



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 16, 2020 – 05:54 pm BST

PDB ID : 5K2D  
Title : 1.9A angstrom A2a adenosine receptor structure with MR phasing using XFEL data  
Authors : Batyuk, A.; Galli, L.; Ishchenko, A.; Han, G.W.; Gati, C.; Popov, P.; Lee, M.-Y.; Stauch, B.; White, T.A.; Barty, A.; Aquila, A.; Hunter, M.S.; Liang, M.; Boutet, S.; Pu, M.; Liu, Z.-J.; Nelson, G.; James, D.; Li, C.; Zhao, Y.; Spence, J.C.H.; Liu, W.; Fromme, P.; Katritch, V.; Weierstall, U.; Stevens, R.C.; Cherezov, V.; GPCR Network (GPCR)  
Deposited on : 2016-05-18  
Resolution : 1.90 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

---

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

MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
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)	:	2.11

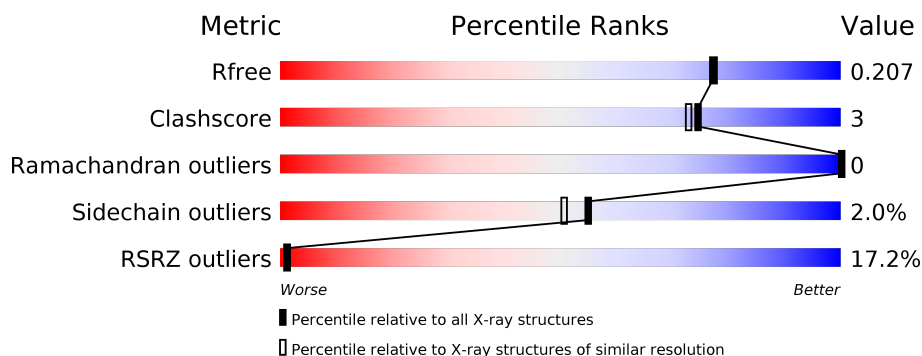
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.90 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	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	447	<div> <div>15%</div> <div>81%</div> <div>7%</div> <div>12%</div> </div>

## 2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 3636 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 Adenosine receptor A2a/Soluble cytochrome b562 chimera.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	395	Total	C	N	O	S	0	12	0
			3121	2045	522	532	22			

There are 39 discrepancies between the modelled and reference sequences:

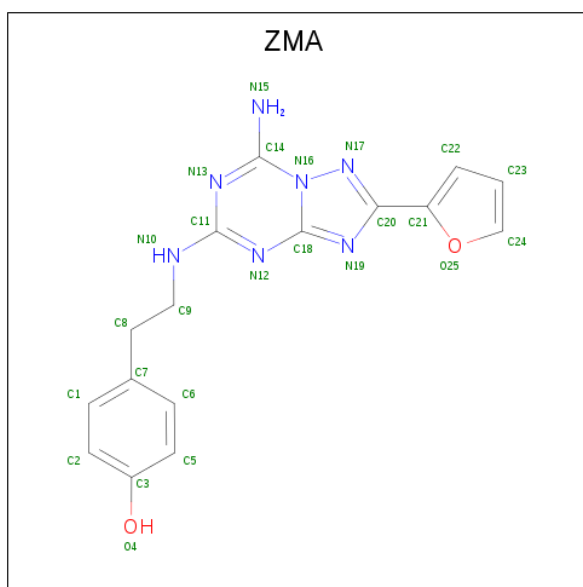
Chain	Residue	Modelled	Actual	Comment	Reference
A	-24	MET	-	initiating methionine	UNP P29274
A	-23	LYS	-	expression tag	UNP P29274
A	-22	THR	-	expression tag	UNP P29274
A	-21	ILE	-	expression tag	UNP P29274
A	-20	ILE	-	expression tag	UNP P29274
A	-19	ALA	-	expression tag	UNP P29274
A	-18	LEU	-	expression tag	UNP P29274
A	-17	SER	-	expression tag	UNP P29274
A	-16	TYR	-	expression tag	UNP P29274
A	-15	ILE	-	expression tag	UNP P29274
A	-14	PHE	-	expression tag	UNP P29274
A	-13	CYS	-	expression tag	UNP P29274
A	-12	LEU	-	expression tag	UNP P29274
A	-11	VAL	-	expression tag	UNP P29274
A	-10	PHE	-	expression tag	UNP P29274
A	-9	ALA	-	expression tag	UNP P29274
A	-8	ASP	-	expression tag	UNP P29274
A	-7	TYR	-	expression tag	UNP P29274
A	-6	LYS	-	expression tag	UNP P29274
A	-5	ASP	-	expression tag	UNP P29274
A	-4	ASP	-	expression tag	UNP P29274
A	-3	ASP	-	expression tag	UNP P29274
A	-2	ASP	-	expression tag	UNP P29274
A	-1	GLY	-	expression tag	UNP P29274
A	0	ALA	-	expression tag	UNP P29274
A	1	PRO	-	expression tag	UNP P29274
A	1007	TRP	MET	engineered mutation	UNP P0ABE7

*Continued on next page...*

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
A	1102	ILE	HIS	engineered mutation	UNP P0ABE7
A	1106	LEU	ARG	engineered mutation	UNP P0ABE7
A	317	HIS	-	expression tag	UNP P29274
A	318	HIS	-	expression tag	UNP P29274
A	319	HIS	-	expression tag	UNP P29274
A	320	HIS	-	expression tag	UNP P29274
A	321	HIS	-	expression tag	UNP P29274
A	322	HIS	-	expression tag	UNP P29274
A	323	HIS	-	expression tag	UNP P29274
A	324	HIS	-	expression tag	UNP P29274
A	325	HIS	-	expression tag	UNP P29274
A	326	HIS	-	expression tag	UNP P29274

- Molecule 2 is 4-{2-[(7-amino-2-furan-2-yl)[1,2,4]triazolo[1,5-a][1,3,5]triazin-5-yl)amino]ethyl} phenol (three-letter code: ZMA) (formula: C<sub>16</sub>H<sub>15</sub>N<sub>7</sub>O<sub>2</sub>).

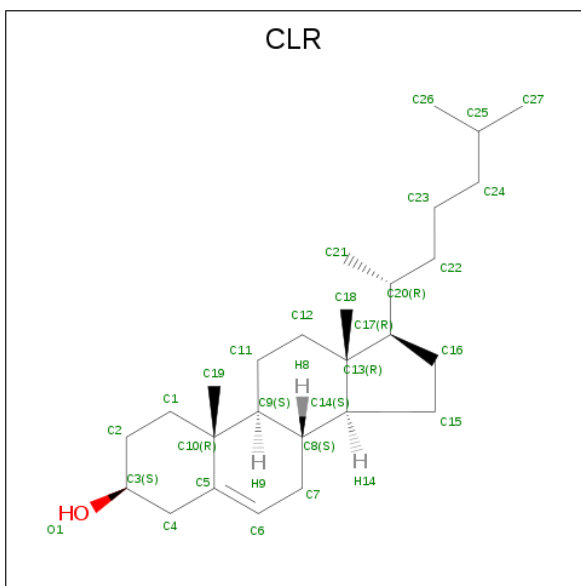


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			25	16	7	2		

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

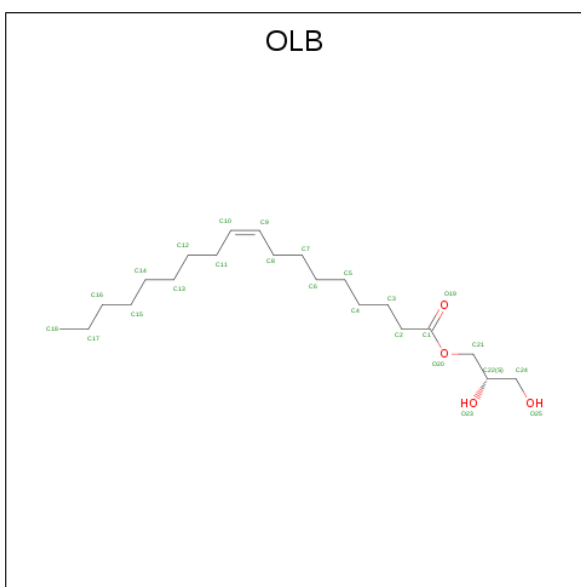
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Na	0	0
			1	1		

- Molecule 4 is CHOLESTEROL (three-letter code: CLR) (formula:  $C_{27}H_{46}O$ ).



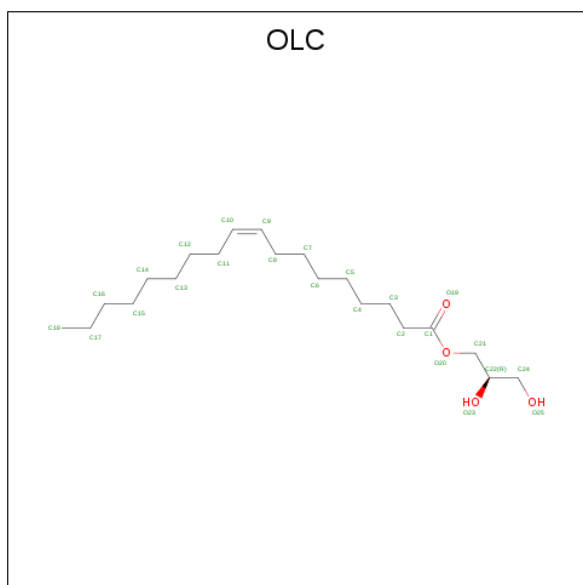
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			28	27	1		
4	A	1	Total	C	O	0	0
			28	27	1		
4	A	1	Total	C	O	0	0
			28	27	1		

- Molecule 5 is (2S)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (three-letter code: OLB) (formula:  $C_{21}H_{40}O_4$ ).



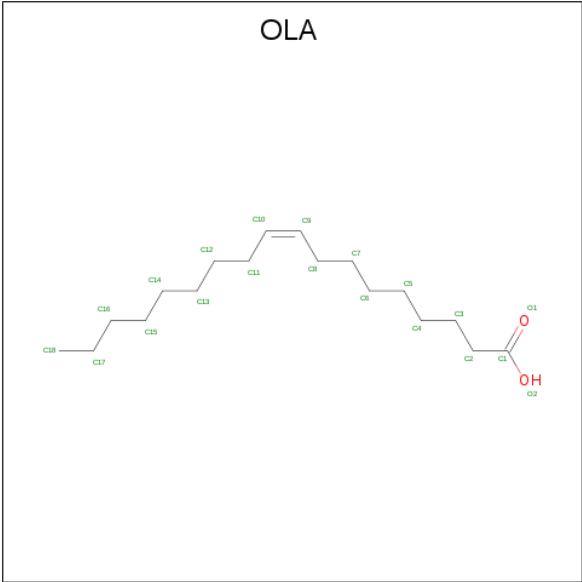
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			18	14	4		
5	A	1	Total	C	O	0	0
			17	13	4		

- Molecule 6 is (2R)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (three-letter code: OLC) (formula: C<sub>21</sub>H<sub>40</sub>O<sub>4</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			17	13	4		
6	A	1	Total	C	O	0	0
			17	13	4		
6	A	1	Total	C	O	0	0
			16	12	4		
6	A	1	Total	C	O	0	0
			11	7	4		
6	A	1	Total	C	O	0	0
			18	14	4		
6	A	1	Total	C	O	0	0
			14	10	4		
6	A	1	Total	C	O	0	0
			17	13	4		
6	A	1	Total	C	O	0	0
			11	7	4		

- Molecule 7 is OLEIC ACID (three-letter code: OLA) (formula: C<sub>18</sub>H<sub>34</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			11	9	2		
7	A	1	Total	C	O	0	0
			12	10	2		
7	A	1	Total	C	O	0	0
			16	14	2		
7	A	1	Total	C	O	0	0
			9	7	2		
7	A	1	Total	C	O	0	0
			11	9	2		
7	A	1	Total	C	O	0	0
			9	7	2		
7	A	1	Total	C	O	0	0
			12	10	2		
7	A	1	Total	C	O	0	0
			13	11	2		
7	A	1	Total	C	O	0	0
			19	17	2		
7	A	1	Total	C	O	0	0
			17	15	2		
7	A	1	Total	C	O	0	0
			20	18	2		

- Molecule 8 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	C	O	0	0
			7	4	3		

- Molecule 9 is water.

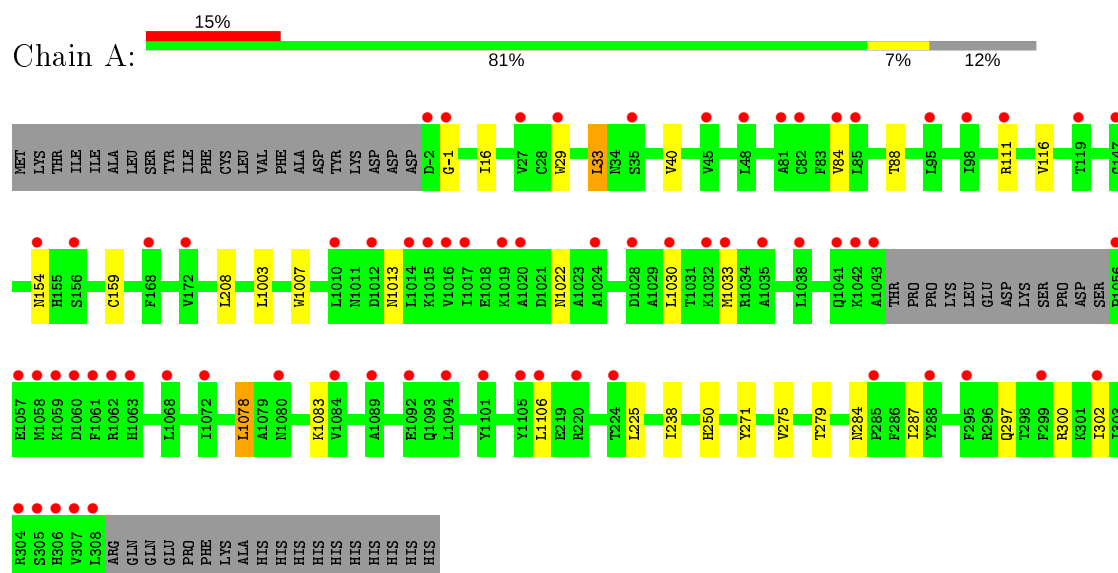
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	93	Total	O	0	0
			93	93		



### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: Adenosine receptor A2a/Soluble cytochrome b562 chimera



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	40.36Å 180.74Å 142.80Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	23.44 – 1.90 23.44 – 1.90	Depositor EDS
% Data completeness (in resolution range)	100.0 (23.44-1.90) 100.0 (23.44-1.90)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	0.97 (at 1.90Å)	Xtriage
Refinement program	PHENIX 1.10_2155	Depositor
R, $R_{free}$	0.174 , 0.207 0.175 , 0.207	Depositor DCC
$R_{free}$ test set	1989 reflections (4.75%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	41.5	Xtriage
Anisotropy	0.136	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 94.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	3636	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	58.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.67% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: OLA, OLB, OLC, NA, ZMA, PEG, CLR

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	0.49	0/3189	0.54	0/4343

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	3121	0	3151	19	1
2	A	25	0	15	1	0
3	A	1	0	0	0	0
4	A	84	0	138	1	0
5	A	35	0	45	1	0
6	A	121	0	149	2	0
7	A	149	0	201	2	0
8	A	7	0	10	0	0
9	A	93	0	0	0	0
All	All	3636	0	3709	23	1

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 3.

