Full wwPDB X-ray Structure Validation Report ⓘ

Aug 22, 2020 – 09:25 PM BST

PDB ID	:	5H5A
Title	:	Mdm12 from K. lactis (1-239), Lys residues are uniformly dimethyl modified
Authors	:	Kawano, S.; Quinbara, S.; Endo, T.
Deposited on	:	2016-11-04
Resolution	:	2.26 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 following versions of software and data (see references ⓘ) were used in the production of this report:

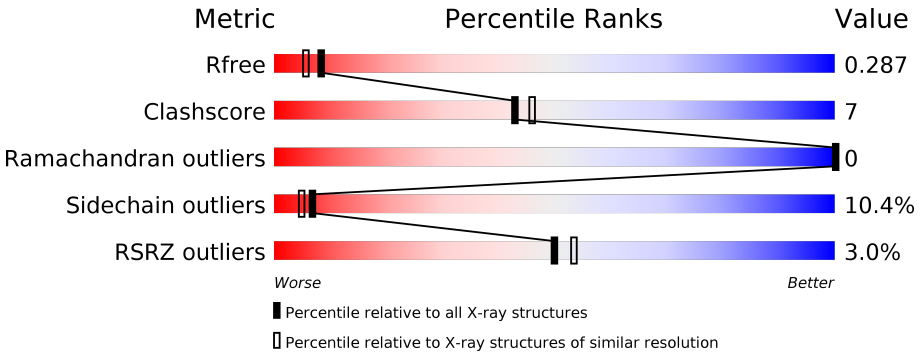
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.13.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.13.1

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 2.26 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	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on 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	240	69% 17% • 11%
1	C	240	4% 68% 15% • 13%
1	D	240	3% 69% 17% •• 12%
2	B	259	3% 63% 18% • 18%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 6931 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 Mitochondrial distribution and morphology protein 12.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	214	Total	C	N	O	S	0	0	0
			1701	1091	280	320	10			
1	C	208	Total	C	N	O	S	0	0	0
			1645	1060	264	311	10			
1	D	211	Total	C	N	O	S	0	0	0
			1668	1071	272	316	9			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	HIS	-	expression tag	UNP Q6CUC3
C	0	HIS	-	expression tag	UNP Q6CUC3
D	0	HIS	-	expression tag	UNP Q6CUC3

- Molecule 2 is a protein called Mitochondrial distribution and morphology protein 12.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	213	Total	C	N	O	S	0	0	0
			1697	1090	279	319	9			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-19	MET	-	initiating methionine	UNP Q6CUC3
B	-18	GLY	-	expression tag	UNP Q6CUC3
B	-17	SER	-	expression tag	UNP Q6CUC3
B	-16	SER	-	expression tag	UNP Q6CUC3
B	-15	HIS	-	expression tag	UNP Q6CUC3
B	-14	HIS	-	expression tag	UNP Q6CUC3
B	-13	HIS	-	expression tag	UNP Q6CUC3
B	-12	HIS	-	expression tag	UNP Q6CUC3
B	-11	HIS	-	expression tag	UNP Q6CUC3

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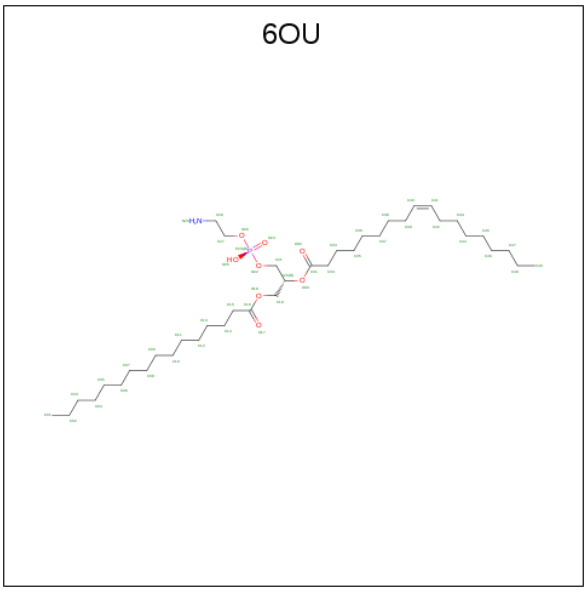
Chain	Residue	Modelled	Actual	Comment	Reference
B	-10	HIS	-	expression tag	UNP Q6CUC3
B	-9	SER	-	expression tag	UNP Q6CUC3
B	-8	SER	-	expression tag	UNP Q6CUC3
B	-7	GLY	-	expression tag	UNP Q6CUC3
B	-6	LEU	-	expression tag	UNP Q6CUC3
B	-5	VAL	-	expression tag	UNP Q6CUC3
B	-4	PRO	-	expression tag	UNP Q6CUC3
B	-3	ARG	-	expression tag	UNP Q6CUC3
B	-2	GLY	-	expression tag	UNP Q6CUC3
B	-1	SER	-	expression tag	UNP Q6CUC3
B	0	HIS	-	expression tag	UNP Q6CUC3

- Molecule 3 is [(2 {R})-1-[2-azanylethoxy(oxidanyl)phosphoryl]oxy-3-hexadecanoyloxy-propan-2-yl] ({Z})-octadec-9-enoate (three-letter code: 6OU) (formula: $C_{39}H_{76}NO_8P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			49	39	1	8	1		
3	B	1	Total	C	N	O	P	0	0
			49	39	1	8	1		
3	C	1	Total	C	N	O	P	0	0
			49	39	1	8	1		
3	D	1	Total	C	N	O	P	0	0
			49	39	1	8	1		

- Molecule 4 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total K 1 1	0	0
4	A	1	Total K 1 1	0	0
4	D	1	Total K 1 1	0	0
4	C	1	Total K 1 1	0	0

- Molecule 5 is water.

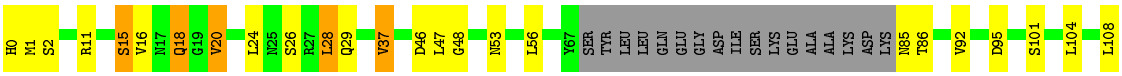
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	7	Total O 7 7	0	0
5	B	5	Total O 5 5	0	0
5	C	4	Total O 4 4	0	0
5	D	4	Total O 4 4	0	0

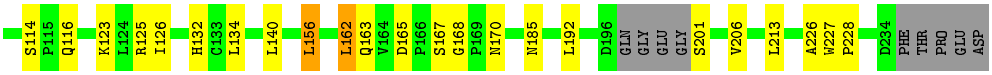
3 Residue-property plots (i)

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: Mitochondrial distribution and morphology protein 12

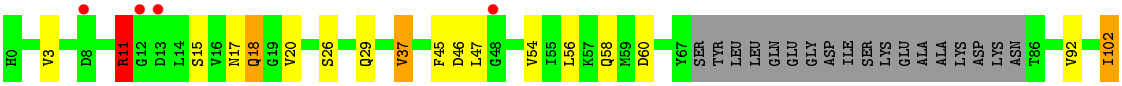
Chain A:

