



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 01:49 PM UTC

PDB ID : 5K2D / pdb_00005k2d
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

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

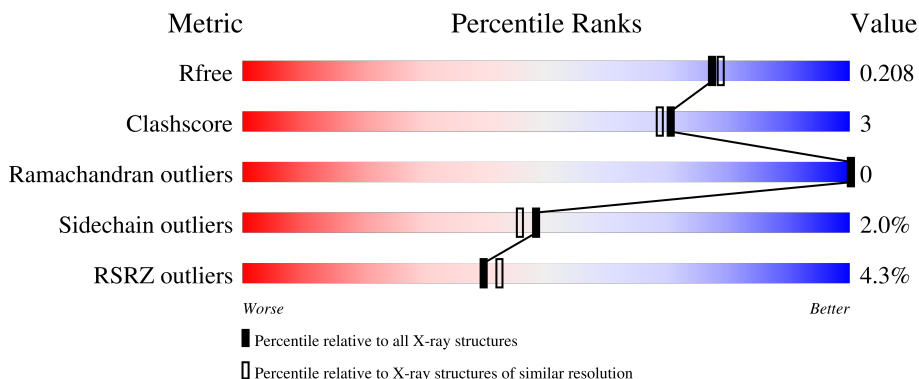
1 Overall quality at a glance

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}	180053	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (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 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	447	

Ideal geometry (proteins) : Engh & Huber (2001)
 Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
 Validation Pipeline (wwPDB-VP) : 2.49

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:

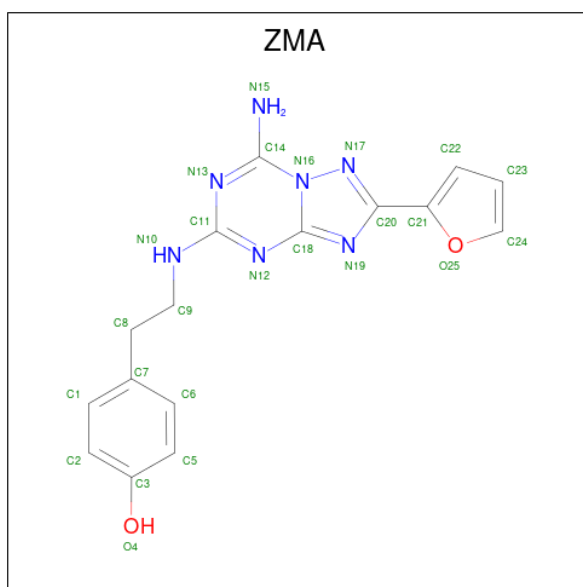
Chain	Residue	Modelled	Actual	Comment	Reference
A	-24	MET	-	initiating methionine	UNP P29274
A	-23	LYS	-	expression tag	UNP P29274
A	-22	THR	-	expression tag	UNP P29274
A	-21	ILE	-	expression tag	UNP P29274
A	-20	ILE	-	expression tag	UNP P29274
A	-19	ALA	-	expression tag	UNP P29274
A	-18	LEU	-	expression 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

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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 (CCD ID: ZMA) (formula: C₁₆H₁₅N₇O₂).

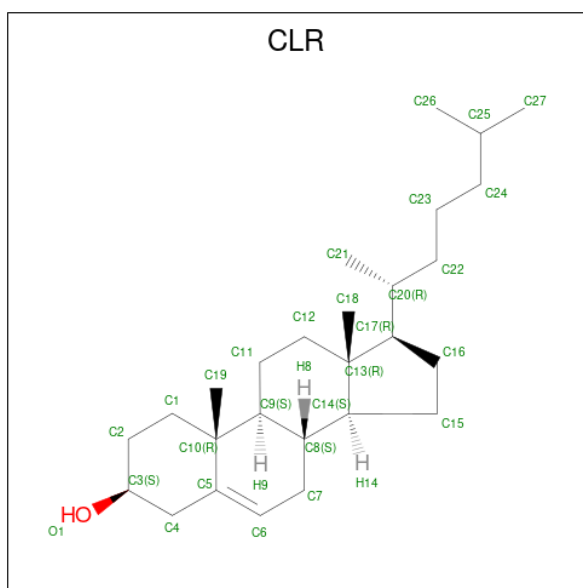


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			25	16	7	2		

- Molecule 3 is SODIUM ION (CCD ID: NA) (formula: Na).

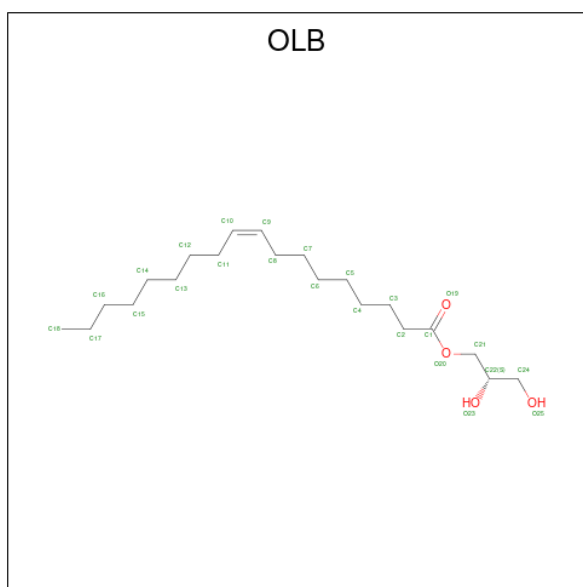
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Na	0	0
			1	1		

- Molecule 4 is CHOLESTEROL (CCD ID: CLR) (formula: $C_{27}H_{46}O$).



