Designation: D 4350 – 00

Standard Test Method for Corrosivity Index of Plastics and Fillers[1]

This standard is issued under the fixed designation D 4350; 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 test method is designed for use in obtaining the specific conductance of a water extract of plastics and fillers. The magnitude of this conductance may be taken as an index of the likelihood that, in a humid atmosphere, metal surfaces in contact with these materials may become corroded due to galvanic action or direct chemical attack; this is called the corrosivity index.

NOTE 1—There is no similar or equivalent ISO standard.

1.2 The values stated in SI units are to be regarded as standard.

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.* Specific precautionary statements are given in Section 7.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 618 Practice for Conditioning Plastics for Testing
D 1193 Specification for Reagent Water
E 1 Specification for ASTM Thermometers
E 11 Specification for Wire-Cloth Sieves for Testing Purposes
E 145 Specification for Gravity-Convection and Forced-Ventilation Ovens
E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Summary of Test Method

3.1 Specimens of plastics or fillers are immersed in distilled water and exposed to specified conditions of temperature and time. The specific resistance of each of the solutions extracted from the test specimens is measured by using the specified conductivity cell. The specific conductance is calculated from the data and is called the corrosivity index of the material.

4. Significance and Use

4.1 This test method provides a means for comparing the corrosive potential of plastics and fillers in humid atmospheres.

4.2 This test method is intended for use in research and evaluation.

5. Apparatus

5.1 *Conductance Bridge*, Wheatstone type, with a range from 1 to 250 000-Ω measured resistance, a built-in potentiometer, a 1000 ± 50-cycles per second oscillator, and a sensitive null point indicator. The bridge shall be capable of measuring resistance with an accuracy of ±2 %.

5.2 *Conductivity Cell*, dip-type, micro, for solutions of medium conductance. The cell should have a cell constant of approximately 1.0 cm^{-1}. The borosilicate glass shall have a maximum outside tube diameter of 12.7 mm, overall length of 177.8 mm, chamber inside diameter of 9.5 mm, and chamber depth of 50.8 mm.[3]

5.3 *Drill*, electric, capable of holding a 10.54-mm drill bit, and rotating at 500-r/min maximum speed.

5.4 *Mill*, such as laboratory Wiley cutting mill or equivalent.

5.5 *Sieves*, standard (alternative) sieve designations 425 µm (No. 40), and 250 µm (No. 60) in accordance with Specification E 11.

5.6 *Analytical Balance*, capable of determining mass to the nearest 1.0 mg.

5.7 *Oven*, forced-ventilation type, with uniformity of temperature within ±1 % of the differential between oven and ambient temperature, with a rate of ventilation of 100 to 200 air changes per hour, in accordance with Specification E 145, Type IIA.

5.8 *Thermometer*, solid-stem, precision, ASTM No. 63C, in accordance with Specification E 1.

5.9 *Chemical Glassware*:

5.9.1 *Borosilicate Glass Flask*, nominally 1000-mL size, with ground glass stopper.

[1] This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.16 on Thermosetting 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.

[3] A conductivity cell found suitable for this purpose is a Model No. 3403 conductivity cell, available from Yellow Springs Instrument Co., Inc., P.O. Box 279, Yellow Springs, OH 45387.

