



Standard Practice for Polishing and Etching Coal Samples for Microscopical Analysis by Reflected Light¹

This standard is issued under the fixed designation D 5671; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers laboratory procedures for preparing an etched, polished surface of granular and block samples of coal for examination with a microscope using reflected light illumination.

1.2 The values stated in SI units shall be considered as 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 121 Terminology of Coal and Coke²

D 2797 Practice for Preparing Coal Samples for Microscopical Analysis by Reflected Light²

D 2798 Test Method for Microscopical Determination of the Reflectance of the Vitrinite in a Polished Specimen of Coal²

D 2799 Test Method for Microscopical Determination of Volume Percent of Physical Components of Coal²

D 4596 Practice for Collection of Channel Samples of Coal in a Mine²

D 5192 Practice for Collection of Coal Samples from Core²

3. Terminology

3.1 Terminology used in this standard can be found in Terminology D 121.

4. Summary of Practice

4.1 A subsplit of a representative sample obtained in accordance with Practice D 4596 and prepared in accordance with Practice D 2797 or a block of coal obtained in accordance with Practice D 5192 is polished to a flat, scratch-free surface, the reflectance of vitrinite is determined on a subsplit in accordance with Test Method D 2798, and then other subsplits are

chemically etched using an acidified potassium permanganate solution.

5. Significance and Use

5.1 Components observable in surfaces of coal samples prepared in accordance with the laboratory procedures of this practice will have differential relief that will aid in their maceral identification by visual classification and enables identification of plant parts or tissues that formed the coal.

5.2 Samples prepared by this practice can be used for microscopical determination of the volume percent of physical components of coal in accordance with Test Method D 2799.

6. Apparatus

6.1 *Ultrasonic Cleaner*—large enough for sample holder and sample preparations to be immersed in cleaning solution.

6.2 *Beakers*—glass beakers, 50, 100, and 500 ml capacity, one each for each etching setup.

6.3 *Stirring Rods*—glass, approximately 20 cm long.

6.4 *Hot Plate*—electric or gas-heated with capability for temperature control and rotating stirring magnets.

6.5 *Watch Glasses*—glass, 100–200 mm in diameter depending on size of specimen blocks to be etched.

6.6 *Graduated Cylinders*—glass, 25 and 100 ml.

6.7 *Grinding and Polishing Equipment*—one or several laps on which the coal briquets or blocks can be ground and polished to a flat, scratch-free surface. Laps may be made of aluminum, iron, brass, or bronze.

7. Reagents

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society where such specifications are available.³ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the quality of the etch.

¹ This practice is under the jurisdiction of ASTM Committee D-5 on Coal and Coke and is the direct responsibility of Subcommittee D05.28 on Petrographic Analysis of Coal and Coke.

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² *Annual Book of ASTM Standards*, Vol 05.05.

³ *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmaceutical Convention, Inc. (USPC), Rockville, MD.