

CALCIUM SILICATE (TENTATIVE)

Tentative specifications prepared at the 77th JECFA (2013) and published in FAO JECFA Monographs 14 (2013), superseding specifications prepared at the 17th JECFA (1973), published in FNP 4 (1978) and in FNP 52 (1992). Metals and arsenic specifications revised at the 57th JECFA (2001). An ADI 'not specified' for silicon dioxide and certain silicates including calcium silicate was established at the 29th JECFA (1985)

Information required on the:

- *Use as food additive:*
- *Composition and methods of manufacture*
- *Functional uses other than anticaking agent, if used*
- *Data, on a minimum of five batches, on the content of calcium and silicon using the proposed "Method of assay"*
- *Data on loss on drying, loss on ignition, and pH of a 10% water slurry*
- *Data on lead, arsenic and mercury content in a minimum of five batches, carried out in the impurities soluble in 0.5 M hydrochloric acid using the proposed methods.*

SYNONYMS

INS No. 552

DEFINITION

A synthetic hydrous calcium silicate or polysilicate prepared by various reactions between siliceous material (e.g. diatomaceous earth) and natural calcium compounds (e.g. lime with varying proportions of other elements, such as magnesium, etc).

Chemical names

Calcium silicate

C.A.S. number

1344-95-2

Chemical formula

Information required

Assay

Information required

Not less than XX% and not more than XX% of calcium and not less than XX%, and not more than XX% of silicon on the dried basis.

DESCRIPTION

A very fine, white or off-white powder with low bulk density and high physical water adsorption

FUNCTIONAL USES

Anticaking agent

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4)

Insoluble in water and ethanol

Test for calcium Passes test
See description under TESTS

Test for silicon Passes test
See description under TESTS

PURITY

pH Information required

Loss on drying (Vol. 4) Information required

Loss on ignition (Vol. 4) Information required

Fluoride (Vol. 4) Not more than 50 mg/kg
Weigh 1 g of the sample to the nearest mg, and proceed as directed in the Limit Test (Method II).

Impurities soluble in 0.5 M hydrochloric acid Lead : Information required
Arsenic: Information required
Mercury: Information required
See description under TESTS

TESTS

IDENTIFICATION TESTS

Test for calcium and silicon Prepare the test solution as shown under method of assay. Analyze aluminum and silica in the test solution by ICP-AES technique (Vol. 4). Set instrument parameters as specified by the instrument manufacturer, use the analytical lines for Ca (393.366 nm) and Si (251.611 nm).

PURITY TESTS

Impurities soluble in 0.5 M hydrochloric acid Extract 20 g of finely ground sample under reflux conditions (to prevent loss of mercury) with 100 ml of 0.5 M hydrochloric acid (spectroscopic grade) for 30 min. Let solution cool, then filter through a 0.1 µm membrane filter. Wash the filter twice with hot 0.5 M hydrochloric acid. Combine the filtrate and wash solution in a 200 ml volumetric flask and make up to volume with 0.5 M hydrochloric acid.

Determine arsenic using an AAS (Hydride generation) technique; lead using an AAS (Electrothermal atomization) technique; and mercury using an AAS (Cold vapour generation) technique. See "Metallic impurities" in the Combined Compendium of Food Additive Specifications (Volume 4).

METHOD OF ASSAY

Weigh about 0.5 g of the sample to the nearest 0.1 mg, in a platinum or nickel crucible, add 5 g potassium hydroxide and 2 g boric acid, Mix and melt completely using a torch burner and allow to stand at room temperature. Place the reaction product along with crucible into 150 ml hot deionized water in a 250-ml PTFE beaker and dissolve residue by agitation. Wash the crucible with hot deionized water and remove it. Add 50 ml hydrochloric acid and transfer the contents into a 250-ml polypropylene volumetric flask. Wash the beaker three times with hot deionized water, transfer the washings to the volumetric flask and make up to volume. Dilute with 2% hydrochloric acid and prepare the test solution. Analyse aluminium and silica in the test solution by ICP-AES technique (Vol. 4). Set instrument parameters as specified by the instrument manufacturer. Use analytical lines for Ca (393.366 nm) and Si (251.611 nm) and construct standard curve using standard solutions 0.2 – 5.0 µg/ml each. Read the concentration of Ca and Si in sample solution (as µg/ml) and calculate the calcium and silicon content of the sample using the formula:

$$\text{Ca or Si (\%)} = \frac{C \times 250 \times \text{DF}}{W \times 10^6} \times 100$$

Where: C is concentration of Ca or Si in the test solution, µg/ml
W is weight of sample, g
DF is dilution factor