

**Product Name:** Methotrexate

**Product Number:** M027

**CAS Number:** 59-05-2

**Molecular Formula:**  $C_{20}H_{22}N_8O_5$

**Molecular Weight:** 454.44

**Solubility:** soluble in DMSO. Practically insoluble in water.

**Description:** Methotrexate is a selective agent for dihydrofolate reductase (DHFR)-transfected cells, and a nucleic acid synthesis inhibitor in protein expression systems, thus can be used as an ancillary material in upstream biomanufacturing applications. It also has immunosuppressive effects for rheumatoid arthritis research and has anti-cancer properties. Methotrexate is soluble in DMSO but practically insoluble in water.

We also offer:

- Methotrexate sodium salt ([M031](#))
- Methotrexate, EvoPure<sup>®</sup> ([M091](#))

This product is considered a dangerous good. Quantities above 1 g may be subject to additional shipping fees. Please contact us for questions.

**Mechanism of Action:** In cancerous cells, methotrexate acts as an allosteric inhibitor of dihydrofolate reductase (DHFR), an enzyme involved in the folic acid metabolic pathway, catalyzing the conversion of dihydrofolate to tetrahydrofolate. Since tetrahydrofolate is needed for synthesis of purine and thymidine synthesis, it results in the inhibition of DNA and RNA synthesis.

**Cancer Applications** Methotrexate acts as a chemotherapeutic agent by inhibiting nucleic acid synthesis in cancer cells. In human glioblastoma U87MG cells (brain tumor), Methotrexate can be used as a carrier for PLGA (poly lactic-co-glycolic acid) nanoparticles (Maleki et al, 2017).

**References:** Fairbanks, LD et al (1999) Methotrexate inhibits the first committed step of purine biosynthesis in mitogen-stimulated human T-lymphocytes: A metabolic basis for efficacy in rheumatoid arthritis? Biochem. J 342 (1):143-52

Maleki H et al (2017) Methotrexate-loaded PLGA nanoparticles: Preparation, characterization and their cytotoxicity effect on human glioblastoma U87MG cells. Med. Nano. Res. 4(1):020

Kingston RE, Kaufman RJ, Bebbington CR and Rolfe MR (2002) Amplification using CHO cell expression vectors. Curr. Protoc. Mol. Biol. Chapter 16:Unit 16.23 PMID 18265304

If you need any help, contact us: [info@toku-e.com](mailto:info@toku-e.com). Find more information on: [www.toku-e.com/](http://www.toku-e.com/)