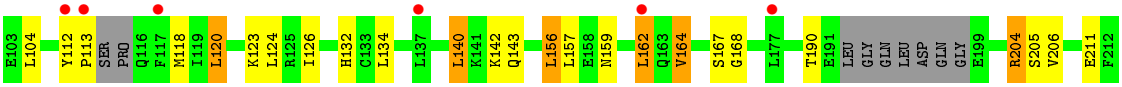


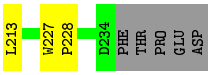


- Molecule 1: Mitochondrial distribution and morphology protein 12

Chain C:

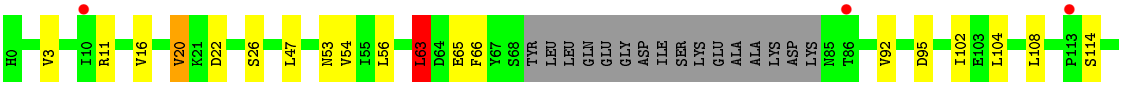


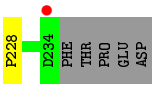




- Molecule 1: Mitochondrial distribution and morphology protein 12

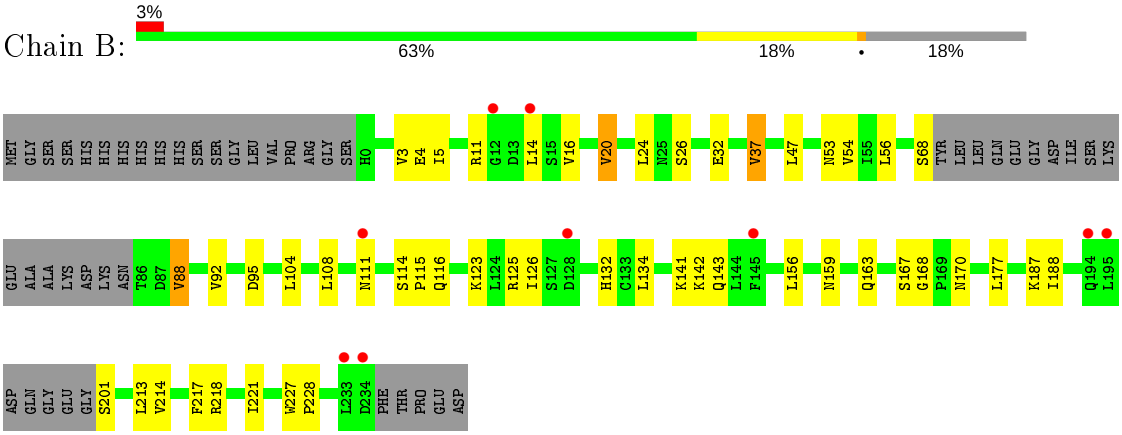
Chain D:





• Molecule 2: Mitochondrial distribution and morphology protein 12

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	42.87Å 48.52Å 130.13Å 90.01° 91.50° 90.01°	Depositor
Resolution (Å)	50.00 – 2.26 36.22 – 2.25	Depositor EDS
% Data completeness (in resolution range)	97.1 (50.00-2.26) 97.0 (36.22-2.25)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.10 (at 2.24Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, R_{free}	0.251 , 0.286 0.255 , 0.287	Depositor DCC
R_{free} test set	2438 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å^2)	38.3	Xtriage
Anisotropy	0.158	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 15.8	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.35$	Xtriage
Estimated twinning fraction	0.012 for h,-k,-l 0.447 for -h,k,-l 0.010 for -h,-k,l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	6931	wwPDB-VP
Average B, all atoms (Å^2)	43.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 12.81% 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: 6OU, K

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	0.68	0/1732	0.96	6/2349 (0.3%)
1	C	0.66	0/1673	0.96	3/2267 (0.1%)
1	D	0.64	0/1698	0.91	2/2302 (0.1%)
2	B	0.68	0/1728	0.94	2/2342 (0.1%)
All	All	0.67	0/6831	0.94	13/9260 (0.1%)

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	C	0	1

There are no bond length outliers.

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	88	VAL	CB-CA-C	-7.58	97.00	111.40
1	C	37	VAL	CB-CA-C	-7.32	97.49	111.40
2	B	37	VAL	CB-CA-C	-7.09	97.93	111.40
1	A	37	VAL	CB-CA-C	-7.06	97.98	111.40
1	C	11	ARG	N-CA-C	6.48	128.49	111.00
1	D	63	LEU	CB-CG-CD1	-6.35	100.20	111.00
1	A	18	GLN	N-CA-C	-6.14	94.42	111.00
1	A	101	SER	CB-CA-C	-5.60	99.46	110.10
1	C	18	GLN	N-CA-C	-5.49	96.17	111.00
1	D	209	LEU	CA-CB-CG	5.47	127.88	115.30
1	A	28	LEU	CA-CB-CG	5.20	127.26	115.30
1	A	165	ASP	CB-CG-OD1	5.15	122.93	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	18	GLN	C-N-CA	-5.13	111.52	122.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	11	ARG	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	1701	0	1693	18	0
1	C	1645	0	1630	26	0
1	D	1668	0	1655	21	0
2	B	1697	0	1698	30	0
3	A	49	0	0	1	0
3	B	49	0	0	5	0
3	C	49	0	0	0	0
3	D	49	0	0	2	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	7	0	0	1	0
5	B	5	0	0	0	0
5	C	4	0	0	0	0
5	D	4	0	0	0	0
All	All	6931	0	6676	93	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 7.

