

## Propylene Glycol Alginate

Hydroxypropyl Alginate; Algin Derivative

$(C_9H_{14}O_7)_n$

Equiv wt, *Calculated*, 234.21

INS: 405

CAS: [9005-37-2]

---

### DESCRIPTION

The propylene glycol ester of alginic acid (see the monograph for *Alginic Acid*) varies in composition according to its degree of esterification and the percentages of free and neutralized carboxyl groups in the molecule. It occurs as a white to yellowish, fibrous or granular powder. It is practically odorless and tasteless. It dissolves in water, in solutions of dilute organic acids, and depending upon the degree of esterification, in hydroalcoholic mixtures containing up to 60% by weight of alcohol to form stable, viscous colloidal solutions at a pH of 3.

**Functional Use in Foods** Stabilizer; thickener; emulsifier.

### REQUIREMENTS

**Identification** Transfer 20 mL of the saponified solution obtained in the determination of *Esterified Carboxyl Groups* into a 250-mL Erlenmeyer flask, add 50 mL of 0.1 M periodic acid, swirl, and allow to stand for 30 min. Add 2 g of potassium iodide, titrate with 0.1 N sodium thiosulfate to a faint yellow color, and then dilute the mixture to 200 mL with water. To 10 mL of this solution add 5 mL of hydrochloric acid and 10 mL of modified Schiff's reagent. A blue to blue violet color develops in about 20 min (*formaldehyde*). To another 10-mL portion of

the solution add 1 mL of a saturated solution of piperazine hydrate and 0.5 mL of sodium nitroferricyanide TS. A green color develops (*acetaldehyde*).

**Note:** Oxidation of Propylene Glycol Alginate yields formaldehyde and acetaldehyde.

**Assay** It yields not less than 16.0% and not more than 20.0% of carbon dioxide (CO<sub>2</sub>), calculated on the dried basis.

**Arsenic** (as As) Not more than 3 mg/kg.

**Esterified Carboxyl Groups** Not less than 40.0%.

**Free Carboxyl Groups** Not more than 35.0%, calculated on the dried basis.

**Heavy Metals** (as Pb) Not more than 0.002%

**Lead** Not more than 5 mg/kg.

**Loss on Drying** Not more than 20.0%.

**Neutralized Carboxyl Groups** Not more than 45.0%.

## TESTS

**Assay** Proceed as directed in the *Alginates Assay*, Appendix IIC.

**Arsenic** A *Sample Solution* prepared as directed for organic compounds meets the requirements of the *Arsenic Test*, Appendix IIIB.

**Esterified Carboxyl Groups** Transfer quantitatively the solution obtained in the determination of *Free Carboxyl Groups* into a 1-L Erlenmeyer flask, add a few drops of phenolphthalein TS and 50.0 mL of 0.1 N sodium hydroxide. Stopper the flask, swirl the solution, and then allow it to stand for 30 min at room temperature. Titrate the excess sodium hydroxide to a faint pink endpoint with 0.1 N hydrochloric acid. Transfer the solution to a 600-mL beaker and complete the titration to a pH of 7.0, determining the endpoint potentiometrically. Calculate the percentage of esterified carboxyl groups by the formula

$$(V \times 44)/(\% \text{ CO}_2 \times W),$$

in which *W* is the weight, in g, of the sample taken, calculated on the dried basis, for the *Free Carboxyl Groups* test, below; *V* is the volume, in mL, of 0.1 N sodium hydroxide consumed in this test; and % CO<sub>2</sub> is the percentage of carbon dioxide in the sample as determined by the *Assay*.

**Free Carboxyl Groups** Transfer about 1 g, accurately weighed, into a 600-mL beaker. Dissolve the sample in 200 mL of water, stirring mechanically for a minimum of 30 min, and titrate with 0.1 N sodium hydroxide to a pH of 7.0, determining the endpoint potentiometrically. Calculate the percentage of free carboxyl groups by the formula

$$(V \times 44)/(\% \text{ CO}_2 \times W),$$

in which *V* is the volume, in mL, of 0.1 N sodium hydroxide consumed; % CO<sub>2</sub> is the percentage of carbon dioxide in the sample as determined by the *Assay*; and *W* is the weight, in g, of the sample taken, calculated on the dried basis.

**Heavy Metals** Determine as directed under *Heavy Metals* in the monograph for *Alginic Acid*.

**Lead** A *Sample Solution* prepared as directed for organic compounds meets the requirements of the *Lead Limit Test*, Appendix IIIB, using 5 μg of lead ion (Pb) in the control.

**Loss on Drying, Appendix IIC** Dry at 105° for 4 h.

**Neutralized Carboxyl Groups** Calculate the percentage of neutralized carboxyl groups by subtracting the sum of the percentage of *Free Carboxyl Groups* and the percentage of *Esterified Carboxyl Groups* from 100%.

**Packaging and Storage** Store in well-closed containers.