Full wwPDB X-ray Structure Validation Report ⓘ

Jun 24, 2025 – 05:31 pm BST

PDB ID	:	1QK3 / pdb_00001qk3
Title	:	TOXOPLASMA GONDII HYPOXANTHINE-GUANINE PHOSPHORIBOSYLTRANSFERASE GMP COMPLEX
Authors	:	Heroux, A.; White, E.L.; Ross, L.J.; Borhani, D.W.
Deposited on	:	1999-07-09
Resolution	:	1.65 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references ⓘ) were used in the production of this report:

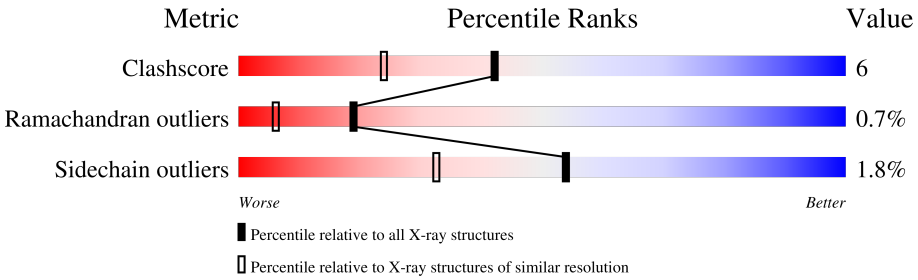
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	FAILED
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.65 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	180529	2515 (1.66-1.66)
Ramachandran outliers	177936	2475 (1.66-1.66)
Sidechain outliers	177891	2475 (1.66-1.66)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Note EDS failed to run properly.

Mol	Chain	Length	Quality of chain
1	A	233	83% 14% • •
1	B	233	82% 15% • •
1	C	233	75% 15% • 9%
1	D	233	76% 18% • •

2 Entry composition

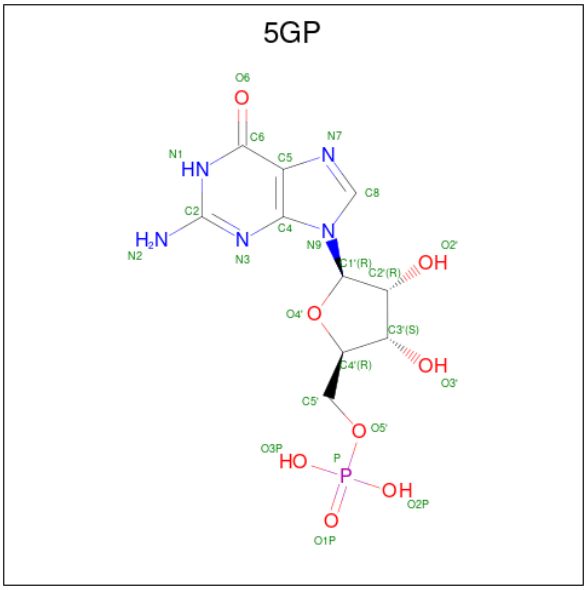
There are 3 unique types of molecules in this entry. The entry contains 8019 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called HYPOXANTHINE-GUANINE PHOSPHORIBOSYLTRANSFERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	228	Total	C	N	O	S	0	8	0
			1860	1200	305	346	9			
1	B	231	Total	C	N	O	S	0	10	0
			1874	1204	308	354	8			
1	C	213	Total	C	N	O	S	0	7	0
			1717	1113	280	315	9			
1	D	227	Total	C	N	O	S	0	5	0
			1827	1181	297	340	9			

- Molecule 2 is GUANOSINE-5'-MONOPHOSPHATE (CCD ID: 5GP) (formula: $C_{10}H_{14}N_5O_8P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			24	10	5	8	1		
2	B	1	Total	C	N	O	P	0	0
			24	10	5	8	1		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	N	O	P	0	0
			24	10	5	8	1		
2	D	1	Total	C	N	O	P	0	0
			24	10	5	8	1		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	183	Total	O	0	0
			183	183		
3	B	160	Total	O	0	0
			160	160		
3	C	152	Total	O	0	0
			152	152		
3	D	150	Total	O	0	0
			150	150		

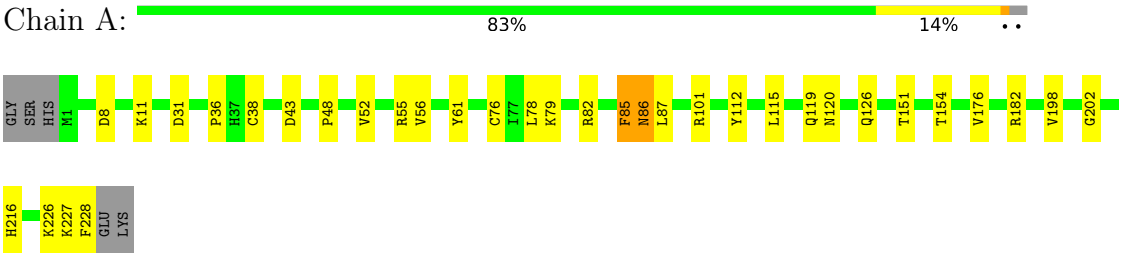
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

Note EDS failed to run properly.

