

Status: Currently Official on 14-Feb-2025

Official Date: Official as of 01-May-2022

Document Type: USP Monographs

DocId: GUID-00A94065-42E2-4BBD-9D54-F4388D083C03_5_en-US

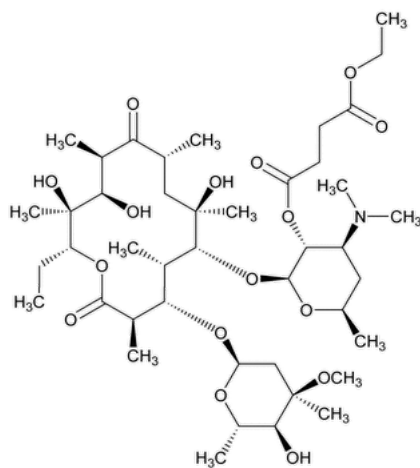
DOI: https://doi.org/10.31003/USPNF_M30320_05_01

DOI Ref: hme8k

© 2025 USPC

Do not distribute

Erythromycin Ethylsuccinate

 $C_{43}H_{75}NO_{16}$

862.06

Erythromycin 2'-(ethyl butanedioate);

Erythromycin 2'-(ethyl succinate) CAS RN®: 1264-62-6; UNII: 1014KSJ86F.

DEFINITION

Erythromycin Ethylsuccinate consists primarily of the 2'-ethylsuccinate ester of erythromycin A. The sum of the percentages of erythromycin A, erythromycin B, and erythromycin C is NLT 76.5%, calculated on the anhydrous basis.

IDENTIFICATION

• A. [SPECTROSCOPIC IDENTIFICATION TESTS \(197\)](#), [Infrared Spectroscopy: 197S](#)

Sample solution: 10 mg/mL in chloroform

Cell: 1.0 mm

Acceptance criteria: Meets the requirements

• **B.** The retention times of the erythromycin A, erythromycin B, and erythromycin C peaks in the *Sample solution* correspond to those of *Standard solution 1* and *Standard solution 2*, as obtained in the Assay.

ASSAY

• PROCEDURE

Use solutions containing erythromycin promptly, or within 1 day if stored in a refrigerator.

Solution A: 20 mg/mL of [dibasic potassium phosphate](#) in [water](#). Adjust with [phosphoric acid](#) to a pH of 8.0.

Solution B: 35 mg/mL of [dibasic potassium phosphate](#) in [water](#). Adjust with [phosphoric acid](#) to a pH of 8.0.

Solution C: Adjust 20 mL of *Solution A* with [phosphoric acid](#) to a pH of 3.5.

Mobile phase: [Acetonitrile](#), [tertiary butyl alcohol](#), *Solution B*, and [water](#) (6:35:10:149)

Standard solution 1: 50 mg of [USP Erythromycin RS](#) in a 25-mL volumetric flask. Add 12.5 mL of [methanol](#), and swirl to dissolve. Dilute with *Solution A* to volume.

Standard solution 2: 5 mg each of [USP Erythromycin B RS](#) and [USP Erythromycin C RS](#), in a 50-mL volumetric flask. Add 25.0 mL of [methanol](#), and swirl to dissolve. Add 2.5 mL of *Standard solution 1*, and dilute with *Solution A* to volume.

System suitability solution: 0.1 mg/mL of [USP Erythromycin Related Compound N RS](#) in *Standard solution 2*

Sample solution: 115 mg of Erythromycin Ethylsuccinate in a 50-mL volumetric flask. Add 25.0 mL of [methanol](#), and swirl to dissolve. Add about 20 mL of *Solution A* and allow to stand at room temperature for about 12 h to effect hydrolysis. Dilute with *Solution A* to volume.

Chromatographic system

(See [Chromatography \(621\)](#), [System Suitability](#).)

Mode: LC

Detector: UV 215 nm

Column: 4.6-mm × 25-cm; packing [L21](#) (1000Å)

Column temperature: 70°

Flow rate: 2 mL/min

Injection volume: 200 µL

Run time: NLT 5 times the retention time of erythromycin A

System suitability

Samples: *Standard solution 1* and *System suitability solution*

The order of elution of the components is erythromycin related compound N, erythromycin C, erythromycin A, and erythromycin B.

Suitability requirements

Resolution: NLT 0.8 between erythromycin related compound N and erythromycin C; NLT 5.5 between erythromycin related compound N and erythromycin A, *System suitability solution*

Relative standard deviation: NMT 1.0%, *Standard solution 1*

Analysis

Samples: *Standard solution 1*, *Standard solution 2*, and *Sample solution*

Calculate the percentage of erythromycin A in the portion of Erythromycin Ethylsuccinate taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times P \times 100$$

r_U = peak response of erythromycin A from the *Sample solution*

r_S = peak response of erythromycin A from *Standard solution 1*

C_S = concentration of [USP Erythromycin RS](#) in *Standard solution 1* (mg/mL)

C_U = concentration of Erythromycin Ethylsuccinate in the *Sample solution* (mg/mL)

P = percentage of erythromycin A in [USP Erythromycin RS](#)

Calculate the percentage of erythromycin B and erythromycin C in the portion of Erythromycin Ethylsuccinate taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times P \times 100$$

r_U = peak response of the relevant analyte from the *Sample solution*

r_S = peak response of the relevant analyte from *Standard solution 2*

C_S = concentration of the corresponding Reference Standard in *Standard solution 2* (mg/mL)

C_U = concentration of Erythromycin Ethylsuccinate in the *Sample solution* (mg/mL)

P = potency of erythromycin B or erythromycin C in the corresponding Reference Standard (mg/mg)

Acceptance criteria: NLT 76.5% for the sum of the percentages of erythromycin A, erythromycin B, and erythromycin C, on the anhydrous basis. The percentage of erythromycin B is NMT 12.0%, and the percentage of erythromycin C is NMT 5.0%.

IMPURITIES

• [RESIDUE ON IGNITION \(281\)](#)

Sample: After ignition at $550 \pm 50^\circ$, the charred residue is moistened with 2 mL of [nitric acid](#) and 5 drops of [sulfuric acid](#).

Acceptance criteria: NMT 1.0%

• ORGANIC IMPURITIES

Solution B, Solution C, Mobile phase, Standard solution 1, Standard solution 2, Sample solution, Chromatographic system, and System suitability: Proceed as directed in the Assay.

Peak identification solution: 10 mg of [USP Erythromycin RS](#) in 2 mL of [methanol](#). Add 10 mL of *Solution C*, and allow to stand for about 30 min. Refrigerate this solution until used, and discard 8 h after preparation.

Analysis

Samples: *Standard solution 2*, *Sample solution*, and *Peak identification solution*

Identify the erythromycin A enol ether peak using the *Peak identification solution*. Begin peak integration of the *Sample solution* after the two peaks for succinates that elute just after the solvent front.

Calculate the percentage of the largest single impurity (the largest peak other than erythromycin A, erythromycin B, erythromycin C, erythromycin A enol ether, and erythromycin N-ethylsuccinate) in the portion of Erythromycin Ethylsuccinate taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times P \times 100$$

r_U = peak response of the largest single impurity (the largest peak other than erythromycin A, erythromycin B, erythromycin C, erythromycin A enol ether, and erythromycin N-ethylsuccinate) from the *Sample solution*

r_S = peak response of erythromycin A from *Standard solution 2*

C_S = concentration of [USP Erythromycin RS](#) in *Standard solution 2* (mg/mL)

C_U = concentration of Erythromycin Ethylsuccinate in the *Sample solution* (mg/mL)