
40 C.F.R. § 799.6784

TSCA water solubility: Column elution method; shake flask method.

(a) *Scope—(1) Applicability.* This section is intended to meet the testing requirements of the Toxic Substances Control Act (TSCA) (15 U.S.C. 2601).

(2) *Source.* The source material used in developing this TSCA test guideline is the Office of Pollution Prevention, Pesticides and Toxics (OPPTS) harmonized test guideline 830.7840 (March 1998, revised final guideline). This source is available at the address in paragraph (f) of this section.

(b) *Introductory information—(1) Prerequisites.* Suitable analytical method, structural formula, vapor pressure curve, dissociation constant, and hydrolysis independence of pH (preliminary test).

(2) *Coefficient of variation.* The coefficient of variation on the mean values reported by the participants of the Organization for Economic Cooperation and Development (OECD) Laboratory Intercomparison Testing, Part I, 1979, appeared to be dependent on the chemicals tested and the test temperatures; it ranges from 0.05 to 0.34 for the column elution method, and from 0.03 to 1.12 for the flask method.

(3) *Qualifying statements.* (i) The method is not applicable to volatile substances. Care should be taken that the substances examined are as pure as possible and stable in water. It must be ascertained that the identity of the substance is not changed during the procedure.

(ii) The column elution method is not suitable for volatile substances. The carrier material used here may not yet be optimal. This method is intended for material with solubilities below approximately 10^{-2} gram/Liter (g/L).

(iii) The flask method is intended for materials with solubility above 10^{-2} g/L. It is not applicable to volatile substances; this method may pose difficulties in the case of surface-active materials.

(c) *Method—(1) Introduction, purpose, scope, relevance, application, and limits of test.* (i) A solution is a homogeneous mixture of different substances in a solvent. The particle sizes of the dispersed substances are of the same magnitude as molecules and ions; therefore, the smallest volumes which can be obtained from a solution are always of uniform composition.

(ii) Solubility in water is a significant parameter because:

(A) The spatial and temporal movement (mobility) of a substance is largely determined by its solubility in water.

(B) Water soluble substances gain ready access to humans and other living organisms.

(C) The knowledge of the solubility in water is a prerequisite for testing biological degradation and bioaccumulation in water and for other tests.

(iii) No single method is available to cover the whole range of solubilities in water, from relatively soluble to very low-soluble chemicals. A general test guideline for the determination of the solubility in water must

include methods which cover the whole range of water soluble substances. Therefore, this section includes two methods:

(A) One which applies to substances with low solubilities ($<10^{-2}$ g/L), referred to as the “column elution method.”

(B) The other which applies to substances with higher solubilities ($\leq 10^{-2}$ g/L), referred to as the “flask method.”

(2) *Definition.* The solubility in water of a substance is specified by the saturation mass concentration of the substance in water and is a function of temperature. The solubility in water is specified in units of weight per volume of solution. The SI-unit is killogram/meter (kg/m) ; g/L may also be used.

(3) *Reference substances.* The reference substances need not be employed in all cases when investigating a new substance. They are provided primarily so that calibration of the method may be performed from time to time and to offer the chance to compare the results when another method is applied. The values presented in table 1 of this section are not necessarily representative of the results which can be obtained with this test method as they have been derived from an earlier version of the test method.

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