



Standard Practice for Qualitative Identification of Polymers in Emulsion Paints¹

This standard is issued under the fixed designation D3168; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This practice describes a procedure for the qualitative identification in emulsion paints of most types of polymers present as major components of the paint vehicle. Limitations are discussed in Sections 5 and 10.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D16 Terminology for Paint, Related Coatings, Materials, and Applications

D1193 Specification for Reagent Water

D2621 Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints

E275 Practice for Describing and Measuring Performance of Ultraviolet and Visible Spectrophotometers

3. Terminology

3.1 *Definitions*—For definitions of terms, refer to Terminology **D16**.

4. Summary of Practice

4.1 The vehicle is extracted from the dried paint and after filtering is cast on a salt plate. The infrared spectrum is

obtained and compared with reference spectra for identification of major components.

4.2 The paint is applied to a filament and pyrolyzed to depolymerize the vehicle. An internal standard is added and the pyrolyzate is separated into its components by gas-liquid chromatography. Monomers are identified by comparison of relative retention times.

5. Significance and Use

5.1 Identification of specific acrylic polymers in emulsion paints is often difficult or impossible by infrared alone. This is particularly true when the acrylic is present in a small amount as a comonomer with vinyl acetate, or when blended with alkyds or other ester systems. If identification of an acrylic component is required in such a system, it may often be accomplished by gas-liquid chromatographic analysis of the pyrolyzed paint film. The presence of a number of other polymers may often also be confirmed by pyrolysis since they produce characteristic and reproducible pyrograms.

5.2 The pyrograms obtained from unknown samples vary in complexity according to the sample composition. It is necessary to establish the presence or absence of as many components as possible from a study of the infrared spectra obtained in the first part of this practice. The gas-liquid chromatography results may then be used to help identify any unknown components present and to confirm identifications made by infrared.

6. Interferences

6.1 Dibutyl maleate and dibutyl fumarate monomers are not successfully recovered by this procedure. If their presence is suspected as comonomer in a vinyl acetate copolymer system, *n*-butyl alcohol should be found in the pyrolyzate. This evidence, together with the absence of butyl acrylate or butyl methacrylate monomer peaks, is an indirect indication of the presence of one or both of these monomers.

6.2 The presence of relatively low quantities of copolymerized acids may not be successfully established by this procedure, due to some unavoidable decomposition of acrylate and methacrylate esters to acrylic or methacrylic acid and the corresponding alcohols during the pyrolysis. The infrared spectrum and an acid number determination, both run on the

¹ This practice is under the jurisdiction of ASTM Committee **D01** on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee **D01.21** on Chemical Analysis of Paints and Paint Materials.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.