



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 20, 2023 – 03:31 AM EDT

PDB ID : 5ITE
Title : 2.2-Angstrom in meso crystal structure of Haloquadratum Walsbyi Bacteriorhodopsin (HwBR) from Octylglucoside (OG) Detergent Micelles
Authors : Broecker, J.; Eger, B.T.; Ernst, O.P.
Deposited on : 2016-03-16
Resolution : 2.18 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35.1
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35.1

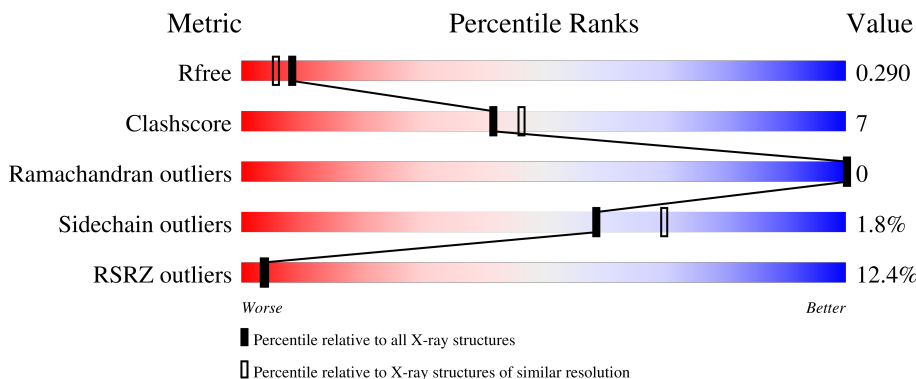
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.18 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	6864 (2.20-2.16)
Clashscore	141614	7689 (2.20-2.16)
Ramachandran outliers	138981	7564 (2.20-2.16)
Sidechain outliers	138945	7564 (2.20-2.16)
RSRZ outliers	127900	6738 (2.20-2.16)

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	268	
1	B	268	
1	C	268	

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	OLB	B	305	-	-	-	X

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 5686 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 Bacteriorhodopsin-I.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	228	Total 1777	C 1184	N 274	O 312	S 7	0	3	0
1	B	228	Total 1772	C 1181	N 271	O 313	S 7	0	3	0
1	C	228	Total 1783	C 1187	N 275	O 314	S 7	0	4	0

There are 48 discrepancies between the modelled and reference sequences:

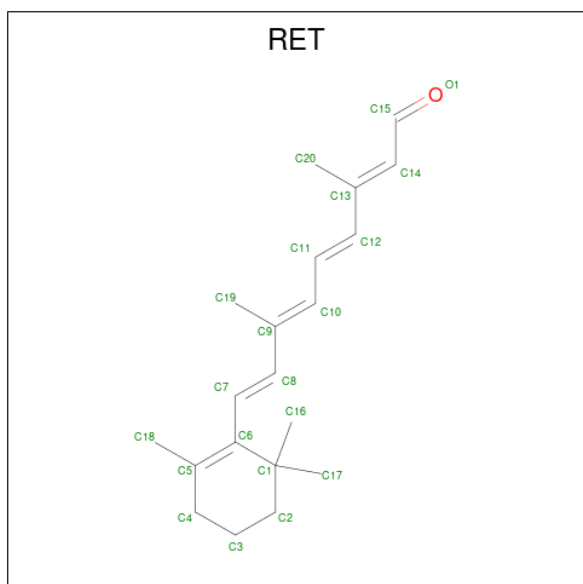
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	initiating methionine	UNP Q18DH8
A	2	ALA	-	expression tag	UNP Q18DH8
A	255	LEU	-	expression tag	UNP Q18DH8
A	256	VAL	-	expression tag	UNP Q18DH8
A	257	PRO	-	expression tag	UNP Q18DH8
A	258	ARG	-	expression tag	UNP Q18DH8
A	259	GLY	-	expression tag	UNP Q18DH8
A	260	SER	-	expression tag	UNP Q18DH8
A	261	LEU	-	expression tag	UNP Q18DH8
A	262	GLU	-	expression tag	UNP Q18DH8
A	263	HIS	-	expression tag	UNP Q18DH8
A	264	HIS	-	expression tag	UNP Q18DH8
A	265	HIS	-	expression tag	UNP Q18DH8
A	266	HIS	-	expression tag	UNP Q18DH8
A	267	HIS	-	expression tag	UNP Q18DH8
A	268	HIS	-	expression tag	UNP Q18DH8
B	1	MET	-	initiating methionine	UNP Q18DH8
B	2	ALA	-	expression tag	UNP Q18DH8
B	255	LEU	-	expression tag	UNP Q18DH8
B	256	VAL	-	expression tag	UNP Q18DH8
B	257	PRO	-	expression tag	UNP Q18DH8
B	258	ARG	-	expression tag	UNP Q18DH8
B	259	GLY	-	expression tag	UNP Q18DH8

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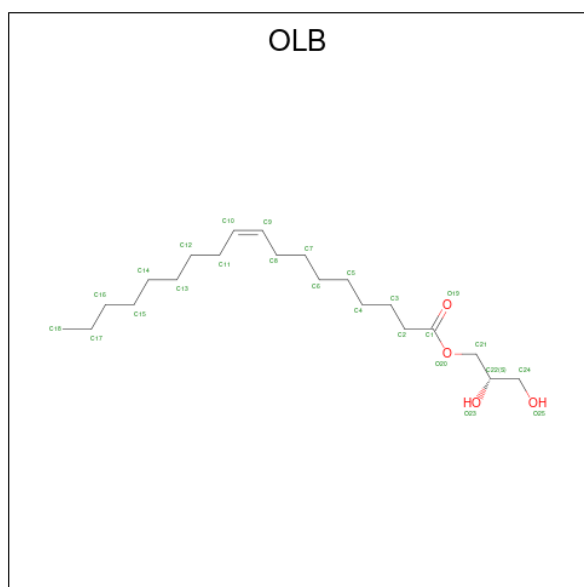
Chain	Residue	Modelled	Actual	Comment	Reference
B	260	SER	-	expression tag	UNP Q18DH8
B	261	LEU	-	expression tag	UNP Q18DH8
B	262	GLU	-	expression tag	UNP Q18DH8
B	263	HIS	-	expression tag	UNP Q18DH8
B	264	HIS	-	expression tag	UNP Q18DH8
B	265	HIS	-	expression tag	UNP Q18DH8
B	266	HIS	-	expression tag	UNP Q18DH8
B	267	HIS	-	expression tag	UNP Q18DH8
B	268	HIS	-	expression tag	UNP Q18DH8
C	1	MET	-	initiating methionine	UNP Q18DH8
C	2	ALA	-	expression tag	UNP Q18DH8
C	255	LEU	-	expression tag	UNP Q18DH8
C	256	VAL	-	expression tag	UNP Q18DH8
C	257	PRO	-	expression tag	UNP Q18DH8
C	258	ARG	-	expression tag	UNP Q18DH8
C	259	GLY	-	expression tag	UNP Q18DH8
C	260	SER	-	expression tag	UNP Q18DH8
C	261	LEU	-	expression tag	UNP Q18DH8
C	262	GLU	-	expression tag	UNP Q18DH8
C	263	HIS	-	expression tag	UNP Q18DH8
C	264	HIS	-	expression tag	UNP Q18DH8
C	265	HIS	-	expression tag	UNP Q18DH8
C	266	HIS	-	expression tag	UNP Q18DH8
C	267	HIS	-	expression tag	UNP Q18DH8
C	268	HIS	-	expression tag	UNP Q18DH8

- Molecule 2 is RETINAL (three-letter code: RET) (formula: C₂₀H₂₈O).



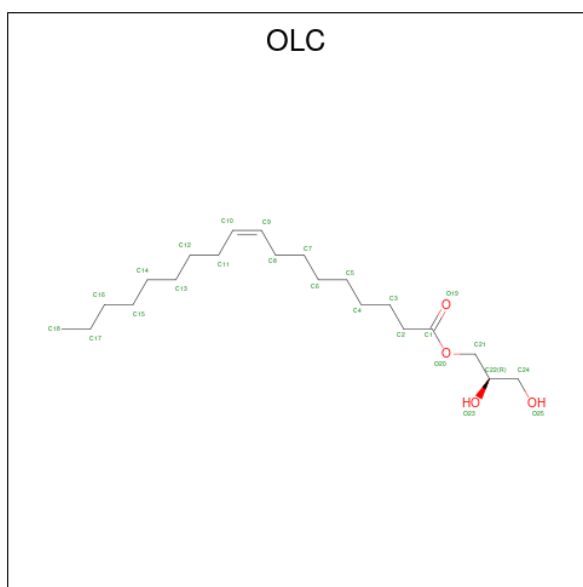
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C 20 20	0	0
2	B	1	Total C 20 20	0	0
2	C	1	Total C 20 20	0	0

- Molecule 3 is (2S)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (three-letter code: OLB) (formula: C₂₁H₄₀O₄).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 25 21 4	0	0
3	B	1	Total C O 25 21 4	0	0
3	C	1	Total C O 25 21 4	0	0

- Molecule 4 is (2R)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (three-letter code: OLC) (formula: C₂₁H₄₀O₄).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 25 21 4	0	0
4	B	1	Total C O 25 21 4	0	0
4	B	1	Total C O 25 21 4	0	0
4	B	1	Total C O 25 21 4	0	0
4	C	1	Total C O 25 21 4	0	0
4	C	1	Total C O 25 21 4	0	0

