

Engineering Guide #55:

Precautions in Use of Method 24 for Water-Based Coatings

Question:

U.S. EPA Method 24 normally is used to determine the volatile organic compound (VOC) content of coatings. What precautions should one take in analyzing data for high water content coatings?

Answer:

Method 24 is applicable for the determination of volatile matter content, water content, density, volume solids, and weight solids of paint, varnish, lacquer, or other related surface coatings. U.S. EPA recognizes the main problem people have with Method 24 is imprecision when determining the VOC content of waterborne coatings as the weight percent of water increases. This issue is most prevalent when Method 24 is applied to low VOC waterborne materials (i.e., less than 100 grams of VOC per liter or 0.83 pound of VOC per gallon). In Method 24, the VOC content of the waterborne coating is calculated by subtracting the weight fraction of the water from the weight fraction of the volatile matter. As the weight fraction of the water approaches the weight fraction of the volatile matter, the difference of these nearly equal values may result in a number that is smaller than the actual measurement variation. As such, the laboratory measurements are adjusted as stated in section 9.2 of Method 24:

“Because of the inherent increased imprecision in the determination of the VOC content of waterborne coatings as the weight percent of water increases, measured parameters for waterborne coatings are replaced with appropriate confidence limits (Section 12.6). These confidence limits are based on measured parameters and inter-laboratory precision statements.”

Compliance determinations must take these confidence limits into consideration when waterborne coatings are analyzed using Method 24. If the adjusted Method 24 measurement yields a result (lbs VOC/gal) which is less than or equal to zero, the VOC content of the coating as specified in the manufacturer's formulation data should be used for the compliance determination, with notification to U.S. EPA as required per OAC rule 3745-21-04(B)(5). If the adjusted Method 24 measurement yields a result which is greater than zero, but not equivalent to the manufacturer's formulation data, the adjusted Method 24 measurement should be used as the VOC content of the coating.

In the situation where it is necessary to have greater precision regarding the coating's VOC content in order to determine compliance with a very low emission limit, the individual components of the coating formulation could be

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analyzed for VOC content, where applicable, using Method 24. The coating's VOC content would then be calculated based upon the volume-weighted amount of each component in the final formulation.

Additional information regarding this topic is available on the U.S. EPA website:
<http://www.epa.gov/ttn/emc/methods/method24.html>.