Full wwPDB X-ray Structure Validation Report

Feb 21, 2024 – 09:24 PM EST

PDB ID	:	4RAO
Title	:	Aza-acyclic nucleoside phosphonates containing a second phosphonate group as inhibitors of the human, Plasmodium falciparum and vivax 6-oxopurine phosphoribosyltransferases and their pro-drugs as antimalarial agents
Authors	:	Keough, D.T.; Hockova, D.; Janeba, Z.; Wang, T.-H.; Naesens, L.; Edstein, M.D.; Chavchich, M.; Guddat, L.W.
Deposited on	:	2014-09-10
Resolution	:	1.87 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 (1)) were used in the production of this report:

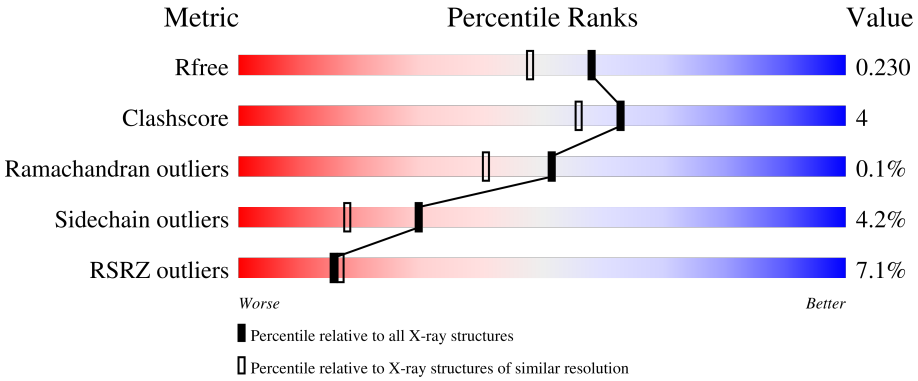
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 1.87 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	9470 (1.90-1.86)
Clashscore	141614	10282 (1.90-1.86)
Ramachandran outliers	138981	10152 (1.90-1.86)
Sidechain outliers	138945	10152 (1.90-1.86)
RSRZ outliers	127900	9303 (1.90-1.86)

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	217	9% 81% 9% 9%
1	B	217	4% 75% 14% • 9%
1	C	217	6% 79% 14% 6%
1	D	217	7% 83% 12% • 5%

2 Entry composition

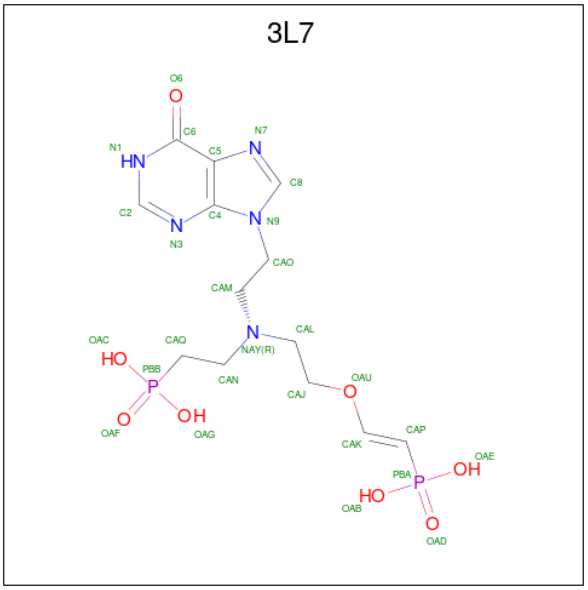
There are 4 unique types of molecules in this entry. The entry contains 6884 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Hypoxanthine-guanine phosphoribosyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	197	Total	C	N	O	S	0	5	0
			1585	1024	264	289	8			
1	B	198	Total	C	N	O	S	0	12	0
			1641	1060	269	302	10			
1	C	203	Total	C	N	O	S	0	6	0
			1636	1052	276	301	7			
1	D	207	Total	C	N	O	S	0	6	0
			1673	1080	277	307	9			

- Molecule 2 is (2-{[2-(6-oxo-1,6-dihydro-9H-purin-9-yl)ethyl](2-{[(E)-2-phosphonoethenyl]oxy}ethyl)amino}ethyl)phosphonic acid (three-letter code: 3L7) (formula: $C_{13}H_{21}N_5O_8P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			28	13	5	8	2		
2	B	1	Total	C	N	O	P	0	1
			56	26	10	16	4		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	C	1	Total C N O P 28 13 5 8 2	0	0
2	D	1	Total C N O P 28 13 5 8 2	0	0

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	2	Total Mg 2 2	0	0
3	B	2	Total Mg 2 2	0	0
3	C	2	Total Mg 2 2	0	0
3	D	2	Total Mg 2 2	0	0

- Molecule 4 is water.

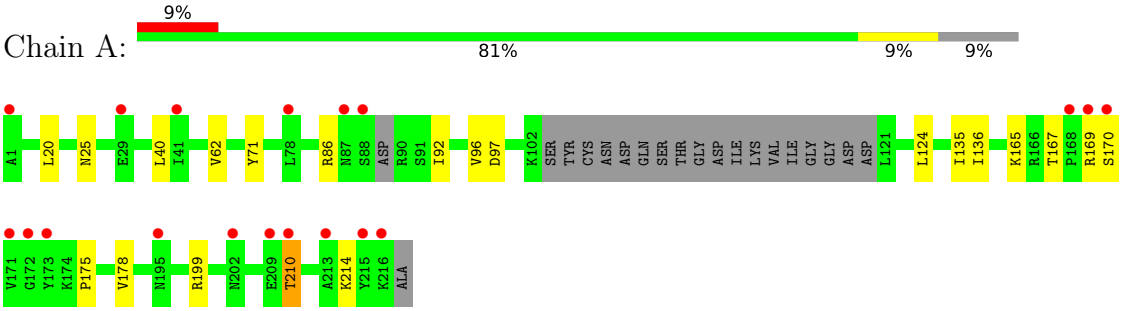
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	53	Total O 53 53	0	0
4	B	48	Total O 48 48	0	0
4	C	53	Total O 53 53	0	0
4	D	47	Total O 47 47	0	0

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.

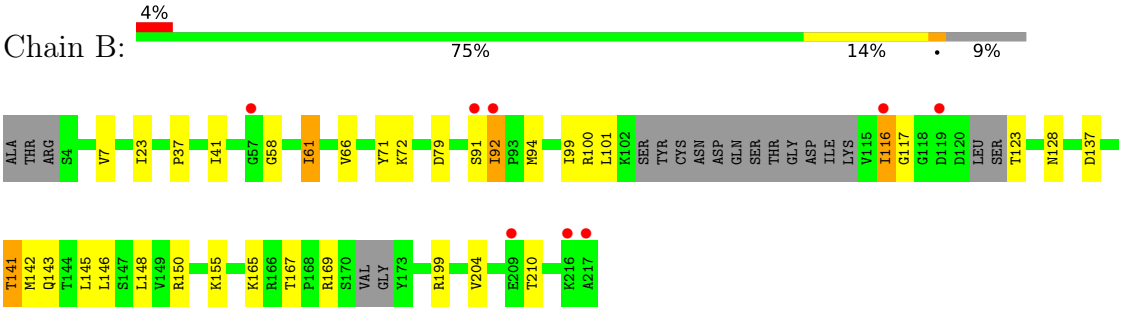
• Molecule 1: Hypoxanthine-guanine phosphoribosyltransferase

Chain A:



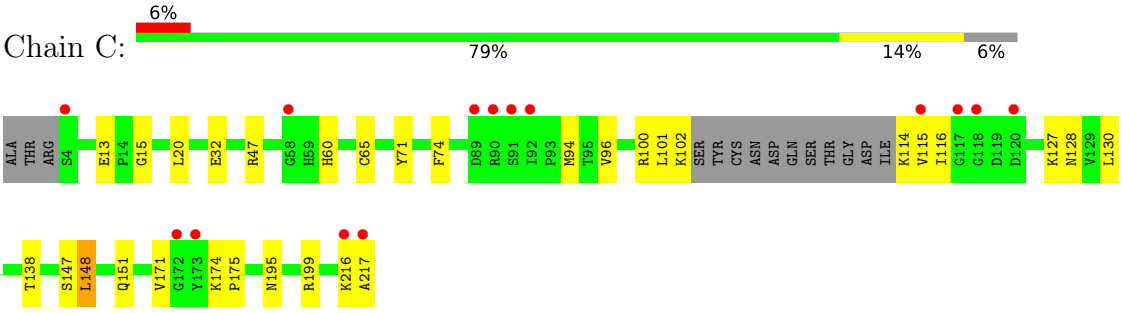
• Molecule 1: Hypoxanthine-guanine phosphoribosyltransferase

Chain B:



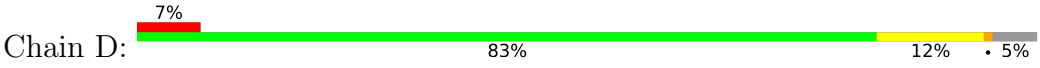
• Molecule 1: Hypoxanthine-guanine phosphoribosyltransferase

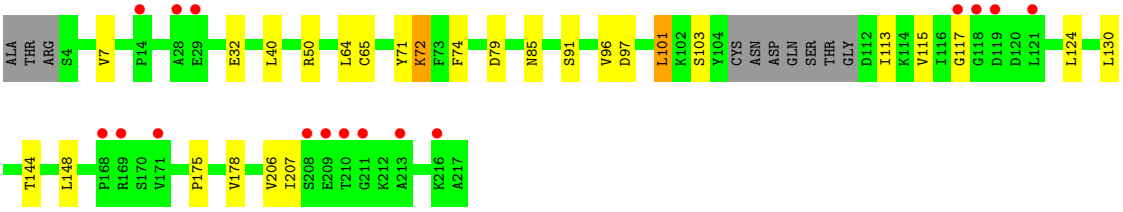
Chain C:



• Molecule 1: Hypoxanthine-guanine phosphoribosyltransferase

Chain D:




ALA
THR
ARG
S4
V7
P14
A28
E29
E32
L40
R50
L64
C65
Y71
K72
F73
F74
D79
N85
S91
V96
D97
L101
K102
S103
Y104
CYS
ASN
ASP
GLN
SER
THR
GLY
D112
I113
K114
V115
I116
G117
G118
D119
D120
L121
L124
L130
T144
L148
P168
R169
S170
V171
P175
V178
V206
I207
S208
E209
T210
G211
K212
A213
K216
A217

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	76.60Å 92.85Å 114.85Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	35.41 – 1.87 41.18 – 1.87	Depositor EDS
% Data completeness (in resolution range)	99.8 (35.41-1.87) 99.8 (41.18-1.87)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.73 (at 1.87Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, R_{free}	0.201 , 0.230 0.201 , 0.230	Depositor DCC
R_{free} test set	2000 reflections (2.94%)	wwPDB-VP
Wilson B-factor (Å^2)	27.1	Xtriage
Anisotropy	0.252	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 46.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	6884	wwPDB-VP
Average B, all atoms (Å^2)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.56% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG, 3L7

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	0.36	0/1629	0.55	0/2199
1	B	0.38	0/1694	0.65	2/2286 (0.1%)
1	C	0.36	0/1685	0.56	0/2274
1	D	0.35	0/1723	0.55	0/2326
All	All	0.36	0/6731	0.58	2/9085 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	92	ILE	C-N-CD	-8.02	102.95	120.60
1	B	92	ILE	C-N-CA	6.14	147.78	122.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	58	GLY	Peptide

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	1585	0	1616	14	0
1	B	1641	0	1654	19	0
1	C	1636	0	1658	16	0
1	D	1673	0	1706	16	0
2	A	28	0	19	0	0
2	B	56	0	36	3	0
2	C	28	0	19	2	0
2	D	28	0	19	0	0
3	A	2	0	0	0	0
3	B	2	0	0	0	0
3	C	2	0	0	0	0
3	D	2	0	0	0	0
4	A	53	0	0	0	0
4	B	48	0	0	1	0
4	C	53	0	0	2	0
4	D	47	0	0	0	0
All	All	6884	0	6727	57	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 (57) 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:D:101:LEU:HB3	1:D:113:ILE:HD11	1.60	0.83
1:B:165:LYS:O	1:B:169:ARG:NH2	2.17	0.76
1:B:116:ILE:HG13	1:D:117:GLY:HA3	1.72	0.70
1:D:175:PRO:HG2	1:D:178:VAL:HG22	1.74	0.69
1:B:116:ILE:HG13	1:D:117:GLY:CA	2.31	0.60
1:B:66:VAL:HG22	1:B:99:ILE:HD11	1.85	0.58
1:C:102:LYS:O	1:C:114:LYS:N	2.40	0.55
1:B:137:ASP:OD1	1:B:167:THR:HG21	2.07	0.54
1:D:113:ILE:HG23	1:D:144:THR:HG21	1.88	0.54
1:A:97:ASP:OD1	1:C:100[A]:ARG:NH2	2.41	0.54
1:B:116:ILE:HG12	1:B:117:GLY:N	2.22	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:101:LEU:HD22	1:B:141[B]:THR:HG23	1.90	0.53
1:C:115:VAL:HG23	1:C:148:LEU:HD13	1.91	0.53
1:B:79:ASP:OD2	1:D:72:LYS:NZ	2.38	0.52
1:A:62:VAL:HG11	1:A:124:LEU:HD23	1.91	0.52
1:A:175:PRO:HG2	1:A:178:VAL:HG22	1.94	0.50
2:C:301:3L7:H4	4:C:450:HOH:O	2.11	0.50
1:D:115:VAL:HG21	1:D:148:LEU:HD23	1.94	0.49
1:A:210:THR:O	1:A:214:LYS:HB2	2.13	0.48
1:A:86:ARG:O	1:D:50:ARG:NH1	2.46	0.48
1:B:199:ARG:HD2	1:D:96:VAL:HG22	1.95	0.48
1:C:195[A]:ASN:HD21	1:C:217:ALA:HB2	1.80	0.47
1:D:64:LEU:HD12	1:D:97:ASP:HB3	1.98	0.46
1:C:216:LYS:HB2	1:C:216:LYS:HE3	1.67	0.46
1:D:85:ASN:OD1	1:D:91:SER:HB2	2.16	0.46
1:B:142[B]:MET:HE2	1:B:146:LEU:HG	1.97	0.46
1:C:94:MET:HE3	1:C:94:MET:HB3	1.69	0.45
1:C:60:HIS:HB3	1:C:127[B]:LYS:HZ3	1.81	0.45
1:A:20:LEU:HD13	1:B:7:VAL:HG22	1.99	0.45
1:D:32[B]:GLU:HB3	1:D:206:VAL:HG23	1.98	0.45
1:B:141[A]:THR:HG23	2:B:301[A]:3L7:OAG	2.17	0.45
1:C:65:CYS:HB2	1:C:74:PHE:CD1	2.52	0.44
1:A:40:LEU:HD13	1:B:37:PRO:HG2	1.98	0.44
1:B:148:LEU:O	1:B:150:ARG:N	2.46	0.44
2:B:301[B]:3L7:H6	2:B:301[B]:3L7:H10	1.84	0.44
1:A:199:ARG:HD2	1:C:96:VAL:HG22	1.99	0.44
2:B:301[A]:3L7:H18	2:B:301[A]:3L7:H11	1.40	0.43
1:A:167:THR:OG1	1:A:169:ARG:HB2	2.18	0.43
1:B:72:LYS:NZ	1:D:79:ASP:OD2	2.51	0.43
1:B:128:ASN:OD1	1:B:155:LYS:HE2	2.18	0.43
1:B:41:ILE:HD11	1:B:204:VAL:HG23	2.01	0.43
1:C:138:THR:O	1:C:171:VAL:HG22	2.18	0.43
1:A:135:ILE:HD11	1:A:165:LYS:HG3	2.01	0.42
1:C:60:HIS:O	1:C:128:ASN:HB2	2.19	0.42
1:B:61[A]:ILE:HG12	1:B:94:MET:HG2	2.02	0.41
1:C:13:GLU:HG3	1:C:15:GLY:H	1.85	0.41
1:C:174:LYS:HA	1:C:175:PRO:HD3	1.90	0.41
2:C:301:3L7:CAK	4:C:450:HOH:O	2.68	0.41
1:A:175:PRO:HG2	1:A:178:VAL:CG2	2.51	0.41
1:B:100[B]:ARG:NH2	4:B:436:HOH:O	2.24	0.41
1:D:65:CYS:HB2	1:D:74:PHE:CD1	2.55	0.41
1:A:96:VAL:HG22	1:C:199:ARG:HD2	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:20:LEU:HD13	1:D:7:VAL:HG22	2.03	0.41
1:C:147:SER:O	1:C:151:GLN:HG2	2.20	0.41
1:D:32[A]:GLU:HB3	1:D:206:VAL:HG23	2.03	0.41
1:A:136:ILE:HD12	1:A:175:PRO:HG3	2.03	0.40
1:A:167:THR:HG23	1:A:170:SER:N	2.36	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	195/217 (90%)	190 (97%)	5 (3%)	0	100 100
1	B	203/217 (94%)	194 (96%)	8 (4%)	1 (0%)	29 17
1	C	205/217 (94%)	199 (97%)	6 (3%)	0	100 100
1	D	209/217 (96%)	206 (99%)	3 (1%)	0	100 100
All	All	812/868 (94%)	789 (97%)	22 (3%)	1 (0%)	51 41