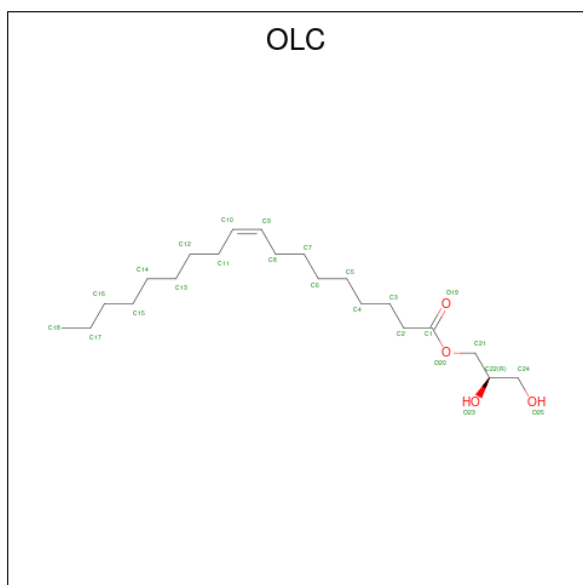
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			28	27	1		
4	A	1	Total	C	O	0	0
			28	27	1		
4	A	1	Total	C	O	0	0
			28	27	1		

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



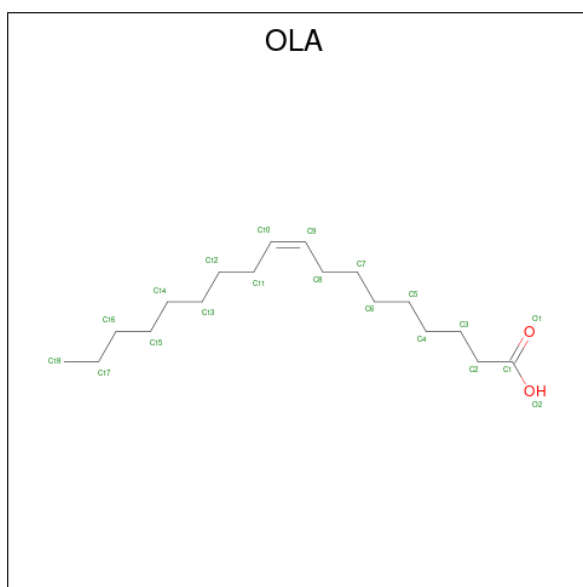
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			18	14	4		
5	A	1	Total	C	O	0	0
			17	13	4		

- Molecule 6 is (2R)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (CCD ID: OLC) (formula: $C_{21}H_{40}O_4$).



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 (CCD ID: OLA) (formula: $C_{18}H_{34}O_2$).



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 (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



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

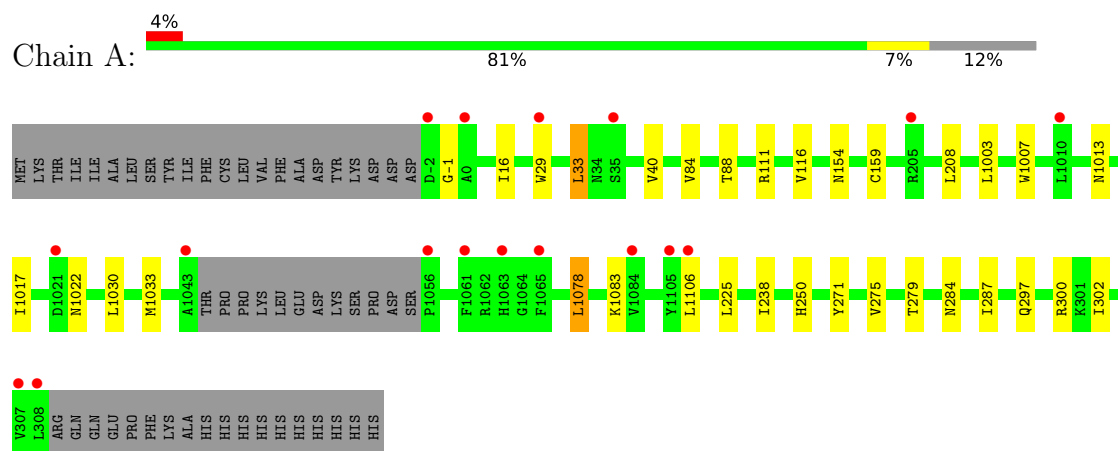
- Molecule 9 is water.

