



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 4, 2023 – 12:07 PM EDT

PDB ID : 6PUF
Title : Structure of human MAIT A-F7 TCR in complex with human MR1-5'D-5-OP-RU
Authors : Awad, W.; Rossjohn, J.
Deposited on : 2019-07-18
Resolution : 1.92 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)
Xtrriage (Phenix) : 1.13
EDS : 2.35.1
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) : 2.35.1

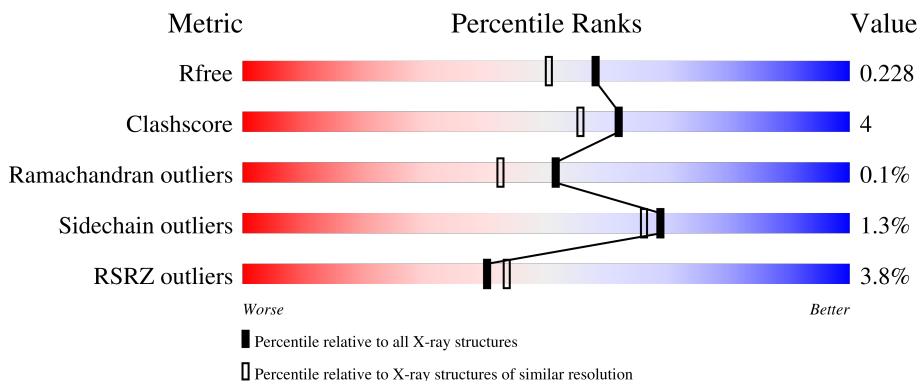
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.92 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	7937 (1.94-1.90)
Clashscore	141614	8644 (1.94-1.90)
Ramachandran outliers	138981	8530 (1.94-1.90)
Sidechain outliers	138945	8530 (1.94-1.90)
RSRZ outliers	127900	7793 (1.94-1.90)

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	F	100	
3	D	204	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
3	G	204	 89% 8% ..
4	E	246	 5% 82% 15% •
4	H	246	 90% 9%

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 14924 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
			Total	C	N	O	S			
1	A	265	2174	1392	373	397	12	0	6	0
1	C	265	2232	1439	378	404	11	1	10	0

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	conflict	UNP Q95460
C	0	MET	-	initiating methionine	UNP Q95460
C	261	SER	CYS	conflict	UNP Q95460

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	97	793	510	130	150	3	0	2	0
2	F	100	825	526	139	156	4	0	2	0

There are 2 discrepancies between the modelled and reference sequences:

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

- Molecule 3 is a protein called Human TCR alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	D	188	1447	928	230	279	10	0	7	0

Continued on next page...

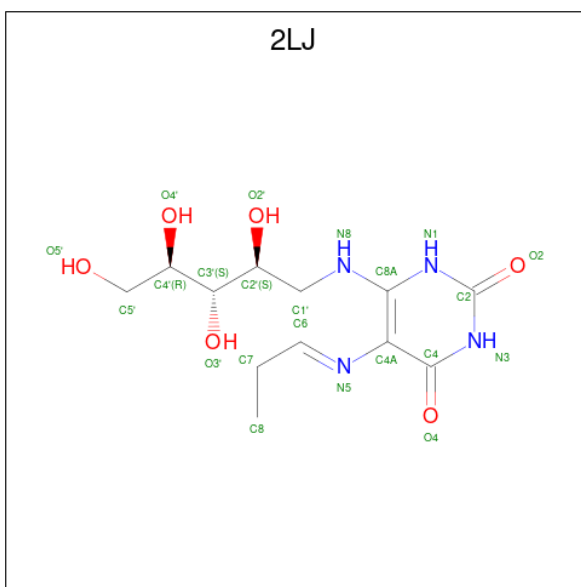
Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	G	200	Total 1583	C 1003	N 250	O 320	S 10	0	8	0

- Molecule 4 is a protein called Human TCR beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	E	240	Total 1859	C 1173	N 316	O 361	S 9	0	3	0
4	H	245	Total 1931	C 1217	N 336	O 365	S 13	0	4	0

- Molecule 5 is 1-deoxy-1-({2,6-dioxo-5-[(E)-propylideneamino]-1,2,3,6-tetrahydropyrimidin-4-yl}amino)-D-ribitol (three-letter code: 2LJ) (formula: C₁₂H₂₀N₄O₆) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	A	1	Total 21	C 12	N 4	O 5	0	0
5	C	1	Total 21	C 12	N 4	O 5	0	0

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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	C	1	Total C O 6 3 3	0	0
6	F	1	Total C O 6 3 3	0	0
6	F	1	Total C O 6 3 3	0	0
6	H	1	Total C O 6 3 3	0	0

- Molecule 7 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	F	1	Total Na 1 1	0	0
7	H	1	Total Na 1 1	0	0

- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	331	Total O 331 331	0	0

Continued on next page...

