

dl- α -TOCOPHEROL

Prepared at the 30th JECFA (1986), published in FNP 37 (1986) and in FNP 52 (1992). Metals and arsenic specifications revised at the 61st JECFA (2003). A group ADI of 0.15-2 mg/kg bw for dl- α -tocopherol and d- α -tocopherol, concentrate, singly or in combination, was established at the 30th JECFA (1986).

SYNONYMS

Vitamin E; INS No. 307c

DEFINITION

Chemical names

dl-5,7,8-Trimethyltolcol, dl-2,5,7,8-tetramethyl-2-(4',8',12'- trimethyltridecyl)-6-chromanol

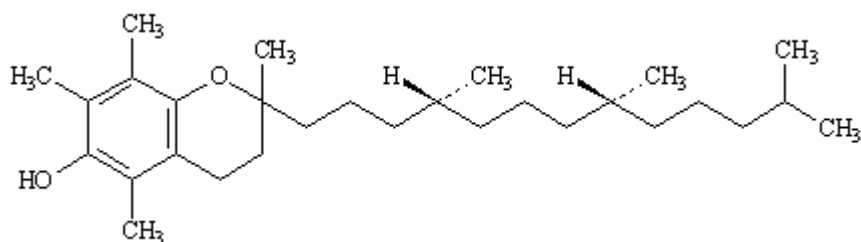
C.A.S. number

No single definite C.A.S. number is for this substance. No. 59-02-9 is for vitamin E, 1406-18-4 is for alpha-tocopherol, 2074-53-5 is for all-rac-alpha-tocopherol, and 10191-40-0 is for racemic-alpha-tocopherol synthesized from natural phytol or its derivative.

Chemical formula

$C_{29}H_{50}O_2$

Structural formula



Formula weight

430.71

Assay

Not less than 96% and not more than 102%

DESCRIPTION

Slightly yellow to amber, nearly odourless, clear, viscous oil (It oxidizes and darkens in air and on exposure to light.)

FUNCTIONAL USES Antioxidant

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4)

Insoluble in water, freely soluble in ethanol, miscible with ether

Specific rotation (Vol. 4)

$[\alpha]_{20, D}$: $0 \pm 0.05^\circ$ (1 in 10 soln in chloroform)

Spectrophotometry (Vol. 4)

In absolute ethanol the maximum absorption is about 292 nm

Colour reaction Dissolve about 0.01 g of the sample in 10 ml of absolute ethanol. Add, with swirling, 2 ml of nitric acid and heat at about 75° for 15 min. A bright red to orange colour develops

PURITY

Refractive index n (20, D): 1.503 - 1.507

Spectrophotometry E (1%, 1 cm) (292 nm): 71-76 (0.01 g in 200 ml of absolute ethanol)
(Vol. 4)

Sulfated ash (Vol. 4) Not more than 0.1%
Test 1 g of the sample (Method II)

Acidity Dissolve 1 g of the sample in 25 ml of a mixture of equal volumes of ethanol and ether that has been neutralized to phenolphthalein TS with 0.1 N sodium hydroxide, add 0.5 ml of phenolphthalein TS, and titrate with 0.1 N sodium hydroxide until the solution remains faintly pink after shaking for 30 sec. Not more than 1.0 ml of 0.1 N sodium hydroxide is required.

Lead (Vol. 4) Not more than 2 mg/kg
Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."

METHOD OF ASSAY

Gas Liquid Chromatographic Method

Reagents and solutions

Internal Standard Solution: Prepare a solution in n-hexane containing a 3 mg of hexadecyl hexadecanoate, accurately weighed, in each ml.

Standard Preparation: dissolve about 30 mg of USP Alpha Tocopherol Reference Standard, accurately weighed, in 10.0 ml of the Internal Standard Solution.

Assay Preparation: dissolve about 30 g of the sample accurately weighed, in 10.0 ml of the International Standard Solution.

Chromatographic System

Use a gas chromatograph equipped with a flame-ionization detector and a glass-lined sample- introduction system or on-column injection. Under typical conditions, the instrument contains a 2-m x 4-mm boro-silicate glass column packed with 2% methylpolysiloxane gum on 80- to 100-mesh acid-base washed silinized chromatographic diatomaceous earth. The column is maintained isothermally between 240° and 260°, the injection port at about 290°, and the detector block at about 300°. The flow rate of dry carrier gas is adjusted to obtain a hexadecyl hexadecanoate peak approximately 18 to 20 min after sample introduction when a 2% column is used, or 30 to 32 min when a 5% column is used. (NOTE: Cure and condition the column as necessary).

System Suitability

Chromatograph a sufficient number of injections of a mixture in n-hexane of 1 mg per ml each of USP Alpha Tocopherol Reference Standard and USP Alpha Tocopheryl Acetate Reference Standard, as directed under Calibration, to assure that the resolution factor, R, is not less than 1.0.

Calibration

Chromatograph successive 2- to 5- μ l portions of the Standard Preparation until the relative response factor, F, is constant (i.e., within a range of approximately 2%) for three consecutive injections. If graphic integration is used, adjust the instrument to obtain at least 70% maximum recorder response for the hexadecyl hexadecanoate peak. Measure the areas under the major peaks occurring at relative retention times of approximately 0.51 (alpha-tocopherol) and 1.00 (hexadecyl hexadecanoate), and record the values as A_s and A_1 , respectively. Calculate the relative response factor, F, by the formula $(A_s/A_1) \times (C_1/C_s)$, in which C_1 and C_s are the exact concentrations, in mg per ml, of hexadecyl hexadecanoate and of USP Alpha Tocopherol Reference Standard in the Standard Preparation, respectively.

Procedure

Inject a suitable portion (2 to 5 μ l) of the Assay Preparation into the chromatograph, and record the chromatogram. Measure the areas under the major peaks occurring at relative retention times of approximately 0.51 (alpha-tocopherol) and 1.00 (hexadecyl hexadecanoate), and record the values as a_u and a_1 , respectively.

Calculate the weight, in mg, of dl-alpha-tocopherol in the sample by the formula $(10C_1/F) \times (a_u/a_1)$.