

Synthesis and Enzymatic Evaluation of the Guanosine Analogue 2-Amino-6-mercapto-7-methylpurine Ribonucleoside (MESG). Insights into the Phosphorolysis Reaction Mechanism based on the Blueprint Transition State: S_{N1} or S_{N2} ?

Brenno A. D. Neto,^{*a} Alexandre A. M. Lapis,^b Paulo A. Netz,^c John Spencer,^d Silvio L. P. Dias,^c Silvia M. Tamborim,^c Luiz A. Basso,^e Diógenes S. Santos^e and Jairton Dupont^{*c}

^aLaboratory of Medicinal and Technological Chemistry, University of Brasilia (IQ-UnB), 72919-970 Brasilia-DF, Brazil

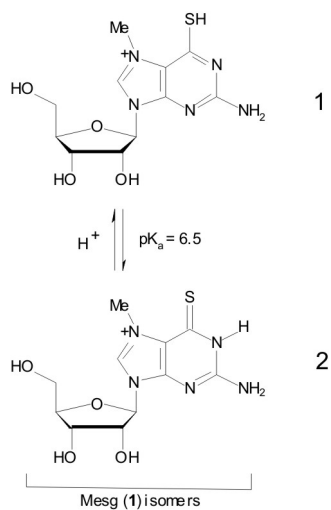
^bUniversidade Federal do Pampa, Unipampa, 96412-420 Bagé-RS, Brazil

^cLaboratory of Molecular Catalysis-Institute of Chemistry -UFRGS, Av. Bento Gonçalves, 9500, 91501-970 Porto Alegre-RS, Brazil

^dSchool of Science, University of Greenwich at Medway, Chatham Maritime, ME4 4TB, UK

^eCentro de Pesquisas em Biologia Molecular e Funcional, Tecnopuc, PUC-RS, Brazil

Table S1. MESG calculations energies



	Structure	321G	631G**
1	MESG1	-1387.3591	-1394.9106
2	MESG2	-1387.3892	-1394.9176
3	PHOSPHATE ($H_2PO_4^-$)	-637.9914	-641.4856
4 (1+3)	MESG1 + PHOSPHATE	-2025.3505	-2036.3962
5 (2+3)	MESG2 + PHOSPHATE	-2025.3806	-2036.4032
6	REACTANTS 1	-2025.5167	-2036.5672
7	REACTANTS 2	-2025.5711	-2036.5594
8	TRANSITION STATE 1	-2025.4802	
9	TRANSITION STATE 2	-2025.5258	-2036.5340

	Structure	321G	631G**
10	PRODUCTS 1	-2025.5386	-2036.5670
11	PRODUCTS 2	-2025.5751	-2036.5734
12 (14+16)	FREE BASE 1 + RIB-1-P	-2025.5147	-2036.5494
13 (15+16)	FREE BASE 2 + RIB-1-P	-2025.5514	-2036.5620
14	FREE BASE 1 (ch = 0)	-896.2612	-901.0708
15	FREE BASE 2 (ch = 0)	-896.2979	-901.0834
16	RIBOSE-1-PHOSPHATE	-1129.2535	-1135.4786
17 (10-6)	ΔH_{R1} (P-R)	-0.0219	+0.0002
		-57.50kJmol ⁻¹	0.52 kJmol ⁻¹
18 (11-7)	ΔH_{R2} (P-R)	-0.004	-0.014
		-10.50 kJmol ⁻¹	-36.76 kJmol ⁻¹
19 (12-4)	ΔH_{R1} (P-R) (isolated)	-0.1642	-0.1532
		-431.1 kJmol ⁻¹	-402.2 kJmol ⁻¹
20 (13-5)	ΔH_{R2} (P-R) (isolated)	-0.1708	-0.1588
		-448.4 kJmol ⁻¹	-416.9 kJmol ⁻¹
21 (8-4)	EA ₁	-0.1297	-
		-340.0kJmol ⁻¹	
22 (9-5)	EA ₂	-0.1452	-0.1308
		-381.2kJmol ⁻¹	-343.4kJmol ⁻¹
23 (8-6)	EA ₁ '	+0.0365	-
		+95.83kJmol ⁻¹	
24 (9-7)	EA ₂ '	+0.0453	+0.0254
		+118.9kJmol ⁻¹	+66.69kJmol ⁻¹
25 (1-2)	$\Delta H_{interconversion, isol}$ (R1-R2)	+0.0301	+0.007
		+79.0 kJmol ⁻¹	+18.4 kJmol ⁻¹
26 (14-15)	$\Delta H_{interconversion, isol}$ (P1-P2)	+0.0367	+0.0126
		+96.4 kJmol ⁻¹	+33.1 kJmol ⁻¹
27	FREE BASE 1 (ch = +1)	-896.6645	-901.4640
28	FREE BASE 2 (ch = +1)	-896.6966	-901.4724

