

## Diacylglycerol Kinase from *Escherichia coli*

Catalog Number **D3065**

Storage Temperature  $-70\text{ }^{\circ}\text{C}$

EC 2.7.1.107

CAS RN 93076-89-2

Synonyms: *sn*-1,2-Diacylglycerol Kinase; Diglyceride Kinase; DAG Kinase; DAGK

### Product Description

Signal transduction and cell signaling are currently among the most studied processes in the biological sciences. G-protein mediated signal transduction occurs when hormones, growth factors, or neurotransmitters bind to a specific cell membrane receptor, which interacts with a G protein, thus, transducing the signal resulting in the stimulation of phospholipase C (PLC). PLC then catalyzes the hydrolysis of phosphatidylinositol-4,5 diphosphate (PIP<sub>2</sub>) to form diacylglycerol (DAG) and inositol-1,4,5-trisphosphate (IP<sub>3</sub>), which act as second messengers in the cytoplasm. Inositol-1,4,5-trisphosphate binds to an IP<sub>3</sub> receptor on the endoplasmic reticulum, which results in the mobilization of calcium stores in the cytoplasm.<sup>1,2</sup>

Diacylglycerol is considered to be a hydrophobic and membrane associated second messenger. DAG binds to a receptor site on protein kinase C (PKC) and stimulates the activity of PKC. The stimulation of PKC by diacylglycerol released from PIP<sub>2</sub> is thought to be short term. Long term stimulation of PKC is a result of DAG release from phosphatidylcholine via the action of phospholipase D and phosphatase.<sup>1,2</sup> The diacylglycerol signal is transient due to its removal by either diacylglycerol kinase<sup>3</sup> or lipase.<sup>4</sup> Thus DAG kinase performs a major role in the metabolism of the diacylglycerol second messenger.

Diacylglycerol kinase from *Escherichia coli* catalyzes the phosphorylation of *sn*-1,2-diacylglycerol to 1,2-diacyl-*sn*-glycerol-3-phosphate, utilizing ATP as the phosphate donor.<sup>5</sup> DAG kinase may play a regulatory role in *E. coli* that is analogous to that of DAG kinase in eukaryotic signal transduction.

DAG kinase from *E. coli* is a membrane bound enzyme consisting of 121 amino acids, of which 70% are non-polar, thus, making it a very hydrophobic protein.

Molecular mass:<sup>6</sup> 13,114 Da

Isoelectric point (pI):<sup>7</sup> 4.0

pH optimum:<sup>7</sup> 6.3–8.3

DAG kinase (membrane preparations) can be used to quantify DAG in crude lipid extracts.<sup>6,8</sup> In addition to *sn*-1,2-diacylglycerol, DAG kinase will also phosphorylate ceramide and monoglycerols.<sup>6,9</sup>

This product is supplied as a turbid membrane suspension in 25 mM NaH<sub>2</sub>PO<sub>4</sub>, pH 7.0, containing 20% glycerol and 1 mM DTT.

Specific Activity:  $\geq 2$  units per mg protein (BCA)

Unit Definition: One unit will phosphorylate 1.0  $\mu\text{mole}$  of diacylglycerol per minute at pH 6.6 at 25  $^{\circ}\text{C}$ .<sup>10</sup>

### Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

### Storage/Stability

This product ships on dry ice and storage at  $-70\text{ }^{\circ}\text{C}$  is recommended. Store the suspension in aliquots at  $-70\text{ }^{\circ}\text{C}$ . Repeated freezing and thawing, and storage in "frost-free" freezers are not recommended.

## References

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