Full wwPDB X-ray Structure Validation Report (i)

Jun 15, 2024 – 07:24 PM EDT

PDB ID	:	2VQZ
Title	:	Structure of the cap-binding domain of influenza virus polymerase subunit PB2 with bound m7GTP
Authors	:	Guilligay, D.; Tarendeau, F.; Resa-Infante, P.; Coloma, R.; Crepin, T.; Sehr, P.; Lewis, J.; Ruigrok, R.W.H.; Ortin, J.; Hart, D.J.; Cusack, S.
Deposited on	:	2008-03-21
Resolution	:	2.30 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 (i) 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 (i)) were used in the production of this report:

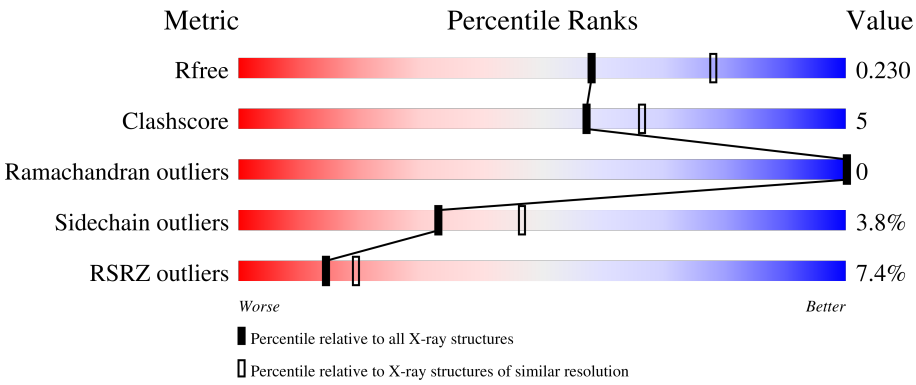
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

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 2.30 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))
R_{free}	130704	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	166	2%, 87%, 10%
1	B	166	8%, 86%, 10%
1	D	166	6%, 89%, 10%
1	E	166	6%, 85%, 11%

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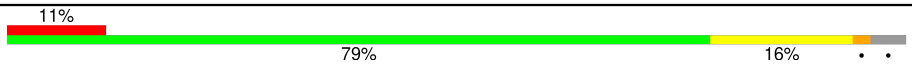
Mol	Chain	Length	Quality of chain
1	F	166	

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 6920 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.

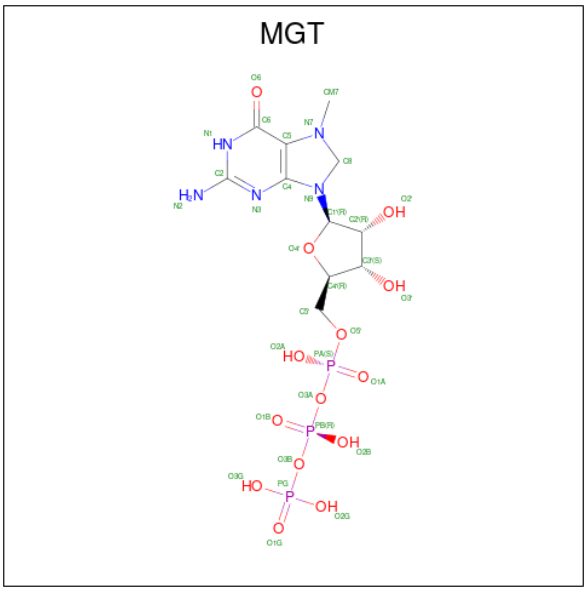
- Molecule 1 is a protein called POLYMERASE BASIC PROTEIN 2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	164	1303	815	238	238	2	10	0	2	0
1	B	162	1294	811	235	236	2	10	0	2	0
1	D	165	1321	827	242	240	2	10	0	2	0
1	E	160	1270	797	229	232	2	10	0	1	0
1	F	160	1295	813	235	234	1	12	0	5	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	389	LYS	ARG	engineered mutation	UNP P31345
B	389	LYS	ARG	engineered mutation	UNP P31345
D	389	LYS	ARG	engineered mutation	UNP P31345
E	389	LYS	ARG	engineered mutation	UNP P31345
F	389	LYS	ARG	engineered mutation	UNP P31345

- Molecule 2 is 7N-METHYL-8-HYDROGUANOSINE-5'-TRIPHOSPHATE (three-letter code: MGT) (formula: $C_{11}H_{20}N_5O_{14}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			33	11	5	14	3		
2	B	1	Total	C	N	O	P	0	0
			33	11	5	14	3		
2	D	1	Total	C	N	O	P	0	0
			33	11	5	14	3		
2	E	1	Total	C	N	O	P	0	0
			33	11	5	14	3		
2	F	1	Total	C	N	O	P	0	0
			33	11	5	14	3		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	65	Total	O	0	0
			65	65		
3	B	66	Total	O	0	0
			66	66		
3	D	58	Total	O	0	0
			58	58		
3	E	51	Total	O	0	0
			51	51		
3	F	32	Total	O	0	0
			32	32		

3 Residue-property plots (i)

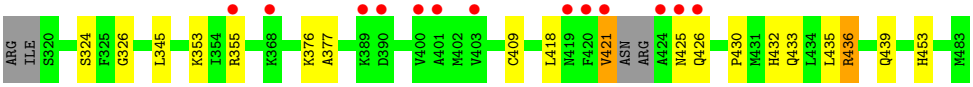
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). 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.

• Molecule 1: POLYMERASE BASIC PROTEIN 2

Chain A:

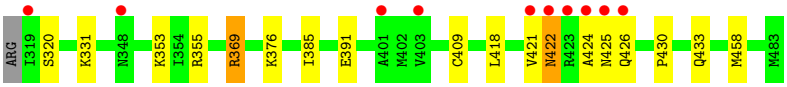
• Molecule 1: POLYMERASE BASIC PROTEIN 2

Chain B:



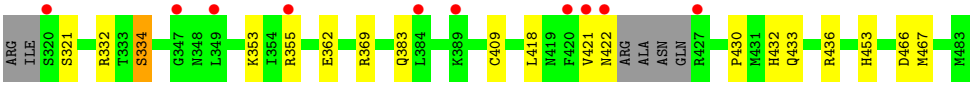
• Molecule 1: POLYMERASE BASIC PROTEIN 2

Chain D:



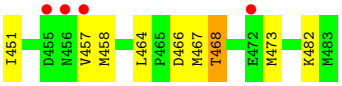
• Molecule 1: POLYMERASE BASIC PROTEIN 2

Chain E:



• Molecule 1: POLYMERASE BASIC PROTEIN 2

Chain F:


I451
D455
N456
V457
M458
L464
P465
D466
M467
T468
E472
M473
K482
M483

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	92.20Å 94.44Å 220.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.53 – 2.30 29.52 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.7 (29.53-2.30) 99.6 (29.52-2.30)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.39 (at 2.31Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.186 , 0.235 0.182 , 0.230	Depositor DCC
R_{free} test set	2165 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	32.1	Xtriage
Anisotropy	0.240	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 47.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	0.047 for -k,-h,-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	6920	wwPDB-VP
Average B, all atoms (Å^2)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.20% 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: MGT

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	0.66	0/1310	0.72	0/1734
1	B	0.66	0/1301	0.70	0/1721
1	D	0.65	0/1329	0.76	1/1760 (0.1%)
1	E	0.62	0/1276	0.70	0/1687
1	F	0.56	0/1303	0.62	0/1724
All	All	0.63	0/6519	0.70	1/8626 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	369	ARG	NE-CZ-NH2	-6.59	117.00	120.30

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	1303	0	1328	13	0
1	B	1294	0	1316	12	0
1	D	1321	0	1347	12	1
1	E	1270	0	1297	12	0
1	F	1295	0	1309	18	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	33	0	16	3	0
2	B	33	0	16	3	0
2	D	33	0	16	2	0
2	E	33	0	16	3	0
2	F	33	0	16	2	0
3	A	65	0	0	3	0
3	B	66	0	0	0	0
3	D	58	0	0	3	1
3	E	51	0	0	5	0
3	F	32	0	0	2	0
All	All	6920	0	6677	66	1

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 5.