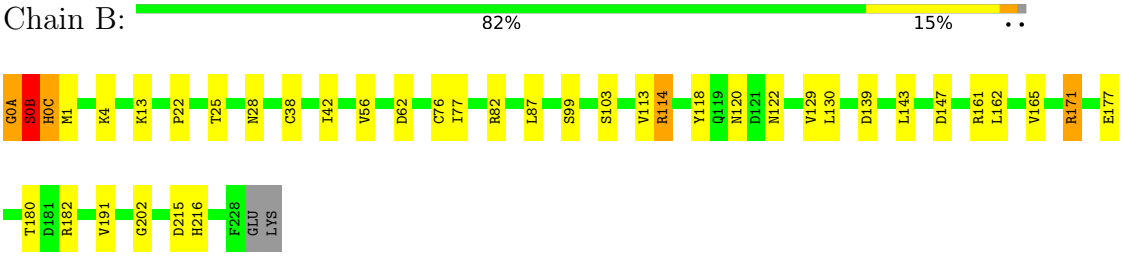
• Molecule 1: HYPOXANTHINE-GUANINE PHOSPHORIBOSYLTRANSFERASE

Chain A:



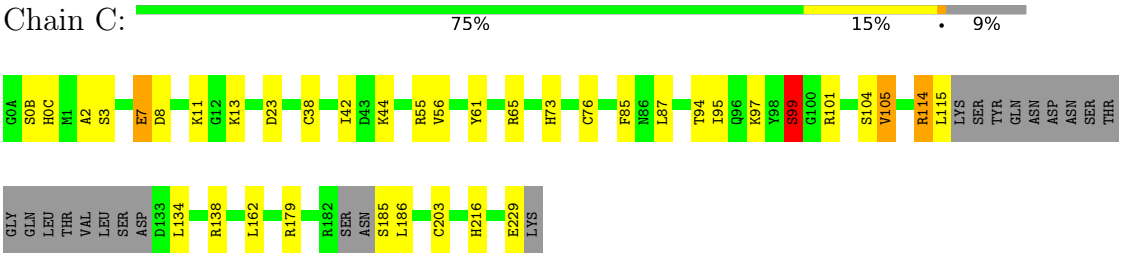
• Molecule 1: HYPOXANTHINE-GUANINE PHOSPHORIBOSYLTRANSFERASE

Chain B:



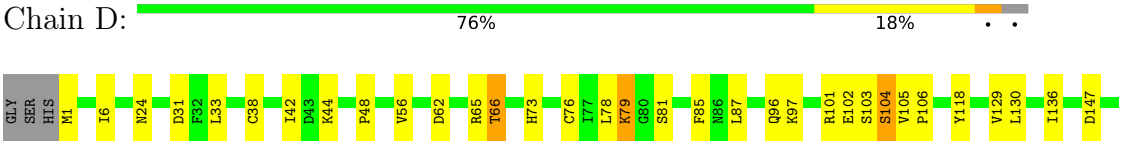
• Molecule 1: HYPOXANTHINE-GUANINE PHOSPHORIBOSYLTRANSFERASE

Chain C:



• Molecule 1: HYPOXANTHINE-GUANINE PHOSPHORIBOSYLTRANSFERASE

Chain D:




D150
T151
K163
M170
T180
D181
R182
SER
ASN
S185
F190
D197
V201
G202
C203
C204
F207
R225
F228
E229
LYS

4 Data and refinement statistics (i)

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	65.45Å 90.84Å 80.26Å 90.00° 92.53° 90.00°	Depositor
Resolution (Å)	12.50 – 1.65	Depositor
% Data completeness (in resolution range)	96.4 (12.50-1.65)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.05	Depositor
$< I/\sigma(I) >$ [1]	1.73 (at 1.65Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.202 , 0.231	Depositor
Wilson B-factor (Å^2)	18.7	Xtriage
Anisotropy	0.298	Xtriage
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.020 for h,-k,-l	Xtriage
Total number of atoms	8019	wwPDB-VP
Average B, all atoms (Å^2)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.03% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: 5GP

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$\|Z\|>5$	RMSZ	#$\|Z\|>5$
1	A	0.85	0/1943	1.58	22/2624 (0.8%)
1	B	0.98	2/1975 (0.1%)	1.68	26/2669 (1.0%)
1	C	0.88	0/1791	1.48	11/2420 (0.5%)
1	D	0.85	0/1895	1.53	25/2561 (1.0%)
All	All	0.89	2/7604 (0.0%)	1.57	84/10274 (0.8%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	0(A)	GLY	N-CA	6.23	1.55	1.45
1	B	202	GLY	N-CA	5.68	1.50	1.45

