Hegman units or as fine as can be measured by this method. Information about conducting the test appears in ASTM Test Method for Fineness of Dispersion of Pigment-Vehicle Systems (D 1210).

Flash Point

This is almost exclusively a concern with solvent-borne coatings. The organic solvents used in these coatings have characteristic temperatures at which their vapors support combustion. This temperature is known as the flash point and is often used for hazard classification in shipping by common carrier. It is also used to determine conditions of storage to meet fire regulations and the U.S. Occupational Safety and Health Act (OSHA). There are several accepted ways for measuring flash point that give somewhat different results. For pigmented and/or viscous materials that require stirring to obtain consistent results, ASTM Test Methods for Flash Point by Pensky-Martens Closed Tester (D 93, Method B) is specified. The small specimen size used with ASTM Test Methods for Flash Point of Liquids by Setaflash-Closed Cup Apparatus (D 3278) eliminates the need for stirring. Since solvents do not require stirring, they are generally tested with ASTM Test Method for Flash Point by Tag Closed Tester (D 56).

Manufacturers of coatings do not always determine the flash points of their products, but classify them on the basis of the solvents they contain. Since this routine does not detect inadvertent contamination, large volume purchases are sometimes tested for flash point in some cases after thinning at the job site. Further details about this technique can be found elsewhere in this manual.

Odor

Some solvent combinations produce undesirable odors, particularly when painting indoors with inadequate ventilation and at elevated temperatures. Although interior solvent-borne coatings usually contain low-odor or odorless mineral spirits, they should nevertheless be evaluated for odor. Latex or other water-borne coatings, which contain relatively little if any organic solvent, may contain other ingredients such as ammonia, residual monomer, etc., that might also be objectionable in a confined space. Hence both solvent- and water-borne coatings should be tested to establish whether the odor is irritating or merely unpleasant.

Although not specifically designed for liquid coatings, ASTM Test Method for Odor of Volatile Solvents and Diluents (D 1296) could be a suitable basis for the evaluation. This method is a comparative procedure for observing characteristic and residual odors of volatile organic solvents and is not designed to determine subtle odor differences or odor intensity. There are hazards associated with the test, and the Hazards section of the method should be read and heeded when the test is used. ASTM D 1296 has been approved as a replacement for Method 4401 of U.S. Federal Test Methods Standard (FTMS) No. 141 by the U.S. Department of Defense.

Volatile Organic Compound (VOC)

Volatile organic compounds evaporate into the atmosphere when coatings dry and/or cure, and they are believed to contribute significantly to air pollution. The chief offenders in this regard are solvent-borne coatings, although water-borne coatings certainly contain some amounts of VOC. In addition, many types of coatings that cure by chemical reaction, in contrast to those that dry solely by evaporation of organic solvent or water, generate volatile molecules such as formaldehyde and related compounds. Both types of materials react with each other and atmospheric oxygen in the presence of sunlight (i.e., photochemical reaction) to produce in the lower atmosphere the actual pollutants, one of which is ozone. Some of the VOCs have also been related to the destruction of ozone in the upper atmosphere. Organic volatiles that are considered to have negligible photochemical activity have, at least to the time of writing, not been included in the calculation of the VOC of a coating for regulatory purposes. Such exempt solvents are very few and within a relatively short time there may be none at all. California and its local agencies have been particularly active in specifying and enforcing limits on the amount of VOC in coatings. Examples of such restrictions are maxima of 350 g/L for "clear wood finishes" and 400 g/L for quick-drying enamels. Since other states have established their own limits, a national rule on VOC in architectural and industrial coatings is at present being developed between representatives of the paint industry and the U.S. Environmental Protection Agency (EPA). ASTM Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings (D 3960), U.S.A. EPA approved, and the recent manual by Brezinski [*2*] discuss applicable ASTM test methods, provide equations for calculating the VOC content in different ways, and provide other information valuable in this area.

Dilution Stability

This property is of concern primarily with solvent-borne coatings because of the wide differences in solubility characteristics of the binders and the solvent power of the various solvents and thinners employed. It is, therefore, desirable to establish that a coating and the specified thinner are compatible and the reduced material is stable. Hence the suggested diluent should, without excessive stirring or shaking, be readily incorporated into the coating in the recommended proportions or to a specified viscosity. Method 4203 in FTMS No. 141 requires that the mixture be allowed to stand for 4 h and then be observed for curdling, flocculation, precipitation, or separation into layers. If there is doubt about the stability, some of the material is then flowed onto a glass panel where any incompatibility is more evident.

Penetration (Absorption)

This term refers to the tendency of the nonvolatile vehicle or binder in a coating to penetrate and be absorbed by porous surfaces. Good resistance to absorption (hold-out) is desirable with interior primers and undercoats because it enables them to seal such surfaces, thus promoting uniformity in both gloss and color of subsequent finish coats. Conversely, a