All (66) 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:B:355:ARG:HD2	2:B:1483:MGT:O1G	1.66	0.95
1:D:355:ARG:HD2	2:D:1483:MGT:O1G	1.69	0.91
1:F:451:ILE:HG21	1:F:473[B]:MSE:HE3	1.58	0.83
1:B:421:VAL:HG13	1:B:425:ASN:HA	1.67	0.77
1:A:355:ARG:HD2	2:A:1483:MGT:O1G	1.87	0.75
1:B:453[B]:HIS:HE1	3:E:2022:HOH:O	1.69	0.74
1:F:466:ASP:OD1	1:F:468:THR:HB	1.87	0.73
1:E:355:ARG:HD2	2:E:1483:MGT:O1G	1.91	0.70
1:E:432:HIS:HE1	2:E:1483:MGT:O2A	1.73	0.70
1:F:451:ILE:HG22	1:F:473[A]:MSE:HE3	1.75	0.68
1:F:482:LYS:HE3	3:F:2031:HOH:O	1.93	0.67
1:D:418:LEU:HB3	1:D:433:GLN:HG3	1.77	0.67
1:E:383:GLN:NE2	3:E:2023:HOH:O	2.29	0.66
1:B:418:LEU:HB3	1:B:433:GLN:HG3	1.79	0.65
1:A:443:LYS:HD2	3:A:2049:HOH:O	1.98	0.64
1:F:418:LEU:HB3	1:F:433:GLN:HG3	1.79	0.63
1:A:385:ILE:HG12	3:A:2029:HOH:O	2.00	0.62
1:D:421:VAL:HG13	1:D:425:ASN:HA	1.82	0.62
1:D:385:ILE:HG13	3:D:2027:HOH:O	1.99	0.61
1:E:418:LEU:HB3	1:E:433:GLN:HG3	1.82	0.60
1:A:418:LEU:HB3	1:A:433:GLN:HG3	1.84	0.60
1:B:436:ARG:NH1	1:B:439:GLN:OE1	2.33	0.58
1:A:422:ASN:HD22	1:A:422:ASN:C	2.07	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:376:LYS:HE3	2:D:1483:MGT:O6	2.03	0.57
1:E:453:HIS:NE2	3:E:2042:HOH:O	2.32	0.55
1:F:355:ARG:HD2	2:F:1483:MGT:O1G	2.06	0.55
1:F:339:LYS:HG2	1:F:357:HIS:CE1	2.43	0.54
1:F:383:GLN:HG3	3:F:2012:HOH:O	2.08	0.54
1:F:464:LEU:HD12	1:F:468:THR:HG22	1.91	0.52
1:D:421:VAL:CG1	1:D:425:ASN:HA	2.40	0.52
1:D:422:ASN:C	1:D:422:ASN:HD22	2.13	0.52
1:E:432:HIS:CE1	2:E:1483:MGT:O2A	2.59	0.52
1:F:340:ARG:HD3	1:F:342:GLU:OE1	2.10	0.51
1:A:385:ILE:CG1	3:A:2029:HOH:O	2.58	0.51
1:D:369:ARG:NH2	3:D:2021:HOH:O	2.44	0.51
1:F:369:ARG:NH1	1:F:390:ASP:OD2	2.44	0.51
1:E:383:GLN:CG	3:E:2023:HOH:O	2.59	0.50
1:B:376:LYS:HE3	2:B:1483:MGT:O6	2.12	0.49
1:F:362:GLU:HG3	1:F:375:ARG:HG2	1.94	0.49
1:E:353:LYS:O	1:E:430:PRO:HG2	2.13	0.49
1:A:422:ASN:ND2	1:A:426:GLN:H	2.11	0.48
1:D:421:VAL:HA	1:D:426:GLN:O	2.14	0.48
1:A:334:SER:HB2	1:A:362:GLU:HB3	1.96	0.47
1:F:339:LYS:HB3	1:F:355:ARG:HD3	1.97	0.47
1:A:357:HIS:NE2	2:A:1483:MGT:O2G	2.40	0.47
1:B:353:LYS:O	1:B:430:PRO:HG2	2.15	0.47
1:D:331:LYS:HE3	3:D:2003:HOH:O	2.15	0.47
1:B:345:LEU:HD12	1:F:467:MSE:HG3	1.97	0.46
1:A:376:LYS:HE3	2:A:1483:MGT:O6	2.16	0.45
1:E:466:ASP:O	1:E:467:MSE:HB2	2.16	0.44
1:A:353:LYS:O	1:A:430:PRO:HG2	2.17	0.44
1:F:345:LEU:HD21	1:F:349:LEU:HG	1.98	0.44
1:F:355:ARG:HD2	2:F:1483:MGT:PG	2.57	0.44
1:D:353:LYS:O	1:D:430:PRO:HG2	2.17	0.44
1:B:326:GLY:HA2	1:B:435:LEU:HD21	2.00	0.44
1:B:376:LYS:HG2	1:B:377:ALA:N	2.32	0.43
1:E:334:SER:HB2	1:E:362:GLU:HB3	2.01	0.43
1:E:436:ARG:NH2	3:E:2034:HOH:O	2.41	0.43
1:F:482:LYS:HA	1:F:482:LYS:HE2	2.01	0.43
1:B:436:ARG:HD2	1:B:436:ARG:HA	1.76	0.42
1:A:326:GLY:HA2	1:A:435:LEU:HD21	2.00	0.42
1:B:432:HIS:CE1	2:B:1483:MGT:O2A	2.73	0.41
1:E:321:SER:HB2	1:E:332:ARG:HB3	2.02	0.41
1:F:405:SER:OG	1:F:407:GLU:HG3	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:391:GLU:HG3	1:A:467:MSE:HB3	2.02	0.41
1:D:422:ASN:ND2	1:D:424:ALA:H	2.20	0.40

All (1) 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)
1:D:458:MSE:SE	3:D:2027:HOH:O[4_555]	2.14	0.06

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	163/166 (98%)	159 (98%)	4 (2%)	0	100	100
1	B	160/166 (96%)	158 (99%)	2 (1%)	0	100	100
1	D	165/166 (99%)	161 (98%)	4 (2%)	0	100	100
1	E	157/166 (95%)	153 (98%)	4 (2%)	0	100	100
1	F	159/166 (96%)	156 (98%)	3 (2%)	0	100	100
All	All	804/830 (97%)	787 (98%)	17 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	144/135 (107%)	140 (97%)	4 (3%)	43	60
1	B	143/135 (106%)	137 (96%)	6 (4%)	30	42
1	D	146/135 (108%)	141 (97%)	5 (3%)	37	51
1	E	141/135 (104%)	135 (96%)	6 (4%)	29	40
1	F	143/135 (106%)	134 (94%)	9 (6%)	18	24
All	All	717/675 (106%)	687 (96%)	30 (4%)	33	42

