Full wwPDB X-ray Structure Validation Report (i)

Dec 15, 2024 – 09:47 AM EST

PDB ID	:	6XQP
Title	:	Structure of human D462-E4 TCR in complex with human MR1-5-OP-RU
Authors	:	Awad, W.; Rossjohn, J.
Deposited on	:	2020-07-10
Resolution	:	2.90 Å(reported)

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

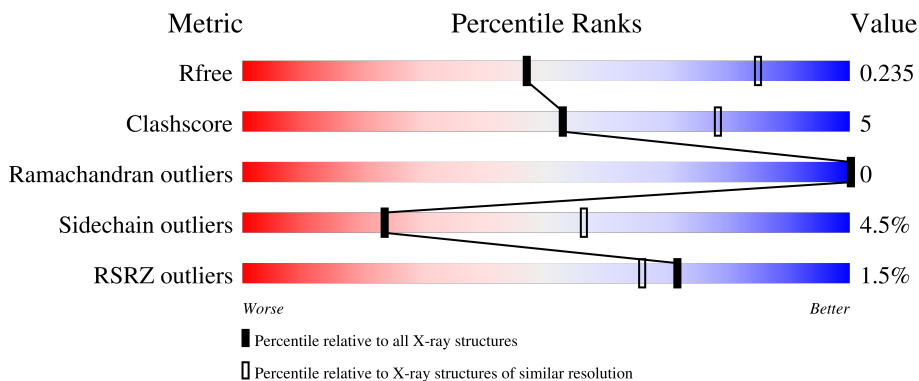|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

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 2.90 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	Percentile Ranks	Value
Rfree		0.235
Clashscore		5
Ramachandran outliers		0
Sidechain outliers		4.5%
RSRZ outliers		1.5%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	2335 (2.90-2.90)
Clashscore	180529	2564 (2.90-2.90)
Ramachandran outliers	177936	2514 (2.90-2.90)
Sidechain outliers	177891	2516 (2.90-2.90)
RSRZ outliers	164620	2337 (2.90-2.90)

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 <=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	2% / 77% / 11% · 10%
1	C	271	2% / 77% / 15% · 6%
2	B	100	3% / 88% / 9% ·
2	D	100	% / 90% / 10%
3	E	205	3% / 80% / 12% · 6%

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Mol	Chain	Length	Quality of chain
3	G	205	83% 11% 5%
4	F	248	81% 16%
4	H	248	88% 10%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	2LJ	A	301[B]	X	-	-	-
5	2LJ	C	301[A]	X	-	-	-
7	BR	G	301	-	-	X	-

2 Entry composition ⓘ

There are 10 unique types of molecules in this entry. The entry contains 12963 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	243	Total 1978	C 1268	N 343	O 358	S 9	0	0	0
1	C	254	Total 2099	C 1343	N 366	O 380	S 10	0	1	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
2	B	100	Total 812	C 517	N 138	O 153	S 4	0	1	0
2	D	100	Total 809	C 515	N 137	O 154	S 3	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1	MET	-	initiating methionine	UNP P61769
D	1	MET	-	initiating methionine	UNP P61769

- Molecule 3 is a protein called TRAV12-2 alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	193	Total 1452	C 911	N 238	O 293	S 10	0	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	G	194	Total 1483	C 926	N 245	O 302	S 10	0	0	0

- Molecule 4 is a protein called TRBV29-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	246	Total 1930	C 1211	N 336	O 374	S 9	0	1	0
4	H	246	Total 1932	C 1212	N 334	O 377	S 9	0	1	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: $C_{12}H_{20}N_4O_6$) (labeled as "Ligand of Interest" by depositor).
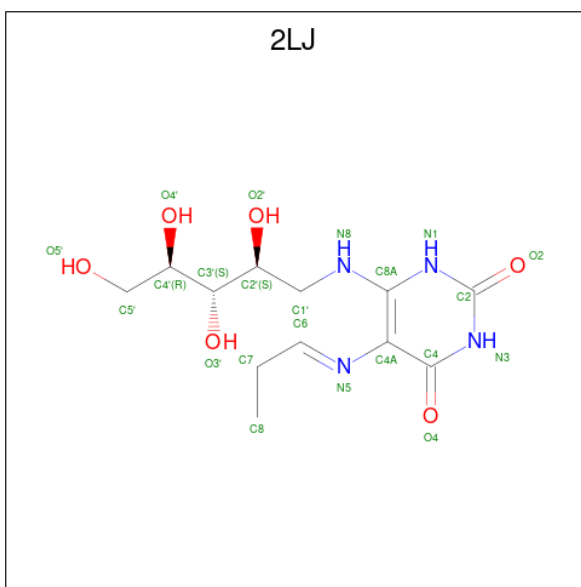
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total 44	C 24	N 8	O 12	0	1
5	C	1	Total 44	C 24	N 8	O 12	0	1

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

GOL

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total 6	C 3	O 3	0	0
6	C	1	Total 6	C 3	O 3	0	0
6	C	1	Total 6	C 3	O 3	0	0
6	C	1	Total 6	C 3	O 3	0	0
6	F	1	Total 6	C 3	O 3	0	0
6	H	1	Total 6	C 3	O 3	0	0
6	H	1	Total 6	C 3	O 3	0	0

- Molecule 7 is BROMIDE ION (three-letter code: BR) (formula: Br).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	E	1	Total 1	Br 1	0	0
7	G	1	Total 1	Br 1	0	0

- Molecule 8 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	F	1	Total 1	Na 1	0	0

- Molecule 9 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	F	2	Total 2	Cl 2	0	0
9	H	2	Total 2	Cl 2	0	0

- Molecule 10 is water.

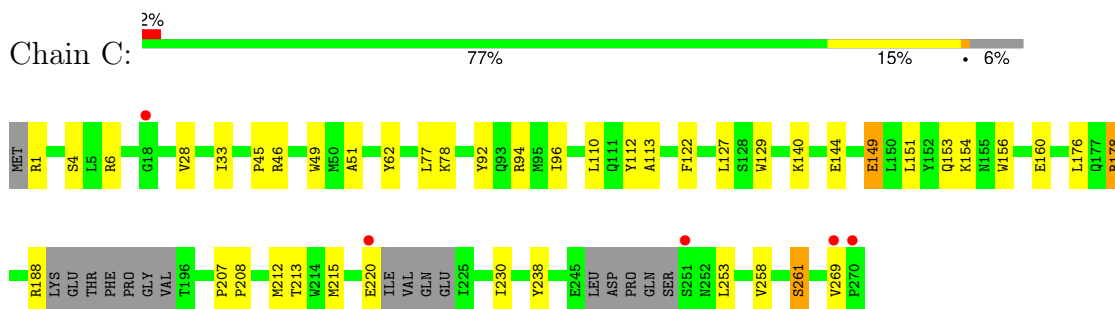| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	54	Total 54	O 54	0	0
10	B	11	Total 11	O 11	0	0
10	C	63	Total 63	O 63	0	0
10	D	20	Total 20	O 20	0	0
10	E	29	Total 29	O 29	0	0
10	F	60	Total 60	O 60	0	0
10	G	36	Total 36	O 36	0	0
10	H	58	Total 58	O 58	0	0

