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Potassium Metaphosphate

$(KPO_3)_n$
Metaphosphoric acid (HPO_3), potassium salt;
Potassium metaphosphate;
Potassium polymetaphosphate

CAS RN®: 7790-53-6.

DEFINITION

Potassium Metaphosphate is a straight-chain polyphosphate, having a high degree of polymerization. It contains the equivalent of NLT 59.0% and NMT 61.0% of phosphorus pentoxide (P_2O_5).

IDENTIFICATION

- **A.**

  Sample: 1 g, finely powdered

  Analysis: Add the *Sample*, slowly and with vigorous stirring, to 100 mL of sodium chloride solution (20 mg/mL).

  Acceptance criteria: A gelatinous mass is formed.

- **B. Identification Tests—General, *Potassium* ⟨191⟩**

  Sample: 0.5 g

  Analysis: Boil a mixture of the *Sample*, 10 mL of nitric acid, and 50 mL of water for 30 min, and cool.

  Acceptance criteria: Meets the requirements

- **C. Identification Tests—General, *Phosphate* ⟨191⟩**

  Sample: 0.5 g

  Analysis: Boil a mixture of the *Sample*, 10 mL of nitric acid, and 50 mL of water for 30 min, and cool.

  Acceptance criteria: Meets the requirements

ASSAY

- **Procedure**

  Sample: 200 mg

  Titrimetric system

  (See *Titrimetry* ⟨541⟩.)

  Mode: Residual titration

  Titrant: 1 N sodium hydroxide VS

  Back-titrant: 1 N sulfuric acid VS

  Endpoint detection: Visual

  Analysis: Mix the *Sample* with 15 mL of nitric acid and 30 mL of water. Boil for 30 min, cool, and dilute with water to 100 mL. Heat to 60°, add an excess of ammonium molybdate TS, and heat at 50° for 30 min. Filter, and wash the precipitate, first with 0.5 N nitric acid, and then with 10 mg/mL of potassium nitrate until the filtrate is no longer acid to litmus. Add 25 mL of water to the precipitate, dissolve it in 50.0 mL of *Titrant*, and add phenolphthalein TS. Titrate the excess sodium hydroxide with *Back-titrant*. Each mL of *Titrant* is equivalent to 3.086 mg of phosphorus pentoxide (P_2O_5).

  Acceptance criteria: 59.0%–61.0%

IMPURITIES

Change to read:

- ▲**Lead** ⟨251⟩, *Procedures, Procedure 1*▲ (CN 1-Jun-2023)

Sample solution: 1 g of Potassium Metaphosphate in 10 mL of 3 N hydrochloric acid

Acceptance criteria: The *Sample solution* contains NMT 5 µg of lead (corresponding to NMT 5 ppm of lead).

• **Limit of Fluoride**

Control: Water

Sample solution: Place 5.0 g of Potassium Metaphosphate, 25 mL of water, 50 mL of perchloric acid, 5 drops of 500 mg/mL silver nitrate, and a few glass beads in a 250-mL distilling flask connected with a condenser and carrying a thermometer and a capillary tube, both of which extend into the liquid. Connect a small dropping funnel, filled with water, or a steam generator to the capillary tube. Support the flask on a distillation shield with a hole that exposes one-third of the bottom of the flask to the flame. Distill into a 250-mL volumetric flask until the temperature reaches 135°. Add water from the funnel or introduce steam through the capillary to maintain the temperature between 135° and 140°. Continue the distillation until 225–240 mL has been collected, then dilute with water to volume.

Analysis: Transfer 50.0 mL of the *Sample solution* to a 100-mL color-comparison tube, and transfer 50.0 mL of the *Control* to a similar tube. Add to each tube 0.1 mL of a filtered solution of sodium alizarinsulfonate TS and 1 mL of freshly prepared 0.25 mg/mL hydroxylamine hydrochloride. Add, dropwise and with stirring, 0.05 N sodium hydroxide to the tube containing the distillate until its color just matches that of the *Control*, which is faintly pink. Then add to each tube 1.0 mL of 0.1 N hydrochloric acid. From a buret, graduated in 0.05-mL increments, add slowly to the tube containing the distillate, enough 0.25-mg/mL thorium nitrate solution so that, after mixing, the color of the liquid just changes to a faint pink. Note the volume of the solution added, add the same volume to the *Control*, and mix. Then add sodium fluoride TS (10 µg/mL of fluorine) to the *Control* from a buret to make the colors of the two tubes match after dilution to the same volume. Mix, and allow all air bubbles to escape before making the final color comparison. Check the endpoint by adding 1 or 2 drops of sodium fluoride TS to the *Control*. A distinct change in color appears.

Acceptance criteria: 10 µg/g; the volume of sodium fluoride TS required for the *Control* is NMT 1.0 mL.

SPECIFIC TESTS

• **Viscosity—Capillary Methods** ⟨911⟩

Sample solution: Mix 300 mg with 200 mL of 3.5 mg/mL sodium pyrophosphate, using a magnetic stirrer.

Analysis: Using an Ostwald-Fenske viscometer maintained at 25°, determine the viscosity of the clear solution obtained, or of the liquid phase of the mixture obtained after 30 min of continuous stirring.

Acceptance criteria: 6.5–15 mPa · s

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in well-closed containers.

Auxiliary Information - Please check for your question in the FAQs before contacting USP.

Topic/Question	Contact	Expert Committee
POTASSIUM METAPHOSPHATE	Documentary Standards Support	SE2020 Simple Excipients
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SE2020 Simple Excipients

Chromatographic Database Information: Chromatographic Database

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