



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 03:18 PM UTC

PDB ID : 7MFI / pdb_00007mfi
Title : Bovine sigma-2 receptor bound to cholesterol
Authors : Alon, A.; Kruse, A.C.
Deposited on : 2021-04-09
Resolution : 2.81 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

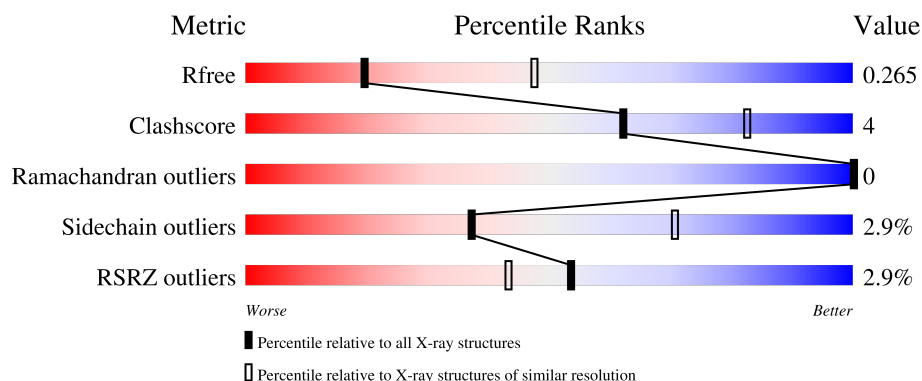
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.81 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	4591 (2.84-2.80)
Clashscore	190562	5010 (2.84-2.80)
Ramachandran outliers	187476	4916 (2.84-2.80)
Sidechain outliers	187428	4918 (2.84-2.80)
RSRZ outliers	180081	4594 (2.84-2.80)

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	174	
1	B	174	
1	C	174	
1	D	174	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 5647 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 intracellular receptor 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	164	Total	C	N	O	S	0	0	0
			1341	916	203	217	5			
1	B	164	Total	C	N	O	S	0	0	0
			1335	914	202	214	5			
1	C	159	Total	C	N	O	S	0	0	0
			1297	891	191	210	5			
1	D	163	Total	C	N	O	S	0	0	0
			1319	907	195	212	5			

There are 24 discrepancies between the modelled and reference sequences:

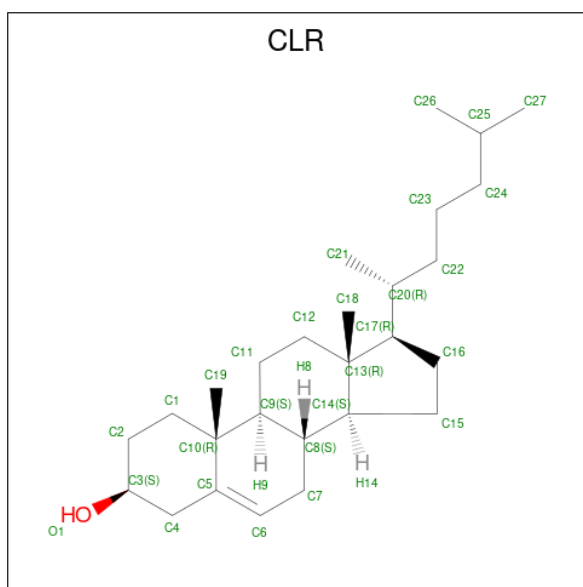
Chain	Residue	Modelled	Actual	Comment	Reference
A	-5	GLY	-	expression tag	UNP Q3MHW7
A	-4	PRO	-	expression tag	UNP Q3MHW7
A	-3	GLY	-	expression tag	UNP Q3MHW7
A	-2	GLY	-	expression tag	UNP Q3MHW7
A	-1	SER	-	expression tag	UNP Q3MHW7
A	0	SER	-	expression tag	UNP Q3MHW7
B	-5	GLY	-	expression tag	UNP Q3MHW7
B	-4	PRO	-	expression tag	UNP Q3MHW7
B	-3	GLY	-	expression tag	UNP Q3MHW7
B	-2	GLY	-	expression tag	UNP Q3MHW7
B	-1	SER	-	expression tag	UNP Q3MHW7
B	0	SER	-	expression tag	UNP Q3MHW7
C	-5	GLY	-	expression tag	UNP Q3MHW7
C	-4	PRO	-	expression tag	UNP Q3MHW7
C	-3	GLY	-	expression tag	UNP Q3MHW7
C	-2	GLY	-	expression tag	UNP Q3MHW7
C	-1	SER	-	expression tag	UNP Q3MHW7
C	0	SER	-	expression tag	UNP Q3MHW7
D	-5	GLY	-	expression tag	UNP Q3MHW7
D	-4	PRO	-	expression tag	UNP Q3MHW7
D	-3	GLY	-	expression tag	UNP Q3MHW7

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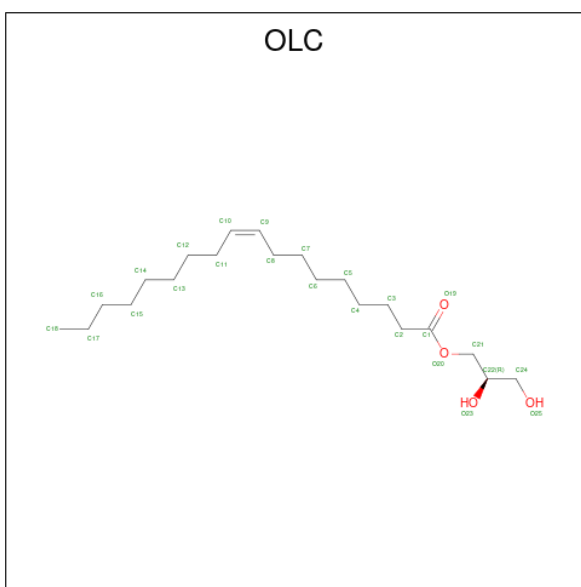
Chain	Residue	Modelled	Actual	Comment	Reference
D	-2	GLY	-	expression tag	UNP Q3MHW7
D	-1	SER	-	expression tag	UNP Q3MHW7
D	0	SER	-	expression tag	UNP Q3MHW7

- Molecule 2 is CHOLESTEROL (CCD ID: CLR) (formula: $C_{27}H_{46}O$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			28	27	1		
2	B	1	Total	C	O	0	0
			28	27	1		
2	C	1	Total	C	O	0	0
			28	27	1		
2	D	1	Total	C	O	0	0
			28	27	1		

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



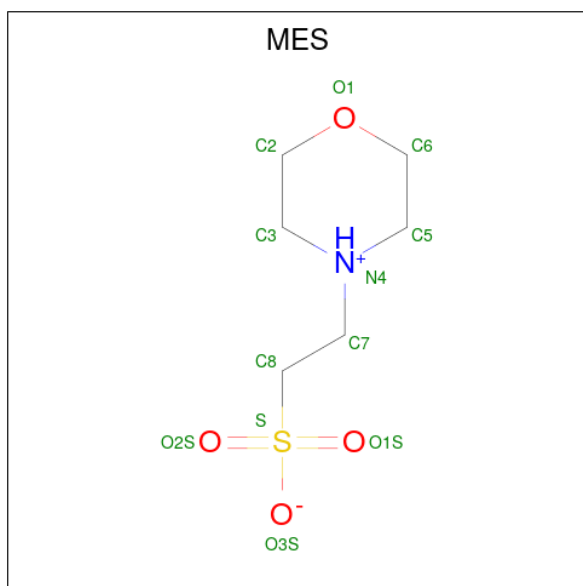
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C 11 11	0	0
3	A	1	Total C 10 10	0	0
3	A	1	Total C 11 11	0	0
3	A	1	Total C 6 6	0	0
3	A	1	Total C 15 15	0	0
3	A	1	Total C 14 14	0	0
3	A	1	Total C 10 10	0	0
3	B	1	Total C 9 9	0	0
3	B	1	Total C 12 12	0	0
3	B	1	Total C 11 11	0	0
3	C	1	Total C 6 6	0	0
3	C	1	Total C 10 10	0	0
3	C	1	Total C 9 9	0	0
3	C	1	Total C 10 10	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	C	1	Total C 10 10	0	0
3	D	1	Total C 12 12	0	0
3	D	1	Total C 14 14	0	0
3	D	1	Total C 18 18	0	0
3	D	1	Total C 8 8	0	0
3	D	1	Total C 5 5	0	0

- Molecule 4 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (CCD ID: MES) (formula: $C_6H_{13}NO_4S$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	C	1	Total C N O S 12 6 1 4 1	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	5	Total O 5 5	0	0
5	B	6	Total O 6 6	0	0

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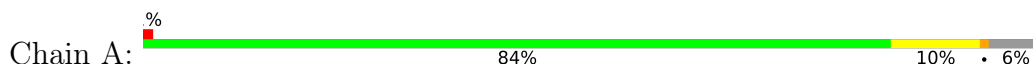
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	C	6	Total 6	O 6	0	0
5	D	3	Total 3	O 3	0	0

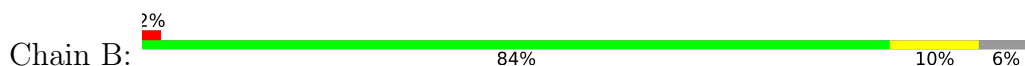
3 Residue-property plots [i](#)

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.

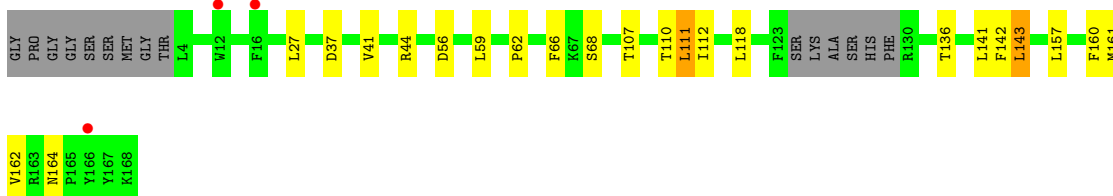
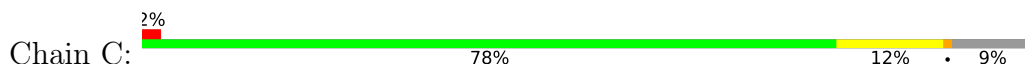
- Molecule 1: Sigma intracellular receptor 2



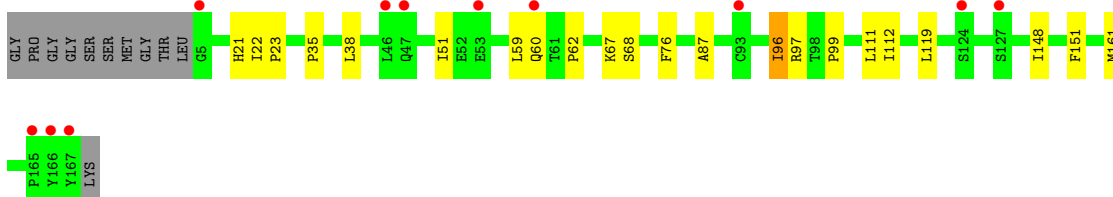
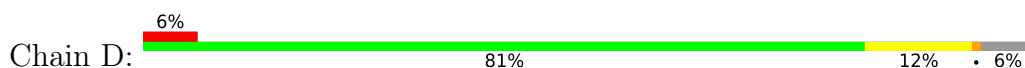
- Molecule 1: Sigma intracellular receptor 2



- Molecule 1: Sigma intracellular receptor 2



- Molecule 1: Sigma intracellular receptor 2



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	70.87Å 54.89Å 93.01Å 90.00° 94.30° 90.00°	Depositor
Resolution (Å)	47.24 – 2.81 47.24 – 2.81	Depositor EDS
% Data completeness (in resolution range)	99.6 (47.24-2.81) 85.2 (47.24-2.81)	Depositor EDS
R_{merge}	0.32	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.48 (at 2.81Å)	Xtriage
Refinement program	PHENIX 1.19.1_4122+SVN	Depositor
R, R_{free}	0.240 , 0.278 (Not available) , 0.265	Depositor DCC
R_{free} test set	1758 reflections (9.84%)	wwPDB-VP
Wilson B-factor (Å ²)	47.2	Xtriage
Anisotropy	0.090	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 59.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	5647	wwPDB-VP
Average B, all atoms (Å ²)	64.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 25.03 % 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 3.4275e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹ Intensities estimated from amplitudes.

