

Carboxymethylcellulose Sodium

1 Nonproprietary Names

BP: Carmellose Sodium
JP: Carmellose Sodium
PhEur: Carmellose Sodium
USP-NF: Carboxymethylcellulose Sodium

2 Synonyms

Akucell; Aqualon CMC; Blanose; Carbose D; carmellosum natricum; cellulose gum; CMC sodium; Dynacel; E466; Finnfix; KiccolateNymcel ZSB; SCMC; sodium carboxymethylcellulose; sodium cellulose glycolate; Sunrose; Tylose CB; Tylose MGA; Walocel C; Walocel CRT; Xylo-Mucine.

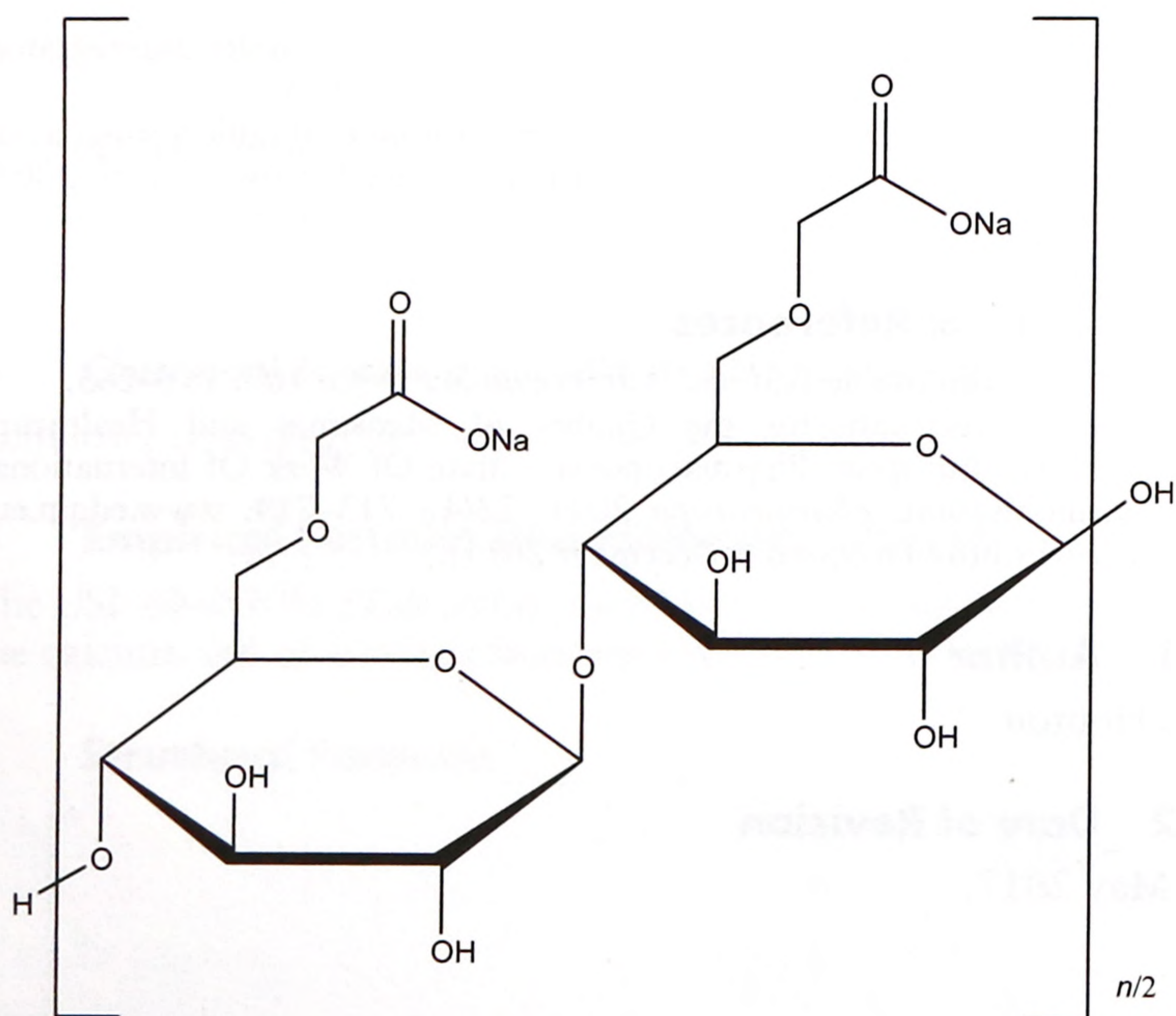
3 Chemical Name and CAS Registry Number

Cellulose, carboxymethyl ether, sodium salt [9004-32-4]

4 Empirical Formula and Molecular Weight

The USP 40-NF 35 S1 describes carboxymethylcellulose sodium as the sodium salt of a polycarboxymethyl ether of cellulose.

5 Structural Formula



Structure shown with a degree of substitution (DS) of 1.0.

6 Functional Category

Adsorbent; emulsifying agent; suspending agent; tablet and capsule binder; tablet and capsule disintegrant; viscosity-increasing agent.

7 Applications in Pharmaceutical Formulation or Technology

Carboxymethylcellulose sodium is widely used in oral and topical pharmaceutical formulations, primarily for its viscosity-increasing properties. Viscous aqueous solutions are used to suspend powders intended for either topical application or oral and parenteral administration.^(1,2) Carboxymethylcellulose sodium may also be used as a tablet binder and disintegrant,⁽³⁻⁶⁾ and to stabilize emulsions.^(7,8)

Encapsulation with carboxymethylcellulose sodium can affect drug protection and delivery.^(6,9)