3 Residue-property plots ⓘ

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.
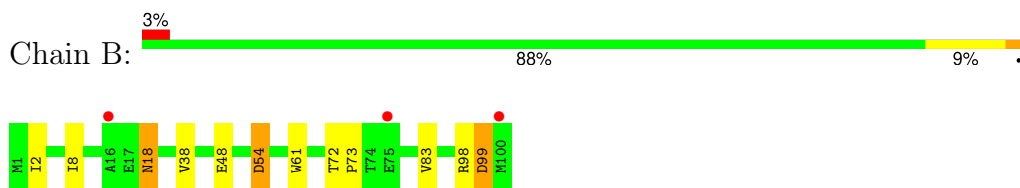
• Molecule 1: Major histocompatibility complex class I-related gene protein
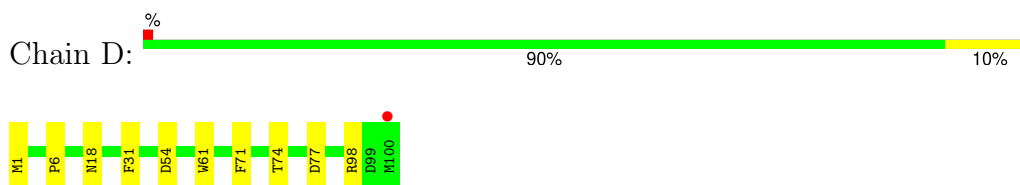
Chain A:

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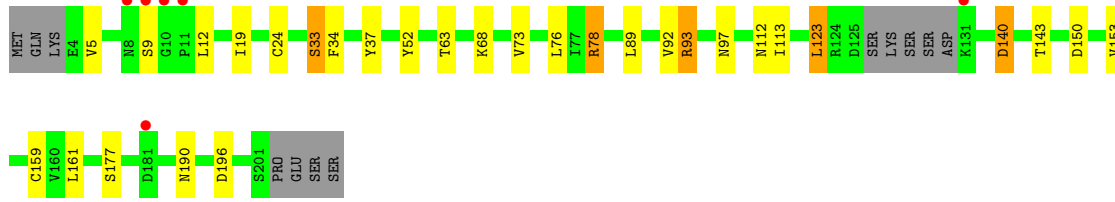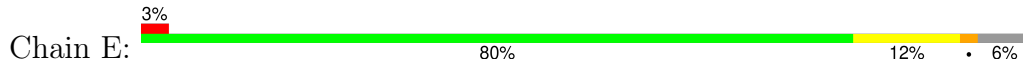
Chain C:

• Molecule 2: Beta-2-microglobulin

Chain B:

• Molecule 2: Beta-2-microglobulin

Chain D:

• Molecule 3: TRAV12-2 alpha chain

Chain E:

3%

80%　　　　12%　•　6%

MET GLN LYS E4 V5 N8 S9 G10 P11 L12 I19 C24 S33 F34 Y37 Y52 T63 K68 V73 L76 I77 R78 L89 V92 R93 N97 N112 I113 L123 R124 D125 SER LYS SER ASP K131 D140 T143 D150 V153

C159 V160 L161 S177 D181 N190 D196 S201 PRO GLU SER SER

● Molecule 3: TRAV12-2 alpha chain

Chain G:

%

83%　　　　11%　　5%

MET GLN LYS E4 V5 G10 P11 Q32 S33 F34 F35 K57 R61 F62 T63 A64 Q65 S74 R78 D84 A91 V92 R93 N97 R106 K110 L123 S128 SER ASP LYS SER V133 C134 L135 L161 S201 PRO GLU SER SER

● Molecule 4: TRBV29-1

Chain F:

81%　　　　16%　•　•

MET S2 S6 R11 Q15 Q23 V26 R37 Q38 Q39 Q42 I47 K66 S77 D88 V96 D99 N104 K122 N123 V124 P127 E133 P134 H141 T142 A145 F154 D157 H158 K168 C175 T176 P180 L187

N188 D189 S196 R197 V200 F204 W205 Q206 R209 R213 C214 Q215 Y219 N224 R231 R246 A247 ASP

● Molecule 4: TRBV29-1

Chain H:

88%　　　　10%　••

MET S2 R11 Q15 R16 V26 Q39 P40 G41 Q42 V96 G103 N104 L118 E119 D120 L121 P127 E133 A151 F154 K168 C175 L187 N188 D189 S190 R191 T203 F204 V216 Y219 R246 A247 ASP

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	101.88Å 113.43Å 209.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.81 – 2.90 45.81 – 2.90	Depositor EDS
% Data completeness (in resolution range)	100.0 (45.81-2.90) 99.9 (45.81-2.90)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.02 (at 2.91Å)	Xtriage
Refinement program	PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.190 , 0.235 0.192 , 0.235	Depositor DCC
R_{free} test set	2819 reflections (5.17%)	wwPDB-VP
Wilson B-factor (Å^2)	43.6	Xtriage
Anisotropy	0.103	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 48.5	EDS
L-test for twinning[2]	$< |L| > = 0.46, < L^2 > = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	12963	wwPDB-VP
Average B, all atoms (Å^2)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.59% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: 2LJ, NA, CL, GOL, BR

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	0.28	0/2038	0.45	0/2773
1	C	0.27	0/2165	0.45	0/2941
2	B	0.28	0/835	0.45	0/1137
2	D	0.28	0/832	0.46	0/1133
3	E	0.25	0/1483	0.43	0/2015
3	G	0.25	0/1514	0.44	0/2054
4	F	0.27	0/1981	0.45	0/2699
4	H	0.27	0/1983	0.46	0/2702
All	All	0.27	0/12831	0.45	0/17454

There are no bond length outliers.

There are no bond angle outliers.

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	1978	0	1842	22	0
1	C	2099	0	1981	29	0
2	B	812	0	746	6	0
2	D	809	0	744	6	0
3	E	1452	0	1331	15	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	G	1483	0	1371	13	0
4	F	1930	0	1850	23	0
4	H	1932	0	1849	14	0
5	A	44	0	35	6	0
5	C	44	0	36	6	0
6	A	6	0	8	1	0
6	C	18	0	24	1	0
6	F	6	0	8	1	0
6	H	12	0	16	1	0
7	E	1	0	0	0	0
7	G	1	0	0	2	0
8	F	1	0	0	0	0
9	F	2	0	0	0	0
9	H	2	0	0	1	0
10	A	54	0	0	0	0
10	B	11	0	0	0	0
10	C	63	0	0	1	0
10	D	20	0	0	0	0
10	E	29	0	0	1	0
10	F	60	0	0	2	0
10	G	36	0	0	1	0
10	H	58	0	0	0	0
All	All	12963	0	11841	121	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 5.

