Full wwPDB X-ray Structure Validation Report ⓘ

Jul 10, 2024 – 10:11 AM JST

PDB ID	:	8X22
Title	:	HIV-1 reverse transcriptase mutant Q151M/Y115F/F116Y/L74V:DNA:dGTP ternary complex
Authors	:	Yasutake, Y.; Hattori, S.I.; Mitsuya, H.
Deposited on	:	2023-11-09
Resolution	:	2.31 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:

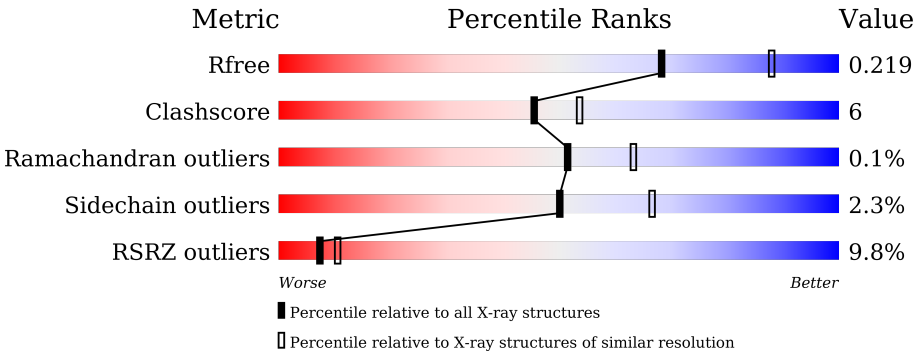
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance

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

The reported resolution of this entry is 2.31 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	5974 (2.34-2.30)
Clashscore	141614	6604 (2.34-2.30)
Ramachandran outliers	138981	6523 (2.34-2.30)
Sidechain outliers	138945	6523 (2.34-2.30)
RSRZ outliers	127900	5855 (2.34-2.30)

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	557	7% 82% 17% ·
1	C	557	11% 83% 15% ··
2	B	444	15% 75% 15% · 9%
2	D	444	6% 80% 11% · 9%
3	E	38	79% 8% 5% 8%
3	F	38	3% 71% 24% 5%

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 17744 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 Pol protein (Fragment).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	553	Total	C	N	O	S	0	0	0
			4497	2910	750	829	8			
1	C	553	Total	C	N	O	S	0	1	0
			4505	2915	751	830	9			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	MET	-	initiating methionine	UNP D3XFN5
A	0	VAL	-	expression tag	UNP D3XFN5
A	74	VAL	LEU	engineered mutation	UNP D3XFN5
A	115	PHE	TYR	engineered mutation	UNP D3XFN5
A	116	TYR	PHE	engineered mutation	UNP D3XFN5
A	151	MET	GLN	engineered mutation	UNP D3XFN5
A	162	SER	CYS	engineered mutation	UNP D3XFN5
A	280	SER	CYS	engineered mutation	UNP D3XFN5
C	-1	MET	-	initiating methionine	UNP D3XFN5
C	0	VAL	-	expression tag	UNP D3XFN5
C	74	VAL	LEU	engineered mutation	UNP D3XFN5
C	115	PHE	TYR	engineered mutation	UNP D3XFN5
C	116	TYR	PHE	engineered mutation	UNP D3XFN5
C	151	MET	GLN	engineered mutation	UNP D3XFN5
C	162	SER	CYS	engineered mutation	UNP D3XFN5
C	280	SER	CYS	engineered mutation	UNP D3XFN5

- Molecule 2 is a protein called HIV-1 RT p51 subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	406	Total	C	N	O	S	0	0	0
			3347	2178	557	606	6			
2	D	406	Total	C	N	O	S	0	0	0
			3347	2178	557	606	6			

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-15	MET	-	expression tag	UNP P12497
B	-14	ALA	-	expression tag	UNP P12497
B	-13	HIS	-	expression tag	UNP P12497
B	-12	HIS	-	expression tag	UNP P12497
B	-11	HIS	-	expression tag	UNP P12497
B	-10	HIS	-	expression tag	UNP P12497
B	-9	HIS	-	expression tag	UNP P12497
B	-8	HIS	-	expression tag	UNP P12497
B	-7	ALA	-	expression tag	UNP P12497
B	-6	LEU	-	expression tag	UNP P12497
B	-5	GLU	-	expression tag	UNP P12497
B	-4	VAL	-	expression tag	UNP P12497
B	-3	LEU	-	expression tag	UNP P12497
B	-2	PHE	-	expression tag	UNP P12497
B	-1	GLN	-	expression tag	UNP P12497
B	0	GLY	-	expression tag	UNP P12497
B	162	SER	CYS	engineered mutation	UNP P12497
B	280	SER	CYS	engineered mutation	UNP P12497
D	-15	MET	-	expression tag	UNP P12497
D	-14	ALA	-	expression tag	UNP P12497
D	-13	HIS	-	expression tag	UNP P12497
D	-12	HIS	-	expression tag	UNP P12497
D	-11	HIS	-	expression tag	UNP P12497
D	-10	HIS	-	expression tag	UNP P12497
D	-9	HIS	-	expression tag	UNP P12497
D	-8	HIS	-	expression tag	UNP P12497
D	-7	ALA	-	expression tag	UNP P12497
D	-6	LEU	-	expression tag	UNP P12497
D	-5	GLU	-	expression tag	UNP P12497
D	-4	VAL	-	expression tag	UNP P12497
D	-3	LEU	-	expression tag	UNP P12497
D	-2	PHE	-	expression tag	UNP P12497
D	-1	GLN	-	expression tag	UNP P12497
D	0	GLY	-	expression tag	UNP P12497
D	162	SER	CYS	engineered mutation	UNP P12497
D	280	SER	CYS	engineered mutation	UNP P12497

- Molecule 3 is a DNA chain called DNA/RNA (38-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	35	Total	C	N	O	P	0	0	0
			718	339	128	216	35			

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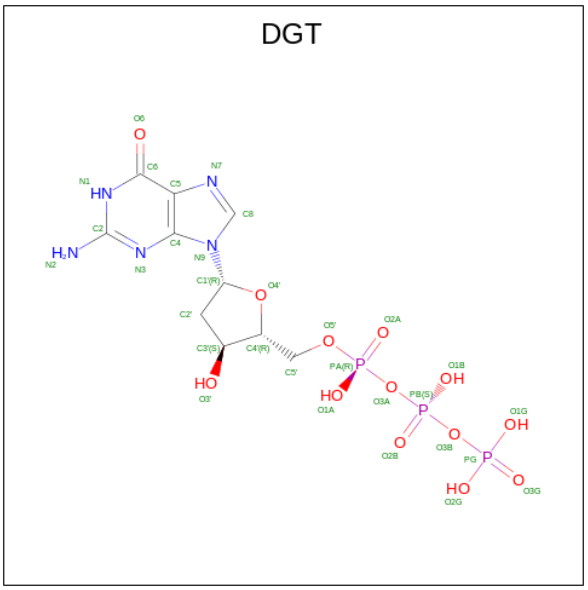
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	F	38	Total	C	N	O	P	0	0	0
			777	369	140	231	37			

- Molecule 4 is 2'-DEOXYGUANOSINE-5'-TRIPHOSPHATE (three-letter code: DGT) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).

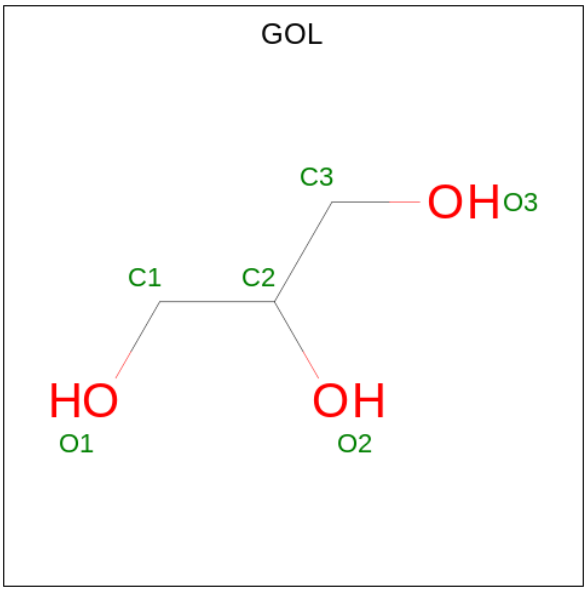


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		
4	C	1	Total	C	N	O	P	0	0
			31	10	5	13	3		

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Mg	0	0
			1	1		
5	C	1	Total	Mg	0	0
			1	1		

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C O 6 3 3	0	0
6	A	1	Total C O 6 3 3	0	0
6	B	1	Total C O 6 3 3	0	0
6	C	1	Total C O 6 3 3	0	0
6	D	1	Total C O 6 3 3	0	0
6	D	1	Total C O 6 3 3	0	0

- Molecule 7 is water.

