Isopropyl Myristate

1 Nonproprietary Names

BP: Isopropyl myristate
PhEur: Isopropylis myristas
USPNF: Isopropyl myristate

2 Synonyms

Crodamol IPM; *Estol IPM*; isopropyl ester of myristic acid; *Kessco IPM 95*; *Lexol IPM-NF*; myristic acid isopropyl ester; *Rita IPM*; *Stepan IPM*; *Tegosoft M*; tetradecanoic acid, 1-methylethyl ester; *Waglinol 6014*.

3 Chemical Name and CAS Registry Number

1-Methylethyl tetradecanoate [110-27-0]

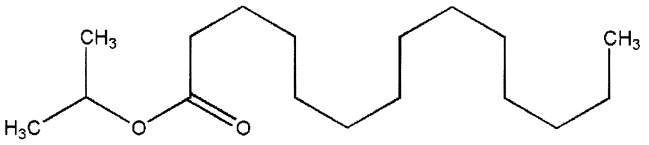
4 Empirical Formula

$C_{17}H_{34}O_2$

Molecular Weight

270.51

5 Structural Formula



6 Functional Category

Emollient; skin penetrant; solvent.

7 Applications in Pharmaceutical Formulation or Technology

Isopropyl myristate is a nongreasy emollient that is absorbed readily by the skin. It is used as a component of semisolid bases and as a solvent for many substances applied topically. Applications in topical pharmaceutical and cosmetic formulations include bath oils; make-up; hair and nail care products; creams; lotions; lip products; shaving products; skin lubricants; deodorants; otic suspensions; and vaginal creams; *see* Table I. For example, isopropyl myristate is a self-emulsifying component of a proposed cold cream formula,[1] which is suitable for use as a vehicle for drugs or dermatological actives; it is also used cosmetically in stable mixtures of water and glycerol.[2]

Isopropyl myristate is used as a penetration enhancer for transdermal formulations and has been used in conjunction with therapeutic ultrasound and iontophoresis.[3] It has been used in a water–oil gel prolonged-release emulsion in which isopropyl myristate is the major ingredient of the oil phase.

Table I: Uses of isopropyl myristate.

Use	Concentration (%)
Detergent	0.003–0.03
Otic suspension	0.024
Perfumes	0.5–2.0
Soap	0.03–0.3
Topical aerosols	2.0–98.0
Topical creams and lotions	1.0–10.0

8 Description

Isopropyl myristate is a clear, colorless, practically odorless liquid of low viscosity that congeals at about 3°C. It consists of esters of propan-2-ol and saturated high molecular weight fatty acids, principally myristic acid.

9 Pharmacopeial Specifications

See Table II.

Table II: Pharmacopeial specifications for isopropyl myristate.

Test	PhEur 2002	USPNF 20
Identification	+	+
Appearance of solution	+	—
Specific gravity	—	0.846–0.854
Relative density	0.850–0.855	—
Refractive index	1.434–1.437	1.432–1.436
Residue on ignition	—	≤0.1%
Sulfated ash	≤0.1%	—
Acid value	≤1.0	≤1.0
Saponification value	202–212	202–212
Iodine value	≤1.0	≤1.0
Appearance of solution	+	—
Viscosity	5–6 mPa s	—
Water	≤0.1%	—
Organic volatile impurities	—	+
Assay (as $C_{19}H_{38}O_2$)	≥90.0%	≥90.0%

10 Typical Properties

Boiling point: 140.2°C at 266 Pa (2 mmHg)
Flash point: 153.5°C (closed cup)
Freezing point: ≈3°C
Solubility: soluble in acetone, chloroform, ethanol, ethyl acetate, fats, fatty alcohols, fixed oils, liquid hydrocarbons, toluene, and waxes. Dissolves many waxes, cholesterol, or lanolin. Practically insoluble in glycerin, glycols, and water.
Viscosity (dynamic): 5–7 mPa s (5–7 cP) at 25°C

11 Stability and Storage Conditions

Isopropyl myristate is resistant to oxidation and hydrolysis and does not become rancid. It should be stored in a well-closed container in a cool, dry place and protected from light.

12 Incompatibilities

When isopropyl myristate comes into contact with rubber, there is a drop in viscosity with concomitant swelling and partial dissolution of the rubber; contact with plastics, e.g. nylon and polyethylene, results in swelling. Isopropyl myristate is incompatible with hard paraffin, producing a granular mixture. It is also incompatible with strong oxidizing agents.

13 Method of Manufacture

Isopropyl myristate may be prepared either by the esterification of myristic acid with propan-2-ol or by the reaction of myristoyl chloride and propan-2-ol with the aid of a suitable dehydrochlorinating agent. A high-purity material is also commercially available, produced by enzymatic esterification at low temperature.

14 Safety

Isopropyl myristate is widely used in cosmetics and topical pharmaceutical formulations and is generally regarded as a nontoxic and nonirritant material.[4–6]

LD_{50} (mouse, oral): 49.7 g/kg[7]
LD_{50} (rabbit, skin): 5 g/kg

15 Handling Precautions

Observe normal precautions appropriate to the circumstances and quantity of material handled.

16 Regulatory Status

Included in the FDA Inactive Ingredients Guide (otic, topical, and vaginal preparations). Used in nonparenteral medicines licensed in the UK.

17 Related Substances

Isopropyl palmitate.

18 Comments

The EINECS number for isopropyl myristate is 203-751-4.

19 Specific References

1 Jimenez SMM, Fresno CMJ, Selles Flores E. Proposal and pharmacotechnical study of a modern dermo-pharmaceutical formulation for cold cream. *Boll Chim Farm* 1996; **135**: 364–373.
2 Ayannides CA, Ktistis G. Stability estimation of emulsions of isopropyl myristate in mixtures of water and glycerol. *J Cosmet Sci* 2002; 53(3): 165–173.
3 Fang JY, Fang CL, Huang YB. Transdermal iontopheresis of sodium nonivaride acetate III: combined effect of pretreatment by penetration enhancers. *Int J Pharm* 1997; **149**: 183–195.
4 Stenbäck F, Shubik P. Lack of toxicity and carcinogenicity of some commonly used cutaneous agents. *Toxicol Appl Pharmacol* 1974; **30**: 7–13.
5 Opdyke DL. Monographs on fragrance raw materials. *Food Cosmet Toxicol* 1976; **14**(4): 307–338.
6 Guillot JP, Martini MC, Giauffret JY. Safety evaluation of cosmetic raw materials. *J Soc Cosmet Chem* 1977; **28**: 377–393.
7 Lewis RJ, ed. *Sax's Dangerous Properties of Industrial Materials*, 10th edn. New York: Wiley, 2000: 2166.

20 General References

Fitzgerald JE, Kurtz SM, Schardein JL, Kaump DH. Cutaneous and parenteral studies with vehicles containing isopropyl myristate and peanut oil. *Toxicol Appl Pharmacol* 1968; **13**: 448–453.
Nakhare S, Vyas SP. Prolonged release of rifampicin from internal phase of multiple w/o/w emulsion systems. *Indian J Pharm Sci* 1995; 57: 71–77.

21 Author

AK Taylor.

22 Date of Revision

24 June 2002.