



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 09:24 PM UTC

PDB ID : 4PJX / pdb_00004pjx
Title : Structure of human MR1-Ac-6-FP in complex with human MAIT C-A11 TCR
Authors : Birkinshaw, R.W.; Rossjohn, J.
Deposited on : 2014-05-12
Resolution : 2.25 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 Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

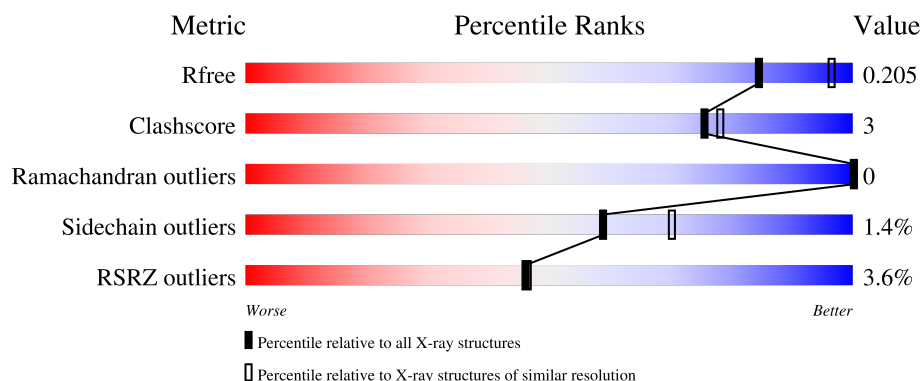
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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}	180053	1898 (2.26-2.26)
Clashscore	190562	2005 (2.26-2.26)
Ramachandran outliers	187476	1965 (2.26-2.26)
Sidechain outliers	187428	1966 (2.26-2.26)
RSRZ outliers	180081	1898 (2.26-2.26)

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 $\leq 5\%$. 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	271	
1	C	271	
2	B	100	
2	D	100	
3	E	205	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
3	G	205	<div><div>%</div><div><div></div><div>87%</div><div>9%</div><div></div></div><div></div></div>
4	F	246	<div><div>6%</div><div><div></div><div>89%</div><div>7%</div><div></div></div><div></div></div>
4	H	246	<div><div>2%</div><div><div></div><div>89%</div><div>9%</div><div></div></div><div></div></div>

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 13290 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 Major histocompatibility complex class I-related gene protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	262	Total	C	N	O	S	0	4	0
			2179	1396	379	393	11			
1	C	250	Total	C	N	O	S	0	0	0
			2026	1295	351	369	11			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	initiating methionine	UNP Q95460
A	261	SER	CYS	engineered mutation	UNP Q95460
C	0	MET	-	initiating methionine	UNP Q95460
C	261	SER	CYS	engineered mutation	UNP Q95460

- Molecule 2 is a protein called Beta-2-microglobulin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	99	Total	C	N	O	S	0	0	0
			796	508	136	149	3			
2	D	96	Total	C	N	O	S	0	0	0
			732	471	123	136	2			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	0	MET	-	initiating methionine	UNP P61769
D	0	MET	-	initiating methionine	UNP P61769

- Molecule 3 is a protein called TCR-alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	187	Total	C	N	O	S	0	0	0
			1397	897	225	267	8			

Continued on next page...

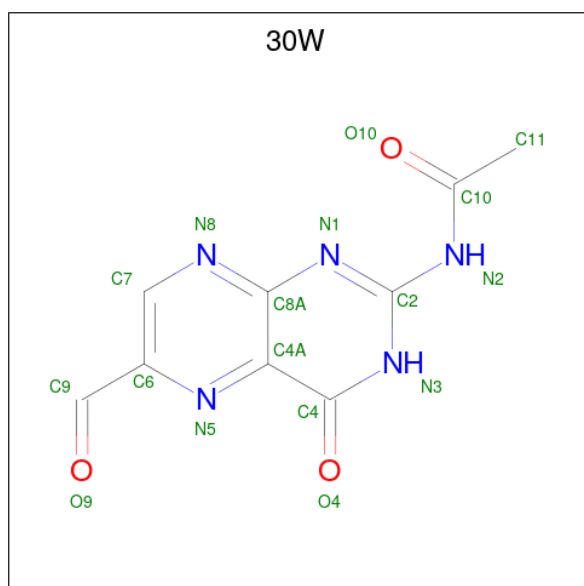
Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	G	198	Total	C	N	O	S	0	0	0
			1508	957	243	299	9			

- Molecule 4 is a protein called TCR-beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	237	Total	C	N	O	S	0	0	0
			1789	1131	310	339	9			
4	H	241	Total	C	N	O	S	0	0	0
			1840	1161	318	352	9			

- Molecule 5 is N-(6-formyl-4-oxo-3,4-dihydropteridin-2-yl)acetamide (CCD ID: 30W) (formula: C₉H₇N₅O₃).

