Designation: D 5166 – 97 (Reapproved 2003)

Standard Practice for Laboratory Preparation of Gelled Vehicle Samples Using a Microwave Oven[1]

This standard is issued under the fixed designation D 5166; 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.

1. Scope

1.1 This practice outlines a procedure for preparing gelled vehicle samples using a microwave oven.

1.2 The test samples can be used for characterizing the gelability or reactivity of resins, gelling agents, and vehicles used in the manufacture of oil based printing inks, or both.

1.3 Evaluation of the gelled vehicles may, depending upon preference, be either visual or instrumental.

1.4 *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 Varnishes[2]

D 1545 Test Method for Viscosity of Transparent Liquids by Bubble Time Method[2]

D 1725 Test Method for Viscosity of Resin Solutions[2]

D 4040 Test Method for Viscosity of Printing Inks and Vehicles by Falling-Rod Viscometer[3]

E 1 Specification for ASTM Thermometers[4]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *gel*—Any resin solution, or more complex blend of resins and alkyds that has been cooked or reacted with a gelling or cross-linking agent to build molecular weight and that exhibits a pseudoplastic rheology. (Also called "gelled vehicle.")

3.1.2 *gelling agent—in the context of ink resins and vehicles*, gelling agents or gellants are typically organo-aluminum compounds that react with carboxylic acid and hydroxyl groups present on the backbone of resins and alkyds to form cross-linked networks. (Also called "gellant.")

3.1.3 *gel length*—References to long, medium, and short gel length refer to the length of a string of gelled vehicle observed when pulling apart a small sample of vehicle with a spatula (that is, a long gel is very fluid and forms a "long" filament; a short gel has little flow and forms a "short" filament).

3.1.4 *pregel*—The resin solution or vehicle components comprising the vehicle prior to the addition of gelling agent and viscosity adjusting solvent. (Also called "pregel vehicle.")

4. Summary of Practice

4.1 Prepare a pregel resin solution or vehicle.

4.2 Separate the pregel vehicle into five or more aliquots to which various levels of gellant are added. Alternately, various gellants can be added at a given concentration to compare their effectiveness.

4.3 Place the test samples on a turntable in the microwave oven and heat the samples at full power until the desired test temperature is attained.

4.4 After the prescribed waiting period, test and rate samples for gelability.

5. Significance and Use

5.1 This practice provides a means of preparing a number of gel vehicle samples with minimum use of materials and time. It provides a means of quickly characterizing and comparing the gelability or reactivity of resins, vehicles, and gelling agents.

6. Apparatus

6.1 *Mercury Thermometer*, capable of reading from 0 to 250°C and conforming to Specification E 1.

6.2 *Jars*, (40 mm in diameter by 83 mm in height), 70 cm^3 with nonmetallic screw-on lids.

6.3 *Microwave Oven*, common 750-watt.[5]

6.4 *Microwave Oven Carousel*, if not contained in the microwave oven.

[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.

Current edition approved May 10, 2003. Published June 2003. Originally approved in 1991. Last previous edition approved in 1997 as D 5166 - 97.

[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.

[5] Any common microwave oven, available at most appliance stores, can be used. A 750–watt oven with a built–in turntable is preferred. Ovens with lower power will require adjustments in the test cycle.