



Standard Test Method for Determining the Stability and Miscibility of a Solid, Semi-Solid, or Liquid Waste Material¹

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1. Scope

1.1 This test method is designed to determine whether a waste material reacts when it is mixed with air, water, strong acid, strong base, an oil/solvent mixture, other waste mixtures, or solid media such as a geological formation or solidification agents.

1.2 The miscibility of the waste material with the above media can also be defined.

NOTE 1—The following ASTM standards provide supplemental information: Test Methods D 4978, D 4979, D 4980, D 4981, D 4982, D 5049, D 5057, and D 5058.

1.3 *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.* For specific hazard statements, see Section 7.

2. Referenced Documents

2.1 ASTM Standards:

- D 1193 Specification for Reagent Water²
- D 4978 Test Methods for Screening of Reactive Sulfides in Waste³
- D 4979 Test Method for Physical Description Screening Analysis in Waste³
- D 4980 Test Methods for Screening of pH in Waste³
- D 4981 Test Method for Screening of Oxidizers in Waste³
- D 4982 Test Methods for Flammability Potential Screening Analysis of Waste³
- D 5049 Test Method for the Screening of Cyanides in Waste⁴
- D 5057 Test Method for the Screening of Apparent Specific Gravity and Bulk Density of Waste³

¹ This test method is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.01.06 on Analytical Methods.

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 11.04.

⁴ Discontinued. See 1998 *Annual Book of ASTM Standards*, Vol 11.04.

D 5058 Test Methods for Compatibility of Screening Analysis of Waste³

3. Summary of Test Method

3.1 The stability and miscibility of a waste material are observed when the waste is mixed with various media.

4. Significance and Use

4.1 This test method will identify waste materials that are potentially unstable when they come in contact with other materials at a waste treatment or disposal site.

4.2 This test method will serve to determine the miscibility of waste materials with various media, including other wastes.

4.3 This test method may not be applicable to all wastes. The appropriateness of these tests depends upon the proposed management of the waste.

4.4 Since the initiation of some chemical reactions are slow to take place, the user may wish to establish reagent-to-waste contact times prior to observing the mixes for any reactions.

5. Apparatus and Materials

5.1 *Disposable Cups*, minimum 40-mL total volume. Select plastics or other materials compatible with the reagents involved.

5.2 *Stirring Rods, Spatulas, Disposal Droppers, Watch Glasses*, and so forth.

5.3 Other waste materials to be evaluated with the test sample.

5.4 *Solid Media*, to be evaluated with the test sample.

6. Reagents

6.1 *Purity of Water*—The deionized water used to prepare the aqueous test solutions should conform to the conductivity specifications of ASTM Type II water as found in Specification D 1193.

6.2 *Hydrochloric Acid (HCl) Test Solution*, carefully mix 100 g of reagent grade hydrochloric acid (~36 %) with 900 g of deionized water.

6.3 *Sodium Hydroxide (NaOH) Test Solution*, carefully mix 200 g of reagent grade sodium hydroxide solution (~50 %) with 800 g of deionized water.

6.4 *Oil/Solvent Test Mixture*, prepare a fifty percent (50 %) by weight mixture of reagent grade perchloroethylene in USP grade mineral oil.

7. Hazards

7.1 Standard laboratory hygiene practices should be followed when conducting these tests. Potentially violent reactions may occur in performance of this test, so appropriate precautions may be advised.

7.2 All tests should be performed in a laboratory fume hood. Waste samples may produce toxic or noxious fumes when mixed with other substances.

7.3 The analyst should wear gloves that are resistant to acids, bases, and organic liquids.

8. Procedure

8.1 Refer to the sample's label and respective chemical composition data to determine if there is any waste component listed that could react with the agents or materials selected for testing.

8.2 *Air Stability:*

8.2.1 Open the cap of the sample container very slowly, and remove the cap slowly by sliding it across the top of the sample container.