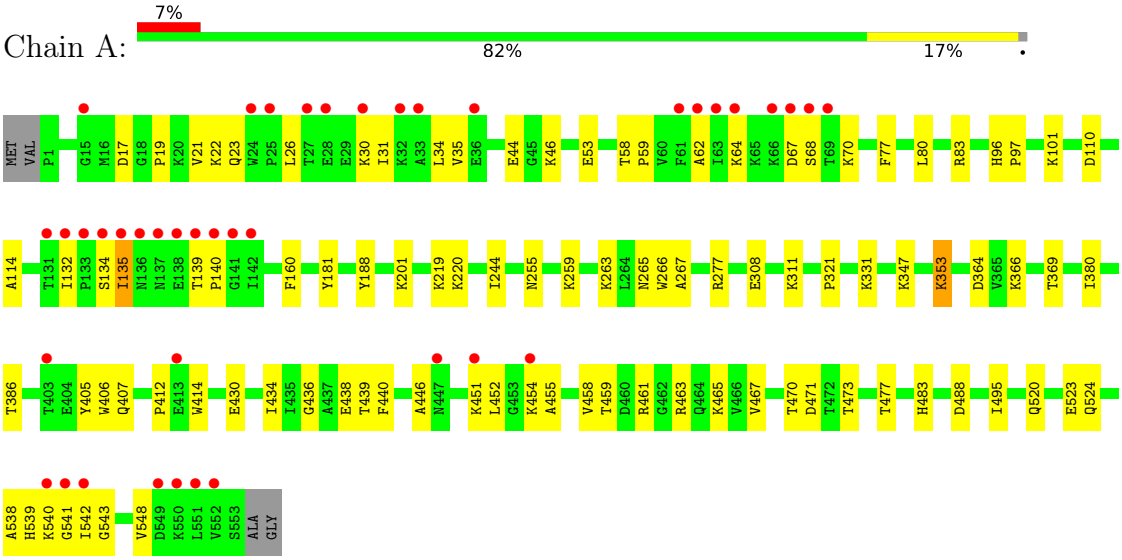
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	126	Total O 126 126	0	0
7	B	52	Total O 52 52	0	0
7	E	40	Total O 40 40	0	0
7	C	115	Total O 115 115	0	0
7	D	86	Total O 86 86	0	0
7	F	34	Total O 34 34	0	0

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.

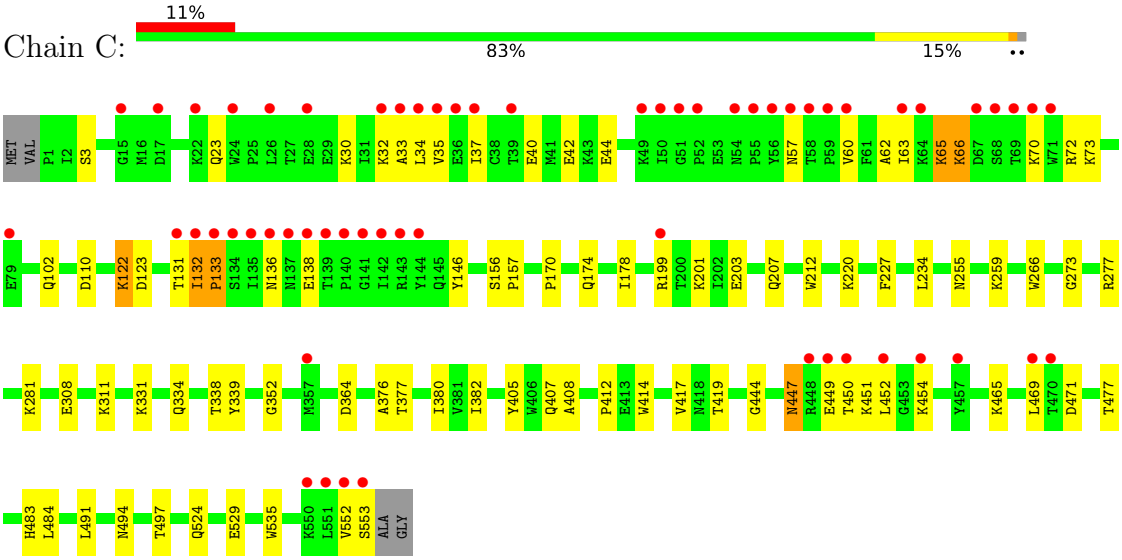
• Molecule 1: Pol protein (Fragment)

Chain A:



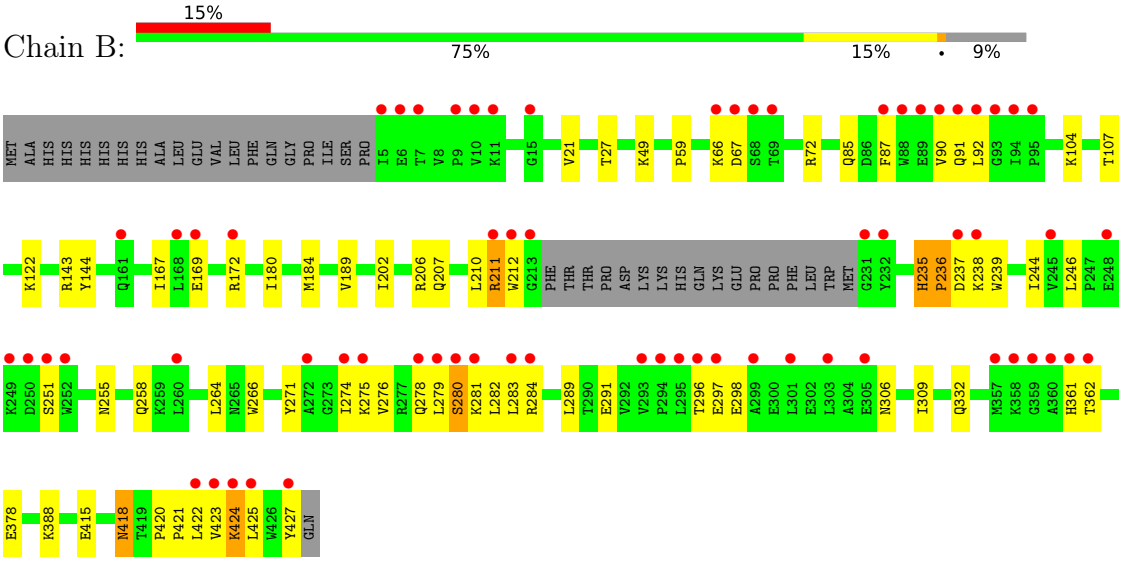
• Molecule 1: Pol protein (Fragment)

Chain C:



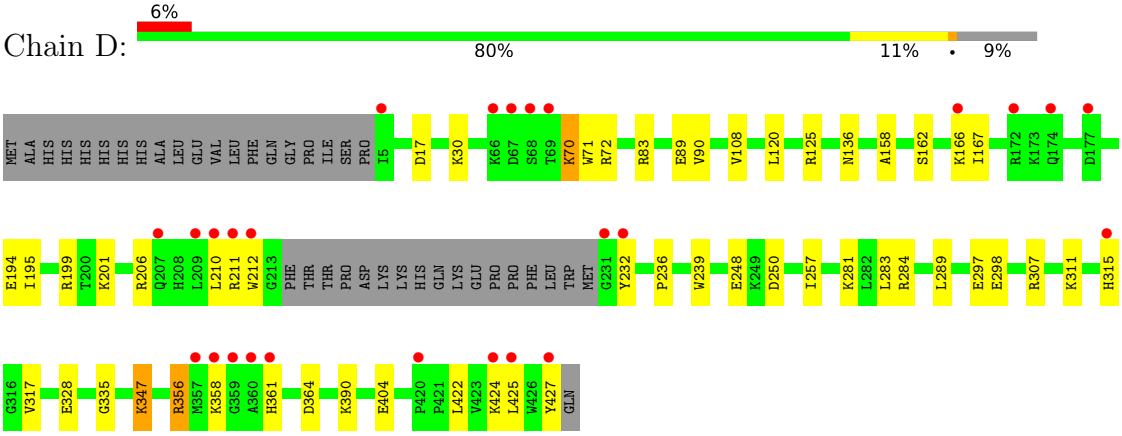
• Molecule 2: HIV-1 RT p51 subunit

Chain B:



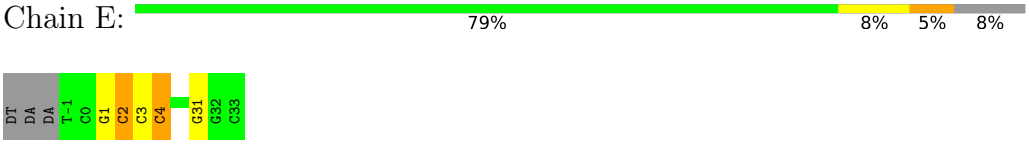
• Molecule 2: HIV-1 RT p51 subunit

Chain D:



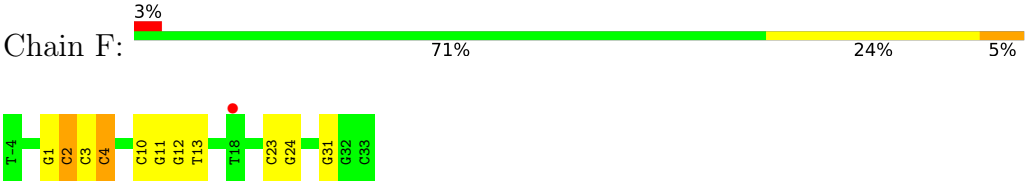
• Molecule 3: DNA/RNA (38-MER)