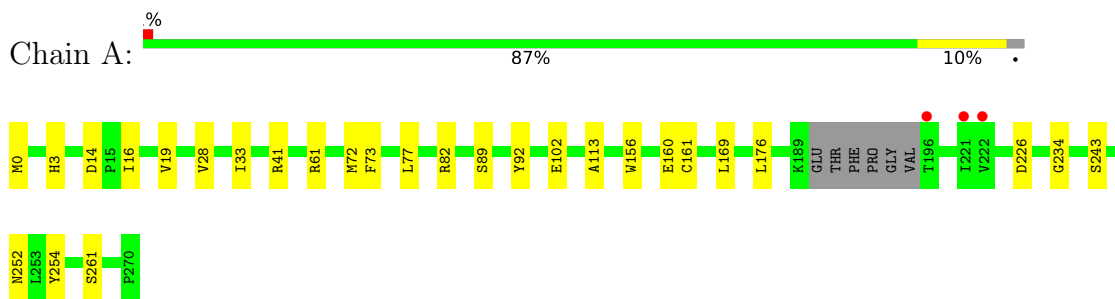
Continued from previous page...

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	B	99	Total 99	O 99	0	0
8	C	354	Total 354	O 354	0	0
8	D	180	Total 180	O 180	0	0
8	E	201	Total 201	O 201	0	0
8	F	165	Total 165	O 165	0	0
8	G	306	Total 306	O 306	0	0
8	H	364	Total 364	O 364	0	0

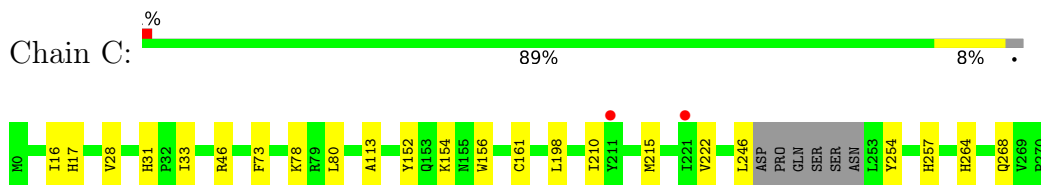
3 Residue-property plots [i](#)

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.

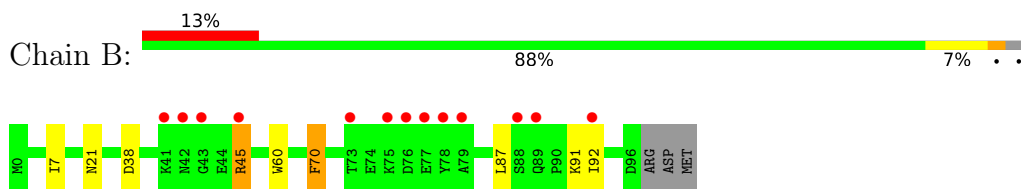
- Molecule 1: Major histocompatibility complex class I-related gene protein



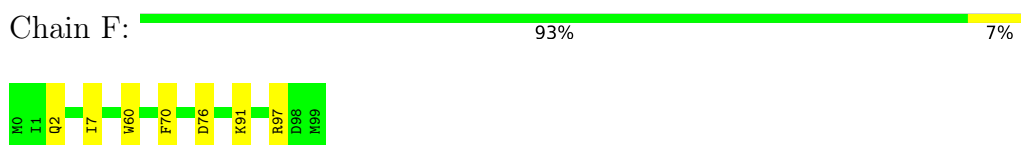
- Molecule 1: Major histocompatibility complex class I-related gene protein



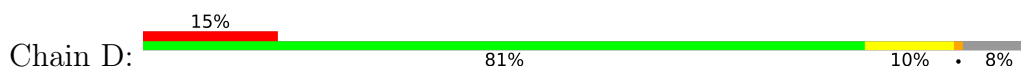
- Molecule 2: Beta-2-microglobulin

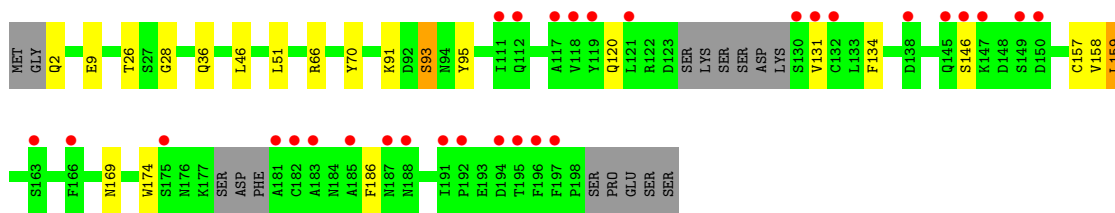


- Molecule 2: Beta-2-microglobulin

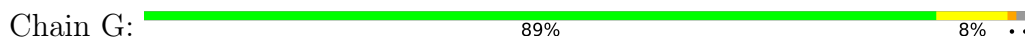


- Molecule 3: Human TCR alpha chain

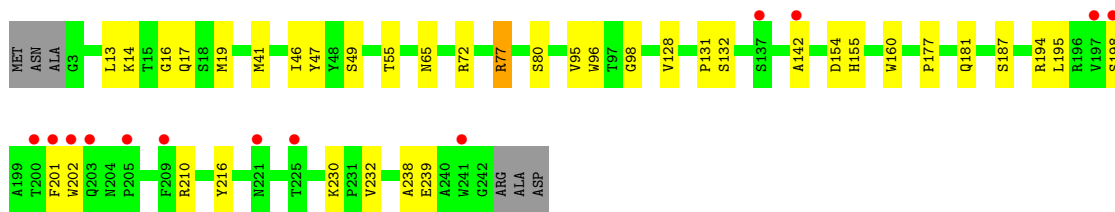
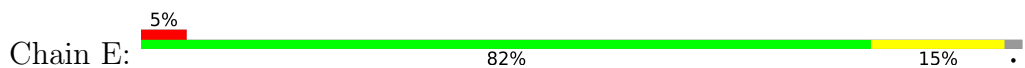




