are ready to start the analysis. If you prepare your sample in advance, be sure to place a lint-free cover over the beaker to prevent the entry of air-borne particles.

1. Place approximately 0.2 gram of sample into a 25-mL beaker.

If your sample tends to agglomerate, add a few drops of surfactant. Mix until it resembles paste.

2. Add 20 mL of electrolyte to the beaker.

3. Place the beaker in an ultrasonic bath for approximately 1-2 minutes.

If sample particles are fragile, do not use the ultrasonic bath; gently stir with a spatula instead.

4. Clean the external glassware (orifice tube, electrode, and stirrer):

   a. Fill a squeeze bottle with clean, filtered electrolyte or water.

   b. Hold a beaker under the glassware and, using the squeeze bottle, thoroughly rinse each piece of glassware.

5. Place the analysis beaker on the sample stand; position the electrode next to the orifice tube so that it will be submerged in the beaker.

6. Add an appropriate amount of sample mix to the analysis beaker; enough to achieve a 1% coincidence level.

If your sample contains large particles, manually stir the sample mixture while transferring to the analysis beaker. This is to prevent the larger particles from remaining in the transferring beaker.

7. Using the schematic (with manual control enabled), ensure that the stirrer is off.

8. Raise the sample stand using the knob on the front. (Refer to **User Interface**, page **2-3** if you need assistance on raising and lowering the sample stand.)

Be sure the stirrer does not strike the bottom or sides of the beaker when raising the sample stand. The stirrer will not operate if it comes in contact with the beaker.

9. Close the sample compartment door on the right side; adjust the light and camera if needed.

10. Close the sample compartment door on the front side.

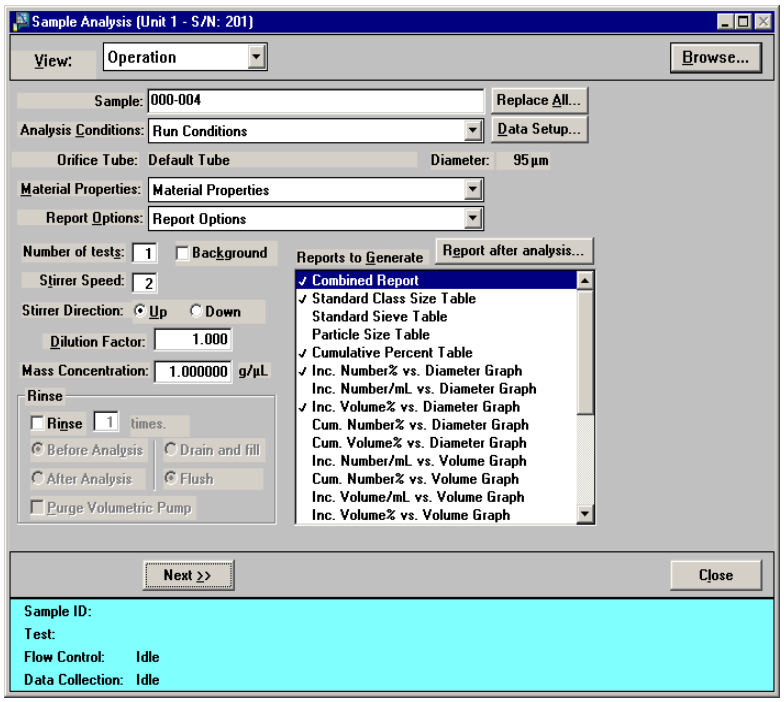
Performing an Analysis

Before you start your analysis, be sure you have:

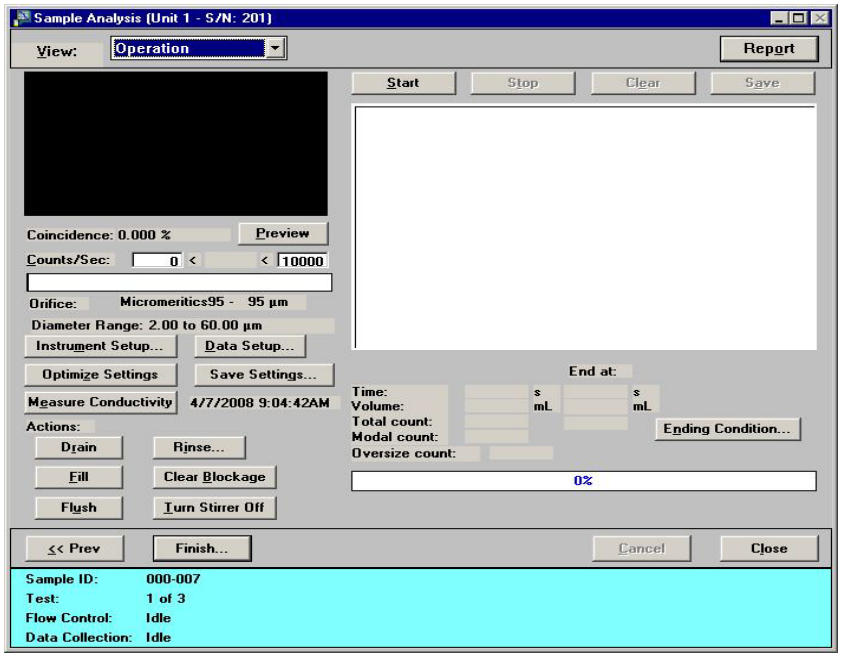
- cleaned and calibrated your orifice tube; page **3-52**
- filled your supply container with filtered electrolyte; page **3-28**
- emptied your waste container
- optimized instrument settings for the current electrolyte (this also can be done on the second view of the Sample Analysis dialog before you begin your analysis); page **3-31**
- created your sample file using appropriate analysis conditions (this also can be done from the Sample Analysis dialog); page **3-10**)

If your application is noise-sensitive, read the discussion in Appendix H, page **H-1** for guidelines in obtaining optimum performance from your elzone.

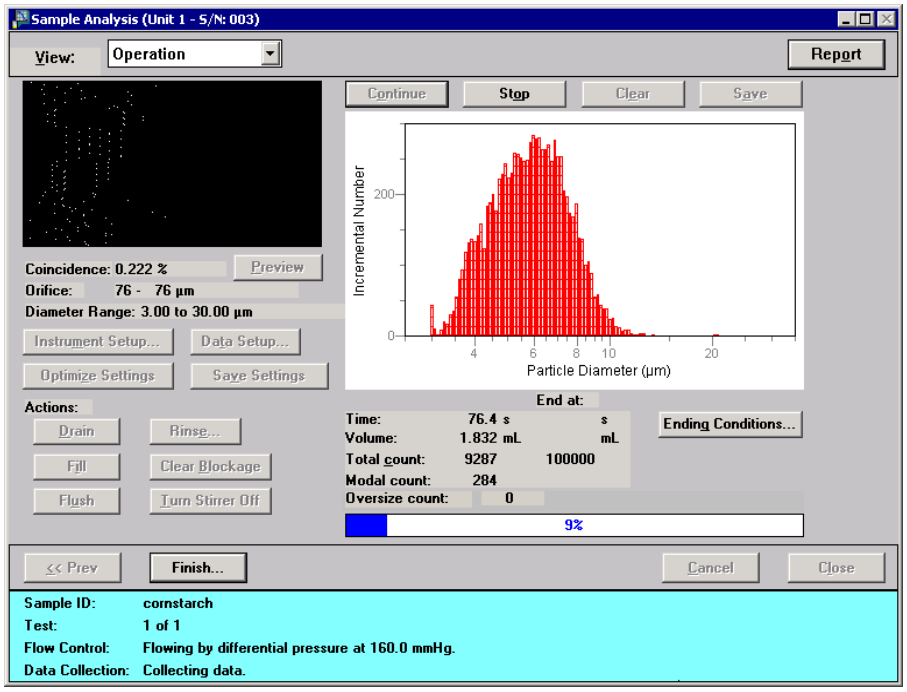
1. Select **Unit** > **Sample Analysis**; the Sample Analysis dialog is displayed.
2. Click **Browse**; the Select a File for Analysis dialog is displayed.
3. Select your file, then click **OK;** the Sample Analysis dialog now contains all the parameters in the file you selected.



4. Ensure that all parameters are appropriate, then click **Next**; the User Log in dialog is displayed. Enter your password and click **OK**; the second view of the Sample Analysis dialog is displayed.



5. Click **Start** to begin the analysis.



After the analysis ends (progress bar reaches 100%), **Save** is enabled allowing you to save the data into the sample file.

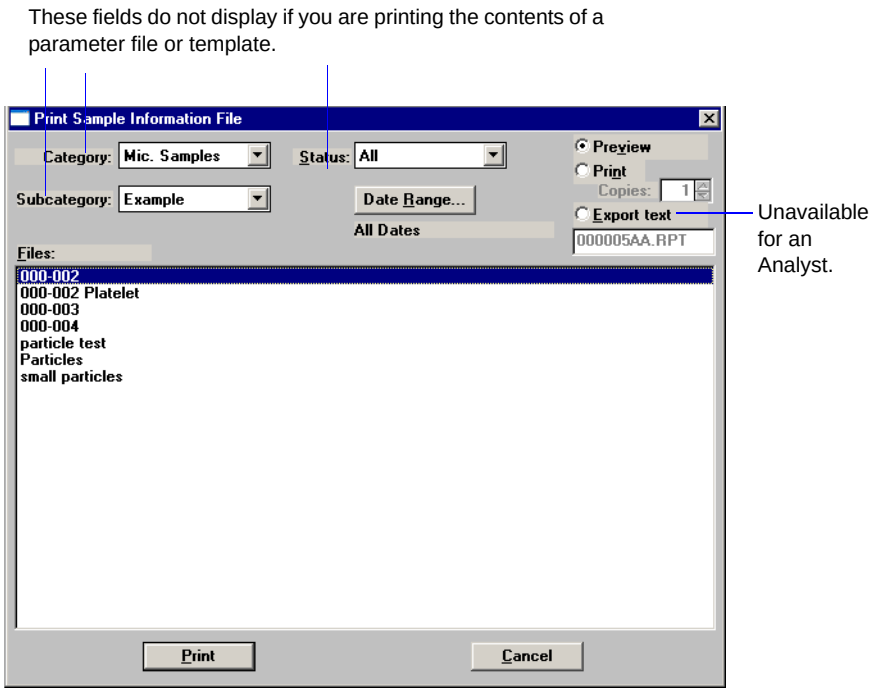
Printing File Contents

You can print the contents of one or more sample file, parameter file, or file template. For example, if you print the contents of an analysis conditions file, you will receive the parameters used for the analysis conditions associated with the file.

- A Developer can print the contents of sample files, sample templates, parameter files, and parameter templates.
- An Analyst can print the contents of sample files, sample templates, and parameter templates (not parameter files).

Refer to **Print**, page **4-59** for detailed information on printing file and template contents.

1. Select **File > Print**; a drop-down list containing file types is displayed.
2. Choose the file type; a dialog similar to this one is displayed.



3. From the **Files** list box, select the desired file. If you plan to print the contents of multiple files, hold down **Ctrl** while clicking on the desired files.

You can use the Status drop-down list and/or the Date Range push button to limit the files displayed in the Files list; refer to page 2-10 for details.

4. Choose whether you wish to print the contents to the screen (**Preview**) or to a printer (**Print**). If you choose **Print**, the **Copies** field is enabled allowing you to print up to four copies.
5. Click **Print**; the file is printed to the specified destination.

Listing File Statistics

You can generate a list of the following information on a sample file, parameter file, or sample template for one or more files:

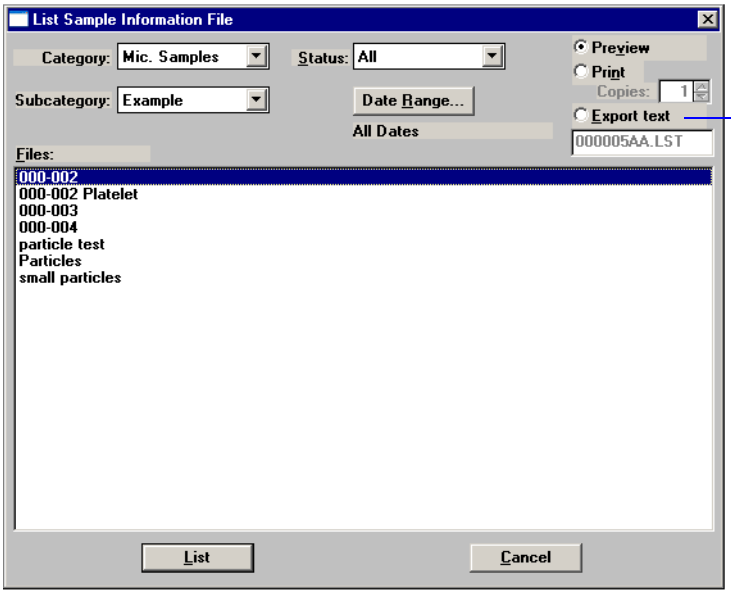
- File name
- Date the file was created (or last edited)
- Time the file was created (or last edited)
- File identification
- File status

Refer to **List**, page **4-62** for detailed information on listing file statistics.

Perform the following steps to list file statistics:

1. Select **File** > **List**.

2. From the List drop-down menu, select the type of file on which you wish information. A dialog similar to the one shown below is displayed:



3. From the **Files** list box, choose the desired file(s). If you wish to include all files, leave all files deselected.

4. Choose whether you wish to print statistics to the screen (**Preview**) or to a printer (**Print**). If you choose **Print**, the **Copies** field is enabled allowing you to print up to four copies.

5. Click **List**, a list for the requested file(s) is sent to the specified destination.

Importing Sample and Parameter Files

An Analyst is not authorized to import sample or parameter files.

The Import function allows you to import files which have been created on a computer other than the one controlling the analyzer and have them display in the **Files** list window.

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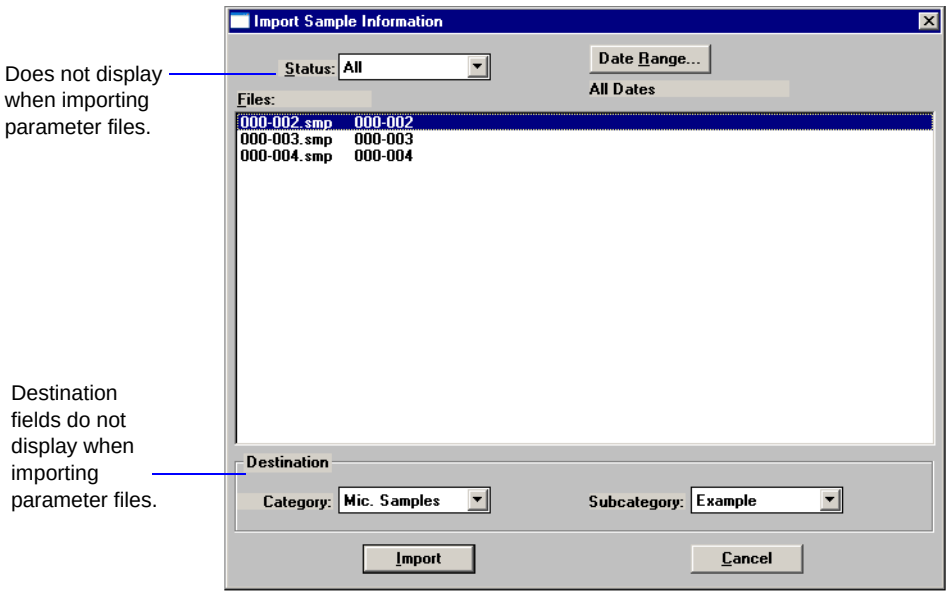
Perform the following steps to import a file:

1. Copy the file(s) you wish to import, then paste into the Import directory. Files must be copied into this directory; otherwise they will not display in the **Files** window of the Import File dialog.

2. Select **File > Import**; a drop-down list containing file types is displayed.

3. Choose the file type; a dialog similar to this one is displayed.



4. Select the directory into which you wish to have the file imported. If you are importing a parameter file, the **Category** and **Subcategory** fields do not display. Parameter files are copied automatically into the directory assigned for parameter files.

5. Select the file(s) you wish to import; this enables the **Import** push button.

6. Click **Import** to import the file.

Exporting a Sample Information File

An Analyst is not authorized to export sample files.

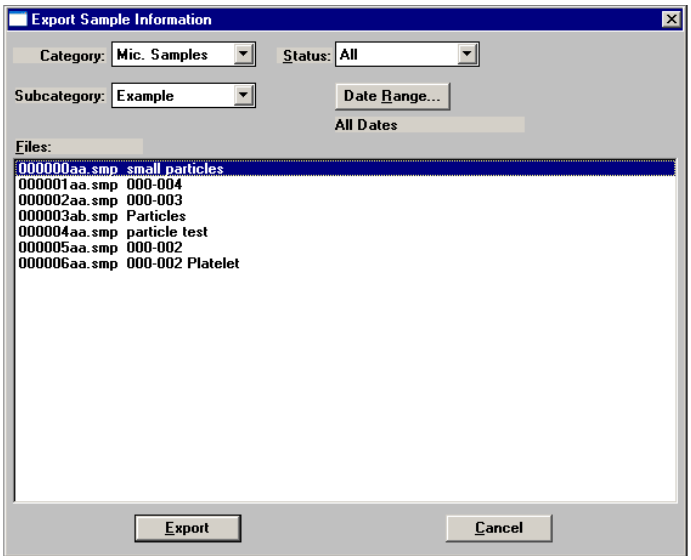
Export allows a Developer to:

- export the entire sample file to the Export directory. For example, you may wish to use this option to transfer a sample file to another computer.
- copy the full-resolution or isotherm data in a sample information file and export it as ASCII text.

You may select multiple files by holding down **Ctrl** while selecting the desired files. Refer to Appendix C on page C-1 for a description of the format used for exported data.

Perform the following steps to export a sample information file or ASCII data:

1. Select **File** > **Export**. Then from the drop-down menu, choose **Sample information** or the type of data you wish to export. This example shows exporting a sample information file; the dialog for exporting ASCII data is the same.



2. From the **Files** list box, choose the file(s) you wish to export. You can select multiple files by holding down **Ctrl** while clicking on the desired files. Note that the confirm program has assigned a name with an **smp** extension for each file. Make a note of the smp file name(s) you are exporting. You will need this information when you retrieve the file(s) from the Export directory.

You can use the Status drop-down list and/or the Date Range push button to limit the files displayed in the Files list.

3. Click **Export**; the file is exported automatically to the export directory.

4. Access the Export directory to retrieve the exported file(s).

Converting Sample Files

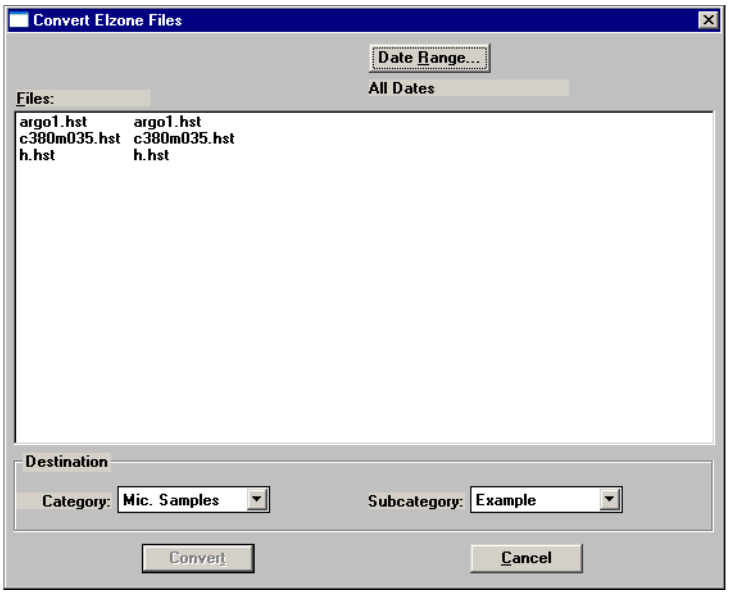
The Convert function enables you to convert two different file types to a format compatible with the current Elzone program.

- **Elzone**: copies and converts data from sample files used with the Model 5380 Series of analyzers
- **ASCII**: copies and converts data from a text file

Regardless of which type of file you are converting, it must first be copied into the Import directory so that it will appear in the Convert dialog.

Elzone Files

1. Select **File** > **Convert** > **Elzone**; the Convert Elzone Dialog is displayed.



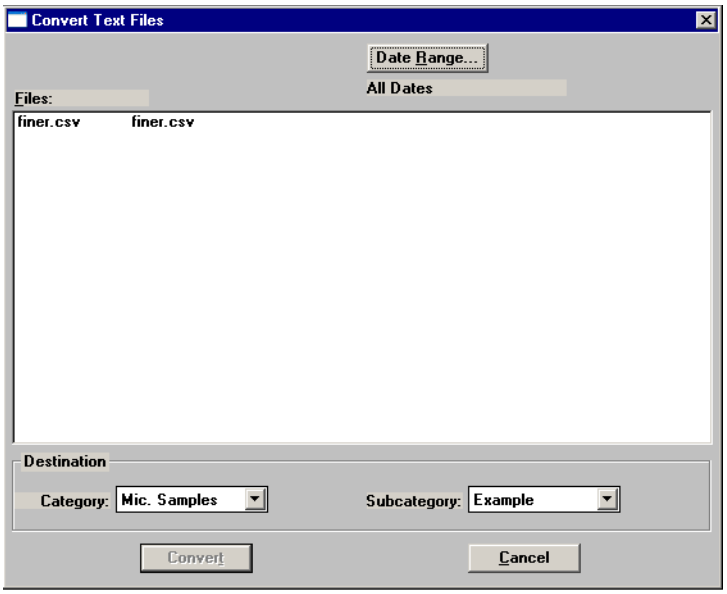
2. In the **Destination** group box, choose the directory(ies) into which the file is to be saved.

3. Select the file, then click **Convert**. If converting multiple files, hold down the **Ctrl** key while selecting the files. A conversion dialog containing conversion results is displayed.

4. Click **X** in the upper right-hand corner to close the dialog.

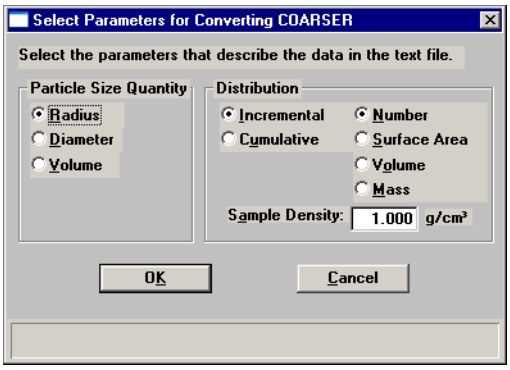
ASCII Text

1. Select **File** > **Convert** > **ASCII Text**; the Convert Text Files Dialog is displayed.



2. In the **Destination** group box, choose the directory(ies) into which the file is to be saved.

3. Select the file, then click **OK**. If converting multiple files, hold down the **Ctrl** key while selecting the files. The Select Parameters for Converting (file name) dialog is displayed.



This dialog enables you to select the type of data contained in the text file. If you have selected multiple files, a dialog is displayed for each file (the name of the file is in the header).

4. Click **OK**; a conversion dialog containing conversion results is displayed (refer to page **3-43** for an example of this dialog).

5. Click **X** in the upper right-hand corner to close the conversion dialog.

Generating Graph Overlays

Use graph overlays when you wish to compare graphically results for multiple samples or multiple graphs for one sample. Graphical lines are differentiated by the use of varying symbols and reported in a legend on the report. If color output capability is available, different colors are used instead of symbols.

Graph overlays can be implemented in three ways:

- **Multiple Sample Overlays**
  Overlay results for up to eight samples on top of a previously selected sample.
- **Multiple Graph Overlays**
  Overlay two different types of graphs from one sample.
- **Multiple Tests Overlays**
  Overlay all tests from the sample file.

An Analyst must click Advanced to access the Report Options tab in order to perform these procedures.

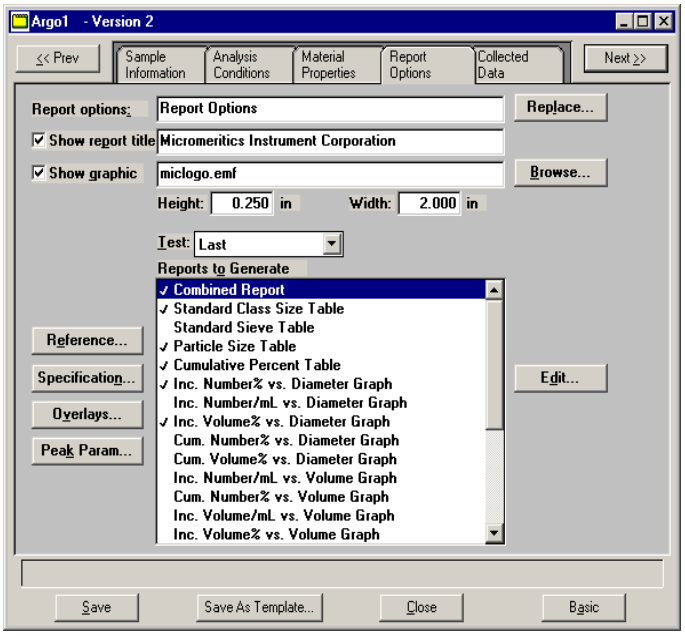
Multiple Samples Overlay

This type of overlay enables you to overlay up to eight plots of the same type on top of the current plot. The data can be collected on the Elzone, the Saturn DigiSizer 5200, the SediGraph 5100, or the SediGraph 5120.

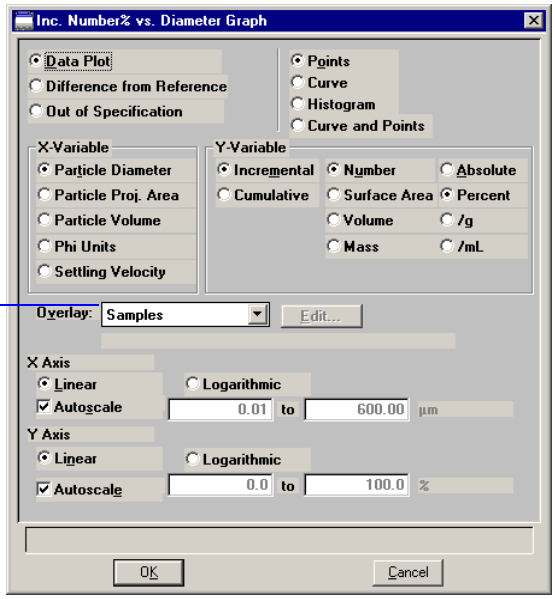
1. Select **File** > **Open** > **Sample Information** to display the Open Sample Information File dialog.

2. Select a sample on which to overlay graphs of other samples, then click **Open**; the Sample Information dialog is displayed.

3. Click the Report Options tab to display the Report Options dialog.



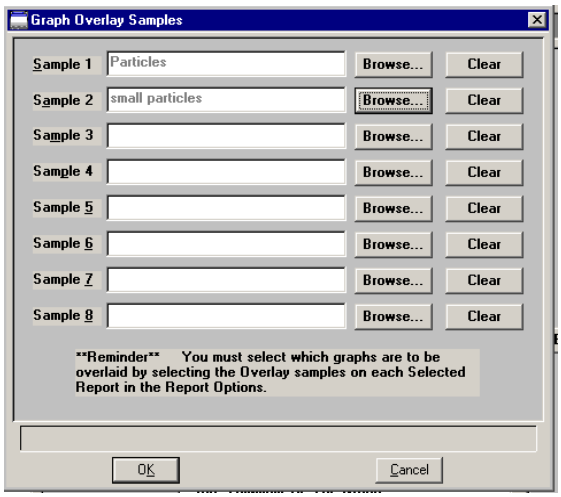
4. Choose the desired graph and click **Edit**; a graph options dialog like the following is displayed.



Choose Samples from the drop-down list.

5. Click on the down arrow at the **Overlay** field and choose **Samples**, then click **OK** to close the dialog.

6. On the Report options dialog, click **Overlays**; the Graph Overlay Samples dialog is displayed.



7. Click **Browse** to the right of the **Sample 1** field; the Plot Overlay Sample Selection dialog is displayed.

8. Choose a sample file, then click **OK**. You may choose up to eight files in this manner.

9. After selecting the desired number of sample files, click **OK** to return to the main Report Options dialog.

10. Make any other selections if desired.

11. Click **Save** if you wish to save your Selected Reports list; a dialog prompting for a reason is displayed. Even if you don't save, all of the options regarding overlays and anything else are available as your reports are generated.

12. Select **Reports** > **Start Report**; the Start Report screen is displayed with the name of your primary file highlighted.

13. Click **Report**; one of the following occurs:

    - if you clicked **Save** to save specified overlay options, the Select Reports dialog is displayed.

    - If you did not click **Save**, a dialog stating that a preview report will be generated or you can cancel the operation is displayed. If you choose to generate the preview report, the Select Reports dialog is displayed.

14. Ensure that the desired graph is selected (preceded with a check mark), then click **OK**.

Multiple Graphs Overlay

This option enables you to overlay two types of graphs from the same file.

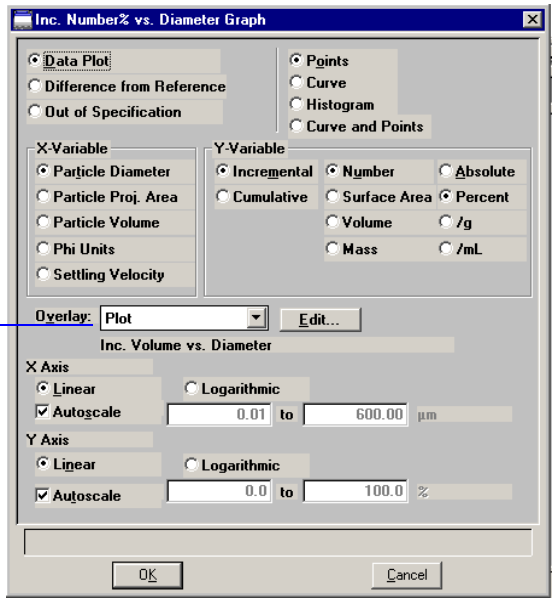
1. Select **File** > **Open** > **Sample Information** to display the Open Sample Information File dialog.

2. Select the desired file, then click **Open**; the Sample Information dialog is displayed.

3. Click the Report Options tab to display the Report Options dialog (shown on page **3-45**).

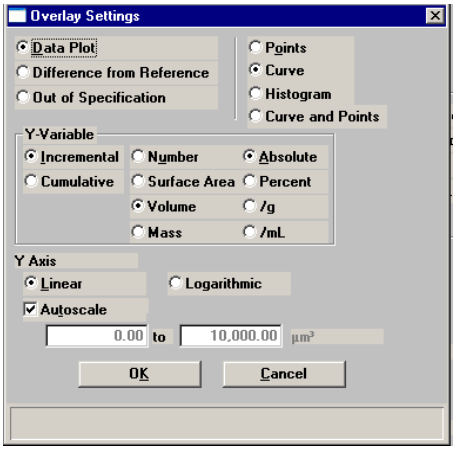
4. Choose the desired graph and click **Edit**; a graph options dialog like the following is displayed.

Choose Plot from the drop-down list.



5. Click on the down arrow at the **Overlay** field and choose **Plot**, the **Edit** push button adjacent to the **Overlay** field is enabled.

6. Click **Edit**; the Report Options dialog enabling you to specify the plot to overlay is displayed.



7. Make your selections and click **Ok** to return to the graph options dialog, then **OK** again to return to the Report Options dialog.

8. Make any other selections if desired.

9. Click **Save** to save your Selected Reports list. Even if you don't save, all of the options regarding overlays and anything else are available as your reports are run.

10. Select **Reports** > **Start Report**; the Start Report screen is displayed with the name of your primary file highlighted.

11. Click **Report**; one of the following occurs:

    - if you clicked **Save** to save specified overlay options, the Select Reports dialog is displayed.

    - If you did not click **Save**, a dialog stating that a preview report will be generated or you can cancel the operation is displayed. If you choose to generate the preview report, the Select Reports dialog is displayed.

12. Ensure that the desired graph is selected (preceded with a check mark, then click **OK**.

Multiple Tests Overlay

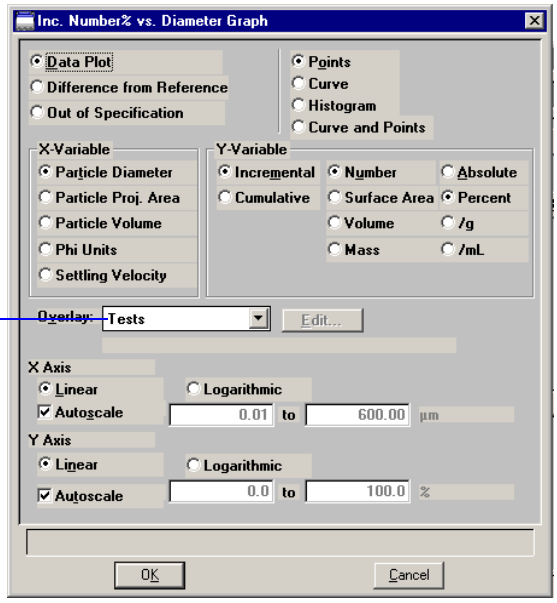
This option enables you to overlay all tests of the same file.

1. Select **File** > **Open** > **Sample Information** to display the Open Sample Information File dialog.

2. Select the desired file, then click **Open**; the Sample Information dialog is displayed.

3. Click the Report Options tab to display the Report Options dialog (shown on page **3-45**).

4. Choose the desired graph and click **Edit**; a graph options dialog like the following is displayed.



Choose Tests from the drop-down list.

5. Click on the down arrow at the **Overlay** field and choose **Tests**, then click **OK** to return to the Report Options dialog.

6. Make any other selections if desired.

7. Click **Save** to save your Selected Reports list. Even if you don't save, all of the options regarding overlays and anything else are available as your reports are run.

8. Select **Reports** > **Start Report**; the Start Report screen is displayed with the name of your primary file highlighted.

9. Click **Report**; one of the following occurs:

   - if you clicked **Save** to save specified overlay options, the Select Reports dialog is displayed.

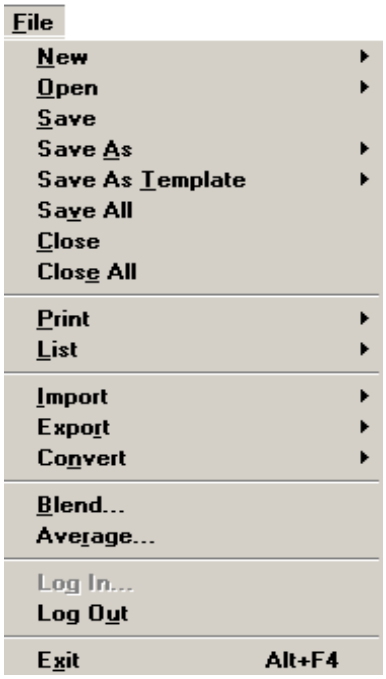
   - If you did not click **Save**, a dialog stating that a preview report will be generated or you can cancel the operation is displayed. If you choose to generate the preview report, the Select Reports dialog is displayed.

10. Ensure that the desired graph is selected (preceded with a check mark), then click **OK.**

4. FILE MENU

The File menu contains options that allow you to manage sample files, parameter files, and templates.

Description



Listed below are brief descriptions of the File menu options. Detailed descriptions follow this section

.

New Enables you to create a sample information or parameter file. Page **4-3**.

Open Allows you to open an existing sample or parameter file, or a sample template. Page **4-49**.

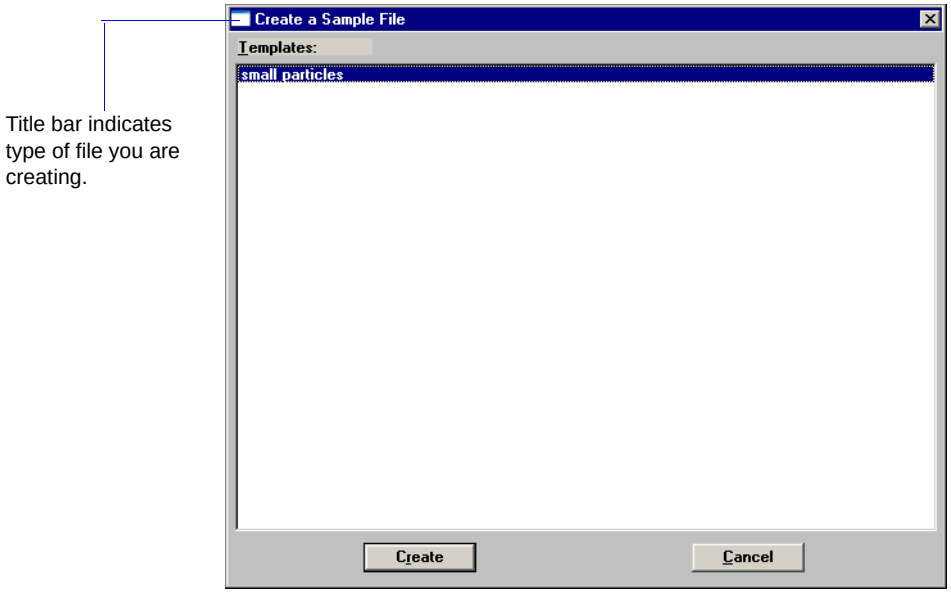
Save Saves the file in the active window. Page **4-55**.

Save As Enables you to save the file in the active window as a different name. You also can use this command to save a subset of a sample file as an independent parameter file. Page **4-55**.

Save As Template	Enables you to save the values from the open file as a template for a sample information or parameter file. Page **4-57**.
Save All	Saves all open files. Page **4-57**.
Close	Closes the file in the active window. Page **4-57**.
Close All	Closes all open files. Page **4-58**.
Print	Enables you to print details of a sample information file, a parameter file, or a template. Page **4-59**.
List	Generates a list of certain information for a sample information file, a parameter file, or a template. Page **4-62**.
Import	Allows you to import a sample information or parameter file into the assigned application directory. Page **4-63**.
Export	Enables you to export data from a sample file in ASCII format or the entire sample file. Page **4-64**.
Convert	Enables you to convert data from a text file or from an earlier version of the Elzone program to a format compatible with the Elzone 5390 program. Page **4-65**.
Blend	Enables you to blend (combine) data from multiple sample files. Page **4-65**.
Average	Enables you to obtain an average for data in multiple sample files. Page **4-69**.
Log In	Allows you to log into the application. Page **4-71**.
Log Out	Allows you to log out of the application. Page **4-72**.
Exit	Exits the Elzone 5390 program. Page **4-72**.

New

New allows you to create a sample information or parameter file. Regardless of the type of file you are creating, a dialog allowing you to choose a template is displayed.



A Developer can create sample information and parameter files. An Analyst can create a sample information file using predefined parameter files chosen from drop-down lists.

After you choose a template, click **Create** to display a dialog for the associated file.

Sample Information

Sample Information files contain information used to control the analysis. Therefore, an analysis cannot proceed until it has been assigned a sample information file. A sample information file consists of:

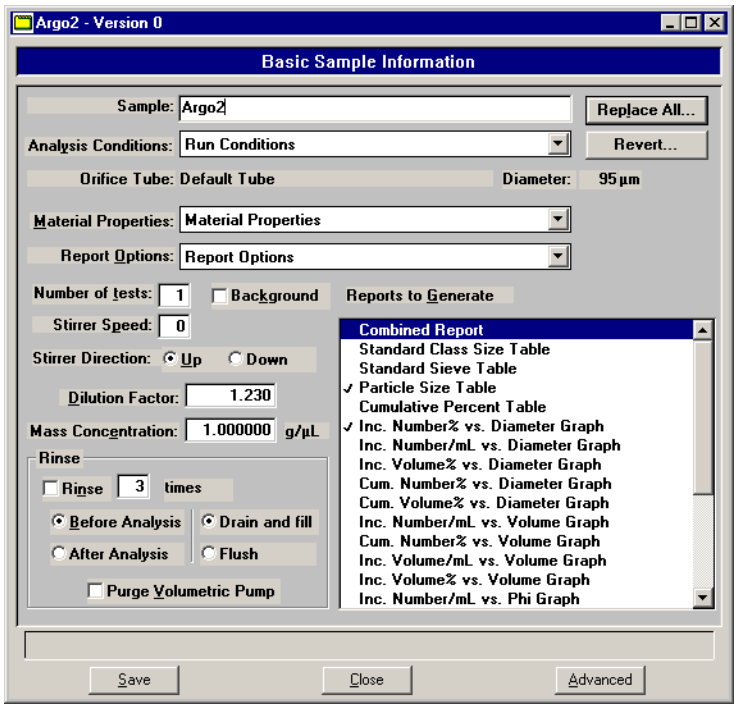
- Sample information
- Analysis conditions
- Material properties
- Report options
- Entered or Collected (appears after analysis is complete) data

Portions of the sample file can also exist as *parameter files* separate from the sample information file itself. These parameter files contain frequently used analysis conditions, material properties, and report options that can be conveniently loaded into a new sample information file.

A sample information file can be created by an Analyst or a Developer. A Developer can create a sample file in its entirety, specifying values for all parameters; all fields on the dialogs are enabled for input from a developer. An Analyst can create a sample file by selecting predefined parameter files from drop-down lists.

Analyst

The Sample Information dialog displays in this manner for an Analyst.



Sample

This field defaults to the description of the template. You must enter a new description or edit the existing one; the Confirm program does not allow duplicate descriptions. The description you enter in this field appears in the **Files** list window on the Open Sample Information dialog. You can use up to 50 alphanumeric characters.

Analysis Conditions
Material Properties
Report Options

These fields contain the descriptions of the current parameter files. Click on the down arrow to the right of the fields to choose different files. These drop-down lists contain predefined files created by a Developer. You can view the values contained in the files by clicking **Advanced**; however, you cannot edit the values.

Orifice Tube

Displays the orifice tube specified in the Analysis Conditions file.

Number of tests

Enables you to enter the number of tests you wish to perform using this file; you can perform up to eight tests with each file.

Background

Select this option to have background data collected. If you select this option, be sure that **Full-resolution** is selected as the type of data in the analysis conditions dialog (**Data Setup** push button).

Stirrer Speed

Enables you to specify a stirrer speed.

The speed ranges from 1 to 10 with 1 being the lowest; 0 (zero) turns the stirrer off.

Stirrer Direction

Enables you to specify a direction for the particle circulation.

Up rotates the stirrer in a direction that pushes the particles upward. **Down** rotates the stirrer in the opposite direction, pushing the particles downward.

This option is not applicable if you have a hydropulser installed on the Elzone analyzer.

Dilution Factor

Enables you to enter the ratio of sample volume to electrolyte volume. This value can be easily determined using the following formula:

$$DF = \frac{sample\ volume\ +\ electrolyte\ volume}{sample\ volume}$$

Mass Concentration

Enter the mass concentration of the sample you are analyzing.

Rinse

Select this option to have rinse(s) performed; all options in this group box are enabled.

Use the **times** field to enter the number of rinses desired. Then choose when the rinse(s) is(are) to be performed; you can rinse before or after the analysis.

From the two options on the right side of the group box, choose the type of rinse desired. **Drain and fill** completely drains the system, then refills it. **Flush** simply flushes concentration through the system, maintaining liquid in the system at all times.

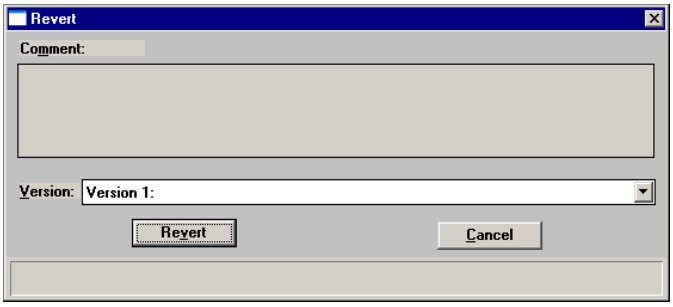
Select **Purge Volumetric Pump** to have the volumetric pump (if installed) purged during the rinsing process.

Replace All

Click this push button to replace all parameters of the current sample file with those from another one.

Revert

Displays the Revert dialog allowing you to choose a previous version (if any exist) of the sample file.



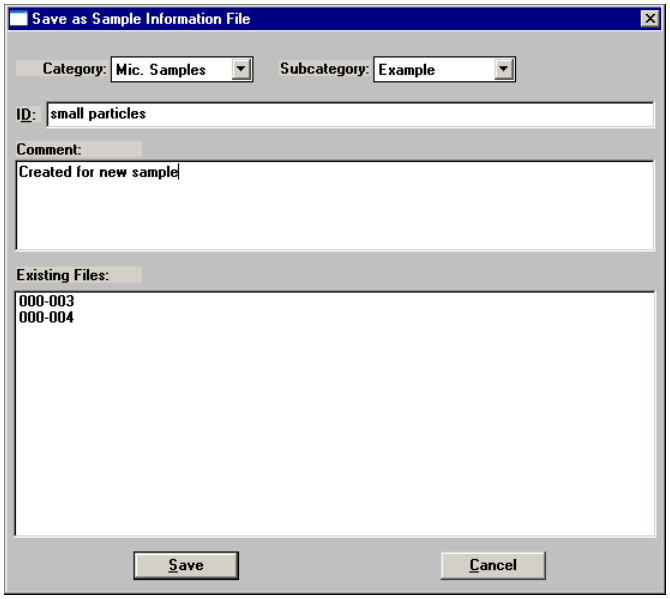
This dialog lists previous versions of the current file and the comment entered for each one; it does not list the current version. You can use the drop-down list to choose other versions; each version's comments will be listed in the **Comments** window.

Reports to Generate

Displays a list of available reports. Reports preceded by a check mark are those that have been selected for the current template. To select additional reports, simply double-click on the desired report. Alternatively, you can highlight the report and press the **Spacebar**. Reports are deselected in the same manner.

Save

Displays the Save As Sample Information File dialog.



From this dialog, choose the directory in which to save the file. Enter a comment and edit the ID of the file. The **Save** push button becomes enabled allowing you to complete the save operation after you make an entry.

If **Save** does not become enabled after an entry is made in the **Comments** window, a file with the same ID currently exists in the selected directory. You must choose a different directory or edit the identification of the current file. The Elzone Confirm program does not allow duplicate descriptions.

Close

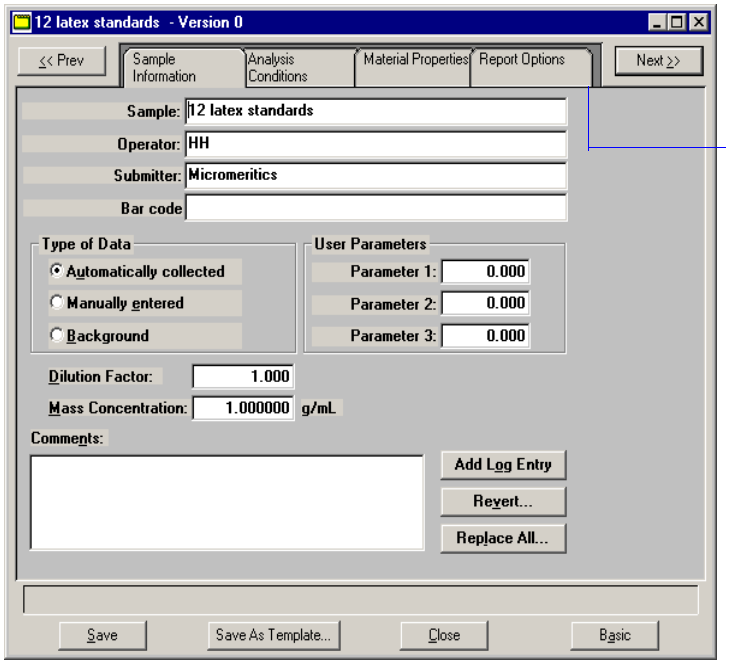
Closes the dialog. If the file contains unsaved changes, you are prompted to save before the dialog box closes.

Advanced

Displays the sample information dialog in the Developer's format. This format allows you to view details of the sample file and allows some fields to be edited. Refer to the next section for a description of the fields for the Developer's format.

Developer

The Sample Information dialog displays in a manner similar to that of an index card file for a Developer. Each parameter has its own tab and is accessed by clicking the tab. Or, you can use **Next** and **Prev** to move back and forth through the dialogs.



A Collected Data tab displays here when analysis is complete.

An Entered Data tab displays if you choose Manually entered, allowing you to enter the data.

The prompts for the **Sample, Operator, Submitter,** and **Bar code** fields may be customized by selecting **Options > Edit Labels**. Refer to **Edit Labels**, page **7-4** for instructions on having these prompts display differently.

Some fields on the Developer's view of the Sample Information dialog are also enabled for an Analyst when **Advanced** is clicked from the Analyst Sample Information dialog.

Sample

Displays the description for the current sample template. You must enter a new description or edit the existing one; the Elzone confirm program does not allow duplicate descriptions. The description you enter in this field appears in the **Files** list window on the Open Sample Information dialog. You can use up to 50 alphanumeric characters.

Operator
Submitter

Enter the name of the operator who will be using this file to perform the analysis and the name of the person (or department) submitting the sample for analysis. You can use up to 40 characters in each field.

Bar code

This field enables you to enter bar code information. If bar code information is not being used, you can use this field to enter additional information about the sample; for example, you may wish to enter the lot number of your sample. You can enter up to 40 characters in this field.

This field will also accept data from a bar code reader.

You can edit this prompt to display as a different label if desired, or you can omit it entirely from the sample file editor (refer to **Edit Labels**, page **7-4**).

Type of Data

You can have data collected automatically, manually enter data, or collect data for a background.

If you choose **Manually entered**, an “Entered” tab is added so that you may enter the desired data. You cannot enter data if you are creating the file on a computer that is not attached to the analyzer.

If you choose **Background**, be sure to select full resolution data using the **Data Setup** push button on the Analysis conditions dialog.

User Parameters

These fields are used primarily for SPC (Statistical Process Control) reporting. However, they can be used for other data as well. You may wish to enter specific analysis conditions or sample criteria such as the weight. These parameters will print on the Summary section of the Combined report. Select **Options** > **Edit Labels** to specify the parameters you wish to report. The parameter(s) you specify replace the **User Parameter** label(s) displayed here.

If desired, you can have these fields omitted from the sample information file (refer to **Edit Labels**, page **7-4**).

Dilution Factor

Enables you to enter the ratio of sample volume to electrolyte volume. This value can be easily determined using the following formula:

$$DF = \frac{sample\ volume\ +\ electrolyte\ volume}{sample\ volume}$$

Mass Concentration

Enter the mass per unit volume (in grams per µL) for the sample you are analyzing.

Comments

Use this field to enter any comments about the sample or the analysis conditions that you wish to note. Comments entered here are printed in the header of some reports.

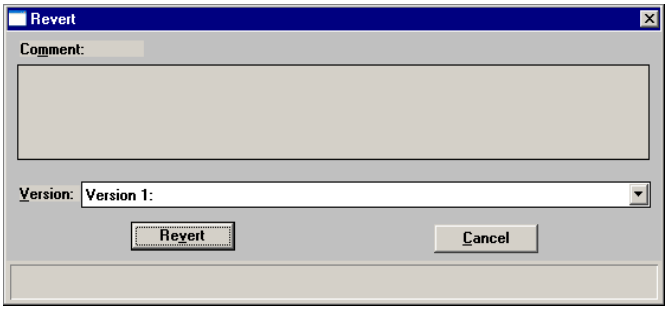
You can enter up to 500 alphanumeric characters.

Add Log Entry

Displays a dialog allowing you to enter pertinent information relating to the sample. Any information you enter here is printed as part of the Sample Log report (select in Report Options).

Revert

Displays the Revert dialog allowing you to revert back to a previous version of the sample file.



The Revert dialog lists previous versions of the current file and the comment entered for each one; it does not list the current version. You can use the drop-down list to choose other versions; each version's comments will be listed in the Comment window.

Replace All

Click this push button to replace all parameters of the current sample file with those from another one.

Save

Displays the Save as Sample Information File dialog (shown on page 4-7).

This dialog allows you to choose the directory in which to save the file. The **Save** push button becomes enabled allowing you to complete the save operation after you make an entry in the **Comments** window. If **Save** does not become enabled after an entry is made in the Comments window, a file with the same identification currently exists in the selected directory. You must choose a different directory or edit the identification of the current file. The Confirm program does not allow duplicate descriptions.

Save as Template

Enables you to save all parameters of the current file as a sample information file template.

Close

Closes the dialog. If the file contains unsaved changes, you are prompted to save before the dialog closes.

Basic

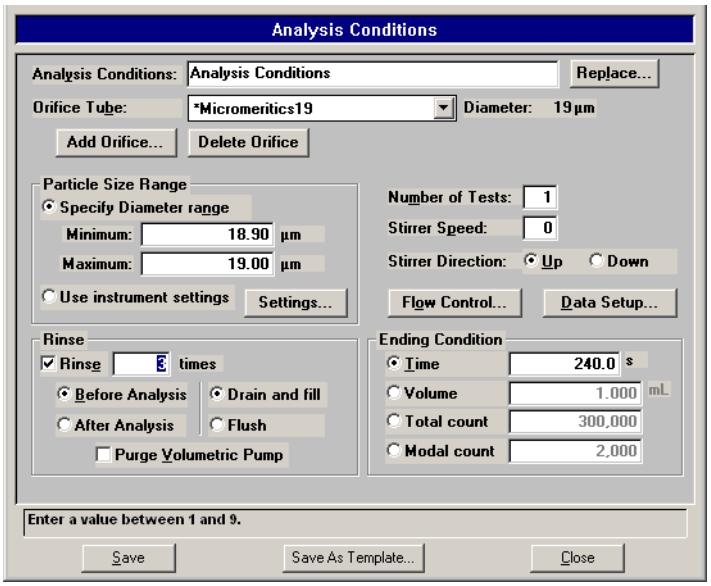
Displays the sample information dialog in the Analyst format (explained in the previous section).

The **Analysis Conditions**, **Material Properties**, and **Report Options** tabs of the Advanced presentation sample information file are described in subsequent sections.

Analysis Conditions

An Analyst is not authorized to create Analysis Conditions files.

This dialog allows you to specify analysis conditions for your sample. You can create an Analysis Conditions file as an independent parameter file or as part of a sample information file. You can also save the analysis conditions portion of a sample information file as an analysis conditions file.



Analysis Conditions

Displays a description of the current Analysis Conditions template. Enter a new description or add to the existing one if desired; the Elzone Confirm program does not allow duplicate descriptions.

Be sure to use an intuitive name (perhaps one that characterizes the analysis conditions) so that it can be easily recognized when needed.

You can enter up to 40 alphanumeric characters in this field.

Replace

Allows you to replace the values in the current file with those from an existing file. Simply click the push button, choose the desired file, and click **OK**. The values of the chosen file are copied into the current file; you can edit them as desired.

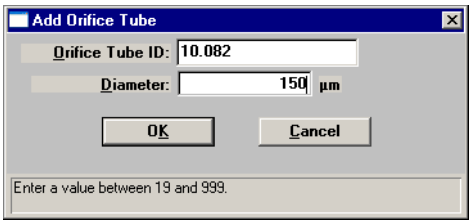
Orifice Tube

This drop-down list contains existing orifice tubes. If the orifice tube has not been calibrated, its name (description) is preceded with an asterisk (*). The diameter of the selected orifice tube is displayed adjacent to the **Orifice Tube** field.

You must select an appropriate orifice tube before you can perform an analysis.

Add Orifice

Displays the Add Orifice Tube dialog so that you can add an orifice tube to the drop-down list.



Delete Orifice

Deletes the orifice tube currently displayed in the **Orifice Tube** field; a confirmation dialog is displayed before the tube is deleted from the list.

Particle Size Range

These options enable you to specify a diameter range or specify instrument settings.

Specify Diameter range

Enables you to specify a range for the size of particles to be read. You should stay within 2% to 70% of the orifice diameter and should not exceed a 30:1 ratio.

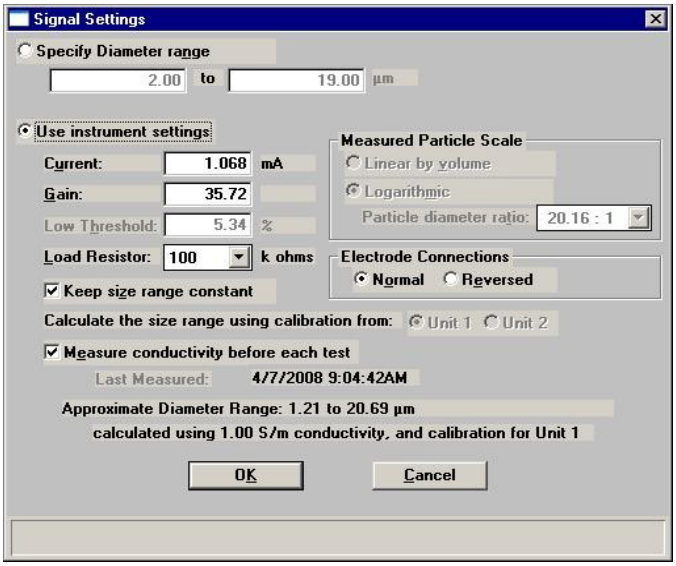
When you choose this option, the instrument settings are automatically set by the software. Most Elzone users choose this option.

