

Product Information

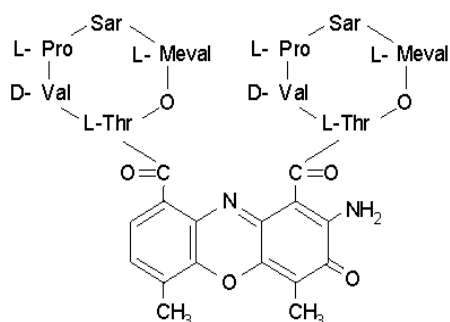
Actinomycin D from *Streptomyces* sp.

Product Numbers **A 1410**, **A 4262**, **A 9415**, **A 5156**

Storage Temperature 2-8 °C

CAS NUMBER: 50-76-0

Synonyms: Dactinomycin; Actinomycin IV; Actinomycin C₁



Molecular formula: C₆₂H₈₆N₁₂O₁₆

Molecular weight: 1255.42

Melting point: decomposes at 241.5-243 °C¹

E_{1%} (244nm) = 281 (methanol)¹

E_{1%} (441nm) = 206 (methanol)¹

E_{mM} (240 nm) = 34.1 (methanol)²

E_{mM} (443 nm) = 24.4 (methanol)²

[α]²⁸_D: -315° (c = 0.25% in methanol)¹

Product Description

Actinomycin D is an antineoplastic antibiotic that inhibits cell proliferation. It is a cytotoxic inducer of apoptosis against tumor cells.³ The compound inhibits the proliferation of cells in a nonspecific way by forming a stable complex with double-stranded DNA (via deoxyguanosine residues), thus inhibiting DNA-primed RNA synthesis. It also causes single-strand breaks in DNA.^{4,5,6}

Actinomycin D has been shown to be an inhibitor of the minus-strand transfer step in reverse transcription^{7,8} and therefore is used in studying and suppressing HIV-replication. It has also been shown to suppress

programmed cell death of PC12 cells induced by etoposide, an inhibitor of topoisomerase II.⁹

It is used in cell culture as a selection agent. Actinomycin D binding to yeast in ribosomal RNA has been studied.¹⁰ The sensitivity of various strains of *E. coli* to Actinomycin D and the mechanism of binding has been studied.^{11,12} The structure was determined by atomic structure and amino acid sequence.

Actinomycin D is an antibiotic used for its antineoplastic properties in the treatment of various malignant neoplasms including Wilm's tumour, and the sarcomas. Adverse effects include bone marrow depression and gastrointestinal toxicity; it is extremely irritating and extravasation produces severe tissue damage.⁴

Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Preparation Instructions

Actinomycin D is sold as red shiny crystals and in solution it is a clear liquid. Sigma tests solubility of A1410, A4262, A9415 in acetonitrile or acetone at 10 mg/mL. It is soluble in DMSO at a minimum of 1 mg/mL. Several references^{4,5,13} claim slight solubility in water (about 0.5 mg/mL).

Storage/Stability

The powder is hygroscopic and sensitive to light. When stored sealed and protected from light and moisture, at 2-8 °C, Actinomycin D remains unchanged (as tested by HPLC) for at least 15 months.

Dilute solutions of Actinomycin D are very sensitive to light.¹ This product tends to adsorb to plastic and glass on standing in solution.¹³ For these reasons, unused dilute solutions should be discarded and not stored for further use. However, frozen aliquots of a concentrated stock solution are expected to be stable for at least a month at -20 °C.

A1410 Actinomycin D 98%

Lyophilized powder with a purity of 98% (HPLC)

A4262 Actinomycin D 95%

Lyophilized powder with a purity of 95% (HPLC)

**A9415 Actinomycin D,
cell culture tested**

Lyophilized powder with purity of 95% (HPLC). For cell culture applications, actinomycin D is used as a selection agent and is used in banding techniques to differentiate between different regions of chromosomes. Suggested working concentrations is 1 µg/mL.

A5156 Actinomycin D-Mannitol

Lyophilized powder containing 1 mg of actinomycin D (98% purity) and 49 mg of Mannitol. It is soluble in water at 20 mg/ml.

References

1. Merck Index, 12th ed., No. 2867 (1996).
2. Meienhofer, J., J. Am. Chem. Soc., **92**, 3771-77 (1970).
3. Kleeff, J., et al.; Actinomycin D induces apoptosis and inhibits growth of pancreatic cancer cells, .Int. J. Cancer, **86**, 399-407 (2000)
4. Martindale: The Extra Pharmacopoeia, 30th ed., Reynolds, J.E.F., Ed., 473 (1993).
5. Data for Biochemical Research, 3rd ed., Dawson, R.M.C., et al., Eds., p. 256-257 (1986).
6. The Pharmacological Basis of Therapeutics, 8th Ed., Goodman and Gilman, Eds. (Pergamon Press, 1990), p. 1240-1241.
7. Davis, W. R., et al., Actinomycin D inhibition of DNA strand transfer reactions catalyzed by HIV-1 reverse transcriptase and nucleocapsid protein., Biochemistry, **37**, 14213-21(1998).
8. Guo, J. T., et al., Actinomycin D inhibits human immunodeficiency virus type 1 minus-strand transfer in in vitro and endogenous reverse transcriptase assays., J. Virol., **72**, 6716-24 (1998).
9. Nakajima, M., et al., Nerve growth factor and epidermal growth factor rescue PC12 cells from programmed cell death induced by etoposide: distinct modes of protection against cell death by growth factors and a protein-synthesis inhibitor., Neurosci. Lett., **176**, 161-164 (1994)
10. Waltschewa, L.W., Interaction of actinomycin D with yeast ribosomal RNA., FEBS Lett., **111**, 179-80 (1980).
11. Singh, A.P., et al., Sensitivity of normal and mutant strains of Escherichia coli to actinomycin-D., Can. J. Microbiol., **18**, 909-15 (1972).
12. Cavalieri, L.F. and Nemchin, R.G., The binding of actinomycin D and F to bacterial DNA., Biochim. Biophys. Acta, **166**, 722-25 (1968).
13. Rapp, R.P., et al., Drug Intelligence and Clinical Pharmacy, **18**, 218 (1984).

NDH/PHC 12/04

Sigma brand products are sold through Sigma-Aldrich, Inc.

Sigma-Aldrich, Inc. warrants that its products conform to the information contained in this and other Sigma-Aldrich publications. Purchaser must determine the suitability of the product(s) for their particular use. Additional terms and conditions may apply. Please see reverse side of the invoice or packing slip.