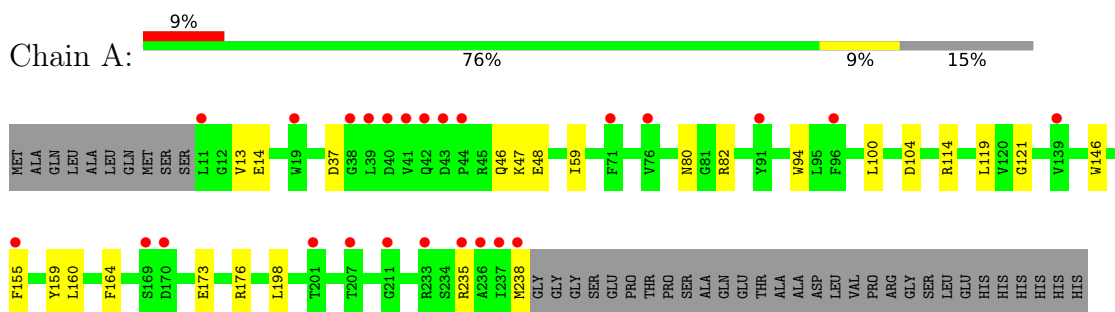
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	25	Total O 25 25	0	0
5	B	21	Total O 21 21	0	0
5	C	23	Total O 23 23	0	0

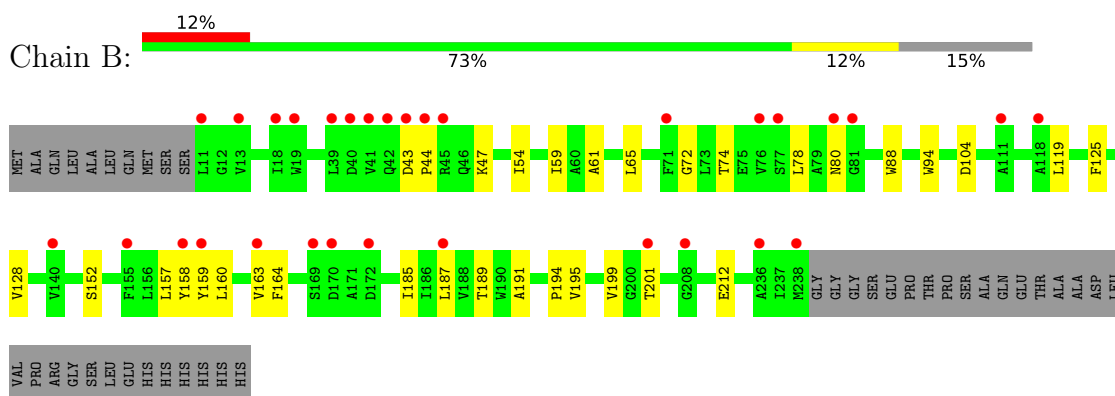
3 Residue-property plots [i](#)

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.

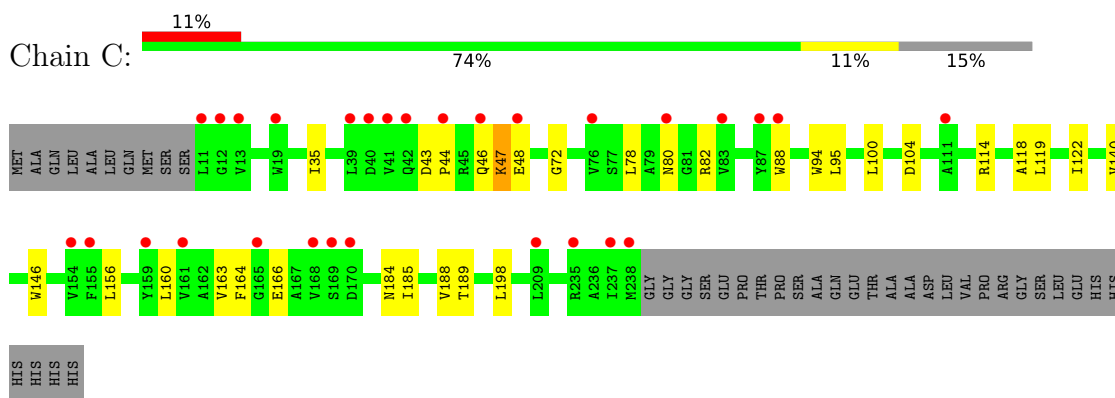
- Molecule 1: Bacteriorhodopsin-I



- Molecule 1: Bacteriorhodopsin-I



- Molecule 1: Bacteriorhodopsin-I



4 Data and refinement statistics i

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	106.44Å 61.56Å 119.69Å 90.00° 116.80° 90.00°	Depositor
Resolution (Å)	47.51 – 2.18 51.75 – 2.18	Depositor EDS
% Data completeness (in resolution range)	99.0 (47.51-2.18) 99.1 (51.75-2.18)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.14 (at 2.18Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.259 , 0.289 0.260 , 0.290	Depositor DCC
R_{free} test set	1738 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å ²)	20.5	Xtrriage
Anisotropy	0.147	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 66.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.028 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.88	EDS
Total number of atoms	5686	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 26.56 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.5752e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: OLB, RET, OLC

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	0.45	0/1822	0.66	0/2486
1	B	0.45	0/1817	0.64	0/2480
1	C	0.44	0/1828	0.65	0/2494
All	All	0.45	0/5467	0.65	0/7460

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 [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	1777	0	1831	19	0
1	B	1772	0	1822	25	0
1	C	1783	0	1834	27	0
2	A	20	0	27	2	0
2	B	20	0	27	3	0
2	C	20	0	27	4	0
3	A	25	0	40	2	0
3	B	25	0	40	4	0
3	C	25	0	40	5	0
4	A	25	0	40	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	75	0	120	12	0
4	C	50	0	80	5	0
5	A	25	0	0	0	0
5	B	21	0	0	0	0
5	C	23	0	0	1	0
All	All	5686	0	5928	81	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 (81) 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:173:GLU:OE1	1:A:176:ARG:NH2	2.13	0.80
1:B:191:ALA:HB1	4:B:304:OLC:H16	1.66	0.77
1:B:94:TRP:CD1	2:B:301:RET:H14	2.20	0.77
4:C:302:OLC:H9	3:C:304:OLB:H4A	1.67	0.77
1:B:128:VAL:HG11	4:B:302:OLC:H12A	1.68	0.74
1:A:59:ILE:HG23	4:B:302:OLC:H13A	1.72	0.72
1:A:94:TRP:CD1	2:A:301:RET:H14	2.25	0.71
1:B:61:ALA:HB1	3:B:305:OLB:H32	1.76	0.67
1:C:146:TRP:CE2	1:C:198:LEU:HD13	2.30	0.66
1:A:114:ARG:HA	3:C:304:OLB:H24A	1.78	0.66
1:A:48:GLU:HG3	4:B:302:OLC:H24A	1.81	0.63
1:A:146:TRP:CE2	1:A:198:LEU:HD13	2.35	0.62
1:C:100:LEU:HD21	3:C:304:OLB:H4	1.81	0.61
1:C:47:LYS:NZ	5:C:401:HOH:O	2.11	0.60
1:C:80:ASN:HD21	1:C:82:ARG:HB2	1.66	0.60
1:B:72:GLY:HA2	1:B:88:TRP:CE2	2.36	0.60
1:B:78:LEU:HB2	1:B:80:ASN:OD1	2.05	0.57
1:C:43:ASP:HB3	1:C:46:GLN:HE21	1.69	0.57
1:C:78:LEU:HB2	1:C:80:ASN:OD1	2.04	0.57
1:A:46:GLN:NE2	1:A:238:MET:SD	2.76	0.56
1:C:163:VAL:O	1:C:166:GLU:HG2	2.06	0.56
2:B:301:RET:H8	2:B:301:RET:H161	1.86	0.56
1:C:94:TRP:CD1	2:C:301:RET:H14	2.41	0.56
1:B:72:GLY:HA2	1:B:88:TRP:CZ2	2.41	0.54
1:A:114:ARG:NE	1:C:48:GLU:OE2	2.33	0.54
1:A:80:ASN:HB3	1:A:82[A]:ARG:H	1.74	0.52
1:C:160:LEU:O	1:C:164:PHE:HB2	2.09	0.52
1:C:119:LEU:HD12	1:C:164:PHE:CZ	2.45	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:80:ASN:HB3	1:A:82[B]:ARG:HB2	1.92	0.51
1:A:13:VAL:HG12	1:A:14:GLU:HG3	1.92	0.51
2:A:301:RET:H8	2:A:301:RET:H161	1.91	0.51
1:A:80:ASN:HB3	1:A:82[B]:ARG:H	1.74	0.51
1:C:80:ASN:ND2	1:C:82:ARG:HB2	2.25	0.50
1:A:114:ARG:HD3	1:C:48:GLU:HG2	1.94	0.50
1:A:59:ILE:HD11	4:B:302:OLC:H7	1.92	0.50
4:A:303:OLC:H13A	4:B:302:OLC:H4A	1.94	0.50
1:A:160:LEU:O	1:A:164:PHE:HB2	2.12	0.49
1:C:44:PRO:O	1:C:48:GLU:HG3	2.12	0.49
1:B:160:LEU:O	1:B:164:PHE:HB2	2.13	0.48
1:B:65:LEU:HD22	3:B:305:OLB:H36	1.95	0.48
1:A:119:LEU:HD12	1:A:164:PHE:CZ	2.49	0.48
1:C:72:GLY:HA2	1:C:88:TRP:CZ2	2.49	0.47
1:B:44:PRO:O	1:B:47:LYS:HG2	2.15	0.47
1:C:95:LEU:HD11	4:C:302:OLC:H18A	1.97	0.47
1:B:59:ILE:HG12	4:C:303:OLC:H17	1.96	0.46
1:B:185:ILE:O	1:B:189:THR:HG23	2.16	0.46
3:B:305:OLB:C3	1:C:122:ILE:HG12	2.46	0.45
1:C:185:ILE:O	1:C:189:THR:HG23	2.17	0.45
1:C:43:ASP:HB3	1:C:46:GLN:NE2	2.32	0.44
1:B:43:ASP:HA	1:B:44:PRO:HD3	1.84	0.44
1:B:44:PRO:HA	1:B:47:LYS:HD3	2.00	0.44
1:B:125:PHE:HD2	1:B:152[B]:SER:HG	1.64	0.44
1:B:158:TYR:CD1	4:B:304:OLC:H4	2.52	0.44
1:B:201[A]:THR:HG22	1:B:212:GLU:OE1	2.18	0.44
3:A:302:OLB:H25	3:A:302:OLB:H20	1.64	0.43
1:B:54:ILE:HD13	3:B:305:OLB:H24A	2.00	0.43
3:A:302:OLB:O23	1:C:35:ILE:HG12	2.18	0.43
1:B:195:VAL:O	1:B:199:VAL:HG13	2.19	0.43
1:C:72:GLY:HA2	1:C:88:TRP:CE2	2.53	0.43
1:C:118:ALA:HB2	4:C:303:OLC:O20	2.19	0.42
1:B:159:TYR:O	1:B:163:VAL:HB	2.19	0.42
1:C:119:LEU:HD23	1:C:119:LEU:HA	1.83	0.42
4:A:303:OLC:H12A	4:A:303:OLC:H15A	1.86	0.42
4:B:304:OLC:H8	4:B:304:OLC:H11A	1.65	0.42
2:C:301:RET:H171	2:C:301:RET:H8	2.00	0.42
4:B:303:OLC:H11	4:B:303:OLC:H8	1.64	0.42
1:B:158:TYR:CE1	4:B:304:OLC:H2A	2.55	0.42
1:C:114:ARG:O	4:C:303:OLC:H3	2.20	0.42
1:A:155:PHE:HD2	1:A:159:TYR:CE2	2.38	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:95:LEU:HD12	1:C:95:LEU:HA	1.92	0.42
2:C:301:RET:H181	2:C:301:RET:H7	1.57	0.41
1:B:74:THR:HG1	1:B:88:TRP:HE1	1.67	0.41
1:B:158:TYR:HD1	4:B:304:OLC:H4	1.85	0.41
1:A:100:LEU:HD21	4:B:302:OLC:H3A	2.02	0.41
2:C:301:RET:H11	2:C:301:RET:H191	1.94	0.41
1:B:194:PRO:HD3	2:B:301:RET:H7	2.03	0.40
1:A:121:GLY:HA2	3:C:304:OLB:H5A	2.02	0.40
1:B:157:LEU:HD22	1:B:187:LEU:HD23	2.04	0.40
1:C:80:ASN:OD1	1:C:82:ARG:N	2.48	0.40
1:C:184:ASN:O	1:C:188:VAL:HG12	2.21	0.40
3:C:304:OLB:H241	3:C:304:OLB:H211	1.70	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	229/268 (85%)	227 (99%)	2 (1%)	0	100	100
1	B	229/268 (85%)	228 (100%)	1 (0%)	0	100	100
1	C	230/268 (86%)	229 (100%)	1 (0%)	0	100	100
All	All	688/804 (86%)	684 (99%)	4 (1%)	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	184/212 (87%)	180 (98%)	4 (2%)	52	62
1	B	184/212 (87%)	182 (99%)	2 (1%)	73	83
1	C	185/212 (87%)	181 (98%)	4 (2%)	52	62
All	All	553/636 (87%)	543 (98%)	10 (2%)	59	70