All (23) 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:154[B]:ASN:HD22	1:A:159:CYS:HB2	1.56	0.70
1:A:275[A]:VAL:O	1:A:279:THR:HG23	1.97	0.65
1:A:154[B]:ASN:ND2	1:A:159:CYS:HB2	2.11	0.64
1:A:275[B]:VAL:O	1:A:279:THR:HG23	1.98	0.64
1:A:84:VAL:O	1:A:88[B]:THR:HG23	2.00	0.61
1:A:16:ILE:CD1	1:A:275[B]:VAL:HG23	2.37	0.55
1:A:208:LEU:HG	1:A:225[B]:LEU:HD23	1.89	0.55
1:A:250:HIS:CE1	2:A:1201:ZMA:H24	2.42	0.54
1:A:271:TYR:O	1:A:275[B]:VAL:HG12	2.10	0.51
1:A:297:GLN:OE1	1:A:300[B]:ARG:NH1	2.44	0.51
5:A:1210:OLB:O23	7:A:1227:OLA:H31	2.13	0.49
1:A:16:ILE:HD11	1:A:275[B]:VAL:HG23	1.94	0.48
4:A:1205:CLR:H72	6:A:1222:OLC:H22	1.96	0.47
1:A:1013:ASN:HB3	1:A:1033:MET:HE2	1.97	0.46
1:A:29[A]:TRP:CD1	1:A:33:LEU:HD13	2.52	0.45
1:A:1007:TRP:CE3	1:A:1106[B]:LEU:HD12	2.51	0.44
6:A:1212:OLC:H2	6:A:1212:OLC:H5A	1.79	0.44
1:A:40:VAL:HG11	1:A:116:VAL:HG12	2.01	0.42
1:A:1078:LEU:HD12	1:A:1083:LYS:HE2	2.01	0.41
1:A:238:ILE:HD13	1:A:287[B]:ILE:HD13	2.02	0.41
1:A:284:ASN:HA	1:A:287[B]:ILE:HD12	2.03	0.41
1:A:29[B]:TRP:HD1	1:A:302:ILE:HD13	1.86	0.40
7:A:1226:OLA:H111	7:A:1226:OLA:H81	1.64	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:-1:GLY:O	1:A:300[A]:ARG:NH1[4_575]	2.12	0.08

## 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	403/447 (90%)	399 (99%)	4 (1%)	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	318/374 (85%)	312 (98%)	6 (2%)	57	53

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	33	LEU
1	A	111	ARG
1	A	1003	LEU
1	A	1022	ASN
1	A	1030	LEU
1	A	1078	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry

Of 27 ligands modelled in this entry, 1 is monoatomic - leaving 26 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
7	OLA	A	1227	-	16,19,19	0.22	0	15,19,19	0.61	0
7	OLA	A	1216	-	5,8,19	0.20	0	4,8,19	0.64	0
6	OLC	A	1221	-	16,16,24	1.14	1 (6%)	17,17,25	1.17	2 (11%)
6	OLC	A	1212	-	17,17,24	1.09	1 (5%)	18,18,25	0.93	1 (5%)
5	OLB	A	1210	-	16,16,24	1.23	1 (6%)	17,17,25	1.03	2 (11%)
6	OLC	A	1209	-	15,15,24	1.19	1 (6%)	16,16,25	1.10	1 (6%)
4	CLR	A	1203	-	31,31,31	0.62	0	48,48,48	0.96	2 (4%)
8	PEG	A	1225	-	6,6,6	0.41	0	5,5,5	0.38	0
6	OLC	A	1220	-	13,13,24	1.21	1 (7%)	14,14,25	1.20	1 (7%)
4	CLR	A	1205	-	31,31,31	0.71	0	48,48,48	0.89	1 (2%)
4	CLR	A	1204	-	31,31,31	0.63	0	48,48,48	0.97	1 (2%)
7	OLA	A	1215	-	12,15,19	0.23	0	11,15,19	0.61	0
7	OLA	A	1223	-	9,12,19	0.30	0	8,12,19	0.78	0
2	ZMA	A	1201	-	21,28,28	0.73	0	22,39,39	2.55	6 (27%)
7	OLA	A	1226	-	13,16,19	0.23	0	12,16,19	0.59	0
7	OLA	A	1214	-	8,11,19	0.37	0	7,11,19	0.70	0
6	OLC	A	1207	-	16,16,24	1.12	1 (6%)	17,17,25	1.14	1 (5%)
7	OLA	A	1224	-	15,18,19	0.23	0	14,18,19	0.61	0
7	OLA	A	1218	-	5,8,19	0.26	0	4,8,19	0.49	0
6	OLC	A	1222	-	10,10,24	1.47	1 (10%)	11,11,25	1.22	1 (9%)
6	OLC	A	1211	-	10,10,24	1.47	1 (10%)	11,11,25	1.22	1 (9%)
5	OLB	A	1206	-	17,17,24	1.12	1 (5%)	18,18,25	0.94	1 (5%)
7	OLA	A	1217	-	7,10,19	0.21	0	6,10,19	0.65	0
6	OLC	A	1208	-	16,16,24	1.14	1 (6%)	17,17,25	1.07	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
7	OLA	A	1219	-	8,11,19	0.34	0	7,11,19	0.86	0
7	OLA	A	1213	-	7,10,19	0.23	0	6,10,19	0.59	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
7	OLA	A	1227	-	-	9/15/17/17	-
7	OLA	A	1216	-	-	3/4/6/17	-
6	OLC	A	1221	-	-	1/16/16/24	-
6	OLC	A	1212	-	-	3/17/17/24	-
5	OLB	A	1210	-	-	7/16/16/24	-
6	OLC	A	1209	-	-	2/15/15/24	-
4	CLR	A	1203	-	-	2/10/68/68	0/4/4/4
8	PEG	A	1225	-	-	0/4/4/4	-
6	OLC	A	1220	-	-	2/13/13/24	-
4	CLR	A	1205	-	-	2/10/68/68	0/4/4/4
4	CLR	A	1204	-	-	3/10/68/68	0/4/4/4
7	OLA	A	1215	-	-	3/11/13/17	-
7	OLA	A	1223	-	-	6/8/10/17	-
2	ZMA	A	1201	-	-	0/6/10/10	0/4/4/4
7	OLA	A	1226	-	-	3/12/14/17	-
7	OLA	A	1214	-	-	2/7/9/17	-
6	OLC	A	1207	-	-	2/16/16/24	-
7	OLA	A	1224	-	-	5/14/16/17	-
7	OLA	A	1218	-	-	2/4/6/17	-
6	OLC	A	1222	-	-	2/10/10/24	-
6	OLC	A	1211	-	-	2/10/10/24	-
5	OLB	A	1206	-	-	4/17/17/24	-
7	OLA	A	1217	-	-	2/6/8/17	-
6	OLC	A	1208	-	-	4/16/16/24	-
7	OLA	A	1219	-	-	3/7/9/17	-
7	OLA	A	1213	-	-	3/6/8/17	-

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	1210	OLB	O20-C1	4.64	1.46	1.33
6	A	1222	OLC	O20-C1	4.48	1.46	1.33
6	A	1211	OLC	O20-C1	4.45	1.46	1.33
6	A	1209	OLC	O20-C1	4.45	1.46	1.33
5	A	1206	OLB	O20-C1	4.34	1.46	1.33
6	A	1208	OLC	O20-C1	4.32	1.46	1.33
6	A	1221	OLC	O20-C1	4.30	1.45	1.33
6	A	1212	OLC	O20-C1	4.24	1.45	1.33
6	A	1220	OLC	O20-C1	4.19	1.45	1.33
6	A	1207	OLC	O20-C1	4.14	1.45	1.33

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1201	ZMA	N15-C14-N16	7.90	123.29	117.97
2	A	1201	ZMA	N17-C20-N19	4.25	117.36	114.56
2	A	1201	ZMA	C9-C8-C7	-4.22	103.08	112.87
2	A	1201	ZMA	N12-C11-N13	-3.19	121.19	126.23
6	A	1220	OLC	O20-C1-C2	3.17	121.86	111.91
6	A	1221	OLC	O20-C1-C2	3.16	121.81	111.91
6	A	1207	OLC	O20-C1-C2	3.10	121.65	111.91
6	A	1209	OLC	O20-C1-C2	2.91	121.03	111.91
6	A	1211	OLC	O20-C1-C2	2.91	121.03	111.91
2	A	1201	ZMA	C21-C20-N17	-2.90	118.39	123.44
6	A	1222	OLC	O20-C1-C2	2.88	120.96	111.91
4	A	1204	CLR	C7-C8-C9	2.78	113.08	109.71
4	A	1203	CLR	C3-C4-C5	-2.71	107.43	112.03
6	A	1208	OLC	O20-C1-C2	2.62	120.11	111.91
5	A	1206	OLB	O20-C1-C2	2.37	119.36	111.91
2	A	1201	ZMA	C9-N10-C11	-2.34	119.71	123.75
5	A	1210	OLB	O20-C1-C2	2.26	119.01	111.91
4	A	1205	CLR	C19-C10-C9	-2.19	109.07	111.68
6	A	1212	OLC	O20-C1-C2	2.18	118.75	111.91
5	A	1210	OLB	C21-O20-C1	2.12	124.98	117.12
4	A	1203	CLR	C11-C12-C13	-2.10	109.18	112.78
6	A	1221	OLC	O20-C1-O19	-2.02	118.50	123.59

There are no chirality outliers.

All (77) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	1216	OLA	C1-C2-C3-C4

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type	Atoms
7	A	1226	OLA	C1-C2-C3-C4
7	A	1223	OLA	C1-C2-C3-C4
7	A	1213	OLA	C1-C2-C3-C4
7	A	1214	OLA	C1-C2-C3-C4
7	A	1224	OLA	C1-C2-C3-C4
7	A	1218	OLA	C1-C2-C3-C4
7	A	1217	OLA	C1-C2-C3-C4
7	A	1219	OLA	C1-C2-C3-C4
6	A	1220	OLC	C1-C2-C3-C4
4	A	1204	CLR	C20-C22-C23-C24
4	A	1203	CLR	C22-C23-C24-C25
7	A	1223	OLA	C4-C5-C6-C7
6	A	1220	OLC	C2-C3-C4-C5
7	A	1223	OLA	C5-C6-C7-C8
5	A	1210	OLB	C4-C5-C6-C7
7	A	1227	OLA	C4-C5-C6-C7
7	A	1227	OLA	C11-C12-C13-C14
7	A	1217	OLA	C2-C3-C4-C5
5	A	1206	OLB	C5-C6-C7-C8
7	A	1219	OLA	C4-C5-C6-C7
7	A	1227	OLA	C14-C15-C16-C17
4	A	1205	CLR	C22-C23-C24-C25
7	A	1213	OLA	C3-C4-C5-C6
5	A	1210	OLB	C1-C2-C3-C4
5	A	1206	OLB	C4-C5-C6-C7
7	A	1224	OLA	C4-C5-C6-C7
7	A	1215	OLA	C10-C11-C12-C13
7	A	1223	OLA	C3-C4-C5-C6
4	A	1204	CLR	C22-C23-C24-C25
7	A	1226	OLA	C10-C11-C12-C13
7	A	1227	OLA	C5-C6-C7-C8
7	A	1213	OLA	C4-C5-C6-C7
4	A	1205	CLR	C21-C20-C22-C23
7	A	1226	OLA	C3-C4-C5-C6
7	A	1219	OLA	C7-C8-C9-C10
6	A	1212	OLC	C2-C1-O20-C21
7	A	1215	OLA	C6-C7-C8-C9
6	A	1221	OLC	C1-C2-C3-C4
5	A	1206	OLB	C2-C1-O20-C21
7	A	1227	OLA	C12-C13-C14-C15
6	A	1208	OLC	O20-C21-C22-C24
6	A	1208	OLC	O20-C21-C22-O23

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms
7	A	1218	OLA	C4-C5-C6-C7
7	A	1224	OLA	C11-C12-C13-C14
6	A	1211	OLC	C2-C1-O20-C21
7	A	1216	OLA	C4-C5-C6-C7
6	A	1212	OLC	O19-C1-O20-C21
7	A	1216	OLA	C3-C4-C5-C6
5	A	1206	OLB	O19-C1-O20-C21
6	A	1211	OLC	O19-C1-O20-C21
6	A	1207	OLC	O20-C21-C22-O23
7	A	1227	OLA	C3-C4-C5-C6
5	A	1210	OLB	C2-C1-O20-C21
5	A	1210	OLB	C7-C8-C9-C10
5	A	1210	OLB	O19-C1-O20-C21
5	A	1210	OLB	C3-C4-C5-C6
6	A	1209	OLC	C3-C4-C5-C6
4	A	1204	CLR	C23-C24-C25-C27
7	A	1223	OLA	C2-C3-C4-C5
7	A	1214	OLA	C4-C5-C6-C7
6	A	1207	OLC	O20-C21-C22-C24
5	A	1210	OLB	C5-C6-C7-C8
6	A	1208	OLC	O23-C22-C24-O25
7	A	1224	OLA	C5-C6-C7-C8
6	A	1222	OLC	C2-C1-O20-C21
7	A	1227	OLA	C9-C10-C11-C12
7	A	1215	OLA	C7-C8-C9-C10
7	A	1227	OLA	C2-C3-C4-C5
7	A	1224	OLA	C7-C8-C9-C10
6	A	1209	OLC	C4-C5-C6-C7
7	A	1227	OLA	C7-C8-C9-C10
6	A	1208	OLC	C21-C22-C24-O25
6	A	1222	OLC	O19-C1-O20-C21
7	A	1223	OLA	C7-C8-C9-C10
4	A	1203	CLR	C21-C20-C22-C23
6	A	1212	OLC	O20-C21-C22-O23

There are no ring outliers.

7 monomers are involved in 5 short contacts:

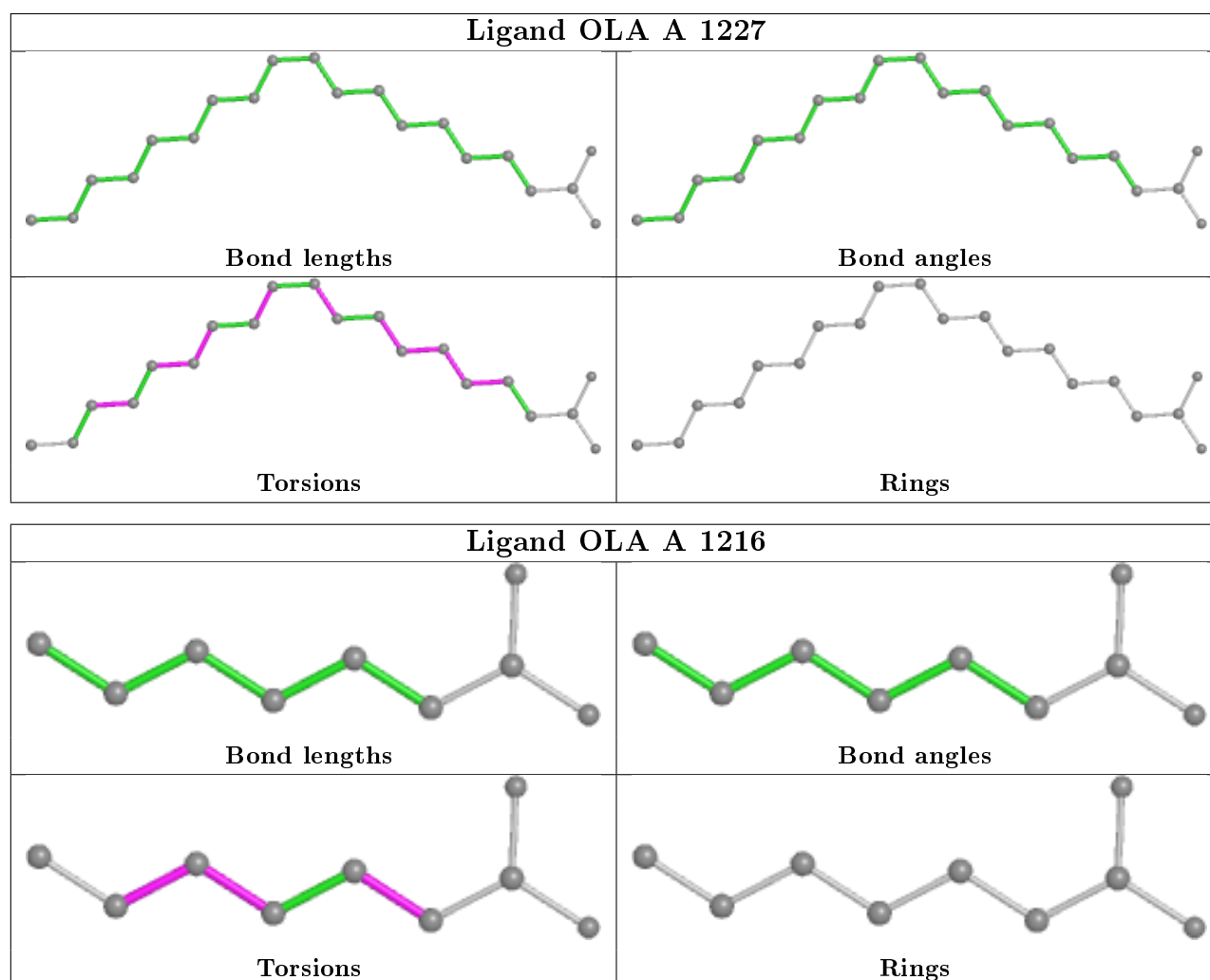
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	1227	OLA	1	0
6	A	1212	OLC	1	0
5	A	1210	OLB	1	0