Use instrument settings

Enables you to specify settings for the instrument. This option is used by a more advanced user. This option can also be used if you have a sample file used in an analysis and which contains appropriate settings.

Settings

Displays the Signal Settings dialog allowing you to define signal settings for analysis conditions.



If you choose **Specify Diameter range** on the Analysis Conditions dialog, the fields on this dialog are disabled and display the settings automatically set by the software. If you feel the settings are inappropriate, you can select **Use instrument settings** and edit the values as required.

Use instrument settings

This option enables you to specify instrument settings and should be used only by a more advanced Elzone user.

Current
Gain

Adjust these values to determine the size of particles to be read. Increase the settings to include smaller particles; decrease them for larger particles.

Low Threshold

Enabled when you deselect **Keep size range constant**, allowing you to enter a value for the threshold.

The threshold is the lower limit of the size distribution. The lowest optimum threshold is determined automatically by the software.

Load Resistor

Enabled when you deselect **Keep size range constant**, allowing you to choose a different value for the load resistor.

This function helps to reduce the noise level for high- or low-conductive electrolytes. Typically, a larger load resistor corresponds to smaller orifices.

Keep size range constant

If this option is selected, you can adjust the current and gain only. Each time you edit one, the other is automatically adjusted to keep the range constant for the selected ratio.

If you deselect this option, the **Low Threshold** and **Load Resistor** fields, and the options in the **Measured Particle Scale** group box are enabled.

Measure conductivity before each test

Select this option to have the conductivity measured before each test specified in the file.

If you deselect this option, the last conductivity recorded for the current orifice tube and liquid will be used.

Measured Particle Scale

Provides options for a linear or logarithmic scale. If you choose **Logarithmic**, the **Particle Diameter ratio** field is enabled, allowing you to choose a ratio (largest particle to the smallest particle) from the drop-down list.

Electrode Connections

Enables you to choose a normal or reversed connection.

Normal transmits the electric current from the inside of the orifice tube to the outside.

Reversed transmits the electric current from the outside of the orifice tube to the inside.

Rinse

Select this option to have rinse(s) performed; all options in this group box are enabled.

Use the **times** field to enter the number of rinses desired. Then choose when the rinse(s) is(are) to be performed; you can rinse before or after the analysis.

From the two options on the right side of the group box, choose the type of rinse desired. **Drain and fill** completely drains the system, then refills it. **Flush** simply flushes concentration through the system, maintaining liquid in the system at all times.

Select **Purge Volumetric Pump** to have the volumetric pump (if installed) purged during the rinsing process.

Number of tests

Enables you to enter the number of tests you plan to perform using the current file; you can perform up to eight tests with each file.

Stirrer Speed

Allows you to specify a stirrer speed (or pulse rate). The lower the number, the lower the speed; 0 (zero) turns the stirrer (or hydropulser) off.

Stirrer Direction

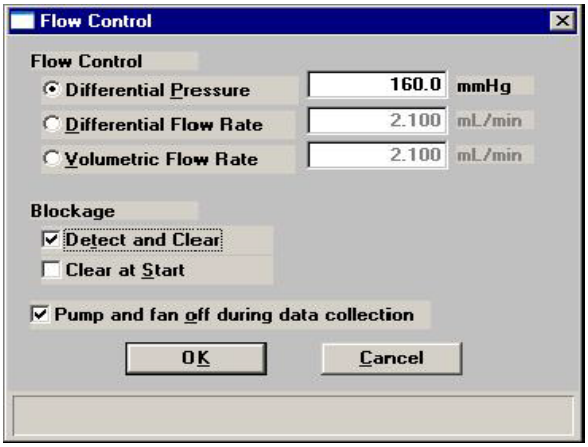
Enables you to specify a direction for particle circulation.

Up rotates the stirrer in a direction that pushes the particles upward. **Down** rotates the stirrer in the opposite direction, pushing the particles downward.

This option is not applicable if you have a hydropulser installed on the Elzone analyzer.

Flow Control

Displays the Flow Control dialog allowing you to specify the flow rate of the analysis liquid and to choose a blockage detection method.



Flow Control

Choose the type of flow control desired; then enter a value in the adjacent field.

Differential Pressure is the default and typically is used for collecting sizing data. This is the method used on the Elzone 5380 series analyzers.

Differential Flow Rate typically is used for concentration and sizing analyses in which a known volume of liquid is measured.

Volumetric Flow Rate is used for the same type of analyses as Differential Flow Rate; however, data typically are a little more accurate. This option is not available if you do not have the volumetric pump installed.

Blockage

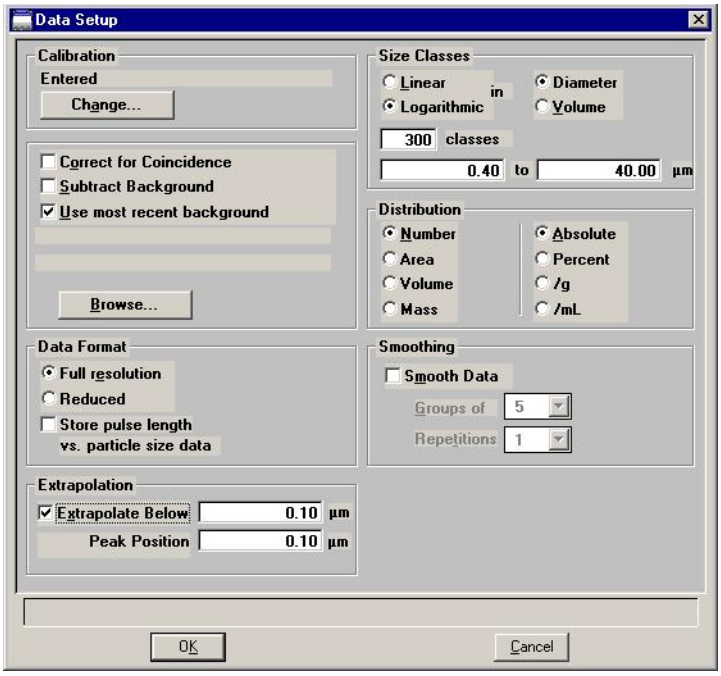
You can choose to have blockages detected and cleared during analysis (default) and/or at the start of the analysis.

Pump and fan off during data collection

Turns the pump and fan off during data collection. You may wish to use this option for extremely noise-sensitive applications, such as when using a small orifice tube (19 or 30 µm) with low conductivity electrolytes.

Data Setup

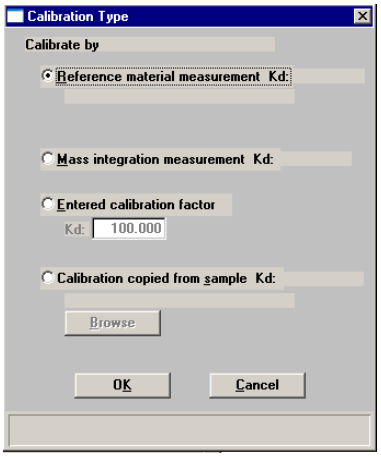
Displays the Data Setup dialog enabling you to specify how raw data are to be produced.



After analysis is complete, the parameters for data setup can be edited by clicking **Data Setup** on the Collected Data dialog explained on page **4-43**.

Calibration

Displays the date and time for the type of calibration selected. Click **Change** to choose a different type of calibration; the Calibration Type dialog is displayed.



Reference material measurement
Uses data from a reference material measurement.

Mass integration measurement
Before the analysis, displays **Measured**; after analysis, it will display the date and time of the analysis that was used for the measurement.

Entered calibration factor
Enter the desired calibration factor. The following table provides the nominal Kd values for Elzone orifice tubes.

Nominal Kd values for Elzone Orifice Tubes	
Orifice Size	**Kd**
19	33
30	42
48	60
76	93
95	120
150	185
190	250
300	448
380	582

Calibration copied from sample
Uses calibration data from a completed sample file that used the same orifice tube; the **Browse** push button is enabled allowing you to choose the file.

Correct for Coincidence

Select this option to have coincidence correction applied.

It is always possible that two or more particles may pass through the orifice at the same time, this is known as *coincidence*. Coincidences cause a portion of the true distribution to be absent and a distorted distribution of oversize, spurious particles. The coincidence correction removes distortion from the distribution and restores the missing pulses.

Subtract Background

This option enables you to subtract any particles that may have been detected in the background measurement.

When you select this option, be sure to click **Browse** and choose a background file or select **Use most recent background**. If you choose a background file that contains numerous tests, the test that is selected from the **Test** drop-down list on the Report Options dialog is the one that will be used for the background subtraction.

Subtract Background (*continued*)

If you neglect to choose a background, you will be warned at the time of analysis and given another opportunity to select a background. If a background is still not selected, a “null” background will be used for data reduction.

The type of background subtraction you use will be printed in the report header.

Use most recent background

Select this option to use the most recent background.

If you wish to use a different background file, deselect this option and use the **Browse** push button to choose the file containing the desired background.

Size Classes

The options in this group box enable you to specify how distribution data are binned (sorted).

You can choose to report data as **linear** or **logarithmic** by **diameter** or **volume**.

Use the classes field to specify the number of classes desired, and the range fields to enter a range.

Distribution

Enables you to choose the manner in which data are presented; choose one from each column.

Smoothing

Select **Smooth Data** to reduce data scattering.

Use the **Groups of** drop-down list to choose the number of size classes to be included.

The smoothing process defaults to **1**; however, you can have it repeated by choosing **2** from the **Repetitions** drop-down list.

Data Format

Enables you to choose the type of data format you wish to store in the sample file. These choices affect the size of the sample file.

Full resolution
This option saves and stores full-resolution data. Be sure to select this option if you plan to generate pulse length reports or if you are collecting background data.

Reduced
This option saves only the binned data; high-resolution data are lost. The size of the file is reduced but you cannot edit any data setup parameters (collected data dialog) other that distribution and smoothing.

Store pulse length vs. particle size data
Select this option to have pulse length and particle size data collected and stored for the Pulse length vs. particle size data report. If this option is not selected, you will be unable to generate the report.

Extrapolation

Use this feature to complete data below the ending point when data does not return to zero on the y-axis; missing points will be calculated automatically.

You can also have data extrapolated after the analysis (see **Collected Data**, page **4-43**).

Ending Conditions

Choose one of these options to specify when to end the analysis.

Time

Analysis ends when the specified time interval expires.

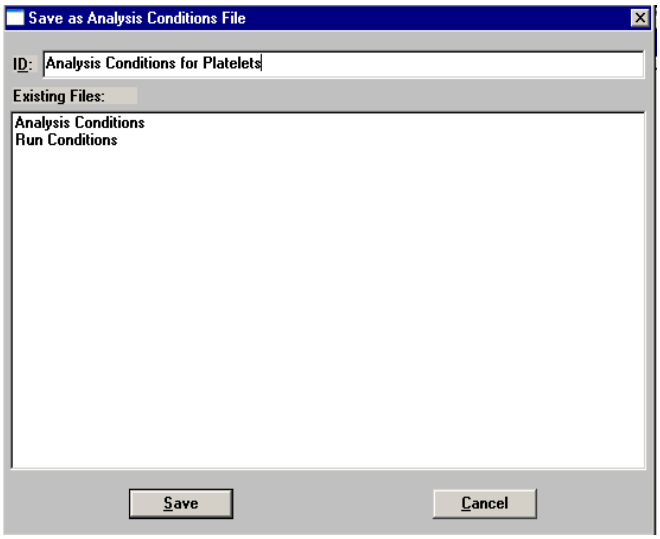
Volume

Analysis ends when the specified liquid volume is reached.

Total count — Analysis ends when the specified number of particles over the entire range is reached.

Modal count — Analysis ends when the specified number for the particle size is reached.

Save — Displays the Save as Analysis Conditions File dialog



If the **Save** push button is not enabled, a file with the same ID currently exists. You must edit the identification of the current file before it can be saved. The Elzone Confirm program does not allow duplicate descriptions.

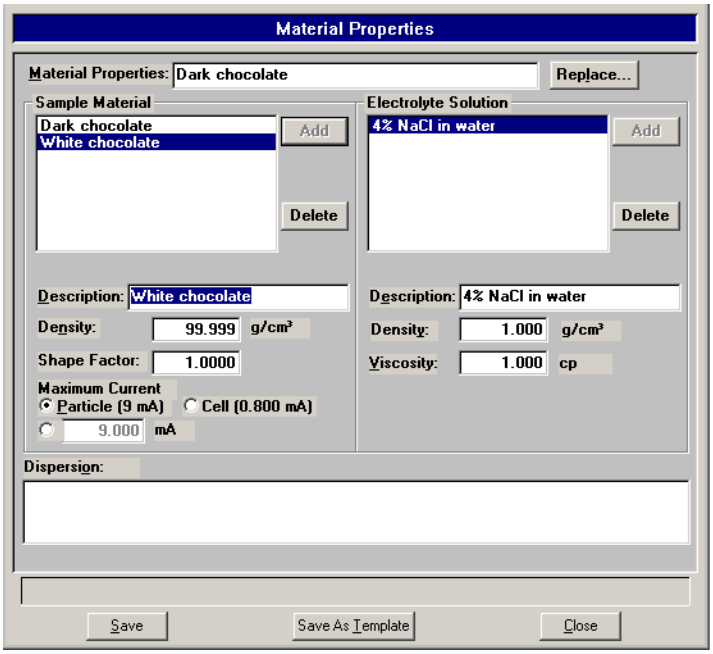
Save as Template — Enables you to save all parameters of the current file as an Analysis conditions template.

Close — Closes the dialog. If the file contains unsaved changes, you are prompted to save before the dialog closes.

Material Properties

An Analyst is not authorized to create Material Properties files.

This dialog allows you to specify the properties of the sample material being analyzed and the electrolyte solution in which it is dispersed. You can create a Material Properties file as an independent parameter file or as part of a sample information file. You can also save the materials properties portion of a sample information file as a material properties file.



Material Properties

Displays a description of the current Material Properties template.

Enter a new description or add to the existing one if desired; the Elzone Confirm program does not allow duplicate descriptions. Be sure to use an intuitive name (perhaps one that characterizes the sample's properties) so that it can be easily recognized when needed.

You can enter up to 40 alphanumeric characters,

Replace

Allows you to replace the values in the current file with those from an existing file. Simply click the push button, choose the desired file, and click **OK**. The values of the chosen file are copied into the current file; you can edit them as desired.

Sample Material — Displays a list of available sample materials. After you select a sample material from the list, its description and properties are displayed.

- **Description** — Displays the sample material you select from the list. This field is also used to add sample materials to the list.
- **Density** — Displays the density of the selected material.
- **Shape Factor** — Displays the shape factor of the selected material, or enables you to enter a shape factor for a material you are adding to the list.

  The shape factor is an adjustment for non-spherical particles.
- **Maximum current** — Displays the maximum current for the selected method.
- **Add** — Enables you to add sample materials to the list.

  Use the **Description**, **Density**, **Shape Factor**, and **Maximum Current** fields to enter your material and its properties, then click **Add** to add it to the list.
- **Delete** — Deletes the selected material from the list.

Electrolyte Solution — Displays a list of available electrolyte solutions (dispersing liquids). After you select a solution from the list, its description and properties are displayed.

- **Description** — Displays the electrolyte solution you select from the list. This field is also used to add liquids to the list.
- **Density** — Displays the density of the selected electrolyte solution.
- **Viscosity** — Displays the viscosity of the selected electrolyte solution.
- **Add** — Enables you to add sample materials to the list.

  Use the **Description**, **Density**, and **Viscosity** fields to enter your electrolyte and its properties, then click **Add** to add it to the list.
- **Delete** — Deletes the selected electrolyte solution from the list.

Dispersion

Enables you to enter pertinent information about the dispersion. The information you enter in this window appears in the Options report.

Save

Displays the Save as Materials Properties File dialog (see page **4-21** for an example of this dialog).

If the **Save** push button is not enabled, a file with the same ID currently exists. You must edit the identification of the current file before it can be saved. The Elzone Confirm program does not allow duplicate descriptions.

Save as Template

Enables you to save all parameters of the current file as a Materials properties template.

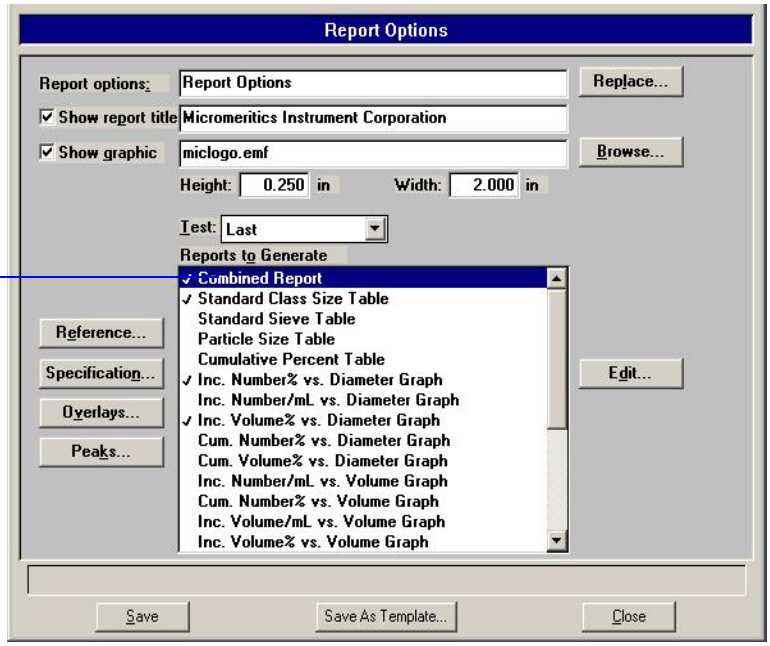
Close

Closes the dialog. If the file contains unsaved changes, you are prompted to save before the dialog box closes.

Report Options

An Analyst is not authorized to create Report Options files.

This dialog enables you to select report options. You can create a Report Options file as an independent parameter file or as part of a sample information file. You can also save the Report Options portion of a sample information file as a report options file



A report is selected when preceded with a check mark.

Report options

Displays a description of the current Report Options template.

Enter a new description or add to the existing one if desired; the Elzone Confirm program does not allow duplicate descriptions. Be sure to use an intuitive name so that it can be easily recognized when needed.

You can enter up to 40 alphanumeric characters.

Replace

Allows you to replace the values in the current file with those from an existing file. Simply click the push button, choose the desired file, and click **OK**. The values of the chosen file are copied into the current file; you can edit them as desired.

Show report title

Select this option to have a title appear at the top of your report; use the adjacent field to enter the text.

You can enter up to 40 characters.

Show graphic

Select this option to have a graphic (bitmap or enhanced metafile) display above the report title. For example, you may wish to display your company logo. Click **Browse** to select the desired graphic, then use the **Height** and **Width** fields to specify the size. This image can be edited from the report window.

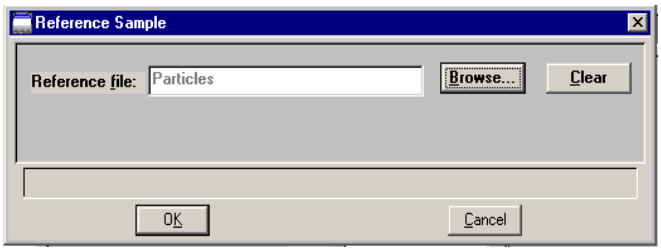
Test

Use this drop-down list to choose the test on which to report data. You can report data from the first test, the last test, an average of all tests, or on all tests.

For background files, the test selected in this field is the one that will be used for any background operation; for example if you have selected this file to use for subtracting a background.

Reference

Displays the Reference Sample dialog so that you can specify a sample file with which to compare analysis results of the current sample; produces a Difference of Reference report.

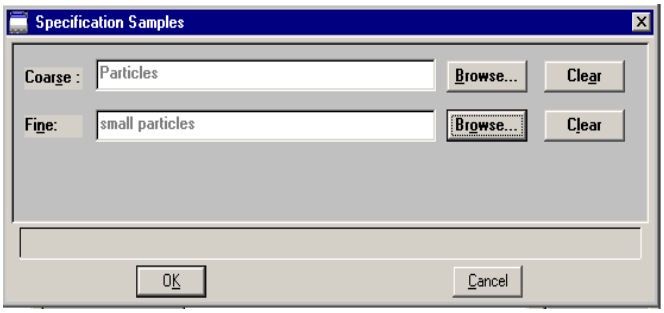


Click **Browse** to display the Reference Sample File Selection dialog containing a list of sample files from which to choose a file.

Use **Clear** to clear a field of its entry.

Specification

Displays the Specification Samples dialog so that you can specify the sample files to be used for the boundaries of the coarse and fine specifications; produces an Out of Specification report. Then you can quickly determine if the results of the current sample are within the specified boundaries.

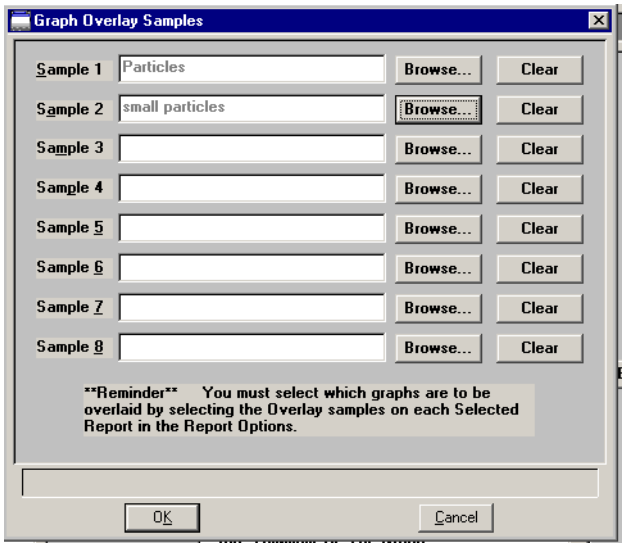


Click **Browse** to the right of each field to display the Specification Sample File Selection dialog containing a list of sample files from which to choose a file.

Use **Clear** to clear a field of its entry.

Overlays

Displays the Graph Overlay Samples dialog so that you can choose the sample files containing the data you wish to overlay onto a selected plot.



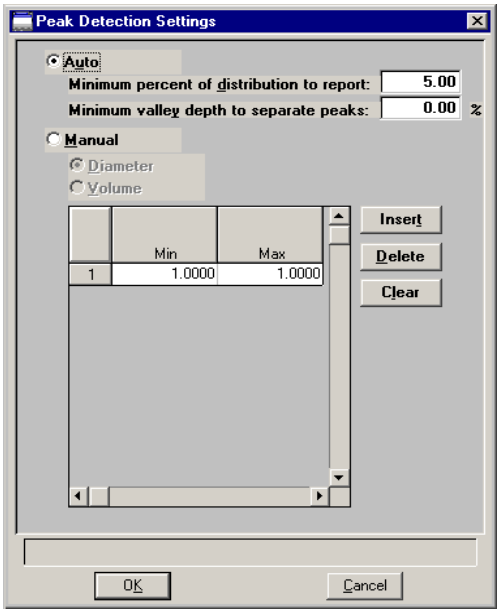
Click **Browse** to the right of the sample number field(s) to choose the desired file(s). Use **Clear** to clear a field of its entry. You can select up to eight files.

Overlays
(continued)

After choosing the desired files, be sure to edit the type of graph you are overlaying and choose the **Overlay samples** option.

Peaks

Displays the Peak Detection Settings dialog, allowing you to choose how peaks are detected.



Auto

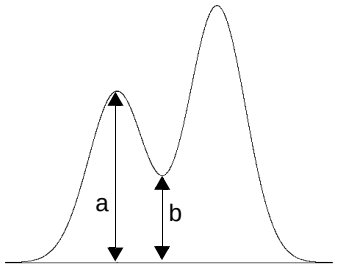
Select this option to have peaks detected automatically. When you select this option, the **Minimum distribution to report** and **Minimum valley depth to separate peaks** fields are enabled, allowing you to specify a threshold for the peak size.

The valley depth option enables you to specify a threshold for resolving multiple peaks. Valley depth is calculated as:

$$\frac{a-b}{a} \times 100\%$$

Auto *(continued)*

where a = the smaller peak
b = lowest point between the two peaks



If the depth is greater than the value you enter as the minimum, the two peaks are treated as separate; otherwise, they are treated as one peak.

Manual

This option enables you to define the peaks by **Diameter** or **Volume**. Use the table to enter the minimum and maximum values for each peak to be detected.

Reports to Generate

Contains a list of available reports.

A report is selected when it is preceded with a check mark. Select reports by double-clicking the desired report(s). Alternatively, you can highlight the desired report and press **Spacebar**. Reports are deselected in the same manner. Certain reports can be edited by highlighting the desired report and clicking **Edit**.

You can also generate Statistical Process Control (SPC) reports using the options on the Reports menu.

Edit

Enables you to edit the highlighted report. Refer to subsequent sections for editing details on the reports available with the Elzone program.

The following reports cannot be edited:

- Calibration
- Log Probability
- Options
- Rosin Rammler
- Sample Log

Save

Displays the Save as Report Options File dialog (see page **4-21** for an example of this dialog).

If the **Save** push button is not enabled, a file with the same ID currently exists. You must edit the identification of the current file before it can be saved. The Elzone Confirm program does not allow duplicate descriptions.

Save as Template

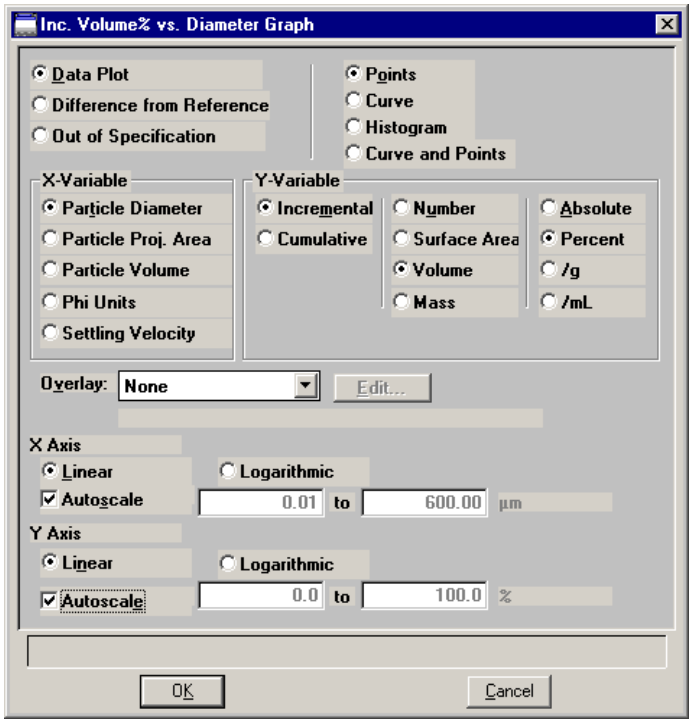
Enables you to save all parameters of the current file as a report options template.

Close

Closes the dialog. If the file contains unsaved changes, you are prompted to save before the dialog box closes.

Graphs

All graph report options are similar and are edited in the same manner. Click **Edit** for a selected graph report; a dialog similar to the following is displayed.



Data Plot
Difference from Reference
Out of Specification

From this group, choose the type of plot desired.

If you select **Difference from Reference** or **Out of Specification**, be sure to click the related push button on the Report Options dialog to choose the file(s).

Points
Curve
Histogram
Curve and Points

Enables you to choose the manner in which to have data plotted.

X-Variable

Enables you to choose the x-axis variable.

Y-Variable

Enables you to choose the y-axis variable and the manner in which it is to be plotted.

Overlay

Click on the down arrow to display the types of overlays available.

Samples

Enables you to overlay the current curve with the same type of curve from multiple sample files. Click **Overlays** on the Report Options dialog to choose the sample file(s) containing the desired curves.

Tests

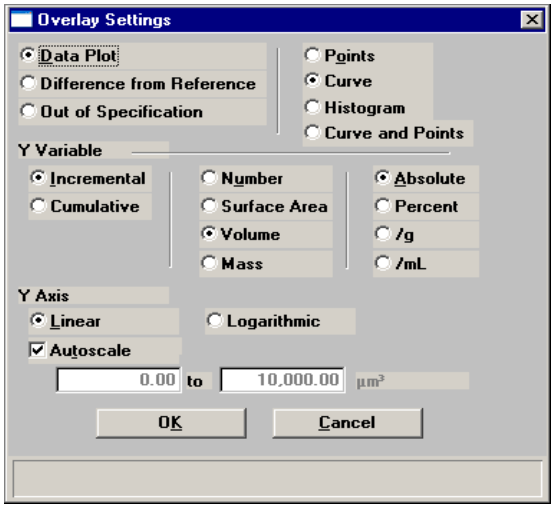
Enables you to overlay the same type of curve from all tests performed with this file.

Plot

Enables you to overlay a different variable with the selected variable (the one you are currently editing). Use the **Edit** button to specify details.

Edit

Enabled when you choose **Plot** as the type of overlay allowing you to choose the overlay variable and specify details; the Overlay Settings dialog is displayed.



X-Axis
Y-Axis

Allows you to choose between a Linear or Logarithmic scale as well as autoscale options.

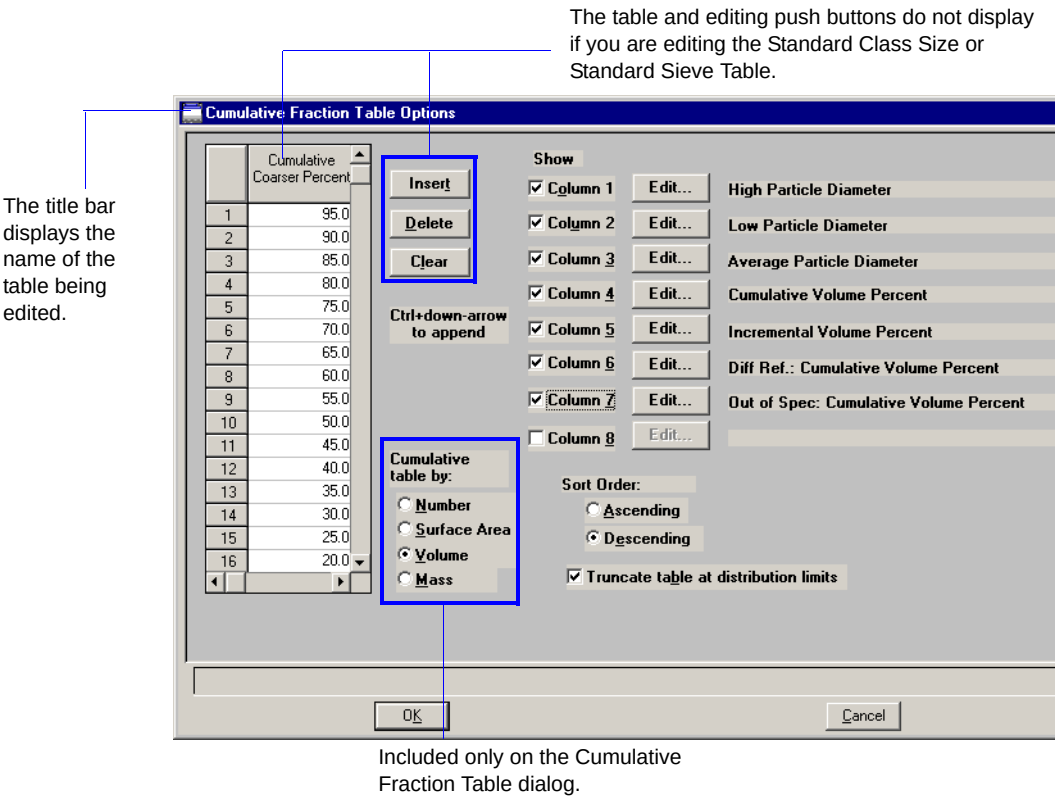
Autoscale

Select this option to have the Y-axis scaled automatically. The scale begins at zero; the highest values collected during analysis are the ending points.

If you deselect this option, the adjacent fields become enabled so that you may specify a range. Valid ranges are displayed in the information bar when the field is selected.

Editing Tables

Select a table to edit; a dialog similar to this one is displayed.



The Standard Class Size Table and the Standard Sieve Table are fixed and, therefore, do not contain a table of values, nor push buttons.

- The Standard Class Size Table is fixed based on the classes specified in Analysis conditions (Data Setup). After the analysis is finished, data can be edited from the Collected Data dialog.
- The Standard Sieve Table is fixed based on the sieves specified using the **Data presentation**, **Sieve Table** option on the Options menu.

Table

Enter the values at which you wish the data to be reported (or accept the defaults).

Not included on the dialogs for the Standard Class Size Table and the Standard Sieve Table.

Insert	Inserts a point above the selected point. Use **Ctrl** ↑ to add points at the beginning of the table and **Ctrl** ↓ to add points at the end of the table. Not included on the dialogs for the Standard Class Size Table and the Standard Sieve Table.
Delete	Deletes the selected point. Not included on the dialogs for the Standard Class Size Table and the Standard Sieve Table.
Clear	Clears all but one point from the table; one point is required. Not included on the dialogs for the Standard Class Size Table and the Standard Sieve Table.
Column [n]	Select these options to choose the type of data to display in report columns. Then click its adjacent **Edit** push button to specify details.
Sort Order	Choose whether you wish to have points collected in an ascending or descending order.
Truncate table at distribution limits	Select this option to have the table shortened to the limits of the distribution.
Cumulative table by	Enables you to select the manner in which to display the Y-axis. Displays only on the Cumulative Fraction Table dialog.

Rosin Rammler

The Rosin Rammler report depicts the collected data as applied to the Rosin Rammler* theory; this report cannot be edited.

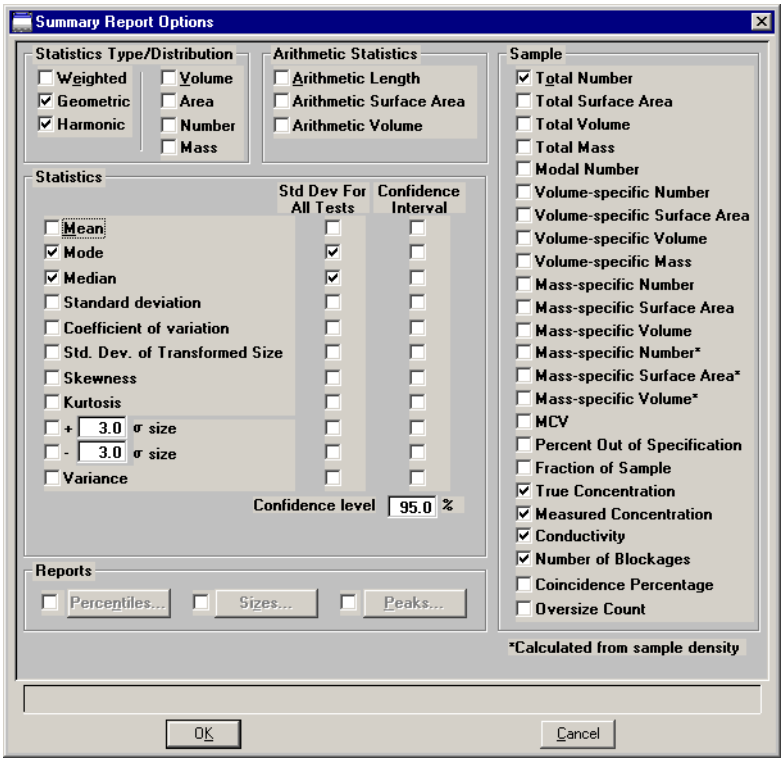
*Rosin, P. and Rammler, E., *J. Inst. Fuel*, 7, 20 (1933)

Log Probability Report

The Log Probability Report provides a comparison of the collected data to that of a log-normal distribution; it cannot be edited.

Summary Report

The Summary report provides a condensed listing of analysis statistics and data results. The Summary Report Options dialog allows you to choose the type of information to include in the report.



Statistics Type/Distribution — Choose the type of statistics and distribution you wish to report.

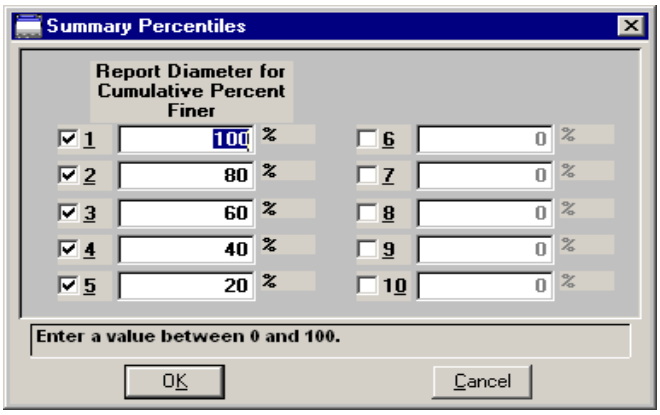
Arithmetic Statistics — Choose the arithmetic statistics you wish to include in the report.

Statistics — Select the variables you wish to include in the report.

Reports — Choose the type of distribution(s) you wish to report.

Percentiles

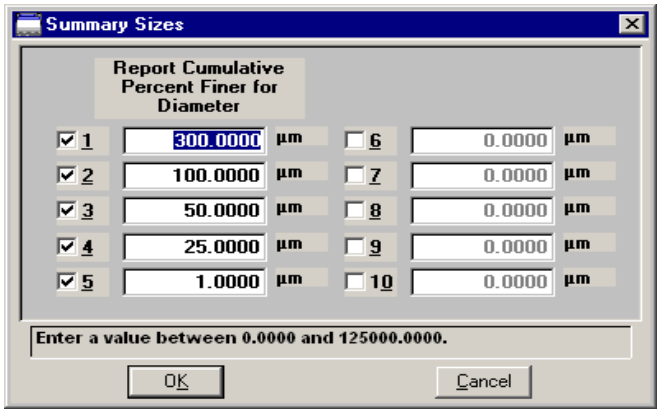
Displays the Summary Percentiles dialog.



This dialog allows you to report the particle diameter (or radius) corresponding to each specified coarser (or finer) percentile. You can enter up to 10 values in any order. If you enter zero (0.00), a blank line is shown on the report.

Sizes

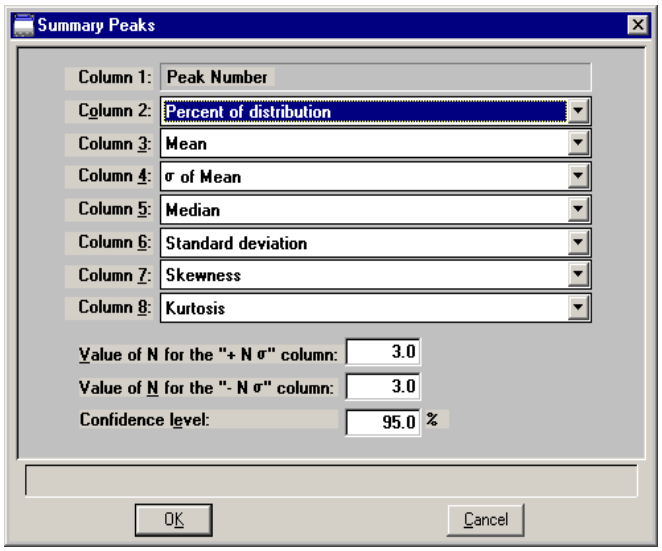
Displays the Summary Sizes dialog.



This dialog allows you to report the cumulative percent (or fraction) coarse (or finer) for each specified diameter (volume). You can enter up to 10 values in any order. If you enter zero (0.00), a blank line is shown on the report.

Peaks

Displays the Summary Peaks dialog.



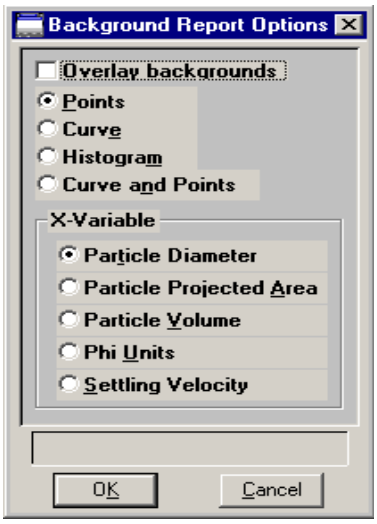
This dialog enables you to specify the types of data to display in the columns of the peak table. Column 1 is fixed and cannot be edited.

Sample

Choose the sample parameters you wish to include in the report.

Background Report

Select **Background** to edit; the Background Options dialog is displayed.



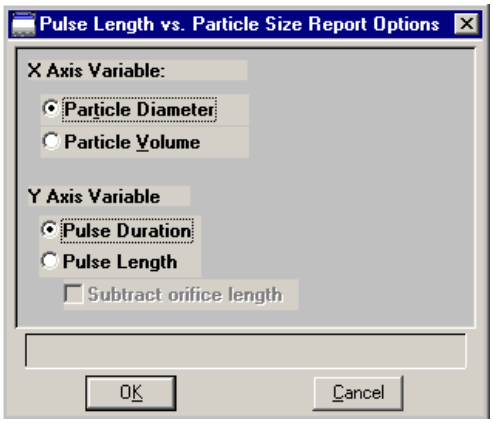
Overlay backgrounds — Choose this option to overlay the background of this sample analysis with the background(s) of other analyses. Click **Overlays** on the Report Options dialog to choose the files containing the backgrounds you wish to overlay.

Points
Curve
Histogram
Curve and Points — Choose the manner in which you wish the background data to display.

X variable — Choose the variable you wish to display for the X-axis.

Pulse Length vs. Particle Size Report

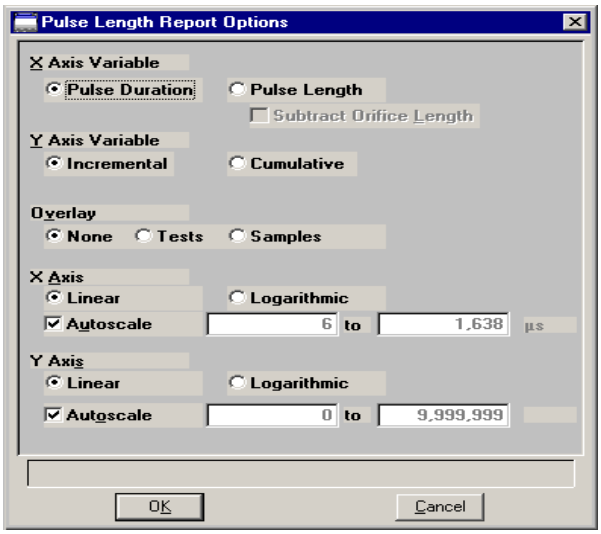
Select **Pulse Length vs. Particle Size** to edit; the Pulse Length vs. Particle Size Report Options dialog is displayed.



This dialog enables you to specify a variable for the x- and y-axes. You must also ensure that the pulse length and particle size data are stored to obtain this report. This is requested on the Analysis conditions screen; click **Data Setup** and select the **Store pulse length vs. particle size data** option located on the lower portion of the dialog. If this option is not selected, appropriate data will not be stored and, therefore, the Pulse Length vs. Particle Size report cannot be produced. You must also choose **Full Resolution** data on the Data Setup dialog (page **4-20**) to generate this type of report.

Pulse Length Report

Select **Pulse Length** to edit; the Pulse Length Report Options dialog is displayed. When generating this type of report, you must choose **Full Resolution** data (page **4-20**) on the Data Setup dialog *before* analysis.



X Axis Variable

Enables you to have the X-axis variable reported as Pulse Duration or Pulse Length. When Pulse Length is selected, the **Subtract Orifice Length** field is enabled; this allows you to have the orifice length subtracted from the pulse length.

Y Axis Variable

Enables you to have the Y-axis variable reported as Incremental or Cumulative.

Overlay

Select **Tests** to overlay data from all tests in the current file, or **Samples** to overlay data in the current file with data from other analyses.

If you select **Samples**, select **Overlays** on the Report Options dialog to choose the files you wish to use.

X-axis
Y-axis

Allows you to choose between a Linear or Logarithmic scale as well as autoscale options.

Autoscale

Select this option to have the X- and/or Y-axis scaled automatically. Both axes begin at zero; the highest values collected during analysis are the ending points.

If you deselect this option, the adjacent fields become enabled so that you may specify a range. Valid ranges are displayed in the information bar when the field is selected.

Options Report

The Options report is a subset of the contents report; it provides pertinent information for the following:

- the sample
- analysis conditions
- material properties
- data collection

The Options Report cannot be edited.

Calibration Report

The Orifice Tube Calibration report contains tabular data for the reference material and goodness of fit, as well as a graphical representation of the goodness of fit. This report can also be generated using the Orifice Tube Calibration command on the Reports menu; refer to **Orifice Tube Calibration**, page **6-7** for additional information on this report.

The Calibration Report cannot be edited.

Sample Log Report

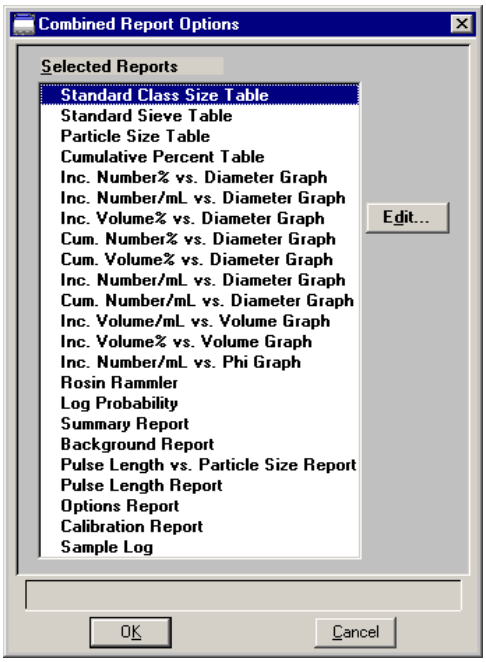
The Sample Log Report provides the following statistics:

- manual control operations performed during analysis
- Information entered using the **Add Log Entry** push button on the sample file editor
- warnings and/or errors that occurred during analysis

The Sample Log Report cannot be edited.

Combined Report

Select the Combined Report to edit; the Combined Report Options dialog is displayed.



The list of reports for the Combined Report is almost identical (the Combined report, of course, is not included in this list) to the list of reports generated in the normal manner. The difference is that the reports generated from the selections on this dialog contain no page breaks or headings. And, unless too many are selected, all reports display on a single page.

Collected Data

The tab for Collected Data does not appear on the Developer's Advanced dialog presentation until after analysis.

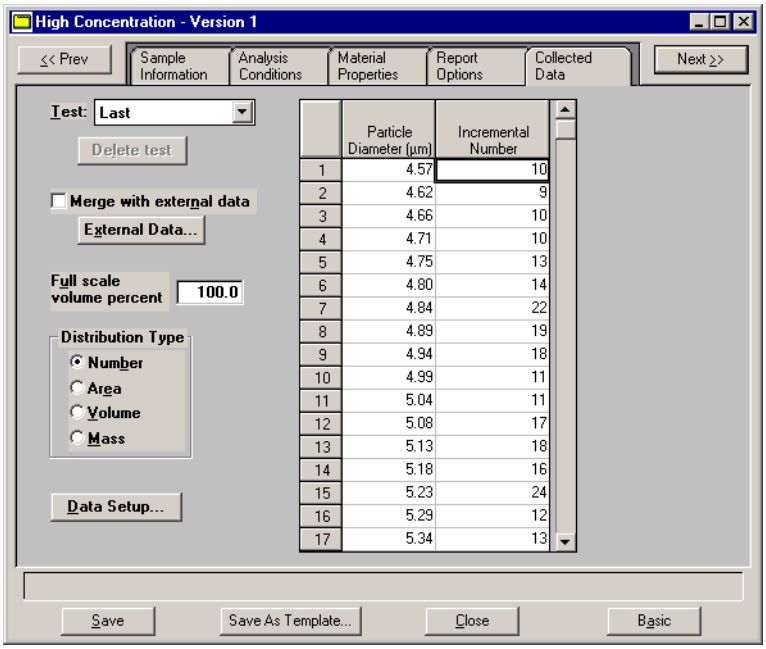


Table — Displays data points for the current test selected from the Test drop-down menu.

Test — Displays the current test for this sample file. If you wish to view data for another test, click on the down arrow to select the desired test.

Delete Test — Click this push button to delete the test displayed in the **Test** field. If only one test exists, this push button is disabled; one test must remain in the file.

Merge with external data — Enables you to merge data collected by some other method with the data of the current test. Click **External Data** to enter the data to be merged.

External Data — Enabled when you select **Merge with external data**. Displays the External Data dialog so that you can enter the data you wish to have merged.

Full scale volume percent

Select this option if you analyzed part of the sample by another method but you *do not* wish to merge the results with the reports for the current test. Specify the volume percent of the sample actually analyzed by the analyzer versus the percent that is manually analyzed. The data are scaled accordingly.

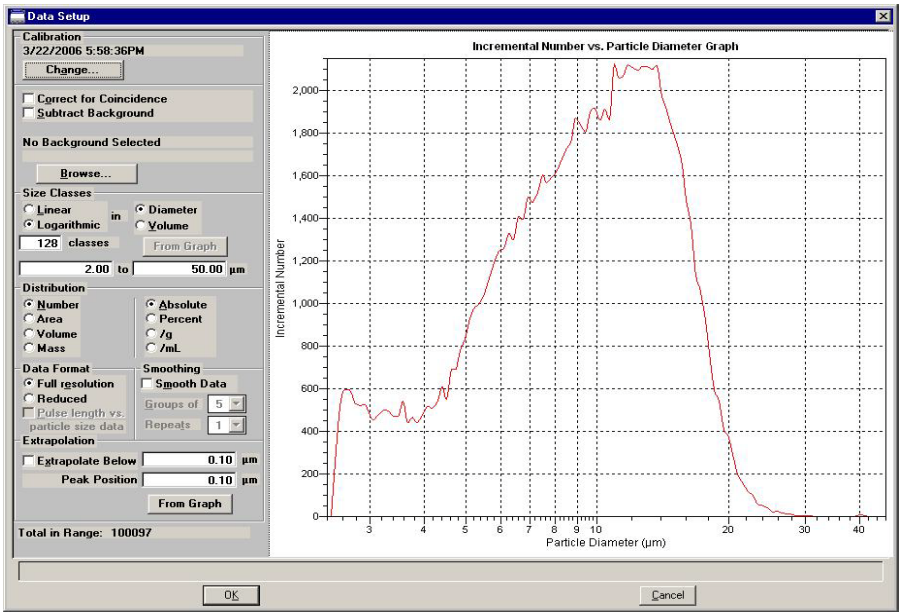
Disabled when **Merge with external data** is selected.

Distribution Type

Allows you to choose the type of distribution to display in the table.

Data Setup

Displays the Data Setup dialog. This dialog enables you to edit the manner in which the data are displayed. If **Reduced** was selected as the **Data Format**, many of the options are disabled and cannot be edited.



Subtract Background

Enabled for **Full resolution** data allowing you to subtract particles that may have been detected in the background measurement. After you select this option, click **Browse** to choose the background file you wish to use.

If you choose a background file containing multiple tests, be sure to access the Report Options dialog in the file and ensure that the desired test is selected in the **Test** field prior to selecting it on this dialog.

From Graph

This option enables you to choose a size range marked on the graph by a set of cross hairs. This button does not become enabled until you have marked the range.

Simply click in the graph at the point you wish to begin the range to place the first cross hair. Hold down the **Shift** key and click at the ending range to place the second cross hair. Then click **From Graph** to set the range.

The total number of particles in the specified range displays in the lower left of the dialog.

Distribution

Enables you to select the manner in which data are presented in the graph. Each time you select a different option, the data are rescaled accordingly.

Extrapolation

Use this feature to complete data below the ending point when data does not return to zero on the y-axis; missing points will be calculated automatically.

A **From Graph** push button is also provided for this feature (it works in the same manner as the one explained above).

This feature is available for full-resolution or reduced data; the extrapolation point is displayed in the report header.

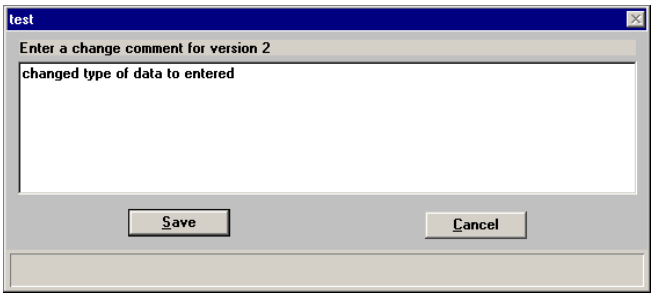
Remaining fields on this dialog

Refer to page **4-17** for a description of their functions.

Save

Displays the Save as Sample Information File dialog (see page 4-7 for an explanation of this dialog).

If this is not the first time the file has been saved, a dialog prompting you for a reason for the change is displayed.



After you make an entry in the window, **Save** is enabled allowing you to complete the save operation.

Save as Template

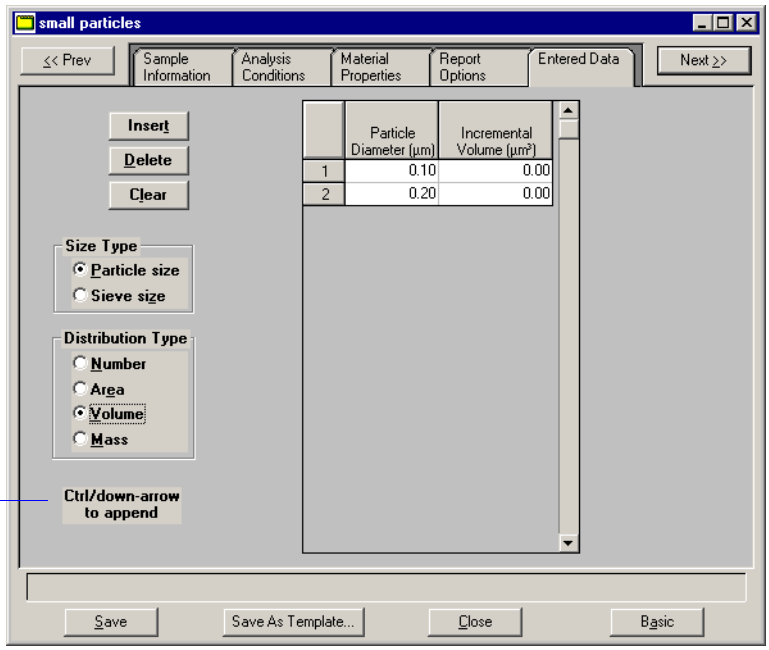
Enables you to save all parameters of the current file as a Sample Information File template.

Close

Closes the dialog. If the file contains unsaved changes, you are prompted to save before the dialog box closes.

Entered Data

An **Entered Data** tab displays when you select **Manually entered** on the Sample information dialog. The dialog for Entered Data enables you to enter data as opposed to having it collected automatically during analysis.



Use this key sequence to add rows to the list.

You cannot enter data if you are using a computer other than the one that is connected to the analyzer.

Table — Enables you to enter the desired data; data are entered in an ascending order.

Insert — Inserts a row above the selected row.

Delete — Deletes the selected row.

Clear — Clears the table of all entries but two; two are required.

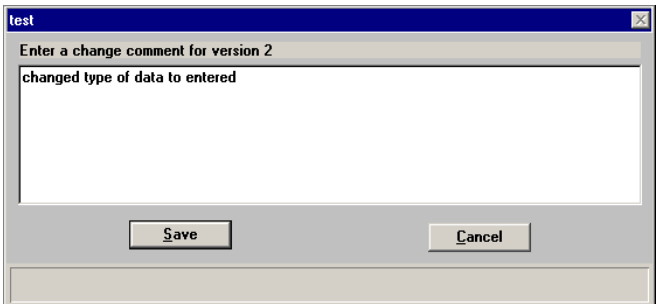
Size Type — Enables you to select the type of size data you plan to enter; you can enter particle size or sieve size data.

Distribution Type — Enables you to select the type of distribution for the data you plan to enter.

Save

Displays the Save as Sample Information File dialog (see page 4-7 for an explanation of this dialog).

If this is not the first time the file has been saved, a dialog prompting you for a reason for the change is displayed.



After you make an entry in the window, **Save** is enabled allowing you to complete the save operation.

Save as Template

Enables you to save all parameters of the current file as a Sample Information File template.