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	37	ASP
1	A	47	LYS
1	A	104	ASP
1	A	235	ARG
1	B	104	ASP
1	B	119	LEU
1	C	47	LYS
1	C	104	ASP
1	C	140	VAL
1	C	156	LEU

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

Mol	Chain	Res	Type
1	C	46	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 monosaccharides in this entry.

5.6 Ligand geometry

12 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
4	OLC	C	303	-	24,24,24	0.95	1 (4%)	25,25,25	1.02	1 (4%)
4	OLC	A	303	-	24,24,24	0.94	1 (4%)	25,25,25	0.88	1 (4%)
2	RET	B	301	1	20,20,21	0.85	2 (10%)	27,27,28	1.71	6 (22%)
4	OLC	B	304	-	24,24,24	0.93	1 (4%)	25,25,25	0.90	1 (4%)
4	OLC	B	303	-	24,24,24	0.92	1 (4%)	25,25,25	0.95	1 (4%)
4	OLC	C	302	-	24,24,24	0.93	1 (4%)	25,25,25	0.91	1 (4%)
2	RET	A	301	1	20,20,21	0.86	2 (10%)	27,27,28	1.69	6 (22%)
3	OLB	A	302	-	24,24,24	0.93	1 (4%)	25,25,25	0.98	1 (4%)
3	OLB	B	305	-	24,24,24	0.93	1 (4%)	25,25,25	1.04	2 (8%)
4	OLC	B	302	-	24,24,24	0.92	1 (4%)	25,25,25	1.02	1 (4%)
2	RET	C	301	1	20,20,21	0.87	2 (10%)	27,27,28	1.87	9 (33%)
3	OLB	C	304	-	24,24,24	0.93	1 (4%)	25,25,25	0.91	1 (4%)

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
4	OLC	C	303	-	-	6/24/24/24	-
4	OLC	A	303	-	-	4/24/24/24	-
2	RET	B	301	1	-	4/13/30/31	0/1/1/1
4	OLC	B	304	-	-	2/24/24/24	-
4	OLC	B	303	-	-	1/24/24/24	-
4	OLC	C	302	-	-	2/24/24/24	-
2	RET	A	301	1	-	4/13/30/31	0/1/1/1
3	OLB	A	302	-	-	6/24/24/24	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	OLB	B	305	-	-	2/24/24/24	-
4	OLC	B	302	-	-	2/24/24/24	-
2	RET	C	301	1	-	0/13/30/31	0/1/1/1
3	OLB	C	304	-	-	0/24/24/24	-

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	303	OLC	O20-C1	3.55	1.43	1.33
4	C	302	OLC	O20-C1	3.50	1.43	1.33
4	B	304	OLC	O20-C1	3.50	1.43	1.33
3	B	305	OLB	O20-C1	3.50	1.43	1.33
3	A	302	OLB	O20-C1	3.49	1.43	1.33
4	A	303	OLC	O20-C1	3.49	1.43	1.33
3	C	304	OLB	O20-C1	3.49	1.43	1.33
4	B	302	OLC	O20-C1	3.48	1.43	1.33
4	B	303	OLC	O20-C1	3.42	1.43	1.33
2	A	301	RET	C11-C10	-2.61	1.35	1.43
2	C	301	RET	C11-C10	-2.54	1.35	1.43
2	B	301	RET	C11-C10	-2.50	1.35	1.43
2	C	301	RET	C14-C13	2.24	1.35	1.33
2	B	301	RET	C14-C13	2.13	1.35	1.33
2	A	301	RET	C14-C13	2.11	1.35	1.33

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	RET	C18-C5-C6	-4.11	119.91	124.53
2	C	301	RET	C18-C5-C6	-4.03	120.00	124.53
2	B	301	RET	C18-C5-C6	-3.99	120.04	124.53
2	B	301	RET	C3-C4-C5	-3.57	107.71	114.08
2	C	301	RET	C3-C4-C5	-3.23	108.30	114.08
2	C	301	RET	C10-C11-C12	-3.20	113.22	123.22
2	B	301	RET	C7-C8-C9	-3.19	121.42	126.23
2	A	301	RET	C3-C4-C5	-2.87	108.95	114.08
4	C	303	OLC	O20-C1-C2	2.84	120.81	111.91
3	B	305	OLB	O20-C1-C2	2.82	120.77	111.91
2	C	301	RET	C19-C9-C8	2.76	122.43	118.08
2	C	301	RET	C1-C6-C7	2.73	123.50	115.78
3	A	302	OLB	O20-C1-C2	2.70	120.37	111.91
4	B	302	OLC	O20-C1-C2	2.66	120.25	111.91
4	B	303	OLC	O20-C1-C2	2.62	120.14	111.91

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	301	RET	C7-C6-C5	-2.59	115.18	121.46
2	A	301	RET	C7-C8-C9	-2.55	122.39	126.23
2	C	301	RET	C2-C3-C4	-2.50	105.79	111.38
2	B	301	RET	C11-C10-C9	-2.44	123.82	127.31
3	C	304	OLB	O20-C1-C2	2.35	119.28	111.91
2	A	301	RET	C11-C10-C9	-2.34	123.97	127.31
2	A	301	RET	C18-C5-C4	2.29	118.01	113.62
2	B	301	RET	C18-C5-C4	2.26	117.97	113.62
2	A	301	RET	C10-C11-C12	-2.26	116.15	123.22
4	C	302	OLC	O20-C1-C2	2.25	118.96	111.91
2	B	301	RET	C10-C11-C12	-2.20	116.35	123.22
3	B	305	OLB	O20-C1-O19	-2.17	118.10	123.59
2	C	301	RET	C20-C13-C12	2.16	121.48	118.08
4	B	304	OLC	O20-C1-C2	2.14	118.62	111.91
4	A	303	OLC	O20-C1-C2	2.00	118.19	111.91
2	C	301	RET	C11-C10-C9	-2.00	124.45	127.31

There are no chirality outliers.

All (33) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	RET	C1-C6-C7-C8
2	A	301	RET	C7-C8-C9-C10
2	A	301	RET	C7-C8-C9-C19
2	B	301	RET	C1-C6-C7-C8
2	B	301	RET	C5-C6-C7-C8
2	B	301	RET	C7-C8-C9-C10
2	B	301	RET	C7-C8-C9-C19
3	B	305	OLB	C2-C3-C4-C5
4	B	303	OLC	C2-C3-C4-C5
3	A	302	OLB	C5-C6-C7-C8
2	A	301	RET	C5-C6-C7-C8
4	C	303	OLC	C4-C5-C6-C7
4	A	303	OLC	C6-C7-C8-C9
4	A	303	OLC	C11-C12-C13-C14
3	A	302	OLB	O20-C1-C2-C3
3	A	302	OLB	C1-C2-C3-C4
4	C	303	OLC	C5-C6-C7-C8
3	A	302	OLB	C12-C13-C14-C15
4	B	304	OLC	C22-C21-O20-C1
3	B	305	OLB	C6-C7-C8-C9
4	C	302	OLC	C15-C16-C17-C18