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, 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: 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, α , β , γ	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) 99.9 (23.44-1.90)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.97 (at 1.90Å)	Xtriage
Refinement program	PHENIX 1.10_2155	Depositor
R, R_{free}	0.174 , 0.207 0.176 , 0.208	Depositor DCC
R_{free} test set	1989 reflections (4.71%)	wwPDB-VP
Wilson B-factor (Å ²)	41.5	Xtriage
Anisotropy	0.136	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 102.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	3636	wwPDB-VP
Average B, all atoms (Å ²)	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.*

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZMA, OLA, OLC, OLB, NA, 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	0.43	0/3189	0.50	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	21	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	25	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 (25) 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: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:1017:ILE:HD12	1:A:1033:MET:HE1	2.00	0.44
1:A:40:VAL:HG11	1:A:116:VAL:HG12	2.01	0.42
1:A:1013:ASN:HB3	1:A:1033:MET:HE2	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
1:A:1013:ASN:CB	1:A:1033:MET:HE2	2.51	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%)	50	47

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

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1099	ASN
1	A	306	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

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	1224	-	18,18,19	0.51	0	18,18,19	0.85	0
5	OLB	A	1206	-	17,17,24	1.13	1 (5%)	18,18,25	0.96	1 (5%)
6	OLC	A	1207	-	16,16,24	1.12	1 (6%)	17,17,25	1.15	1 (5%)
4	CLR	A	1203	-	31,31,31	0.65	0	48,48,48	0.99	2 (4%)
6	OLC	A	1221	-	16,16,24	1.14	1 (6%)	17,17,25	1.19	2 (11%)
4	CLR	A	1204	-	31,31,31	0.65	0	48,48,48	1.00	1 (2%)
6	OLC	A	1222	-	10,10,24	1.47	1 (10%)	11,11,25	1.26	1 (9%)
7	OLA	A	1217	-	10,10,19	0.65	0	10,10,19	1.11	0
7	OLA	A	1214	-	11,11,19	0.67	0	11,11,19	1.07	1 (9%)
4	CLR	A	1205	-	31,31,31	0.73	0	48,48,48	0.92	1 (2%)
6	OLC	A	1208	-	16,16,24	1.15	1 (6%)	17,17,25	1.08	2 (11%)
7	OLA	A	1216	-	8,8,19	0.69	0	8,8,19	1.56	2 (25%)
7	OLA	A	1219	-	11,11,19	0.64	0	11,11,19	1.16	0
7	OLA	A	1226	-	16,16,19	0.53	0	16,16,19	0.86	0
5	OLB	A	1210	-	16,16,24	1.23	1 (6%)	17,17,25	1.01	2 (11%)
7	OLA	A	1215	-	15,15,19	0.55	0	15,15,19	0.89	0
7	OLA	A	1213	-	10,10,19	0.69	0	10,10,19	1.18	2 (20%)
6	OLC	A	1211	-	10,10,24	1.47	1 (10%)	11,11,25	1.26	1 (9%)
7	OLA	A	1223	-	12,12,19	0.62	0	12,12,19	1.03	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	OLA	A	1227	-	19,19,19	0.49	0	19,19,19	0.83	0
6	OLC	A	1220	-	13,13,24	1.21	1 (7%)	14,14,25	1.23	1 (7%)
8	PEG	A	1225	-	6,6,6	0.42	0	5,5,5	0.38	0
6	OLC	A	1212	-	17,17,24	1.09	1 (5%)	18,18,25	0.94	1 (5%)
2	ZMA	A	1201	-	26,28,28	1.24	3 (11%)	30,39,39	1.96	8 (26%)
6	OLC	A	1209	-	15,15,24	1.20	1 (6%)	16,16,25	1.13	1 (6%)
7	OLA	A	1218	-	8,8,19	0.75	0	8,8,19	1.25	1 (12%)

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	1224	-	-	5/16/16/17	-
5	OLB	A	1206	-	-	4/17/17/24	-
6	OLC	A	1207	-	-	2/16/16/24	-
4	CLR	A	1203	-	-	1/10/68/68	0/4/4/4
6	OLC	A	1221	-	-	1/16/16/24	-
4	CLR	A	1204	-	-	3/10/68/68	0/4/4/4
6	OLC	A	1222	-	-	2/10/10/24	-
7	OLA	A	1217	-	-	4/8/8/17	-
7	OLA	A	1214	-	-	4/9/9/17	-
4	CLR	A	1205	-	-	2/10/68/68	0/4/4/4
6	OLC	A	1208	-	-	3/16/16/24	-
7	OLA	A	1216	-	-	3/6/6/17	-
7	OLA	A	1219	-	-	3/9/9/17	-
7	OLA	A	1226	-	-	3/14/14/17	-
5	OLB	A	1210	-	-	7/16/16/24	-
7	OLA	A	1215	-	-	3/13/13/17	-
7	OLA	A	1213	-	-	5/8/8/17	-
6	OLC	A	1211	-	-	2/10/10/24	-
7	OLA	A	1223	-	-	6/10/10/17	-
7	OLA	A	1227	-	-	11/17/17/17	-
6	OLC	A	1220	-	-	2/13/13/24	-
8	PEG	A	1225	-	-	0/4/4/4	-
6	OLC	A	1212	-	-	2/17/17/24	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	ZMA	A	1201	-	-	0/10/10/10	0/4/4/4
6	OLC	A	1209	-	-	2/15/15/24	-
7	OLA	A	1218	-	-	2/6/6/17	-

