



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 05:50 AM UTC

PDB ID : 6DK1 / pdb_00006dk1
Title : Human sigma-1 receptor bound to (+)-pentazocine
Authors : Schmidt, H.R.; Kruse, A.C.
Deposited on : 2018-05-28
Resolution : 3.12 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

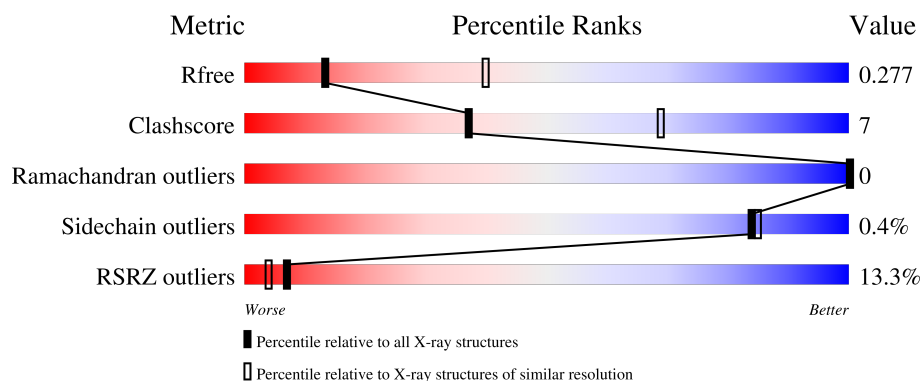
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.12 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1816 (3.14-3.10)
Clashscore	190562	1906 (3.14-3.10)
Ramachandran outliers	187476	1802 (3.14-3.10)
Sidechain outliers	187428	1802 (3.14-3.10)
RSRZ outliers	180081	1816 (3.14-3.10)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	227	11% 80% 14% 7%
1	B	227	19% 78% 19% •
1	C	227	8% 80% 17% •

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
3	SO4	B	305	-	-	-	X

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 5407 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.

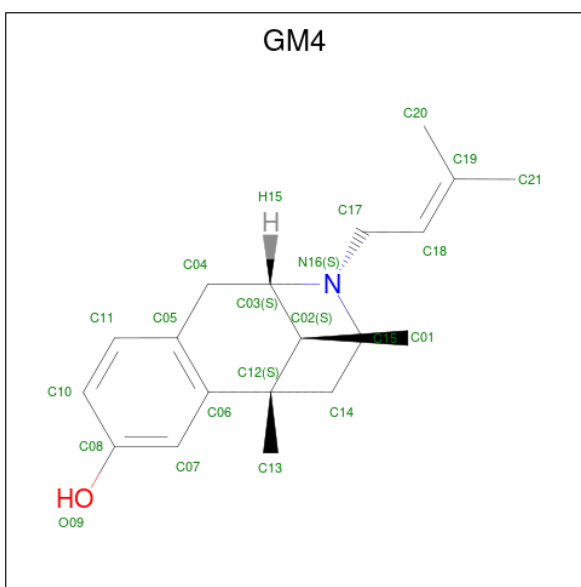
- Molecule 1 is a protein called Sigma non-opioid intracellular receptor 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	212	Total	C	N	O	S	0	0	0
			1655	1075	279	297	4			
1	B	220	Total	C	N	O	S	0	0	0
			1701	1107	291	298	5			
1	C	220	Total	C	N	O	S	0	0	0
			1698	1098	289	307	4			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP Q99720
A	-2	PRO	-	expression tag	UNP Q99720
A	-1	GLY	-	expression tag	UNP Q99720
A	0	SER	-	expression tag	UNP Q99720
B	-3	GLY	-	expression tag	UNP Q99720
B	-2	PRO	-	expression tag	UNP Q99720
B	-1	GLY	-	expression tag	UNP Q99720
B	0	SER	-	expression tag	UNP Q99720
C	-3	GLY	-	expression tag	UNP Q99720
C	-2	PRO	-	expression tag	UNP Q99720
C	-1	GLY	-	expression tag	UNP Q99720
C	0	SER	-	expression tag	UNP Q99720

- Molecule 2 is (2S,6S,11S)-6,11-dimethyl-3-(3-methylbut-2-en-1-yl)-1,2,3,4,5,6-hexahydro-2,6-methano-3-benzazocin-8-ol (CCD ID: GM4) (formula: C₁₉H₂₇NO).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			21	19	1	1		
2	B	1	Total	C	N	O	0	0
			21	19	1	1		
2	C	1	Total	C	N	O	0	0
			21	19	1	1		

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		

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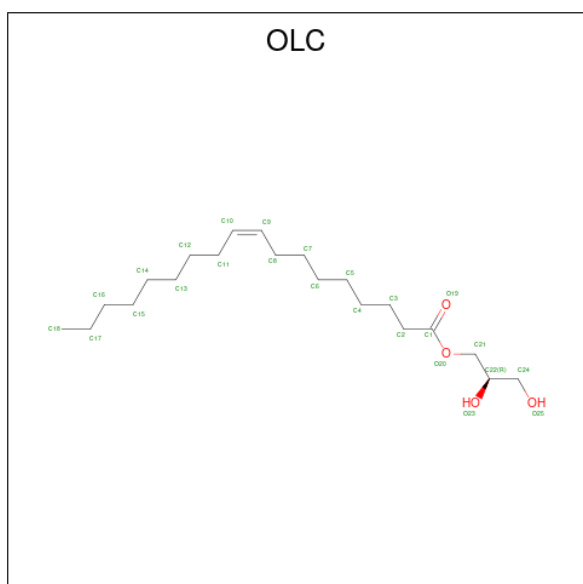
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		
4	C	1	Total	C	O	0	0
			6	3	3		
4	C	1	Total	C	O	0	0
			6	3	3		

- Molecule 5 is (2R)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (CCD ID: OLC) (formula: $C_{21}H_{40}O_4$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 9 5 4	0	0
5	A	1	Total C O 10 6 4	0	0
5	B	1	Total C O 10 6 4	0	0
5	B	1	Total C O 10 6 4	0	0
5	B	1	Total C O 9 5 4	0	0
5	C	1	Total C O 11 7 4	0	0
5	C	1	Total C O 9 5 4	0	0
5	C	1	Total C O 8 4 4	0	0
5	C	1	Total C O 11 7 4	0	0
5	C	1	Total C O 10 6 4	0	0
5	C	1	Total C O 13 9 4	0	0

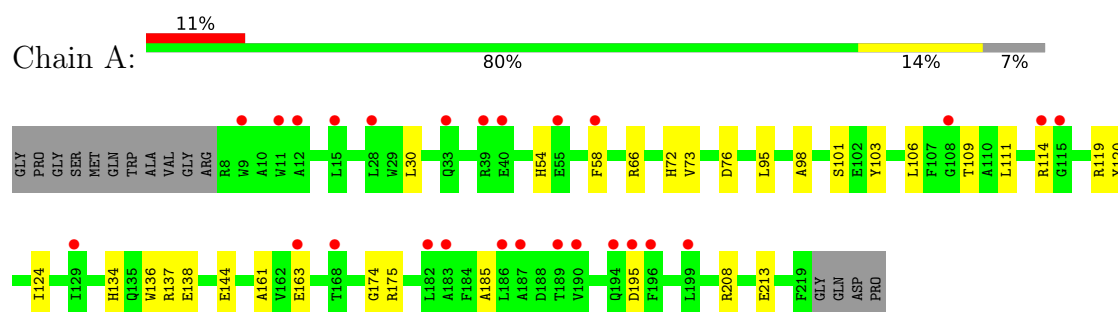
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	24	Total O 24 24	0	0
6	B	18	Total O 18 18	0	0
6	C	44	Total O 44 44	0	0

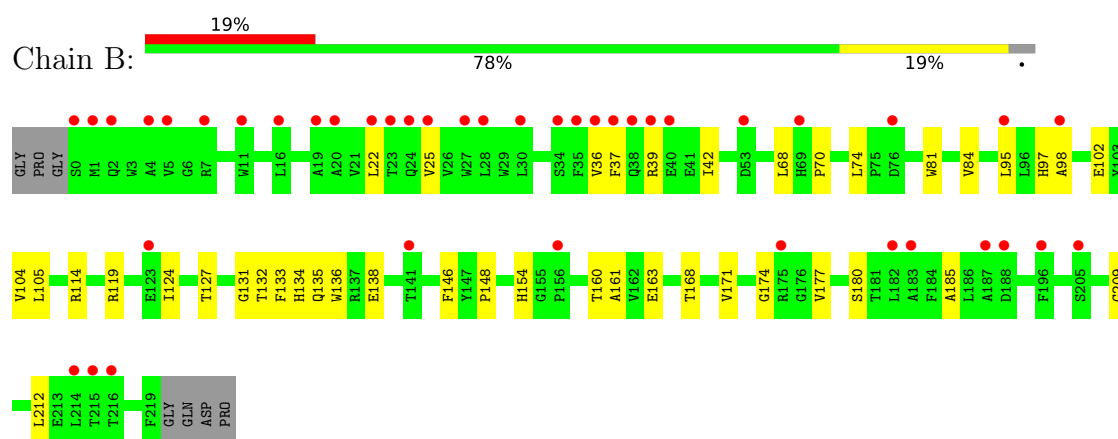
3 Residue-property plots [i](#)

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.

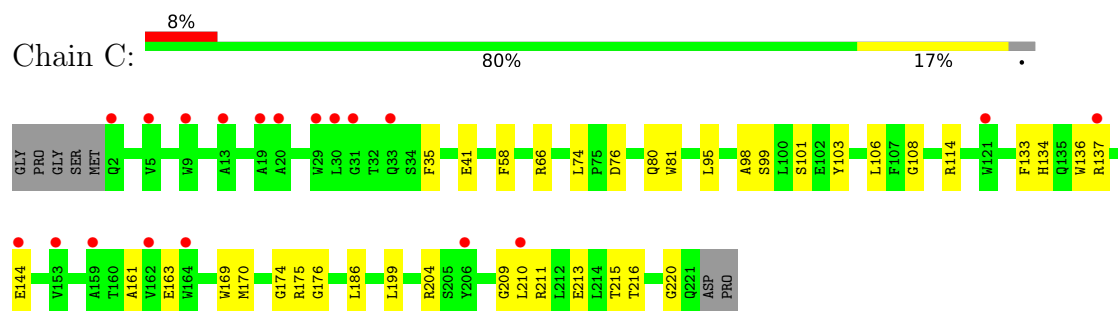
- Molecule 1: Sigma non-opioid intracellular receptor 1



- Molecule 1: Sigma non-opioid intracellular receptor 1



- Molecule 1: Sigma non-opioid intracellular receptor 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	84.84Å 128.59Å 109.18Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.91 – 3.12 45.91 – 3.12	Depositor EDS
% Data completeness (in resolution range)	83.0 (45.91-3.12) 66.4 (45.91-3.12)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.27 (at 3.12Å)	Xtriage
Refinement program	PHENIX (1.13_2998)	Depositor
R, R_{free}	0.247 , 0.278 0.249 , 0.277	Depositor DCC
R_{free} test set	1003 reflections (2.43%)	wwPDB-VP
Wilson B-factor (Å ²)	59.7	Xtriage
Anisotropy	0.438	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.24 , 33.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.86	EDS
Total number of atoms	5407	wwPDB-VP
Average B, all atoms (Å ²)	79.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.53% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GM4, OLC, GOL, SO4

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	0.12	0/1703	0.29	0/2327
1	B	0.11	0/1751	0.30	0/2394
1	C	0.11	0/1748	0.29	0/2388
All	All	0.11	0/5202	0.29	0/7109

