

D-PANTOTHENYL ETHYL ETHER

For cosmetic use

Definition

Ether form of dextrorotatory isomer of pantothenic acid, belonging to the group of watersoluble vitamins, member of B-complex vitamins, specially designed for topical application

DEXTROROTATORY-Isomer ...

of pantothenic acid. Key for healthcare: the "right-turning" D-isomer converts full vitamin efficacy, in contrary to L-form (turning left) having no vitamin activity. D-Pantothenyl Ethyl Ether mediates as a key to the cell and opens the door for skin regeneration and health care.

Synonymous names

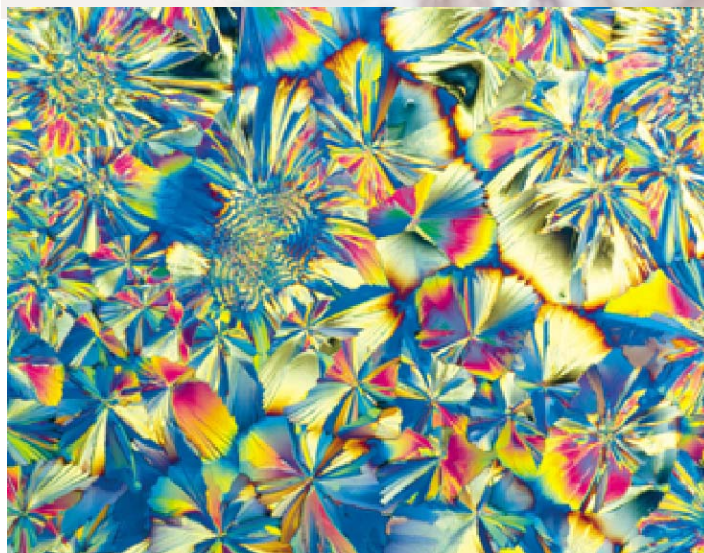
Dex-Ethyl Panthenol
D-Panthenyl Ethyl Ether
D-Ethyl-Panthenol
Dextrorotatory Ethyl Panthenol

Chemical names

D(+)-N-(3-Ethoxypropyl)-2,4-dihydroxy-3,3-dimethylbutyramid;
D(+)-3-(2'-hydroxy-4'-hydroxy-3',3'-dimethylbutyl) amino-propyl-ethyl-ether;
(R) (1,3-dihydroxy-2-dimethylbutyryl)-(3-ethoxy-propyl) amine;

Official adopted names and nomenclatures

CAS No.: 667-83-4
EINECS No.: 211-569-1
INCI name: Panthenyl Ethyl Ether
CTFA name: Panthenyl Ethyl Ether
CN code: 2936 2400
D- or DL-Pantothenic acid
(Vitamin B3 or Vitamin B5)
and its derivatives



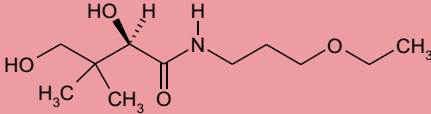
Producer: DAIICHI FINE CHEMICAL CO., LTD., Japan

 DAIICHI FINE CHEMICAL CO. LTD



Kyowa Hakko Europe GmbH
Daiichi Fine Chemical Division

SPECIFICATION

Chemical name:	(R)-N-(3-Ethoxypropyl)-2,4-dihydroxy-3,3-dimethylbutyramid
Chemical structure:	
Empirical formula:	C ₁₁ H ₂₃ NO ₄ Molecular weight: 233.31
Appearance:	A clear, colorless to light yellow, viscous liquid with a faint, characteristic odor, bitter taste
Identification:	Ninhydrin reaction
Optical rotation:	$[\alpha]_D^{20} : + 27.5^\circ \sim + 29.5^\circ$
Refractive index:	$n_D^{20} : 1.474 \sim 1.476$
Heavy metals:	Not more than 20 ppm
Water:	Not more than 0.5%
Residue on ignition:	Not more than 0.1%
Assay:	Not less than 98.0 %

Other physio-chemical Properties

3-Ethoxy propylamin:	Not more than 0.5%
Boiling point:	150°C (0.05 mm Hg)
Acidity:	pH of 10% solution: 9.0 ~ 11.0

Storage and Packaging

Storage:	Protect against humidity and heat, store in tight containers at room temperature (JP: 1°C to 30°C)
Standard packaging:	20 kg PE-bottle net, cartonized 200 kg PE-drum net, on special request
Expiry date:	In unopened original packaging and under adequate storage conditions minimum 2 years after production date

Formulating

Standardization: Calculated on the different molecular weights the relations among the derivatives and pantothenic acid are as follows:
1.000 g PANTOTHENIC ACID is equivalent to 1.064 g D-Pantothenyl Ethyl Ether
1.000 g D-PANTHENOL is equivalent to 1.137 g D-Pantothenyl Ethyl Ether
1.000 g D-CALCIUM PANTOTHENATE is equivalent to 0.979 g D-Pantothenyl Ethyl Ether

Stability: Relatively stable to oxygen and light, slightly hygroscopic, stable in neutral or slightly acidic (pH 4 - 7,5), less stable in acidic and alkaline aqueous solutions by hydrolytic cleavage, excessive exposure to heat exceeding 70°-75° C may cause racemization

D-PANTOTHENYL ETHYL ETHER is specially designed for cosmetic preparations that are mostly ranging between pH 5 and pH 7. Within this range, D-PANTOTHENYL ETHYL ETHER can be regarded as stable. Reasonably stable to usual sterilization time in aqueous solutions and before mentioned pH environment. In an excessive heat test (130° C/3h) in a 5% aqueous solution 82% D-PANTOTHENYL ETHYL ETHER was found (in comparison: DEXPANTHENOL: 70 %).

