

Dithiothreitol (DTT, Cleland's reagent)

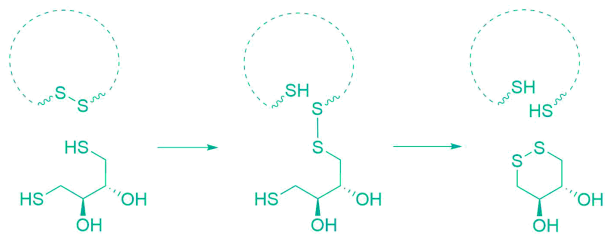
GENERAL DESCRIPTION

Dithiothreitol (DTT) is a well-known small molecule redox reagent, widely used for the reduction of disulfide bridges in proteins. It is also known as Cleland's reagent and has various applications in biotechnology, biology, and biochemistry.

REDUCING PROPERTIES

Dithiothreitol is a particularly strong reducing agent with a redox potential of -0.33 V at pH 7. The reduction of a typical disulfide bond is followed by two sequential thiol-disulfide exchange reactions.

Once in oxidized state, DTT forms a stable six-membered ring structure and leaves behind a reduced disulfide bond.



SOLUBILITY

DTT is highly soluble in water ($OD < 0.05$ at 0.02 M), forming a clear, colourless solution. DTT is also soluble in ethanol, chloroform, acetone, and ether. DTT solutions should be prepared fresh daily.

APPLICATIONS

DTT is suitable for use in molecular biology or protein biochemistry applications to reduce disulfide bridges, protect biomolecules, as well as in sample preparation, and in reconstructing proteins before electrophoresis analysis.

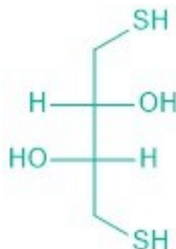
As an antioxidant, DTT is applied as a protective agent against ionizing radiations in living cells.

It is also used as an oxidizing agent to effectively prevent the population of mixed-disulfide species. In rare cases, a DTT adduct may be formed.

TECHNICAL PROFILE

- Technical name: Dithiothreitol (DTT)
- CAS No: 3483-12-3
- Empirical formula: C₄H₁₀O₂S₂
- Molecular weight: 154.253 g/mol

CHEMICAL STRUCTURE



TEST	METHOD REFERENCE	SPECIFICATION
Description	In-house	White to off-white powder
Identification by IR	Ph.Eur. 2.2.24	The IR spectrum of the sample conforms to the reference standard.
Color of solution (10% in water)	In-house	The solution is colorless.
Turbidity (1% in water)	In-house	Not more than 5.0 NTU
Melting point	Ph.Eur. 2.2.14	38-48°C
UV Absorption (0.1 mol/L in water) at 260 nm at 280 nm	In-house	Not more than 0.400 AU Not more than 0.100 AU
%Loss on drying (40°C, 3hours under vacuum)	Ph.Eur. 2.2.32	Not more than 1.5% w/w
pH value (0.1 mol/L in water, at 25°C)	Ph.Eur. 2.2.3	pH 4.5-6.5
Heavy metals (as Pb)	In-house	Not more than 1 mg/kg
Impurity (Oxidized product, UV at 283nm)	In-house	Not more than 0.2%
Iodometric titration	In-house	99.0-101.0% w/w on as is basis
Sulphate traces	In-house	Not more than 50 mg/kg

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