All (93) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:188:ILE:HD13	2:B:214:VAL:CG2	1.87	1.04
2:B:188:ILE:HD13	2:B:214:VAL:HG22	1.40	1.01
2:B:188:ILE:CD1	2:B:214:VAL:HG22	1.93	0.98
2:B:24:LEU:HD21	3:B:301:6OU:C49	1.99	0.93
1:A:48:GLY:HA3	5:A:401:HOH:O	1.81	0.81
2:B:221:ILE:HD11	3:B:301:6OU:C49	2.13	0.77
2:B:141:LYS:HG3	2:B:141:LYS:O	1.88	0.74
2:B:5:ILE:HD12	2:B:54:VAL:HG21	1.71	0.73
1:C:20:VAL:HG11	1:C:45:PHE:CD2	2.24	0.72
2:B:141:LYS:CG	2:B:141:LYS:O	2.38	0.70
2:B:5:ILE:CD1	2:B:54:VAL:HG21	2.22	0.69
1:A:11:ARG:NH1	1:A:48:GLY:O	2.25	0.68
2:B:217:PHE:CE1	3:B:301:6OU:C49	2.78	0.67
2:B:142:LYS:C	2:B:143:GLN:OE1	2.35	0.65
1:C:15:SER:O	1:C:18:GLN:O	2.17	0.63
1:A:2:SER:N	3:D:301:6OU:O25	2.30	0.63
1:C:17:ASN:O	1:C:20:VAL:HG12	1.99	0.63
2:B:188:ILE:HD11	2:B:214:VAL:HG22	1.76	0.62
1:D:102:ILE:HD11	3:D:301:6OU:C01	2.28	0.62
1:C:20:VAL:HG11	1:C:45:PHE:CE2	2.35	0.60
1:A:15:SER:O	1:A:18:GLN:O	2.19	0.59
2:B:187:LYS:C	2:B:188:ILE:HD12	2.22	0.59
2:B:143:GLN:N	2:B:143:GLN:OE1	2.36	0.58
2:B:188:ILE:CD1	2:B:214:VAL:CG2	2.64	0.57
2:B:188:ILE:HD12	2:B:188:ILE:N	2.20	0.57
1:C:29:GLN:NE2	1:D:211:GLU:OE2	2.38	0.57
1:C:45:PHE:HD1	1:C:102:ILE:HG23	1.69	0.56
1:D:219:ASN:OD1	1:D:222:ARG:NH1	2.34	0.56
1:D:122:VAL:HG12	1:D:192:LEU:HD13	1.89	0.55
1:C:102:ILE:HG13	1:C:126:ILE:HB	1.89	0.54
1:D:167:SER:N	1:D:168:GLY:HA3	2.23	0.53
1:D:108:LEU:HD13	1:D:209:LEU:HD22	1.89	0.53
2:B:16:VAL:O	2:B:20:VAL:HG13	2.09	0.53
1:D:16:VAL:O	1:D:20:VAL:HG13	2.09	0.52
1:D:122:VAL:HG12	1:D:192:LEU:CD1	2.40	0.52
1:A:16:VAL:O	1:A:20:VAL:HG13	2.10	0.51
1:D:170:ASN:OD1	1:D:170:ASN:N	2.44	0.51
2:B:24:LEU:CD2	3:B:301:6OU:C49	2.82	0.51
1:C:112:TYR:CG	1:C:112:TYR:O	2.62	0.51
1:D:124:LEU:HB3	1:D:188:ILE:HD11	1.93	0.50
1:A:26:SER:O	1:A:29:GLN:HG2	2.12	0.49
1:C:156:LEU:HB3	1:C:162:LEU:HB2	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:53:ASN:HB3	1:D:95:ASP:HB3	1.96	0.48
2:B:111:ASN:HA	2:B:115:PRO:O	2.14	0.47
1:A:167:SER:N	1:A:168:GLY:HA3	2.29	0.47
1:C:167:SER:N	1:C:168:GLY:HA3	2.29	0.47
1:D:140:LEU:O	1:D:140:LEU:HD12	2.15	0.47
1:D:227:TRP:CG	1:D:228:PRO:HA	2.49	0.47
1:A:227:TRP:CG	1:A:228:PRO:HA	2.50	0.47
2:B:163:GLN:HB2	2:B:170:ASN:O	2.14	0.47
2:B:167:SER:N	2:B:168:GLY:HA3	2.30	0.46
1:A:46:ASP:OD1	1:A:47:LEU:O	2.34	0.46
1:C:26:SER:O	1:C:29:GLN:HG2	2.15	0.46
1:D:63:LEU:HD12	1:D:66:PHE:CE2	2.51	0.46
1:A:140:LEU:HD12	1:A:140:LEU:O	2.15	0.46
1:A:163:GLN:HB2	1:A:170:ASN:O	2.15	0.46
1:C:46:ASP:OD1	1:C:47:LEU:O	2.34	0.45
1:A:85:ASN:N	1:A:86:THR:HA	2.31	0.45
1:A:156:LEU:HB3	1:A:162:LEU:HB2	1.97	0.45
2:B:227:TRP:CG	2:B:228:PRO:HA	2.52	0.45
2:B:141:LYS:O	2:B:143:GLN:OE1	2.34	0.45
2:B:53:ASN:HB3	2:B:95:ASP:HB3	1.99	0.45
1:C:157:LEU:O	1:C:159:ASN:O	2.35	0.44
1:C:140:LEU:N	1:C:140:LEU:HD23	2.33	0.43
1:C:227:TRP:CG	1:C:228:PRO:HA	2.53	0.43
2:B:3:VAL:HG13	2:B:54:VAL:HB	2.00	0.43
1:C:142:LYS:O	1:C:142:LYS:HG3	2.19	0.43
1:C:164:VAL:HG13	1:C:164:VAL:O	2.18	0.43
1:A:213:LEU:HA	1:A:213:LEU:HD23	1.79	0.43
2:B:104:LEU:HD11	2:B:126:ILE:HD12	2.00	0.43
1:C:213:LEU:HD23	1:C:213:LEU:HA	1.78	0.43
1:A:53:ASN:HB3	1:A:95:ASP:HB3	1.99	0.43
1:D:156:LEU:HB3	1:D:162:LEU:HB2	2.01	0.42
1:D:3:VAL:HG13	1:D:54:VAL:HB	2.02	0.42
1:D:163:GLN:HB2	1:D:170:ASN:O	2.19	0.42
1:C:104:LEU:HD11	1:C:126:ILE:HD12	2.02	0.42
1:A:104:LEU:HD11	1:A:126:ILE:HD12	2.01	0.42
1:C:118:MET:HG2	1:C:120:LEU:HD12	2.01	0.42
1:C:3:VAL:HG13	1:C:54:VAL:HB	2.01	0.42
2:B:213:LEU:HD23	2:B:213:LEU:HA	1.81	0.42
2:B:217:PHE:HE1	3:B:301:6OU:C49	2.31	0.42
2:B:5:ILE:HD12	2:B:54:VAL:CG2	2.46	0.42
2:B:188:ILE:HD13	2:B:214:VAL:HG23	1.93	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:104:LEU:HD11	1:D:126:ILE:HD12	2.02	0.41
1:D:213:LEU:HD12	1:D:213:LEU:HA	1.76	0.41
1:C:124:LEU:HD23	1:C:190:THR:OG1	2.20	0.41
1:D:22:ASP:O	1:D:26:SER:OG	2.33	0.41
1:A:226:ALA:O	1:A:227:TRP:C	2.59	0.41
1:A:24:LEU:HD21	3:A:301:6OU:C49	2.50	0.41
1:C:204:ARG:HG3	1:C:205:SER:N	2.35	0.41
1:C:143:GLN:OE1	1:D:204:ARG:NH2	2.53	0.41
1:C:112:TYR:O	1:C:113:PRO:C	2.59	0.41
1:C:58:GLN:OE1	1:C:60:ASP:OD1	2.39	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	208/240 (87%)	198 (95%)	10 (5%)	0	100	100
1	C	200/240 (83%)	189 (94%)	11 (6%)	0	100	100
1	D	203/240 (85%)	198 (98%)	5 (2%)	0	100	100
2	B	207/259 (80%)	200 (97%)	7 (3%)	0	100	100
All	All	818/979 (84%)	785 (96%)	33 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	194/221 (88%)	173 (89%)	21 (11%)	6 4
1	C	185/221 (84%)	169 (91%)	16 (9%)	10 9
1	D	190/221 (86%)	172 (90%)	18 (10%)	8 6
2	B	194/237 (82%)	170 (88%)	24 (12%)	4 3
All	All	763/900 (85%)	684 (90%)	79 (10%)	7 5

