

# PROPYLENE GLYCOL ALGINATE

*Prepared at the 49th JECFA (1997), published in FNP 52 (1997) superseding specifications prepared at the 44th JECFA (1995), published in FNP 52 Add 3 (1995). An ADI of 0-70 mg/kg bw was established at the 41st JECFA (1993)*

**SYNONYMS** 1,2-propane-diol ester of alginic acid; hydroxypropyl alginate; propane 1,2-diol alginate; INS No. 405.

**DEFINITION** Propylene glycol alginate is an ester of alginic acid in which some of the carboxyl groups are esterified with propylene glycol, some neutralized with an appropriate alkali and some remain free.

C.A.S. number 9005-37-2

Chemical formula  $(C_9H_{14}O_7)_n$  (esterified)

Formula weight Structural unit : 234.21 (theoretical)  
Macromolecule : 10,000 - 600,000 (typical average)

Assay Yields, on the dried basis, not less than 16% and not more than 20% of carbon dioxide (CO<sub>2</sub>).

**DESCRIPTION** White to yellowish brown filamentous, grainy, granular or powdered forms

**FUNCTIONAL USES** Stabilizer, thickener, emulsifier

## CHARACTERISTICS

### IDENTIFICATION

Solubility (Vol. 4) Soluble in water giving a viscous, colloidal solution; soluble in up to 60% aqueous ethanol depending upon degree of esterification.

Precipitate formation with sulphuric acid To 10 ml of a 1% solution of the sample add 1 ml of sodium hydroxide TS. Heat in a boiling water bath for about 5 min, cool and add 1 ml of dilute sulphuric acid TS. A gelatinous precipitate is formed.

Precipitate formation with lead acetate To 5 ml of a 1% solution of the sample add 1 ml of lead acetate TS. A gelatinous precipitate is formed

### PURITY

Loss on drying (Vol. 4) Not more than 20% (105°, 4 h)

Water-insoluble matter Not more than 2% on the dried basis  
See description under TESTS

Total propylene glycol Not less than 15% and not more than 45%.  
See description under TESTS.

Free propylene glycol Not more than 15%  
See description under TESTS

<u>Arsenic</u> (Vol. 4)	Not more than 3 mg/kg (Method II)
<u>Lead</u> (Vol. 4)	Not more than 5 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."
<u>Microbiological criteria</u> (Vol. 4)	Total plate count: Not more than 5,000 colonies per gram. Initially prepare a $10^{-1}$ dilution by adding a 50 g sample to 450 ml of Butterfield's phosphate buffered dilution water and homogenizing in a high speed blender. Yeasts and moulds: Not more than 500 colonies per gram Coliforms: Negative by test Salmonella: Negative by test

## TESTS

### PURITY TESTS

<u>Water-insoluble matter</u>	Disperse 2 g of the sample, weighed to the nearest 0.1 mg, in 800 ml of water in a 2,000-ml flask. Neutralize to pH 7 with sodium hydroxide TS and then add 3 ml in excess. Add 40 ml of hydrogen peroxide solution containing 30% by weight $H_2O_2$ , cover the flask and boil for 1 h with frequent stirring. Filter while hot through a tared Gooch crucible provided with a glass fibre filter (2.4 cm, No 934 AH, Reeve Angel & Co, Clifton, N.Y., USA, or equivalent). If slow filtration is caused by high viscosity of the sample solution, boil until the viscosity is reduced enough to permit filtration. Wash the crucible thoroughly with hot water, dry the crucible and its contents at $105^\circ$ for 1 h, cool and weigh. Calculate as percentage of the dry weight.
<u>Total propylene glycol</u>	<p><u>Sample solution:</u> Weigh, to the nearest 0.1 mg, 1 g of the sample previously dried and dissolve in 100 ml distilled water in a 400-ml beaker. After dissolution add 50 ml of 0.1 N sodium hydroxide and stir for 30 min. At the end of this period neutralize with 0.1 N hydrochloric acid and precipitate the gum with 25 ml of a 5% calcium chloride solution. Filter the mixture using fast filter paper collecting the filtrate in a 250-ml volumetric flask. Wash the precipitate with several small portions of distilled water combining the washings with the filtrate and dilute to the mark with distilled water.</p> <p><u>Periodic acid, 0.029 M:</u> Add 5.500 g of periodic acid and 200 ml of distilled water to a 1-litre volumetric flask. Dilute to the mark with glacial acetic acid.</p> <p><u>Procedure:</u> Pipette a 25-ml aliquot of the sample solution and 25 ml of the 0.029 M periodic acid into a 250-ml conical flask, swirl and let stand for 30 min. At the end of this period add approximately 2 g of potassium iodide and titrate with 0.1 N sodium thiosulfate using 1% starch solution as an indicator.</p>

Perform a blank determination using 50 ml of distilled water and 25 ml of 0.029 M periodic acid. Calculate the percentage of propylene glycol by the formula:

$$\text{Propylene glycol \%} = \frac{3.8 (A - B)}{W}$$

where

A = ml 0.1 N sodium thiosulfate used for blank

B = ml 0.1 N sodium thiosulfate used for sample

W = weight of the sample (in grams)

#### Free propylene glycol

Determine the percentage of free propylene glycol in the sample by extracting 2 g of sample for 2 hours under reflux, using 80 ml of propan-2-ol. Allow the solution to cool to room temperature, then determine the quantity of free propylene glycol using titration with 0.029 M periodic acid as described under the procedure for Total propylene glycol.

#### **METHOD OF ASSAY**

Proceed as directed under Carbon Dioxide Determination by Decarboxylation in the *General Methods* (see Volume 4). Each ml of 0.25 N Sodium hydroxide consumed is equivalent to 5.5 mg of carbon dioxide (CO<sub>2</sub>).