Chain E:



• Molecule 3: DNA/RNA (38-MER)

Chain F:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α, β, γ	285.23Å 285.23Å 96.08Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	48.81 – 2.31 48.81 – 2.31	Depositor EDS
% Data completeness (in resolution range)	100.0 (48.81-2.31) 100.0 (48.81-2.31)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.24 (at 2.32Å)	Xtriage
Refinement program	PHENIX (1.14_3260: ???)	Depositor
R, R_{free}	0.182 , 0.219 0.182 , 0.219	Depositor DCC
R_{free} test set	6481 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	48.0	Xtriage
Anisotropy	0.219	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 47.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.008 for h,-h-k,-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	17744	wwPDB-VP
Average B, all atoms (Å^2)	65.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.31% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG, DGT, OMC, GOL

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	0.41	0/4615	0.55	0/6267
1	C	0.44	4/4623 (0.1%)	0.55	2/6277 (0.0%)
2	B	0.47	3/3441 (0.1%)	0.60	3/4673 (0.1%)
2	D	0.38	0/3441	0.52	0/4673
3	E	0.76	0/756	0.97	0/1165
3	F	0.86	2/823 (0.2%)	0.95	0/1269
All	All	0.48	9/17699 (0.1%)	0.61	5/24324 (0.0%)

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	236	PRO	N-CA	13.07	1.69	1.47
1	C	133	PRO	N-CA	12.93	1.69	1.47
1	C	199	ARG	CZ-NH2	8.11	1.43	1.33
2	B	211	ARG	CB-CG	-5.99	1.36	1.52
3	F	13	DT	O3'-P	-5.56	1.54	1.61
1	C	132	ILE	C-N	5.36	1.44	1.34
1	C	199	ARG	NE-CZ	-5.34	1.26	1.33
3	F	12	DG	O3'-P	-5.28	1.54	1.61
2	B	235	HIS	C-N	5.12	1.44	1.34

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	211	ARG	NE-CZ-NH2	-10.03	115.29	120.30
1	C	133	PRO	CA-N-CD	-7.88	100.46	111.50
1	C	199	ARG	NE-CZ-NH1	-7.79	116.40	120.30
2	B	236	PRO	CA-N-CD	-5.83	103.33	111.50
2	B	211	ARG	CB-CG-CD	-5.14	98.22	111.60

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	4497	0	4551	73	0
1	C	4505	0	4559	59	0
2	B	3347	0	3379	57	0
2	D	3347	0	3379	31	0
3	E	718	0	397	3	0
3	F	777	0	432	6	0
4	A	31	0	12	0	0
4	C	31	0	12	0	0
5	A	1	0	0	0	0
5	C	1	0	0	0	0
6	A	12	0	16	3	0
6	B	6	0	8	0	0
6	C	6	0	8	0	0
6	D	12	0	16	1	0
7	A	126	0	0	1	0
7	B	52	0	0	0	0
7	C	115	0	0	1	0
7	D	86	0	0	1	0
7	E	40	0	0	0	0
7	F	34	0	0	0	0
All	All	17744	0	16769	217	0

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 (217) 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)
2:B:236:PRO:N	2:B:236:PRO:CA	1.69	1.45
1:C:133:PRO:N	1:C:133:PRO:CA	1.69	1.44
1:C:450:THR:HG23	1:C:452:LEU:H	1.37	0.88