² Theoretical 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: CLR, OLC, MES

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	0.10	0/1390	0.26	0/1900
1	B	0.10	0/1384	0.25	0/1892
1	C	0.09	0/1345	0.24	0/1842
1	D	0.10	0/1368	0.26	0/1872
All	All	0.10	0/5487	0.25	0/7506

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	1341	0	1327	11	0
1	B	1335	0	1333	10	0
1	C	1297	0	1280	11	0
1	D	1319	0	1294	14	0
2	A	28	0	46	2	0
2	B	28	0	46	2	0
2	C	28	0	46	2	0
2	D	28	0	46	2	0
3	A	77	0	117	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	32	0	46	3	0
3	C	45	0	67	0	0
3	D	57	0	89	1	0
4	C	12	0	12	1	0
5	A	5	0	0	0	0
5	B	6	0	0	0	0
5	C	6	0	0	0	0
5	D	3	0	0	0	0
All	All	5647	0	5749	47	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (47) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:62:PRO:HB2	1:D:67:LYS:HG3	1.72	0.70
1:C:56:ASP:HA	1:C:143:LEU:HD21	1.79	0.65
1:B:59:LEU:HD11	2:B:201:CLR:H151	1.82	0.62
1:C:41:VAL:HG12	1:C:44:ARG:HH21	1.64	0.61
1:A:56:ASP:HA	1:A:143:LEU:HD21	1.81	0.61
1:D:51:ILE:HD13	1:D:60:GLN:HB2	1.85	0.59
1:C:62:PRO:HB3	1:C:66:PHE:HD2	1.70	0.56
1:D:76:PHE:HB3	3:D:204:OLC:H15A	1.86	0.56
1:C:27:LEU:HD23	4:C:205:MES:H61	1.89	0.55
2:C:201:CLR:H222	2:C:201:CLR:H121	1.88	0.55
1:D:22:ILE:HB	1:D:23:PRO:HD3	1.93	0.51
1:C:160:PHE:O	1:C:164:ASN:HB2	2.11	0.51
1:C:112:ILE:HG22	1:D:68:SER:HB2	1.93	0.50
1:A:57:PRO:HA	1:A:132:GLN:HG3	1.93	0.49
1:A:94:LYS:HG2	1:A:167:TYR:HA	1.96	0.48
1:A:68:SER:HB2	1:B:112:ILE:HG22	1.96	0.48
1:C:111:LEU:HD11	2:C:201:CLR:H192	1.96	0.48
1:B:119:LEU:HB2	1:B:144:ILE:HD11	1.96	0.47
1:B:22:ILE:HB	1:B:23:PRO:HD3	1.97	0.47
1:D:111:LEU:HD22	1:D:151:PHE:HB2	1.97	0.47
1:B:103:TYR:HB2	3:B:202:OLC:H8	1.97	0.46
1:C:107:THR:O	1:C:110:THR:OG1	2.34	0.46
1:D:60:GLN:O	1:D:62:PRO:HD3	2.17	0.45
1:A:115:LEU:HD22	1:A:144:ILE:HG23	1.98	0.45
1:D:111:LEU:HD11	2:D:201:CLR:H192	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:59:LEU:HD11	2:D:201:CLR:H151	1.98	0.45
1:A:118:LEU:HD22	1:A:143:LEU:HD23	1.99	0.45
1:A:143:LEU:HD12	1:A:143:LEU:HA	1.89	0.44
1:C:157:LEU:O	1:C:161:MET:HG2	2.18	0.44
1:B:14:LEU:HD13	1:B:157:LEU:HD13	2.00	0.43
1:D:87:ALA:HB3	1:D:96:ILE:HD12	1.99	0.43
1:A:157:LEU:O	1:A:161:MET:HG2	2.18	0.43
1:C:118:LEU:HD22	1:C:143:LEU:HD23	2.01	0.43
1:C:68:SER:HB2	1:D:112:ILE:HG22	2.01	0.42
3:B:202:OLC:H9	3:B:202:OLC:H6	1.77	0.42
1:D:97:ARG:HA	1:D:161:MET:SD	2.59	0.42
1:A:22:ILE:HG23	1:A:78:LEU:HD11	2.00	0.42
2:A:201:CLR:H213	2:A:201:CLR:H232	1.82	0.42
1:B:146:VAL:HG12	2:B:201:CLR:H20	2.01	0.42
1:B:87:ALA:HB3	1:B:96:ILE:HD12	2.00	0.42
1:D:35:PRO:HD2	1:D:38:LEU:HD12	2.03	0.41
1:A:111:LEU:HD11	2:A:201:CLR:H192	2.02	0.41
3:A:202:OLC:H13	3:A:202:OLC:H16A	1.69	0.41
1:B:134:PRO:HB2	1:B:140:ARG:HG2	2.03	0.40
1:D:96:ILE:C	1:D:99:PRO:HD2	2.46	0.40
1:A:81:PHE:HB2	1:A:82:PRO:HD3	2.03	0.40
1:B:26:LEU:HD22	3:B:203:OLC:H10	2.04	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	160/174 (92%)	157 (98%)	3 (2%)	0	100	100
1	B	162/174 (93%)	158 (98%)	4 (2%)	0	100	100
1	C	155/174 (89%)	152 (98%)	3 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	161/174 (92%)	157 (98%)	4 (2%)	0	100	100
All	All	638/696 (92%)	624 (98%)	14 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	142/155 (92%)	140 (99%)	2 (1%)	59	84
1	B	140/155 (90%)	138 (99%)	2 (1%)	59	84
1	C	136/155 (88%)	128 (94%)	8 (6%)	18	46
1	D	134/155 (86%)	130 (97%)	4 (3%)	36	69
All	All	552/620 (89%)	536 (97%)	16 (3%)	37	71

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	111	LEU
1	A	146	VAL
1	B	21	HIS
1	B	148	ILE
1	C	37	ASP
1	C	59	LEU
1	C	111	LEU
1	C	136	THR
1	C	141	LEU
1	C	142	PHE
1	C	143	LEU
1	C	162	VAL
1	D	21	HIS
1	D	96	ILE
1	D	119	LEU
1	D	148	ILE

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

Mol	Chain	Res	Type
1	A	77	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

25 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	OLC	A	207	-	13,13,24	0.35	0	12,12,25	0.69	0
3	OLC	C	207	-	9,9,24	0.37	0	8,8,25	0.64	0
3	OLC	C	206	-	9,9,24	0.42	0	8,8,25	0.88	0
2	CLR	D	201	-	31,31,31	0.96	1 (3%)	48,48,48	1.47	9 (18%)
2	CLR	C	201	-	31,31,31	0.89	2 (6%)	48,48,48	1.17	2 (4%)
3	OLC	D	202	-	11,11,24	0.35	0	10,10,25	0.70	0
3	OLC	C	202	-	5,5,24	0.32	0	4,4,25	0.62	0
3	OLC	B	204	-	10,10,24	0.36	0	9,9,25	0.66	0
3	OLC	D	205	-	7,7,24	0.42	0	6,6,25	0.73	0
3	OLC	C	204	-	8,8,24	0.32	0	7,7,25	0.77	0
3	OLC	D	203	-	13,13,24	0.34	0	12,12,25	0.72	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	OLC	A	208	-	9,9,24	0.36	0	8,8,25	0.67	0
3	OLC	B	203	-	11,11,24	0.35	0	10,10,25	0.72	0
3	OLC	D	206	-	4,4,24	0.33	0	3,3,25	0.56	0
2	CLR	B	201	-	31,31,31	0.68	0	48,48,48	1.21	6 (12%)
3	OLC	A	203	-	9,9,24	0.40	0	8,8,25	0.75	0
3	OLC	A	202	-	10,10,24	0.42	0	9,9,25	0.83	0
3	OLC	A	206	-	14,14,24	0.34	0	13,13,25	0.73	0
3	OLC	D	204	-	17,17,24	0.33	0	16,16,25	0.76	0
2	CLR	A	201	-	31,31,31	0.65	0	48,48,48	1.24	5 (10%)
3	OLC	A	205	-	5,5,24	0.32	0	4,4,25	0.62	0
3	OLC	A	204	-	10,10,24	0.42	0	9,9,25	0.84	0
3	OLC	C	203	-	9,9,24	0.42	0	8,8,25	0.89	0
3	OLC	B	202	-	8,8,24	0.43	0	7,7,25	0.87	0
4	MES	C	205	-	12,12,12	2.35	1 (8%)	15,16,16	1.88	4 (26%)

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	OLC	A	207	-	-	4/11/11/24	-
3	OLC	C	207	-	-	4/7/7/24	-
3	OLC	C	206	-	-	2/7/7/24	-
2	CLR	D	201	-	-	5/10/68/68	0/4/4/4
2	CLR	C	201	-	-	7/10/68/68	0/4/4/4
3	OLC	D	202	-	-	2/9/9/24	-
3	OLC	C	202	-	-	1/3/3/24	-
3	OLC	B	204	-	-	2/8/8/24	-
3	OLC	D	205	-	-	2/5/5/24	-
3	OLC	C	204	-	-	0/6/6/24	-
3	OLC	D	203	-	-	6/11/11/24	-
3	OLC	A	208	-	-	2/7/7/24	-
3	OLC	B	203	-	-	5/9/9/24	-
3	OLC	D	206	-	-	0/2/2/24	-
2	CLR	B	201	-	-	2/10/68/68	0/4/4/4
3	OLC	A	203	-	-	3/7/7/24	-
3	OLC	A	202	-	-	5/8/8/24	-
3	OLC	A	206	-	-	6/12/12/24	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	OLC	D	204	-	-	2/15/15/24	-
2	CLR	A	201	-	-	5/10/68/68	0/4/4/4
3	OLC	A	205	-	-	1/3/3/24	-
3	OLC	A	204	-	-	4/8/8/24	-
3	OLC	C	203	-	-	3/7/7/24	-
3	OLC	B	202	-	-	3/6/6/24	-
4	MES	C	205	-	-	4/6/14/14	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	205	MES	C8-S	-7.86	1.66	1.77
2	D	201	CLR	C20-C17	3.84	1.61	1.54
2	C	201	CLR	C20-C17	3.09	1.59	1.54
2	C	201	CLR	C13-C17	2.07	1.58	1.55

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	201	CLR	C22-C20-C17	3.54	117.66	110.33
4	C	205	MES	C5-N4-C3	3.52	116.43	108.84
4	C	205	MES	C6-C5-N4	-3.50	104.80	110.12
2	A	201	CLR	C13-C17-C20	-3.48	114.13	119.50
2	D	201	CLR	C17-C13-C14	-3.04	96.61	100.10
4	C	205	MES	C7-N4-C5	2.93	119.06	111.24
2	D	201	CLR	C16-C17-C13	-2.66	100.71	103.84
2	A	201	CLR	C11-C9-C10	-2.60	109.87	113.08
2	C	201	CLR	C22-C20-C17	2.59	115.69	110.33
2	D	201	CLR	C10-C9-C8	-2.42	109.17	112.71
4	C	205	MES	O2S-S-C8	2.40	110.36	106.73
2	D	201	CLR	C2-C3-C4	-2.38	106.94	110.29
2	B	201	CLR	C13-C17-C20	-2.35	115.87	119.50
2	A	201	CLR	C13-C14-C8	-2.31	111.13	114.41
2	B	201	CLR	C10-C9-C8	-2.23	109.46	112.71
2	D	201	CLR	C11-C12-C13	-2.21	109.01	112.74
2	D	201	CLR	C23-C22-C20	-2.16	109.03	115.08
2	B	201	CLR	C11-C9-C10	-2.16	110.42	113.08
2	B	201	CLR	C4-C5-C6	-2.11	117.71	120.57
2	D	201	CLR	C11-C9-C10	-2.10	110.49	113.08
2	C	201	CLR	C11-C9-C10	-2.10	110.50	113.08
2	B	201	CLR	C11-C12-C13	-2.10	109.20	112.74

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	201	CLR	C10-C9-C8	-2.08	109.67	112.71
2	D	201	CLR	C4-C5-C6	-2.04	117.80	120.57
2	A	201	CLR	C11-C12-C13	-2.04	109.29	112.74
2	B	201	CLR	C7-C8-C14	-2.00	108.09	110.93

There are no chirality outliers.