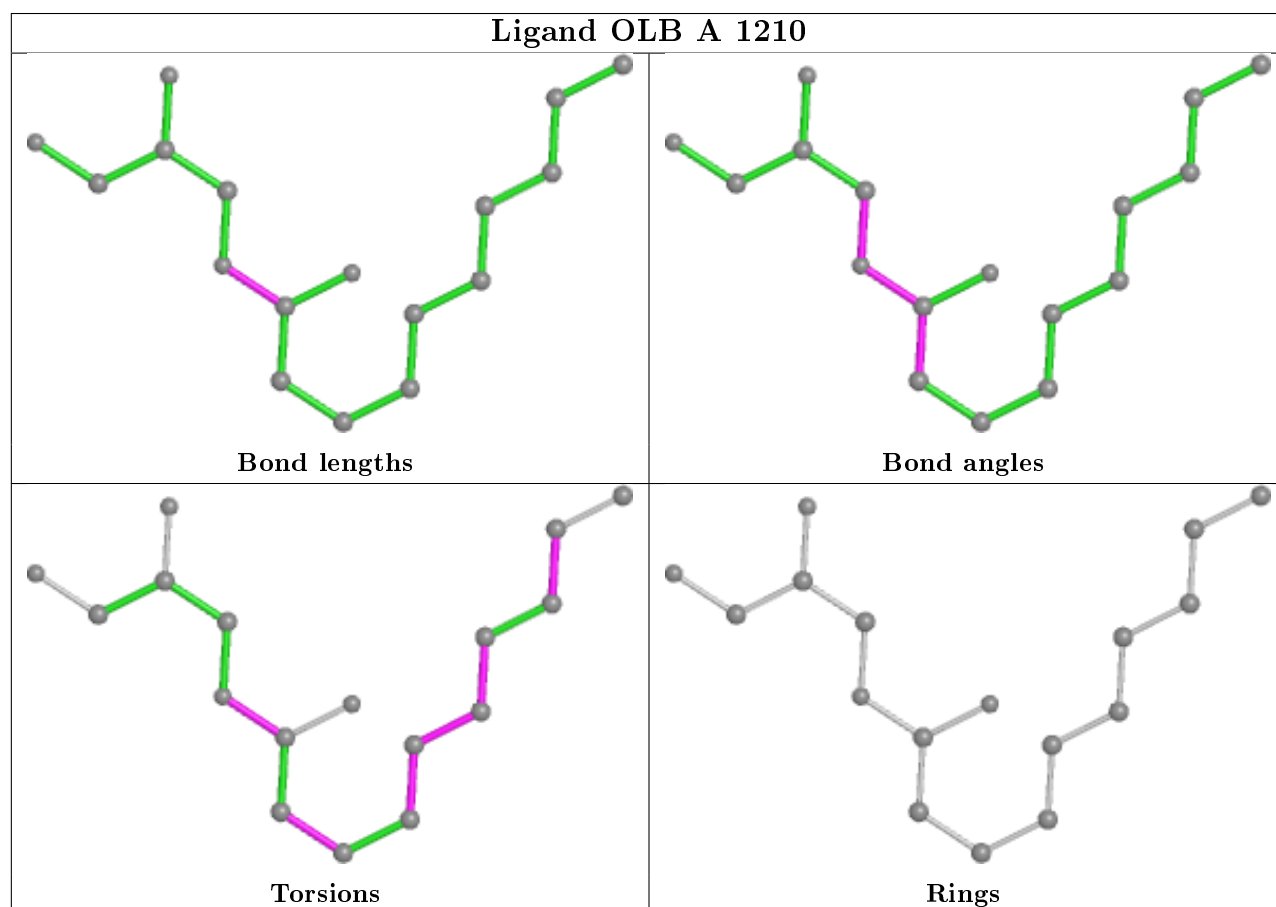
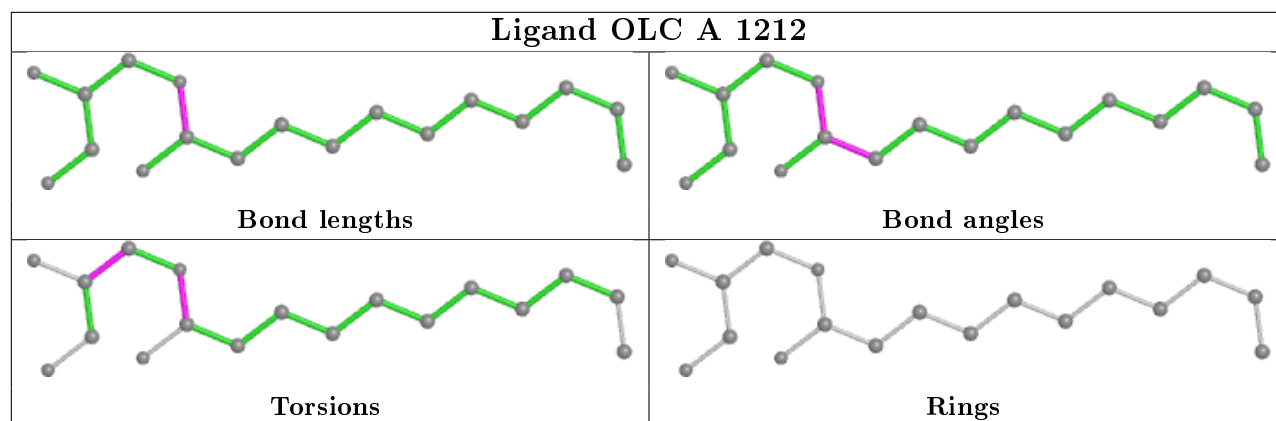
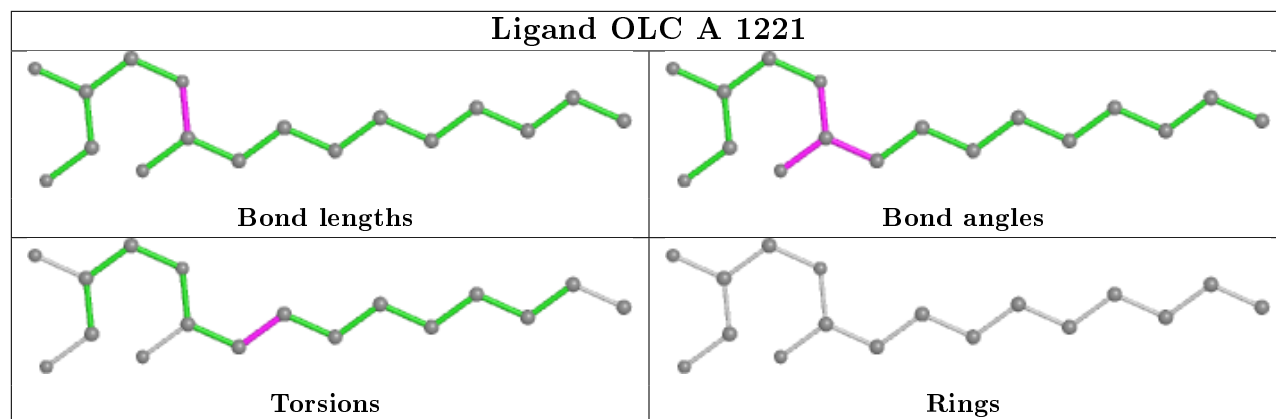
*Continued on next page...*

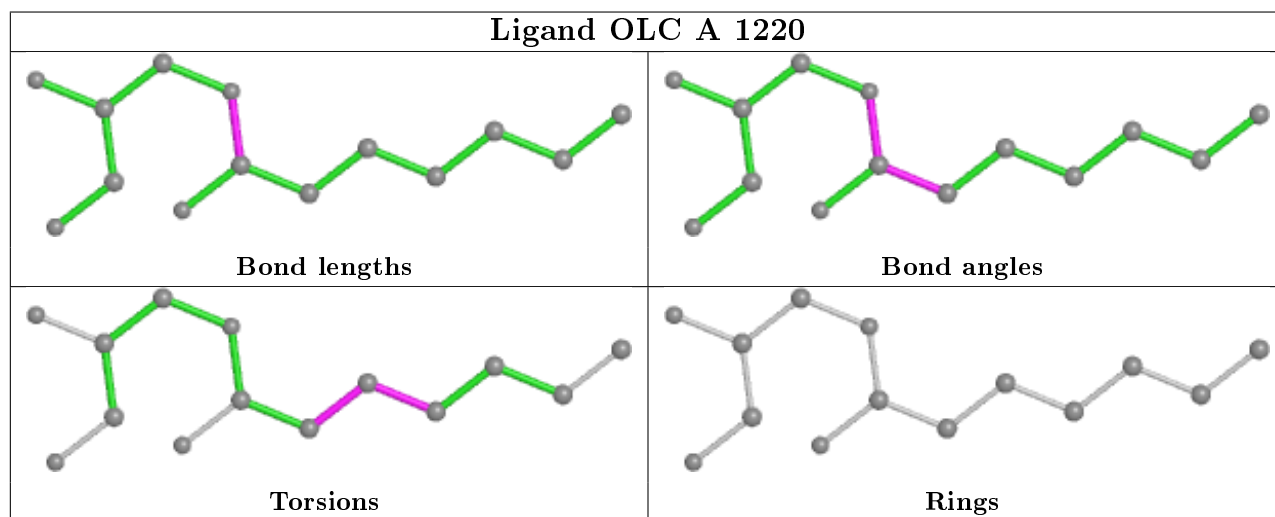
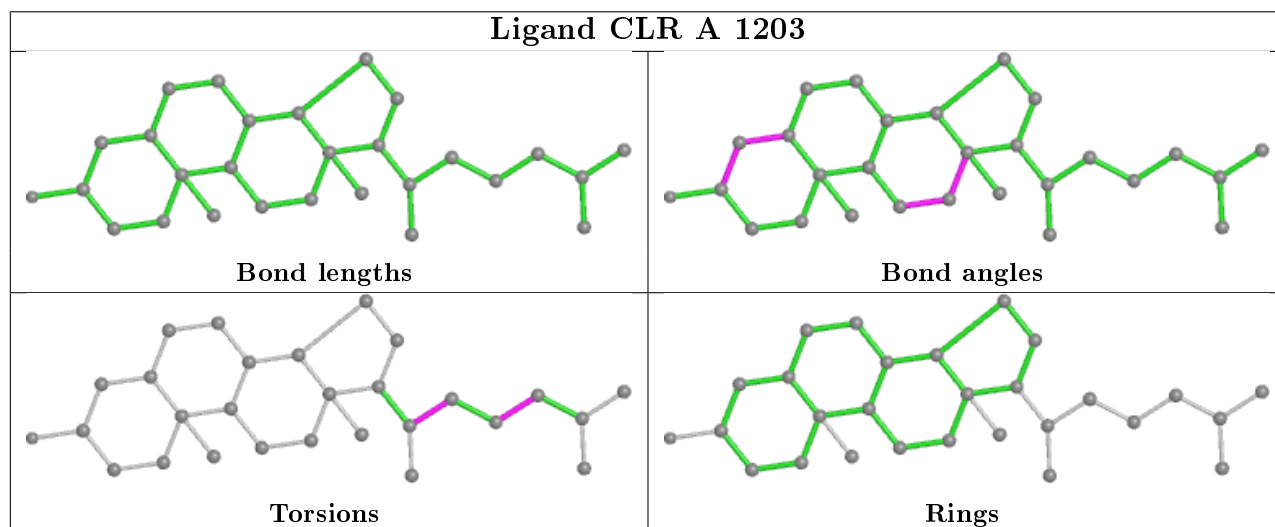
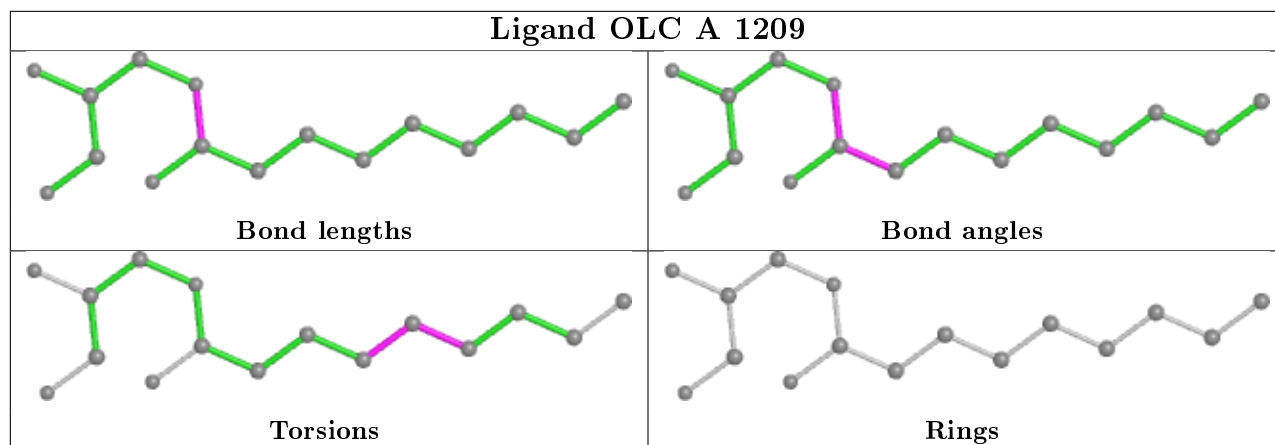
*Continued from previous page...*

