ALUMINIUM SILICATE

Prepared at the 57th JECFA (2001) and published in the Combined Compendium of Food Additive Specifications, FAO JECFA Monographs 1 (2005). A PTWI of 2 mg/kg bw for aluminium was established at the 74th JECFA (2011).

SYNONYMS Kaolin, light or heavy; INS No. 559

DEFINITION A native hydrated aluminium silicate, freed from most of its impurities by elutriation and dried. The article of commerce may be further specified as to chloride, foreign substances, particle size, loss on drying, loss on ignition and pH value.

DESCRIPTION A soft, whitish powder free from gritty particles; odourless

FUNCTIONAL USES Anticaking agent

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4) Insoluble in water, ethanol and mineral acids

Plasticity To 8 g of the sample add 5 ml of water and mix well. The mixture is plastic

Test for silicate Mix about 500 mg of the sample with about 200 mg of anhydrous sodium carbonate and 2 g of anhydrous potassium carbonate, and heat the mixture in a platinum or nickel crucible until it melts completely. Cool, add 5 ml of water, and allow to stand for 3 min. Heat the bottom of the crucible gently, detach the melt, and transfer it to a beaker with the aid of about 50 ml of water. Add gradually hydrochloric acid until no effervescence is observed, then add 10 ml more of the acid, and evaporate the mixture on a steam bath to dryness. Cool, add 20 ml of water, boil and filter the mixture through an ash-free filter paper. An insoluble residue of silica remains. (Note. Retain the filtrate for the test for aluminium). Transfer the gelatinous residue into a platinum dish, and cautiously add 5 ml of hydrofluoric acid (warning: toxic, corrosive, must not contact skin; work under fume hood). The precipitate dissolves. (If it does not dissolve, repeat the evaporation with hydrofluoric acid.) Heat and hold in the vapours a glass stirring rod with a drop of water on the tip. The drop becomes turbid.

Test for aluminium (Vol. 4) Add ammonia TS to the filtrate obtained in the test for silicate. A white gelatinous precipitate is formed which is insoluble in excess ammonia but dissolves in sodium hydroxide TS.

PURITY

Water soluble substances Not more than 0.3%

See description under TESTS

Acid soluble substances — Not more than 2%
See description under TESTS

Asbestos — Absent
Electron microscope method (tentative): Prepare a sample to be as homogeneous as possible. Examination of a specimen of the sample from a minimum of 100 fields of view using a transmission electron microscope fails to reveal any fibrous material.

Lead (Vol. 4) — Not more than 5 mg/kg
Determine using an AAS/ICP-AES technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the methods described in Volume 4 (under “General Methods, Metallic Impurities”).

TESTS

Water soluble substances — Weigh 5 g of the sample to the nearest mg, and boil with 50 ml of water for 30 min, adding water from time to time to maintain approximately the original volume. Filter, evaporate the filtrate to dryness, dry at 105° for 1 h, and weigh.

% Water soluble substances = m/[10 x W]

where
m is the weight of the residue, in mg; and
W is the weight of the sample, in g.

Acid soluble substances — Weigh 2 g of the sample to the nearest mg, and boil with 100 ml of dilute hydrochloric acid TS under a reflux condenser for 15 min, cool, and filter. Evaporate 50 ml of the filtrate to dryness, then ignite gently to constant weight.

% Acid soluble substances = m/[5 x W]

where
m is the weight of the residue, in mg; and
W is the weight of the sample, in g.