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	1655	0	1577	21	0
1	B	1701	0	1609	27	0
1	C	1698	0	1585	27	0
2	A	21	0	0	1	0
2	B	21	0	0	2	0
2	C	21	0	0	0	0
3	A	35	0	0	3	0
3	B	20	0	0	1	0
3	C	15	0	0	1	0
4	A	6	0	8	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	6	0	8	1	0
4	C	12	0	16	3	0
5	A	19	0	16	2	0
5	B	29	0	25	0	0
5	C	62	0	60	2	0
6	A	24	0	0	0	0
6	B	18	0	0	0	0
6	C	44	0	0	1	0
All	All	5407	0	4904	73	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 (73) 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:101:SER:HB3	5:A:311:OLC:H24	1.63	0.78
1:A:175:ARG:NH2	3:A:307:SO4:O3	2.21	0.73
1:C:81:TRP:NE1	4:C:305:GOL:O2	2.20	0.70
1:C:66:ARG:NH1	1:C:76:ASP:OD1	2.26	0.68
1:A:66:ARG:NH1	1:A:76:ASP:OD1	2.26	0.67
1:A:134:HIS:HB2	1:A:163:GLU:HB3	1.75	0.67
1:A:54:HIS:ND1	3:A:303:SO4:O4	2.21	0.66
1:B:134:HIS:HB2	1:B:163:GLU:HB3	1.78	0.65
1:C:137:ARG:NE	1:C:144:GLU:OE2	2.25	0.65
1:A:119:ARG:NH2	1:A:138:GLU:OE1	2.31	0.64
1:B:136:TRP:HB3	1:B:161:ALA:HB3	1.80	0.64
1:C:211:ARG:NH2	3:C:302:SO4:O1	2.30	0.61
1:A:72:HIS:ND1	1:A:213:GLU:OE2	2.27	0.57
1:B:95:LEU:HD21	1:B:98:ALA:HB2	1.86	0.57
1:B:81:TRP:NE1	4:B:306:GOL:O2	2.38	0.56
1:B:74:LEU:HD23	1:B:212:LEU:HD22	1.87	0.56
1:B:98:ALA:HB3	1:B:209:GLY:HA3	1.88	0.55
1:A:30:LEU:HD22	5:A:311:OLC:H22	1.88	0.54
1:A:208:ARG:NE	3:A:302:SO4:O2	2.37	0.54
1:B:119:ARG:NH2	1:B:138:GLU:OE1	2.41	0.53
1:C:108:GLY:HA3	1:C:169:TRP:CE3	2.43	0.53
1:B:124:ILE:HB	1:B:154:HIS:HB3	1.91	0.52
1:B:132:THR:H	1:B:168:THR:HG22	1.75	0.52
1:C:66:ARG:NH2	1:C:74:LEU:O	2.42	0.52
1:C:99:SER:HB3	1:C:213:GLU:HG3	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:35:PHE:CD1	1:C:175:ARG:HD2	2.47	0.50
1:A:136:TRP:HB3	1:A:161:ALA:HB3	1.94	0.50
1:A:195:ASP:CG	1:B:119:ARG:HH11	2.19	0.50
1:B:102:GLU:HA	1:B:174:GLY:O	2.12	0.50
1:C:215:THR:HG22	5:C:312:OLC:H2	1.94	0.50
1:A:185:ALA:HA	2:A:301:GM4:C10	2.43	0.49
1:B:97:HIS:HB3	1:B:104:VAL:HB	1.94	0.49
1:A:137:ARG:NH1	1:A:144:GLU:OE2	2.44	0.49
1:A:58:PHE:CG	1:A:106:LEU:HD13	2.48	0.49
1:C:41:GLU:N	6:C:401:HOH:O	2.46	0.49
1:C:136:TRP:HB3	1:C:161:ALA:HB3	1.94	0.49
1:C:81:TRP:HE1	4:C:305:GOL:HO2	1.54	0.48
1:A:111:LEU:HB3	1:B:163:GLU:OE2	2.15	0.47
1:C:95:LEU:HD21	1:C:98:ALA:HB2	1.96	0.47
1:B:127:THR:HB	1:B:171:VAL:HG22	1.97	0.46
1:C:103:TYR:CE2	1:C:174:GLY:HA3	2.51	0.46
1:B:135:GLN:HE21	1:B:160:THR:HG21	1.81	0.46
1:B:39:ARG:N	3:B:305:SO4:O2	2.48	0.46
1:A:114:ARG:HG2	1:A:163:GLU:HG3	1.98	0.46
1:C:80:GLN:OE1	1:C:204:ARG:NH2	2.48	0.45
1:B:177:VAL:O	1:B:180:SER:OG	2.34	0.45
1:B:22:LEU:HA	1:B:25:VAL:HG22	1.99	0.45
1:A:66:ARG:HG2	1:A:73:VAL:HB	1.99	0.45
1:C:81:TRP:NE1	4:C:305:GOL:HO2	2.14	0.45
1:B:114:ARG:HG2	1:B:163:GLU:HG3	1.98	0.45
1:C:99:SER:HA	1:C:210:LEU:HD23	1.99	0.45
1:B:84:VAL:HG13	2:B:301:GM4:C08	2.47	0.44
1:A:95:LEU:HD11	1:A:98:ALA:HB2	1.99	0.44
1:C:186:LEU:HD13	1:C:199:LEU:HD11	1.99	0.43
1:B:68:LEU:O	1:B:70:PRO:HD3	2.17	0.43
1:C:114:ARG:HG2	1:C:163:GLU:HG3	2.00	0.43
1:C:58:PHE:CG	1:C:106:LEU:HD13	2.54	0.43
1:B:133:PHE:HB3	1:B:146:PHE:HB2	2.01	0.43
1:B:95:LEU:HD12	1:B:105:LEU:HB3	2.01	0.42
1:A:103:TYR:CE2	1:A:174:GLY:HA3	2.55	0.42
1:C:133:PHE:HD2	1:C:170:MET:HE1	1.84	0.42
5:C:310:OLC:H24A	5:C:311:OLC:H24	2.02	0.42
1:A:103:TYR:OH	1:A:124:ILE:HD12	2.20	0.41
1:B:185:ALA:HB1	2:B:301:GM4:C08	2.50	0.41
1:C:101:SER:HA	1:C:176:GLY:O	2.20	0.41
1:C:134:HIS:HB2	1:C:163:GLU:HB3	2.01	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:98:ALA:HB3	1:C:209:GLY:HA3	2.00	0.41
1:C:35:PHE:CG	1:C:175:ARG:HD2	2.55	0.41
1:C:216:THR:HA	1:C:220:GLY:HA2	2.02	0.41
1:A:109:THR:HA	1:B:136:TRP:CH2	2.56	0.40
1:C:186:LEU:HD22	1:C:199:LEU:HD12	2.02	0.40
1:B:131:GLY:O	1:B:148:PRO:HD3	2.22	0.40
1:B:37:PHE:CD2	1:B:42:ILE:HD11	2.57	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	210/227 (92%)	207 (99%)	3 (1%)	0	100	100
1	B	218/227 (96%)	209 (96%)	9 (4%)	0	100	100
1	C	218/227 (96%)	215 (99%)	3 (1%)	0	100	100
All	All	646/681 (95%)	631 (98%)	15 (2%)	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	163/182 (90%)	162 (99%)	1 (1%)	78	81
1	B	160/182 (88%)	159 (99%)	1 (1%)	78	81
1	C	162/182 (89%)	162 (100%)	0	100	100
All	All	485/546 (89%)	483 (100%)	2 (0%)	84	85

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	120	TYR
1	B	36	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	97	HIS
1	B	135	GLN
1	B	194	GLN
1	C	24	GLN
1	C	44	GLN
1	C	194	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

32 ligands are modelled in this entry.

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	SO4	B	305	-	4,4,4	0.22	0	6,6,6	0.09	0
3	SO4	B	302	-	4,4,4	0.23	0	6,6,6	0.08	0
4	GOL	C	306	-	5,5,5	0.57	0	5,5,5	0.34	0
2	GM4	B	301	-	22,23,23	4.42	7 (31%)	33,35,35	1.80	7 (21%)
4	GOL	A	309	-	5,5,5	0.57	0	5,5,5	0.36	0
5	OLC	A	311	-	9,9,24	1.24	2 (22%)	10,10,25	1.18	1 (10%)
3	SO4	C	304	-	4,4,4	0.23	0	6,6,6	0.08	0
5	OLC	C	309	-	7,7,24	0.98	0	6,7,25	0.55	0
5	OLC	A	310	-	8,8,24	1.12	1 (12%)	9,9,25	0.91	0
3	SO4	C	303	-	4,4,4	0.24	0	6,6,6	0.08	0
5	OLC	B	308	-	9,9,24	1.27	2 (22%)	10,10,25	1.12	1 (10%)
3	SO4	B	303	-	4,4,4	0.24	0	6,6,6	0.08	0
3	SO4	A	306	-	4,4,4	0.24	0	6,6,6	0.08	0
3	SO4	A	305	-	4,4,4	0.23	0	6,6,6	0.08	0
3	SO4	A	307	-	4,4,4	0.24	0	6,6,6	0.09	0
5	OLC	C	307	-	10,10,24	1.20	2 (20%)	11,11,25	1.17	1 (9%)
3	SO4	A	302	-	4,4,4	0.23	0	6,6,6	0.10	0
2	GM4	C	301	-	22,23,23	4.45	7 (31%)	33,35,35	1.80	7 (21%)
3	SO4	C	302	-	4,4,4	0.23	0	6,6,6	0.09	0
3	SO4	B	304	-	4,4,4	0.24	0	6,6,6	0.07	0
3	SO4	A	304	-	4,4,4	0.24	0	6,6,6	0.06	0
5	OLC	B	309	-	8,8,24	1.13	1 (12%)	9,9,25	0.85	0
5	OLC	C	308	-	8,8,24	1.13	1 (12%)	9,9,25	0.85	0
4	GOL	C	305	-	5,5,5	0.62	0	5,5,5	0.55	0
2	GM4	A	301	-	22,23,23	4.42	7 (31%)	33,35,35	1.95	9 (27%)
5	OLC	B	307	-	9,9,24	1.25	2 (22%)	10,10,25	1.22	1 (10%)
3	SO4	A	308	-	4,4,4	0.22	0	6,6,6	0.08	0
5	OLC	C	310	-	10,10,24	1.21	2 (20%)	11,11,25	1.17	1 (9%)
5	OLC	C	311	-	9,9,24	1.24	2 (22%)	10,10,25	1.07	1 (10%)
3	SO4	A	303	-	4,4,4	0.26	0	6,6,6	0.09	0
5	OLC	C	312	-	12,12,24	1.14	2 (16%)	13,13,25	1.12	1 (7%)
4	GOL	B	306	-	5,5,5	0.59	0	5,5,5	0.42	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
2	GM4	A	301	-	-	0/5/35/35	0/4/3/3
5	OLC	A	310	-	-	4/7/7/24	-
5	OLC	B	307	-	-	0/9/9/24	-
5	OLC	C	307	-	-	2/10/10/24	-
4	GOL	C	306	-	-	0/4/4/4	-
5	OLC	B	308	-	-	2/9/9/24	-
5	OLC	C	310	-	-	6/10/10/24	-
5	OLC	C	309	-	-	0/6/6/24	-
5	OLC	C	311	-	-	2/9/9/24	-
2	GM4	C	301	-	-	1/5/35/35	0/4/3/3
2	GM4	B	301	-	-	0/5/35/35	0/4/3/3
5	OLC	C	308	-	-	2/7/7/24	-
4	GOL	A	309	-	-	0/4/4/4	-
5	OLC	B	309	-	-	1/7/7/24	-
5	OLC	A	311	-	-	3/9/9/24	-
5	OLC	C	312	-	-	4/12/12/24	-
4	GOL	C	305	-	-	0/4/4/4	-
4	GOL	B	306	-	-	0/4/4/4	-