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	334	SER
1	A	341	GLU
1	A	369	ARG
1	A	422	ASN
1	B	324	SER
1	B	409[A]	CYS
1	B	409[B]	CYS
1	B	421	VAL
1	B	426	GLN
1	B	436	ARG
1	D	320	SER
1	D	391	GLU
1	D	409[A]	CYS
1	D	409[B]	CYS
1	D	422	ASN
1	E	334	SER
1	E	369	ARG
1	E	409[A]	CYS
1	E	409[B]	CYS
1	E	421	VAL
1	E	422	ASN
1	F	341	GLU
1	F	342	GLU
1	F	345	LEU
1	F	364	THR
1	F	409	CYS
1	F	422	ASN
1	F	457	VAL
1	F	458	MSE
1	F	468	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	422	ASN
1	D	422	ASN
1	E	422	ASN
1	F	357	HIS
1	F	422	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

5 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	MGT	A	1483	-	34,35,35	3.64	11 (32%)	45,56,56	2.15	12 (26%)
2	MGT	B	1483	-	34,35,35	3.47	11 (32%)	45,56,56	1.87	12 (26%)
2	MGT	E	1483	-	34,35,35	3.75	9 (26%)	45,56,56	1.82	10 (22%)
2	MGT	D	1483	-	34,35,35	3.59	11 (32%)	45,56,56	2.26	15 (33%)
2	MGT	F	1483	-	34,35,35	3.64	10 (29%)	45,56,56	1.94	15 (33%)

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	MGT	A	1483	-	-	1/22/50/50	0/3/3/3
2	MGT	B	1483	-	-	0/22/50/50	0/3/3/3
2	MGT	E	1483	-	-	2/22/50/50	0/3/3/3
2	MGT	D	1483	-	-	7/22/50/50	0/3/3/3
2	MGT	F	1483	-	-	5/22/50/50	0/3/3/3

All (52) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	1483	MGT	C8-N9	-16.82	1.35	1.45
2	A	1483	MGT	C8-N9	-16.66	1.35	1.45
2	E	1483	MGT	C8-N9	-16.16	1.35	1.45
2	B	1483	MGT	C8-N9	-15.99	1.35	1.45
2	D	1483	MGT	C8-N9	-15.60	1.35	1.45
2	E	1483	MGT	PA-O3A	8.87	1.69	1.59
2	A	1483	MGT	PA-O3A	7.92	1.68	1.59
2	D	1483	MGT	PA-O3A	7.18	1.67	1.59
2	E	1483	MGT	PB-O3A	7.04	1.67	1.59
2	B	1483	MGT	PA-O3A	6.66	1.66	1.59
2	D	1483	MGT	PB-O3A	5.84	1.65	1.59
2	D	1483	MGT	PB-O3B	5.79	1.65	1.59
2	F	1483	MGT	PB-O3A	5.63	1.65	1.59
2	F	1483	MGT	PA-O3A	5.25	1.65	1.59
2	F	1483	MGT	PB-O3B	4.71	1.64	1.59
2	A	1483	MGT	PB-O3A	4.36	1.64	1.59
2	F	1483	MGT	PG-O1G	4.21	1.63	1.50
2	E	1483	MGT	PG-O1G	4.10	1.63	1.50
2	B	1483	MGT	C4-N9	-3.98	1.33	1.37
2	E	1483	MGT	PB-O1B	3.95	1.64	1.50
2	B	1483	MGT	PB-O3A	3.83	1.63	1.59
2	F	1483	MGT	PB-O1B	3.82	1.64	1.50
2	B	1483	MGT	PG-O1G	3.82	1.62	1.50
2	A	1483	MGT	PB-O3B	3.79	1.63	1.59
2	D	1483	MGT	C4-N9	-3.71	1.33	1.37
2	F	1483	MGT	C4-N9	-3.67	1.33	1.37
2	B	1483	MGT	PB-O1B	3.45	1.62	1.50
2	D	1483	MGT	PG-O1G	3.42	1.61	1.50
2	E	1483	MGT	PB-O3B	3.41	1.63	1.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1483	MGT	PG-O1G	3.26	1.60	1.50
2	F	1483	MGT	PA-O1A	3.20	1.61	1.50
2	A	1483	MGT	PB-O1B	3.17	1.61	1.50
2	E	1483	MGT	C4-N9	-3.16	1.34	1.37
2	D	1483	MGT	PB-O1B	3.15	1.61	1.50
2	A	1483	MGT	C4-N9	-3.13	1.34	1.37
2	A	1483	MGT	C1'-N9	3.07	1.52	1.46
2	E	1483	MGT	PA-O1A	3.03	1.61	1.50
2	E	1483	MGT	PG-O2G	3.02	1.66	1.54
2	D	1483	MGT	PA-O1A	2.97	1.61	1.50
2	A	1483	MGT	PA-O1A	2.91	1.60	1.50
2	D	1483	MGT	PG-O2G	2.85	1.65	1.54
2	B	1483	MGT	PB-O3B	2.74	1.62	1.59
2	B	1483	MGT	O4'-C1'	2.62	1.48	1.42
2	B	1483	MGT	PG-O2G	2.60	1.64	1.54
2	D	1483	MGT	C1'-N9	2.51	1.51	1.46
2	A	1483	MGT	O4'-C1'	2.31	1.47	1.42
2	B	1483	MGT	PA-O1A	2.26	1.58	1.50
2	F	1483	MGT	C1'-N9	2.25	1.50	1.46
2	B	1483	MGT	C2-N1	2.12	1.42	1.37
2	F	1483	MGT	PG-O2G	2.06	1.62	1.54
2	A	1483	MGT	PG-O2G	2.02	1.62	1.54
2	D	1483	MGT	O4'-C1'	2.01	1.46	1.42

All (64) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	1483	MGT	C2-N3-C4	5.99	122.62	112.30
2	A	1483	MGT	C2-N3-C4	5.62	121.98	112.30
2	F	1483	MGT	C2-N3-C4	5.51	121.80	112.30
2	B	1483	MGT	C2-N3-C4	5.34	121.50	112.30
2	A	1483	MGT	C5-C6-N1	5.33	120.32	110.94
2	E	1483	MGT	C2-N3-C4	5.12	121.11	112.30
2	A	1483	MGT	O4'-C1'-N9	-5.11	102.33	109.30
2	B	1483	MGT	C5-C6-N1	4.69	119.20	110.94
2	A	1483	MGT	N9-C4-N3	4.65	132.28	125.46
2	D	1483	MGT	C5-C6-N1	4.64	119.11	110.94
2	A	1483	MGT	O3G-PG-O3B	4.32	119.12	104.64
2	D	1483	MGT	N9-C4-N3	4.21	131.63	125.46
2	E	1483	MGT	C5-C6-N1	4.20	118.33	110.94
2	F	1483	MGT	C5-C6-N1	4.08	118.12	110.94
2	D	1483	MGT	C5-C4-N3	-4.02	120.58	128.13