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	1210	OLB	O20-C1	4.65	1.46	1.33
6	A	1222	OLC	O20-C1	4.49	1.46	1.33
6	A	1211	OLC	O20-C1	4.46	1.46	1.33
6	A	1209	OLC	O20-C1	4.46	1.46	1.33
5	A	1206	OLB	O20-C1	4.35	1.46	1.33
6	A	1208	OLC	O20-C1	4.33	1.46	1.33
6	A	1221	OLC	O20-C1	4.31	1.45	1.33
6	A	1212	OLC	O20-C1	4.25	1.45	1.33
6	A	1220	OLC	O20-C1	4.20	1.45	1.33
6	A	1207	OLC	O20-C1	4.15	1.45	1.33
2	A	1201	ZMA	C18-N16	-3.32	1.33	1.38
2	A	1201	ZMA	C18-N19	2.31	1.37	1.33
2	A	1201	ZMA	C14-N16	-2.00	1.35	1.37

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1201	ZMA	C9-C8-C7	-4.32	103.08	112.83
2	A	1201	ZMA	N15-C14-N16	3.96	123.29	118.32
6	A	1220	OLC	O20-C1-C2	3.29	121.86	111.83
6	A	1221	OLC	O20-C1-C2	3.27	121.81	111.83
2	A	1201	ZMA	C18-N16-N17	3.23	112.83	110.41
2	A	1201	ZMA	N13-C11-N12	-3.23	121.19	126.79
6	A	1207	OLC	O20-C1-C2	3.22	121.65	111.83
2	A	1201	ZMA	O25-C21-C22	3.17	114.63	109.96
6	A	1209	OLC	O20-C1-C2	3.02	121.03	111.83
6	A	1211	OLC	O20-C1-C2	3.01	121.03	111.83
6	A	1222	OLC	O20-C1-C2	2.99	120.96	111.83
2	A	1201	ZMA	N10-C11-N12	2.98	119.98	116.95
4	A	1204	CLR	C7-C8-C9	2.91	113.08	109.72
4	A	1203	CLR	C3-C4-C5	-2.90	107.43	112.05
6	A	1208	OLC	O20-C1-C2	2.72	120.11	111.83
2	A	1201	ZMA	C23-C22-C21	-2.70	102.28	106.52
7	A	1216	OLA	O2-C1-C2	2.66	122.42	114.00
2	A	1201	ZMA	C20-N17-N16	-2.57	98.73	101.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1206	OLB	O20-C1-C2	2.47	119.36	111.83
7	A	1216	OLA	C3-C2-C1	-2.45	108.10	114.51
5	A	1210	OLB	O20-C1-C2	2.35	119.01	111.83
4	A	1205	CLR	C19-C10-C9	-2.31	109.07	111.66
6	A	1212	OLC	O20-C1-C2	2.27	118.75	111.83
7	A	1213	OLA	O2-C1-O1	-2.23	117.59	123.33
7	A	1213	OLA	O2-C1-C2	2.19	120.92	114.00
5	A	1210	OLB	C21-O20-C1	2.15	124.98	117.12
4	A	1203	CLR	C11-C12-C13	-2.11	109.18	112.74
7	A	1218	OLA	C3-C2-C1	-2.11	109.01	114.51
6	A	1221	OLC	O20-C1-O19	-2.05	118.50	123.63
7	A	1214	OLA	O2-C1-C2	2.02	120.38	114.00
6	A	1208	OLC	O20-C1-O19	-2.01	118.60	123.63

There are no chirality outliers.

All (82) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	1224	OLA	C1-C2-C3-C4
6	A	1220	OLC	C1-C2-C3-C4
4	A	1203	CLR	C22-C23-C24-C25
4	A	1204	CLR	C20-C22-C23-C24
7	A	1214	OLA	C1-C2-C3-C4
7	A	1216	OLA	C1-C2-C3-C4
7	A	1217	OLA	C1-C2-C3-C4
7	A	1218	OLA	C1-C2-C3-C4
7	A	1219	OLA	C1-C2-C3-C4
6	A	1220	OLC	C2-C3-C4-C5
7	A	1223	OLA	C4-C5-C6-C7
7	A	1223	OLA	C5-C6-C7-C8
5	A	1210	OLB	C4-C5-C6-C7
4	A	1205	CLR	C22-C23-C24-C25
7	A	1217	OLA	C2-C3-C4-C5
5	A	1210	OLB	C1-C2-C3-C4
7	A	1227	OLA	C4-C5-C6-C7
7	A	1223	OLA	C1-C2-C3-C4
7	A	1227	OLA	C11-C12-C13-C14
5	A	1206	OLB	C5-C6-C7-C8
7	A	1219	OLA	C4-C5-C6-C7
5	A	1206	OLB	C4-C5-C6-C7
7	A	1227	OLA	C14-C15-C16-C17
7	A	1224	OLA	C4-C5-C6-C7