All (84) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	82	ARG	NE-CZ-NH2	-15.52	105.24	119.20
1	B	82	ARG	NE-CZ-NH1	14.10	135.60	121.50
1	B	0(B)	SER	CA-C-O	12.66	138.62	120.51
1	B	161	ARG	NE-CZ-NH2	-11.76	108.61	119.20
1	B	0(B)	SER	C-N-CA	10.50	147.95	121.70
1	C	134	LEU	N-CA-C	10.42	125.55	113.15
1	B	161	ARG	NH1-CZ-NH2	8.34	130.14	119.30
1	D	181	ASP	N-CA-C	-8.31	95.66	109.46
1	B	114	ARG	NE-CZ-NH1	8.30	129.80	121.50
1	A	228	PHE	CA-CB-CG	-7.70	106.11	113.80
1	A	126	GLN	OE1-CD-NE2	7.60	130.20	122.60
1	A	78	LEU	CA-C-O	7.43	127.86	120.88
1	D	97	LYS	CA-CB-CG	7.40	128.89	114.10
1	C	229	GLU	CA-C-O	-7.35	108.30	120.80
1	D	228	PHE	CA-C-N	7.03	134.36	121.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	228	PHE	C-N-CA	7.03	134.36	121.70
1	C	138	ARG	NE-CZ-NH2	7.03	125.53	119.20
1	D	225	ARG	NE-CZ-NH2	-7.03	112.88	119.20
1	D	96	GLN	CA-C-O	6.75	127.70	120.55
1	A	101	ARG	CD-NE-CZ	6.62	133.67	124.40
1	B	143	LEU	CA-C-O	-6.56	113.51	120.40
1	B	0(B)	SER	O-C-N	-6.48	112.33	122.70
1	C	138	ARG	NE-CZ-NH1	-6.42	115.08	121.50
1	A	82	ARG	NE-CZ-NH2	-6.36	113.47	119.20
1	B	139	ASP	CA-CB-CG	6.36	118.96	112.60
1	B	215	ASP	CA-CB-CG	-6.35	106.25	112.60
1	C	216	HIS	CA-C-O	-6.27	114.13	121.46
1	A	52	VAL	O-C-N	-6.18	115.86	121.91
1	D	228	PHE	CA-CB-CG	-6.16	107.64	113.80
1	A	31	ASP	CA-CB-CG	6.15	118.75	112.60
1	B	216	HIS	CA-C-O	-6.09	114.52	121.40
1	D	181	ASP	CA-CB-CG	6.00	118.60	112.60
1	B	0(A)	GLY	CA-C-N	-5.98	104.04	117.20
1	C	162	LEU	O-C-N	-5.92	115.41	122.15
1	D	201	VAL	CA-C-O	-5.87	115.82	121.63
1	A	55	ARG	NE-CZ-NH1	5.86	127.36	121.50
1	B	28	ASN	OD1-CG-ND2	-5.85	116.75	122.60
1	A	86	ASN	OD1-CG-ND2	-5.79	116.81	122.60
1	D	203[A]	CYS	CB-CA-C	-5.79	109.36	117.23
1	D	203[B]	CYS	CB-CA-C	-5.79	109.36	117.23
1	A	198	VAL	CA-C-O	-5.71	115.98	121.63
1	C	73	HIS	CA-CB-CG	-5.61	108.19	113.80
1	D	78	LEU	N-CA-C	5.60	118.47	110.68
1	B	120	ASN	OD1-CG-ND2	5.58	128.18	122.60
1	D	104	SER	N-CA-C	-5.58	106.27	112.57
1	A	43	ASP	CA-CB-CG	5.57	118.17	112.60
1	A	101	ARG	NE-CZ-NH2	-5.51	114.24	119.20
1	A	78	LEU	N-CA-C	5.50	118.78	110.64
1	B	77[A]	ILE	CB-CG1-CD1	5.48	125.31	113.80
1	B	77[B]	ILE	CB-CG1-CD1	5.48	125.31	113.80
1	B	143	LEU	O-C-N	5.47	130.35	123.12
1	C	2	ALA	N-CA-C	5.47	117.32	111.36
1	B	122	ASN	N-CA-C	5.41	118.08	110.23
1	A	101	ARG	NE-CZ-NH1	5.40	126.90	121.50
1	B	171	ARG	NE-CZ-NH2	-5.39	114.35	119.20
1	C	55	ARG	NE-CZ-NH2	-5.35	114.38	119.20
1	D	24	ASN	O-C-N	-5.34	115.93	122.55

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	0(B)	SER	N-CA-CB	-5.31	101.51	110.49
1	A	112	TYR	CA-C-O	-5.31	114.62	120.30
1	C	179	ARG	NE-CZ-NH2	5.30	123.97	119.20
1	A	38	CYS	CB-CA-C	-5.28	99.58	109.72
1	A	119	GLN	CA-C-O	-5.25	114.77	120.81
1	D	201	VAL	O-C-N	5.24	128.94	123.02
1	A	55	ARG	NH1-CZ-NH2	-5.23	112.51	119.30
1	D	180	THR	N-CA-C	5.21	117.31	109.23
1	D	73	HIS	CA-CB-CG	-5.21	108.59	113.80
1	D	31	ASP	CA-CB-CG	5.21	117.81	112.60
1	B	147	ASP	CA-CB-CG	5.20	117.80	112.60
1	A	85[A]	PHE	CA-CB-CG	5.14	118.94	113.80
1	A	85[B]	PHE	CA-CB-CG	5.14	118.94	113.80
1	D	207	PHE	CA-CB-CG	5.12	118.92	113.80
1	D	48	PRO	CA-C-N	5.10	125.64	119.98
1	D	48	PRO	C-N-CA	5.10	125.64	119.98
1	D	147[A]	ASP	N-CA-C	5.08	117.20	111.11
1	D	147[B]	ASP	N-CA-C	5.08	117.20	111.11
1	B	114	ARG	NE-CZ-NH2	-5.08	114.63	119.20
1	B	99	SER	CA-C-N	5.05	126.49	120.13
1	B	99	SER	C-N-CA	5.05	126.49	120.13
1	D	197	ASP	O-C-N	-5.04	115.72	122.38
1	A	48	PRO	O-C-N	-5.03	116.77	123.01
1	D	181	ASP	CA-C-O	-5.02	114.87	120.54
1	A	176	VAL	O-C-N	5.01	128.36	123.00
1	C	23	ASP	CA-CB-CG	5.01	117.61	112.60
1	B	62	ASP	CA-CB-CG	5.01	117.61	112.60