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:356:ARG:HE	2:D:361:HIS:HB3	1.41	0.83
2:D:356:ARG:NE	2:D:361:HIS:HB3	1.95	0.81
2:B:246:LEU:HD21	2:B:264:LEU:HD21	1.63	0.80
1:C:66:LYS:HD2	1:C:66:LYS:O	1.83	0.77
2:D:70:LYS:HD3	2:D:71:TRP:H	1.49	0.76
2:B:237:ASP:OD1	2:B:237:ASP:O	2.04	0.76
1:A:21:VAL:HG23	1:A:59:PRO:HD3	1.70	0.74
1:A:31:ILE:HD13	1:A:135:ILE:H	1.52	0.74
1:A:459:THR:HG22	1:A:461:ARG:H	1.55	0.72
1:C:203:GLU:O	1:C:207:GLN:HG2	1.88	0.72
1:A:451:LYS:HD2	1:A:471:ASP:HA	1.72	0.71
1:A:67:ASP:OD2	1:A:219:LYS:HE2	1.90	0.71
1:A:331:LYS:NZ	1:A:364:ASP:OD2	2.23	0.71
1:C:32:LYS:HA	1:C:35:VAL:HG22	1.73	0.70
2:B:207:GLN:HA	2:B:210:LEU:HD12	1.74	0.70
1:C:33:ALA:O	1:C:37:ILE:HG13	1.94	0.67
2:D:422:LEU:O	2:D:425:LEU:HG	1.93	0.67
2:B:266:TRP:CD1	2:B:425:LEU:HD22	2.30	0.66
1:A:440:PHE:HB2	1:A:495:ILE:HD13	1.76	0.66
1:A:406:TRP:HE1	2:B:418:ASN:ND2	1.94	0.65
2:B:422:LEU:HG	2:B:423:VAL:H	1.60	0.65
1:C:34:LEU:HD21	1:C:62:ALA:HB2	1.77	0.65
2:B:244:ILE:HD13	2:B:425:LEU:HD11	1.78	0.64
1:A:31:ILE:O	1:A:35:VAL:HG23	1.98	0.64
2:B:180:ILE:HG12	2:B:189:VAL:HG12	1.80	0.64
1:A:438:GLU:OE2	1:A:459:THR:HG21	1.98	0.63
2:B:91:GLN:OE1	2:B:91:GLN:HA	1.98	0.63
1:A:101:LYS:HE2	1:A:321:PRO:HG3	1.81	0.63
2:B:85:GLN:HE22	2:B:90:VAL:HG21	1.63	0.63
6:D:502:GOL:H32	7:D:603:HOH:O	1.99	0.63
2:B:274:ILE:HG23	2:B:306:ASN:ND2	2.14	0.62
2:B:332:GLN:OE1	2:B:424:LYS:HD2	1.99	0.62
1:A:31:ILE:HG21	1:A:134:SER:HA	1.81	0.62
2:B:90:VAL:HG12	2:B:92:LEU:HG	1.80	0.62
1:C:331:LYS:NZ	1:C:364:ASP:OD1	2.32	0.61
2:B:236:PRO:N	2:B:236:PRO:C	2.53	0.60
1:A:21:VAL:CG2	1:A:59:PRO:HD3	2.32	0.60
1:A:459:THR:HG22	1:A:461:ARG:N	2.16	0.60
2:B:235:HIS:HB2	2:B:238:LYS:HE2	1.81	0.60
1:A:436:GLY:O	1:A:461:ARG:NH2	2.35	0.60
2:B:87:PHE:HB3	2:B:92:LEU:HB2	1.84	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:278:GLN:OE1	2:B:298:GLU:HB2	2.03	0.58
1:A:263:LYS:NZ	7:A:704:HOH:O	2.37	0.58
1:A:64:LYS:HE3	1:A:68:SER:O	2.03	0.58
1:A:17:ASP:O	1:A:83:ARG:HD3	2.03	0.58
1:A:540:LYS:HB2	1:A:542:ILE:HD11	1.85	0.58
1:A:459:THR:CG2	1:A:461:ARG:H	2.17	0.57
1:A:366:LYS:HA	6:A:604:GOL:H31	1.86	0.56
2:B:297:GLU:HG3	2:B:298:GLU:OE1	2.04	0.56
1:A:308:GLU:O	1:A:311:LYS:HG2	2.05	0.56
3:F:3:DC:H2'	3:F:4:OMC:C6	2.41	0.56
1:A:255:ASN:O	1:A:259:LYS:HG3	2.07	0.55
3:E:3:DC:H2'	3:E:4:OMC:C6	2.41	0.55
1:C:417:VAL:HG22	1:C:419:THR:HG23	1.88	0.55
2:D:195:ILE:O	2:D:199:ARG:HG3	2.05	0.55
1:A:446:ALA:HB2	1:A:477:THR:HG21	1.89	0.55
2:B:424:LYS:HA	2:B:424:LYS:CE	2.35	0.55
3:F:1:DG:H2'	3:F:2:OMC:C6	2.42	0.55
1:A:135:ILE:HG22	1:A:135:ILE:O	2.06	0.55
1:A:19:PRO:HG3	1:A:80:LEU:HB2	1.88	0.55
1:C:23:GLN:NE2	1:C:60:VAL:H	2.05	0.55
1:C:110:ASP:HB3	1:C:220:LYS:HD3	1.88	0.55
1:A:543:GLY:HA3	2:B:283:LEU:O	2.07	0.54
1:C:447:ASN:HB3	1:C:450:THR:HG22	1.89	0.54
2:B:388:LYS:NZ	2:B:415:GLU:OE1	2.40	0.54
1:A:369:THR:HG21	6:A:604:GOL:H32	1.90	0.54
1:A:452:LEU:CD2	1:A:470:THR:HG22	2.38	0.54
1:C:170:PRO:O	1:C:174:GLN:HG3	2.08	0.54
1:C:255:ASN:O	1:C:259:LYS:HG3	2.08	0.53
2:B:422:LEU:HG	2:B:423:VAL:N	2.24	0.53
2:D:162:SER:O	2:D:166:LYS:HD2	2.07	0.53
1:A:446:ALA:HB2	1:A:477:THR:CG2	2.38	0.53
1:A:439:THR:HG21	2:B:289:LEU:HD13	1.89	0.53
1:A:520:GLN:O	1:A:524:GLN:HG3	2.08	0.53
1:A:380:ILE:HD12	2:B:27:THR:HG22	1.90	0.52
2:B:422:LEU:HD23	2:B:422:LEU:H	1.74	0.52
1:C:30:LYS:O	1:C:34:LEU:HG	2.09	0.52
1:A:181:TYR:HB2	1:A:188:TYR:HB3	1.92	0.52
2:B:143:ARG:HG2	2:B:143:ARG:HH11	1.74	0.52
1:A:135:ILE:HD13	1:A:135:ILE:N	2.25	0.51
1:A:405:TYR:CE2	1:A:407:GLN:HB2	2.45	0.51
1:C:3:SER:HB2	1:C:212:TRP:O	2.11	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:139:THR:HG22	1:A:140:PRO:O	2.10	0.51
1:C:138:GLU:HA	1:C:138:GLU:OE2	2.11	0.51
1:A:380:ILE:HD11	1:A:386:THR:HG23	1.91	0.51
1:C:339:TYR:CZ	1:C:352:GLY:HA3	2.45	0.51
3:E:1:DG:H2'	3:E:2:OMC:C6	2.46	0.51
1:C:465:LYS:HD3	1:C:484:LEU:HD11	1.92	0.51
2:B:167:ILE:HG23	2:B:212:TRP:HD1	1.76	0.51
2:D:90:VAL:HG11	2:D:158:ALA:HA	1.93	0.51
2:B:207:GLN:O	2:B:211:ARG:HG3	2.11	0.50
1:C:405:TYR:CE2	1:C:407:GLN:HB2	2.46	0.50
2:D:248:GLU:OE1	2:D:307:ARG:NH2	2.45	0.50
2:D:281:LYS:HG2	2:D:284:ARG:HH21	1.75	0.50
2:B:282:LEU:HD13	2:B:296:THR:HG23	1.93	0.50
1:A:22:LYS:HD2	1:A:23:GLN:H	1.76	0.50
2:B:274:ILE:HG23	2:B:306:ASN:HD22	1.76	0.49
2:B:276:VAL:O	2:B:280:SER:N	2.38	0.49
2:D:70:LYS:HE2	2:D:70:LYS:HA	1.94	0.49
2:D:328:GLU:HG2	2:D:390:LYS:HD3	1.93	0.49
2:D:361:HIS:CD2	2:D:361:HIS:O	2.65	0.49
2:B:236:PRO:N	2:B:237:ASP:N	2.61	0.49
1:C:73:LYS:HE3	1:C:146:TYR:OH	2.12	0.49
1:C:136:ASN:N	1:C:136:ASN:HD22	2.11	0.49
2:D:361:HIS:O	2:D:361:HIS:CG	2.64	0.49
1:A:440:PHE:HB2	1:A:495:ILE:CD1	2.42	0.49
2:B:255:ASN:HD22	2:B:258:GLN:HE21	1.61	0.49
2:D:236:PRO:HA	2:D:239:TRP:CD2	2.48	0.49
2:D:356:ARG:HE	2:D:361:HIS:CB	2.19	0.49
1:C:122:LYS:HG2	1:C:123:ASP:N	2.28	0.49
2:B:424:LYS:HA	2:B:424:LYS:HE2	1.95	0.48
1:C:34:LEU:HB3	1:C:132:ILE:HD13	1.94	0.48
1:C:454:LYS:HB2	1:C:552:VAL:HG13	1.95	0.48
1:A:26:LEU:HD22	1:A:30:LYS:HE3	1.95	0.48
2:D:335:GLY:HA3	2:D:356:ARG:HG2	1.95	0.48
2:B:235:HIS:CB	2:B:238:LYS:HE2	2.43	0.48
2:D:167:ILE:HD12	2:D:212:TRP:CD1	2.49	0.48
2:B:207:GLN:HG2	2:B:210:LEU:HD12	1.96	0.48
2:B:278:GLN:CD	2:B:298:GLU:HB2	2.34	0.48
1:C:308:GLU:OE1	1:C:311:LYS:NZ	2.35	0.47
1:A:31:ILE:HD13	1:A:135:ILE:HD13	1.96	0.47
1:C:444:GLY:HA2	1:C:552:VAL:HG11	1.97	0.47
1:C:447:ASN:OD1	1:C:450:THR:N	2.32	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:90:VAL:HG12	2:B:90:VAL:O	2.15	0.47
2:B:296:THR:OG1	2:B:298:GLU:HG2	2.13	0.47
2:D:194:GLU:OE2	2:D:194:GLU:HA	2.14	0.47
2:B:21:VAL:HB	2:B:59:PRO:HD3	1.95	0.47
2:B:202:ILE:O	2:B:206:ARG:HG3	2.15	0.47
1:C:412:PRO:O	1:C:414:TRP:HD1	1.97	0.47
1:C:133:PRO:N	1:C:133:PRO:C	2.59	0.46
2:D:108:VAL:HG21	2:D:232:TYR:CE1	2.50	0.46
1:A:473:THR:O	1:A:477:THR:HG23	2.14	0.46
2:D:317:VAL:HG22	2:D:347:LYS:HB3	1.96	0.46
1:C:65:LYS:H	1:C:65:LYS:HG2	1.51	0.46
1:C:227:PHE:HB2	1:C:234:LEU:HB2	1.97	0.46
1:A:483:HIS:ND1	1:A:524:GLN:OE1	2.44	0.46
1:C:23:GLN:NE2	1:C:60:VAL:O	2.48	0.46
2:D:206:ARG:O	2:D:210:LEU:HD13	2.16	0.46
2:D:120:LEU:HD23	2:D:125:ARG:HG2	1.96	0.46
1:C:110:ASP:HB3	1:C:220:LYS:HB3	1.97	0.45
1:A:430:GLU:HG3	1:A:434:ILE:HD11	1.97	0.45
1:A:458:VAL:HG22	1:A:548:VAL:HB	1.99	0.45
1:A:96:HIS:CG	1:A:97:PRO:HD2	2.52	0.45
1:A:412:PRO:O	1:A:414:TRP:HD1	1.99	0.45
1:C:40:GLU:O	1:C:44:GLU:HG3	2.17	0.45
1:A:406:TRP:HE1	2:B:418:ASN:HD21	1.61	0.45
1:C:497:THR:O	1:C:535:TRP:HA	2.16	0.45
1:A:366:LYS:HG2	6:A:604:GOL:H2	1.98	0.45
1:C:377:THR:OG1	7:C:701:HOH:O	2.21	0.45
1:A:266:TRP:CE2	3:E:31:DG:H4'	2.52	0.44
1:A:520:GLN:O	1:A:523:GLU:HG2	2.17	0.44
1:A:67:ASP:OD2	1:A:219:LYS:CE	2.63	0.44
1:A:114:ALA:HB1	1:A:160:PHE:CZ	2.52	0.44
2:B:49:LYS:HG2	2:B:144:TYR:CE2	2.52	0.44
2:B:274:ILE:N	2:B:275:LYS:HZ3	2.15	0.44
1:C:376:ALA:O	1:C:380:ILE:HG12	2.18	0.44
3:F:23:DC:H2"	3:F:24:DG:C8	2.52	0.44
2:B:85:GLN:NE2	2:B:90:VAL:HG21	2.29	0.44
1:C:156:SER:HB2	1:C:157:PRO:HD3	2.00	0.44
1:A:58:THR:HG21	1:A:77:PHE:CD1	2.53	0.44
1:C:63:ILE:O	1:C:72:ARG:N	2.44	0.44
1:A:30:LYS:HG2	1:A:62:ALA:HB3	1.99	0.44
1:A:459:THR:HB	1:A:463:ARG:H	1.83	0.44
1:A:406:TRP:CZ2	2:B:420:PRO:HG3	2.53	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:178:ILE:HD11	1:C:201:LYS:HG3	1.99	0.43
1:C:266:TRP:CE2	3:F:31:DG:H4'	2.53	0.43
1:C:451:LYS:HB3	1:C:471:ASP:HA	2.00	0.43
1:C:382:ILE:O	2:D:136:ASN:HB2	2.18	0.43
3:F:4:OMC:HM23	3:F:4:OMC:H1'	1.88	0.43
2:B:236:PRO:N	2:B:237:ASP:H	2.17	0.43
1:C:281:LYS:HB3	1:C:281:LYS:HE3	1.83	0.43
1:C:447:ASN:CG	1:C:450:THR:HG22	2.38	0.43
1:C:447:ASN:OD1	1:C:449:GLU:N	2.51	0.43
1:A:34:LEU:HB2	1:A:132:ILE:HD11	1.99	0.43
1:A:452:LEU:HD21	1:A:470:THR:HG22	2.00	0.43
2:B:309:ILE:O	2:B:309:ILE:HG22	2.17	0.43
2:D:70:LYS:HD3	2:D:71:TRP:N	2.27	0.43
1:A:44:GLU:HB3	1:A:46:LYS:HE3	2.02	0.42
1:C:483:HIS:ND1	1:C:524:GLN:OE1	2.52	0.42
1:C:273:GLY:HA2	1:C:338:THR:HG21	2.00	0.42
1:A:439:THR:CG2	2:B:289:LEU:HD13	2.48	0.42
1:C:65:LYS:HE2	1:C:72:ARG:HB2	2.01	0.42
1:A:201:LYS:HA	1:A:201:LYS:HD3	1.84	0.42
1:A:22:LYS:HD2	1:A:23:GLN:N	2.34	0.42
1:C:491:LEU:HB3	1:C:529:GLU:HB2	2.01	0.42
1:A:110:ASP:HB3	1:A:220:LYS:HB3	2.02	0.41
3:F:10:DC:H2"	3:F:11:DG:C8	2.56	0.41
1:A:465:LYS:NZ	1:A:488:ASP:OD2	2.46	0.41
2:D:201:LYS:HD3	2:D:201:LYS:HA	1.83	0.41
1:A:541:GLY:O	2:B:281:LYS:HE3	2.20	0.41
1:C:408:ALA:HB1	2:D:364:ASP:HB3	2.02	0.41
2:D:30:LYS:NZ	2:D:404:GLU:OE1	2.53	0.41
2:B:172:ARG:HH11	2:B:180:ILE:HB	1.86	0.41
1:A:31:ILE:CD1	1:A:135:ILE:H	2.27	0.41
1:C:447:ASN:CB	1:C:450:THR:HG22	2.50	0.41
2:B:239:TRP:CE3	2:B:378:GLU:HG2	2.55	0.41
1:C:57:ASN:ND2	1:C:131:THR:OG1	2.54	0.41
1:C:469:LEU:HD12	1:C:477:THR:HG22	2.03	0.41
2:D:257:ILE:HB	2:D:283:LEU:HD21	2.02	0.41
2:D:297:GLU:HG2	2:D:298:GLU:OE1	2.21	0.41
1:A:244:ILE:HD13	1:A:267:ALA:HB2	2.02	0.40
2:B:107:THR:O	2:B:189:VAL:HG22	2.21	0.40
2:B:244:ILE:HD12	2:B:271:TYR:HE1	1.86	0.40
1:C:494:ASN:HB3	2:D:289:LEU:HD12	2.04	0.40
2:D:17:ASP:O	2:D:83:ARG:HD3	2.20	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:538:ALA:HB1	1:A:539:HIS:CD2	2.56	0.40
2:B:420:PRO:HA	2:B:421:PRO:HD3	1.93	0.40
1:C:334:GLN:HE21	1:C:334:GLN:HB2	1.65	0.40
1:A:265:ASN:OD1	1:A:353:LYS:HE3	2.21	0.40
2:B:361:HIS:C	2:B:362:THR:HG23	2.41	0.40
1:C:70:LYS:HZ2	1:C:70:LYS:HG2	1.69	0.40
1:A:53:GLU:O	1:A:53:GLU:CD	2.60	0.40
1:A:455:ALA:O	1:A:467:VAL:HG12	2.22	0.40
1:C:102:GLN:HE21	1:C:102:GLN:HB2	1.67	0.40

