

# The Amendment of Standards for Specification, Scope, Application and Limitation of Food Additives

MOHW Food No. 1071301483, 19 June, 2018

## Appendix 2: Standards for Specification of Food Additives

### 12. Pasting Agent

§ 12008

#### Food Starches, Modified

#### Synonyms

Acid treated starch: INS No. 1401

Alkaline treated starch: INS No. 1402

Bleached starch: INS No. 1403

Oxidized starch: INS No. 1404

Monostarch phosphate: INS No. 1410

Distarch phosphate: INS No. 1412

Phosphated distarch phosphate: INS No. 1413

Acetylated distarch phosphate: INS No. 1414

Starch acetate: INS No. 1420

Acetylated distarch adipate: INS No. 1422

Hydroxypropyl starch: INS No. 1440

Hydroxypropyl distarch phosphate: INS No. 1442

Starch sodium octenylsuccinate: INS No. 1450

#### Definition

Food starches which have one or more of their original characteristics altered by treatment in accordance with good manufacturing practice by one of the procedures listed in Table 1. In the case of starches treated with heat in the presence of acid or with alkali, the alteration is a minor fragmentation. When the starch is bleached, the change is essentially in the color only. Oxidation involves the deliberate production of carboxyl groups. Acetylation results in substitution of hydroxyl groups with acetyl esters. Treatment with reagents such as orthophosphoric

acid results in partial substitution in the 2, 3- or 6- position of the anhydroglucose unit unless the 6-position is occupied for branching. In cases of cross-linking, where a polyfunctional substituting agent, such as phosphorus oxychloride, connects two chains, the structure can be represented by: Starch-O-R-O-Starch, where R = cross-linking group and Starch refers to the linear and/or branched structure.

C.A.S. number      Starch acetate: 9045-28-7  
                         Acetylated distarch adipate: 68130-14-3  
                         Hydroxypropyl starch: 9049-76-7  
                         Hydroxypropyl distarch phosphate: 53124-00-8  
                         Starch sodium octenylsuccinate: 66829-29-6

**Description**      Most modified starches are white or off-white, odourless powders. According to the drying method these powders can consist of whole granules having the appearance of the original native starch, or aggregates consisting of a number of granules (pearl starch, starch-grits) or, if pre-gelatinized, of flakes, amorphous powder or coarse particles.

### **Characteristics**

Identification

Solubility      Insoluble in cold water (if not pre-gelatinized); forming typical colloidal solutions with viscous properties in hot water; insoluble in ethanol.

Microscopy      Passes test  
                         Modified starches which have not been pre-gelatinized retain their granular structure and can be identified as starches by microscopic observation. Shape, size and sometimes striations are characteristics of the botanical

origin. In polarized light under cross nicol prisms the typical polarization cross will be observed.

Iodine stain

Passes test

Add a few drops of 0.1 N potassium tri-iodide to an aqueous suspension of the sample. These starches stain with iodine in the same way as native starches. The colour can range from dark blue to red.

Copper reduction

Passes test

Place about 2.5 g of the sample previously washed with water, in a boiling flask, add 10 ml of dilute hydrochloric acid (3%) and 70 ml of water, mix, reflux for about three hours and cool. Add 0.5 ml of the resulting solution to 5 ml of hot alkaline cupric tartrate TS. A copious red precipitate is produced

Differentiation test

Passes test for type of starch

1. Hypochlorite oxidized starch
2. Specific reaction for acetyl groups
3. Positive test for ester groups

Purity

Sulfur dioxide

Not more than 50 mg/kg for modified cereal starches

Not more than 10 mg/kg for other modified starches unless otherwise specified in Table 1

Lead

Not more than 2 mg/kg

Additional purity specifications for individual chemically modified starches

See Table 1

**Category**

Food additives category (12)

## Functional uses     Pasting Agents

Table 1. Additional purity specifications for individual chemically modified starches (All percentages calculated on dry substance)

<b>Modification</b>	<b>Process limitations</b>	<b>End-product specifications</b>
Acid treated starch	Treatment with hydrochloric acid or ortho-phosphoric acid or sulfuric acid	Final pH 4.8 – 7.0
Alkaline treated starch	Treatment with sodium hydroxide or potassium hydroxide	Final pH 5.0 – 7.5
Bleached starch	Treatment with peracetic acid and/or hydrogen peroxide, or sodium hypochlorite or sodium chlorite, or sulfur dioxide or alternative permitted forms of sulfites, or potassium permanganate or ammonium persulfate	Added carbonyl group not more than 0.1% No residual reagent Residual sulfur dioxide not more than 50 mg/kg Residual manganese not more than 50 mg/kg
Oxidized starch	Treatment with sodium hypochlorite	Carboxyl groups not more than 1.1% Residual sulfur dioxide not more than 50 mg/kg
Monostarch phosphate	Esterification with orthophosphoric acid, or sodium or potassium ortho-phosphate, or sodium tripolyphosphate	Phosphate calculated as phosphorus not more than 0.5% for potato or wheat, and not more than 0.4% for other

		starches
Distarch phosphate	Esterification with sodium trimetaphosphate or phosphorus oxychloride	Phosphate calculated as phosphorus not more than 0.5% for potato and wheat, and not more than 0.4% for other starches
Phosphated distarch phosphate	Combination of treatments for Monostarch phosphate and Distarch phosphate	Phosphate calculated as phosphorus not more than 0.5% for potato and wheat, and not more than 0.4% for other starches
Acetylated distarch phosphate	Esterification with sodium trimetaphosphate or phosphorus oxychloride combined with esterification with acetic anhydride or vinyl acetate	Acetyl groups not more than 2.5%; phosphate calculated as phosphorus not more than 0.14% for potato and wheat, and 0.04% for other starches; and vinyl acetate not more than 0.1 mg/kg
Starch acetate	Esterification with acetic anhydride or vinyl acetate	Acetyl groups not more than 2.5%
Acetylated distarch adipate	Esterification with acetic anhydride and adipic anhydride	Acetyl groups not more than 2.5% and adipate groups not more than 0.135%
Hydroxypropyl starch	Etherification with propylene oxide	Hydroxypropyl groups not more than 7.0%; propylene chlorohydrin

		not more than 1 mg/kg
Hydroxypropyl distarch phosphate	Esterification with sodium trimetaphosphate or phosphorus oxychloride combined with etherification by propylene oxide	Hydroxypropyl groups not more than 7.0%; propylene chlorohydrin not more than 1 mg/kg; and residual phosphate calculated as phosphorus not more than 0.14% for potato and wheat, and not more than 0.04% for other starches
Starch sodium octenylsuccinate	Esterification with octenylsuccinic anhydride	Octenylsuccinyl groups not more than 3%; and residual octenylsuccinic acid not more than 0.3%
Oxidized Hydroxypropyl Starch	Chlorine, as sodium hypochlorite, not to exceed 5.5% of dry starch; active oxygen obtained from hydrogen peroxide, not to exceed 0.45%; and propylene oxide, not to exceed 25%	Propylene chlorohydrin not more than 1 mg/kg
Starch Aluminum Octenyl Succinate	Octenyl succinic anhydride, not to exceed 2%, and aluminium sulfate, not to exceed 2%	—
Starch Sodium Succinate	Succinic anhydride, not to exceed 4%	—
Distarchoxy Propanol	Acrolein not to exceed	—

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0.6%