All (38) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	301	GM4	C17-N16	-16.12	1.20	1.47
2	B	301	GM4	C17-N16	-16.05	1.20	1.47
2	A	301	GM4	C17-N16	-15.98	1.20	1.47
2	C	301	GM4	C04-C05	7.17	1.65	1.51
2	B	301	GM4	C04-C05	7.07	1.64	1.51
2	A	301	GM4	C04-C05	7.06	1.64	1.51
2	C	301	GM4	C04-C03	5.59	1.65	1.54
2	A	301	GM4	C12-C02	-5.57	1.48	1.55
2	B	301	GM4	C04-C03	5.57	1.65	1.54
2	C	301	GM4	C12-C02	-5.54	1.48	1.55
2	A	301	GM4	C04-C03	5.48	1.65	1.54
2	B	301	GM4	C12-C02	-5.30	1.48	1.55
2	A	301	GM4	C14-C12	-4.69	1.47	1.54
2	B	301	GM4	C14-C12	-4.57	1.47	1.54
2	C	301	GM4	C14-C12	-4.38	1.47	1.54
2	A	301	GM4	C01-C02	4.16	1.61	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	301	GM4	C01-C02	4.15	1.61	1.53
2	B	301	GM4	C01-C02	4.11	1.61	1.53
2	B	301	GM4	C17-C18	2.65	1.53	1.50
2	C	301	GM4	C17-C18	2.60	1.53	1.50
5	C	312	OLC	O20-C1	2.53	1.40	1.33
5	C	311	OLC	O20-C1	2.49	1.40	1.33
5	B	308	OLC	O20-C1	2.49	1.40	1.33
2	A	301	GM4	C17-C18	2.48	1.53	1.50
5	A	311	OLC	O20-C1	2.47	1.40	1.33
5	B	307	OLC	O20-C1	2.46	1.40	1.33
5	C	307	OLC	O20-C1	2.42	1.40	1.33
5	C	310	OLC	O20-C1	2.42	1.40	1.33
5	B	309	OLC	O20-C21	-2.27	1.40	1.45
5	C	308	OLC	O20-C21	-2.21	1.40	1.45
5	C	310	OLC	O20-C21	-2.21	1.40	1.45
5	B	308	OLC	O20-C21	-2.17	1.40	1.45
5	C	312	OLC	O20-C21	-2.15	1.40	1.45
5	A	311	OLC	O20-C21	-2.10	1.40	1.45
5	B	307	OLC	O20-C21	-2.09	1.40	1.45
5	C	307	OLC	O20-C21	-2.07	1.40	1.45
5	A	310	OLC	O20-C21	-2.06	1.40	1.45
5	C	311	OLC	O20-C21	-2.02	1.40	1.45

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	GM4	C06-C12-C02	5.73	114.73	109.95
2	B	301	GM4	C06-C12-C02	5.51	114.55	109.95
2	C	301	GM4	C06-C12-C02	5.20	114.29	109.95
2	B	301	GM4	C17-C18-C19	-4.35	119.91	127.12
2	A	301	GM4	C01-C02-C12	-4.19	109.83	113.89
2	C	301	GM4	C01-C02-C12	-4.05	109.96	113.89
2	A	301	GM4	C17-C18-C19	-4.02	120.46	127.12
2	C	301	GM4	C17-C18-C19	-3.92	120.62	127.12
2	A	301	GM4	C14-C15-N16	3.73	116.33	111.00
2	B	301	GM4	C01-C02-C12	-3.63	110.37	113.89
2	B	301	GM4	C14-C15-N16	3.37	115.82	111.00
2	C	301	GM4	C14-C12-C06	-3.17	106.12	108.96
5	B	307	OLC	O20-C1-C2	3.00	120.27	111.15
2	C	301	GM4	C04-C03-N16	-2.95	110.61	115.77
5	A	311	OLC	O20-C1-C2	2.89	119.91	111.15
5	B	308	OLC	O20-C1-C2	2.87	119.87	111.15

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	312	OLC	O20-C1-C2	2.83	120.47	111.83
5	C	307	OLC	O20-C1-C2	2.79	120.33	111.83
5	C	311	OLC	O20-C1-C2	2.78	119.59	111.15
5	C	310	OLC	O20-C1-C2	2.66	119.95	111.83
2	A	301	GM4	C14-C12-C06	-2.66	106.58	108.96
2	A	301	GM4	C04-C03-N16	-2.58	111.25	115.77
2	B	301	GM4	C04-C03-N16	-2.49	111.42	115.77
2	A	301	GM4	C15-N16-C03	2.34	115.10	110.58
2	C	301	GM4	C21-C19-C20	2.28	119.84	114.59
2	B	301	GM4	C12-C02-C03	2.25	112.53	109.75
2	B	301	GM4	C21-C19-C20	2.22	119.70	114.59
2	A	301	GM4	C21-C19-C20	2.15	119.53	114.59
2	A	301	GM4	C12-C02-C03	2.03	112.27	109.75
2	C	301	GM4	C12-C02-C03	2.00	112.23	109.75

There are no chirality outliers.

All (27) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	311	OLC	O20-C21-C22-C24
5	C	307	OLC	C21-C22-C24-O25
5	C	308	OLC	O20-C21-C22-C24
5	C	310	OLC	C21-C22-C24-O25
5	C	310	OLC	O20-C21-C22-C24
5	C	310	OLC	O20-C21-C22-O23
5	C	311	OLC	C21-C22-C24-O25
5	A	311	OLC	O20-C21-C22-O23
5	C	308	OLC	O20-C21-C22-O23
5	C	312	OLC	O20-C21-C22-C24
5	C	312	OLC	O20-C21-C22-O23
5	A	310	OLC	C21-C22-C24-O25
5	C	312	OLC	C21-C22-C24-O25
5	C	307	OLC	O23-C22-C24-O25
5	A	310	OLC	O20-C21-C22-C24
5	C	310	OLC	C2-C1-O20-C21
5	C	310	OLC	O23-C22-C24-O25
5	C	311	OLC	O23-C22-C24-O25
5	A	310	OLC	O20-C21-C22-O23
5	C	310	OLC	O19-C1-O20-C21
5	A	310	OLC	O23-C22-C24-O25
5	B	308	OLC	O20-C21-C22-C24
5	C	312	OLC	O23-C22-C24-O25

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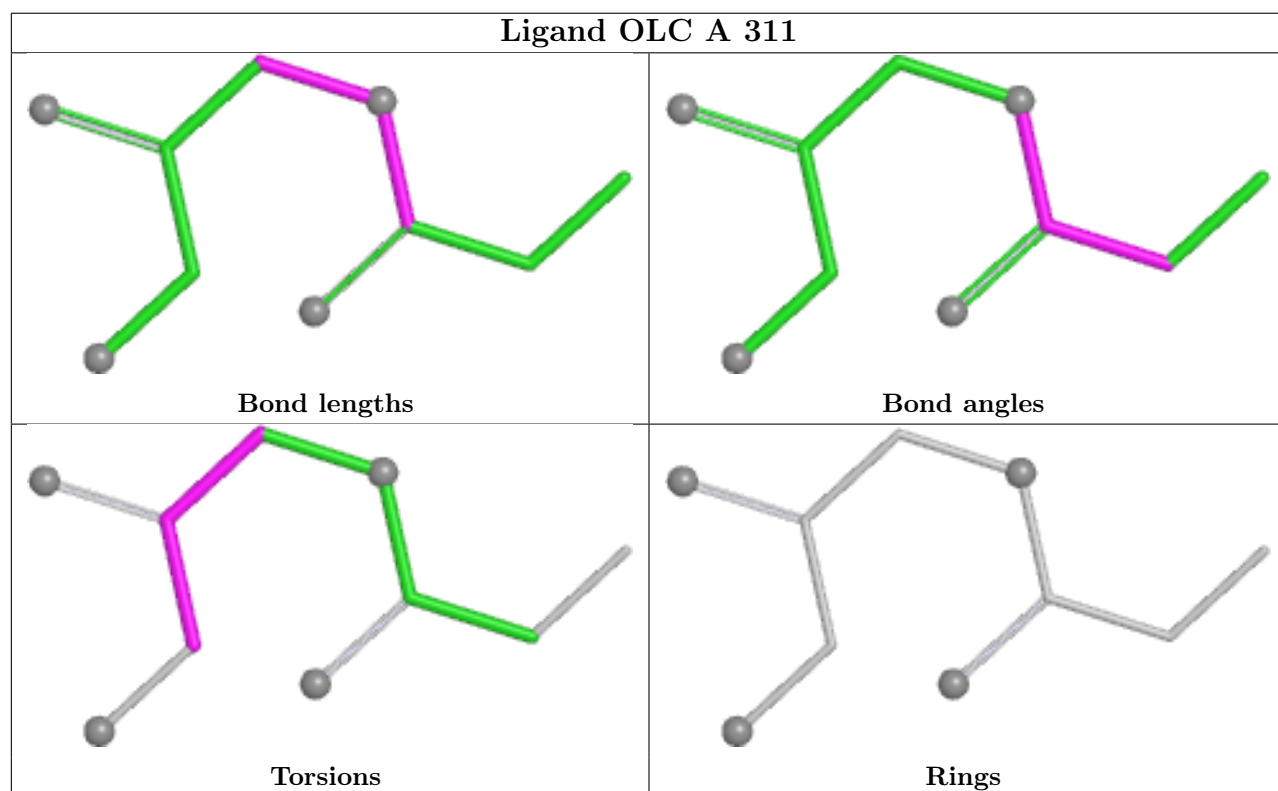
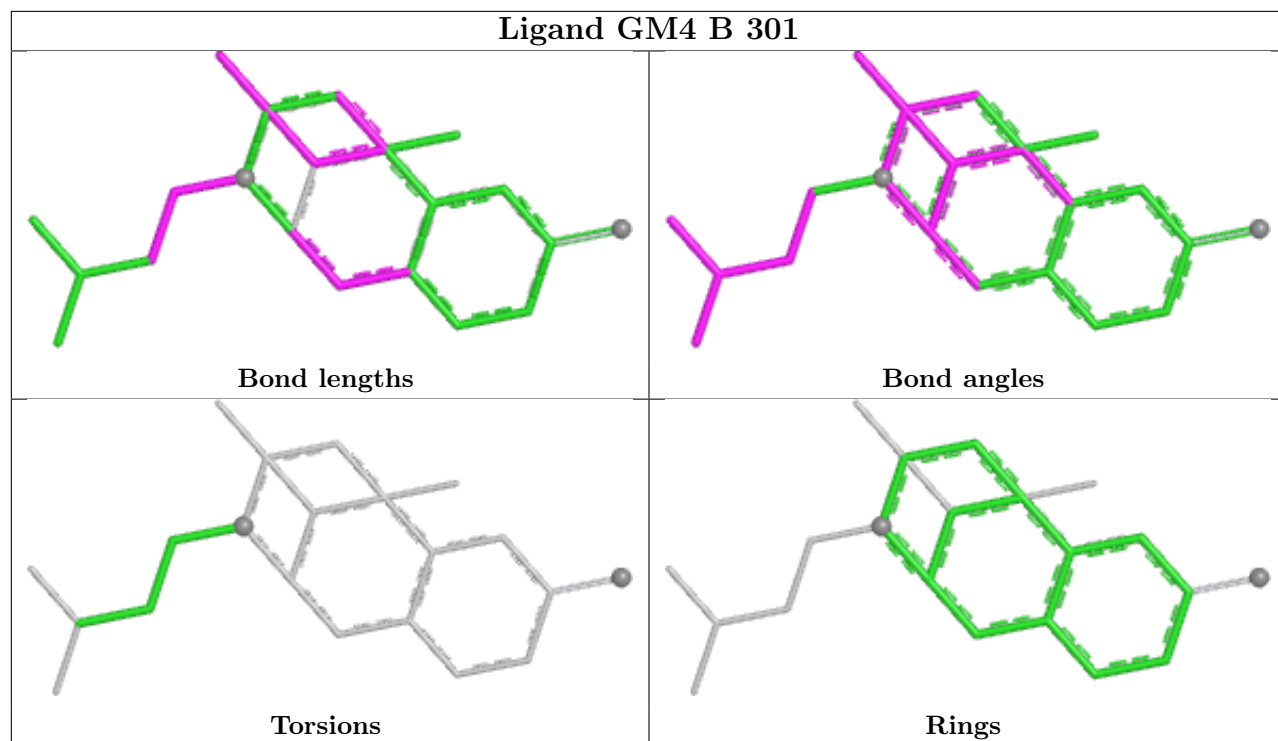
Mol	Chain	Res	Type	Atoms
5	B	308	OLC	O20-C21-C22-O23
5	B	309	OLC	O20-C21-C22-C24
2	C	301	GM4	N16-C17-C18-C19
5	A	311	OLC	O23-C22-C24-O25

There are no ring outliers.