All (121) 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:A:32:PRO:HB2	1:A:46:ARG:HG2	1.70	0.73
3:G:33:SER:HB3	3:G:93:ARG:HG2	1.70	0.72
1:C:78:LYS:HE3	6:C:304:GOL:H2	1.73	0.70
3:G:93:ARG:HD3	3:G:97:ASN:HA	1.75	0.67
3:E:93:ARG:HD3	3:E:97:ASN:HA	1.77	0.66
3:G:61:ARG:NH2	3:G:84:ASP:OD2	2.29	0.65
3:G:63:THR:OG1	3:G:78:ARG:NH2	2.30	0.65
1:A:2:THR:HG23	1:A:101:LEU:HA	1.78	0.64
1:A:96:ILE:HG13	1:A:110:LEU:HB2	1.79	0.64
3:G:123:LEU:HD11	3:G:135:LEU:HD12	1.79	0.63
1:A:77:LEU:HD13	1:A:92:TYR:HB2	1.79	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:68:LYS:NZ	10:E:401:HOH:O	2.32	0.63
1:C:208:PRO:HG3	1:C:238:TYR:CE1	2.34	0.63
4:H:16:ARG:NH1	4:H:119:GLU:OE2	2.31	0.62
1:C:261:SER:O	1:C:261:SER:OG	2.17	0.61
1:C:77:LEU:HD13	1:C:92:TYR:HB2	1.82	0.61
1:C:212:MET:HG2	1:C:258:VAL:HG22	1.82	0.61
2:D:18:ASN:OD1	2:D:98:ARG:NH1	2.35	0.60
3:E:63:THR:HB	3:E:76:LEU:HB2	1.83	0.59
1:C:160:GLU:OE2	3:G:32:GLN:NE2	2.30	0.59
4:F:124:VAL:O	4:F:231:ARG:NH2	2.36	0.58
4:F:209:ARG:NH1	10:F:402:HOH:O	2.36	0.58
4:F:200:VAL:HG22	6:F:301:GOL:H12	1.86	0.57
3:E:161:LEU:HB3	4:F:175:CYS:HB2	1.88	0.56
4:H:15:GLN:HG2	4:H:121:LEU:HG	1.88	0.56
1:A:156:TRP:CZ2	5:A:301[B]:2LJ:H9	2.40	0.56
3:G:65:GLN:HB2	3:G:74:SER:HB2	1.88	0.56
3:E:159:CYS:HB2	4:F:197:ARG:HH11	1.71	0.55
1:C:96:ILE:HG13	1:C:110:LEU:HB2	1.88	0.55
1:C:178:ARG:NH2	10:C:402:HOH:O	2.31	0.55
1:A:28:VAL:HG23	1:A:33:ILE:HD13	1.88	0.55
4:F:200:VAL:HG13	4:F:204:PHE:HB3	1.89	0.55
1:C:1:ARG:NH1	1:C:207:PRO:HG3	2.22	0.54
1:C:153:GLN:NE2	5:C:301[B]:2LJ:O5’	2.41	0.54
2:B:99:ASP:OD1	2:B:99:ASP:N	2.39	0.54
4:H:39:GLN:HB3	4:H:42:GLN:HG3	1.90	0.54
1:A:210:ILE:HG21	1:A:212:MET:HE3	1.90	0.53
1:C:208:PRO:HG3	1:C:238:TYR:CZ	2.44	0.53
4:F:134:PRO:HG2	4:F:145:ALA:HB1	1.90	0.53
2:B:18:ASN:OD1	2:B:18:ASN:N	2.30	0.53
4:F:39:GLN:HB3	4:F:42:GLN:HG3	1.91	0.53
4:F:213:ARG:NH2	10:F:401:HOH:O	2.35	0.53
3:E:113:ILE:HG13	3:E:140:ASP:HA	1.92	0.52
4:F:99:ASP:OD1	4:F:104:ASN:ND2	2.36	0.52
4:F:176:THR:HG23	4:F:196:SER:HB2	1.92	0.52
1:C:113:ALA:HB2	2:D:61:TRP:CE2	2.45	0.52
3:E:150:ASP:HB3	3:E:153:VAL:HG12	1.93	0.51
4:F:37:ARG:HB3	4:F:47:ILE:HD11	1.92	0.51
3:E:24:CYS:HB3	3:E:73:VAL:HG23	1.92	0.51
3:E:33:SER:HB3	3:E:52:TYR:CE1	2.47	0.50
3:E:196:ASP:OD1	3:E:196:ASP:N	2.40	0.50
1:A:46:ARG:NH2	2:B:54:ASP:HB2	2.27	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:113:ALA:HB2	2:B:61:TRP:CE2	2.47	0.50
1:A:9:ARG:HD3	1:A:22:PHE:HZ	1.77	0.49
4:F:66:LYS:NZ	4:F:88:ASP:OD2	2.44	0.49
1:C:49:TRP:CH2	1:C:176:LEU:HD11	2.47	0.49
4:H:127:PRO:HB3	4:H:154:PHE:CD1	2.47	0.49
1:C:94:ARG:HG3	1:C:112:TYR:CE2	2.47	0.48
5:A:301[B]:2LJ:H1	5:A:301[B]:2LJ:O4	2.12	0.48
4:F:187:LEU:HD12	4:F:189:ASP:OD1	2.13	0.48
1:C:215:MET:HG2	1:C:220:GLU:HG2	1.94	0.48
4:H:133:GLU:OE2	4:H:246:ARG:NH2	2.46	0.48
2:D:74:THR:OG1	2:D:77:ASP:OD2	2.28	0.48
4:F:127:PRO:HB3	4:F:154:PHE:CD1	2.48	0.48
3:G:34:PHE:HD2	3:G:92:VAL:HG22	1.79	0.47
4:F:11[B]:ARG:HD2	4:F:219:TYR:CG	2.50	0.47
5:A:301[A]:2LJ:O4	5:A:301[A]:2LJ:H1	2.13	0.47
4:F:213:ARG:NH1	4:F:215:GLN:OE1	2.47	0.47
5:A:301[A]:2LJ:H19	5:A:301[A]:2LJ:H8	1.38	0.47
3:G:35:PHE:HB2	3:G:91:ALA:HB3	1.97	0.47
3:E:34:PHE:HD1	3:E:92:VAL:HG22	1.81	0.46
10:G:403:HOH:O	9:H:304:CL:CL	2.58	0.46
4:F:157:ASP:HB2	4:F:180:PRO:HG2	1.97	0.46
1:A:156:TRP:CZ2	5:A:301[A]:2LJ:H9	2.51	0.46
4:H:26:VAL:HG21	4:H:96:VAL:HG21	1.97	0.46
1:C:156:TRP:CZ2	5:C:301[B]:2LJ:H9	2.51	0.46
4:H:39:GLN:HG3	4:H:40:PRO:HD2	1.98	0.45
1:C:28:VAL:HG23	1:C:33:ILE:HD13	1.98	0.45
1:A:212:MET:HG2	1:A:258:VAL:HG22	1.98	0.45
1:C:149:GLU:HG2	4:H:103:GLY:HA3	1.98	0.45
1:C:62:TYR:CE1	5:C:301[B]:2LJ:H3	2.52	0.45
1:C:149:GLU:HG2	4:H:104:ASN:H	1.80	0.45
3:G:161:LEU:HB3	4:H:175:CYS:HB2	1.99	0.45
1:C:122:PHE:HB2	1:C:129:TRP:CH2	2.53	0.44
5:A:301[B]:2LJ:H19	5:A:301[B]:2LJ:H8	1.46	0.44
1:C:4:SER:OG	1:C:6[B]:ARG:NH2	2.50	0.44
4:F:158:HIS:HB3	4:F:219:TYR:HB2	1.99	0.44
2:D:1:MET:H1	4:F:168:LYS:HE3	1.82	0.44
1:C:62:TYR:CE1	5:C:301[A]:2LJ:H3	2.53	0.44
4:H:151:ALA:HB2	4:H:216:VAL:HG21	2.00	0.44
3:E:19:ILE:HG12	3:E:78:ARG:HA	2.00	0.44
1:A:156:TRP:CD1	1:A:160:GLU:HB3	2.53	0.43
3:G:57:LYS:CE	7:G:301:BR:BR	3.21	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:210:ILE:HG13	1:A:260:HIS:HB2	1.99	0.43
2:B:73:PRO:HB2	2:B:98:ARG:HH21	1.82	0.43
4:H:11:ARG:HD2	4:H:219:TYR:CG	2.53	0.43
2:B:38:VAL:HG22	2:B:83:VAL:HG22	2.01	0.43
1:C:45:PRO:HG3	1:C:51:ALA:HB2	2.01	0.43
1:A:241:TRP:HZ3	1:A:243:SER:HB3	1.84	0.43
1:A:75:VAL:HG22	6:A:302:GOL:H31	2.00	0.43
1:A:210:ILE:HD13	1:A:212:MET:HE2	2.01	0.42
1:C:140:LYS:NZ	1:C:144:GLU:OE2	2.48	0.42
3:G:57:LYS:HE3	7:G:301:BR:BR	2.74	0.42
4:H:204:PHE:HA	6:H:302:GOL:H2	2.01	0.42
1:C:208:PRO:O	1:C:230:ILE:HD13	2.18	0.42
5:C:301[A]:2LJ:O4	5:C:301[A]:2LJ:H1	2.17	0.42
4:F:206:GLN:HA	4:F:246:ARG:O	2.19	0.42
3:E:123:LEU:HB3	4:F:133:GLU:O	2.20	0.42
1:C:156:TRP:CZ2	5:C:301[A]:2LJ:H9	2.55	0.42
3:G:10:GLY:HA3	3:G:11:PRO:HD3	1.85	0.42
1:C:127:LEU:HD21	1:C:154:LYS:HD2	2.02	0.42
1:A:140:LYS:NZ	1:A:144:GLU:OE1	2.51	0.41
1:A:3:HIS:ND1	1:A:29:ASP:OD2	2.53	0.41
3:E:37:TYR:HB2	3:E:89:LEU:HB2	2.01	0.41
2:D:6:PRO:HB3	2:D:31:PHE:HB3	2.03	0.41
4:F:26:VAL:HG21	4:F:96:VAL:HG21	2.03	0.41
1:A:86:HIS:HE1	4:H:168:LYS:HE3	1.85	0.41
1:A:144:GLU:HA	1:A:150:LEU:HD11	2.02	0.41
3:E:153:VAL:HA	3:E:177:SER:HB2	2.02	0.40
1:A:169:LEU:HD23	1:A:169:LEU:HA	1.87	0.40
1:C:46:ARG:NH1	2:D:54:ASP:HB2	2.36	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	235/271 (87%)	231 (98%)	4 (2%)	0	100	100
1	C	247/271 (91%)	239 (97%)	8 (3%)	0	100	100
2	B	99/100 (99%)	98 (99%)	1 (1%)	0	100	100
2	D	98/100 (98%)	96 (98%)	2 (2%)	0	100	100
3	E	189/205 (92%)	185 (98%)	4 (2%)	0	100	100
3	G	190/205 (93%)	185 (97%)	5 (3%)	0	100	100
4	F	245/248 (99%)	240 (98%)	5 (2%)	0	100	100
4	H	245/248 (99%)	241 (98%)	4 (2%)	0	100	100
All	All	1548/1648 (94%)	1515 (98%)	33 (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	206/241 (86%)	200 (97%)	6 (3%)	37	72
1	C	222/241 (92%)	214 (96%)	8 (4%)	30	65
2	B	88/95 (93%)	81 (92%)	7 (8%)	10	30
2	D	88/95 (93%)	87 (99%)	1 (1%)	70	90
3	E	157/182 (86%)	146 (93%)	11 (7%)	12	36
3	G	164/182 (90%)	159 (97%)	5 (3%)	36	71
4	F	216/219 (99%)	201 (93%)	15 (7%)	13	37
4	H	217/219 (99%)	209 (96%)	8 (4%)	29	64
All	All	1358/1474 (92%)	1297 (96%)	61 (4%)	23	56

