



Designation: D 5553 – 95 (Reapproved 2001)

Standard Test Method for Determination of the Unsaponifiable Nonvolatile Matter in Sulfated Oils¹

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1. Scope

1.1 This test method covers the determination of the unsaponifiable, nonvolatile (above 80°C) matter existing in a sample of sulfated oil by saponifying the desulfated fatty matter and extracting the unsaponifiable matter, and extracting the unsaponifiable matter from the soap solution with ethyl ether.

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

2. Referenced Documents

2.1 ASTM Standards:

D 5350 Test Method for Determination of Organically Combined Sulfuric Anhydride by Titration, Test Method A²

D 5351 Test Method for Determination of Organically Combined Sulfuric Anhydride by Extraction Titration, Test Method B²

D 5353 Test Method for Determination of Total Desulfated Fatty Matter²

3. Significance and Use

3.1 This test method is intended for use in the determination of the unsaponifiable, nonvolatile matter contained in sulfated oils for the purpose of quality assurance.

4. Apparatus and Reagents

4.1 *Saponification Flask*—The apparatus required for the saponification consists of a glass flask provided with an air condenser.

4.2 *Ethyl Ether*.

4.3 *Potassium Hydroxide, Alcoholic Solution (28 g/L)*—Dissolve approximately, but not less than, 28 g of KOH in ethyl alcohol and dilute to 1 L.

4.4 *Potassium Hydroxide Aqueous Solution (28 g/L)*—Dissolve 28 g of potassium hydroxide (KOH) in water and dilute to 1 L.

5. Procedure

5.1 The procedure consists of decomposing the sample with mineral acid, extracting the desulfated fatty matter, saponifying the latter, and extracting the unsaponifiable matter from the soap solution with ethyl ether.

5.1.1 *Desulfated Fatty Matter*—Determine the desulfated fatty matter as described in the determination of total desulfated fatty matter. See Test Methods D 5350, D 5351, and D 5353.

5.1.2 *Saponification*—Accurately weigh 2 to 2.5 g of the desulfated fatty matter in the flask, add 25 mL of the alcoholic KOH solution, and simmer the contents (without loss of alcohol) for 1 h with occasional swirling, over an electric hot plate or other source of heat.

5.1.3 *Extraction*—Transfer the content of the flask to a 250-mL separatory funnel and wash the flask several times with a total of 50 mL of water, pouring it into the separatory funnel. Extract the solution while still warm (about 30°C) with 50 mL of ether (rinse the saponification flask with the ether before adding it to the separatory funnel), shaking vigorously for about 1 min, and allow the layers to settle and clear. Draw off the lower layer in a second 250-mL separatory funnel and extract in a similar manner with two 50-mL portions of ether.

5.1.4 *Preliminary Water Washing*—Add 20 mL of water to the combined ether layer, turn the separatory funnel and contents over gently about six times, and allow the layers to settle and clear. Draw off the lower layer and discard. Wash the ether layer twice more with 20-mL portions of water, shaking vigorously after each addition.

5.1.5 *Alkali and Water Washing*—Add 20 mL of aqueous KOH solution to the washed ether layer, turn the separatory funnel and contents over gently about six times, and allow the layers to settle and clear. Draw off the lower layer and discard. Wash the ether layer with 20 mL of water, shaking vigorously. Continue washing with 20 mL of KOH solution followed by 20

¹ This test method is under the jurisdiction of ASTM Committee D31 on Leather and is the direct responsibility of Subcommittee D31.08 on Fats and Oils. This test method was developed in cooperation with the American Leather Chemists Assn. (Method H 47-1957).

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² *Annual Book of ASTM Standards*, Vol 15.04.