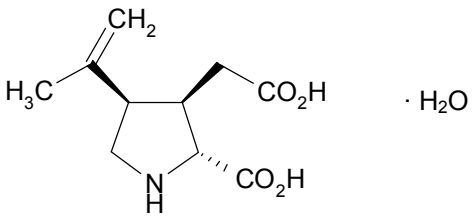
Product Information

3050 Spruce Street, Saint Louis, MO 63103 USA
Tel: (800) 521-8956 (314) 771-5765 Fax: (800) 325-5052 (314) 771-5757
email: techservice@sial.com sigma-aldrich.com

Kainic acid monohydrate

Catalog Number **K0250**
Storage Temperature 2–8 °C

CAS RN 58002-62-3
Synonym: 2-Carboxy-3-carboxymethyl-4-isopropenylpyrrolidine



Product Description
Molecular Formula: $C_{10}H_{15}NO_4 \cdot H_2O$
Molecular Weight: 231.25
Synthetic

Glutamate is the predominant excitatory neurotransmitter in the central nervous system. The involvement of glutamate in key neurological processes such as synaptogenesis,[1] as well as neurodegenerative disorders and neurotoxicity[2] has stimulated research focused on identifying glutamate receptors and understanding their functions.

Glutamate receptors are classified into two groups, metabotropic and ionotropic. Ionotropic glutamate include NMDA and non-NMDA subclasses. Receptors preferring kainic acid (KA receptors) are categorized within the non-NMDA subclass along with AMPA receptors.[3]

Kainic acid is a conformationally restricted analog of L-glutamic acid and is the prototype agonist at the kainate class of ionotropic glutamate receptors. Despite having lower affinity at kainate receptors than the kainic acid analog, domoic acid, kainic acid is the preferred agonist due to its greater selectivity.[4]

Kainic acid has been used to delineate differences between AMPA and KA recognition sites. It is an excitotoxin that has been used to model experimental epilepsy and neurodegenerative diseases *in vivo*.[5-13]

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.

Preparation Instructions
The product is soluble in water or dilute aqueous base. Solubilize in one or two drops of 1 N NaOH then bring to volume with water or aqueous buffer. The solution can be stored one to two days refrigerated.

Storage/Stability
Store the product tightly sealed at 2–8 °C protected from light.

References
1. McDonald, J.W., and Johnston, M.V., Physiological and pathophysiological roles of excitatory amino acids during central nervous system development. *Br. Res. Rev.*, **15**, 41-70 (1990).
2. Meldrum, B., and Garthwaite, J., Excitatory amino acid neurotoxicity and neurodegenerative disease. *Trends. Pharmacol. Sci.*, **11**, 379-387 (1990).
3. Wisden, W., and Seeburg, P.H., Mammalian ionotropic glutamate receptors. *Curr. Opin. Neurobiol.*, **3**, 291-298 (1993).
4. Hampson, D.R., and Manalo, J.L., The activation of glutamate receptors by kainic acid and domoic acid. *Nat. Toxins*, **6,** 153-158 (1998).
5. Coyle, J.T., Kainic acid: insights into excitatory mechanisms causing selective neuronal degeneration. *Ciba Found. Symp.*, **126,** 186-203 (1987).
6. Dawson, R., Jr., et al., Excitotoxins, aging, and environmental neurotoxins: implications for understanding human neurodegenerative diseases. *Toxicol. Appl. Pharmacol.*, **134,** 1-17 (1995).
7. Buckmaster, P.S., and Dudek, F.E., Neuron loss, granule cell axon reorganization, and functional changes in the dentate gyrus of epileptic kainate-treated rats. *J. Comp. Neurol.*, **385,** 385-404 (1997).
8. Simonian, N.A., et al., Kainic acid induces apoptosis in neurons. *Neuroscience*, **75,** 1047-1055 (1996).

9. Routbort, M.J., et al., Seizures, cell death, and mossy fiber sprouting in kainic acid-treated organotypic hippocampal cultures. *Neuroscience*, **94,** 755-765 (1999).
10. Gluck, M.R., et al., CNS oxidative stress associated with the kainic acid rodent model of experimental epilepsy. *Epilepsy Res*., **39,** 63-71 (2000).
11. Kondratyev, A., and Gale, K., Intracerebral injection of caspase-3 inhibitor prevents neuronal apoptosis after kainic acid-evoked status epilepticus. *Brain Res. Mol. Brain Res*., **75,** 216-224 (2000).
12. Ferrer, I., et al., Differential c-Fos and caspase expression following kainic acid excitotoxicity. *Acta Neuropathol.*, **99,** 245-256 (2000).
13. Nakai, M., et al., Kainic acid-induced apoptosis in rat striatum is associated with nuclear factor-κB activation. *J. Neurochem*., **74,** 647-658 (2000).

DXP,LMY,MAM 12/07-1