All (61) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	ARG
1	A	73	PHE

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Mol	Chain	Res	Type
1	A	140	LYS
1	A	151	LEU
1	A	243	SER
1	A	266	VAL
2	B	2	ILE
2	B	8	ILE
2	B	18	ASN
2	B	48	GLU
2	B	54	ASP
2	B	72	THR
2	B	99	ASP
1	C	149	GLU
1	C	151	LEU
1	C	178	ARG
1	C	188	ARG
1	C	213	THR
1	C	253	LEU
1	C	261	SER
1	C	269	VAL
2	D	71	PHE
3	E	5	VAL
3	E	9	SER
3	E	12	LEU
3	E	33	SER
3	E	78	ARG
3	E	93	ARG
3	E	112	ASN
3	E	123	LEU
3	E	140	ASP
3	E	143	THR
3	E	190	ASN
4	F	6	SER
4	F	15	GLN
4	F	23	GLN
4	F	37	ARG
4	F	77	SER
4	F	96	VAL
4	F	122	LYS
4	F	123	ASN
4	F	141	HIS
4	F	142	THR
4	F	187	LEU

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Mol	Chain	Res	Type
4	F	197	ARG
4	F	200	VAL
4	F	224	ASN
4	F	246	ARG
3	G	5	VAL
3	G	32	GLN
3	G	106	ARG
3	G	110	LYS
3	G	128	SER
4	H	96	VAL
4	H	118	LEU
4	H	187	LEU
4	H	188	ASN
4	H	189	ASP
4	H	191	ARG
4	H	203	THR
4	H	246	ARG