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	92	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	176/191 (92%)	172 (98%)	4 (2%)	50 41
1	B	181/191 (95%)	169 (93%)	12 (7%)	16 7
1	C	180/191 (94%)	172 (96%)	8 (4%)	28 16
1	D	186/191 (97%)	177 (95%)	9 (5%)	25 14
All	All	723/764 (95%)	690 (95%)	33 (5%)	30 15

All (33) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	ASN
1	A	71	TYR
1	A	92	ILE
1	A	210	THR
1	B	23	ILE
1	B	61[A]	ILE
1	B	61[B]	ILE
1	B	71	TYR
1	B	91	SER
1	B	116	ILE
1	B	123	THR
1	B	141[A]	THR
1	B	141[B]	THR
1	B	143	GLN
1	B	145	LEU
1	B	210	THR
1	C	32[A]	GLU
1	C	32[B]	GLU
1	C	47	ARG
1	C	71	TYR
1	C	101	LEU
1	C	116	ILE
1	C	130	LEU
1	C	148	LEU
1	D	40[A]	LEU
1	D	40[B]	LEU
1	D	71	TYR
1	D	72	LYS
1	D	101	LEU
1	D	103	SER
1	D	124	LEU
1	D	130	LEU
1	D	207	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	60	HIS

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 13 ligands modelled in this entry, 8 are monoatomic - leaving 5 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	$\#\|Z\| > 2$
2	3L7	C	301	3	26,29,29	3.86	7 (26%)	24,41,41	1.47	3 (12%)
2	3L7	B	301[A]	-	26,29,29	3.74	9 (34%)	24,41,41	1.51	4 (16%)
2	3L7	B	301[B]	3	26,29,29	3.72	9 (34%)	24,41,41	1.57	3 (12%)
2	3L7	A	301	3	26,29,29	3.84	7 (26%)	24,41,41	1.27	3 (12%)
2	3L7	D	301	3	26,29,29	3.74	8 (30%)	24,41,41	1.49	3 (12%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	3L7	C	301	3	-	4/17/20/20	0/2/2/2
2	3L7	B	301[A]	-	-	7/17/20/20	0/2/2/2
2	3L7	B	301[B]	3	-	6/17/20/20	0/2/2/2
2	3L7	A	301	3	-	5/17/20/20	0/2/2/2
2	3L7	D	301	3	-	6/17/20/20	0/2/2/2

All (40) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	301	3L7	CAP-CAK	13.78	1.53	1.32
2	A	301	3L7	CAP-CAK	13.55	1.53	1.32
2	D	301	3L7	CAP-CAK	13.49	1.53	1.32
2	B	301[B]	3L7	CAP-CAK	13.38	1.53	1.32
2	B	301[A]	3L7	CAP-CAK	13.28	1.52	1.32
2	C	301	3L7	PBA-CAP	9.23	1.89	1.76
2	D	301	3L7	PBA-CAP	8.81	1.88	1.76
2	A	301	3L7	PBA-CAP	8.63	1.88	1.76
2	B	301[B]	3L7	PBA-CAP	8.56	1.88	1.76
2	B	301[A]	3L7	PBA-CAP	8.34	1.88	1.76
2	A	301	3L7	PBA-OAD	7.10	1.60	1.48
2	C	301	3L7	PBA-OAD	6.54	1.59	1.48
2	C	301	3L7	O6-C6	5.40	1.34	1.23
2	B	301[A]	3L7	O6-C6	5.11	1.33	1.23
2	B	301[B]	3L7	O6-C6	5.09	1.33	1.23
2	D	301	3L7	O6-C6	4.95	1.33	1.23
2	A	301	3L7	O6-C6	4.90	1.33	1.23
2	D	301	3L7	PBA-OAE	4.36	1.60	1.54
2	B	301[A]	3L7	PBA-OAE	4.35	1.60	1.54
2	D	301	3L7	PBB-OAF	4.23	1.59	1.50
2	B	301[B]	3L7	PBA-OAE	3.93	1.59	1.54
2	B	301[A]	3L7	PBA-OAD	3.82	1.55	1.48
2	D	301	3L7	C2-N3	3.53	1.36	1.29
2	B	301[B]	3L7	C2-N3	3.51	1.36	1.29
2	B	301[A]	3L7	PBB-OAC	-3.47	1.47	1.54
2	B	301[B]	3L7	PBB-OAC	-3.45	1.47	1.54
2	B	301[A]	3L7	C2-N3	3.39	1.36	1.29
2	A	301	3L7	PBB-OAC	-3.35	1.47	1.54
2	B	301[B]	3L7	PBA-OAD	3.34	1.54	1.48
2	C	301	3L7	C2-N3	3.31	1.35	1.29
2	A	301	3L7	C2-N3	3.12	1.35	1.29
2	D	301	3L7	PBB-OAC	-2.92	1.48	1.54
2	B	301[A]	3L7	PBA-OAB	-2.66	1.50	1.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301[B]	3L7	PBA-OAB	-2.50	1.50	1.54
2	D	301	3L7	CAO-N9	2.49	1.52	1.48
2	B	301[A]	3L7	CAO-N9	2.45	1.52	1.48
2	C	301	3L7	CAO-N9	2.43	1.52	1.48
2	B	301[B]	3L7	CAO-N9	2.36	1.52	1.48
2	C	301	3L7	PBA-OAB	-2.34	1.50	1.54
2	A	301	3L7	CAO-N9	2.31	1.51	1.48

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	301	3L7	OAU-CAJ-CAL	3.63	118.59	108.42
2	D	301	3L7	OAU-CAJ-CAL	3.62	118.55	108.42
2	B	301[B]	3L7	CAO-CAM-NAY	3.34	121.00	112.51
2	A	301	3L7	OAU-CAJ-CAL	3.08	117.05	108.42
2	B	301[A]	3L7	OAU-CAJ-CAL	2.96	116.72	108.42
2	C	301	3L7	CAO-CAM-NAY	2.81	119.64	112.51
2	B	301[A]	3L7	C8-N7-C5	2.65	108.04	102.99
2	B	301[B]	3L7	OAU-CAJ-CAL	2.65	115.85	108.42
2	B	301[B]	3L7	C8-N7-C5	2.64	108.02	102.99
2	D	301	3L7	CAO-CAM-NAY	2.62	119.18	112.51
2	C	301	3L7	C8-N7-C5	2.60	107.95	102.99
2	D	301	3L7	C8-N7-C5	2.57	107.88	102.99
2	A	301	3L7	C8-N7-C5	2.47	107.69	102.99
2	B	301[A]	3L7	CAO-CAM-NAY	2.34	118.45	112.51
2	B	301[A]	3L7	OAG-PBB-CAQ	2.32	112.41	106.95
2	A	301	3L7	N1-C2-N3	-2.08	120.45	125.87

There are no chirality outliers.