All (80) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	201	CLR	C13-C17-C20-C22
2	C	201	CLR	C16-C17-C20-C21
2	D	201	CLR	C13-C17-C20-C22
2	D	201	CLR	C16-C17-C20-C21
3	A	203	OLC	C7-C8-C9-C10
4	C	205	MES	C8-C7-N4-C5
4	C	205	MES	C7-C8-S-O1S
4	C	205	MES	C7-C8-S-O2S
4	C	205	MES	C7-C8-S-O3S
2	D	201	CLR	C16-C17-C20-C22
2	A	201	CLR	C21-C20-C22-C23
2	C	201	CLR	C13-C17-C20-C21
2	C	201	CLR	C16-C17-C20-C22
2	C	201	CLR	C17-C20-C22-C23
2	B	201	CLR	C21-C20-C22-C23
2	A	201	CLR	C17-C20-C22-C23
2	C	201	CLR	C21-C20-C22-C23
3	A	202	OLC	C13-C14-C15-C16
2	D	201	CLR	C13-C17-C20-C21
3	A	204	OLC	C3-C4-C5-C6
3	A	206	OLC	C13-C14-C15-C16
3	B	204	OLC	C7-C8-C9-C10
3	A	206	OLC	C12-C13-C14-C15
3	D	203	OLC	C6-C7-C8-C9
3	D	203	OLC	C5-C6-C7-C8
3	A	202	OLC	C10-C11-C12-C13
3	A	202	OLC	C12-C13-C14-C15
3	A	202	OLC	C11-C12-C13-C14
2	D	201	CLR	C22-C23-C24-C25
3	A	203	OLC	C12-C13-C14-C15
3	B	204	OLC	C9-C10-C11-C12
3	A	204	OLC	C4-C5-C6-C7
3	C	207	OLC	C10-C11-C12-C13

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Mol	Chain	Res	Type	Atoms
2	A	201	CLR	C13-C17-C20-C21
3	D	205	OLC	C10-C11-C12-C13
2	A	201	CLR	C13-C17-C20-C22
3	B	202	OLC	C4-C5-C6-C7
2	C	201	CLR	C20-C22-C23-C24
3	B	203	OLC	C12-C13-C14-C15
3	A	206	OLC	C11-C12-C13-C14
3	D	204	OLC	C9-C10-C11-C12
3	C	206	OLC	C9-C10-C11-C12
3	C	207	OLC	C9-C10-C11-C12
3	A	204	OLC	C5-C6-C7-C8
3	A	204	OLC	C7-C8-C9-C10
3	A	208	OLC	C7-C8-C9-C10
3	A	206	OLC	C9-C10-C11-C12
3	A	207	OLC	C7-C8-C9-C10
3	C	207	OLC	C4-C5-C6-C7
3	D	203	OLC	C12-C13-C14-C15
3	B	203	OLC	C7-C8-C9-C10
3	B	203	OLC	C6-C7-C8-C9
3	A	207	OLC	C9-C10-C11-C12
3	A	205	OLC	C4-C5-C6-C7
3	A	206	OLC	C3-C4-C5-C6
3	C	203	OLC	C5-C6-C7-C8
3	D	205	OLC	C7-C8-C9-C10
3	A	206	OLC	C6-C7-C8-C9
3	A	208	OLC	C9-C10-C11-C12
3	D	202	OLC	C9-C10-C11-C12
3	A	207	OLC	C10-C11-C12-C13
3	C	203	OLC	C6-C7-C8-C9
3	A	202	OLC	C9-C10-C11-C12
3	D	203	OLC	C7-C8-C9-C10
3	A	203	OLC	C9-C10-C11-C12
3	B	202	OLC	C7-C8-C9-C10
3	A	207	OLC	C13-C14-C15-C16
3	B	203	OLC	C9-C10-C11-C12
3	C	203	OLC	C7-C8-C9-C10
3	B	203	OLC	C11-C12-C13-C14
3	B	202	OLC	C6-C7-C8-C9
3	D	202	OLC	C7-C8-C9-C10
3	D	203	OLC	C9-C10-C11-C12
3	C	207	OLC	C7-C8-C9-C10
2	B	201	CLR	C13-C17-C20-C21

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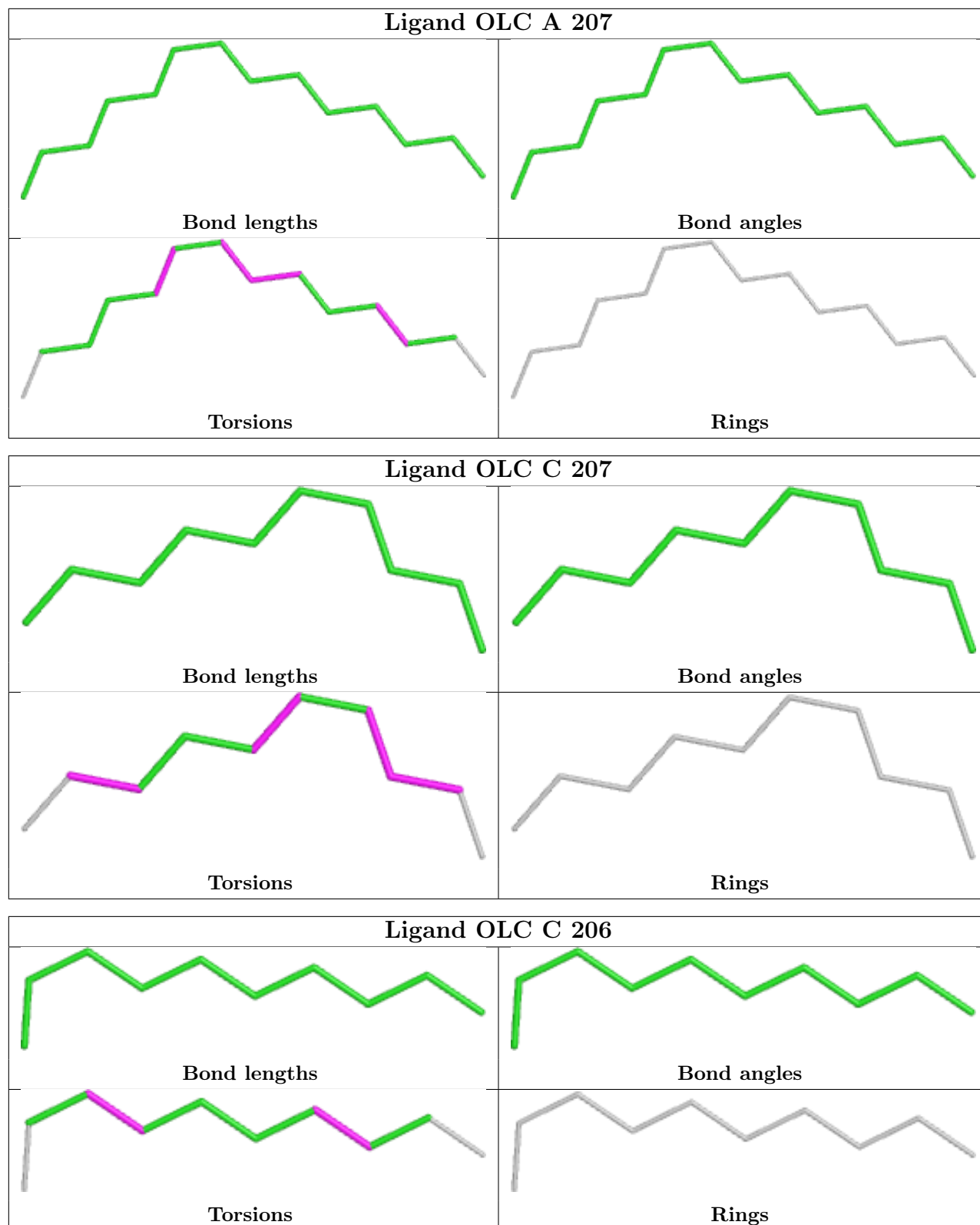
Mol	Chain	Res	Type	Atoms
2	A	201	CLR	C16-C17-C20-C22
3	C	206	OLC	C13-C14-C15-C16
3	D	203	OLC	C4-C5-C6-C7
3	D	204	OLC	C4-C5-C6-C7
3	C	202	OLC	C4-C5-C6-C7

