

- LD₅₀ (mouse, oral): 0.338 g/kg
 LD₅₀ (rat, IP): 0.0165 g/kg
 LD₅₀ (rat, IV): 0.019 g/kg
 LD₅₀ (rat, oral): 0.368 g/kg
 LD₅₀ (rat, SC): 0.119 g/kg

15 Handling Precautions

Observe normal precautions appropriate to the circumstances and quantity of material handled. Eye protection and gloves are recommended.

Benzethonium chloride is highly flammable and should be kept away from sources of ignition. When heated to decomposition it emits very toxic fumes of hydrogen chloride, ammonia (NH₃), and nitrogen oxides (NO_x). Suitable eye, skin, and respiratory protection are recommended.

16 Regulatory Status

Included in the FDA Inactive Ingredients Database (IM and IV injections; nasal, ophthalmic, and otic preparations). Included in the Canadian Natural Health Products Ingredients Database.

17 Related Substances

Benzalkonium chloride; cetrимide; cetrимonium bromide.

18 Comments

Benzethonium chloride has been used therapeutically as a disinfectant and topical anti-infective agent.⁽⁷⁻¹⁰⁾ However, its use in these applications has largely been superseded by other more effective antimicrobials and it is now largely used solely as a preservative in a limited number of pharmaceutical and cosmetic formulations.

The EINECS number for benzethonium chloride is 204-479-9. The PubChem Compound ID (CID) for benethonium chloride includes 8478 and 547429.

19 Specific References

- 1 Herdová P, *et al.* [Influence of temperature and concentration of a surfactant on pharmaceutical availability] [In Czech]. *Ceska Slov Farm* 2013; 62(5): 223–226.
- 2 Wallhäuser KH. Benzethonium chloride. In: Kabara JJ, ed. *Cosmetic and Drug Preservation Principles and Practice*. New York: Marcel Dekker, 1984; 734–735.
- 3 Gennaro AR, ed. *Remington: The Science and Practice of Pharmacy*, 20th edn. Baltimore: Lippincott Williams and Wilkins, 2000; 1508.
- 4 Dao H Jr, *et al.* Sensitization prevalence for benzalkonium chloride and benzethonium chloride. *Dermatitis* 2012; 23(4): 162–166.
- 5 The Expert Panel of the American College of Toxicology. Final report on the safety assessment of benzethonium chloride and methylbenzethonium chloride. *J Am Coll Toxicol* 1985; 4: 65–106.
- 6 Lewis RJ, ed. *Sax's Dangerous Properties of Industrial Materials*, 12th edn. New York: Wiley, 2012; 507–508.
- 7 Shintre MS, *et al.* Efficacy of an alcohol-based healthcare hand rub containing synergistic combination of farnesol and benzethonium chloride. *Int J Hyg Environ Health* 2006; 209(5): 477–487.
- 8 Bearden DT, *et al.* Comparative *in vitro* activities of topical wound care products against community-associated methicillin-resistant *Staphylococcus aureus*. *J Antimicrob Chemother* 2008; 62(4): 769–772.
- 9 Suzuki T, *et al.* Bactericidal activity of topical antiseptics and their gargles against *Bordetella pertussis*. *J Infect Chemother* 2012; 18(2): 272–275.
- 10 Czerwinski SE, *et al.* Novel water-based antiseptic lotion demonstrates rapid, broad-spectrum kill compared with alcohol antiseptic. *J Infect Public Health* 2014; 7(3): 199–204.

20 General References

Lonza. Material safety data sheet: *Hyamine 1622*, 2012.

21 Author

ME Quinn.

22 Date of Revision

4 May 2017.

Benzoic Acid

1 Nonproprietary Names

BP: Benzoic Acid
 JP: Benzoic Acid
 PhEur: Benzoic Acid
 USP–NF: Benzoic Acid

2 Synonyms

Acidum benzoicum; benzenecarboxylic acid; benzene formic acid; carboxybenzene; dracylic acid; E210; phenylcarboxylic acid; phenylformic acid; *Purox B*.