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

Mol	Chain	Res	Type
1	A	58	HIS
1	C	153	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 18 ligands modelled in this entry, 7 are 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	$\#|Z| > 2$
6	GOL	C	303	-	5,5,5	0.94	0	5,5,5	1.08	0
5	2LJ	C	301[B]	1	22,22,22	1.08	2 (9%)	24,29,29	1.24	1 (4%)
5	2LJ	A	301[B]	1	22,22,22	1.26	1 (4%)	24,29,29	1.37	1 (4%)
6	GOL	H	302	-	5,5,5	0.93	0	5,5,5	1.08	0
6	GOL	F	301	-	5,5,5	0.94	0	5,5,5	1.05	0
5	2LJ	C	301[A]	1	22,22,22	1.18	2 (9%)	24,29,29	1.20	1 (4%)
5	2LJ	A	301[A]	1	22,22,22	1.48	1 (4%)	24,29,29	1.60	2 (8%)
6	GOL	C	302	-	5,5,5	0.92	0	5,5,5	1.08	0
6	GOL	H	301	-	5,5,5	0.95	0	5,5,5	1.06	0
6	GOL	A	302	-	5,5,5	0.95	0	5,5,5	1.07	0
6	GOL	C	304	-	5,5,5	0.93	0	5,5,5	1.06	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
6	GOL	C	303	-	-	0/4/4/4	-
5	2LJ	C	301[B]	1	-	8/18/19/19	0/1/1/1
5	2LJ	A	301[B]	1	1/1/3/5	8/18/19/19	0/1/1/1
6	GOL	H	302	-	-	0/4/4/4	-
6	GOL	F	301	-	-	2/4/4/4	-
5	2LJ	C	301[A]	1	1/1/3/5	8/18/19/19	0/1/1/1
5	2LJ	A	301[A]	1	-	6/18/19/19	0/1/1/1
6	GOL	C	302	-	-	3/4/4/4	-
6	GOL	H	301	-	-	0/4/4/4	-
6	GOL	A	302	-	-	0/4/4/4	-
6	GOL	C	304	-	-	2/4/4/4	-

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	301[A]	2LJ	C8A-N8	6.46	1.42	1.32
5	A	301[B]	2LJ	C8A-N8	5.45	1.41	1.32
5	C	301[A]	2LJ	C8A-N8	4.05	1.38	1.32
5	C	301[B]	2LJ	C7-C6	-3.33	1.45	1.49
5	C	301[A]	2LJ	C7-C6	-3.31	1.46	1.49
5	C	301[B]	2LJ	C8A-N8	3.25	1.37	1.32

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	301[A]	2LJ	C1'-N8-C8A	-6.23	113.53	126.69
5	A	301[B]	2LJ	C1'-N8-C8A	-5.75	114.54	126.69
5	C	301[B]	2LJ	C1'-N8-C8A	-5.25	115.59	126.69
5	C	301[A]	2LJ	C1'-N8-C8A	-5.24	115.63	126.69
5	A	301[A]	2LJ	N1-C8A-N8	-2.12	115.57	118.66

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
5	A	301[B]	2LJ	C4'
5	C	301[A]	2LJ	C4'

All (37) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	301[A]	2LJ	N8-C1'-C2'-O2'
5	A	301[A]	2LJ	N8-C1'-C2'-C3'
5	A	301[A]	2LJ	C1'-C2'-C3'-O3'
5	A	301[A]	2LJ	C1'-C2'-C3'-C4'
5	A	301[B]	2LJ	N8-C1'-C2'-O2'
5	A	301[B]	2LJ	N8-C1'-C2'-C3'
5	A	301[B]	2LJ	O4'-C4'-C5'-O5'
5	C	301[A]	2LJ	N8-C1'-C2'-O2'
5	C	301[A]	2LJ	C1'-C2'-C3'-O3'
5	C	301[A]	2LJ	C1'-C2'-C3'-C4'
5	C	301[B]	2LJ	N8-C1'-C2'-O2'
5	C	301[B]	2LJ	C1'-C2'-C3'-O3'
5	C	301[B]	2LJ	C1'-C2'-C3'-C4'
6	C	302	GOL	O1-C1-C2-O2
6	C	302	GOL	O1-C1-C2-C3
6	C	304	GOL	O1-C1-C2-C3
6	F	301	GOL	C1-C2-C3-O3
5	A	301[B]	2LJ	C3'-C4'-C5'-O5'

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Mol	Chain	Res	Type	Atoms
5	C	301[A]	2LJ	C3'-C4'-C5'-O5'
5	A	301[A]	2LJ	O2'-C2'-C3'-O3'
5	A	301[A]	2LJ	O2'-C2'-C3'-C4'
5	C	301[A]	2LJ	O4'-C4'-C5'-O5'
5	C	301[A]	2LJ	N8-C1'-C2'-C3'
5	C	301[B]	2LJ	N8-C1'-C2'-C3'
6	C	302	GOL	C1-C2-C3-O3
6	C	304	GOL	O1-C1-C2-O2
6	F	301	GOL	O2-C2-C3-O3
5	C	301[B]	2LJ	O2'-C2'-C3'-C4'
5	C	301[A]	2LJ	O2'-C2'-C3'-O3'
5	C	301[B]	2LJ	O2'-C2'-C3'-O3'
5	C	301[A]	2LJ	O2'-C2'-C3'-C4'
5	C	301[B]	2LJ	C3'-C4'-C5'-O5'
5	C	301[B]	2LJ	O4'-C4'-C5'-O5'
5	A	301[B]	2LJ	O2'-C2'-C3'-O3'
5	A	301[B]	2LJ	O2'-C2'-C3'-C4'
5	A	301[B]	2LJ	C1'-C2'-C3'-O3'
5	A	301[B]	2LJ	C1'-C2'-C3'-C4'

There are no ring outliers.

8 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	301[B]	2LJ	3	0
5	A	301[B]	2LJ	3	0
6	H	302	GOL	1	0
6	F	301	GOL	1	0
5	C	301[A]	2LJ	3	0
5	A	301[A]	2LJ	3	0
6	A	302	GOL	1	0
6	C	304	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 2LJ C 301 (B)

Ligand 2LJ A 301 (B)

Ligand 2LJ C 301 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand 2LJ A 301 (A)

