16 Mitchell K, *et al.* Influence of drugs on the properties of gels and swelling characteristics of matrices containing methylcellulose or hydroxypropylmethylcellulose. *Int J Pharm* 1993; 100(1–3): 165–173.
17 Huikari A, Kristoffersson E. Rheological properties of methylcellulose solutions: general flow properties and effects of added substances. *Acta Pharm Fenn* 1985; 94(4): 143–154.
18 Allen Jr LV *et al*, eds. *Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems*, 9th edn. Baltimore MD: Wolters Kluwer-LWW, 2011; 410.
19 Csempesz F, Puskas I. Controlling the physical stability of liposomal colloids. In: Tadros TF, ed. *Colloid Stability and Application in Pharmacy*. Weinheim, Germany: Wiley-VCH, 2007; 79–89.
20 *Food Chemicals Codex*. [online] Bethesda, MD: United States Pharmacopeia. http://publications.usp.org (accessed 31 March 2017).

20 General References

Dow Chemical Company. Technical bulletin: *Methocel*, October 2013. http://pharmaandfood.dow.com/en/pharma-solutions/products/methocel (accessed 19 October 2015).
Dow Chemical Company. Material safety data sheet: *Methocel A15*, version 7.0, 28 August 2014.
European Directorate for the Quality of Medicines and Healthcare (EDQM). European Pharmacopoeia – State Of Work Of International Harmonisation. *Pharmeuropa* 2011; 23(4): 713–714. www.edqm.eu/site/-614.html (accessed 5 December 2011).
Kamide K. *Cellulose and Cellulose Derivatives*, Amsterdam: Elsevier Science, 2005.
Li J, Mei X. Applications of cellulose and cellulose derivatives in immediate release solid dosage. In: ACS Symposium Series, 934 , *Polysaccharides for Drug Delivery and Pharmaceutical Applications*. 2006: 19–55.
Muratora SA, *et al.* Studying interactions in microcrystalline cellulose-drug systems. *Pharm Chem J* 2002; 36(11): 619–622.
Rowe RC. The molecular weight of methyl cellulose used in pharmaceutical formulation. *Int J Pharm* 1982; 11: 175–179.
Tapia Villanueva C, Sapag Hagar J. Methylcellulose: its pharmaceutical applications. *Acta Farm Bonaerense* 1995; 14(Jan–Mar): 41–47.
Viriden A, *et al.* Influence of substitution pattern on solution behaviour of hydroxypropyl methylcellulose. *Biomacromolecules* 2009; 10(3): 522–529.
Wan LS, Prasad KP. Influence of quantity of granulating liquid on water uptake and disintegration of tablets with methylcellulose. *Pharm Ind* 1989; 51(1): 105–109.
Wan LS, Prasad KP. Studies on the swelling of composite disintegrant–methylcellulose films. *Drug Dev Ind Pharm* 1990; 16(2): 191–200.

21 Author

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22 Date of Revision

4 May 2017.

M

Methylparaben

1 Nonproprietary Names

BP: Methyl Hydroxybenzoate
JP: Methyl Parahydroxybenzoate
PhEur: Methyl Parahydroxybenzoate
USP–NF: Methylparaben

2 Synonyms

Aseptoform M; *CoSept M*; E218; 4-hydroxybenzoic acid methyl ester; metagin; *Methyl Chemosept*; methylis parahydroxybenzoas; methyl *p*-hydroxybenzoate; *Methyl Parasept*; *Nipagin M*; *Solbrol M*; *Tegosept M*; *Uniphen P-23*.

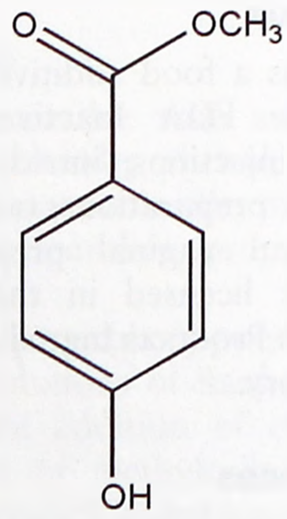
3 Chemical Name and CAS Registry Number

Methyl-4-hydroxybenzoate [99-76-3]

4 Empirical Formula and Molecular Weight

$C_8H_8O_3$ 152.15

5 Structural Formula



6 Functional Category

Antimicrobial preservative.

7 Applications in Pharmaceutical Formulation or Technology

Methylparaben is widely used as an antimicrobial preservative in cosmetics, food products, and pharmaceutical formulations; *see* Table I. It may be used either alone or in combination with other parabens or with other antimicrobial agents. In cosmetics, methylparaben is the most frequently used antimicrobial preservative.[1]

The parabens are effective over a wide pH range and have a broad spectrum of antimicrobial activity, although they are most effective against yeasts and molds. Antimicrobial activity increases as the chain length of the alkyl moiety is increased, but aqueous solubility decreases; therefore a mixture of parabens is frequently