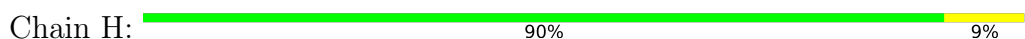
• Molecule 3: Human TCR alpha chain



• Molecule 4: Human TCR beta chain



• Molecule 4: Human TCR beta chain



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	216.03Å 69.81Å 142.94Å 90.00° 104.26° 90.00°	Depositor
Resolution (Å)	47.81 – 1.92 47.81 – 1.92	Depositor EDS
% Data completeness (in resolution range)	99.4 (47.81-1.92) 99.4 (47.81-1.92)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.96 (at 1.92Å)	Xtrriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.178 , 0.221 0.188 , 0.228	Depositor DCC
R_{free} test set	7940 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å ²)	23.0	Xtrriage
Anisotropy	0.217	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 52.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	14924	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.14% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, 2LJ, NA

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	0.32	0/2256	0.49	0/3068
1	C	0.31	0/2330	0.51	0/3167
2	B	0.28	0/822	0.48	0/1122
2	F	0.31	0/854	0.50	0/1161
3	D	0.31	0/1499	0.51	0/2038
3	G	0.34	0/1642	0.54	1/2229 (0.0%)
4	E	0.30	0/1918	0.49	0/2617
4	H	0.33	0/2000	0.53	0/2721
All	All	0.32	0/13321	0.51	1/18123 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
3	G	159	LEU	CA-CB-CG	5.11	127.05	115.30

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	2174	0	2055	21	0
1	C	2232	0	2142	18	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	793	0	738	7	0
2	F	825	0	775	6	0
3	D	1447	0	1345	12	0
3	G	1583	0	1499	12	0
4	E	1859	0	1719	22	0
4	H	1931	0	1823	16	0
5	A	21	0	15	2	0
5	C	21	0	15	2	0
6	A	12	0	16	0	0
6	C	6	0	8	0	0
6	F	12	0	15	2	0
6	H	6	0	8	2	0
7	F	1	0	0	0	0
7	H	1	0	0	0	0
8	A	331	0	0	3	0
8	B	99	0	0	5	0
8	C	354	0	0	5	0
8	D	180	0	0	3	0
8	E	201	0	0	4	0
8	F	165	0	0	2	0
8	G	306	0	0	4	0
8	H	364	0	0	2	0
All	All	14924	0	12173	109	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 4.

All (109) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:222:VAL:HA	4:H:200:THR:HG21	1.67	0.77
1:A:41:ARG:NH2	8:A:401:HOH:O	2.17	0.76
3:G:19:GLN:NE2	8:G:302:HOH:O	2.17	0.72
2:B:92:ILE:O	8:B:101:HOH:O	2.11	0.69
3:G:138[B]:ASP:OD1	8:G:301:HOH:O	2.11	0.68
1:C:46[B]:ARG:NH1	8:C:401:HOH:O	2.23	0.68
1:A:3:HIS:CD2	1:A:169[B]:LEU:HD21	2.29	0.67
4:H:44:ARG:HH12	6:H:301:GOL:H31	1.59	0.67
4:H:210:ARG:NH1	4:H:212:GLN:OE1	2.29	0.66
1:A:77:LEU:HD13	1:A:92:TYR:HB2	1.78	0.65
1:A:72:MET:SD	8:H:668:HOH:O	2.54	0.65