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Mol	Chain	Res	Type	Atoms
7	A	1215	OLA	C10-C11-C12-C13
7	A	1213	OLA	C3-C4-C5-C6
4	A	1204	CLR	C22-C23-C24-C25
7	A	1213	OLA	C1-C2-C3-C4
7	A	1226	OLA	C1-C2-C3-C4
7	A	1226	OLA	C10-C11-C12-C13
7	A	1223	OLA	C3-C4-C5-C6
6	A	1212	OLC	C2-C1-O20-C21
7	A	1219	OLA	C7-C8-C9-C10
5	A	1206	OLB	C2-C1-O20-C21
4	A	1205	CLR	C21-C20-C22-C23
6	A	1208	OLC	O20-C21-C22-O23
7	A	1227	OLA	C5-C6-C7-C8
7	A	1213	OLA	C4-C5-C6-C7
7	A	1226	OLA	C3-C4-C5-C6
7	A	1215	OLA	C6-C7-C8-C9
6	A	1211	OLC	C2-C1-O20-C21
7	A	1218	OLA	C4-C5-C6-C7
7	A	1227	OLA	C12-C13-C14-C15
6	A	1221	OLC	C1-C2-C3-C4
6	A	1208	OLC	O20-C21-C22-C24
7	A	1224	OLA	C11-C12-C13-C14
6	A	1212	OLC	O19-C1-O20-C21
5	A	1206	OLB	O19-C1-O20-C21
7	A	1216	OLA	C4-C5-C6-C7
6	A	1211	OLC	O19-C1-O20-C21
7	A	1216	OLA	C3-C4-C5-C6
5	A	1210	OLB	C7-C8-C9-C10
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	O19-C1-O20-C21
6	A	1209	OLC	C3-C4-C5-C6
5	A	1210	OLB	C3-C4-C5-C6
6	A	1208	OLC	O23-C22-C24-O25
4	A	1204	CLR	C23-C24-C25-C27
7	A	1223	OLA	C2-C3-C4-C5
7	A	1214	OLA	C4-C5-C6-C7
7	A	1227	OLA	C9-C10-C11-C12
7	A	1213	OLA	O1-C1-C2-C3
7	A	1214	OLA	O2-C1-C2-C3
5	A	1210	OLB	C5-C6-C7-C8

