



Designation: D5919 – 96 (Reapproved 2017)

Standard Practice for Determination of Adsorptive Capacity of Activated Carbon by a Micro-Isotherm Technique for Adsorbates at ppb Concentrations¹

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1. Scope

1.1 This practice covers the assessment of activated carbon for the removal of low concentrations of adsorbable constituents from water and wastewater using the bottle point isotherm technique. It can be used to characterize the adsorptive properties of virgin and reactivated activated carbons.

1.2 This practice can be used in systems with constituent concentrations in the low milligrams per litre or micrograms per litre concentration ranges.

1.3 This practice can be used to determine the adsorptive capacity of and Freundlich constants for volatile organic compounds provided the handling procedures described in this practice are followed carefully.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 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:²

D1129 Terminology Relating to Water

D1193 Specification for Reagent Water

D2652 Terminology Relating to Activated Carbon

D2867 Test Methods for Moisture in Activated Carbon

D3370 Practices for Sampling Water from Closed Conduits

¹ This practice is under the jurisdiction of ASTM Committee D28 on Activated Carbon and is the direct responsibility of Subcommittee D28.02 on Liquid Phase Evaluation.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this practice relating to activated carbon, refer to Terminology D2652.

3.1.2 For definitions of terms used in this practice relating to water, refer to Terminology D1129.

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 contained in an essentially zero headspace container with activated carbon, determining the amount of the constituents removed, and calculating the adsorptive capacity and the Freundlich constants, K and $1/n$, from a Freundlich isotherm plot.

4.1.1 The weights of activated carbon used in this practice may have to be adjusted to achieve reasonable levels of removal of the constituent. The best data is obtained when carbon dosages are selected that result in no more than 90 % or no less than 10 % of the adsorbable constituents being removed from the water by the carbon.

4.1.2 If carbon dosages used are less than 1 mg, larger volumes of the aqueous solution may be used, such as 1000 mL.

5. Significance and Use

5.1 This practice allows the adsorption capacity at equilibrium of an activated carbon for adsorbable constituents present in water to be determined. The Freundlich K and $1/n$ constants that can be calculated based upon information collected using this practice can be used to estimate carbon loading capacities and usages rates for the constituent present in a water stream at other concentrations.

6. Interferences

6.1 The water shall not contain any nondissolved components.

6.2 The presence of naturally occurring organic compounds such as humic acids in the water being studied may significantly affect the ability of the carbon to adsorb the constituent