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1860	0	1826	13	0
1	B	1874	0	1824	25	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1717	0	1663	23	0
1	D	1827	0	1788	38	1
2	A	24	0	12	0	0
2	B	24	0	12	0	0
2	C	24	0	12	0	0
2	D	24	0	12	0	0
3	A	183	0	0	1	0
3	B	160	0	0	1	1
3	C	152	0	0	2	0
3	D	150	0	0	2	1
All	All	8019	0	7149	90	2

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (90) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:101:ARG:NH1	1:D:33[A]:LEU:HD11	1.63	1.12
1:B:0(A):GLY:HA2	3:B:2131:HOH:O	1.60	1.00
1:C:101:ARG:HH12	1:D:33[A]:LEU:CD1	1.76	0.98
1:C:101:ARG:HH12	1:D:33[A]:LEU:HD11	0.81	0.96
1:D:44:LYS:HD2	3:D:2040:HOH:O	1.70	0.91
1:C:114:ARG:O	1:C:115:LEU:HB2	1.76	0.85
1:B:0(A):GLY:N	1:B:4:LYS:NZ	2.24	0.84
1:D:118:TYR:CD1	1:D:130:LEU:HD11	2.13	0.83
1:D:66[A]:THR:HG21	1:D:190:PHE:HZ	1.44	0.83
1:D:66[A]:THR:HG21	1:D:190:PHE:CZ	2.20	0.76
1:C:101:ARG:HH12	1:D:33[B]:LEU:HD22	1.51	0.75
1:D:1:MET:HE1	1:D:65:ARG:HG2	1.71	0.72
1:B:0(A):GLY:N	1:B:4:LYS:HZ1	1.87	0.72
1:B:0(A):GLY:N	1:B:4:LYS:HZ3	1.89	0.70
1:D:182:ARG:NH1	1:D:197:ASP:OD2	2.25	0.70
1:B:0(A):GLY:O	1:B:171:ARG:NE	2.19	0.66
1:C:44:LYS:HE3	3:C:2017:HOH:O	1.96	0.66
1:C:114:ARG:O	1:C:115:LEU:CB	2.45	0.65
1:C:101:ARG:HH12	1:D:33[B]:LEU:CD2	2.07	0.64
1:D:225:ARG:O	1:D:229:GLU:HG3	1.96	0.64
1:D:6:ILE:HG23	1:D:170:MET:HE2	1.81	0.62
1:B:0(A):GLY:N	1:B:13:LYS:O	2.29	0.62
1:D:62:ASP:O	1:D:66[A]:THR:HG22	1.99	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:6:ILE:HG23	1:D:170:MET:CE	2.31	0.61
1:D:76:CYS:HB2	1:D:85:PHE:CE1	2.38	0.58
1:D:136:ILE:HG23	3:D:2085:HOH:O	2.03	0.58
1:C:95:ILE:O	1:C:99:SER:HB2	2.04	0.58
1:D:181:ASP:O	1:D:182:ARG:HB2	2.04	0.57
1:B:0(A):GLY:H3	1:B:4:LYS:HZ3	1.51	0.57
1:C:11:LYS:HD3	1:C:13:LYS:HE3	1.86	0.57
1:D:118:TYR:HB2	1:D:130:LEU:HG	1.87	0.56
1:C:76:CYS:HB2	1:C:85:PHE:CE1	2.40	0.56
1:A:61:TYR:OH	1:D:101:ARG:HD3	2.07	0.55
1:C:76:CYS:HB2	1:C:85:PHE:CD1	2.41	0.55
1:B:38:CYS:HB3	1:B:42[B]:ILE:HD12	1.90	0.54
1:D:151:THR:HG22	1:D:182:ARG:HG2	1.90	0.53
1:D:79:LYS:HA	1:D:79:LYS:HE2	1.91	0.53
1:C:104:SER:O	1:C:105:VAL:C	2.52	0.53
1:D:76:CYS:HB2	1:D:85:PHE:CD1	2.45	0.52
1:B:22:PRO:HD2	1:B:25:THR:HG21	1.90	0.52
1:C:8:ASP:HA	1:C:11:LYS:HD2	1.93	0.51
1:D:163:LYS:HG2	1:D:170:MET:HE1	1.91	0.51
1:D:81:SER:OG	1:D:204:CYS:HB2	2.10	0.51
1:A:8:ASP:HA	1:A:11:LYS:HD2	1.92	0.51
1:B:22:PRO:O	1:B:25:THR:HG22	2.11	0.51
1:B:56:VAL:HG21	1:B:87:LEU:HD23	1.93	0.50
1:A:36:PRO:HG2	1:B:103:SER:HB2	1.92	0.50
1:D:38:CYS:HB3	1:D:42[A]:ILE:HD12	1.94	0.50
1:B:0(A):GLY:H1	1:B:4:LYS:HZ1	1.59	0.49
1:D:6:ILE:HD12	1:D:170:MET:HE2	1.95	0.49
1:D:150:ASP:OD1	1:D:182:ARG:HD3	2.13	0.49
1:B:0(A):GLY:H1	1:B:4:LYS:NZ	2.11	0.48
1:B:0(A):GLY:H2	1:B:4:LYS:NZ	2.06	0.48
1:D:228:PHE:CD2	1:D:229:GLU:N	2.82	0.48
1:A:79:LYS:HE3	3:A:2124:HOH:O	2.13	0.47
1:B:1:MET:O	1:B:171:ARG:NH2	2.47	0.47
1:D:104:SER:O	1:D:106:PRO:HD3	2.15	0.47
1:C:56:VAL:HG21	1:C:87:LEU:HD23	1.97	0.47
1:A:76[B]:CYS:HB2	1:A:85[B]:PHE:CE1	2.51	0.46
1:C:94[A]:THR:HG21	3:C:2077:HOH:O	2.15	0.46
1:B:114:ARG:HG2	1:B:129:VAL:HG11	1.98	0.45
1:A:226:LYS:O	1:A:227:LYS:C	2.61	0.44
1:D:102:GLU:O	1:D:103:SER:HB2	2.18	0.44
1:A:85[A]:PHE:CE1	1:A:86:ASN:OD1	2.70	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:38:CYS:HB3	1:C:42:ILE:HD12	2.00	0.43
1:C:101:ARG:CZ	1:D:33[A]:LEU:HD11	2.39	0.43
1:B:162:LEU:O	1:B:165:VAL:HG22	2.18	0.43
1:D:180:THR:OG1	1:D:182:ARG:HB2	2.17	0.43
1:B:0(B):SER:HB3	1:B:0(C):HIS:H	1.38	0.43
1:D:181:ASP:O	1:D:182:ARG:CB	2.67	0.43
1:D:56:VAL:HG21	1:D:87:LEU:HD23	2.00	0.43
1:A:115:LEU:CD1	1:A:154:THR:HG23	2.48	0.42
1:B:113[A]:VAL:HG22	1:B:130:LEU:HB2	2.02	0.42
1:C:115:LEU:HD23	1:C:115:LEU:HA	1.81	0.42
1:C:61:TYR:CE2	1:C:65:ARG:HD2	2.55	0.42
1:D:1:MET:CE	1:D:65:ARG:HG2	2.47	0.42
1:C:7:GLU:CD	1:C:7:GLU:H	2.28	0.41
1:C:61:TYR:CZ	1:C:65:ARG:HD2	2.56	0.41
1:A:115:LEU:HD11	1:A:154:THR:HG23	2.01	0.41
1:A:151:THR:O	1:A:182:ARG:NH1	2.50	0.41
1:A:56:VAL:HG21	1:A:87:LEU:HD23	2.03	0.40
1:B:177[A]:GLU:HG2	1:B:191:VAL:HG11	2.03	0.40
1:C:101:ARG:HH22	1:D:33[A]:LEU:CD1	2.34	0.40
1:D:228:PHE:CG	1:D:229:GLU:N	2.89	0.40
1:A:76[B]:CYS:HB2	1:A:85[B]:PHE:CD1	2.57	0.40
1:A:202:GLY:HA3	1:A:216:HIS:O	2.21	0.40
1:B:118:TYR:CE2	1:B:129:VAL:HB	2.56	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:2116:HOH:O	3:D:2139:HOH:O[2_858]	1.75	0.45
1:B:182:ARG:CD	1:D:229:GLU:OE1[2_858]	2.19	0.01