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	E	1483	MGT	N9-C4-N3	3.99	131.31	125.46
2	B	1483	MGT	N9-C4-N3	3.98	131.30	125.46
2	E	1483	MGT	C5-C4-N3	-3.85	120.90	128.13
2	F	1483	MGT	N9-C4-N3	3.78	131.00	125.46
2	F	1483	MGT	O3G-PG-O3B	3.72	117.10	104.64
2	A	1483	MGT	C2-N1-C6	-3.61	118.56	125.11
2	D	1483	MGT	O3G-PG-O3B	3.61	116.75	104.64
2	A	1483	MGT	C5-C4-N3	-3.61	121.36	128.13
2	B	1483	MGT	O4'-C1'-N9	-3.55	104.46	109.30
2	B	1483	MGT	C5-C4-N3	-3.52	121.53	128.13
2	D	1483	MGT	O4'-C1'-N9	-3.51	104.52	109.30
2	B	1483	MGT	O3G-PG-O3B	3.47	116.28	104.64
2	F	1483	MGT	C5-C4-N3	-3.46	121.64	128.13
2	D	1483	MGT	C6-C5-N7	3.44	137.26	131.93
2	D	1483	MGT	O2B-PB-O3A	3.23	115.99	107.27
2	D	1483	MGT	O2A-PA-O3A	3.17	115.84	107.27
2	B	1483	MGT	C2-N1-C6	-3.15	119.41	125.11
2	A	1483	MGT	O6-C6-C5	-3.11	119.99	127.62
2	D	1483	MGT	C2-N1-C6	-3.10	119.48	125.11
2	E	1483	MGT	O3G-PG-O3B	3.05	114.86	104.64
2	F	1483	MGT	C2-N1-C6	-2.79	120.05	125.11
2	D	1483	MGT	O3B-PB-O1B	-2.76	102.39	110.70
2	F	1483	MGT	C6-C5-N7	2.70	136.11	131.93
2	E	1483	MGT	C2-N1-C6	-2.67	120.27	125.11
2	B	1483	MGT	O6-C6-C5	-2.65	121.11	127.62
2	E	1483	MGT	C6-C5-N7	2.60	135.96	131.93
2	E	1483	MGT	O4'-C1'-N9	-2.59	105.77	109.30
2	D	1483	MGT	O3A-PB-O1B	-2.58	102.93	110.70
2	F	1483	MGT	O3A-PA-O1A	-2.56	103.02	110.70
2	D	1483	MGT	C6-C5-C4	-2.54	117.93	122.40
2	F	1483	MGT	O2B-PB-O3A	2.53	114.12	107.27
2	F	1483	MGT	O3B-PB-O1B	-2.36	103.59	110.70
2	D	1483	MGT	O2B-PB-O3B	2.36	113.66	107.27
2	A	1483	MGT	C6-C5-C4	-2.36	118.26	122.40
2	F	1483	MGT	O2B-PB-O3B	2.35	113.62	107.27
2	D	1483	MGT	O3A-PA-O1A	-2.34	103.67	110.70
2	A	1483	MGT	C6-C5-N7	2.31	135.51	131.93
2	B	1483	MGT	C6-C5-N7	2.27	135.45	131.93
2	A	1483	MGT	N2-C2-N1	2.21	121.43	116.76
2	F	1483	MGT	N2-C2-N1	2.17	121.34	116.76
2	B	1483	MGT	C6-C5-C4	-2.11	118.69	122.40
2	B	1483	MGT	N2-C2-N1	2.09	121.18	116.76

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	1483	MGT	N1-C2-N3	-2.09	119.50	123.32
2	F	1483	MGT	N1-C2-N3	-2.07	119.53	123.32
2	E	1483	MGT	C6-C5-C4	-2.07	118.76	122.40
2	E	1483	MGT	O2B-PB-O3B	2.06	112.83	107.27
2	F	1483	MGT	C6-C5-C4	-2.01	118.86	122.40
2	B	1483	MGT	N1-C2-N3	-2.01	119.64	123.32
2	F	1483	MGT	O2A-PA-O3A	2.01	112.70	107.27

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	1483	MGT	C5'-O5'-PA-O3A
2	D	1483	MGT	C5'-O5'-PA-O2A
2	F	1483	MGT	C5'-O5'-PA-O3A
2	D	1483	MGT	PB-O3A-PA-O1A
2	D	1483	MGT	PG-O3B-PB-O1B
2	F	1483	MGT	PA-O3A-PB-O1B
2	D	1483	MGT	O4'-C4'-C5'-O5'
2	D	1483	MGT	C5'-O5'-PA-O1A
2	F	1483	MGT	C5'-O5'-PA-O1A
2	F	1483	MGT	O4'-C4'-C5'-O5'
2	D	1483	MGT	PB-O3A-PA-O2A
2	E	1483	MGT	PA-O3A-PB-O3B
2	E	1483	MGT	PA-O3A-PB-O2B
2	F	1483	MGT	PA-O3A-PB-O2B
2	A	1483	MGT	PB-O3A-PA-O2A

There are no ring outliers.

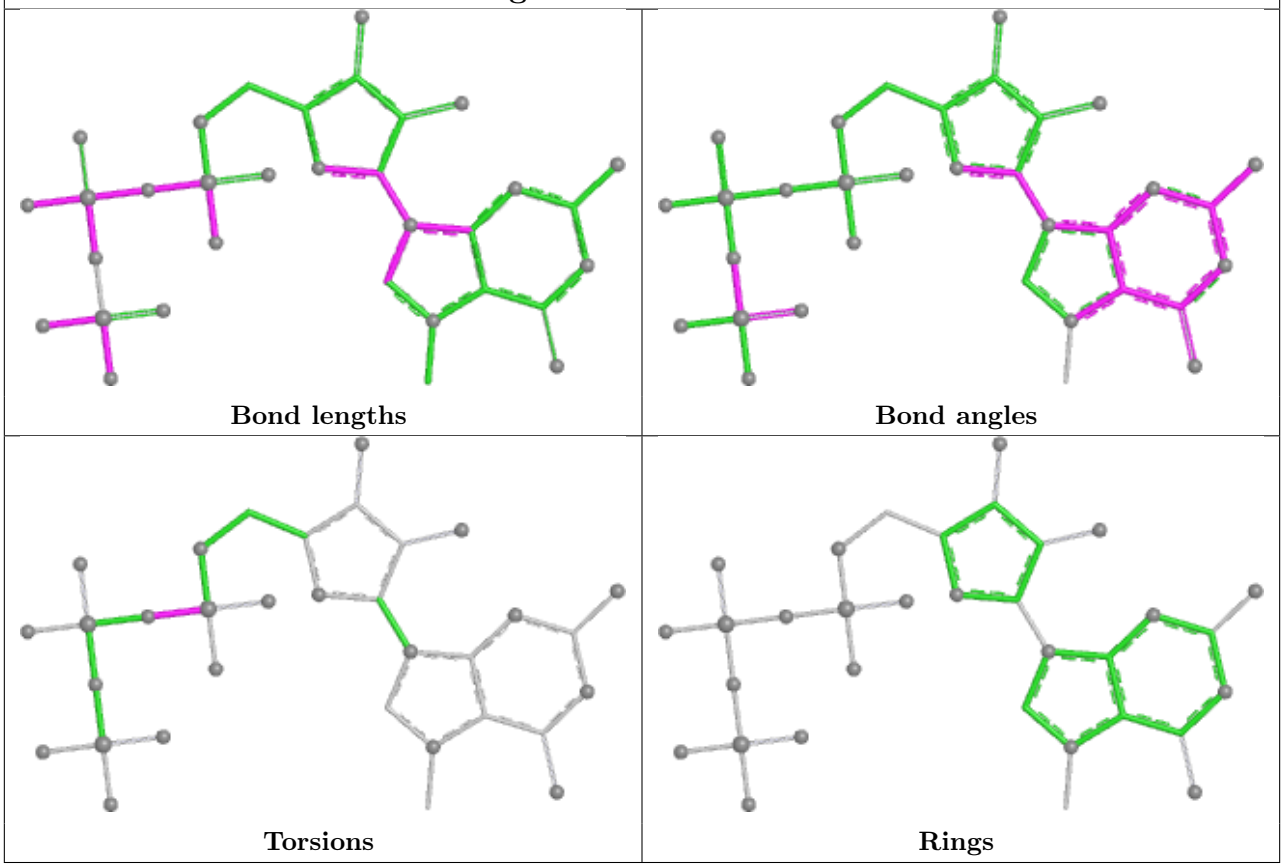
5 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1483	MGT	3	0
2	B	1483	MGT	3	0
2	E	1483	MGT	3	0
2	D	1483	MGT	2	0
2	F	1483	MGT	2	0