There are no symmetry-related clashes.

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	551/557 (99%)	535 (97%)	15 (3%)	1 (0%)	47 58
1	C	552/557 (99%)	535 (97%)	17 (3%)	0	100 100
2	B	402/444 (90%)	385 (96%)	17 (4%)	0	100 100
2	D	402/444 (90%)	390 (97%)	12 (3%)	0	100 100
All	All	1907/2002 (95%)	1845 (97%)	61 (3%)	1 (0%)	51 63

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	135	ILE

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	492/494 (100%)	487 (99%)	5 (1%)	76 87
1	C	493/494 (100%)	486 (99%)	7 (1%)	67 80
2	B	365/400 (91%)	350 (96%)	15 (4%)	30 43
2	D	365/400 (91%)	353 (97%)	12 (3%)	38 52
All	All	1715/1788 (96%)	1676 (98%)	39 (2%)	50 66

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	70	LYS
1	A	277	ARG
1	A	347	LYS
1	A	353	LYS
1	A	454	LYS
2	B	66	LYS
2	B	67	ASP
2	B	72	ARG
2	B	104	LYS
2	B	122	LYS
2	B	169	GLU
2	B	184	MET
2	B	251	SER
2	B	279	LEU
2	B	280	SER
2	B	284	ARG
2	B	291	GLU
2	B	418	ASN
2	B	424	LYS
2	B	427	TYR
1	C	42	GLU
1	C	65	LYS
1	C	66	LYS
1	C	122	LYS
1	C	277	ARG
1	C	447	ASN
1	C	553	SER
2	D	70	LYS

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Mol	Chain	Res	Type
2	D	72	ARG
2	D	89	GLU
2	D	211	ARG
2	D	250	ASP
2	D	311	LYS
2	D	315	HIS
2	D	347	LYS
2	D	356	ARG
2	D	358	LYS
2	D	424	LYS
2	D	427	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	197	GLN
1	A	221	HIS
1	A	500	GLN
1	A	539	HIS
2	B	151	GLN
2	B	182	GLN
2	B	208	HIS
2	B	258	GLN
2	B	269	GLN
2	B	361	HIS
2	B	418	ASN
1	C	23	GLN
1	C	57	ASN
1	C	102	GLN
1	C	136	ASN
1	C	137	ASN
1	C	221	HIS
1	C	278	GLN
1	C	315	HIS
1	C	330	GLN
1	C	334	GLN
1	C	340	GLN
1	C	507	GLN
2	D	182	GLN
2	D	407	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues 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	$\#\|Z\| > 2$
3	OMC	E	4	3	19,22,23	2.71	8 (42%)	26,31,34	0.73	0
3	OMC	F	2	3	19,22,23	2.76	8 (42%)	26,31,34	0.76	0
3	OMC	F	4	3	19,22,23	2.67	8 (42%)	26,31,34	0.65	0
3	OMC	E	2	3	19,22,23	2.66	8 (42%)	26,31,34	0.71	0

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
3	OMC	E	4	3	-	0/9/27/28	0/2/2/2
3	OMC	F	2	3	-	0/9/27/28	0/2/2/2
3	OMC	F	4	3	-	0/9/27/28	0/2/2/2
3	OMC	E	2	3	-	0/9/27/28	0/2/2/2

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	F	2	OMC	C6-C5	6.01	1.49	1.35
3	F	4	OMC	C6-C5	5.88	1.48	1.35
3	E	4	OMC	C6-C5	5.83	1.48	1.35
3	E	4	OMC	C2-N3	5.68	1.47	1.36
3	F	2	OMC	C2-N3	5.63	1.47	1.36
3	E	2	OMC	C6-C5	5.59	1.48	1.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	F	4	OMC	C2-N3	5.48	1.47	1.36
3	E	2	OMC	C2-N3	5.07	1.46	1.36
3	F	2	OMC	C4-N3	4.75	1.44	1.34
3	E	2	OMC	C4-N3	4.70	1.44	1.34
3	F	2	OMC	C2-N1	4.65	1.50	1.40
3	E	2	OMC	C2-N1	4.60	1.50	1.40
3	E	4	OMC	C2-N1	4.52	1.49	1.40
3	F	4	OMC	C2-N1	4.46	1.49	1.40
3	F	4	OMC	C4-N3	4.42	1.43	1.34
3	E	4	OMC	C4-N3	4.33	1.43	1.34
3	F	2	OMC	C6-N1	3.20	1.45	1.38
3	E	4	OMC	C4-N4	3.18	1.41	1.33
3	E	2	OMC	C6-N1	3.16	1.45	1.38
3	E	4	OMC	C6-N1	3.14	1.45	1.38
3	F	2	OMC	C4-N4	3.09	1.41	1.33
3	F	4	OMC	C6-N1	3.00	1.45	1.38
3	F	4	OMC	C4-N4	2.91	1.40	1.33
3	E	2	OMC	C5-C4	2.89	1.49	1.42
3	E	2	OMC	C4-N4	2.87	1.40	1.33
3	E	4	OMC	C5-C4	2.78	1.49	1.42
3	F	2	OMC	C5-C4	2.77	1.49	1.42
3	E	2	OMC	O2-C2	-2.61	1.18	1.23
3	F	4	OMC	C5-C4	2.54	1.48	1.42
3	F	4	OMC	O2-C2	-2.09	1.19	1.23
3	E	4	OMC	O2-C2	-2.04	1.19	1.23
3	F	2	OMC	O2-C2	-2.02	1.20	1.23

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	E	4	OMC	1	0
3	F	2	OMC	1	0
3	F	4	OMC	2	0
3	E	2	OMC	1	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 10 ligands modelled in this entry, 2 are monoatomic - leaving 8 for Mogul analysis.

