

11 *Food Chemicals Codex*. [online] Bethesda, MD: United States Pharmacopeia. <http://publications.usp.org> (accessed 31 March 2017).

20 General References

Johnson MA. *The Aerosol Handbook*, 2nd edn. Mendham, NJ: WE Dorland Co., 1982: 361–372.
 Sanders PA. *Handbook of Aerosol Technology*, 2nd edn. New York: Van Nostrand Reinhold, 1979: 44–54.
 Sciarra JJ, Sciarra CJ. Pharmaceutical and cosmetic aerosols. *J Pharm Sci* 1974; **63**: 1815–1837.
 Sciarra CJ, Sciarra JJ. Aerosols. In: *Remington: The Science and Practice of Pharmacy*, 21st edn. Philadelphia, PA: Lippincott, Williams and Wilkins, 2005: 1000–1017.

Sciarra CJ, Sciarra JJ. Pressurized dispensers. In: Schlossman ML. *The Chemistry and Manufacture of Cosmetics*, 4th edn, vol. 1. Carol Stream, IL: Allured Publishing Corporation, 2009: 451–478.
 Sciarra JJ. Pharmaceutical aerosols. In: Banker GS, Rhoes CT, eds. *Modern Pharmaceutics*, 3rd edn. New York: Marcel Dekker, 1996: 547–574.
 Sciarra JJ, Stoller L. *The Science and Technology of Aerosol Packaging*. New York: Wiley, 1974: 137–145.

21 Authors

CJ Sciarra, JJ Sciarra.

22 Date of Revision

4 May 2017.

Carboxymethylcellulose Calcium

1 Nonproprietary Names

BP: Carmellose Calcium
 JP: Carmellose Calcium
 PhEur: Carmellose Calcium
 USP–NF: Carboxymethylcellulose Calcium

2 Synonyms

Calcium carboxymethylcellulose; calcium cellulose glycolate; carmellosum calcium; CMC calcium; ECG 505; Nymcel ZSC.

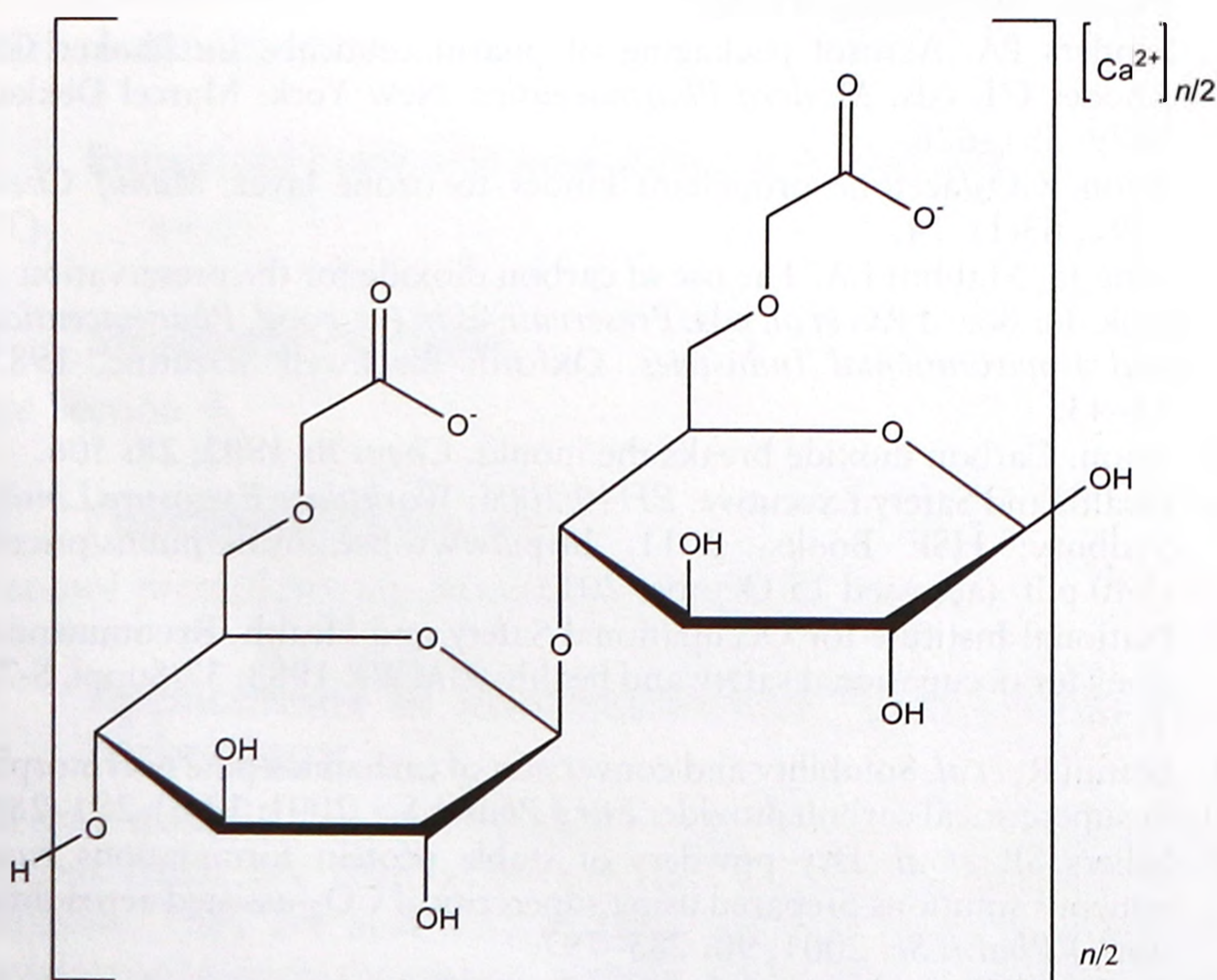
3 Chemical Name and CAS Registry Number

Cellulose, carboxymethyl ether, calcium salt [9050-04-8]

4 Empirical Formula and Molecular Weight

The USP 40–NF 35 S1 describes carboxymethylcellulose calcium as the calcium 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; coating agent; suspending agent; tablet and capsule binder; tablet and capsule disintegrant; viscosity-increasing agent.

7 Applications in Pharmaceutical Formulation or Technology

The main use of carboxymethylcellulose calcium is in tablet formulations (*see* Table I), where it is used as a binder, diluent, and disintegrant.^(1–4) Although carboxymethylcellulose calcium is insoluble in water, it is an effective tablet disintegrant as it swells to several times its original bulk on contact with water. Concentrations up to 15% w/w may be used in tablet formulations; above this concentration, tablet hardness is reduced.

Carboxymethylcellulose calcium is also used in other applications similarly to carboxymethylcellulose sodium; for example, as a suspending or viscosity-increasing agent in oral and topical pharmaceutical formulations. Carboxymethylcellulose calcium is also used in modern wound dressings for its water absorption, retention and hemostatic properties.

Table I: Uses of carboxymethylcellulose calcium.

Use	Concentration (%)
Tablet binder	5–15
Tablet disintegrant	1–15

8 Description

Carboxymethylcellulose calcium occurs as a white to yellowish-white, hygroscopic powder.

9 Pharmacopeial Specifications

The pharmacopeial specifications for carboxymethylcellulose calcium have undergone harmonization of many attributes for JP, PhEur, and USP–NF.

See Table II. *See also* Section 18.