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:21:ASN:OD1	8:B:102:HOH:O	2.15	0.64
4:E:72:ARG:NH1	8:E:304:HOH:O	2.29	0.60
2:F:2:GLN:OE1	8:F:201:HOH:O	2.16	0.59
4:E:198:SER:OG	4:E:201:PHE:HB2	2.03	0.59
1:A:0:MET:O	1:A:102:GLU:HG3	2.03	0.59
1:C:156:TRP:CZ2	5:C:301:2LJ:H9	2.40	0.57
4:H:6:GLN:HB3	4:H:91[B]:CYS:SG	2.45	0.57
4:E:41:MET:SD	8:E:477:HOH:O	2.58	0.56
1:A:113:ALA:HB2	2:B:60:TRP:CE2	2.41	0.56
2:B:87:LEU:O	8:B:103:HOH:O	2.18	0.55
2:B:38:ASP:HB3	2:B:45:ARG:HG3	1.89	0.54
3:G:159:LEU:HB3	4:H:172:CYS:HB2	1.90	0.54
1:A:41:ARG:NH1	8:A:402:HOH:O	2.18	0.54
3:G:148:ASP:OD2	3:G:177:LYS:NZ	2.31	0.53
1:C:268[A]:GLN:NE2	8:C:413:HOH:O	2.41	0.53
4:E:72:ARG:NE	8:E:311:HOH:O	2.39	0.53
4:E:98:GLY:N	8:E:306:HOH:O	2.33	0.53
3:D:120:GLN:O	4:E:132:SER:HB2	2.08	0.53
2:F:97:ARG:NH2	8:F:210:HOH:O	2.42	0.53
4:H:44:ARG:NH1	6:H:301:GOL:H31	2.24	0.53
1:C:264:HIS:HB2	8:C:419:HOH:O	2.09	0.52
3:D:91:LYS:HG2	3:D:95:TYR:HA	1.91	0.52
3:D:2:GLN:HG2	3:D:26:THR:HA	1.91	0.51
1:C:154:LYS:HD3	3:D:51:LEU:HD11	1.93	0.51
3:G:150:ASP:HB2	3:G:177:LYS:HD3	1.91	0.50
4:H:128:VAL:HG23	4:H:238:ALA:HB3	1.93	0.50
1:A:156:TRP:CZ2	5:A:301:2LJ:H9	2.47	0.50
1:A:19:VAL:HG11	8:B:160:HOH:O	2.12	0.49
3:G:193:GLU:OE1	8:G:303:HOH:O	2.19	0.49
5:A:301:2LJ:O4	5:A:301:2LJ:H1	2.13	0.49
4:H:23:CYS:SG	4:H:91[B]:CYS:SG	3.11	0.49
1:C:113:ALA:HB2	2:F:60:TRP:CE2	2.48	0.48
4:E:131:PRO:HD2	4:E:202:TRP:CZ2	2.49	0.48
1:C:16:ILE:HD12	1:C:17:HIS:O	2.13	0.48
1:A:169[B]:LEU:HD12	1:A:176:LEU:HD13	1.94	0.48
3:D:28:GLY:HA3	3:D:93[B]:SER:HB3	1.96	0.48
4:E:14:LYS:O	4:E:17:GLN:HB2	2.14	0.47
4:E:128:VAL:HG23	4:E:238:ALA:HB3	1.95	0.47
1:A:28:VAL:HG23	1:A:33:ILE:HD13	1.94	0.47
1:C:210:ILE:O	4:H:206[B]:ARG:HD2	2.14	0.47
1:C:215:MET:HG3	1:C:257:HIS:CD2	2.49	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:159:LEU:HD23	8:D:303:HOH:O	2.15	0.47
4:E:154:ASP:OD1	4:E:177:PRO:HG2	2.15	0.47
2:F:76:ASP:O	2:F:97:ARG:NH1	2.48	0.47
4:E:95:VAL:HG12	4:E:96:TRP:CD1	2.50	0.46
4:E:155:HIS:HB3	4:E:216:TYR:HB2	1.98	0.46
3:G:138[A]:ASP:OD2	8:G:304:HOH:O	2.20	0.46
4:H:9:LYS:HG2	4:H:10:PHE:CE2	2.50	0.46
4:E:131:PRO:HG2	4:E:142:ALA:HB1	1.98	0.46
4:H:8:PRO:HD2	4:H:21:LEU:HD22	1.98	0.46
5:C:301:2LJ:O4	5:C:301:2LJ:H1	2.15	0.46
4:E:46:ILE:HG22	4:E:47:TYR:HD1	1.81	0.45
1:A:0:MET:SD	1:A:169[B]:LEU:HD23	2.57	0.45
4:E:49:SER:HB2	4:E:55:THR:HG22	1.98	0.45
1:A:252:ASN:HB2	1:A:254:TYR:CE2	2.52	0.45
1:C:28:VAL:HG23	1:C:33:ILE:HD13	1.98	0.45
3:G:89:ALA:HB1	3:G:97:LEU:HD22	1.98	0.45
1:C:78:LYS:NZ	8:C:420:HOH:O	2.49	0.45
4:E:13:LEU:HD11	4:E:19:MET:HB2	1.99	0.45
3:D:9:GLU:OE2	8:D:301:HOH:O	2.21	0.45
3:D:36:GLN:HB2	3:D:46:LEU:HD11	1.98	0.44
4:E:65:ASN:OD1	4:E:77:ARG:NH1	2.49	0.44
4:H:120:ASN:HB2	8:H:466:HOH:O	2.16	0.44
4:E:181:GLN:O	4:E:187:SER:HB2	2.17	0.44
2:F:7:ILE:HB	6:F:101:GOL:H2	2.00	0.44
4:H:159:SER:OG	4:H:212:GLN:HG2	2.18	0.44
3:D:134:PHE:HB2	3:D:186:PHE:CE2	2.52	0.44
1:C:246:LEU:HD22	1:C:254:TYR:CE2	2.53	0.43
1:A:156:TRP:CZ3	1:A:161:CYS:HB2	2.53	0.43
4:E:160:TRP:CE2	4:E:195:LEU:HB2	2.52	0.43
3:D:131:VAL:HG22	3:D:174:TRP:HB3	2.00	0.43
4:E:16:GLY:HA2	4:E:80:SER:OG	2.19	0.43
3:G:147:LYS:HG3	3:G:188:ASN:OD1	2.18	0.43
1:A:3:HIS:CG	1:A:169[A]:LEU:HD21	2.53	0.43
3:D:158:VAL:HG22	3:D:169:ASN:OD1	2.19	0.43
4:E:230:LYS:HG2	4:E:232:VAL:HG13	2.01	0.43
3:G:2:GLN:HA	3:G:25:GLN:O	2.19	0.43
4:E:210:ARG:HG3	4:E:239:GLU:HB3	2.00	0.42
2:F:91:LYS:HD3	6:F:101:GOL:H31	2.01	0.42
2:B:21:ASN:HB3	2:B:70:PHE:CE1	2.55	0.42
1:C:31:HIS:HE1	8:C:588:HOH:O	2.03	0.42
1:C:222:VAL:HG12	1:C:222:VAL:O	2.19	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:14:ASP:HB3	1:A:89:SER:HB2	2.02	0.42
4:H:174:ASP:HB2	4:H:191:LEU:HD12	2.00	0.42
1:C:80:LEU:HD23	1:C:80:LEU:HA	1.88	0.42
1:C:198:LEU:CD1	1:C:246:LEU:HD21	2.50	0.42
3:D:66[B]:ARG:NH2	8:D:321:HOH:O	2.53	0.41
2:B:7:ILE:HD12	2:B:91:LYS:HD2	2.02	0.41
4:H:224:TRP:CZ2	4:H:226:GLN:HB2	2.55	0.41
3:G:60:PHE:CD1	3:G:75:LEU:HD22	2.55	0.41
1:A:160:GLU:OE2	8:A:403:HOH:O	2.22	0.41
1:C:156:TRP:CZ3	1:C:161:CYS:HB2	2.56	0.41
1:A:234:GLY:HA3	8:B:112:HOH:O	2.21	0.41
1:A:226:ASP:HB3	1:A:243:SER:OG	2.21	0.40
1:A:61[B]:ARG:HD2	1:A:61[B]:ARG:HA	1.81	0.40
3:G:28:GLY:HA3	3:G:93[A]:SER:OG	2.21	0.40
4:H:125:GLU:O	4:H:148:ALA:HA	2.21	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	267/271 (98%)	261 (98%)	5 (2%)	1 (0%)	34	24
1	C	271/271 (100%)	265 (98%)	6 (2%)	0	100	100
2	B	97/100 (97%)	95 (98%)	2 (2%)	0	100	100
2	F	100/100 (100%)	99 (99%)	1 (1%)	0	100	100
3	D	189/204 (93%)	181 (96%)	8 (4%)	0	100	100
3	G	206/204 (101%)	202 (98%)	4 (2%)	0	100	100
4	E	241/246 (98%)	234 (97%)	7 (3%)	0	100	100
4	H	249/246 (101%)	246 (99%)	3 (1%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	1620/1642 (99%)	1583 (98%)	36 (2%)	1 (0%)	51 42