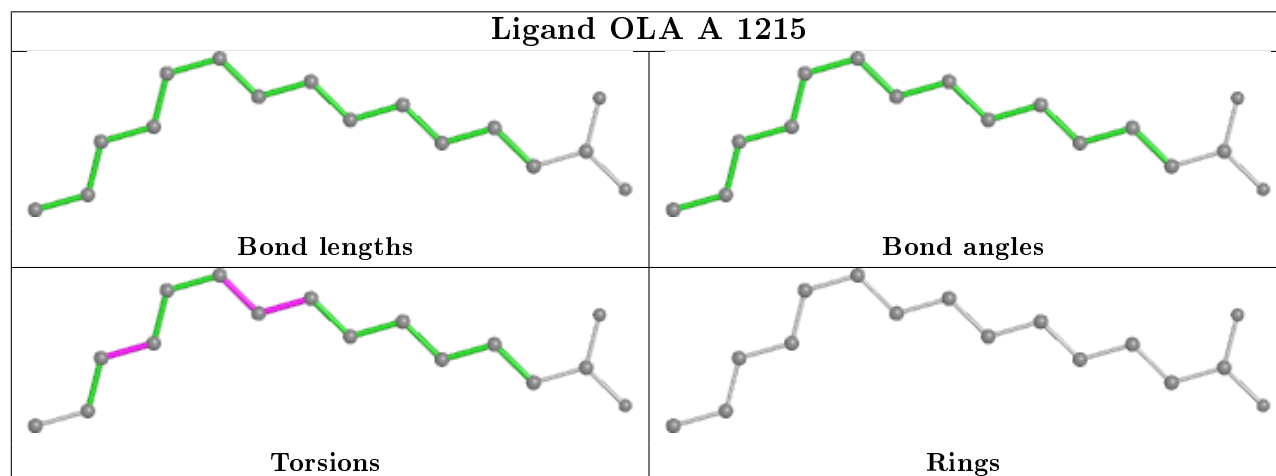
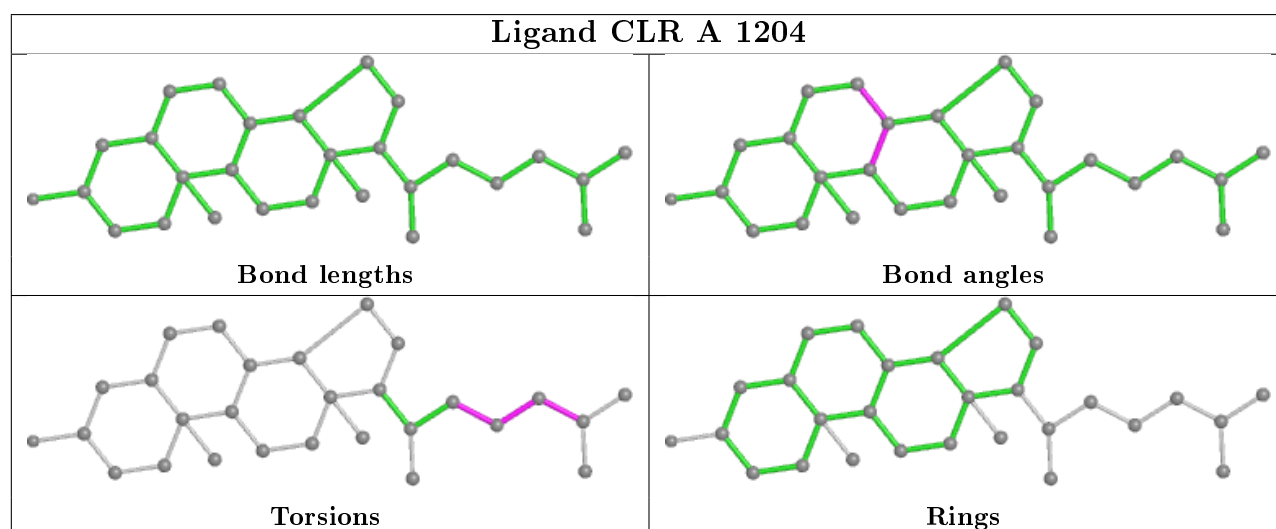
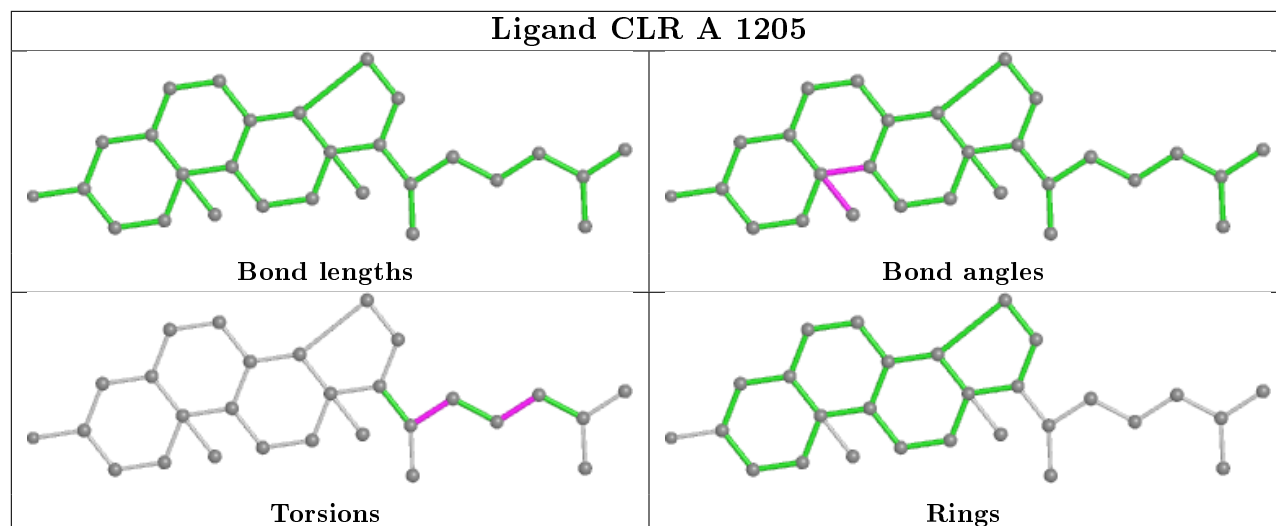
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	1205	CLR	1	0
2	A	1201	ZMA	1	0
7	A	1226	OLA	1	0
6	A	1222	OLC	1	0

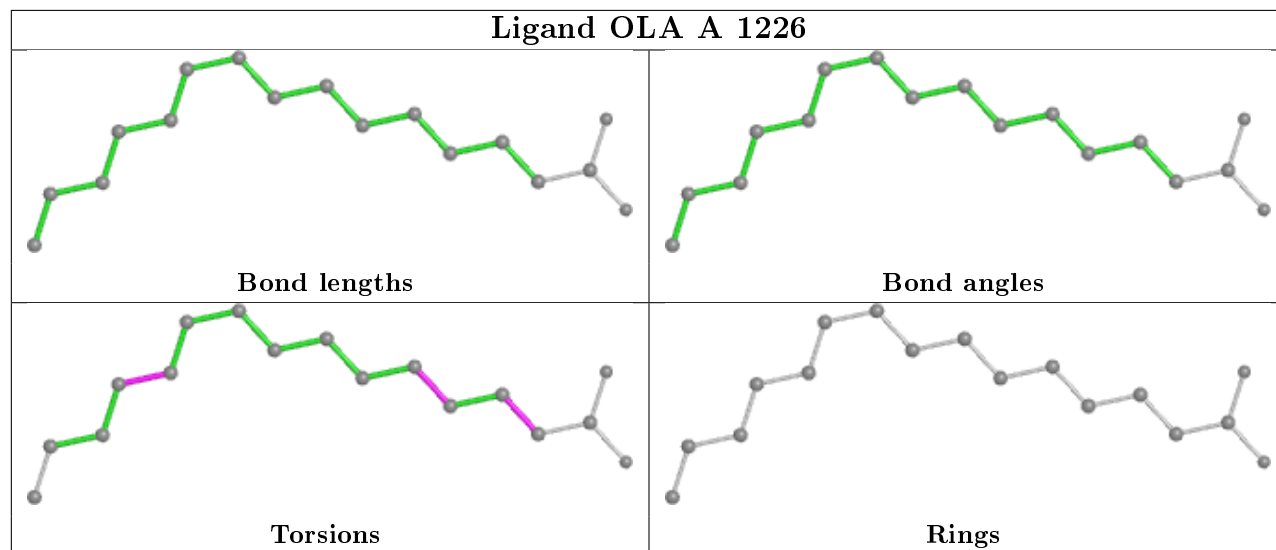
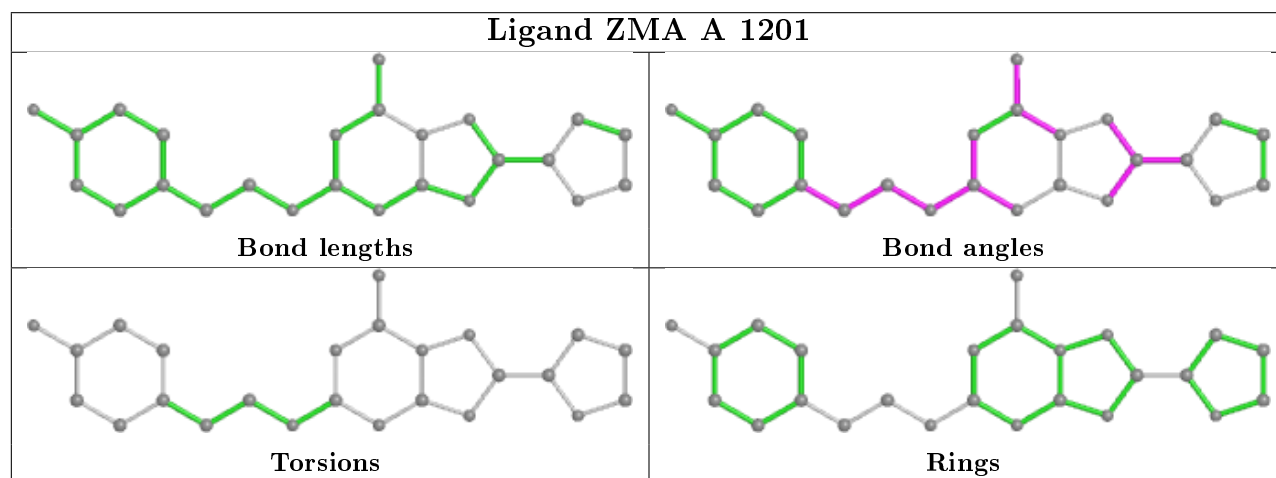
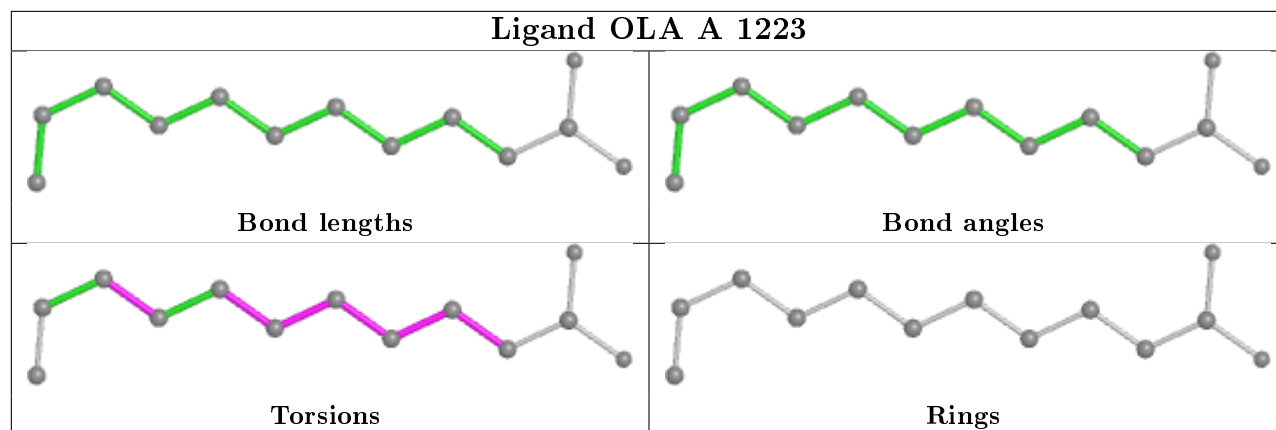
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

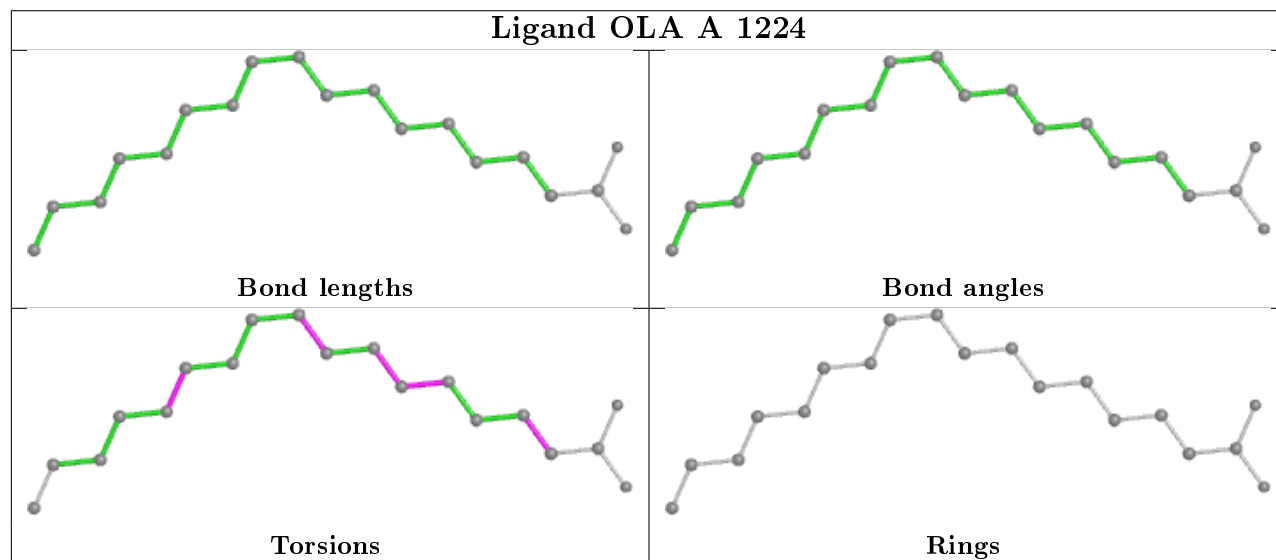
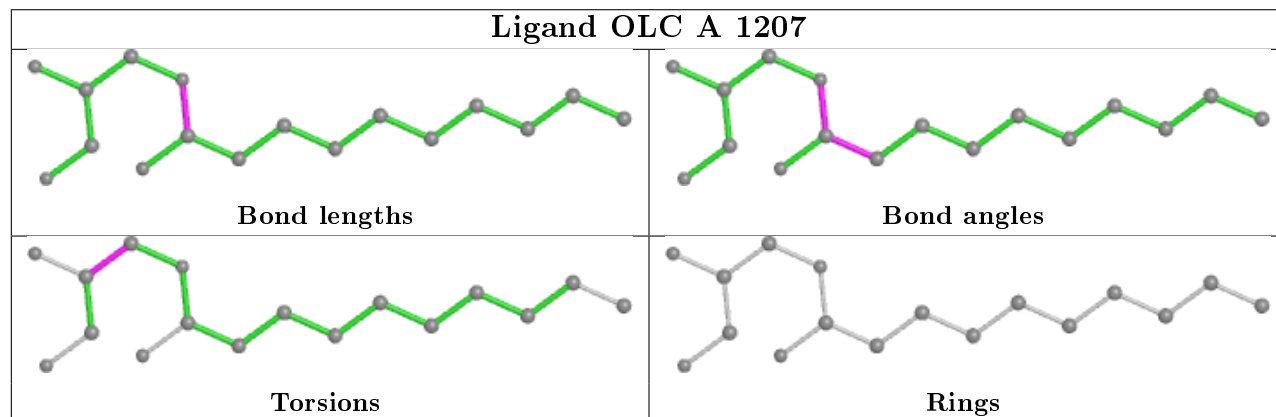
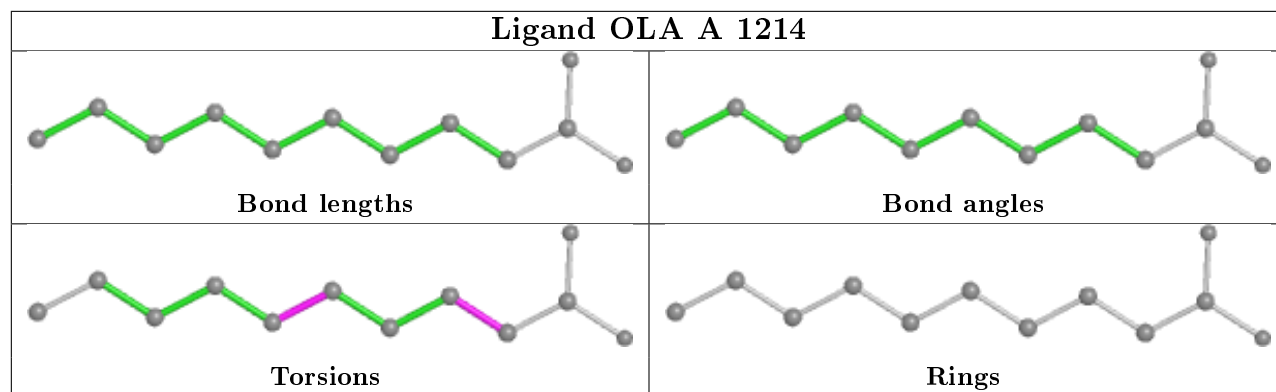