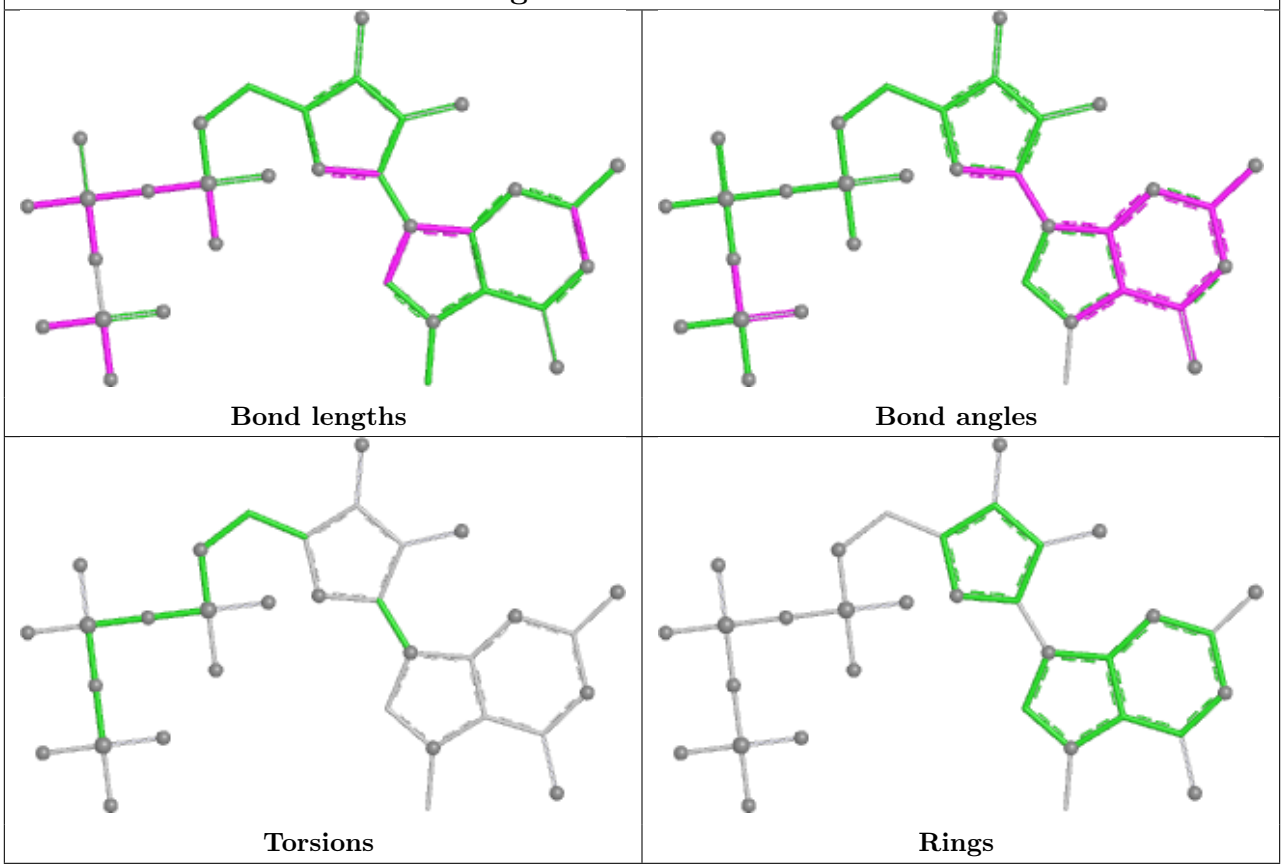
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

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.

