



Designation: D 3860 – 98

## Standard Practice for Determination of Adsorptive Capacity of Activated Carbon by Aqueous Phase Isotherm Technique<sup>1</sup>

This standard is issued under the fixed designation D 3860; 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 practice covers the determination of the adsorptive capacity of activated carbon to remove undesirable constituents from water and waste water. It can be used to evaluate the adsorptive capacity of activated or reactivated carbon.

1.2 This practice is not recommended unless special precautions are taken to reduce loss during sample preparation and analysis.

1.3 This practice is recommended to determine the adsorptive capacity of activated carbon for the following applications, but is not limited to these applications:

1.3.1 Removal of color from dye mill waste water,

1.3.2 Removal of taste or odor constituents, or both, from potable waters,

1.3.3 Removal of toxicants from water,

1.3.4 Removal of surface active agents from water,

1.3.5 Removal of BOD<sub>5</sub> from sanitary waste waters, and

1.3.6 Removal of TOC from industrial waste waters.

1.4 The following safety caveat applies to the procedure section of this practice: *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 1129 Terminology Relating to Water<sup>2</sup>

D 1193 Specification for Reagent Water<sup>2</sup>

D 3370 Practices for Sampling Water from Closed Conduits<sup>2</sup>

D 2652 Terminology Relating to Activated Carbon<sup>3</sup>

D 2867 Test Method for Moisture in Activated Carbon<sup>3</sup>

E 300 Practice for Sampling Industrial Chemicals<sup>4</sup>

### 3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this practice relating to activated carbon, refer to Terminology D 2652.

3.1.2 For definition of terms used in this practice relating to water, refer to Terminology D 1129.

### 4. Summary of Practice

4.1 This practice consists of the determination of the adsorptive capacity of activated carbon for adsorbable constituents by contacting the aqueous solution with activated carbon, determining the amount of the constituents removed, and calculating the adsorptive capacity from a Freundlich isotherm plot.

4.1.1 Sample weights of activated carbon may have to be adjusted, depending on the concentration of adsorbable constituents in the water.

### 5. Significance and Use

5.1 This practice is used when activated carbon is considered as an adsorbent in treating water. Since both granular and powdered activated carbons are commercially available, a standard practice is needed to ensure that the activated carbons are evaluated under the same test conditions. Specified particle size carbon is to be used to ensure that the same test conditions are used. The practice is generally performed at 20°C; however, other temperatures may be used and noted.

### 6. Interferences

6.1 The water sample must not contain any immiscible oil.

6.2 Generally, membrane filters contain a slight amount of leachable surfactants and wetting agents that might be a source of detectable error in waters having low concentrations of adsorbable constituents.

### 7. Apparatus

7.1 *Agitator*, able to keep slurried activated carbon in suspension.

NOTE 1—A wrist-action shaker or a magnetic stirrer is suitable as an agitator.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D-28 on Activated Carbon and is the direct responsibility of Subcommittee D28.02 on Liquid Phase Evaluation Tests.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 11.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 15.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 15.05.