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	$\#\|Z\| > 2$
4	DGT	C	601	5	26,33,33	3.67	13 (50%)	32,52,52	1.36	6 (18%)
6	GOL	A	603	-	5,5,5	0.84	0	5,5,5	1.09	1 (20%)
6	GOL	C	603	-	5,5,5	1.09	0	5,5,5	0.85	0
6	GOL	A	604	-	5,5,5	0.93	0	5,5,5	0.77	0
6	GOL	D	502	-	5,5,5	0.22	0	5,5,5	0.38	0
6	GOL	B	501	-	5,5,5	1.24	0	5,5,5	0.77	0
6	GOL	D	501	-	5,5,5	1.15	0	5,5,5	1.19	1 (20%)
4	DGT	A	601	5	26,33,33	3.63	13 (50%)	32,52,52	1.47	8 (25%)

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
4	DGT	C	601	5	-	4/18/34/34	0/3/3/3
6	GOL	A	603	-	-	4/4/4/4	-
6	GOL	C	603	-	-	0/4/4/4	-
6	GOL	A	604	-	-	0/4/4/4	-
6	GOL	D	502	-	-	2/4/4/4	-
6	GOL	B	501	-	-	2/4/4/4	-
6	GOL	D	501	-	-	4/4/4/4	-
4	DGT	A	601	5	-	5/18/34/34	0/3/3/3

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	601	DGT	O4'-C1'	8.92	1.62	1.42
4	A	601	DGT	O4'-C1'	8.43	1.61	1.42
4	A	601	DGT	O4'-C4'	-7.43	1.28	1.45
4	C	601	DGT	O4'-C4'	-7.33	1.28	1.45
4	A	601	DGT	C2'-C1'	-6.65	1.33	1.52
4	C	601	DGT	C2'-C1'	-6.58	1.34	1.52
4	C	601	DGT	C2-N3	5.84	1.47	1.33
4	A	601	DGT	C2-N3	5.68	1.47	1.33
4	C	601	DGT	C2-N2	5.54	1.47	1.34
4	A	601	DGT	C2-N2	5.27	1.46	1.34
4	C	601	DGT	C4-N3	5.04	1.49	1.37
4	A	601	DGT	C4-N3	4.90	1.49	1.37
4	A	601	DGT	O6-C6	-4.49	1.14	1.23
4	C	601	DGT	C6-N1	4.33	1.44	1.37
4	A	601	DGT	C6-N1	4.14	1.44	1.37
4	C	601	DGT	O6-C6	-3.99	1.15	1.23
4	C	601	DGT	C5-C6	3.36	1.54	1.47
4	A	601	DGT	C5-C6	3.29	1.54	1.47
4	C	601	DGT	C2-N1	2.79	1.44	1.37
4	C	601	DGT	O3'-C3'	-2.71	1.37	1.43
4	A	601	DGT	O3'-C3'	-2.70	1.37	1.43
4	A	601	DGT	C2-N1	2.66	1.44	1.37
4	A	601	DGT	C5-C4	-2.64	1.36	1.43
4	C	601	DGT	C5-C4	-2.43	1.36	1.43
4	C	601	DGT	PA-O5'	2.28	1.68	1.59
4	A	601	DGT	PA-O5'	2.25	1.68	1.59

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	601	DGT	C5-C6-N1	3.66	120.42	113.95
4	A	601	DGT	C2-N1-C6	-3.19	119.22	125.10
4	C	601	DGT	C5-C6-N1	3.12	119.47	113.95
4	C	601	DGT	C2-N1-C6	-2.88	119.79	125.10
4	A	601	DGT	C8-N7-C5	2.82	108.36	102.99
4	C	601	DGT	C8-N7-C5	2.81	108.33	102.99
4	A	601	DGT	O6-C6-C5	-2.51	119.48	124.37
4	A	601	DGT	PB-O3B-PG	-2.33	124.84	132.83
4	C	601	DGT	PB-O3B-PG	-2.31	124.88	132.83
6	D	501	GOL	C3-C2-C1	-2.25	102.96	111.70
4	A	601	DGT	O2G-PG-O3B	2.22	112.09	104.64
4	C	601	DGT	O6-C6-C5	-2.15	120.18	124.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	601	DGT	C2'-C1'-N9	-2.08	109.48	114.27
4	A	601	DGT	N2-C2-N1	2.08	121.14	116.71
4	C	601	DGT	O1G-PG-O3B	2.06	111.54	104.64
6	A	603	GOL	C3-C2-C1	-2.01	103.88	111.70

There are no chirality outliers.

All (21) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	601	DGT	PB-O3B-PG-O2G
4	C	601	DGT	PB-O3B-PG-O1G
6	A	603	GOL	O1-C1-C2-C3
6	D	501	GOL	C1-C2-C3-O3
6	A	603	GOL	C1-C2-C3-O3
6	B	501	GOL	O1-C1-C2-C3
6	D	502	GOL	O1-C1-C2-C3
6	A	603	GOL	O1-C1-C2-O2
6	D	501	GOL	O2-C2-C3-O3
6	D	502	GOL	O1-C1-C2-O2
6	A	603	GOL	O2-C2-C3-O3
6	D	501	GOL	O1-C1-C2-O2
4	C	601	DGT	PA-O3A-PB-O1B
4	A	601	DGT	PA-O3A-PB-O2B
6	B	501	GOL	O1-C1-C2-O2
4	A	601	DGT	PB-O3A-PA-O2A
4	A	601	DGT	PB-O3B-PG-O1G
4	C	601	DGT	PB-O3B-PG-O2G
4	A	601	DGT	PA-O3A-PB-O1B
4	C	601	DGT	PA-O3A-PB-O2B
6	D	501	GOL	O1-C1-C2-C3

There are no ring outliers.

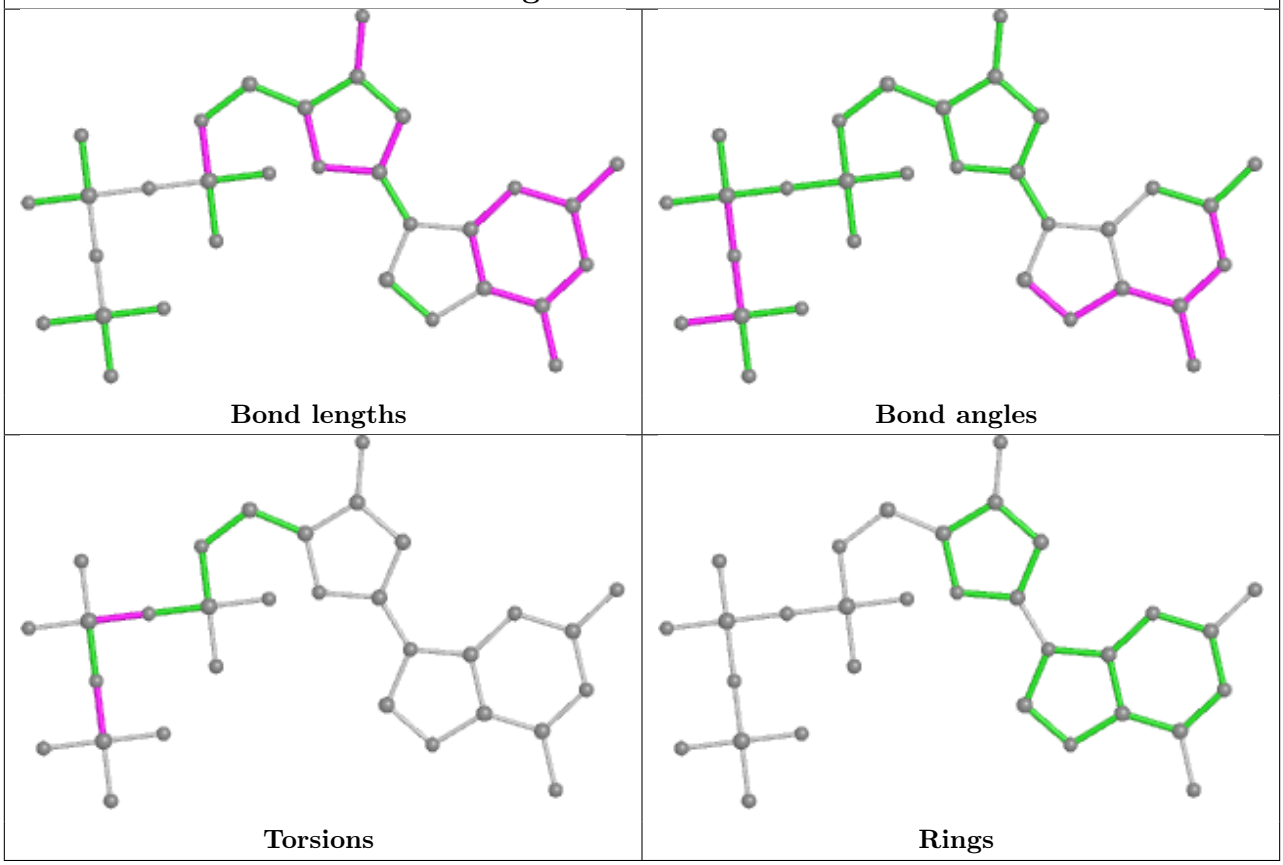
2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	604	GOL	3	0
6	D	502	GOL	1	0

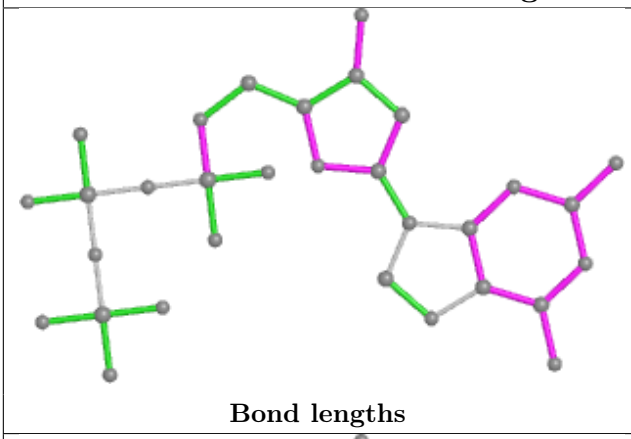
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

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.