All (28) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	3L7	CAK-CAP-PBA-OAD
2	A	301	3L7	CAP-CAK-OAU-CAJ
2	B	301[A]	3L7	CAK-CAP-PBA-OAD
2	B	301[A]	3L7	CAQ-CAN-NAY-CAL
2	B	301[A]	3L7	CAQ-CAN-NAY-CAM
2	B	301[A]	3L7	CAO-CAM-NAY-CAN
2	B	301[A]	3L7	NAY-CAM-CAO-N9
2	B	301[A]	3L7	CAM-CAO-N9-C4
2	B	301[B]	3L7	CAP-CAK-OAU-CAJ
2	B	301[B]	3L7	CAL-CAJ-OAU-CAK

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Mol	Chain	Res	Type	Atoms
2	C	301	3L7	CAK-CAP-PBA-OAD
2	D	301	3L7	CAK-CAP-PBA-OAD
2	D	301	3L7	CAP-CAK-OAU-CAJ
2	C	301	3L7	OAU-CAJ-CAL-NAY
2	D	301	3L7	OAU-CAJ-CAL-NAY
2	C	301	3L7	CAO-CAM-NAY-CAL
2	D	301	3L7	CAO-CAM-NAY-CAL
2	A	301	3L7	CAL-CAJ-OAU-CAK
2	B	301[A]	3L7	CAO-CAM-NAY-CAL
2	A	301	3L7	NAY-CAM-CAO-N9
2	B	301[B]	3L7	CAQ-CAN-NAY-CAM
2	D	301	3L7	NAY-CAM-CAO-N9
2	A	301	3L7	OAU-CAJ-CAL-NAY
2	B	301[B]	3L7	CAN-CAQ-PBB-OAC
2	B	301[B]	3L7	CAN-CAQ-PBB-OAF
2	C	301	3L7	CAL-CAJ-OAU-CAK
2	B	301[B]	3L7	CAN-CAQ-PBB-OAG
2	D	301	3L7	CAQ-CAN-NAY-CAM

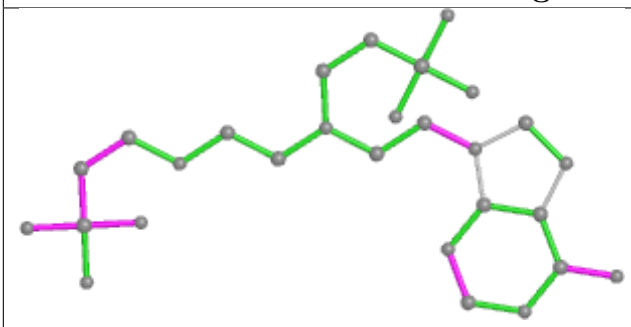
There are no ring outliers.

3 monomers are involved in 5 short contacts:

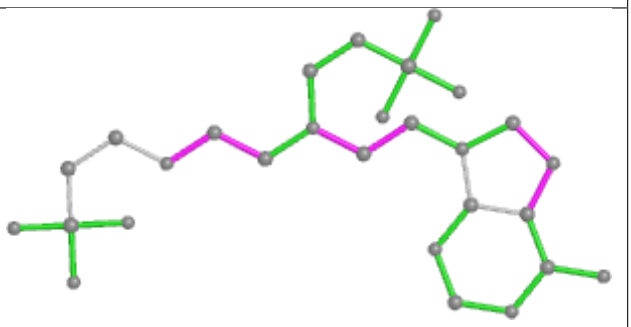
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	301	3L7	2	0
2	B	301[A]	3L7	2	0
2	B	301[B]	3L7	1	0

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.

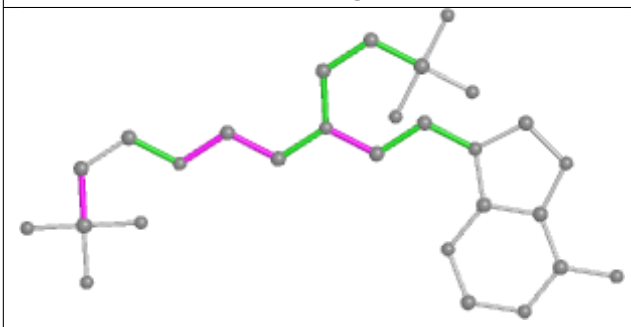
Ligand 3L7 C 301



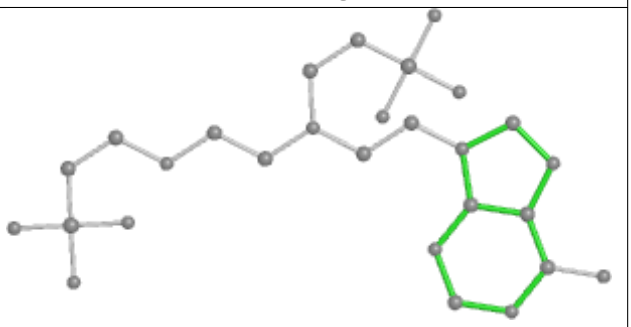
Bond lengths



Bond angles

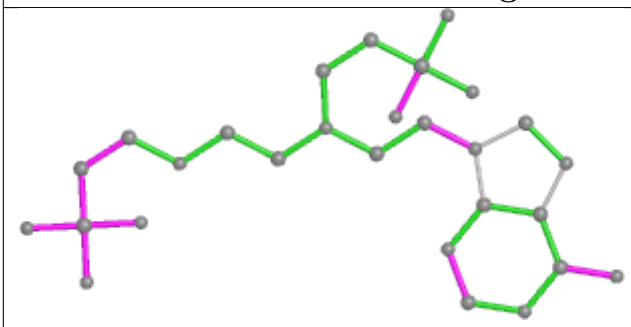


Torsions

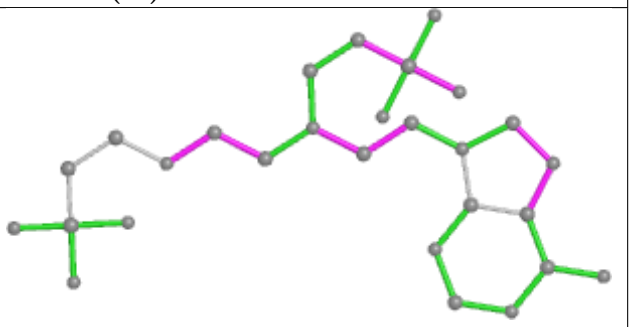


Rings

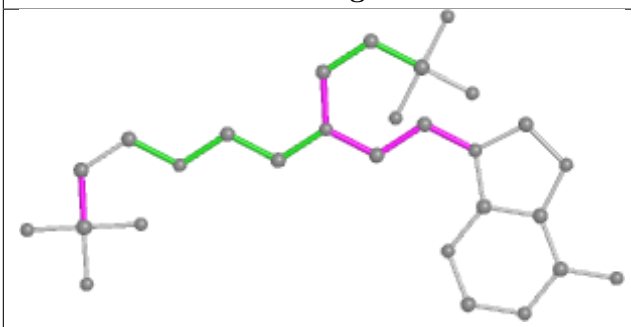
Ligand 3L7 B 301 (A)