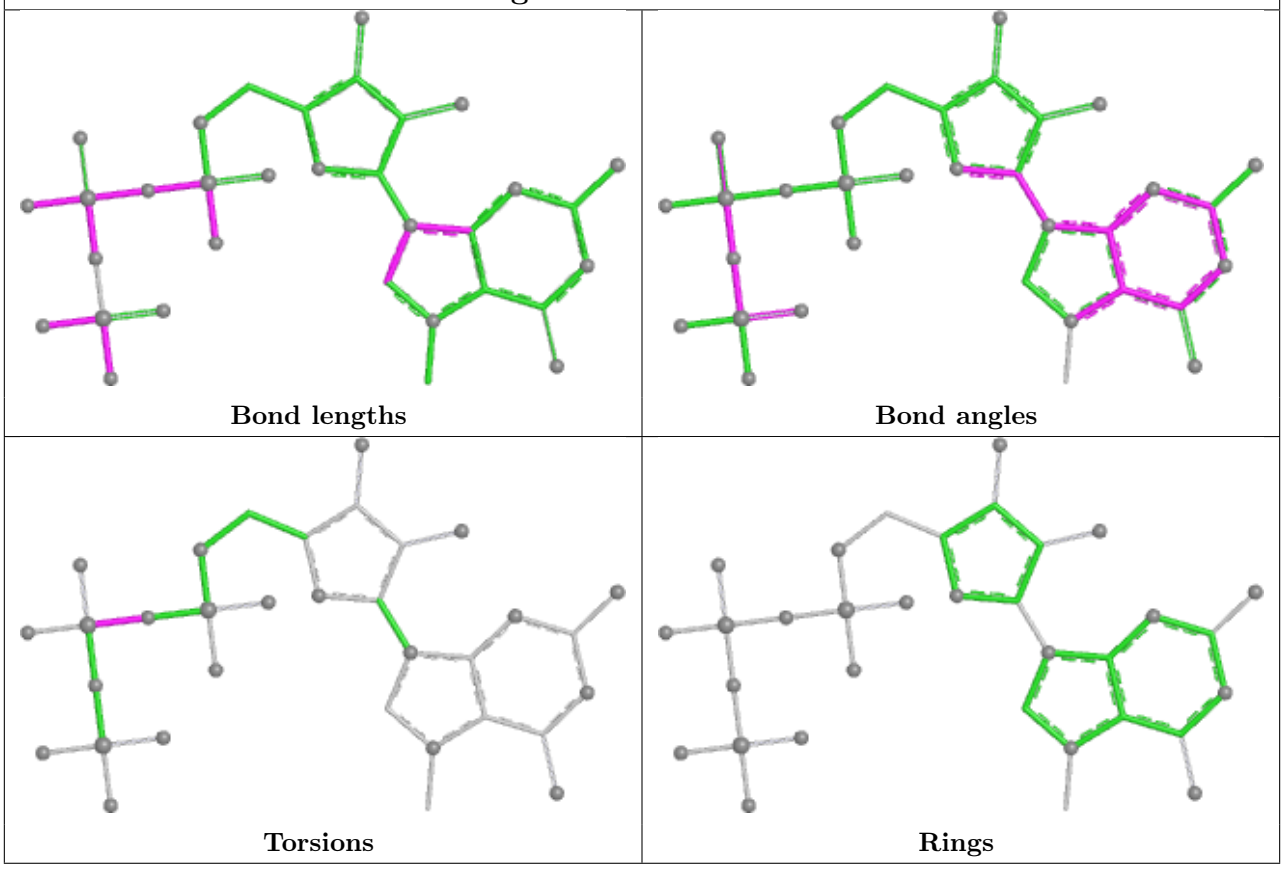
Ligand MGT A 1483



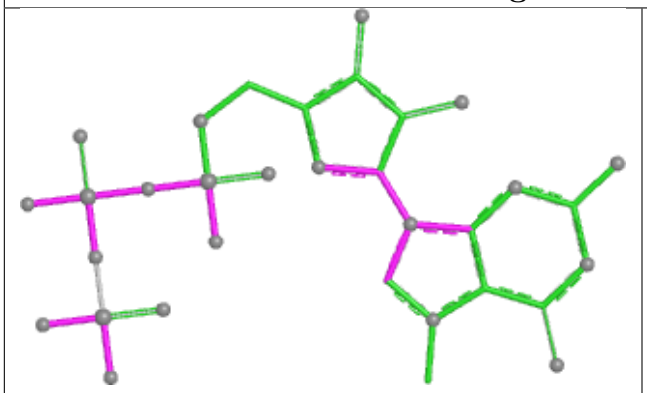
Ligand MGT B 1483



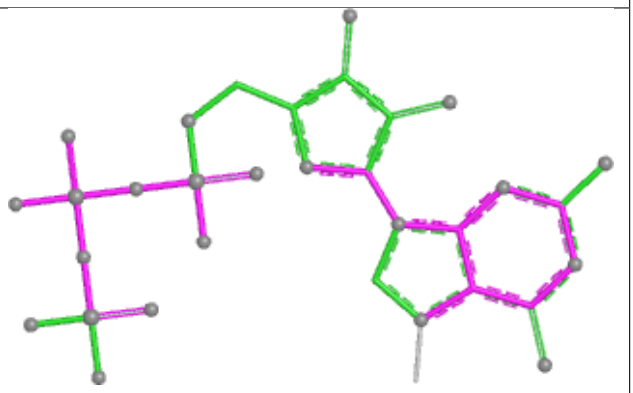
Ligand MGT E 1483



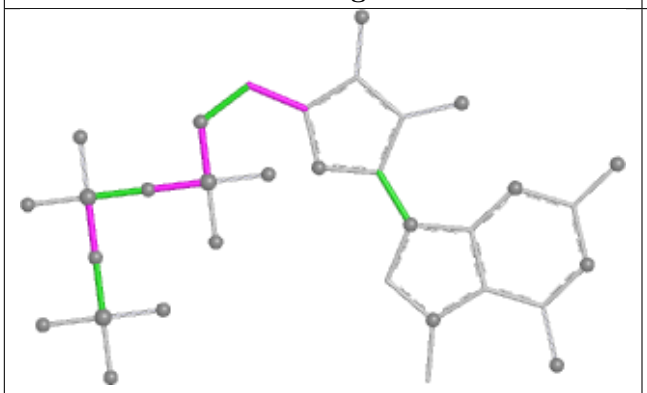
Ligand MGT D 1483



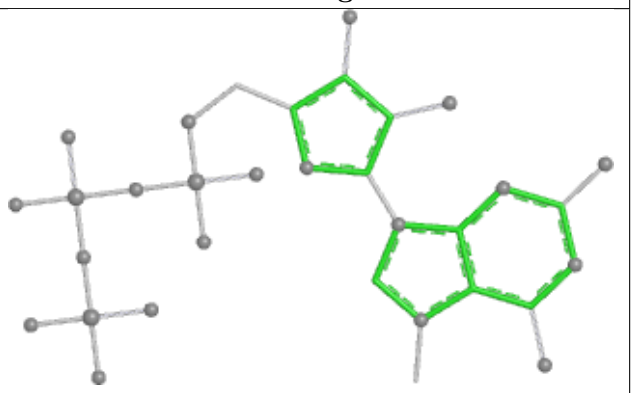
Bond lengths



Bond angles

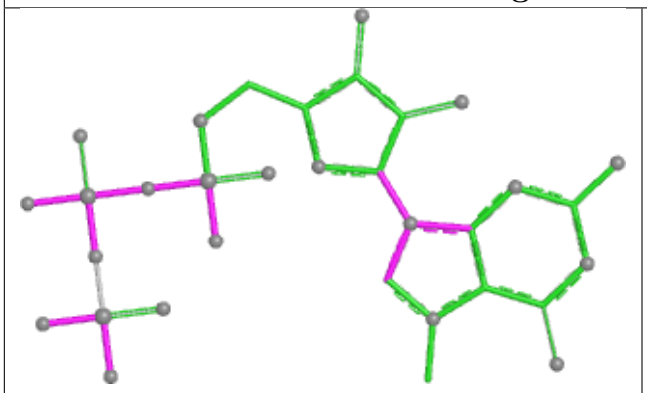


Torsions

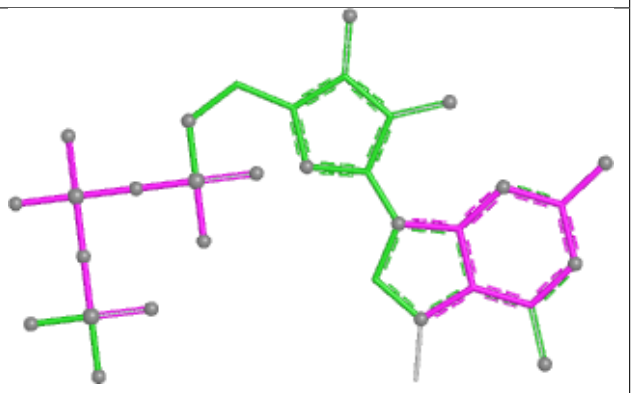


Rings

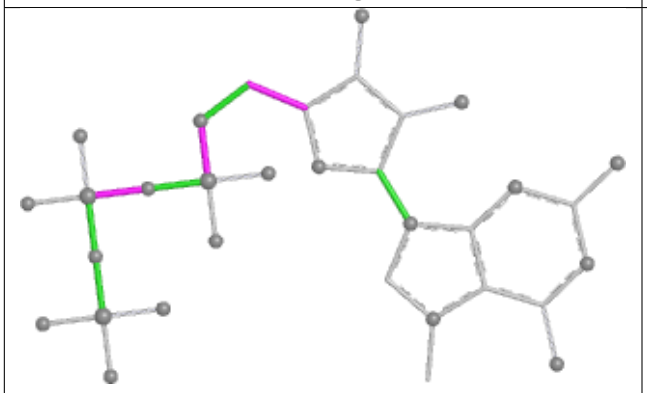
Ligand MGT F 1483



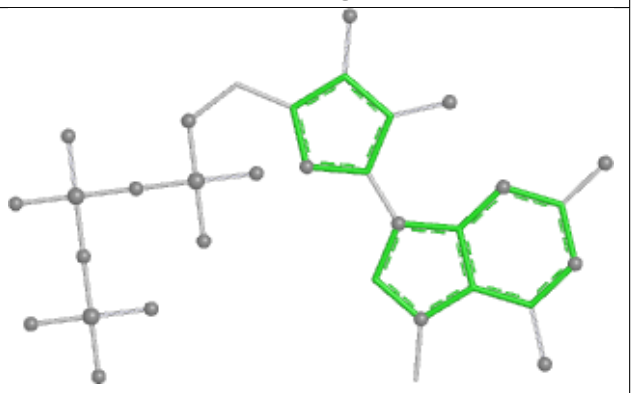
Bond lengths



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 (i)

