



Edition: BP 2025 (Ph. Eur. 11.6 update)

Manganese Sulfate

General Notices

Manganese Sulphate

MnSO₄·4H₂O 223.1 7785-87-7

DEFINITION

Manganese Sulfate is manganese(II) sulfate tetrahydrate. It contains not less than 98.0% and not more than 100.5% of MnSO₄, calculated with reference to the substance ignited at 450° to 500°.

CHARACTERISTICS

Pale pink crystals or crystalline powder.

Freely soluble in water; practically insoluble in ethanol (96%).

IDENTIFICATION

- A. Dissolve 0.5 g in 10 mL of water and add 1 mL of sodium sulfide solution. A pink precipitate is produced which is soluble in 6M acetic acid.
- B. To 0.1 g add 2 g of *lead(IV) oxide* and 5 mL of nitric acid, boil gently for a few minutes, add 100 mL of water and filter. A purple solution is produced.
- C. Yields the reactions characteristic of sulfates, Appendix VI.

TESTS

Arsenic

0.25 g complies with the limit test for arsenic, Appendix VII (4 ppm).

Heavy metals

Dissolve 0.50 g in 50 mL of water, add 1 mL of 1M acetic acid and pass hydrogen sulfide through the solution for 20 seconds. The colour produced within 2 minutes is not more intense than that obtained by

treating 10 mL of [lead standard solution \(2 ppm Pb\)](#) diluted to 50 mL in the same manner (40 ppm).

Iron

Dissolve 1.0 g in 10 mL of [water](#) and add 2 mL of 1M [hydrochloric acid](#) and, dropwise, 0.05M [potassium permanganate](#) until a permanent pink colour is produced. Add 5 mL of a 10% w/v solution of [ammonium thiocyanate](#) and 20 mL of a mixture of equal volumes of [isoamyl alcohol](#) and [amyl acetate](#), shake well and allow to separate. Any colour in the upper layer is not more intense than that obtained by treating 2 mL of [iron standard solution \(20 ppm Fe\)](#) diluted to 10 mL in the same manner (40 ppm).

Zinc

Dissolve 2.0 g in 10 mL of [water](#), add 3 mL of 1M [hydrochloric acid](#) and 0.3 mL of a freshly prepared 3% w/v solution of [potassium hexacyanoferrate\(II\)](#), mix and allow to stand for 15 minutes. Any turbidity produced is not more intense than that obtained by treating 10 mL of [zinc standard solution \(100 ppm Zn\)](#) in the same manner (500 ppm).

Chloride

15 mL of a 1.0% w/v solution complies with the [limit test for chlorides, Appendix VII](#) (330 ppm).

Loss on ignition

When ignited to constant weight at 450° to 500°, loses 31.0 to 34.0% of its weight. Use 1 g.

ASSAY

Dissolve 0.15 g in 40 mL of [water](#), add 8 mL of freshly boiled and cooled [nitric acid](#), cool, add 1.5 g of [sodium bismuthate](#) and shake for 2 minutes. Add 25 mL of a mixture of 3 volumes of [nitric acid](#) and 97 volumes of [water](#), filter, wash the residue with 40 mL of the mixture, collecting the filtrate and washings in 50 mL of 0.1M [ammonium iron\(II\) sulfate VS](#), and titrate immediately with 0.02M [potassium permanganate VS](#). Repeat the operation without the substance being examined. The difference between the titrations represents the amount of ammonium iron(II) sulfate required. Each mL of 0.1M [ammonium iron\(II\) sulfate VS](#) is equivalent to 3.020 mg of MnSO_4 .