



Designation: E2403 – 06 (Reapproved 2018)

## Standard Test Method for Sulfated Ash of Organic Materials by Thermogravimetry<sup>1</sup>

This standard is issued under the fixed designation E2403; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method describes the determination of sulfated ash content (sometimes called residue-on-ignition) of organic materials by thermogravimetry. This test method converts common metals found in organic materials (such as sodium, potassium, lithium, calcium, magnesium, zinc, and tin) into their sulfate salts permitting estimation of their total content as sulfates or oxides. The range of this test method is from 0.1 to 100 % metal content.

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:*<sup>2</sup>

[D874 Test Method for Sulfated Ash from Lubricating Oils and Additives](#)

[D914 Test Methods for Ethylcellulose](#)

[D3516 Test Methods for Ashing Cellulose](#)

[E473 Terminology Relating to Thermal Analysis and Rheology](#)

[E1131 Test Method for Compositional Analysis by Thermogravimetry](#)

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee E37 on Thermal Measurements and is the direct responsibility of Subcommittee E37.01 on Calorimetry and Mass Loss.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[E1142 Terminology Relating to Thermophysical Properties](#)  
[E1582 Test Method for Temperature Calibration of Thermogravimetric Analyzers](#)

[E2040 Test Method for Mass Scale Calibration of Thermogravimetric Analyzers](#)

2.2 *Other Standards:*

[The United States Pharmacopeia XXII and The National Formulary XVII, United States Pharmacopeial Convention, Rockville, MD, 1990, Section 281, p. 1527](#)

### 3. Terminology

3.1 *Definitions*—Technical terms used in this standard are defined in Terminologies [E473](#) and [E1142](#).

3.1.1 *sulfated ash, n*—the residue remaining after a specimen has been oxidized, and the residue subsequently treated with sulfuric acid and heated to constant weight.

3.1.2 *residue-on-ignition, ROI, n*—a commonly used alias for sulfated ash.

3.1.3 *volatiles, n*—for the purpose of this test, those materials evolving as gas at temperatures below 160°C in an air atmosphere.

### 4. Summary of Test Method

4.1 A test specimen is ignited and burned in an air atmosphere at temperatures up to 600°C until only ash remains. After cooling, the residue is treated with sulfuric acid and heated to 800°C to constant weight. The residue remaining is identified as sulfated ash.

4.2 This test method is similar to Test Method [D874](#) for lubricating oils and additives, Test Methods [D914](#) for ethyl cellulose, Test Methods [D3516](#) cellulose, and that of The United States Pharmacopeia XXII and makes use of thermogravimetric apparatus to perform the determination.

### 5. Significance and Use

5.1 The sulfated ash may be used to indicate the level of known metal-containing additives or impurities in an organic material. When phosphorus is absent, barium, calcium, magnesium, sodium and potassium are converted to their sulfates. Tin and zinc are converted to their oxides.

5.2 This test method may be used for research and development, specification acceptance, and quality assurance purposes.