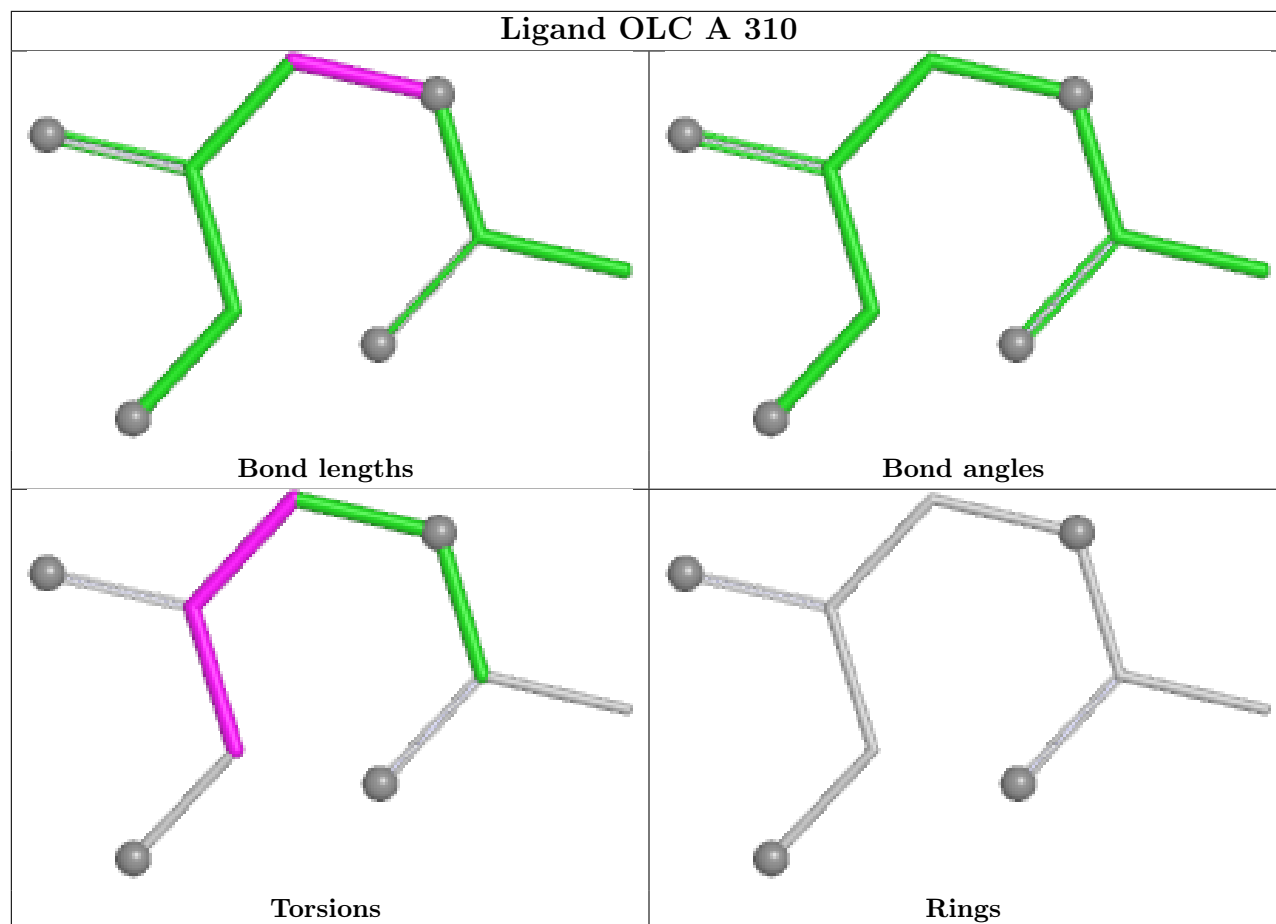
13 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	305	SO4	1	0
2	B	301	GM4	2	0
5	A	311	OLC	2	0
3	A	307	SO4	1	0
3	A	302	SO4	1	0
3	C	302	SO4	1	0
4	C	305	GOL	3	0
2	A	301	GM4	1	0
5	C	310	OLC	1	0
5	C	311	OLC	1	0
3	A	303	SO4	1	0
5	C	312	OLC	1	0
4	B	306	GOL	1	0

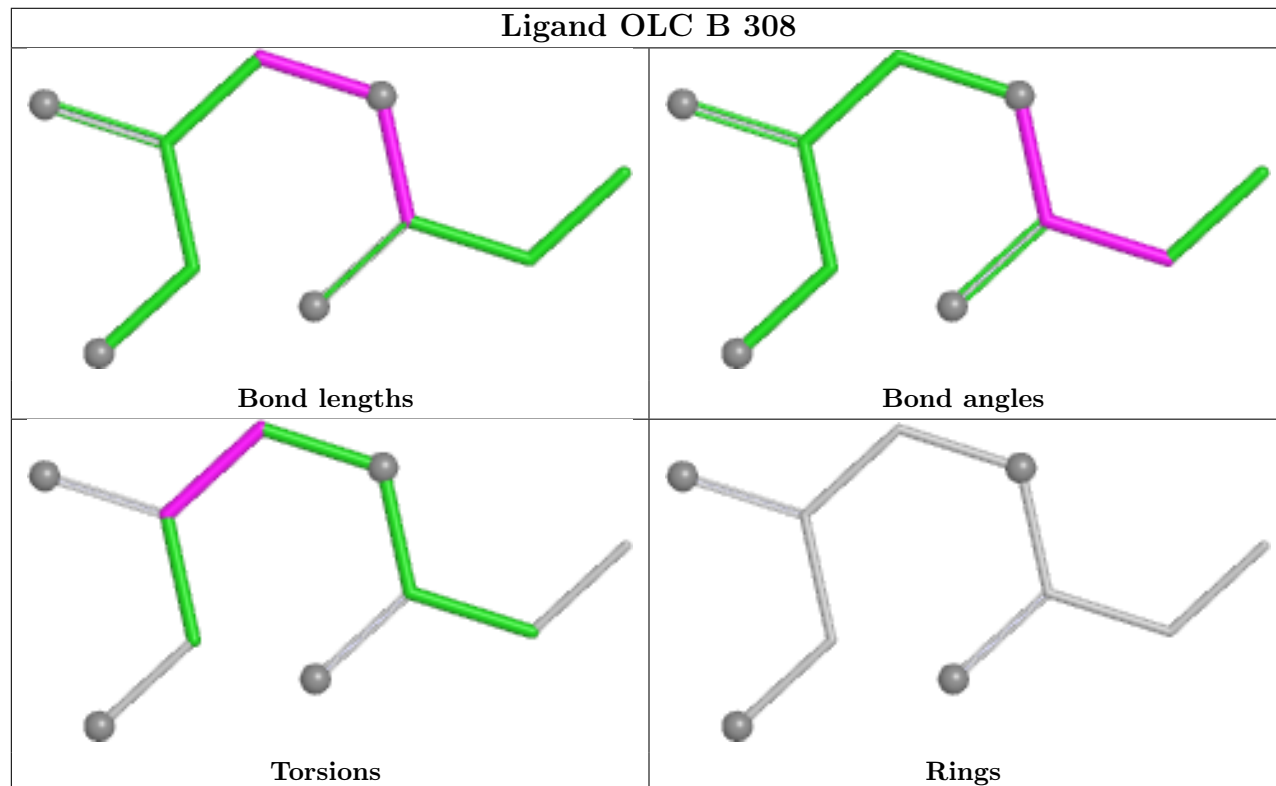
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



