Designation: D 2761 – 89 (Reapproved 1998)

Standard Test Method for Analysis of Sodium Triphosphate by the Simplified Ion Exchange Method[1]

This standard is issued under the fixed designation D 2761; 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 covers the determination of ortho-, pyro-, and meta-phosphates in sodium triphosphate. It depends on direct flow elutriation through a column of ion exchange resin.

1.2 *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.* Material Safety Data Sheets are available for reagents and materials. Review them for hazards prior to usage.

2. Summary of Test Method

2.1 A sample of sodium triphosphate is introduced into an ion exchange resin column. The phosphate ions diffuse into the resin phase and are held by the resin cation. The anions are then selectively eluted from the column using different strengths of potassium chloride solutions. The ions with the least affinity are eluted first: ortho-, pyro-, tri-, and meta-phosphate, respectively. Colorimetric molybdenum blue procedure is used for phosphorus pentoxide (P_2O_5) determinations of each fraction and of total phosphate.

3. Apparatus

3.1 *Separatory Funnel*, 500-mL.

3.2 *Ion Exchange Column*, 31 cm (310 mm) long with 28-mm inside diameter.[2]

3.3 *Tubing*, vinyl (Tygon), ¼-in. (6-mm) inside diameter, ⅜-in. (9-mm) outside diameter.

3.4 *Tubing*, capillary, chemical-resistant glass, 1½-mm inside diameter, 7-mm outside diameter.

3.5 *Photometer*—A spectrophotometer or filter photometer suitable for measurements at approximately 650 nm with 10-mm cells.

4. Reagents

4.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.[3] Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

4.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean distilled water or water of equal purity.

4.3 *Ammonium Molybdate Solution* (100 g/L)—Dissolve 100 g of ammonium molybdate ($(NH_4)_6Mo_7O_{24}\cdot 4H_2O$) in water and dilute to 1 L.

4.4 *Ion-Exchange Resin*—Anion-exchange resin, 100 to 200-mesh, chloride form (**Caution,** see Note 1).

NOTE 1—**Caution:** This method as written is based on the use of analytical grade Dowex AG-1X8 anion exchange resin. Comparable results may not be obtained with other resins.

4.5 *Phosphate, Standard Solution* (1 mL = 0.05 mg P_2O_5)—Dissolve 0.9568 g of potassium dihydrogen phosphate (KH_2PO_4) in water and dilute to 500 mL. Transfer 25 mL of this solution to a 500-mL volumetric flask and dilute to volume.

4.6 *Potassium Acetate Stock Buffer Solution* (78.5 g/L, pH = 5.0)—Dissolve 78.5 g of potassium acetate ($KC_2H_3O_2$) in water and dilute to 1 L. Adjust the pH to 5.0 with glacial acetic acid.

NOTE 2—Add a pinch of mercuric iodide to inhibit mold growth.

4.7 *Potassium Chloride Solution* (22.35 g/L)—Dissolve 22.35 g of potassium chloride (KCl) in water, add 5 mL of the stock buffer solution (4.6), and dilute to 1 L (Note 2).

4.8 *Potassium Chloride Solution* (44.7 g/L)—Dissolve 44.7 g of KCl in water, add 5 ml of the stock buffer solution (4.6), and dilute to 1 L (Note 2).

[1] This test method is under the jurisdiction of ASTM Committee D-12 on Soaps and Other Detergents and is the direct responsibility of Subcommittee D12.14 on Analysis of Inorganic Alkaline Detergents.

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[2] Fischer and Porter, Model No. 1320, available from Scientific Glass Apparatus Co., Inc., Bloomfield, NJ as Catalog No. C4225X, has been found satisfactory for this purpose.

[3] *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.