



Standard Test Method for Rubber Chemicals—Wet Sieve Analysis of Sulfur¹

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1. Scope

1.1 This test method covers the evaluation of the particle size distribution of the coarse fraction of sulfur. It is limited to the measurement of those particles greater than 45 μm (No. 325 sieve).

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:

D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries²

E 11 Specification for Wire-Cloth Sieve for Testing Purposes³

E 145 Specification for Gravity-Convection and Forced-Ventilation Ovens³

3. Significance and Use

3.1 This test method is used to evaluate sulfur for suitability as a rubber vulcanizing agent. Sulfur particles must be significantly small enough to dissolve in rubber during cure and produce a uniform network of cross-links. This test method is used as a quality control method to ensure that no excessively large sulfur particles are present and to see if the product follows a typical pattern of size distribution.

3.2 This procedure is necessary when problems of the sulfur caking occur with the use of the dry sieving procedure for particle size.

4. Apparatus

4.1 *Standard Sieves*, stainless steel, 76 mm diameter containing selected stainless steel wire cloth in the range of 45 to 250 μm mesh count.

4.2 *No. 6 Stiff Bristle Artist Brush*, having 10 to 15 mm long bristles.

4.3 *Balance*, with a minimum capacity of 150 g sensitive to 0.001 g.

4.4 *Oven*, circulating air type, controlled to 70 ± 2°C.

5. Materials

5.1 *Liquid Detergent*.

6. Procedure

6.1 Weigh 10.0 g of the sulfur sample into a 250-cm³ beaker. Wet the sulfur with 25 mL of water. Mix thoroughly with a glass stirring rod to guarantee wetting all the sulfur.

NOTE 1—A 1 % solution of a liquid detergent may be used if the sulfur sample does not wet out properly.

6.2 Weigh each cleaned and dried sieve to the nearest 0.001 g. Assemble preweighed stainless steel sieves in order to descending fineness with the coarsest screen on top. Carefully transfer the wetted sulfur to top screen using additional water to wash all of the sulfur out of the beaker. Wash the sulfur through the top sieve with a gentle stream of water from a nozzle and detergent (see 5.1) as needed. Tap or vibrate the screen while washing. Finally, break up all agglomerated sulfur particles using the brush. Clean sulfur from the bristles of the brush using wash water. Be careful that the wash water does not back up on the finer sieves causing the sulfur slurry to overflow the sieve sides.

6.3 Remove the top sieve. Wash off any residual sulfur slurry on the underside of the sieve. Repeat the washing procedure described in 6.2 ensuring total transport of the fine sulfur particles through each successive sieve.

6.4 Carefully dry the sides of the sieves with a lint free towel, and place each sieve separately in a drying oven at 70°C for 1 h or until the sulfur is dry. Remove the sieves and cool at least ½ h in a dessicator.

6.5 Weigh each sieve to the nearest 0.001 g. When the amount of sulfur on the coarser sieves is very small (a few particles), it may be appropriate to brush the particles on to a preweighed glassine weighing paper and weigh the sulfur directly.

7. Calculation

7.1 Calculate the percent retained on each sieve, *P*, as follows:

$$P = \frac{M_1}{M_2} \times 100 \quad (1)$$

¹ This test method is under the jurisdiction of ASTM Committee D-11 on Rubber and is the direct responsibility of Subcommittee D11.11 on Chemical Analysis.

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² *Annual Book of ASTM Standards*, Vol 09.01.

³ *Annual Book of ASTM Standards*, Vol 14.02.