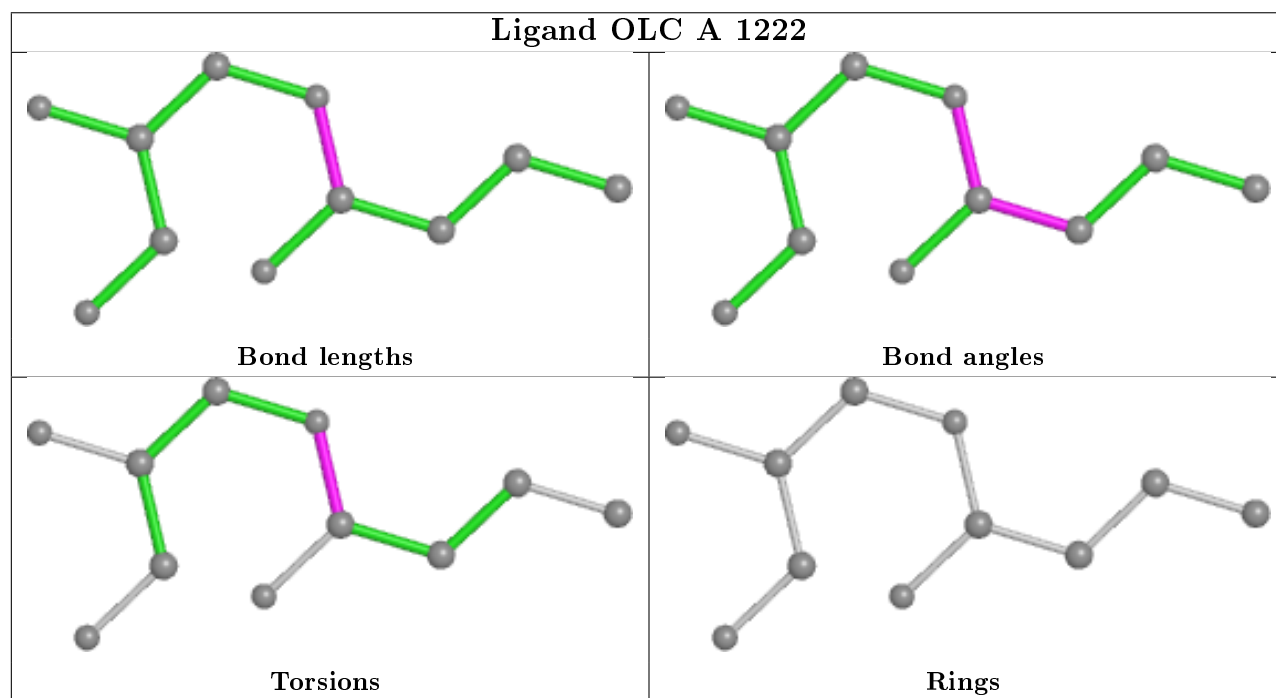
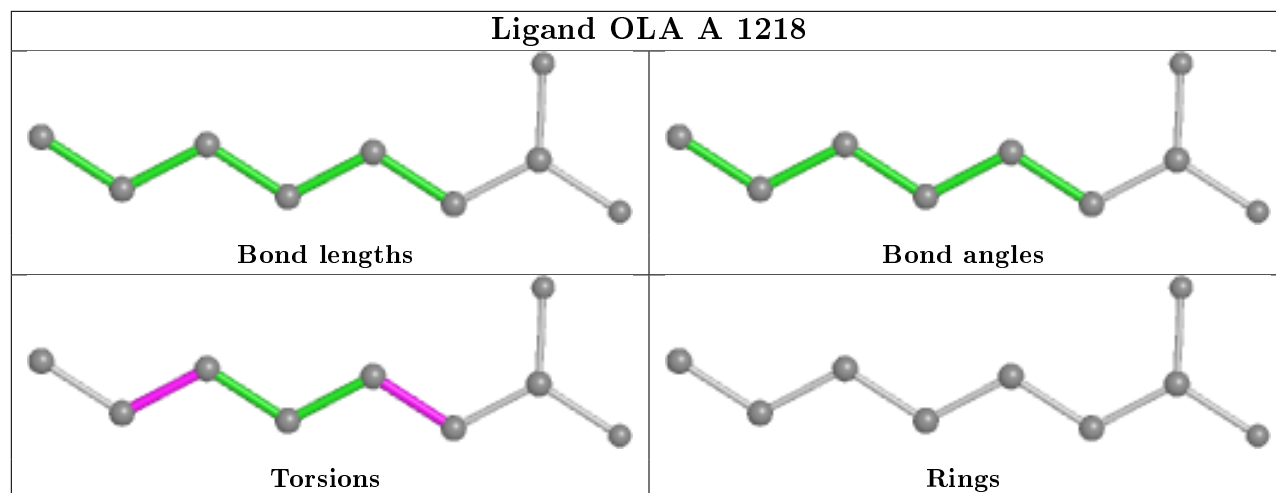


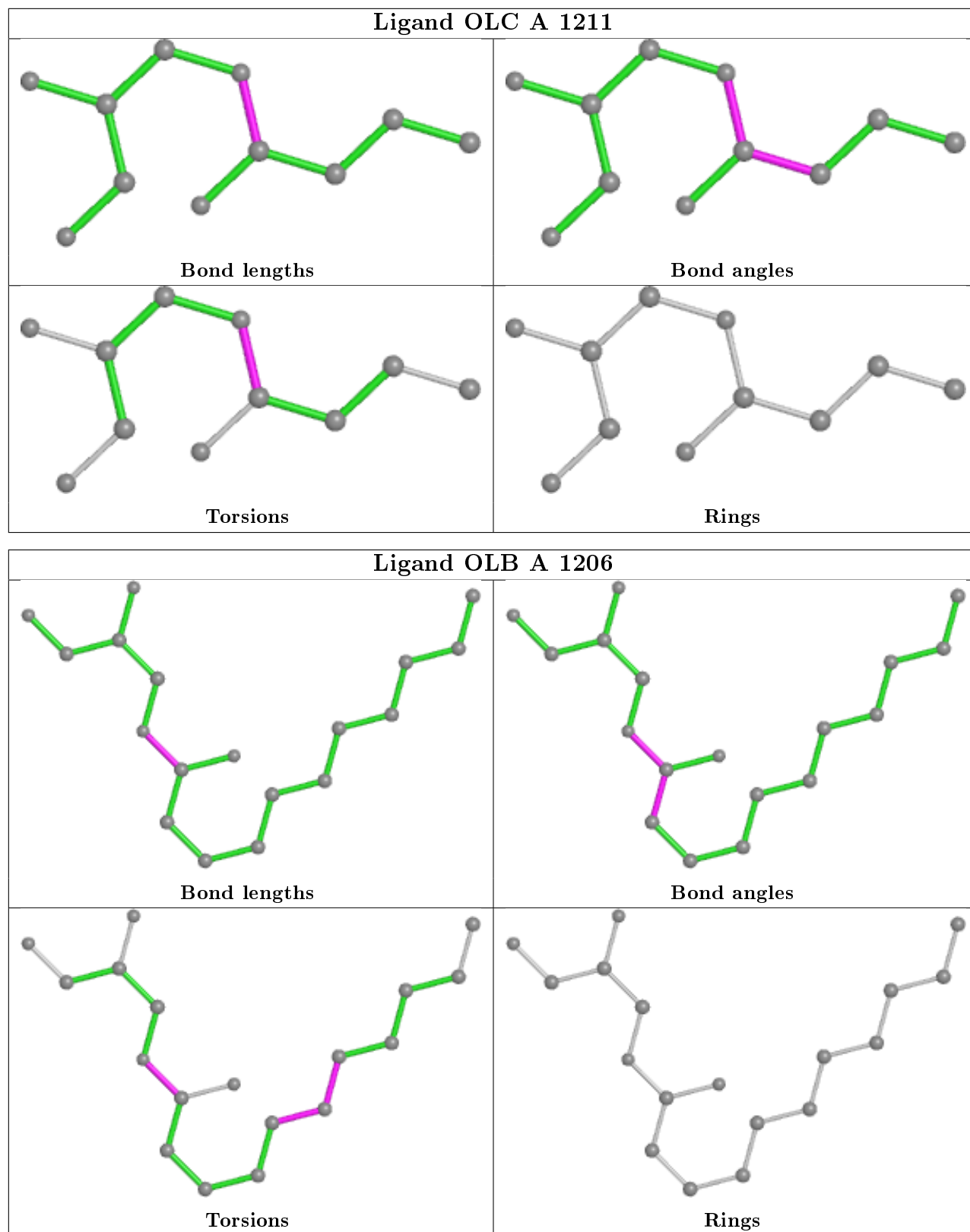


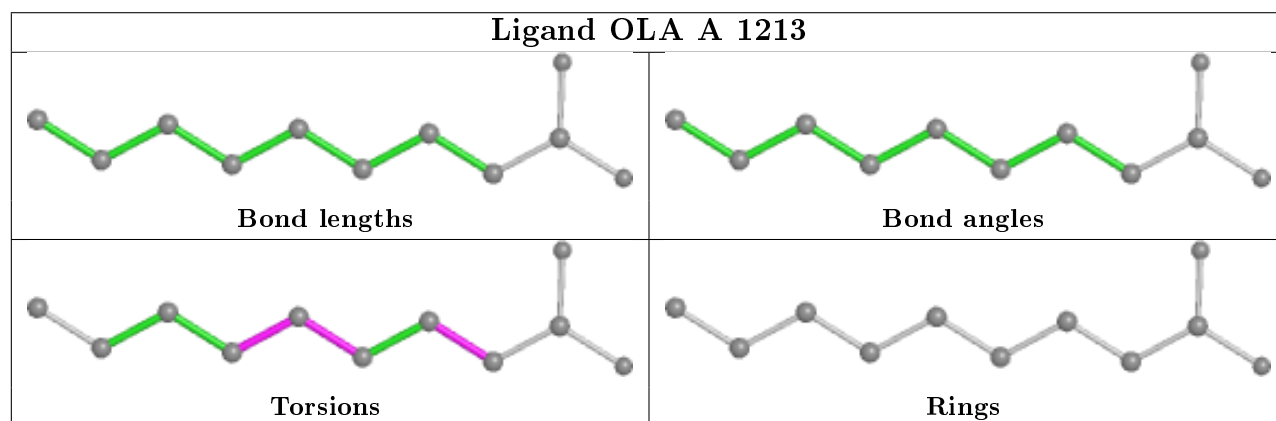
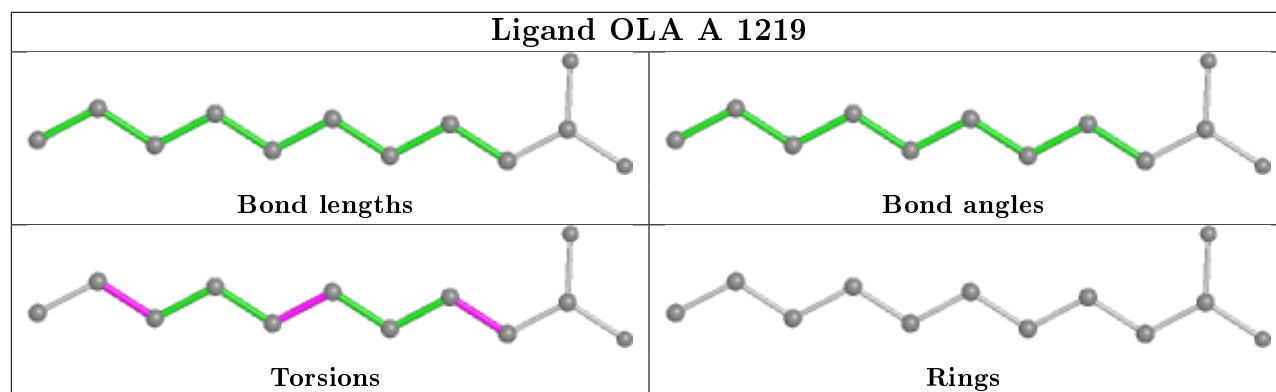
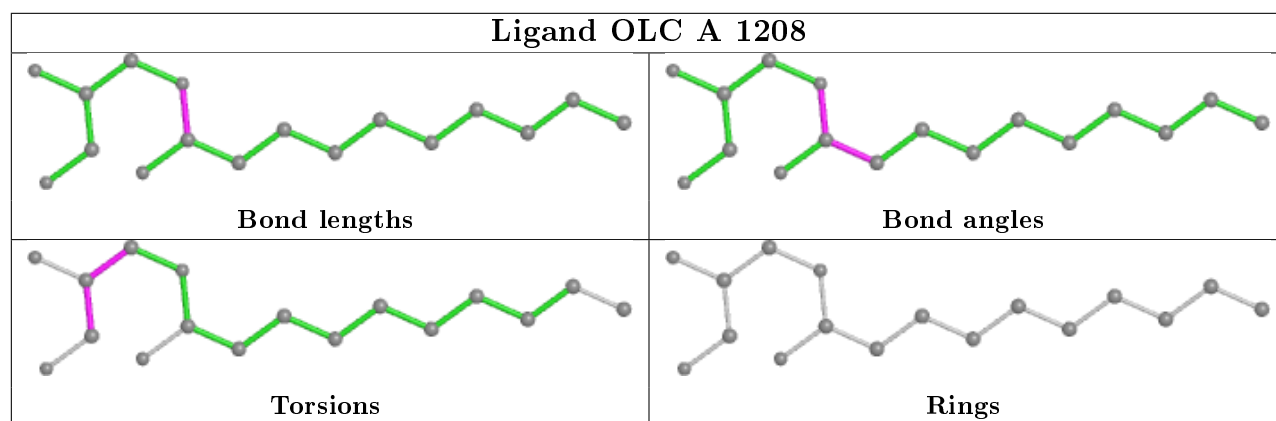
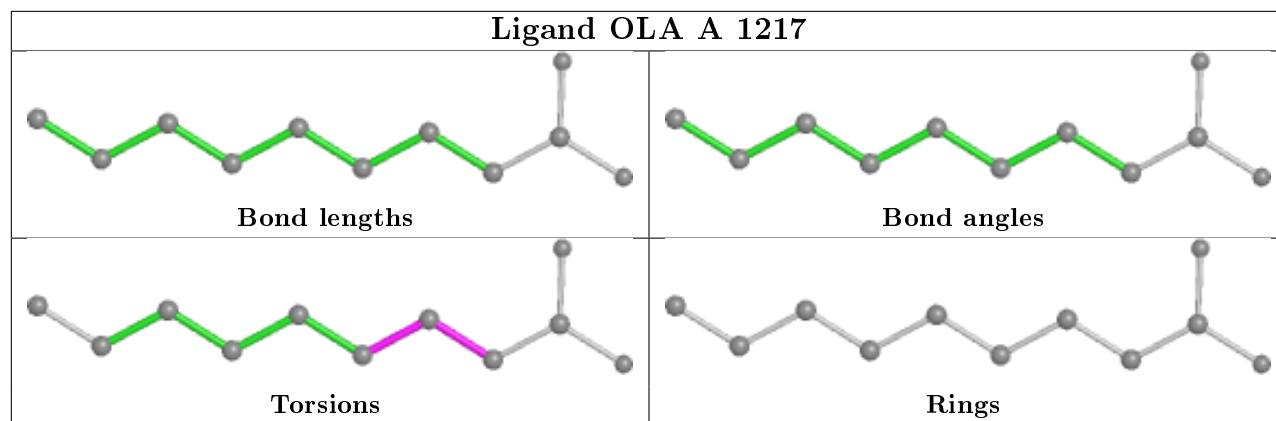