Bond lengths

Bond angles

Torsions

Rings
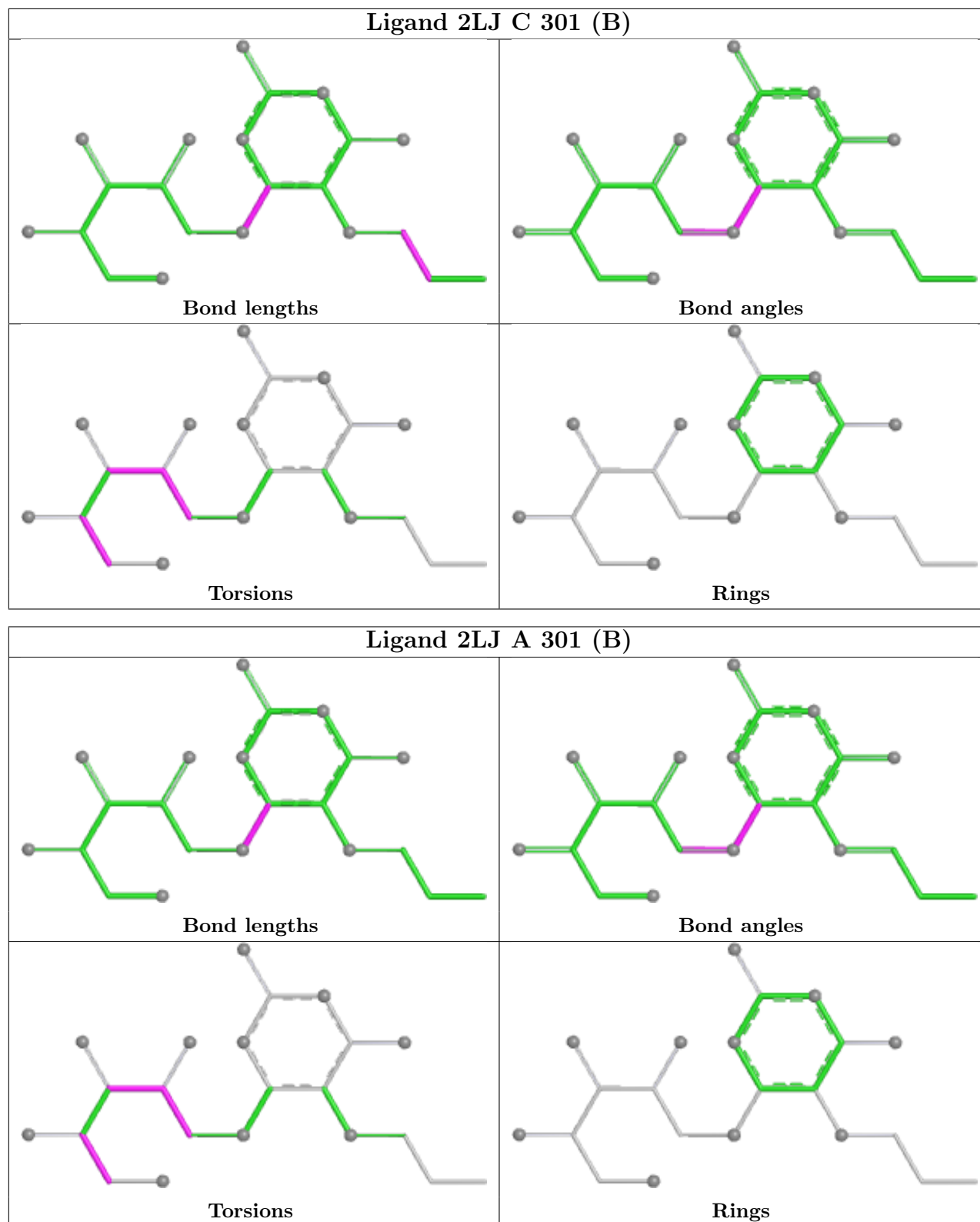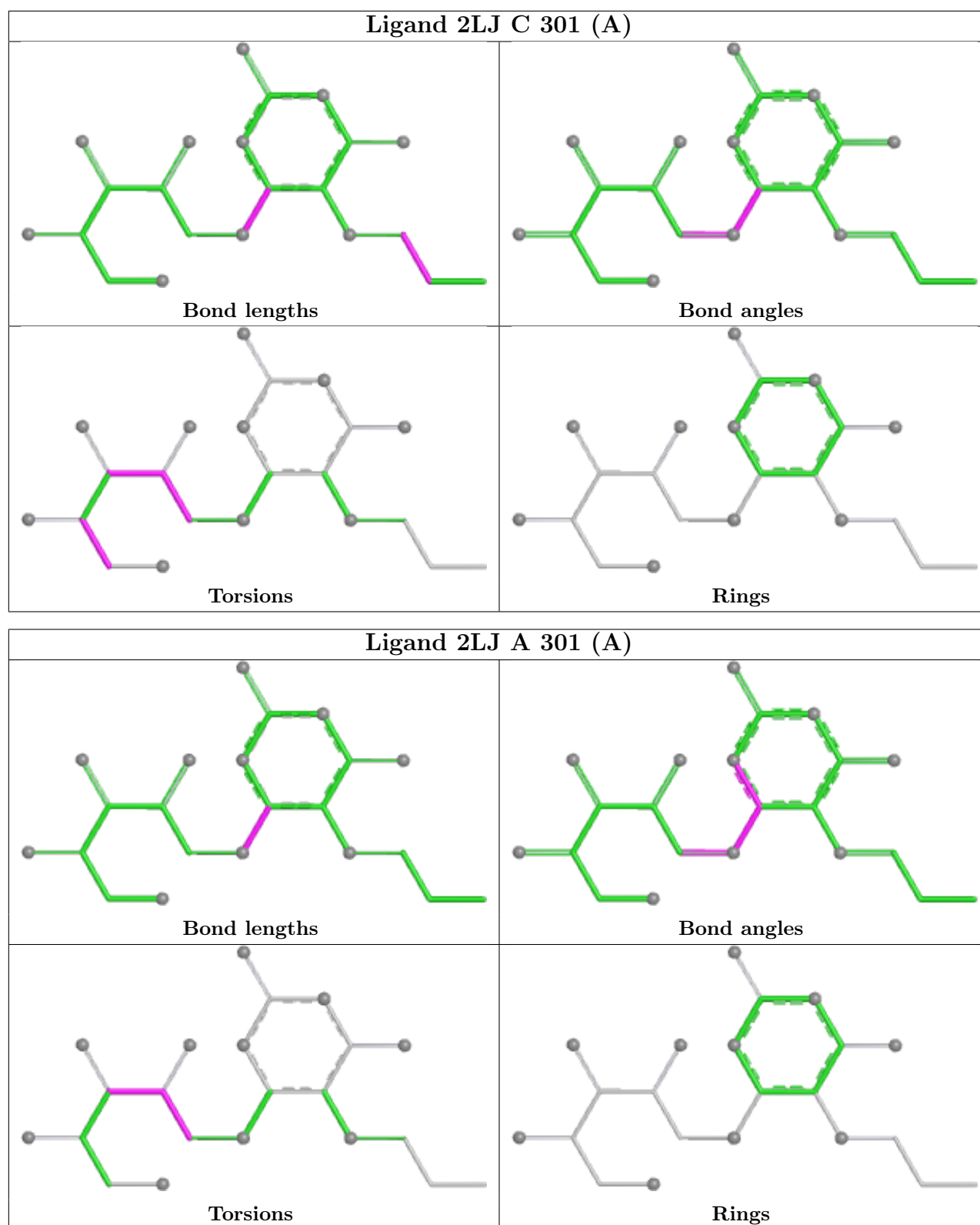
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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(Å²)	Q<0.9
1	A	243/271 (89%)	-0.34	5 (2%)	63	57	22, 40, 81, 101	0
1	C	254/271 (93%)	-0.55	5 (1%)	64	58	19, 35, 71, 92	2 (0%)
2	B	100/100 (100%)	0.11	3 (3%)	52	47	20, 60, 84, 102	1 (1%)
2	D	100/100 (100%)	-0.24	1 (1%)	79	74	27, 47, 80, 100	0
3	E	193/205 (94%)	-0.04	6 (3%)	51	46	24, 53, 83, 109	0
3	G	194/205 (94%)	-0.28	3 (1%)	71	66	22, 42, 68, 84	0
4	F	246/248 (99%)	-0.64	1 (0%)	89	86	17, 33, 57, 86	1 (0%)
4	H	246/248 (99%)	-0.75	0	100	100	18, 29, 53, 92	1 (0%)
All	All	1576/1648 (95%)	-0.41	24 (1%)	71	66	17, 39, 77, 109	5 (0%)

