



Standard Test Method for Determination of the Total Pore Volume of Catalysts and Catalyst Carriers¹

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1. Scope

1.1 This test method covers the determination of the total pore volume of catalysts and catalyst carriers, that is, the volume of pores having pore diameter between approximately 14 μm and 0.4 nm (4 $\text{\AA}$).

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 **WARNING**—Mercury has been designated by many regulatory agencies as a hazardous material that can cause central nervous system, kidney and liver damage. Mercury, or its vapor, may be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury containing products. See the applicable product Material Safety Data Sheet (MSDS) for details and EPA's website—<http://www.epa.gov/mercury/faq.htm>—for additional information. Users should be aware that selling mercury and/or mercury containing products into your state or country may be prohibited by law.

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.* Specific hazard statements are given in Section 8. Warning statements are given in 9.1.4, 9.1.7, and 9.1.11.

2. Referenced Documents

2.1 ASTM Standards:²

D3766 Terminology Relating to Catalysts and Catalysis

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

¹ This test method is under the jurisdiction of ASTM Committee D32 on Catalysts and is the direct responsibility of Subcommittee D32.02 on Physical-Mechanical Properties.

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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.

E456 Terminology Relating to Quality and Statistics

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 Definitions:

3.1.1 *particle volume*—the volume of a particle including pores into which mercury cannot penetrate at ambient pressure (smaller than approximately 14 μm diameter pore mouth).

3.1.2 *true volume*—the volume of a particle, including pores, into which helium cannot penetrate (smaller than about approximately 0.4 nm (4 $\text{\AA}$) diameter pore mouth).

3.1.3 Other definitions and terms used in this test method are defined in Terminology D3766.

3.2 Symbols for Mercury Intrusion:

W	= mass of sample
W_c	= mass of sealed empty sample cell
W'_c	= mass of sealed sample cell filled with mercury
W_s	= mass of sealed sample cell with sample
W'_s	= mass of sealed sample cell with sample filled with mercury
V_{Hg}^c	= volume of mercury in empty sample cell (volume of sample cell)
V_{Hg}^s	= volume of mercury in cell with sample
V_{Hg}^s	= sample volume, cm^3
V_{Hg}	= specific sample volume
V_p	= particle volume
W_b	= weight mercury reservoir after filling burette with sample
$W_{b'}$	= mass of mercury reservoir after filling burette without sample

3.3 Symbols for Helium Pycnometry:

V_c	= volume of sample cell and associated tubing, cm^3
V_R	= reference volume, cm^3
V_{He}^s	= sample volume, cm^3
V_{Cyl}	= volume of calibration cylinder, cm^3
V_{STD}	= volume of calibration standard, cm^3
V_{He}	= specific sample volume
P'_1	= pressure in empty sample cell, psig or pascals