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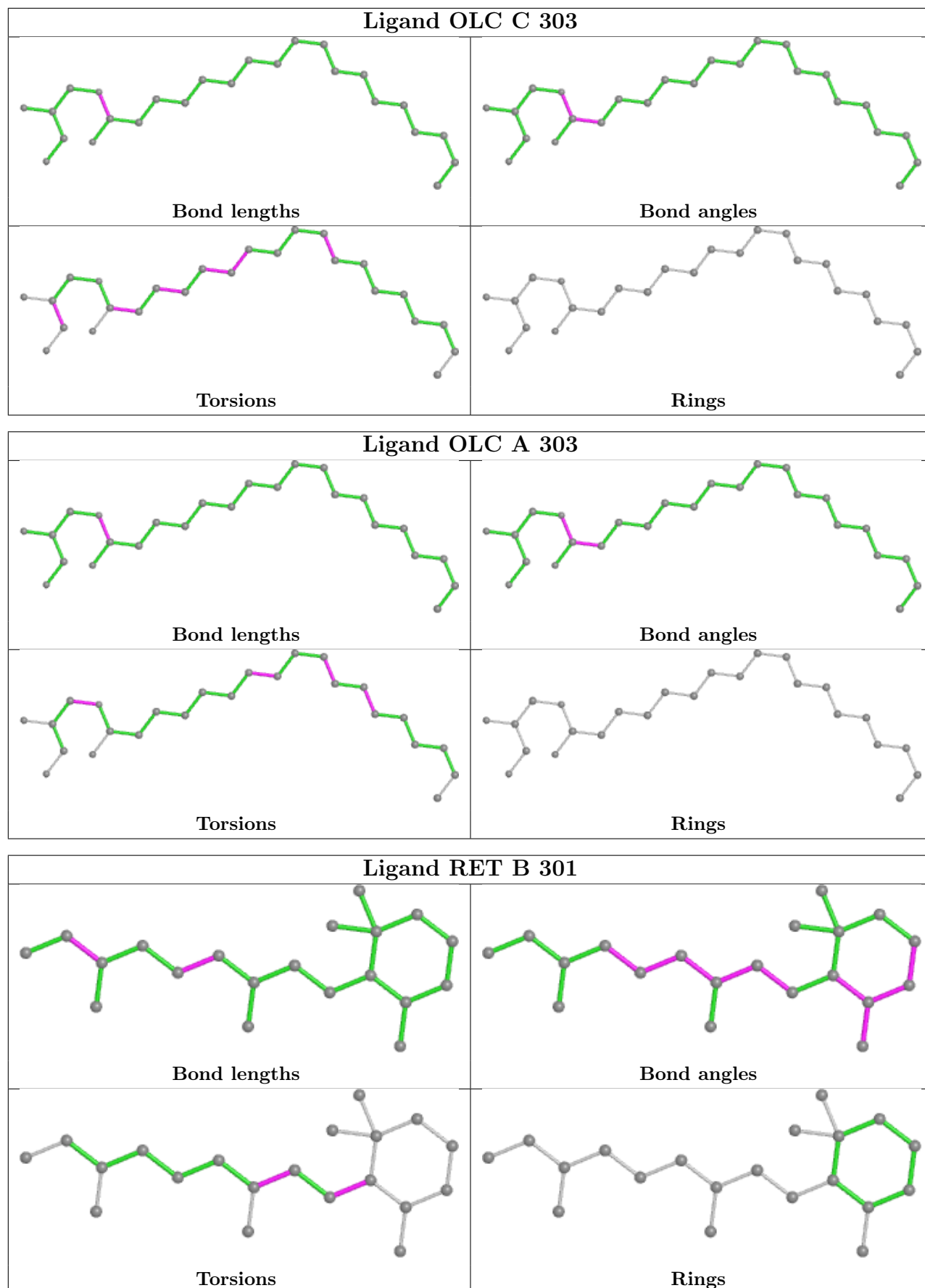
Mol	Chain	Res	Type	Atoms
4	C	302	OLC	C9-C10-C11-C12
4	A	303	OLC	C9-C10-C11-C12
4	B	304	OLC	C11-C12-C13-C14
4	A	303	OLC	C22-C21-O20-C1
3	A	302	OLB	O19-C1-C2-C3
4	B	302	OLC	C9-C10-C11-C12
3	A	302	OLB	C11-C12-C13-C14
4	B	302	OLC	C22-C21-O20-C1
4	C	303	OLC	C9-C10-C11-C12
4	C	303	OLC	C21-C22-C24-O25
4	C	303	OLC	C2-C3-C4-C5
4	C	303	OLC	O20-C1-C2-C3

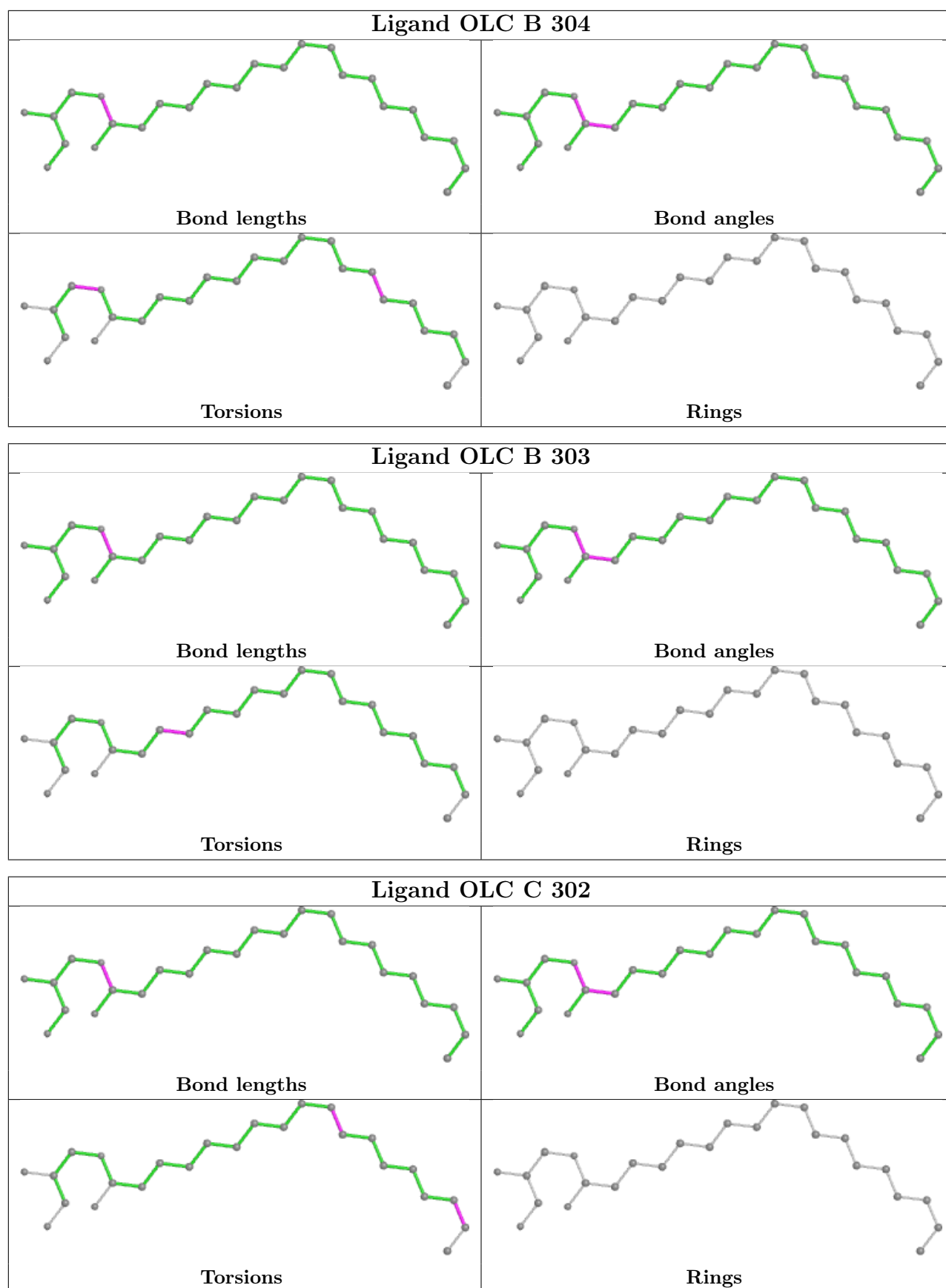
There are no ring outliers.