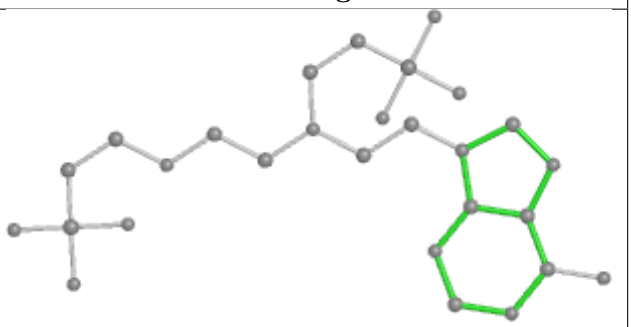
Bond lengths



Bond angles

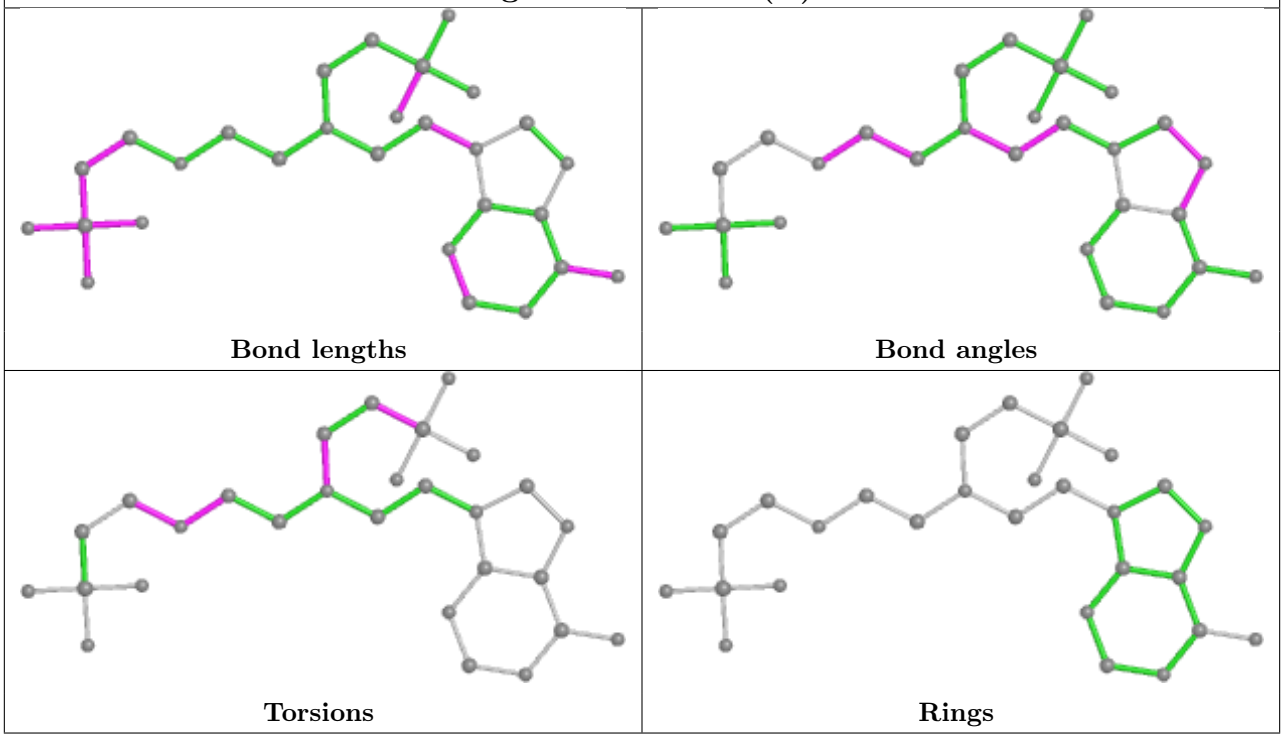


Torsions

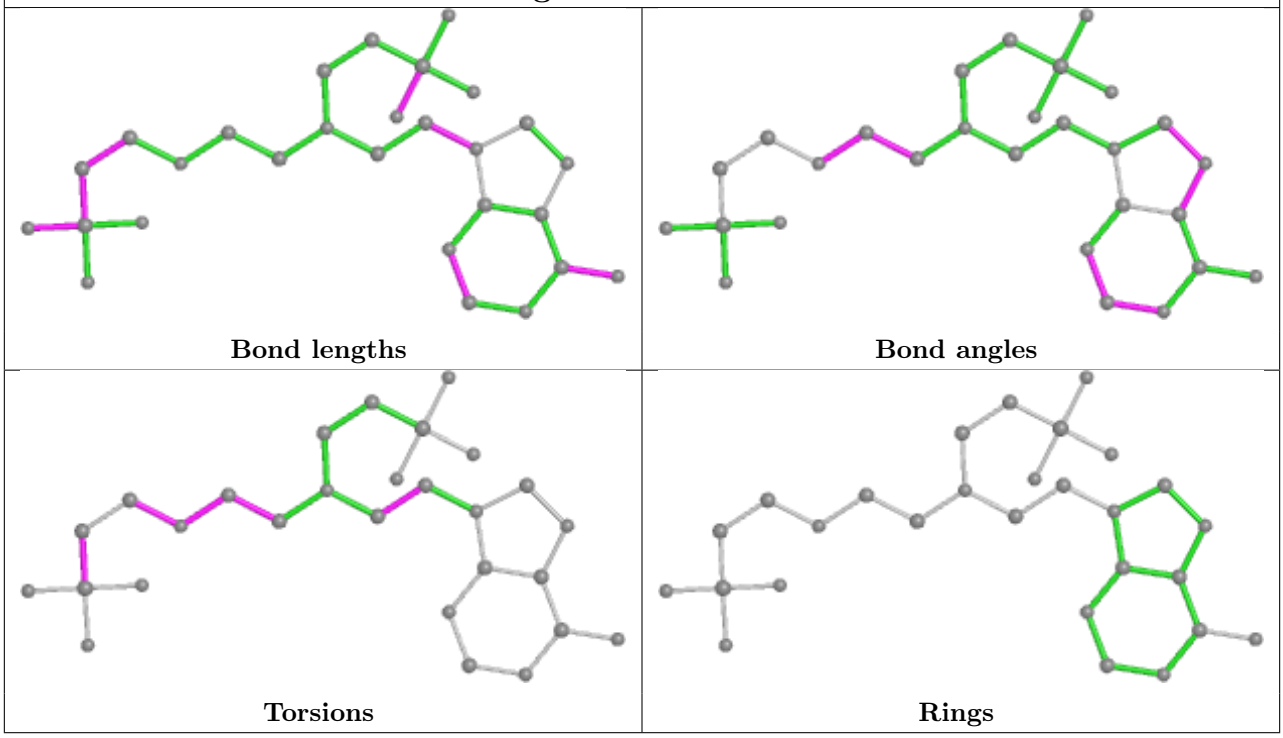


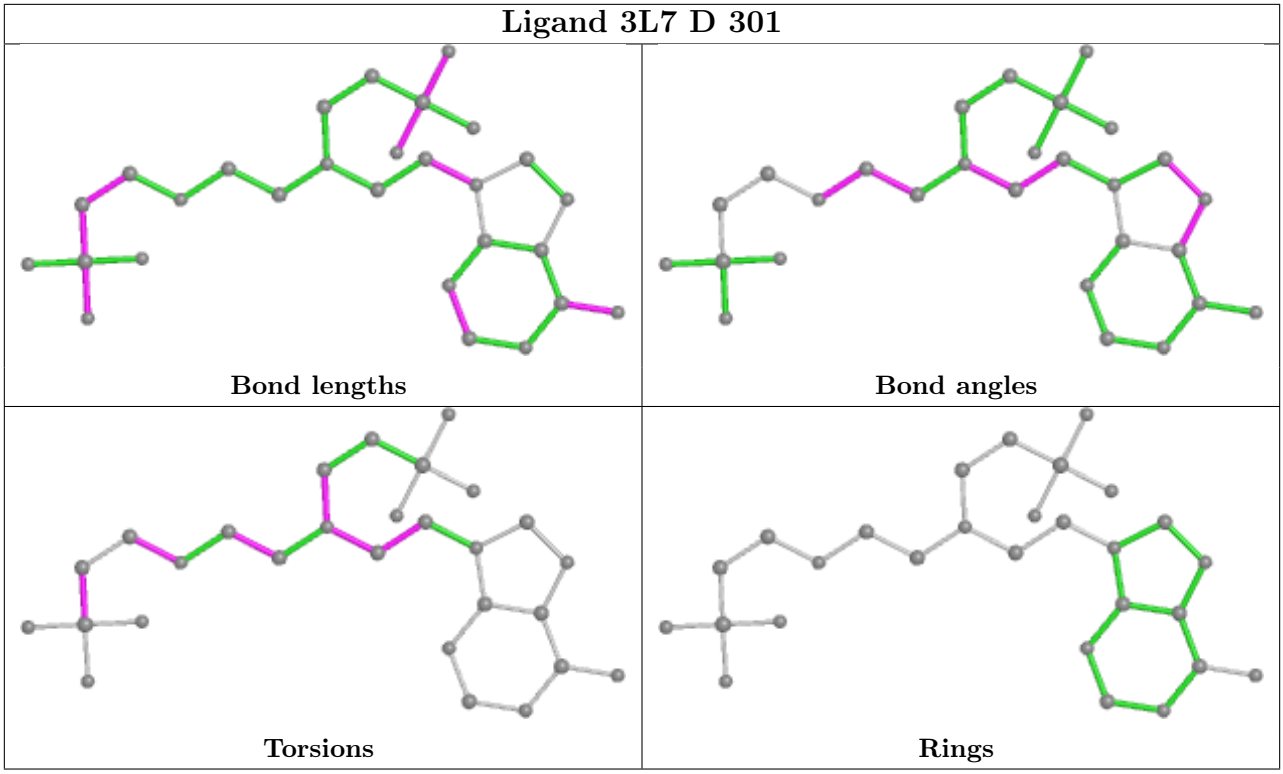
Rings

Ligand 3L7 B 301 (B)



Ligand 3L7 A 301





5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	197/217 (90%)	0.52	19 (9%)	8	8	22, 37, 73, 96	0
1	B	198/217 (91%)	0.36	8 (4%)	38	39	20, 34, 74, 101	0
1	C	203/217 (93%)	0.45	14 (6%)	16	18	22, 39, 70, 107	0
1	D	207/217 (95%)	0.32	16 (7%)	13	14	22, 36, 68, 88	0
All	All	805/868 (92%)	0.41	57 (7%)	16	17	20, 37, 71, 107	0

All (57) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	217	ALA	7.2
1	A	171	VAL	6.9
1	A	170	SER	5.8
1	A	168	PRO	5.6
1	A	210	THR	5.2
1	D	168	PRO	4.5
1	D	171	VAL	4.5
1	C	173	TYR	4.4
1	C	217	ALA	4.3
1	A	172	GLY	4.1
1	D	213	ALA	4.0
1	C	117	GLY	3.9
1	A	215	TYR	3.8
1	A	1	ALA	3.4
1	D	29	GLU	3.3
1	C	91	SER	3.3
1	C	90	ARG	3.3
1	B	91	SER	3.2
1	A	173	TYR	3.1
1	D	210	THR	3.1
1	C	89	ASP	3.1

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Mol	Chain	Res	Type	RSRZ
1	A	213	ALA	3.0
1	C	58	GLY	3.0
1	D	121	LEU	3.0
1	A	216	LYS	3.0
1	B	92	ILE	3.0
1	C	172	GLY	2.9
1	B	116	ILE	2.9
1	A	169	ARG	2.9
