Canola Oil

1 Nonproprietary Names

None adopted.

2 Synonyms

Canbra oil; *Colzao CT*; *Lipex 108*; *Lipex 204*; *Lipovol CAN*; low erucic acid colza oil; low erucic acid rapeseed oil.

3 Chemical Name and CAS Registry Number

Canola oil [120962-03-0]

4 Empirical Formula Molecular Weight

Canola oil contains approximately 6% saturated acids, 2% monounsaturated acids, and 32% polyunsaturated acids; *see* Table I. Additionally, sulfur-containing fatty acids may also be present as minor constituents.

Table I: Typical composition of glycerides present in canola oil.

Glyceride	Amount present (%)
Erucic acid	0.2–1.8
Palmitic acid	3.0–4.5
Palmitoleic acid	0.2–0.3
Stearic acid	1.3–1.7
Linoleic acid	19.0–24.0
Oleic acid	56.0–62.0

The sulfur-containing compounds have been held responsible for the unpleasant odors from heated rapeseed oil. It has been suggested that the sulfur compounds in rapeseed oil are of three types: volatile, thermolabile, and nonvolatile.[1]

Unrefined canola oil is said to contain low levels of sulfur-containing fatty acids, resulting in the presence of sulfur in the oil in the stable form of triglycerides. These triglycerides resist refining procedures.[2] *See* Table II for the sulfur content of crude, refined, and deodorized canola oils.[3]

Table II: Total sulfur content in crude, refined and bleached and deodorized canola oil.[a]

Oil sample	Range (mg/kg)	Mean	Standard deviation
Crude	23.6–24.1	23.8	1.0
Refined	19.1–20.2	19.7	2.85
Bleached and deodorized	15.6–16.5	16.2	2.7

[a] Determined using five replicates of each sample analyzed by ion chromatography.

5 Structural Formula

See Section 4.

6 Functional Category

Lubricant; oleaginous vehicle.

7 Applications in Pharmaceutical Formulation or Technology

Canola oil is a refined rapeseed oil obtained from particular species of rapeseed that have been genetically selected for their low erucic acid content.[4] In pharmaceutical formulations, canola oil is used mainly in topical preparations such as soft soaps and liniments. It is also used in cosmetics.

8 Description

A clear, light yellow-colored oily liquid with a bland taste.

9 Pharmacopeial Specifications

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10 Typical Properties

Acid value: ≤ 0.5
Density: 0.913–0.917 g/cm^3
Erucic acid: $\leq 2.0\%$
Flash point: 290–330°C
Free fatty acid: $\leq 0.05\%$ as oleic acid
Freezing point: -10 to -2°C
Iodine number: 94–126
Refractive index: n_D^{40} = 1.465–1.469
Saponification value: 186–198
Solubility: soluble in chloroform and ether; practically insoluble in ethanol (95%); miscible with fixed oils.
Viscosity (dynamic): 77.3–78.3 mPa s (77.3–78.3 cP) at 20°C

11 Stability and Storage Conditions

Canola oil is stable and should be stored in an airtight, light-resistant container in a cool, dry place. During storage, grassy, paintlike, or rancid off-flavors can develop.

Flavor deterioration has been attributed mainly to secondary oxidation products of linolenic acid, which normally makes up 9–15% of the fatty acids in canola oil. Storage tests of canola oil showed sensory changes after 2–4 days at 60–65°C in comparison to 16 weeks at room temperature. Canola oil seems to be more stable to storage in light than cottonseed oil and soybean oils, but is less stable than sunflower oil.[5] In addition, the effects of various factors on sediment formation in canola oil have been reported.[6]

It has been reported that oils stored at 2°C showed the highest rate of sediment formation, followed by those stored at at 6°C.[5] All samples showed little sediment formation, as measured by turbidity, during storage at 12°C. Removal of sediment from canola oil prior to storage by cold precipitation and filtration did not eliminate this phenomenon, which still developed rapidly at 2°C.

A study on the effect of heating on the oxidation of low linolenic acid canola oil at frying temperature under nitrogen and air clearly showed that a significantly lower development of oxidation was evident for the low linolenic acid canola oil. Reduction in the linolenic acid content of canola oil reduced the development of room odor at frying temperatures.

