

Corn Oil

1 Nonproprietary Names

BP: Refined maize oil
JP: Corn oil
PhEur: *Maydis oleum raffinatum*
USPNF: Corn oil

2 Synonyms

Maize oil; *Majsao CT*.

3 Chemical Name and CAS Registry Number

Corn oil [8001-30-7]

4 Empirical Formula Molecular Weight

Corn oil is composed of fatty acid esters with glycerol, known commonly as triglycerides. Typical corn oil produced in the USA contains five major fatty acids: linoleic 58.9%; oleic 25.8%; palmitic 11.0%; stearic 1.7%; and linolenic 1.1%. Corn grown outside the USA yields corn oil with lower linoleic, higher oleic, and higher saturated fatty acid levels. Corn oil also contains small quantities of plant sterols.

The USPNF 20 describes corn oil as the refined fixed oil obtained from the embryo of *Zen mays* Linné (Fam. Gramineae).

5 Structural Formula

See Section 4.

6 Functional Category

Oleaginous vehicle; solvent.

7 Applications in Pharmaceutical Formulation or Technology

Corn oil is used primarily in pharmaceutical formulations as a solvent for intramuscular injections or as a vehicle for topical preparations. Emulsions containing up to 67% corn oil are also used as oral nutritional supplements; see also Section 18. When combined with surfactants and gel-forming polymers, it is used to formulate veterinary vaccines.

Corn oil has a long history of use as an edible oil and may be used in tablets or capsules for oral administration.

8 Description

Clear, light yellow-colored, oily liquid with a faint characteristic odor and slightly nutty, sweet taste resembling cooked sweet corn.

9 Pharmacopeial Specifications

See Table I.

Table I: Pharmacopeial specifications for corn oil.

Test	JP 2001	PhEur 2002	USPNF 20
Acid value	≤0.2	≤0.5	—
Alkaline impurities	—	+	—
Characters	+	+	—
Cottonseed oil	—	—	+
Composition of fatty acids	—	+	+
Fatty acids less than C ₁₆	—	≤0.6%	+
Arachidic acid	—	≤0.8%	—
Behenic acid	—	≤0.5%	—
Oleic acid	—	20.0–42.2%	—
Eicosanoic acid	—	≤0.5%	—
Linoleic acid	—	39.4–65.6%	—
Linolenic acid	—	0.5–1.5%	—
Palmitic acid	—	8.6–16.5%	—
Stearic acid	—	≤3.3%	—
Other fatty acids	—	≤0.5%	—
Sterols	—	≤0.3%	—
Water	—	≤0.1%	—
Free fatty acids	—	—	+
Heavy metals	—	—	≤0.001%
Iodine value	103–130	—	102–130
Organic volatile impurities	—	—	+
Peroxide value	—	≤10.0	—
Refractive index	—	1.474	—
Saponification value	187–195	—	187–193
Specific gravity	0.915–0.921	0.920	0.914–0.921
Sterols	—	+	—
Unsaponifiable matter	≤1.5%	≤2.8%	≤1.5%
Water	—	≤0.1%	—

10 Typical Properties

Acid value: 2–6

Autoignition temperature: 393°C

Density: 0.915–0.918 g/cm³

Flash point: 321°C

Hydroxyl value: 8–12

Melting point: –18 to –10°C

Refractive index:

$n_D^{25} = 1.470–1.474$;

$n_D^{40} = 1.464–1.468$.

Solubility: miscible with benzene, chloroform, dichloromethane, ether, and hexane; practically insoluble in ethanol (95%) and water.

Viscosity (dynamic): 37–39 mPa s (37–39 cP)

11 Stability and Storage Conditions

Corn oil is stable when protected with nitrogen in tightly sealed bottles. Prolonged exposure to air leads to thickening and rancidity. Corn oil may be sterilized by dry heat, maintaining it at 150°C for 1 hour.⁽¹⁾

Corn oil should be stored in an airtight, light-resistant container in a cool, dry place. Exposure to excessive heat should be avoided.

12 Incompatibilities

The photooxidation of corn oil is sensitized by cosmetic and drug-grade samples of coated titanium oxide and zinc oxide.⁽²⁾

13 Method of Manufacture

Refined corn oil is obtained from the germ or embryo of *Zea mays* Linné (Fam. Gramineae), which contains nearly 50% of the fixed oil compared with 3.0–6.5% in the whole kernel. The oil is obtained from the embryo by expression and/or solvent extraction. Refining involves the removal of free fatty acids, phospholipids, and impurities; decolorizing with solid adsorbents; dewaxing by chilling; and deodorization at high temperature and under vacuum.

14 Safety

Corn oil is generally regarded as a relatively nontoxic and nonirritant material with an extensive history of usage in food preparation.

15 Handling Precautions

Observe normal precautions appropriate to the circumstances and quantity of material handled. Spillages of this material are very slippery and should be covered with an inert absorbent material prior to disposal.

16 Regulatory Status

Included in the FDA Inactive Ingredients Guide (oral capsules and tablets).

17 Related Substances

Canola oil; cottonseed oil; peanut oil; sesame oil; soybean oil.

18 Comments

Owing to its high content of unsaturated acids, corn oil has been used as a replacement for fats and oils containing a high content of saturated acids in the diets of patients with hypercholesterolemia.

19 Specific References

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- 2 Sayre RM, Dowdy JC. Titanium dioxide and zinc oxide induce photooxidation of unsaturated lipids. *Cosmet Toilet* 2000; 115: 75–80, 82.

20 General References

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- Mann JI, Carter R, Eaton P. Re-heating corn oil does not saturate its double bonds [letter]. *Lancet* 1977; ii: 401.
- Watson SA, Ramstead PE, eds. *Corn Chemistry and Technology*. St. Paul, MN: American Association of Cereal Chemists Inc., 1987: 53–78.

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