## 5.7 Other polymers [i](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	395/447 (88%)	0.86	68 (17%) ⓘ ⓘ	28, 45, 108, 156	0

All (68) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1056	PRO	7.3
1	A	1024	ALA	6.2
1	A	307	VAL	6.1
1	A	304	ARG	5.7
1	A	1019	LYS	5.6
1	A	306	HIS	5.5
1	A	1062	ARG	5.4
1	A	1060	ASP	4.8
1	A	-1	GLY	4.8
1	A	1010	LEU	4.7
1	A	1058	MET	4.7
1	A	1057	GLU	4.7
1	A	305	SER	4.5
1	A	1061	PHE	4.5
1	A	1020	ALA	4.4
1	A	1080	ASN	4.4
1	A	1068	LEU	4.3
1	A	1092	GLU	4.0
1	A	1063	HIS	3.9
1	A	308	LEU	3.9
1	A	299	PHE	3.8
1	A	111	ARG	3.7
1	A	1094	LEU	3.7
1	A	81	ALA	3.6
1	A	1041	GLN	3.5
1	A	1028	ASP	3.5
1	A	-2	ASP	3.4

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	A	1089	ALA	3.4
1	A	1059	LYS	3.4
1	A	1105	TYR	3.4
1	A	1038	LEU	3.3
1	A	156	SER	3.2
1	A	1101	TYR	3.2
1	A	1043	ALA	3.2
1	A	1072	ILE	3.1
1	A	27	VAL	3.0
1	A	1033	MET	2.9
1	A	1016	VAL	2.9
1	A	1030	LEU	2.9
1	A	98	ILE	2.9
1	A	119	THR	2.9
1	A	154[A]	ASN	2.7
1	A	1017	ILE	2.6
1	A	295	PHE	2.6
1	A	1042	LYS	2.6
1	A	1106[A]	LEU	2.6
1	A	1014	LEU	2.6
1	A	84	VAL	2.6
1	A	48	LEU	2.5
1	A	224	THR	2.5
1	A	35	SER	2.4
1	A	85	LEU	2.4
1	A	1012	ASP	2.3
1	A	45	VAL	2.3
1	A	82	CYS	2.3
1	A	168	PHE	2.3
1	A	147	GLY	2.3
1	A	1035	ALA	2.3
1	A	288	TYR	2.2
1	A	220	ARG	2.2
1	A	1084	VAL	2.2
1	A	1015	LYS	2.1
1	A	172	VAL	2.1
1	A	29[A]	TRP	2.1
1	A	1032	LYS	2.1
1	A	95	LEU	2.1
1	A	285	PRO	2.0
1	A	302	ILE	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 6.4 Ligands [i](#)

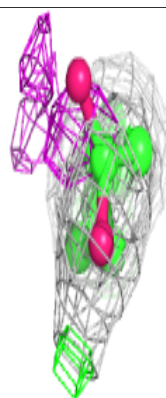
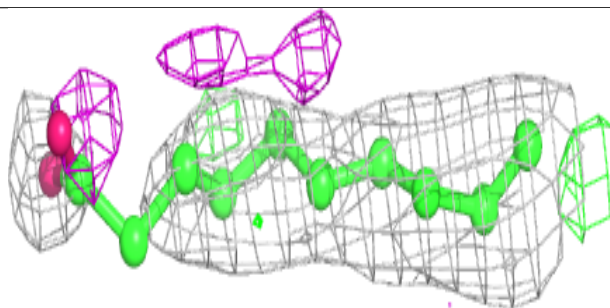
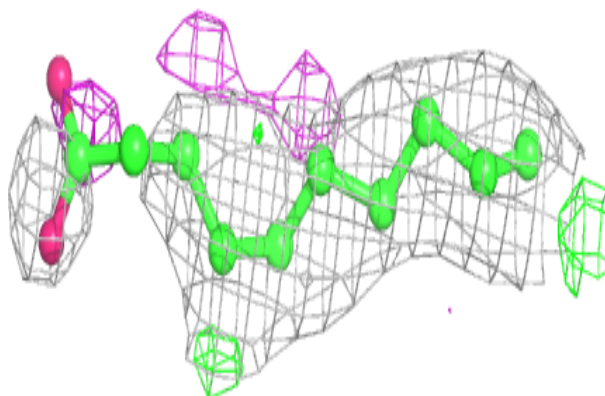
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
7	OLA	A	1214	12/20	0.29	0.30	75,83,102,104	0
7	OLA	A	1226	17/20	0.54	0.25	79,89,98,98	0
7	OLA	A	1227	20/20	0.55	0.34	80,86,105,107	0
7	OLA	A	1217	11/20	0.60	0.19	97,100,104,106	0
6	OLC	A	1222	11/25	0.61	0.19	100,103,107,107	0
8	PEG	A	1225	7/7	0.63	0.18	95,96,98,98	0
7	OLA	A	1215	16/20	0.64	0.24	61,84,97,99	0
7	OLA	A	1223	13/20	0.65	0.38	84,91,111,112	0
5	OLB	A	1210	17/25	0.67	0.24	71,81,88,91	0
7	OLA	A	1224	19/20	0.68	0.20	75,87,94,95	0
7	OLA	A	1213	11/20	0.68	0.30	50,64,91,93	0
6	OLC	A	1208	17/25	0.69	0.18	69,77,92,92	0
7	OLA	A	1219	12/20	0.70	0.15	80,85,104,104	0
6	OLC	A	1211	11/25	0.75	0.21	110,111,113,114	0
5	OLB	A	1206	18/25	0.77	0.27	59,70,101,102	0
6	OLC	A	1207	17/25	0.80	0.17	62,76,89,90	0
6	OLC	A	1212	18/25	0.81	0.17	69,75,89,91	0
7	OLA	A	1218	9/20	0.81	0.13	84,88,97,97	0
6	OLC	A	1209	16/25	0.84	0.20	75,82,89,89	0
7	OLA	A	1216	9/20	0.86	0.26	65,71,76,78	0
6	OLC	A	1221	17/25	0.86	0.16	73,79,87,89	0
4	CLR	A	1205	28/28	0.87	0.14	49,55,78,81	0
4	CLR	A	1204	28/28	0.90	0.13	47,56,66,67	0
6	OLC	A	1220	14/25	0.91	0.18	76,85,92,94	0
2	ZMA	A	1201	25/25	0.94	0.17	28,30,51,58	0
4	CLR	A	1203	28/28	0.94	0.09	44,50,76,78	0
3	NA	A	1202	1/1	0.99	0.05	35,35,35,35	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 OLA A 1214:**

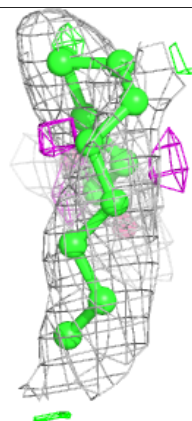
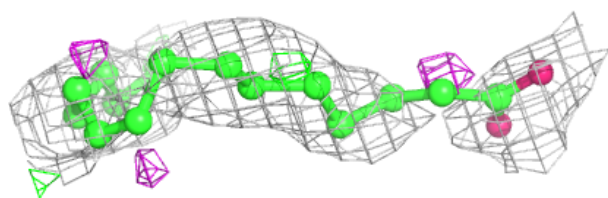
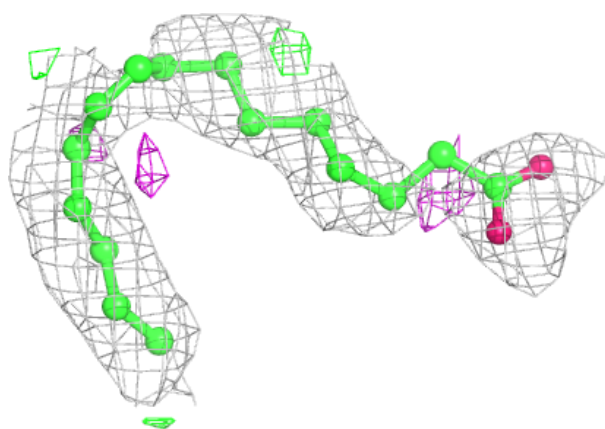
2mF<sub>o</sub>-DF<sub>c</sub> (at 0.7 rmsd) in gray  
mF<sub>o</sub>-DF<sub>c</sub> (at 3 rmsd) in purple (negative)  
and green (positive)



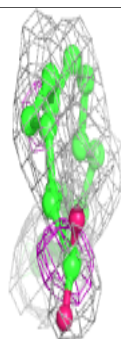
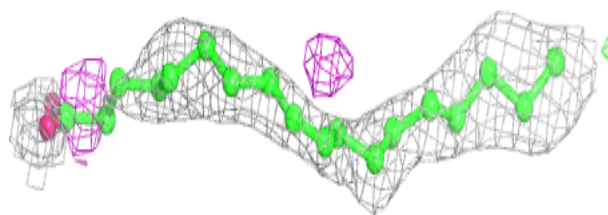
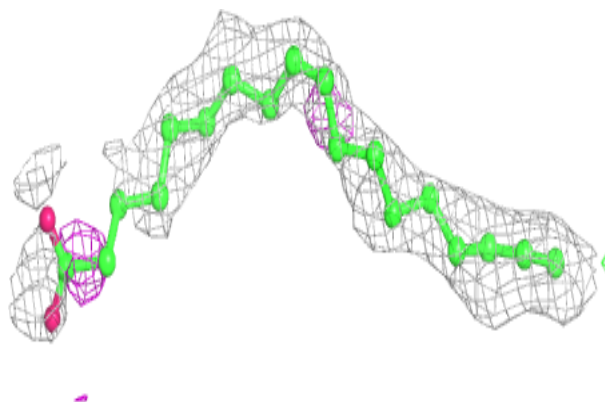


**Electron density around OLA A 1226:**

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

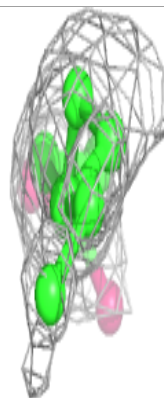
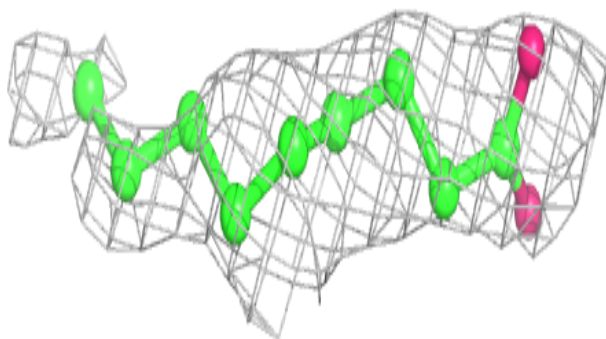
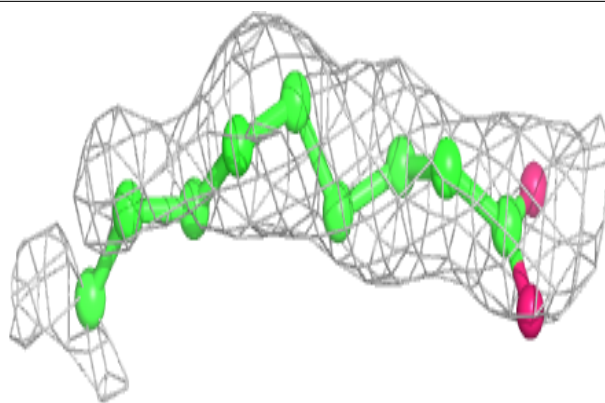
**Electron density around OLA A 1227:**

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

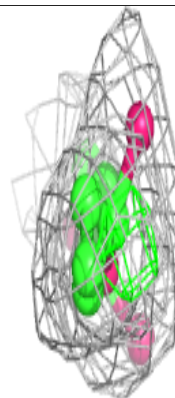
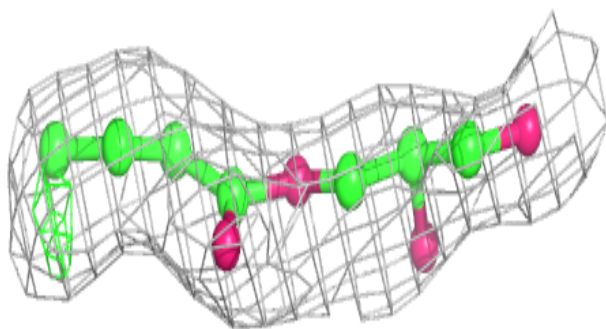
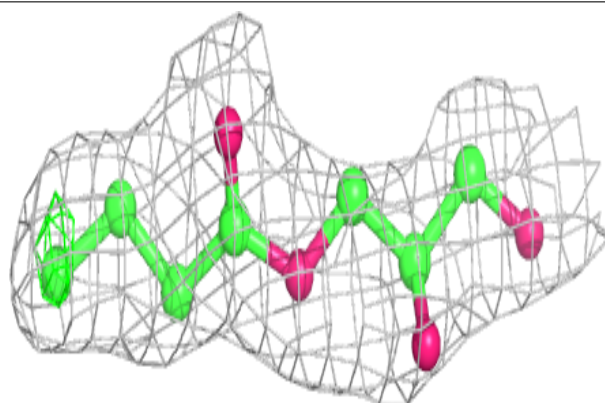


**Electron density around OLA A 1217:**

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

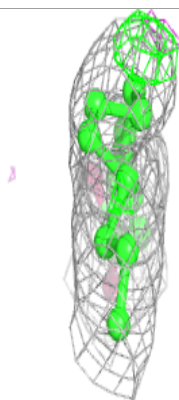
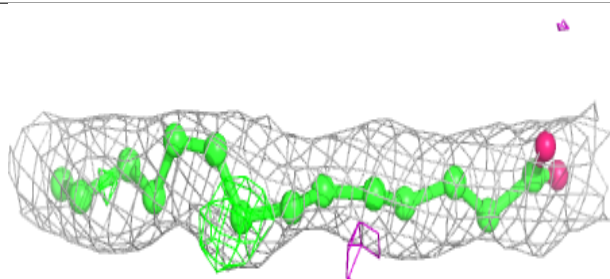
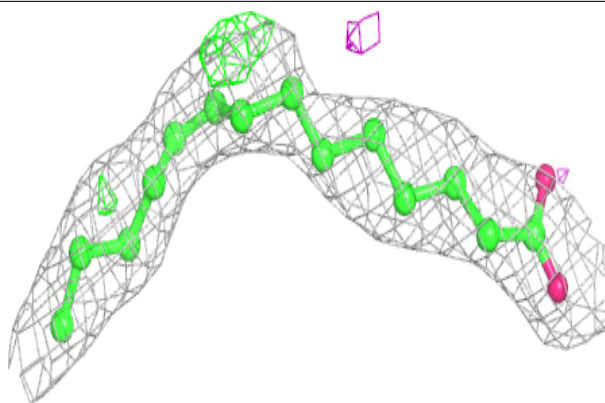
**Electron density around OLC A 1222:**