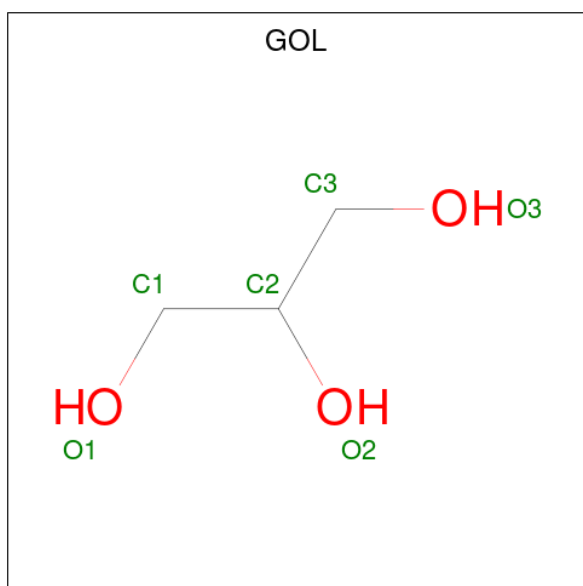


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			16	9	5	2		
5	C	1	Total	C	N	O	0	0
			16	9	5	2		

- Molecule 6 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

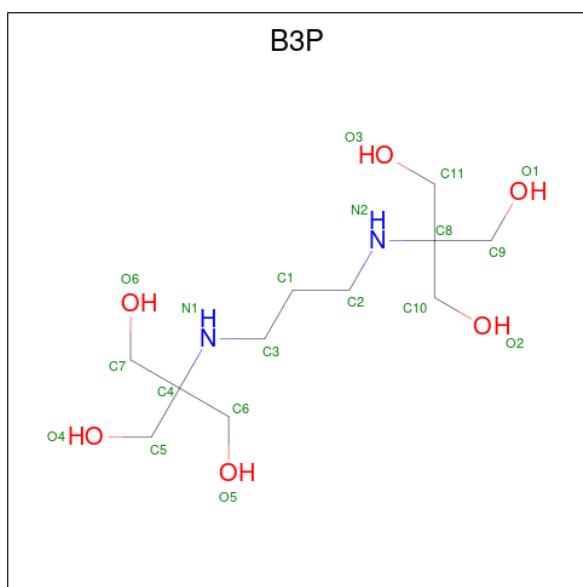
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Cl	0	0
			1	1		

- Molecule 7 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			6	3	3		
7	B	1	Total	C	O	0	0
			6	3	3		
7	B	1	Total	C	O	0	1
			12	6	6		
7	C	1	Total	C	O	0	0
			6	3	3		
7	C	1	Total	C	O	0	0
			6	3	3		
7	F	1	Total	C	O	0	0
			6	3	3		

- Molecule 8 is 2-[3-(2-HYDROXY-1,1-DIHYDROXYMETHYL-ETHYLAMINO)-PROPYLAMINO]-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: B3P) (formula: $C_{11}H_{26}N_2O_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	A	1	Total	C	N	O	0	0
			19	11	2	6		
8	C	1	Total	C	N	O	0	0
			19	11	2	6		

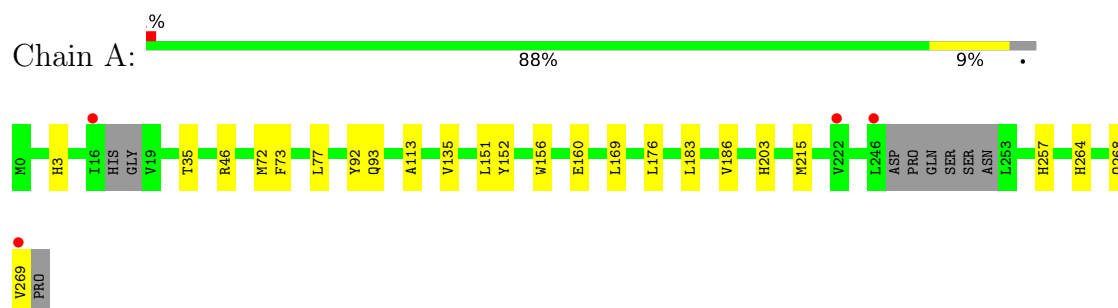
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	197	Total	O	0	0
			197	197		
9	B	79	Total	O	0	0
			79	79		
9	C	139	Total	O	0	0
			139	139		
9	D	34	Total	O	0	0
			34	34		
9	E	91	Total	O	0	0
			91	91		
9	F	92	Total	O	0	0
			92	92		
9	G	134	Total	O	0	0
			134	134		
9	H	144	Total	O	0	0
			144	144		

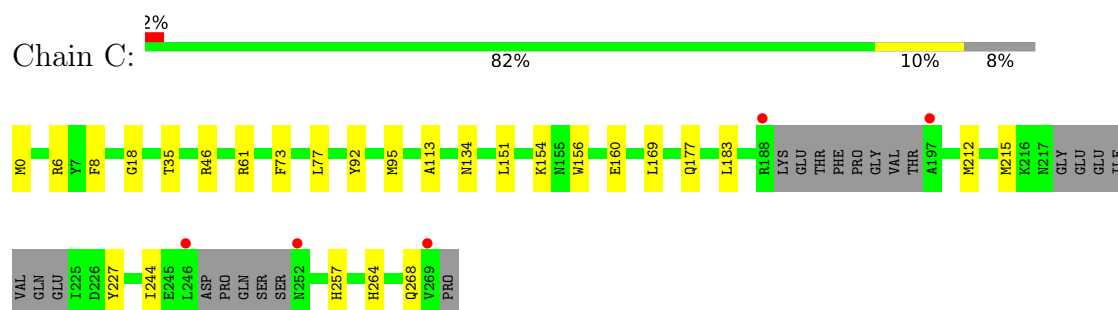
3 Residue-property plots [i](#)

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.

