

Product Information

DL-Dithiothreitol Solution

1 M in H₂O

Catalog Number **646563**

Store at Room Temperature

CAS RN 3483-12-3

Synonyms: Cleland's Reagent, DTT

Molecular Formula: C₄H₁₀O₂S₂

Molecular Weight: 154.3

Product Description

Dithiothreitol (DTT) is used in proteomics applications to maintain sulfhydryl (-SH) groups in the reduced state and for quantitative reduction of disulfide (-S-S-) groups, as described by Cleland in his pioneering work in the 1960's.¹ By reducing the disulfide bonds in a protein sample, the protein can be more effectively fragmented and analyzed.

DTT is a commonly used reagent in buffers because of its ability to reduce the oxidation state of a protein sample, and thereby, preserve enzymatic activity.² DTT is oxidized to the cyclic disulfide during the reduction of other disulfides in solution. Disulfide reduction is typically complete in minutes at pH 8. Its usefulness stems from its water solubility, reduced odor, and lower toxicity compared to other thiol compounds (2-mercaptoethanol).¹ Typically, a 7-fold lower concentration of DTT (100 mM) is used compared to 2-mercaptoethanol [5% (v/v), 700 mM].

DTT is a versatile compound that can be used in many downstream applications. These include SDS-PAGE, chromatography, and modification of cysteine containing compounds. For cysteine modification, it is recommended that the DTT be removed prior to labeling, because the -SH groups of DTT will compete directly with the protein for attachment of thiol reactive labels.²

DTT concentration can be quantitatively determined by reaction with 5,5'-dithiobis(2-nitrobenzoic acid) (DTNB). In this procedure, the DTT completely reduces the disulfide bond of the DTNB to produce two molecules of the thiol NTB, which can be measured at 412 nm.³

Several references cite use of this product.⁴⁻⁷

Precautions and Disclaimer

For R&D use only. Not for drug, household, or other uses. Please consult the Safety Data Sheet for information regarding hazards and safe handling practices.

Preparation Instructions

This product is supplied as a ready-to-use 1 M solution.

Storage/Stability

The unopened product is stable for at least two years at room temperature.

Procedure

SDS-PAGE sample preparation with DTT

1. Dilute the 1 M DTT Solution to 50 mM by adding 50 µL of the 1 M DTT Solution to 950 µL of ultrapure water.
2. Aliquots of the 50 mM can be added to the samples to a final concentration of 5 mM.
3. Boil the samples for five minutes.
4. Allow the samples to cool.
5. Load the samples onto an SDS-PAGE gel.

References

1. Cleland, W.W., *Biochemistry*, **3(4)**, 480-482 (1964).
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3. Han, J.C., and Han, G.Y., *Anal. Biochem.*, **220(1)**, 5-10 (1994).
4. Markely, L.R.A. *et al.*, *Biotechnol. Prog.*, **30(2)**, 516-520 (2014).
5. Thiel, W.H. *et al.*, *Methods Mol. Biol.*, **1218**, 187-199 (2015).
6. Dai, Y. *et al.*, *Anal. Chem.*, **89(15)**, 7841-7846 (2017).
7. Trychta, K.A. *et al.*, *Cell Rep.*, **25(7)**, 1829-1840.e6 (2018).

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