*e-mail: brenno.ipi@gmail.com and jairton.dupont@ufrgs.br

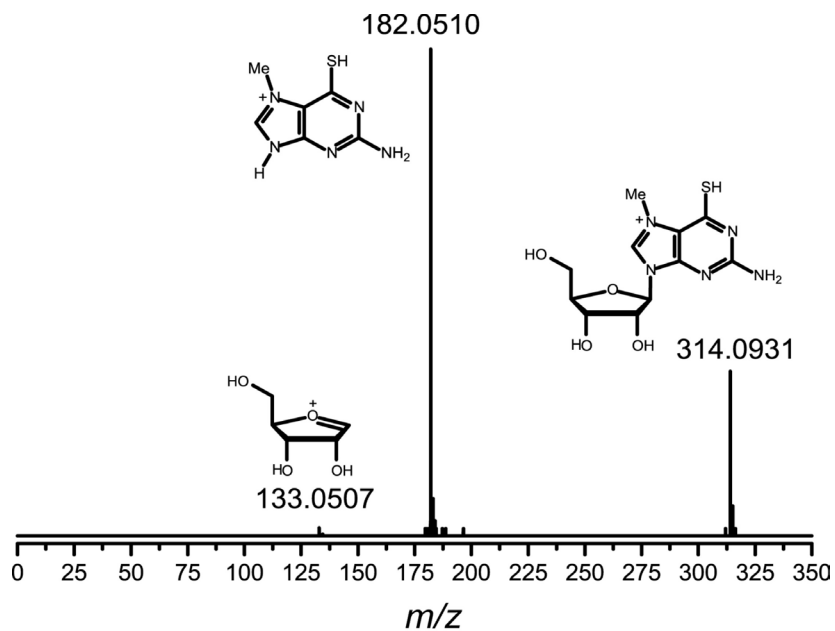


Figure S1. High resolution ESI(+)-MSMS

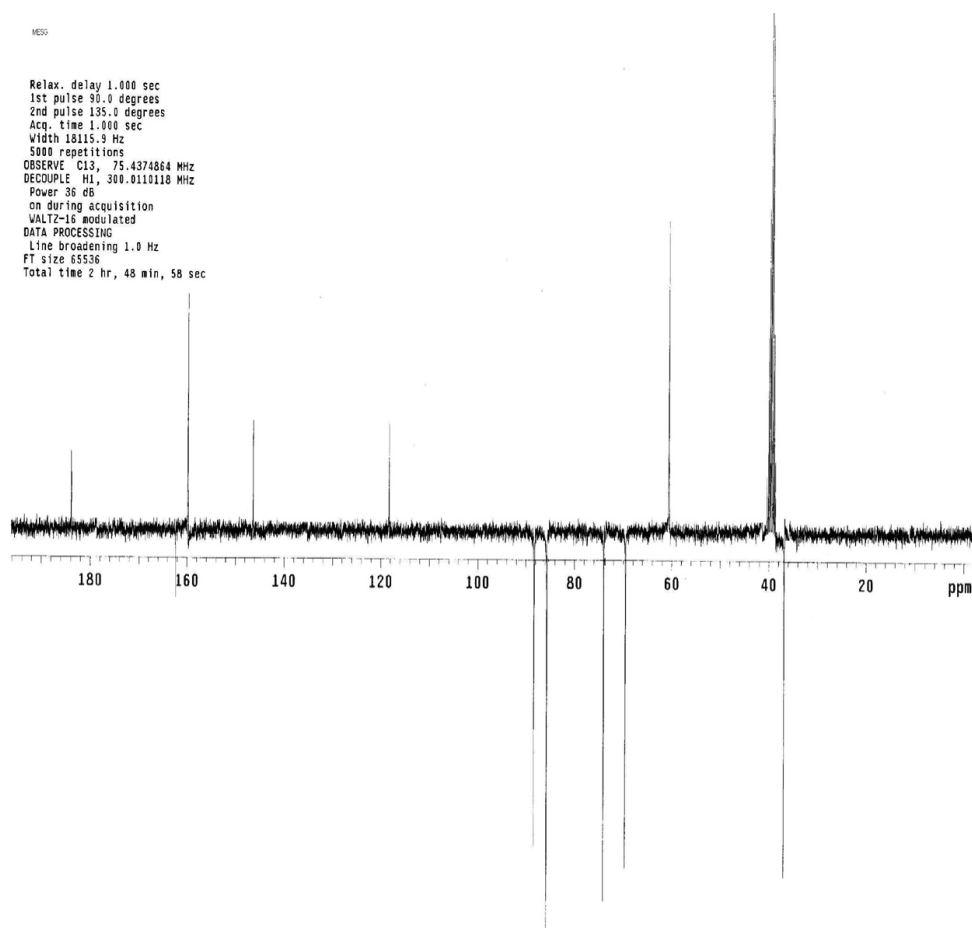


Figure S2. ^{13}C NMR (APT) (DMSO-d_6)