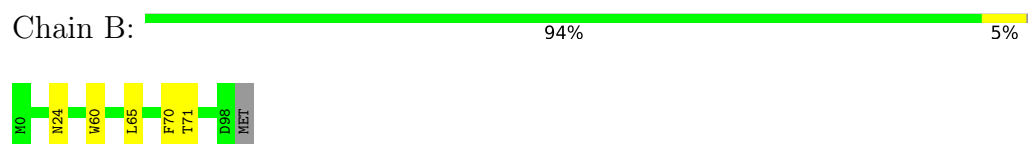
- Molecule 1: Major histocompatibility complex class I-related gene protein



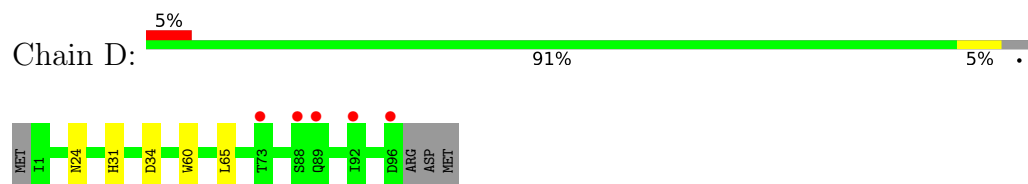
- Molecule 1: Major histocompatibility complex class I-related gene protein



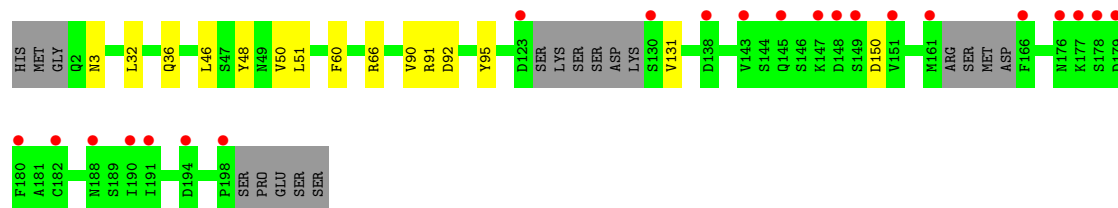
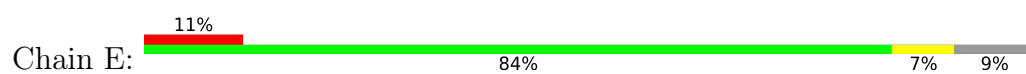
- Molecule 2: Beta-2-microglobulin



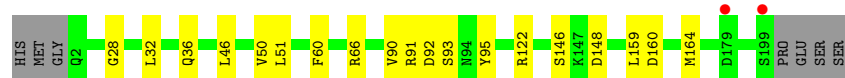
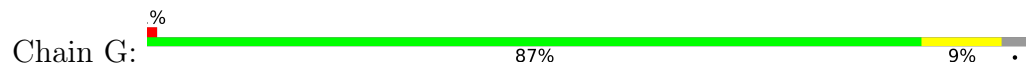
- Molecule 2: Beta-2-microglobulin



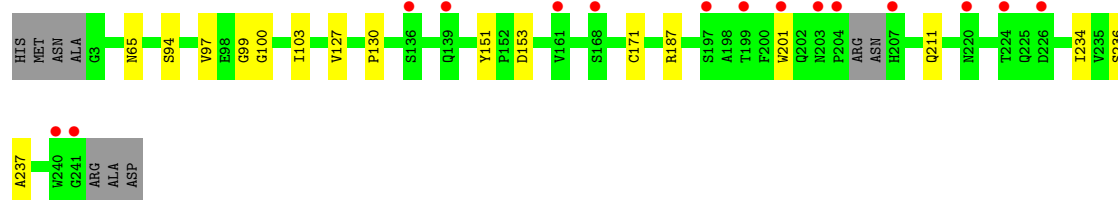
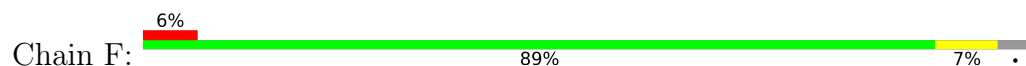
- Molecule 3: TCR-alpha



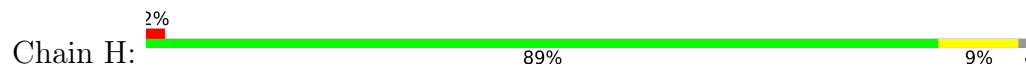
• Molecule 3: TCR-alpha



• Molecule 4: TCR-beta



• Molecule 4: TCR-beta



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	213.92Å 69.58Å 142.50Å 90.00° 103.74° 90.00°	Depositor
Resolution (Å)	32.94 – 2.25 32.94 – 2.25	Depositor EDS
% Data completeness (in resolution range)	99.8 (32.94-2.25) 99.8 (32.94-2.25)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.11 (at 2.24Å)	Xtriage
Refinement program	BUSTER 2.10.0	Depositor
R, R_{free}	0.170 , 0.203 0.174 , 0.205	Depositor DCC
R_{free} test set	4840 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	36.0	Xtriage
Anisotropy	0.486	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 61.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	13290	wwPDB-VP
Average B, all atoms (Å ²)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.55% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ 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: GOL, 30W, CL, B3P

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	0.81	0/2243	1.12	1/3047 (0.0%)
1	C	0.85	0/2086	1.14	2/2837 (0.1%)
2	B	0.79	0/819	1.10	2/1116 (0.2%)
2	D	0.74	0/755	1.10	0/1037
3	E	0.86	0/1429	1.07	2/1946 (0.1%)
3	G	0.86	0/1542	1.10	5/2097 (0.2%)
4	F	0.76	0/1835	1.09	2/2506 (0.1%)
4	H	0.79	0/1889	1.09	1/2579 (0.0%)
All	All	0.81	0/12598	1.10	15/17165 (0.1%)

There are no bond length outliers.

