# MAGNESIUM SILICATE (synthetic)

*Prepared at the 61st JECFA (2003), published in FNP 52 Add 11 (2003) superseding specifications prepared at the 25th JECFA (1981), published in FNP 25 (1981) and in FNP 52 (1992). An ADI 'not specified' was established at the 25th JECFA (1981).*

## SYNONYMS

INS No. 553(i)

## DEFINITION

Magnesium silicate (synthetic) is manufactured by the precipitation reaction between sodium silicate and a soluble magnesium salt. The aqueous suspension of the precipitate is filtered and the collected solid washed, dried, classified for particle size and packaged. The finest material is intended for use as an anticaking agent and the coarser particles are for use as a filtering aid. Although magnesium silicate is of variable composition, the molar ratio of MgO to $SiO_2$ is approximately 2:5.

Chemical name

Magnesium silicate

C.A.S. Number

1343-88-0

Assay

Not less than 15% of MgO and not less than 67% of $SiO_2$, calculated on the ignited basis.

## DESCRIPTION

Very fine, white, odourless powder, free from grittiness

## FUNCTIONAL USES

Anticaking agent, filtering aid

## CHARACTERISTICS

### IDENTIFICATION

Solubility (Vol. 4)

Insoluble in water and in ethanol; readily decomposed by mineral acids

pH (Vol. 4)

7.0 – 11.0 (1 in 10 slurry)

Magnesium (Vol. 4)

Mix about 0.5 g of the sample with 10 ml of dilute hydrochloric acid TS, filter, and neutralize the filtrate to litmus paper with ammonia TS. The neutralized filtrate gives a positive test for magnesium.

Silicate

Prepare a bead by fusing a few crystals of sodium ammonium phosphate on a platinum loop in the flame of a Bunsen burner. Place the hot, transparent bead in contact with the sample, and again fuse. Silica floats about in the bead, producing, upon cooling, an opaque bead with a web-like structure.

### PURITY

Loss on drying (Vol. 4)

Not more than 15% (105°, 2 h)
Retain the dried sample for determination of loss on ignition.

Loss on ignition (Vol. 4)

Not more than 15% on the dried basis
Weigh to the nearest 0.1 mg, 1 g of the dried sample in a tared platinum crucible provided with a cover. Gradually apply heat to the crucible at first,

then strongly ignite at 900/1000° for 20 min. Cool, weigh and calculate as percentage.

Free alkali

Not more than 1% (as NaOH)
Add 2 drops of phenolphthalein TS to 20 ml of dilute filtrate prepared in the test for Soluble salts (see below), representing 1 g of the sample. Not more than 2.5 ml of 0.1 N hydrochloric acid should be required to discharge the pink colour produced.

Soluble salts

Not more than 3%
Boil 10 g of the sample with 150 ml of water for 15 min. Cool to room temperature, and add water to restore the original volume. Allow the mixture to stand for 15 min, and filter until clear. Retain 20 ml of the filtrate for the test Free alkali. Evaporate 75 ml of the filtrate, representing 5 g of the sample in a tared platinum dish on a steam bath to dryness, and ignite gently to constant weight. Cool, weigh and calculate as percentage (the weight of the residue should not exceed 150 mg).

Fluoride (Vol. 4)

Not more than 10 mg/kg
Weigh 2.5 g of the sample to the nearest mg and proceed as directed in the Fluoride Limit Test (Method I or III).

Lead (Vol. 4)

Not more than 5 mg/kg
Determine using an atomic absorption technique appropriate to the specified level. The selection of the sample size and method of sample preparation may be based on the principles of the method described in Volume 4, “Instrumental methods”.

## METHOD OF ASSAY

Magnesium oxide: Weigh 1.5 g of the sample, to the nearest 0.1 mg, transfer into a 250 ml conical flask, add 50 ml of 1 N sulfuric acid, and digest on a steam bath for 1 h. Cool to room temperature, add methyl orange TS, and titrate the excess acid with 1 N sodium hydroxide. Each ml of 1 N sulfuric acid is equivalent to 20.15 mg of MgO.

Silicon dioxide: Transfer about 0.7 g of the sample, weighed to the nearest 0.1 mg (W1), into a 150 ml beaker add 20 ml of 1 N sulfuric acid, and heat on a steam bath for 1.5 h. Decant the supernatant liquid through an ashless filter paper, and wash the residue, by decantation, three times with hot water.

Treat the residue with 25 ml of water and digest on a steam bath for 15 min. Finally, transfer the residue to the filter paper and wash thoroughly with hot water. Transfer the filter paper and its contents to a platinum crucible. Heat to dryness, incinerate, then ignite strongly for 30 min, cool and weigh (W2).

Moisten the residue with water, and add 6 ml of concentrated hydrofluoric acid (warning: toxic, corrosive, must not contact skin; work with fume hood) and 3 drops of sulfuric acid TS. Evaporate to dryness, ignite for 5 min, cool and weigh.

The loss in weight represents the weight of $SiO_2$ (W3):

$$\%\mathrm{SiO2} = \frac{(\mathrm{W2} - \mathrm{W3})}{\mathrm{W1}} \cdot 100$$

Where:

W1 = Weight of sample taken
W2 = Weight after sulfuric acid treatment
W3 = Weight after concentrated hydrofluoric and sulfuric acid treatment