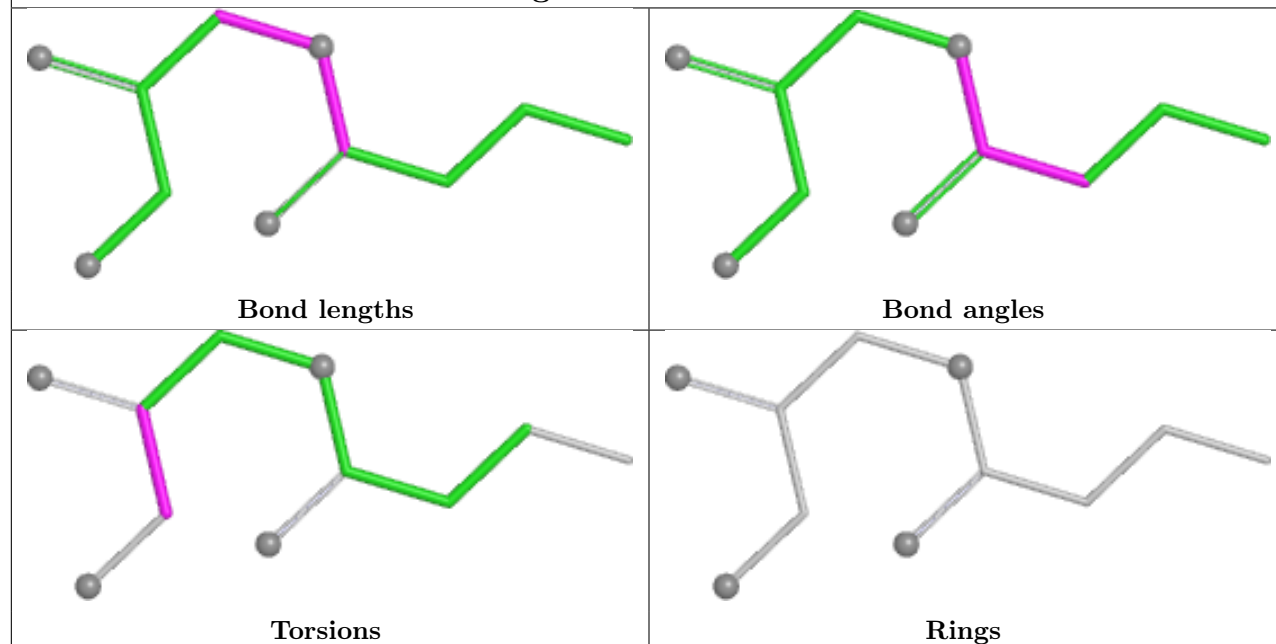
Ligand OLC A 310



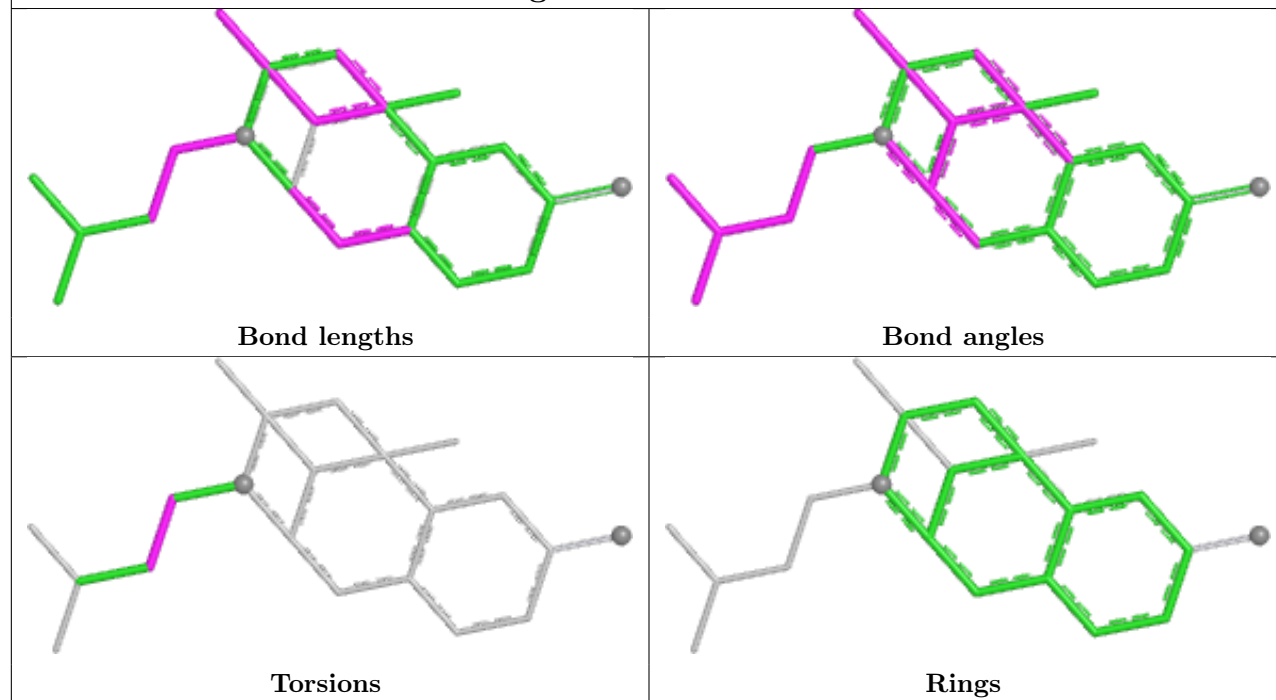
Ligand OLC B 308

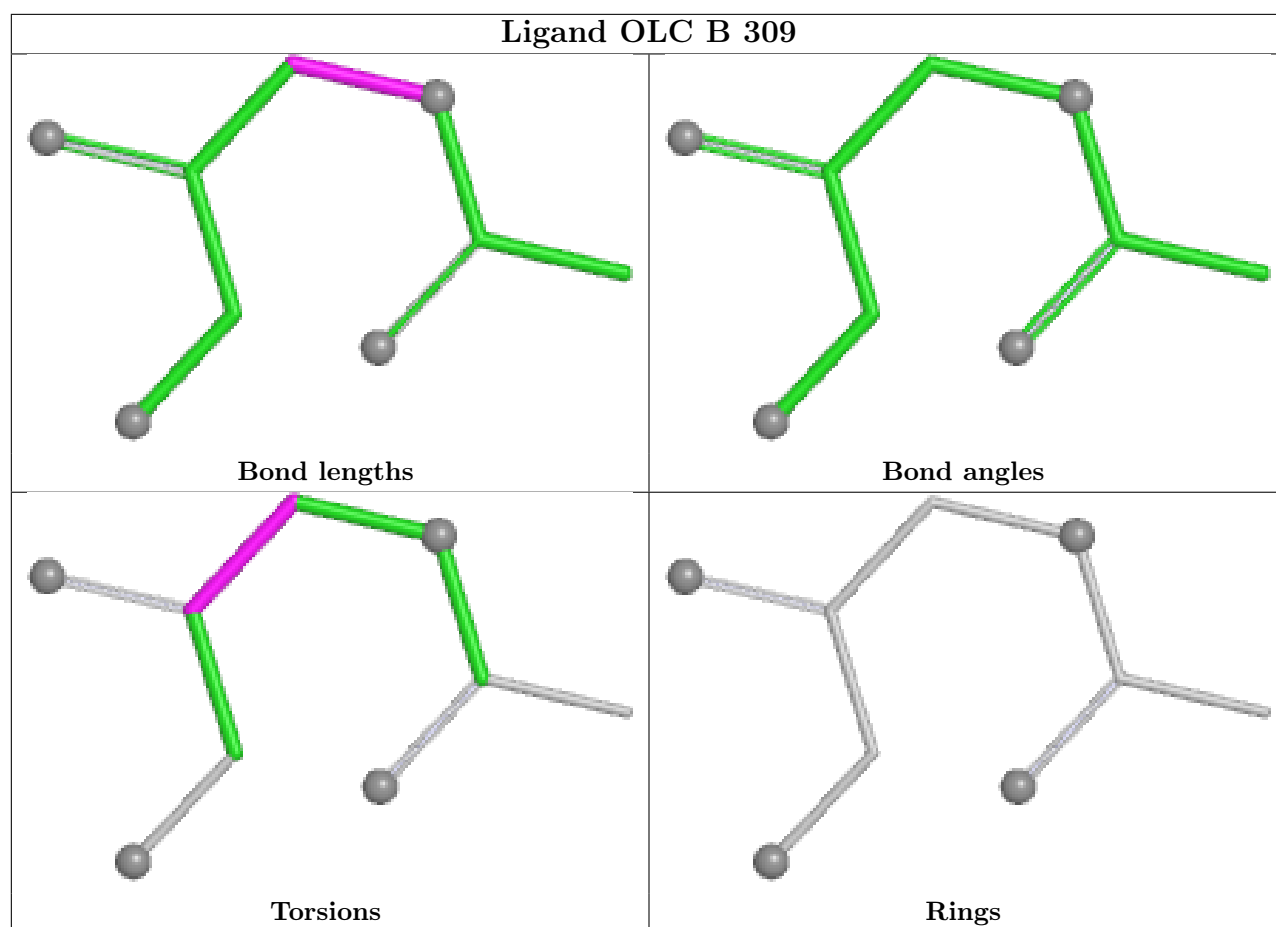


Ligand OLC C 307

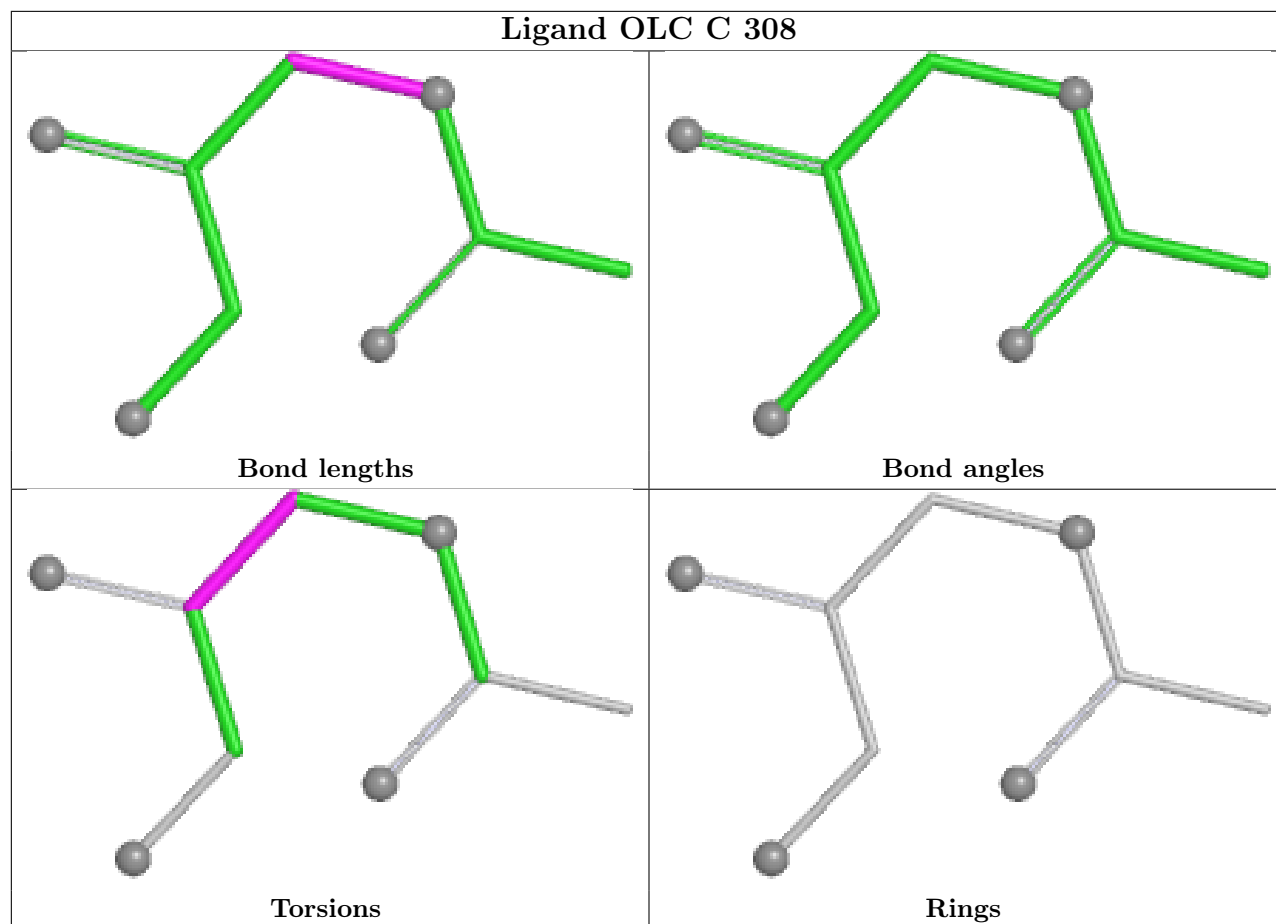


Ligand GM4 C 301

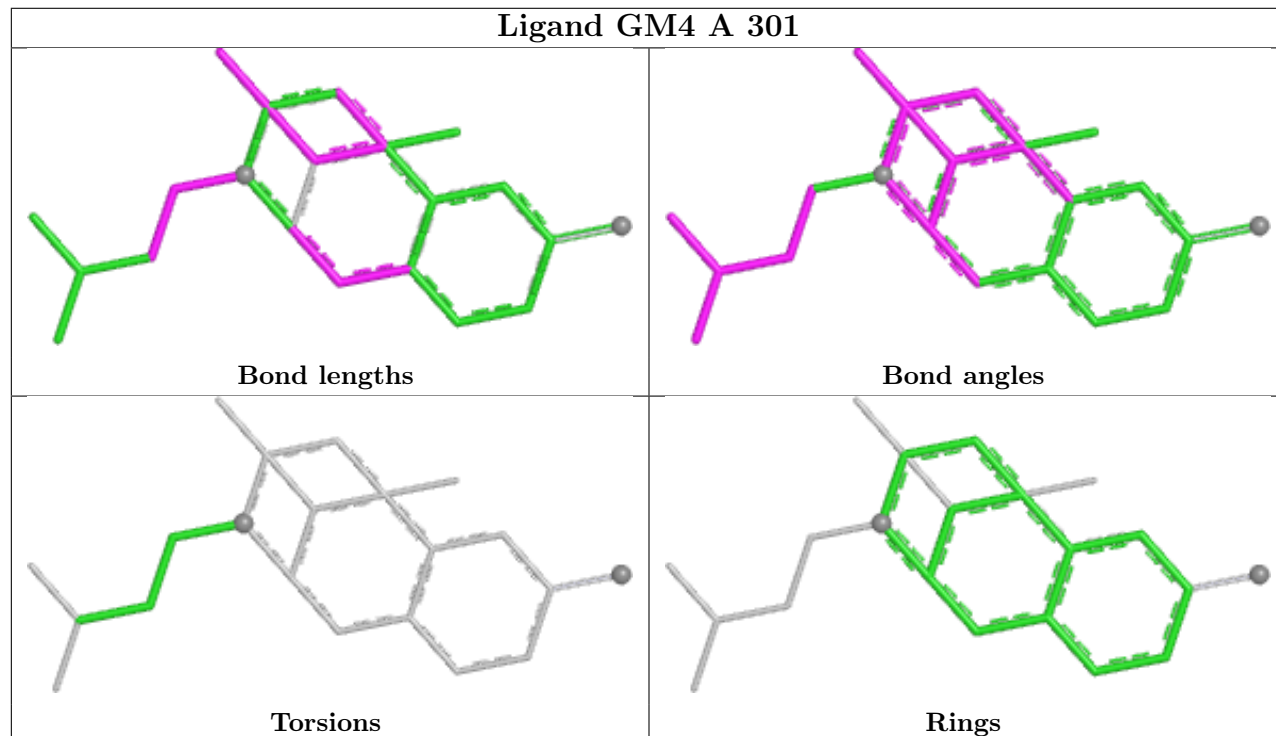




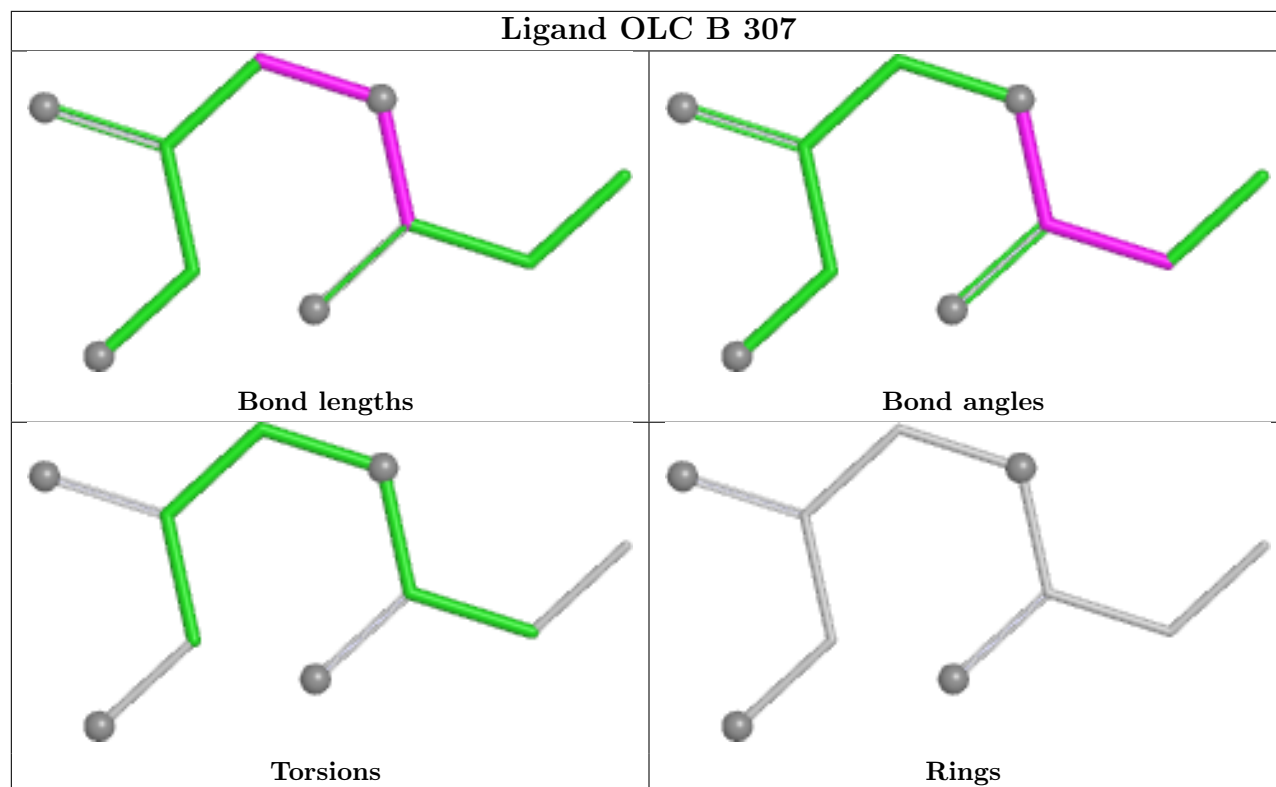
Ligand OLC C 308



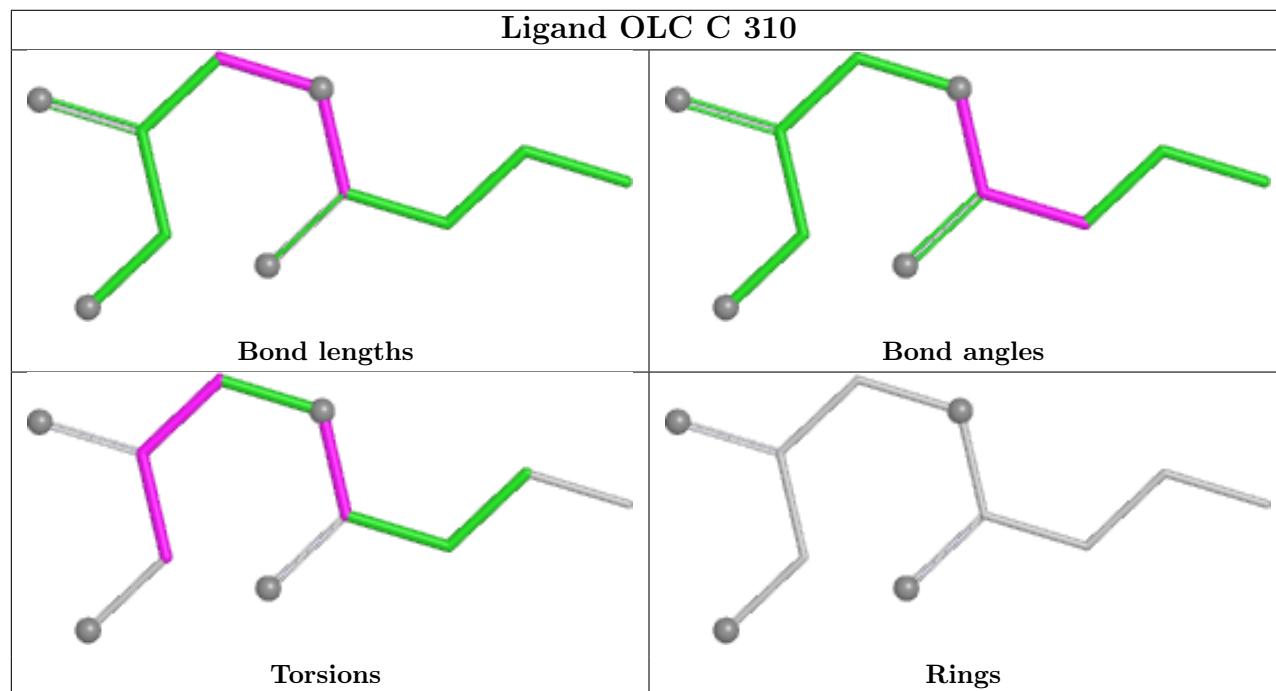
Ligand GM4 A 301