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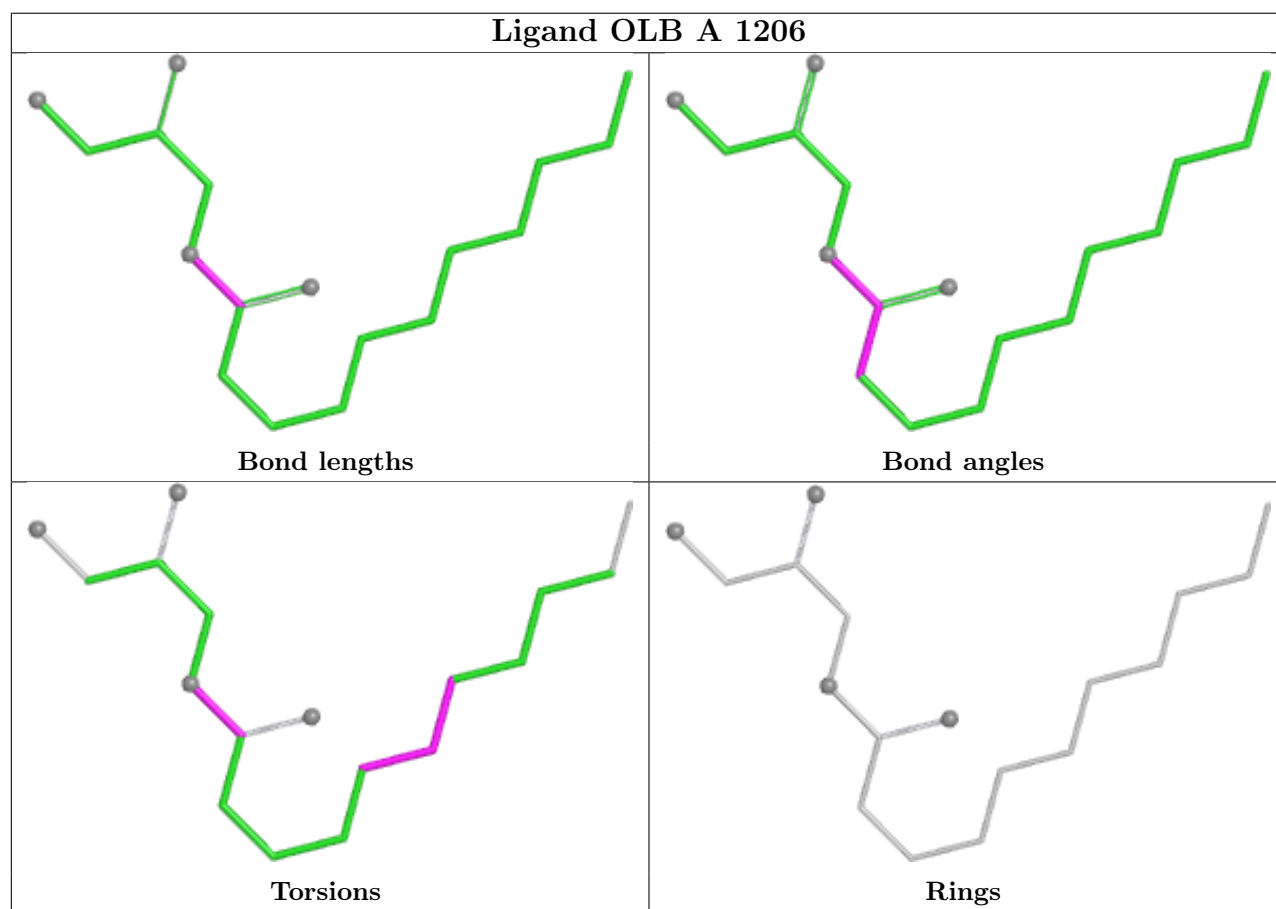
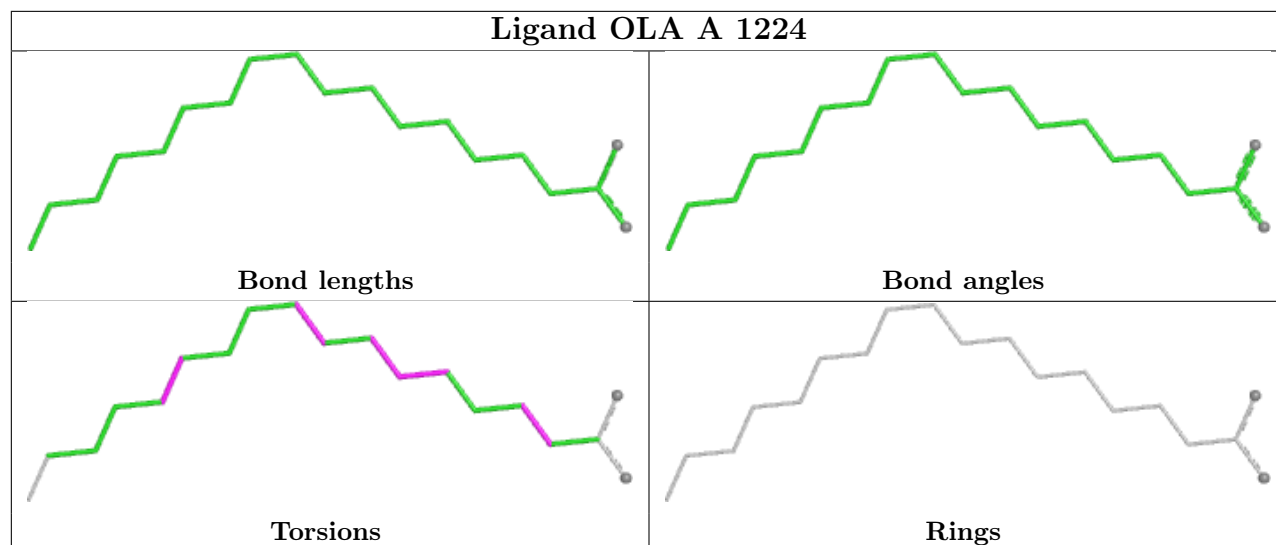
Mol	Chain	Res	Type	Atoms
7	A	1213	OLA	O2-C1-C2-C3
7	A	1214	OLA	O1-C1-C2-C3
6	A	1207	OLC	O20-C21-C22-C24
7	A	1215	OLA	C7-C8-C9-C10
7	A	1224	OLA	C5-C6-C7-C8
6	A	1222	OLC	C2-C1-O20-C21
7	A	1217	OLA	O2-C1-C2-C3
7	A	1224	OLA	C7-C8-C9-C10
7	A	1227	OLA	C2-C3-C4-C5
7	A	1217	OLA	O1-C1-C2-C3
6	A	1209	OLC	C4-C5-C6-C7
7	A	1223	OLA	C7-C8-C9-C10
7	A	1227	OLA	C7-C8-C9-C10
7	A	1227	OLA	O2-C1-C2-C3
6	A	1222	OLC	O19-C1-O20-C21
7	A	1227	OLA	O1-C1-C2-C3

