



Designation: D 4669 – 98

Standard Test Method for Polyurethane Raw Materials: Determination of Specific Gravity of Polyols¹

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1. Scope*

1.1 This test method measures the specific gravity of polyols using a pycnometer. (See Note 1.)

1.2 *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.*

NOTE 1—There is no equivalent ISO standard.

2. Referenced Documents

2.1 *ASTM Standards:*

D 883 Terminology Relating to Plastics²

E 1 Specification for ASTM Thermometers³

E 202 Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.⁴

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method see Terminology D 883.

3.2 *Description of Term Specific to This Standard:*

3.2.1 *specific gravity*—the ratio of the weight in air of a given volume of the material at a stated temperature to the weight in air of an equal volume of water at a stated temperature. It shall be expressed as specific gravity, 25/25°C, indicating that the sample and reference water were both measured at 25°C.

4. Significance and Use

4.1 This test method is suitable for quality control, as a specification test, and for research. It is necessary when converting from kinematic to absolute viscosity.

5. Apparatus

5.1 *Pycnometer*, of 25 or 50-mL capacity, conical shape with a capillary side arm overflow tube complete with a standard-taper^{5/12} ground-glass joint to receive a ground-glass vented cap. A thermometer with a scale graduated from 12 to 38°C in 0.2-degree divisions joins the neck of the flask with a standard-taper 10/18 ground-glass joint. The thermometer contained in the pycnometer shall be calibrated in accordance with Specification E 1.

5.2 *Water Bath*, capable of maintaining a temperature of $25.0 \pm 0.05^\circ\text{C}$ during the test.

5.3 *Thermometer*, an ASTM Low Softening Point Thermometer having a range from -2 to +80°C and conforming to the requirements for Thermometer 15°C as prescribed in Specification E 1.

5.4 *Analytical Balance*, sensitive to 0.1 mg.

6. Reagents

6.1 *Chromic Acid Cleaning Solution*—Prepare a saturated solution of chromic acid (CrO_3) in concentrated sulfuric acid (H_2SO_4 , sp gr 1.84).

7. Sampling

7.1 Polyesters and polyethers usually contain molecules covering an appreciable range of molecular weights. These have a tendency to fractionate during solidification. Unless the material is a finely ground solid it is necessary to melt (using no higher temperature than necessary) and mix the resin well before removing a sample for analysis. Since many polyols are hygroscopic, take care to provide minimum exposure to atmospheric moisture during the sampling.

8. Procedure

8.1 Clean the pycnometer by filling it with a chromic acid cleaning solution. Allow it to stand for a few hours, empty, and rinse well with distilled water.

8.2 Fill the pycnometer with freshly boiled distilled water cooled to 22 to 24°C, and set the pycnometer thermometer in place carefully, avoiding trapping of air. Place the pycnometer in the water bath that has been maintained at $25.0 \pm 0.05^\circ\text{C}$ for at least 30 min. Wipe the overflow from the side-arm capillary

¹ This test method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.22 on Cellular Plastics. It was recommended to ASTM by the Society of the Plastics Industry Polyurethane Raw Materials Analysis Committee.

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² *Annual Book of ASTM Standards*, Vol 08.01.

³ *Annual Book of ASTM Standards*, Vol 14.03.

⁴ *Annual Book of ASTM Standards*, Vol 15.05.