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	F	153	ASP	CA-CB-CG	7.23	119.83	112.60
3	G	92	ASP	CA-CB-CG	6.88	119.48	112.60
4	F	65	ASN	CA-CB-CG	6.57	119.17	112.60
2	B	70	PHE	CA-CB-CG	6.25	120.05	113.80
3	G	148	ASP	CA-C-N	5.29	127.37	120.28
3	G	148	ASP	C-N-CA	5.29	127.37	120.28
3	G	160	ASP	CA-CB-CG	5.24	117.84	112.60
4	H	116	ASP	CA-CB-CG	5.24	117.83	112.60
1	C	18	GLY	CA-C-N	5.23	131.81	122.13
1	C	18	GLY	C-N-CA	5.23	131.81	122.13
3	E	92	ASP	CA-CB-CG	5.22	117.82	112.60
2	B	71	THR	CB-CA-C	5.18	117.08	110.34
1	A	135	VAL	N-CA-C	-5.05	105.78	110.53
3	E	60	PHE	CA-CB-CG	5.03	118.83	113.80
3	G	60	PHE	CA-CB-CG	5.01	118.81	113.80

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	2179	0	2052	18	0
1	C	2026	0	1875	22	0
2	B	796	0	734	2	0
2	D	732	0	633	3	0
3	E	1397	0	1257	6	0
3	G	1508	0	1386	12	0
4	F	1789	0	1631	7	0
4	H	1840	0	1701	15	0
5	A	16	0	6	0	0
5	C	16	0	6	0	0
6	A	1	0	0	1	0
7	A	6	0	8	0	0
7	B	18	0	24	1	0
7	C	12	0	16	2	0
7	F	6	0	8	0	0
8	A	19	0	26	0	0
8	C	19	0	26	0	0
9	A	197	0	0	5	0
9	B	79	0	0	1	0
9	C	139	0	0	4	0
9	D	34	0	0	1	0
9	E	91	0	0	0	0
9	F	92	0	0	1	0
9	G	134	0	0	2	0
9	H	144	0	0	0	0
All	All	13290	0	11389	72	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 3.