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was

analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	234/233 (100%)	221 (94%)	13 (6%)	0	100 100
1	B	239/233 (103%)	230 (96%)	7 (3%)	2 (1%)	16 4
1	C	214/233 (92%)	203 (95%)	7 (3%)	4 (2%)	6 0
1	D	228/233 (98%)	221 (97%)	7 (3%)	0	100 100
All	All	915/932 (98%)	875 (96%)	34 (4%)	6 (1%)	19 6

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	0(B)	SER
1	C	105	VAL
1	B	0(C)	HIS
1	C	114	ARG
1	C	203	CYS
1	C	99	SER

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	209/207 (101%)	208 (100%)	1 (0%)	86 80
1	B	212/207 (102%)	211 (100%)	1 (0%)	86 80
1	C	186/207 (90%)	178 (96%)	8 (4%)	25 6
1	D	202/207 (98%)	197 (98%)	5 (2%)	42 19
All	All	809/828 (98%)	794 (98%)	15 (2%)	54 30

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	120	ASN
1	B	180	THR
1	C	0(B)	SER

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Mol	Chain	Res	Type
1	C	0(C)	HIS
1	C	3	SER
1	C	7	GLU
1	C	97	LYS
1	C	99	SER
1	C	185	SER
1	C	186	LEU
1	D	66[A]	THR
1	D	66[B]	THR
1	D	79	LYS
1	D	105	VAL
1	D	129	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	0(C)	HIS
1	B	24	ASN
1	B	64	HIS
1	D	24	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