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	16	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	230/241 (95%)	228 (99%)	2 (1%)	78 78
1	C	241/241 (100%)	238 (99%)	3 (1%)	71 69
2	B	87/95 (92%)	85 (98%)	2 (2%)	50 43
2	F	92/95 (97%)	91 (99%)	1 (1%)	73 72
3	D	152/181 (84%)	145 (95%)	7 (5%)	27 16
3	G	179/181 (99%)	176 (98%)	3 (2%)	60 55
4	E	197/212 (93%)	195 (99%)	2 (1%)	76 75
4	H	207/212 (98%)	204 (99%)	3 (1%)	67 63
All	All	1385/1458 (95%)	1362 (98%)	23 (2%)	69 55

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	73	PHE
1	A	82	ARG
2	B	45	ARG
2	B	70	PHE
1	C	73[A]	PHE
1	C	73[B]	PHE
1	C	152	TYR
3	D	70	TYR
3	D	93[A]	SER

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
3	D	93[B]	SER
3	D	146	SER
3	D	157[A]	CYS
3	D	157[B]	CYS
3	D	159	LEU
4	E	77	ARG
4	E	194	ARG
2	F	70	PHE
3	G	93[A]	SER
3	G	93[B]	SER
3	G	162	ARG
4	H	194	ARG
4	H	206[A]	ARG
4	H	206[B]	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
3	D	120	GLN
3	D	187	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](#)

