Application Note

Measuring the Percent Solids of a Slurry
with the AccuPyc 1330 Pycnometer

The percent solids of a slurry can be calculated readily and easily from analyses performed with the AccuPyc 1330 Pycnometer. To ensure accuracy, any pores of the solid must fill with liquid. Analyses were performed on samples of varying percentages of solids using the following procedure.

1. An instrument calibration was performed.

2. A weighed amount of clay and a weighed amount of water were placed in the sample cup of the AccuPyc 1330, then stirred thoroughly.

3. An analysis was performed on the sample prepared in step 2 using the following parameters, and the results were recorded.

Purges	=	3
Runs	=	3
Run Precision	=	No

4. Steps 1 through 3 were repeated seven times using different percentages of solids in the sample.

5. The density of the dry solid was measured.

6. The following equation was used to determine the percent solids of the slurry. Respective solid and liquid volumes and weights were both assumed to be additive in its derivation.

$$\%solids\,(w/w) \;=\; \left(1 - \frac{D_{liq}}{D_{slu}}\right) \; x \; \left(\frac{D_{sol}}{D_{sol} - D_{liq}}\right) \; x \; 100$$

where (with all densities at the same temperature: 22 °C)

D_{liq}	=	Density of liquid = 0.9977 g/cm^3
D_{sol}	=	Density of solid = 2.6471 g/cm^3
D_{slu}	=	Density of slurry (as measured by the AccuPyc 1330)
% solids (w/w)	=	Weight percent solids

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The results are shown in the following table.

Analysis	Water Mass (g)	Clay Mass (g)	D_{slu} 1330 (g/cm^3)	% Solids Calculated with a Known Water and Clay Mass (w/w)	% Solids Using 1330 results (w/w)
1	20.7313	2.1842	1.064	9.53	10.00
2	20.7107	4.1794	1.117	16.79	17.14
3	20.0836	6.0823	1.171	23.24	23.75
4	51.2941	16.7724	1.174	24.64	24.10
5	29.2592	11.9434	1.225	28.99	29.78
6	40.1003	19.8484	1.241	33.11	31.46
7	21.7233	12.9248	1.300	37.30	37.32

As shown in the table, the percent solids of a slurry can be determined reliably using AccuPyc 1330 density results. If you know the density of the solid and the density of the liquid, or measure them with the AccuPyc 1330, you can calculate the percent solids of a slurry using the equation shown above.