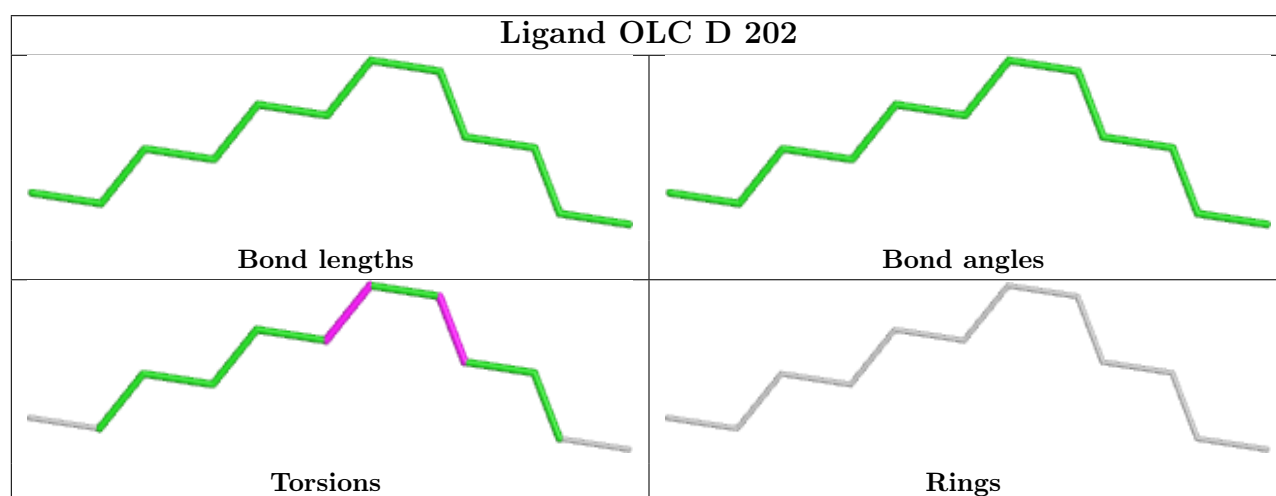
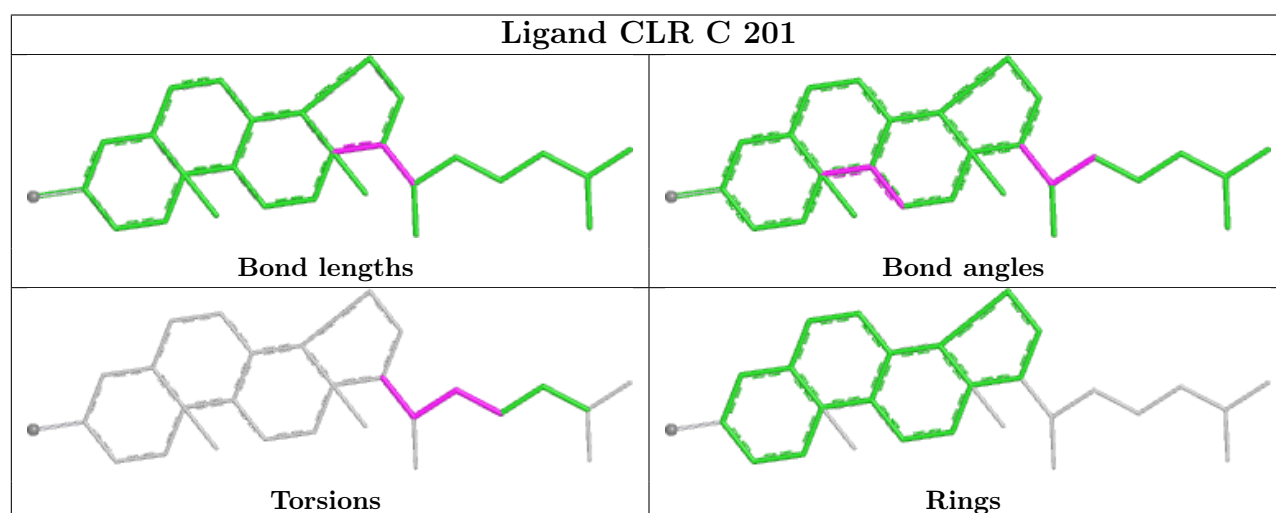
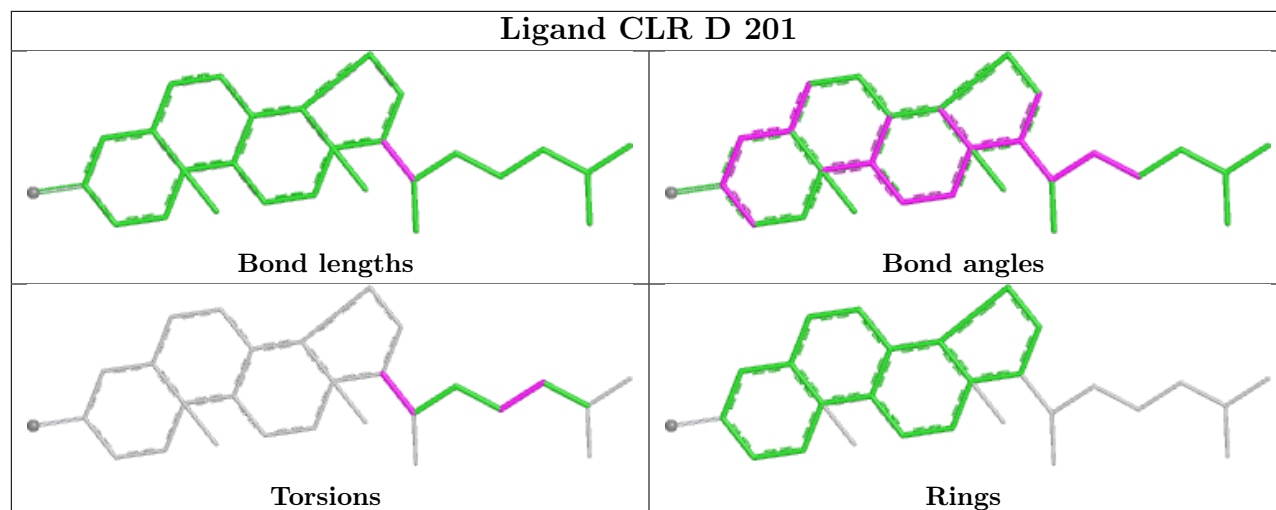
There are no ring outliers.

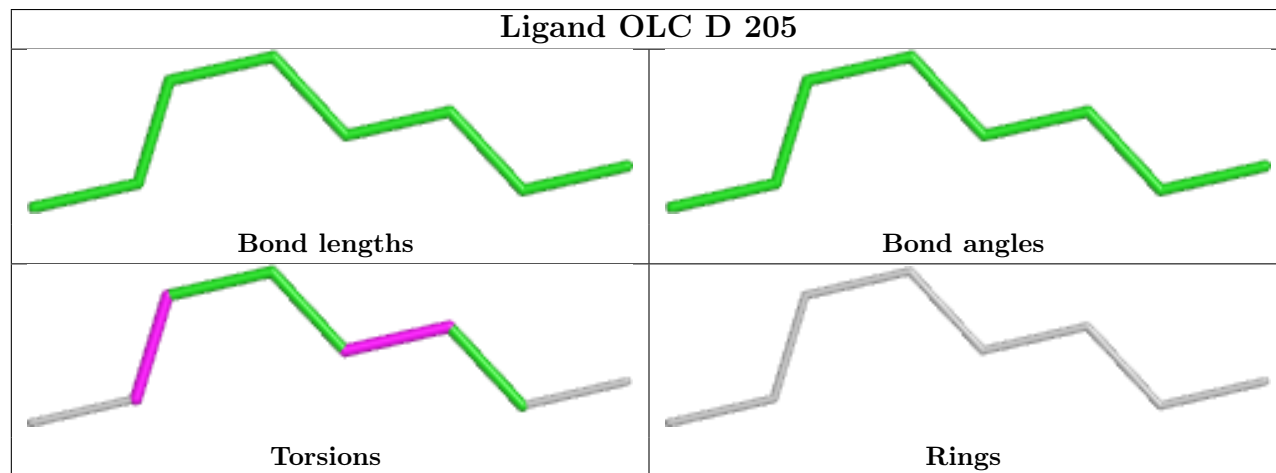
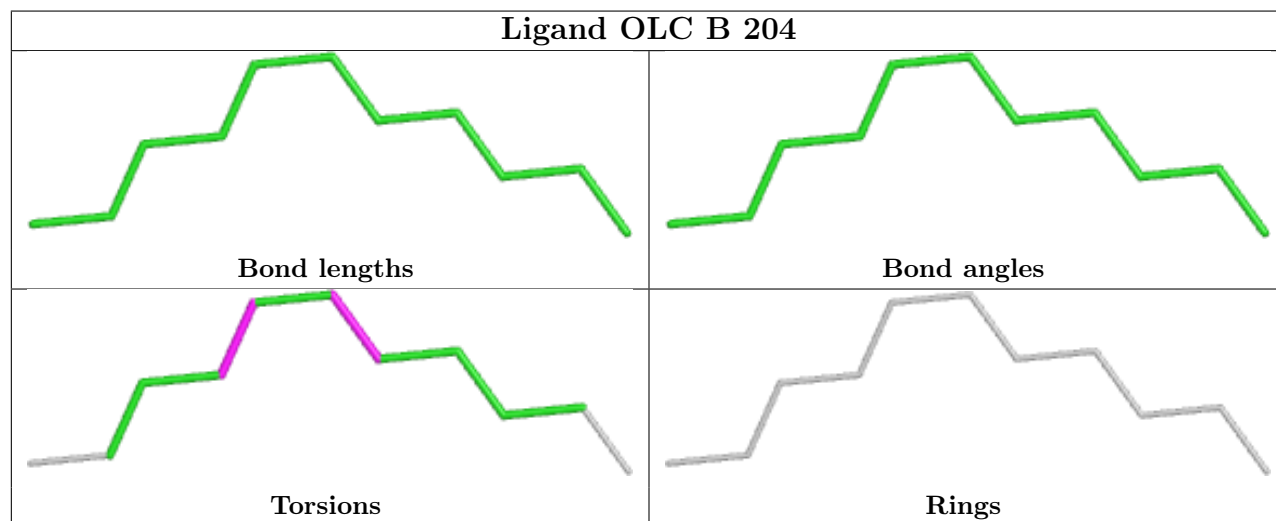
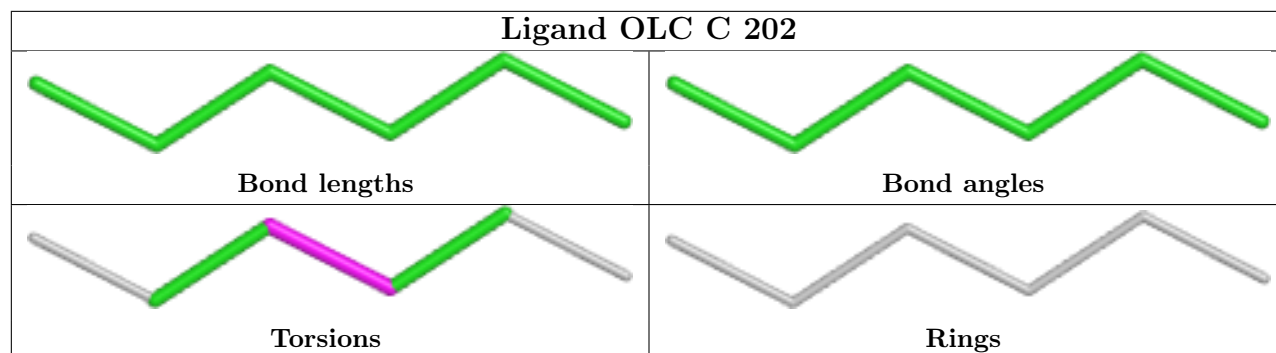
9 monomers are involved in 14 short contacts:

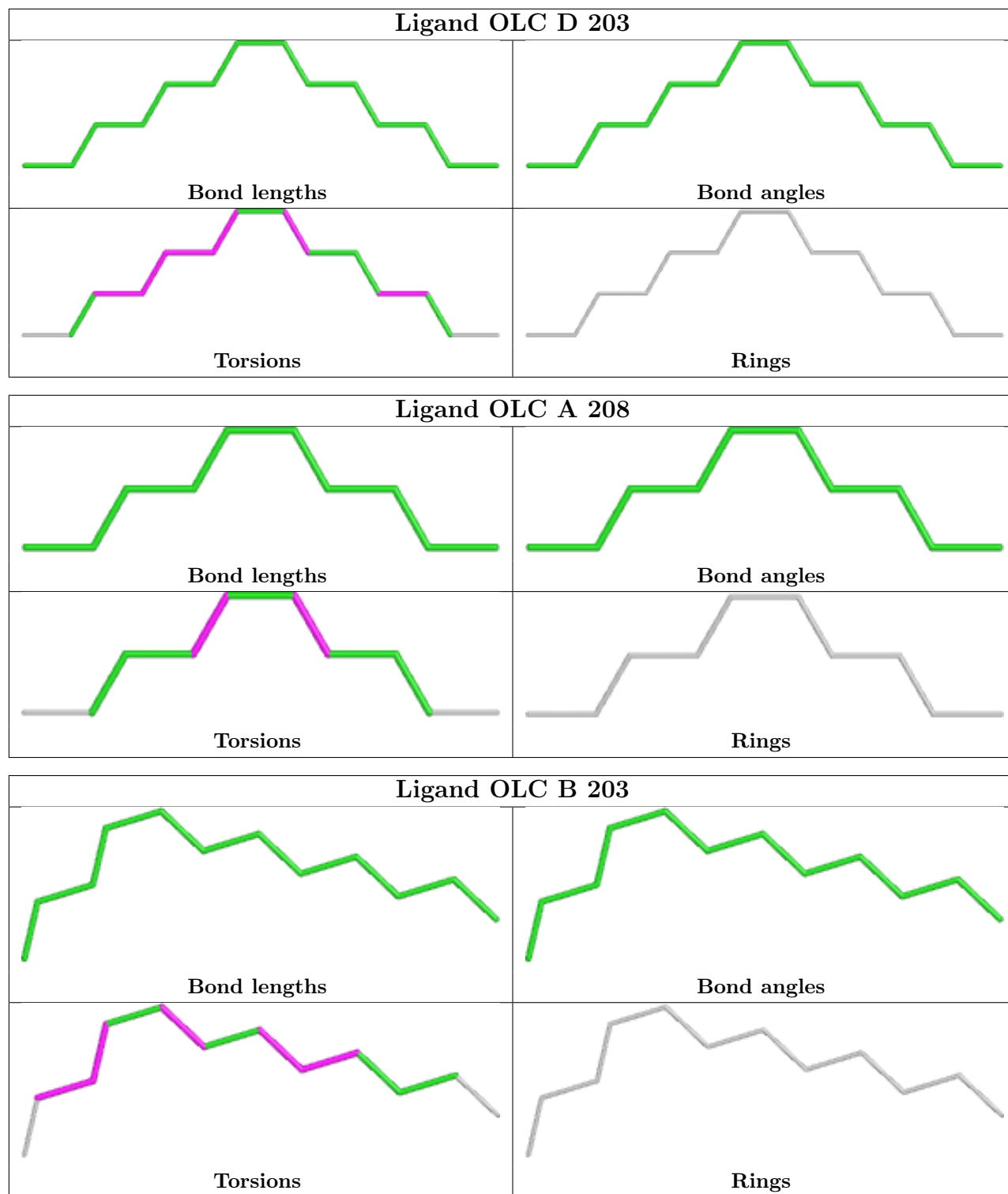
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	201	CLR	2	0
2	C	201	CLR	2	0
3	B	203	OLC	1	0
2	B	201	CLR	2	0
3	A	202	OLC	1	0
3	D	204	OLC	1	0
2	A	201	CLR	2	0
3	B	202	OLC	2	0
4	C	205	MES	1	0

