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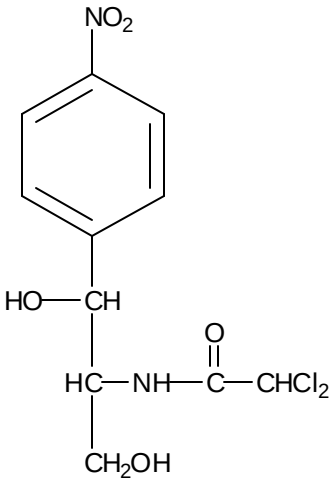
ProductInformation

CHLORAMPHENICOL
Product Number **C0378**
Storage Temperature RT

CAS #: 56-75-7



Synonyms: Chloromycetin, CAP

Product Description
Appearance: White to white with yellow cast powder
Molecular formula: $C_{11}H_{12}Cl_2N_2O_5$
Molecular weight: 323.1
$E^{1\%}$ (278 nm) = 298 (water)[1]
Melting point: 150.5-151.5°C[1]
pKa = 5.5[2]
$[\alpha_D]^{27}$ = +18.6 (ethanol)[3]
$[\alpha_D]^{27}$ = -25.5 (ethyl acetate)

Chloramphenicol is a synthetic antibiotic, which was first isolated from strains of *Streptomyces venezuelae*. It has a broad spectrum of activity against Gram-positive and Gram-negative bacteria.

Chloramphenicol inhibits bacterial protein synthesis by blocking the peptidyl transferase step (elongation inhibition). It binds to the 50S ribosomal subunit and prevents attachment of aminoacyl tRNA to the ribosome. This antibiotic is often used in molecular biology applications for bacterial selection (10-20 µg/ml). The mode of resistance is inactivation of chloramphenicol (acetylation) by chloramphenicol acetyltransferase (cate gene).

It inhibits mitochondrial and chloroplast protein synthesis and ribosomal formation of (p)ppGpp, thus de-repressing rRNA transcription. It exhibits irreversible toxicity to animal cells and humans at very high concentrations, which may be due to the inhibition of DNA synthesis.[6] Chloramphenicol and several analogues inhibited DNA synthesis in Ehrlich Ascites cells under aerobic and anaerobic conditions in the presence and absence of glucose. It is possible that DNA synthesis is inhibited by chloramphenicol in whole cells in the presence of glucose because the antibiotic undergoes metabolism (possibly reduction) and the p-nitro group is important for this effect.[7]

Chloramphenicol, although a broad spectrum antibiotic has limited pharmaceutical application, used mainly for opthalmic (eye drops) and veterinary purposes.[3,9]

Preparation Instructions
Sigma routinely tests the solubility at 50 mg/mL in ethanol yielding a clear, very faint yellow solution.

Aqueous solutions are neutral and stable over a wide pH range. Hydrolysis does not occur rapidly at ordinary temperatures at pH 2-7. Aqueous solutions stored at 20-22°C for 290 days lose about half their chloramphenicol content by hydrolysis. Under the same conditions, borax buffered solutions (pH 7.4) lose only 14% of the chloramphenicol content. Heating aqueous solutions at 115°C for 30 minutes results in a 10% loss. Solutions should be protected from light. Photochemical decomposition results in a yellowing of the solution, development of a orange-yellow precipitate and lowering of the pH.[2,5]

Degradation of chloramphenicol in aqueous solution is catalyzed by general acids and bases. The rate of degradation is independent of the ionic strength and pH, within the range of 2-7.[2,4]

For USP potency determinations the median dose is 25 µg/ml.. For this method a stock solution is made at 10 mg/ml in ethanol and then diluted with water to a final stock concentration of 1 mg/ml. It is suggested the stock solution should be stored refrigerated and used within 30 days.[10]

References

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8. Rahal, Jr., J.J., and Simberkoff, M.S., *Antimicrobial Agents and Chemotherapy*, 16, 13-18 (1979).
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