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	E	10	GLY	4.9
1	A	191	THR	4.1
1	C	251	SER	3.6
1	A	224	GLU	3.0
3	G	10	GLY	3.0
1	A	198	LEU	2.8
3	G	128	SER	2.8
1	C	270	PRO	2.8
3	E	11	PRO	2.7
2	B	100	MET	2.7
3	E	181	ASP	2.6
2	D	100	MET	2.6
3	E	131	LYS	2.6
1	C	220	GLU	2.3
1	C	269	VAL	2.2
1	A	1	ARG	2.2

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Mol	Chain	Res	Type	RSRZ
4	F	187	LEU	2.2
1	A	190	GLU	2.2
3	E	9	SER	2.2
3	E	8	ASN	2.1
2	B	75	GLU	2.1
1	C	18	GLY	2.1
3	G	201	SER	2.0
2	B	16	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 monosaccharides 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
6	GOL	H	301	6/6	0.86	0.13	46,58,68,77	0
6	GOL	F	301	6/6	0.87	0.13	41,44,50,51	0
6	GOL	C	302	6/6	0.91	0.14	53,54,59,62	0
6	GOL	C	304	6/6	0.92	0.13	28,55,64,71	0
6	GOL	H	302	6/6	0.93	0.12	26,44,49,58	0
5	2LJ	C	301[B]	22/22	0.94	0.10	20,26,31,34	22
6	GOL	A	302	6/6	0.94	0.11	32,44,47,55	0
5	2LJ	C	301[A]	22/22	0.94	0.10	21,26,32,35	22
6	GOL	C	303	6/6	0.94	0.10	40,48,53,55	0
5	2LJ	A	301[B]	22/22	0.95	0.09	26,31,35,37	22
5	2LJ	A	301[A]	22/22	0.95	0.09	26,31,36,36	22
8	NA	F	302	1/1	0.96	0.17	19,19,19,19	0
9	CL	F	304	1/1	0.97	0.06	32,32,32,32	0
7	BR	E	301	1/1	0.98	0.04	61,61,61,61	0
9	CL	F	303	1/1	0.99	0.07	16,16,16,16	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
7	BR	G	301	1/1	0.99	0.04	58,58,58,58	0
9	CL	H	303	1/1	0.99	0.07	19,19,19,19	0
9	CL	H	304	1/1	0.99	0.03	19,19,19,19	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.
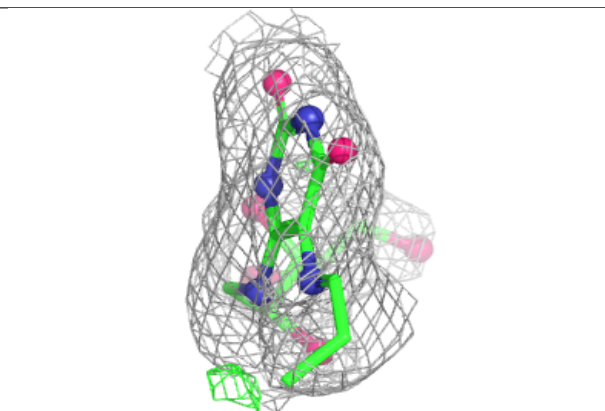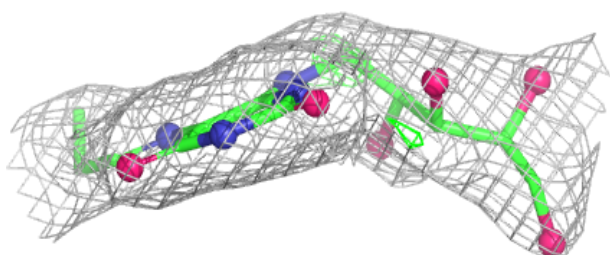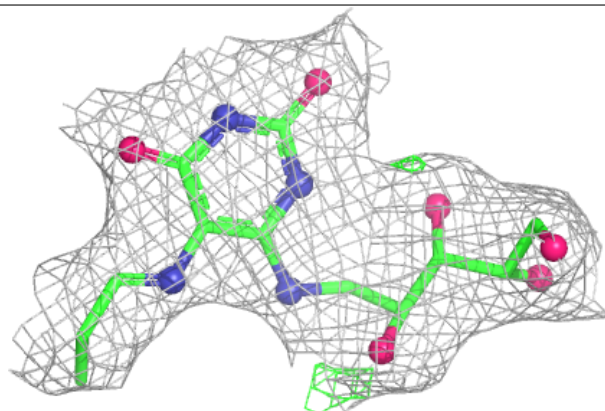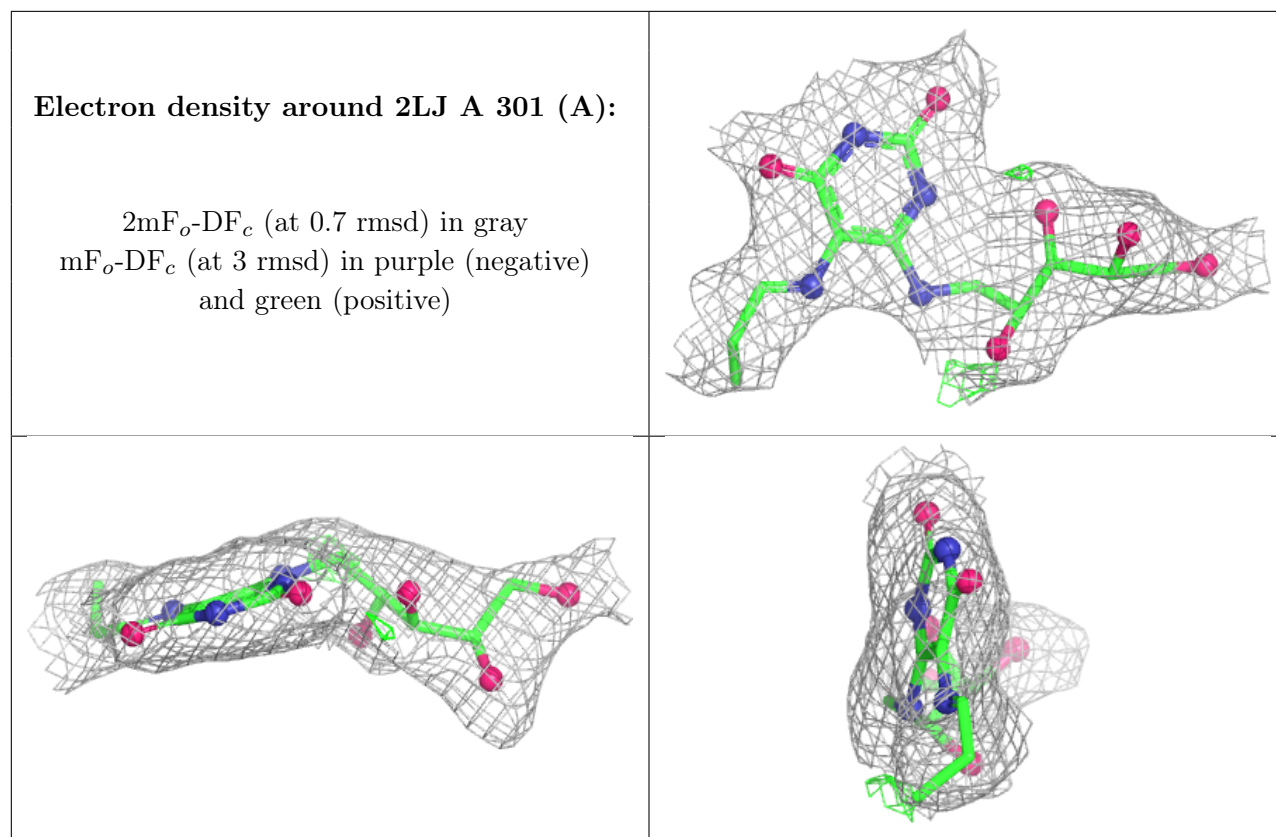
Electron density around 2LJ C 301 (B):

