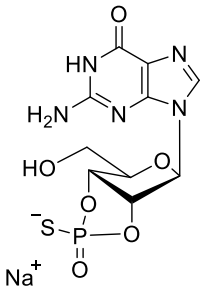
BIOLOG - LIFE SCIENCE INSTITUTE -

Technical Information about Sp*exo*-2',3'-cGMPS

Tool for research on stereochemical requirements of 2',3'-cGMP binding receptors

Update: July 06, 2023 ss



Abbreviation: **Sp-2',3'-cGMPS**

Formula	CAS No.	Molecular Weight	UV	BIOLOG Cat. No.
$C_{10}H_{11}N_5O_6PS{\cdot}Na$	[38557-86-7]	383.3	λ_{max} 252 nm / ε 14300 / pH 7	G 071

Name: Guanosine- 2', 3'- cyclic monophosphorothioate, Sp- or *exo*- isomer, sodium salt

Description: Sp-2',3'-cGMPS is an analogue of 2',3'-cyclic GMP (Cat. No. G 025) where one of two exocyclic oxygen atoms (*exo* position) in the cyclic phosphate moiety is replaced by sulfur. The suffix "p" indicates that R/S nomenclature refers to phosphorus.

Properties: Sp-2',3'-cGMPS and its corresponding Rp-isomer (Rp-2',3'-cGMPS, Cat. No. G 070) are valuable tools for determination of the stereochemical requirements of 2',3'-cGMP binding receptors. Depending on the type of receptor they could behave as agonists or inhibitors of the binding site. Often phosphorothioate-modified nucleotides are more stable against metabolic degradation compared to their sulfur-free parent structures.
According to Eckstein et al. (1972), Rp-2',3'-cGMPS is hydrolyzed by ribonuclease T_1 (RNase T_1), which converts guanosine 3'-phosphate esters to guanosine 3'-phosphate with guanine 2′,3′-cyclic monophosphate (2′,3′-cGMP) as intermediate, while the Sp-isomer Sp-2',3'-cGMPS resists hydrolysis and acts as a competitive inhibitor for this enzyme.

Specification: Crystallized or lyophilized sodium salt. Other salt forms of Sp-2',3'-cAMPS are available upon request. Please keep in mind that equal amounts of the compound may look different in volume depending on humidity. The compound can even contract to small volume droplets. Normally the product is located in the conical bottom of the tube. Micromolar quantities are determined by UV at λ_{max}.

Purity: Typical analysis is better than 97% (HPLC / UV / 252 nm). The product is not sterile and has not been tested for endotoxins.

Solubility: Sp-2',3'-cGMPS is soluble in water or aqueous buffers (≥ 20 mM, limits have not been determined). Please rinse tube walls carefully and preferably use ultrasonic or vortex to achieve total and uniform mixing. When opening the tube please make sure that no substance is lost within the cap.

Stability and Storage: Sp-2',3'-cAMPS has sufficient stability at room temperature and does not need special care during handling or shipment. Nevertheless, we recommend that the compound should be stored in the freezer, for longer storage periods preferably in freeze-dried form.

Toxicity and Safety: Since nucleotides have multiple tasks in every organism it is very likely that corresponding analogues will interfere with many cell regulation processes *in vivo*. However, due to the rather small quantities to work with no health hazards have been reported. Nevertheless please keep in mind that the *in vivo* properties of this compounds are not sufficiently characterized up to now. Avoid skin contact or ingestion and allow only trained personnel to handle the product.
Our products are designed, developed and sold for research purposes only. They are intended for *in vitro* and nonhuman *in vivo* laboratory applications. Any other use requires approval of health authorities.
Not for drug, household or related uses!

Selected References for 2',3'-cGMPS:

Bauerová-Hlinková, V.; Dvorský, R.; Perecko, D.; Povazanec, F.; Sevcík, J., *FEBS J.*, **276**, 4156 - 4168 (2009): "Structure of RNase Sa2 Complexes with Mononucleotides--New Aspects of Catalytic Reaction and Substrate Recognition"

BIOLOG Life Science Institute, Bremen, Germany Phone: 49 (0) 421 591355 Fax: 49 (0) 421 5979713 e-mail: service@biolog.de

Zegers, I,; Haikal, A.F.; Palmer, R.; Wyns, L., *J. Biol. Chem*., **269**, 127 - 133 (1994): "Crystal Structure of Rnase T1 with 3'-Guanylic Acid and Guanosine"

Eckstein, F.; Schulz, H.H.; Rüterjans, H.; Haar, W.; Maurer, W., *Biochemistry*, **11**, 3507 - 3512 (1972): "Stereochemistry of the Transesterification Step of Ribonuclease T1"

Selected References for cyclic 2',3'-phosphorothioates:

Heaton, P.A.; Eckstein, F., *Nucl. Acid Res*., **24**, 850 - 853 (1996): "Diastereomeric Specificity of 2',3'-cyclic nucleotide 3'-phosphodiesterase"

Lowe, G.; Thelin, M., *J. Chem. Soc.*, *Chem. Commun.*, 1947 - 1948 (1994): "The Stereochemical Course of Substitution of Sulfur by Oxygen Nucleophiles in Five-membered Cyclic Phosphorothioates"

Eckstein, F., *Acc. Chem. Res*., **12**, 204 - 210 (1979): "Phosphorothioate Analogues of Nucleotides"

Eckstein, F., *J. Am. Chem. Soc*., **92**, 4718 - 4723 (1970): "Nucleoside Phosphorothioates"

Saenger, W.; Eckstein, F., *J. Am. Chem. Soc*., **92**, 4712 - 4718 (1970): "Stereochemistry of a Substrate for Pancreatic Ribonuclease. Crystal and Molecular Structure of the Triethylammonium Salt of Uridine 2',3'-O,O-cyclophosphorothioate"

Eckstein, F.; *FEBS Lett*., **2**, 85 - 86 (1968): "Uridine 2',3'-O,O-cyclophosphorothioate as Substrate for Pancreatic Ribonuclease (I)"

BIOLOG Life Science Institute, Bremen, Germany Phone: 49 (0) 421 591355 Fax: 49 (0) 421 5979713 e-mail: service@biolog.de