15 Handling Precautions

Observe normal precautions appropriate to the circumstances and quantity of the material handled. Avoid skin and eye contact; eye goggles should be worn, or a full face shield where splashing may occur. There are no specific fire or explosion hazards for HEPES.

16 Regulatory Status

Included in the FDA Inactive Ingredients Database (IV, injection). Included in BP 2017 as a reagent.

17 Related Substances

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18 Comments

HEPES is widely used in cell culture as a buffering agent where maintenance of pH near or at physiological pH is desired.[1–3] HEPES has been shown to be biologically active *in vitro* as a result of the inhibition of taurine uptake by cultured cells.[4] In addition, cell death has been shown to occur faster upon light exposure in the presence of HEPES.[5,6] HEPES has also been shown to adversely impact *in vitro* pregnancy and implantation rates due to a higher rate of triploid and degenerated oocytes after fertilization.[7]

The EINECS number for HEPES is 230-907-9. The PubChem Compound ID (CID) for HEPES is 23830.

19 Specific References

1 Luo S, *et al.* Effect of HEPES buffer on the uptake and transport of P-glycoprotein substrates and large neutral amino acids. *Mol Pharm* 2010; 7(2): 412–420.

2 Baicu SC, Taylor MJ. Acid–base buffering in organ preservation solutions as a function of temperature: new parameters for comparing buffer capacity and efficiency. *Cryobiology* 2002; 45(1): 33–48.

3 Swain JE, Pool TB. New pH-buffering system for media utilized during gamete and embryo manipulations for assisted reproduction. *Reprod Biomed Online* 2009; 18(6): 799–810.

4 Petegnief V, *et al.* Taurine analog modulation of taurine uptake by two different mechanisms in cultured glial cells. *Biochem Pharmacol* 1995; 49(3): 399–410.

5 Lepe-Zuniga JL, *et al.* Toxicity of light-exposed HEPES media. *J Immunol Methods* 1987; 103(1): 145.

6 Zigler JS, *et al.* Analysis of the cytotoxic effects of light-exposed HEPES-containing culture medium. *In Vitro Cell Dev Biol* 1985; 21(5): 282–287.

7 Morgia F, *et al.* Use of a medium buffered with *N*-hydroxyethylpiperazine-*N*-ethanesulfonate (HEPES) in intracytoplasmic sperm injection procedures is detrimental to the outcome of *in vitro* fertilization. *Fertil Steril* 2006; 85(5): 1415–1419.

20 General References

Acros Organics (part of Thermo Fisher Scientific). Material safety data sheet: *HEPES*, version 5.0, 15 December 2011.

21 Author

J Rexroad.

22 Date of Revision

21 April 2017.

Hydroxypropyl Betadex

1 Nonproprietary Names

BP: Hydroxypropylbetadex

PhEur: Hydroxypropylbetadex

USP–NF: Hydroxypropyl Betadex

2 Synonyms

Cavasol W7 HP Pharma; 2-hydroxypropyl-β-cyclodextrin; 2-hydroxypropyl cyclomaltoheptaose; hidroksipropilbetadeksas; hydoxipropylbetadex; hydroksipropylbetadeksi; hydroxypropylbetadeksum; hydroxypropylbetadexum; *Kleptose HPB*.

3 Chemical Name and CAS Registry Number

β-Cyclodextrin, 2-hydroxypropyl ether [94035-02-6] and [128446-35-5]

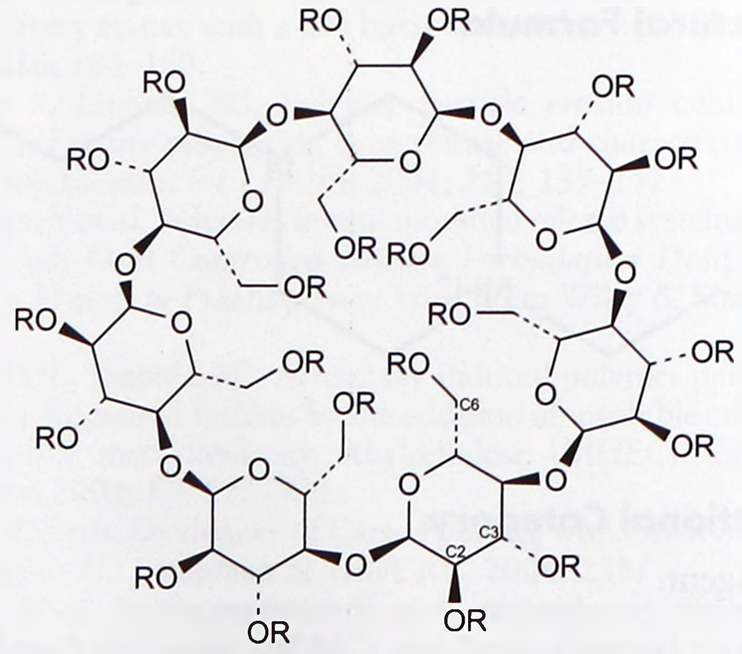
4 Empirical Formula and Molecular Weight

$C_{42}H_{70}O_{35}(C_3H_6O)_x$ (where x = 7 molar substitution)

The molecular weight depends on the degree of substitution. The molecular weight of unsubstituted β-cyclodextrin is 1134.98.

5 Structural Formula

Hydroxpropyl betadex is a partially substituted ether of β-cyclodextrin. USP 40–NF 35 S1 requires that the molar substitution is between 0.4 and 1.5 hydroxypropyl groups per anhydroglucose unit.



R = H or $CH_2CH(CH_3)OH$

6 Functional Category

Complexing agent; modified-release agent; penetration enhancer; solubilizing agent; tonicity agent.