1	C	92	ILE	2.9
1	B	119	ASP	2.8
1	B	209	GLU	2.8
1	C	115	VAL	2.8
1	D	209	GLU	2.8
1	B	57	GLY	2.7
1	C	118	GLY	2.6
1	C	120	ASP	2.5
1	B	216	LYS	2.5
1	D	208	SER	2.5
1	D	169	ARG	2.5
1	C	4	SER	2.4
1	C	216	LYS	2.3
1	A	209	GLU	2.3
1	D	28	ALA	2.3
1	D	211	GLY	2.3
1	A	87	ASN	2.2
1	A	202[A]	ASN	2.2
1	D	119	ASP	2.2
1	D	14	PRO	2.2
1	A	195	ASN	2.2
1	A	88[A]	SER	2.1
1	D	117	GLY	2.1
1	A	29	GLU	2.1
1	D	216	LYS	2.1
1	D	118	GLY	2.1
1	A	78[A]	LEU	2.1
1	A	41	ILE	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)

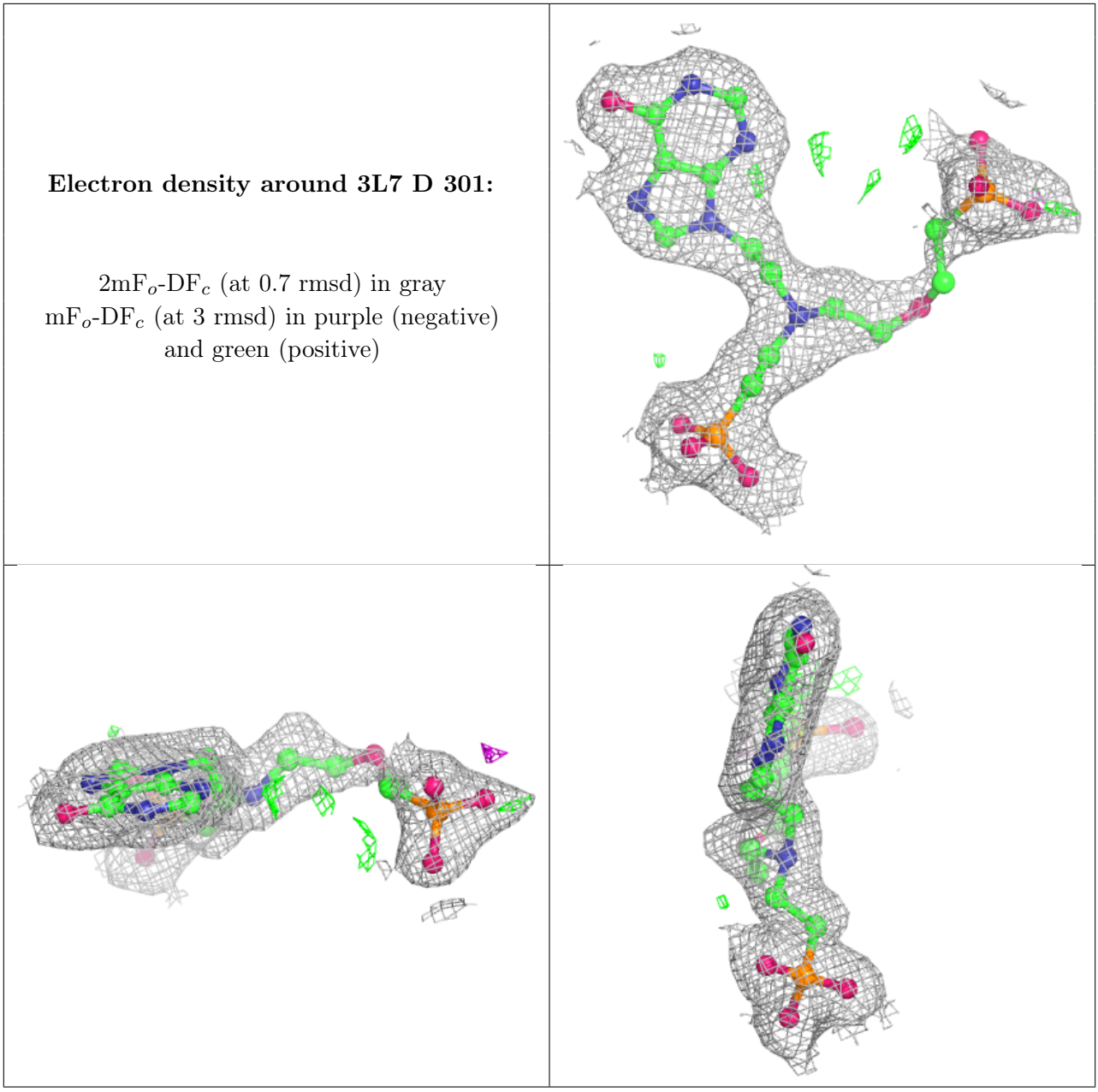
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	MG	B	302	1/1	0.85	0.13	75,75,75,75	0
2	3L7	D	301	28/28	0.94	0.13	37,45,80,115	0
2	3L7	B	301[B]	28/28	0.95	0.16	26,35,41,42	28
2	3L7	C	301	28/28	0.95	0.15	23,32,51,53	28
2	3L7	A	301	28/28	0.95	0.13	36,42,69,73	0
2	3L7	B	301[A]	28/28	0.95	0.16	31,37,60,62	28
3	MG	D	303	1/1	0.95	0.06	45,45,45,45	0
3	MG	C	303	1/1	0.96	0.06	41,41,41,41	0
3	MG	A	303	1/1	0.96	0.14	45,45,45,45	0
3	MG	A	302	1/1	0.97	0.12	28,28,28,28	0
3	MG	D	302	1/1	0.98	0.16	26,26,26,26	0
3	MG	C	302	1/1	0.98	0.08	27,27,27,27	0
3	MG	B	303	1/1	0.99	0.08	36,36,36,36	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.