Close

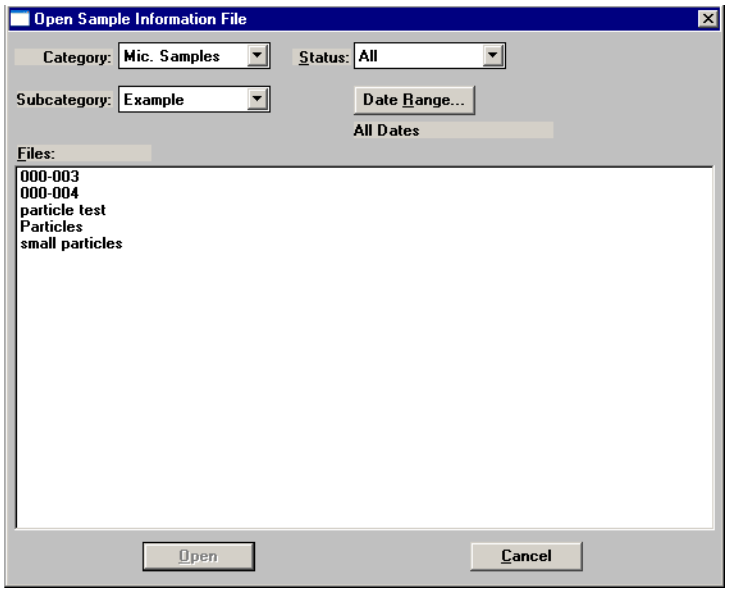
Closes the dialog. If the file contains unsaved changes, you are prompted to save before the dialog box closes.

Open

Open enables you to open an existing sample or parameter file, as well as a sample or parameter template.

Sample Information File

The following dialog displays for the Analyst and Developer when **File > Open > Sample information** is selected.



A sample file can be edited by a Developer or an Analyst. The changes can also be saved. If you choose to save the changes, a dialog prompting for a reason is displayed. After you enter a reason in the **Comments** field, **Save** is enabled so that you can complete the save operation. These changes are saved as a version of the sample file, becoming part of the sample file history. All versions of the sample file (of the Status selected) can be viewed when you click **Revert** on the Sample file dialog.

Category/Subcategory These drop-down lists contain existing archive locations (directories) in which files have been stored. The directory labels shown in this example are defaults. Many laboratories use the Year/Month system. A Developer can edit these labels to display differently if desired. Refer to **Edit Labels**, page **7-4** for information on editing the labels and adding directories (archive locations).

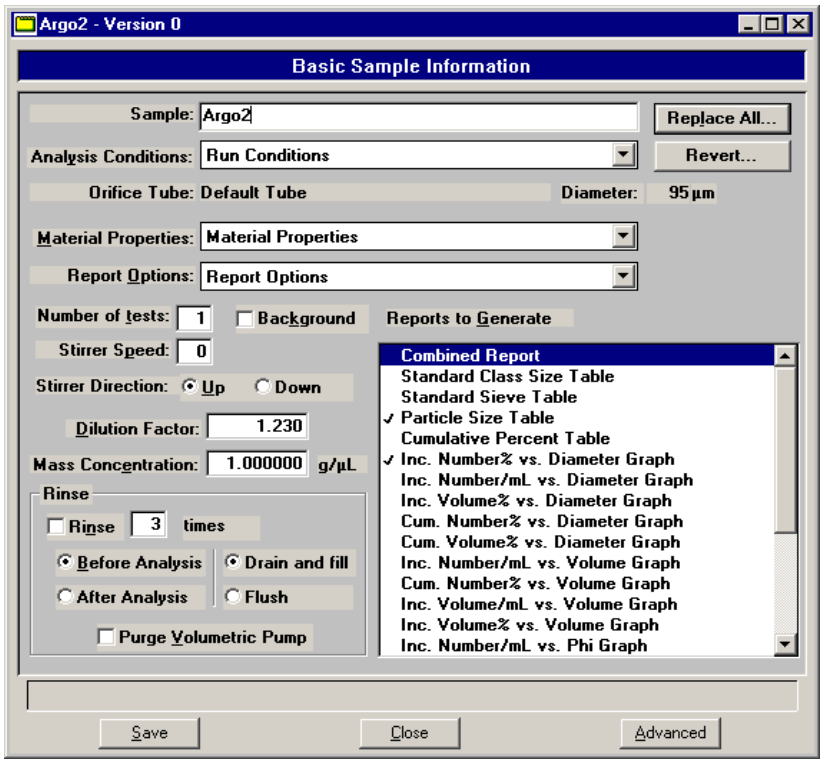
Status This drop-down list allows you to choose the types of sample files to display in the **Files** window. All files of the type you choose, within the range of dates, and in the current directory are displayed. Refer to **Table 2-2. File Status and Description**, page **2-11** for a description of file types.

Date Range Click this push button to display files created within a specified range of dates. Refer to page **2-10** for an explanation of this dialog.

Files window Lists the file(s) of the type selected in the **Status** list within the selected directory and range of dates.

Analyst

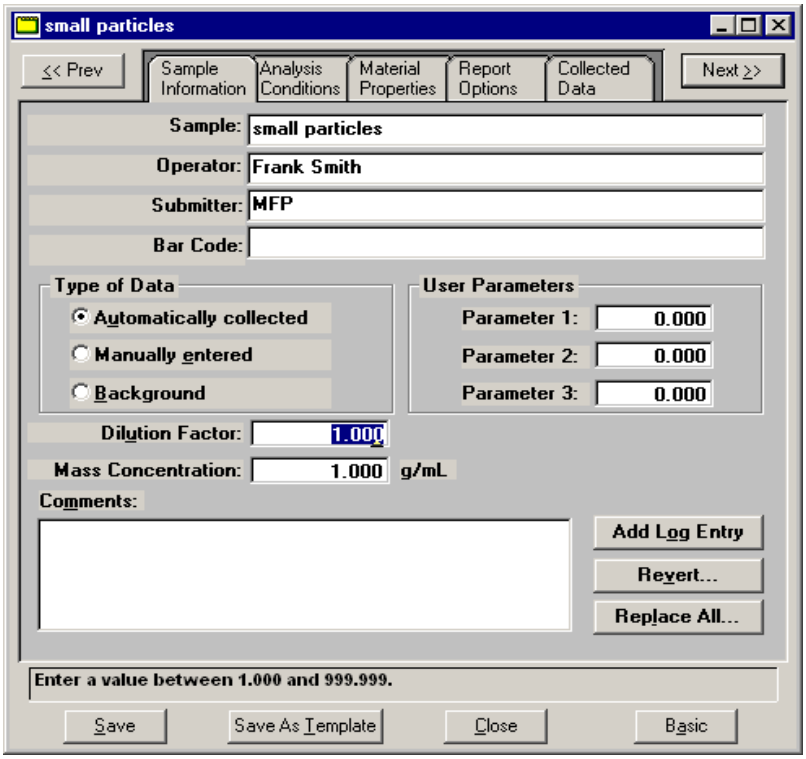
When an Analyst opens a sample information file, the dialog displays in this manner:



If desired, an Analyst can click **Advanced** to access the Developer's view of the dialog. This view allows an Analyst to review the parameters used in the analysis. An Analyst can edit certain parameters of the sample file; the fields for those parameters are enabled. Report options can also be edited and reports generated.

Developer

When a Developer opens a sample information file, the dialog displays in this manner:



A Developer can view all parameters of the file, as well as edit certain parameters; those parameters are enabled. Report options can also be edited and reports generated.

A Developer's view of the dialog includes a Collected Data tab (if the file status is Complete) which allows you to view the points collected during analysis. Refer to **Collected Data**, page **4-43**.

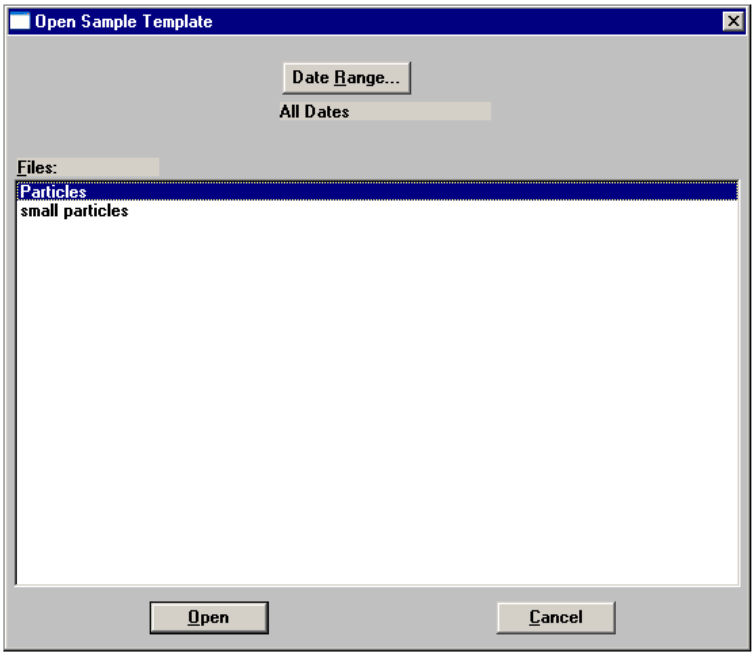
The **Save As Template** push button displays on each parameter allowing you to save the values contained in all parameters of the file as a sample file template.

Templates

Sample and Parameter templates can be opened and their contents viewed by a Developer or an Analyst. However, you cannot make changes to an existing template. If you wish to make changes, a Developer will have to create a new template. An Analyst is not authorized to create templates.

Sample Files

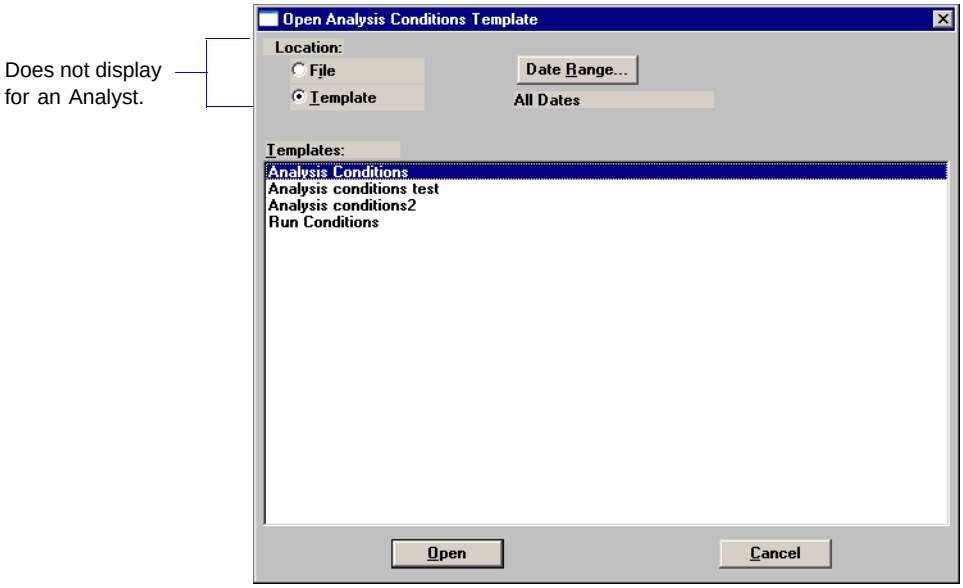
A Developer or an Analyst can view the contents of a Sample Template by selecting **File > Open > Sample Template**; the Open Sample Template dialog is displayed.



Choose the template(s) containing the parameters you wish to view and click **Open**; the template(s) you choose is(are) displayed.

Parameter

A Developer or an Analyst can view the contents of a Parameter Template by selecting **File > Open > (parameter)**; in this example Analysis conditions is chosen as the parameter. The Open Analysis Conditions Template dialog is displayed.

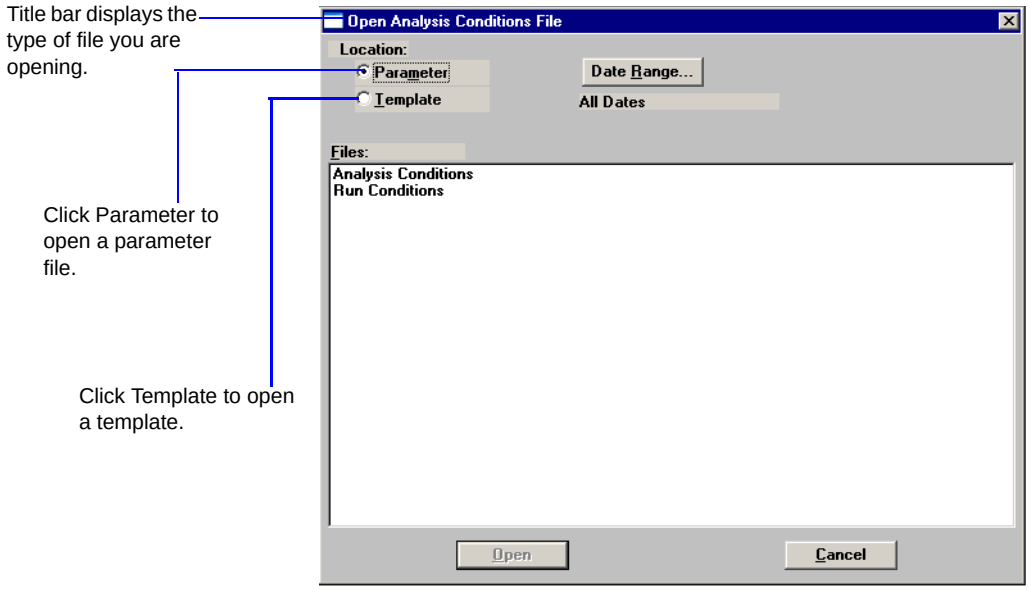


A Developer can use this dialog to open a template or a parameter file; an Analyst cannot. The Location portion of this dialog does not display for an Analyst.

Choose the template(s) containing the parameters you wish to view and click **Open**; the template(s) you choose is(are) displayed.

Parameter Files

Parameter files (Analysis Conditions, Material Properties, and Report Options) can be opened only by a Developer. When you select **File** > **Open** > **(parameter file)**, an Open (parameter) dialog is displayed.



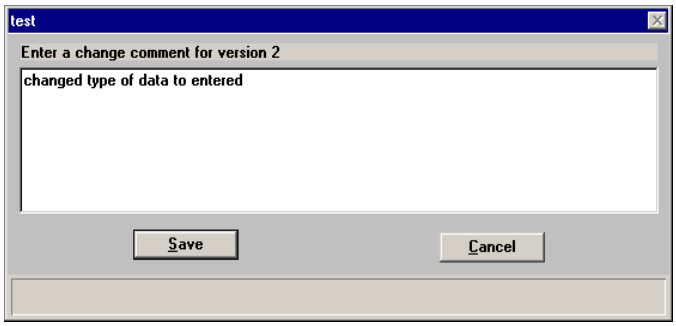
This same type of dialog displays when you open a parameter file *template*. You simply click **Template** to display the templates.

Location Allows you to open a **Parameter** file or a **Template** for a parameter file. You can open a template and view the details but you cannot edit the values. If you wish to make changes, you will have to create a new template. You can edit and save changes in a parameter file.

Date Range Allows you to choose a range of dates in which to display files in the **Files** window. Refer to page **2-10** for information on using this push button.

Save

Save enables you to save any changes made to the file in the active window. The file is saved under its current name. If a sample information file is in the active window, a dialog requesting a comment on the change is displayed.



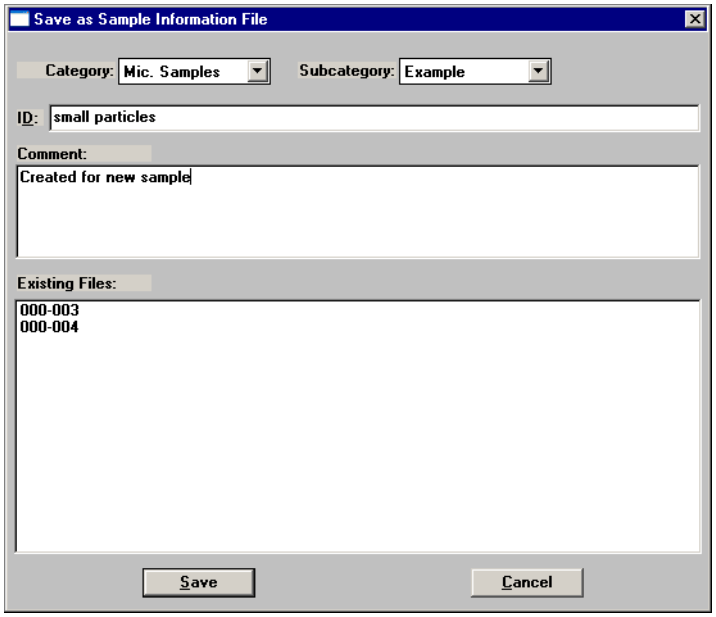
Enter the reason and click **Save** to complete the save operation.

Save As

Save As is unavailable for an Analyst; a Developer can use this function to:

- save a sample file in the active window as another sample file with a different name.

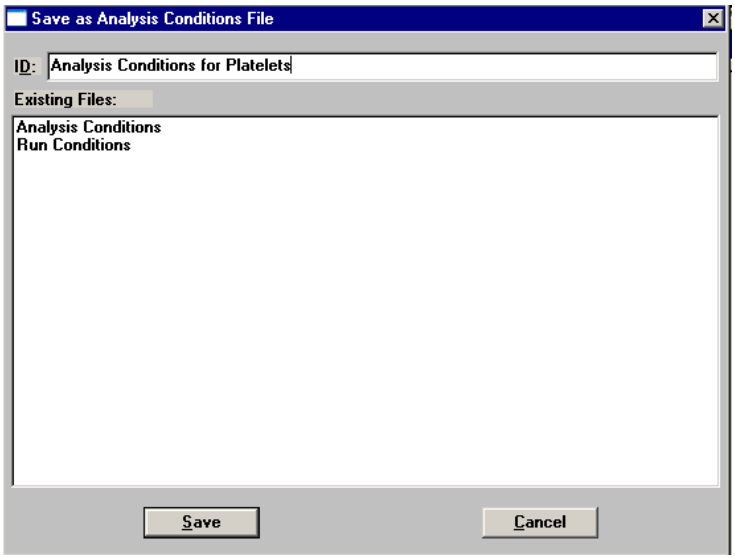
When you select this option, this type of dialog is displayed.



Enter a description in the **ID** field; you can use up to 50 characters. You must also enter a comment in the **Comment** window to enable the **Save** push button. If the **Save** push button does not become enabled, a file with the same description already exists. The Elzone Confirm program does not allow duplicate descriptions. The new file is saved as specified, but does not remain in the active window. Be sure to open the new file before making any changes.

- save a parameter file in the active window with a different name. The parameter file must be of the same type; for example, you can save an Analysis conditions file only as another Analysis conditions file.

  When you save as a parameter file, this type of dialog is displayed.



  Enter a description in the **ID** field; you can use up to 50 characters. If the **Save** push button does not become enabled, a file with the same description currently exists. The Confirm program does not allow duplicate file descriptions. Edit the description to enable the **Save** push button.

- save a subset (parameter) of the sample file in the active window as a standalone parameter file. For example, select Analysis Conditions from the **Save As** menu to create a standalone parameter file of the analysis conditions portion of the active sample file.

  When you save a subset of a sample as a parameter file, the same type of dialog as shown above is displayed.

Save As Template

An Analyst is not authorized to create sample and parameter file templates.

Save As Template is unavailable for an Analyst; a Developer can use this function to:

- save the values of the sample file in the active window as a sample template
- save a subset (parameter) of the sample file in the active window as a parameter file template
- save the values of a parameter file in the active window as a parameter file template

Save All

Save All enables you to save all open files under their current names. This option provides a faster way to save *all* open files at one time and avoids having to perform a **Save** operation on each individual file.

A dialog prompting for a reason for the current change version of each file is displayed.

Close

Close enables you to close the file in the active window. If the file contains changes that have not been saved, the following message is displayed:

(file name) has been changed. Save changes before closing?

Yes **No** **Cancel**

Click **Yes**; a dialog prompting for a reason for the change is displayed before the file closes.

Click **No** to close the file without saving the changes.

Click **Cancel** to return to the active file.

Close All

Close All enables you to close *all* open files under their current names. The following message displays for every file containing changes that have not been saved:

(file name) has been changed. Save changes before closing?

Yes **No** **Cancel**

Click **Yes**; a dialog prompting for a reason for the change is displayed before the file closes.

Click **No** to close the file without saving the changes.

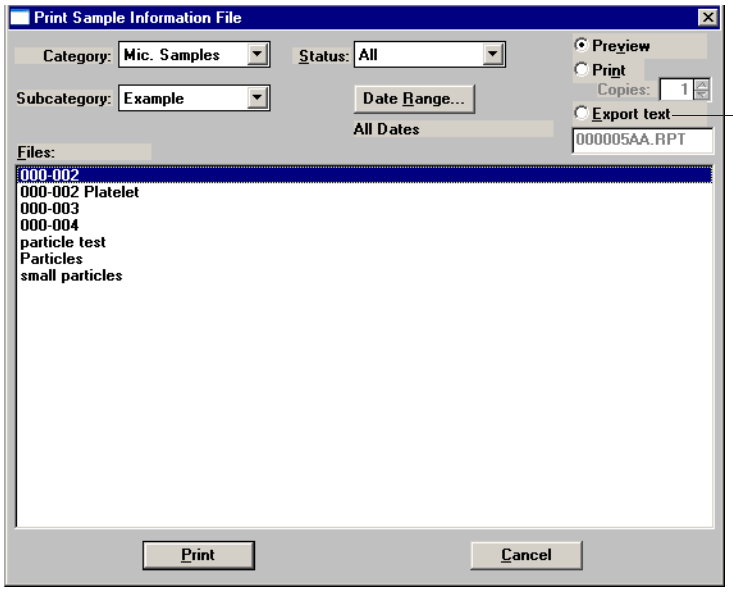
Click **Cancel** to return to the active file.

Print

Print enables you to print details of a sample file, sample template, or parameter file. For example, if you choose to print the contents of an analysis conditions file, you will receive the parameters used for all analysis conditions associated with the file.

Sample Information

Contents of a Sample Information file can be printed by a Developer or an Analyst; the Print Sample Information dialog is displayed.



Category/Subcategory — These drop-down lists contain the existing directories in which files are stored.

Status — This drop-down list allows you to choose the types of sample files to display in the **Files** window. (Refer to page **2-11** for a description of the status types.) All files of the type you choose, within the range of dates, and in the current directory are displayed.

Date Range — Allows you to specify a range of dates for the files you wish to display in the **Files** list window, or you can choose **All** for all files to display. The range you choose is displayed below the push button. (Refer to page **2-10** for information on using this push button.)

Preview
Print
Export

Choose **Preview** to view the file on the computer screen; you can then print the file from the preview window.

Choose **Print** to send the file directly to the printer; you can print up to 4 copies.

Choose **Export** to print to a file; use the field below the Export option to enter a name. The Export option is unavailable for an Analyst.

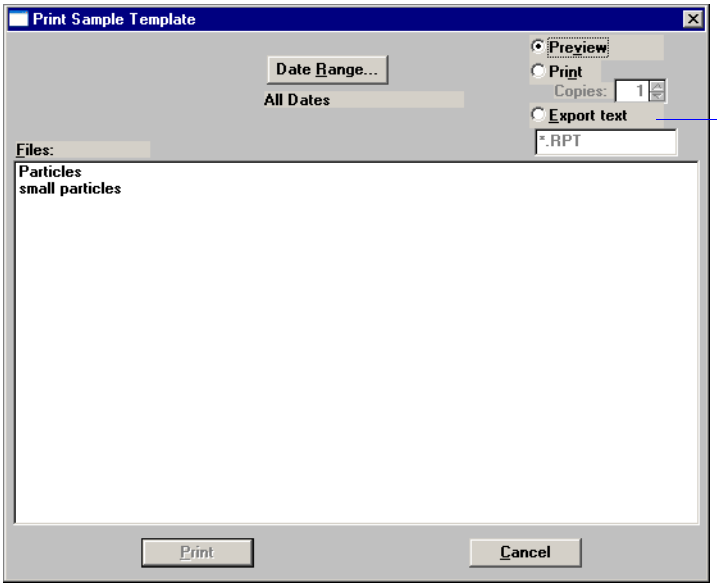
Files window

Displays the file(s) of the type selected in the **Status** list within the selected directory and range of dates.

You may print the contents of multiple files by holding down **Ctrl** while selecting files.

Sample Template

Contents of a Sample Template can be printed by a Developer or an Analyst; the Print Sample Template dialog is displayed.

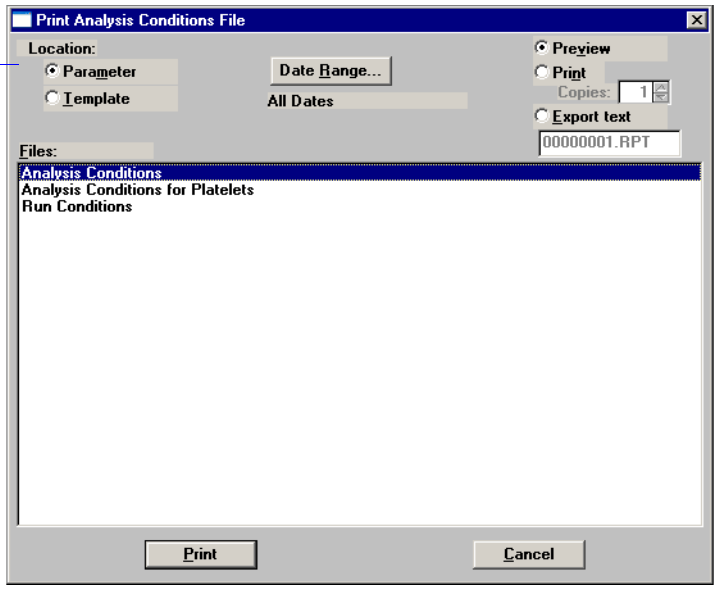


Refer to the previous page for an explanation of the fields on this dialog.

Parameter Files and Templates

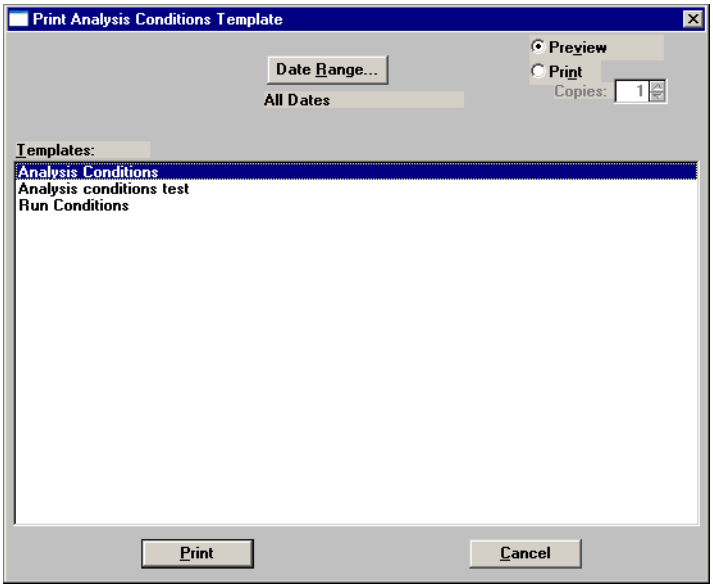
The contents of a parameter file can be printed only by a Developer. The contents of parameter file templates can be printed by a Developer or an Analyst. This type of dialog displays for a Developer. A Developer simply selects whether the contents of a Parameter file or a parameter template are to be printed.

Select Parameter for parameter files or Template for parameter templates.



Refer to page **4-59** for an explanation of the fields on this dialog.

An Analyst can print the contents of parameter file *templates* (not parameter files) by selecting **File > Print > (parameter file)**. In this example, **Analysis Conditions** is selected as the parameter; the Print Analysis Conditions *Template* dialog is displayed.

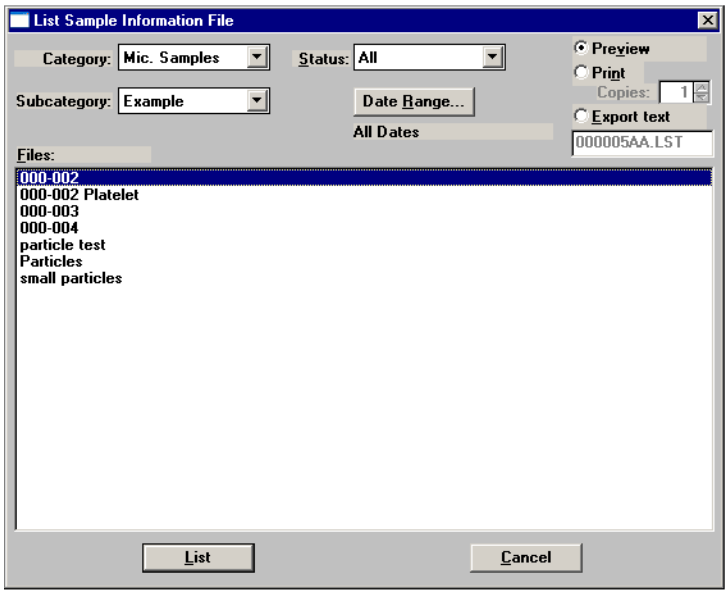


List

List enables you to list the following statistics for a selected sample file, parameter file, or a sample template.

- File name
- Date the file was created
- Time the file was created
- File identification
- File status

Regardless of the type of file you choose, the dialogs are similar; the options presented in the header vary slightly. The types of dialogs displayed are identical to the ones displayed for the **Print** function; you simply obtain different types of information. This example shows a dialog for sample files.



Permissions for listing statistics are the same as for the printing file contents. For example, an Analyst can list statistics for parameter file templates, but not for parameter files.

Refer to the **Print** section, page **4-59** for an explanation of the fields on this dialog box.

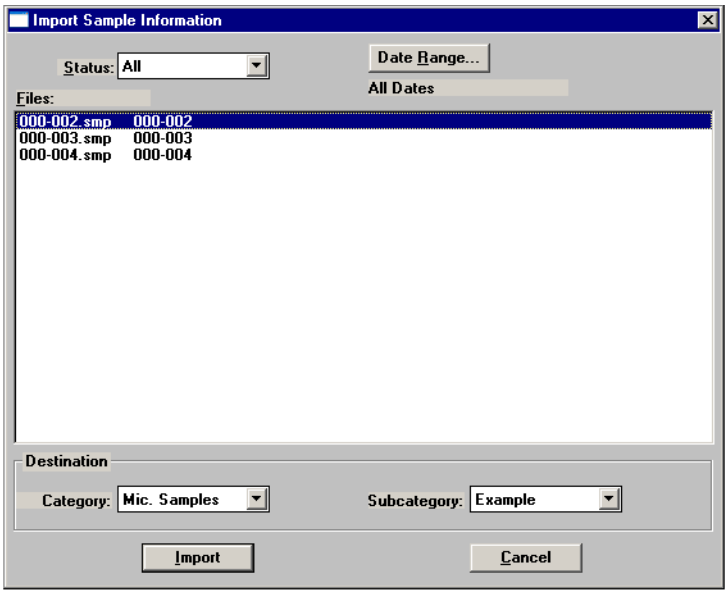
You may request a list of multiple files by holding down **Ctrl** while selecting files. If no files are selected, a list is generated for *all* files.

Import

An Analyst is not authorized to import sample and parameter files.

A Developer can use this option to import files that have been created external to the Confirm software and copied into the Import directory. If the files are not copied into the Import directory, they will not display in the **Files** window

Use Windows Explorer to copy the files into the Import directory.



Status
Date Range

Use these two options to limit the files displayed in the **Files** window. The **Status** drop-down list does not display when importing parameter files. (Refer to page **2-10** for information on using these options.)

Category
Subcategory

Use these drop-down lists to choose the directory into which to import the file. Refer to **Add Archive Location**, page **7-3** for information on creating directories.

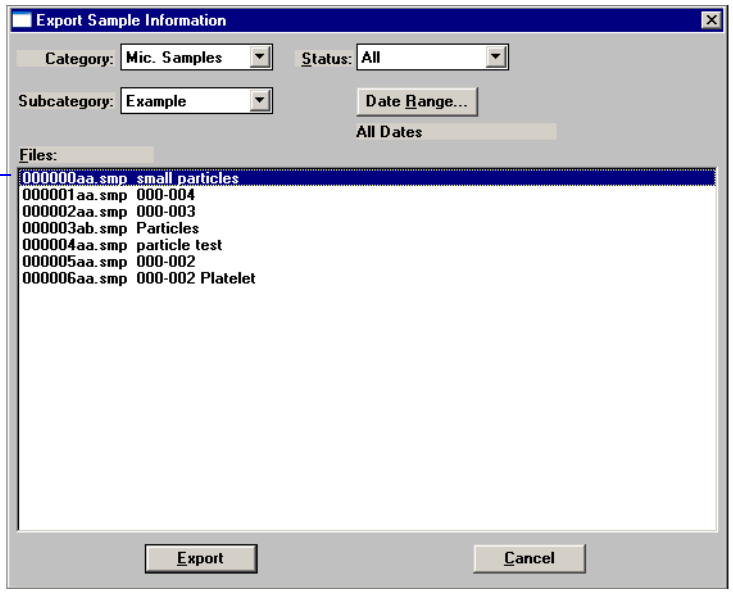
These drop-down lists do not display when importing parameter files. Parameter files are imported into an assigned directory.

Export

An Analyst is not authorized to Export sample files.

A Developer can use the Export option to:

- export the entire sample file to the Export directory. For example, you may wish to use this option to transfer a sample file to another computer.
- copy the reduced or full-resolution data in a sample information file and export it as ASCII text. ASCII data can be imported into other applications, such as spreadsheets. The data are exported in a comma-delimited format. Refer to Appendix C, page **C-1** for a description of exported data.



Files are assigned a sample number automatically and generated to the Export directory. Use Windows Explorer or a file transfer utility to transfer the file to the desired location.

All fields on this dialog function in the same manner as other dialogs, such as the Import and Print dialogs. Refer to **Print**, page **4-59** if you need information on these fields.

Convert

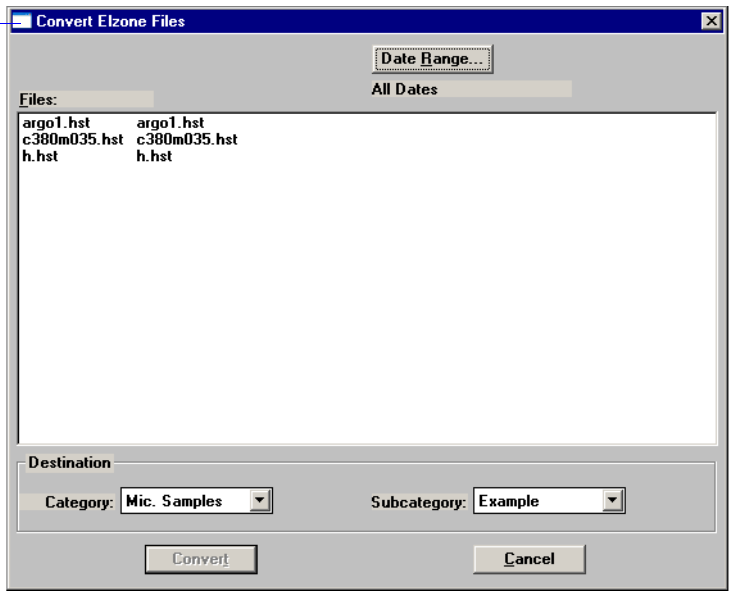
An Analyst is not authorized to convert sample files.

Convert allows a Developer to convert, two types of files:

- **Elzone**: copies and converts data from sample files used with the Model 5380 Series of analyzers
- **ASCII**: copies and converts data from a text file. The text should be comma-delimited; for example: size 1, quantity 1; size 2, quantity 2; etc.

These data are converted to a format compatible with the Elzone II program. The files to be converted must be copied into the Import directory so they will display in the Convert dialog. A dialog like the following is displayed regardless of the type of file you are converting.

Displays the type of file you are converting.



Files

Contains a list of the files available for conversion. If you are converting Elzone sample files, the extension will be ***.HST**. If you are converting a text file, the extension will be ***.CSV**.

To select multiple files, hold down the **Ctrl** key while selecting the files.

Category
Subcategory

Use these drop-down lists to choose a location for the converted file(s). Refer to **Add Archive Location**, page **7-3** for information on creating directories. These drop-down lists do not display when importing parameter files. Parameter files are imported into an assigned directory.

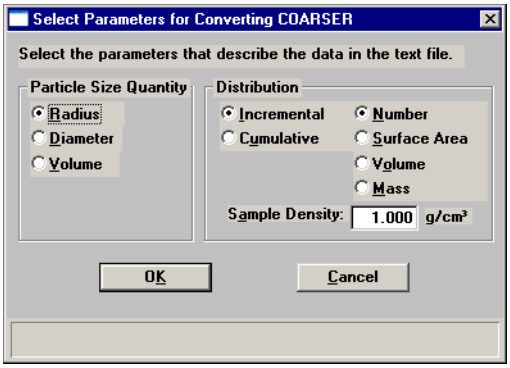
Date Range

Use this push button to specify a date range in which to display files. Refer to **Selecting Files,** page **2-10** if you need help on using this push button.

Convert

Converts the data of the selected file(s); a confirmation dialog is displayed.

If you are converting ASCII text files and select this push button, a dialog enabling you to select data parameters is displayed before the confirmation dialog.



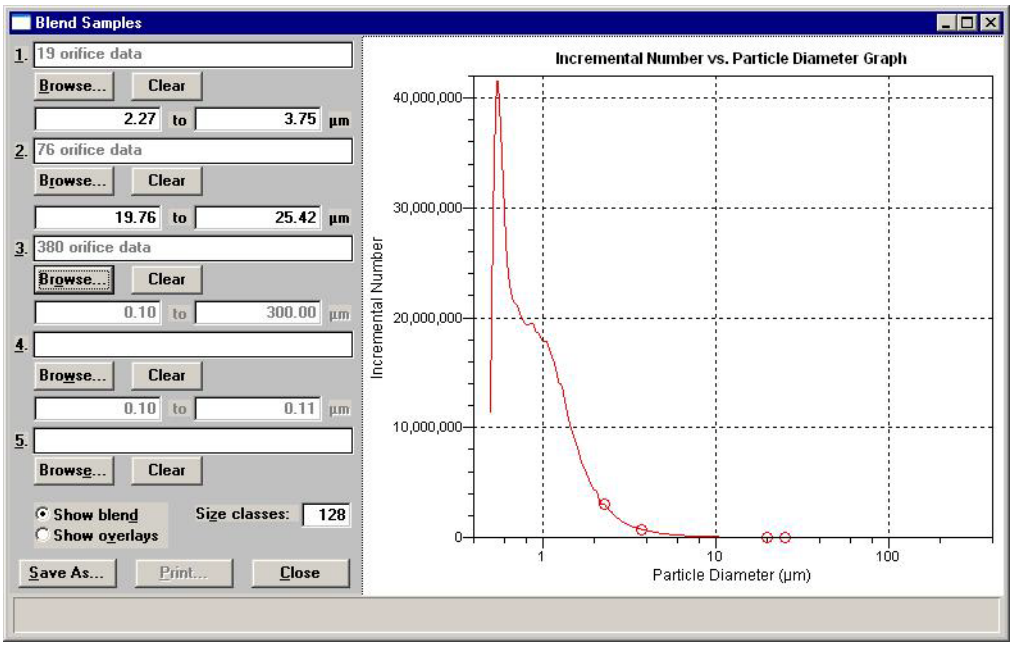
This dialog enables you to select the type of data contained in the text file. If you have selected multiple files, a dialog is displayed for each file (the name of the file is in the header).

Cancel

Cancels the operation and closes the dialog.

Blend

Blend enables you to merge data from multiple analyses in which different orifice tubes were used. A single orifice tube is capable of measuring particles within a certain size range. You can use multiple orifice tubes to measure the distribution over a wider range. The Blend option enables you to blend the data from all of the orifice tubes used in the analysis. Blending is the preferred method of completing the data. The Blend Sample Files dialog is displayed.



You can also edit graph properties; for example, you may wish to hide data from one of the sample files. Right-click in the graph area and select **Hide curve**, then choose the one you wish to hide. Refer to **Shortcut menus** for graphs, page **6-26** for an explanation of the options available.

Fields 1 through 5 — Display the file you choose using **Browse**.

Browse — Click this push button to choose the desired file.

Clear — Clears the field of its entry.

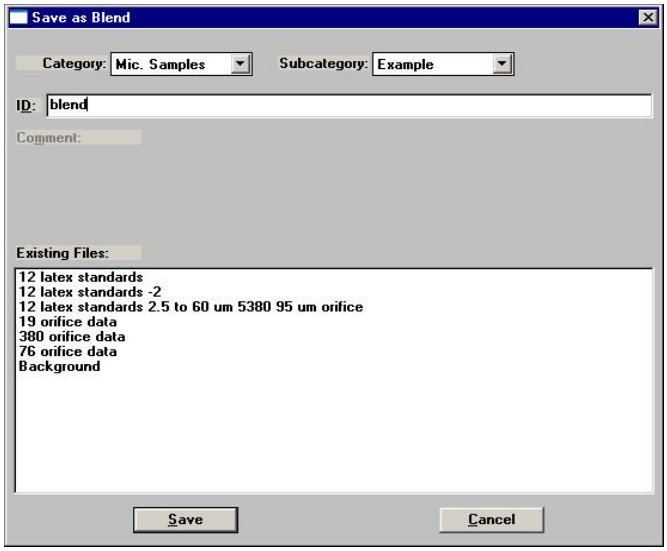
Range fields — Displays the range for overlapped data. This range is determined automatically by the analysis program; however these values may be edited. The blend ranges are marked on the graph with circles.

Show Blend Select this option to blend the data from all files and plot the graph as if it were one distribution.

Show Overlays Plots the data from each file as overlays.

Size Classes Defaults to the number of size classes for the first data set (field 1); this value can be edited as desired.

Save As Displays the Save as Blend dialog.



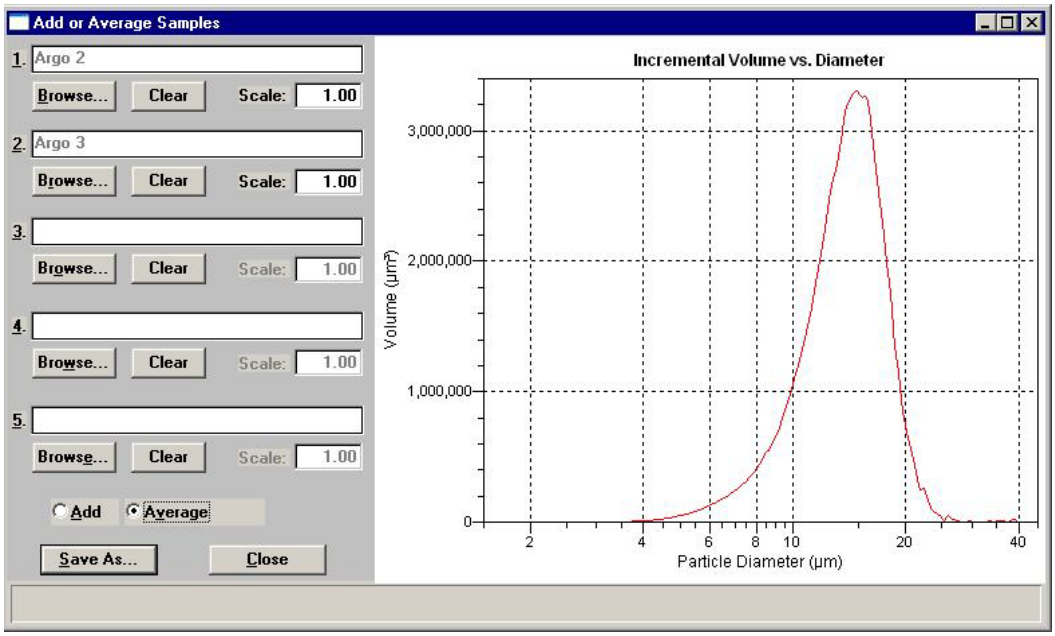
This dialog enables you to save the blended data as a sample file. If desired, you can then use **Report > Start Report** to generate reports to the printer or to the screen to view data.

Print Becomes enabled after you save the blended data. Click this push button to display the Report Settings dialog so that you can specify output options.

Close Closes the dialog.

Average

Average enables you to choose up to five sample files and average the data from all files. Or, you can choose **Add** to add and combine the data from the selected files. A graph is drawn on the right side of the dialog and updates automatically each time a file is added (or removed). The Add or Average Samples dialog is displayed.



Fields 1 through 5 — Display the files you choose using **Browse**.

Browse — Click this push button to choose the desired file.

Clear — Clears the field of its entry.

Scale — Enables you to scale the distribution. Users typically use this to scale data in relation to sample concentration or analysis time. For example: you are averaging data from two files. One was analyzed for 60 seconds and the other one for only 30 seconds. Enter 2.00 in the **Scale** field of the 30-second analysis to scale the data to match the 60-second analysis. After editing the value in this field, click in the graph area to initiate the rescale.

You can also use negative values in this field to subtract distributions.

Add	Enables you to obtain a total of all data sets in the selected sample files.
Average	Enables you to obtain an average for all data sets in the selected sample files.
Save As	Allows you to save the data as a sample file.
Cancel	Closes the dialog; all entries are lost.

Log In

Log in enables you to log into the application; the User Log in dialog is displayed.

Simply enter your user name and password, then click O**K**.

User name

Typically in this field, you should enter your Windows User name, unless your Administrator has specified a different user name.

Password

Enter your password. If you enter your password incorrectly a specified number of times (your Administrator determines the number when setting up system options; the default is three), the application will lock and you will not be allowed to proceed. Contact the Administrator to unlock the application and assign a new password.

The first time you log into the application after the Confirm software is installed, you will be prompted to change your password to one of personal preference. You must enter at least six characters.

Change password

Select this option to change your password after you have logged in; the Set password dialog allowing you to change your password is displayed.

Log Out

Select this option to log out of the system. If files are open and contain changes that have not been saved, you are prompted to save or discard them before you can log out.

Exit

Exit enables you to exit (close) the Confirm program.

- If a window containing a modified file is open, the following message is displayed:

  (file name) has been changed. Save changes before closing?

  Yes No Cancel

  Click **Yes**; a dialog prompting for a reason for the change is displayed before the file closes.

  Click **No** to close the file without saving the changes.

  Click **Cancel** to return to the active file.

- If an analysis is in progress, the following message is displayed:

  2459- An analyzer is busy. A delay in restarting this application could result in loss of new data. continue with program exit?

  Yes No

  Click **Yes** to exit the analysis program but the analysis will continue until completion; analysis data are collected and stored in the analyzer's memory.

  Click **No** to allow the analysis program to remain active and the analysis to finish

Although data are stored in the analyzer when you exit the program during analysis, they are not saved in the file until the program is restarted. At that time the data are saved automatically. If a power failure occurs in the interim and you do not have an Uninterruptible Power Supply (UPS) attached, loss of data will result.

- If a report is in progress, you are cautioned that reports are being generated, and given the opportunity to either cancel the print job or allow the reports to print before exiting.

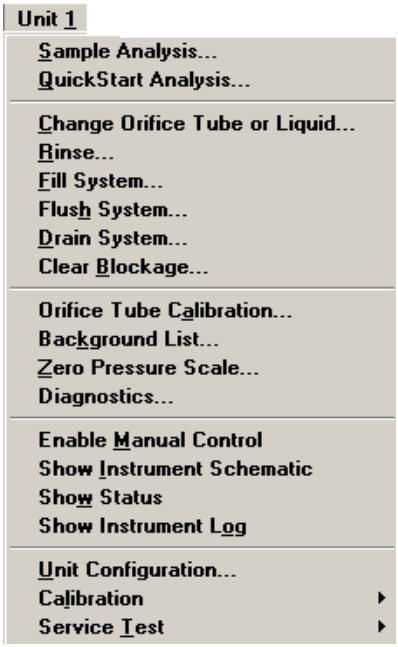
5. UNIT MENU

The Unit menu contains the operations which can be performed with the Elzone analyzer. The main menu contains a Unit menu for each attached analyzer. For example, if you have two attached analyzers, the main menu contains two Unit menus. The unit number and the serial number appear in the title bar of the operational window(s).

For easy differentiation, the status windows for each unit are display in a different color. This feature is especially useful when you have two units attached to the same computer.

The Unit menu does not appear on the menu bar if the analysis program is being used for offline data manipulation.

Description



Listed below are brief descriptions of the Unit menu options. Detailed descriptions are found later in this chapter.

Sample Analysis Use this mode of operation to perform single sample analyses. This option is disabled if analyses are being performed in another mode. Page 5-3.

QuickStart Analysis	Use this mode of operation to perform successive sample analyses. Page **5-14**.
Change Orifice Tube or Liquid	Enables you to change the orifice tube or the liquid. Page **5-19**.
Rinse	Enables you to rinse the system (internal glassware). Page **5-20**.
Fill System	Enables you to fill the system with liquid. Page **5-21**.
Flush System	Enables you to flush liquid through a filled system. Page **5-21**.
Drain System	Drains the system of all liquid. Page **5-22**.
Clear Blockage	Enables you to clear a blockage from the orifice tube. Page **5-22**.
Orifice Tube Calibration	Enables you to calibrate the orifice tube. Page **5-23**.
Background List	Allows you to edit the background list. Page **5-31**.
Zero Pressure Scale	Enables you to zero the pressure transducer to atmospheric pressure. Page **5-32**.
Diagnostics	Enables you to perform predefined user diagnostics. Page **5-33**.
Enable Manual Control	Allows you to control certain instrument components manually. Page **5-36**.
Show Instrument Schematic	Displays the instrument schematic. Page **5-42**.
Show Status	Displays only the status window of the operational window, enabling you to view the status of the operation in progress. Page **5-43**.
Show Instrument Log	Displays the instrument log. Page **5-44**.

Unit Configuration Displays the configuration of the analyzer. Page 5-47

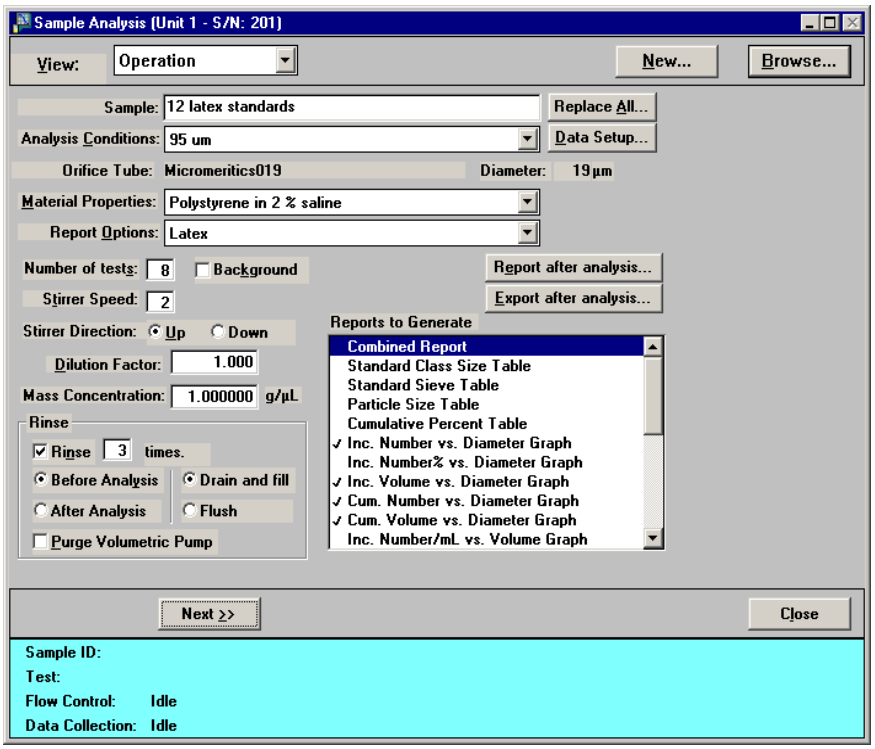
Calibration Enables you to perform certain instrument calibrations. The options on this menu are enabled only with the direction of a Micromeritics service representative. 5-49.

Service Test Allows you to perform certain troubleshooting procedures. This option is enabled only under the direction of a Micromeritics service representative. Page 5-49.

Sample Analysis

Use this mode of operation to perform up to eight tests (analyses) on a single sample.

When you select this option, the Sample Analysis dialog containing greyed fields is displayed. Click **New** to create a new file or **Browse** to choose an existing one. After a sample file has been designated, the Sample Analysis dialog is displayed. The fields now contain the values for the selected file, or if creating a new file, the specified defaults.



View

Allows you to view one of the following in the current window:

- the current operation
- the instrument schematic
- the instrument log

New

Displays the Create a File for Analysis dialog, allowing you to choose a template from which to create a new file.

Browse

Displays the Select a File for Analysis dialog, allowing you to select an existing sample file for your analysis.

Sample

Displays the identification of the sample.

Replace All

This push button allows you to replace the values for all parameters of the current file with the values from an existing file. Simply click the push button, choose the desired file, and click **OK**. The values of the chosen file are copied into the current file; you can edit them as desired.

Analysis Conditions

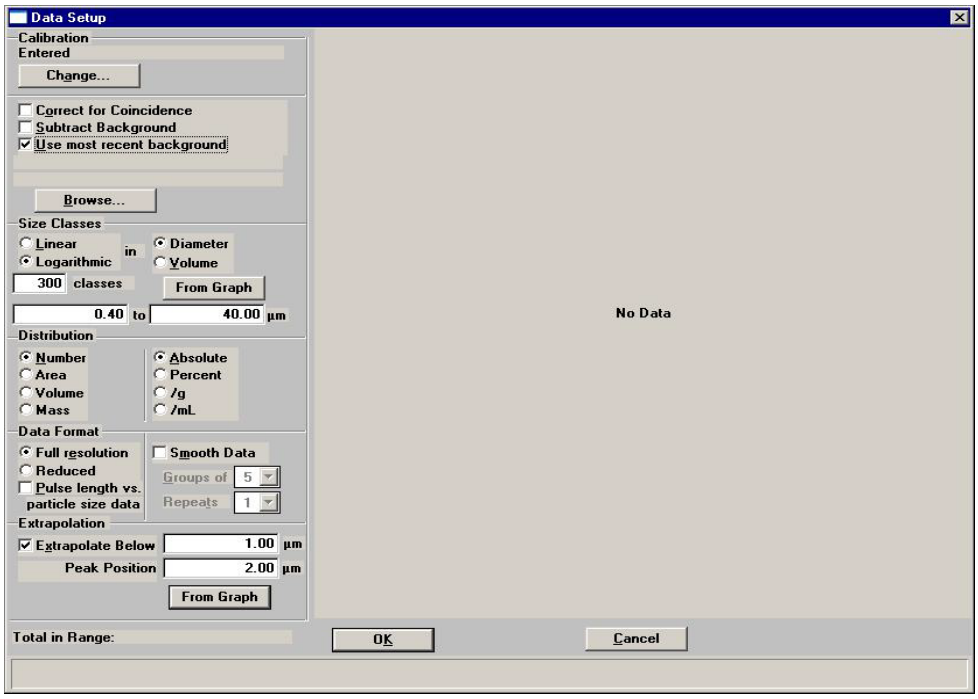
Displays the description of the analysis conditions file in the selected sample information file.

Use the drop-down list to select a different file if desired.

Data Setup

Displays the Analysis Conditions Data Setup dialog enabling you to edit analysis conditions. Data does not display in this view of the dialog.

Refer to page **4-17** for a description of the fields on this dialog.



Orifice Tube

Displays a description of the orifice tube specified in the Analysis Conditions file. If the identification is preceded with an asterisk, the orifice tube has not been calibrated for this instrument. Orifice tubes should be calibrated to obtain accurate results.

Material Properties

Displays a description of the materials properties file in the selected sample information file.

Use the drop-down list to select a different file if desired.

Report Options

Displays a description of the report options file in the selected sample information file.

Use the drop-down list to select a different report options file if desired.

Reports to Generate

Displays the selected reports (the ones preceded with a check mark) from the file you select from the Report Options drop-down list; these selections may be edited if desired.

Number of tests

Allows you to enter the number of analyses you wish to perform using this sample file; you can perform up to eight tests with each file.

Background

This option enables you to have the data collected in this analysis saved as a background.

Stirrer Speed

Displays the stirrer speed specified in the sample file; you can edit this value if desired. The lower the number, the lower the speed; 0 (zero) turns the stirrer off.

Stirrer Direction

Displays the stirrer direction (particle circulation) specified in the sample file; you can change the direction if desired.

Dilution Factor

Displays the dilution factor specified in the sample file; you can edit this value if desired.

Mass Concentration

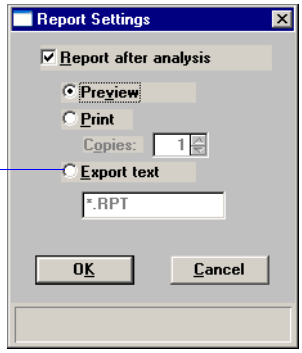
Displays the concentration specified in the sample file; you can edit this value if desired.

Rinse

Displays the rinse options selected in the sample file; you can edit these options if desired.

Report after analysis

Displays the Reports Settings dialog so that you can specify report output options.



Select the option on this dialog to have reports printed automatically after analysis. If you do not wish to have reports generated automatically, you can generate them after the analysis using the **Start Report** option on the Reports menu.

