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Product Information

POLYMYXIN B SULFATE Sigma Prod. No. P1004

CAS NUMBER: 1405-20-5

SYNONYM: Aerosporin, PMB

PHYSICAL DESCRIPTION:

Appearance: White to light yellow powder; hygroscopic^{1,2}

Molecular structure: Polymyxin B is a mixture of Polymyxin B₁ and B₂.^{3,4} Approximately 2.5 moles of sulfate are present.²

Molecular formula for free base:⁴

For B₁, C₅₆H₉₈N₁₆O₁₃

For B₂, C₅₅H₉₆N₁₆O₁₃

Molecular weight: 1450 (estimated, including sulfate)²

Specific optical rotation: -86° to -87°¹

For pure B₁, -85° (c = 2.33 in 75% ethanol)³

For pure B₂, -112.4° (in 2% acetic acid)³

This product is 60-70% B₁ (based on HPLC data and optical rotation values).¹⁻³

STORAGE / STABILITY AS SUPPLIED:

The product should be stored at 2-8°C in the dark. No change was observed in retained samples after three years' storage (tested by HPLC).²

SOLUBILITY / SOLUTION STABILITY:

A solution of Polymyxin B sulfate in water at 50 mg/mL is clear to very slightly hazy, colorless to yellow in appearance.² Polymyxin B sulfate has only minimal solubility in any organic solvent, for example, 0.115 mg/mL in ethanol.⁵

Polymyxin B was used as a component of a permeabilization reagent reported as stable at least two months at 2-8°C, more than three weeks at room temperature.⁶ The U.S.P. recommends that stock solutions of polymyxin B be kept only 14 days if used as reference standard⁷. Solutions should be sterilized by filtration; they are rapidly inactivated by strong acids and bases.⁸

GENERAL REMARKS:

Polymyxin B sulfate (PMB) is a strongly cationic cyclic polypeptide antibiotic isolated from fermentation of *Bacillus polymyxa*.^{1,7} PMB is a variable mixture of B₁ and B₂ (predominantly B₁).

Polymyxins combine with cell membranes and disrupt normal permeability to small molecules.¹ Polymyxin B and the other polymyxin antibiotics act primarily by binding membrane phospholipids and disrupting the cytoplasmic membrane, inducing pore formation in bacterial walls (large enough to permit nucleotide leakage.)⁸ Polymyxin B binds to the lipid-A portion of the lipopolysaccharide in the cell membrane of Gram-negative bacteria. The interaction involves ionic forces between amino groups in Polymyxin B and phosphate and carboxyl groups in the lipid A-Kdo region, with hydrophobic interactions between the respective acyl groups. Data suggest a stoichiometric binding of one LPS monomer to one polymyxin B molecule.^{9,10} "Polymyxin B has a bactericidal action on most Gram-negative bacilli (E. coli, e.g.) except proteus spp. ... not active against Neisseria species, ... most fungi and Gram-positive bacteria."¹¹

Activity is inhibited by iron(II), Co(II), Mn(II) and magnesium ions.¹² Polymyxin B may be incompatible with other microbial agents, including amphotericin, cephalothin sodium, cephasolin sodium, chloramphenicol sodium succinate and tetracycline hydrochloride; it is also incompatible with heparin sodium and prednisolone sodium phosphate.¹¹ Usage of Polymyxin B sulfate is often reported in terms of unit activity: "one unit is contained in 0.000119 mg of the second International Standard Preparation (1969) of Polymyxin B Sulfate which contains 8403 units per mg."¹¹ One U.S.P unit equals one International Unit for this product.¹³ Sigma does not bioassay P1004, but gives supplier potency data for each lot; minimum potency is 6000 units/mg solid.¹

GENERAL REMARKS: (continued)

Polymyxin B conjugated to horseradish peroxidase has been used to quantify lipid A in ELISA and to stain Gram-negative bacteria histochemically.⁹ Comparative inhibition of protein kinase C by mastoparan, melittin, cardiotoxin and polymyxin B was studied.¹⁴

Polymyxin B has been immobilized and used to remove endotoxins from solutions (See Sigma Prod. No. P1411).^{15,16}

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