30020 D-Cycloserine (D-4-amino-3-isoxazolidone, D-oxamycin, Seromycin, K300, NJ-21)

**CAS number:** 68-41-7

**Product Description:**
prepared from microbial source
Appearance:   White powder
Molecular Formula:  C₃H₆N₂O₂
Molecular Weight:  102.1 g/mol
Mp:   ~ 150° C (dec.)
E₂₂₆ nm⁻¹ :   402 (1% in water)
[α]₀²⁰ :   +115° (c = 1.0%, water)¹
[α]₀²₀ :   +114 ± 3° (c = 2% in water)¹⁹
[α]₃₄₆²₀ :   +138 ± 3° (c = 2% in water)¹⁹

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 to 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)⁴, strains of *Staphylococcus aureus*, *Nocardia* species and *Chlamydia*, 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.³
D-cycloserine is an excitatory amino acid and partial agonist at the glycine binding site of the N-methyl-D-aspartate (NMDA) receptor.⁶⁻⁸ At low doses it is a cognitive enhancer that improves learning and memory in several experimental models of disease and cognitive deficit.⁶⁻⁷⁻⁹⁻¹⁴ 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
The HPLC determination of D-cycloserine in plasma and urine¹⁷ and a colorimetric method for determination of cycloserine in biological fluids¹⁸ have been reported. UV, IR, NMR and mass spectra and pharmacokinetics of D-cycloserine have been reported.²

**Applications:**
This products is used for preparing diverse selective media for molecular biology and microbiology.²¹
Cycloserine is a broad-spectrum antibiotic used to treat tuberculosis. It is used rarely for treating noninfectious diseases.²²

**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:**
Storage Temperature of the powder is -18° C
It is generally recommended to prepare solutions immediately before use because neutral or acidic solutions are unstable.³ However, aqueous solutions buffered to pH 10 with sodium carbonate may be stored for up to one week if stored at 2 °C to 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:
For Laboratory Use Only. Not for drug, household or other uses.

References:
8. Watson, et al., D-Cycloserine acts as a partial agonist at the glycine modulatory site of the NMDA receptor expressed in Xenopus oocytes Brain Res. 510, 158-160 (1990)
19. Fluka quality control