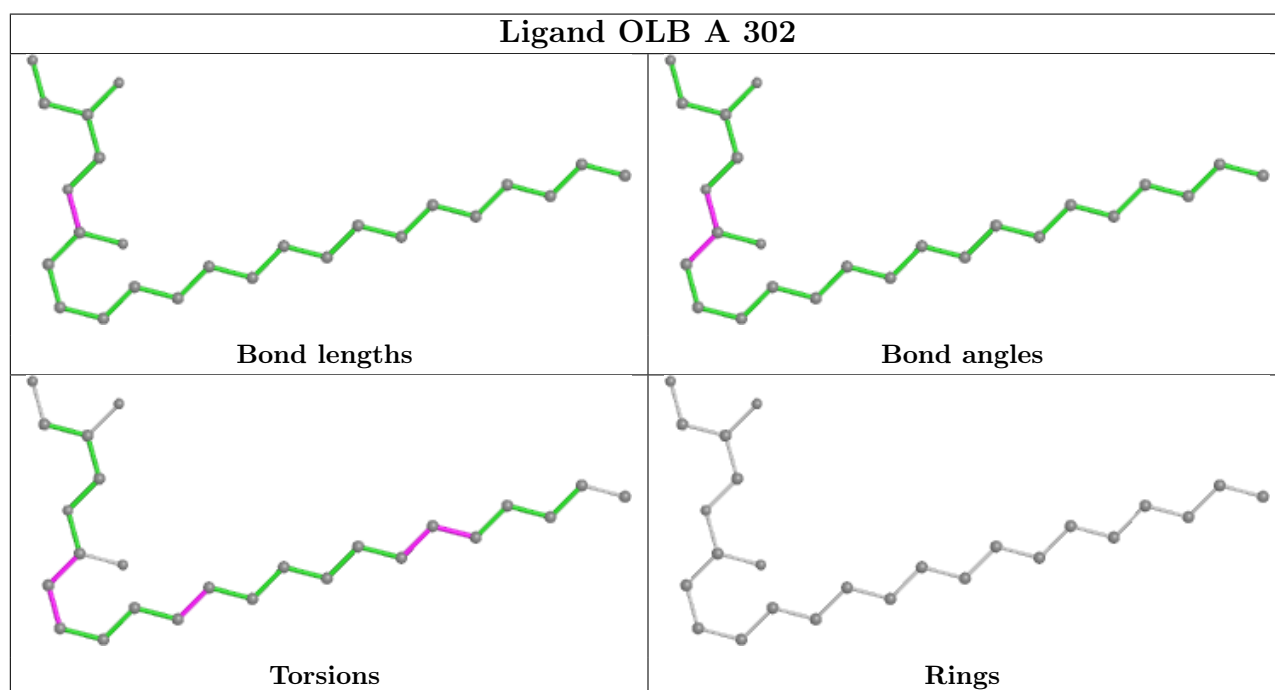
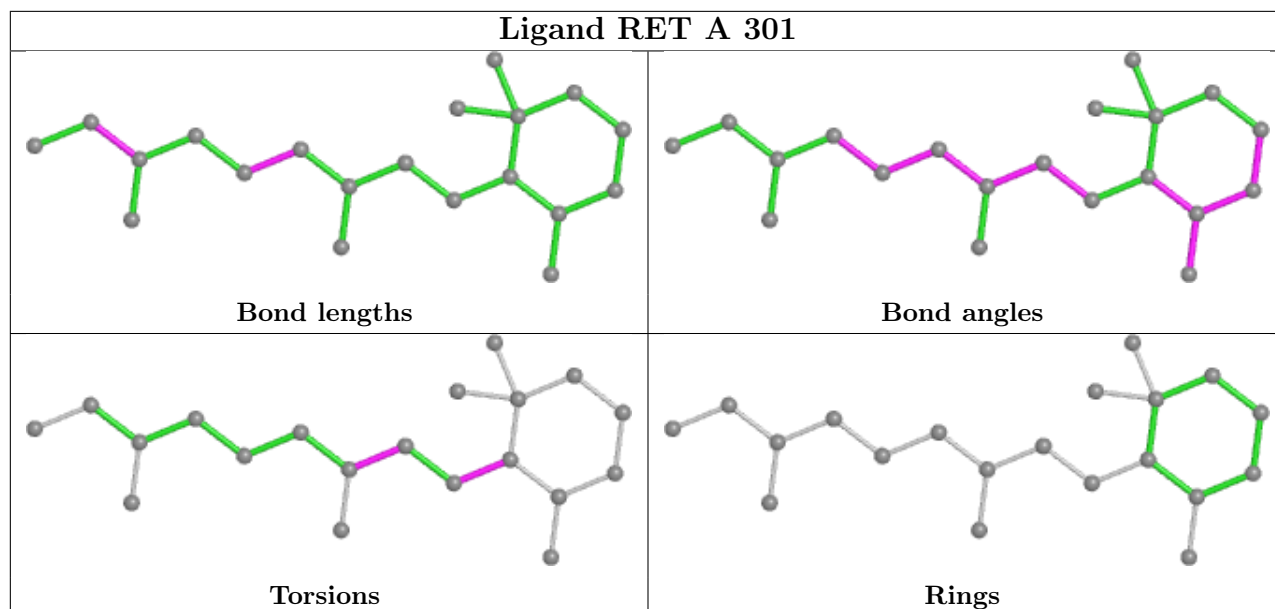
12 monomers are involved in 37 short contacts:

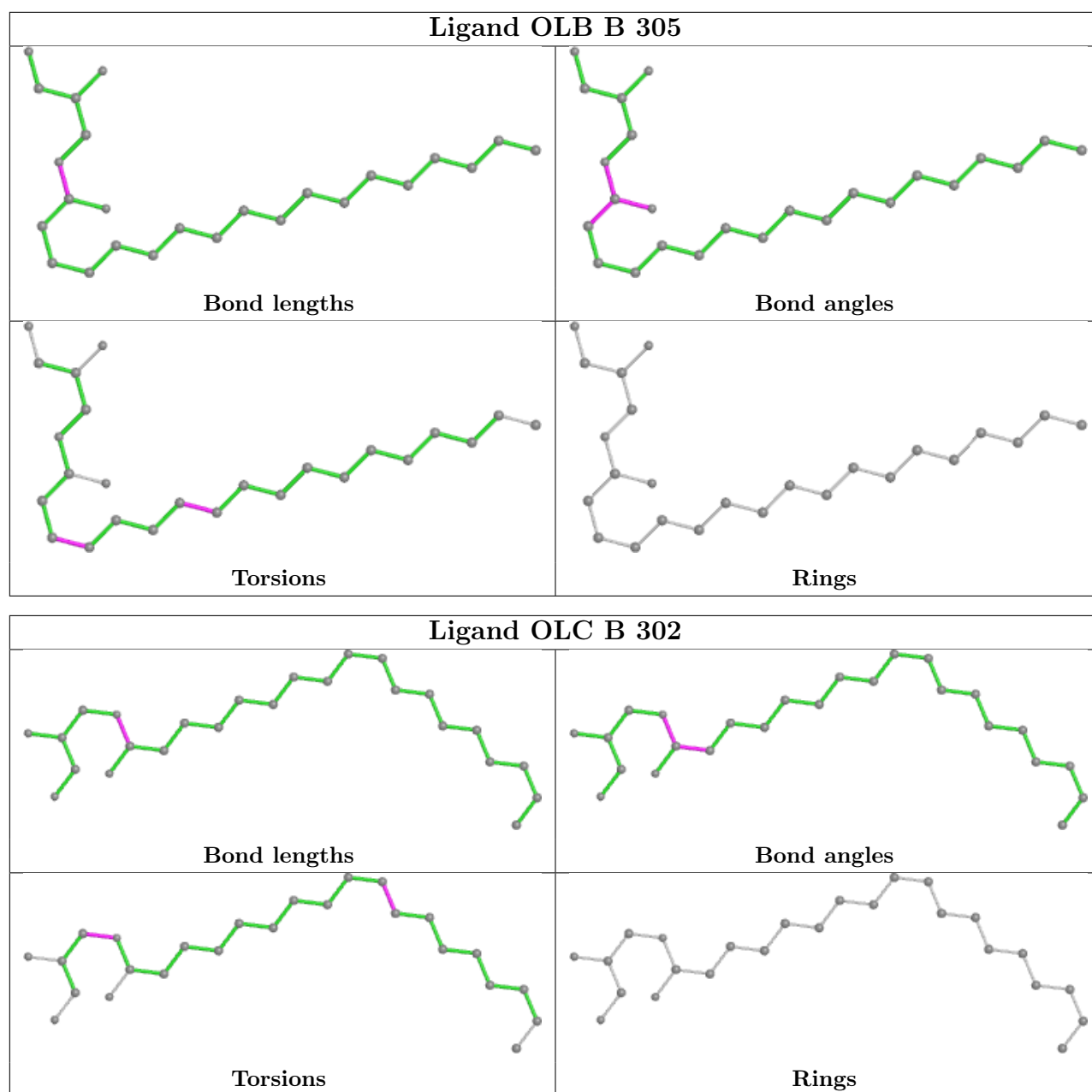
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	303	OLC	3	0
4	A	303	OLC	2	0
2	B	301	RET	3	0
4	B	304	OLC	5	0
4	B	303	OLC	1	0
4	C	302	OLC	2	0
2	A	301	RET	2	0
3	A	302	OLB	2	0
3	B	305	OLB	4	0
4	B	302	OLC	6	0
2	C	301	RET	4	0
3	C	304	OLB	5	0

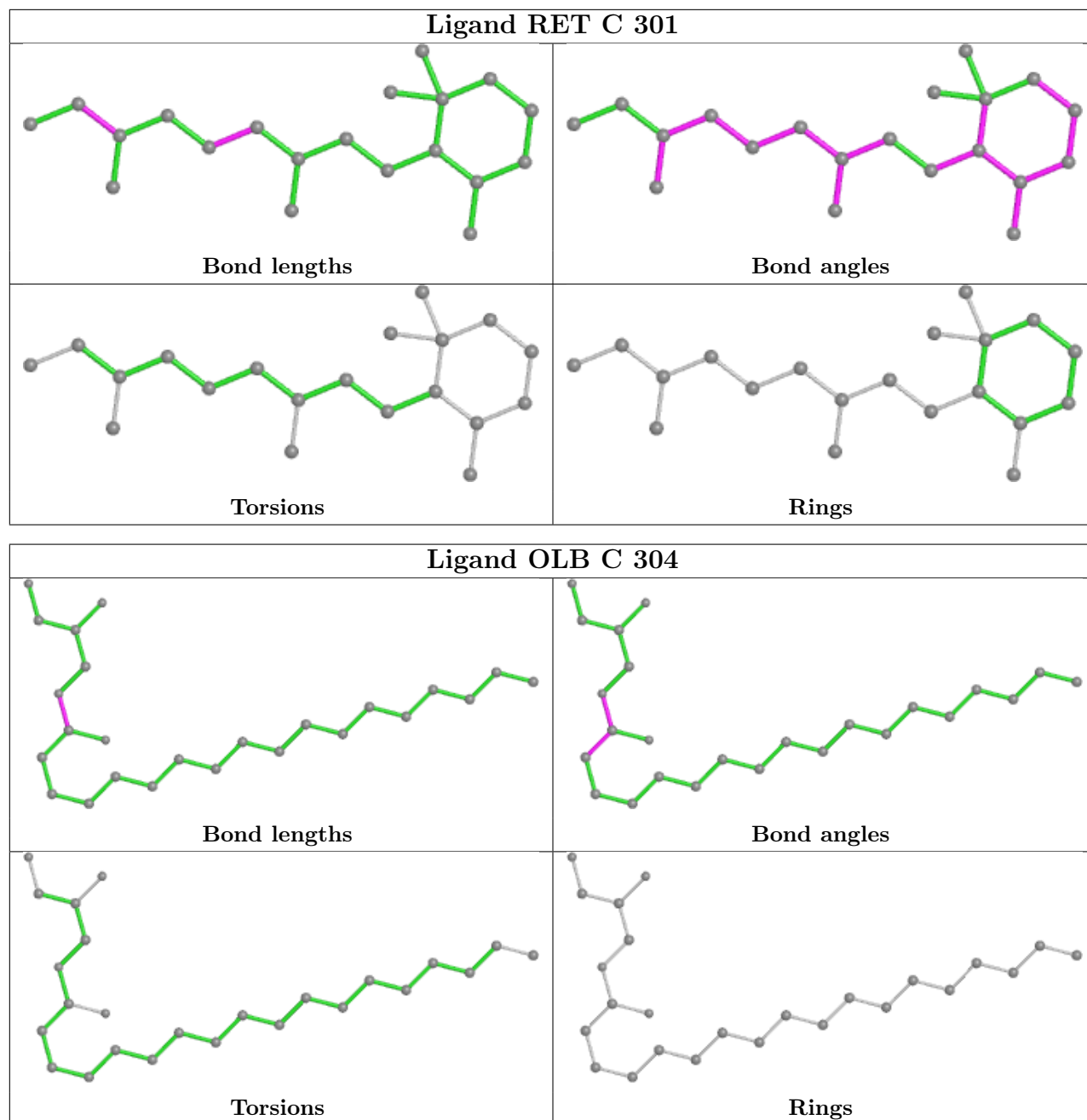
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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











