D-Cycloserine

Catalog Numbers: C6880, C3909, C7670

Storage Temperature –20°C

CAS #: 68-41-7
Synonym(s): D-4-amino-3-isoxazolidone, D-oxamycin, Seromycin, K300, NJ-21

Product Description
Appearance: White powder
Molecular Formula: C₃H₆N₂O₂
Molecular Weight: 102.09

E₁%= 402 (226 nm)
[α]D₂₃ = +115° (c=1.0%, water)

D-Cycloserine, a structural analog of D-alanine, is a broad spectrum antibiotic produced by certain strains of Streptomyces orchidaceus or S. garphalus.¹⁻⁵ D-cycloserine (at 100-200 µg/ml) inhibits the synthesis of bacterial cell walls (involving peptidoglycan synthesis) by preventing formation of D-alanine from L-alanine and hence the formation of peptide bonds involving D-alanine.⁴ D-cycloserine has antibiotic activity in vitro against growth phase Gram-negative bacteria including Escherichia coli (working concentration of approx. 200 µg/ml)¹, strains of Staphylococcus aureus, Nocardia species and Chlamydia,³ and some mycobacteria including Mycobacterium tuberculosis.

The minimum inhibitory concentrations (MIC) in vitro for M. tuberculosis range from 5-20 µg/ml. Studies in vitro show no suppression of growth in cultures made in media containing D-alanine which appears to block the antibacterial action of D-cycloserine.⁵

D-cycloserine is an excitatory amino acid and partial agonist at the glycine binding site of the N-methyl-D-aspartate (NMDA) receptor.⁶ At low doses it is a cognitive enhancer that improves learning and memory in several experimental models of disease and cognitive deficit.⁶,⁷,⁸,⁻¹⁴ At high doses, D-cycloserine is an anti-convulsant.¹⁵,¹⁶ Intermediate doses potentiate the anti-convulsant action of phenytoin but block its long-term memory impairment.¹⁶

Reagents
These products are supplied as powders.

C7670 is convenience packaged for use in molecular biology; it is pre-weighed in quantities to give typical working concentrations when the entire package is added to 1 L of agar preparations (for 50 plates of 20 ml per plate). Furthermore, C 7670 is γ-irradiated for sterility and septum-capped for ease in injecting sterile diluent. C 7670 is also USP tested for potency following γ-irradiation to assure full biological activity.

Preparation Instructions
D-cycloserine is soluble in deionized water up to 100 mg/ml. A solution of 50 mg/ml cycloserine in water is clear and colorless or very faintly yellow. D-cycloserine is also soluble at 1 in 50 parts of 96% ethanol, but practically insoluble in chloroform and ether. It is also slightly soluble in methanol or propylene glycol. Stock solutions (e.g.,10 mg/ml) of D-cycloserine may also be prepared immediately before use in 0.1 M sodium phosphate buffer, pH 8.0.

Storage/Stability
D-Cycloserine powder is stable for at least four years when stored unopened and desiccated at –20 °C. It is generally recommended to prepare solutions immediately before use because neutral or acidic solutions are unstable.⁴ However, aqueous solutions buffered to pH 10 with sodium carbonate may be stored for up to one week if stored at 2-8 °C. In addition, aqueous solutions of D-cycloserine have been stored in aliquots at –20 °C and thawed just prior to use.¹²

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.

References