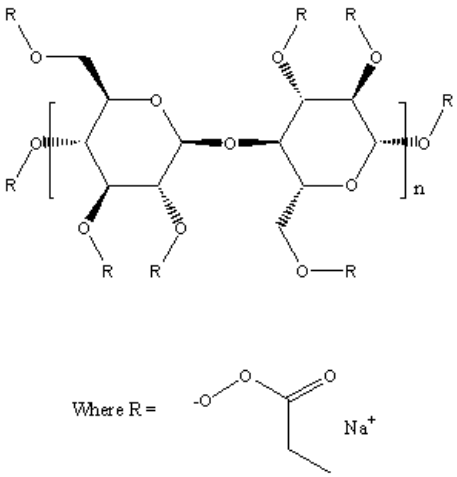
Catalog Number: 101278, 150560, 150561

Carboxymethyl Cellulose Sodium Salt

Structure:



CAS # : 9004-32-4

Synonyms: CMC; Carboxymethyl ether cellulose sodium salt; Sodium carboxymethylcellulose; Sodium cellulose glycolate; Cellulose glycolic acid sodium salt

Physical Description: White to off white powder

Derivation: Cellulose fiber with sodium hydroxide and chloroacetic acid.

Solubility: Soluble in aqueous solution. The CMC should be added to the water carefully so that it is well dispersed. Adding the solid in portions may be necessary. Adding water to the dry solid produces clumps of solid CMC that is very difficult to dissolve. The solid should be added to the water. Stir gently or shake intermittently; do not stir constantly with a magnetic stirring bar. High heat is not needed and may actually slow down the solubilization process. A mixing device, such as an impeller-type agitator which produces a vortex would allow the powder to be drawn into the liquid, but it may produce some shearing.

Note: High viscosity CMC is soluble at up to 50 mg/ml concentration but heat may be required. It is typically used at concentrations less than 20 mg/ml.

Stability: Under normal conditions, the effect of temperature on solutions of CMC is reversible. Slight temperature variation has no permanent effect on viscosity. However, long periods of heating CMC solutions at high temperatures, such as autoclaving, will degrade CMC and permanently reduce viscosity. This makes CMC very difficult to sterilize. gamma-Irradiation, like heating, will degrade CMC. High viscosity CMC is more adversely affected by autoclaving and irradiation than is low viscosity CMC. Filtering CMC solutions tends to leave a gel behind because the material is fibrous. This makes solutions unfilterable.

Solutions are stable between pH 2 and 10; Below pH 2 precipitation of a solid occurs, above pH 10 the viscosity decreases rapidly.[1] The free acid is obtained from an aqueous solution at pH 2.5 and may be precipitated with alcohol.[1]

	Low Viscosity	Medium Viscosity	High Viscosity
Molecular Weight:	approximately 90 kDa	approximately 250 kDa	approximately 700 kDa
Degree of polymerization:	approximately 400	approximately 1,100	approximately 3200
Degree of substitution:	approximately 0.65-0.90 carboxymethyl groups per 10 anhydroglucose units	approximately 7 carboxymethyl groups per 10 anhydroglucose units	approximately 6.5-8.5 carboxymethyl groups per 10 anhydroglucose units
Sodium content:	approximately 8% by weight	approximately 8% by weight	approximately 8% by weight

pKa: 4.30(1)

Viscosity: The viscosity of CMC solutions are both concentration and temperature dependent. As the temperature increases, the viscosity decreases. As the concentration increases, the viscosity increases.

To measure the viscosity of CMC solutions: Prepare a set percentage solution (w/w) of CMC in water. Heat for several hours at 37°C. Place in a shaker for one to two days at 2-8°C to completely dissolve the product. Bring the solution back to 25°C. Measure the viscosity with a Brookfield viscometer using the following parameters:

Model: LVF
Spindle: #3

Speed: 60 rpm
Temperature: 25°C
Container: 120 ml polybottle
Multiplication factor: 20

Applications: In drilling muds, in detergents as a soil-suspending agent, in resin emulsion paints, adhesives, printing inks, textile sizes, as protective colloid in general.[1] As stabilizer in foods.[1] Used in pharmaceuticals as a suspending agent, tablet excipient, viscosity-increasing agent.[1]

Used as a suspending agent. Low viscosity is usually used in thin aqueous solutions. Medium viscosity is used to make solutions that look like a syrup. High viscosity is used to make a mixture which resembles a cream or lotion.

Availability:

Catalog Number	Description	Size
101278	Carboxymethyl Cellulose Sodium Salt, Low viscosity, 4% aqueous solution is 50-200 centipoises at 25°C	500 g 1 kg 3 kg
150560	Carboxymethyl Cellulose Sodium Salt, Medium viscosity, 2% aqueous solution is 200-800 centipoises at 25°C	500 g 1 kg 2 kg
150561	Carboxymethyl Cellulose Sodium Salt, High viscosity, 1% aqueous solution is 1000-3000 centipoises at 25°C	500 g 1 kg 3 kg

References:

1. *Merck Index*, **12th Ed.**, No. 1877.
2. Beaudouin, E., et al., "Anaphylaxie a la carboxymethylcellulose: a propos de deux cas de chocs a des corticoides injectables." *Allerg. Immunol. (Paris)*, **v. 24(9)**, 333-335 (1992).
3. Heinen, J.M., "Evaluation of some binding agents for crustacean diets." *Prog. Fish-Cult.*, **v. 43**, 142-145 (1981).
4. Karlsson, J., et al., "Enzymatic degradation of carboxymethyl cellulose hydrolyzed by the endoglucanases Cel5A, Cel7B, and Cel45A from *Humicola insolens* and Cel7B, Cel12A and Cel45Acore from *Trichoderma reesei*." *Biopolymers*, **v. 63(1)**, 32-40 (2002).
5. Muroi, N., et al., "Anaphylaxis from the carboxymethylcellulose component of barium sulfate suspension." *N. Engl. J. Med.*, **v. 337(18)**, 1275-1277 (1997).
6. Patterson, D.L., et al., "Anaphylaxis induced by the carboxymethylcellulose component of injectable triamcinolone acetonide suspension (Kenalog)", *Ann. Allergy, Asthma, Immunol.*, **v. 74(2)**, 163-166 (1995).
7. Zhou, S. and Ingram, L.O., "Synergistic hydrolysis of carboxymethyl cellulose and acid-swollen cellulose by two endoglucanases (CelZ and CelY) from *Erwinia chrysanthemi*." *J. Bacteriol.*, **v. 182(20)**, 5676-5682 (2000).