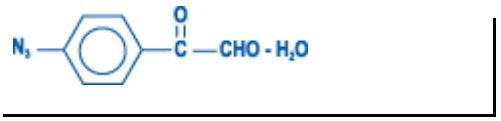
FT-28071

APG

Product Description

Photoreactive and arginine selective

Catalog number: UP28071A, 100mg UP28071B, 50mg
Name: **APG**
Formula: p-Azidophenyl glyoxal monohydrate
$C_8H_7N_3O_3$, **M.W.= 193.16**, CAS[96602-46-9]



Reacts selectively with arginine residues at pH 7-8.

Features
•Reactive groups: phenyl azide and phenylglyoxal
•Reactive towards: amino groups and guanidium side chain of arginine

Technical Information

APG reacts specifically with arginine on one end and nonspecifically on the other end.

The azido group can then be photoactivated with a UV light source.
The reaction could be monitored thanks to the release of a highly reactive aryl nitrene that will nonspecifically react with neighboring molecules. The aryl nitrene's rapid rate of reaction (10^{-4} s) and its nonspecific nature can result in low efficiency, but its ease of use and its ability to conjugate to almost any molecule overcome this drawback.
APG's unique characteristics have allowed it to be used in numerous applications. Ngo et al. used it to inhibit enzymes such as bovine heart lactic dehydrogenase and egg white lysozyme. They also studied its specificity to arginine as compared to other amino acids.2 APG was used by Politz et al. to crosslink ribonucleic acid to E. coli ribosomes (Politz1981).3 APG was also used by Sgro et al. to crosslink brome mosaic virus coat protein to viral RNA in situ (Sgro1986). APG has been used under a wide range of conditions in these studies. A review of these and other references is suggested before using APG.

- APG is soluble in aqueous solutions. It can be dissolved in PBS, pH 7.5 at concentrations of at least 6 mM. It is also soluble in organic solvents such as dioxane.
- APG reacts best in a slightly basic environment with a pH between 7.0 and 8.0. It is normally used in a two-step reaction with the arginine reactive end conjugated first, in the dark, followed by the photoactivation of the azido group.
- The dicarbonyl group of APG's glyoxal specifically reacts with the guanidinyl group of arginine's side chain (Ngo1981). It forms a cyclic compound, more stable than Schiff's bases formed between amines and aldhydes/ketones.
  However, APG can react both reversibly or irreversibly with arginine, depending on the stoichiometry of the reaction, and is is recommended to a 1:1 or a 2:1 ratio of glyoxal compounds to arginine residues that was showed to favors reversible bonds (Takahashi1968, Konishi1987).
  Secundly, APG may react also, in a lower extend, with other amino acid side chains. Over 17 tested aminoacids, 50% of cysteine and histidine were found to be modified defavorable conditions such as 2.5 µM aa /ml in PBS, pH 7.5 and 6 mM APG at 25° C for 15 hours, while 95% of the arginine was modified.
- The photoactivatable aryl azide is stable in solution's that are free of reducing agents and nucleophiles, provided it is not exposed to light. Exposure to a long wave UV light source in the range of 265 – 275 nm (Philips Ultrapnil MLU 300 W, General Electric Sunlamp RSM 275 W, and National Self-Ballasted BHRF 240 - 250 V 250 W-P lamp) for about 15 minutes photoactivates APG, releasing a highly reactive and short-lived aryl nitrene. This nitrene will nonspecifically react with neighboring molecules with a rapid rate of

reaction (10^{-4} s)(Hermanson1996). The reaction is very exothermic, so it is best to operate on ice. The nitrene may undergo numerous reactions, notably :
-inserts into active carbon hydrogen bonds,
-adds to unsaturated carbon chains
-ring-expand to a dehydroazepine intermediate (most likely reaction), that is highly reactive toward nucleophiles.

- The yield of crosslinking may be relatively low, but can be improved by increasing the availability of the target molecule, therefore a molar excess of the target should be used in the second half of APG's two-step reaction.

For any information, please contact Uptima – Interchim

Literature

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Hermanson, G.T. (1996) Bioconjugate Techniques. Academic Press, San Diego.
Ngo, T.T., Yam, C.F., Lenhoff, H.M. and Ivy, J. (1981). p-Azidophenylglyoxal, a heterobifunctional photoactivable cross-linking reagent selective for arginyl residues. J. Biol. Chem. 256 (21), 11313-11318.
Politz, M.P., Noller, H.F. and McWhirter P.D. (1981). Ribonucleic Acid-Protein Cross-Linking in Escherichia coli Ribosomes: (4-Azidophenyl) glyoxal, a Novel Heterobifunctional Reagent. Biochem. 20, 372-378.
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Konishi, K. and Fujioka, M. (1987). Chemical modification of a functional arginine residue of rat liver glycine methyltransferase. Biochemistry. 26,8496-8502.