



Designation: D4646 – 16 (Reapproved 2023)

Standard Test Method for 24 h Batch-Type Measurement of Contaminant Sorption by Soils and Sediments¹

This standard is issued under the fixed designation D4646; 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 sorption affinity of waste solutes by unconsolidated geologic material in aqueous suspension. The waste solute may be derived from a variety of sources such as wells, underdrain systems, or laboratory solutions such as those produced by waste extraction tests like the Practice D3987 shake extraction method.

1.2 This test method is applicable in screening and providing relative rankings of a large number of geomedia samples for their sorption affinity in aqueous leachate/geomedia suspensions. This test method may not simulate sorption characteristics that would occur in unperturbed geologic settings.

1.3 While this procedure may be applicable to both organic and inorganic constituents, care must be taken with respect to the stability of the particular constituents and their possible losses from solution by such processes as degradation by microbes, light, hydrolysis, or sorption to material surfaces. This test method should not be used for volatile chemical constituents (see 6.1).

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 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This test method is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.01.04 on Waste Leaching Techniques.

Current edition approved Nov. 1, 2023. Published November 2023. Originally approved as E8 10 – 85. Last previous edition approved in 2016 as D4646 – 16. DOI: 10.1520/D4646-16R23.

2. Referenced Documents

2.1 ASTM Standards:²

- D1193 Specification for Reagent Water
- D2216 Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- D3987 Practice for Shake Extraction of Solid Waste with Water
- D4319 Test Method for Distribution Ratios by the Short-Term Batch Method (Withdrawn 2007)³
- D5681 Terminology for Waste and Waste Management
- E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves
- E2551 Test Methods for Humidity Calibration (or Conformation) of Humidity Generators for Use with Thermogravimetric Analyzers

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminology D5681.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *distribution coefficient, K_d* —the ratio of the concentration of solute sorbed on the soil or other geomedia divided by its concentration in solution. A 24 h K_d is the analogous ratio evaluated after 24 h of contact of the solute with the geomedia.

3.2.1.1 *Discussion*—The dimensions of K_d reduce to units of volume per mass. It is convenient to express K_d in units of milliliters (or cubic centimeters) of solution per gram of geomedia. Dissimilar K_d values may be obtained if different initial solute concentrations are used, depending on the sorption behavior of the solute and the properties of the geomedia (that is, nonlinear sorption curve). This concentration dependency may be absent where the solute concentrations are sufficiently low or the characteristics of the particular solute-sorbent combination yield K_d values that are independent of the concentration of solute (that is, linear sorption curve).

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 The last approved version of this historical standard is referenced on www.astm.org.