All (72) 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)
3:G:164:MET:HE1	4:H:140:LYS:HE3	1.17	1.12
1:C:257:HIS:HD2	9:C:539:HOH:O	1.30	1.11
1:C:257:HIS:CD2	9:C:539:HOH:O	2.08	1.00
1:A:264:HIS:CE1	9:A:597:HOH:O	2.25	0.89
3:G:164:MET:CE	4:H:140:LYS:HE3	2.08	0.81
9:G:434:HOH:O	4:H:99:GLY:HA2	1.79	0.80
3:G:164:MET:HE1	4:H:140:LYS:CE	2.11	0.67
3:G:159:LEU:HB3	4:H:171:CYS:HB2	1.78	0.65
1:A:93:GLN:OE1	6:A:302:CL:CL	2.54	0.63
1:C:151:LEU:HD22	3:G:51:LEU:HD12	1.82	0.61
1:C:35:THR:HB	1:C:46:ARG:HD2	1.84	0.60
3:G:28:GLY:HA3	3:G:93:SER:HB3	1.83	0.60
4:H:127:VAL:HG23	4:H:237:ALA:HB3	1.84	0.58
1:C:264:HIS:CE1	9:C:539:HOH:O	2.56	0.58
4:F:127:VAL:HG23	4:F:237:ALA:HB3	1.89	0.55
1:A:151:LEU:HD22	3:E:51:LEU:HD12	1.90	0.54
3:G:91:ARG:HG2	3:G:95:TYR:HA	1.89	0.54
1:A:46[B]:ARG:NE	9:A:587:HOH:O	2.41	0.54
1:A:72:MET:HG2	9:F:423:HOH:O	2.08	0.54
1:C:0:MET:HE2	1:C:169:LEU:HD13	1.90	0.53
1:C:215:MET:HG3	1:C:257:HIS:CE1	2.43	0.53
1:A:113:ALA:HB2	2:B:60:TRP:CE2	2.44	0.53
1:C:113:ALA:HB2	2:D:60:TRP:CE2	2.44	0.52
1:C:8:PHE:CE2	1:C:95:MET:HG3	2.44	0.52
4:H:153:ASP:CG	4:H:176:PRO:HG3	2.37	0.50
1:A:169[A]:LEU:HD23	1:A:176:LEU:HD13	1.93	0.50
2:D:31:HIS:HD2	9:D:125:HOH:O	1.95	0.49
1:A:3:HIS:CD2	1:A:169[B]:LEU:HD21	2.48	0.49
1:C:35:THR:HB	1:C:46:ARG:CD	2.42	0.49
1:A:186:VAL:HG11	1:A:269:VAL:HG22	1.94	0.49
9:G:434:HOH:O	4:H:100:GLY:N	2.36	0.49
1:A:152:TYR:CD1	4:F:99:GLY:HA3	2.47	0.49
1:C:160:GLU:OE2	9:C:533:HOH:O	2.20	0.48
1:A:264:HIS:NE2	9:A:597:HOH:O	2.36	0.47
1:A:203:HIS:HE1	9:B:244:HOH:O	1.97	0.47
3:E:36:GLN:HB2	3:E:46:LEU:HD11	1.97	0.46
2:D:24:ASN:HB3	2:D:65:LEU:HD11	1.98	0.46
1:C:154:LYS:HD3	3:G:51:LEU:HD11	1.96	0.46
4:H:217:LEU:HD22	4:H:230:PRO:HD2	1.97	0.46
3:E:48:TYR:CE2	4:F:100:GLY:HA2	2.52	0.45
4:H:130:PRO:HD3	4:H:143:LEU:HG	1.98	0.45
1:A:35:THR:CG2	1:A:46[A]:ARG:HD3	2.47	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:151:TYR:HB2	4:F:187:ARG:HG2	1.99	0.45
1:C:212:MET:HB2	7:C:303:GOL:H12	1.99	0.44
4:F:94:SER:HB3	4:F:103:ILE:HD13	1.99	0.44
4:F:211:GLN:HG3	4:F:234:ILE:HG23	2.00	0.43
3:G:36:GLN:HB2	3:G:46:LEU:HD11	2.00	0.43
1:A:264:HIS:HE1	9:A:597:HOH:O	1.82	0.43
1:A:215:MET:HG3	1:A:257:HIS:CD2	2.52	0.43
2:B:24:ASN:HB3	2:B:65:LEU:HD11	2.01	0.43
1:C:61:ARG:HH22	4:H:97:VAL:HG11	1.84	0.43
4:F:130:PRO:HD2	4:F:201:TRP:CZ2	2.54	0.43
1:C:215:MET:HG3	1:C:257:HIS:ND1	2.34	0.43
1:C:215:MET:HE3	1:C:215:MET:HB3	1.97	0.42
3:E:50:VAL:O	3:E:66:ARG:HD3	2.20	0.42
3:E:91:ARG:HG2	3:E:95:TYR:HA	2.01	0.42
4:H:154:HIS:HB3	4:H:215:TYR:HB2	2.02	0.42
1:A:203:HIS:HD2	9:A:592:HOH:O	2.03	0.42
7:B:101:GOL:O2	1:C:134:ASN:ND2	2.53	0.42
4:H:211:GLN:HG3	4:H:234:ILE:HG23	2.01	0.42
1:C:0:MET:CE	1:C:169:LEU:HD13	2.49	0.41
1:C:0:MET:HE3	1:C:177:GLN:CD	2.45	0.41
1:A:156:TRP:HA	1:A:160:GLU:HB2	2.02	0.41
1:C:77:LEU:HD13	1:C:92:TYR:HB2	2.02	0.41
1:C:227:TYR:HD1	7:C:303:GOL:H11	1.85	0.41
1:C:156:TRP:HA	1:C:160:GLU:HB2	2.02	0.41
4:H:149:GLY:O	4:H:187:ARG:HD2	2.21	0.41
3:E:32:LEU:HD12	3:E:90:VAL:HG22	2.03	0.40
1:A:77:LEU:HD13	1:A:92:TYR:HB2	2.03	0.40
3:G:32:LEU:HD12	3:G:90:VAL:HG22	2.02	0.40
3:G:50:VAL:O	3:G:66:ARG:HD3	2.21	0.40
3:G:122:ARG:HB2	4:H:129:GLU:HB2	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	260/271 (96%)	252 (97%)	8 (3%)	0	100	100
1	C	242/271 (89%)	236 (98%)	6 (2%)	0	100	100
2	B	97/100 (97%)	97 (100%)	0	0	100	100
2	D	94/100 (94%)	94 (100%)	0	0	100	100
3	E	181/205 (88%)	179 (99%)	2 (1%)	0	100	100
3	G	196/205 (96%)	194 (99%)	2 (1%)	0	100	100
4	F	233/246 (95%)	229 (98%)	4 (2%)	0	100	100
4	H	239/246 (97%)	236 (99%)	3 (1%)	0	100	100
All	All	1542/1644 (94%)	1517 (98%)	25 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	227/241 (94%)	224 (99%)	3 (1%)	61	72
1	C	209/241 (87%)	204 (98%)	5 (2%)	43	54
2	B	86/95 (90%)	86 (100%)	0	100	100
2	D	72/95 (76%)	71 (99%)	1 (1%)	59	70
3	E	137/182 (75%)	134 (98%)	3 (2%)	45	56
3	G	159/182 (87%)	158 (99%)	1 (1%)	78	84
4	F	178/211 (84%)	175 (98%)	3 (2%)	53	65
4	H	190/211 (90%)	189 (100%)	1 (0%)	81	87
All	All	1258/1458 (86%)	1241 (99%)	17 (1%)	59	70