Preview

Prints the report to the monitor screen. This option allows you to customize reports with details such as font and column placement. Refer to **Onscreen Reports**, page **6-22** for the options available for onscreen reports.

Print

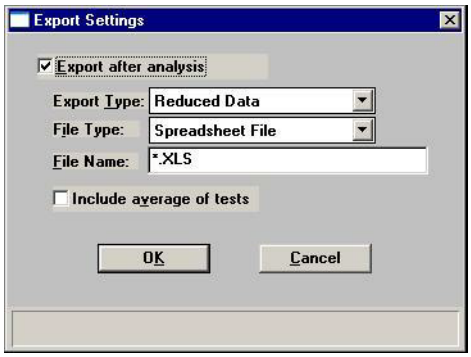
Prints the report to the printer designated as the default printer. When you choose this option, the **Copies** field is enabled allowing you to print up to four copies.

Export

Exports report data to a file. When you choose this option the adjacent field containing a default name is enabled; you can edit the name if desired. This option is unavailable for an Analyst.

Export after Analysis

Enables you to export data automatically after analysis; the Export Settings dialog is displayed.



If you do not wish to have reports exported automatically, you can export them after the analysis using the **Export** option on the File menu.

Export Type

You can export Reduced Data or Full resolution Data.

File Type

You can export the data as a text file (TXT) or in a spreadsheet format (XLS).

File name

The data will be exported as the file name and the appropriate extension to the application directory. You can enter a different directory if desired.

Include average of tests

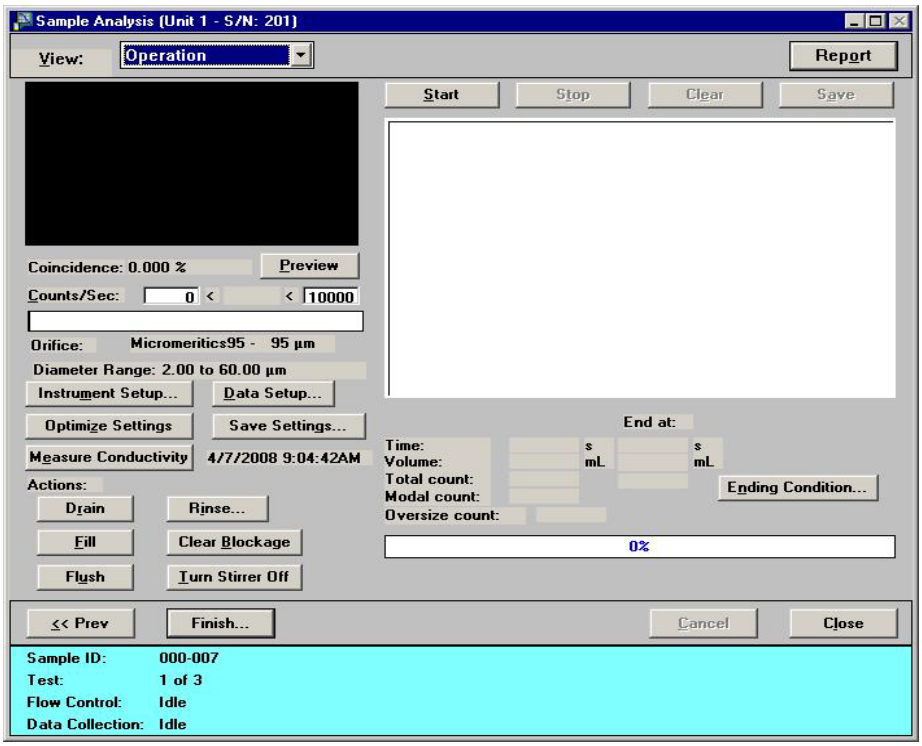
Select this option to export values for the average of all tests included in the file.

Next

Click this push button to advance to the next view of the Analysis dialog; a logon dialog is displayed.

This dialog is used to verify that the logged-in user is performing the analysis.

After verification of the user, the next view of the Sample Analysis dialog is displayed.



View

Allows you to view one of the following in the current window:

- the current operation
- the instrument schematic
- the instrument log

Report

Enables you to generate a report for the data collected up to the time you request the report.

Sparkle Display

Displays during data collection or while in **Preview** mode.

The Sparkle display emulates an oscilloscope (turned 90º to the right). The analyzer measures the change of resistance across the orifice and displays a dynamic scan of pulses (tips) in real time.

Coincidence

Displays the current coincidence level.

Preview

Enables you to view signals (in the Sparkle display) and the coincidence rate.

Orifice

Displays the serial number and the size of the orifice tube being used in this analysis.

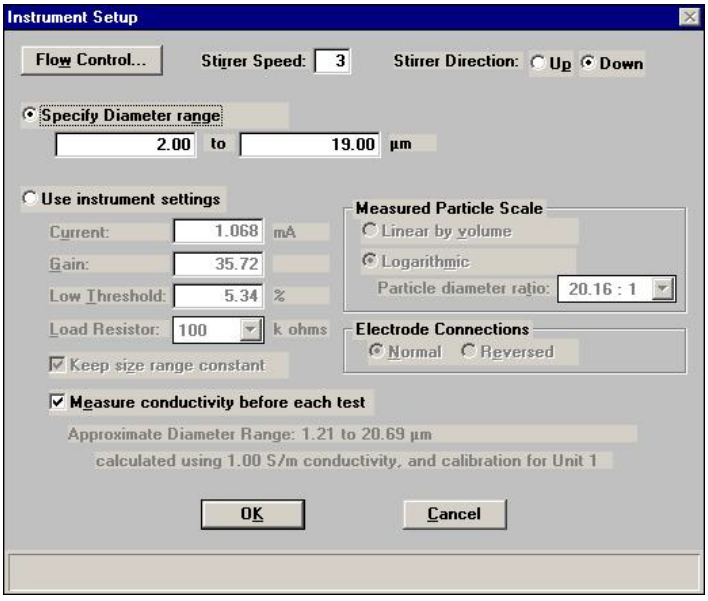
Diameter Range

Displays the range in which to detect particles.

Instrument Setup

Displays the Instrument Setup dialog, enabling you to edit certain analysis conditions prior to analysis.

Disabled for an Analyst.



Optimize Settings

Enables you to have the optimum Load Resistor, Current, and Gain determined. These values will be stored in the analysis conditions file as well as in the collected data, and as the optimized settings for the orifice/electrolyte combination.

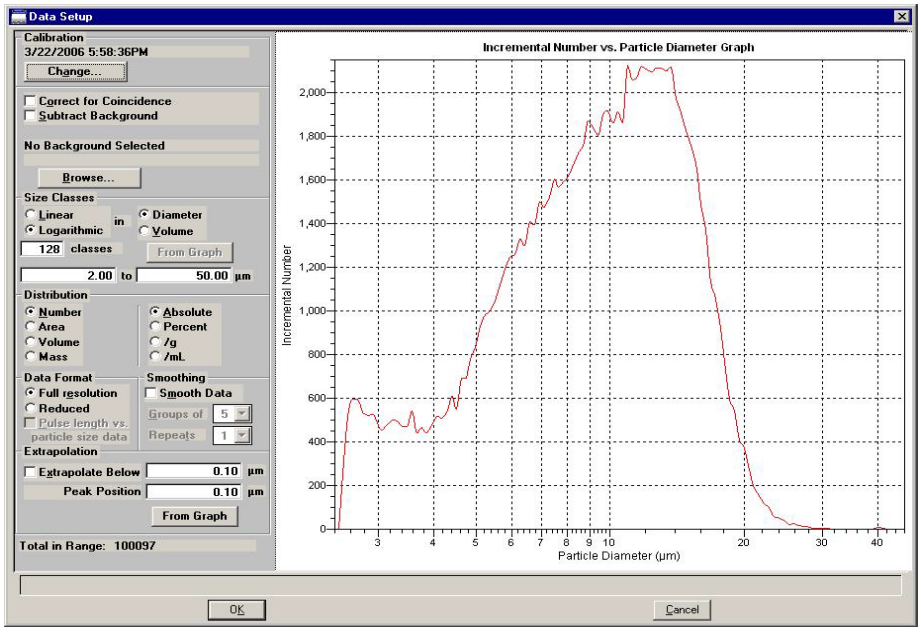
Typically, it is best to optimize settings with a beaker containing only electrolyte; no sample. Then add your sample after optimization is complete. Refer to **Optimizing Instrument Settings**, page **3-31** for additional information.

Disabled for an Analyst.

Data Setup

Enables you to edit data parameters.

Disabled for an Analyst.



From Graph

This option enables you to choose a size range marked on the graph by a set of cross hairs. This button does not become enabled until you have marked the range.

Simply click in the graph at the point you wish to begin the range to place the first cross hair. Hold down the **Shift** key and click at the ending range to place the second cross hair. Then click **From Graph** to set the range.

The total number of particles in the specified range displays in the lower left of the dialog.

Refer to page **4-17** if you need assistance on this dialog.

Save Settings

Displays the Save as Analysis Conditions dialog allowing you to save the current settings as an Analysis conditions file.

Disabled for an Analyst.

Actions

The following actions are available prior to analysis:

- **Drain**: drains the system, leaving the glassware empty
- **Fill**: fills the glassware with electrolyte solution
- **Flush**: flushes solution through the glassware; it does not empty the glassware
- **Rinse**: displays the Rinse dialog enabling you to specify rinsing preferences
- **Clear Blockage**: clears any blockage that may be in the orifice tube. This option is also available during analysis, but only up to the point where data collection begins.
- **Turn Stirrer Off**: turns the stirrer off.

Ending Conditions

Displays the Ending Condition dialog so that you can edit the ending criteria if desired.

Disabled for an Analyst.

Time, Volume, Total and Modal count

Displays the parameters for the current ending conditions.

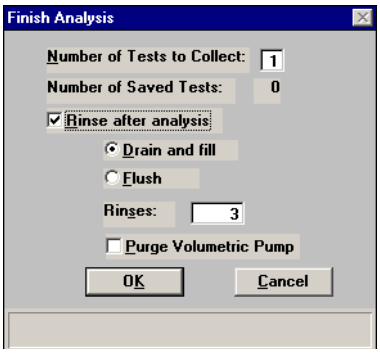
Start/Continue Enables you to start or continue (when stopped) data collection.

Stop Stops data collection.

Clear Discards all data collected for this analysis. This action is recorded in the instrument log.

Save Enables you to save the collected data into the sample file as the next test. The data are discarded after being saved.

Finish Enabled when all setup parameters are appropriate for the analysis; displays the Finish Analysis dialog.



After verifying information in this dialog, click **OK** to close the dialog and complete the analysis.

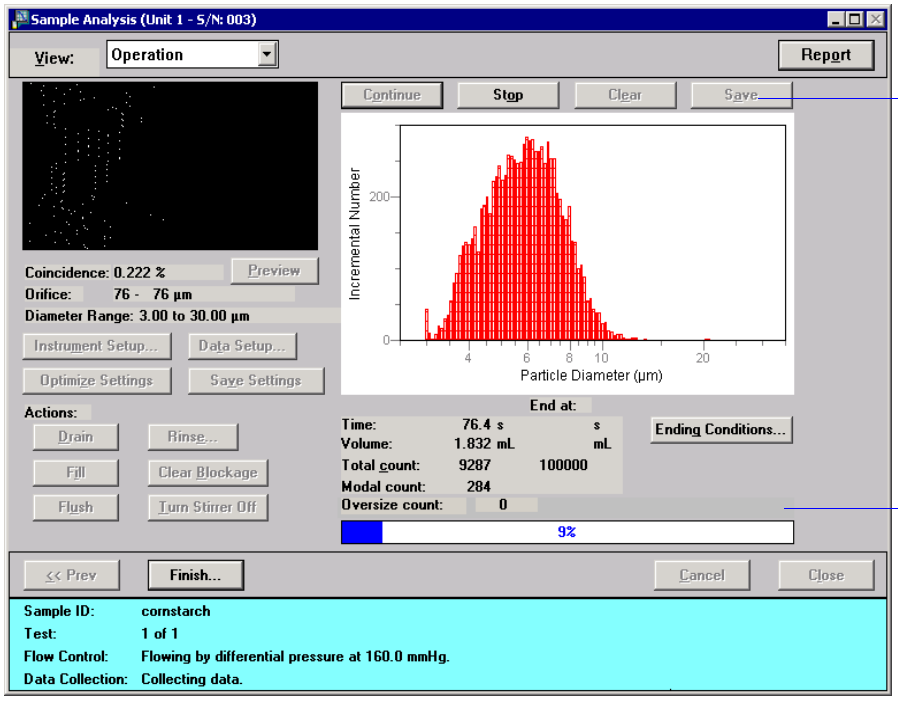
After the analysis is complete, you will be returned to the first dialog in the Analysis series to begin another test or end the session.

Cancel Cancels the current operation.

Close Closes the dialog; you will be prompted to save data before the dialog closes.

Status Window Displays the status of the current analysis. Refer to **Show Status**, page **5-43** for additional information on this window.

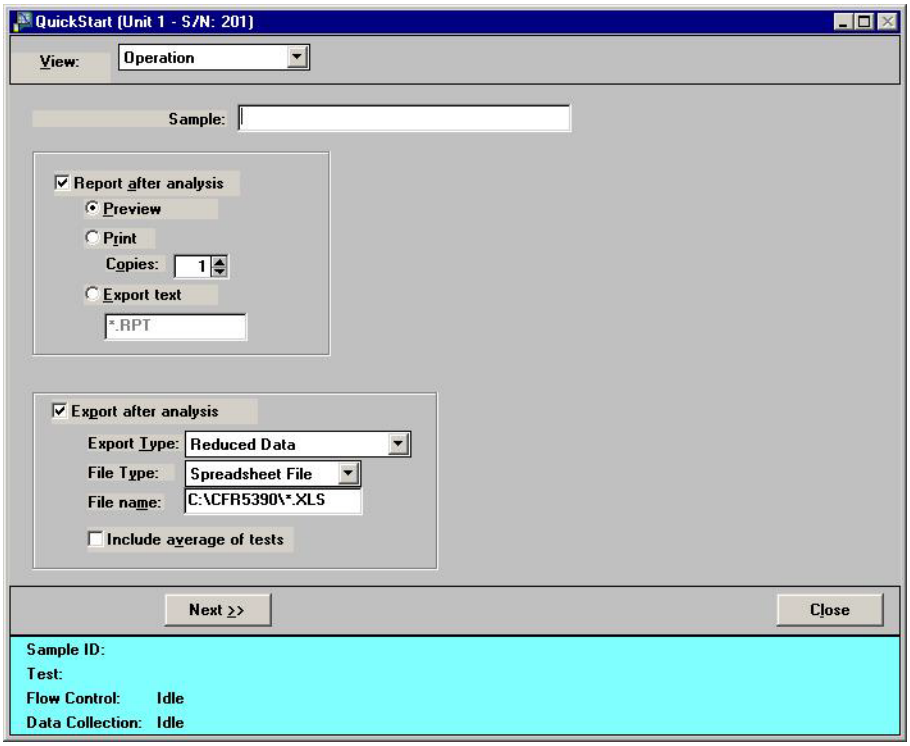
Click **Start** to begin the analysis; data starts to collect and the dialog now looks like this:



After data are collected (progress bar reaches 100%), **Save** is enabled allowing you to save the data into the sample file.

QuickStart Analysis

Use this mode of operation to analyze a series of samples of the same type which contain the same analysis conditions; sample files are created automatically. When you select this option from the Unit menu, the QuickStart dialog is displayed.



View

Allows you to view one of the following in the current window:

- the current operation
- the instrument schematic
- the instrument log

Sample

Displays the identification of the selected file; you may edit this identification if desired.

Report after analysis

Select this option to have reports printed automatically after analysis. If you do not wish to have reports generated automatically, you can generate them after the analysis using the **Start Report** option on the Reports menu. Refer to page **5-6** for an explanation of report output options.

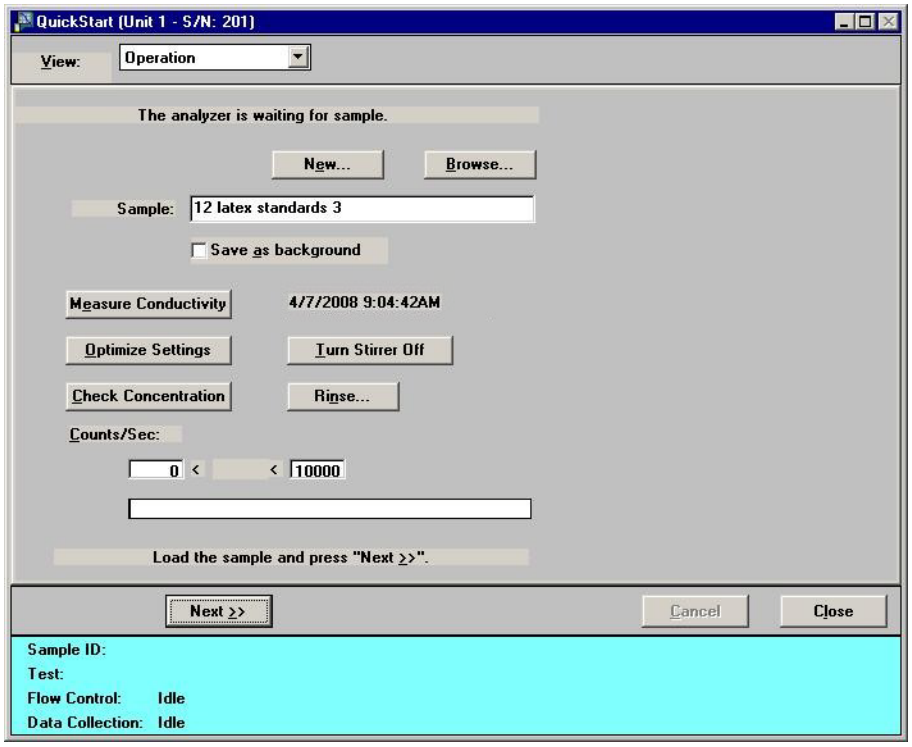
Export after Analysis

Select this option to export full-resolution data or reduced data automatically after analysis.

Refer to page 5-7 for an explanation of export output options.

Next

Advances you to the next view of the QuickStart dialog.



New

Displays the Create a File for Analysis dialog containing templates. Select the template containing the desired conditions and click **Create**.

Browse

Displays the Select a File for Analysis dialog enabling you to choose an existing file.

Sample

Displays the identification of the selected file; you may edit this identification if desired.

Save as background

Select this option to have the data collected for this analysis saved as a background. For example, you may wish to have the first run of the current series of analyses saved as the background analysis.

Measure Conductivity

Select this option to measure the conductivity for the current orifice tube and liquid. The date and time of the last recorded measurement for this tube/liquid combination displays to the right of the push button.

Optimize Settings

Enables you to have the optimum Load Resistor, Current, and Gain determined. These values will be stored in the analysis conditions file as well as in the collected data, and as the optimized settings for the orifice/electrolyte combination.

The analyzer is placed in the plumbing state and remains there until optimization is complete.

Refer to **Optimizing Instrument Settings**, page **3-31** for additional information on this option.

Turn Stirrer On
Turn Stirrer Off

This toggle switch enables you to turn the stirrer on or off during analysis.

Check Concentration

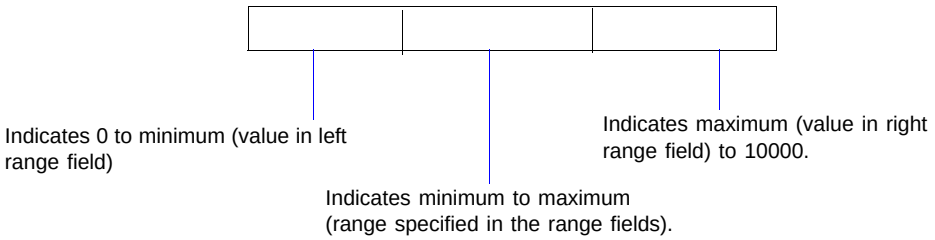
Use this push button to check the concentration level of the electrolyte after you have specified a range in the **Counts/Sec** fields. The measured rate of the concentration will display between the range fields and the progress bar will indicate visually whether or not the concentration is within range.

Counts/Sec

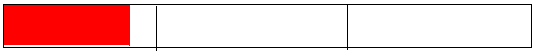
These fields are provided to enter a range for the amount of particles per second that you wish to have pass through the orifice. The valid range is 0 to 10000.

Progress bar

The progress bar indicates the concentration in relation to the specified range. When the **Check Concentration** push button is clicked, the status bar is divided into three sections, separated with vertical bars; the first representing 0 to the minimum range you specify, the second minimum to maximum ranges, and the third maximum range you specify to the limit of 10000.



The bar will be colored up to the measured concentration. For example: a bar colored like this one indicates low concentration; add more sample.



A bar colored like this one indicates the concentration is within the specified range.

A bar colored like this one indicates the concentration is too high; add more electrolyte or discard sample and start over.

Rinse

Displays a dialog containing the rinse options selected in the sample file; you can edit these options if desired. Refer to page **4-15** for information on the fields in this dialog.

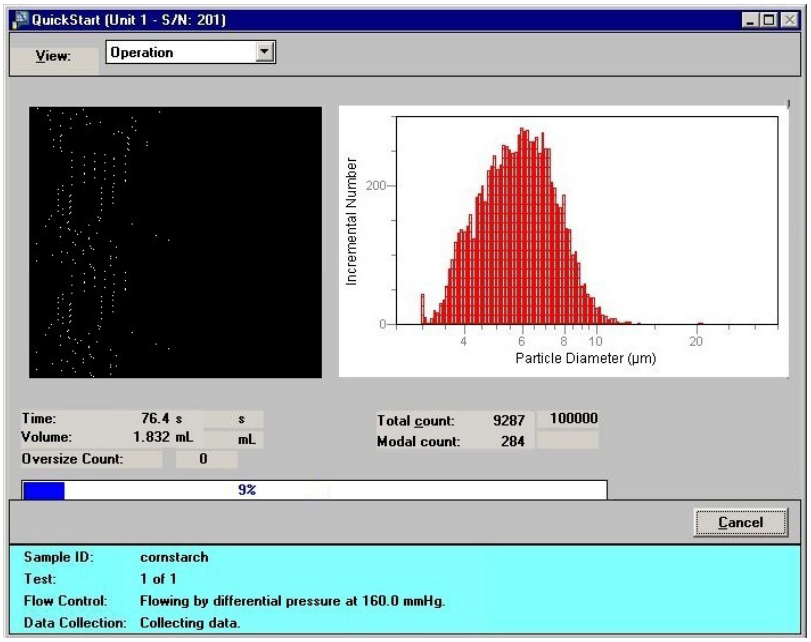
Status Window

Displays the status of the current analysis. Refer to **Show Status**, page **5-43** for additional information on this window.

Next

Enabled after you load your sample. When you click this push button, the User Log on dialog is displayed so that you can enter your password. After you enter your password and click **OK**, analysis begins and you advance to the next analysis screen.

This view of the dialog displays the data as they are collected.



Sparkle Display

Displays during data collection.

The Sparkle display emulates an oscilloscope (turned 90º to the right). The analyzer measures the change of resistance across the orifice and displays a dynamic scan of pulses (tips) in real time.

Time, Volume, Total and Modal count

Displays the parameters for the current ending conditions.

Progress bar

Displays the percentage of completion for the current operation.

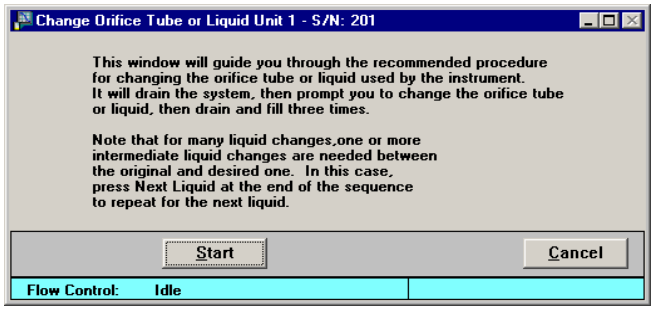
Cancel

Cancels the current analysis and returns you to the original sample selection window.

After the analysis is finished, you are returned to the second view of the QuickStart dialog allowing you to add sample and continue analyses.

Change Orifice Tube or Liquid

This option enables you to change the orifice tube or liquid; the Change Orifice Tube or Liquid dialog is displayed.



This dialog is the first of a series of dialogs that guide you through the process of changing the orifice tube or liquid. After you click **Start** on this dialog, you receive (in sequence):

- a dialog showing the status of the initial draining step; after draining operation is completed, you are advanced to the next dialog automatically
- a dialog prompting you to replace the orifice tube or liquid; after you have performed the requested action, click **Continue** to proceed to the next dialog
- a dialog showing the status of the draining/filling operations; after this operation is complete, you are advanced to the next dialog automatically
- a dialog indicating that the operation is complete; this dialog contains two push buttons:

Next Liquid

For some liquids, one or more intermediate liquid changes are required; click **Next Liquid** if this is the case with your liquid.

Example: If you are using as the electrolyte sodium chloride in water and you wish to change to a lithium chloride in IPA, you should use this option. This enables you to rinse first with the water (base for current solution), then with IPA (base for new solution), then with the new electrolyte solution.

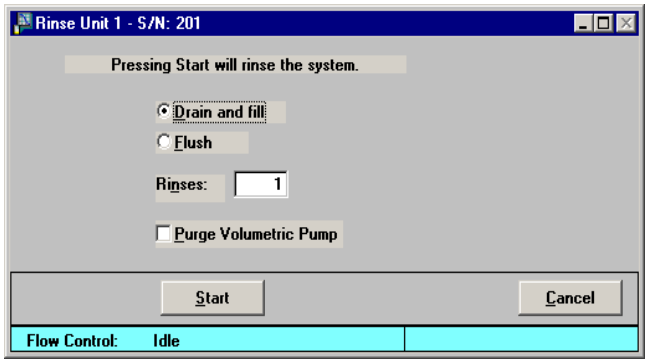
Refer to **Changing the Liquid in the Supply Container**, page **3-29**.

Done

Click this push button to close the dialog

Rinse

This option enables you to rinse the system (internal glassware); the Rinse dialog is displayed.



Drain and fill — Choose this option to drain, rinse, and refill the system with liquid.

Flush — Choose this option to flush the system with liquid; liquid remains in the glassware at all times.

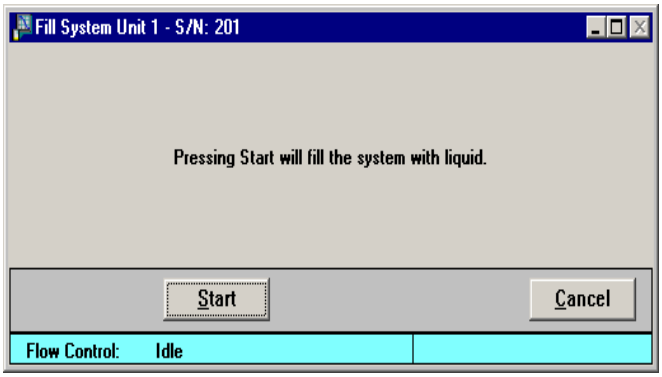
Rinses — Enter the number of times you wish to perform the selected option.

You can perform up to nine rinses.

Purge Volumetric Pump — Select this option to have the volumetric pump (if installed) purged during the rinsing process

Fill System

This option enables you to fill a drained system (internal glassware) with liquid. Before selecting this option, place a beaker of electrolyte on the sample stand and raise the stand.

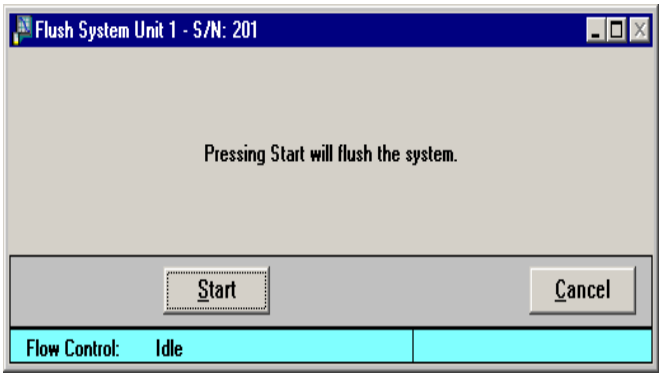


Start Click this push button to begin filling the beaker.

Cancel Cancels the operation.

Flush System

This option enables you to flush liquid through the system; the Flush System dialog is displayed.



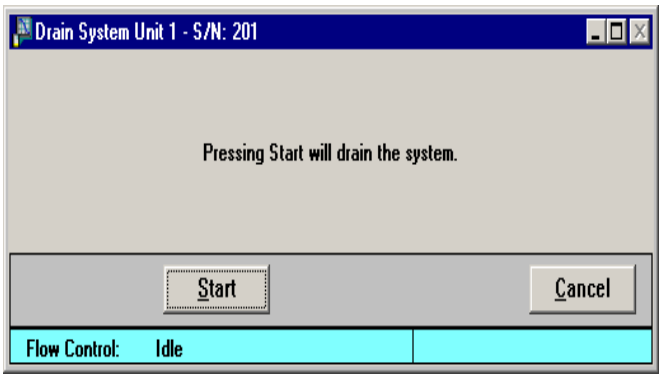
Before selecting this option, place a beaker of electrolyte on the sample stand and raise the stand.

Start Click this push button to start the flushing process.

Cancel Cancels the operation.

Drain System

This option enables you to drain the liquid from the system; the Drain System dialog is displayed.



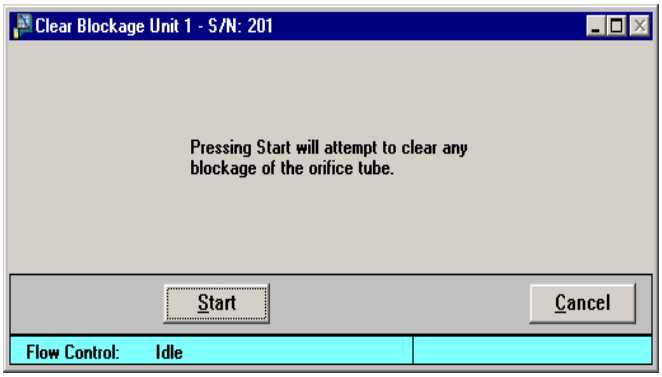
Before selecting this option, be sure that the sample stand is in its lowest position; your orifice tube should not be submerged for this operation.

Start Click this push button to start the draining process.

Cancel Cancels the operation.

Clear Blockages

This option enables you to clear blockages from the orifice tube; the Clear Blockage dialog is displayed.

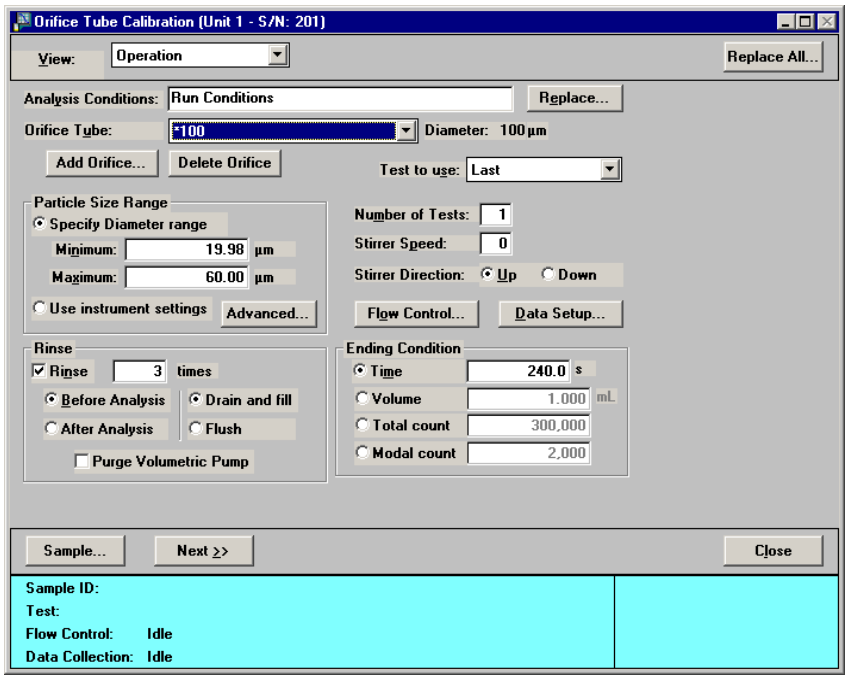


Start Click this push button to start the process.

Cancel Cancels the operation.

Orifice Tube Calibration

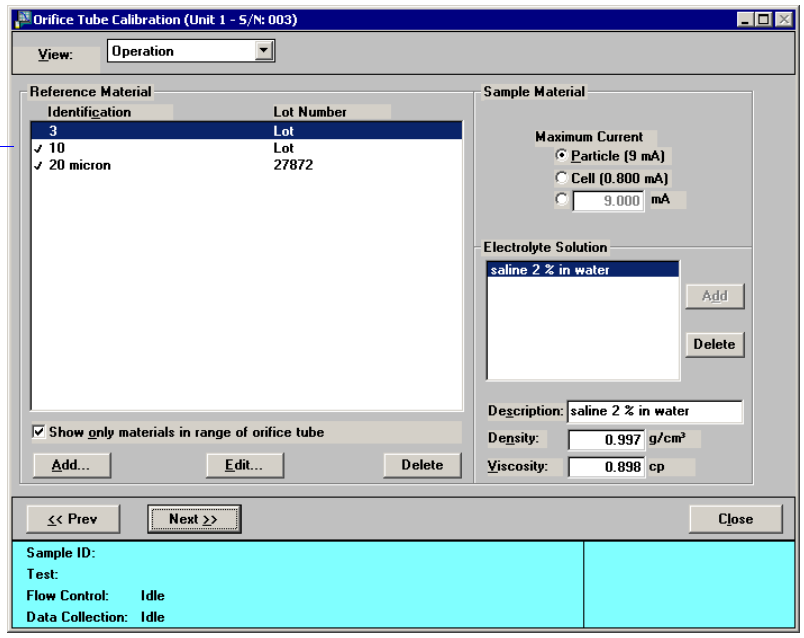
This option enables you to calibrate an orifice tube to a selected sample and electrolyte solution. A sample file for the calibration is created automatically and stored in the calib/serial number subdirectories, which are located in the data subdirectory of the application. A sample identification containing the orifice identification and size is automatically assigned making it easy to recognize the calibration.



The fields on this dialog are identical to the fields on the Analysis conditions dialog; refer to **Analysis Conditions**, page **4-12** for an explanation of this dialog.

Click **Next** to advance to the next view of the calibration dialog.

Be sure the reference materials required in the calibration are checked.



View

Allows you to view one of the following in the current window:

- the current operation
- the instrument schematic
- the instrument log

Reference Material Identification List

This window lists the reference material(s) required to calibrate orifice tubes. Reference materials required for the current calibration must be selected (check mark). Double-click on the reference material to place (or remove) a check mark.

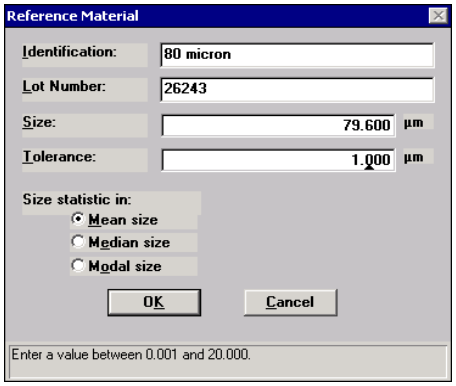
If the reference materials required for the calibration are not in the list, use the **Add** push button to add them.

Show only materials in range of orifice tube

Select this option to show only the materials appropriate for the current orifice tube.

Add

Displays the Reference Material dialog so that you can add a new reference material to the list.



The information required in these fields can be found on the reference material bottle or its accompanying booklet.

Identification

Enter an appropriate description; you can use up to 20 alphanumeric characters. Most users enter the size of the orifice tube and the serial number (located on the orifice tube).

Lot Number

Enter the lot number; you can use up to 20 alphanumeric characters.

Size

Enter the size specified on the reference material.

If you enter a value in this field that is not within the range allowed for the orifice tube being calibrated, a warning is displayed.

Tolerance

Enter the tolerance level.

Size statistic in

Select appropriate statistic.

Edit

Displays the Reference Material dialog (shown above) enabling you to edit the selected material.

Delete

Deletes the selected material from the list.

Maximum Current

Choose the maximum current; typically this choice will be **Particle**. If you wish to specify a different value, select the third choice and enter the desired current.

Electrolyte Solution — Displays a list of available electrolyte solutions (dispersing liquids). After you select a solution from the list, its description and properties are displayed.

Description — Displays the electrolyte solution you select form the list.

Density — Displays the density of the selected electrolyte solution.

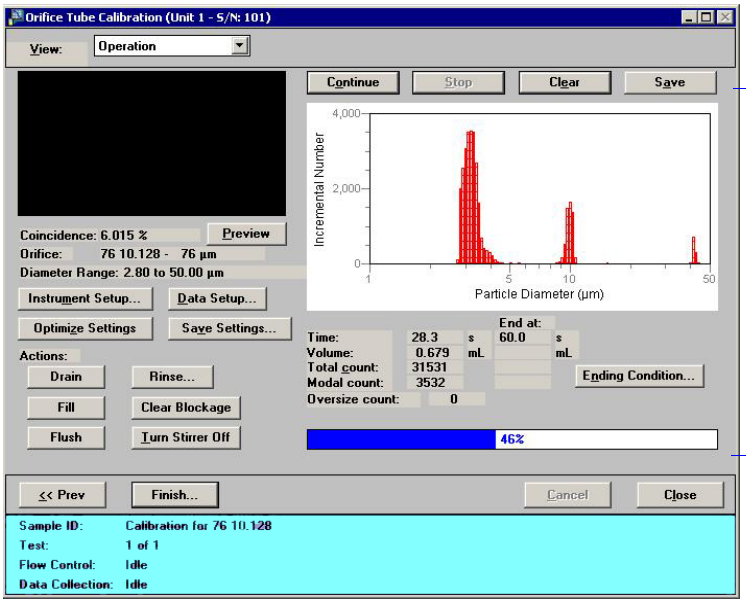
Viscosity — Displays the viscosity of the selected electrolyte solution.

Add — Enables you to add sample materials to the list.

Use the **Description**, **Density**, and **Viscosity** fields to enter your electrolyte and its properties, then click **Add** to add it to the list.

Delete — Deletes the selected electrolyte solution from the list.

Click **Next** to advance to the next view of the calibration dialog



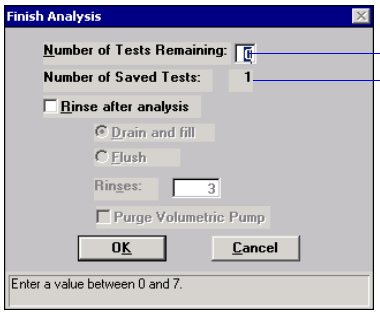
The fields on this dialog are identical to the fields on the Sample Analysis dialog explained previously on page 5-3.

Save

Enabled when the calibration is complete (progress bar reaches 100%) allowing you to save the data.

Finish

Displays the Finish Analysis dialog.

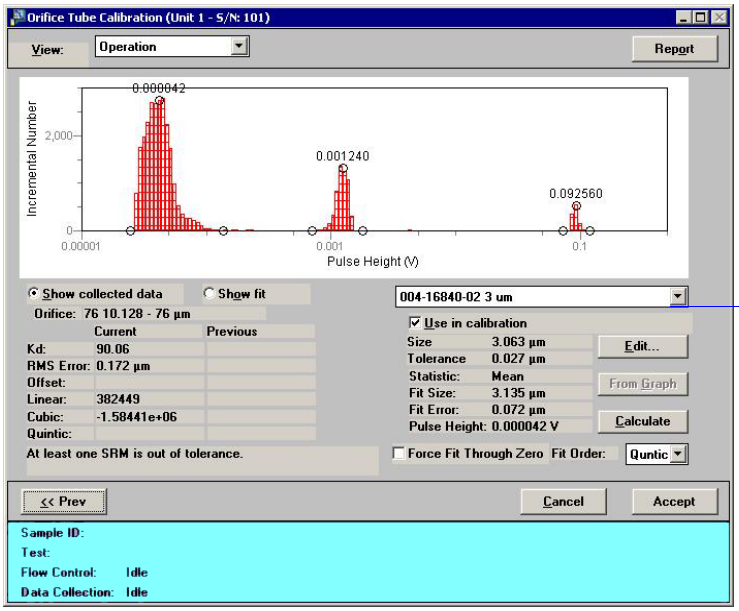


Be sure 0 (zero) is displayed here.

Indicates the data were saved.

This dialog enables you to verify that the reference material data were saved. You should also verify that a 0 (zero) is in the **Number of Tests Remaining** field; otherwise another calibration will be performed.

When you click **OK** on this dialog, the final Orifice Tube Calibration screen is displayed.



Choose the reference material on which to display information from this list.

The values on the left side of this dialog display the calibration information of the current calibration as well as the previous one (if one exists). If a reference material is out of tolerance, it will be displayed just below the calibration information.

The values on the right side of the dialog are specific to a reference material. The reference material is selected from the drop-down list just above the information.

Report

Generates the calibration report to the computer screen. You can print a hard copy of the report from the report window if desired.

Show collected data
Show fit

The collected data option is selected automatically. Select **Show fit** to show the goodness of fit.

Reference Material drop-down list

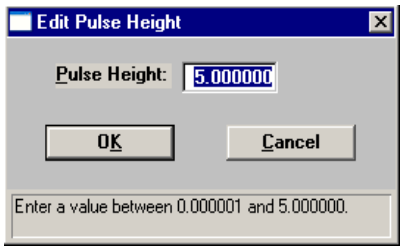
Choose a reference material used in the calibration to display its related information (below the list).

Use in calibration

Initially, this option is checked for all materials included in the calibration, indicating that all will be included in the line-fit calculation. If you do not wish to have a reference material included in the calculation, deselect this option when the desired reference material is displayed in the field of the drop-down list.

Edit

Displays the Pulse Height dialog.



The pulse height is initially calculated by the software; this dialog enables you to manually enter a pulse height. The pulse height can also be edited with cross-hairs (see **Graph** below).

From Graph

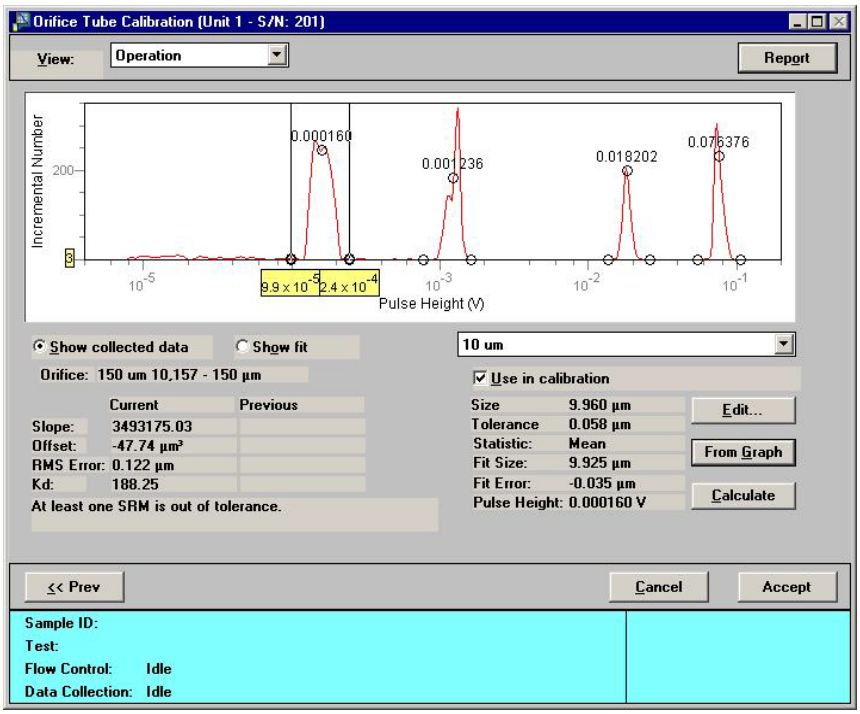
This option enables you to:

- set the pulse height at the position of a single cross hair

  Simply click in the graph at the desired location for a single cross hair, then click **From Graph**.

- have the mean (mode or median) value calculated between two cross hairs

  Click in the graph at the *left* side of the desired peak for the first cross hair. Hold down the **Shift** key and click at the *right* side of the desired peak. Then click **From Graph.**



This example shows a graph in which two cross hairs are used.

Calculate

Click this push button to recalculate the pulse height to its original value.

Force Fit Through Zero

Select this option to force the calibration fit to where zero voltage of the peak detector corresponds to a particle of zero size.

Fit Order

Enables you to choose the highest order for the polynomial fit. If the fit is invalid, the order will decrease to the next lowest selection and refit.

The coefficients of the polynomial fit are displayed on the left side of the dialog.

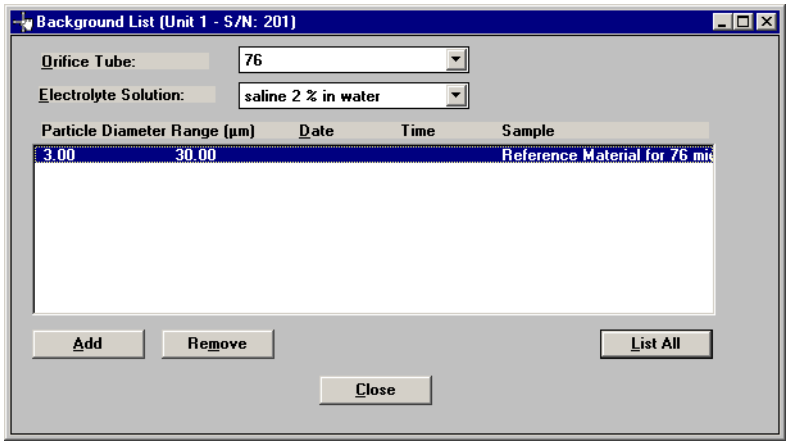
Accept

If values are within tolerance and are as desired, click **Accept** to save the calibration and close the dialog

The file is automatically assigned a name and saved into the CALIB\(serial number) directory. These directories are created in the DATA directory the first time an orifice tube calibration is performed. If you have two instruments attached, directories for each instrument serial number will be created.

Background List

The software maintains a list of backgrounds performed on the analyzer; the Maintain Backgrounds dialog is displayed.



Orifice Tube

Contains a list of the orifice tubes that have been used with the analyzer.

Electrolyte Solution

Contains a list of electrolyte solutions that have been used with the analyzer.

Background list

Lists the backgrounds available for the selected orifice tube/electrolyte solution combination.

This window lists the:

- minimum and maximum particle diameter range
- date and time for the background
- sample file identification

An asterisk preceding the values listed in the minimum and maximum fields indicates approximate values.

Add

Enables you to add a sample file for an analysis whose data you wish to use for a background.

Remove

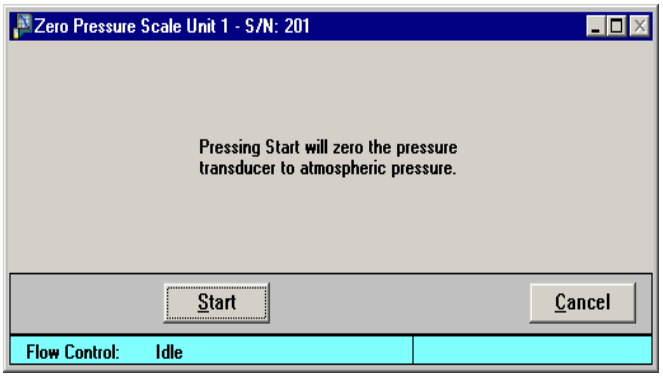
Removes the selected file from the list; it does not delete the file. You can add it back to the list using the **Add** push button if desired.

List All Generates a report of the window contents to the screen, enabling you to print or save the list.

Close Closes the dialog.

Zero Pressure Scale

This option enables you to zero the pressure transducer to atmospheric pressures; the Zero Pressure Scale dialog is displayed.



Start Click this push button to start the zeroing process. When the operation is complete, the dialog closes automatically.

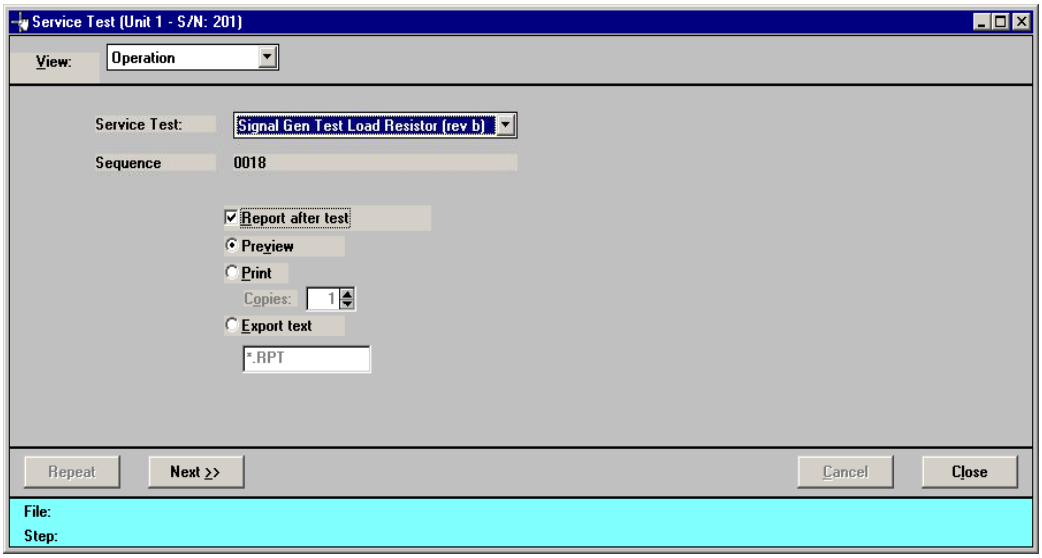
Cancel Cancels the operation.

Diagnostics

This option enables you to perform a diagnostic test to determine if the signal processing circuitry is operating properly. This test actually emulates an analysis sending electronic pulses through a series of predefined ranges. Your service representative may request this test when data results are inaccurate and you have been unable to resolve the problem. The data generated from this test may be insignificant to you as a user, but can be very helpful to your service representative. Your service representative may be able to view the results of this test and resolve the problem, eliminating downtime and repair costs.

This test generates a file to the **cfr5390\Service\userdiag** directory. Your service representative will request that you E-mail this file to him so that he may examine it. If Mail is unavailable, you may print the report and fax it. Your service representative will provide you with the applicable destination information.

When you select **Unit [n] > Diagnostics**, the Service Test dialog is displayed:



View — Allows you to view the current operation (operate), the instrument schematic, or the instrument log in the Service Test dialog. **Operate** is the appropriate choice for this test.

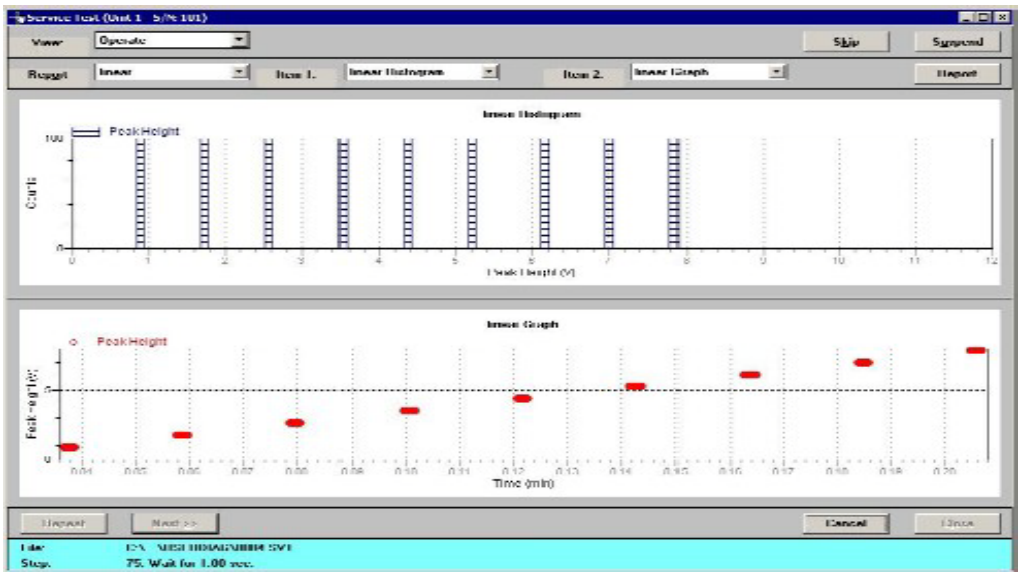
Sequence — Displays the test file number. This number is assigned automatically and incrementally sequenced by the software each time a test is performed. This also serves as the name of the file that is generated to the **userdiag** directory, and will be appended with SVT. For example, the name of the file for the test shown in the above dialog is 0018.SVT.

Report after test Select this option to have a report generated automatically after the test; page 5-6 provides an explanation of output options.

If you do not select this option, you can still have a report generated from the report window.

Cancel Cancels the test.

Next Begins the test; displays the next view of the Service test dialog.



Report Contains a list of predefined pulse ranges. Unless otherwise instructed, this choice should remain as **Linear**.

Item [n[Enables you to display data for the selected report as a Histogram and a Graph.

Report Enables you to generate a report.

Cancel Cancels the test.

The following push buttons become enabled when the test is complete.

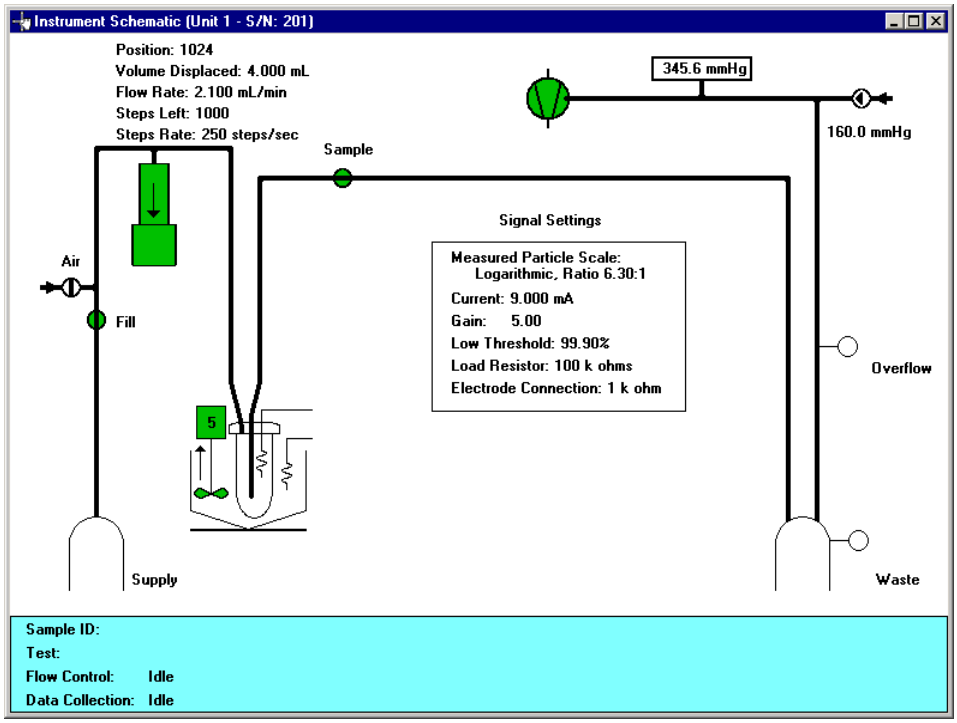
Repeat Repeats the test; not applicable for this test.

Next	Returns you to the first view of the Service Test window.
Close	Closes the dialog.

Enable Manual Control

Select this option to manually control the system. Manual control typically is only used for service issues; normal operation does not require manual control. If the instrument schematic is not displayed, select **Show Instrument Schematic** from the Unit menu.

Manual Control is disabled if an automatic operation is in progress.



When you enable manual control, the symbols for pumps and valves change color on the control screen to indicate manual operation..

Valves: Open = Green 

Closed = Yellow 

Pumps: On = Green
Off = Yellow

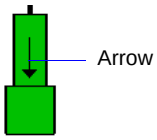
Use one of the following options to move among the system components depicted on the instrument schematic:

- click on the desired component
- use the **Tab** key or arrow keys to move the desired component

A component is selected when it is surrounded by a dotted line. Each component has a shortcut menu displaying the operations available for that paticular component. These menus may be accessed by right-clicking on the desired component, or by using the shortcut keys **Shift + F9** when the component is selected.

Components on the instrument schematic are:

Volumetric pump



The volumetric pump is optional and displays only when installed on the Elzone. The arrow indicates direction of flow. If a volumetric pump is not installed, the fill valve is connected directly to the orifice.