All (79) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	0	HIS
1	A	1	MET
1	A	15	SER
1	A	20	VAL
1	A	28	LEU
1	A	37	VAL
1	A	56	LEU
1	A	92	VAL
1	A	108	LEU
1	A	114	SER
1	A	116	GLN
1	A	123	LYS
1	A	125	ARG
1	A	132	HIS
1	A	134	LEU
1	A	156	LEU
1	A	162	LEU
1	A	185	ASN
1	A	192	LEU
1	A	201	SER
1	A	206	VAL
2	B	4	GLU
2	B	11	ARG
2	B	14	LEU
2	B	20	VAL
2	B	26	SER
2	B	32	GLU
2	B	37	VAL
2	B	47	LEU
2	B	56	LEU

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Mol	Chain	Res	Type
2	B	68	SER
2	B	88	VAL
2	B	92	VAL
2	B	108	LEU
2	B	114	SER
2	B	116	GLN
2	B	123	LYS
2	B	125	ARG
2	B	132	HIS
2	B	134	LEU
2	B	156	LEU
2	B	159	ASN
2	B	177	LEU
2	B	201	SER
2	B	218	ARG
1	C	11	ARG
1	C	37	VAL
1	C	56	LEU
1	C	92	VAL
1	C	102	ILE
1	C	120	LEU
1	C	123	LYS
1	C	132	HIS
1	C	134	LEU
1	C	140	LEU
1	C	156	LEU
1	C	162	LEU
1	C	164	VAL
1	C	204	ARG
1	C	206	VAL
1	C	211	GLU
1	D	11	ARG
1	D	20	VAL
1	D	47	LEU
1	D	56	LEU
1	D	63	LEU
1	D	65	GLU
1	D	92	VAL
1	D	114	SER
1	D	123	LYS
1	D	131	MET
1	D	132	HIS

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Mol	Chain	Res	Type
1	D	134	LEU
1	D	162	LEU
1	D	177	LEU
1	D	185	ASN
1	D	192	LEU
1	D	201	SER
1	D	209	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	9	ASN
1	A	18	GLN
1	A	185	ASN
1	C	53	ASN
1	C	58	GLN
1	D	0	HIS
1	D	185	ASN

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 monosaccharides in this entry.

5.6 Ligand geometry

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 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	$\#\|Z\| > 2$
3	6OU	B	301	-	48,48,48	0.92	2 (4%)	51,53,53	1.65	13 (25%)
3	6OU	A	301	-	48,48,48	0.95	2 (4%)	51,53,53	1.32	7 (13%)
3	6OU	D	301	-	48,48,48	0.87	2 (4%)	51,53,53	1.40	7 (13%)
3	6OU	C	301	-	48,48,48	0.91	2 (4%)	51,53,53	1.54	9 (17%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	6OU	B	301	-	-	27/52/52/52	-
3	6OU	A	301	-	-	24/52/52/52	-
3	6OU	D	301	-	-	20/52/52/52	-
3	6OU	C	301	-	-	19/52/52/52	-

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	301	6OU	C41-C40	3.81	1.53	1.31
3	A	301	6OU	C41-C40	3.60	1.52	1.31
3	D	301	6OU	C41-C40	3.48	1.52	1.31
3	B	301	6OU	C41-C40	3.22	1.50	1.31
3	C	301	6OU	O18-C19	-2.90	1.38	1.45
3	A	301	6OU	C15-C16	2.89	1.59	1.50
3	B	301	6OU	C15-C16	2.71	1.58	1.50
3	D	301	6OU	P23-O22	2.12	1.67	1.59

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	301	6OU	C47-C46-C45	-3.54	96.44	114.42
3	B	301	6OU	C36-C35-C34	-3.31	97.61	114.42
3	D	301	6OU	C34-C33-C31	-3.25	101.81	113.62
3	B	301	6OU	C34-C33-C31	-3.20	102.00	113.62
3	C	301	6OU	C06-C05-C04	-3.05	98.94	114.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	301	6OU	C08-C07-C06	-2.77	100.39	114.42
3	B	301	6OU	C38-C37-C36	-2.70	100.70	114.42
3	C	301	6OU	O18-C19-C20	-2.70	100.57	108.43
3	A	301	6OU	C38-C37-C36	-2.66	100.91	114.42
3	A	301	6OU	C44-C43-C42	-2.66	102.22	113.79
3	C	301	6OU	C11-C10-C09	-2.59	101.26	114.42
3	C	301	6OU	C45-C44-C43	-2.53	101.56	114.42
3	B	301	6OU	C44-C43-C42	-2.52	102.83	113.79
3	A	301	6OU	C13-C12-C11	-2.48	101.83	114.42
3	A	301	6OU	C13-C14-C15	-2.45	104.40	113.19
3	C	301	6OU	C13-C12-C11	-2.44	102.04	114.42
3	C	301	6OU	C38-C37-C36	-2.43	102.10	114.42
3	B	301	6OU	C12-C11-C10	-2.42	102.16	114.42
3	D	301	6OU	C37-C36-C35	-2.41	102.21	114.42
3	B	301	6OU	C37-C38-C39	-2.38	103.41	113.79
3	B	301	6OU	C38-C39-C40	-2.34	99.04	112.43
3	D	301	6OU	C46-C45-C44	-2.33	102.60	114.42
3	B	301	6OU	C13-C14-C15	-2.32	104.85	113.19
3	B	301	6OU	O30-C31-C33	2.27	116.39	111.50
3	B	301	6OU	C09-C08-C07	-2.24	103.03	114.42
3	C	301	6OU	C09-C08-C07	-2.21	103.22	114.42
3	B	301	6OU	C20-O30-C31	-2.17	112.46	117.79
3	D	301	6OU	C45-C44-C43	-2.17	103.43	114.42
3	A	301	6OU	C43-C42-C41	-2.15	100.13	112.43
3	D	301	6OU	C13-C12-C11	-2.07	103.94	114.42
3	D	301	6OU	C11-C10-C09	-2.05	104.02	114.42
3	A	301	6OU	C20-O30-C31	-2.03	112.79	117.79
3	D	301	6OU	O30-C31-C33	2.03	115.86	111.50
3	A	301	6OU	C09-C08-C07	-2.02	104.18	114.42
3	C	301	6OU	C37-C36-C35	-2.02	104.19	114.42
3	B	301	6OU	C45-C44-C43	-2.00	104.25	114.42

There are no chirality outliers.

