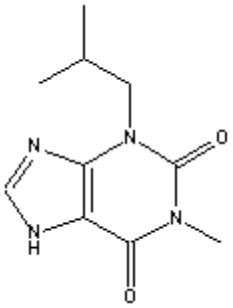
Catalog Number: 195262

3-Isobutyl-1-methylxanthine

Structure:



Molecular Formula: $C_{10}H_{14}N_4O_2$

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[17]), 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.[17] 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.[22] 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)[4], significantly more effective than theophylline.[1,2,14,15,21] Also inhibits cGMP phosphodiesterases. IBMX inhibits cyclic nucleotide PDE with subsequent inhibition of cyclic nucleotide hydrolysis, resulting in accumulation of cyclic AMP and guanosine 3',5'-cyclic monophosphate.[11,20] 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.[14]

IBMX, when used at 0.05 mM, was 20-fold more effective than theophylline at stimulating lipolysis in fat cells.[2] 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.[16]

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.[5,7,18]

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).

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