

CUPRIC SULFATE

Prepared at the 17th JECFA (1973), published in FNP 4 (1978) and in FNP 52 (1992). Metals and arsenic specifications revised at the 61st JECFA (2003). An MTDI of 0.5mg/kg bw of copper was established at the 26th JECFA (1982)

SYNONYMS Copper sulfate, blue stone, INS No. 519

DEFINITION

Chemical names Cupric sulfate
C.A.S. number 7758-98-7
Chemical formula $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
Formula weight 249.68
Assay Not less than 98.5% and not more than 104.5%

DESCRIPTION Deep blue triclinic crystals, or blue, crystalline granules or powder; effloresces slowly in dry air

FUNCTIONAL USES Antimicrobial preservative, colour fixative

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4) Freely soluble in water; slightly soluble in ethanol.

Test for copper (Vol. 4) Passes test

Test for sulfate (Vol. 4) Passes test

PURITY

Acidity Dissolve 1 g of the sample in 20 ml of water. A clear blue solution should be produced. Add 0.1 ml of methyl orange TS solution. The solution should turn brownish green.

pH (Vol. 4) A solution of the sample is acid to litmus

Insoluble matter (Vol. 4) Not more than 50 mg/kg

Nitrogen compounds Not more than 10 mg/kg.
Weigh 2 g of the sample to the nearest mg and dissolve in 50 ml of water. Add 1 g of Dewarda Metal and 30 ml of a 10% sodium hydroxide solution, and allow to stand protected from loss of ammonia for 2 h. Then distil gently about 40 ml of the solution into 5 ml of water containing 1 drop of dilute hydrochloric acid. Dilute the distillate to 50 ml, and add 1 ml of a 10% sodium hydroxide solution and 2 ml of Nessler solution TS. The colour produced should not be darker than that produced in a control containing 0.02 mg of nitrogen (0.08 mg NH_4Cl) and treated in the same manner as the sample.

Alkali and rare earths

Not more than 0.2%

To a solution of 3 g of the sample, weighed to the nearest mg, in 120 ml of water add 2 ml of hydrochloric acid. Warm to 70° and precipitate the copper with passing hydrogen sulfide. Dilute with water to 150 ml, allow to settle and filter. Evaporate 100 ml of the filtrate and ignite at 450° to 550° to constant weight. Cool, weigh and calculate as percentage. (The residue should not exceed 4 mg).

Lead (Vol. 4)

Not more than 10 mg/kg

Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."

Other metals

Not more than 50 mg/kg (as Ni)

To the residue from the above test for alkalis and rare earths add 2 ml of hydrochloric acid, 2 ml of water and 5 drops of nitric acid, and slowly evaporate on a steam bath to dryness. Take up the residue with 1 ml of hydrochloric acid and 10 ml of water, filter if necessary, and dilute to 50 ml. To 25 ml of the solution add a slight excess of strong ammonia TS, boil for 1 min, filter and wash with 15 ml of hot water. Then cool and dilute to 50 ml. Neutralize 20 ml of the solution to litmus paper with dilute hydrochloric acid TS. Add 5 drops of dilute ammonia TS and then 2 ml of hydrogen sulfide TS. The solution should not be darker than a control made with 0.02 mg of Ni in 25 ml of water, treated with 5 drops of dilute ammonia TS and 2 ml of hydrogen sulfide TS.

METHOD OF ASSAY

Weigh 1 g of the sample to the nearest 0.1 mg, and dissolve in 50 ml of water. Add 4 ml of acetic acid and 3 g of potassium iodide, and titrate the liberated iodine with 0.1 N sodium thiosulfate, using starch TS as the indicator. Perform a blank determination, and make any necessary correction. Each ml of 0.1 N sodium thiosulfate is equivalent to 24.97 mg of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$.