

Technical Data Sheet

Thiazolyl blue tetrazolium bromide (MTT)

for biochemistry Order number: 1334

Thiazolyl blue tetrazolium bromide or methylthiazolyldiphenyl tetrazolium bromide – in short MTT - is one of the most commonly used tetrazolium salts in bioassays. MTT-based assays are applied to mammalian cell lines, bacteria, and fungi to detect and evaluate cell viability.

The water-soluble and membrane permeable yellowish MTT (absorption peak at 375 nm) is converted to a water-insoluble blue-violet formazan by metabolically active, i.e., living, eukaryotic cells and bacteria. The process itself is a chemical reduction in which 2 protons and 2 electrons are transferred from NADH to MTT by NADH-dependent oxidoreductases. The resulting blue-violet formazan crystals are usually dissolved with acidified isopropanol and the concentration is determined colorimetrically at 570 nm: The darker (violet) the solution, the greater the number of viable, metabolically active cells. Consequently, the MTT assay is a quantitative assay that allows rapid and convenient handling of large numbers of samples in microtiter plates.

Note: The spectrum of absorption depends on the solvent and the presence of metal ions. The maximum absorption of MTT formazan in sunflower oil is 562 nm. In acidic isopropanol the maximum shifts to 570 nm and in DMSO it is 540 nm.

Application

MTT can be used to determine the cellular metabolic activity of prokaryotic and eukaryotic cells as an indicator of viability, proliferation, and cytotoxicity. In cell biology, MTT is used

- x for quantification of cell growth and viability
- x as a histochemical/cytochemical reagent
- x to measure cell proliferation in response to growth factors, cytokines, and nutrients
- × to measure cytotoxicity e.g., quantification of tumor necrosis factors or macrophage-induced cell death, evaluation of cytotoxic or growth inhibitory agents
- x for the investigation of cell activation.

In eukaryotic cells, the reduction of MTT by NADH and NADPH is dependent on endoplasmic reticulum enzymes. The mechanism of MTT reduction by bacteria is poorly understood, yet the MTT assay is also used in prokaryotic cells with different objectives:



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- × for quantification of cell growth and viability*
- x for microbial biofilm evaluation
- × for antibacterial activity evaluation, e.g., as an alternative/additional method to Minimal Inhibitory Concentration (MIC) determination
- x for microbial growth evaluation on solidified media

MTT is soluble in water (10 mg/mL), ethanol (20 mg/mL), buffered salt solutions (5 mg/mL) and culture media (5 mg/mL). We recommend preparing a 12 mM stock solution by dissolving 5 mg MTT per mL phosphate buffered saline. Mix by vortexing or sonication until all powder is dissolved. Filter-sterilize solution; this step will also remove remaining undissolved material.

Storage

Store MTT powder at 2 – 8°C. Stock solutions of MTT are stable at -20°C for at least 6 months. Do not store MTT solutions at 2 – 8C°C for more than a few days.

Related products

- 3490 DMEM with 4.5 g/I D(+)-Glucose, w/o L-Glutamine, Sodium pyruvate, with NaHCO3
- 1426 DMEM with 4.5g/l D(+)-Glucose, with L-Glutamine and NaHCO3, w/o Sodium pyruvate
- 1489 RPMI 1640 Medium w/o L-Glutamine, with 2.0 g/l NaHCO3
- 2111 RPMI 1640 Medium with L-Glutamine and 2.0 g/l NaHCO3, w/o Phenol red
- 2095 Fetal Calf Serum (FBS, origin South America) standard quality for cell biology
- 1175 D-PBS (10X) powder mixture w/o Ca and Mg for cell biology
- 1429 D-PBS (1X) w/o Ca and Mg (pH 7.4) for cell biology
- 1210 L-Glutamine for cell biology
- 1207 L-Arginine free base for cell biology
- 1204 L-Asparagine monohydrate for cell biology
- 1425 ß-Mercaptoethanol for biochemistry
- 1111 DTT for biochemistry
- 1261 XTT sodium salt for molecular biology

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*In microbial viability estimations MTT seems to be a more reliable choice, as it produces less background absorbance comparing to alternatives such as WST-5, WST-8 and XTT.



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