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

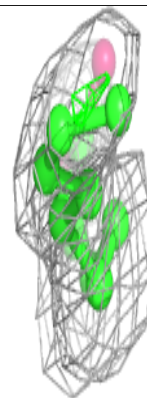
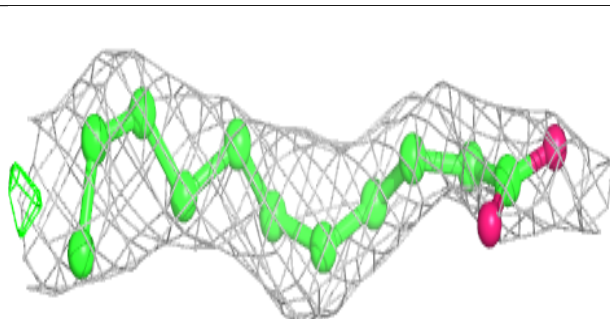
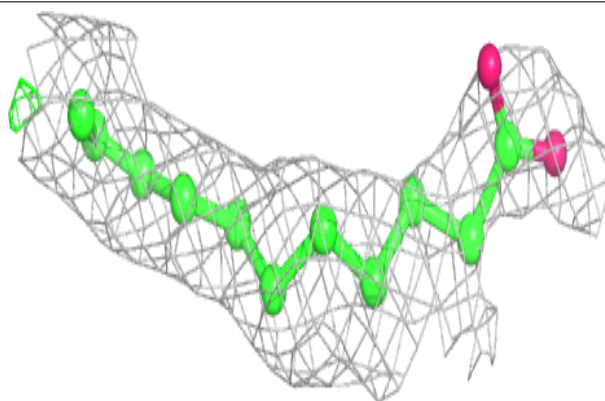


**Electron density around OLA A 1215:**

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

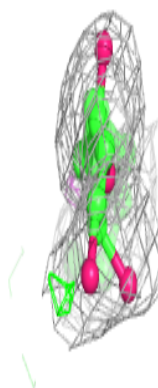
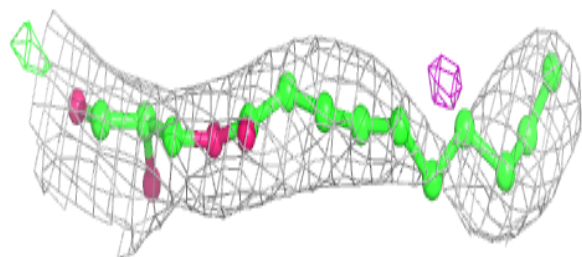
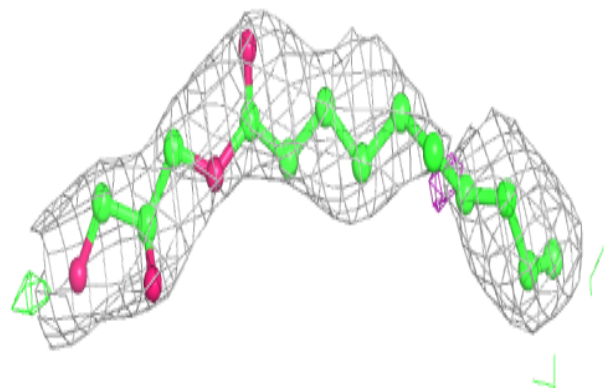
**Electron density around OLA A 1223:**

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

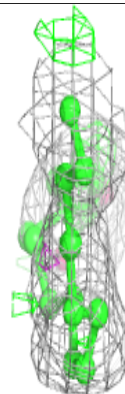
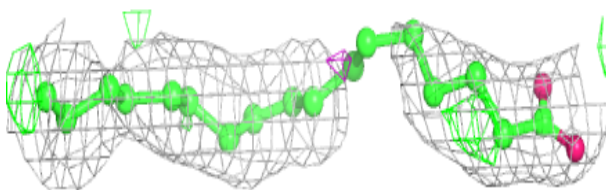
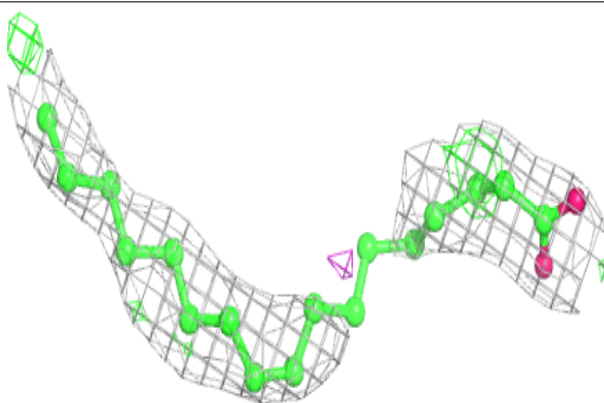


**Electron density around OLB A 1210:**

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

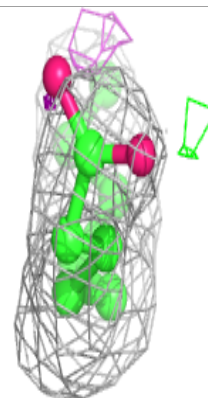
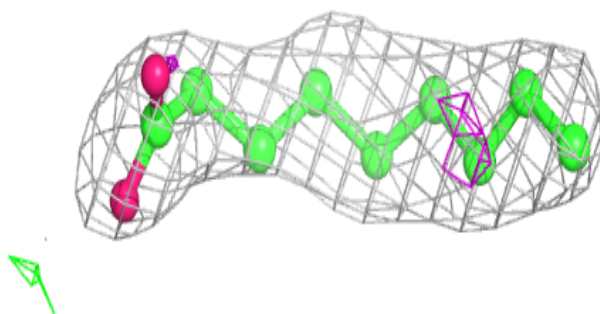
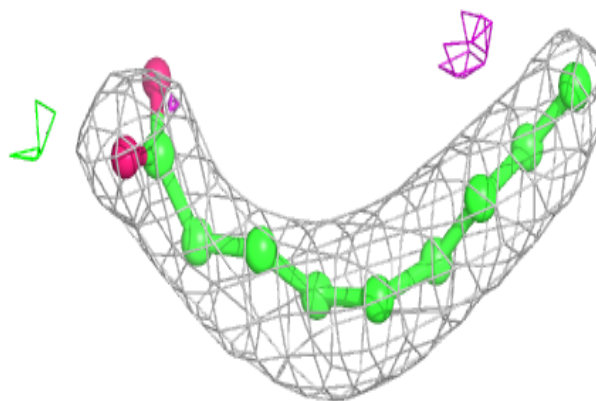
**Electron density around OLA A 1224:**

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

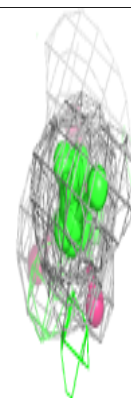
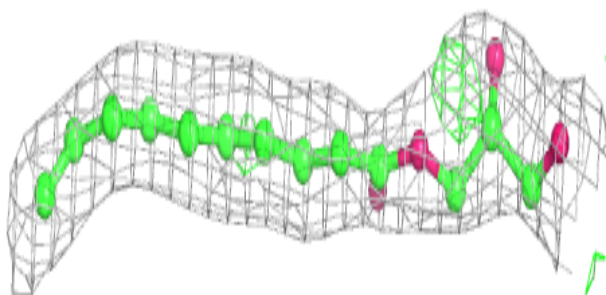
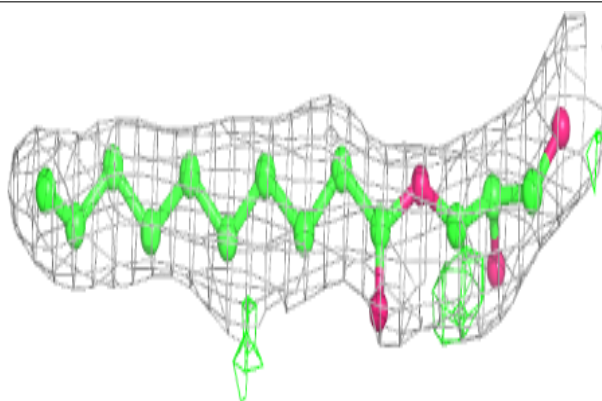


**Electron density around OLA A 1213:**

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

**Electron density around OLC A 1208:**

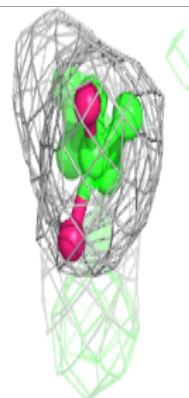
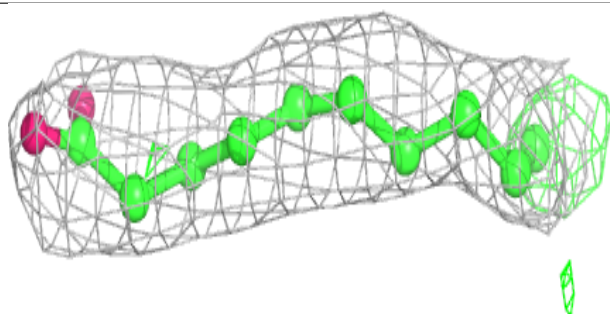
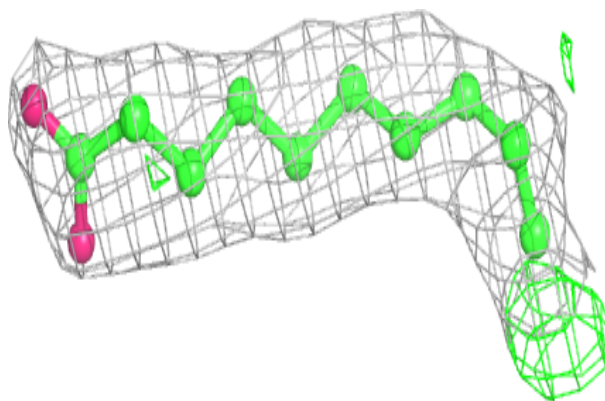
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



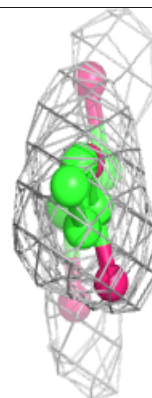
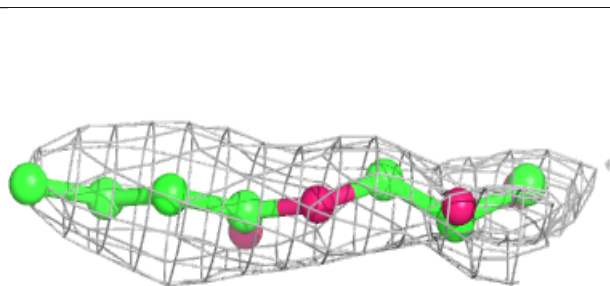
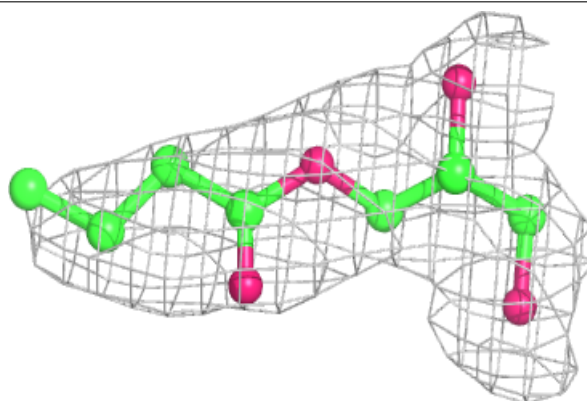


**Electron density around OLA A 1219:**

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

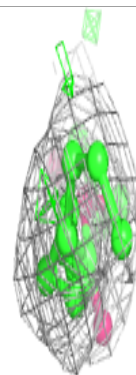
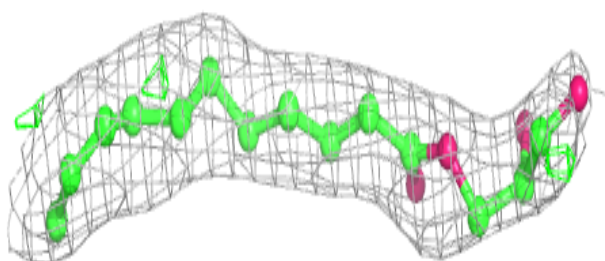
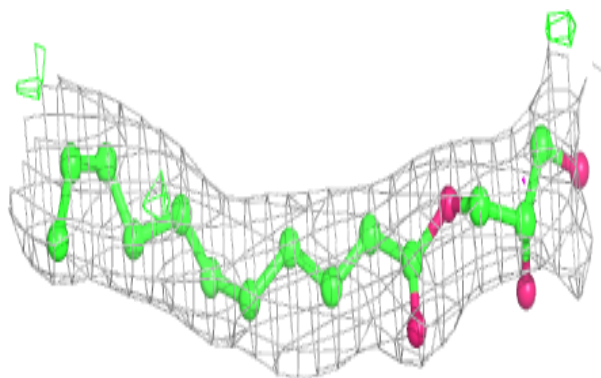
**Electron density around OLC A 1211:**

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

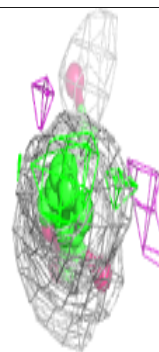
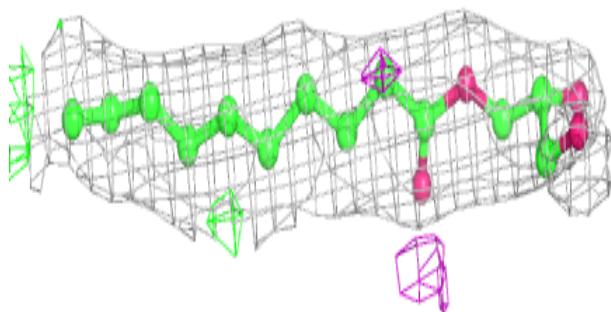
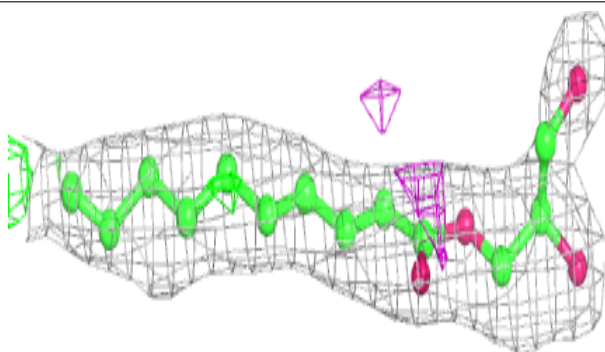


**Electron density around OLB A 1206:**

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

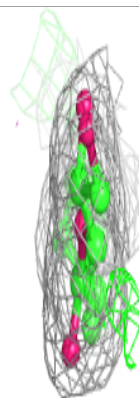
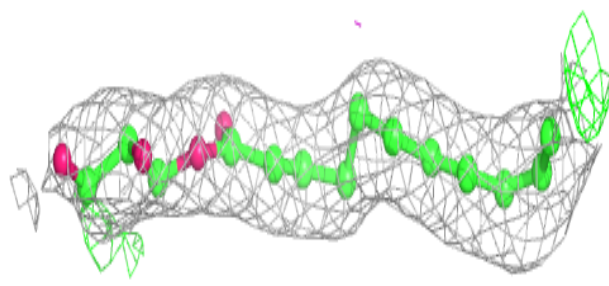
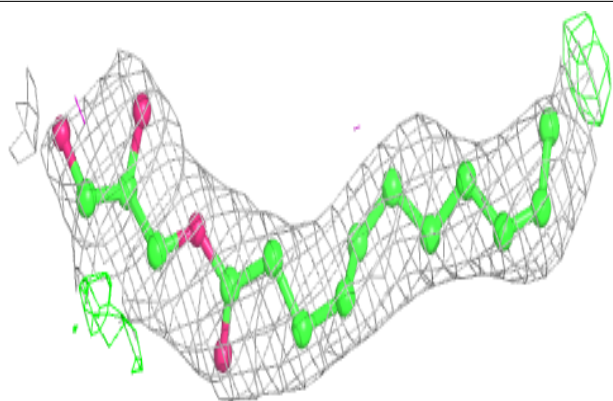
**Electron density around OLC A 1207:**