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
5	2LJ	A	301	1	19,21,22	1.36	2 (10%)	17,28,29	0.74	0
6	GOL	F	101	-	5,5,5	0.94	0	5,5,5	1.40	1 (20%)
6	GOL	H	301	-	5,5,5	0.86	0	5,5,5	1.12	1 (20%)
5	2LJ	C	301	1	19,21,22	1.21	1 (5%)	17,28,29	0.87	2 (11%)
6	GOL	F	102	-	5,5,5	1.10	0	5,5,5	0.87	0
6	GOL	A	303	-	5,5,5	0.86	0	5,5,5	0.99	0
6	GOL	C	302	-	5,5,5	0.84	0	5,5,5	0.94	0
6	GOL	A	302	-	5,5,5	0.87	0	5,5,5	1.02	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
5	2LJ	A	301	1	-	1/16/17/19	0/1/1/1
6	GOL	F	101	-	-	2/4/4/4	-
6	GOL	H	301	-	-	1/4/4/4	-
5	2LJ	C	301	1	-	1/16/17/19	0/1/1/1
6	GOL	F	102	-	-	0/4/4/4	-
6	GOL	A	303	-	-	2/4/4/4	-
6	GOL	C	302	-	-	0/4/4/4	-
6	GOL	A	302	-	-	0/4/4/4	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	301	2LJ	C8A-N8	5.02	1.39	1.32
5	C	301	2LJ	C8A-N8	4.77	1.39	1.32
5	A	301	2LJ	C7-C6	-2.85	1.46	1.49

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	301	2LJ	C2'-C1'-N8	2.21	117.86	111.52

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	301	2LJ	C8-C7-C6	2.10	117.46	113.75
6	F	101	GOL	C3-C2-C1	-2.08	103.63	111.70
6	H	301	GOL	C3-C2-C1	-2.03	103.82	111.70

There are no chirality outliers.

All (7) torsion outliers are listed below:

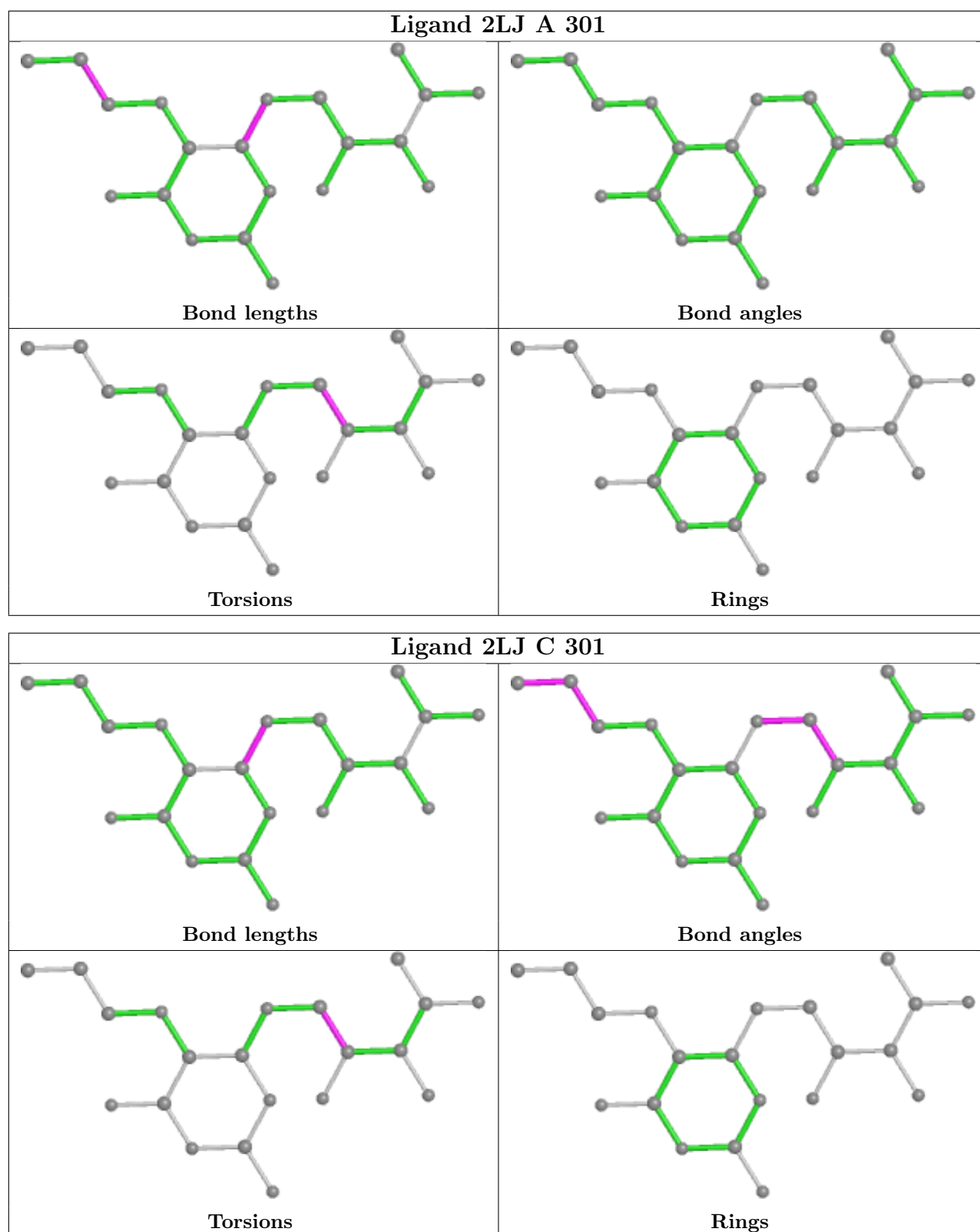
Mol	Chain	Res	Type	Atoms
5	A	301	2LJ	N8-C1'-C2'-C3'
6	A	303	GOL	C1-C2-C3-O3
6	F	101	GOL	O1-C1-C2-O2
6	F	101	GOL	O1-C1-C2-C3
5	C	301	2LJ	N8-C1'-C2'-C3'
6	A	303	GOL	O2-C2-C3-O3
6	H	301	GOL	O1-C1-C2-C3

There are no ring outliers.