4 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and

the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	5GP	C	300	-	22,26,26	1.31	5 (22%)	26,40,40	0.90	1 (3%)
2	5GP	D	300	-	22,26,26	1.21	3 (13%)	26,40,40	0.95	0
2	5GP	A	300	-	22,26,26	1.28	5 (22%)	26,40,40	1.02	0
2	5GP	B	300	-	22,26,26	1.35	3 (13%)	26,40,40	1.13	3 (11%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	5GP	C	300	-	-	3/6/26/26	0/3/3/3
2	5GP	D	300	-	-	2/6/26/26	0/3/3/3
2	5GP	A	300	-	-	3/6/26/26	0/3/3/3
2	5GP	B	300	-	-	0/6/26/26	0/3/3/3

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	300	5GP	C5-C6	-3.10	1.41	1.47
2	A	300	5GP	O4'-C1'	3.00	1.45	1.41
2	A	300	5GP	C5-C6	-2.77	1.41	1.47
2	B	300	5GP	C6-N1	2.72	1.41	1.37
2	C	300	5GP	C5-C6	-2.71	1.41	1.47
2	D	300	5GP	C5-C6	-2.58	1.42	1.47
2	C	300	5GP	C6-N1	2.41	1.41	1.37
2	D	300	5GP	O4'-C1'	2.36	1.44	1.41
2	A	300	5GP	C8-N7	-2.34	1.31	1.35
2	C	300	5GP	O4'-C4'	2.19	1.49	1.45
2	A	300	5GP	C5-C4	-2.15	1.37	1.43
2	D	300	5GP	C8-N7	-2.11	1.31	1.35
2	B	300	5GP	O4'-C1'	2.11	1.44	1.41
2	C	300	5GP	C5-C4	-2.11	1.37	1.43
2	A	300	5GP	C6-N1	2.04	1.40	1.37
2	C	300	5GP	O4'-C1'	2.03	1.43	1.41

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	300	5GP	O6-C6-C5	2.74	129.73	124.37
2	B	300	5GP	O3P-P-O2P	2.55	117.38	107.64
2	C	300	5GP	O3'-C3'-C4'	2.14	117.24	111.05
2	B	300	5GP	O6-C6-N1	-2.09	118.18	120.65

There are no chirality outliers.

All (8) torsion outliers are listed below:

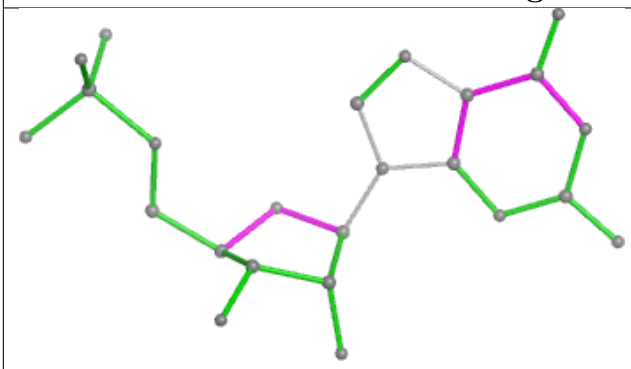
Mol	Chain	Res	Type	Atoms
2	A	300	5GP	C5'-O5'-P-O2P
2	C	300	5GP	C5'-O5'-P-O2P
2	C	300	5GP	C5'-O5'-P-O3P
2	D	300	5GP	C5'-O5'-P-O1P
2	D	300	5GP	C5'-O5'-P-O2P
2	A	300	5GP	C5'-O5'-P-O1P
2	C	300	5GP	C5'-O5'-P-O1P
2	A	300	5GP	C5'-O5'-P-O3P

There are no ring outliers.

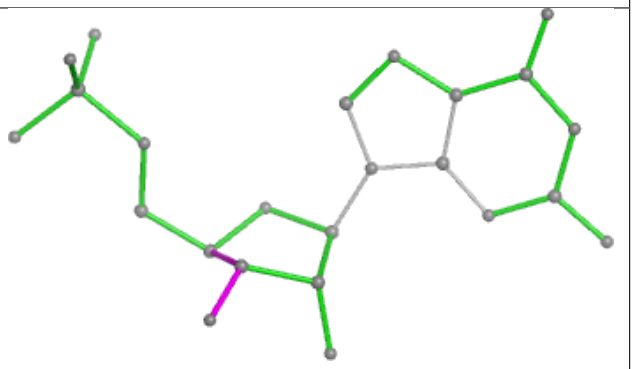
No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