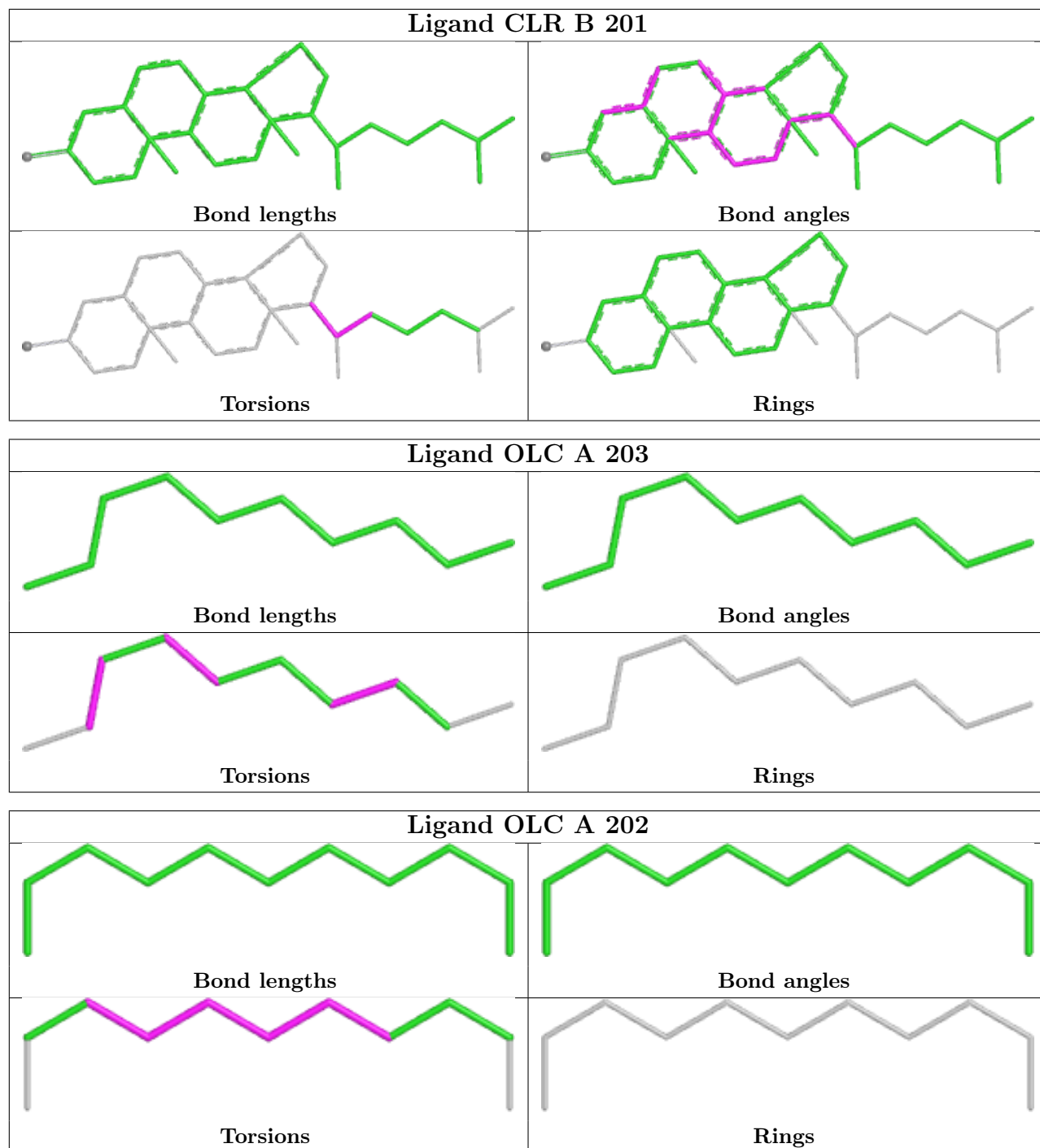
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

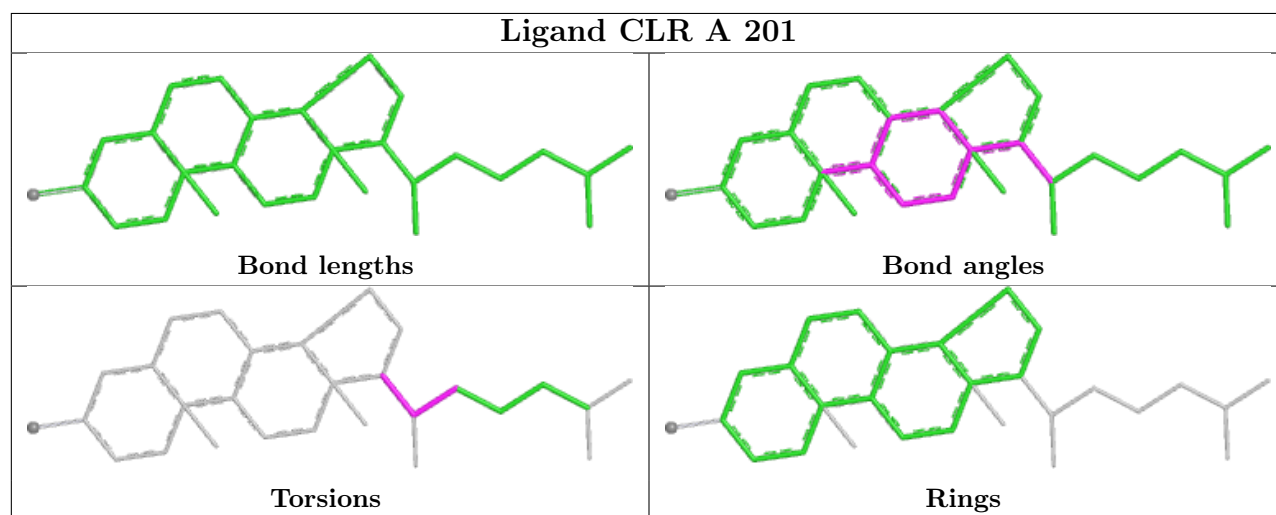
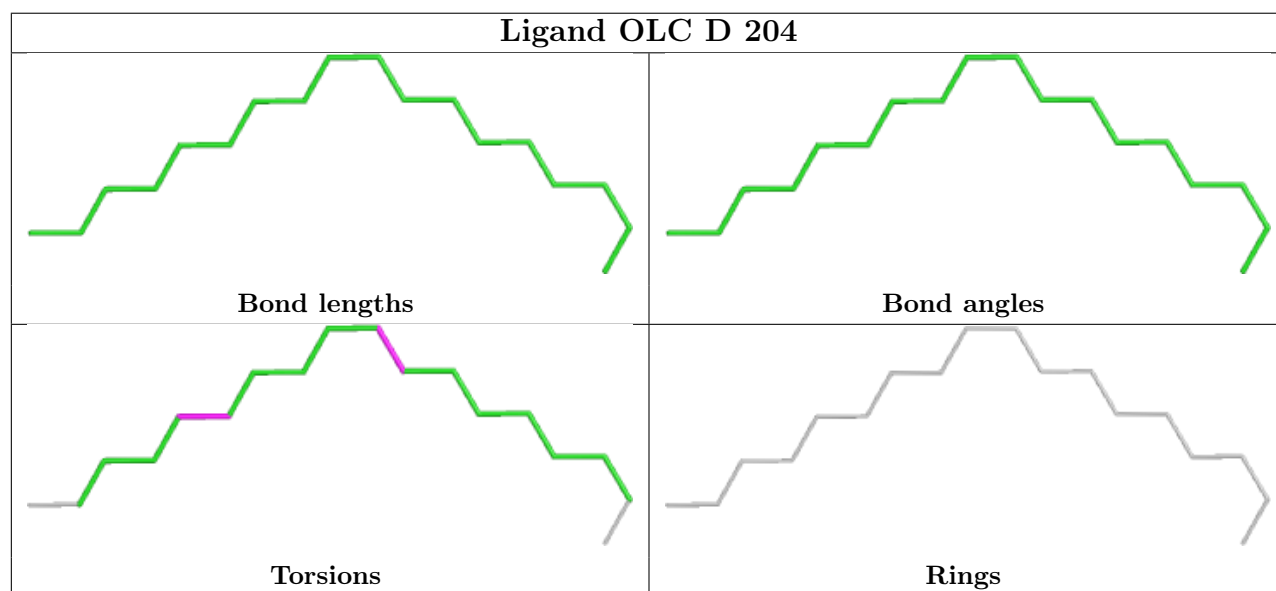
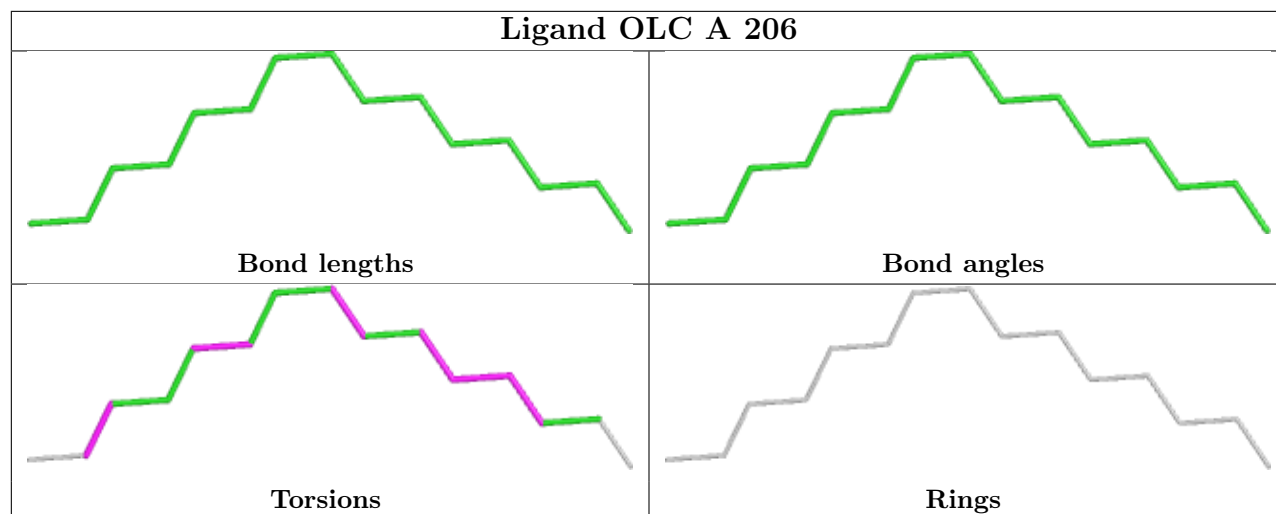


