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Standard Practice for Laboratory Preparation of Gelled Vehicles Using a Resin Kettle¹

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1. Scope*

1.1 This practice covers a laboratory procedure for the gelation of a resin solution, ink varnish, or vehicle using a resin kettle.

1.2 Guidance in preparing gelled vehicle samples suitable for use in laboratory sample quantity oil-based printing inks is provided.

1.3 The procedure outlined is not intended as a means of rating or evaluating resin or vehicle gelability, and is applicable only if the solutions, varnishes, or vehicles produced are of a rheology that is measurable by conventional ink and varnish industry viscometers or rheometers.

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

1.5 *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

D154 Guide for Testing Varnishes

D1545 Test Method for Viscosity of Transparent Liquids by Bubble Time Method

D1725 Practice for Preparing Resin Solutions for Viscosity Measurement by Bubble Time Method

D4040 Test Method for Rheological Properties of Paste Printing and Vehicles by the Falling-Rod Viscometer

E1 Specification for ASTM Liquid-in-Glass Thermometers

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 D01.37 on Ink Vehicles.

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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.

3. Terminology

3.1 *Definitions:*

3.1.1 *gel or gelled vehicle*—any resin solution, or a more complex blend of resins and alkyds that has been cooked to build molecular weight or reacted with a gelling or crosslinking agent (for example, organo-aluminum compounds) and exhibits a pseudoplastic rheology.

3.1.2 *pregel or pregel vehicle*—the resin solution or vehicle components comprising the vehicle prior to the addition of gelling agent and viscosity adjusting solvent.

3.1.2.1 *Discussion*—The terms “vehicle” and “varnish” are commonly used interchangeably. Some vehicle and varnish chemists, however, may consider a varnish to be a vehicle that undergoes a chemical reaction during a cooking cycle.

3.1.3 *gel seed, n*—a non-homogeneous, gelatinous particle in a gel vehicle, often the result of poor mixing or localized over-reaction during gelation.

4. Summary of Practice

4.1 Prepare a pregel vehicle by dissolving all vehicle or varnish components, or both, in a heated 1-L, resin kettle with inert gas blanket.

4.2 Add gellant solution into the pregel vehicle. Mix using the suggested stirring rate at the prescribed reaction temperature for 1 h.

4.3 Remove the resin kettle from heat, evaluate, adjust if necessary, and re-evaluate.

5. Significance and Use

5.1 This practice provides a means of preparing gel vehicles in laboratory equipment that most closely resembles production reactors. It can be used to predict the performance of gel vehicle components (resins, gellants, alkyds, etc.) in the user's equipment.

5.2 An ample amount of gel vehicle can be prepared for use in preparing inks for press testing.

6. Apparatus (see Fig. 1)

6.1 *Balance or Scale*, accurate to 0.1 g.

6.2 *Resin Kettle*, 1-L with 5-neck kettle head.

*A Summary of Changes section appears at the end of this standard