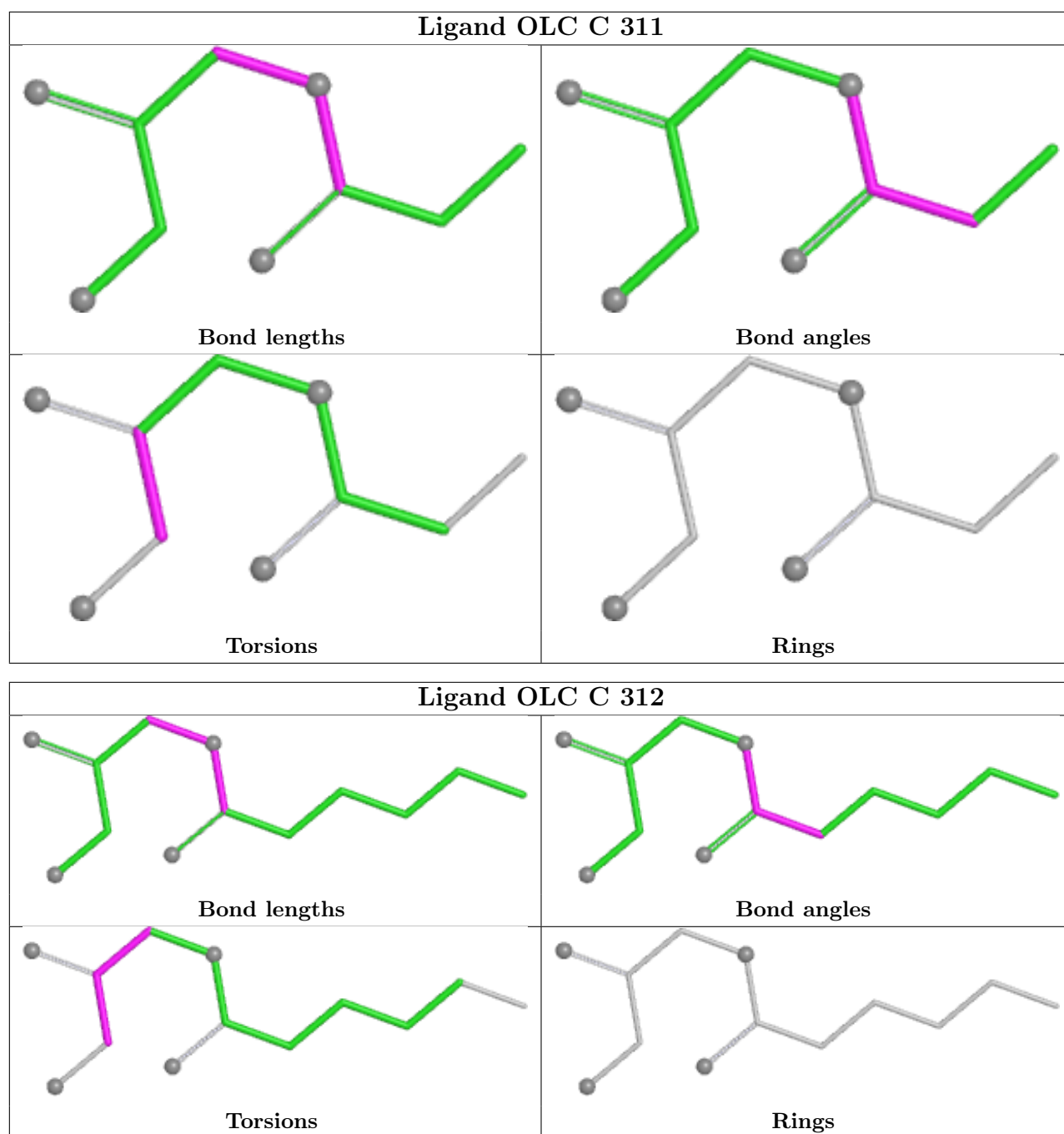


Ligand OLC B 307



Ligand OLC C 310





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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	212/227 (93%)	0.82	26 (12%) 8 5	44, 68, 110, 153	0
1	B	220/227 (96%)	1.10	42 (19%) 3 2	55, 87, 128, 155	0
1	C	220/227 (96%)	0.68	19 (8%) 16 9	43, 67, 124, 138	0
All	All	652/681 (95%)	0.87	87 (13%) 7 4	43, 74, 124, 155	0