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	73	PHE
1	A	183	LEU
1	A	268	GLN
1	C	6	ARG
1	C	73	PHE
1	C	183	LEU
1	C	244	ILE
1	C	268	GLN
2	D	34	ASP
3	E	3	ASN
3	E	131	VAL
3	E	150	ASP
4	F	97	VAL
4	F	171	CYS
4	F	236	SER
3	G	146	SER
4	H	17	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (31) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	42	GLN
1	A	83	HIS
1	A	93	GLN
1	A	137	HIS
1	A	146	ASN
1	A	147	GLN
1	A	203	HIS
1	A	217	ASN
1	A	239	GLN
1	A	268	GLN
2	B	13	HIS
2	B	31	HIS
1	C	64	GLN
1	C	93	GLN
1	C	134	ASN
1	C	137	HIS
1	C	146	ASN
1	C	147	GLN
1	C	257	HIS
2	D	13	HIS
2	D	31	HIS
3	E	36	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
3	E	79	GLN
3	E	96	GLN
3	E	120	GLN
4	F	101	ASN
4	F	213	GLN
3	G	19	GLN
3	G	21	ASN
3	G	79	GLN
4	H	213	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](#)

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](#)

Of 12 ligands modelled in this entry, 1 is monoatomic - leaving 11 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	$\# Z > 2$
7	GOL	A	303	-	5,5,5	0.19	0	5,5,5	0.46	0
7	GOL	B	101	-	5,5,5	0.18	0	5,5,5	0.49	0
7	GOL	C	303	-	5,5,5	0.06	0	5,5,5	0.24	0
5	30W	A	301	1	16,17,18	0.65	0	18,24,25	2.08	4 (22%)
7	GOL	F	301	-	5,5,5	0.13	0	5,5,5	0.28	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
8	B3P	C	304	-	18,18,18	0.56	0	23,23,23	1.70	3 (13%)
5	30W	C	301	1	16,17,18	0.69	0	18,24,25	2.02	3 (16%)
7	GOL	C	302	-	5,5,5	0.12	0	5,5,5	0.22	0
7	GOL	B	102[A]	-	5,5,5	0.16	0	5,5,5	0.42	0
7	GOL	B	102[B]	-	5,5,5	0.15	0	5,5,5	0.24	0
8	B3P	A	304	-	18,18,18	0.59	0	23,23,23	1.29	3 (13%)

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
7	GOL	A	303	-	-	0/4/4/4	-
7	GOL	B	101	-	-	3/4/4/4	-
7	GOL	C	303	-	-	1/4/4/4	-
5	30W	A	301	1	-	0/4/4/6	0/2/2/2
7	GOL	F	301	-	-	2/4/4/4	-
8	B3P	C	304	-	-	4/28/28/28	-
5	30W	C	301	1	-	0/4/4/6	0/2/2/2
7	GOL	C	302	-	-	2/4/4/4	-
7	GOL	B	102[A]	-	-	1/4/4/4	-
7	GOL	B	102[B]	-	-	0/4/4/4	-
8	B3P	A	304	-	-	5/28/28/28	-

There are no bond length outliers.

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	301	30W	N2-C2-N3	7.14	129.96	117.96
5	C	301	30W	N2-C2-N3	6.88	129.54	117.96
8	C	304	B3P	C3-N1-C4	5.98	124.92	116.17
8	C	304	B3P	C2-N2-C8	4.01	122.04	116.17
8	A	304	B3P	C3-N1-C4	3.64	121.49	116.17
5	A	301	30W	N2-C2-N1	-3.44	112.32	117.87
5	C	301	30W	N2-C2-N1	-3.20	112.71	117.87
8	A	304	B3P	C5-C4-N1	-2.92	100.30	109.02
5	C	301	30W	C10-N2-C2	-2.60	122.13	127.56
8	A	304	B3P	C7-C4-N1	2.48	116.41	109.02
8	C	304	B3P	C7-C4-N1	2.42	116.23	109.02

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	301	30W	C10-N2-C2	-2.29	122.77	127.56
5	A	301	30W	C4A-C8A-N1	-2.02	120.36	123.19

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	B	101	GOL	C1-C2-C3-O3
7	B	101	GOL	O2-C2-C3-O3
7	F	301	GOL	C1-C2-C3-O3
8	A	304	B3P	C7-C4-N1-C3
8	A	304	B3P	N1-C4-C6-O5
8	C	304	B3P	C2-C1-C3-N1
7	C	302	GOL	O1-C1-C2-C3
8	A	304	B3P	C5-C4-N1-C3
8	C	304	B3P	C1-C3-N1-C4
7	B	101	GOL	O1-C1-C2-O2
8	C	304	B3P	C3-C1-C2-N2
7	B	102[A]	GOL	O1-C1-C2-O2
7	F	301	GOL	O2-C2-C3-O3
8	A	304	B3P	C5-C4-C6-O5
8	C	304	B3P	C7-C4-C5-O4
7	C	303	GOL	C1-C2-C3-O3
7	C	302	GOL	O1-C1-C2-O2
8	A	304	B3P	C6-C4-N1-C3

