

- 34 Takeuchi H, *et al.* Enteral absorption of insulin in rats from mucoadhesive chitosan-coated liposomes. *Pharm Res* 1996; **13**: 896–901.
- 35 Bayomi MA, *et al.* Preparation of casein-chitosan microspheres containing diltiazem hydrochloride by an aqueous coacervation technique. *Pharma Acta Helv* 1998; **73**: 187–192.
- 36 Miyazaki S, *et al.* Drug release from oral mucosal adhesive tablets of chitosan and sodium alginate. *Int J Pharm* 1995; **118**: 257–263.
- 37 Sakurai K, *et al.* Glass transition temperature of chitosan and miscibility of chitosan/poly(*N*-vinyl pyrrolidone) blends. *Polymer* 2000; **41**: 7051–7056.
- 38 Gocho H, *et al.* Effect of polymer chain end on sorption isotherm of water by chitosan. *Carbohydr Polym* 2000; **41**: 87–90.
- 39 Errington N, *et al.* Hydrodynamic characterization of chitosans varying in degree of acetylation. *Int J Biol Macromol* 1993; **15**: 113–117.
- 40 Skaugrud O. Chitosan – new biopolymer for cosmetics and drugs. *Drug Cosmet Ind* 1991; **148**: 24–29.
- 41 Gebelein CG, Dunn RL, eds. *Progress in Biomedical Polymers*. New York: Plenum Press, 1990: 283.
- 42 Gooday GW *et al.* eds. *Chitin in Nature and Technology*. New York: Plenum Press, 1986: 435.
- 43 Arai K, *et al.* Toxicity of chitosan. *Bull Tokai Reg Fish Res Lab* 1968; **43**: 89–94.

20 General References

- Brine CJ *et al.* eds. *Advances in Chitin and Chitosan*. London: Elsevier Applied Science, 1992.
- Ijaz M. Preactivated thiomers: their role in drug delivery. *Expert Opin Drug Deliv* 2015; **12**(8): 1269–1281.
- Remunan-Lopez C, *et al.* Design and evaluation of chitosan/ethylcellulose mucoadhesive bilayered devices for buccal drug delivery. *J Control Release* 1998; **55**: 143–152.
- Sawayangi Y, *et al.* Use of chitosan for sustained-release preparations of water soluble drugs. *Chem Pharm Bull* 1982; **30**: 4213–4215.
- Skjak-Braek G *et al.* eds. *Chitin and Chitosan: Sources, Chemistry, Biochemistry, Physical Properties and Applications*. Amsterdam: Elsevier, 1992.
- Yomota C, *et al.* Sustained-release effect of the direct compressed tablet based on chitosan and Na alginate. *Yakugaku Zasshi* 1994; **114**: 257–263.

21 Author

DS Jones.

22 Date of Revision

4 May 2017.

Chlorhexidine

1 Nonproprietary Names

- BP: Chlorhexidine Acetate
Chlorhexidine Gluconate Solution
Chlorhexidine Hydrochloride
- JP: Chlorhexidine Gluconate Solution
Chlorhexidine Hydrochloride
- PhEur: Chlorhexidine Diacetate
Chlorhexidine Digluconate Solution
Chlorhexidine Dihydrochloride
- USP–NF: Chlorhexidine Acetate
Chlorhexidine Gluconate Solution
Chlorhexidine Hydrochloride

Chlorhexidine is usually encountered as the acetate, gluconate, or hydrochloride salt, and a number of pharmacopeias contain monographs for such materials. See Sections 9 and 17.

2 Synonyms

See Table I.

3 Chemical Name and CAS Registry Number

Chlorhexidine 1E-2-[6-[[Amino-[[amino-[(4-chlorophenyl)amino]methylidene]amino]methylidene]amino]hexyl]-1-[amino-[(4-chlorophenyl)amino]methylidene]guanidine [55-56-1]
See Table II for CAS registry numbers of chlorhexidine salts.

4 Empirical Formula and Molecular Weight

See Table III.

Table I: Synonyms of chlorhexidine and its salts.

Name	Synonym
Chlorhexidine	1,6-bis[<i>N</i> -(<i>p</i> -Chlorophenyl)- <i>N</i> ⁵ -biguanido]hexane; <i>N,N'</i> -bis(4-chlorophenyl)-3,12-diimino-2,4,11,13-tetraazatetradecanediiimidamide; 1,6-di(4'-chlorophenyldiguanido)hexane; 1,1'-hexamethylene-bis[5-(<i>p</i> -chlorophenyl)biguanide]; Hibitane.
Chlorhexidine acetate	Chlorhexidini acetas; chlorhexidini diacetat; chlorhexidine diacetate; 1,1'-hexamethylenebis[5-(4-chlorophenyl)biguanide] diacetate; Hibitane diacetate.
Chlorhexidine gluconate	Chlorhexidine digluconate; chlorhexidini digluconatis; chlorhexidini digluconatis solutio; 1,1'-hexamethylenebis[5-(4-chlorophenyl)biguanide] digluconate.
Chlorhexidine hydrochloride	Chlorhexidini dihydrochloridum; chlorhexidine dihydrochloride; chlorhexidini hydrochloridum; 1,1'-hexamethylenebis[5-(4-chlorophenyl)biguanide]dihydrochloride.

5 Structural Formula