Higher concentrations, usually 3–6%, of the medium-viscosity grade are used to produce gels that can be used as the base for applications and pastes; glycols are often included in such gels to prevent them drying out.

Carboxymethylcellulose sodium is also used in cosmetics, toiletries,⁽¹⁰⁾ personal hygiene, and food products.

See Table I.

Table I: Uses of carboxymethylcellulose sodium.

Use	Concentration (%)
Emulsifying agent	0.25–1.0
Gel-forming agent	3.0–6.0
Injections	0.05–0.75
Oral solutions	0.1–1.0
Tablet binder	1.0–6.0

8 Description

Carboxymethylcellulose sodium occurs as a white to almost white, odorless, tasteless, granular powder. It is hygroscopic after drying.

See also Section 18.

9 Pharmacopeial Specifications

See Table II. See also Section 18.

Table II: Pharmacopeial specifications for carboxymethylcellulose sodium.

Test	JP XVII	PhEur 9.2	USP 40–NF 35 S1
Identification	+	+	+
Characters	+	+	–
pH (1% w/v solution)	6.0–8.0	6.0–8.0	6.5–8.5
Appearance of solution	+	+	–
Viscosity	–	+	+
Loss on drying	≤10.0%	≤10.0%	≤10.0%
Heavy metals	≤20 ppm	–	≤20 ppm
Chloride	≤0.640%	≤0.25%	–
Arsenic	≤10 ppm	–	–
Sulfate	≤0.960%	–	–
Silicate	≤0.5%	–	–
Sodium glycolate	–	≤0.4%	–
Starch	+	–	–
Sulfated ash	–	20.0–33.3%	–
Assay (of sodium)	6.5–8.5%	6.5–10.8%	6.5–9.5%

10 Typical Properties

Density (bulk) 0.52 g/cm³

Density (tapped) 0.78 g/cm³

Dissociation constant pK_a = 4.30

Melting point Browns at approximately 227°C, and chars at approximately 252°C.

Moisture content Typically contains less than 10% water. However, carboxymethylcellulose sodium is hygroscopic and absorbs significant amounts of water at temperatures up to 37°C at relative humidities of about 80%.

See Section 11. See also Figure 1.