The arrow indicates direction of flow.

 indicates the syringe is emptying and resetting to the Start position (towards start) where it will fill.

 indicates the syringe is filling (towards end). When in this position, liquid is being pulled from the outside of the orifice tube through the orifice for analysis, or through the Fill valve if open0

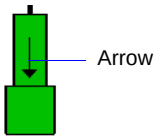
The emptying/filling sequence repeats until the requested volume is obtained.

Actions: *Turn Off*
Move to Start
Move to End
Move Volume
Move Steps

Move to Start empties the pump syringe and goes to the starting position.

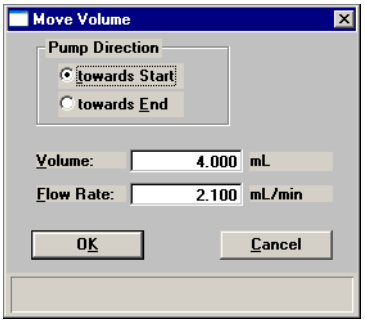
Move to End fills the pump syringe, pulling liquid through the orifice for analysis, or through the Fill valve if open.

Volumetric pump



(*continued***)**

Move Volume displays a dialog enabling you to specify flow direction, the total volume to move, and the flow rate.



Move Steps displays a dialog enabling you to specify flow direction, the number of steps to move, and the rate at which to move the steps.

Air valve

Shows valve in a closed position.

Supplies air to the system for draining the liquid; automatically opens when you perform the draining operation.

Actions: *Open*
Close
Close All

Close All closes all valves and turns off the Servo valve.

Fill valve

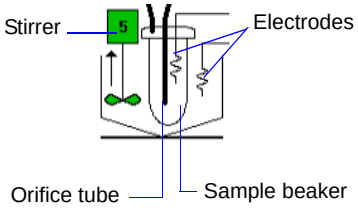
Shows valve in an open position.

Allows fillling of the orifice with liquid.

Actions: *Open*
Close
Close All

Close All closes all valves and turns off the Servo valve.

Stirrer/Orifice tube

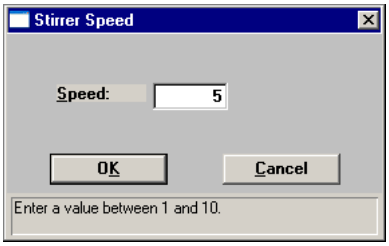


The icon displays in this manner if a hydropulser is being used.

A stirrer or optional hydropulser is used to maintain particle suspension in the sample beaker. The current speed is displayed in the icon.

Actions: *Turn On (green)*
Turn Off (yellow)
Increase Speed
Decrease Speed
Set Speed
Set Stirrer Direction Up (stirrer only)
Set Stirrer Direction Down (stirrer only)

Set Speed displays the Stirrer Speed dialog enabling you to specify a speed for the stirrer (or hydropulser); the value you specify (and the operating speed) is displayed in the icon.



The speed range is 1 through 10; the higher the number, the faster the rotation.

Sample Valve

Allows the sample to flow through the orifice. This valve is also used during filling and draining operations.

Actions: *Open*
Close
Close All

Close All closes all valves and turns off the Servo valve

If the sample compartment is not closed, **Door Open** (in red text) is displayed above the valve. Both sample compartment doors should always be closed during analysis.

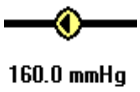
Vacuum pump

Provides vacuum for system operations.

Actions: *Pump On (green)*
Pump Off (yellow)
Fan On
Fan Off

There is no icon associated with fan operations.

Servo valve

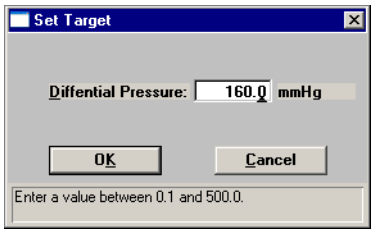


Regulates system vacuum pressure.

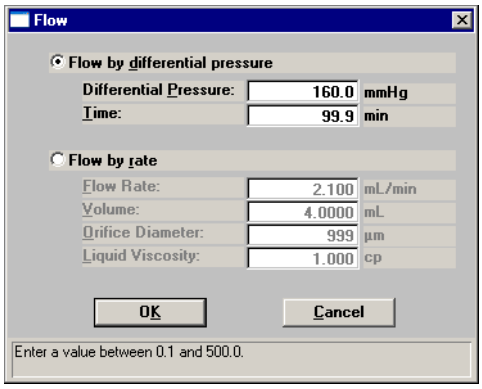
Actions: *Turn On*
Turn Off
Vent
Set Target
Flow

Vent allows air into the system.

Set Target displays the Set Target dialog enabling you to specify a target differential pressure.

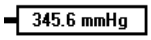


Flow displays the Flow dialog enabling you to specify flow requirements.



The choice you make enables its corresponding fields so that you can enter appropriate values.

Pressure reading



This rectangular box located to the right of the vacuum pump displays the amount of pressure below atmospheric.

Actions: *Zero Pressure Scale*

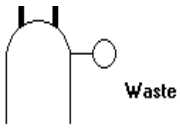
Zero Pressure Scale simply zeroes the pressure scale, assuming that the current pressure is at atmospheric.

Sensors

There are two sensors displayed on the schematic; one for the waste container and one for overflow of the waste container.

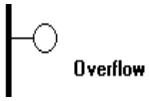
Colors: *White; indicates no liquid present at the sensor level*
Blue; indicates liquid is present at the sensor level

Waste



Represents the Waste container. The sensor to the right of the icon indicates the presence (blue) or absence (white) of liquid at the sensor's height. If the waste sensor displays blue, the waste container is full; current operation will be canceled automatically. You must empty the waste container before proceeding.

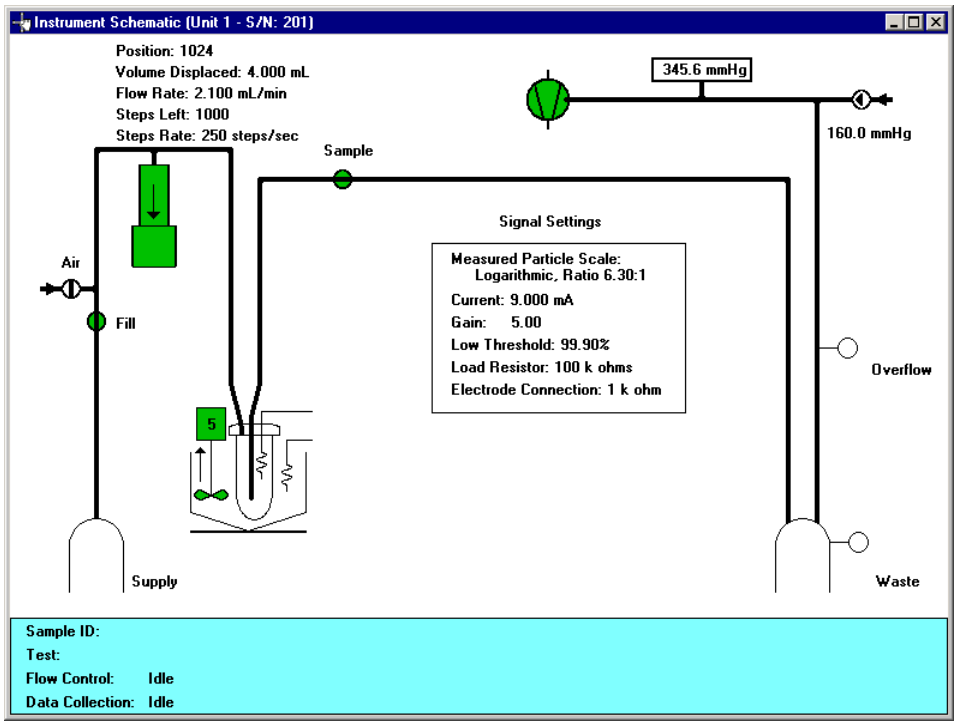
Overflow



The Overflow sensor is provided as a safety precaution in the event the Waste sensor did not detect a full container. For example, the Waste sensor may not have been securely connected. If the Overflow sensor turns blue, the pump stops automatically to prevent liquid from reaching internal components. Terminate all operations and contact your Service Representative.

Show Instrument Schematic

Select this option to display a schematic of the Elzone analyzer.



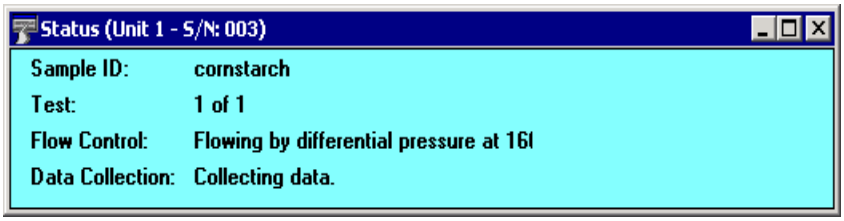
You can determine the state of the valves and pumps by color.

- Valves: Closed = White* Open = Green
- Pumps: Off = White* On = Green

*Closed and Off positions are yellow if manual control is enabled. Select **Enable Manual Control** from the Unit menu to control components manually (refer to page **5-36** for a description of the components on the instrument schematic).

Show Status

Select this option to show only the status window of an operation in progress.



You may wish to use this option if:

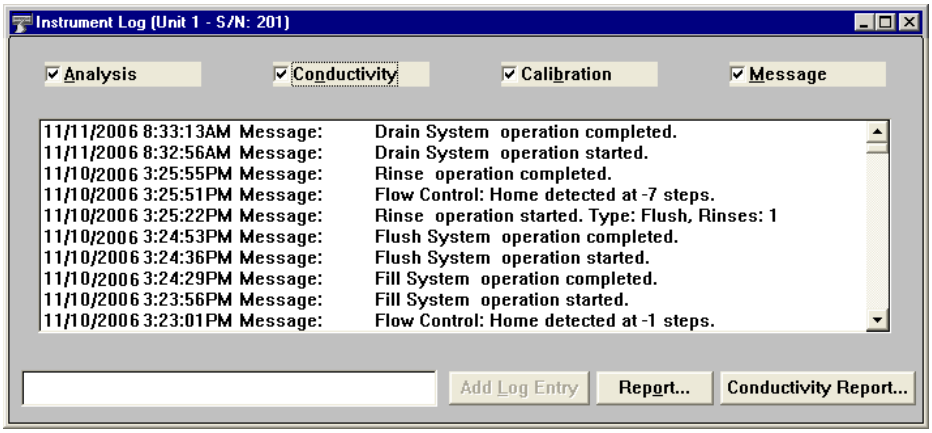
- You have an automatic operation in progress and you wish to edit a sample file, for example. This way, you can monitor the operation while performing another task.
- You have two units attached to your computer. You can select **Show Status** on each unit menu and view the status of the operations on both units at the same time.

The following items display in the status window:

Sample ID	The path and name of the sample file being used with the current analysis.
Test	The current test being used with the sample file; you can perform up to eight tests with each sample file.
Plumbing	The current plumbing operation: **Draining**, **Filling**, **Flushing**, **Rinsing**. **Idle** displays when a plumbing operation is not in progress.
Data Collection	The current operation in preparation for data acquisition or calibration: **Optimizing Settings**, **Blockage Detection**, **Checking Blockage**, **Testing Conductivity**, **Collecting Data**, **Calibrating**. **Idle** displays when an operation is not in progress.

Show Instrument Log

Select this option to display a log of recent analyses, calibrations, errors or messages, and conductivity details. By default, information for analyses and messages are retained 60 days; calibration and conductivity information is retained 90 days. You may change the time for which this information is retained in the Unit section of the WIN5390.INI file.



You can choose the type of information to display in the window by selecting only the desired item(s). For example, check the **Analysis** box to display only analysis information.

Analysis
Conductivity
Calibration
Message

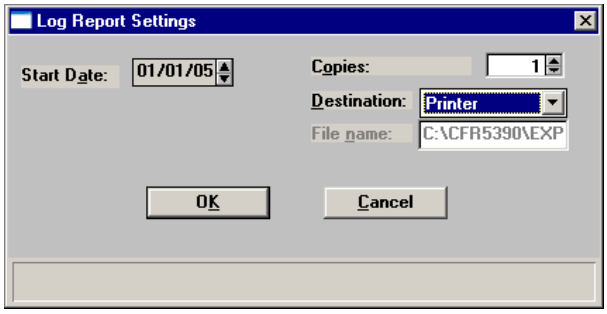
Enable you to choose the type of entries to display in the window. For example, if you select **Analysis**, only Analysis operations are displayed.

Add Log Entry

Becomes enabled when you make an entry in the adjacent field. Entries display in the Log Report.

Report

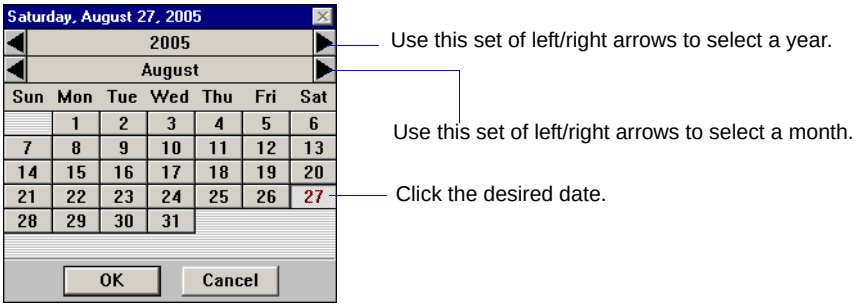
Enables you to display on the screen or print a report of log entries; the Log Report Settings dialog is displayed.



Start Date

Use this field to specify a date at which to begin listing entries. You can specify a start date using any of the following methods:

- Highlight the field (or press **F2** to clear the field) and type in the desired date.
- Double-click in the field (or press **F4**) to display a calendar to choose a date.



- Press **F2** to clear the field, then **F3** to insert the current date.

Copies

Enabled when you choose **Printer** for the destination, allowing you to print up to four copies.

Destination

Specify a report destination.

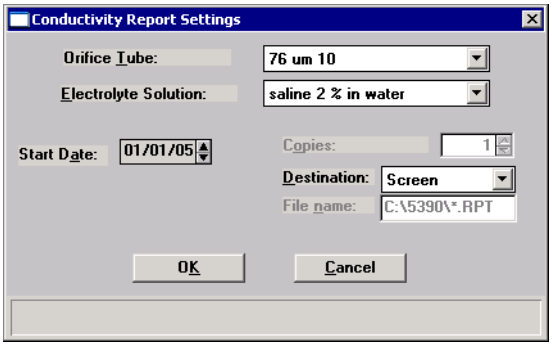
Choices: *Screen, Printer, File*

File name

Enabled when you select *File* for the destination, enter a file name.

Conductivity Report

Enables you to display on the screen or print a report of conductivity for a selected orifice tube and electrolyte solution; the Conductivity Report Settings dialog is displayed.

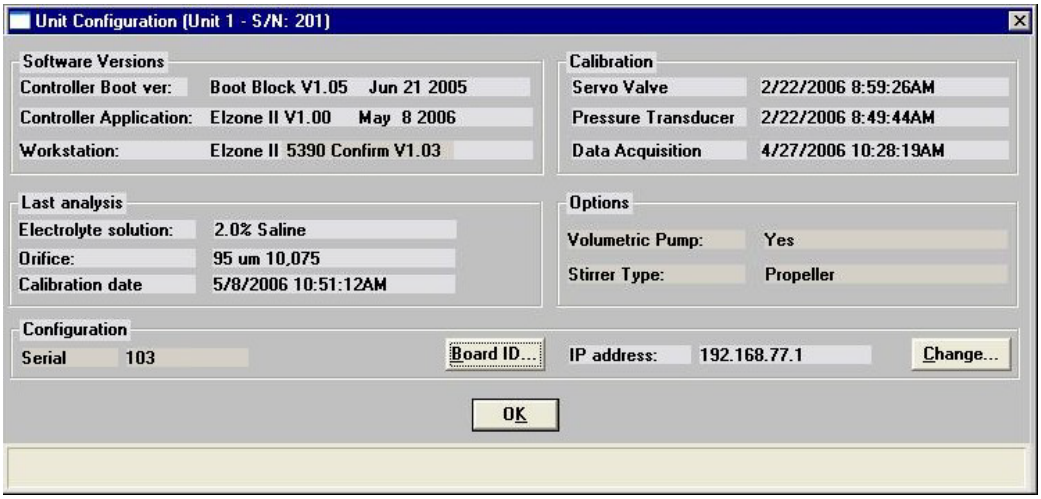


The **Orifice Tube** and **Electrolyte solution** drop-down lists enable you to choose the combination desired.

The remaining options function in the same manner as the Log Report (explained on the previous page).

Unit Configuration

Select this option to display software/hardware configurations for the selected analyzer. When you select Unit Configuration from the Unit menu, the Unit Configuration dialog is displayed.



Software Versions — Displays the software versions for components being used by the analyzer.

Last analysis — Displays the last orifice and electrolyte solution used by the analyzer, or unknown. If known, the calibration date of the orifice tube is also shown.

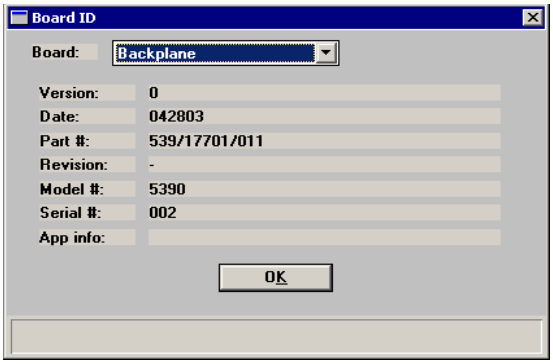
Calibration — Displays calibration dates for components being used by the analyzer.

Options — Indicates whether the volumetric pump is installed. Also displays the type of stirrer installed on the analyzer.

Configuration — Displays the analyzer's IP address. Also enables you to view details of the boards installed in the analyzer.

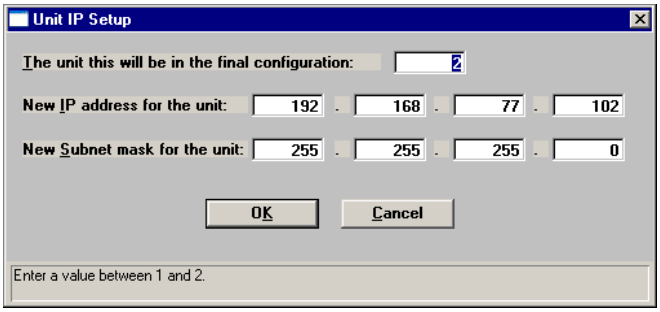
Board ID

Displays the Board ID dialog containing information on the circuit boards installed in the computer; the Board ID dialog is displayed.



Change

Displays the Unit IP Setup dialog.



This dialog shows the IP address and Subnet mask that were assigned during installation. Do not edit these numbers unless directed by a Micromeritics service representative.

Calibration

The Calibration option provides a method of storing instrument calibration data. Your Micromeritics service representative may use this option to enter calibration data or perform component calibrations for future reference when servicing the analyzer.

This option is enabled only when the analysis program is operating in Service Test mode (refer to **Service Test Mode**, page **7-8** for additional information).

Service Test

Certain service tests are included in the operating program, but can be performed only with the assistance of a trained Micromeritics service representative. These tests are designed to provide your service representative with instrument readouts, as well as to assist him in troubleshooting potential problems and, perhaps, eliminating unnecessary repair services. This service strategy allows you to conduct expert tests in less time than it would take to be properly trained in servicing the instrument.

This option is enabled only when the analysis program is operating in Service Test mode (refer to**Service Test Mode**, page **7-8** for additional information**).**

6. REPORTS MENU

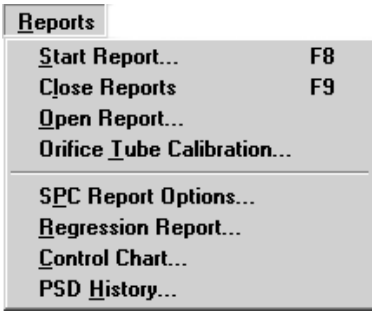
The options on the Reports menu enable you to generate reports on:

- sample analyses
- orifice tube calibrations
- statistical process control parameters
- historical particle size distribution

This chapter provides a description of these options, as well as sample copies of some of the reports available with the Elzone program. Refer to **Report Options**, page **4-25** for details on editing reports.

Description

Listed below are brief descriptions of the commands contained on the Reports menu. Detailed descriptions follow this section.



Start Report — Allows you to generate a report on a completed sample analysis or on the data collected thus far for an analysis in progress. Page **6-3**.

Close Reports — Closes all open report windows. Page **6-6**.

Open Report — Enables you to open a report saved from the report window. Page **6-6**.

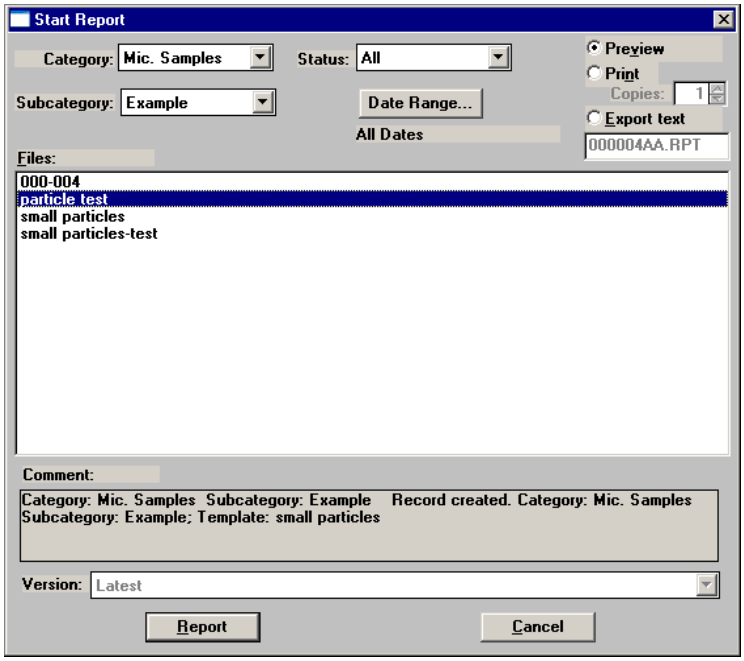
Orifice Tube Calibration — Allows you to generate a report on an orifice tube. Page **6-7**.

SPC Report Options — Allows you to specify the sample data to be included in SPC reports. Page **6-8**.

Regression Report	Allows you to generate a regression report. Page **6-11**.
Control Chart	Allows you to generate a control chart report. Page **6-15**.
PSD History	Allows you to generate a particle size distribution history report. Page **6-19**.

Start Report

Select this option to generate a report on a sample analysis. Select **Start report** from the **Reports** menu to display the Start Report dialog



Category/Subcategory

Use these drop-down lists (directories) to navigate to the desired file(s).

Status

This drop-down list determines the type of sample files displayed in the **Files** list window in the specified directory for all dates, or within the specified range of dates (using push button).

Choices: All, Analyzing, Complete, Entered

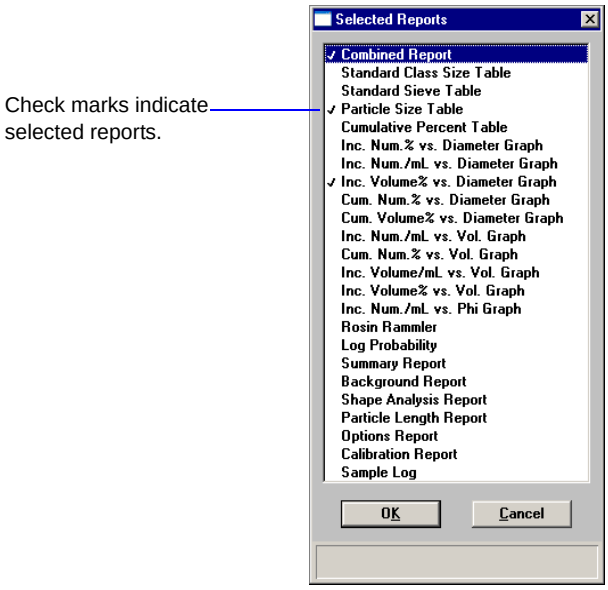
Refer to **Table 2-2. File Status and Description**, page **2-11** for a description of the status types.

Date Range

Displays the Select Dates dialog so that you may specify a range of dates. Refer to **Selecting Files**, page **2-10** for a description of this push button.

Preview	Choose this option to have the report(s) generated to the screen. If a printed copy is desired, you can print the report from the report window. Options for customizing and fine-tuning data are available for onscreen reports (page **6-22**).
Print	Choose this option to have the report(s) generated directly to the printer. If you choose this option, the **Copies** field is enabled allowing you to print up to four copies.
Export	Choose this option to print to a file; use the field below the Export option to enter a name. The Export option is unavailable for an Analyst.
Files window	Displays a list of the available sample files for the choice shown in the **Status** field and in the selected date range.
Comments	Displays statistics for the selected file.
Version	Displays the version of the selected file. If more than one version exists, the drop-down list containing the versions available is enabled.
Report	Generates the report to the requested destination.

If you choose a single sample file, the Selected Reports dialog is displayed when you click **Report**. The reports selected are the ones you specified in the sample file. This dialog allows you to deselect reports or select additional ones.



Double-click on the report(s) you wish to select (or deselect). A check mark is placed before each selected report. Pressing the **Spacebar** performs the same function. After you make your report selection and click **OK**, the requested reports are sent to the specified destination.

If you choose more than one file, this dialog is not displayed. The reports you specified in each sample file will be generated and sent to the specified destination.

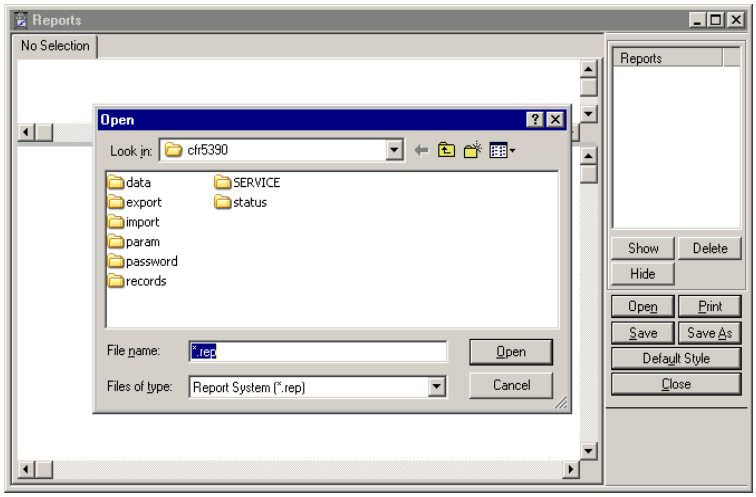
Close Reports

This option enables you to close all open report windows at one time. This avoids having to select close on each report window.

Open Report

This option enables you to open a report that has been saved from the Report window; the Report window opens with an Open dialog positioned on top.

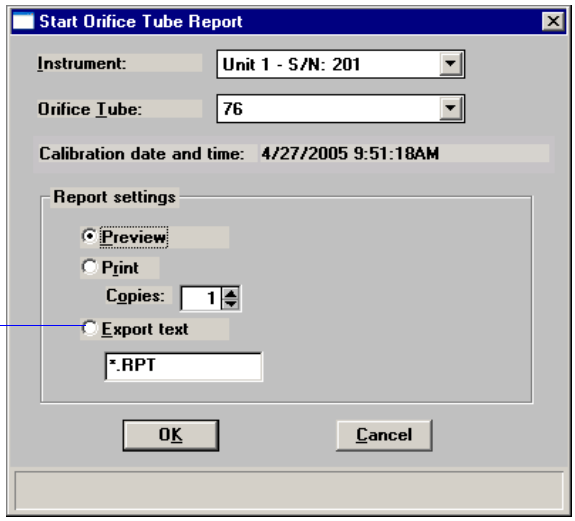
Report Window



After you navigate to the desired directory, select your file, and click **Open**, your report is displayed in the Report window.

Orifice Tube Calibration

This option enables you to generate a report on an orifice tube calibration; the Start Orifice Tube Report dialog is displayed.



Not displayed for an Analyst.

Instrument — Drop-down list containing the serial number of the instrument(s) installed on the current computer. You can have up to two instruments on one computer.

Orifice Tube — Drop-down list containing the calibrated orifice tubes that exist for the selected instrument.

Calibration date and time — Displays the date and time of the calibration for the selected orifice tube.

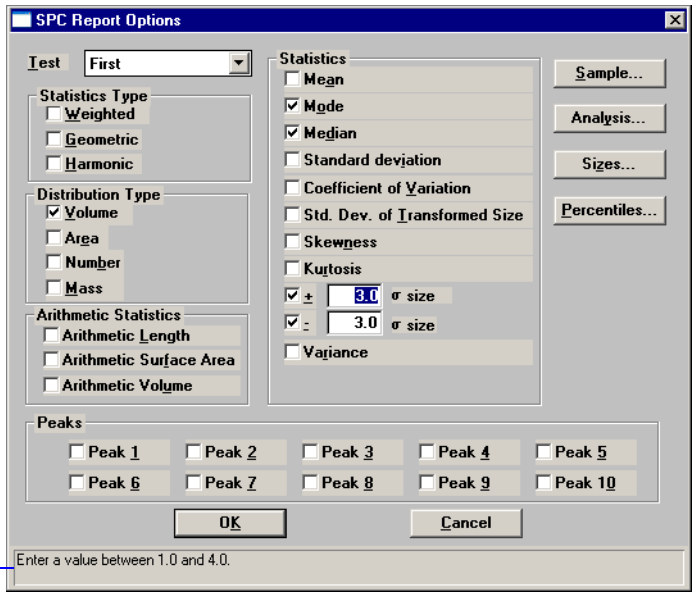
Report settings — Choose **Preview** to have the report generated to the screen. If a printed copy is desired, you can print the report from the report window.

Choose **Print** to have the report generated directly to the printer. If you choose this option, the **Copies** field is enabled allowing you to print up to four copies.

Choose **Export** to have the data exported to a file; its corresponding field is enabled with a default name assigned. You can edit the name if desired. This option is not available for an Analyst.

SPC Report Options

When you select SPC Report Options, the SPC Calculations dialog is displayed.



Displays the range for the selected field.

Test This drop-down list contains analysis choices for SPC calculations.

Last reports statistics for the last analysis performed.

First reports statistics for the first analysis performed.

Average reports an average based on all tests in the selected sample file(s).

Statistics Type Allows you to choose the type of statistics for which the SPC variables are to be calculated.

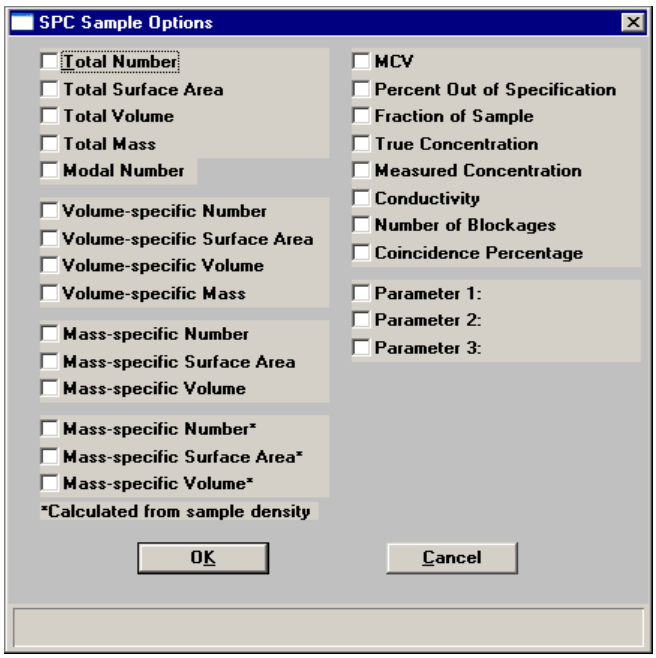
Distribution Type Allows you to choose the type of distribution data for which the SPC variables are to be calculated.

Arithmetic Statistics Allows you to choose the type of arithmetic statistics for which the SPC variables are to be calculated.

Statistics Displays a list of the variables available for SPC reporting; you may choose as many as you wish.

Sample

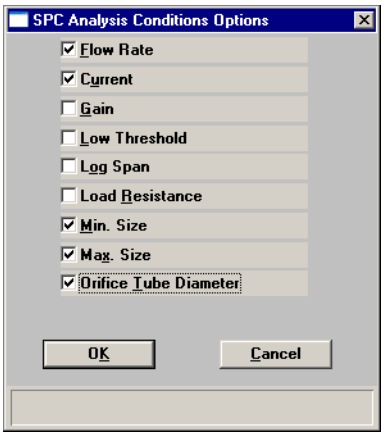
Displays the Sample SPC Options dialog, allowing you to select the sample parameters you wish to have reported.



Specific parameters can be designated for the fields labeled **Parameter [n]**. Refer to **Edit Labels**, page **7-4** for additional information.

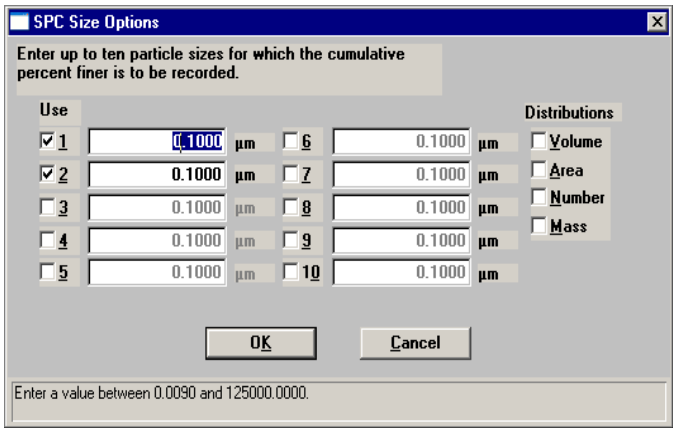
Analysis

Displays the SPC Analysis Conditions Options dialog, allowing you to select the analysis conditions you wish to have reported.



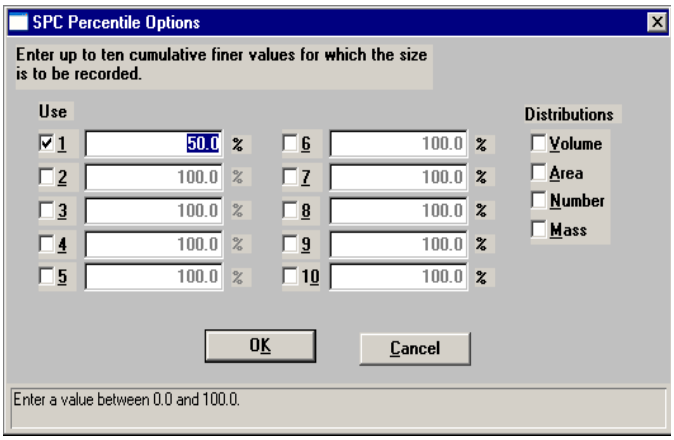
Sizes

Displays the SPC Size Options dialog, allowing you to specify up to 10 sizes and 5 distribution types at which the cumulative percent finer (or coarser, depending on the selection in the Units dialog) is to be reported.



Percentiles

Displays the SPC Percentile Options dialog, allowing you to specify the percentiles and distribution types for which the cumulative percent finer (or coarser, depending on the selection in the Units dialog) is to be reported.

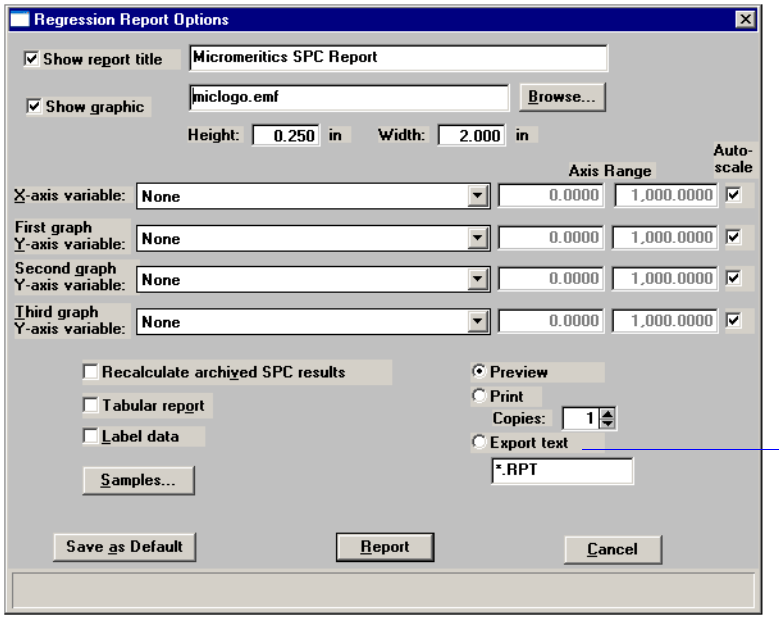


Peaks

Allows you to choose the peaks to include in SPC calculations; you can include up to 10 peaks.

Regression Report

Select this option to generate a regression report. The regression report is used to determine the interdependency between two variables. Up to three dependent variables (Y-axis) may be plotted against a single independent variable (X-axis). The degree of correlation between the variables also is reported. The graphs for the regression report are scaled so that all three fit on a single page. If you choose less than three, the graphs are scaled to fill most of the page.



Not displayed for an Analyst.

Show report title

Select this option to have a title display on your report. Accept the default or enter a new title. You can enter up to 40 alphanumeric characters.

Deselect this option to omit the report title.

Show graphic

Select this option to have a graphic display above your report title. For example, you may wish to display your company logo. The graphic must be a bitmap (bmp) or enhanced metafile (emf).

Click **Browse** to choose the file, then use the **Height** and **Width** fields to specify a size. This image can be edited in the report window (when printed to the screen), or removed if desired.

X- and Y-Axes Variable fields

Allows you to designate the X- and Y-axes variables. Click on the down arrow to display a list of variables. The variables in this list are the ones you specified in the **SPC report options**.

With this option, you can plot the regression of up to three Y-axis variables against the X-axis variable. The X-axis specifies the independent variable for the regression, while the Y-axes provide the dependent variables.

Axis Range

Enables you to specify the beginning and ending values for the X- and Y-axis ranges. Data collected outside these ranges are not included in the plot. These fields are disabled if you choose **Autoscale**.

Autoscale

Allows you to have the X- and/or Y-axes scaled automatically. When scaled automatically, both axes begin at zero. The analysis program uses the highest values collected during analysis as the ending points.

Recalculate archived SPC results

Select this option to have archived SPC values recalculated. This ensures that any changes made to the SPC Report Options are included in the new report; however, it does lengthen the time required to generate the report.

Tabular report

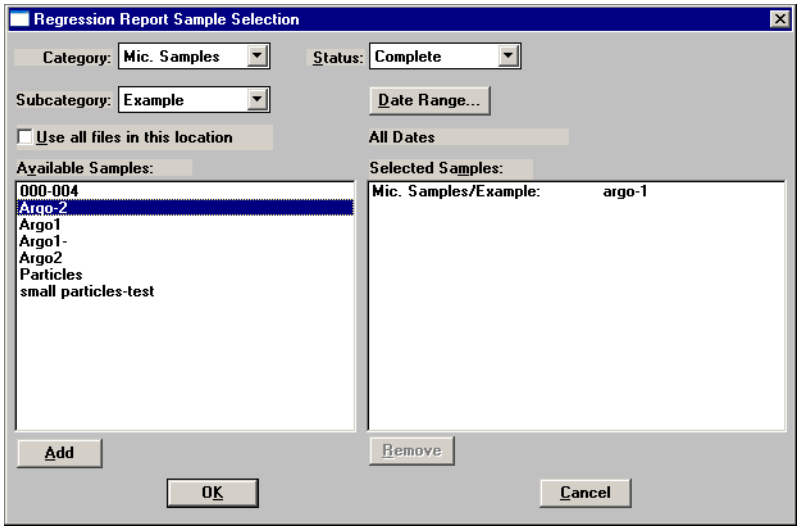
Enables you to generate tabular, as well as graphical, data of the included samples. A tabular report contains the numeric values contributed by each sample.

Label data

Allows you to label the points on the plot to correspond with the values in the sample files.

Samples

Displays the Regression Report Sample Selection dialog, allowing you to choose the sample files you wish to have reported.



Category
Subcategory

Drop-down lists containing current directories. The Category represents the Directory, and the Subcategory represents the Subdirectory of the selected Directory.

Status

This drop-down list determines the type of sample files that display in the **Available Samples** pane in the selected directory for all dates, or within the specified range of dates (using **Date Range** push button). Refer to **Table 2-2. File Status and Description**, page **2-11** for an explanation of the Status types.

Date Range

Displays the Select Dates dialog so that you can specify a range of dates. Refer to page **2-10** for an explanation of this dialog.

Use all files in this location

Select this option to include all files in the selected directory in the Regression report.

Available Samples

This pane contains the sample files residing in the selected directory and within the selected range of dates.

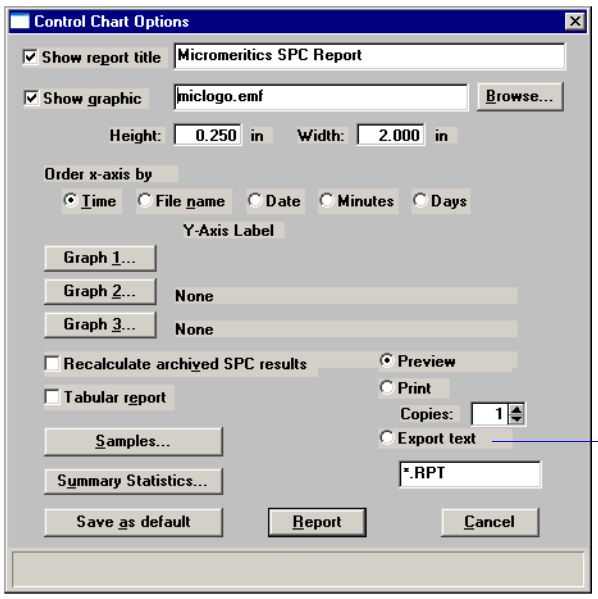
Selected Samples

This pane contains the sample files you select to include in the report.

Add	Moves the selected file to the **Selected Files** pane. Alternatively, you can simply double-click on the desired file(s). You can select multiple files by holding down **Ctrl** while making your selections. You can include up to 200 sample files.
Remove	Removes the selected file from the **Selected Files** pane and places it back into the **Available Files** pane.
Save As Default	Saves the current definition of the report as the default.
Preview	Choose this option to have the report(s) generated to the screen. If a printed copy is desired, you can print the report from the report window.
Print	Choose this option to have the report(s) generated directly to the printer without reviewing them first. If you choose this option, the **Copies** field is enabled allowing you to print up to four copies.
Report	Generates the report.

Control Chart

This option enables you to generate a control chart report which plots the changes in a statistic.



Not displayed for an Analyst.

Show report title

Select this option to have a title display on your report. Accept the default or enter a new title.

Deselect this option to omit the report title.

Range: *40 characters*

Show graphic

Select this option to have a graphic display above your report title. For example, you may wish to display your company logo. The graphic must be a bitmap (bmp) or enhanced metafile (emf).

Click **Browse** to choose the file, then use the **Height** and **Width** fields to specify a size. This image can be edited in the report window (when printed to the screen), or removed if desired.

Order x-axis by

Enables you to choose the order in which X-axis statistics are placed. You can have them placed by **Time**, **File name**, **Date**, **Minutes**, or **Days**.

X-axis Order by

(continued)

Time places the files on the graph at numerical points in the order of the date/time the files are analyzed.

File name places the files on the graph at numerical points in alphanumeric order.

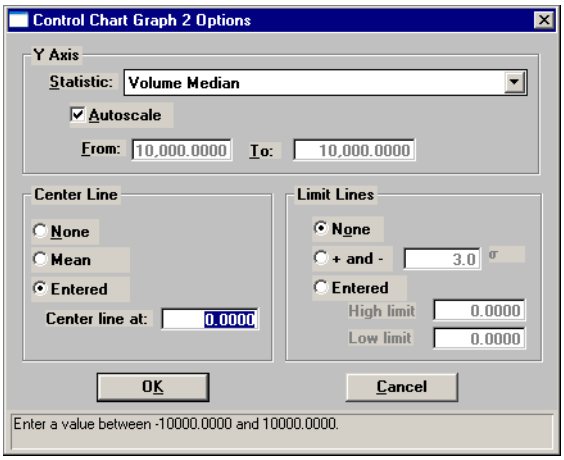
Date places the files on the graph at points representing the actual date/time the files are analyzed.

Minutes places the files on the graph at points representing the minutes that have elapsed from the first file placed on the list, which is the earliest-analyzed file.

Days places the files on the graph at points representing the number of days that have elapsed from the first file placed on the list, which the earliest-analyzed file.

Graph [n]

Displays the Control Chart Graph [n] Options dialog, allowing you to define the Y-axis of each graph.



Statistic

This drop-down list displays the SPC variables selected on the SPC Report Options dialog. The variable you choose will be plotted against time.

Autoscale

Allows you to have the Y-axis scaled automatically. If you wish to specify a range, deselect this option and enter ranges in the **From** and **To** fields.

Center Line

Displays placement options for the variable's optional value. Choose *Entered* to specify placement of the line.

Limit Lines

Displays the options available for limiting lines. You can have the lines placed at some multiple of the standard deviation or at specified positions (*Entered*).

When you select *Entered*, the **High limit** and **Low limit** fields are enabled, allowing you to enter appropriate values.

Recalculate archived SPC results

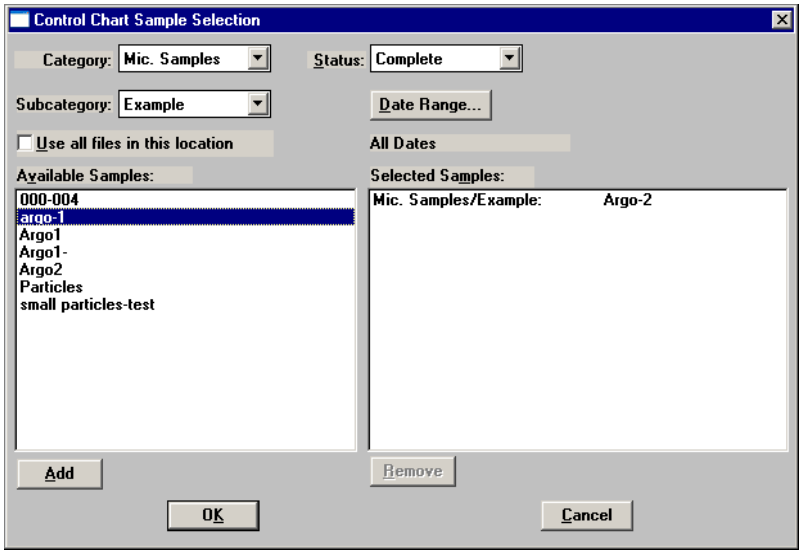
Select this option to have archived SPC values recomputed. This ensures that any changes made to the SPC Report Options are included in the new report. It also lengthens the time required to generate the report.

Tabular report

Allows you to generate tabular, as well as graphical, data of the included samples. A tabular report contains the numeric values contributed by each sample.

Samples

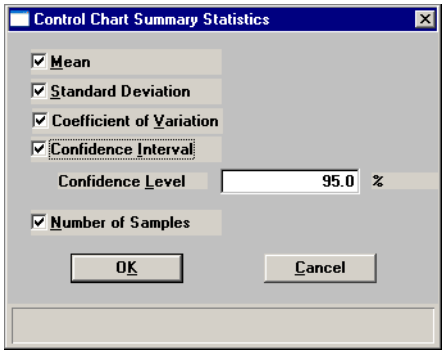
Displays the Control Chart Sample Selection dialog, allowing you to choose the sample files on which you wish to report.



This dialog functions in the same manner as the Regression Report Sample Selection Dialog explained earlier in this chapter. Refer to page **6-12** if you need assistance on the fields of this dialog.

Summary Statistics

Allows you to select the statistics to display in the report.



Coefficient of Variation is the Standard Deviation divided by the Mean.

Confidence Interval of the mean value (shown on the same line below the graph on the report). When you select this option, the **Confidence Level** field is enabled allowing you to enter the percentage.

Select **Number of Samples** to have the number of samples analyzed included in the report.

Save as default

Saves the current definition of the report as the default.

Preview

Choose this option to have the report(s) generated to the screen. If a printed copy is desired, you can print the report from the report window.

Print

Choose this option to have the report generated directly to the printer without reviewing it. If you choose this option, the **Copies** field is enabled allowing you to print up to four copies.

Export

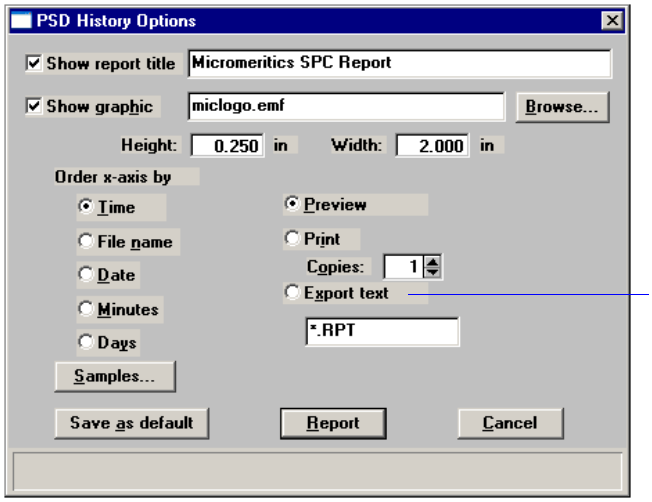
Choose this option to have the report generated to a **File**; the field just below the option becomes enabled allowing you to enter a name for the file.

Report

Generates the report.

PSD History

This option enables you to report a sequence of full particle size distribution graphs.



Show report title

Select this option to have a title display on your report. Accept the default or enter a new title. You can enter up to 40 alphanumeric characters.

Deselect this option to omit the report title.

Show graphic

Select this option to have a graphic display above your report title. For example, you may wish to display your company logo. The graphic must be a bitmap (bmp) or enhanced metafile (emf).

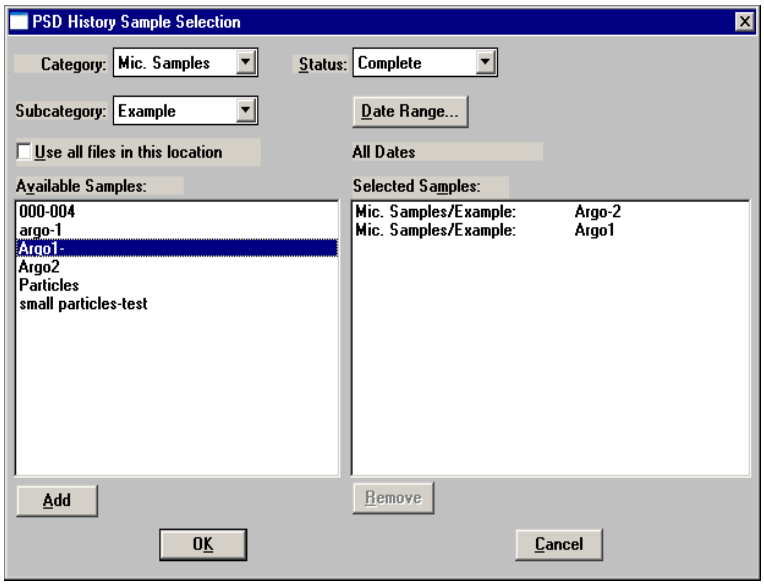
Click **Browse** to choose the file, then use the **Height** and **Width** fields to specify a size. This image can be edited in the report window (when printed to the screen), or removed if desired.

X-axis Order By

Enables you to choose the order in which X-axis statistics are placed. You can have them placed by **Time**, **File name**, **Date**, **Minutes**, or **Days**. Refer to page **6-16** for an explanation of these options.

Samples

Displays the PSD History Sample Selection dialog, allowing you to choose the sample files on which you wish to report.



This dialog functions in the same manner as the Regression Report Sample Selection Dialog explained earlier in this chapter. Refer to page **6-12** if you need assistance on the fields of this dialog.

Save As Default — Saves the current definition of the report as the default.

Preview — Choose this option to have the report(s) generated to the screen. If a printed copy is desired, you can print the report from the report window.

Print — Choose this option to have the report(s) generated directly to the printer. If you choose this option, the **Copies** field is enabled allowing you to print up to four copies.

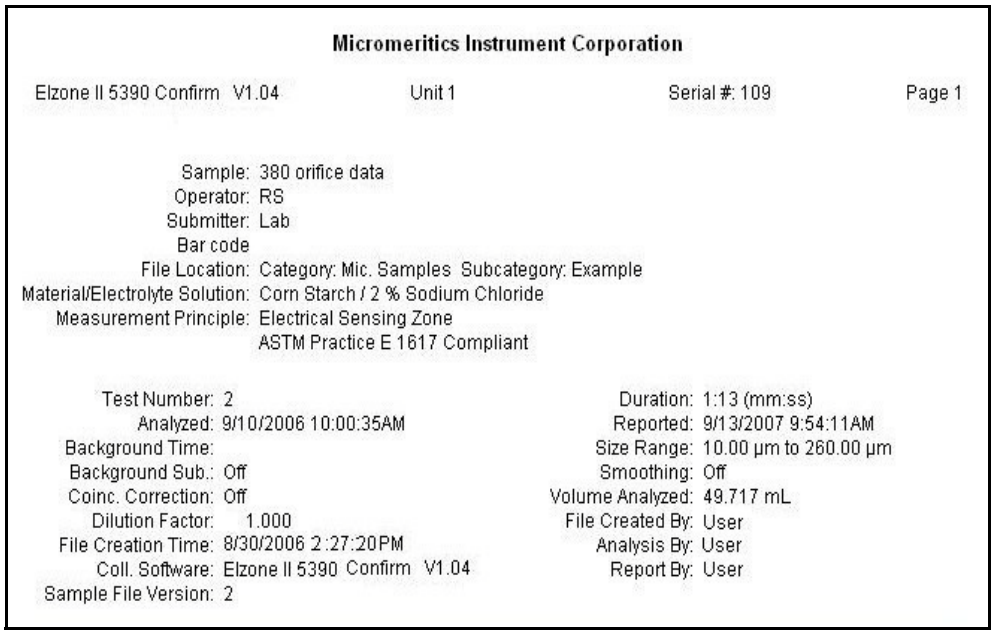
Export — Choose this option to have the report generated to a **File**; the field just below the option becomes enabled allowing you to enter a name for the file.

Report — Generates the report.

Printed Reports

Header

All printed reports (either to the screen or to a printer) contain a header displaying file statistics, as shown in this example.



Micromeritics Instrument Corporation

Elzone II 5390 Confirm V1.04 Unit 1 Serial #: 109 Page 1

Sample:	380 orifice data
Operator:	RS
Submitter:	Lab
Bar code	
File Location:	Category: Mic. Samples Subcategory: Example
Material/Electrolyte Solution:	Corn Starch / 2 % Sodium Chloride
Measurement Principle:	Electrical Sensing Zone ASTM Practice E 1617 Compliant

Test Number:	2	Duration:	1:13 (mm:ss)
Analyzed:	9/10/2006 10:00:35AM	Reported:	9/13/2007 9:54:11AM
Background Time:		Size Range:	10.00 µm to 260.00 µm
Background Sub.:	Off	Smoothing:	Off
Coinc. Correction:	Off	Volume Analyzed:	49.717 mL
Dilution Factor:	1.000	File Created By:	User
File Creation Time:	8/30/2006 2:27:20PM	Analysis By:	User
Coll. Software:	Elzone II 5390 Confirm V1.04	Report By:	User
Sample File Version:	2		

The report header may contain a graphic (such as a company logo) and/or title if specified. The header also contains:

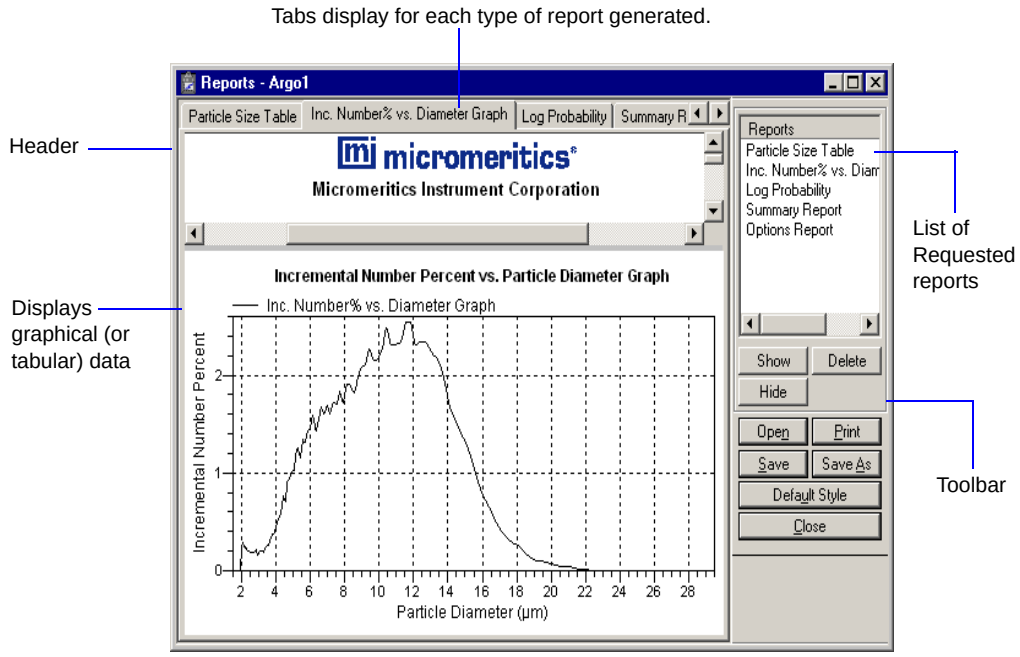
- Sample and instrument statistics such as date and time of analysis, analysis conditions, and background data for tabular and graphical reports.
- Comments entered in the **Comments** window on the sample information dialog.
- Notes of any changes to the sample file which occur after analysis (excluded in summary reports).
- SPC and PSD report headers also display the range of dates of the selected samples as well as the current date.

