



Designation: D4781 – 03 (Reapproved 2018)^{ε1}

Standard Test Method for Mechanically Tapped Packing Density of Fine Catalyst Particles and Catalyst Carrier Particles¹

This standard is issued under the fixed designation D4781; 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.

^{ε1} NOTE—Section 6.2 updated editorially in May 2018.

1. Scope

1.1 This test method covers the determination of the mechanically tapped packing density of fine catalyst and catalyst carrier particles smaller than 0.8 mm in diameter.

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 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

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](#)

[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*—See Terminology [D3766](#).

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.

Current edition approved May 1, 2018. Published June 2018. Originally approved in 1988. Last previous edition approved in 2013 as D4781-03(2013). DOI: 10.1520/D4781-03R18.

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.

4. Summary of Test Method

4.1 A preconditioned sample of dried fine catalyst or catalyst carrier particles is tapped in a graduated cylinder. The mechanically tapped packing density is determined from the known mass and tapped volume.

5. Significance and Use

5.1 This test method is for measuring the mechanically tapped packing density of powders that are smaller than 0.8 mm in diameter, such as Fluidized Catalytic Cracking Catalysts (FCC).

6. Apparatus

6.1 *Graduated Cylinder*, capacity 100 mL.

6.2 *Holder*, a cylinder holder weighing 454 g.

6.3 *Tapping Device*, consisting of a baseplate with worm drive, with specifications of 250 r/min camshaft speed, tapping stroke travel of 3.2 mm.

6.4 *Counter*, a four-digit adjustable counter, which can be preset to deliver number of taps between 1 and 9999.

6.5 *Desiccator*, with a desiccant grade molecular sieve such as 4A.

6.6 *Balance*, having a sensitivity of 0.1 g.

6.7 *Drying Oven*.

7. Procedure

7.1 Heat an adequate sample at $400 \pm 15^\circ\text{C}$ for not less than 3 h. Normally, this treatment can take place in air. However, in the case of materials that might react with air at elevated temperature (such as prerduced catalysts) the heat treatment should take place in an inert atmosphere. After heating, cool the test sample in a desiccator or other suitable container to eliminate the possibility of moisture adsorption prior to testing.

NOTE 1—These conditions may not be appropriate for all materials.

NOTE 2—Since many catalyst formulations are strong adsorbents, the use of 4A indicating (cobalt-treated) molecular sieves as a desiccating medium is recommended. The desiccant should be regenerated at 220 to 260°C, as required.