

ATTRITION OF CHARCOAL PARTICLES

UOP Method 802-80

SCOPE

This method is for determining the tendency of charcoal particles to abrade.

OUTLINE OF METHOD

A representative sample is placed on a U.S.A. Series No. 30 sieve along with ten plastic disks. The sieve is covered, placed in a sieve shaker and shaken for 10 minutes. The percent of material passing through the sieve is calculated. A second sample is placed on the No. 30 sieve without the disks, shaken for 5 minutes, and the percent of material passing through the sieve calculated. The weight percent attrition is calculated by subtracting the percent of material passing through the sieve when no disks are added from the percent passing through the sieve when the disks are added.

APPARATUS

Balance, triple-beam, 0.01 g sensitivity, available from Sargent-Welch Scientific Co., or equivalent

Brush, 2-inch wide, paint brush with bristles cut to 1-inch length, or equivalent

Plastic disks, 3/4-inch diameter x 1/16-inch thick, cut from polymethyl methacrylate rod, (Plexiglas rod), or equivalent

Riffler, Sepor "Micro-Splitter", or equivalent apparatus, designed for sample volumes of 1-liter or less, available from Sepor Laboratory Supply, or equivalent

Sieve, 8-inch diameter, U.S.A. Series No. 30, with cover and two bottom pans (ASTM E-11 Specification), available from W. S. Tyler, Inc. or equivalent

Sieve-shaker, W. S. Tyler "Ro-Tap", with timer, available from W. S. Tyler, Inc., or equivalent

IT IS THE USER'S RESPONSIBILITY TO ESTABLISH APPROPRIATE PRECAUTIONARY PRACTICES AND TO DETERMINE THE APPLICABILITY OF REGULATORY LIMITATIONS PRIOR TO USE. EFFECTIVE HEALTH AND SAFETY PRACTICES ARE TO BE FOLLOWED WHEN UTILIZING THIS PROCEDURE. FAILURE TO UTILIZE THIS PROCEDURE IN THE MANNER PRESCRIBED HEREIN CAN BE HAZARDOUS. MATERIAL SAFETY DATA SHEETS (MSDS) OR EXPERIMENTAL MATERIAL SAFETY DATA SHEETS (EMSDS) FOR ALL OF THE MATERIALS USED IN THIS PROCEDURE SHOULD BE REVIEWED FOR SELECTION OF THE APPROPRIATE PERSONAL PROTECTION EQUIPMENT (PPE).

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PROCEDURE

- A. Nest the U.S.A. No. 30 sieve on the bottom pan. Place approximately 100 - mL of a carefully riffled sample on the top of the sieve, along with 10 plastic disks. Cover and place in the sieve shaker. Adjust the shaker to properly hold the set. Shake for 10 minutes and remove the sieve from the shaker. Remove the disks and carefully dump the material retained on the sieve into a separate bottom pan by inverting the sieve over the pan. Brush the underside of the sieve to remove material lodged in the mesh. Weigh the material to the nearest 0.1 g and record as the weight of material retained on the sieve. Obtain the weight of the material in the bottom pan.
- B. Place approximately 100-mL of another portion of carefully riffled sample on the nested U.S.A. No. 30 sieve. Do not add plastic disks. Cover and place in the sieve shaker. Shake for 5 minutes and remove the sieve from the shaker. Carefully dump the material retained on the sieve into a separate bottom pan by inverting the sieve over the pan. Brush the underside of the sieve to remove material lodged in the mesh. Weigh the material to the nearest 0.1 g and record as the weight of material retained on the sieve. Obtain the weight of the material in the bottom pan.

This part of the method may be ignored if "Size Distribution of Charcoal Particles" (UOP Method 801), has also been run. In this event, use the weight-percent reported "through U.S.A. No. 30 sieve" as "C" in *CALCULATIONS*.

CALCULATIONS

Calculate the weight-percent, C, of the original sample *through* the U.S.A. No. 30 sieve (*PROCEDURE B*) as follows:

$$C, \text{ wt-\%} = \frac{X \ 100}{Y}$$

where:

X = material through the U.S.A. No. 30 sieve, g
Y = total material recovered, g

Calculate the weight-percent attrition as follows:

$$\text{Attrition wt-\%} = \frac{A \ 100}{B} - C$$

where:

A = material through U.S.A. No. 30 sieve after attrition, g
B = total material recovered after attrition, g
C = material through U.S.A. No. 30 sieve with no attrition, as calculated above or from UOP Method 801, wt-%

TIME FOR ANALYSIS

The elapsed time for one analysis including size distribution is 1.46 hours or 0.70 hour if size distribution is done separately. The labor requirement including size distribution is 0.80 man-hour or 0.40 man-hour if size distribution is done separately.

SUGGESTED SUPPLIERS

Sargent-Welch Scientific Co., 7300 N. Linder Ave., Skokie, IL 60076
 Sepor Laboratory Supply, P.O. Box 1252, 718 N. Fries, Wilmington, CA 90744
 W. S. Tyler, Inc., 8200 Tyler Boulevard, Mentor, OH 44060