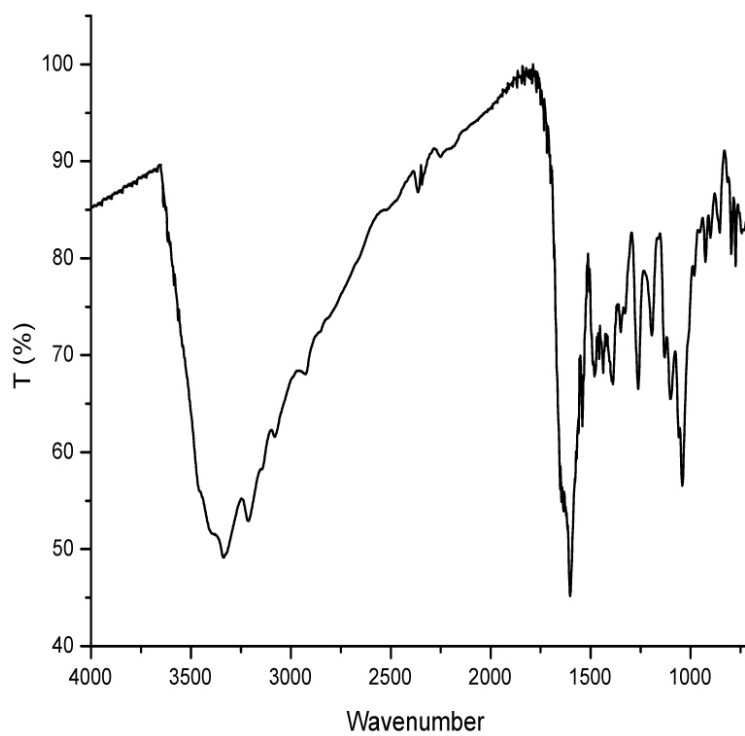


Figure S3. FTIR (KBr, $\nu_{\max}/\text{cm}^{-1}$)

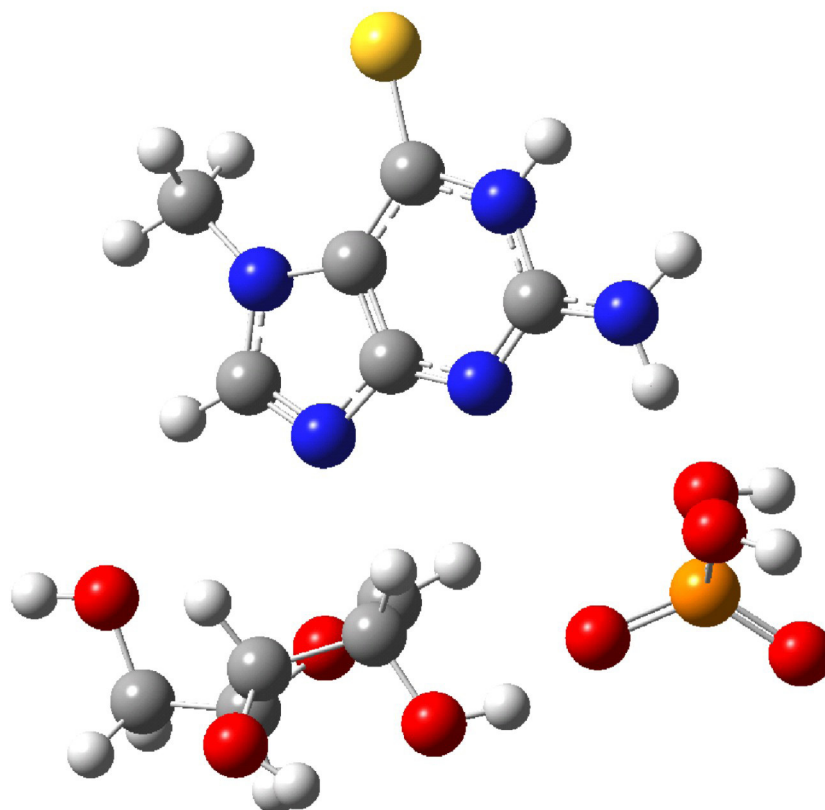


Figure S4. Calculated transition state