6.1 Protein, DNA and RNA chains (i)

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	154/166 (92%)	-0.06	4 (2%)	56	63	15, 26, 43, 64	0
1	B	152/166 (91%)	0.16	13 (8%)	10	14	17, 29, 48, 83	0
1	D	155/166 (93%)	0.15	10 (6%)	18	24	14, 27, 59, 80	0
1	E	150/166 (90%)	0.17	10 (6%)	17	23	17, 31, 54, 70	0
1	F	150/166 (90%)	0.47	19 (12%)	3	5	29, 49, 74, 100	0
All	All	761/830 (91%)	0.18	56 (7%)	14	19	14, 31, 65, 100	0

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	425	ASN	6.4
1	B	426	GLN	5.4
1	E	421	VAL	5.3
1	B	424	ALA	5.3
1	F	456	ASN	5.2
1	F	349	LEU	4.8
1	F	421	VAL	4.7
1	D	424	ALA	4.5
1	A	424	ALA	4.4
1	D	423	ARG	4.2
1	F	426	GLN	4.1
1	F	340	ARG	4.0
1	F	322	SER	3.9
1	D	319	ILE	3.6
1	A	423	ARG	3.5
1	D	425	ASN	3.4
1	F	455	ASP	3.4
1	B	425	ASN	3.4
1	E	422	ASN	3.3
1	B	421	VAL	3.2

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Mol	Chain	Res	Type	RSRZ
1	B	401	ALA	3.0
1	D	422	ASN	2.9
1	E	427	ARG	2.9
1	A	425	ASN	2.9
1	F	419	ASN	2.9
1	D	421	VAL	2.8
1	F	331	LYS	2.8
1	F	403	VAL	2.8
1	B	355	ARG	2.6
1	F	416	GLY	2.6
1	F	348	ASN	2.6
1	B	400	VAL	2.6
1	A	426	GLN	2.5
1	E	349	LEU	2.5
1	B	403	VAL	2.4
1	D	426	GLN	2.4
1	E	347	GLY	2.4
1	D	348	ASN	2.4
1	F	415	ARG	2.4
1	F	417	ASP	2.4
1	E	389	LYS	2.3
1	F	457	VAL	2.3
1	E	320	SER	2.3
1	E	355	ARG	2.2
1	B	368	LYS	2.2
1	D	403	VAL	2.2
1	E	420	PHE	2.2
1	F	472[A]	GLU	2.2
1	B	390	ASP	2.1
1	E	384	LEU	2.1
1	B	389	LYS	2.1
1	F	360	TYR	2.1
1	D	401	ALA	2.1
1	B	420	PHE	2.0
1	F	323	PHE	2.0
1	B	419	ASN	2.0

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

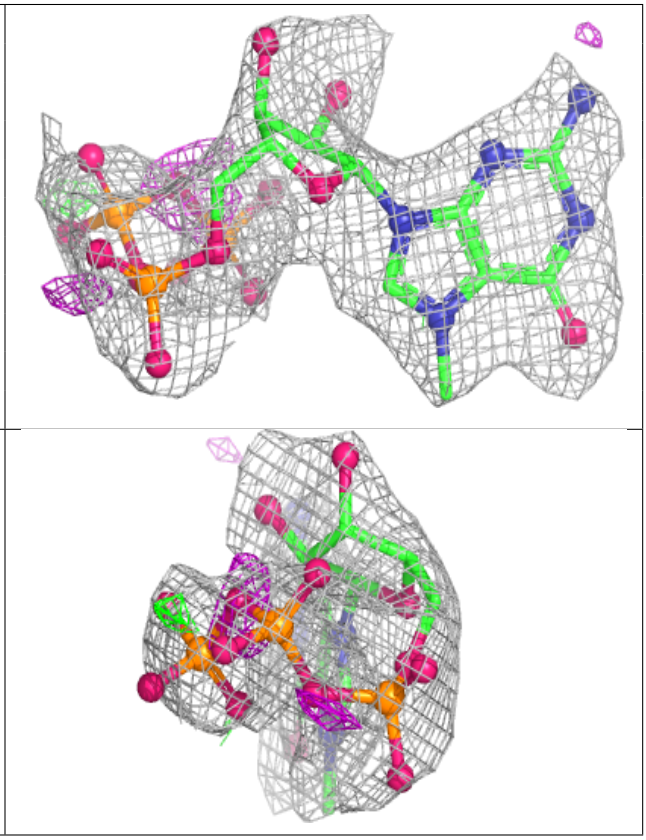
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	MGT	F	1483	33/33	0.88	0.20	54,65,97,100	0
2	MGT	E	1483	33/33	0.91	0.15	30,43,68,70	0
2	MGT	D	1483	33/33	0.92	0.14	27,41,64,67	0
2	MGT	B	1483	33/33	0.93	0.13	23,38,52,53	0
2	MGT	A	1483	33/33	0.93	0.14	25,34,50,51	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

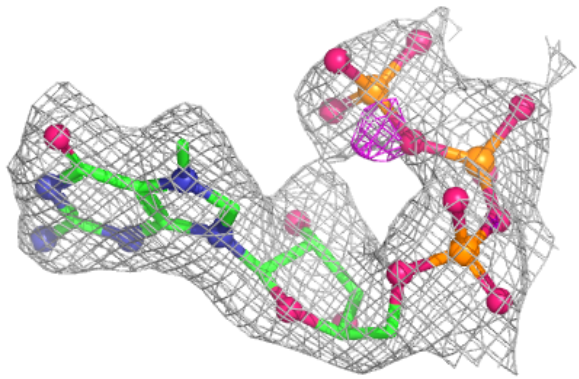
Electron density around MGT F 1483:

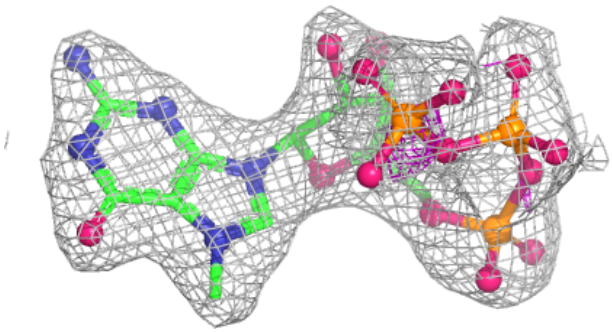
2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

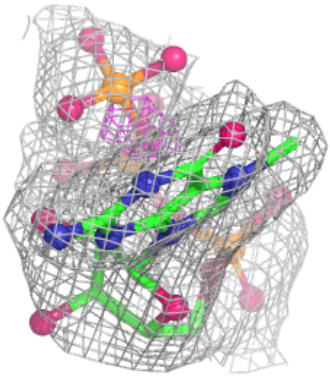


Electron density around MGT E 1483:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