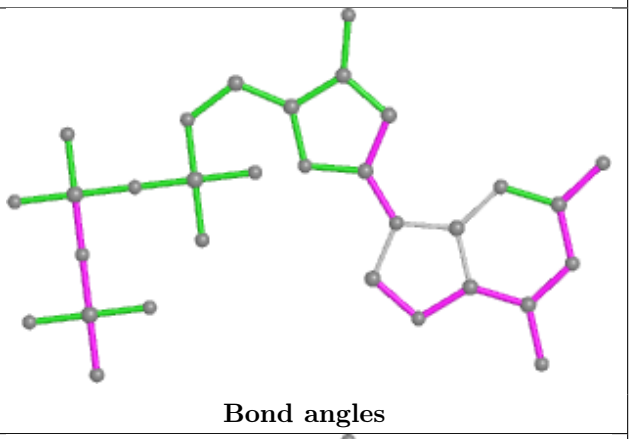
Ligand DGT C 601



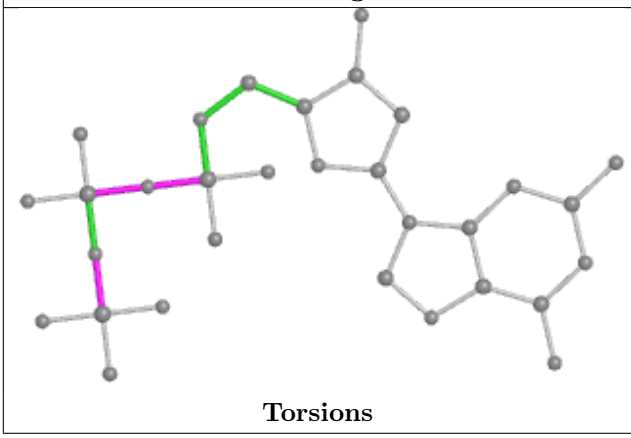
Ligand DGT A 601



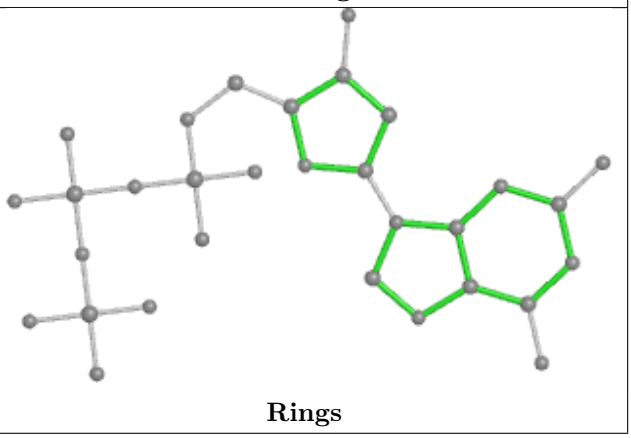
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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, 95^{th} 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	553/557 (99%)	0.47	41 (7%) 14 19	33, 59, 104, 180	0
1	C	553/557 (99%)	0.59	60 (10%) 5 8	33, 58, 109, 156	0
2	B	406/444 (91%)	1.03	67 (16%) 1 2	35, 69, 141, 176	0
2	D	406/444 (91%)	0.45	26 (6%) 19 25	32, 55, 100, 164	0
3	E	33/38 (86%)	-0.15	0 100 100	35, 55, 88, 138	0
3	F	36/38 (94%)	-0.00	1 (2%) 53 60	39, 65, 112, 157	0
All	All	1987/2078 (95%)	0.59	195 (9%) 7 10	32, 59, 119, 180	0

All (195) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	93	GLY	11.2
2	B	301	LEU	11.2
2	B	88	TRP	10.2
2	B	90	VAL	9.6
2	B	92	LEU	8.8
1	C	140	PRO	8.8
1	A	67	ASP	8.6
2	D	231	GLY	8.3
2	B	361	HIS	8.1
2	D	360	ALA	8.0
2	B	357	MET	7.6
1	A	136	ASN	7.4
2	B	94	ILE	7.0
1	C	141	GLY	7.0
2	B	212	TRP	6.9
2	D	67	ASP	6.8
2	B	425	LEU	6.8
1	A	140	PRO	6.8
2	B	5	ILE	6.6

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Mol	Chain	Res	Type	RSRZ
2	B	359	GLY	6.5
1	C	69	THR	6.5
2	B	68	SER	6.4
2	D	361	HIS	6.4
2	B	89	GLU	6.4
1	A	69	THR	6.3
2	D	359	GLY	6.3
2	B	295	LEU	6.2
2	D	212	TRP	6.1
2	B	360	ALA	6.1
2	D	232	TYR	6.1
2	B	297	GLU	5.9
1	C	133	PRO	5.8
1	C	142	ILE	5.8
2	B	91	GLN	5.6
1	A	133	PRO	5.6
1	C	132	ILE	5.5
2	B	422	LEU	5.5
1	C	137	ASN	5.4
2	D	5	ILE	5.3
1	C	52	PRO	5.2
1	C	26	LEU	5.2
1	C	70	LYS	5.2
2	B	245	VAL	5.1
1	A	139	THR	5.1
1	C	136	ASN	5.0
2	B	67	ASP	5.0
1	A	28	GLU	5.0
1	A	138	GLU	5.0
2	B	251	SER	4.9
1	C	131	THR	4.9
2	B	95	PRO	4.8
2	D	66	LYS	4.7
1	C	68	SER	4.7
1	C	34	LEU	4.6
2	D	68	SER	4.6
1	C	67	ASP	4.5
2	B	168	LEU	4.5
1	C	452	LEU	4.5
1	C	553	SER	4.4
2	D	174	GLN	4.4
1	C	39	THR	4.3

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Mol	Chain	Res	Type	RSRZ
1	A	66	LYS	4.2
1	C	32	LYS	4.1
1	C	552	VAL	4.1
2	B	252	TRP	4.1
1	C	469	LEU	4.1
1	C	60	VAL	4.0
2	B	423	VAL	4.0
2	B	248	GLU	4.0
2	D	424	LYS	3.9
1	C	35	VAL	3.9
1	A	142	ILE	3.9
1	A	550	LYS	3.9
1	A	451	LYS	3.8
1	C	64	LYS	3.8
1	C	50	ILE	3.7
2	B	260	LEU	3.7
2	D	425	LEU	3.7
2	B	299	ALA	3.7
1	C	449	GLU	3.7
1	C	33	ALA	3.7
2	D	211	ARG	3.6
2	B	305	GLU	3.6
1	A	137	ASN	3.6
1	C	138	GLU	3.5
2	B	296	THR	3.5
1	C	134	SER	3.5
1	A	542	ILE	3.5
1	A	27	THR	3.5
2	B	232	TYR	3.5
2	D	427	TYR	3.5
1	C	28	GLU	3.5
2	B	211	ARG	3.5
2	B	213	GLY	3.4
2	B	279	LEU	3.4
2	B	303	LEU	3.4
1	C	135	ILE	3.3
2	B	278	GLN	3.3
1	C	144	TYR	3.3
1	A	64	LYS	3.3
2	B	6	GLU	3.3
1	C	37	ILE	3.3
1	C	49	LYS	3.3

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Mol	Chain	Res	Type	RSRZ
1	C	54	ASN	3.2
1	C	357[A]	MET	3.2
2	B	358	LYS	3.2
3	F	18	DT	3.2
1	C	58	THR	3.2
1	A	68	SER	3.2
2	B	427	TYR	3.2
2	B	66	LYS	3.2
1	C	139	THR	3.2
2	B	249	LYS	3.2
1	A	134	SER	3.1
2	B	250	ASP	3.1
2	B	9	PRO	3.1
1	A	24	TRP	3.1
1	C	450	THR	3.0
2	D	209	LEU	3.0
2	B	274	ILE	3.0
1	A	33	ALA	3.0
1	A	403	THR	3.0
1	C	448	ARG	3.0
1	C	79	GLU	2.9
2	B	294	PRO	2.9
2	B	280	SER	2.9
2	D	210	LEU	2.9
1	A	32	LYS	2.9
1	A	131	THR	2.9
2	B	283	LEU	2.9
1	C	56	TYR	2.9
1	C	24	TRP	2.8
1	C	71	TRP	2.8
1	C	457	TYR	2.8
1	A	132	ILE	2.8
2	B	7	THR	2.8
1	C	454	LYS	2.8
1	C	470	THR	2.7
2	B	362	THR	2.7
2	D	69	THR	2.7
1	A	135	ILE	2.7
2	B	272	ALA	2.7
2	B	237	ASP	2.7
1	C	51	GLY	2.7
1	C	550	LYS	2.7

