A Ex Ammonium Alginate

1 Nonproprietary Names

None adopted.

2 Synonyms

Alginic acid, ammonium salt; ammonium polymannuronate; E404.

3 Chemical Name and CAS Registry Number

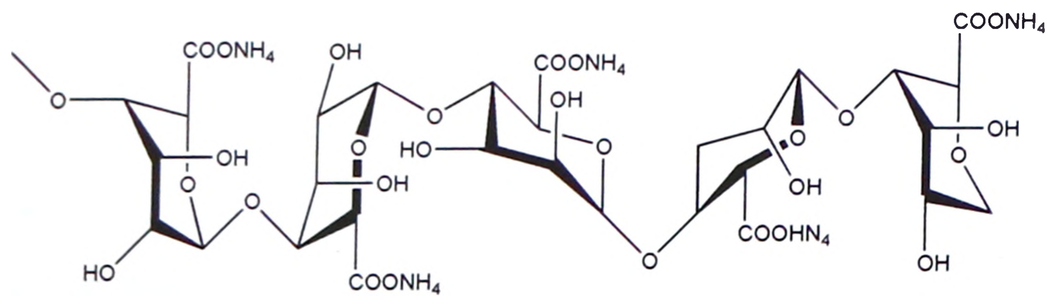
Ammonium alginate [9005-34-9]

4 Empirical Formula and Molecular Weight

$(C_6H_{11}NO_6)_n$ 193.16 (calculated)
217 (actual, average)

Ammonium alginate is the ammonium salt of alginic acid.

5 Structural Formula



The number and sequence of the mannuronate and glucuronate residues shown above vary in the naturally occurring alginate. The associated water molecules are not shown.

6 Functional Category

Emulsifying agent; film-forming agent;gelling agent; humectant; tablet and capsule binder; viscosity-increasing agent.

7 Applications in Pharmaceutical Formulation or Technology

Ammonium alginate is used in pharmaceutical preparations as an emulsifier, film-former, and humectant.

Hydrophilic matrix tablets based on an alginate system have been investigated for modified drug release.[1] Alginates have also been investigated for use in microparticle and hydrogel systems.[2–8] Alginate microspheres have been produced by internal gelation using emulsificiation methods.[9,10]

8 Description

Ammonium alginate occurs as white to yellowish brown filamentous, grainy, granular, or powdered forms.

9 Pharmacopeial Specifications

See Section 18.

10 Typical Properties

Moisture content Not more than 15% at 105°C for 4 hours.
Solubility Dissolves slowly in water to form a viscous solution; insoluble in chloroform, ethanol, ether and in acids having a pH lower than 3.0

11 Stability and Storage Conditions

Ammonium alginate is a hygroscopic material, although it is stable if stored at low relative humidities and cool temperatures.

12 Incompatibilities

Ammonium alginate is incompatible with oxidizing agents and strong acids and alkalis.

13 Method of Manufacture

Ammonium alginate is prepared from alginic acid, which is a polysaccharide extracted from the giant brown seaweed species of Phaeophyceae (*see* Alginic Acid), by an ion-exchange reaction whereby the alginic acid is neutralized with ammonium hydroxide and sufficient water. Final preparation includes a drying stage and milling to the desired particle size.

14 Safety

Ammonium alginate is widely used in cosmetics and food products, and also in pharmaceutical formulations such as tablets. It is generally regarded as a nontoxic and nonirritant material, although excessive oral consumption may be harmful.

15 Handling Precautions

Observe normal precautions appropriate to the circumstances and quantity of the material handled. Eye protection, gloves, and a dust respirator are recommended.

16 Regulatory Status

GRAS listed. Accepted in Europe for use as a food additive. Included in the FDA Inactive Ingredients Database (oral, tablets). Included in the Canadian Natural Health Products Ingredients Database.

17 Related Substances

Alginic Acid; calcium alginate; potassium alginate; propylene glycol alginate; sodium alginate.

18 Comments

Ammonium alginate and other alginate salts bind water very strongly due to the large number of carboxylate anions they contain.

Protanal (formerly *Keltose*; FMC Biopolymer) is a blend of ammonium alginate and calcium alginate.

Therapeutically, alginates provide an ideal moist healing environment, which makes them ideal for use in wound dressings.[11,12] Chitosan and alginates have been used together to produce sponges for use as wound dressings, or matrices for tissue engineering.[13]

Ammonium alginate is also widely used in foods as a thickener and emulsifier.

Table I: FCC specification for ammonium alginate.[14]

Test	FCC 10 S2
Identification	+
Arsenic	≤3 mg/kg
Residue on ignition	≤7.0%
Lead	≤5 mg/kg
Loss on drying	≤15.0%
Assay	18–21% of CO_2, corresponding to 88.7–103.6% ammonium alginate