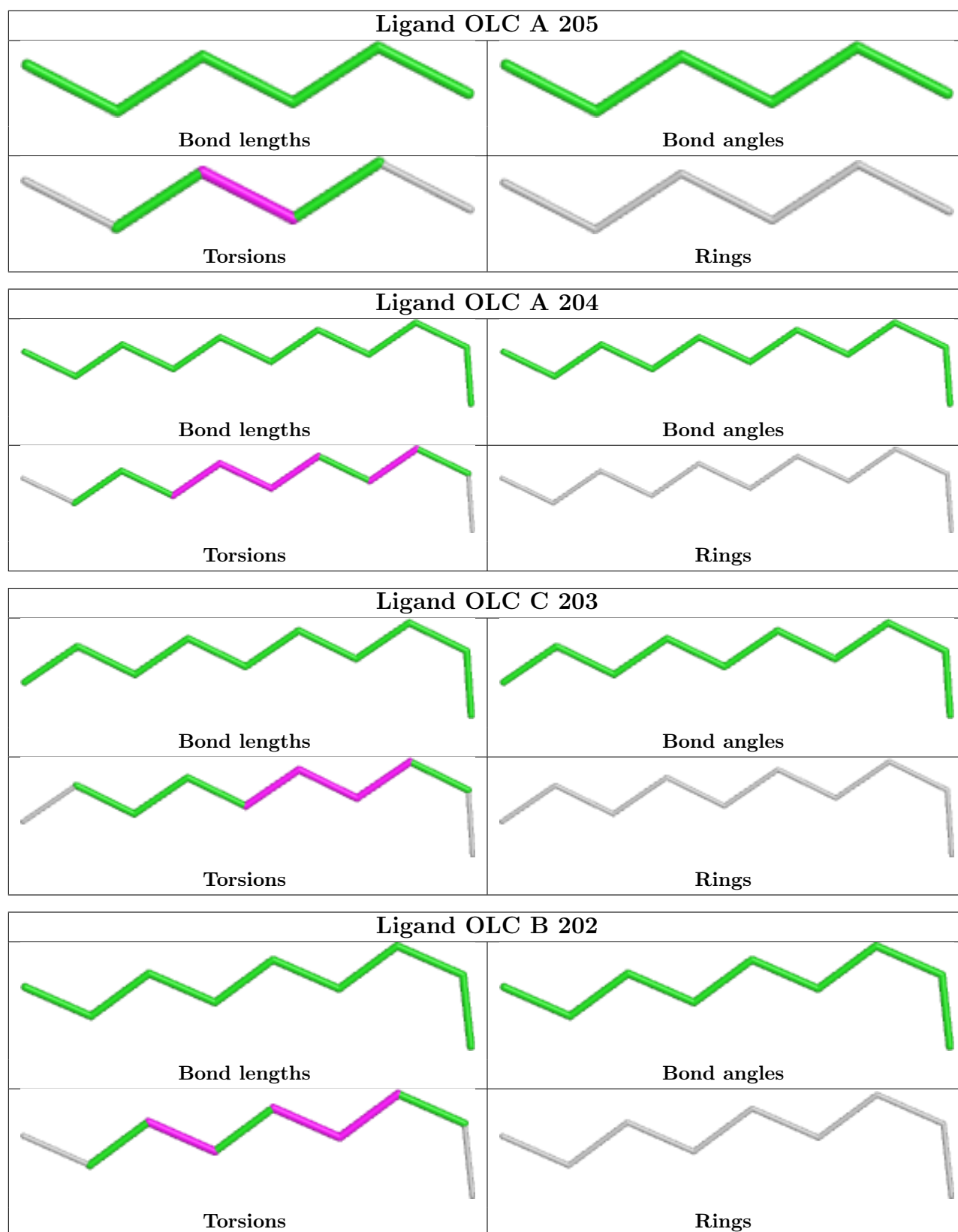












5.7 Other polymers [i](#)

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	164/174 (94%)	0.44	2 (1%) 76 68	44, 62, 84, 93	0
1	B	164/174 (94%)	0.50	3 (1%) 67 58	47, 61, 94, 110	0
1	C	159/174 (91%)	0.50	3 (1%) 66 57	48, 62, 87, 103	0
1	D	163/174 (93%)	0.52	11 (6%) 24 17	48, 61, 98, 137	0
All	All	650/696 (93%)	0.49	19 (2%) 53 43	44, 62, 90, 137	0

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	5	GLY	3.3
1	B	132	GLN	3.0
1	B	131	GLY	2.9
1	D	93	CYS	2.7
1	D	124	SER	2.7
1	D	167	TYR	2.5
1	A	124	SER	2.5
1	D	127	SER	2.3
1	D	165	PRO	2.3
1	D	53	GLU	2.2
1	D	166	TYR	2.2
1	D	47	GLN	2.2
1	C	166	TYR	2.2
1	D	60	GLN	2.2
1	D	46	LEU	2.1
1	A	131	GLY	2.1
1	B	61	THR	2.1
1	C	12	TRP	2.1
1	C	16	PHE	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.

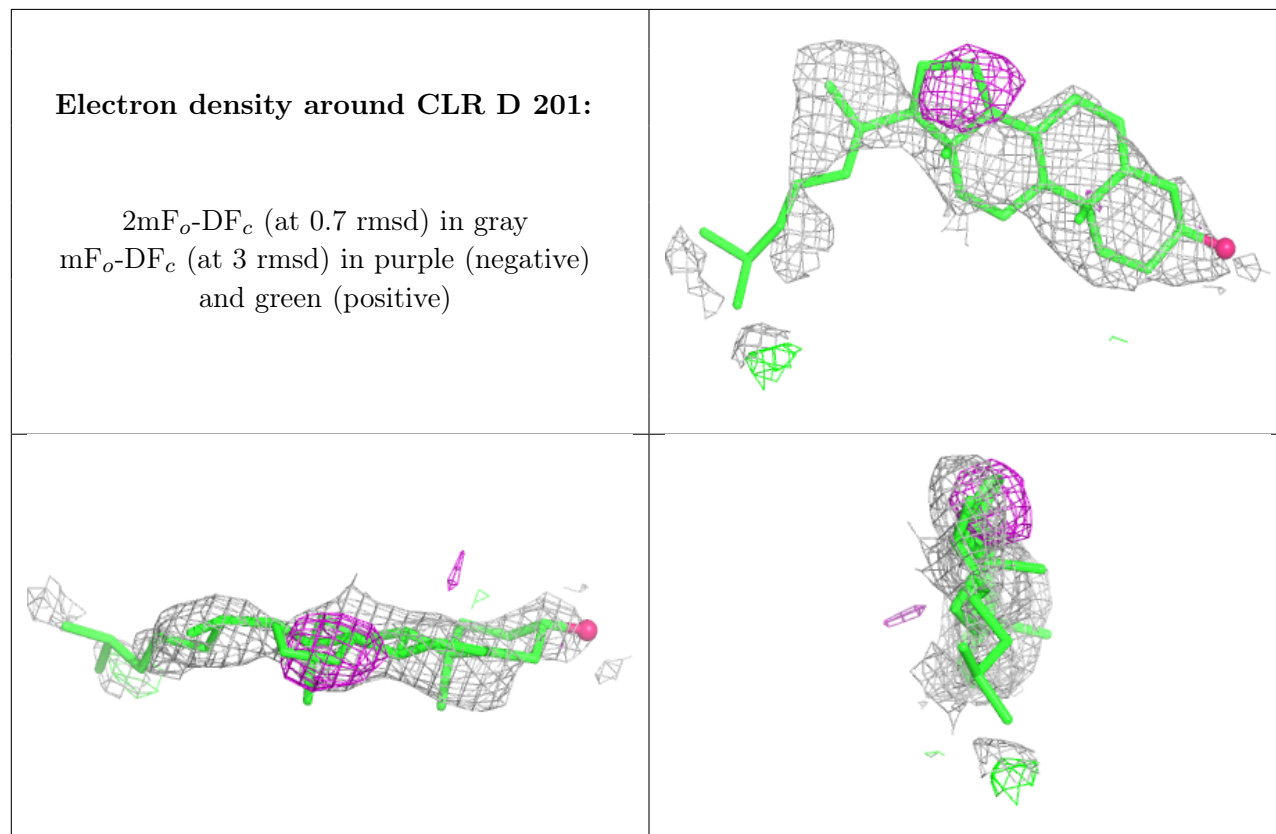
6.4 Ligands [i](#)

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($\text{\AA}^2$)	Q<0.9
2	CLR	D	201	28/28	0.56	0.22	61,69,77,82	0
2	CLR	C	201	28/28	0.63	0.22	62,73,81,83	0
2	CLR	B	201	28/28	0.63	0.20	66,70,79,88	0
3	OLC	A	208	10/25	0.66	0.22	54,62,67,68	0
3	OLC	D	203	14/25	0.70	0.23	52,62,76,76	0
4	MES	C	205	12/12	0.70	0.15	69,78,107,117	0
3	OLC	C	202	6/25	0.71	0.19	53,57,62,62	0
3	OLC	A	204	11/25	0.71	0.22	53,64,72,74	0
3	OLC	D	205	8/25	0.71	0.21	53,62,68,68	0
2	CLR	A	201	28/28	0.71	0.19	61,69,84,92	0
3	OLC	B	204	11/25	0.73	0.21	58,66,71,72	0
3	OLC	C	207	10/25	0.75	0.21	47,56,64,65	0
3	OLC	A	206	15/25	0.75	0.19	53,63,73,76	0
3	OLC	D	202	12/25	0.77	0.17	45,62,66,66	0
3	OLC	D	204	18/25	0.77	0.18	48,59,78,87	0
3	OLC	A	203	10/25	0.79	0.19	57,65,71,71	0
3	OLC	D	206	5/25	0.79	0.17	49,54,58,61	0
3	OLC	B	202	9/25	0.79	0.17	44,47,51,52	0
3	OLC	A	205	6/25	0.80	0.17	42,48,51,57	0
3	OLC	C	203	10/25	0.82	0.19	60,64,69,76	0
3	OLC	B	203	12/25	0.82	0.17	46,62,67,68	0
3	OLC	C	204	9/25	0.83	0.15	40,49,52,53	0
3	OLC	A	207	14/25	0.83	0.16	62,67,69,73	0
3	OLC	C	206	10/25	0.87	0.14	58,62,66,69	0
3	OLC	A	202	11/25	0.87	0.14	46,52,60,60	0

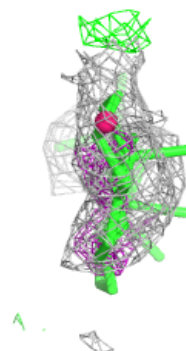
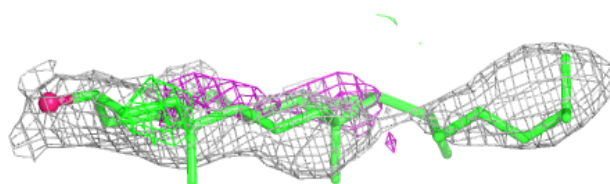
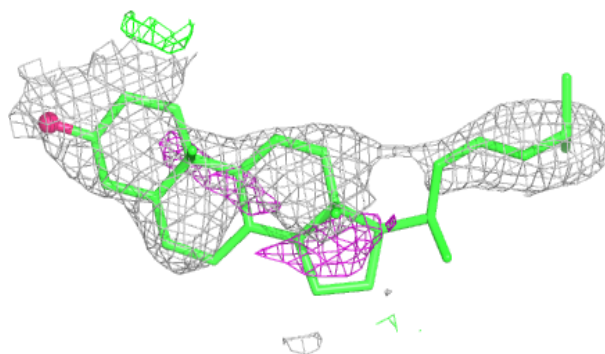
The following is a graphical depiction of the model fit to experimental electron density of all

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.