4 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	301	2LJ	2	0
6	F	101	GOL	2	0
6	H	301	GOL	2	0
5	C	301	2LJ	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 [i](#)

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	265/271 (97%)	-0.30	3 (1%) 80 82	12, 25, 59, 81	1 (0%)
1	C	265/271 (97%)	-0.42	2 (0%) 86 87	13, 21, 45, 66	4 (1%)
2	B	97/100 (97%)	0.58	13 (13%) 3 3	18, 42, 71, 74	0
2	F	100/100 (100%)	-0.35	0 100 100	15, 26, 45, 59	1 (1%)
3	D	188/204 (92%)	0.45	30 (15%) 1 2	16, 36, 76, 97	1 (0%)
3	G	200/204 (98%)	-0.55	0 100 100	12, 21, 44, 56	4 (2%)
4	E	240/246 (97%)	0.08	13 (5%) 25 29	19, 37, 74, 88	5 (2%)
4	H	245/246 (99%)	-0.27	0 100 100	12, 22, 40, 74	4 (1%)
All	All	1600/1642 (97%)	-0.15	61 (3%) 40 43	12, 26, 65, 97	20 (1%)

All (61) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	D	150	ASP	5.6
3	D	197	PHE	5.2
3	D	191	ILE	4.8
1	A	222	VAL	4.8
2	B	73	THR	3.9
4	E	205	PRO	3.9
4	E	200	THR	3.9
3	D	131	VAL	3.7
2	B	78	TYR	3.6
3	D	117	ALA	3.6
2	B	77	GLU	3.5
3	D	185	ALA	3.5
2	B	79	ALA	3.4
3	D	175	SER	3.4
3	D	119	TYR	3.4
2	B	76	ASP	3.3

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
4	E	201	PHE	3.2
2	B	92	ILE	3.2
3	D	187	ASN	3.1
3	D	163	SER	3.1
4	E	241	TRP	3.1
3	D	121	LEU	3.1
2	B	88	SER	3.0
3	D	147	LYS	3.0
4	E	209	PHE	2.9
4	E	137	SER	2.9
4	E	198	SER	2.9
3	D	132	CYS	2.9
3	D	149	SER	2.8
3	D	182	CYS	2.8
3	D	166	PHE	2.8
4	E	225	THR	2.8
3	D	130	SER	2.8
3	D	111	ILE	2.7
3	D	118	VAL	2.5
3	D	112	GLN	2.5
3	D	192	PRO	2.5
2	B	43	GLY	2.4
3	D	183	ALA	2.4
2	B	89	GLN	2.4
1	A	221	ILE	2.4
3	D	196	PHE	2.3
3	D	188	ASN	2.3
3	D	138	ASP	2.3
1	C	221	ILE	2.3
4	E	203	GLN	2.3
4	E	197	VAL	2.3
2	B	45	ARG	2.3
1	A	196	THR	2.3
2	B	75	LYS	2.2
3	D	181	ALA	2.2
3	D	146	SER	2.2
2	B	42	ASN	2.2
4	E	221	ASN	2.2
3	D	195	THR	2.1
3	D	194	ASP	2.1
4	E	202	TRP	2.1
3	D	145	GLN	2.1

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	C	211[A]	TYR	2.0
4	E	142	ALA	2.0
2	B	41	LYS	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](#)

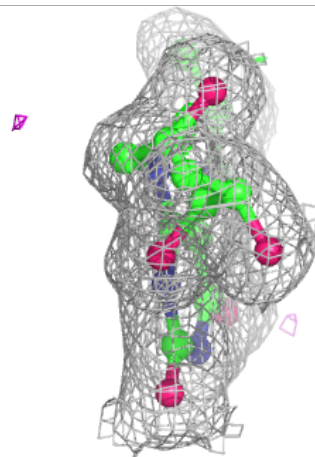
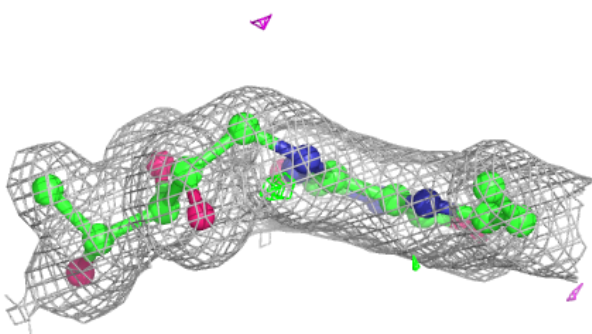
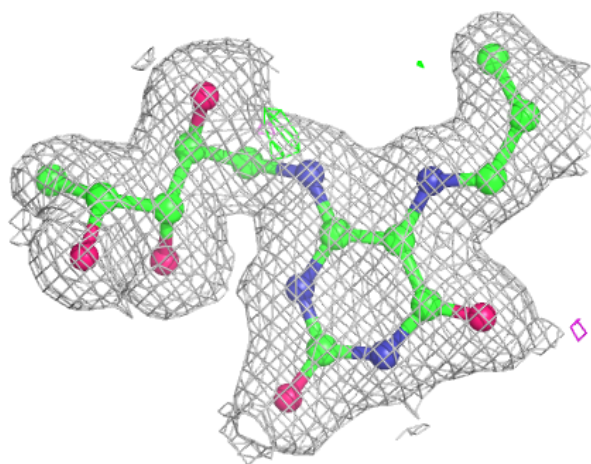
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