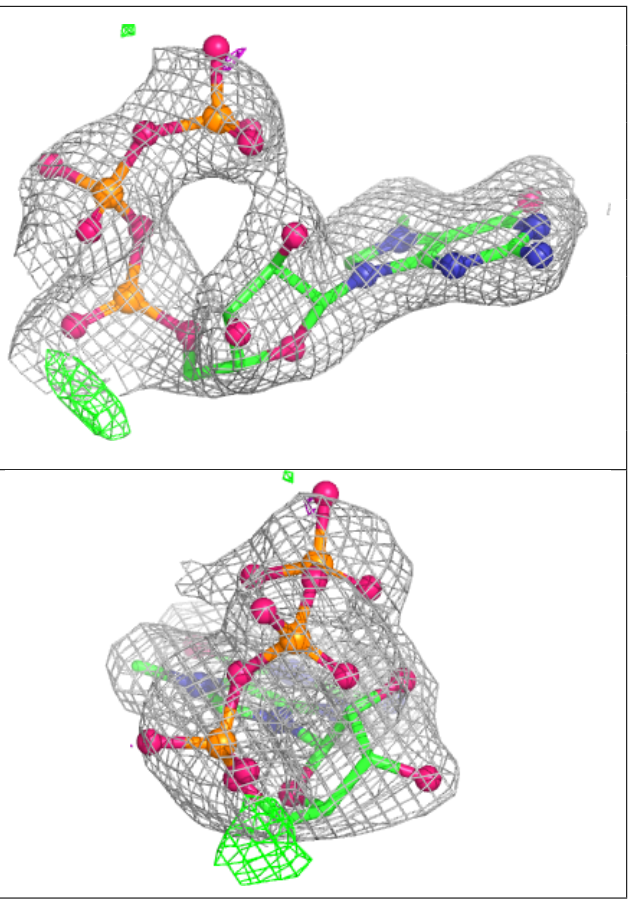


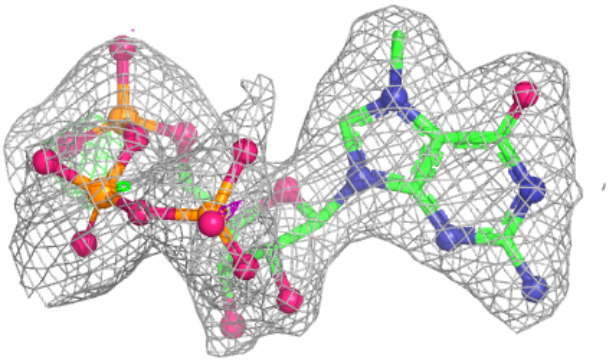




Electron density around MGT D 1483:

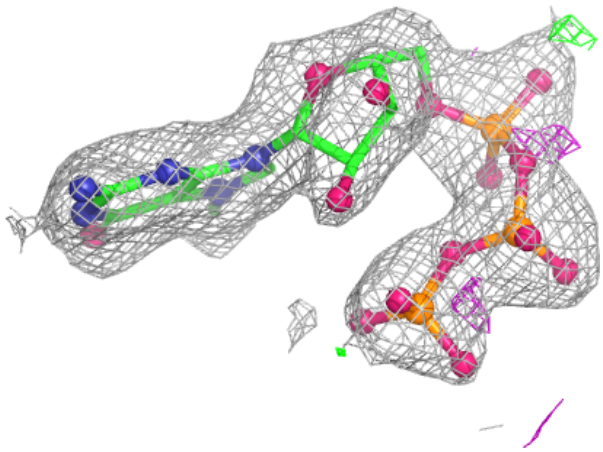
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

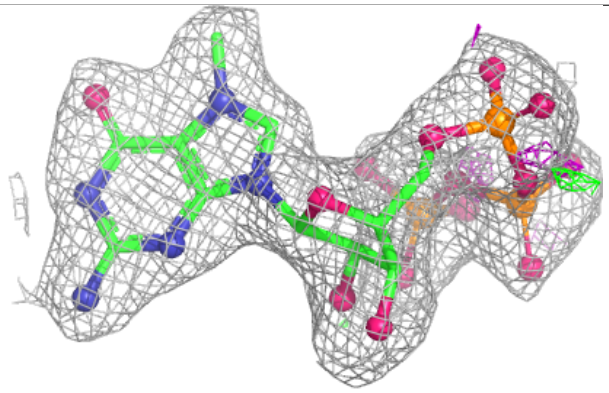


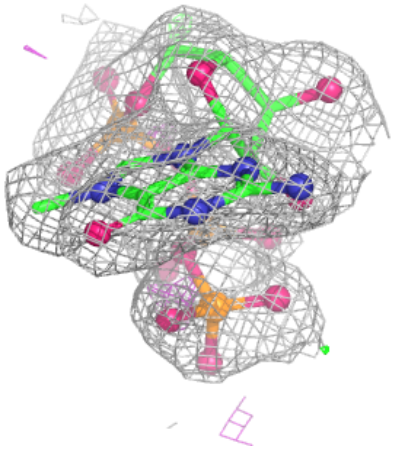


Electron density around MGT B 1483:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

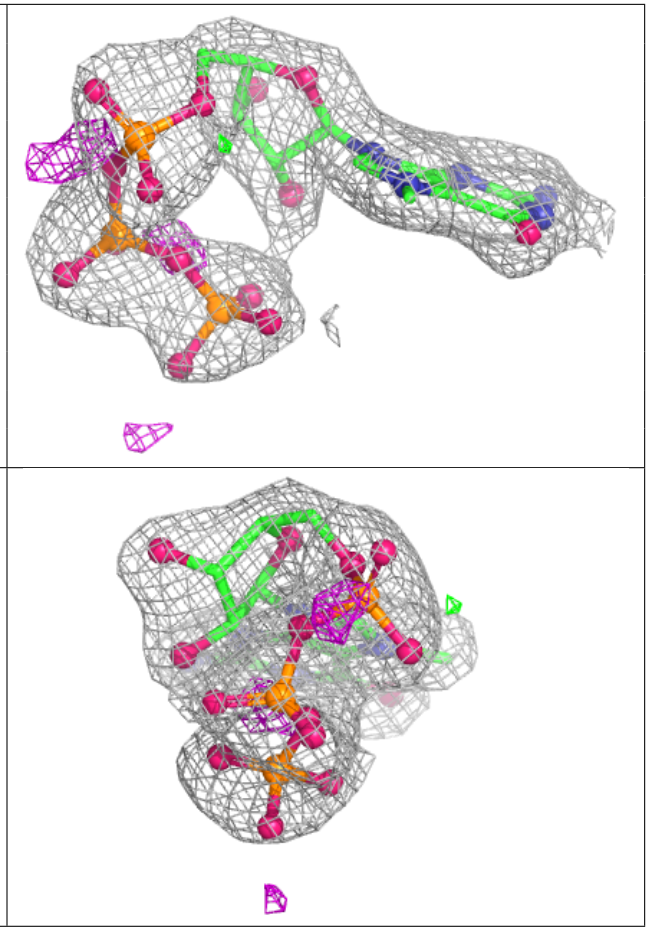


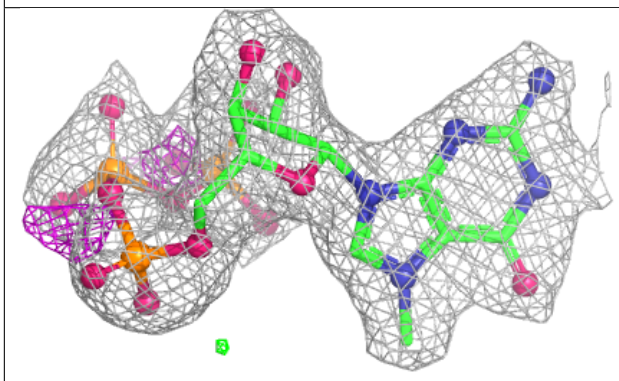




Electron density around MGT A 1483:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





6.5 Other polymers (i)

There are no such residues in this entry.