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Standard Practice for Estimating the Operating Performance of Granular Activated Carbon for Removal of Soluble Pollutants from Water¹

This standard is issued under the fixed designation D 3922; 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.

^{ε1}NOTE—Section 13 was added editorially in September 1993.

1. Scope

1.1 This practice covers the determination of the operating capacity of granular activated carbon (GAC) to remove soluble pollutants from water. This practice can be used to determine the operating capacity of virgin and reactivated granular activated carbons.

1.2 This practice can be applied to all types of water, including industrial waste waters, potable waters, sanitary wastes and effluent waters.

1.3 This practice is recommended to determine the operating capacity of GAC on a weight basis for removals of the following from water, but is not limited to these:

- 1.3.1 Removal of color,
- 1.3.2 Taste and odor,
- 1.3.3 Toxicants,
- 1.3.4 Surface active agents,
- 1.3.5 BOD₅ from sanitary waste waters, and
- 1.3.6 TOC from industrial waste waters.

1.4 *This standard does not purport to address all of the safety problems, 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 Water²
 - D 1193 Specification for Reagent Water²
 - D 2652 Definitions of Terms Relating to Activated Carbon³
 - D 2867 Test Method for Moisture in Activated Carbon³
 - D 3370 Practices for Sampling Water²
 - E 300 Practice for Sampling Industrial Chemicals⁴

3. Terminology

3.1 Definitions:

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

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

4. Summary of Practice

4.1 The operating capacity of the GAC is determined by passing the water sample at a fixed flow rate through a bed of GAC contained in a column until the effluent quality has degraded to a predetermined level.

5. Significance and Use

5.1 This practice can be used to determine effluent quality obtainable when treating a water sample with GAC of removal of soluble pollutants, and is generally performed at 20°C. However, other temperatures may be used and recorded.

5.2 This practice can be used to compare different types of GAC.

6. Interference

6.1 Insoluble materials, such as oils, emulsions, and solid particulates, will interfere with the adsorption of solubles by the GAC. These materials must be removed by suitable means.

7. Apparatus (see Fig. 1)

7.1 The test assembly consists of the following:

7.1.1 *Column*, vertically supported, 25.4 ± 2.5 mm (1.0 ± 0.1 in.) inside diameter and approximately 92 cm (36 in.) long. (The inside diameter of the column should be at least 10 times the average particle diameter of the GAC being evaluated. Connections shall be provided at top and bottom for admission and discharge of solution and back wash capabilities as described in 10.3. Adequate means for measuring flow and through-put volume shall be provided.

7.1.2 *Support for GAC*—A suggested support utilizes a 60-mesh screen of a material compatible with the solution. Other supports such as glass beads or pea-size gravel may be used.

8. Reagents and Materials

8.1 *Granular activated carbon (GAC).*

8.2 *Reagent grade water, Type IV.*

8.2.1 *Purity of Water*—Unless otherwise indicated, reference to water shall be understood to mean Type IV reagent water conforming to Specification D 1193.

¹ 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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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 15.01.

⁴ *Annual Book of ASTM Standards*, Vol 15.05.