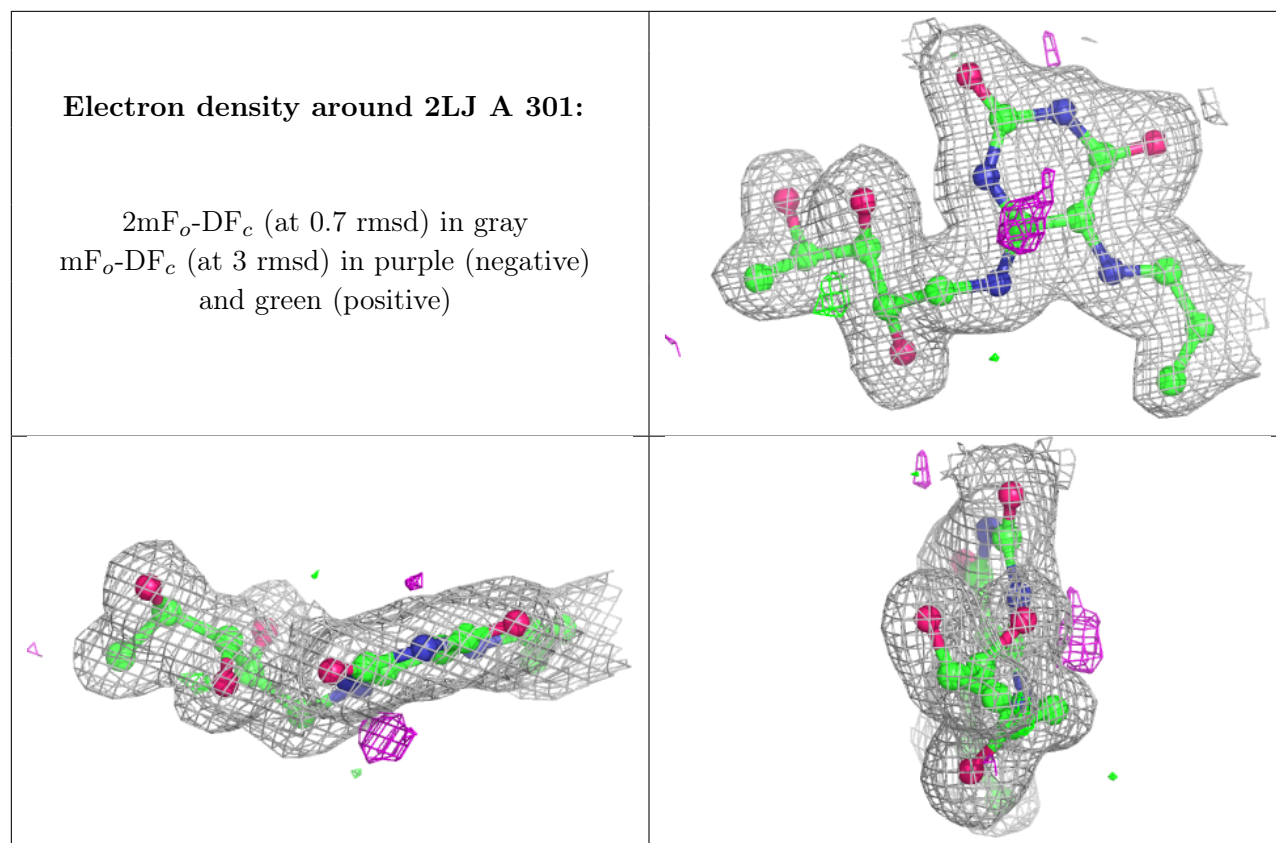
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
6	GOL	A	303	6/6	0.75	0.17	59,60,61,61	0
6	GOL	A	302	6/6	0.84	0.14	28,37,43,44	0
6	GOL	H	301	6/6	0.90	0.27	37,40,41,44	0
6	GOL	C	302	6/6	0.94	0.12	37,44,47,47	0
6	GOL	F	101	6/6	0.95	0.12	22,27,34,35	0
5	2LJ	C	301	21/22	0.97	0.10	13,16,19,21	0
5	2LJ	A	301	21/22	0.97	0.09	11,15,18,20	0
7	NA	F	103	1/1	0.97	0.09	32,32,32,32	1
7	NA	H	302	1/1	0.97	0.06	25,25,25,25	0
6	GOL	F	102	6/6	0.98	0.07	23,24,26,27	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 2LJ C 301:

$2mF_o-DF_c$ (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.