Solubility: Easily soluble in water, alcohol, propylene-glycol and glycerin, readily miscible in some typical cosmetic oils such as f.i. corn oil, sunflower oil, peanut oil and castor oil, insoluble in paraffin oil, di-/cyclomethicone, fats and mineral oil.

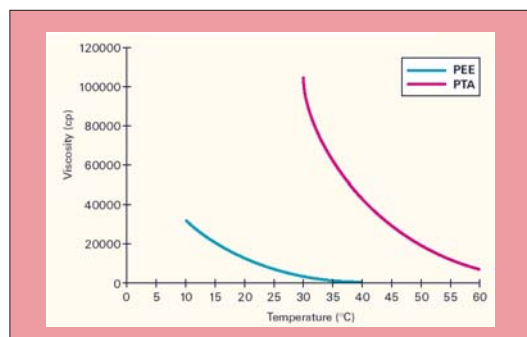
Microorganisms: Bacteria count not more than 100/g
Fungi not more than 10/g
Pathol. causative organisms like pseudomonas aeruginosa, staphylococcus aureus, candida albicans, escherichia coli are not traceable.

Toxicity: D-PANTOTHENYL ETHYL ETHER is non-toxic (oral LD₅₀ rat > 2000 mg/kg; topical LD₅₀ rat > 2000 mg/kg), non-irritant (dermal and eye), non-sensitising and non-phototoxic.



Handling

Properties: D-PANTOTHENYL ETHYL ETHER (PEE) is a viscous liquid, but fairly to handle at room temperature (9000mPas at 20° C). The difference to Dexpanthenol Ph. Eur. (PTA) is shown in the table below:



Among the derivatives of pantothenic acid, D-PANTOTHENYL ETHYL ETHER offers significant advantages with its acceptable viscosity (no warming-up), wide range of solubility and lack of stickiness also in higher concentrations.
Viscosity (cp)

Antistatic electricity: Desirable values (intrinsic surface resistance = $3,7 \times 10^9 \Omega \text{ cm}$)

Role in cosmetic formulations

D-PANTOTHENYL ETHYL ETHER has excellent physical (solubility, anti-electrostatic, etc.) chemical (stability) and biological (transcutaneous absorption etc.) properties. When D-PANTOTHENYL ETHYL ETHER is applied to the skin directly or in cosmetic formulations, it is rapidly absorbed and changed into pantothenic acid (a constituent of coenzyme A) by hydrolysis and oxidation.

In skin care ... pantothenic acid:	stabilizes the metabolism of skin surface retains natural moisture balance of the skin penetrates well into deeper skin layer stimulates the formation of skin pigments
In hair care ... pantothenic acid:	improves the combability of wet hair penetrates well into the hair shaft causes long lasting moisturizing effects promotes gloss and elasticity improves the structure of hair and has a repair effect
Recommendations for cosmetic use:	With concentrations of 0.5% to 5% D-PANTOTHENYL ETHYL ETHER can be used either alone or in combination with other active ingredients to develop a large series of highly effective cosmetic product concepts.
Examples:	Skin care (creams and lotions)

Skin care (creams and lotions)



Product	D-Pantothenyl Ethyl Ether in %
Face lotion	0.5
After shave	0.5
Face cream	1.0
Skin care cream W/O	1.0
Tinted treatment W/O	1.0
Collagen day cream W/O	1.5
After sun cream O/W	1.5
After shave balm	1.5
Wound healing cream W/O	1.5
Lip care	1.5

Hair care (leave-on and rinse-off)

Product	D-Pantothenyl Ethyl Ether in %
Hair lotion	0.5
Burdock root-hair lotion	0.5
Shampoo (damaged hair)	1.0

Literature: K.-H. Bässler, I. Golly, D. Loew, K. Pietrzik: Vitamin-Lexikon für Ärzte, Apotheker und Ernährungswissenschaftler (1997). P. Berry Ottaway: The Technology of Vitamins in Food (1993). Dr. H. Eggensperger: Multiaktive Wirkstoffe für Kosmetika (1994/1995). G. A. Nowak: Cosmetic Preparations Vol. 1 (1985). Karl Heinz Bässler: Vitamine (1989). Dr. rer. nat. G. Erlemann: Neue Derivate des Panthenols. DGE: Empfehlungen für die Nährstoffzufuhr (1991). Bundesanzeiger Nr. 179 dd. 93/09/23: Monographie Pantothenic Acid, systemic use; Nr. 24 dd 93/02/05: Monographie Pantothenic Acid, topical use.

The data submitted in this publication are based on our current knowledge and experience. They do not constitute a guarantee in the legal sense of the term and, in view of the manifold factors that may affect processing and application, do not relieve those to whom we supply our products from the responsibility of carrying out their own tests and experiments. Any relevant patent rights and existing legislation and regulations must be observed.



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