All (90) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	301	6OU	C27-O26-P23-O25
3	B	301	6OU	O32-C31-O30-C20
3	B	301	6OU	C33-C31-O30-C20
3	A	301	6OU	C21-O22-P23-O24
3	A	301	6OU	C21-O22-P23-O25
3	A	301	6OU	C21-O22-P23-O26

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Mol	Chain	Res	Type	Atoms
3	A	301	6OU	O26-C27-C28-N29
3	A	301	6OU	O32-C31-O30-C20
3	D	301	6OU	C27-O26-P23-O22
3	D	301	6OU	O26-C27-C28-N29
3	D	301	6OU	C33-C31-O30-C20
3	C	301	6OU	C27-O26-P23-O22
3	D	301	6OU	O32-C31-O30-C20
3	A	301	6OU	C33-C31-O30-C20
3	D	301	6OU	C15-C16-O18-C19
3	C	301	6OU	C31-C33-C34-C35
3	D	301	6OU	O17-C16-O18-C19
3	D	301	6OU	C03-C04-C05-C06
3	B	301	6OU	O17-C16-O18-C19
3	B	301	6OU	C15-C16-O18-C19
3	A	301	6OU	C15-C16-O18-C19
3	B	301	6OU	C31-C33-C34-C35
3	B	301	6OU	C27-O26-P23-O22
3	B	301	6OU	C09-C10-C11-C12
3	A	301	6OU	C12-C13-C14-C15
3	B	301	6OU	C35-C36-C37-C38
3	A	301	6OU	C08-C09-C10-C11
3	C	301	6OU	C12-C13-C14-C15
3	A	301	6OU	O17-C16-O18-C19
3	C	301	6OU	C09-C10-C11-C12
3	D	301	6OU	C13-C14-C15-C16
3	D	301	6OU	C06-C07-C08-C09
3	B	301	6OU	O26-C27-C28-N29
3	C	301	6OU	O26-C27-C28-N29
3	D	301	6OU	C42-C43-C44-C45
3	A	301	6OU	C04-C05-C06-C07
3	D	301	6OU	C08-C09-C10-C11
3	B	301	6OU	C37-C38-C39-C40
3	A	301	6OU	C34-C35-C36-C37
3	A	301	6OU	C33-C34-C35-C36
3	C	301	6OU	C03-C04-C05-C06
3	C	301	6OU	C13-C14-C15-C16
3	C	301	6OU	C01-C02-C03-C04
3	A	301	6OU	C36-C37-C38-C39
3	B	301	6OU	C04-C05-C06-C07
3	B	301	6OU	C19-C20-C21-O22
3	D	301	6OU	C34-C35-C36-C37
3	B	301	6OU	O18-C19-C20-C21

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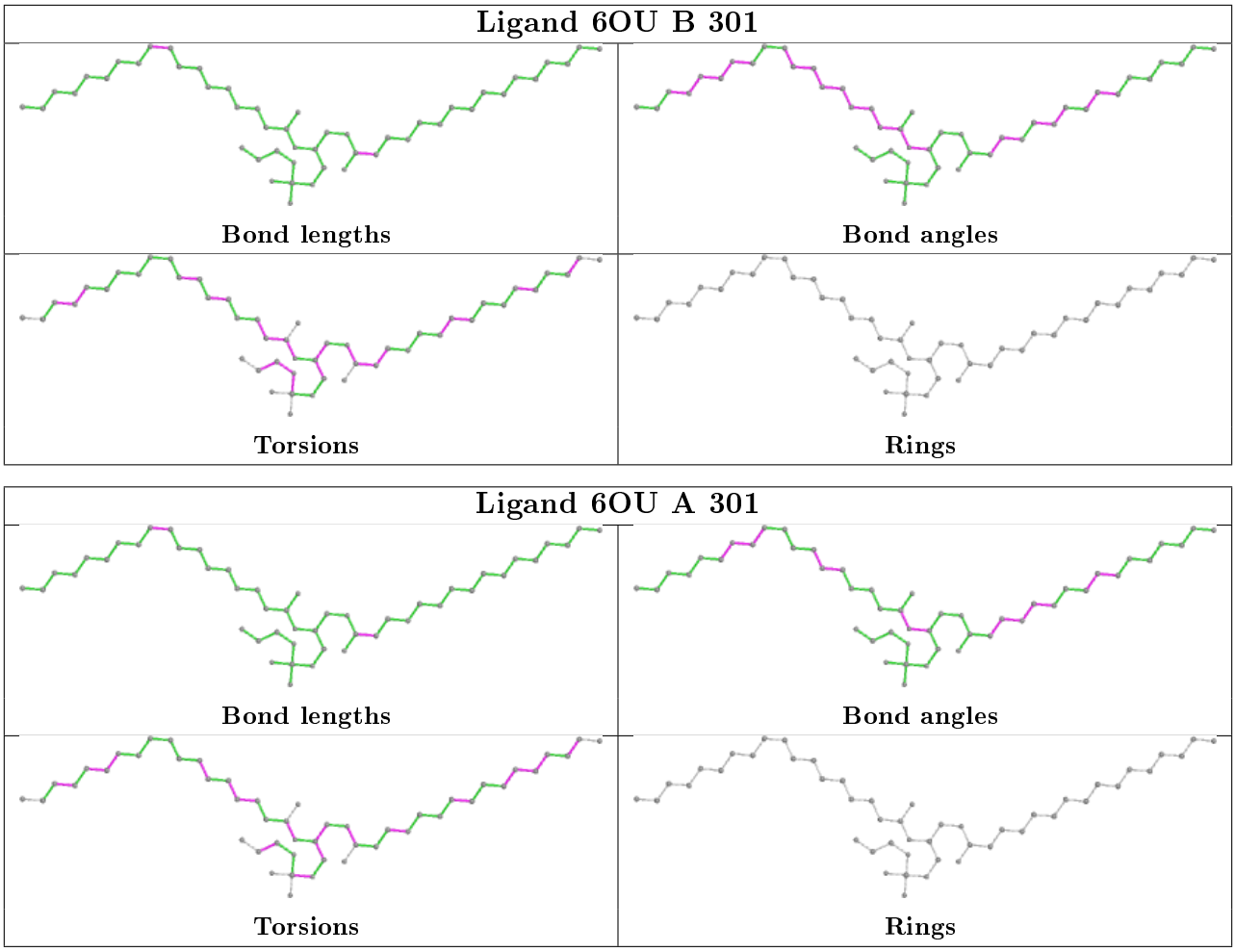
Mol	Chain	Res	Type	Atoms
3	A	301	6OU	O18-C19-C20-C21
3	D	301	6OU	C46-C47-C48-C49
3	C	301	6OU	C45-C46-C47-C48
3	A	301	6OU	O18-C19-C20-O30
3	A	301	6OU	C19-C20-C21-O22
3	A	301	6OU	C03-C04-C05-C06
3	B	301	6OU	C01-C02-C03-C04
3	B	301	6OU	O30-C20-C21-O22
3	A	301	6OU	O30-C20-C21-O22
3	B	301	6OU	O18-C19-C20-O30
3	A	301	6OU	C45-C46-C47-C48
3	B	301	6OU	C45-C46-C47-C48
3	C	301	6OU	C15-C16-O18-C19
3	A	301	6OU	C05-C06-C07-C08
3	B	301	6OU	C27-O26-P23-O24
3	D	301	6OU	C27-O26-P23-O24
3	C	301	6OU	C27-O26-P23-O25
3	D	301	6OU	C41-C42-C43-C44
3	C	301	6OU	C07-C08-C09-C10
3	D	301	6OU	C33-C34-C35-C36
3	C	301	6OU	C21-O22-P23-O26
3	B	301	6OU	C13-C14-C15-C16
3	D	301	6OU	C07-C08-C09-C10
3	B	301	6OU	C08-C09-C10-C11
3	A	301	6OU	C43-C44-C45-C46
3	C	301	6OU	C41-C42-C43-C44
3	B	301	6OU	C44-C45-C46-C47
3	A	301	6OU	C01-C02-C03-C04
3	C	301	6OU	O17-C16-O18-C19
3	B	301	6OU	O30-C31-C33-C34
3	D	301	6OU	C38-C39-C40-C41
3	B	301	6OU	C14-C15-C16-O18
3	B	301	6OU	C14-C15-C16-O17
3	D	301	6OU	C05-C06-C07-C08
3	A	301	6OU	C42-C43-C44-C45
3	C	301	6OU	C21-O22-P23-O24
3	C	301	6OU	C11-C12-C13-C14
3	B	301	6OU	O32-C31-C33-C34
3	B	301	6OU	C28-C27-O26-P23
3	C	301	6OU	O32-C31-C33-C34
3	C	301	6OU	O30-C31-C33-C34
3	D	301	6OU	C14-C15-C16-O18