8.2.2 If any evidence of fuming is observed when the container is first opened, close the container immediately and refer to the sample's respective chemical composition data to determine if there is any waste component listed that could be reactive in air. If no air reactive components are identified, then carefully open the container.

8.2.3 Using a glass, plastic spatula, or disposable dropper, remove a small portion of the sample and place it on a watch glass to observe any reaction of the waste in air. Note any reaction. If the waste sample is air reactive, do not proceed with any of the following steps.

8.3 *Water Stability:*

8.3.1 Mix liquid waste sample thoroughly, and place a 10-mL aliquot of the sample in a 40-mL plastic cup. For dry waste or sludges, add enough sample to fill the cup to the 10-mL mark.

8.3.2 Pour 10-mL of water slowly and carefully over the sample and observe any reaction. If no reaction is observed immediately, then mix the sample and water and note any reaction. Also estimate the volume percent solubility of the sample in water. If the waste appears to be water reactive, it is suggested that the appropriateness of the following steps be reviewed.

8.4 *Stability with Acid:*

8.4.1 Take a 10-mL aliquot of the well mixed liquid waste sample and place it in a 40-mL plastic cup. For dry waste or sludges, fill to the 10-mL mark.

8.4.2 Slowly and carefully add 10-mL of the HCl test solution or up to 10-mL until a reaction is observed. If no reaction is observed after the addition of 10-mL, then carefully mix the HCl solution with the sample until it is evenly mixed. Note any reaction that occurs. Also estimate the volume percent solubility of the sample in the acid.

8.5 *Stability with Base:*

8.5.1 Take a 10-mL aliquot of the well mixed liquid waste sample and place it in a 40-mL plastic cup. For dry waste or sludges, fill to the 10-mL mark.

8.5.2 Slowly and carefully add 10-mL of the NaOH test solution or up to 10-mL until a reaction is observed. If no reaction is observed after the addition of 10-mL, then carefully mix the NaOH solution with the sample until it is evenly mixed. Note any reaction that occurs. Also estimate the volume percent solubility of the sample in base.

8.6 *Stability with Organics:*

8.6.1 For waste material that may be mixed with other wastes for treatment and disposal, take a 10-mL aliquot of the well mixed liquid waste sample and place it in a 40-mL plastic cup. For dry waste or sludges fill to the 10-mL mark.

8.6.2 Slowly and carefully add 10-mL of oil/solvent mixture or up to 10-mL until a reaction is observed. If no reaction is observed after the addition of 10-mL, then carefully mix the oil/solvent with the sample until it is evenly mixed. Note any reaction that occurs. Also estimate the volume percent solubility of the sample with organics.

8.7 *Stability with Other Waste Materials or Solid Media:*

8.7.1 Place a 10-mL aliquot of the well mixed liquid sample in a 40-mL plastic cup. For dry waste or sludge, fill to the 10-mL mark.

8.7.2 Carefully and slowly add 10-mL of the other waste material or solid media or up to 10-mL until a reaction is observed. If no reaction is observed after the addition of the 10-mL, then carefully mix the contents of the plastic cup until evenly mixed. Note any reaction that occurs. Also note the volume percent solubility of the waste sample with the other waste material, if applicable.

9. Interpretation of Results

9.1 If the waste material reacts with any of the test media evaluated, resulting in the evolution of heat or the vigorous evolution of gases, then the waste will be termed unstable with that respective media.

9.2 The solubility of the waste material observed when mixed with the various liquid media can be an indication of the miscibility of the waste in those media.

10. Precision and Bias

10.1 *Precision*—It is not practicable to specify the precision of the procedure in Test Method D 5232 for measuring the stability and miscibility of a waste material, because no numerical data exist due to the wide variations in waste material compositions.


10.2 *Bias*—Since there is no accepted reference material suitable for measuring the bias for the procedure in Test Method D 5232 for measuring the stability and miscibility of a waste material, bias has not been determined.

11. Quality Control

11.1 Quality control samples and replicate evaluations should be performed at a level specified by the laboratory and at a predetermined frequency.

12. Keywords

12.1 miscibility; stability; waste

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