

Castor Oil

1 Nonproprietary Names

BP: Virgin castor oil
JP: Castor oil
PhEur: Ricini oleum virginalle
USP: Castor oil

2 Synonyms

EmCon CO; *Lipovol CO*; oleum ricini; ricinoleum; ricinus communis; ricinus oil; tangantangan.

3 Chemical Name and CAS Registry Number

Castor oil [8001-79-4]

4 Empirical Formula Molecular Weight

Castor oil is a triglyceride of fatty acids. The fatty acid composition is approximately ricinoleic acid (87%); oleic acid (7%); linoleic acid (3%); palmitic acid (2%); stearic acid (1%) and trace amounts of dihydroxystearic acid.

5 Structural Formula

See Section 4.

6 Functional Category

Emollient; oleaginous vehicle; solvent.

7 Applications in Pharmaceutical Formulation or Technology

Castor oil is widely used in cosmetics, food products, and pharmaceutical formulations. In pharmaceutical formulations, castor oil is most commonly used in topical creams and ointments at concentrations of 5–12.5%. However, it is also used in oral tablet and capsule formulations and as a solvent in intramuscular injections.^(1,2)

Therapeutically, castor oil has been administered orally for its laxative action, but such use is now obsolete.

8 Description

Castor oil is a clear, almost colorless or pale yellow-colored viscous oil. It has a slight odor and a taste that is initially bland but afterwards slightly acrid.

9 Pharmacopeial Specifications

See Table I.

Table I: Pharmacopeial specifications for castor oil.

Test	JP 2001	PhEur 2002	USP 25
Identification	+	+	—
Characters	+	+	—
Specific gravity	0.953–0.965	≈0.958	0.957–0.961
Heavy metals	—	—	≤0.001%
Iodine value	80–90	82–90	83–88
Saponification value	176–187	—	176–182
Hydroxyl value	155–177	≥150	160–168
Acid value	≤1.5	≤2.0	—
Peroxide value	—	≤10.0	—
Refractive index	—	≈1.479	—
Optical rotation	—	+3.5° to +6.0°	—
Water	—	≤0.3%	—
Absorbance	+	≤1.5	—
Composition of fatty acids	—	+	—
Purity	+	—	—
Distinction from most other fixed oils	—	—	+
Free fatty acids	—	—	+
Unsaponifiable matter	—	≤0.8%	—

10 Typical Properties

Autoignition temperature: 449°C

Boiling point: 313°C

Density: 0.955–0.968 g/cm³ at 25°C

Flash point: 229°C

Melting point: –12°C

Moisture content: ≤0.25%

Refractive index:

$n_D^{25} = 1.473–1.477$

$n_D^{40} = 1.466–1.473$

Solubility: miscible with chloroform, diethyl ether, ethanol, glacial acetic acid, and methanol; freely soluble in ethanol (95%) and petroleum ether; practically insoluble in water; practically insoluble in mineral oil unless mixed with another vegetable oil. See also Section 11.

Surface tension:

39.0 mN/m at 20°C

35.2 mN/m at 80°C

Viscosity (dynamic):

1000 mPa s (1000 cP) at 20°C

200 mPa s (200 cP) at 40°C

11 Stability and Storage Conditions

Castor oil is stable and does not turn rancid unless subjected to excessive heat. On heating at 300°C for several hours, castor oil polymerizes and becomes soluble in mineral oil. When cooled to 0°C, it becomes more viscous.

Castor oil should be stored at a temperature not exceeding 25°C in well-filled airtight containers protected from light.

12 Incompatibilities

Castor oil is incompatible with strong oxidizing agents.

13 Method of Manufacture

Castor oil is the fixed oil obtained by cold-expression of the seeds of *Ricinus communis* Linné (Fam. Euphorbiaceae). No other substances are added to the oil.

14 Safety

Castor oil is used in cosmetics and foods and orally, parenterally, and topically in pharmaceutical formulations. It is generally regarded as a relatively nontoxic and nonirritant material when used as an excipient.⁽³⁾

Castor oil has been used therapeutically as a laxative and oral administration of large quantities may cause nausea, vomiting, colic, and severe purgation. It should not be given when intestinal obstruction is present.

Although widely used in topical preparations, including ophthalmic formulations, castor oil has been associated with some reports of allergic contact dermatitis, mainly to cosmetics such as lipsticks.⁽⁴⁻⁷⁾

15 Handling Precautions

Observe normal precautions appropriate to the circumstances and quantity of material handled. Castor oil may cause mild irritation to the skin and eyes. Castor oil is flammable when exposed to heat. Spillages are slippery and should be covered with an inert absorbant before collection and disposal.

16 Regulatory Status

GRAS listed. Included in the FDA Inactive Ingredients Guide (IM injections; oral capsules and tablets; topical creams, emulsions, ointments, and solutions). Included in nonparenteral medicines licensed in the UK.

17 Related Substances

Castor oil, hydrogenated.

18 Comments

The EINECS number for castor oil is 232-293-8.

19 Specific References

- 1 Rifkin C, Huber R, Keysser CH. Castor oil as a vehicle for parenteral administration of steroid hormones. *J Pharm Sci* 1964; 53: 891-895.
- 2 Jumaa M, Müller BW. Development of a novel parenteral formulation for tetrazepam using a lipid emulsion. *Drug Dev Ind Pharm* 2001; 27(10): 1115-1121.
- 3 Irwin R. NTP technical report on the toxicity studies of castor oil (CAS no 8001-79-4) in F344/N rats and B6C3F1 mice (dosed feed studies). *Toxic Rep Ser* 1982; 12: 1-B5.
- 4 Fisher LB, Berman B. Contact allergy to sulfonated castor oil. *Contact Dermatitis* 1981; 7(6): 339-340.
- 5 Sai S. Lipstick dermatitis caused by castor oil. *Contact Dermatitis* 1983; 9(1): 75.
- 6 Andersen KE, Nielsen R. Lipstick dermatitis related to castor oil. *Contact Dermatitis* 1984; 11(4): 253-254.
- 7 Smolinske SC. *CRC Handbook of Food, Drug and Cosmetic Excipients*. Boca Raton, FL: CRC Press, 1992: 69-70.

20 General References

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21 Author

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22 Date of Revision

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