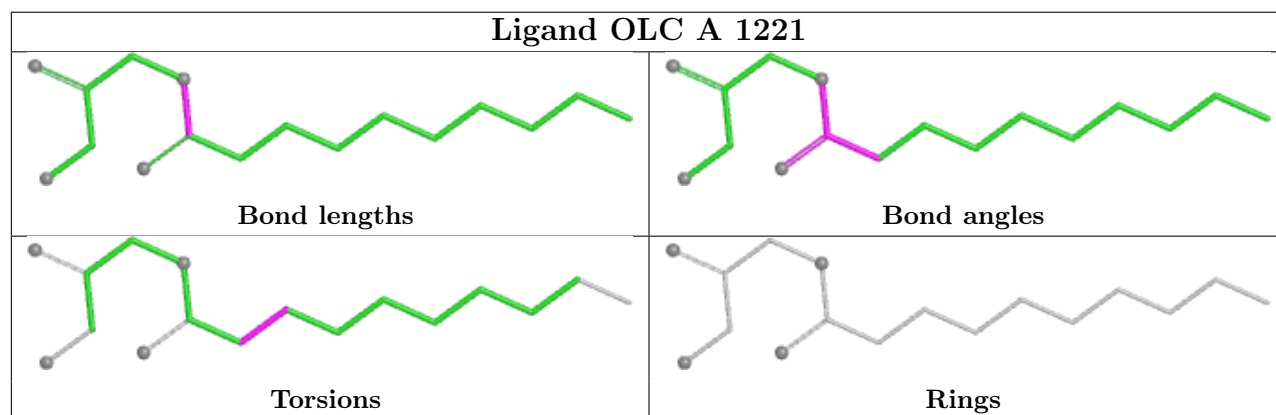
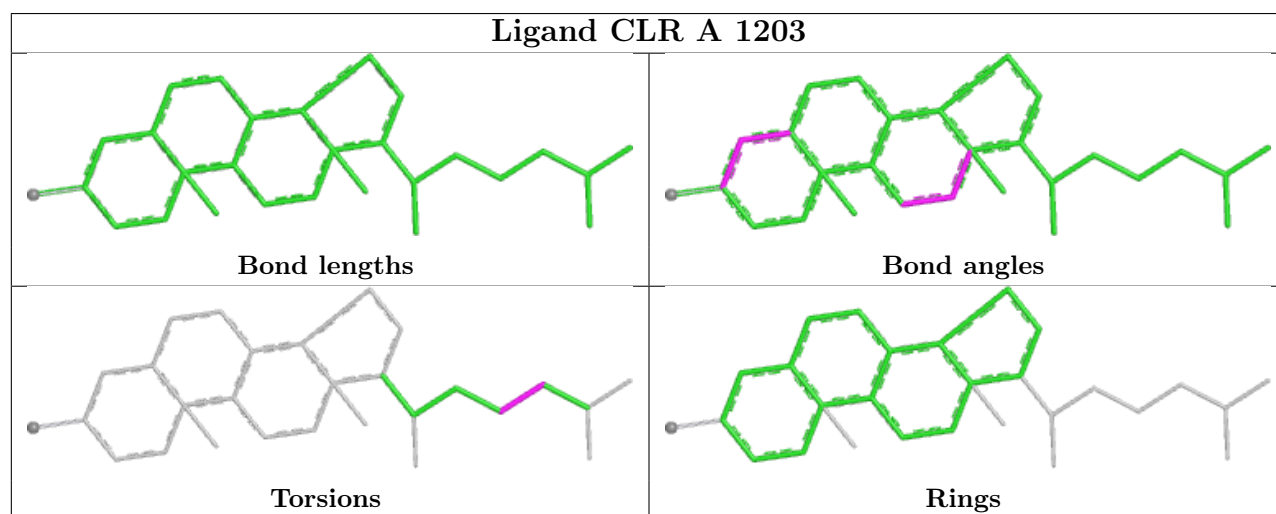
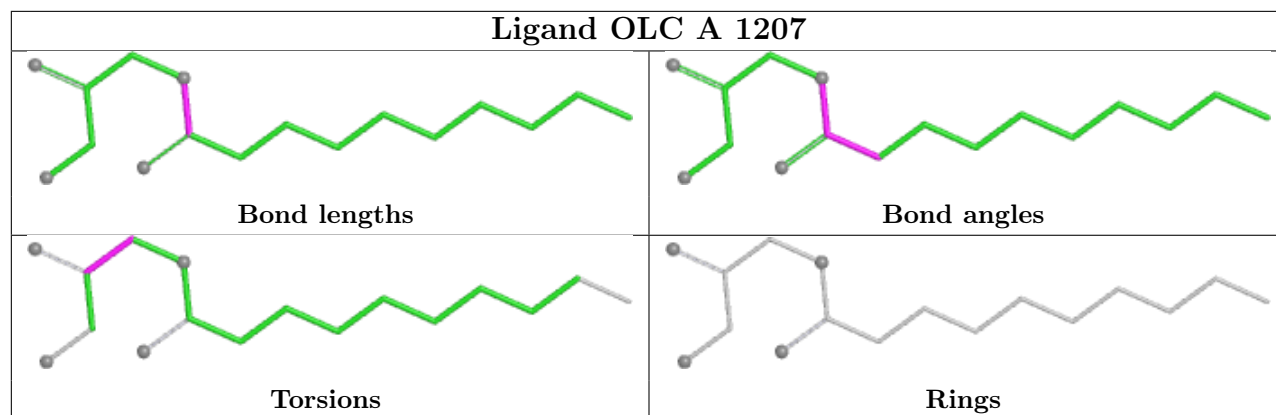
There are no ring outliers.