5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	228/268 (85%)	0.98	25 (10%) 5 6	12, 20, 43, 73	0
1	B	228/268 (85%)	0.92	31 (13%) 3 3	12, 20, 39, 74	0
1	C	228/268 (85%)	1.02	29 (12%) 3 3	11, 21, 43, 84	0
All	All	684/804 (85%)	0.97	85 (12%) 4 4	11, 20, 42, 84	0

All (85) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	11	LEU	6.1
1	A	41	VAL	6.0
1	A	238	MET	5.3
1	A	11	LEU	5.2
1	B	42	GLN	5.1
1	C	238	MET	5.0
1	A	155	PHE	4.5
1	A	76	VAL	4.4
1	A	42	GLN	4.4
1	B	44	PRO	4.4
1	C	42	GLN	4.2
1	B	159	TYR	4.1
1	C	170	ASP	3.9
1	B	81	GLY	3.8
1	C	235	ARG	3.6
1	C	165	GLY	3.5
1	B	80	ASN	3.4
1	B	41	VAL	3.4
1	C	39	LEU	3.3
1	C	12	GLY	3.2
1	C	155	PHE	3.2
1	A	39	LEU	3.1
1	A	170	ASP	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	11	LEU	3.1
1	B	170	ASP	3.0
1	C	40	ASP	3.0
1	C	87	TYR	2.9
1	B	187	LEU	2.9
1	C	169	SER	2.9
1	C	48	GLU	2.8
1	A	19	TRP	2.8
1	B	39	LEU	2.8
1	B	155	PHE	2.8
1	C	159	TYR	2.8
1	C	111	ALA	2.7
1	B	19	TRP	2.7
1	A	40	ASP	2.7
1	A	201[A]	THR	2.7
1	A	237	ILE	2.7
1	C	41	VAL	2.7
1	C	80	ASN	2.7
1	A	235	ARG	2.6
1	B	45	ARG	2.6
1	B	158	TYR	2.6
1	C	237	ILE	2.6
1	B	208	GLY	2.6
1	B	13	VAL	2.6
1	B	236	ALA	2.5
1	A	44	PRO	2.5
1	C	46	GLN	2.5
1	A	38	GLY	2.4
1	C	76	VAL	2.4
1	C	19	TRP	2.4
1	B	71	PHE	2.4
1	B	163	VAL	2.4
1	C	44	PRO	2.4
1	C	83	VAL	2.3
1	C	154	VAL	2.3
1	B	40	ASP	2.3
1	B	169	SER	2.3
1	C	13	VAL	2.3
1	A	207	THR	2.3
1	B	238	MET	2.3
1	A	169	SER	2.2
1	A	71	PHE	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	236	ALA	2.2
1	A	233	ARG	2.2
1	C	88	TRP	2.1
1	B	140	VAL	2.1
1	B	118	ALA	2.1
1	B	43	ASP	2.1
1	C	209	LEU	2.1
1	A	139	VAL	2.1
1	C	168	VAL	2.1
1	A	96	PHE	2.1
1	B	172	ASP	2.1
1	B	77[A]	SER	2.1
1	A	43	ASP	2.1
1	B	201[A]	THR	2.1
1	B	18	ILE	2.0
1	A	91	TYR	2.0
1	B	76	VAL	2.0
1	A	211	GLY	2.0
1	B	111	ALA	2.0
1	C	161	VAL	2.0

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

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

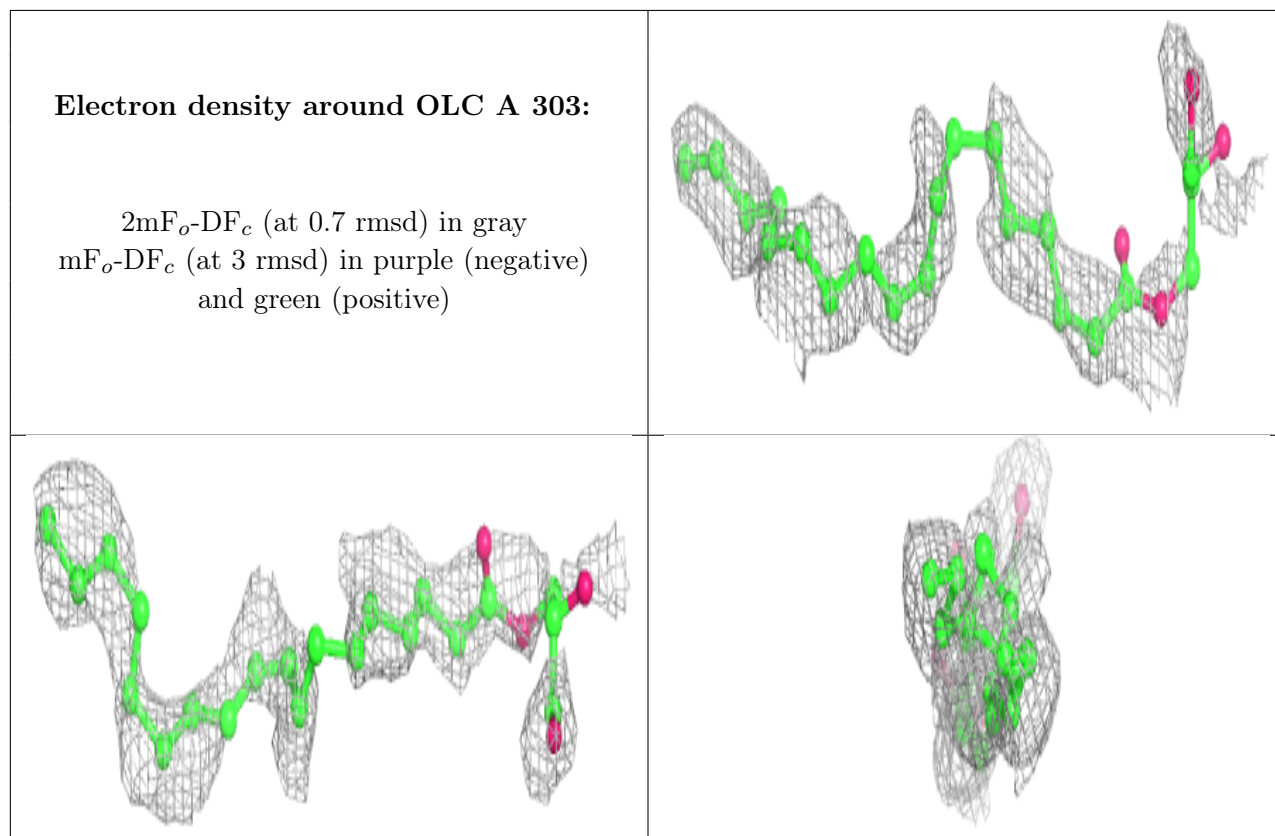
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	OLC	A	303	25/25	0.45	0.37	46,57,65,65	0
3	OLB	B	305	25/25	0.51	0.46	55,57,69,70	0
4	OLC	C	303	25/25	0.52	0.35	33,39,51,52	0

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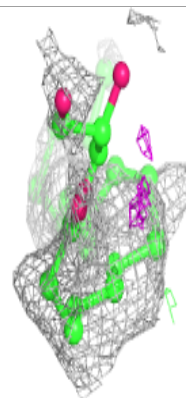
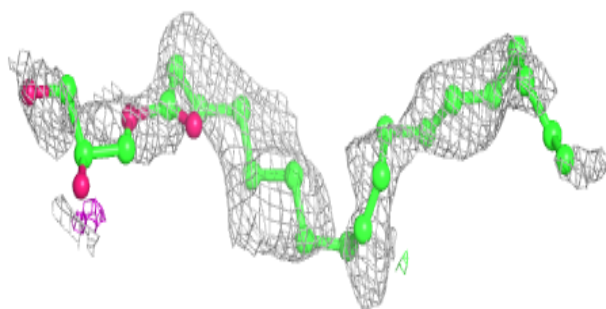
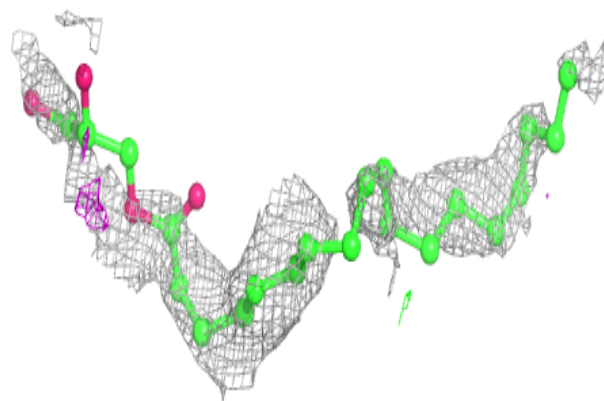
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	OLB	A	302	25/25	0.57	0.35	45,52,58,59	0
4	OLC	C	302	25/25	0.60	0.28	38,43,60,60	0
4	OLC	B	304	25/25	0.61	0.28	26,41,51,51	0
3	OLB	C	304	25/25	0.64	0.31	39,46,55,55	0
4	OLC	B	302	25/25	0.66	0.31	36,42,46,46	0
4	OLC	B	303	25/25	0.71	0.25	35,42,51,52	0
2	RET	C	301	20/21	0.84	0.18	3,8,13,13	0
2	RET	A	301	20/21	0.86	0.18	12,15,17,17	0
2	RET	B	301	20/21	0.86	0.19	13,16,19,19	0