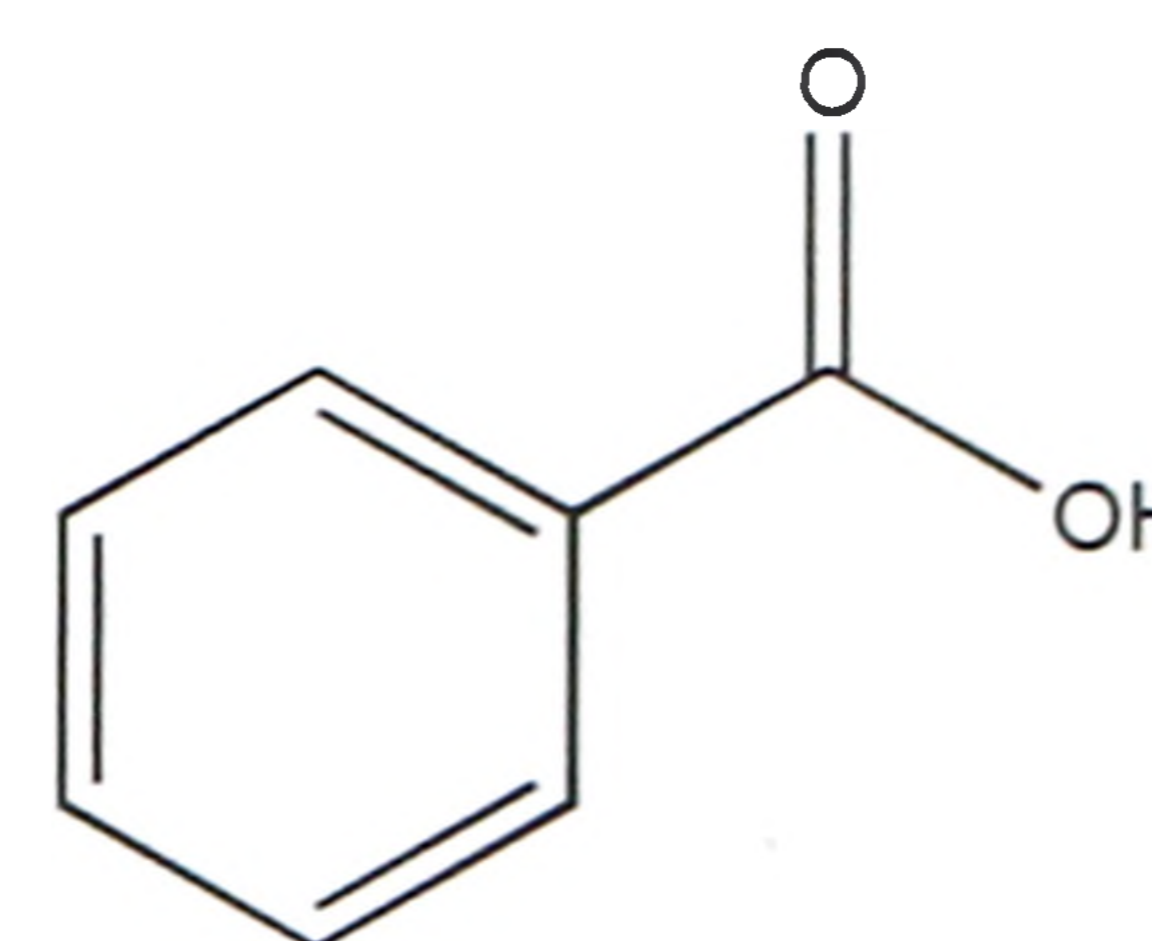
3 Chemical Name and CAS Registry Number

Benzoic acid [65-85-0]

4 Empirical Formula and Molecular Weight

C₇H₆O₂ 122.12

5 Structural Formula



6 Functional Category

Antimicrobial preservative.

7 Applications in Pharmaceutical Formulation or Technology

Benzoic acid is widely used in pharmaceuticals (*see* Table I), as an antimicrobial preservative.⁽¹⁻³⁾ The greatest antimicrobial activity is seen at pH values between 2.5–4.5; *see* Section 10.