Onscreen Reports

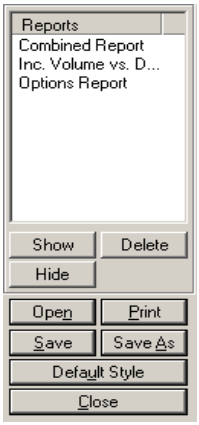
When you choose **Preview** as the report destination, reports are printed to the screen. Onscreen reports provide many options for customizing and manipulating reports:

- a tool bar
- shortcut menus
- zoom feature
- axis cross-hairs

When reports are printed to the screen, they are printed in a window like the one shown below. Each requested report is listed in the Reports window on the tool bar; they are also indicated by selectable tabs across the top of the report header. To view a specific report, select its tab or select the report in the Reports window and click **Show**.



Tool Bar



Reports Contains a list of all requested reports.

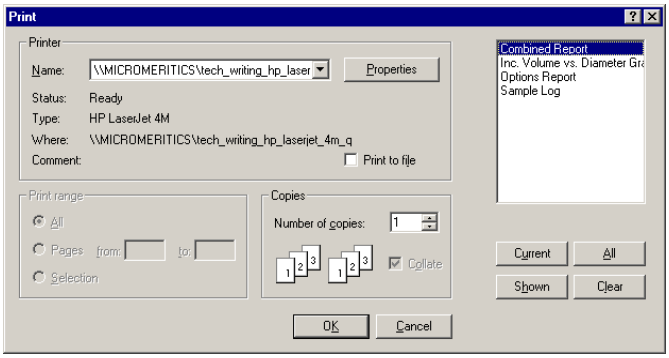
Show Shows the selected report in the report window. If the report has been hidden, it and its associated tab will become visible.

Delete Deletes the selected report. A deletion confirmation dialog is displayed since this function cannot be undone. The deleted report(s) will have to be regenerated if deleted in error.

Hide Hides (removes) the selected report from the report window. The report's associated tab is also removed.

Open Allows you to open a previously saved report file

Print Displays a print dialog so that you can choose an appropriate printer for report output.



Print
(continued)

A list of available reports is displayed in the window on the right side of the dialog

For convenience in selecting which reports to print, push buttons are provided beneath the report window. Or, you can make your selection by clicking on the desired reports.

Current selects the report displayed in the report window.

Shown selects only the shown reports; any non-highlighted reports indicate they are hidden. You can still select hidden reports from this window to print.

All selects all reports, including those that may have been hidden.

Clear clears all selections.

Save

Saves all reports of the currently open file in a report format using the same name as the sample file, only with an **rep** extension. If you wish to specify a name and/or specific reports to save, use the **Save As** push button.

Save As

Saves all or specified reports from the currently open file. The push buttons displayed on this dialog perform in the same manner as the print dialog (explained above).

Reports can be saved in three different formats:

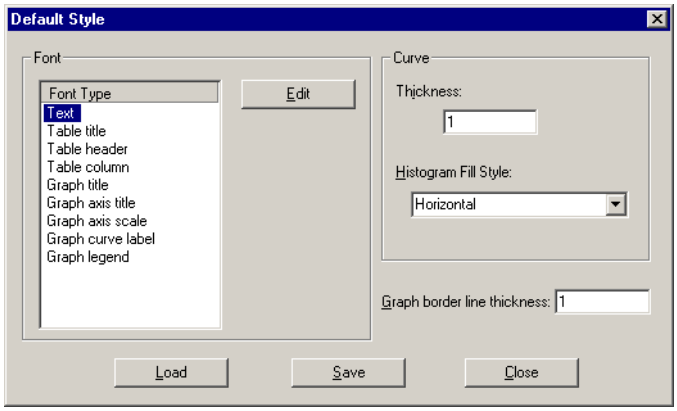
Report system (.rep)*: Saved in a format which allows you to reopen the file using the push button on the Report window tool bar.

Spreadsheet (*.xls): Saved in a format which can be imported into most spreadsheet programs.

Ascii Text (.txt)*: Saved in ASCII text which can be imported into programs accepting this type of file.

Default Style

Displays the Default Style dialog so that you can edit report defaults.



Fonts

Contains a list of report elements for which the font can be edited. Simply highlight the desired element and click **Edit**; a font dialog is displayed so that you can specify the desired font and attributes.

Curve

The items in this group box enable you to specify a thickness for report curves and, when using histograms, the type of fill to apply.

Graph border line thickness

Enables you to specify a thickness for the border of the graph.

Load

Loads the last *saved* defaults.

Save

Saves the changes as the defaults. If you do not click **Save**, the changes will apply to the current report set only. The next reports will revert to the defaults.

Close

Closes the dialog and applies the changes. If you clicked **Save**, the changes become the defaults. If you did not click **Save**, the changes apply to the current report only.

Close

Closes the report window.

Shortcut Menus

Shortcut menus are accessed when you right-click on the tabular or graphical portion of a report.

Tabular Reports

Resize column — Displays a dialog so that you can specify the width of the selected column (in inches).

Rename column — Displays a dialog so that you can edit the name of the selected column. Use **Ctrl + Enter** to insert line feeds.

Move column — Allows you to move the location of the selected column to the left or to the right.

Align column — Enables you to right-align, left-align, or center the data in the selected column.

Hide column — Displays a list of the columns that have not been hidden, enabling you to select the one you wish to hide.

Show column — Displays a list of all hidden columns, enabling you to select the one you wish to have shown again.

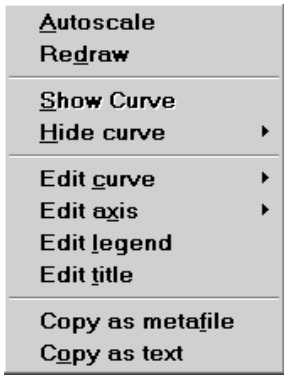
Column font — Displays a Font dialog, allowing you to change font attributes for the tabular data in the current report.

Header font — Displays a Font dialog, allowing you to change font attributes for column headers in the current report.

Edit title Allows you to edit the table title and font.

Copy table as text Enables you to copy the entire table (column headers and data) and then insert it into another program. Columns are tab-delimited, allowing easy alignment

Graphs



Autoscale Sets the axis boundaries to autoscale, presenting the signal in full scale.

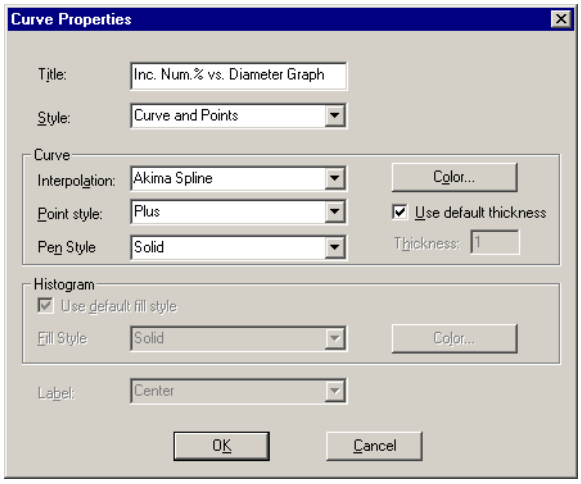
Redraw Sets axis boundaries to its original view.

Show curve Shows any curve(s) that has been hidden. This option is disabled (greyed) if no curves have been hidden.

Hide curve Hides (removes from view) any unwanted curve(s).

Edit curve

Displays the Curve Properties dialog, allowing you to edit curve properties.



Title

Displays the title of the curve you are editing. You can edit the title if desired.

Style

This drop-down list contains the styles in which collected data can be displayed.

Choices: *Curve*, *Histogram*, *Points*, *Curve and Points*

Curve

Contains options for curves and points. You can:

- choose a linear or Akima Spline interpolation for the curve (disabled when points is chosen)
- choose a style and color for curves and/or points
- specify a line thickness for curves

The options in this group box are disabled if *Histogram* is chosen from the **Style** drop-down list.

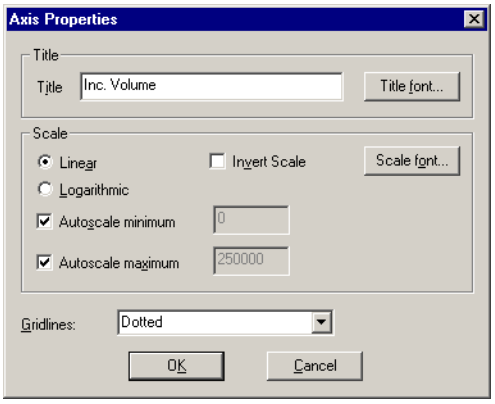
Histogram

Allows you to specify the type of fill as well as the color when *Histogram* is chosen as the style for collected data.

The options in this group box are disabled if *Curve*, *Points*, or *Curve/Points* is chosen from the **Style** drop-down list.

Edit axis

Displays the Axis Properties dialog, allowing you to edit axis properties.



Title

Displays the title of the axis you are editing; use the **Title font** push button to edit font attributes if desired.

Scale

The items in this group box enable you to:

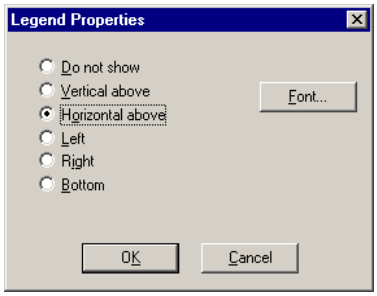
- choose a linear or logarithmic scale
- invert the scale
- edit the autoscale values
- edit the attributes for the scale font

Gridlines

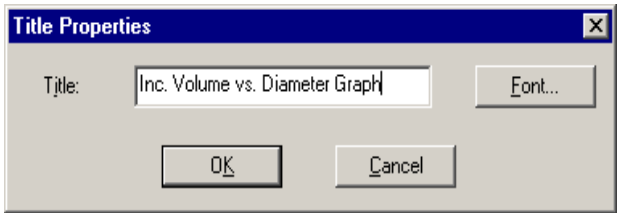
This drop-down list enables you to choose solid or dotted grid lines, or you can choose **None** to omit grid lines.

Edit legend

Displays the Legend Properties dialog, allowing you to edit the placement of the legend. You can also edit the font if desired.



Edit title Displays the Title Properties dialog, allowing you to edit the current graph's title and font.



Copy as metafile Copies the graph and places it on the clipboard, allowing you to paste it into other applications accepting Windows metafiles.

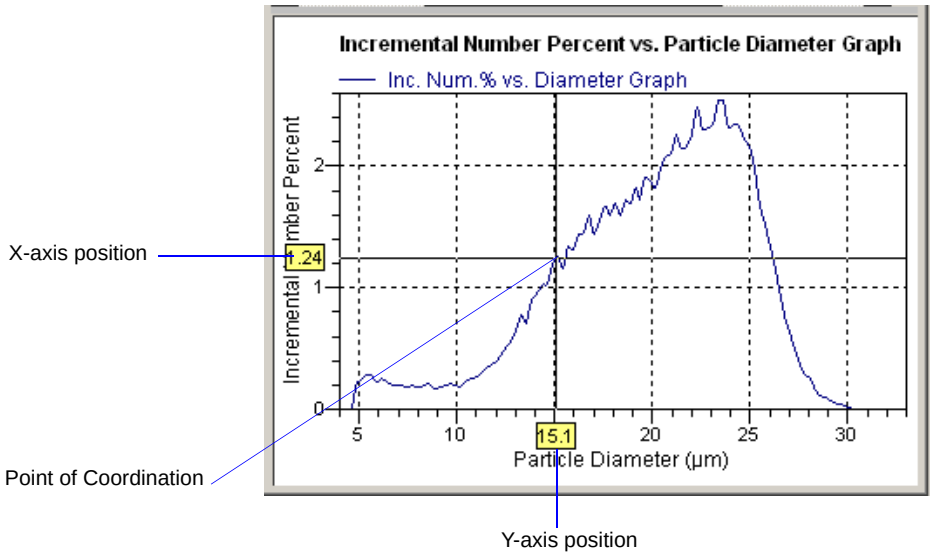
Copy as text Copies the data used to generate the graph as a series of tab-delimited columns of text.

Zoom Feature

A zoom feature is included with the report system so that you can zoom in to examine fine details. To use this feature, simply hold down the left mouse button and drag the mouse cursor (drawing a box) across the area you wish to view; then release the button. The enlarged area immediately fills the graph area. You can return to the normal view by right-clicking on the graph and selecting **Redraw** or **Autoscale** from the shortcut menu.

Axis Cross Hair

A cross-hair function is available so that you can view axis coordinates. To use this feature, simply left-click in the desired area of the graph.



Right-click in the graph area and choose **Autoscale** or **Redraw** from the shortcut menu to remove cross-hair lines and return to the normal view. Alternatively, you can click outside of the graph area.

Report Examples

The remainder of this chapter contains samples of some of the reports that can be generated by the Elzone 5390 Confirm Program. Most of the reports can be varied through entries on the report options screens.

Combined Report

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Demo Elzone II 5390 Confirm V1.04 | Unit 1 | Serial #: 109 | Page 1

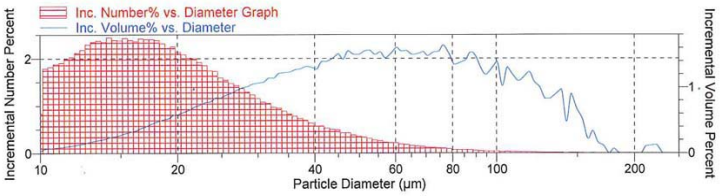
Sample: 380 orifice data
Operator: RS
Submitter: Lab
Bar code
File Location: Category: Mic. Samples Subcategory: Example
Material/Electrolyte Solution: Corn Starch / 2 % Sodium Chloride
Measurement Principle: Electrical Sensing Zone
ASTM Practice E 1617 Compliant

Test Number: 2
Analyzed: 8/30/2006 10:00:35AM
Background Time:
Background Sub.: Off
Coinc. Correction: Off
Dilution Factor: 1.000
File Creation Time:
Coll. Software: Elzone II 5390 V1.00
Sample File Version: 2

Duration: 1:13 (mm:ss)
Reported: 9/13/2007 10:26:44AM
Size Range: 10.00 µm to 260.00 µm
Smoothing: Off
Volume Analyzed: 49.717 mL
File Created By:
Analysis By:
Report By: User

Combined Report

Incremental Number Percent vs. Particle Diameter Graph



Summary Report

Sample Statistics

Total Number 306096
Total Volume 4.6741e+09 µm³

Weighted Statistics (Volume Distribution)

Mean	63.28	Mode	76.55
Median	54.94		

Weighted Statistics (Number Distribution)

Mean	22.21	Mode	14.16
Median	18.30		

Geometric Statistics (Volume Distribution)

Mean	53.07	Mode	76.55
Median	54.94		

Geometric Statistics (Number Distribution)

Mean	19.71	Mode	14.16
Median	18.30		

Incremental Number vs. Particle Diameter

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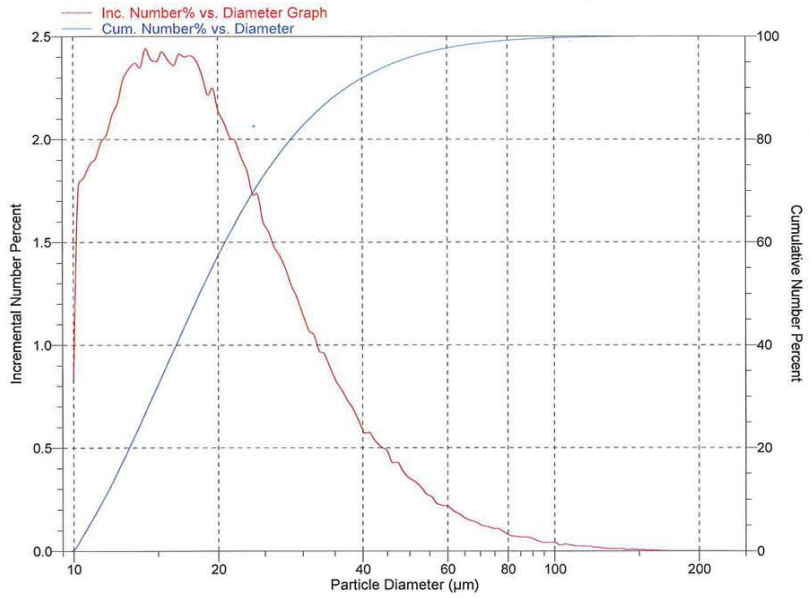
Demo Elzone II 5390 Confirm V1.04 | Unit 1 | Serial #: 109 | Page 1

Sample: 380 orifice data
Operator: RS
Submitter: Lab
Bar code
File Location: Category: Mic. Samples Subcategory: Example
Material/Electrolyte Solution: Corn Starch / 2 % Sodium Chloride
Measurement Principle: Electrical Sensing Zone
ASTM Practice E 1617 Compliant

Test Number: 2
Analyzed: 8/30/2006 10:00:35AM
Background Time:
Background Sub.: Off
Coinc. Correction: Off
Dilution Factor: 1.000
File Creation Time:
Coll. Software: Elzone II 5390 V1.00
Sample File Version: 2

Duration: 1:13 (mm:ss)
Reported: 9/13/2007 10:26:44AM
Size Range: 10.00 µm to 260.00 µm
Smoothing: Off
Volume Analyzed: 49.717 mL
File Created By:
Analysis By:
Report By: User

Incremental Number Percent vs. Particle Diameter Graph



Incremental Volume Percent vs. Particle Diameter

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Micromeritics Instrument Corporation

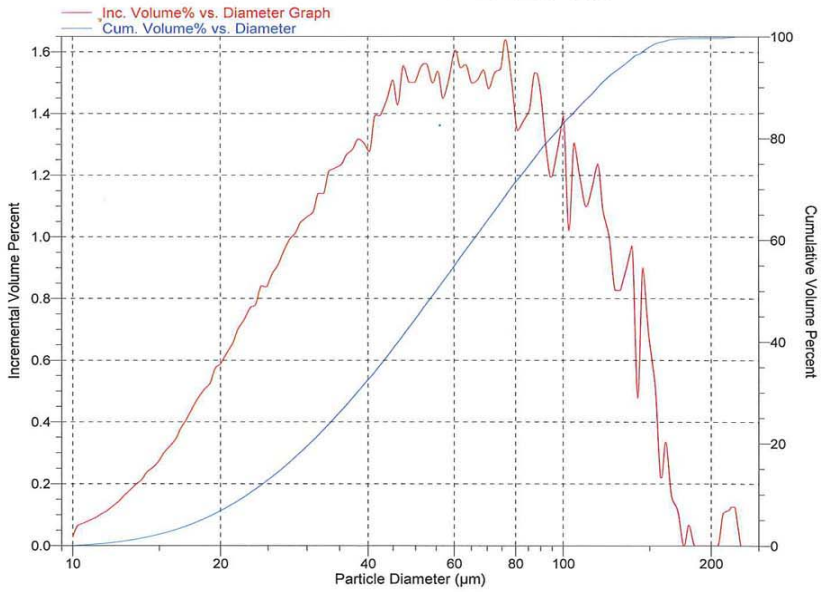
Demo Elzone II 5390 Confirm V1.04 | Unit 1 | Serial #: 109 | Page 1

Sample: 380 orifice data
Operator: RS
Submitter: Lab
Bar code
File Location: Category: Mic. Samples Subcategory: Example
Material/Electrolyte Solution: Corn Starch / 2 % Sodium Chloride
Measurement Principle: Electrical Sensing Zone
ASTM Practice E 1617 Compliant

Test Number: 2
Analyzed: 8/30/2006 10:00:35AM
Background Time:
Background Sub.: Off
Coinc. Correction: Off
Dilution Factor: 1.000
File Creation Time:
Coll. Software: Elzone II 5390 V1.00
Sample File Version: 2

Duration: 1:13 (mm:ss)
Reported: 9/13/2007 10:26:44AM
Size Range: 10.00 µm to 260.00 µm
Smoothing: Off
Volume Analyzed: 49.717 mL
File Created By:
Analysis By:
Report By: User

Incremental Volume Percent vs. Particle Diameter Graph



Standard Class Size Table

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Demo Elzone II 5390 Confirm V1.04 | Unit 1 | Serial #: 109 | Page 2

Sample: 380 orifice data
Operator: RS
Submitter: Lab
Bar code
File Location: Category: Mic. Samples Subcategory: Example
Material/Electrolyte Solution: Corn Starch / 2 % Sodium Chloride
Measurement Principle: Electrical Sensing Zone
ASTM Practice E 1617 Compliant

Test Number: 2
Analyzed: 8/30/2006 10:00:35AM
Background Time:
Background Sub.: Off
Coinc. Correction: Off
Dilution Factor: 1.000
File Creation Time:
Coll. Software: Elzone II 5390 V1.00
Sample File Version: 2

Duration: 1:13 (mm:ss)
Reported: 9/13/2007 10:26:44AM
Size Range: 10.00 µm to 260.00 µm
Smoothing: Off
Volume Analyzed: 49.717 mL
File Created By:
Analysis By:
Report By: User

Report by Size Class

Low Particle Diameter (µm)	Incremental Volume (µm³)	Incremental Volume Percent	Cumulative Volume Percent	Incremental Number	Incremental Number Percent	Cumulative Number Percent
9.87	1.3650×10^6	0.0	0.0	2554	0.8	0.0
10.13	3.1065×10^6	0.1	0.0	5471	1.8	0.8
10.41	3.4248×10^6	0.1	0.1	5567	1.8	2.6
10.69	3.8333×10^6	0.1	0.2	5750	1.9	4.4
10.98	4.2146×10^6	0.1	0.3	5836	1.9	6.3
11.28	4.7605×10^6	0.1	0.3	6079	2.0	8.2
11.59	5.2579×10^6	0.1	0.4	6193	2.0	10.2
11.90	5.9597×10^6	0.1	0.6	6480	2.1	12.2
12.22	6.6405×10^6	0.1	0.7	6664	2.2	14.4
12.56	7.5737×10^6	0.2	0.8	7016	2.3	16.5
.						
.						
.						
.						
.						
187.75	0.00	0.0	99.7	0	0.0	100.0
192.85	0.00	0.0	99.7	0	0.0	100.0
198.08	0.00	0.0	99.7	0	0.0	100.0
203.46	0.00	0.0	99.7	0	0.0	100.0
208.98	4.9746×10^6	0.1	99.7	1	0.0	100.0
214.65	5.3908×10^6	0.1	99.8	1	0.0	100.0
220.48	5.8418×10^6	0.1	99.9	1	0.0	100.0

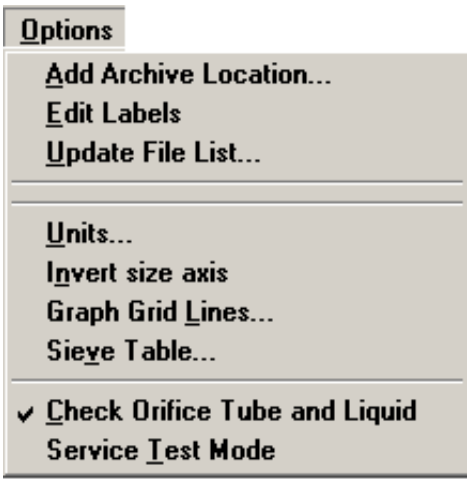
7. OPTIONS MENU

The choices on the Options menu allow you to configure the system to your laboratory's requirements. With the options on this menu, you can:

- Add directories
- Edit labels for sample files and directories
- Specify data presentation modes
- Specify default sieve sizes

Some functions on the Options menu cannot be performed by an Analyst; those are marked accordingly.

Description



Listed below are brief descriptions of the options contained on the Options menu. Detailed descriptions follow this section.

The only functions available to an Analyst on the Options menu are to add an archive location or check the orifice tube and liquid. All other operations are initiated by a Developer.

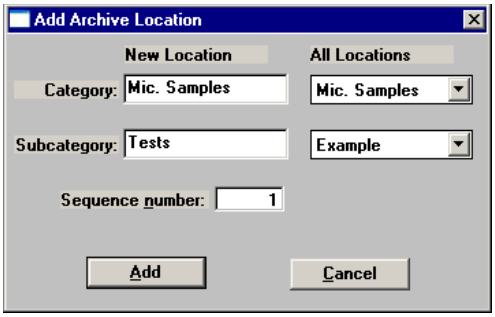
Add Archive Location Allows you to add a directory. Page 7-3.

Edit Labels Allows you to specify names for the labels that appear on the sample file editor. Page 7-4.

Update File List	Allows you to update the cache file for the sample or parameter file directory. This operation has to be initiated by the Administrator. Page 7-5.
Units	Enables you to choose the manner in which to display units of measurement, pressure, and temperature. Page 7-5.
Invert size axis	Enables you to invert the size axis. Page 7-6.
Graph Grid Lines	Enables you to choose the type(s) of grid lines to show on your report. Page 7-6.
Sieve Table	Allows you to specify defaults for sieve sizes. Page 7-7.
Check Orifice Tube and Liquid	Use this default option to have the program verify at the start of an analysis that the orifice tube and liquid in the current analysis match those of the previous analysis. Page 7-7.
Service Test Mode	Enables you to perform certain troubleshooting procedures. under the direction of a Micromeritics service representative. Page 7-8.

Add Archive Location

Archive locations (directories) can be added by an Analyst or a Developer; the Add Archive Location dialog is displayed.



Category
Subcategory

These fields allow you to create new directories and/or subdirectories for the repository.

The drop-down lists in the **All Locations** column contain the existing directories and subdirectories.

The fields in the **New Location** column allow you to enter new directories. **Category** represents the "Directory," and **Subcategory** represents the "subdirectory." You can add a subdirectory to an existing directory by choosing the directory from the drop-down list, then entering the new directory name in the **Subcategory** field.

The labels for the directories can be changed by the Developer (see following section). Many laboratories use the month/year combination for organizing files.

These directories and their contents are not visible through the use of Windows Explorer; they can only be viewed within the analysis program.

Sequence number

Allows you to enter a new sequence number for the directory you create. This number is incrementally sequenced for each sample file you create and displays as part of the identification if the sample template includes a $ symbol.

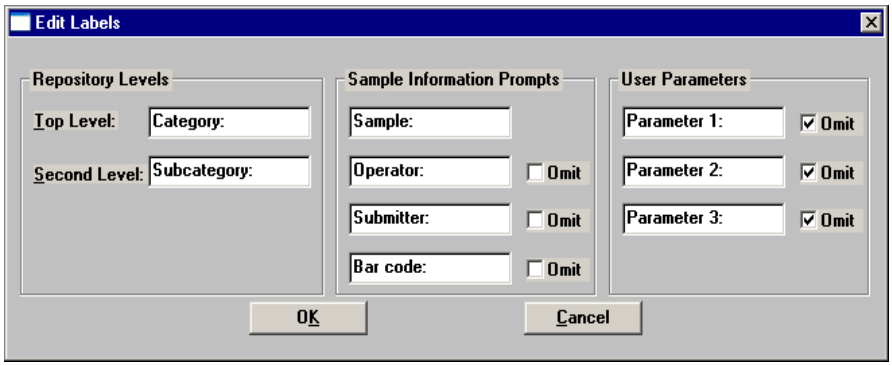
Add

Enabled when you make an entry in the **Subcategory** field, allowing you to add the new directory and close the dialog box.

Edit Labels

An Analyst is not authorized to edit sample file labels.

Edit labels allows the Developer to edit the labels that display on the sample file editor; the Edit Labels dialog is displayed.



Repository Levels

The Top and Second Levels represent the directory (category) and subdirectory (subcategory) for the location of sample files.

Sample Information prompts

These are the labels that appear on the sample information dialog. You can edit the labels to display differently if desired; for example, you may wish to use **Material** rather than Sample.

If you do not wish to have the **Operator, Submitter,** and/or **Bar code** (or other specified names) lines, you can click **Omit** to have them excluded.

User Parameters

The fields in this group box are used primarily for SPC (Statistical Process Control) reporting. They are used to specify characteristics of the sample or its manufacturing process.

For example, you may wish to report the relationship of the motor speed of a grinder used in the manufacturing process to the median diameter of the sample. Enter **Motor speed** as a Parameter; add the value in the sample file. When you add the value in the sample file, you can save the file as a Template, making it available when desired. Specified parameters display in the SPC Sample Options dialog (accessed through the SPC Calculations dialog).

User Parameters *(continued)*

Once specified, these parameters display on the sample editor and in the SPC Sample Options dialog (accessed through the SPC Report Options dialog).

These fields can also be used to record analysis conditions or sample information so that it can be printed on the Summary report.

Select **Omit** if you are not reporting SPC data; this will prevent them from displaying on the sample information dialog.

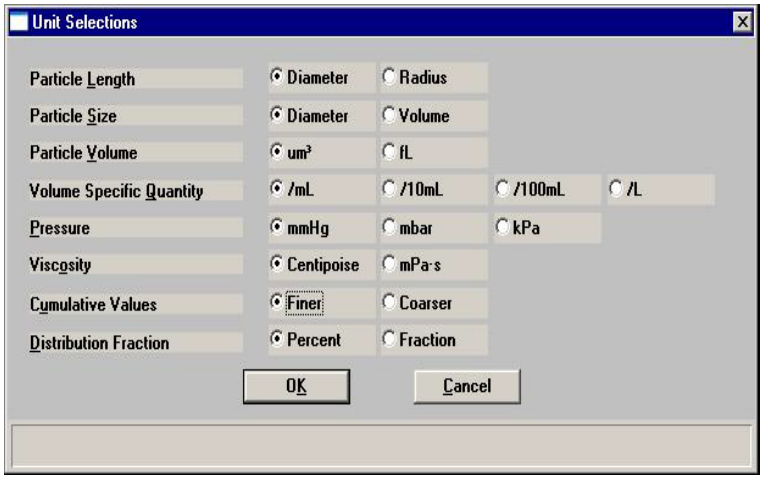
Update File List

This function cannot be performed by an Analyst nor a Developer, unless the Developer has Administrator rights. This is an Administrator function only; details for performing this operation are covered in the Administrator's Guide.

This option allows the directory to be updated when files have been added outside of the application. For example, if you need to restore the directory with a backup file.

Units

This menu command displays the Units Selections dialog which allows you to choose the manner in which to display units.



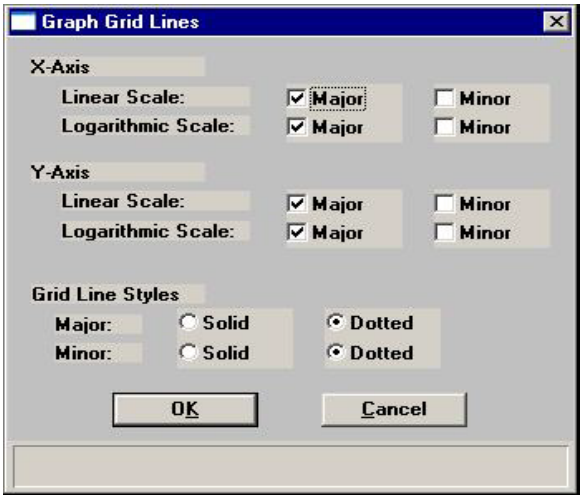
Invert Size Axis

An Analyst is not authorized to invert the size axis.

Select this option to invert the size axis.

Graph Grid Lines

Graph Grid Lines enables you to choose the type(s) of grid lines to show on your reports; the Graph Grid Lines dialog is displayed.



X-Axis
Y-Axis

Enables you to choose Major and/or Minor lines to display in printed reports for the Logarithmic and Linear scales.

If you deselect these items (remove the check marks), your report will not display grid lines.

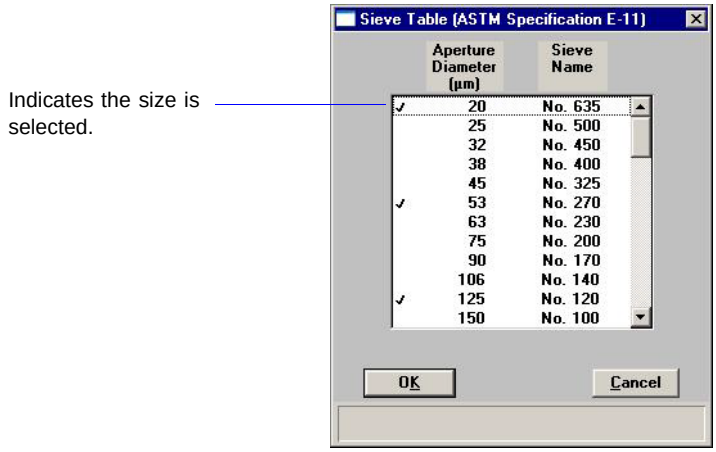
Grid Line Style

Allows you to choose the type of grid line to display if grid lines are being shown.

Sieve Table

An Analyst is not authorized to specify sieve defaults.

Displays the Sieve Table allowing you to specify default sieve sizes for sieve data.



To select sizes, move to the desired size, then double-click the left mouse button or press **Spacebar**. A sieve size is selected when it is preceded by a check mark.

Check Orifice Tube and Liquid

Select this option to have the analysis program check at the beginning of each analysis to verify that the orifice tube and liquid specified in the sample file match the ones used in the previous analysis. If the tube and liquid do not match, an error message is displayed.

Service Test Mode

Certain service tests are included in the operating program, but can be performed only with the assistance of a trained Micromeritics service representative. These tests are designed to provide your service representative with instrument readouts, as well as to assist him in troubleshooting potential problems and, perhaps, eliminating unnecessary repair services. This service strategy allows you to conduct expert tests in less time than it would take to be trained in servicing the instrument properly.

When you select **Service Test Mode** from the Options menu, a dialog box is displayed prompting you to enter a password. This password can be provided only by your service representative; therefore, you will not be able to enter Service Test Mode and perform these tests without his guidance

8. TROUBLESHOOTING AND MAINTENANCE

The Elzone II 5390 analyzer has been designed to provide efficient and continuous service. However, in order to obtain the best results over the longest period of time, certain maintenance and service procedures should be followed. This chapter contains information regarding common operational problems and corrective action, and maintenance and service procedures.

If you encounter a problem that is not covered in this chapter, contact your Micromeritics service representative.

Troubleshooting

The following table lists some solutions for common operational problems that may be incurred.

Table 8-1. Common Operational Problems

Problem	Reason	Solution
No liquids flow when the valves are open; the vacuum pump is operating properly.	Possible valve damage	Access the instrument schematic and be sure that valves are open and that the pump is operating. Then contact your Micromeritics service representative.
Sizes are incorrect when analyzing reference material.	The orifice may be partially blocked.	Clean the orifice tube. Refer to **Cleaning Orifice Tubes**, page **8-9**.
	The orifice may have changed size or may be cracked	Replace the orifice tube.
	The sample you analyzed did not represent the reference sample	Prepare a new sample or use another reference material.
	The wrong calibration data were used.	Ensure that the correct calibration and setup data were used.
Air bubbles are sticking to the inside of the orifice tube around the orifice.	The surface of the orifice tube may not be clean.	Clean the orifice tube; refer to **Cleaning Orifice Tubes**, page **8-9**.

Problem	Reason	Solution
There is a high background count on electrolyte.	The electrolyte may be contaminated.	Filter the electrolyte.
	Front and/or side panel doors are open.	Ensure that the doors are securely closed.
	The orifice tube may be cracked.	Check the orifice tube; replace if necessary.
	Noise from electronics, power line, or radio frequency (RF) may be causing interference.	Have an electrician check for noise on the power line or for RF noise.
	Noise from CRT monitor may be causing interference.	If possible, place the monitor to the *left* side of the analyzer where it will be away from the sample compartment. If not possible, place the monitor at least two feet away from the sample compartment on the right side.
		Use an LCD monitor if available.
Instrument is unable to measure conductivity within the normal range.	There is no electrolyte in the sample beaker.	Fill the beaker with electrolyte.
	The external electrode is not in the sample beaker.	Place the electrode in the beaker.
	The external electrode is not plugged in securely.	Ensure that the plug is securely seated in the connector.
	The orifice is blocked.	Use one (or more) of the following options on the Unit menu to clear the orifice tube: • Clear Blockage • Flush System • Drain System; if you use this option, be sure to refill the system • Fill System
	Faulty circuit board.	Contact your Micromeritics service representative.
	The orifice tube is not filled completely.	Fill the orifice tube.

Problem	Reason	Solution
System won't fill.	Waste container lid may not be securely screwed onto the container.	Tighten lid on waste container, then try to fill the system.
	Supply tube may not be submerged in the Supply container.	Be sure the supply tube is completely submerged in the supply liquid.
	Leak in plumbing system.	Access instrument schematic and enable manual control. Right-click on servo valve; set target to 100. Turn on servo valve and pump. When target reaches 100, open sample valve. If vacuum drops significantly, a leak is indicated. Call your Micromeritics service representative.
	Valves may not be functioning properly.	Call your Micromeritics service representative.
	Vacuum is unable to reach the target vacuum.	See below.
Vacuum does not reach target.	Calibration files may have become corrupted.	Have your Administrator (or someone with Administrator rights) reinstall calibration files. If you are still unable to reach the target, call your Micromeritics service representative.
	Filters to servo valve may be blocked.	Call your Micromeritics service representative.
	Vacuum pump may be faulty.	Call your Micromeritics service representative.

Preventive Maintenance

Table 8-2 lists the preventive maintenance procedures you should perform to keep your system operating at peak performance. Instructions for each procedure follow the table.

Table 8-2. Preventive Maintenance Schedule

Maintenance Required	Frequency
Maintain orifice condition, page **8-4**	Daily
Clean the sample area, page **8-6**	Daily
Clean the system, page **8-6**	Monthly
Replace the air filter, page **8-8**	Monthly
Clean the orifice tube, page **8-9**	Monthly

Maintaining Orifice Condition

A clean, undamaged orifice jewel is essential for collecting valid data. Contaminated surfaces or obstructions cause signal noise and false pulse amplitudes. Check the orifice daily for changes.

The orifice tube may remain connected to the analyzer when not in use. When not in use, immerse the orifice tube in clean water or detergent rinse. If this practice is not followed, evaporate buildup and/or slow-to-wet active sites on orifice surfaces will cause signal noise or false amplitude.

The following practices will help keep the orifice in proper condition and help detect potential problems.

Storing Orifice Tubes

If the orifice tube is removed from the analyzer, store it as follows:

1. Clean the orifice tube (refer to **Cleaning Orifice Tubes**, page **8-9**).

2. Store the orifice tube in a dust-free container.

Preventing Orifice Blockages

Sample materials are seldom sources of fibers or debris in sufficient amount to cause frequent blockages. If blockages do occur due to sample materials, you can “scalp off” debris by wet-sieving the prepared suspension through a clean mesh that is roughly 75% of the orifice diameter.

At all times, there must be no substantial source of dust or debris:

- in the outer surface of the orifice tube or inner surface of the sample beaker
- on the operator’s hands or clothing
- on the instrument or bench-top
- in the ambient air

A good technique is to filter the electrolyte properly through a 0.1-µm microporous membrane. Clean all surfaces in contact with this filtered electrolyte with detergent and then rinse two to three times with the filtered electrolyte.

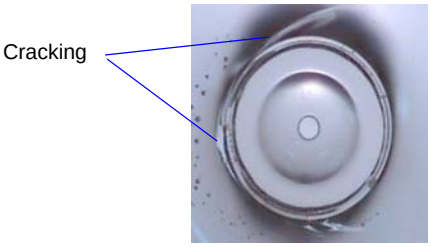
Do not use towels to dry sample beakers. Keep sample beakers covered or inverted on a clean surface.

Stress Cracking of Orifice Jewel

The orifice jewel seal is a ceramic bonding of synthetic sapphire and glass which withstands virtually all chemicals. By nearly matching thermal expansion coefficients, the bonding is strong but can, in time, develop stress cracks in the glass around the jewel, which may cause a noise signal. Repeated cracking will require remount of the jewel in new glass or replacement of the orifice tube.

Check the orifice jewel periodically for signs of cracking. The illustrations below show the jewel portion of the orifice tube. The illustration on the left shows a jewel in good condition while the one on the left shows a jewel that has begun to crack.

This is a jewel in good condition.



This is the jewel of the same orifice tube; note how it is beginning to crack.

Cleaning the Sample Area

For this procedure you will need the following:

- Lint-free cloth
- Isopropyl alcohol (IPA), mild detergent, or hydrogen peroxide solution

Use a clean, lint-free cloth to wipe up spills as they occur.

All surfaces of the analyzer should be kept clean and dry at all times. You may use a clean cloth, dampened with IPA, a mild detergent, or a 3% hydrogen peroxide solution to clean the outer casing of the analyzer.

Cleaning the System

You should clean the Elzone system (internal glassware) at least every 30 days.

Your system may require cleaning more often, depending on the type of sample being analyzed.

For this procedure, you will need the following:

- a sample beaker of water
- 500 - 1000 mL beaker of water
- 500 - 1000 mL beaker of soapy water

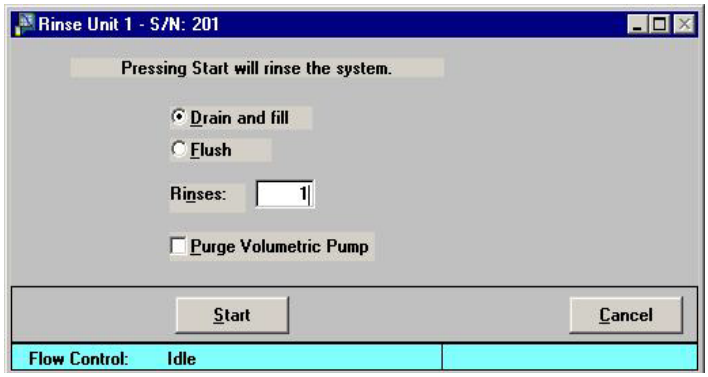
1. Install an orifice tube onto the sample port.

2. Place a sample beaker of water on the sample stand, then raise the sample stand. Be sure the tube is submerged.

3. Disconnect the Supply tube from the side of the analyzer, then remove the tube from the bottle allowing any contents to drain back into the Supply bottle.

4. Reattach the Supply tubing to the side of the analyzer; place the other end of the tubing into 500 - 1000 mL the beaker of water.

5. Select **Unit > Rinse** to display the Rinse dialog.



Select **Drain and fill** and enter **1** in the **Rinses** field (as shown in the dialog).

6. Click **Start**; the dialog closes automatically when the rinsing operation is complete.

7. Remove the Supply tube from the 500 - 1000 mL beaker of water, then place it into the 500 - 1000 mL beaker of soapy water.

8. Select **Unit > Rinse** to display the Rinse dialog again; ensure that **Drain and fill** is selected and enter **2** in the **Rinses** field.

9. Click **Start**; the dialog closes automatically when the rinsing operation is complete.

10. Remove the Supply tube from the 500 - 1000 mL beaker of soapy water. Rinse the end of the tube thoroughly to remove any soap residue, then place it back into the 500 - 1000 mL beaker of water.

11. Select **Unit > Rinse** to display the Rinse dialog again; ensure that **Drain and fill** is selected and enter **3** in the **Rinses** field.

12. Click **Start**; the dialog closes automatically when the rinsing operation is complete.

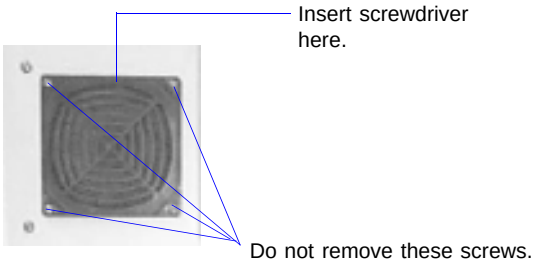
13. Remove the Supply tube from the 500 - 1000 mL beaker of water and place it into the Supply container.

14. Lower the sample stand and remove the sample beaker of water.

Replacing the Air Filter

The air filter on the rear panel should be replaced every 30 days (more often in environments with increased levels of dust).

1. Remove the filter by inserting a pointed object, such as a flat-blade screwdriver, into the outer edge of the retaining cover; then pop off the cover. You do not have to remove the screws.



2. Discard the old filter and replace with a new one from your accessories kit.

3. Replace the retaining cover.

Cleaning Orifice Tubes

Orifice tubes must be kept clean to ensure accurate analysis results. Follow the procedure below to clean an orifice tube when:

- the orifice tube will not be used for at least one week
- air bubbles are forming on the inside of the orifice tube
- at least once a month when the orifice tube is in use

Do not touch or breathe vapors from the solvents used in this procedure. Failure to observe these precautions could result in a health hazard. Refer to the Nitric Acid MSDS and the Acetone MSDS for proper handling instructions. Dispose of all solvents appropriately.

Do not attempt to clean the orifice with a hard or pointed object or by immersing the orifice tube in an ultrasonic cleaner. Doing so could damage the orifice jewel.

You will need the following items to perform this procedure:

- Scrub brush (provided in the accessories kit)
- Rubber gloves
- Detergent
- Nitric acid
- Acetone

1. Protect your hands with rubber gloves.

2. Use detergent and the scrub brush to scrub the inside of the tube, then scrub across the outside of the jewel.

3. Rinse off the detergent with water.
4. Rinse the inside and outside of the tube with acetone.
5. Let the tube dry and store it, or place it on the analyzer.

Orifice tubes should be cleaned on a **monthly** basis as follows:

1. Perform steps 1 through 4 (above).
2. After rinsing with acetone, rinse with water. Make sure all acetone is rinsed off.
3. Place the tube in a nitric acid solution, which can be concentrated or diluted. Be sure to fill half the tube with the nitric acid solution.
4. Soak the tube for at least one hour. You can soak the tube overnight or over a weekend if desired.
5. Rinse the tube with water to remove completely all acid.
6. The tube is ready to be placed on the analyzer or you can rinse it with acetone and allow it to dry for storage.

Clearing Blockages

Occasionally, a particle may become lodged in the orifice and cannot be cleared through the use of the software. Perform the following steps to manually clear a blockage from the orifice.

1. Click **Stop** on the Analysis window (if not stopped by the software) to stop the analysis.

2. Lower the sample stand to gain access to the orifice tube.

3. Using the bent orifice brush provided in the accessories kit, brush the orifice area of the tube. Then rinse the outside of the tube to remove any debris that may have remained from the brush.

Bent brush

4. Raise the sample stand; click **Continue** to restart the analysis.

   • If the orifice is still blocked, proceed to the next step.

   • If the orifice is unblocked, continue with the analysis.

5. Lower the sample stand to gain access to the orifice tube.

6. Using the larger orifice tube brush provided in the accessories kit, brush the orifice area of the tube. Then rinse the outside of the tube to remove any debris that may have remained from the brush.

Straight brush

7. Raise the sample stand click **Continue.**

   • If the orifice is still blocked, proceed to the next step.

   • If the orifice is unblocked, continue with the analysis.

8. Select **Unit > Drain** to drain the system.

9. Lower the sample stand and remove the sample beaker to gain access to the orifice tube.

10. Remove the orifice tube and clean it thoroughly (refer to **Cleaning Orifice Tubes**, page **8-9** for instructions).

11. After cleaning the tube, check the orifice to see if it is unblocked; a good procedure for doing this is:

    a. Rinse the tube with cold tap water.

    b. Holding the tube underneath the faucet, fill completely until it is in a meniscus state.

    c. Place your index finger over the top of the tube and press downward; this will spew water out of the orifice if the tube is unblocked. You may have to hold the tube against a darker background to obtain a clear view of the stream of water.

If the orifice is still blocked, call your Micromeritics Service representative.

12. Reinstall the orifice tube.

13. Prepare a new beaker of electrolyte and place it on the sample stand.

14. Raise the sample stand, submerging the orifice tube in the beaker.

15. Select **Unit > Fill** to fill the system with electrolyte.

16. Prepare a fresh sample mixture and restart the analysis.

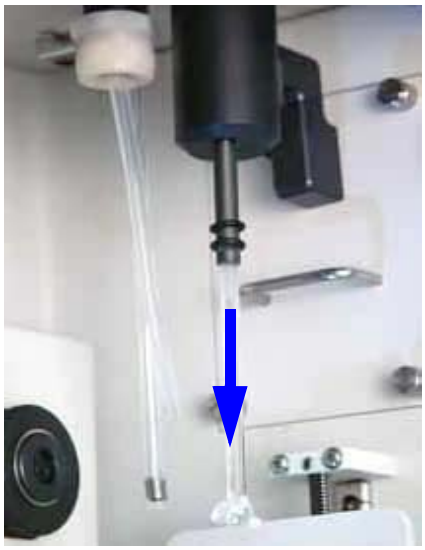
Installing the Hydropulser

The hydropulser and stirrer are installed in the same location, the back wall of the sample compartment.

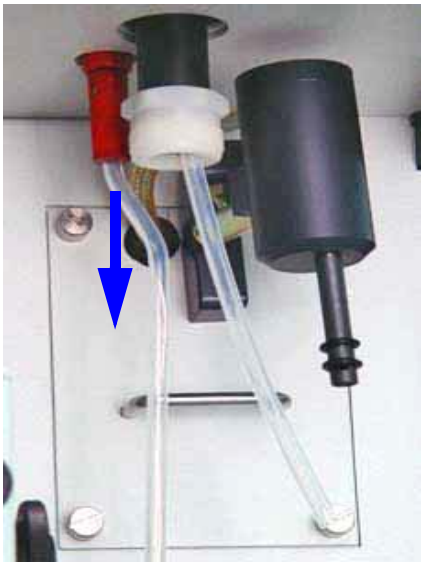
These instructions are assuming you have a stirrer currently installed on your analyzer.

1. Ensure that the sample stand is in its lowest position.

2. Grasp the propeller and pull downward to remove it from its rubber connector.



3. Gently pull downward on the external electrode to remove it from its red connector.



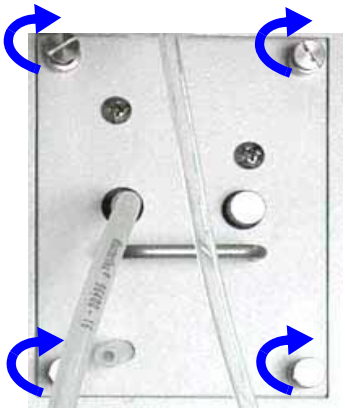
4. Turn the four captive thumb screws counterclockwise to loosen the stirrer assembly.

5. Slide the stirrer assembly out and store in a secure location for future use.

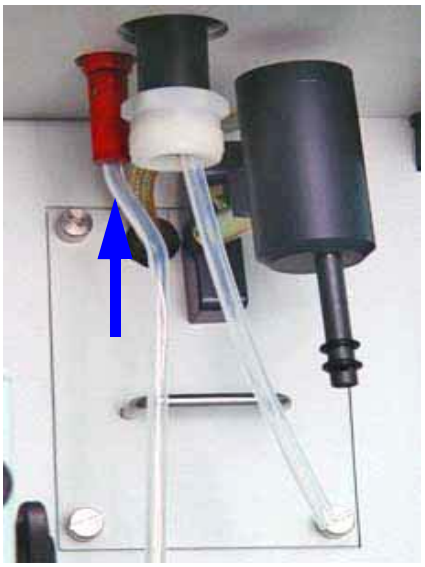
6. Insert the hydropulser assembly, ensuring that the back plate of the hydropulser assembly slides into the two slots inside the opening.

7. Make sure the hydropulser assembly is flush with the analyzer back panel; this ensures that the connector on the back plate of the hydropulser plugs into the connector inside the analyzer.

8. Turn the four captive thumb screws clockwise to tighten.



9. Gently slide the external electrode back into its red connector.



10. Use the clip to attach the hydropulser tube to the orifice tube when performing an analysis.

Cleaning the Hydropulser

The hydropulser tube should be cleaned daily between sample analyses and more thoroughly on a monthly basis, or when the hydropulser is not to be used for long periods of time.

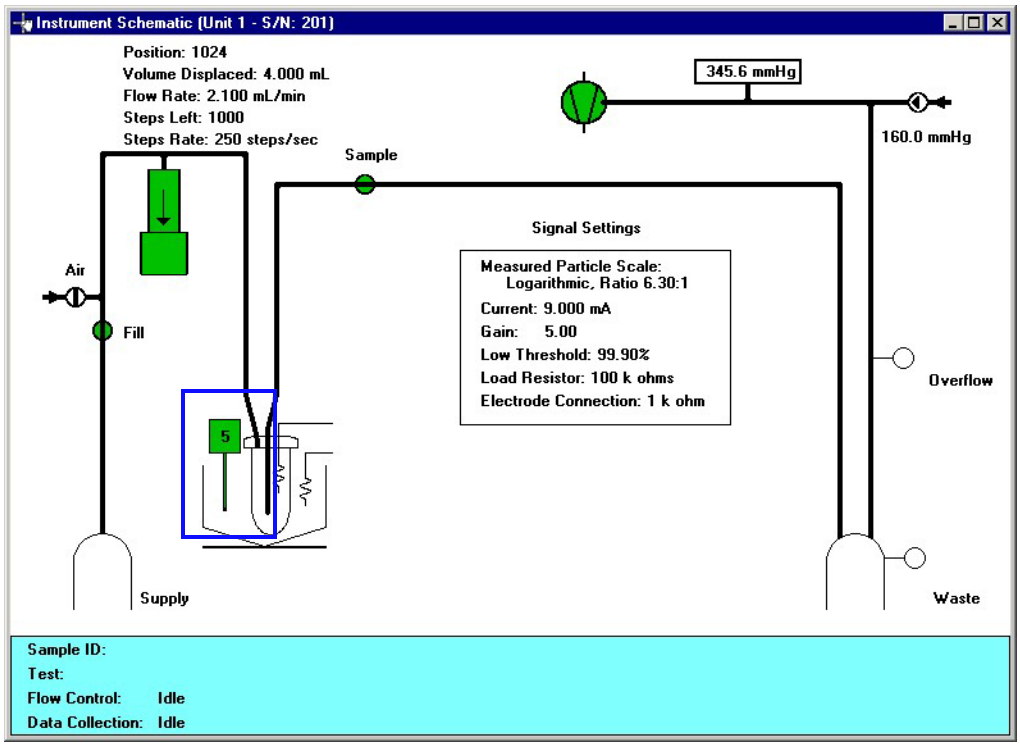
Daily

Clean the hydropulser tube after each analysis and at the end (or the beginning) of the work day.

1. Place a beaker of clean electrolyte on the sample platform.

2. Raise the sample platform until the orifice tube, electrode, and hydropulser tube are submerged (as shown above).

3. Enable manual control and use the instrument schematic to turn on the hydropulser.



   a. Double-click on the stirrer icon; the icon is green when it is on.

   b. Allow the electrolyte to cycle through the tube for approximately 10 seconds

   c. Double-click on the icon to turn the hydropulser off; the icon is yellow when turned off.

4. Proceed with the next step if you are ready to load the sample. If you are not ready to load the sample, allow the glassware to remain submerged in the electrolyte.

5. Fill a squeeze bottle with clean, filtered electrolyte or water and thoroughly rinse the hydropulser tube, the orifice tube, and the electrode. Do not squeeze electrolyte up into the hydropulser tube.

Do not squeeze electrolyte up into the hydropulser tube. Liquid may get into the hydropulser assembly and damage the assembly, or cause erratic results. Remove the tube, clean, and dry it thoroughly if this occurs.

6. Place your sample into the beaker and start your analysis.

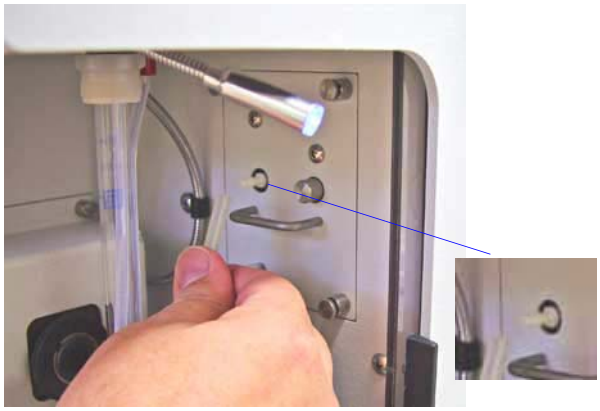
Monthly

The hydropulser tube should be removed and thoroughly cleaned on a monthly basis. It is good practice to perform this procedure on the first of each month so it will be easy to remember.

