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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Practice for Water Extraction of Residual Solids From Degraded Plastics for Toxicity Testing¹

This standard is issued under the fixed designation D 5152; 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 practice provides a procedure for leaching residual solids from degraded plastics, yielding an aqueous solution which can be used to determine the aquatic toxicity of the materials leached under the specified test conditions, and determine the materials extractable under nonspecified testing conditions. This practice may be used in conjunction with Test Methods D 4229, E 1192, E 1295 or other currently accepted toxicity test methods (see OECD Guideline 203 or 40FR 797).

1.2 This practice provides for the shaking of a known weight of photodegraded plastic with water of specified composition (see Terminology D 1129) and the separation of the aqueous phase (extract) for analysis. It describes the collection of samples from biodegradation and chemodegradation tests to be used for further analyses. In the event that a particular sample does not pass the toxicity test, chemical characterization of the degradation products can be performed on the aqueous extract to determine the source of the toxicity. The description of the performance of these analyses is beyond the scope of this practice.

1.3 *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 1293 Test Methods for pH of Water²

D 4229 Practice for Conducting Static Acute Toxicity Tests on Wastewater with Daphnia³

E 729 Guide for Conducting Acute Toxicity Tests with Fishes, Macroinvertebrates and Amphibians³

E 1192 Guide for Conducting Acute Toxicity Tests on Aqueous Effluents with Fishes, Macroinvertebrates and Amphibians³

E 1295 Guide for Conducting Three-Brood Renewal Toxic-

ity Tests with Ceriodaphnia dubia³

2.2 Other Standard:

OECD Guideline 203, Fish, Acute Toxicity Test 40FR797A (USEPA), A Variety of Toxicity Testing Procedures⁴

3. Terminology

3.1 For definitions and terms used in this practice, see Terminology D 1129 and the terminology sections in Practice D 4229 and Guide E 729.

4. Significance and Use

4.1 This practice is intended as a rapid means of obtaining an extract from the residual solids of degraded plastics. The extract may be used to estimate the release of certain constituents of degradable plastics under the laboratory conditions described in this procedure and the toxicity, or both, of these releases to aquatic organisms.

4.2 Some photodegradable plastic degradation test methods involve accelerated light exposure of plastic in an apparatus which may include cyclic applications of water spray, mist or condensation. However, for the purpose of this practice, the exposure of the plastic should be performed dry, with the moisture cycle turned off. This prevents premature elution of soluble degradation products from the plastic, and limits extraneous sources of contamination.

4.3 In plastic degradation test methods that are water based, the water utilized in the test method should be collected, preserved and stored in accordance with acceptable procedures for the specific chemical characterizations or toxicity assays to be carried out. Specific procedures for collection, preservation, and storage of these liquids are beyond the scope of this practice.

4.4 This practice is not intended to simulate any or all of the site specific leaching conditions to which degraded plastics may be subjected. It has not been scientifically demonstrated to represent actual disposal-site leaching conditions such as oceans, beaches, soils, compost heaps, or landfills.

4.5 This practice is end-point specific as written, in that it is focused on a post-degradation analysis. Water collection and storage as recommended here allows for further qualitative and quantitative toxicological testing procedures which are beyond

¹ Precision and Bias This practice is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.96 on Environmentally Degradable Plastics.

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² Annual Book of ASTM Standards, Vol 11.01.

³ Annual Book of ASTM Standards, Vol 11.04.

⁴ Available from Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402.