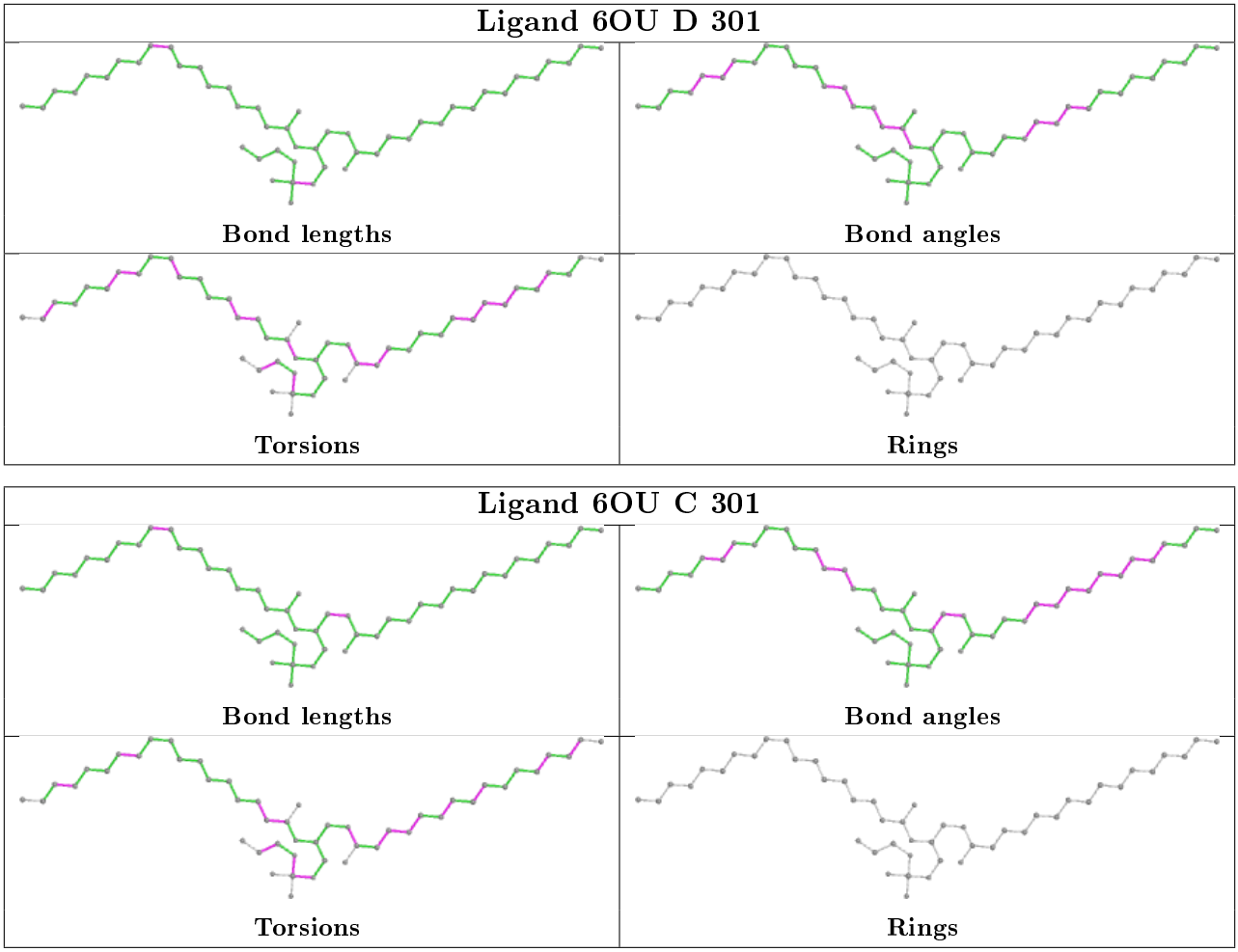
There are no ring outliers.

3 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	301	6OU	5	0
3	A	301	6OU	1	0
3	D	301	6OU	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 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.





5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	214/240 (89%)	0.15	0 100 100	23, 36, 62, 72	0
1	C	208/240 (86%)	0.42	10 (4%) 30 33	30, 44, 71, 103	0
1	D	211/240 (87%)	0.39	6 (2%) 53 55	29, 45, 70, 83	0
2	B	213/259 (82%)	0.34	9 (4%) 36 38	22, 36, 61, 74	0
All	All	846/979 (86%)	0.32	25 (2%) 50 53	22, 41, 66, 103	0

All (25) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	234	ASP	3.7
1	C	12	GLY	3.7
1	C	13	ASP	3.2
1	D	113	PRO	3.0
1	C	112	TYR	3.0
1	C	162	LEU	2.8
2	B	14	LEU	2.7
1	C	8	ASP	2.5
1	D	138	ALA	2.5
2	B	234	ASP	2.5
2	B	195	LEU	2.4
1	C	117	PHE	2.4
1	C	48	GLY	2.3
1	D	86	THR	2.3
2	B	12	GLY	2.3
2	B	145	PHE	2.3
2	B	111	ASN	2.3
1	C	177	LEU	2.2
1	D	202	VAL	2.2
2	B	194	GLN	2.2
1	C	113	PRO	2.1

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Mol	Chain	Res	Type	RSRZ
1	C	137	LEU	2.1
2	B	233	LEU	2.1
2	B	128	ASP	2.1
1	D	10	ILE	2.1

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)