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

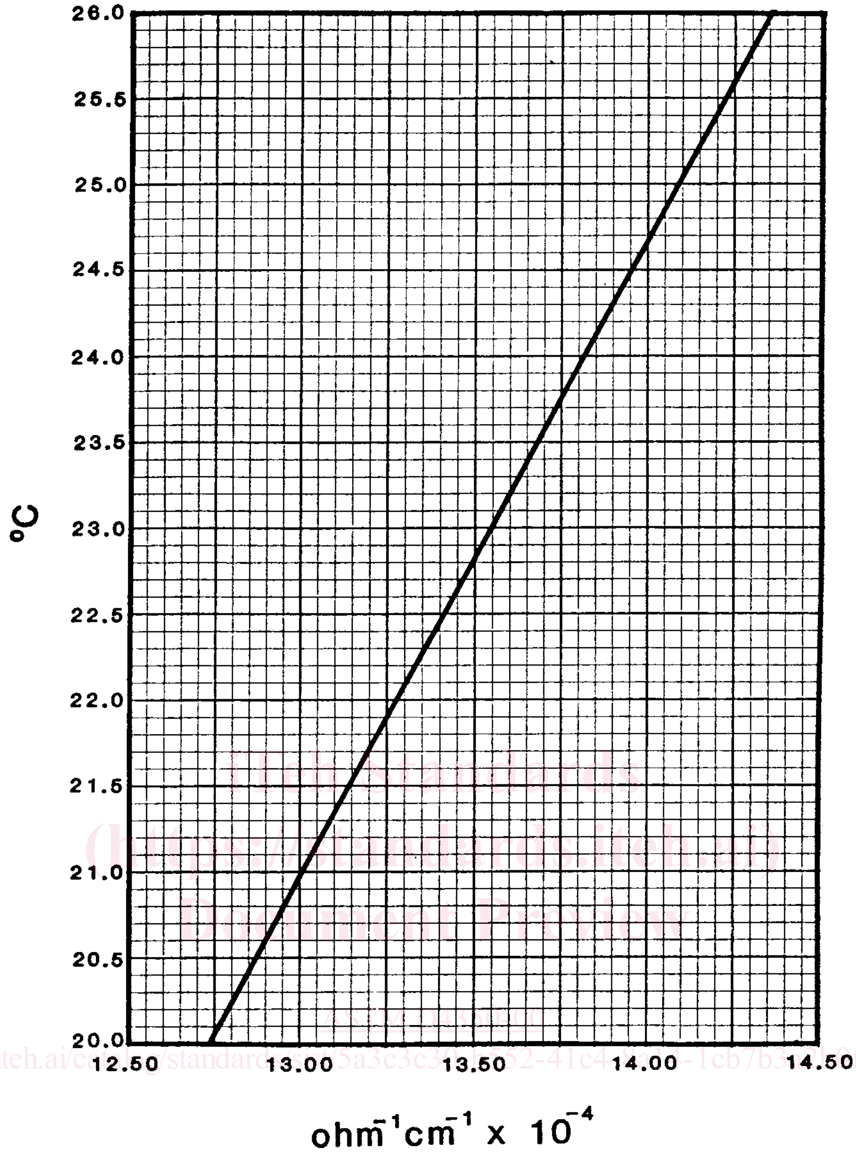

FIG. 1 Specific Conductance of 0.0100 Demal KCl

5.9.2 *Borosilicate Glass Erlenmeyer Flask*, 65-mL actual capacity to bottom of stopper (nominally 50-mL size), with ground glass stopper No. 19.

5.9.3 *Pipet*, volumetric, 50-mL capacity, calibrated "to deliver."

6. Reagents and Materials

6.1 *Distilled Water*, Type III, reagent water as defined in Specification D 1193. When stored in borosilicate glass bottles at 23 ± 2°C, the water shall have a calculated specific conductance of less than 2.0×10^{-6}, ohm^{-1}, cm^{-1}.

6.2 *Potassium Chloride Solution*, consisting of 0.7453 g of reagent grade potassium chloride, previously dried at 105 ± 3°C for at least 24 h, dissolved in 1000 g of distilled water. The solution shall be stored in a borosilicate glass stoppered bottle. The specific conductance of this 0.0100 Demal KCl solution is 0.0007736 ohm^{-1}, cm^{-1} at 0°C, 0.0012205 ohm^{-1}, cm^{-1} at 18°C, and 0.0014087 ohm^{-1}, cm^{-1} at 25°C.[4] This specific conductance versus temperature is plotted in Fig. 1.

6.3 *Grease*, silicone, not soluble in water nor containing any water-soluble constituents. In the control specimens, water exposed to the grease on the stopper shall have a specific conductance less than 7×10^{-6}, ohm^{-1}, cm^{-1}.

7. Safety Hazards

7.1 Some plastics and fillers are known to contain toxic components and special precautions are required in handling. The manufacturer's precautionary instructions and sound laboratory safety practices should be diligently followed.

[4] Specific conductance values are based on the work of Jones, G., and Bradshaw, B. C., *J. Amer. Chem. Soc.*, 55 (1933) 1780. For more detailed information on the use of Demal KCl, see" Electrolyte Solutions," by Robinson, R. A., and Stokes, R. H., Academic Press, Inc., New York, 1955, pp. 94–96.