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Mol	Chain	Res	Type	RSRZ
2	D	420	PRO	2.6
1	C	199	ARG	2.6
2	D	358	LYS	2.6
1	A	36	GLU	2.6
1	C	17	ASP	2.5
1	C	36	GLU	2.5
1	A	540	LYS	2.5
2	B	87	PHE	2.5
2	B	238	LYS	2.5
2	B	15	GLY	2.5
1	A	551	LEU	2.5
1	A	62	ALA	2.5
2	D	207	GLN	2.4
1	C	59	PRO	2.4
1	A	61	PHE	2.4
1	A	413	GLU	2.4
1	C	63	ILE	2.4
2	B	281	LYS	2.4
1	A	549	ASP	2.3
2	D	357	MET	2.3
2	B	169	GLU	2.3
2	B	161	GLN	2.3
1	C	551	LEU	2.3
1	C	55	PRO	2.3
1	A	541	GLY	2.3
1	A	141	GLY	2.3
1	C	22	LYS	2.3
2	B	284	ARG	2.3
2	B	293	VAL	2.3
1	A	447	ASN	2.2
2	B	275	LYS	2.2
2	B	231	GLY	2.2
2	B	10	VAL	2.2
2	D	177	ASP	2.2
1	A	454	LYS	2.2
1	C	143	ARG	2.2
2	B	424	LYS	2.2
2	B	11	LYS	2.2
2	B	69	THR	2.2
1	A	552	VAL	2.1
2	D	166	LYS	2.1
2	D	172	ARG	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	15	GLY	2.1
2	B	172	ARG	2.1
1	A	30	LYS	2.1
1	A	63	ILE	2.1
2	D	315	HIS	2.1
1	C	15	GLY	2.0
1	A	25	PRO	2.0
1	C	57	ASN	2.0

6.2 Non-standard residues in protein, DNA, RNA chains (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, 95^{th} 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
3	OMC	E	2	21/22	0.97	0.18	33,40,44,47	0
3	OMC	F	2	21/22	0.97	0.16	45,51,53,57	0
3	OMC	E	4	21/22	0.98	0.19	32,35,41,44	0
3	OMC	F	4	21/22	0.98	0.19	33,38,44,46	0

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, 95^{th} 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
6	GOL	A	604	6/6	0.76	0.27	57,64,70,70	0
5	MG	C	602	1/1	0.85	0.21	55,55,55,55	0
5	MG	A	602	1/1	0.86	0.09	51,51,51,51	0
6	GOL	A	603	6/6	0.91	0.31	65,71,72,72	0
6	GOL	D	501	6/6	0.91	0.20	46,50,52,53	0
4	DGT	C	601	31/31	0.93	0.13	45,59,80,84	0

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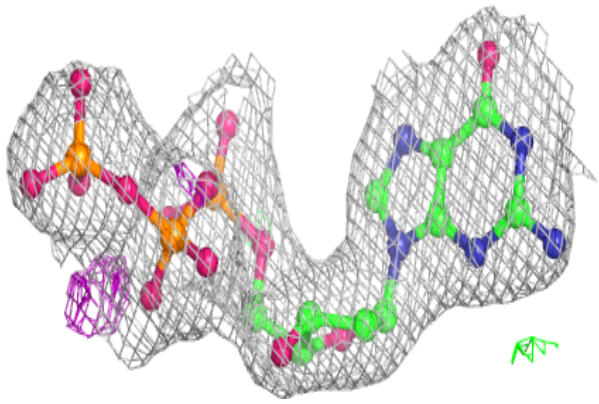
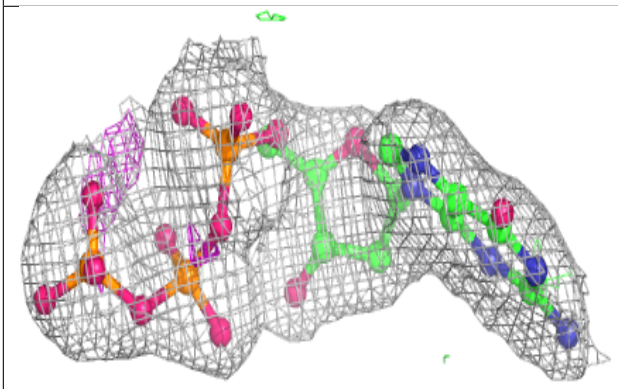
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	GOL	D	502	6/6	0.93	0.18	60,64,64,65	0
6	GOL	C	603	6/6	0.94	0.21	42,45,50,53	0
4	DGT	A	601	31/31	0.95	0.14	42,50,64,67	0
6	GOL	B	501	6/6	0.96	0.24	44,46,47,50	0

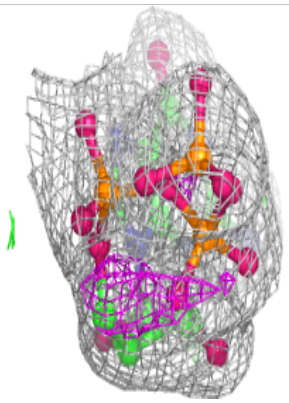
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around DGT C 601:

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

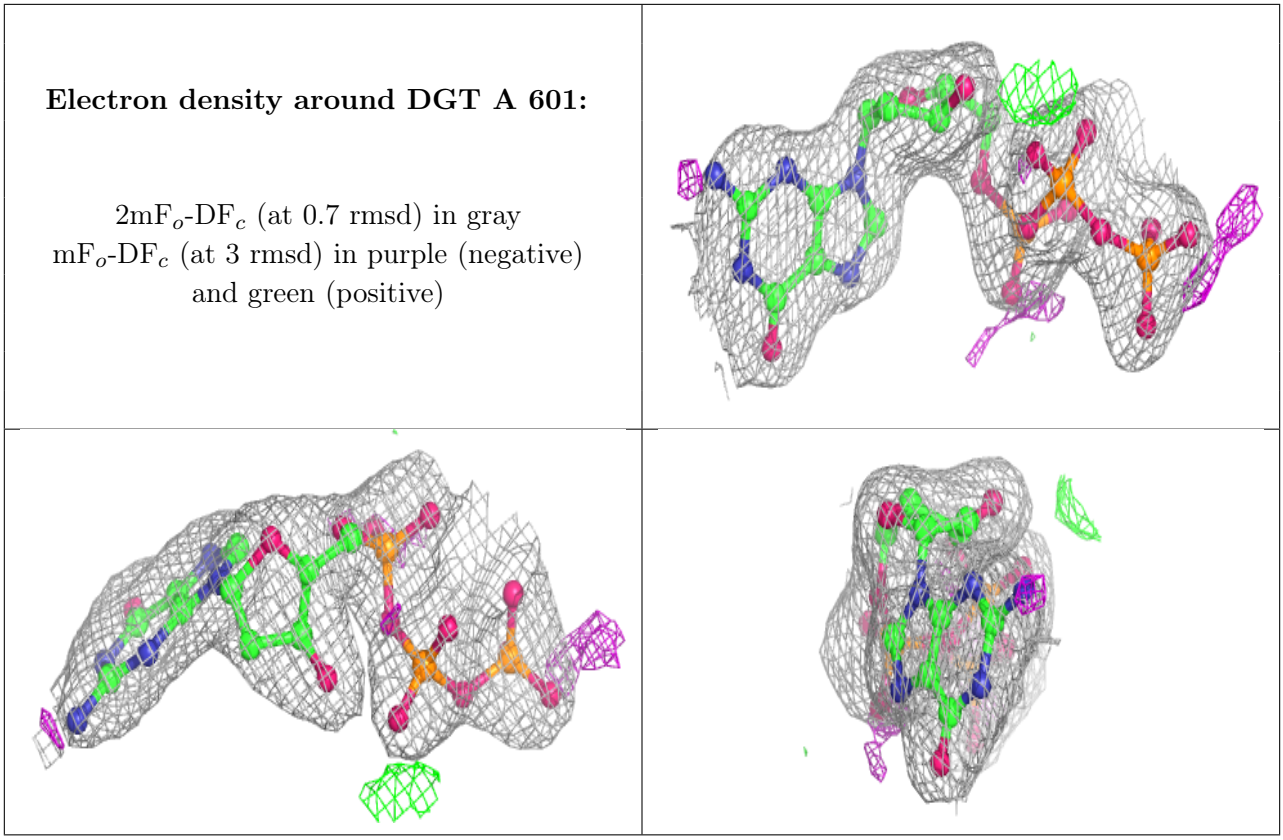






Electron density around DGT A 601:

$2mF_o$-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.