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Standard Test Method for Particle Size Distribution of Catalytic Materials by Sieving¹

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1. Scope

1.1 This test method covers the determination of particle size distribution of catalytic powder material using a sieving instrument and is one of several found valuable for the measurement of particle size. This test method is particularly suitable for particles in the 20 to 420- μ m range.

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.*

2. Referenced Documents

2.1 ASTM Standards:

E 11 Specification for Wire-Cloth Sieves for Testing Purposes²

E 161 Specification for Precision Electroformed Sieves (Square Opening Series)²

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods²

E 456 Terminology Relating to Quality and Statistics²

3. Summary of Test Method

3.1 A 50 % relative humidity-equilibrated sample of known weight is allowed to fractionate on a series of various size sieves to allow the various particle sizes to be collected on successively smaller sieve openings.

3.2 The sample fraction collected on each sieve of the series is weighed and its fractional part of the original sample is determined.

4. Significance and Use

4.1 This test method can be used to determine particle size distributions of catalysts and supports for materials specifications, manufacturing control, and research and development work.

5. Apparatus

5.1 Laboratory Sieving Instrument.³

5.2 *U. S. Standard Sieves* or equivalent, to include micrometers (mesh) 420(40), 250(60), 177(80), 149(100), 105(140), 74(200), 44(325) and electroformed 30 and 20 micrometers. Because of their superior uniformity and resistance to distortion or damage during use, electroformed sieves, preferably with square holes, are recommended. Sieves with diameters between 6 and 10 cm are suggested.

5.3 Ultrasonic Cleaning Tank, 100 W.

5.4 *Transmitted Light Microscope*, 300 magnification, with calibrated scale eyepiece.

5.5 Heat Gun Dryer (hair dryer or equivalent).

5.6 *Analytical Balance*, capable of weighing to 0.001 g.

5.7 *Sample Splitter, Chute Type, or Spinning Riffler*, with spinning riffler preferred.

6. Reagents

6.1 *Antistatic Coating* (record cleaning spray or equivalent.)

6.2 *Alcohol-Water Solution*—One part ethanol to nine parts deionized or distilled water.

7. Sampling

7.1 The sample must be free-flowing and homogeneous. If particle size segregation is apparent to either the eye or from observation under a microscope, remix and resample the material using the proper riffing procedure.

7.2 Equilibrate the sample at 20 to 25°C (68 to 77°F) in a desiccator with a humidity level of 50 %. A 24-h period is usually sufficient.

8. Calibration and Standardization

8.1 Prior to use, check all sieves for damage or improper cleaning. If woven-wire sieves are used rather than the preferred electroformed sieves, it is especially important to carefully inspect the wire surface for wear, misalignment, tears, creases, or separation along the edges.

NOTE 1—Specifications for wire cloth sieves are described in Specification E 11 and specifications for electroformed sieves are described in Specification E 161.

¹ This test method is under the jurisdiction of ASTM Committee D-32 on Catalysts and is the direct responsibility of Subcommittee D32.02 on Physical-Mechanical Properties.

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² *Annual Book of ASTM Standards*, Vol 14.02.

³ ATM Sonic Sifter, Model L3P, or equivalent.