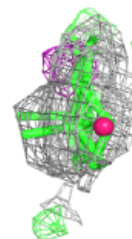
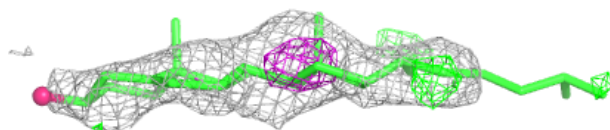
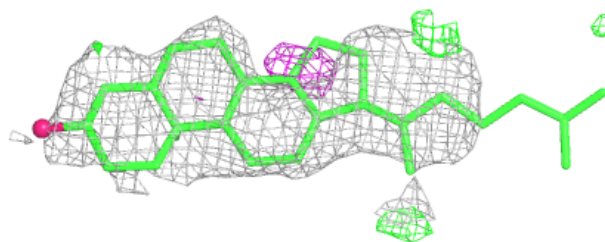


Electron density around CLR C 201:

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

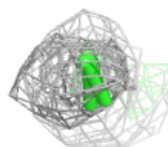
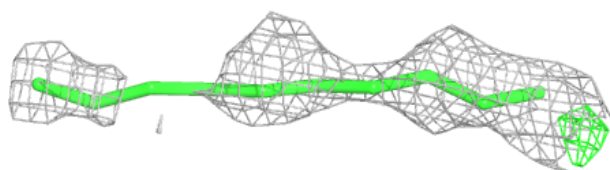
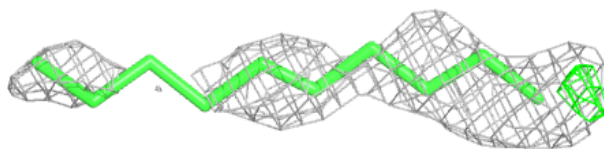
**Electron density around CLR B 201:**

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

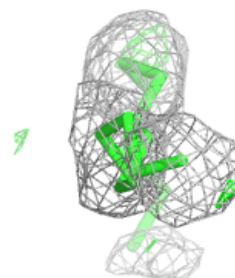
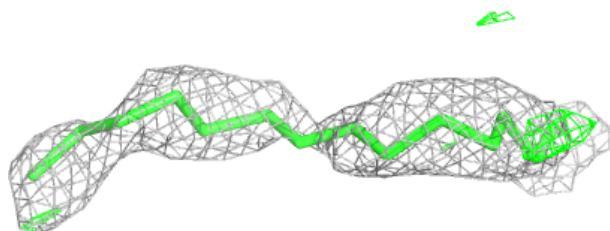
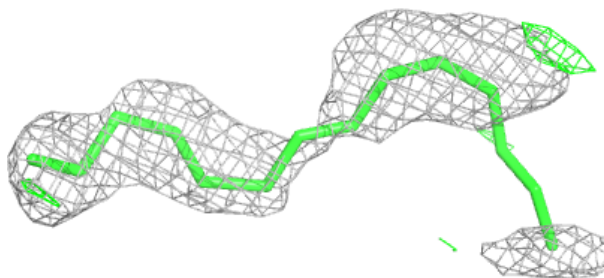


Electron density around OLC A 208:

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

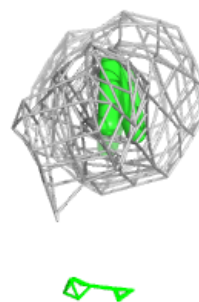
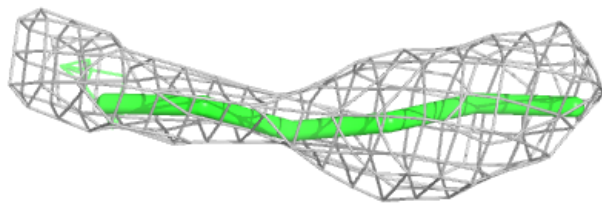
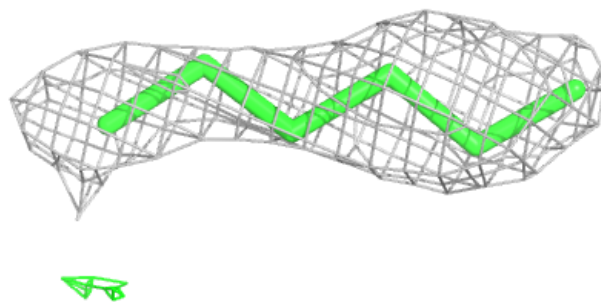
**Electron density around OLC D 203:**

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

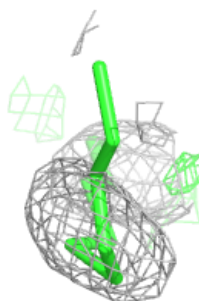
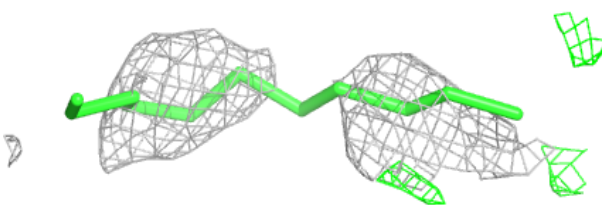
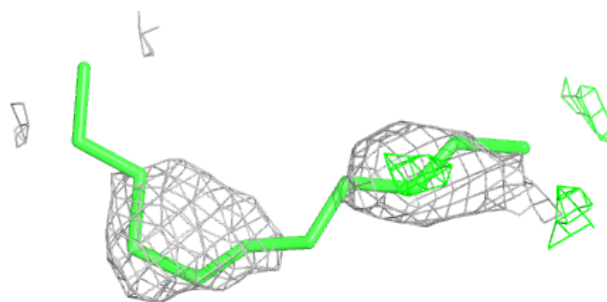


Electron density around OLC C 202:

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

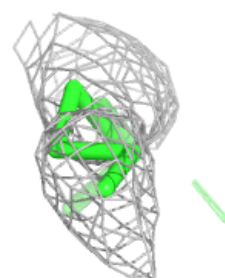
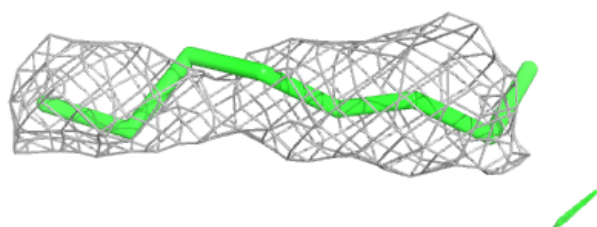
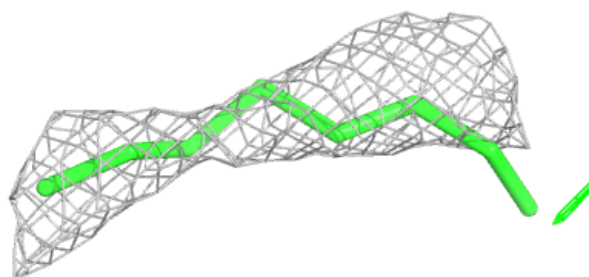
**Electron density around OLC A 204:**

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

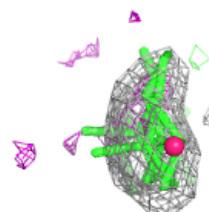
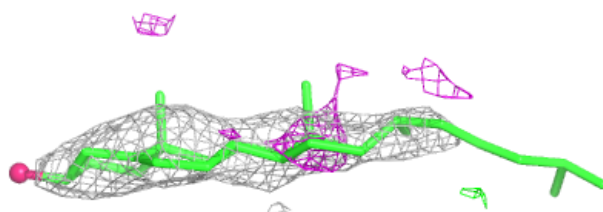
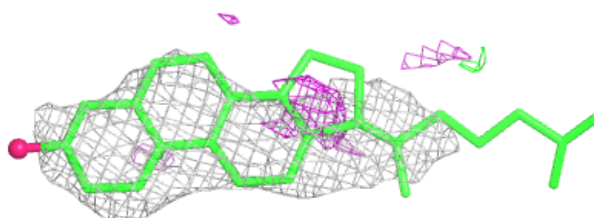


Electron density around OLC D 205:

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

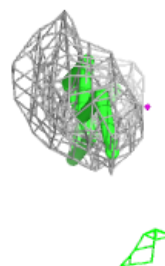
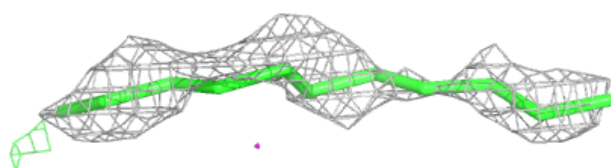
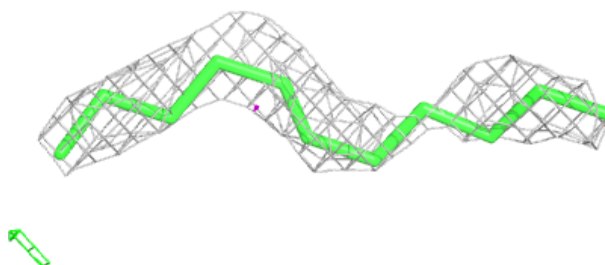
**Electron density around CLR A 201:**

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

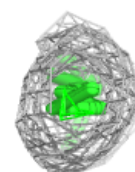
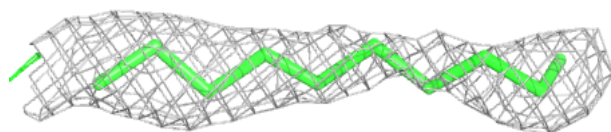
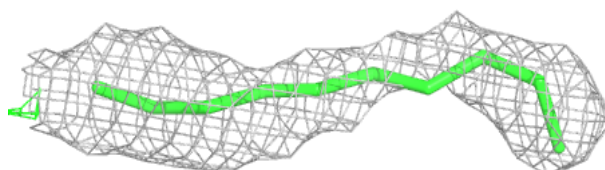


Electron density around OLC B 204:

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

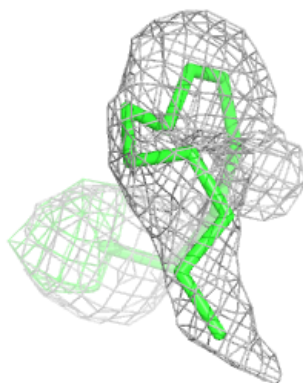
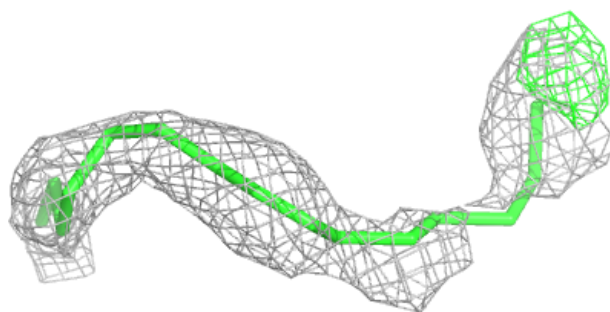
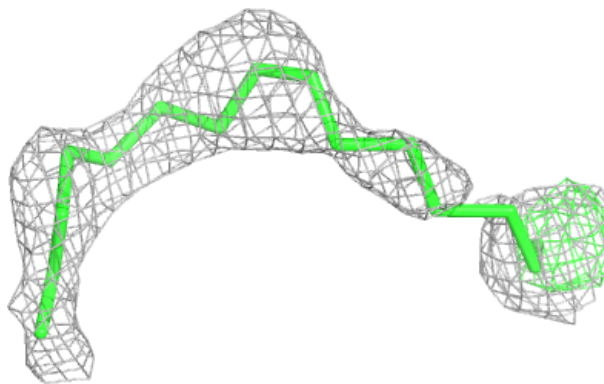
**Electron density around OLC C 207:**

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

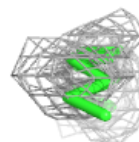
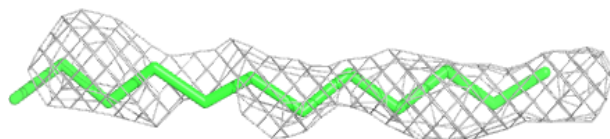
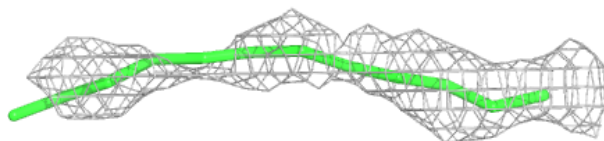


