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MNI-glutamate **Cat. No. 1490**

The peak absorption is at 340 nm, the quantum yield is 0.085 and photo release following a light pulse has half-time 200 ns. Release of glutamate is stoichiometric with cage consumption during progressive photolysis. One photon photolysis gives about 35% conversion with a 1 ms flash lamp pulse in a typical set-up. With laser photolysis, full conversion in a 1 µm laser spot at 405 nm requires 200 nJ.μm^{-2}, a 0.1 ms exposure at 2 mW, also showing no phototoxicity at this level. At 355 nm full conversion requires about 20 µJ.μm^{-2} ; however extracellular photolysis in an upright microscope with 355 nm light is subject to substantial losses due to inner filtering in the bath solution.

MNI-glutamate shows no interference with glutamate receptors or transporters at mM concentration but interferes with synaptic activation of GABA-A receptors with IC50 approx. 0.5 mM. Although stable to hydrolysis and soluble in water at 50 mM, it is often necessary to warm stock solutions of MNI-glutamate after thawing.

Two photon photolysis

Although widely used, the efficiency of two-photon photolysis of MNI-glutamate is low. The TP photolysis cross-section is 0.02-0.06 GM (10^{-50} cm^4.s /photon) at 730 nm, 3 orders less than common fluorophores. For 5 mW, average power and with usual TiS mode-locked laser beam parameters at 730 nm, the two-photon conversion of MNI-glutamate in an excitation volume formed by a 0.9 NA objective requires cage concentrations of 10 mM to generate free glutamate at concentrations that mimic synaptic activation. Exposures are often longer than the optimal 200 µs generate glutamate in a volume larger than the two-photon excitation volume.

For extracellular photolysis avoiding the ‘inner filtering effect’ of the cage, the alternative of using one photon excitation at 405 nm is substantially more efficient than two-photon excitation.

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