All (87) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	38	GLN	9.7
1	B	36	VAL	7.9
1	C	31	GLY	7.2
1	B	37	PHE	4.9
1	B	39	ARG	4.9
1	B	53	ASP	4.5
1	B	0	SER	4.0
1	A	11	TRP	3.9
1	B	123	GLU	3.9
1	A	199	LEU	3.8
1	B	40	GLU	3.8
1	C	206	TYR	3.8
1	B	35	PHE	3.7
1	A	189	THR	3.7
1	C	162	VAL	3.7
1	A	33	GLN	3.7
1	A	190	VAL	3.6
1	B	22	LEU	3.5
1	B	187	ALA	3.4
1	B	34	SER	3.3
1	B	182	LEU	3.3
1	C	9	TRP	3.2
1	B	23	THR	3.1

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Mol	Chain	Res	Type	RSRZ
1	A	168	THR	3.1
1	A	15	LEU	3.0
1	A	186	LEU	3.0
1	B	95	LEU	3.0
1	A	115	GLY	2.9
1	B	196	PHE	2.9
1	C	210	LEU	2.9
1	B	25	VAL	2.8
1	B	27	TRP	2.8
1	B	4	ALA	2.8
1	B	28	LEU	2.8
1	A	183	ALA	2.8
1	B	216	THR	2.7
1	C	121	TRP	2.7
1	A	12	ALA	2.7
1	C	20	ALA	2.7
1	B	30	LEU	2.7
1	B	11	TRP	2.6
1	C	164	TRP	2.6
1	B	1	MET	2.6
1	B	205	SER	2.6
1	C	2	GLN	2.6
1	A	39	ARG	2.6
1	B	141	THR	2.6
1	C	13	ALA	2.5
1	C	19	ALA	2.5
1	C	5	VAL	2.5
1	A	108	GLY	2.5
1	B	19	ALA	2.4
1	C	29	TRP	2.4
1	A	195	ASP	2.4
1	A	40	GLU	2.4
1	B	69	HIS	2.4
1	C	33	GLN	2.4
1	A	55	GLU	2.4
1	A	58	PHE	2.3
1	B	24	GLN	2.3
1	A	129	ILE	2.3
1	B	175	ARG	2.3
1	B	2	GLN	2.3
1	A	187	ALA	2.3
1	C	30	LEU	2.3

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Mol	Chain	Res	Type	RSRZ
1	C	153	VAL	2.3
1	B	98	ALA	2.2
1	B	214	LEU	2.2
1	B	76	ASP	2.2
1	B	183	ALA	2.2
1	B	5	VAL	2.2
1	B	16	LEU	2.2
1	B	20	ALA	2.1
1	A	114	ARG	2.1
1	B	188	ASP	2.1
1	A	28	LEU	2.1
1	B	215	THR	2.1
1	C	144	GLU	2.1
1	B	7	ARG	2.1
1	A	194	GLN	2.1
1	A	163	GLU	2.1
1	A	196	PHE	2.1
1	A	9	TRP	2.0
1	A	182	LEU	2.0
1	C	137	ARG	2.0
1	C	159	ALA	2.0
1	B	156	PRO	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	OLC	B	307	10/25	0.44	0.21	96,122,134,136	0

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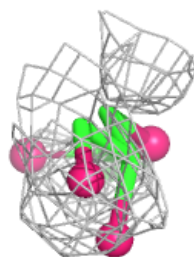
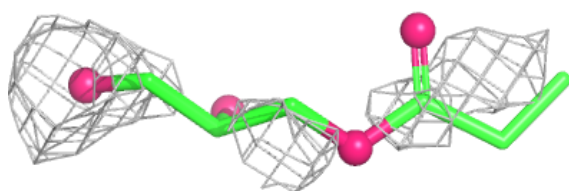
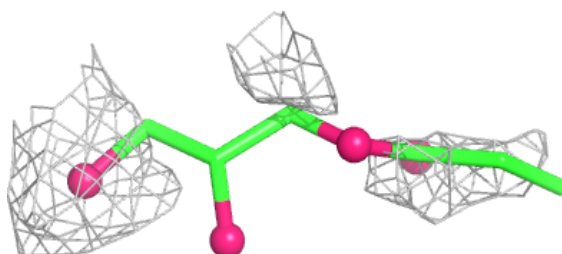
Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	SO4	B	303	5/5	0.45	0.14	127,140,149,163	0
3	SO4	A	304	5/5	0.59	0.12	120,152,166,173	0
3	SO4	B	305	5/5	0.64	0.47	128,149,157,160	0
5	OLC	B	308	10/25	0.65	0.19	98,118,130,137	0
3	SO4	C	304	5/5	0.66	0.17	91,92,103,106	5
4	GOL	B	306	6/6	0.66	0.21	80,99,106,107	0
3	SO4	A	306	5/5	0.71	0.10	136,149,160,172	0
3	SO4	A	307	5/5	0.71	0.14	117,132,149,149	0
5	OLC	B	309	9/25	0.72	0.22	93,100,121,124	0
5	OLC	C	309	8/25	0.72	0.27	101,108,113,123	0
3	SO4	C	302	5/5	0.77	0.12	85,90,107,114	0
5	OLC	C	307	11/25	0.79	0.20	54,64,86,87	0
3	SO4	B	302	5/5	0.80	0.10	105,117,121,123	0
5	OLC	A	310	9/25	0.81	0.20	86,97,107,110	0
3	SO4	A	305	5/5	0.81	0.14	104,121,154,163	0
5	OLC	A	311	10/25	0.82	0.23	63,83,116,117	0
3	SO4	A	302	5/5	0.83	0.08	67,82,92,92	0
5	OLC	C	310	11/25	0.84	0.17	73,99,107,107	0
3	SO4	A	303	5/5	0.85	0.15	65,77,84,95	0
3	SO4	B	304	5/5	0.85	0.09	86,92,112,116	0
3	SO4	C	303	5/5	0.87	0.11	89,94,126,153	0
5	OLC	C	312	13/25	0.87	0.18	61,84,92,93	0
4	GOL	C	305	6/6	0.88	0.16	68,75,83,90	0
5	OLC	C	311	10/25	0.88	0.20	71,86,90,93	0
2	GM4	A	301	21/21	0.88	0.16	57,84,98,105	0
4	GOL	C	306	6/6	0.89	0.19	75,91,102,104	0
5	OLC	C	308	9/25	0.89	0.13	72,87,95,98	0
4	GOL	A	309	6/6	0.90	0.13	45,60,75,86	0
2	GM4	B	301	21/21	0.91	0.19	75,87,97,100	0
2	GM4	C	301	21/21	0.91	0.19	58,69,89,92	0
3	SO4	A	308	5/5	0.96	0.09	60,62,83,85	0

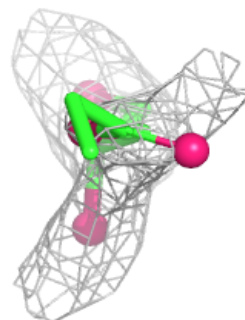
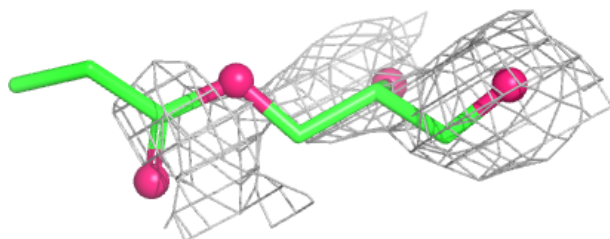
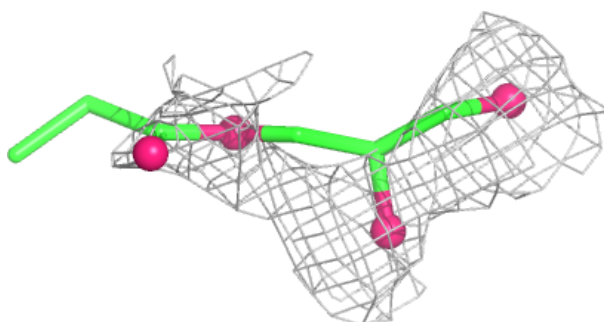
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around OLC B 307:

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

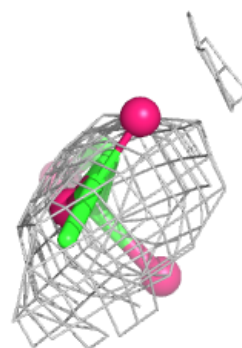
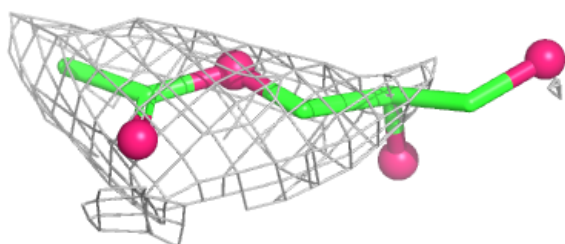
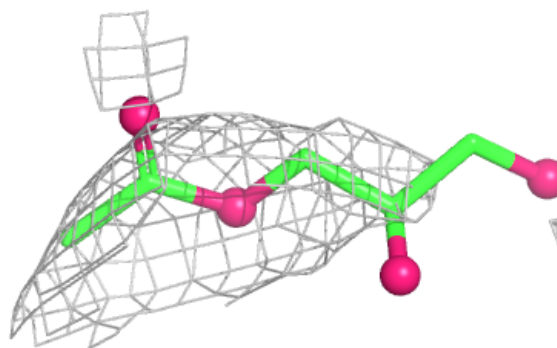
**Electron density around OLC B 308:**

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

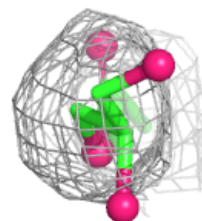
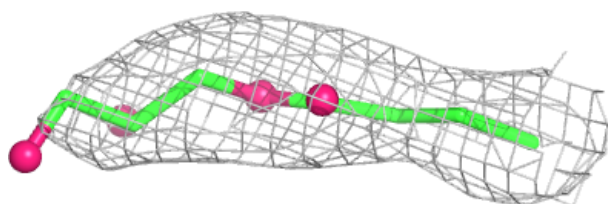
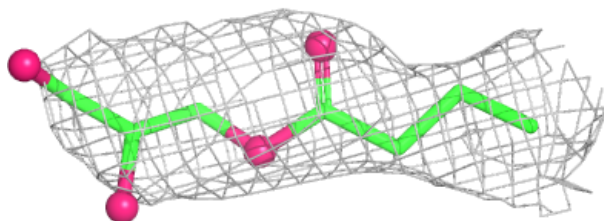


Electron density around OLC B 309:

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

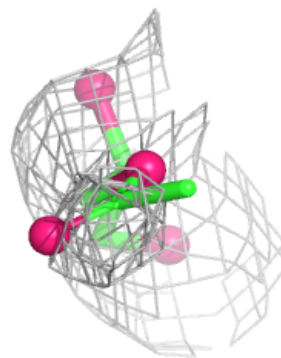
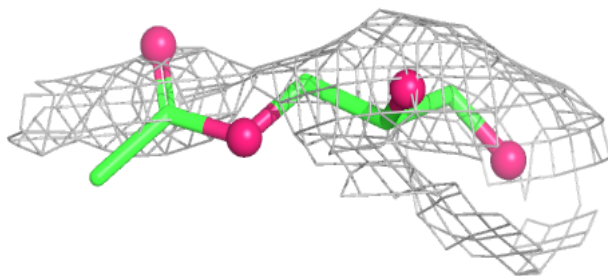
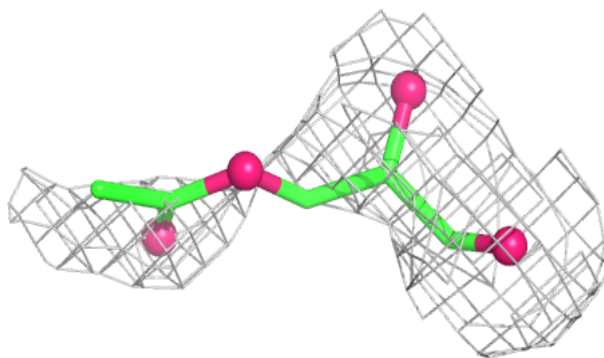
**Electron density around OLC C 307:**

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

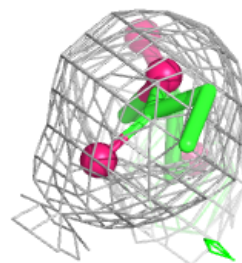
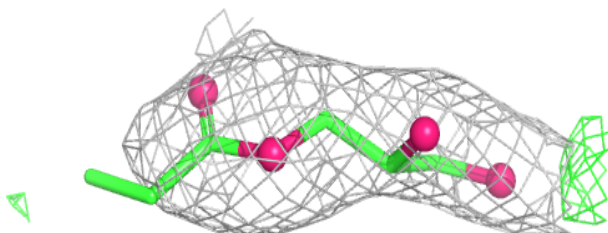
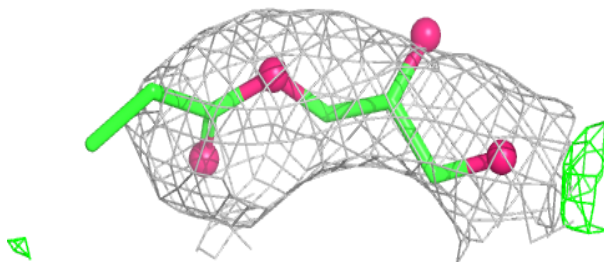


Electron density around OLC A 310:

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

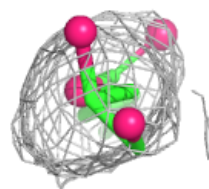
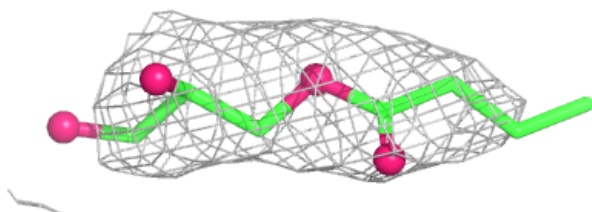
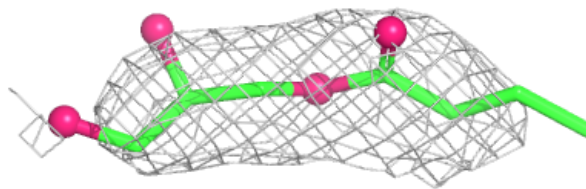
**Electron density around OLC A 311:**

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

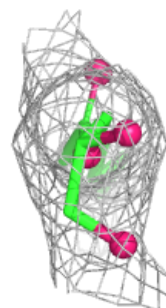
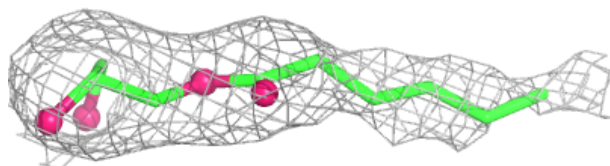
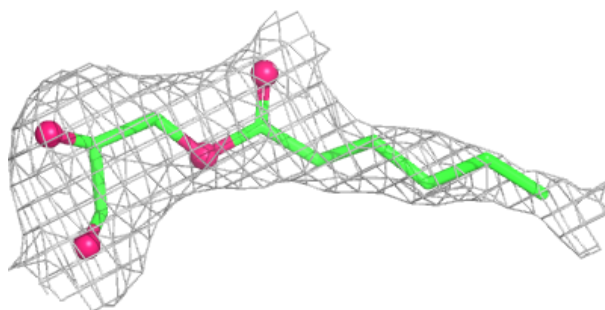


Electron density around OLC C 310:

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

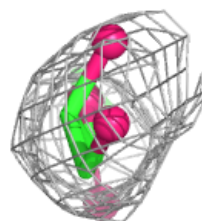
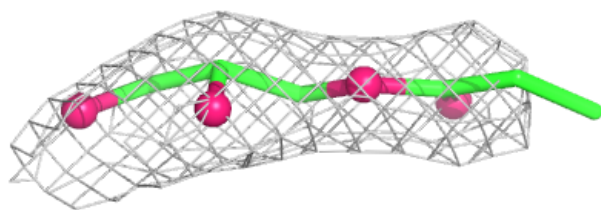
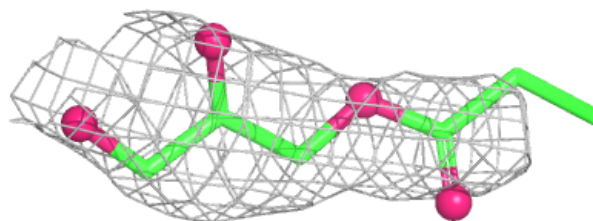
**Electron density around OLC C 312:**

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

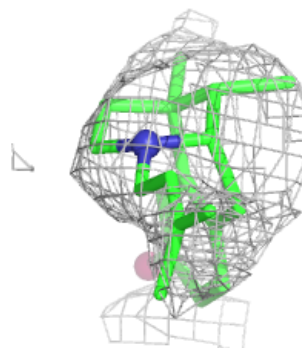
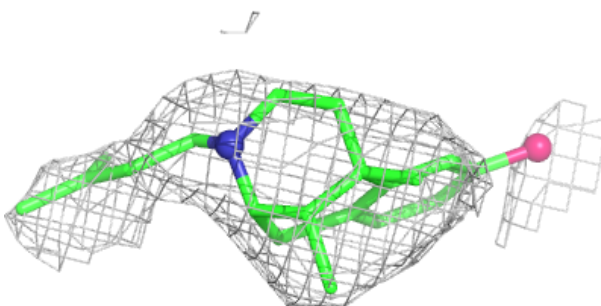
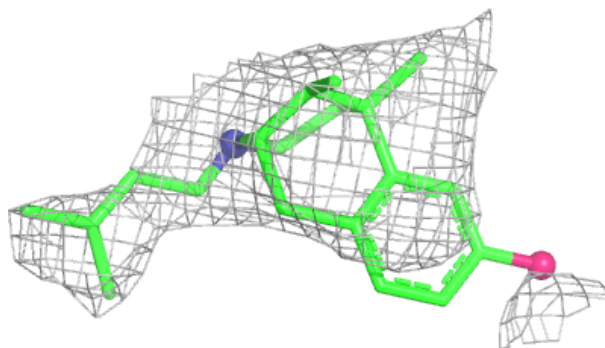


Electron density around OLC C 311:

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

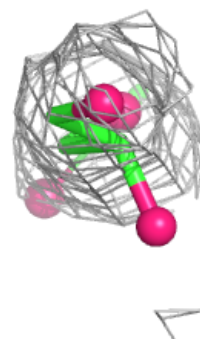
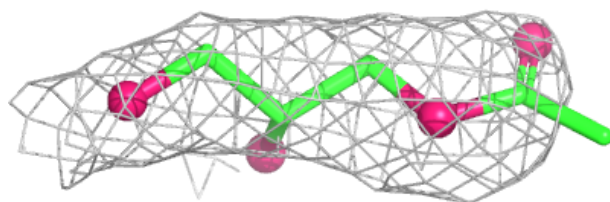
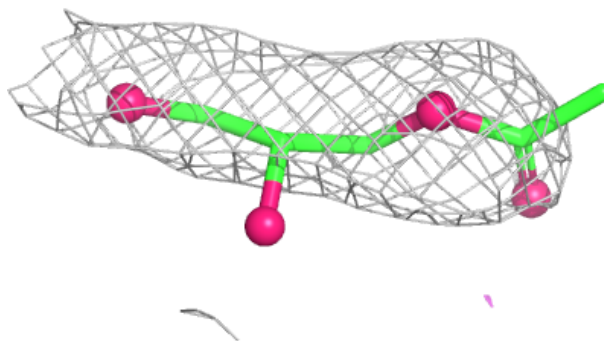
**Electron density around GM4 A 301:**

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

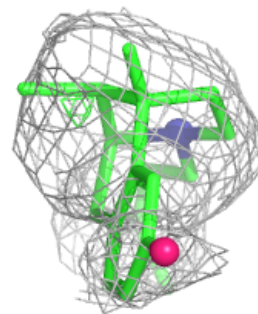
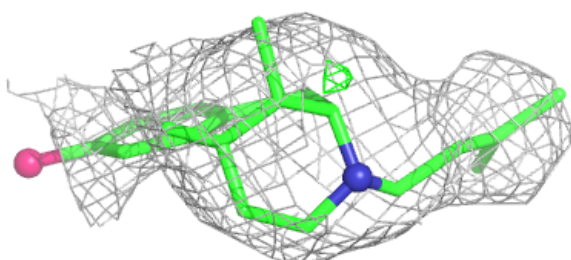
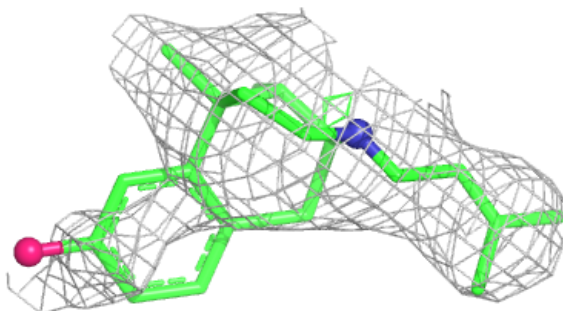


Electron density around OLC C 308:

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

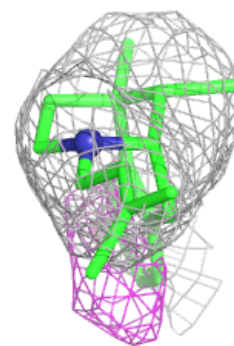
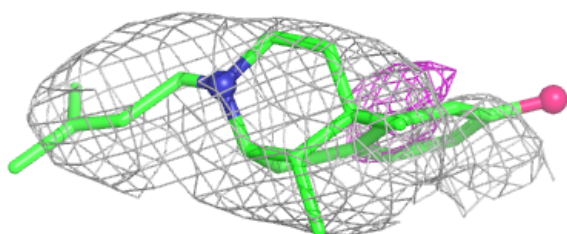
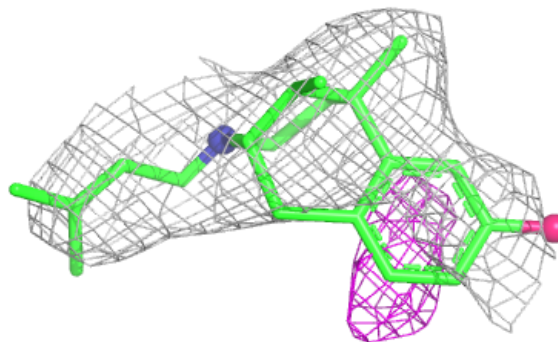
**Electron density around GM4 B 301:**

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



Electron density around GM4 C 301:

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



6.5 Other polymers [i](#)

There are no such residues in this entry.