



## Standard Test Method for Gross Moisture in Green Petroleum Coke<sup>1</sup>

This standard is issued under the fixed designation D 4931; 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 covers both the preparation procedure for samples containing free water (air drying loss (ADL) on gross moisture samples) and the determination of the gross moisture content of green petroleum coke.

1.2 The values stated in acceptable metric 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 2013 Method of Preparing Coal Samples for Analysis<sup>2</sup>
- D 2234 Test Methods for Collection of a Gross Sample of Coal<sup>2</sup>
- D 3302 Test Method for Total Moisture in Coal<sup>2</sup>
- E 11 Specification for Wire Cloth Sieves for Testing Purposes<sup>3</sup>

### 3. Terminology

#### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *air drying, n*—a process of partial drying of a green petroleum coke sample to bring it to near equilibrium with the atmosphere in the room in which further reduction/division of the petroleum coke sample is to take place.

3.1.2 *air dry loss (ADL), n*—the loss in mass, expressed as a percentage, resulting from each air drying operation.

3.1.3 *free water, n*—visible unbound water in the sample.

3.1.4 *green petroleum coke, n*—a solid, carbonaceous residue that has not been calcined, produced by thermal decomposition of heavy petroleum fractions and/or cracked stock.

3.1.5 *gross moisture, n*—that moisture determined as the loss in mass in an air atmosphere under rigidly controlled conditions of temperature, time, and air flow.

3.1.5.1 *Discussion*—Test Method D 3302 prescribes the above controlled conditions.

3.1.6 *residual moisture, n*—that moisture remaining in the sample after air drying.

3.1.7 *total moisture, n*—synonym for *gross moisture*.

### 4. Summary of Test Method

4.1 This test method is based on the loss in mass of a green petroleum coke sample in an air atmosphere under controlled conditions of temperature, time, and air flow.

4.1.1 *Preparation Procedure* shall be used when the petroleum coke sample contains free water. The gross moisture sample is weighed and air dried to equilibrate it with the atmosphere. Determination of residual moisture is that determined using the *Drying Oven Method*. Air drying and residual moisture losses are combined to report gross moisture.

4.1.2 *Drying Oven Method* shall be used in routine commercial practice when the sample does not contain *free water*. The sample is crushed to at least minus 25 mm (1 in.) top sieve size and divided into analytical portions of at least 500 g each. Determination of total gross moisture is calculated by summing the results of the *Drying Oven Method* and the results of the *Preparation Procedure*.

### 5. Significance and Use

5.1 Moisture adds weight to the coke and serves no useful purpose. A knowledge of the moisture content is important in the purchase and sale of green petroleum coke (which are conducted on a dry basis).

5.2 The collection of the sample as specified for the *Drying Oven Method* is intended for the express purpose of determining the total moisture of green petroleum coke. The standard is available to producers, sellers, and consumers for determination when other techniques or modifications are not mutually agreed on.

5.3 The *Preparation Procedure* is used only when sample contains free water. Obtaining a representative sample of a coke source is compounded by the presence of free water.

### 6. Apparatus

#### 6.1 Ovens:

6.1.1 *Air Drying Oven*—A device for passing slightly heated air over the sample. The oven shall be capable of maintaining a temperature of 10 to 15°C (18 to 27°F) above ambient with a maximum oven temperature of 40°C (104°F) unless ambient temperature is above 40°C (104°F), in which case ambient temperature shall be used. Air changes are to be at the rate of 1 to 4/min. A typical oven is shown in Fig. 1.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.05 on Properties of Fuels, Petroleum Coke, and Oil Shale.

Current edition approved Nov. 15, 1992. Published January 1993. Originally published as D 4931 – 89. Last previous edition D 4931 – 89.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 05.05.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 14.02.