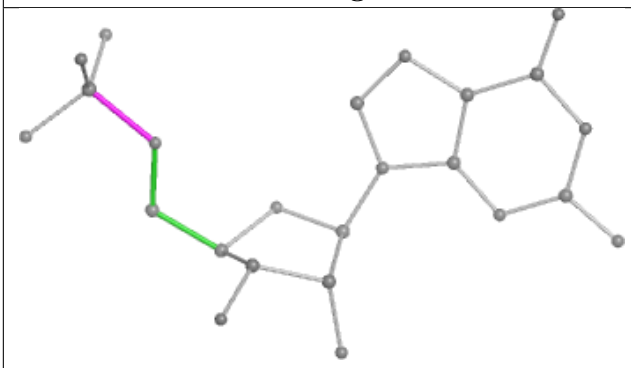
Ligand 5GP C 300



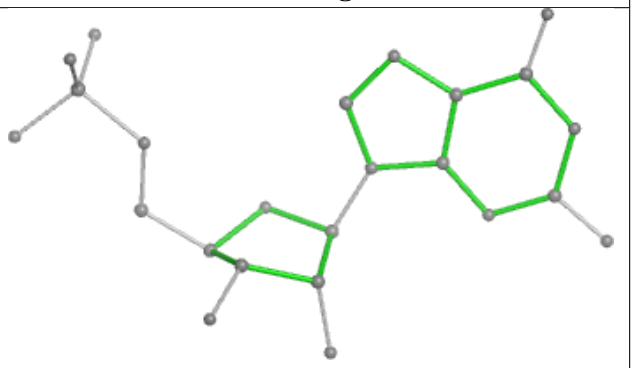
Bond lengths



Bond angles

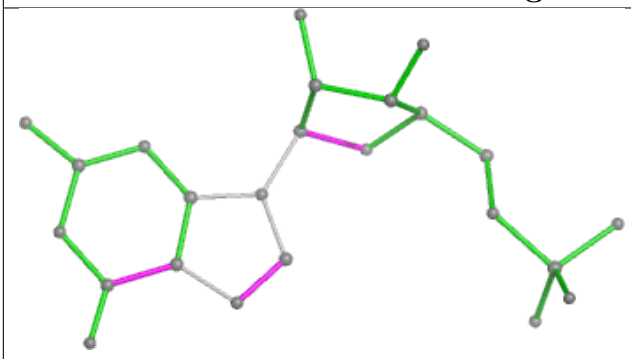


Torsions

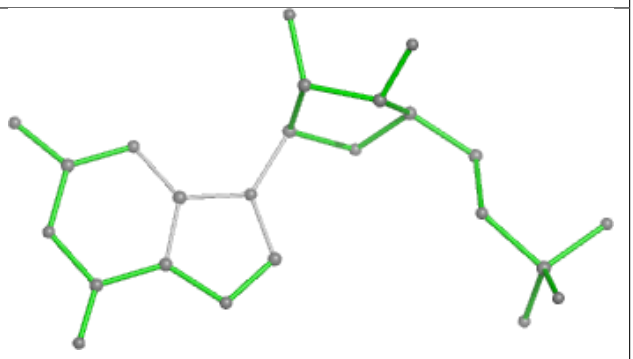


Rings

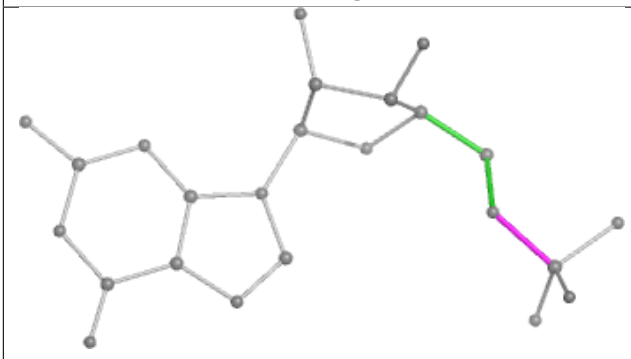
Ligand 5GP D 300



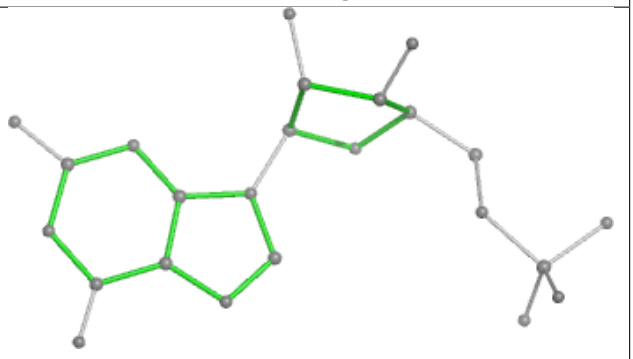
Bond lengths



Bond angles

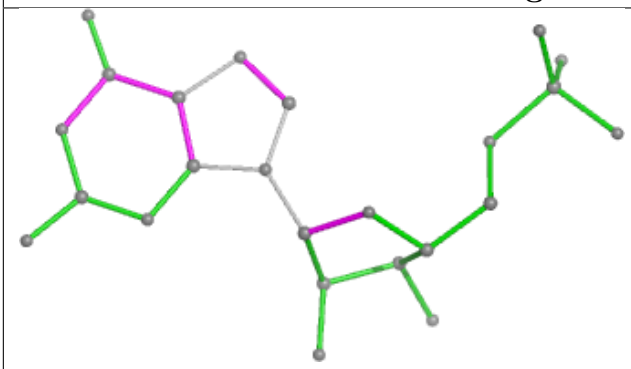


Torsions

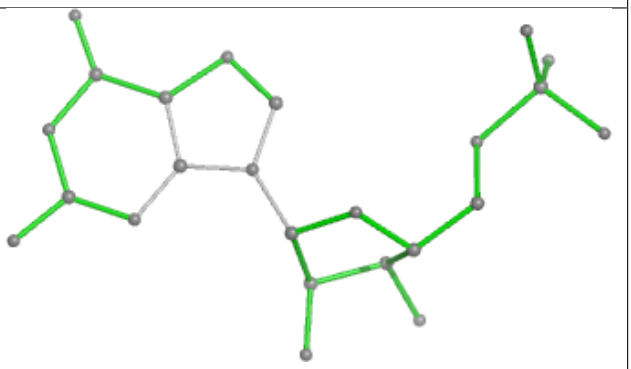


Rings

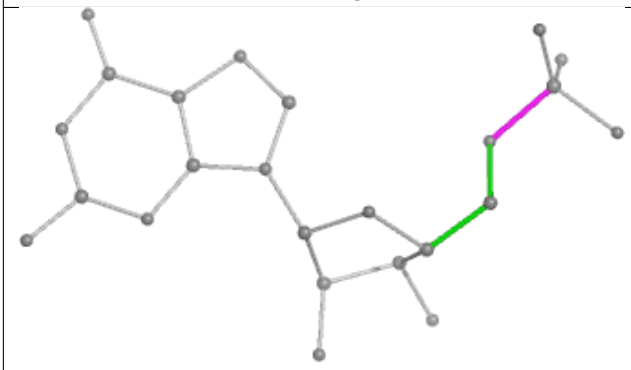
Ligand 5GP A 300



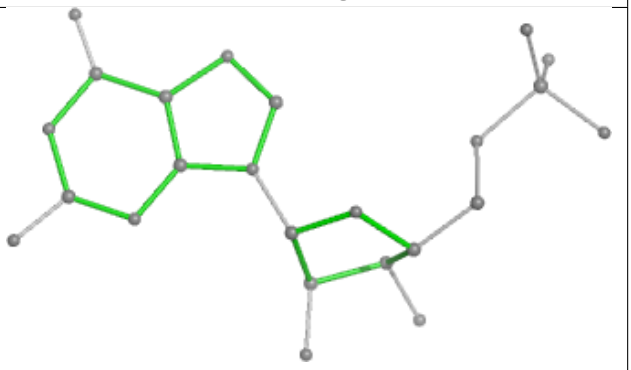
Bond lengths



Bond angles