Electron density around OLC A 206:

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

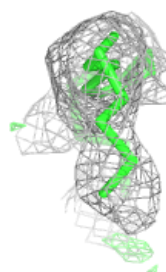
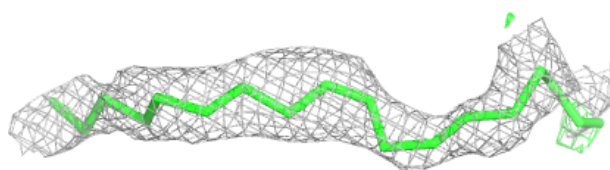
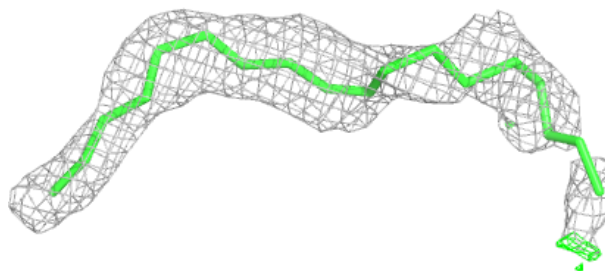
**Electron density around OLC D 202:**

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

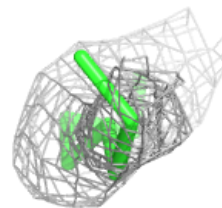
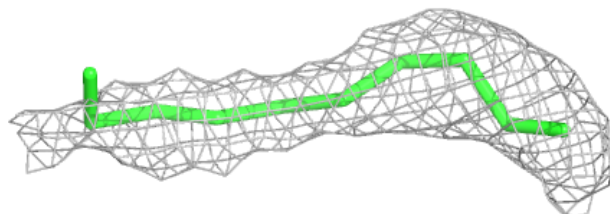
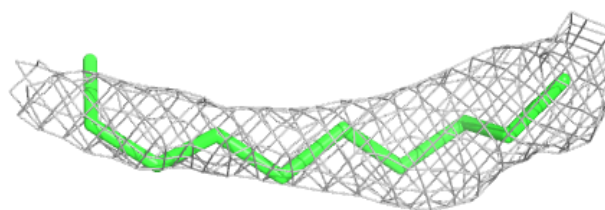


Electron density around OLC D 204:

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

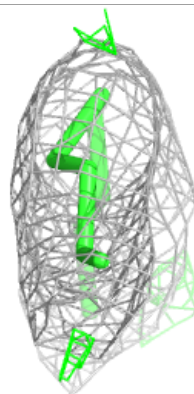
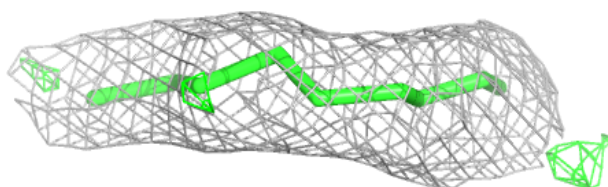
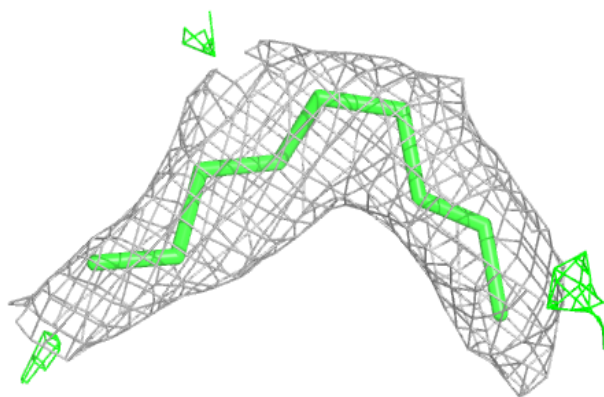
**Electron density around OLC A 203:**

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

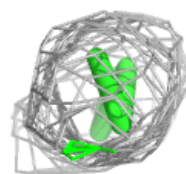
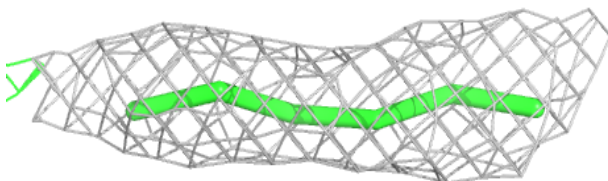
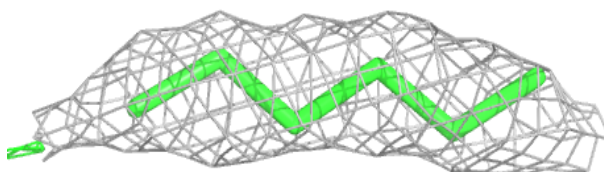


Electron density around OLC B 202:

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

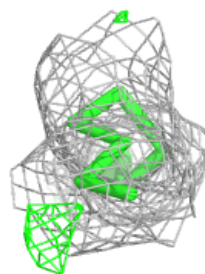
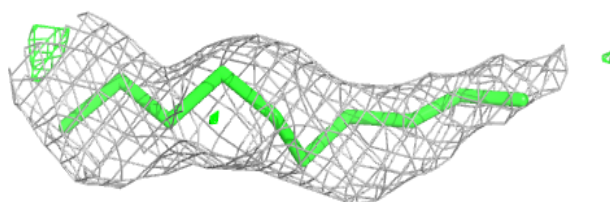
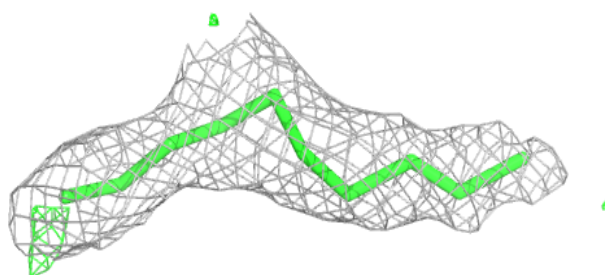
**Electron density around OLC A 205:**

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

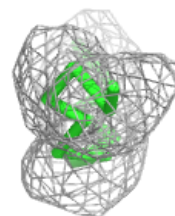
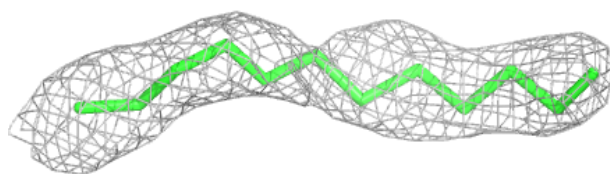
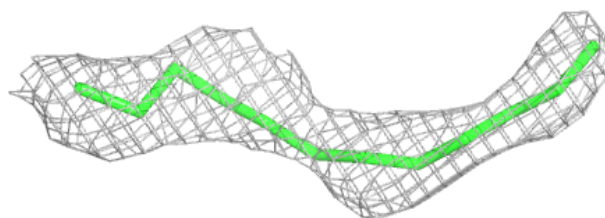


Electron density around OLC C 203:

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

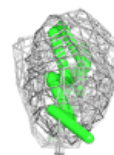
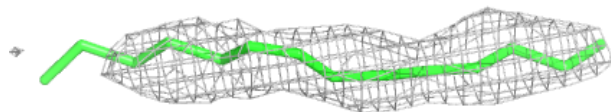
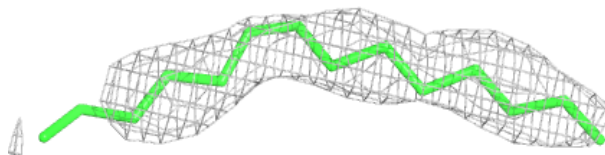
**Electron density around OLC B 203:**

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

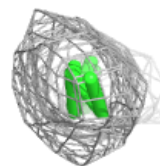
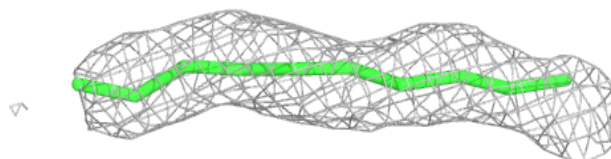
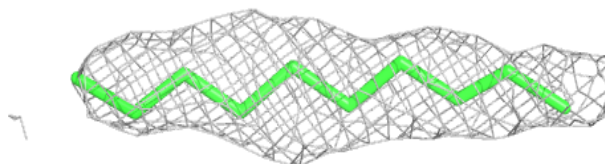


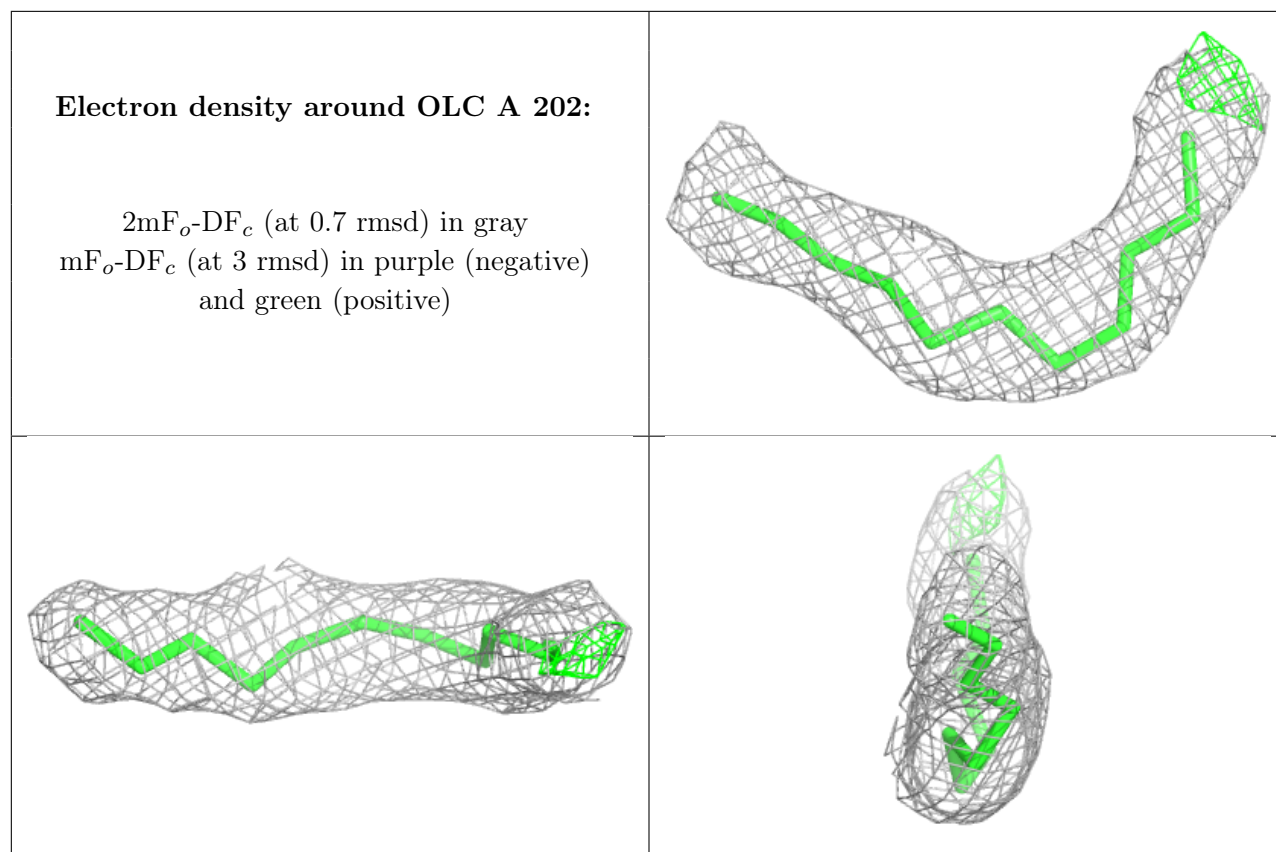
Electron density around OLC A 207:

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

**Electron density around OLC C 206:**

$2mF_o-DF_c$ (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.