1. Lower the sample platform.

2. Remove the retaining clip from the orifice tube; it is not necessary to remove it from the hydropulser tube.

3. Grasp the tube and remove it from its barbed fitting.



4. Place the tube into a beaker of diluted detergent, then place the beaker into an ultrasonic bath for approximately five minutes.

   If an ultrasonic bath is not available, use a pipette or a syringe attached to the end of the tube; cycle the detergent solution in and out of the tube at least ten times.

5. Flow water through the tube until all detergent is completely removed.

6. Allow the tube to dry completely. Pour IPA through the tube to speed the drying process.

7. Reattach the hydropulser tube to the barbed fitting.

8. Perform the steps given for **Daily** cleaning in the previous section.

9. ORDERING INFORMATION

The Elzone 5390 system components and accessories can be ordered using one of the following methods:

- Call our Customer Service Department at (770) 662-3636
- Access our web site at www.micromeritics.com
- Contact your local sales representative

When ordering, please use the information provided below to place your order:

Part Number	Item and Description
538-61704-01	Stirrer, medium propeller; enables you to maintain dispersion of samples. The stirrer provides a rotary movement, the speed of which is specified in the software.
538-61704-02	Stirrer, large propeller
539-34020-00	Hydropulser; provides a more gentle method of maintaining dispersion of samples. The hydropulser uses a fluid pulsing movement, the speed of which is specified in the software.
539-33602-00	Camera, for viewing the orifice jewel; includes a backlight and mounting hardware
539-33604-00	Volumetric pump, enables you to measure particle concentration
539-33610-00	Orifice Tube Kit; includes one 19-µm orifice tube, reference materials, and reference booklet
539-33611-00	Orifice Tube Kit; includes one 30-µm orifice tube, reference materials, and reference booklet
539-33612-00	Orifice Tube Kit; includes one 48-µm orifice tube, reference materials, and reference booklet
539-33613-00	Orifice Tube Kit; includes one 76-µm orifice tube, reference materials, and reference booklet
539-33614-00	Orifice Tube Kit; includes one 95-µm orifice tube, reference materials, and reference booklet
539-33615-00	Orifice Tube Kit; includes one 150-µm orifice tube, reference materials, and reference booklet
539-33616-00	Orifice Tube Kit; includes one 190-µm orifice tube, reference materials, and reference booklet

Part Number	Item and Description
539-33617-00	Orifice Tube Kit; includes one 300-µm orifice tube, reference materials, and reference booklet
539-33618-00	Orifice Tube Kit; includes one 380-µm orifice tube, reference materials, and reference booklet
004-16840-00	Reference material, 1 µm; approx. 8 mL
004-16840-01	Reference material, 2 µm; approx. 8 mL
004-16840-02	Reference material, 3 µm; approx. 8 mL
004-16840-03	Reference material, 5 µm; approx. 8 mL
004-16840-04	Reference material, 10 µm; approx. 8 mL
004-16840-05	Reference material, 20 µm; approx. 8 mL
004-16840-10	Reference material, 30 µm; approx. 8 mL
004-16840-06	Reference material, 40 µm; approx. 8 mL
004-16840-07	Reference material, 60 µm; approx. 8 mL
004-16840-08	Reference material, 100 µm; approx. 8 mL
004-16840-09	Reference material, 160 µm; approx. 8 mL
538-61703-00	Beaker, 150 mL, contoured
538-61703-01	Beaker, 240 mL, contoured
538-61706-00	Sample vial, 25-mL polystyrene with flat sides and snap cap
003-51130-01	Fuse, 1.0 A Slow-Blow, 5 x 20 mm (220/230 VAC)
003-51131-00	Fuse, 2.0 Amp, 3 AG, Slow-Blow (100/120 VAC)
004-25474-00	O-ring, -013, Kalrez®; for sample port
004-54615-00	Brush, for cleaning orifice tubes
004-54616-00	Brush, bent, for cleaning orifice jewel
004-32209-00	Squeeze bottle, 500 mL, for cleaning glassware
004-61039-01	Bottle, 2 liters, for supply liquid
004-32117-00	Bottle, 2 liters, for waste liquid
539-32804-00	Tubing, for waste bottle
539-32805-00	Tubing, for supply bottle

Part Number	Item and Description
539-60804-01	Sensor cable, for supply liquid
539-25856-00	Clip, hydropulser tube
539-32803-04	Tubing, flexible, hydropulser
539-32802-08	Tubing, rigid, hydropulser
004-27015-00	Air filter (rear panel), package of 10
539-42822-00	Operator’s manual
539-33022-00	Software package, Elzone 5390; includes current version of software and operator’s manual

A. ERROR MESSAGES

This appendix contains a numerical listing of the error messages associated with the Elzone program.

The 1000-series error messages (used primarily for software testing) are not included in this appendix. These errors should not occur during normal operation. If you receive a 1000 series error message or an error message not listed in this appendix: record the error message, make backup copies of any files involved, then contact your service representative.

2200 and 2300 Series

2201- Cannot execute report subsystem.

Cause: The software for the report subsystem has been corrupted and cannot be started.

Action: Reinstall the software.

2331- Logged-in Windows user is not an application user.

Cause: You attempted to log into the application but the user logged into Windows is not an application user.

Action A: Close the application, restart Windows, and log in as the windows user. Then log into the application.

Action B: Contact your Administrator to assign application rights to the current logged-in Windows user.

2333- You did not enter user name or password.

Cause: You attempted to access the application without entering your user name or password.

Action: Enter your Windows OS user name and password in the User Logon dialog box.

2334- Incorrect user name or password.

Cause A: You entered an incorrect user name or password in the User Logon dialog box.

Action A: Reenter your user name and password. Ensure that Caps Lock is not enabled; entries are case-sensitive.

Cause B: You entered your user name but failed to enter your password.

Action B: Reenter your user name and password.

Cause C: You entered your application password in both fields.

Action C: Enter your Windows OS user name in the user name field and your password in the password field.

2335- Attempt of unauthorized access was detected. Please contact administrator.

Cause: You have exceeded the allowed number of log-on attempts.

Action: Contact your Administrator.

2336- This user account is locked. Please contact administrator.

Cause: You entered an incorrect password more than the allowed number of times (by default, this is three), and our account has been locked (disabled).

Action: Contact your Administrator to unlock your account.

2337- The user is not an adminstrator.

Cause: You attempted to log in and perform a task that only the Administrator is allowed to perform.

Action: Contact your Administrator to complete the task.

2338- Your password has expired or needs to be changed. You will not be able to log in without changing the password.

Cause: The allowed time using a password has expired.

Action: Change your password.

2339- Your password will expire soon. Do you want to change your password?.

Cause: The allowed time for using a password is about to expire.

Action: Change your password.

2340- You must log in as a Windows OS user to change a password.

Cause: You attempted to change your password but you are not logged in as the Windows OS user.

Action: You cannot change your password unless you are logged in as the Windows OS user. Close the application, then restart Windows and log in as the user.

2341- Error writing file or the user is not Windows OS user.

Cause: You attempted to log into the application but have been denied access. Your password file may have become corrupt.

Action: Contact your Administrator.

2342- Please enter a valid password.

Cause: You entered an incorrect password.

Action: Reenter your password in both fields. Ensure that **Caps Lock** is not enabled; entries are case-sensitive.

2343- This password is already in use. Please enter a valid password.

Cause: You attempted to change your password but entered one that has already been used.

Action: Choose a different password.

2344- Application locked.

Cause: Your account has been disabled.

Action: Contact your Administrator.

2345- Attempt of unauthorized access was detected.

Cause: You attempted to log into the application but entered and incorrect login name or password.

Action: Confirm your login name and password.

2346- This user account is disabled. Please contact an administrator.

Cause: You have attempted to log into the application repeatedly but all attempts have failed.

Action: Contact your Administrator.

2400 Series

2401- FATAL ERROR: (Error message)

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative if you continue to receive this error message.

2430- Error accessing file (file name), error code = (number)

Cause A: Hard disk may be damaged.

Action A: Run diagnostics.

Cause B: A software error occurred when the file was accessed.

Action B: Contact your service representative.

2431- Error writing file (file name), error code = (number).

Cause: The hard disk does not have enough space left to perform the operation.

Action: Copy files not used regularly from the hard disk to diskette, delete them from the hard disk, and then try the operation again.

2432- Invalid response from MMI 'FILE_READ' request.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative if you continue to receive this error message.

2433- New entries have been found in this directory. Refresh the directory information?

Cause: Several files (sample information, analysis conditions, or report options) have been added to this directory by some function other than the AutoChem program.

Action: Click **Yes** to update the directory information with data from each new file. This operation may take a few minutes.Click **No** if you do not want to spend the time updating the directory information.

This option may be feasible if a large number of files has been copied into the directory and you know the name of the file you wish to access.

2434- File (file name) - Subset # (number) wrote wrong amount of data.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative if you continue to receive this error message.

2436- Path specification (path name) is invalid.

Cause: You entered an invalid path name and/or extension.

Action: Enter a valid path name (including the proper extension) and press Enter.

2437- File (file name) does not exist.

Cause: You entered an invalid file name.

Action: Enter the name of an existing file or select a file name from the Files list window.

2438- Disk drive (letter): is inaccessible.

Cause: You selected a disk drive that is presently inaccessible.

Action: Ensure that the disk in the disk drive is not write-protected

2439- Could not register file.

2440- Subset not found.

2441- Seek within file failed.

2442- Had header in subset file.

2443- Subset owner denied access.

2444- Not a valid file format.

2445- Subset wrote the wrong amount of data.

2446- Error reading data.

2447- Error writing data.

Cause: An unexpected error occurred when you tried to access a data file.

Action: Contact your service representative.

2448- File directory (path name) is invalid. Resetting to the installation directory.

Cause: A working directory specified in the .INI file is invalid. The directory may have been deleted or moved to a different location.

Action: The installation directory will be substituted. The next time you open a file, use the **Directories** list to move to the correct directory.

2449- This field does not contain a valid file specification.

Cause: You entered an invalid file name.

Action: See the description of file naming conventions in your operating system or Windows manual and reenter the name.

2450- Sample Defaults may not be edited while this operation is in progress. Do you wish to save and close the Sample Defaults edit session?

Cause: You are in the process of initiating an automatic analysis (an analysis in which sample files are created using the defaults) while editing the defaults.

Action: Finish your edit session of the defaults and close the dialog. Then restart the automatic analysis.

2452- Attempt to write MICATTR.DIR in read only mode. File (file name).

2453- Attempt to append MICATTR.DIR in read only mode. File (file name)

Cause: The Read-Only attribute is turned on in the application's MICATTR.DIR file (this file exists in each folder containing sample or parameter files).

Action: Use Windows Explorer to access the folder containing the MICATTR.DIR file and disable the Read-Only option.

2454- Too many selections for a print-to-file operation. Only the first (number) selections will be processed. Please reselect the remainder.

2455- Too many selections for an export-to-file operation. Only the first (number) selections will be processed. Please reselect the remainder.

Cause: You selected too many files for this operation.

Action: Select only the number of files specified in the message.

2456- Insufficient file handles available. Application cannot continue.

Cause: You have more than 50 files open at the same time.

Action: Refer to the manual for your operating system and set the limit for open files to 50 or greater.

2457- Results cannot be displayed. More than (number) windows are currently displaying or printing results.

Cause: You have too many windows open in the application.

Action: Close some of the open windows.

2458- An instrument is performing a critical operation. Wait a few moments before exiting the application.

Cause: You are attempting to exit the application while the instrument is performing a critical operation. This operation must be completed before the application can be stopped.

Action: Wait a short time and attempt to stop the application again.

2459- An instrument is busy. A delay in restarting this application could result in loss of new data. Continue with program Exit?

Cause: You attempted to exit the Elzone analysis program while an analysis is in progress. While this is possible, the data collected while the analysis program is inactive will not be permanently recorded until the analysis program is re-started. A power failure to the instrument could cause some data to be lost.

Action: If your are not concerned with potential loss of data if a power failure occurs, click **Yes** to continue with the exit; click **No** if you wish to wait for the analysis to finish.

2460- Fatal Communications error on (Unit n - S/N: nnnn)

Cause: There was a fatal error in the communications between the analysis program and the analyzer. All displays for the analyzer will close.

Action: Ensure that the analyzer's ethernet connections are properly connected. Stop and restart the analysis program. If the restarted application cannot establish communications with the analyzer, turn the analyzer off, then back on. If this error persists, contact your Micromeritics service representative.

2461- No instruments are in operation. This application will unconditionally terminate.

Cause: An analyzer must be active for the application to operate. The initialization of the analyzes configured with the Setup program has failed. The application stops.

Action A: Usually this message is preceded by another message giving the reason for the analyzer's failure to initialize. See the instructions for that message.

Action B: Ensure that the analyzer is attached to the computer. Verify that the analyzer has the power switch in the ON position. If the application continues to fail in its attempts to initialize the analyzer, contact your service representative.

2477- Unit n - S/N: nnnn did not properly initialize.

Cause A: There were communication problems between the computer and the analyzer.

Action A: Check the communication cables and make sure they are connected securely.

Cause B: You selected **Cancel** during initialization.

Action B: None required.

2478- Error copying sequential data segment.

Cause: An internal processing and/or hardware error occurred while accessing a portion of a sample file.

Action: Confirm that the media being accessed does not contain errors; for example, you may wish to use a utility such as ScanDisk.

Contact your service representative if you continue to receive this message.

2479- Unit n - S/N: nnnn The instrument is busy performing an operation of which this application is unaware. Do you want to cancel?

Cause: During initialization, the instrument was found to be analyzing, but the analysis program has no record of it.

Action: Click **Yes** to cancel the analysis and synchronize the analysis program with the instrument's status. Click **No** to abort the initialization and allow the analyzer to continue the analysis.

2480- File (name) cannot be analyzed. It is currently being edited.

Cause: You attempted to start an analysis using a file that is open for editing.

Action: Finish editing the file, save and close it; then restart the analysis.

2481- Error accessing the sample information file (name).

Cause: An unexplained error prevents you from accessing this file.

Action: The hard disk drive may be corrupt. Run diagnostics.

2482- File (file name) cannot be opened for writing. It is already in use.

Cause: The file you specified in a **Save As** operation is already open for edit.

Action: Select a different file for the **Save As** operation

2483- An analysis cannot be performed on (file name). It is open for editing and contains errors.

Cause: You attempted to start an analysis using a file that contains errors and is open for editing.

Action: Finish editing the file, save and close it; then start the analysis.

2484- The edit session for (file name) must be saved before the analysis. Save changes and proceed with the analysis?

Cause: You attempted to start an analysis using a file that contains unsaved changes and is still open.

Action: Click **Yes** to save the changes and proceed with the analysis. Click **No** to cancel the analysis and continue editing the file.

2486- Cannot construct (name) report type. Program will terminate.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative if you continue to receive this message.

2487- Cannot start report generator. Error code (number). Program will terminate.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative if you continue to receive this message.

2488- File (file name) cannot be opened for editing. It is already in use.

Cause: The file you specified is already open for editing.

Action: Check the windows list to locate the other edit session.

2489- File (file name) cannot be opened for writing. It is already in use.

Cause: The file you specified in a **Save As** operation is already open for edit.

Action: Select a different file for the **Save As** operation.

2490- No '.INI' file present. Application will terminate.

Cause: The ASCII file containing initialization information and system options information used during program startup does not exist.

Action: Contact your Micromeritics service representative.

2491- Highlighted fields contain errors. Please correct the errors before closing.

Cause: The highlighted fields contain invalid entries. You will not be able to close the dialog until you correct the errors.

Action: Check the entries, correct the errors, and close the dialog.

2492- This field's entry is invalid.

Cause: The highlighted field contains an invalid entry.

Action: Check the entry and correct the error.

2493- An entry is required for this field.

Cause: This field contains an invalid entry.

Action: Enter or select an appropriate value.

2494- Value is out of the valid range.

Cause: The value you entered in the highlighted field is outside the valid range of values.

Action: Check the entry and enter or select a value within the indicated range. The valid range is shown in the information bar across the bottom of the dialog.

2495- Value is out of the valid range. Enter a value between (value) and (value).

Cause: The value you entered in the highlighted field is outside the valid range of values.

Action: Check the entry and enter a value between the range indicated. The valid range is shown in the information bar across the bottom of the dialog.

2496- Invalid number.

Cause: The number you entered in the highlighted field is invalid.

Action: Check the entry and enter or select a valid number.

2497- This field contains an invalid character.

Cause: You entered an invalid character in the highlighted field.

Action: Check the entry and enter valid characters.

2498- The requested change to the Sample's status is invalid at this time.

Cause: A request to change the file's status (for example, from automatically collected to manually entered data) could not be done.

Action: Contact your service representative if you continue to receive this message. Record the name of the sample file in which the problem occurred.

2499- Sequence number must contain at least 3 digits.

Cause: You tried to enter a sequence number that did not contain at least three digits.

Action: Enter a sequence number that contains at least three digits.

2500 Series

2501- System resources have reached a dangerously low level. Please close some windows to avoid the loss of data.

Cause: A large number of windows are open and consuming the system resources available to all applications.

Action: Close one or more windows on the screen. Contact your Micromeritics service representative if you continue to receive this error message.

2502- Error writing to file (name) during print. Error code: (number).

Cause: An error occurred in the file being written to during a print operation.

Action: Ensure that there is sufficient space on the drive containing the file.

2503- Error converting file (name). Could not create DIO intermediate file.

Cause A: Insufficient space is available on the hard disk. The DIO file is placed in the directory specified by the TEMP environment variable.

Action A: Determine if there is sufficient space on the drive where the TEMP directory is located.

Cause B: An internal processing and/or hardware error has occurred.

Action B: Contact your service representative.

2504- Cannot create output file for sample (name).

Cause: Insufficient space may be available on the hard disk.

Action: Ensure that sufficient space is available. Contact your service representative if you continue to receive this message.

2505- Error Logger cannot be initialized. Error code (number). Program will exit.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your service representative.

2506- (sample file) Output device (name) is not installed. Printing cannot be accomplished.

Cause: The selected output device is not installed.

Action: Install the device using the Control Panel, Printers operation.

2507- Error opening file (name) for printing. Error code: (number).

Cause: An error occurred in the selected file for print output.

Action: Ensure that sufficient space is available on the drive containing the file.

2508- (sample file) Overlay file (name) was not found. It will not be included in the reports.

Cause: The specified overlay file could not be found.

Action: Ensure that the file specified as an overlay does exist.

2509- (sample file) Error opening file (name): (error). Reports cannot be produced.

Cause: An error occurred while the program was opening a file necessary to the report operation.

Action: Use the name given in the error message to investigate. Contact your service representative if you continue to receive this error message.

2510- (sample file) Error parsing reports from file (name). Reports cannot be produced.

Cause A: One or more data entry fields in the sample file may contain an invalid character (such as a single quote or double quotes).

Action A: Review the data entry fields (for example, the Sample field) and remove the invalid character.

Cause B: The system was unable to create the usual temporary files during the report, possibly due to insufficient disk space.

Action B: Check the space available on the had disk.

Cause C: An internal processing error occurred.

Action C: Contact your service representative.

2511- Print job (name) has been cancelled due to insufficient disk space. Delete unnecessary files and restart the report.

Cause: The disk drive does not have enough space for the temporary file required by the Windows Print Manager. Therefore, printing of the requested report has been canceled.

Action: Delete unnecessary files form the disk. You will require at least five megabytes of free space for normal operation.

2512- Print job (name) has been canceled.

Cause: The requested print job was canceled at your request.

Action: None required.

2513- Unable to read the calibration file (file name).

Cause: The calibration file selected for loading is not valid or cannot be read.

Action: Confirm the media containing the alleged calibration file has no problems.

2514- Unable to write the calibration file (file name).

Cause: An attempt to Save calibration data has failed due to possible media problems

Action A: Confirm the media containing the alleged calibration file has no problems.

Action B: Choose an alternate media to Save the calibration data.

2515- Warning: Changing the calibration information will affect the performance of the instrument. Only qualified service personnel should do this. Do you wish to proceed?

Cause: You have started the process of performing a calibration operation.

Action: Calibration operations should only be done by or under the direction of qualified service personnel.

2516- Warning: Keeping a backup copy of the calibration data is recommended by Micromeritics. Would you like to do so now?

Cause: You have performed a calibration operation; a backup copy is recommended.

Action: Perform a calibration Save operation.

2517- Canceling this dialog will reset the calibration state to what it was when this dialog was first opened. Are you sure you want to cancel?

Cause: You clicked **Cancel** on the calibration dialog; this will cancel the calibration you just performed and revert back to the previous calibration.

Action: If the calibration operation was successful, click **Accept**.

2519- Entered or merged data must have at least two points with unique mass percent values.

Cause: The entered and/or merged data included in the report being attempted does not have sufficient unique mass percent values.

Action: Review the entered or merged data. There must be at least two points and the mass percent value of the last point must be different than the mass percent value of the first point.

2521- Unable to program controller.

Cause: A hardware malfunction has occurred.

Action: Contact your local Micromeritics service representative.

2522- Invalid controller application file.

Cause: The application's control file has been corrupted or deleted.

Action: Reinstall the analysis program.

2523- Programming the controller failed.

2524- CRC check failed on programming controller.

2525- Unknown error programming controller.

2526- Controller download was not successful.

2527- Controller CRC error on boot block.

2528- Controller DRAM error.

2529- Controller Com1: error.

2530- Controller Com2: error.

2531- Controller debug port error.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your Micromeritics service representative if you continue to receive this error message.

2532- The instrument contains a different software version. Do you want to reset it?

Cause: The application has discovered a different version of software operating in the analyzer.

Action: If there are no analyzers other than the one connected to the computer, select **Yes** and allow the updated software to load.

2533- Analyzer initialization failed.

Cause: An internal processing and/or hardware error has occurred.

Action: Contact your Micromeritics service representative if you continue to receive this error message.

2534- Error opening file (name) for printing. Error code: (number)

Cause: An error occurred in the selected file for print output.

Action: Ensure that sufficient space is available on the drive containing the file.

2535- The requested directory is not a repository location. Resetting to the default location.

Cause: The directory last accessed is no longer available; the application defaults to the default location.

Action: Choose an appropriate directory to select a file.

2536- The maximum number of versions has already been created for this file.

Cause: The current file contains the maximum number of 676 versions.

Action: If additional versions are required, select **File**, **Save As** to create a new file from the current version.

2537- The directory (name) has already been added to the repository.

Cause: An internal conflict with the repository structure has occurred.

Action: Contact your Micromeritics service representative.

2538- The archive location name (name) has already been used.

Cause: An internal conflict with the repository structure has occurred.

Action: Contact your Micromeritics service representative.

2539- The repository location (name) cannot be created.

Cause: You attempted to create a new directory (category) or subdirectory (sub-category) but the directory-creating function of the Windows operating system has prevented you from doing so.

Action: Contact your Administrator to review security permissions and local disk space.

2540- Error getting log file name.

Cause: The Confirm application was unable to access (or create) the system log.

Action: Contact your Administrator to review user rights and local disk space.

2541- Windows and application user's rights conflict.

Cause: You attempted to log into the application, but the windows user rights and Confirm application rights do not agree.

Action: Contact your Administrator to review user rights.

2542- The file (name) could not be written. Check that the directory permissions are correct.

Cause: The system has prevented you from saving your file.

Action: Contact your Administrator to review user rights and local disk space.

2543- Cannot read from the repository. Check that the directory permissions are correct.

Cause: The system has prevented you from accessing a file in the repository.

Action: Contact your Administrator to review user rights for the application and the Windows operating system.

2544- Cannot write to the repository. Check that the directory permissions are correct

Cause: The system has prevented you from saving your file to the repository.

Action: Contact your Administrator to review user rights for the application and the Windows operating system.

2545- The repository appears to be empty. Check that the directory permissions are correct.

Cause: The application was unable to determine the repository structure.

Action: Contact your Administrator to review user rights and local disk space.

2546- The file list for the current repository location is missing. Contact an administrator to update the list.

Cause: You attempted to access a file but the repository does not contain any files.

Action: Contact your Administrator to review user rights and local disk space.

2547- The instrument is busy. Exiting the application will result in the termination of the analysis. Continue with program exit? (Yes, No)

Cause: You attempted to exit the application while an analysis is in progress.

Action: If you are not concerned with cancellation of the analysis, click **Yes** to continue the exit; otherwise select **No** and allow the analysis to finish.

2549- Error accessing online manual file (name).

Cause: You were unable to open the online manual.

Action: Exit the application and reinstall the software. The manual may have been accidentally deleted.

2550- Attempts to acquire the instrument's status timed out.

Cause: Communication between the analyzer and application have been unsuccessful for more than one minute.

Action A: Exit the application, then restart it.

Action B: Ensure that the ethernet cable is securely connected to the computer and analyzer.

Action C: Exit the application. Turn off the analyzer, then turn it back on. Restart the application. If communication problems persist after all actions have been taken, contact your Micromeritics representative.

4200 Series

4200- An error occurred while loading the application control information. Data entry cannot be performed. (Code # <number>)

Cause: An internal error occurred while read control information was being read from a disk file.

Action: The disk on which the application is installed may have failed. Contact your Micromeritics service representative and report the code number given in the message.

4201- No reports selected.

Cause: You failed to select reports in the **Reports to Generate** list box. No output could be produced.

Action: Ensure that at least one report is selected for the sample and re-submit the sample for reporting.

4202- No valid data to report.

Cause: The selected analysis in the sample file activated for reporting does not contain any valid data.

Action: If the sample is still analyzing, wait until enough data have been collected to allow reporting. If the sample is complete, an error or operator intervention stopped this analysis before sufficient data could be collected. The analysis may be deleted from the file

4203- The reference file is not valid. 'Diff. from ref.' column was deleted.

Cause: You requested a tabular report with *Difference from reference* selected as one of the columns. This quantity cannot be computed because the reference file is invalid.

Action: If no reference file has been specified, select one from the Report Options dialog and re-run the reports. If a file has been specified, ensure that it contains valid information.

4204- Coarser specification file is not valid. 'Out of spec.' column was deleted.

Cause: You requested a tabular report with **Out of Specification** selected as one of the columns. This quantity cannot be computed because the coarse specification file is invalid.

Action: If no specification file has been specified, select one from the Report Options dialog and re-run the reports. If a file has been specified, ensure that it contains valid information.

4205- Finer specification file is not valid. 'Out of spec.' column was deleted.

Cause: You requested a tabular report with the **Out of Specification** selected as one of the columns. This quantity cannot be computed because the finer specification file is invalid.

Action: If no specification file has been specified, select one from the Report Options dialog and re-run the reports. If a file has been specified, ensure that it contains valid information.

4206- The tabular report has no valid columns selected. No report produced.

Cause: You requested a tabular report with all of the columns set to *none*.

Action: Edit the options for that table and select a variable in at least one column of the table.

4207- No valid data are available for this report. No report produced.

Cause: The selected test in the sample file activated for reporting does not contain any valid data.

Action: If the sample is still analyzing, wait until enough data have been collected to allow reporting. If the sample is complete, an error or operator intervention stopped this analysis before sufficient data could be collected. The analysis may be deleted from the file.

4208- An overlay file is not valid. It was not included in the report

Cause: The sample file you selected for overlay does not exist or contains invalid data.

Action: From the Report Options dialog, click **Overlays** and remove the sample file

4209- The reference file is not valid. The report was not produced.

Cause: You selected the **Difference from Reference** graph; it cannot be computed because the reference file is invalid.

Action: If a reference file has not been specified, select one from the Report Options dialog and re-run the reports. If a file has been specified, ensure that it contains valid information.

4210- Coarser specification file is not valid. The report was not produced.

Cause: You selected the **Out of Specification** graph; it cannot be computed because the coarse specification file is invalid.

Action: If a specification file has not been specified, select one from the Report Options dialog and re-run the reports. If a file has been specified, ensure that it contains valid information.

4211- Finer specification file is not valid. The report was not produced.

Cause: You selected **Out of Specification** graph; it cannot be computed because the fine specification file is invalid.

Action: If a specification file has not been specified, select one from the Report Options dialog and re-run the reports. If a file has been specified, ensure that it contains valid information.

4212- At least one report item must be selected. Press Cancel if you do not want a report.

Cause: You failed to select reports in the “Reports to Generate” list box. No output could be produced.

Action: Ensure that at least one report is selected for the sample and re-submit the sample for reporting.

4213- Are you sure you want to delete the test?

Cause: You selected **Delete** on the Collected Data editor.

Action: Click **Yes** to remove the indicated test from the sample file. Click **No** to have the test remain in the sample file.

4214- The reference file is not valid. The overlay was not produced.

Cause: The reference file specified in the current file does not exist.

Action: On the Report Options dialog, click **Reference** and choose a different file.

4215- Coarser specification file is not valid. The overlay was not produced.

Cause: The file specified for the coarser specification does not exist.

Action: On the Report Options dialog, click **Specification** and choose a different file.

4216- Finer specification file is not valid. The overlay was not produced.

Cause: The file specified for the finer specification does not exist.

Action: On the Report Options dialog, click **Specification** and choose a different file.

4217- No table entries are within the distribution limits.

Cause: **Truncate to distribution** limits is selected on the report editor, but table entries are not within the range of the collected data.

Action: Edit the table entries, or deselect **Truncate to distribution** on the report editor.

4218- In order to use (option) you must select a Statistics Type or Arithmetic Statistics Type.

Cause: You requested a Summary report, but did not select a Statistics Type.

Action: Edit the Summary report and select at least one Statistics Type.

4219- In order to use (option) you must select a Distribution Type.

Cause: You requested a Summary report but did not select a Distribution Type.

Action: Edit the Summary report and select a Distribution Type.

6000 Series

6001- DataAcq: Peak width read timed out. Height: (number)

6002- DataAcq: Peak data sequence error. Height: (number) Width: (number) Status: (number)

6003- DataAcq: Current D/A Converter Timed Out.

6004- DataAcq: Test Pulse D/A Converter Timed Out.

6005- DataAcq: Low Threshold D/A Converter Timed Out.

6006- DataAcq: Electrode Current A/D Converter Timed Out. Status: (number)

6007- DataAcq: Preamplifier A/D Converter Timed Out. Status: (number)

6008- DataAcq: Amplifier A/D Converter Timed Out. Status: (number)

6009- DataAcq: Electrode Voltage A/D Converted Timed Out. Status: (number)

6010- DataAcq: Preamplifier Digital Potentiometer Timed Out.

6011- DataAcq: Amplifier Digital Potentiometer Timed Out.

6012- DataAcq: Log Gain Digital Potentiometer Timed Out.

6013- DataAcq: Log Reference D/A Converter Timed Out.

Cause: An electronic malfunction has occurred.

Action: Contact your Micromeritics Service representative.

6030- Plumbing: Servo D/A Converter Timed Out.

6031- Plumbing: Stirrer D/A Converter Timed Out.

6032- Plumbing: A System Reset has occurred.

Cause: An electronic malfunction has occurred.

Action: Contact your Micromeritics Service representative.

6050- Flow Control: Supply liquid reservoir is low.

Cause: Your supply bottle is almost empty.

Action: Refill the supply bottle with electrolyte.

6051- Flow Control: Differential pressure out of range for zero. Actual: (number) mmHg Allowed: (number) mmHg

Cause: The pressure transducer is operating out of specification.

Action: Contact your Micromeritics Service representative.

6052- Flow Control: Home detected out of range at (number) of steps, maximum allowed (number) of steps.

Cause: The volumetric pump is operating out of specification.

Action: Contact your Micromeritics Service representative.

6053- Flow Control: Waste liquid reservoir full. It must be emptied before continuing.

Cause: The waste bottle is almost full of expended electrolyte.

Action: Empty the waste bottle and reattach it to the analyzer before beginning another operation.

6054- Flow Control: Waste liquid full sensor not present. It must be installed before continuing.

Cause: The sensor for the waste container is not properly installed.

Action: Insert the sensor cable and ensure that it is fully seated into the connector. If you continue to get this message, contact your Micromeritics Service representatives.

6055- Flow Control: Waste liquid reservoir overflowed. It must be emptied before continuing.

Cause: Liquid has gotten into the tubing from the waste bottle to the vacuum pump. Further operation could damage the vacuum pump.

Action: Contact your Micromeritics Service representative.

6056- Flow Control: Waste liquid overflow sensor not present. It must be installed before continuing.

Cause: The overflow sensor is not properly installed.

Action: Contact your Micromeritics Service representative.

6058- Flow Control: Differential pressure out of range. Actual: (number) mmHg Expected: (number) mmHg

Cause: The differential pressure system is unable to set the required pressure.

Action: Verify that the waste bottle top is tightly screwed onto the bottle, and that the two vacuum lines are securely attached to the fittings on the waste bottle top and to the fittings on the side panel of the instrument.

Verify that an orifice tube is securely attached to the orifice tube port, and that the orifice is immersed in a beaker of electrolyte.

Restart the operation; if the message persists, contact your Micromeritics Service representative.

6059- Flow Control: Volumetric pump home position found at (number) steps.

6060- Flow Control: Volumetric pump home position not found at (number) steps.

6061- Flow Control: Volumetric pump position (number) steps exceeds maximum position (number) steps.

6062- Flow Control: Volumetric pump movement stopped. Move was (number) steps at (number) steps/second, direction (number), stopped after (number) seconds.

6063- Flow Control: Volumetric pump movement timed out. Move was (number) steps at (number) steps/second, direction (number), stopped after (number) seconds.

Cause: The volumetric pump has malfunctioned.

Action: Contact your Micromeritics Service representative.

6064- Flow Control: Flow operation superseded. Old operation code: (number) New operation code: (number)

Cause: A new flow operation was started before the previous operation had completed. The previous operation will not be completed.

Action: None required.

6080- Data Collection: Measured current out of range. Actual: (number) mA Min: (number) mA Max: (number) mA

6081- Data Collection: Test pulse amplitude out of range. Measured: (number) mA Set: (number) mA

6082- Data Collection: Test pulse frequency out of range. Measured: (number) Hz Set: (number) Hz

6083- Data Collection: Test pulse width out of range. Measured: (number) microseconds Set: (number) microseconds

6084- Data Collection: Preamp signal out of range. Actual: (number) V Min: (number) V Max: (number) V

6085- Data Collection: Amplifier signal out of range. Actual: (number) V Min: (number) V Max: (number) V

6086- Data Collection: Log range out of range. Measured: (number) to (number) Set: (number) to (number)

6087- Data Collection: Low threshold out of range. Measured: (number) V Set: (number) V

Cause: An electronic malfunction has occurred.

Action: Contact your Micromeritics Service representative.

6088- Data Collection: Failed to automatically clear blockage. The blockage must be cleared manually before continuing.

Cause: The orifice could not be cleared automatically.

Action: Manually clear the orifice; refer to **Clearing Blockages**, page **8-11.**

6089- Data Collection: Orifice Conductivity too low. Minimum = (number) S/m, Actual = (number) S/m. Orifice Resistance = (number) k ohms.

Cause A: The orifice may be blocked.

Action A: Select **Unit [n] > Clear Blockages**. If this fails, manually clear the blockage; refer to **Clearing Blockages**, page **8-11.**

Cause B: The orifice tube and internal tubing are not filled with electrolyte, therefore electrical contact is not being made.

Action B: Verify that the supply bottle has sufficient electrolyte, then select **Unit [n] > Flush** to flush the orifice tube and internal tubing with electrolyte.

Cause C: The electrolyte conductivity is too low for the size orifice in use.

Action C: Use an electrolyte with higher conductivity; for example, a solution with a higher concentration of salt.

6092- Data Collection: Particle detection rate of (number) particle per second is excessive. Data collection is cancelled.

Cause A: The doors to the sample compartment are open.

Action A: Securely close the doors to the sample compartment. The doors act as shields to prevent outside electronic noise sources from interfering with data collection.

Cause B: The orifice is blocked.

Action B: Select **Unit [n] > Clear Blockages**. If this fails, manually clear the blockage; refer to **Clearing Blockages**, page **8-11.**

Cause C: The signal settings are inappropriate for this orifice tube and electrolyte and, therefore, causing electronic noise.

Action C: Click **Optimize Settings** on the Sample Analysis dialog to automatically determine signal settings that will minimize electronic noise.

Cause D: The particle concentration is too high.

Action D: Reduce the particle concentration by at least a factor of 2, and repeat the analysis.

6093- Data Collection: Cannot measure Orifice Conductivity; Conductivity may be too high. Maximum Conductivity = (number), minimum Orifice Resistance = (number)

Cause A: The orifice may be blocked.

Action A: Select **Unit [n] > Clear Blockages**. If this fails, manually clear the blockage; refer to **Clearing Blockages**, page **8-11.**

Cause B: The orifice tube and internal tubing are not filled with electrolyte, therefore electrical contact is not being made.

Action B: Verify that the supply bottle has sufficient electrolyte, then select **Unit [n] > Flush** to flush the orifice tube and internal tubing with electrolyte.

Cause C: The electrolyte conductivity is too high for the size orifice in use.

Action C: Use an electrolyte of lower conductivity; for example, a solution with a lower concentration of salt.

6100 Series

6100- Unable to establish the TCP connection with the instrument.

Cause: A communications problem between the computer and the analyzer has occurred.

Action A: Check the cable connection between the computer and the analyzer.

Action B: Select **Unit [n] > Unit configuration** and verify that the TCP/IP configuration for the computer and the analyzer are correct.

Action C: Exit the Elzone application, and turn off the analyzer. Then turn on the analyzer and restart the application. If the problem persists, contact your local Micromeritics representative.

6101- Configured serial number does not match instrument.

Cause: The instrument serial number specified for this unit during installation does not match the serial number recorded in the attached instrument.

Action: Attach the correct instrument, or run the Setup program and install the calibration files for the correct instrument serial number. The instrument serial number is located on the back panel of the analyzer.

6102- The instrument (S/N) is not calibrated.

Cause: You attempted to begin an analysis, but the instrument is not fully calibrated.

Action A: Exit the analysis program and turn off the analyzer. Turn the analyzer back on and restart the analysis program. Select Unit configuration from the Unit [n] menu to verify that calibrations are installed (calibration items will contain dates). If no information displays for the calibration items, go to Action B.

Action B: Contact your Administrator or someone with Administrator rights to reinstall the calibration files.

6110- An automatic analysis mode is enabled. The sample defaults may not be edited while this mode is active.

Cause: One of the automatic analysis modes is active. Sample defaults cannot be edited while this mode is active.

Action: End all automatic analysis modes on all attached units and try again.

6111- Orifice tube not calibrated with this instrument. Do you want to proceed with analyses anyway?

Cause: You selected an orifice tube that has not been calibrated to this instrument.

Action A: Stop the analysis and calibrate the orifice tube.

Action B: Choose a calibration tube that has been calibrated.

Action C: Continue with the analysis, then calibrate the orifice tube after the analysis. For the sample file used with the analysis, select **Data Setup** on the Collected Data dialog and update the calibration.

6112- Backgrounds require full resolution data storage. Do you want to select full resolution data storage?

Cause: You attempted to run a background with a file that does not have **Full-resolution** selected for the data format.

Action: Full-resolution data are required for a background. Click **Yes** to have the software automatically select this option. Click **No** to stop the background analysis.

6113- Volumetric flow rate is unavailable. Do you want to use differential flow rate instead?

Cause: You attempted to begin an analysis using a file in which **Volumetric Flow Rate** was selected as the Flow Control but you do not have the optional volumetric pump installed.

Action: Click **Yes** to have the software automatically select the **Differential Flow Rate** option. Select **No** to stop the analysis and edit the current file or choose another one.

6114- You chose to use the most recent background but no background is available. Choose Yes to proceed without background data.

Cause: You selected **Use most recent background** on the Data Setup dialog (from the Analysis Conditions dialog) but a background has not been performed on this instrument for the selected orifice tube and liquid.

Action: Click **Yes** to proceed without a background. Then run a background after the analysis. Open the sample file and click **Data Setup** on the Collected Data dialog. From the Data Setup dialog, click **Browse** and choose the background file.

Click **No** to stop the analysis so that you can run a background, then restart the analysis.

6115- Background subtraction is selected but no background data is specified. Select a data file from the Data Setup dialog if you wish to subtract a background.

Cause: You requested background subtraction but you did not select a background file.

Action: Click **Data Setup**, then click **Browse** to choose a background file, or select the **Use most recent background** option.

6116- Selected orifice tube or liquid is different from last used on this unit. Do you want to change the orifice tube or liquid before continuing with the analysis?.

Cause: You selected to use an orifice tube or a liquid that is not the same as used in the previous analysis (or calibration).

Action: Click **Yes** to change the orifice tube or liquid. Click **No** to continue with the operation; this is assuming that you have already changed the tube or liquid.

6117- Please raise the beaker stand and press OK to continue, or Cancel.

Cause: You attempted to start an analysis with the sample stand in the lowered position.

Action: Raise the sample stand, then click OK to continue the analysis.

6118- The entered Minimum Particle Size (number) cannot be measured using the calibration selected in Data Setup. A new calibration spanning the desired size range is recommended.

Cause: You selected an orifice tube that has not been calibrated to cover the specified diameter range.

Action A: Enter a size range that will accommodate the selected orifice tube.

Action B: Recalibrate the orifice tube using reference samples that will cover the desired range.

6119- The entered Minimum Particle Size (number) requires a log range of (number): 1 using the calibration selected in Data Setup. A new calibration spanning the desired size range is recommended.

Cause: The particle size range for the current calibration is not consistent with the collected data range.

Action A: Perform a calibration using the same range as specified in the message. Then click **Data Setup** on the collected data dialog and update the calibration.

Action B: Use the existing calibration, in which case interpolation will be used to span the collected data range.

6120- Unable to read the calibration file (file name).

Cause: The calibration file selected for loading is not valid or cannot be read.

Action: Confirm the media containing the alleged calibration file has no problems.

6121- Unable to write the calibration file (file name).

Cause: An unexpected error has occurred.

Action: Contact your Micromeritics service representative.

6130- The calculation could not be performed.

Cause: You requested a calculated peak height on the orifice tube calibration review screen and the number of reference materials is greater than the number of peaks (see Message 6136).

Action A: Select the peak height manually.

Action B: Make sure the correct sample is in the system, the correct SRM's are selected, and the proper analysis conditions (for the current sample) are selected; then try again.

6131- The peak height has not been initialized, and so cannot be used in the fit.

Cause: You requested that a peak be included in the fit but the peak height had not been assigned.

Action A: Select and assign the peak height manually.

Action B: Make sure the correct sample is in the system, the correct SRM's are selected, and the proper analysis conditions (for the current sample) are selected; then try again.

6132- Calibration failed: No SRM selected.

Cause: No SRMs were selected on the Orifice Tube calibration review screen.

Action: Select one or more SRMs to be included.

6133- Calibration failed: Fit tolerances exceeded.

6134- Calibration failed: Error in fit too large.

6136- The automatic calibration could not be performed because the number of reference materials is greater than the number of peaks. All reference materials have been removed from the fit.

Cause: The calibration could not be completed because the line of best fit (orifice tube calibration review screen) is too far from the measured value.

Action: Make sure the correct sample is in the system, the correct SRMs are selected in the Reference Material list, and the proper analysis conditions are specified for this sample.

6151- This sample file was analyzed on a different instrument. Do you want to proceed anyway?

Cause: You attempted to perform an analysis using a file that has been used for an analysis with a different instrument.

Action: Click **Yes** to continue with the analysis; however, data will be less accurate than if the analysis was performed on the same instrument as the first analysis. Click **No** and choose a file containing an orifice that was calibrated on the current instrument.

6161- The sample already contains eight tests and cannot be used for an analysis.

Cause: You selected **Start/Continue** after a test completed but the current file already contains eight tests.

Action: Delete some of the tests from the file or choose a different file; you can only perform eight tests with a file.

6162- File (file name) cannot be analyzed. It is currently being edited.

Cause: You selected a file that was still open in an editing window for analysis.

Action: Finish the changes to the sample file, then save and close the editing window.

6163- The current test is complete. Please save or clear the data before starting a new test or change Ending Conditions to collect more data.

Cause: You attempted to begin another test but data for the current test has not been saved or cleared.

Action: Clear the data, save the data, or change the ending conditions.

6165- Please save or clear collected data before starting this operation.

Cause: You attempted to perform an operation but you have collected data that have not been saved or cleared.

Action: Save or clear the data before proceeding with the operation.

6167- The newly measured conductivity value (number) differs from previous value (number)

The first stage of data collection evaluates the conductivity and compares it to the previously recorded value for the current orifice tube and the electrolyte and the values differ by more than 2%.

Cause A: The orifice tube may be blocked.

Action A: Select **Unit [n] > Clear Blockages**. If this fails, manually clear the blockage; refer to **Clearing Blockages**, page **8-11**.

Cause B: Incorrect analysis liquid or improperly prepared liquid.

Action B: Ensure that the correct liquid is in the Supply container, and that it has been properly prepared.

Cause C: Air bubbles are in the tubing.

Action C: Select **Unit [n] > Flush System** to flush electrolyte through the system.

6180- Cannot read the background file (file name).

Cause: The selected background file is not present or cannot be opened.

Action A: Ensure that the path name is correct.

Action B: Check directory permissions.

Action C: Make sure you have sufficient space on your disk.

6181- The background file (file name) was not analyzed with the same liquid as this file.

Cause: You selected a background that has a different liquid from the one in the current file.

Action: Choose a background that was performed used the same electrolyte as the current file.

6182- There is no full-resolution data in the background file (file name).

Cause: You selected a background that does not contain full-resolution data.

Action: Choose a different background file. Do not delete full-resolution data from background files.

6183- The orifice ID for (name) does not match the current tube's ID (name).

6184- The orifice diameter for (file name) (number) does not match the current tube's diameter (number).

Cause: You selected **Calibration copied from sample (file name)** and you chose a file for an orifice tube other than the one you are using for the current analysis.

Action: Choose a file that contains calibration information for the current tube.

6185- The calibrations could not be updated. The instrument used for the analysis (s/n) is not in operation.

Cause: You attempted to update calibration information but the instrument used in the calibration is not the current instrument.

Action: Update the calibration information using the instrument on which the calibration was performed.

6186- Cannot copy calibration from this file. Orifice Tube ID (name) and diameter (number) must match the current settings.

Cause: You selected a file that contains calibration parameters for an orifice tube other than the current one.

Action: Choose a file containing calibration information for the current orifice tube.

6187- Cannot open the data file (file name) for reading.

Cause: You attempted to open a data file but were unsuccessful.

Action A: Check directory permissions.

Action B: Make sure the disk is not full.

6188- Cannot create a new test in (file name).

Cause: An unexpected error occurred.

Action: Contact your Micromeritics Service representative.

6189- Cannot add a test to (file name)

Cause: You have saved the maximum number of 8 tests for this file.

Action: Delete unwanted tests, or create a new file.

6190- There is no calibration for the orifice (name) on this instrument.

Cause: You attempted to update calibration information for an orifice tube that has not been calibrated on this instrument.

Action: Calibrate the orifice tube, then update the calibration using the **Data Setup** push button on the Collected Data dialog.

6191- New minimum particle size range greater than maximum range. Old settings restored.

Cause: You entered a minimum size value that was greater than the maximum value.

Action: The minimum value must be less than the maximum value; reenter the minimum size.

6200 Series

6200- The file (file name) does not have background data.

Cause: You selected a background report for a file that contains no background data.

Action: Click **Data Setup** on the Collected Data dialog and select a background file.

6201- The file (file name) does not have full-resolution data.

Cause: You selected a pulse length or pulse length vs. particle size report for a file that does not contain full-resolution data. This information either was not collected or has been deleted.

Action: Before analysis, select **Full resolution** data on the Data Setup dialog (from the Analysis Conditions dialog). Do not delete full-resolution data if you wish to produce these type of reports.

6202- Graph is not available. The orifice tube was not calibrated.

Cause: You requested an orifice tube calibration report for an orifice tube that has not been calibrated.

Action: Calibrate the orifice tube, then request the report again.

6203- No data available in file (file name) for reporting.

Cause: You requested a report for a file that does not contain collected data.

Action: Use the file in an analysis before requesting reports.

6204- The file (file name) does not have pulse length data.

Cause: You requested a pulse length report for a file that contains entered data.

Action: Choose a report containing full-resolution data; pulse length reports are only available for this type of data.

6205- The file (file name) does not have pulse length vs. particle size data.

Cause: You requested a pulse length vs. particle size report for a file that does not contain the required data. You may not have collected this data or you may have deleted it.

Action: Before analysis, select **Pulse length vs. particle size data** on the Data Setup dialog (from the Analysis Conditions dialog). Do not delete full-resolution data if you wish to produce these type of reports.

6210- Data sets must be ordered from finest to coarsest.

Cause: You attempted to blend data, but the data sets have not been placed in order.

Action: Reselect the files, placing the file with the finest data in field #1.

6211- Not enough overlap between data sets.

Cause: The particle size ranges of at least one adjacent pair of data sets do not overlap by at least 10 points.

Action: Choose an additional data set to cover the intermediate sizes.

6212- Channels with no counts were found in the blend range.

Cause: You attempted to blend data; however, at least one of the data files does not contain size classes in the size range where blending is to be done.

Action: Collect more data or choose an additional data set to cover the blending range.

6213- The blend range could not be determined.

Cause: The slopes of the distributions in the blending range are not comparable for at least one pair of data sets.

Action: Collect more data or choose an additional data set to cover the blending range.

6214- The noise level or curvature in the blending range is too high.

Cause: The data in the blending range are not comparable due to excessive scatter or high curvature for at least one pair of data sets.

Action: Collect more data or choose an additional data set to cover the blending range.

6230- The reference material ID (name), Lot (number) is already in the list.

Cause: You attempted to add a reference material that already exists in the list.

Action: Change the identification of the material you are adding so that it does not conflict with the one in the list.

6231- Please select at least one reference material.

Cause: You attempted to start an orifice tube calibration, but no reference materials have been selected.

Action: Select the appropriate reference material(s) and try again.

6232- No more than ten reference materials can be selected.

Cause: You attempted to start an orifice tube calibration with more than 10 reference materials selected.

Action: Select the appropriate reference materials, but no more than 10.

6233- The reference material is outside valid range for selected orifice tube. Do you want to add the reference material to global list only?

Cause: You attempted to add a reference material that is outside of the range for the orifice tube selected for this calibration.

Action: Click **Yes** to add the reference material to the list. Click **No** to edit the reference material parameters.

6235- The reference material is out of range of the orifice tube and cannot be used in the calibration.

Cause: You selected a reference material that is too large or too small for the selected orifice tube.

Action: Select the appropriate-sized reference material(s) or orifice tube and try again.

6240- The input file (file name) has too many data points. Only the first (number) lines will be converted.

Cause: The number of size classes in reduced data is limited to 300; you attempted to convert a file containing more than this number.

Action: Reduce the number of data points in the file.

6241- The input file (file name) does not have enough data points. At least two size-value pairs must be present.

Cause: Reduced data must have at least four size classes; you attempted to convert a file containing fewer than this number.

Action: Increase the number of data points in the file.

6242- Converting data failed. Check the contents of the input file (file name).

Cause: You attempted to convert an ASCII file but the format is incorrect.

Action: Properly format the ASCII file before converting; refer to **Convert**, page for the proper format.

6243- A negative particle size was found in the input file (file name).

Cause: You attempted to convert an ASCII file but one of the particle sizes read from the input file is less than zero.

Action: Correct the particle sizes in the input file, then convert the file.

6244- A negative incremental distribution value was found in the input file (file name).

Cause: You attempted to convert an ASCII file, but one of the incremental distribution values in the input file is less than zero.

Action: Correct the distribution values in the input file, then convert the file.

6245- An inappropriate cumulative distribution value was found in the input file (file name).

Cause: You attempted to convert an ASCII file, but an increasing cumulative coarser, or decreasing cumulative finer distribution value was read from the input file.

Action: Ensure that the correct type of cumulative data was specified on the conversion dialog box. Correct any inappropriate data point in the input file, then convert the file.

6246- The particle sizes in the file (file name) are not evenly spaced on a linear or logarithmic scale.

Cause: The particle sizes in the input file are irregularly spaced.

Action: Choose regularly spaced particle sizes on either a linear or logarithmic basis.

6247- Particle sizes must be strictly increasing.

Cause: You attempted to convert an ASCII file, but a particle size was read that is less than the previous size.

Action: Edit the input file so that the data points are in ascending order by particle size, then convert the file.

6248- File (file name) has an unrecognized type.

Cause: The input file does not nave the expected format.

Action: Correct the format of the input file.

6260- Full-resolution data cannot be exported because the file (file name) does not have full-resolution data.

Cause: You attempted to export full-resolution data using a file that does not contain full-resolution data.

Action: Choose **Reduced Data** as the Export Type in the export dialog box.

6272- The value of the distribution at the extrapolation point must be less than the peak value. The extrapolation calculation was not performed.

Cause: You specified extrapolation and peak points in that the value of the distribution is higher at the extrapolation point that at the peak point.

Action: Enter (or select from the graph) an extrapolation point and/or a peak point so that the extrapolation value is lower than the peak value.

6273- The value of the distribution at the extrapolation point must be non-zero. The extrapolation calculation was not performed.

Cause: You specified an extrapolation point where the distribution is zero (0).

Action: Specify (or select from the graph) an extrapolation point with non-zero distribution.

B. DATA REDUCTION

Peak Statistics

Four types of statistics are available for reporting:

- Weighted
- Geometric
- Harmonic
- Arithmetic

The following distributions can be reported for Weighted, Geometric, and Harmonic:

- Volume
- Area
- Number
- Mass

The following statistics can be reported for Arithmetic:

- Length
- Surface area
- Volume

Calculations for these statistics use equations 1 through 6. Use the information provided in Tables B-1 through B-3 to produce the equation for the desired statistic. An example is given at the end of this section.

$$\bar{x}_f = \frac{\sum f(\bar{d}_i) F_{\alpha, i}}{\sum F_{\alpha, i}} \quad (1)$$

$$\sigma_f = \sqrt{\frac{\sum (f(\bar{d}_i) - \bar{x}_f)^2 F_{\alpha, i}}{\sum F_{\alpha, i}}} \quad (2)$$

$$\bar{x} = f^{-1}(\bar{x}_f) \quad (3)$$

$$\sigma = f^{-1}(\sigma_f) \quad (4)$$

$$s = \frac{\sum\left(\frac{f(\bar{d}_i) - \bar{x}_f}{\sigma_f}\right)^3 F_{\alpha,i}}{\sum F_{\alpha,i}} \quad (5)$$

$$k = \frac{\sum\left(\frac{f(\bar{d}_i) - \bar{x}_f}{\sigma_f}\right)^4 F_{\alpha,i}}{\sum F_{\alpha,i}} - 3 \quad (6)$$

where

$\bar{d}_i$ = average particle diameter for size class i
$F_{\alpha,i}$ = value of frequency distribution in size class i (number, area, volume, or mass)
$\bar{x}_f$ = mean of transformed size

Table B-1. Statistic Types and Distributions

Statistic	f(x) (function)	$f^{-1}(x)$ (inverse function)	Distribution	α
Weighted	x	x	Volume	v
Geometric	$\log_{10}x$	10^x	Area	a
Harmonic	1/x	1/x	Number	n
			Mass	m

Table B-2. Arithmetic Statistics

Statistic	f(x) (function)	$f^{-1}(x)$ (inverse function	α
Length	x	x	n
Surface Area	x^2	$x^{1/2}$	n
Volume	x^3	$x^{1/3}$	n

Table B-3. Statistics

Statistic	Formula
Mean	$\bar{x}$
Standard deviation	σ
Coefficient of variation	$\bar{x}/\sigma$
Standard deviation of transformed size	σ_f
Skewness	s
Kurtosis (coefficient of excess)	k
+ [n] σ size	$f^{-1}(\bar{x}_f + n\sigma_f)$
– [n] σ size	$f^{-1}(\bar{x}_f - n\sigma_f)$
Variance	σ^2

Example

This example provides the calculations for **Harmonic Number Mean**.

