



Standard Test Method for Determining a Sorption Constant (K_{oc}) for an Organic Chemical in Soil and Sediments¹

This standard is issued under the fixed designation E 1195; 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 test method describes a procedure for determining the partitioning of organic chemicals between water and soil or sediment. The goal is to obtain a single value which can be used to predict partitioning under a variety of environmental conditions from the measurement of sorption coefficients for specific solids.

1.2 Sorption represents the binding process of chemicals to surfaces of soils or sediments through chemical, or physical, or both interactions.

1.3 The sorption of nonpolar organic chemicals, and to some extent polar organic chemicals, is correlated with the organic carbon content of the sorbing solid. Charged inorganic and organic molecules may behave differently, and some other property, such as, cation exchange capacity, clay content, or total surface area of sorbing solids, may influence sorption. Hydrous metal oxides of iron and aluminum may significantly affect sorption in sediments. In order to provide a sorption coefficient that is useful for a wide range of soils and sediments, the coefficient is based on organic carbon content. This approach, however, will not apply to all chemicals or all soils and sediments. In cases where it does not apply, the investigator may need to seek other methods of relating sorption to the properties of the chemical, soil, or sediment.

1.4 It is possible that, in addition to organic carbon, sorption is correlated with the total surface area of sorbing solids. This may be particularly important with solids having organic carbon contents so low that sorption to inorganic surfaces is significant in comparison to sorption by organic material. In such a case, inclusion of the total surface area into the sorption calculation may be useful. For further information on this subject see Ref (1).²

1.5 Equilibrium sorption coefficients are determined. It is recognized that equilibrium conditions do not always exist in environmental situations, but sorption equilibria values are necessary for making generalizations about environmental partitioning.

1.6 Studies are conducted preferably with an analytical or technical-grade chemical. Mixtures are used only if analytical methods allow measurement of individual components of interest in the mixture. Good laboratory procedures must be followed to ensure validity of the data.

1.7 *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 421 Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants³

D 422 Test Method for Particle-Size Analysis of Soils³

D 1193 Specification for Reagent Water⁴

D 4129 Test Method for Total and Organic Carbon in Water by Oxidation Coulometric Detection⁵

2.2 Other standards:

OECD Test Guideline 106⁶

3. Terminology Definitions

3.1 *sorption distribution coefficient (K_d)*—the concentration of chemical sorbed by solids, in $\mu\text{g/g}$, on an oven-dry solids weight basis divided by the concentration of chemical in the water, in $\mu\text{g/g}$, at equilibrium.

¹ This test method is under the jurisdiction of ASTM Committee E47 on Biological Effects and Environmental Fate and is the direct responsibility of Subcommittee E47.04 on Environmental Fate of Chemical Substances.

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² The boldface numbers in parentheses refer to the list of references at the end of this test method.

³ *Annual Book of ASTM Standards*, Vol 04.08.

⁴ *Annual Book of ASTM Standards*, Vol 11.01.

⁵ *Annual Book of ASTM Standards*, Vol 11.02.

⁶ Available from the Organization for Economic Co-Operation and Development, 2, rue André Pascal F-75775 Paris Cedex 16 France.