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

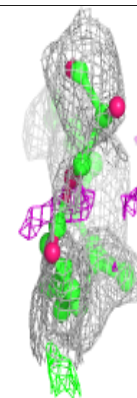
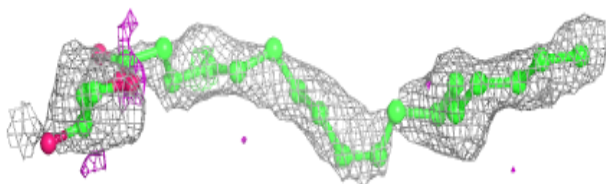
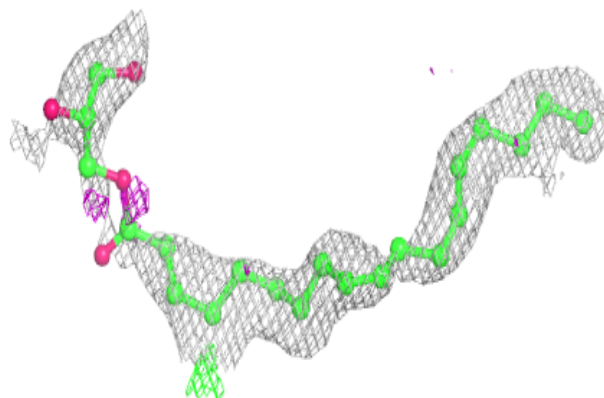


Electron density around OLB B 305:

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

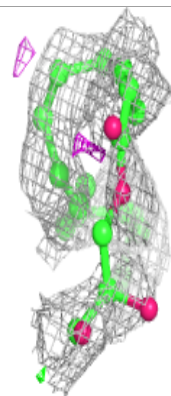
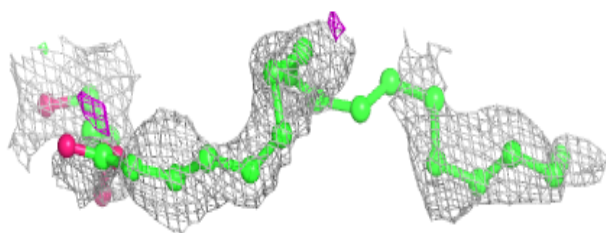
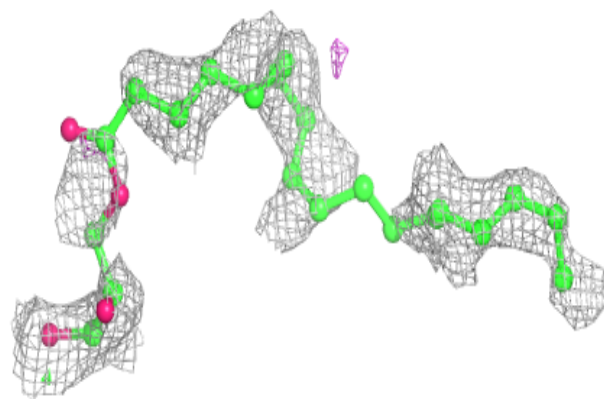
**Electron density around OLC C 303:**

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

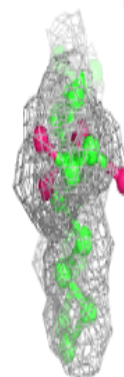
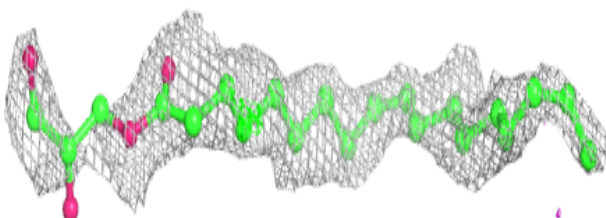
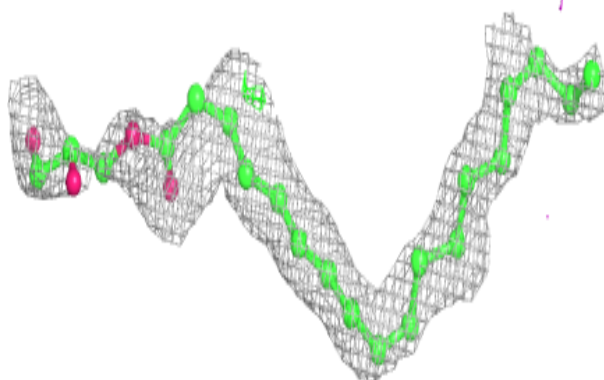


Electron density around OLB A 302:

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

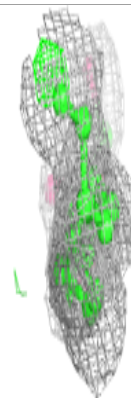
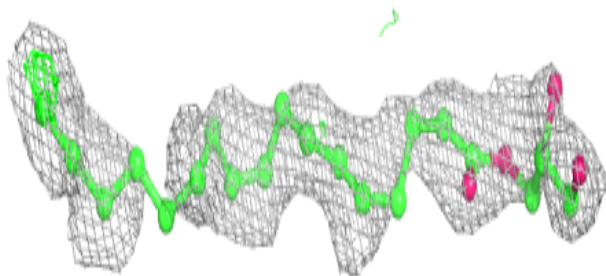
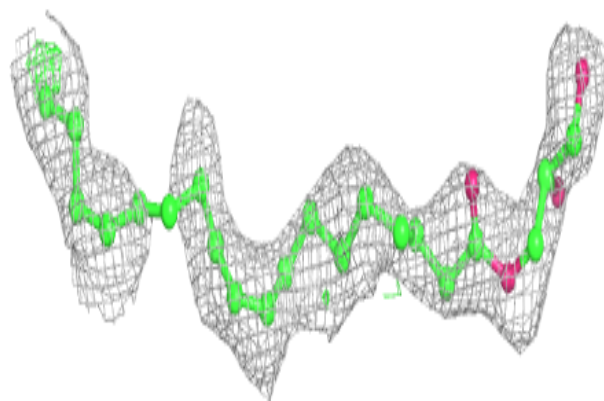
**Electron density around OLC C 302:**

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

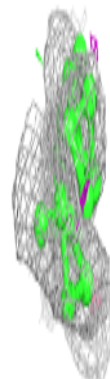
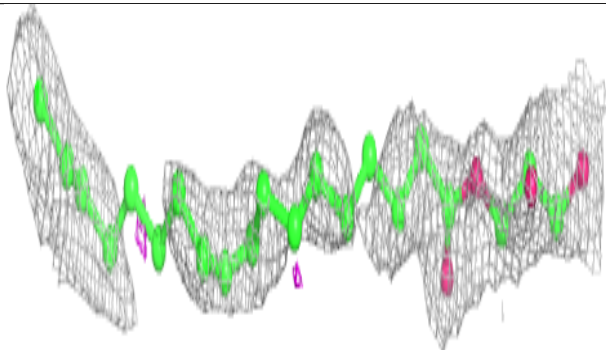
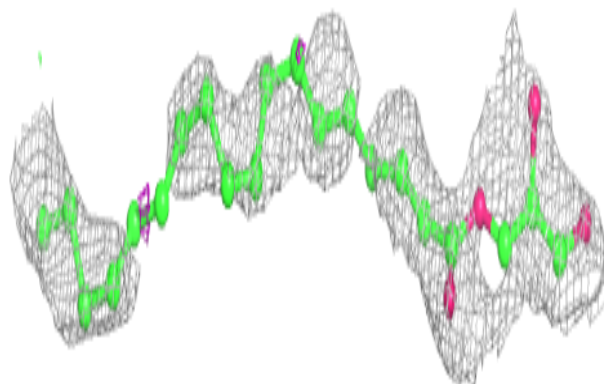


Electron density around OLC B 304:

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

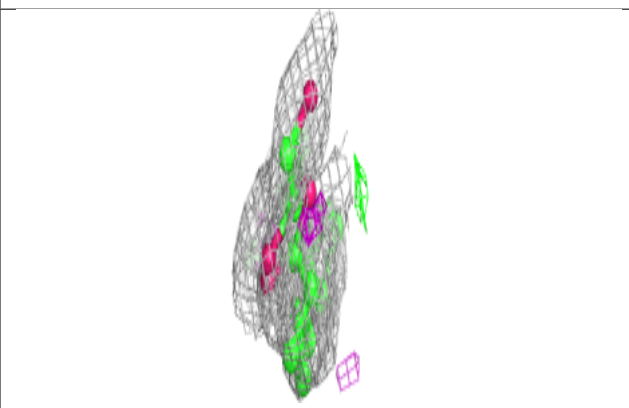
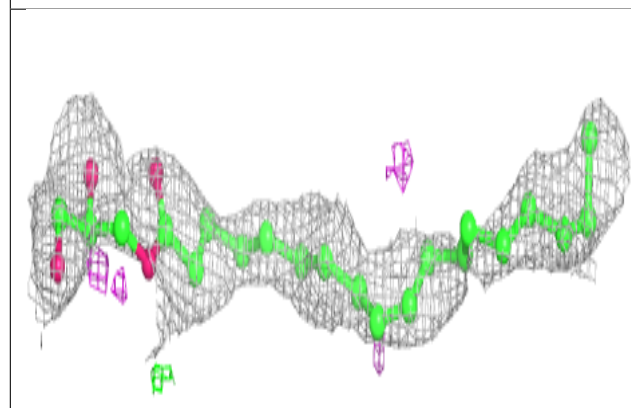
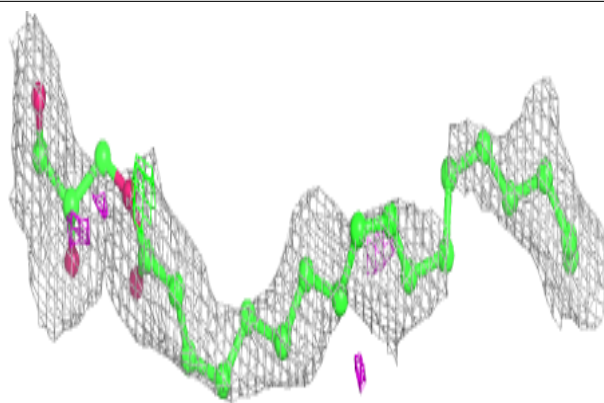
**Electron density around OLB C 304:**

