



Designation: D 5165 – 93 (Reapproved 1999)

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.

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:*

D 154 Guide for Testing Varnishes²

D 1545 Test Method for Viscosity of Transparent Liquids by Bubble Time Method²

D 1725 Test Method for Viscosity of Resin Solutions²

D 4040 Test Method for Viscosity of Printing Inks and Vehicles by Falling Rod Viscometer³

E 1 Specifications for ASTM Thermometers⁴

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.

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 vehicle from heat. Pour into a 1-qt can, and allow the sample to sit overnight before testing.

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.

6.3 *Electric Stirrer*, equipped with speed control.

6.4 *Glass Stirring Rod*.

6.5 *Paddle*, 6.4 cm (2.5 in.) in width.

6.6 *Heating Mantle*, to fit 1-L resin kettle.

6.7 *Electronic Temperature Control Device*.

6.8 *Thermometer*, with 15.24-cm (6-in.) immersion, and a range of 0 to 250°C, conforming to Specification E 1.

6.9 *Inert Gas Blanket Source*, (for example, nitrogen, carbon dioxide).

¹ This practice is under the jurisdiction of ASTM Committee D-1 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 *Annual Book of ASTM Standards*, Vol 06.03.

³ *Annual Book of ASTM Standards*, Vol 06.02.

⁴ *Annual Book of ASTM Standards*, Vol 14.03.