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

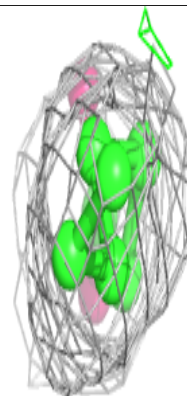
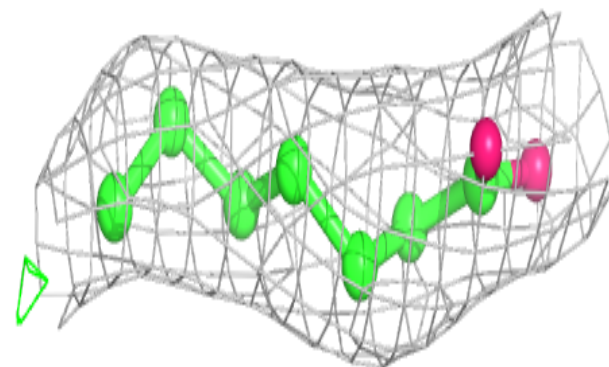
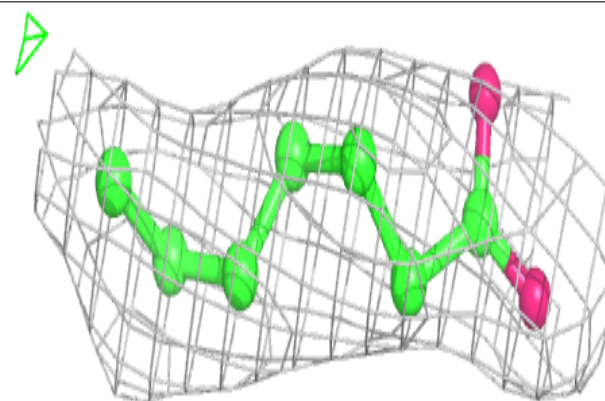


**Electron density around OLC A 1212:**

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

**Electron density around OLA A 1218:**

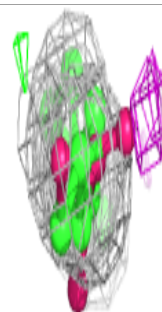
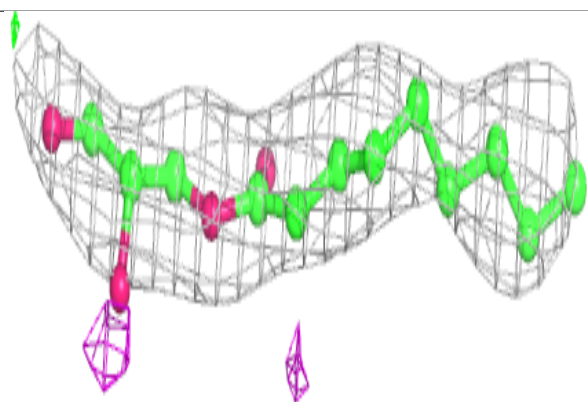
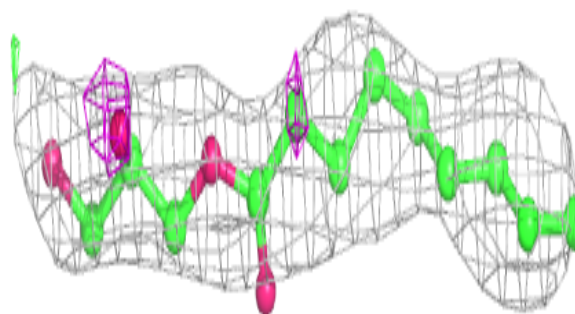
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



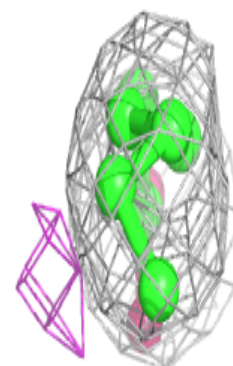
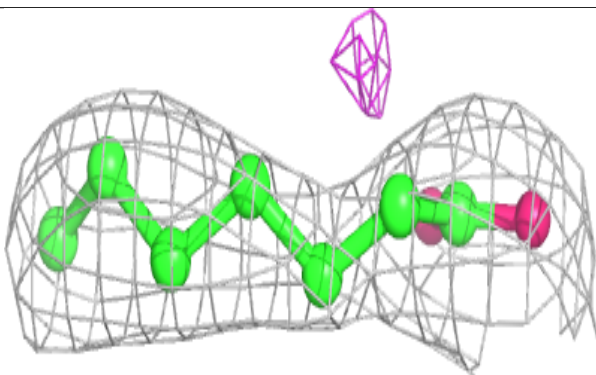
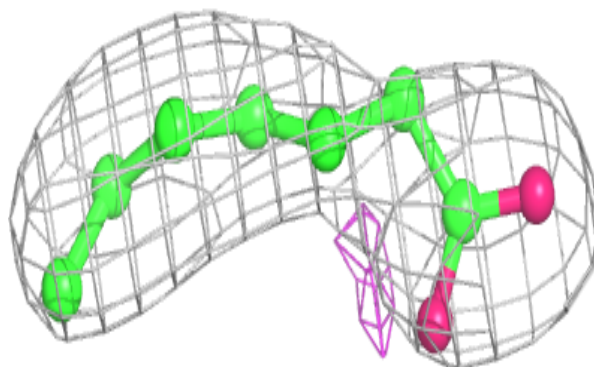


**Electron density around OLC A 1209:**

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

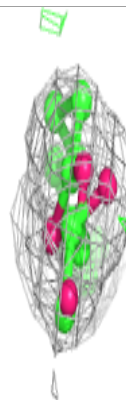
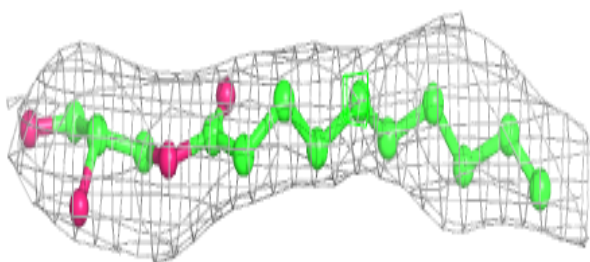
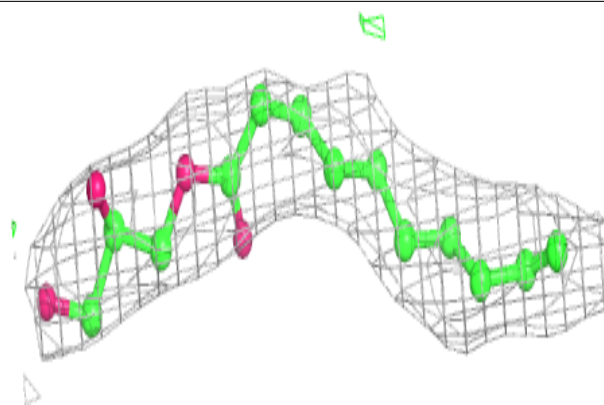
**Electron density around OLA A 1216:**

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

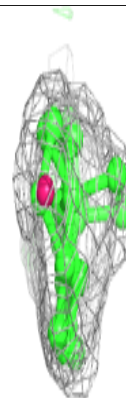
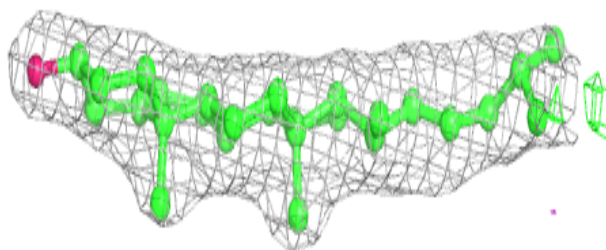
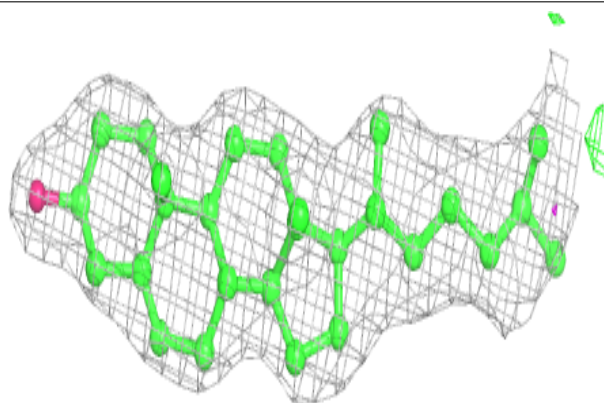


**Electron density around OLC A 1221:**

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

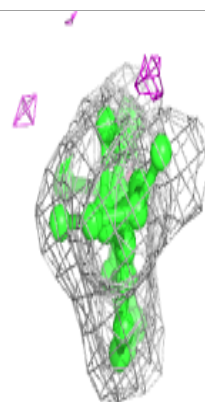
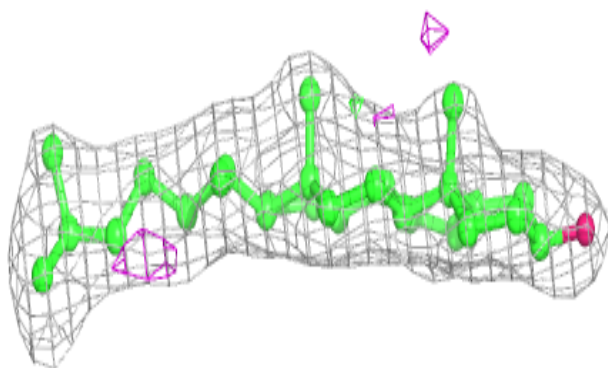
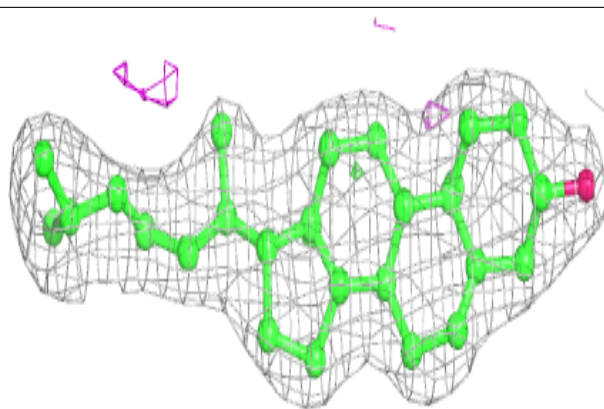
**Electron density around CLR A 1205:**

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

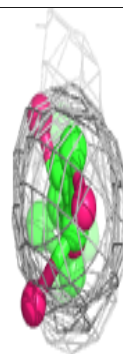
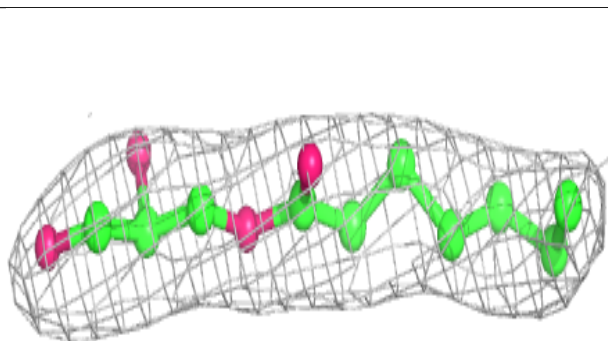
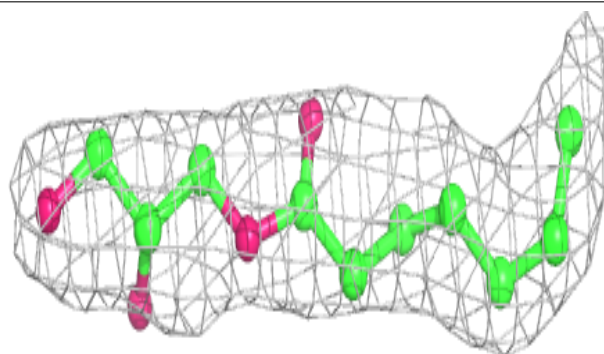


**Electron density around CLR A 1204:**

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

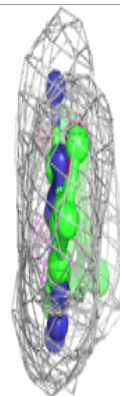
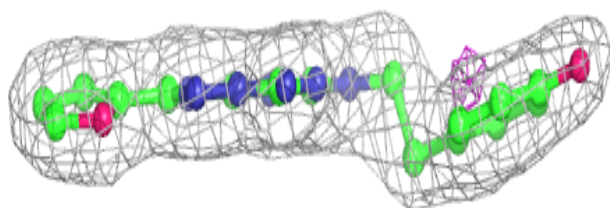
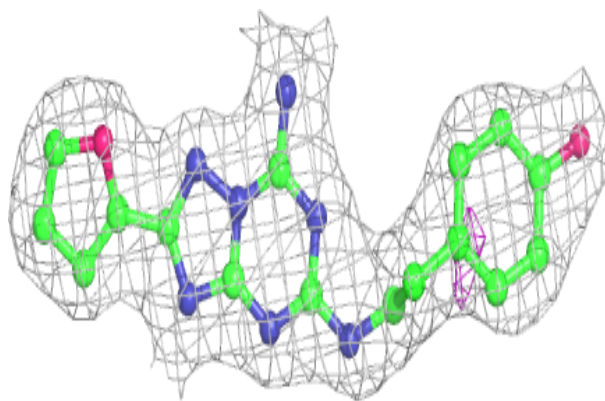
**Electron density around OLC A 1220:**

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

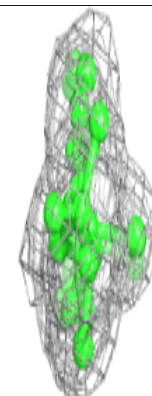
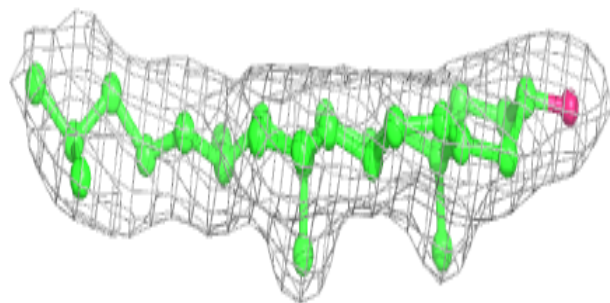
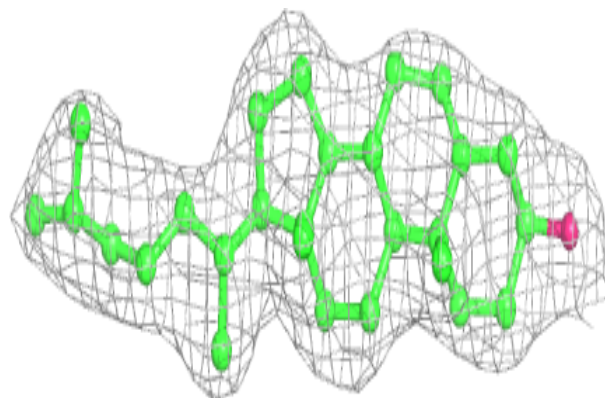


**Electron density around ZMA A 1201:**

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

**Electron density around CLR A 1203:**

$2mF_o-DF_c$  (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.