12 Lewis RJ, ed. *Sax's Dangerous Properties of Industrial Materials*, 12th edn. New York: Wiley, 2012; 474.
13 Centre for disease control and prevention. Parasites – Scabies: Medications, Sept 2009. http://www.cdc.gov/parasites/scabies/health_professionals/meds.html (accessed 22 January 2016).
14 National Institute for Health Care Excellence (NICE). Clinical Knowledge Summaries: Scabies, Dec 2011. http://cks.nice.org.uk/scabies#!scenario (accessed 22 January 2016).
15 Bachewar NP, *et al.* Comparison of safety, efficacy, and cost effectiveness of benzyl benzoate, permethrin, and ivermectin in patients of scabies. *Indian J Pharmacol* 2009; **41**(1): 914.
16 Ly F, *et al.* Ivermectin versus benzyl benzoate applied once or twice to treat human scabies in Dakar, Senegal: a randomized controlled trial. *Bull World Health Organ* 2009; **87**(6): 424–430.
17 Panahi Y, *et al.* The efficacy of topical and oral ivermectin in the treatment of human scabies. *Ann Parasitol* 2015; **61**(1): 11–16.
18 Ohno O, *et al.* Inhibitory effects of benzyl benzoate and its derivatives on angiotensin II-induced hypertension. *Bioorg Med Chem* 2008; **16**(16): 7843–7852.
19 Bishop Y, ed. *The Veterinary Formulary*, 6th edn. London: Pharmaceutical Press, 2005; 56.
20 Humphreys DJ. *Veterinary Toxicology*, 3rd edn. London: Baltier Tindall, 1988; 131.
21 *Food Chemicals Codex*. [online] Bethesda, MD: United States Pharmacopeia. http://publications.usp.org (accessed 31 March 2017).

20 General References

Draize JH, *et al.* Toxicological investigations of compounds proposed for use as insect repellents. *J Pharmacol Exp Ther* 1948; **93**: 26–39.
Gilman AG *et al.* eds. *Goodman and Gilman's The Pharmacological Basis of Therapeutics*, 8th edn. New York: Pergamon Press, 1990; 1630.
Graham BE, Kuizenga MH. Toxicity studies on benzyl benzoate and related benzyl compounds. *J Pharmacol Exp Ther* 1945; **84**: 358–362.
Gupta VD, Ho HW. Quantitative determination of benzyl benzoate in benzyl benzoate lotion NF. *Am J Hosp Pharm* 1976; **33**: 665–666.
Hassan MMA, Mossa JS. Benzyl benzoate. In: Florey K, ed. *Analytical Profiles of Drug Substances*, vol 10. New York: Academic Press, 1981; 55–74.
Hayes WJ, Jr, Laws ER, Jr, eds. Classes of Pesticides. In: *Handbook of Pesticide Toxicology*. New York, NY: Academic Press Inc, 1991; 1505.
Sweet DV, ed. *Registry of Toxic Effects of Chemical Substances*. Cincinnati: US Department of Health, 1987; 965.

21 Author

ME Quinn.

22 Date of Revision

4 May 2017.

Beta Carotene

1 Nonproprietary Names

BP: Betacarotene
PhEur: Betacarotene
USP–NF: Beta Carotene

2 Synonyms

all-*trans*-β-Carotene; beta-carotene; betacarotenum; β-carotene; β,β-carotene; *Carotaben*; E160a; *Lumitene*; *Provatene*; provitamin A; *Solatene*.

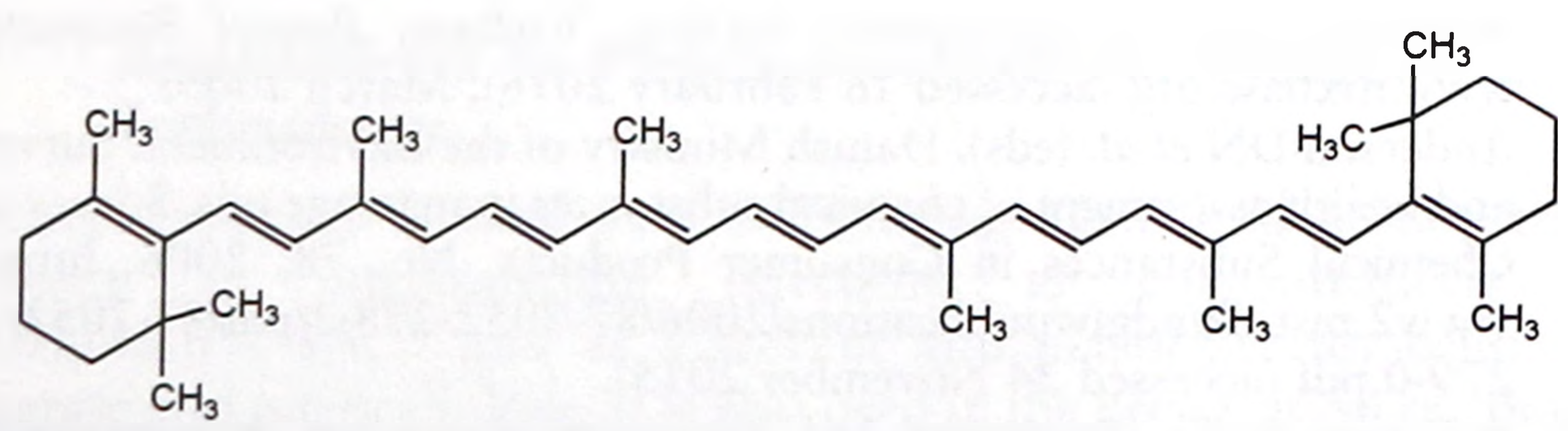
3 Chemical Name and CAS Registry Number

(*all-E*)-1,1′-(3,7,12,16-Tetramethyl-1,3,5,7,9,11,13,15,17-octadecanonaene-1,18-diyl)bis[2,6,6-trimethylcyclohexene] [7235-40-7]

4 Empirical Formula and Molecular Weight

$C_{40}H_{56}$ 536.87

5 Structural Formula



6 Functional Category

Colorant.

7 Applications in Pharmaceutical Formulation or Technology

Beta carotene is used as a colorant in pharmaceutical tablets, capsules, and oral granules and powders for solution. It is capable of producing colors varying from pale yellow to dark orange, and can be used as a color for sugar-coated tablets prepared by the ladle process.

Because of its poor water solubility, beta carotene cannot be used to color clear aqueous systems, and cosolvents such as ethanol must be used.

Suppositories have been successfully colored with beta carotene in approximately 0.1% concentration.

8 Description

Beta carotene is a member of the carotenoids, which are colored fat-soluble compounds naturally present in many fruits, grains, oil, and vegetables. It occurs as red or reddish-brown to violet-brown crystals or crystalline powder, producing red crystals when recrystallized from petroleum ether and deep-purple crystals from benzene and methanol. Beta carotene is also available as micronized crystals suspended in edible oil, such as peanut oil.

9 Pharmacopeial Specifications

See Table I.

10 Typical Properties

Absorption maximum (chloroform) 497, 466 nm
Density 1 g/cm^3 at 20°C[1]
Melting point 183°C (evacuated tube)
Solubility Soluble in carbon disulfide, benzene, and 1 in 30 parts of chloroform; moderately soluble in ether, petroleum ether, and oils; very sparingly soluble in methanol and ethanol; practically