LABORATORY PROCEDURE 24
Volatile Matter Content, Water Content, Density,
Volume Solids, and Weight Solids of Surface Coatings

Note: The laboratory data sheet (LDS 24) serves as a summary; hence, there is no Summary Sheet.

A. Applicable Standard Methods

Follow procedures specified in the standard methods below:

1. ASTM D 1475-60 (Reapproved 1980), Standard Test Method for Density of Paint, Varnish, Lacquer, and Related Products.

2. ASTM D 2369-81, Standard Test Method for Volatile Content of Coatings.

3. ASTM D 3792-79, Standard Test Method for Water Content of Water Reducible Paints by Direct Injection into a Gas Chromatograph.

4. ASTM D 4017-81, Standard Test Method for Water in Paints and Paint Materials by the Karl Fischer Titration Method.

5. ASTM D 4457-85, Standard Test Method for Determination of Dichloromethane and 1,1,1-Trichloroethane in Paints and Coatings by Direct Injection into a Gas Chromatograph.

B. Volatile Matter Content

1. Using ASTM D 2369-81, determine the volatile matter content (may include water) of the coating.

2. Run duplicate sets of analyses for each coating until the criterion in LDS 24 is met.

C. Water Content

1. For waterborne (water reducible) coatings only, determine the weight fraction of water using either ASTM D 3792-79 or ASTM D 4017-81.

2. Run duplicate sets of determinations until the criterion in LDS 24 is met.

D. Coating Density

1. Determine the density of the surface coating using ASTM D 1475-60.

2. Run duplicate sets of determinations for each coating until the criterion in LDS 24 is met.

E. Solids Content

Calculate the volume fraction solids of the coating using the manufacturer's formulation.

F. Exempt Solvent Content

Determine the weight fraction of Exempt Solvents using ASTM D 4457-85.

LABORATORY DATA SHEET 24
VOC in Surface Coatings

Client/Plant Name _____ Job # _____

Analyst _____ Date _____

Attach appropriate ASTM analytical data and summarize the information below:

Sample ID# _____

Difference ≤ Within-Lab Values?

Run No.	1	2	Diff	Avg	Within-Lab	OK?
Volatile Matter Content, W_v					$0.015\,\overline{W}_v$ =	
Water Content, W_w					$0.029\,\overline{W}_w$ =	
Density, D_c					0.001 kg/liter	
Solids, V_s						
Wgt Fract'n Nonaq. Vol. Matter Solvent-Borne, $W_o = W_v$ Waterborne, $W_o = W_v - W_w$						
Wgt Fract'n Solids, $W_s = 1 - W_v$						

Confidence Limit Calculations for Waterborne Coatings

LCL $W_v = 0.953\,\overline{W}_v$ = _____

UCL $W_w = 1.075\,\overline{W}_w$ = _____

LCL $D_c = \overline{D}_c + 0.002$ = _____

QA/QC Check

Completeness_____   Legibility _____   Accuracy _____   Specifications _____   Reasonableness _____

Checked by: _____   _____
          Personnel (Signature/Date)   Team Leader (Signature/Date)

LABORATORY PROCEDURE 24A
Volatile Matter Content and Density of
Printing Inks and Related Coatings

*Note: The laboratory data sheet (LDS 24A) serves as a summary; hence, there is no **Summary Sheet**.*

A. Weight Fraction VOC

1. Run triplicate analyses. Shake or mix the sample thoroughly to suspend completely all the solids. Label and weigh to the nearest 0.1 mg a weighing dish.

2. Use a 5-mL syringe without a needle to remove a sample of the coating. Weigh the syringe and sample to the nearest 0.1 mg.

3. Transfer 1 to 3 g of the sample to the tared weighing dish. Reweigh the syringe and sample to the nearest 0.1 mg.

4. Heat the weighing dish and sample in a vacuum oven at 510 ± 51 mm Hg absolute and at 120 ± 2°C for 4 hr.

5. Allow the weighing dish to cool, and reweigh it to the nearest 0.1 mg.

B. Coating Density

Determine the density of the ink or related coating using ASTM D 1475-60 (Reapproved 1980).

C. Solvent Density

Run triplicate analyses. Determine the density of the solvent using ASTM D 1475-60 (reapproved 1980).

D. Alternative

Rather than using a vacuum oven, heat the weighing dish and sample in a forced draft oven at 120 ± 2°C for 24 hr.

LABORATORY DATA SHEET 24A
Printing Inks

Client/Plant Name _____ Job # _____

Analyst _____ Date _____

Attach appropriate ASTM analytical data and record the information below:

Sample ID# _____

Run No.	1	2	3	Avg
Weighing Dish, M_{x1} (g)				
Syringe/Sample, M_{cy1} (g)				
Syringe/Sample, M_{cy2} (g)				
Weighing Dish/Sample, M_{x2} (g)				
Solvent Density, D_o (kg/L)				
Coating Density, D_c (kg/L)				
Wgt Fract'n VOC, W_o				
Vol Fract'n VOC, V_o				

Sample ID# _____

Run No.	1	2	3	Avg
Weighing Dish, M_{x1} (g)				
Syringe/Sample, M_{cy1} (g)				
Syringe/Sample, M_{cy2} (g)				
Weighing Dish/Sample, M_{x2} (g)				
Solvent Density, D_o (kg/liter)				
Coating Density, D_c (kg/liter)				
Wgt Fract'n VOC, W_o				
Vol Fract'n VOC, V_o				

$$W_o = \frac{M_{x1} + M_{cy1} - M_{cy2} - M_{x2}}{M_{cy1} - M_{cy2}} \qquad V_o = \frac{\overline{W_o}\ \overline{D_c}}{\overline{D_o}}$$

QA/QC Check

Completeness _____   Legibility _____   Accuracy _____   Specifications _____   Reasonableness _____

Checked by: _____   _____
    Personnel (Signature/Date)   Team Leader (Signature/Date)