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

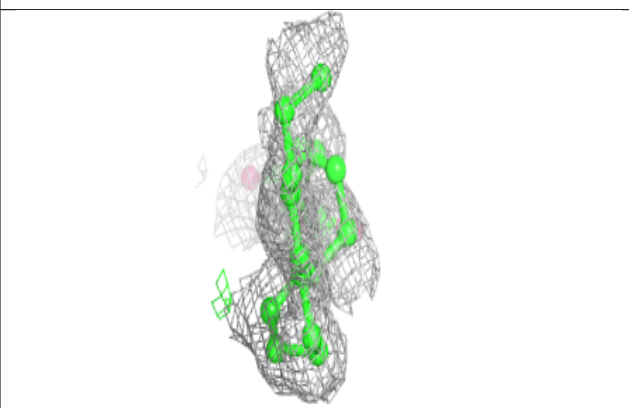
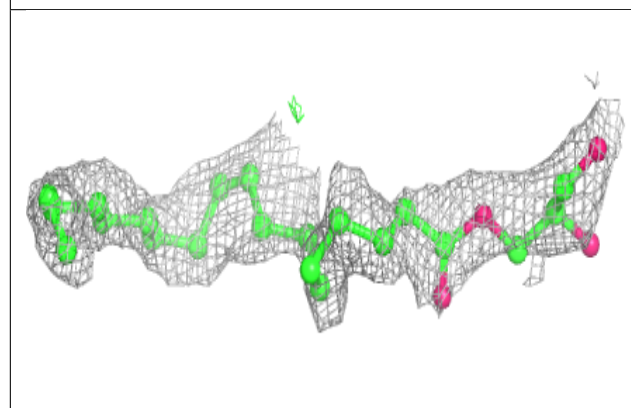
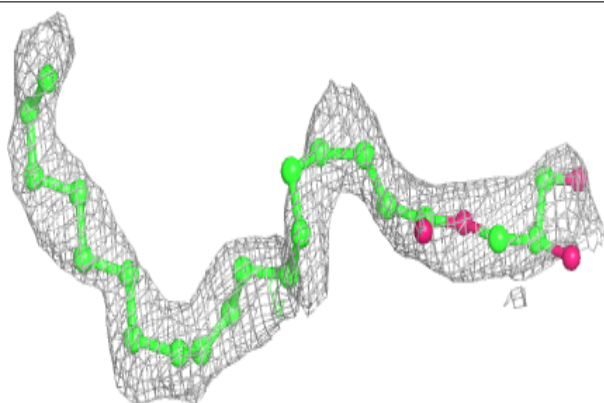


Electron density around OLC B 302:

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

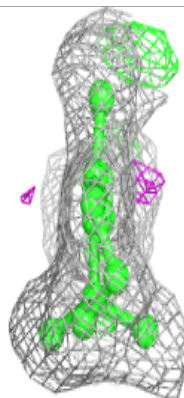
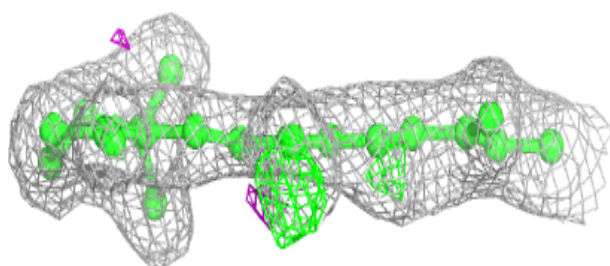
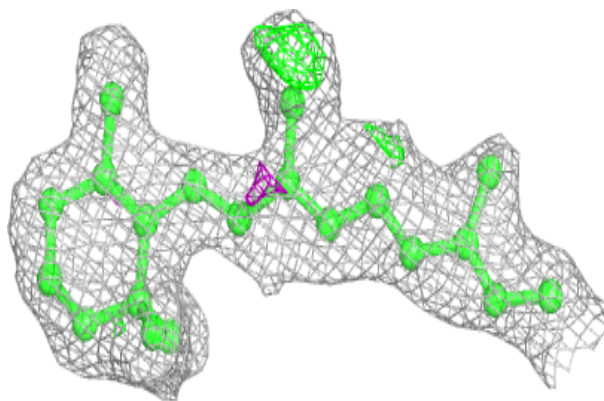
**Electron density around OLC B 303:**

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

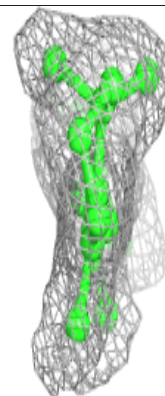
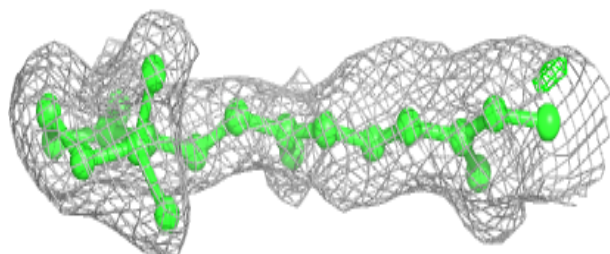
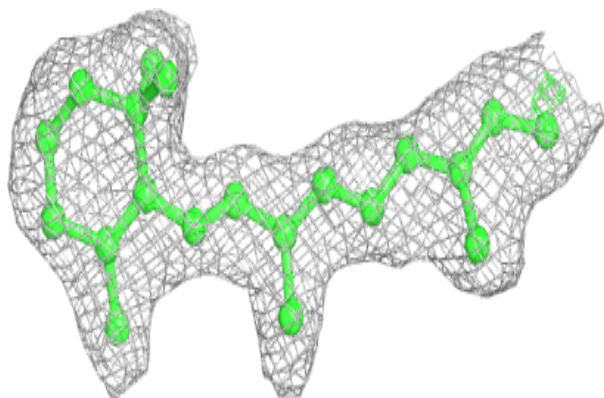


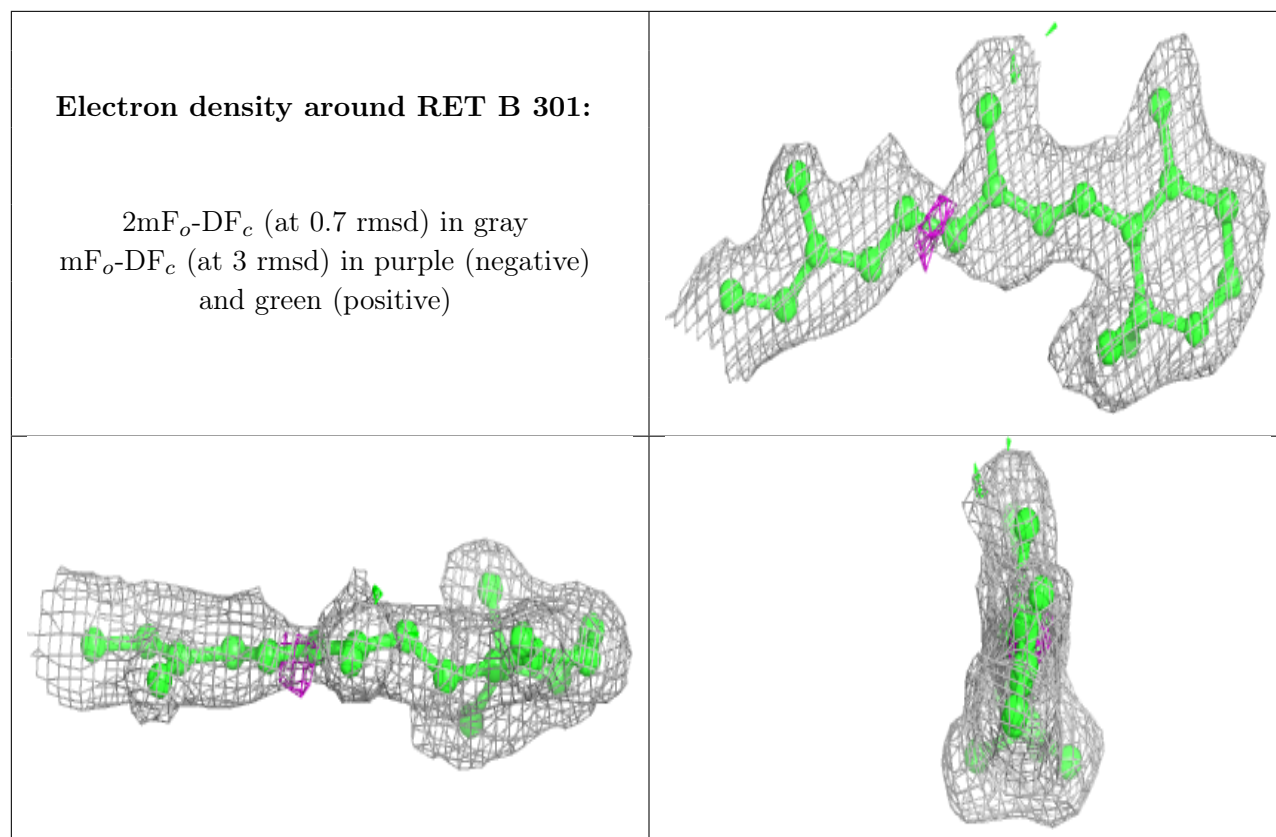
Electron density around RET C 301:

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

**Electron density around RET 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)





6.5 Other polymers [i](#)

There are no such residues in this entry.