# SODIUM ALUMINIUM SILICATE (TENTATIVE)

*Prepared at the 80th JECFA and published in FAO JECFA Monographs 17 (2015), superseding tentative specifications prepared at the 77th JECFA (2013) and published in FAO JECFA Monographs 14 (2013). An ADI 'not specified' for silicon dioxide and certain silicates was established at the 29th JECFA (1985). A PTWI of 2 mg/kg bw for total aluminium was established at the 74th JECFA (2011). The PTWI applies to all aluminium compounds in food, including food additives.*

*Information required:*

- *Functional uses other than anticaking agent, if any, and information on the types of products in which it is used and the use levels in these products*
- *Data on solubility using the procedure documented in the "Compendium of Food Additives Specifications, Vol. 4, Analytical methods"*
- *Data on the impurities soluble in 0.5 M hydrochloric acid, from a minimum of five batches. If a different extraction and determination method is used, provide data along with details of method and QC data.*
- *Suitability of the analytical method for the determination of aluminium, silicon and sodium using the proposed "Method of assay" along with data, from a minimum of five batches, using the proposed method. If a different method is used, provide data along with details of the method and QC data.*

**SYNONYMS** Sodium silicoaluminate; sodium aluminosilicate; aluminium sodium silicate; silicic acid, aluminium sodium salt; INS No. 554

**DEFINITION** Sodium aluminium silicate is a series of amorphous hydrated sodium aluminium silicates with varying proportions of $Na_2O$, $Al_2O_3$ and $SiO_2$. It is manufactured by, precipitation process, reacting aluminium sulphate and sodium silicate.

Chemical names Aluminium sodium silicate

C.A.S. number 1344-00-9

Chemical formula $xSiO_2 \cdot yAl_2O_3 \cdot zNa_2O$

Assay Not less than 66% and not more than 88% as silicon dioxide ($SiO_2$), not less than 5% and not more than 15% as aluminium oxide ($Al_2O_3$) and not less than 5% and not more than 8.5% as sodium oxide ($Na_2O$); on the ignited basis.

**DESCRIPTION** Odourless, fine, white amorphous powder, or as beads

**FUNCTIONAL USES** Anticaking agent (information on other functional uses required)

## CHARACTERISTICS

IDENTIFICATION

| | |
|---|---|
| Solubility (Vol. 4) | Information required |
| Test for sodium | Passes test<br>See description under TESTS |
| Test for aluminium | Passes test<br>See description under TESTS |
| Test for silicon | Passes test<br>See description under TESTS |

PURITY

| | |
|---|---|
| pH (Vol. 4) | 6.5 – 11.5 (5% slurry) |
| Loss on drying (Vol. 4) | Not more than 8.0% ($105^{o}$, 2h) |
| Loss on ignition (Vol. 4) | Not less than 5.0% and not more than 11.0% on the dried basis ($1000^{o}$, constant weight) |
| Impurities soluble in 0.5 M hydrochloric acid | Lead : Not more than 5 mg/kg *(information required)*<br>Arsenic: Not more than 3 mg/kg *(information required)*<br>See description under TESTS |

## TESTS

IDENTIFICATION TESTS

| | |
|---|---|
| Test for aluminium, sodium and silicon | Prepare the test solution as shown under method of assay. Analyze 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 Al (396.15 nm), Na (589.52 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 with 100 ml of 0.5 M hydrochloric acid (spectroscopic grade) for 30 min. Let solution cool, and 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 and lead using an AAS (Electrothermal atomization) 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 Al (396.152 nm), Si (251.611 nm) and Na (589.52 nm). Construct standard curve using standard solutions 0.2 – 5.0 µg/ml each. Read the concentration of Al and Si in sample solution (as µg/ml). Conduct as a blank determination following the above procedure. Calculate the content of aluminium oxide, sodium oxide and silicon dioxide in the sample using the formula:

$$Al_2O_3\,(\%) = \frac{1.889 \times (C - B) \times 250 \times DF}{W \times 10^6} \times 100$$

$$Na_2O\,(\%) = \frac{1.348 \times (C - B) \times 250 \times DF}{W \times 10^6} \times 100$$

$$SiO2\,(\%) = \frac{2.139 \times (C - B) \times 250 \times DF}{W \times 10^6} \times 100$$

Where:

C is concentration of Al or Na or Si in the test solution, µg/ml
B is concentration of Al or Na or Si in the blank solution, µg/ml
W is weight of sample on the ignited basis, g
DF is dilution factor