

Lead Not more than 10 mg/kg.

Loss on Ignition Not more than 1.0%.

Substances Not Precipitated by Sulfide Not more than 0.5%.

TESTS

Assay Dissolve about 1.5 g of freshly ignited sample, accurately weighed, and 2.5 g of ammonium chloride in 50.0 mL of 1 *N* sulfuric acid with the aid of gentle heat, if necessary. When solution is complete, add methyl orange TS, and titrate the excess sulfuric acid with 1 *N* sodium hydroxide. Each milliliter of 1 *N* sulfuric acid is equivalent to 40.69 mg of ZnO.

Alkalinity Suspend 2 g of sample in 20 mL of water, boil for 1 min, filter, and add 0.1 mL of phenolphthalein TS to the filtrate. No red color appears.

Cadmium Determine as directed under *Cadmium Limit Test*, Appendix IIIB, using the following as the *Sample Solution*: Transfer 5 g of sample, accurately weighed, into a 50-mL volumetric flask, dissolve in a minimum volume of 2:3 hydrochloric acid, dilute to volume with water, and mix.

Lead Determine as directed in the *APDC Extraction Method* under *Lead Limit Test*, Appendix IIIB, using a 5-g sample.

Loss on Ignition Ignite about 2 g of sample, accurately weighed, at $800^{\circ} \pm 25^{\circ}$ to constant weight.

Substances Not Precipitated by Sulfide Transfer 2 g of sample, accurately weighed, into a 200-mL volumetric flask, dissolve in 20 mL of 1:4 acetic acid, dilute to about 150 mL with water, and mix. Precipitate the zinc completely with ammonium sulfide TS, dilute to volume with water, and mix. Filter through a dry filter, discarding the first portion of filtrate, and collect 100 mL of the subsequent filtrate. Add a few drops of sulfuric acid, and evaporate to dryness on a steam bath in a tared dish. Ignite cautiously until the ammonium salts are volatilized, ignite to constant weight at $800^{\circ} \pm 25^{\circ}$, cool, and weigh. The weight of the residue does not exceed 5 mg.

Packaging and Storage Store in well-closed containers.

Zinc Sulfate

ZnSO₄·H₂O Formula wt, monohydrate 179.45
ZnSO₄·7H₂O Formula wt, heptahydrate 287.54

CAS: monohydrate [7446-19-7]

CAS: heptahydrate [7446-20-0]

DESCRIPTION

Zinc Sulfate occurs as colorless, transparent prisms or small needles, or as a granular, crystalline powder. It contains one or seven molecules of water of hydration. The monohydrate loses water at temperatures above 238°; the heptahydrate effloresces in dry air at room temperature. Its solutions are acid

to litmus. The monohydrate is soluble in water and practically insoluble in alcohol. One gram of the heptahydrate dissolves in about 0.6 mL of water and in about 2.5 mL of glycerin; it is insoluble in alcohol.

Function Nutrient.

REQUIREMENTS

Identification A 1:20 aqueous solution gives positive tests for *Zinc* and for *Sulfate*, Appendix IIIA.

Assay *Monohydrate*: Not less than 98.0% and not more than 100.5% of ZnSO₄·H₂O; *Heptahydrate*: Not less than 99.0% and not more than 108.7% of ZnSO₄·7H₂O.

Acidity Passes test.

Alkalies and Alkaline Earths Not more than 0.5%.

Cadmium Not more than 2 mg/kg.

Lead Not more than 4 mg/kg.

Mercury Not more than 5 mg/kg.

Selenium Not more than 0.003%.

TESTS

Assay Dissolve about 175 mg of the monohydrate, or about 300 mg of the heptahydrate, accurately weighed, in 100 mL of water, add 5 mL of ammonia–ammonium chloride buffer TS and 0.1 mL of eriochrome black TS, and titrate with 0.05 *M* disodium EDTA until the solution turns deep blue. Each milliliter of 0.05 *M* disodium EDTA is equivalent to 8.973 mg of ZnSO₄·H₂O, or 14.38 mg of ZnSO₄·7H₂O.

Acidity Add methyl orange TS to a 1:20 aqueous solution. A pink color does not appear.

Alkalies and Alkaline Earths Transfer 2 g of sample into a 200-mL volumetric flask, dissolve in about 150 mL of water, and precipitate the zinc completely with ammonium sulfide TS. Dilute to volume with water, and mix. Filter through a dry filter, rejecting the first portion of the filtrate, and add a few drops of sulfuric acid to 100 mL of the subsequent filtrate. Evaporate to dryness in a tared dish, ignite to constant weight, cool, and weigh. The weight of the residue does not exceed 5 mg.

Cadmium Determine as directed under *Cadmium Limit Test*, Appendix IIIB.

Lead Determine as directed in the *APDC Extraction Method* under *Lead Limit Test*, Appendix IIIB, using a 5-g sample.

Mercury Determine as directed under *Mercury Limit Test*, Appendix IIIB, using the following as the *Sample Preparation*: Dissolve 400 mg of sample in 10 mL of water in a small beaker, add 1 mL of a 1:5 sulfuric acid solution and 1 mL of a 1:25 potassium permanganate solution, cover the beaker, boil for a few seconds, and cool.

Selenium Determine as directed in *Method I* under *Selenium Limit Test*, Appendix IIIB, using 200 mg of sample.

Packaging and Storage Store in tight containers.