Harmonic: from Table B-1

$$f(x) = \frac{1}{x} \quad (7)$$

$$f^{-1}(x) = \frac{1}{x} \quad (8)$$

Number (Distribution): from Table B-1

$\alpha = n$

$F_{\alpha,i} \rightarrow F_{n,i}$ = incremental number distribution

Mean (Statistic): from Table B-3

$\bar{x}$

Substituting equation (8) into equation (3),

$$\bar{x} = f^{-1}(\bar{x}_f) = \frac{1}{\bar{x}_f}$$

Using equations (1) and (7),

$$\bar{x}_f = \frac{\sum f(\bar{d}_i) F_{n,i}}{\sum F_{n,i}} = \frac{\sum \frac{F_{n,i}}{\bar{d}_i}}{\sum F_{n,i}}$$

Thus, the **Harmonic Number Mean**,

$$\bar{x} = \frac{\sum F_{n,i}}{\frac{F_{n,i}}{\bar{d}_i}}$$

Mass Balance

True and Measured Concentration

The true concentration is calculated from user input. The mass concentration and dilution factor are entered on the Sample Information dialog and the sample density on the Materials Properties dialog.

$$\text{True Concentration} = \frac{\text{Mass Concentration}}{\text{Sample Density} \times \text{Dilution Factor}}$$

The measured concentration is the total particle volume measured by the instrument, divided by the volume of suspension analyzed:

$$\text{Measured Concentration} = \frac{\Sigma N_i \times V_i}{\text{Suspension Volume}}$$

where

N_i = number of particles measured in size channel i
V_i = volume of a particle in size channel i

Kd by Mass Integration

For mass integration, reference material-derived calibration slope and offset are not used. The default calibration factor of the orifice tube is used so that the resulting K_d value is not dependent on orifice tube calibration by reference materials.

$$K_v = \frac{\text{True Concentration}}{\text{Measured Default Concentration}}$$

$$K_d = \left(\frac{6K_v}{\pi}\right)^{\frac{1}{3}}$$

where

$$\text{Measured Default Concentration} = \frac{\Sigma N_i V_{def_i}}{\text{Suspension Volume}}$$

$V_{def_i\,i}$ = volume of a particle in size channel i calculated using default calibration for the orifice tube

Fraction of Sample Measured

The Fraction of Sample is selected on the Summary report.

$$\text{Fraction Sample Measured} = \frac{\text{Measured Concentration}}{\text{True Concentration}}$$

Specification/Reference Quantities

Out of Spec

$SampCumFrac_i$ = cumulative fraction coarser/finer/passed/retained for class i from sample distribution

$CoarseSpecCumFrac_i$ = cumulative fraction coarser/finer/passed/retained for class i from Coarse Specification distribution interpolated if the bins are of different size. This is always the average of all tests in the named sample file.

$FineSpecCumFrac_i$ = cumulative fraction coarser/finer/passed/retained for class i from FineSpecification distribution interpolated if the bins are of different size. This is always the average of all the tests in the named sample file.

If $\{SampCumFracCoarser_{i-1} > CoarseSpecCumFracCoarser_{i-1}\}$

$OutSpecFracCoarser_i = SampCumFracCoarser_{i-1} - CoarseSpecCumFrac$

$Coarser_{i-1}$

If $\{SampCumFracCoarser_{i-1} < FineSpecCumFracCoarser_{i-1}\}$

$OutspecFracCoarser_i = SampCumFracCoarser - FineSpecCumFrac$

$Coarser_{i-1}$

or,

$OutSpecFracFiner_i = -OutSpecFracCoarser_{i-1}$

$OutSpecFracRetain_i = OutSpecFracCoarser_{i-1}$

$OutSpecFracPass_i = OutSpecFracCoarser_{i-1}$

Difference from Reference

$SampCumFrac_i$ = cumulative fraction coarser/finer/passed/retained for class i from sample distribution

$RefSpecCumFrac_i$ = cumulative fraction coarser/finer/passed/retained for class i from Reference Specification distribution interpolated if the bins are of different size. This is always the average of all the tests in the named sample file.

$DiffRefCoarser_i = SampCumFrac_i - RefCumFrac_i$

or,

$DiffRefFiner_i = DiffRefCoarser_{i-1}$

$DiffRefRetain_i = DiffRefCoarser_{i-1}$

$DiffRefPass_i = DiffRefCoarser_{i-1}$

Maximum Out of Spec

MaxOutSpecFrac = maximum (abs value ($OutSpecFrac_i$))

Pass/Fail by Specification

If MaxOutSpecFrac = 0, PassFail = Passed by Specification

Otherwise, PassFail = FAILED by Specification

SPC Report Variables

Regression Chart

The line of best for the Regression Chart is calculated by the usual least squares method[1]. If there is only a single point, or all N points have the same x-value, there can be no line of best fit in the standard form.

$$XAve = \frac{\Sigma x_i}{N}$$

$$YAve = \frac{\Sigma y_i}{N}$$

$$Slope = \frac{\Sigma (x_i - XAve)(y_i\ YAve)}{\Sigma (x_i - XAve)^2}$$

$$YIntercept = YAve - Slope \cdot XAve$$

The coefficient of correlation for this line also is calculated in the usual way[2].

$$\sigma_x = \sqrt{\frac{\Sigma (x_i - XAve)^2}{N}}$$

$$\sigma_y = \sqrt{\frac{\Sigma (y_i - YAve)^2}{N}}$$

$$Cov\ (x,y) = \frac{\Sigma (x_i - XAve)(y_i - YAve)}{N}$$

1. BASIC Scientific Subroutines Vol. 11, Ruckdeschel, F. R., BYTE Publications, McGraw Hill, p 16.
2. Mathematical Handbook for Scientists and Engineers, Korn, G.A. and Korn, T.M., McGraw Hill, Sec. 18.4 (1968).

$$\text{CorrelationCoef} = \frac{\text{Cov}(x, y)}{\sigma_x \sigma_y}$$

Control Chart

$$\text{Mean} = \frac{\Sigma y_i}{N}$$

$$\text{StdDev} = \sqrt{\frac{\Sigma (y_i - \text{Mean})^2}{N - 1}}$$

$$\text{CoefVar} = \frac{\text{StdDev}}{\text{Mean}}$$

$$\text{PlusNSig} = \text{Mean} + n \cdot \text{STdDev}$$

$$\text{MinusNSig} = \text{Mean} - n \cdot \text{StdDev}$$

Log Probability Data

Log probability data are a transformation of cumulative mass finer data as a means of determining how well cumulative and differential mass data represent statistical log normal distributions. Since cumulative mass finer data are essentially data indicating the probabilities of finding particles of mass finer at given diameters, log normal probability data are a fit of the cumulative mass data to the defined, symmetrical probabilities tabulated for a log normal distribution.

The log probability table used is a subset of 99 points, ranging from (-2.88, 0.2%) to (0.0, 50.0%) to (+2.88, 99.8%), from a standard normal distribution table (see Table B-1. Log Probability Interpolation on the next page). The x-axis and y-axis data which are plotted on a log probability graph are calculated as follows:

1. X-axis boundaries are determined by the spline interpolation at 0.2% and 99.8% from cumulative mass finer vs. log diameter. This gives Xprob_beg and Xprob_end, respectively.

2. For each of the number of points collected,

   If Diameter value is between Xprob_beg and Xprob_end and

   if CumMassFiner value is between 0.2% and 99.8%, then

   Xprob value = Diameter value

   Yprob value = Spline interpolation at CumMassFiner values of the x vs. y log probability table values

Log Probability Interpolation Table

X (%)	Y	X (%)	Y	X (%)	Y
0.20	-2.88	33.00	-0.44	68.08	0.47
0.99	-2.33	34.83	-0.39	69.15	0.50
2.02	-2.05	35.94	-0.36	69.85	0.52
3.01	-1.88	37.07	-0.33	70.88	0.55
4.01	-1.75	37.83	-0.31	71.90	0.58
4.95	-1.65	38.97	-0.28	72.91	0.61
5.94	-1.56	40.13	-0.25	73.89	0.64
6.94	-1.48	40.90	-0.23	74.86	0.67
7.93	-1.41	42.07	-0.20	76.11	0.71
9.01	-1.34	42.86	-0.18	77.04	0.74
10.03	-1.28	44.04	-0.15	77.94	0.77
10.93	-1.23	44.83	-0.13	79.10	0.81
11.90	-1.18	46.02	-0.10	79.95	0.84
12.92	-1.13	46.81	-0.08	81.06	0.88
14.01	-1.08	48.01	-0.05	82.12	0.92
14.92	-1.04	48.80	-0.03	82.89	0.95
16.11	-0.99	50.00	0.00	83.89	0.99
17.11	-0.95	51.20	0.03	85.08	1.04
17.88	-0.92	51.99	0.05	85.99	1.08
18.94	-0.88	53.19	0.08	87.08	1.13
20.05	-0.84	53.98	0.10	88.10	1.18
20.90	-0.81	55.17	0.13	89.07	1.23
22.06	-0.77	55.96	0.15	89.97	1.28
22.96	-0.74	57.14	0.18	90.99	1.34
23.89	0.71	57.93	0.20	92.07	1.41
25.14	-0.67	59.10	0.23	93.06	1.48
26.11	-0.64	59.87	0.25	94.06	1.56
27.09	-0.61	61.03	0.28	95.05	1.65
28.10	-0.58	62.17	0.31	95.99	1.75
29.12	-0.55	62.93	0.33	96.99	1.88
30.15	-0.52	64.06	0.36	97.98	2.05
30.85	-0.50	65.17	0.39	99.01	2.33
31.92	-0.47	67.00	0.44	99.80	2.88

C. FORMAT OF EXPORTED DATA

This appendix gives the format for sample files exported in ASCII text. All character strings are delimited with quotation marks; columns are separated with a comma and white space.

The following types of data can be exported:

- Reduced data
- Full-resolution data

Reduced Data

Information Conveyed	Form
File identification	quoted string
Material identification	quoted string
Material density	floating point
Liquid identification	quoted string
Liquid viscosity	floating point
Particle Size Data	
Number of tests, including average if selected (following reported for each test)	integer
Test: [n] (n = 1, 2, ... , Average)	quoted string
Date and time	quoted strings
Current	floating point*
Gain	floating point*
Orifice Kd	floating point*
Ending condition	integer
0 = total count	floating point*
1 = modal count	
2 = volume	
3 = time	
Mean particle size	floating point
Median particle size	floating point
Modal particle size	floating point
Number of size class boundaries (following reported for each)	integer
Particle size	floating point
Value (number, surface area, volume or mass) in class	floating point

*Reported for average test only if the values for all tests are the same; otherwise the string “Settings Vary” is displayed.

Pulse Length Data	
Number of tests (following reported for each test)	integer
Test: [n]	quoted string

Date and time	quoted strings
Number of length class boundaries (following reported for each)	integer
Particle length	floating point
Number of particles in class	integer

Full-Resolution Data

Information Conveyed	Form
File identification	quoted string
Material identification	quoted string
Material density	floating point
Liquid identification	quoted string
Liquid viscosity	floating point
Particle Size Data	
Number of tests (following reported for each test)	integer
Test: [n]	quoted string
Date and time	quoted strings
Current	floating point
Gain	floating point
Conductivity	floating point
Linear instrument calibration coefficients	3 floating points
Number of logarithmic calibration points (following reported for each point)	integer
Measured voltage	floating point
Normalized voltage	floating point
Orifice Kd value	floating point
Number of calibration coefficients (following reported for each coefficient)	integer
Order	integer
Coefficient	floating point
Number of channels (following reported for each channel)	integer
Particle size	floating point
Number of particles in channel	integer
Pulse Length Data	
Number of tests (following reported for each test)	integer
Test: [n]	quoted string
Date and time	quoted strings
Flow rate	floating point
Orifice diameter	floating point
Effective orifice length	floating point
Number of channels (following reported for each channel)	integer
Particle size	floating point
Number of particles in channel	integer

Particle Shape Data

Number of tests (following reported for each test)	integer
Test: [n]	quoted string
Date and time	quoted strings
Number of size classes	integer
Number of length classes (following reported for each combination of length and size class)	integer
Particle length	floating point
Particle size	floating point
Number of particles in class	integer

D. ELECTROLYTES

This appendix contains a discussion on electrolytes and how to prepare them for analysis.

Overview

The Elzone II 5390 analyzes samples based on the electrical sensing zone method. This method requires an electrolyte with suitable electrical conductivity and with physico-chemical neutrality toward the sample particles; i.e. it must not cause them to dissolve, react, agglomerate, disintegrate, shrink, or swell. There are extensive listings of materials vs. electrolytes, but consulting one* is usually unnecessary since virtually all materials have more than one satisfactory electrolyte.

The practical range for electrolyte conductivity is from 4 to 100 m-mho/cm which corresponds to approximately 0.2 to 5% NaCl by weight in water. Tubes with smaller orifices require a higher conductivity than those with large orifices. For example, a tube with a 30-micrometer orifice optimally requires an electrolyte conductivity of about 45 m-mho/cm, corresponding to 2.25% NaCl in water, while a conductivity of 9 m-mho/cm, corresponding to 0.45% NaCl in water, is adequate for a tube with a 300-micrometer orifice.

When a material is found to be slightly soluble in an electrolyte, an appropriate procedure is to (1) saturate the electrolyte with particles of the material, (2) filter the electrolyte and remove undissolved particles, and (3) use the filtered electrolyte and new particles for size analysis. Micromeritics has a unit called the *ElectroPrep* which has been specifically designed for filtering electrolyte. Refer to **ElectroPrep** on page **D-5** for a description.

Types of Electrolytes

Electrolytes are conveniently classified into these groups: aqueous, organic, and modified organic.

Aqueous

Aqueous electrolytes are safe, economical, and easy to handle and, therefore, are the choice whenever possible. Their pH, wetting ability, and ion type sometimes require consideration. Moderately basic solutions, like those of the alkali phosphates, generally favor suspension stability and provide good wetting action for most non-biological materials. Typically a 4% solution by weight of sodium pyrophosphate provides good dispersing and wetting, but sometimes sodium hexa-meta-phospohate is preferable. An acid or neutral electrolyte is required when a material undergoes some dissolution and instability at pH values well above eight. A wetting agent or dispersant is required when an acid condition does not give a satisfactory dispersion.

*ISO 13319, “Determination of Particle Size Distributions - Electrical Sensing Zone Method” (2000).

Wetting and dispersion are highly variable matters associated with the physical chemistry of particle surfaces that can range from tens of square centimeters to hundreds of square meters per gram. Nevertheless, only a few drops of a liquid dispersant or a few grains of a solid one are needed. The dispersant preferably should be added directly to the sample and the sample then added to the electrolyte. Ordinary household or laboratory detergents very frequently are satisfactory. As a further source, however, Table D-1 lists commercial detergents and some specific materials for which they have been found valuable.

When the particles are already in some effective electrolyte such as sea water, plating solution, beer, crystallizer liquor, or when the particles are biological cells requiring isotonic salinity (physiologically “normal” saline) to avoid swelling, shrinkage, or other damage, the choices become limited. In the first case, it probably will be necessary to dilute with particle-free water. In the second case, the demand from hematology laboratories has resulted in the ready availability of isotonic saline from laboratory supply houses. Formulations vary slightly, but all include mono- and di-basic phosphate buffered to pH 7.4 with an osmolality of 335-345 m-osmos. Some are filtered down to 3 micrometers and others to 1 micrometer.

Organic

Organic electrolytes are needed for water-soluble materials (including most salts and sugars), many esters and foodstuffs, and for other materials already suspended in media that are immiscible with water. For these, polar organic liquids having dielectric constants of 10 or more, with readily ionized compounds such as lithium chloride, ammonium thiocyanate, or ammonium perchlorate, form a useful group of electrolytes. Very useful organic media include alcohols and ketones having from one to four carbon atoms. Amides and esters are good for some samples. Often, when some other water-immiscible media is involved, a polar liquid alone will not form a single liquid phase or the material may be somewhat soluble in it. In these cases, chlorinated hydrocarbons, tetrahydrofuran, and aliphatic and aromatic hydrocarbons may be used for the suppression of particle solubility. Be sure to handle organics carefully and in a well-ventilated area.

Adequate ventilation and handling precautions must be observed when working with organic media.

Modified Organic

The dispersant Niaproof 4 (See Table D-1), undiluted, is an acceptable electrolyte for especially difficult materials such as Teflon®, chocolates, paints, liquid toners, and complex hydraulic and lubricating oils. However, after particles are dispersed in it, they then frequently can be mixed in other liquids, including sometimes, plain water, and analyzed. The dispersant apparently clings to the particles allowing sufficient time for a good analysis.

Niaproof 4 is a strong irritant. Use rubber gloves and goggles when handling this product and ensure that adequate ventilation is present.

Table D-1. Special Dispersants and Primary Applications

Dispersant	Manufacturer	Application	Class
Triton® X-100	Rohm and Haas Philadelphia, Pa	General purpose, often first to be tried for an unknown	Non-ionic
Niaproof® 4	Niacet Corporation Niagara Falls, NY	Quite effective for materials of (-) charge, e.g., polyfluorocarbons. Irritant.	Anionic
Lomar PW	Diamond Shamrock Dallas, TX	Carbon, coal, coke, charcoal	Anionic
Sulframin	Purex Company Chicago, IL	Carbides, polymers, oil shale, stearates	Anionic
Daxad® 23	W.R. Grace Lexington, MA	Metals and metal oxides	Anionic
Variquat® (50-MC)	Sherex Chemical Dublin, OH	Quite effective for materials of (+) charge, e.g., cationic exchange resin	Cationic
Tween® 20	ICI Americas, Inc. Wilminton, DE	Polystyrene and similar polymers	Non-ionic
For additional information, see McCutchen's Emulsifiers and Detergents, McCutchen Publishing Company, Glen Rock, NJ			

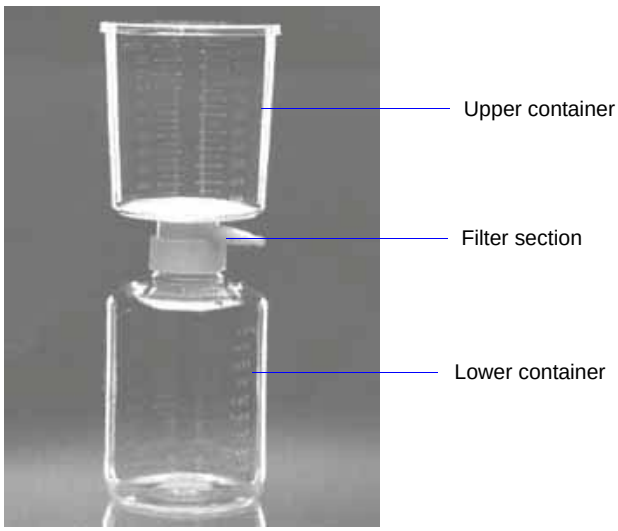
Preparation of Electrolyte Solutions

Choosing the composition of and preparing an electrolyte for frequently used materials are relatively straightforward, while for unknowns it most likely will involve some trial and error. Most often satisfactory electrolytes can be prepared from distilled water or anhydrous organic liquids using technical grade salts. Electrolytes must be virtually free of particles for best results, or at least free of particles above the threshold intended to be used in any analysis.

Filter cartridges of the high area type provide the best filtration and the easiest handling. Only a small liquid head and no pumping or pressurizing is required. Filtering rates of 100 mL/min can be achieved with 0.2-micrometer (sterile) filters and greater rates for larger pore filters. One filter can process many hundreds of liters. Some users prefer to process only enough electrolyte for one day's operation to avoid contamination problems. This electrolyte should be held at the same temperature as the area of the analytical instrument and its container should remain sealed except when actually being poured from.

Only testing for stability with an actual sample of the material in question can prove adequacy. If dissolving, crystallizing, or agglomeration occurs over time, a different composition obviously is required. Small changes indicative of dissolving usually can be corrected by pre-saturating the electrolyte.

The instructions given below are for one type of filtering devices available. The one in your lab may be of a different design and, therefore, will function differently. The important thing to remember is that you must use a 0.2-µm (or lower) filter.



1. Remove the upper container and rinse with a small amount of electrolyte.

2. Clean the lower container:

    a. Rinse the lower container with a small amount of electrolyte, then replace the upper container.

    b. Pour electrolyte into the upper container until it is approximately one-half full; allow the electrolyte to filter through to the lower container.

    c. Remove the upper container.

    d. Swish the electrolyte around in the lower container, then discard the electrolyte.

    e. Replace the upper container.

    f. Repeat steps b through e two more times.

3. Fill the upper container with electrolyte; allow it to filter through into the lower container.

4. Remove the upper container, then pour the electrolyte into the supply bottle.

5. Repeat steps 3 and 4 until the supply bottle is filled.

Be sure to read about the ElectroPrep in the next section. The ElectroPrep automates the filtering process, providing a continuous supply of electrolyte.

ElectroPrep

The ElectroPrep is designed to recirculate electrolyte through a filter cartridge that retains particles greater than 0.1- to 0.2-micrometers in diameter. The electrolyte is contained in a reservoir, providing a supply of clean electrolyte at all times.

For electrolytes in which sample particles readily disperse (e.g., alumina in saline water) without having to add a dispersing agent, the waste liquid can simply be poured back into the reservoir and used again and again. In typical usage under this circumstance, one preparation of electrolyte will last several months before the filter cartridge has to be replaced. This is also true with saturated electrolytes.

Waste liquid cannot be recycled when the sample material requires a special dispersing agent because placing it back into the electrolyte would change the electrolyte composition. The ElectroPrep is still useful in these situations by affording a ready source of clean electrolyte to fill instrument sample beakers and supply containers. The ElectroPrep can be employed with either aqueous or organic electrolytes by selecting the appropriate cartridge. Refer to **Ordering Information**, page **9-1** for information on ordering the ElectroPrep, or contact your local sales representative.

E. THEORY OF OPERATION

The Elzone II 5390 is based on the electrical sensing zone method — also known as the Coulter principle. The sample material is prepared and placed into a beaker containing electrolytic liquid of high electrical conductance in which the particles are suspended. The suspension is caused to move through an orifice (electrical sensing zone) separating a positive and negative electrode between which a current and a corresponding difference of potential are established. Almost all of the applied voltage is dropped along the interior of the orifice as a result of its extremely small cross-section as compared to that of the bulk liquid on either side of the orifice.

As a particle passes through the orifice with the carrier liquid, it displaces some of the conducting fluid. This generates an electrical signal that is proportional in amplitude to the change in electrical conductivity through the orifice channel; the less-conductive particle displaces its own volume of conductive liquid and causes an increase in the electrical resistance of the orifice channel. The electrical signal produced, therefore, is proportional to the volume of the particle. The length of the pulse is related to the shape of the particle in that particles of a given mass and composition but with one or two significantly differing dimensions may take longer to transit the orifice passage than an otherwise identical particle having all three dimensions equal. Obviously, a sphere will produce the shortest possible pulse while rod-shaped particles can maximally extend the duration of the pulse. Some complications exist in interpretation of this pulse width data because particles traveling close to the orifice walls are embedded in slower moving liquid than those in the center of the orifice. Those slower moving particles near the walls produce longer electrical pulses than those in the center even if all the particles involved are identical.

The descriptive equation for the change in orifice resistance caused by a particle in the orifice is:

$$\Delta R = \left[\rho_0 \times \frac{V}{A^2}\right] \times \left[\left(1 - \frac{\rho_0}{\rho}\right)^{-1} - \frac{a}{A}\right]^{-1}$$

where:

ΔR = change in resistance caused by the particle in the orifice
ρ_0 = electrolyte resistivity
V = volume of the particle
A = orifice area normal to the axis
ρ = effective resistivity of the particle
a = cross-sectional area of the particle normal to the orifice axis

Note that the orifice channel length does not appear in the equation. The effect of longer orifices is two-fold:

1. The pulse width of the signal increases and improves the ability to detect and measure the particle, and

2. At a given concentration, a longer channel length increases the probability that more than one particle (coincidence) will be in the orifice at the same time, thus producing an erroneous signal. The probability of coincidence can be reduced to its original value by diluting particle concentration, but this results in longer analysis times. The additional analysis time is proportional to the amount of dilution, and both are proportional to the amount that the orifice length was increased.

These contrary effects are commonly encountered in information theory applications where one must make trade-offs between speed, precision, accuracy, and error rate.

Particles arrive at the entrance of the orifice in a random manner at a rate that depends upon their concentration. Therefore, measuring the maximum number of particles per unit of time by increasing the sample concentration, the more likely it is that two or more closely spaced particles will merge to create a combined pulse. This pulse falsely indicates a single particle of volume exceeding that of either particle alone. This combination may indicate a particle volume that exceeds that of any particle that is actually present in the sample. The general effect of such combined signals is to spread the particle size spectrum upward toward larger sizes and to under-represent the amount of particle volume present at the lower sizes.

In addition to these fully merged coincidence events, there also exists a partial coincidence or near coincidence. Partial coincidence creates signals that can be mistaken for elongated particles or which may be too difficult to interpret. Near coincidence signals are those which involve a second pulse which occurs while the signal processing circuit has not yet completed the processing of a slightly earlier pulse. The system typically does not detect pulses which follow another pulse too closely. The coincidence correction feature in the Elzone application enables you to compensate for the effects of full, partial, and near coincidences.

F. CONCENTRATION ANALYSES

Concentration analyses are performed when you need to determine the concentration of particles within your sample.

You must have the volumetric pump installed to perform concentration analyses.

Standard Analysis

Creating the Sample File

These instructions are given for the Developer's (Advanced) format. If an Analyst is to create the file, appropriate templates will have to be created by the Developer.

1. Select **File > New > Sample Information**; the Create a Sample File dialog containing templates is displayed.

2. Choose a template, the click **Create**; the Sample Information dialog is displayed.

3. On the **Sample Information** dialog:

   a. Enter an appropriate description in the **Sample** field.

   b. Ensure that **Automatically collected** is selected as the type of data.

   c. Enter the dilution factor for the sample you are analyzing. Refer to **Preparing the Sample** on the next page for determining this value.

   d. Enter information in any other fields as desired (Operator, Submitter, etc.).

4. Click the **Analysis Conditions** tab, then:

   a. Click the down arrow to the right of the **Orifice Tube** field and choose the orifice tube you plan to use.

   b. Select **Specify Diameter range**, then enter a range in the **Minimum** and **Maximum** fields.

   c. Click **Flow Control** to display the Flow Control dialog. Select **Volumetric Flow Rate** and enter the appropriate flow rate for the orifice tube being used. (Refer to **Table 3-1. Particle Concentration Guidelines**, page **3-33** for guidelines.) Click **OK** to return to the Analysis Conditions dialog.

d. Click **Data Setup**; select or enter the following:

Full-resolution as the Data Format
Logarithmic in **Diameter**
Class range typically for concentration analyses is the same range as specified for diameter range

e. Select **Volume** as the ending condition and enter the volume of electrolyte for the analysis in the adjacent field; 4 mL is the maximum amount allowed. Smaller orifice sizes use less than 1 mL because there is a greater chance of blockages occurring.

f. Enter appropriate values for other fields (size range, stirrer speed, etc.).

5. Click the **Material Properties** tab; select the sample material and the electrolyte being used.

6. Click the **Report Options** tab; select (precede with a check mark):

Inc. Number/mL% vs. Diameter Graph
Summary; click **Edit** and ensure that **Total Number** and **Volume-Specific Number** are selected.

7. Click **Save; the Save as Sample Information dialog is displayed.**

8. Enter a comment in the **Comments** window, then click **Save; the Sample Information file is displayed**. Click **Close** to close the dialog.

Preparing the Sample

Your sample concentration should be at or below the amount specified in **Table 3-1. Particle Concentration Guidelines**, page **3-33** for the orifice tube you are using.

1. Measure a volume of sample and place it into the sample beaker. Record the volume as **SV** (in mL).

2. Measure a volume of electrolyte. Record the volume of **EV** (in mL).

3. Calculate the dilution factor using the following formula:

If you entered a dilution factor in the file you created, you can edit this value when you begin the analysis or after the analysis.

$$DF = \frac{SV + EV}{SV}$$

Example: Use a 150-mL beaker filled with 120 mL electrolyte and a sample volume of 2 mL.

$$DF = \frac{2 + 120}{2} = \frac{122}{2} = 61$$

Performing the Analysis

1. Install the orifice tube onto the sample port (refer to **Choosing and installing an Orifice tube**, page **3-26**).

2. Ensure that the appropriate electrolyte is connected to the Supply port.

3. Clean the outside of orifice tube, stirrer, and electrode with filtered electrolyte.

   a. Fill a squeeze bottle with clean, filtered electrolyte or water.

   b. Place (or hold) a beaker under the glassware and, using the squeeze bottle, thoroughly rinse each piece of glassware; then remove the beaker.

4. Place the analysis beaker containing your prepared sample on the sample stand; position the electrode next to the orifice tube so that it will be submerged in the beaker.

5. Raise the sample stand.

Be sure the stirrer does not strike the bottom or sides of the beaker when raising the sample stand. The stirrer will not operate if it comes in contact with the beaker.

6. Select **Unit [n] > Fill System** to fill the orifice tube.

7. Adjust and focus the camera if needed (if using the camera).

8. Select **Unit [n] > Sample Analysis** to display the analysis screen. Click **Browse** and choose the sample file you created. Edit the dilution factor to show the value obtained when preparing your sample.

9. Click **Next**, the User Log in dialog is displayed.

10. Enter your password, then click **OK** and start the analysis.

11. After the analysis is finished, save the data and print the report.

Background-Subtraction Analysis

Occasionally, the ratio between contaminates in the electrolyte and particles in a sample can be low and, therefore, difficult to tell the difference between the two. When performing an analysis, the desired ratio between sample particles and contamination (sometimes called signal-to-noise ratio) in the electrolyte is approximately 99:1 in 1 mL of electrolyte. In other words, for every 99 sample particles, there should be no more than 1 particle of contamination in the electrolyte.

When the signal-to-noise ratio drops below an unacceptable level, a procedure can be performed to remove the presence of contaminates in the electrolyte from the analysis data.

Creating the Sample File

1. Select **File > New > Sample Information**; the Create a Sample File dialog containing templates is displayed.

2. Choose an appropriate template, then click **Create**; the Sample Information dialog is displayed.

3. On the **Sample Information** dialog:

   a. Enter an appropriate description in the **Sample** field.

   b. Select **Background** as the type of data.

   c. Enter a dilution factor of 1.00.

   d. Enter information in any other fields as desired (Operator, Submitter, etc.).

4. Click the **Analysis Conditions** tab, then:

   a. Click the down arrow to the right of the **Orifice Tube** field and choose the orifice tube you plan to use.

   b. Select **Specify Diameter range**, then enter a range in the **Minimum** and **Maximum** fields.

   c. Click **Flow Control** to display the Flow Control dialog. Select **Volumetric Flow Rate** and enter the appropriate flow rate for the orifice tube being used. (Refer to **Table 3-1. Particle Concentration Guidelines**, page **3-33** for guidelines.) Click **OK** to return to the Analysis Conditions dialog.

d. Click Data Setup; select or enter the following:

Full-resolution as the Data Format
Logarithmic in **Diameter**
Class range typically for concentration analyses is the same range as specified for diameter range.

e. Enter appropriate values for other fields (size range, stirrer speed, etc.).

5. Click the **Material Properties** tab; select the electrolyte being used. The sample material selected is irrelevant since only the electrolyte is being used for the background. However, many Elzone users make an entry in the Sample Material list relevant to the background. For example, you may wish to use “Background particles.” This is more relevant on the Background report.

6. Click the **Report Options** tab; select (precede with a check mark):

Inc. Number/mL% vs. Diameter Graph
Summary; click **Edit** and ensure that **Total Number** and **Volume-Specific Number** are selected.

7. Click **Save; the Save as Sample Information dialog is displayed.**

8. Enter a comment in the **Comments** window, then click **Save; the Sample Information file is displayed**. Click **Close** to close the dialog.

Performing the Background Analysis

1. Install the orifice tube onto the sample port (refer to **Choosing and installing an Orifice tube**, page **3-26**).

2. Ensure that the appropriate electrolyte is connected to the Supply port.

3. Clean the outside of orifice tube, stirrer, and electrode with filtered electrolyte.

   a. Fill a squeeze bottle with clean, filtered electrolyte or water.

   b. Place (or hold) a beaker under the glassware. Use the squeeze bottle to thoroughly rinse each piece of glassware, then remove the beaker.

4. Fill the analysis beaker with electrolyte (no sample) and place it on the sample stand; position the electrode next to the orifice tube so that it will be submerged in the beaker.

5. Raise the sample stand.

Be sure the stirrer does not strike the bottom or sides of the beaker when raising the sample stand. The stirrer will not operate if it comes in contact with the beaker.

6. Select **Unit [n] > Fill System** to fill the orifice tube.

7. Adjust and focus the camera if needed (if using the camera).

8. Select **Unit [n] > Sample Analysis** to display the analysis screen. Click **Browse** and choose the sample file you created.

9. Click **Next**, the User Log in dialog is displayed.

10. Enter your password, then click **OK** and start the analysis.

11. After the analysis is finished, save the background data.

Performing the Sample Analysis

Now that you have established a background, you can perform your sample analysis and have the background subtracted from the analysis.

1. Create a sample file for the sample analysis:

   a. Select **File > New > Sample Information**; the Create a Sample File dialog containing templates is displayed.

   b. Choose an appropriate template, then click **Create**; the Sample Information dialog is displayed.

   c. Click **Replace All** and select the file you used for the background analysis.

   d. Change the type of data to **Automatically collected**.

   e. Click the **Analysis Conditions** tab. Click **Data Setup** and select **Use most recent background**. Then click **OK** to return to the Analysis Conditions dialog.

   f. Click **Save**, then **Close**.

2. Perform steps 3 through 11 in **Performing the Analysis**, page **F-3**.

G. CAMERA OPTION

This appendix contains installation and operating instructions for the camera used with the Elzone II analyzer.

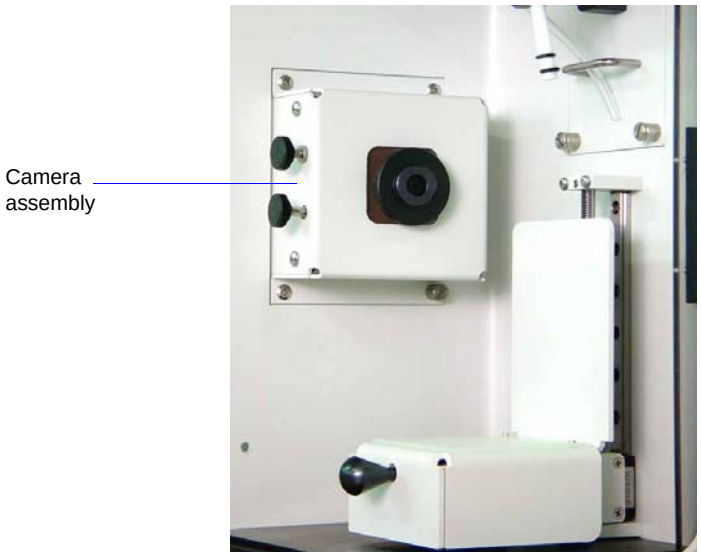
The camera option kit includes the following:

- Camera assembly
- Light assembly
- USB cable

Description

The camera is installed on the front panel of the Elzone II analyzer, enabling you to:

- view particle activity in the orifice
- detect blockages in the orifice
- check the orifice jewel for cracking
- check the orifice for particle build-up



The camera software contains many features for manipulating images; however, this appendix provides information only on the ones directly related to the Elzone application. Refer to the help system in the camera software for assistance on other features.

Installation

This section will explain how to install the:

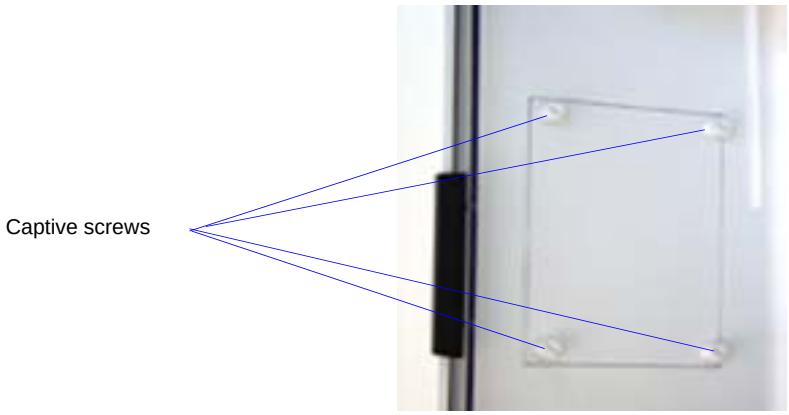
- camera assembly
- light assembly
- camera software

Camera Assembly

If your Elzone was ordered with a camera option installed, advance to Light Assembly and continue with installation of the light assembly.

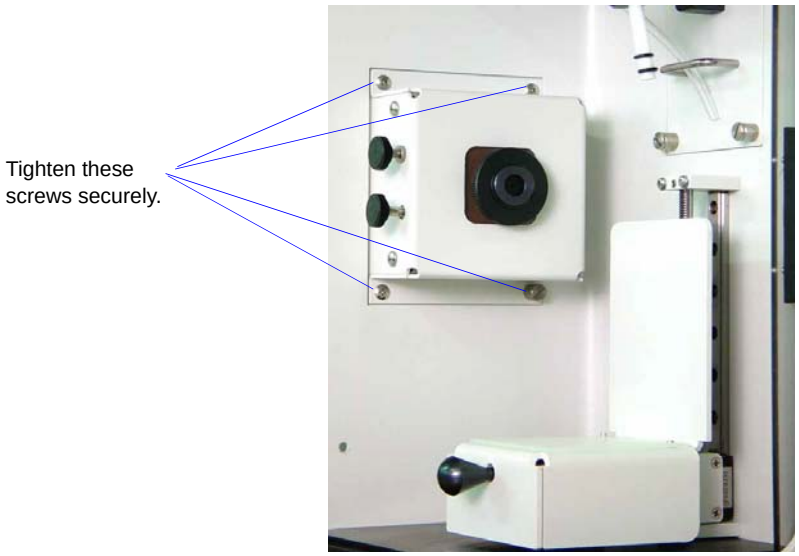
Install the camera assembly as follows:

1. Using a flat-head screwdriver (or your fingers), unscrew the four captive screws; then remove the plate from the left front panel.

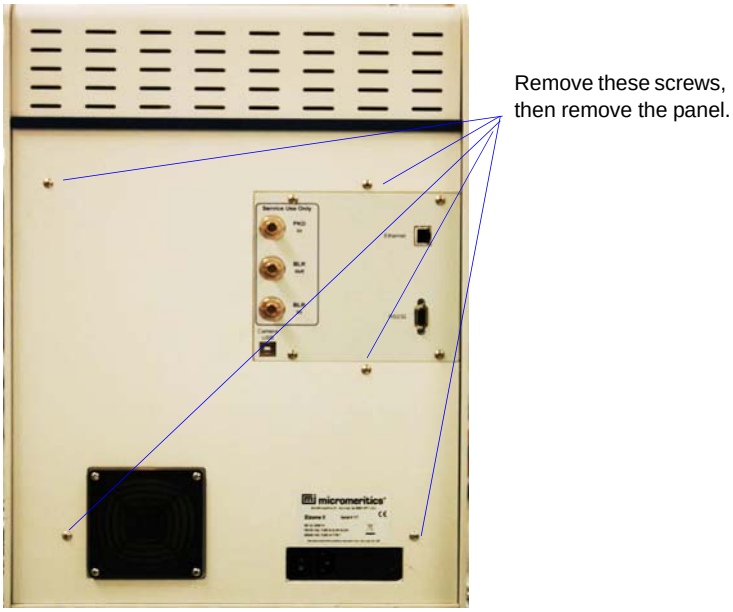


2. Insert the cord of the camera assembly into the opening. Ensure that the focusing knobs of the assembly are facing outward. The cord should be secured with a twist tie making it easier to place inside the compartment. Be sure at least 12 to 14 inches (30 to 36 cm) are free from the twist tie.

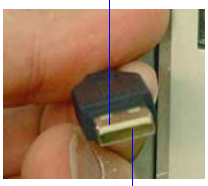
3. With a Phillips-head screwdriver, secure the assembly into position using the four captive screws on the assembly.



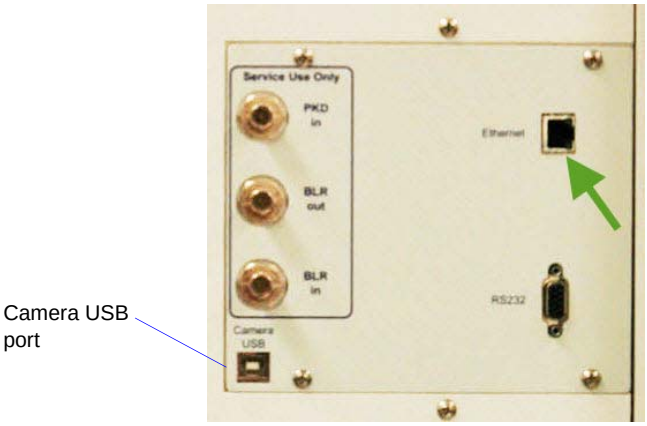
4. Using a Phillips-head screwdriver, unscrew the retaining screws on the rear panel; then remove the panel.



5. Locate the camera assembly cord you inserted earlier. Plug the cord into its USB connector. The guide should be facing upward and the connector slot downward.

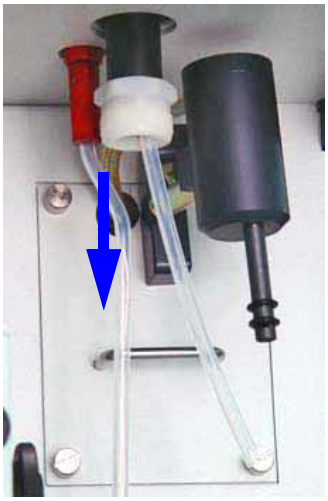


6. Replace the rear panel, then connect the USB cable to the connector labeled **Camera USB** on the rear panel of the analyzer. Do not plug the other end of the USB cable into the computer until instructed to do so (during installation of the camera software).



Light Assembly

1. Remove the external electrode and the stirrer for easy access to the connector for the orifice light cable.



2. Connect the orifice light cable to the connector inside the top panel of the sample compartment.

3. Using a Phillips-head screwdriver, remove the mounting screw on the back panel of the sample compartment.

4. Insert the screw through the retaining clip, then back into the hole on the back panel of the sample compartment; tighten with a Phillips-head screwdriver.

Camera Software

Be sure to close all programs before installing the camera software. Your computer will restart automatically after software installation.

1. If the camera software was not installed with the Elzone software, insert the Elzone installation CD and browse to the Camera folder then launch the camera Setup program.

2. Follow the instructions displayed on the screen to install the software. After the software installation is complete, your computer will restart. Do not remove the camera software CD from the CD drive.

3. After your computer restarts, a window instructing you to insert the camera cable (from the analyzer) into the computer is displayed.

4. Insert the cable as instructed, then remove the camera software CD and store in a secure location.

Operation

This section will explain how to:

- start and use the software
- adjust the orifice light
- focus the image

Before starting the camera software, perform the following steps:

1. Reinstall the external electrode and the stirrer.

2. Install an orifice tube on the sample port of the analyzer. Use a tube with the largest orifice size you have available. A larger orifice is easier to focus and view on the screen.

3. Place a beaker of electrolyte on the sample stand; raise the stand.

4. Select **Unit > Fill System** to fill the orifice tube with electrolyte.

Now you are ready to start the camera software.

Starting the Camera Software

- Click the camera icon (AMCap) installed in the Windows Start menu or double click the application file installed in the Windows folder (typically this is C:\WIndows\AMCap.exe).

- If multiple Elzone cameras are installed, select the preferred camera from the *Devices* menu.

- To capture video, select a location to store the captured video file using **File > Set Capture File...**. then start the capture using *Capture > Start Capture* and click **OK** in the *Ready to Capture* window. When the capture is complete, go to **Capture > Stop Capture.**

- Zoom, brightness, and contrast can be set in **Options > Video Capture Filter > Properties**.

Adjusting the Orifice Light

Be sure the sample stand is raised (as instructed earlier at the beginning of the Operation section) and the camera software is operating.

1. Close the right door of the sample compartment (the one containing the reflector).

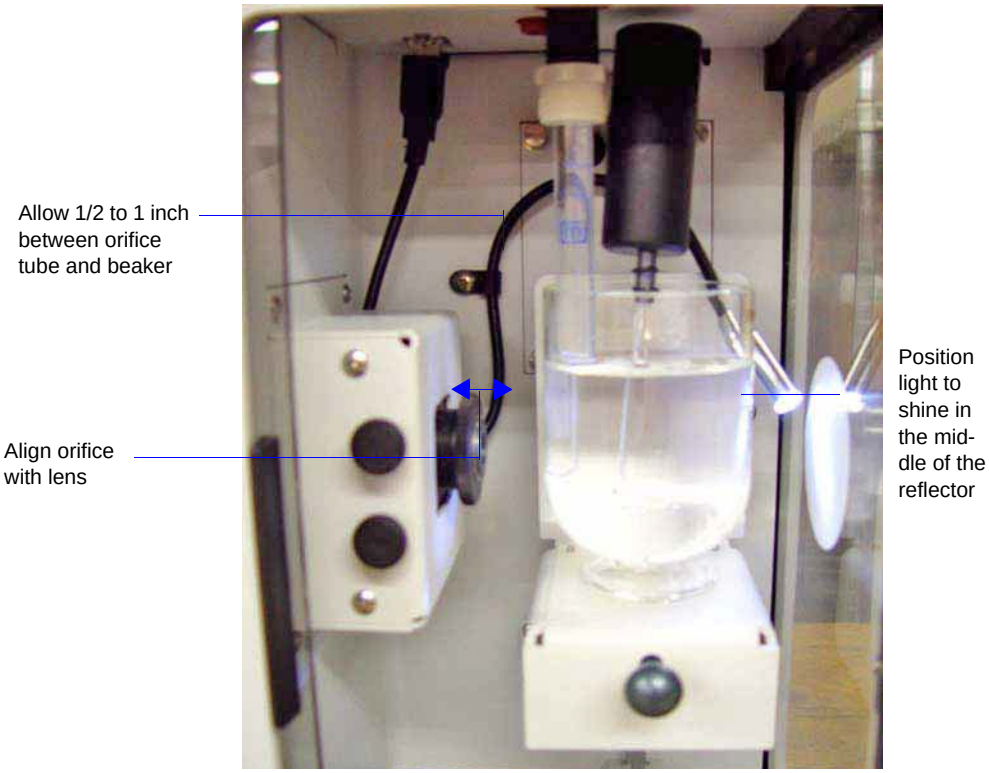
2. While observing the image on the screen, adjust the orifice light cable so that the light shines onto the middle of the reflector on the sample compartment door.

An image should display in the QuickCapture window of the camera software. If an image does not display, you will be able to adjust it to display when you are focusing the image (next section).

Focusing the Image

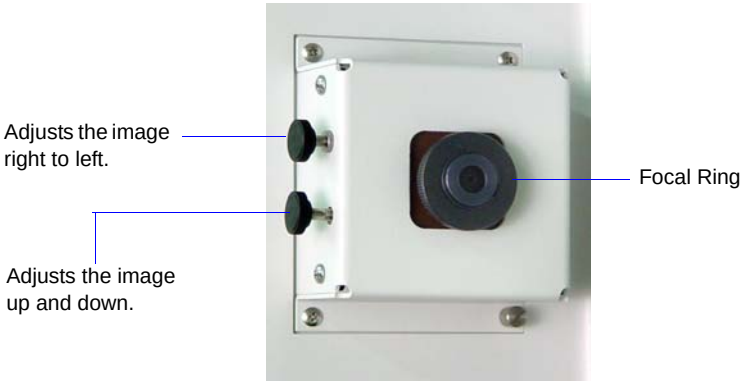
Follow these guidelines to obtain a clear image of the orifice on the computer screen:

- Make sure the orifice is aligned with the camera lens.
- Be sure the orifice tube is not too close to the beaker. There should be approximately 1/2 to 1 inch (12.7 to 25.4 mm) between the orifice tube and the inside of the beaker.
- Position the orifice light approximately an inch (25.4 mm) away from the reflector so that it shines into the middle of the reflector.



- Use the focusing ring and horizontal and vertical knobs to adjust the image (described below)

1. Turn the focal ring fully clockwise (to the right), then slowly turn it counterclockwise (to the left) until a clear image displays on the computer screen.



You may also need to adjust the position of the orifice light to obtain the best results.

2. After you obtain a clear image, use the knobs on the left side of the camera to adjust the position of the image. The knob on the top adjusts the image right to left. The lower knob adjusts the image up and down.

You can also use the zoom and pan controls in the camera software for adjusting the position.

H. OPTIMUM PERFORMANCE FOR STRAY PARTICLE COUNT AND NOISE

Some Elzone users have applications which require minimum stray or particle counts, or are prone to their appearance. These unexpected pulses, counted as particles, can result from:

- particle contamination in the sample or electrolyte
- electrical noise that simulates particle passage pulses
- vibration or acoustic waves that produce electrical signals which simulate particle pulses in the same manner as a microphone

Removal or minimization of these sources of stray particle pulses mean improved performance.

Using the guidelines provided in this appendix and appropriate cleaning procedures, reliable particle size analyses can be obtained with low-conductivity, high-viscosity electrolytes, small orifice tubes, and other noise-sensitive operating conditions.

Contamination

If the source is contamination in the sample or electrolyte, additional cleaning or filtering of the electrolyte is required. Most “stray” particles detected during background or sample analyses, especially those of a size greater than 3 or 4 % of the orifice diameter, are usually the result of true particle contamination. Be sure that the orifice tube, stirrer paddle or hydropulser tube, and electrode are completely clean and free of particles.

Electrical Noise

Electrical noise usually results from sources *external* to the Elzone. There are numerous noise filters and electrical isolation circuits that, when operating properly, suppress *internal* sources of electrical noise. External sources may be in the form of radio frequency fields, such as those from fluorescent lights, radio stations, or power-switching transients. The doors that enclose the Elzone sample compartment contain a wire mesh shield that stops almost all external radio frequency noise when closed, which should always be the case during analysis. The input power supply also contains electrical filters that remove normal power-line noise. Power sources to which high current or inductive devices, such as heaters or large AC motors, are connected should not be used to power the Elzone. Unusually noisy circuits such as this may degrade analysis results.

Vibration and Acoustic Noise

Vibration and acoustic noise produce electrical signals much like those produced by a microphone. This usually results from the combination of a small orifice in the sample tube and a viscous electrolyte solution. As the size of the orifice decreases, the voltage drop across the orifice during operation increases. The higher the voltage, the more susceptible the system is to microphonic pulses. These pulses may be due to vibrations transmitted into the beaker of electrolyte through the hardware of the instrument, created by the vacuum pump, cooling fan, stirrer, or transformed from air-borne acoustic waves.

In addition, as the conductivity of the electrolyte decreases, the voltage drop across the orifice increases, again resulting in greater susceptibility to vibration and acoustic stimuli. Other operational factors that increase the sensitivity to these vibration sources are increased viscosity or a very slow flow of the electrolyte through the orifice.

Improved Performance

The Elzone includes several features which help to control the occurrence of stray particle counts.

Software

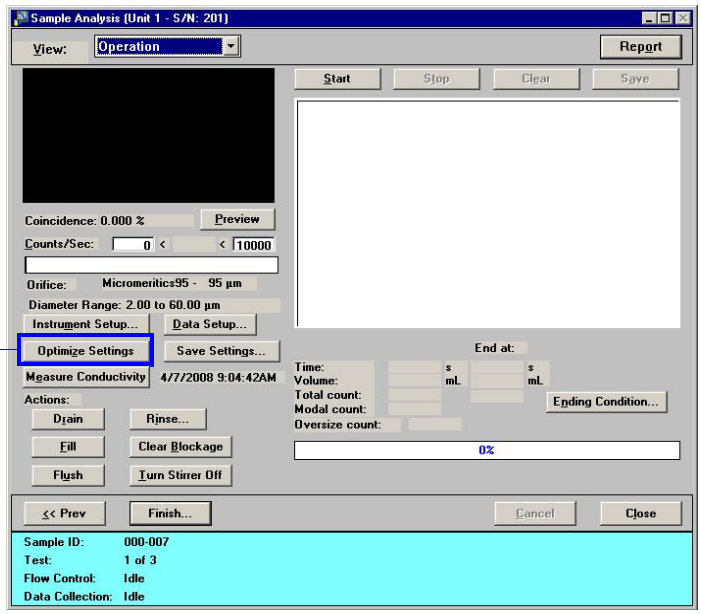
The Elzone software contains certain analysis parameters that can be selected to help minimize background counts.

Optimize Settings

Generally, the current should be set as high as possible. The amplifier gain settings should be chosen to cover the desired particle size range. If the *current* is set too high, the electrolyte may heat in the orifice enough to form air or vapor bubbles, which are detected as particles. If the *gain* is set too high (to compensate for too low of a current choice), noise inherent to the electronics is amplified and also detected as particles.This noise results from Brownian motion of the ions in the electrolyte.

An option to optimize instrument settings to your electrolyte (current/gain settings) has been included in the software and is located on the second view of the Analysis dialog. Refer to **Optimizing Instrument Settings**, page **3-31**for step-by-step instructions.

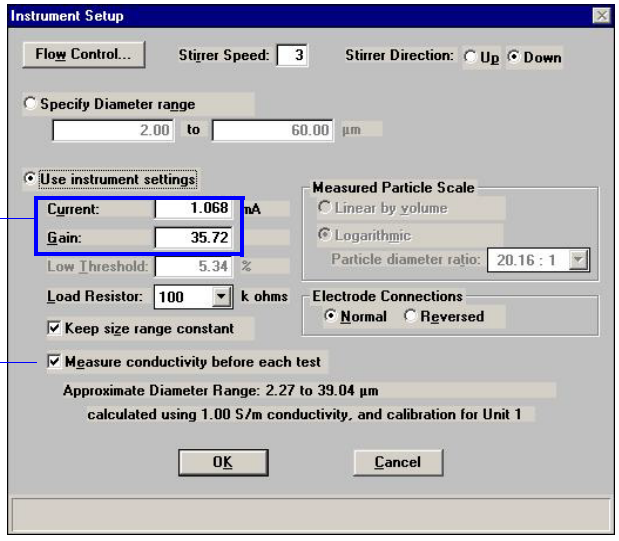
Click this push button to have the software optimize current/gain settings automatically.



After you optimize the settings, run a background to verify that the settings are acceptable. If the "particle" count is too high, click **Instrument Setup** to adjust the current/gain. Remember the guidelines given earlier when making the adjustment.

Adjust the values in these fields to further optimize instrument settings.

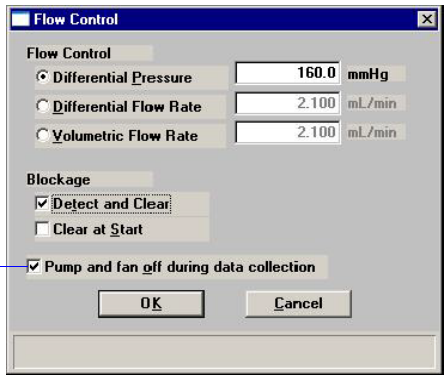
Deselect this option not to have the values in these fields adjust automatically.



Pump/Fan Off During Data Collection

The vacuum pump used to drive the electrolyte flow and the fan used to cool the electronics of the Elzone produce internal vibrations which may be detected when using low-conductivity electrolytes of high viscosity with small orifice tubes. These two components can be programmed to be turned off automatically during data collection (if needed) to remove these internal vibration sources. This option can be selected on the Flow Control dialog which can be accessed in the sample file (analysis conditions) or on the second view of the Analysis dialog using the **Instrument Setup** push button. .

Select this option to turn the pump and fan off while data are collected.



The pump and fan can also be turned on and off using the instrument schematic. Refer to **Enable Manual Control**, page **5-36** for additional information.

Stirrers

The Elzone accessories include two stirrer paddles. The larger one can be used at slower stirrer speeds to reduce vibrations of the electrolyte that may produce unwanted signals in low-conductivity, high-viscosity electrolyte systems used with small orifice tubes. Setting the stirrer so that the liquid is lifted (“up” direction), the larger stirrer paddle can still lift most samples at a lower speed setting than is needed when using the smaller paddle.

The Elzone software enables you to set the stirrer speed and direction. This option is located on the Analysis Conditions dialog as well as the first view of the Sample analysis dialog. Stirrer speed has a range of 0 to 10; with 1 being the lowest speed (0 turns the stirrer off).

Location

The Elzone uses vibration-absorbing feet to reduce the effects of vibrations in the lab bench, but whenever working with noise-sensitive applications, extra effort should be taken to reduce the vibrations in the vicinity of the Elzone. For example, a sieve shaker may sit on the same bench with the Elzone. If so, do not use the shaker while analyzing samples with the Elzone.

Try to choose a location for the Elzone that is away from heavy floor traffic; for example, do not use a location close to loading docks or elevators where large equipment is being moved.

Place the Elzone on a stable, vibration-resistant bench and, if possible, on a bench by itself where it cannot pick up vibrations from other laboratory equipment. Also, do not lean on or shake the bench during an analysis.

Cleanliness

Cleanliness of system components is of utmost importance. Remember the following:

- Use electrolyte that has been thoroughly filtered with an appropriate filtering device.
- Always wear latex gloves when handling or cleaning orifice tubes.
- After cleaning the orifice tube, install it immediately on the elzone analyzer to prevent air-borne particles from accumulating on its surface.
- Clean the orifice tube again after it has been installed.
- Place a lint-free cover on prepared samples until ready for analysis; this prevents air-borne particles from falling into the sample.

See these sections in your operator's manual for guidelines and information on maintaining clean components:

- **Preparation of Electrolyte Solutions**, page **D-4**
- **Cleaning Orifice Tubes**, page **8-9**
- **Cleaning the System**, page **8-6**
- **Preparing and Loading Your Sample**, page **3-33**

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