

VOLUME SOLIDS DETERMINATION OF COATINGS – THEORETICAL**Application**

This test method describes the procedure to calculate the theoretical volume of solids in a coating or paint sample. The procedure uses values of weight percent solids of the coating and weight per liter as determined by Ford Laboratory Test Method BI 102-01 and ASTM D 1475, respectively.

Apparatus Required

Equipment and procedures for required determinations are specified in FLTM BI 102-01 and ASTM D 1475.

Conditioning and Test Conditions

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 +/- 2 °C and 50 +/- 5 % relative humidity for not less than 24 h prior to testing and tested under the same conditions unless otherwise specified.

Procedure

To calculate the theoretical volume solids of a paint sample, the following information is required:

1. Weight per liter of the coating (ASTM D 1475).
2. Percent weight solids of the coating (FLTM BI 102-01).
3. Weight per liter of each solvent in the subject coating.
4. Percent of each solvent by weight in the subject coating (based on 100 %).

Calculations

- A. Weight of the solvent = (weight/liter of coating) x (100 % - weight % of solids)
- B. Calculate the average weight per liter of the solvents in the coating.

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Page 1 of 2

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C. Volume of the solvents = $\frac{\text{Weight of the Solvent}}{\text{Average wt/L of the Solvents}}$

D. Volume of solids = (1.00 - volume of the solvents).

Sample Calculation

Information Needed

1. Coating wt/L = 1.2 kg/L

2. Solids = 50 % (0.50)

3. Solvent A = 1.08 kg/L
Solvent B = 0.96 kg/L
Solvent C = 0.84 kg/L

4. Solvent A = 50 % (0.50)
Solvent B = 25 % (0.25)
Solvent C = 25 % (0.25)

A. Weight of solvent = $1.2 \times (1.00 - 0.50) = 0.6 \text{ kg/L}$

B. Solvent A = $0.50 \times 1.08 = 0.54$
Solvent B = $0.25 \times 0.96 = 0.24$
Solvent C = $0.25 \times 0.84 = 0.21$
0.99 wt/L of solvents

C. $\frac{5.00}{8.25} = 0.606 = 60.6 \text{ \% volume of the solvents}$

$\frac{0.60}{0.99} = 0.606 = 60.6 \text{ \% volume of the solvents}$

D. Percent volume of solids = $(1.00 - 0.606) \times 100 = 39.4 \text{ \%}$

Chemicals, materials, parts, and equipment referenced in this document must be used and handled properly. Each party is responsible for determining proper use and handling in its facilities.