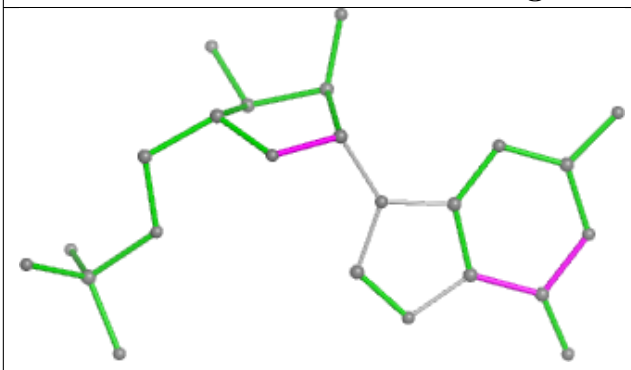


Torsions

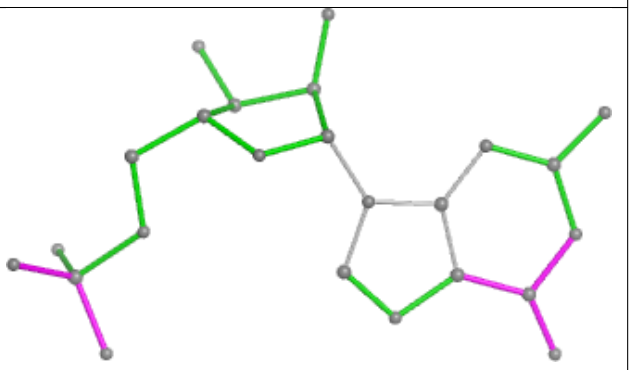


Rings

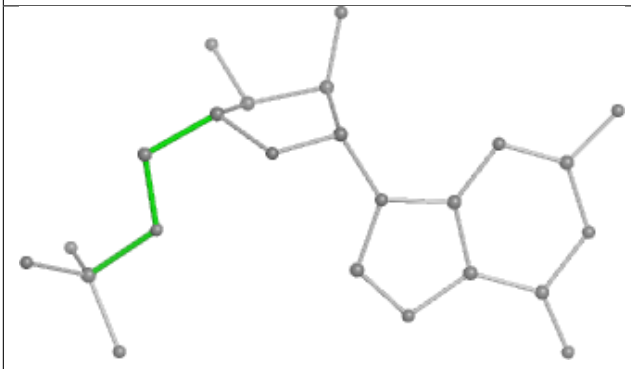
Ligand 5GP B 300



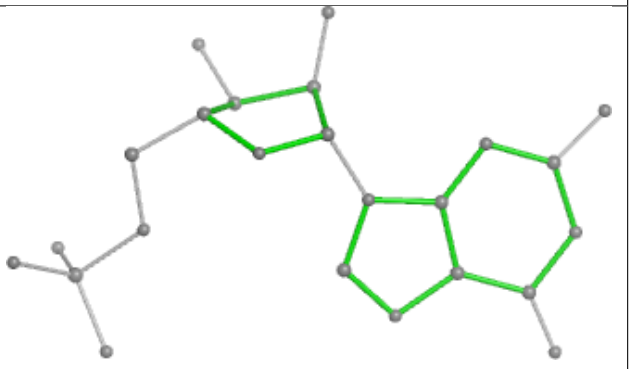
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS failed to run properly - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS failed to run properly - this section is therefore empty.

6.3 Carbohydrates

EDS failed to run properly - this section is therefore empty.

6.4 Ligands

EDS failed to run properly - this section is therefore empty.

6.5 Other polymers

EDS failed to run properly - this section is therefore empty.