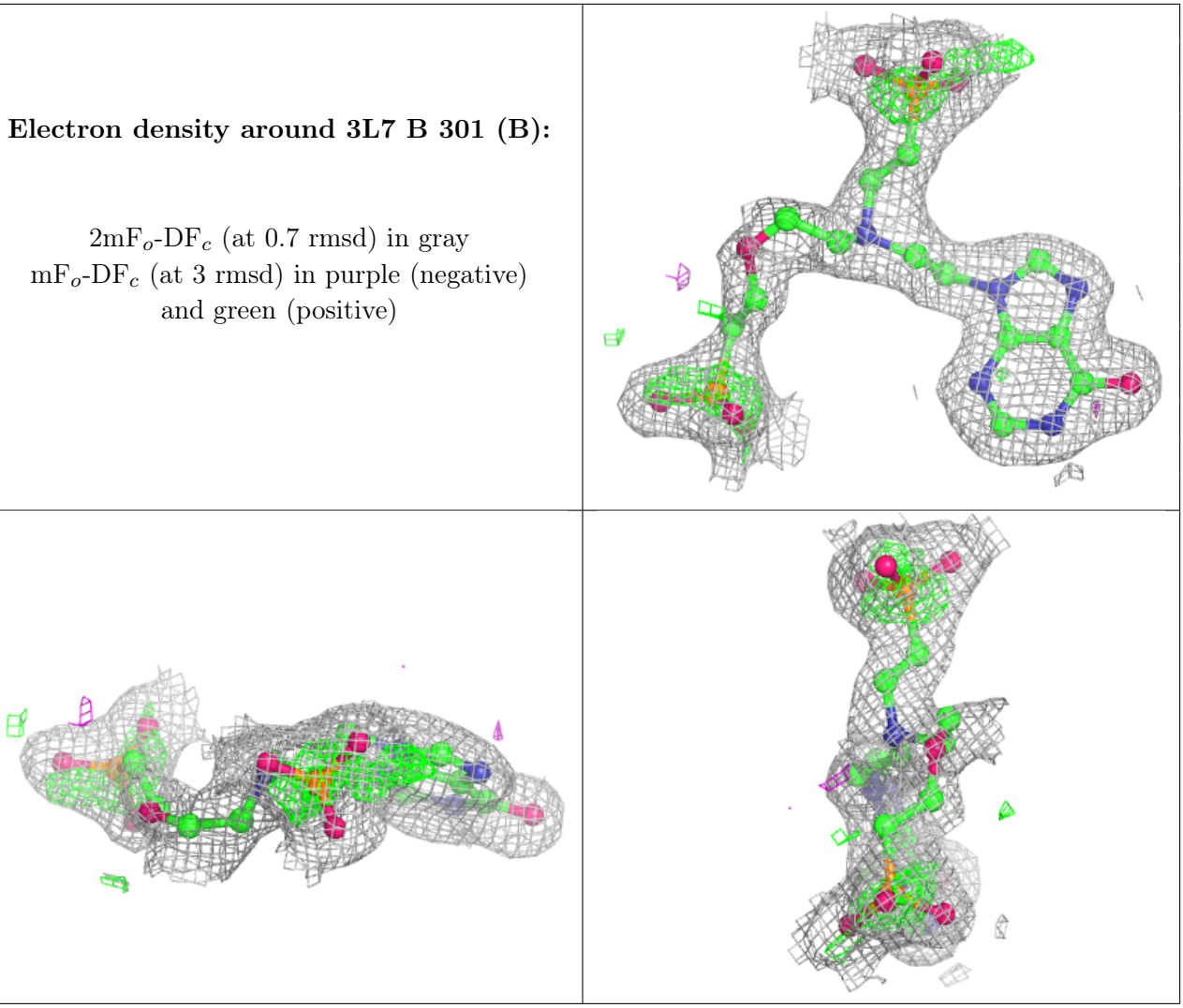
Electron density around 3L7 D 301:

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



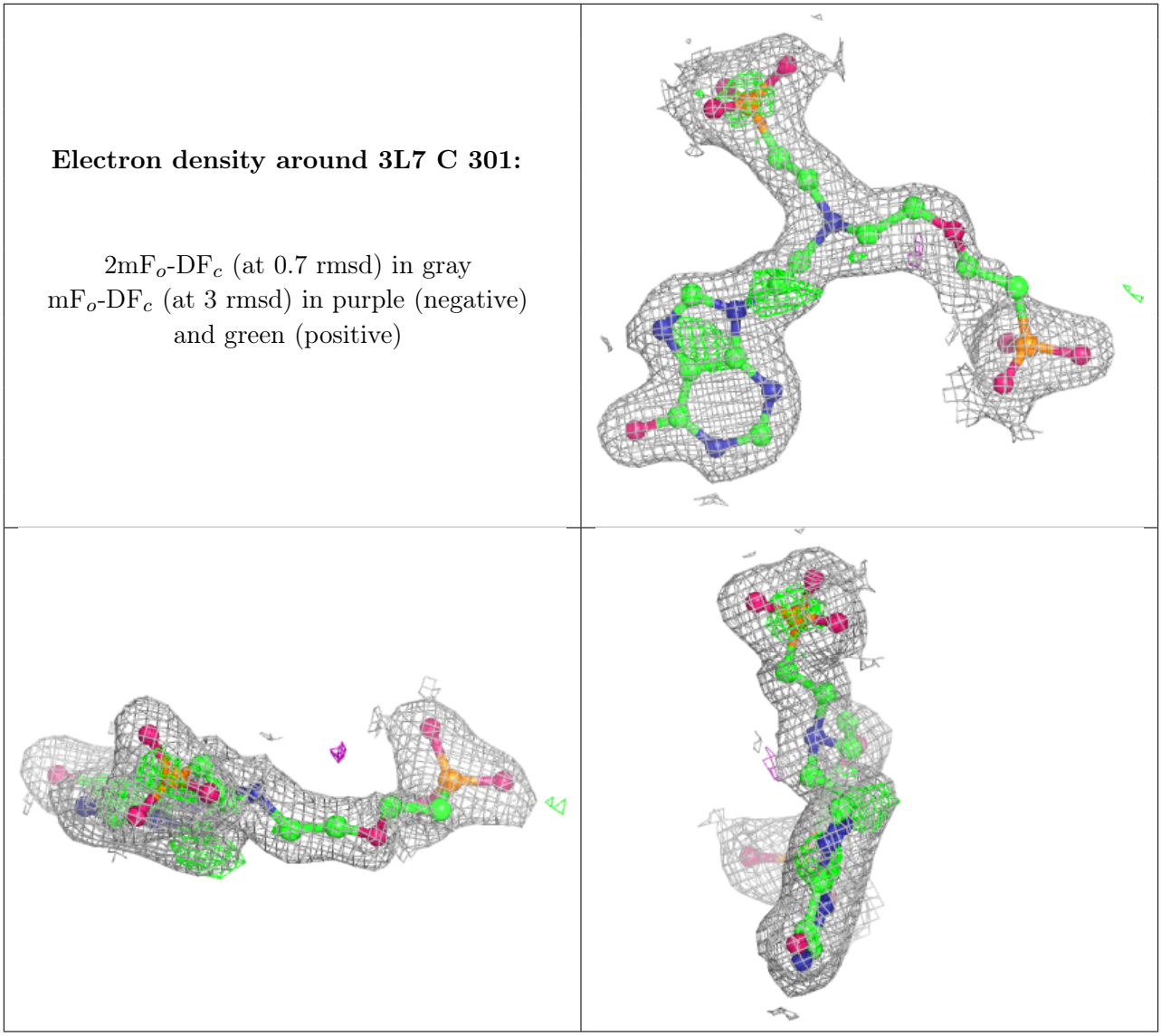
Electron density around 3L7 B 301 (B):