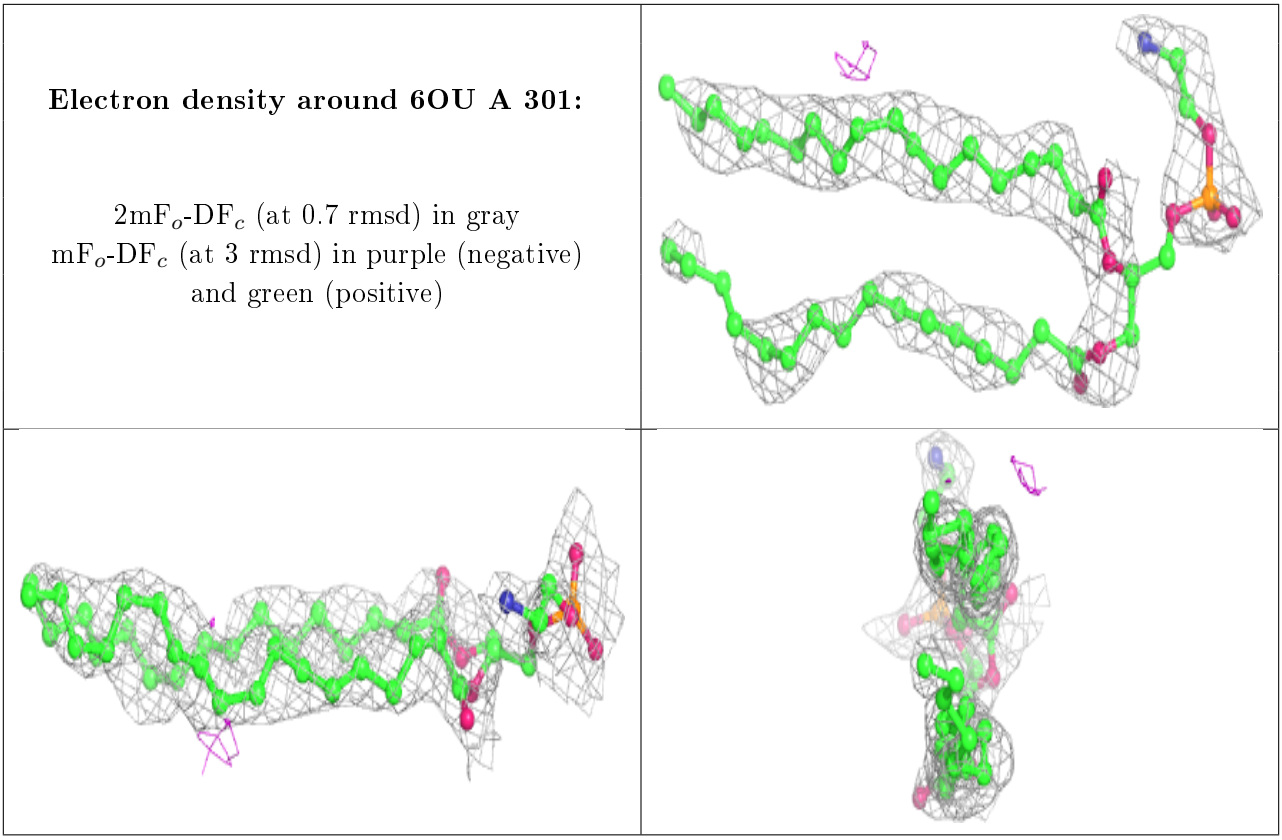
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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	6OU	A	301	49/49	0.73	0.28	45,63,86,94	0
3	6OU	C	301	49/49	0.76	0.29	51,65,89,92	0
3	6OU	D	301	49/49	0.78	0.24	45,66,84,91	0
3	6OU	B	301	49/49	0.79	0.29	55,66,83,86	0
4	K	B	302	1/1	0.96	0.07	32,32,32,32	0
4	K	D	302	1/1	0.97	0.06	36,36,36,36	0
4	K	C	302	1/1	0.98	0.08	39,39,39,39	0
4	K	A	302	1/1	0.99	0.07	30,30,30,30	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.

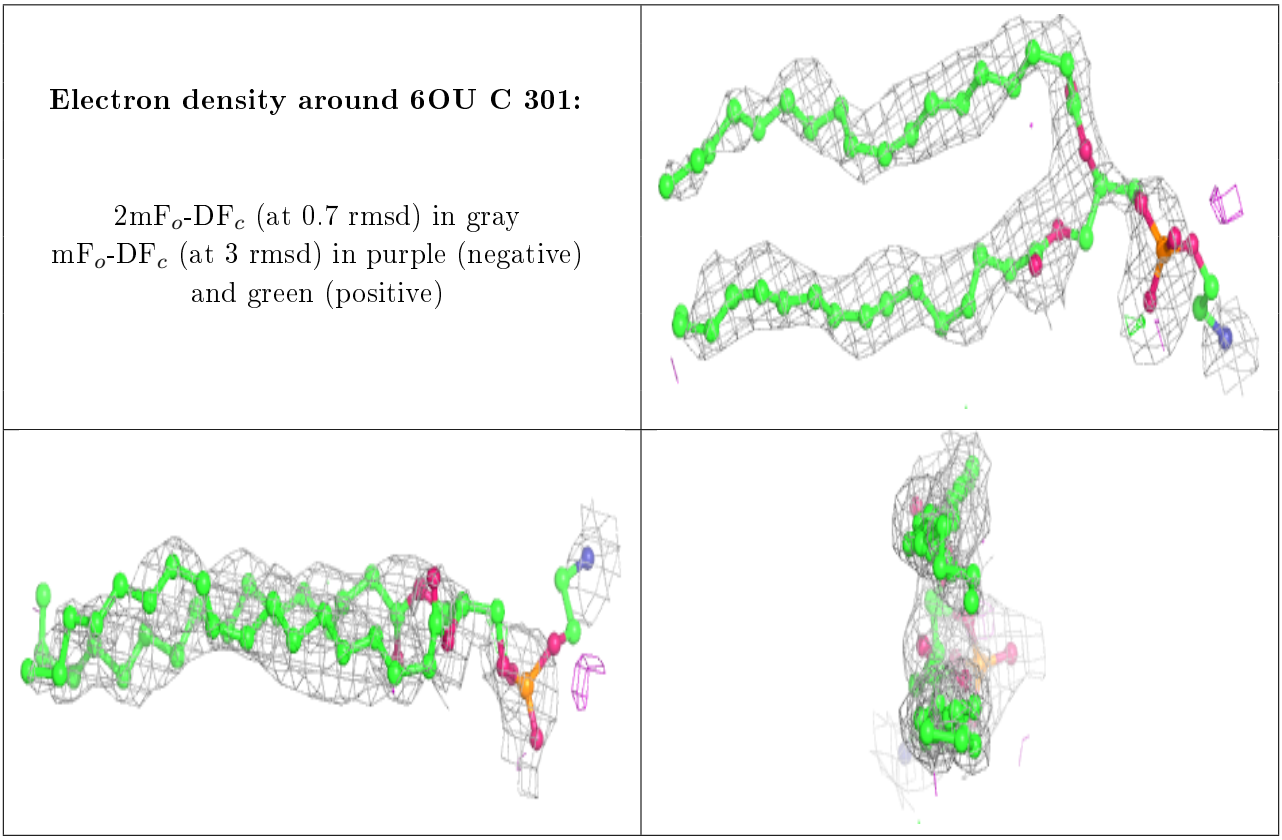
Electron density around 6OU A 301:

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



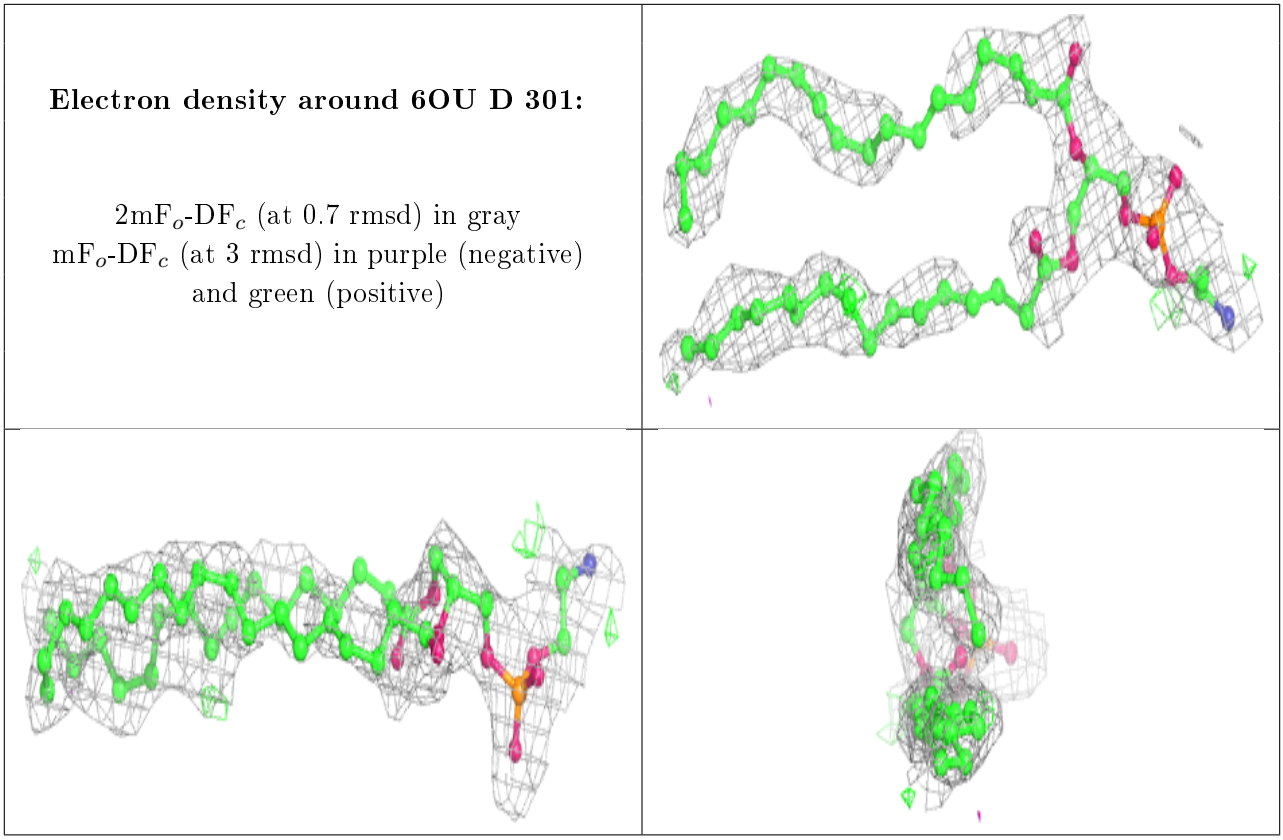
Electron density around 6OU C 301:

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



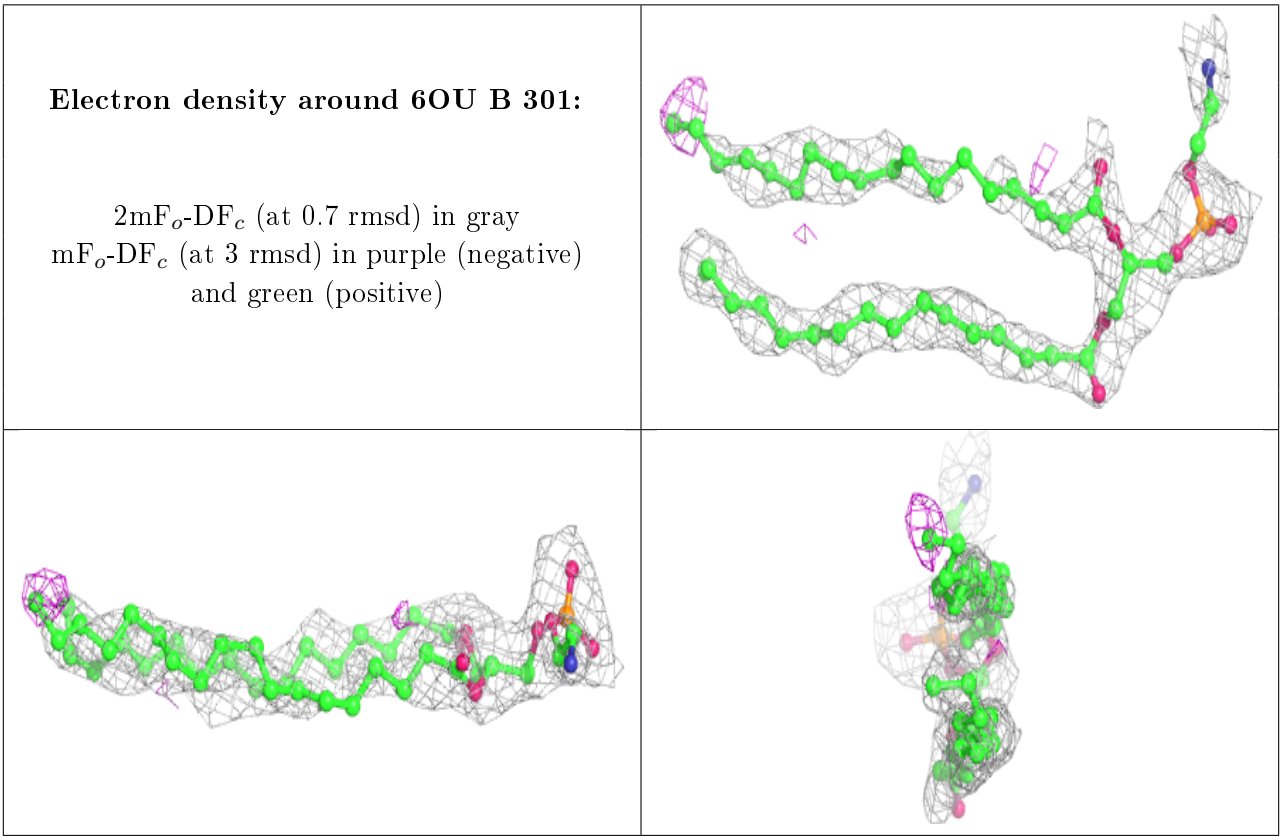
Electron density around 6OU D 301:

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



Electron density around 6OU B 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.