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative) and green (positive)
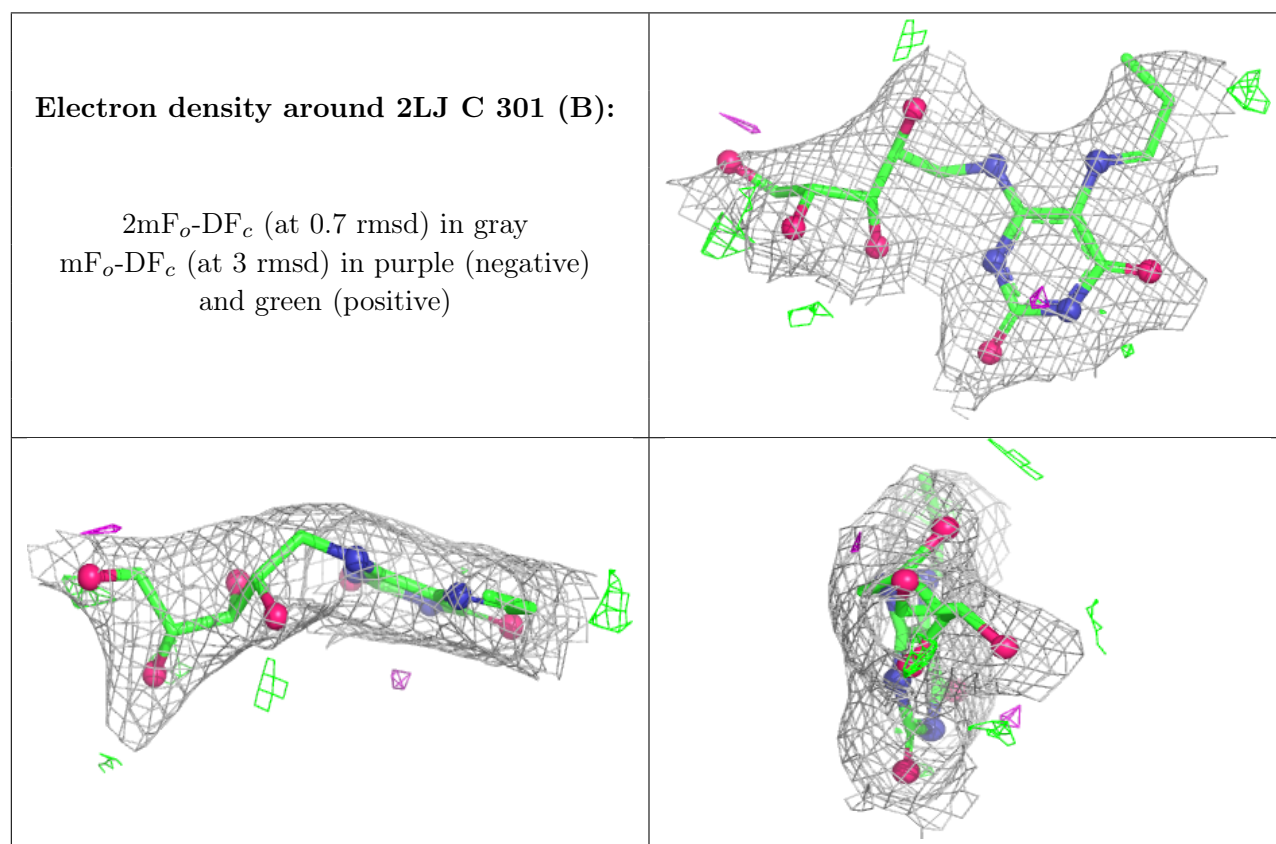
Electron density around 2LJ C 301 (A):

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
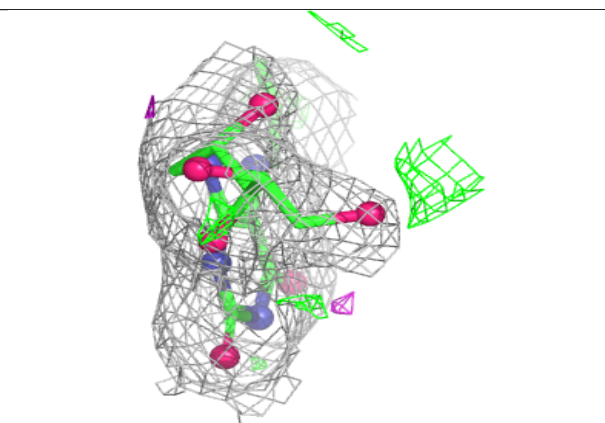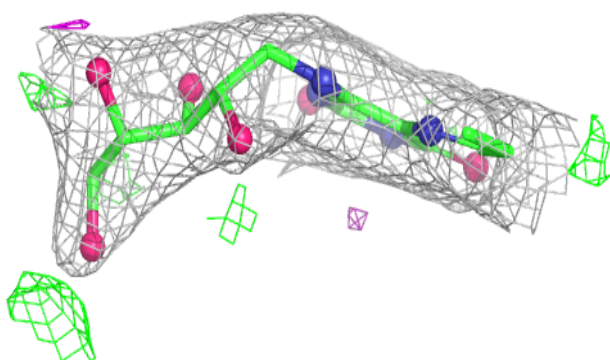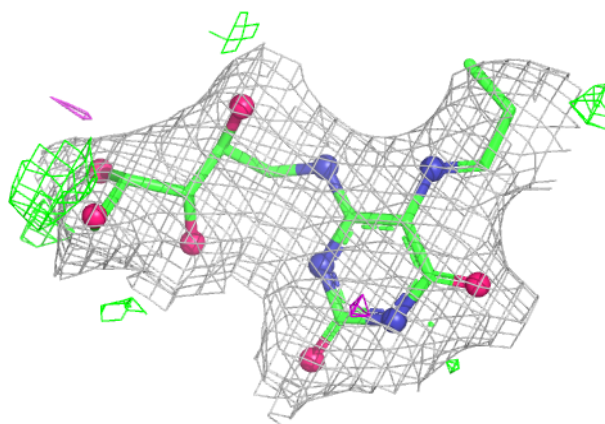
Electron density around 2LJ A 301 (B):

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

Electron density around 2LJ A 301 (A):

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

6.5 Other polymers ⓘ

There are no such residues in this entry.