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



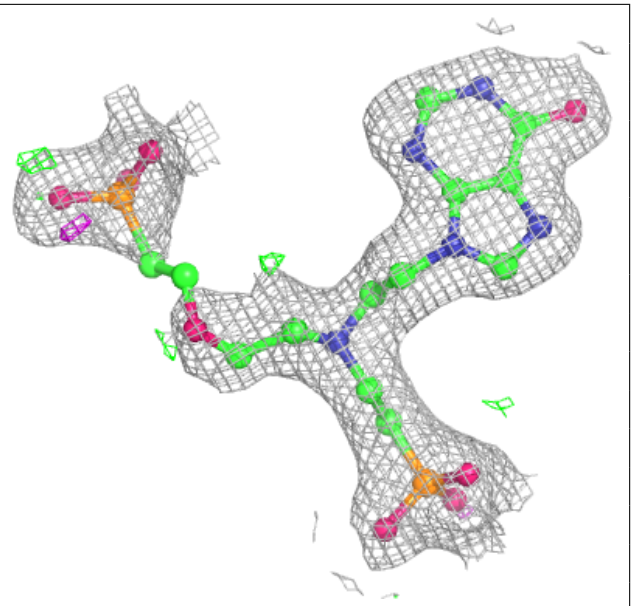
Electron density around 3L7 C 301:

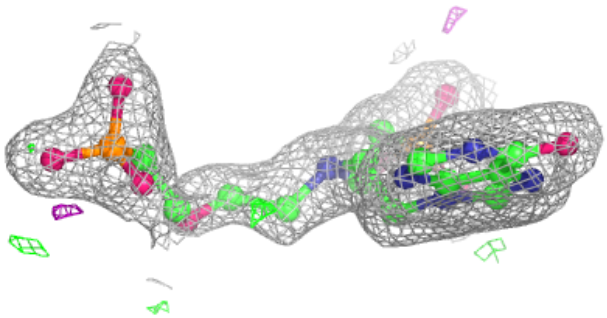
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

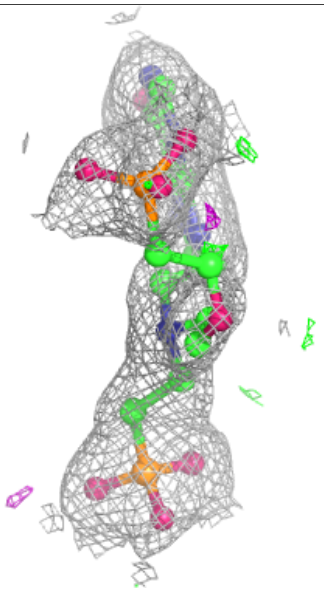


Electron density around 3L7 A 301:

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

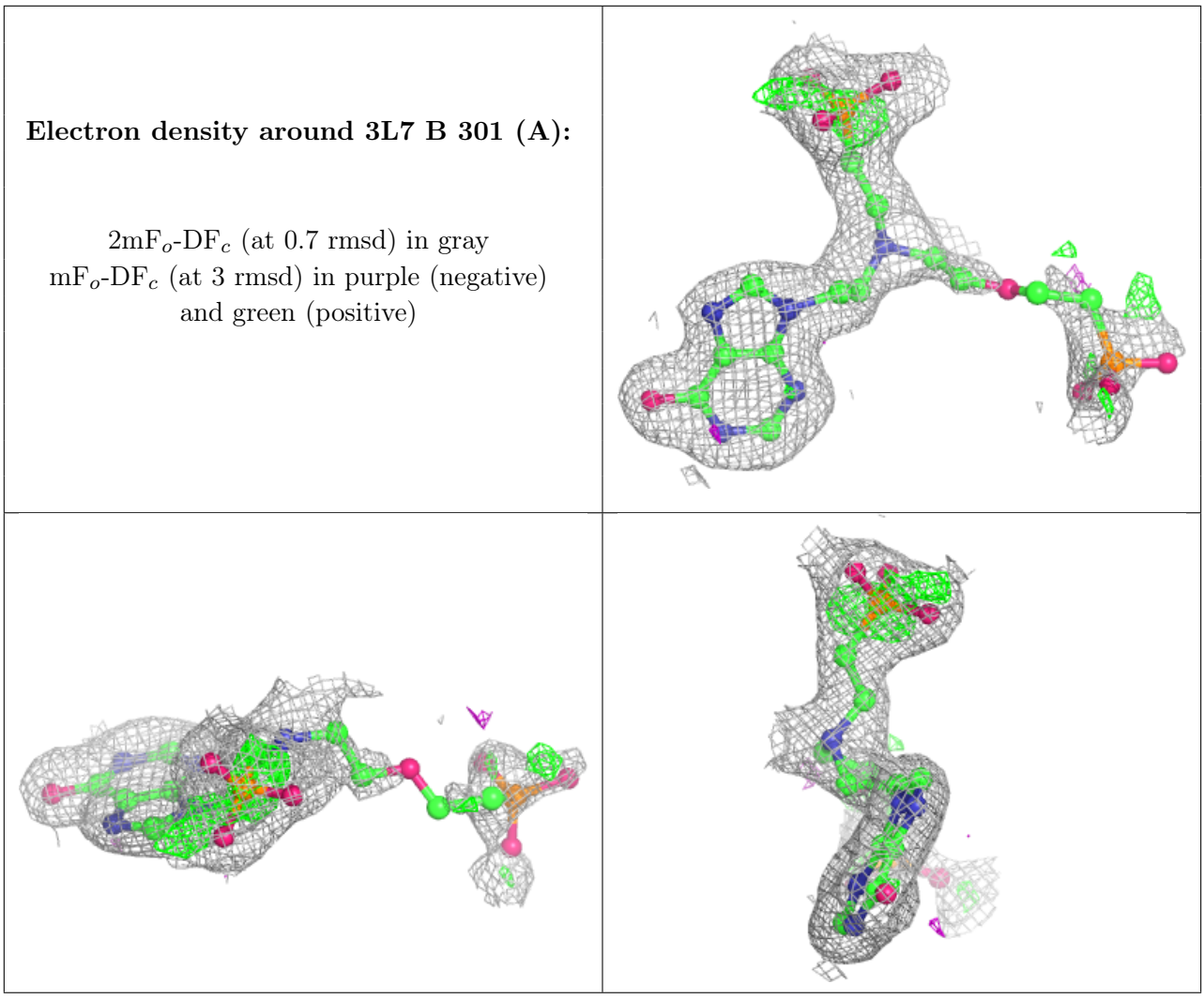






Electron density around 3L7 B 301 (A):

$2mF_o$-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 (i)

There are no such residues in this entry.