Catalog Number: 195262

3-Isobutyl-1-methylxanthine

Structure:

Molecular Formula: C_{10}H_{14}N_{4}O_{2}

Formula Weight: 222.24 (as anhydrous)

CAS #: 28822-58-4

Synonym: IBMX; MIX; MeiBu-Xan; IBX

Solubility: Soluble in Krebs-Henseleit bicarbonate buffer, ethanol (10 mg/ml or 25 mg/ml with sonication), DMSO (1 M with warming), or aqueous NaOH (pH 9.5); slightly soluble in water (0.3 mg/ml hot water). Solubility in 45% (w/v) aqueous 2-hydroxy-propyl-β-cyclodextrin is 3.2 mg/ml. Ethanol solutions can be stored at 2-8°C for approximately three (3) months. DMSO solutions should be aliquoted and stored at -20°C for 3 to 4 months. Aqueous solutions can be aliquoted and stored at -20°C for approximately 3 months. The aqueous solutions should be thawed for use by heating in a boiling water bath.

Description: IBMX has been shown to be a potent, non-specific inhibitor of adenosine 3',5'-cyclic monophosphate phosphodiesterase (cAMP PDE), significantly more effective than theophylline. IBMX inhibits cyclic nucleotide PDE with subsequent inhibition of cyclic nucleotide hydrolysis, resulting in accumulation of cyclic AMP and guanosine 3',5'-cyclic monophosphate. In a study of cyclic AMP and insulin release by islets of Langerhans, IBMX at 1 mM caused a marked increase in the intracellular concentration of cyclic AMP in the presence of glucose.

IBMX, when used at 0.05 mM, was 20-fold more effective than theophylline at stimulating lipolysis in fat cells. It has been shown to promote the conversion of fibroblast cells into adipose cells, apparently without altering the amount of bromodeoxyuridine (BrdU) present in the DNA of the cells.

The increase in cAMP level as a result of phosphodiesterase inhibition by IBMX activates PKA leading to decreased proliferation, increased differentiation, and induction of apoptosis.

Other actions of IBMX:
  - Inhibition of phenylephrine-induced release of 5-hydroxytryptamine from neuroendocrine
epithelial cells of the airway mucosa (IC$_{50} = 1.3$ uM).$^9$

- An adenosine receptor antagonist.$^7$$^{12}$
- Inhibits ion channels in the neuromuscular junction, GH3 cells, and vascular smooth muscle cells.$^8$
- Inhibits the growth of carcinoma cells both in vivo and in vitro in mice.$^{10}$

**Pharmacology:** $K_i$ (nM): $A_1 = 2460$; $A_2 = 13800$ (ref. 6).

**References:**