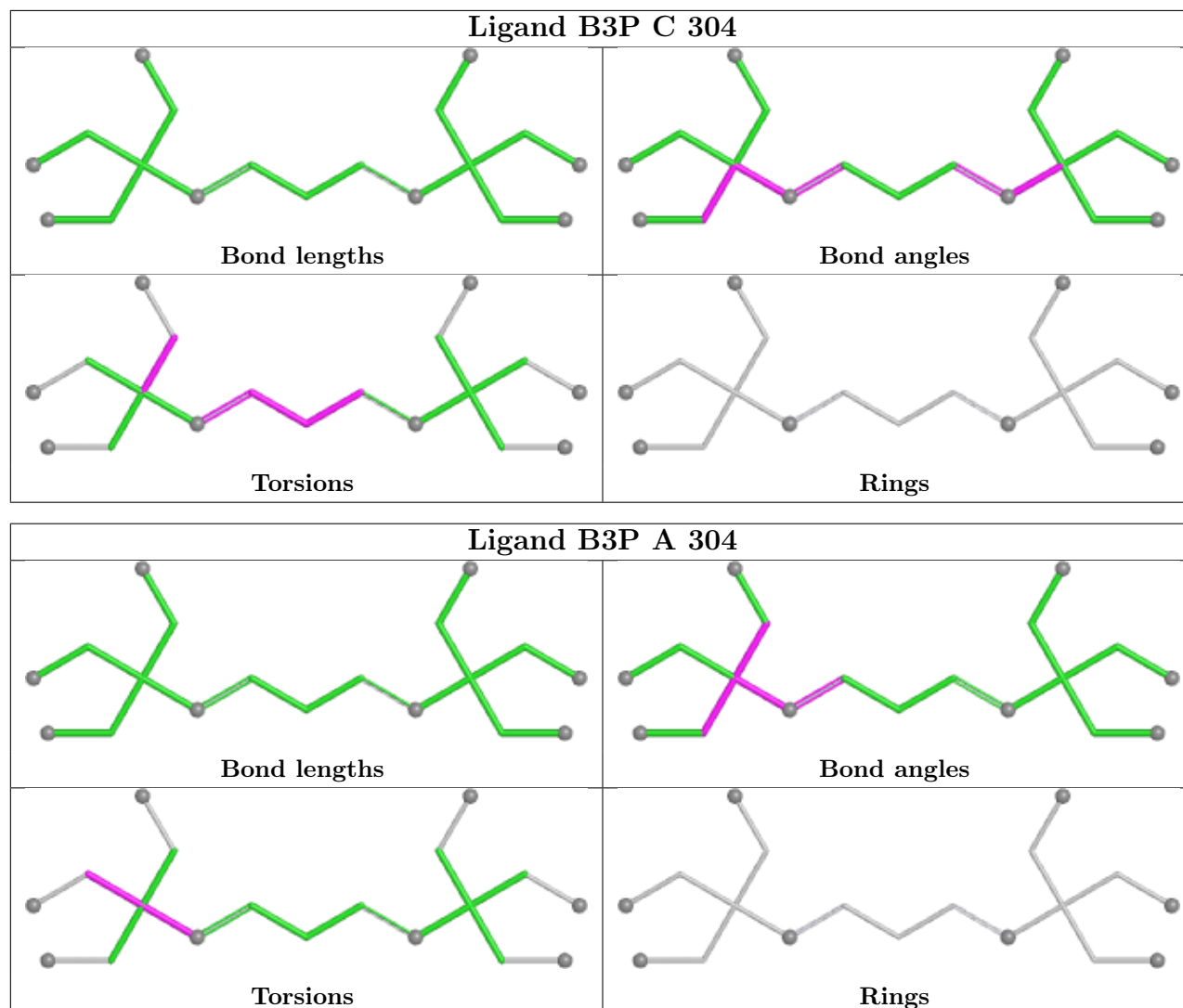
There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	101	GOL	1	0
7	C	303	GOL	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 than 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.



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, 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	262/271 (96%)	-0.29	4 (1%) 72 73	17, 36, 62, 79	5 (1%)
1	C	250/271 (92%)	-0.14	5 (2%) 65 65	27, 41, 72, 92	1 (0%)
2	B	99/100 (99%)	-0.33	0 100 100	27, 41, 66, 74	0
2	D	96/100 (96%)	0.49	5 (5%) 33 31	34, 63, 100, 110	0
3	E	187/205 (91%)	0.39	22 (11%) 9 8	26, 52, 93, 116	0
3	G	198/205 (96%)	-0.26	2 (1%) 79 81	28, 39, 64, 83	0
4	F	237/246 (96%)	0.21	15 (6%) 26 24	30, 48, 96, 125	2 (0%)
4	H	241/246 (97%)	-0.18	4 (1%) 69 70	29, 41, 62, 81	2 (0%)
All	All	1570/1644 (95%)	-0.05	57 (3%) 46 46	17, 42, 83, 125	10 (0%)

All (57) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	96	ASP	5.8
3	E	123	ASP	5.8
3	G	199	SER	5.4
1	A	16	ILE	5.1
4	F	241	GLY	4.7
1	C	252	ASN	4.5
1	A	246	LEU	4.0
1	C	246	LEU	3.9
3	E	178	SER	3.7
4	F	199	THR	3.6
1	A	222	VAL	3.3
3	E	191	ILE	3.3
4	F	224	THR	3.1
3	E	149	SER	3.1
3	E	148	ASP	3.1
3	E	177	LYS	3.0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
3	E	198	PRO	3.0
4	F	204	PRO	2.9
4	F	136	SER	2.9
3	E	182	CYS	2.9
1	C	269	VAL	2.8
2	D	73	THR	2.7
4	H	184	ASN	2.7
3	E	161	MET	2.7
3	E	130	SER	2.7
4	F	207	HIS	2.6
3	E	188	ASN	2.6
3	E	138	ASP	2.6
3	G	179	ASP	2.5
4	F	203	ASN	2.5
4	H	99	GLY	2.5
4	F	139	GLN	2.5
3	E	180	PHE	2.4
4	F	226	ASP	2.4
2	D	92	ILE	2.4
4	H	185	ASP	2.4
4	F	168	SER	2.4
3	E	151	VAL	2.4
1	C	188	ARG	2.4
1	A	269	VAL	2.3
3	E	166	PHE	2.2
3	E	179	ASP	2.2
3	E	194	ASP	2.2
2	D	89	GLN	2.2
4	H	243	ALA	2.2
4	F	240	TRP	2.1
3	E	145	GLN	2.1
2	D	88	SER	2.1
3	E	147	LYS	2.1
3	E	143	VAL	2.1
4	F	220	ASN	2.1
4	F	161	VAL	2.1
4	F	197	SER	2.1
3	E	190	ILE	2.1
3	E	176	ASN	2.0
4	F	201	TRP	2.0
1	C	197	ALA	2.0

