

Ascorbyl Palmitate

1 Nonproprietary Names

BP: Ascorbyl palmitate
PhEur: Ascorbylis palmitas
USPNF: Ascorbyl palmitate

2 Synonyms

E304; L-Ascorbic acid 6-palmitate; 3-oxo-L-gulofuranolactone 6-palmitate; vitamin C palmitate.

3 Chemical Name and CAS Registry Number

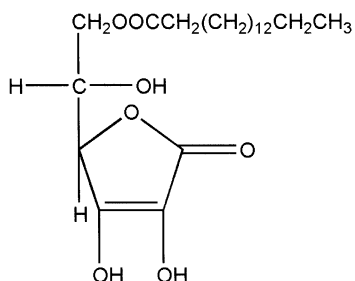
L-Ascorbic acid 6-hexadecanoate [137-66-6]

4 Empirical Formula Molecular Weight

$C_{22}H_{38}O_7$

414.54

5 Structural Formula



6 Functional Category

Antioxidant.

7 Applications in Pharmaceutical Formulation or Technology

Ascorbyl palmitate is primarily used either alone or in combination with alpha tocopherol as a stabilizer for oils in oral pharmaceutical formulations and food products. It may also be used in oral and topical preparations as an antioxidant for drugs unstable to oxygen. The combination of ascorbyl palmitate with alpha tocopherol shows marked synergism, which increases the effect of the components and allows the amount used to be reduced.

The solubility of ascorbyl palmitate in alcohol permits it to be used in nonaqueous and aqueous systems and emulsions.

8 Description

Ascorbyl palmitate is a practically odorless, white to yellowish powder.

9 Pharmacopeial Specifications

See Table I.

Table I: Pharmacopeial specifications for ascorbyl palmitate.

Test	PhEur 2002	USPNF 20
Identification	+	+
Characters	+	—
Appearance of solution	+	—
Melting range	—	107–117 °C
Specific rotation (10% w/v in methanol)	+21° to +24°	+21° to +24°
Loss on drying	≤ 1.0%	≤ 2.0%
Residue on ignition	—	≤ 0.1%
Sulfated ash	≤ 0.1%	—
Heavy metals	≤ 10 ppm	≤ 0.001%
Organic volatile impurities	—	+
Assay (dried basis)	98.0–100.5%	95.0–100.5%

10 Typical Properties

Solubility: see Table II.

Table II: Solubility of ascorbyl palmitate.

Solvent	Solubility at 20 °C unless otherwise stated ⁽¹⁾
Acetone	1 in 15
Chloroform	1 in 3300
Ethanol	1 in 11 at 60 °C 1 in 8 1 in 1.7 at 70 °C
Ethanol (95%)	1 in 9.3
Ethanol (50%)	1 in 2500
Ether	1 in 132
Methanol	1 in 5.5 1 in 1.7 at 60 °C
Olive oil	1 in 3300
Peanut oil	1 in 3300
Propan-2-ol	1 in 20 1 in 5 at 70 °C
Sunflower oil	1 in 3300
Water	Practically insoluble 1 in 500 at 70 °C 1 in 100 at 100 °C

11 Stability and Storage Conditions

Ascorbyl palmitate is stable in the dry state, but is gradually oxidized and becomes discolored when exposed to light and high humidity. In an unopened container, stored in a cool place, it has a shelf life of at least 12 months. During processing, temperatures greater than 65 °C should be avoided.

The bulk material should be stored in an airtight container at 8–15 °C, protected from light.

12 Incompatibilities

Incompatibilities are known with oxidizing agents, e.g., in solution oxidation is catalyzed by trace metal ions such as Cu^{2+} and Fe^{3+} .

13 Method of Manufacture

Ascorbyl palmitate is prepared synthetically by the reaction of ascorbic acid with sulfuric acid followed by reesterification with palmitic acid.

14 Safety

Ascorbyl palmitate is used in oral pharmaceutical formulations and food products and is generally regarded as an essentially nontoxic and nonirritant material. The WHO has set an estimated acceptable daily intake for ascorbyl palmitate at up to 1.25 mg/kg body-weight.⁽²⁾

LD₅₀ (mouse, oral): 25 g/kg⁽³⁾

LD₅₀ (rat, oral): 10 g/kg

15 Handling Precautions

Observe normal precautions appropriate to the circumstances and quantity of material handled. Ascorbyl palmitate dust may cause irritation to the eyes and respiratory tract. Eye protection is recommended.

16 Regulatory Status

GRAS listed. Accepted for use as a food additive in Europe. Included in the FDA Inactive Ingredients Guide (oral, rectal, topical preparations). Included in nonparenteral medicines licensed in the UK.

17 Related Substances

Ascorbic acid.

18 Comments

The EINECS number for ascorbyl palmitate is 205-305-4.

In order to maximize the stability and efficacy of ascorbyl palmitate the following precautions are recommended: stainless steel, enamel, or glass should be used; deaeration (vacuum) procedures and inert gas treatment are recommended where feasible; protect from light and radiant energy.

19 Specific References

- 1 Kläui H. Tocopherol, carotene and ascorbyl palmitate. *Int Flavours Food Addit* 1976; 7(4): 165–172.
- 2 FAO/WHO. Toxicological evaluation of certain food additives with a review of general principles and of specifications. Seventeenth report of the joint FAO/WHO expert committee on food additives. *World Health Organ Tech Rep Ser* 1974; No. 539.
- 3 Sweet DV, ed. *Registry of Toxic Effects of Chemical Substances*. Cincinnati: US Department of Health, 1987.

20 General References

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- Daniel JW. Metabolic aspects of antioxidants and preservatives. *Xenobiotica* 1986; 16(10–11): 1073–1078.
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- Weller PJ, Newman CM, Middleton KR, Wicker SM. Stability of a novel dithranol ointment formulation, containing ascorbyl palmitate as an anti-oxidant. *J Clin Pharm Ther* 1990; 15: 419–423.

21 Authors

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22 Date of Revision

25 April 2002.