12 Incompatibilities

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13 Method of Manufacture

Canola oil is obtained by mechanical expression or *n*-hexane extraction from the seeds of *Brassica napus (Brassica campestris)* var. *oleifera* and certain other species of *Brassica* (Cruciferae). The crude oil thus obtained is refined, bleached, and deodorized to substantially remove free fatty acids, phospholipids, color, odor and flavor components, and miscellaneous nonoil materials.

14 Safety

Canola oil is generally regarded as an essentially nontoxic and nonirritant material and has been accepted by the FDA for use in cosmetics, foods, and pharmaceuticals.

Rapeseed oil has been used for a number of years in food applications as a cheap alternative to olive oil. However, there are large amounts of erucic acid and glucosinolates in conventional rapeseed oil, both substances being toxic to humans and animals.[7] Canola oil derived from genetically selected rapeseed plants that are low in erucic acid content has been developed to overcome this problem.

Feeding studies in rats have suggested that canola oil is nontoxic to the heart, although it has also been suggested that the toxicological data may be unclear.[8]

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. Canola oil poses a slight fire hazard.

16 Regulatory Status

Accepted for use by the FDA in cosmetics and foods. Included in the FDA Inactive Ingredients Guide (oral capsules).

17 Related Substances

Corn oil; cottonseed oil; peanut oil; rapeseed oil; sesame oil; soybean oil.

Rapeseed oil
CAS number: [8002-13-9]
Synonyms: *Calchem H-102*; colza oil; rape oil.
Appearance: a clear, yellow to dark yellow-colored oily liquid.
Iodine number: 94–120
Peroxide value: <5
Saponification value: 168–181
Comments: rapeseed oil contains 40–55% erucic acid. It is an edible oil and has been primarily used as an alternative, in foods and some pharmaceutical applications, to the more expensive olive oil. However, the safety of rapeseed oil as part of the diet has been questioned; *see* Section 14.

18 Comments

Canola oil has the lowest level of saturated fat compared to all other oils on the market at present. It has both a high protein (28%) and a high oil content (40%). When the oil is extracted, a high-quality and highly palatable feed concentrate of 37% protein remains. Canola oil is also high in the monounsaturated fatty acid oleic acid; *see* Table III.

The content of tocopherol, a natural antioxidant in canola, is comparable to those of peanut and palm oil. This is an important factor for oils with high linolenic acid content, which can reduce the shelf-life of the product, while the natural antioxidant, if present, can prevent oxidation during storage and processing.

Suggested specifications for refined, bleached, and deodorized canola oil are shown in Table IV.

The EINECS number for canola oil is 232-313-5.

Table III: Comparison of the composition of crude soybean, canola, palm, and peanut oils.

Components	Canola	Palm	Peanut	Soybean
Fatty acid (%)	0.4–1.0	4.6	0.5–1.0	0.3–0.7
Phosphatides (gum)(%)	3.6	0.05–0.1	0.3–0.4	1.2–1.5
Sterols/triterpene alcohol (%)	0.53	0.1–0.5	0.2	0.33
Tocopherols (%)	0.06	0.003–0.1	0.02–0.06	0.15–0.21
Carotenoids (mg/kg)	25–50	500–1600	>1	40–50
Chlorophyll/ pheophytins (ppm)	5–25	—	—	1–2
Sulfur (ppm)	—	—	—	12–17
Iodine value	112–131	44–60	84–100	123–139

Table IV: Suggested specifications for canola oil.

Test	Minimum	Maximum
Acid value	—	6
Iodine value	110	126
Heavy metal (as lead)	—	5 mg/kg
Refractive index n_D^{40}	1.465	1.467
Free fatty acid (as oleic)	—	0.05%
Erucic acid	—	2%
Moisture and impurities	—	0.05%
Saponification value (mg KOH/g oil)	182	193
Unsaponifiable matter	—	15 g/kg

19 Specific References

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20 General References

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21 Author

KS Alexander.

22 Date of Revision

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