POTASSIUM ALUMINIUM SILICATE-BASED PEARLESCENT PIGMENTS, Type II

Prepared at the 77th JECFA (2013), published *in FAO Monographs 14 (2013) replacing the tentative specifications prepared for potassium aluminium silicate-based pearlescent pigments prepared at the 74th JECFA (2011), published in FAO Monographs 11 (2011). 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. An ADI of 0-0.5 mg/kg bw for iron oxides was established at the 53rd JECFA (1999).*

SYNONYMS Mica-based pearlescent pigments, Type II; INS 176

DEFINITION Potassium aluminium silicate-based pearlescent pigments, Type II, are produced by the deposition of iron salts on potassium aluminium silicate followed by calcination at high temperatures. The resulting pigment consists of potassium aluminium silicate coated with iron oxide. The pigments can be produced with a variety of different pearlescent colour effects depending upon particle size and the amount of iron oxide deposited on the potassium aluminium silicate. Particles below a size of 100 nm shall not be present.

While values will vary for each individual pearlescent pigment in regards to the amounts of iron oxide and potassium aluminium silicate, particle size and pH of an aqueous slurry, general information can be provided for the pigments as a class. When considered together as a class, Type II pigments typically show ranges for iron oxide and potassium aluminium silicate in the pigments of 32-55%, and 45-68%, respectively. Similarly, when taken as a class, median particle size typically ranges from 18-25 µm.

Assay	Iron oxide (Fe_2O_3): Potassium aluminium silicate:	As labeled.

DESCRIPTION Powder with distinctive sheen.

FUNCTIONAL USES Colour

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4)	Practically insoluble or insoluble in water.
Test for Iron	Passes test See description under TESTS

PURITY

Loss on Drying (Vol. 4)	Not more than 0.5% (10 g sample, 105°, 2 h)

Impurities soluble in 0.5 M hydrochloric acid	Antimony:	Not more than 3 mg/kg
	Arsenic:	Not more than 3 mg/kg
	Barium:	Not more than 25 mg/kg
	Cadmium:	Not more than 1 mg/kg
	Chromium:	Not more than 100 mg/kg
	Copper:	Not more than 25 mg/kg
	Lead:	Not more than 4 mg/kg
	Mercury:	Not more than 1 mg/kg
	Nickel:	Not more than 50 mg/kg
	Zinc:	Not more than 25 mg/kg
	See description under TESTS	

TESTS

IDENTIFICATION TESTS

Test for Iron

Use the test solution as shown under method of assay. Analyze iron in the test solution by ICP-AES technique (Volume 4). Set instrument parameters as specified by the instrument manufacturer, use the analytical line for Fe (259.940 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; antimony, barium, chromium, copper, nickel and zinc by an ICP-AES technique; lead and cadmium 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

Determination of percent iron and aluminium: 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 (alkali fusion) and allow to stand at room temperature. Place the reaction product along with crucible in a 250-ml PTFE beaker, add 150 ml hot deionized water and dissolve residue by agitation. Wash the crucible with a small amount of hot water and add the washings to the beaker. Add 50 ml hydrochloric acid and transfer the contents into a 250-ml volumetric flask. Wash the beaker three times with hot water, transfer the washings to the volumetric flask and make up to volume (Solution A). Prepare the test solution by diluting Solution A with 2% hydrochloric acid solution to get the solution within the linear dynamic range of the analyzer. Analyze iron and aluminium in the test solution using ICP-AES (Vol. 4). Set instrument parameters as specified by the instrument manufacturer and use the analytical lines for iron (259.940 nm) and aluminium (396.152 nm). Determine the concentration (as µg/ml) of iron and aluminium from the respective standard curves. Calculate the percentage of iron oxide and potassium aluminium silicate using the formulas below:

$$\%\ Fe_2O_3\ (w/w)\ \text{in Potassium Aluminium Silicate-Based Pearlescent Pigments} = \frac{1.43 \times C_{Fe} \times 250 \times DF}{W \times 10^6}$$

$$\%\ \text{Potassium aluminium silicate (w/w) in Potassium Aluminium Silicate-Based Pearlescent Pigments} = \frac{4.92 \times C_{Al} \times 250 \times DF}{W \times 10^6}$$

Where:

C is Concentration of Fe or Al in the test solution, µg/ml
DF is Dilution factor (dilution of Solution A to get test solution)
W is Weight of sample, g