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

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

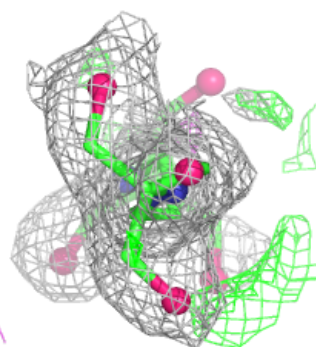
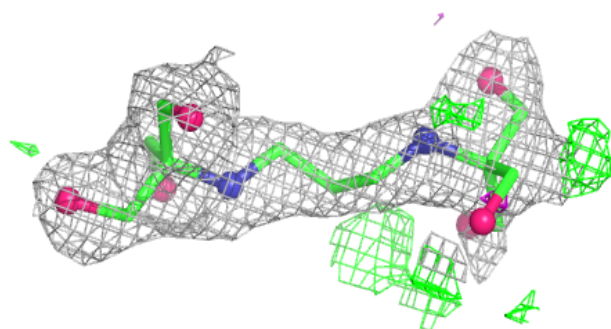
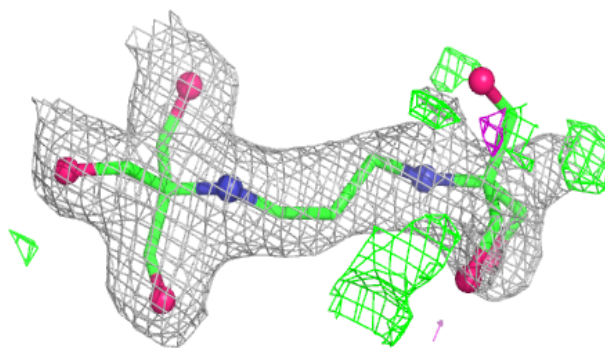
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
7	GOL	B	102[A]	6/6	0.65	0.32	31,35,35,36	6
7	GOL	B	102[B]	6/6	0.65	0.32	10,14,14,15	6
7	GOL	F	301	6/6	0.79	0.19	69,74,74,75	0
8	B3P	C	304	19/19	0.89	0.13	35,52,82,84	0
7	GOL	C	303	6/6	0.90	0.12	61,70,73,73	0
8	B3P	A	304	19/19	0.91	0.12	36,42,69,69	0
7	GOL	C	302	6/6	0.91	0.14	65,70,72,72	0
7	GOL	A	303	6/6	0.92	0.11	40,43,48,49	0
7	GOL	B	101	6/6	0.93	0.11	37,40,42,46	0
5	30W	C	301	16/17	0.97	0.06	27,32,36,36	0
5	30W	A	301	16/17	0.98	0.05	28,30,34,36	0
6	CL	A	302	1/1	0.99	0.18	48,48,48,48	0

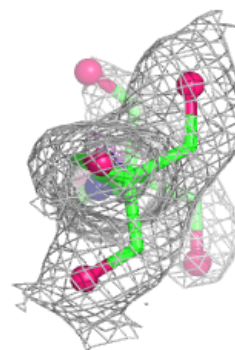
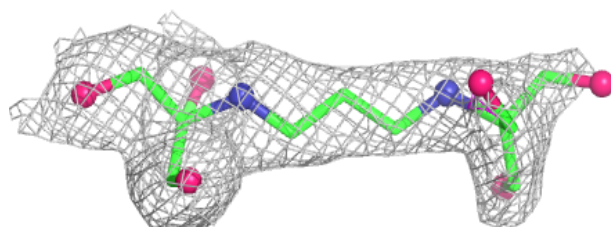
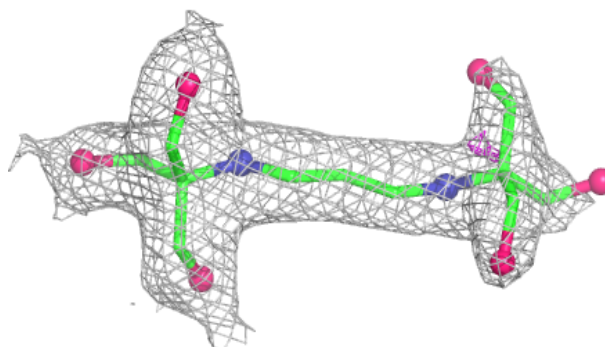
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around B3P C 304:

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

**Electron density around B3P A 304:**

$2mF_o-DF_c$ (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.