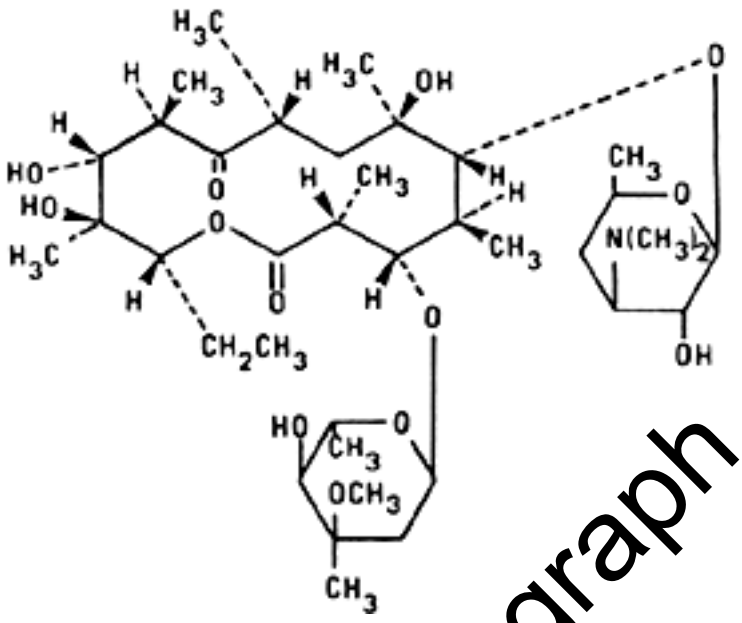
Erythromycin (Erythromycinum)

Molecular formula. $C_{37}H_{67}NO_{13}$

Relative molecular mass. 733.9

Graphic formula.



Chemical name. [3*R*-(3*R**,4*S**,5*S**,6*R**,7*R**,9*R**,11*R**,12*R**,13*S**,14*R**)]-4-[(2,6-Dideoxy-3-*C*-methyl-3-*O*-methyl-α-L-*ribo*-hexopyranosyl)oxyl]-14-ethyl-7,12,13-trihydroxy-3,5,7,9,11,13-hexamethyl-6-[[3,4,6-trideoxy-3-(dimethylamino)-β-D-*xylo*-hexopyranosyl]oxy]oxacyclotetradecane-2,10-dione; CAS Reg. No. 114-07-8.

Description. White or slightly yellow crystals or powder; odourless or almost odourless.

Solubility. Soluble in 1000 parts of water but less soluble in hot water; freely soluble in ethanol (~750 g/l) TS and ether R.

Category. Antibacterial drug.

Storage. Erythromycin should be kept in a tightly closed container, protected from light.

Additional information. Erythromycin is slightly hygroscopic.

Requirements

Definition. Erythromycin is a mixture of substances produced by the growth of certain strains of *Streptomyces erythreus.* The main component of the mixture is erythromycin A with lesser amounts of erythromycins B and C.

The molecular formula, the relative molecular mass, and the chemical name given above relate to erythromycin A only.

Erythromycin contains not less than 870 International Units per mg, calculated with reference to the anhydrous substance.

Identity tests

• Either test A alone or tests B, C and D may be applied.

A. Carry out the examination as described under 1.7 Spectrophotometry in the infrared region. The infrared absorption is concordant with the spectrum obtained from erythromycin RS or with the *reference spectrum* of erythromycin.

B. To 5 mg add 2 mL of sulfuric acid (~1760 g/l) TS and shake gently; a reddish brown colour is produced.

C. Dissolve 3 mg in 2 mL of acetone R and add 2 mL of hydrochloric acid (~420 g/l) TS; an orange colour is produced, which changes to red and then to deep purplish red. Add 2 mL of chloroform R and shake; the chloroform layer becomes purple.

D. To 5 mg add 5 mL of xanthydrol TS and heat on a water-bath; a red colour is produced.

Specific optical rotation. Use a 20 mg/mL solution in dehydrated ethanol R, allow to stand for 30 minutes, measure the angle of

rotation, and calculate with reference to the anhydrous substance; $[\alpha]_D^{20\,°C}$ = -71° to -78°.

Sulfated ash. Not more than 2.0 mg/g.

Water. Determine as described under 2.8 Determination of water by the Karl Fischer method, method A, using about 1 g of the substance; the water content is not more than 100 mg/g.

pH value. Dissolve 0.1 g in 50 mL of a mixture composed of 1 volume of methanol R and 19 volumes of carbon-dioxide-free water R; the pH is between 8.0 and 10.5.

Assay. Carry out the assay as described under 3.1 Microbiological assay of antibiotics, using *Bacillus pumilus* (NCTC 8241 or ATCC 14884) as the test organism, culture medium Cm1 with a final pH of 8.0-8.1, sterile phosphate buffer, pH 8.0 TS or TS2, an appropriate concentration of erythromycin (usually between 5 and 25 IU per mL), and an incubation temperature of 35-39 °C. The precision of the assay is such that the fiducial limits of error of the estimated potency (P = 0.95) are not less than 95% and not more than 105% of the estimated potency. The upper fiducial limit of error of the estimated potency (P = 0.95) is not less than 870 IU per mg, calculated with reference to the anhydrous substance.