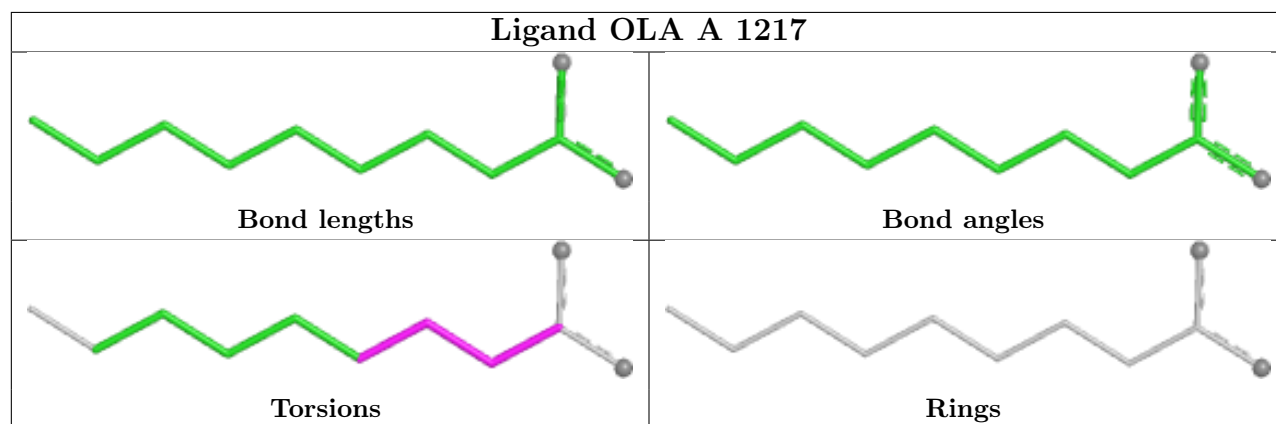
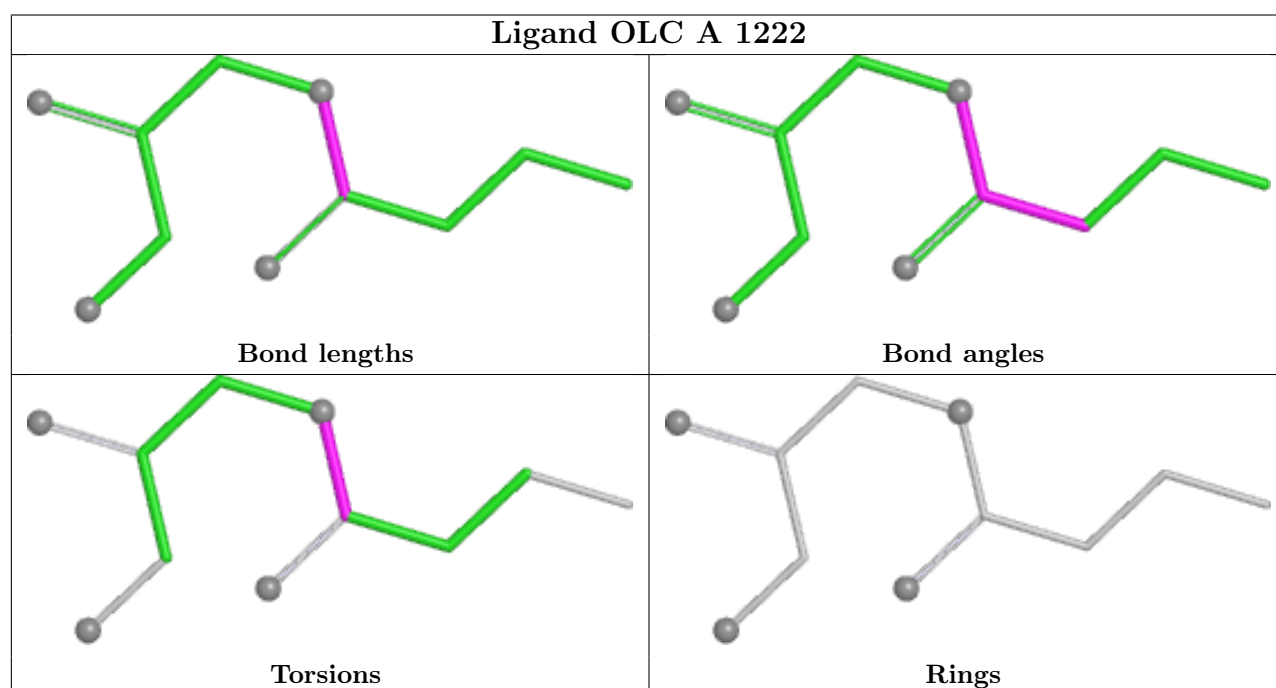
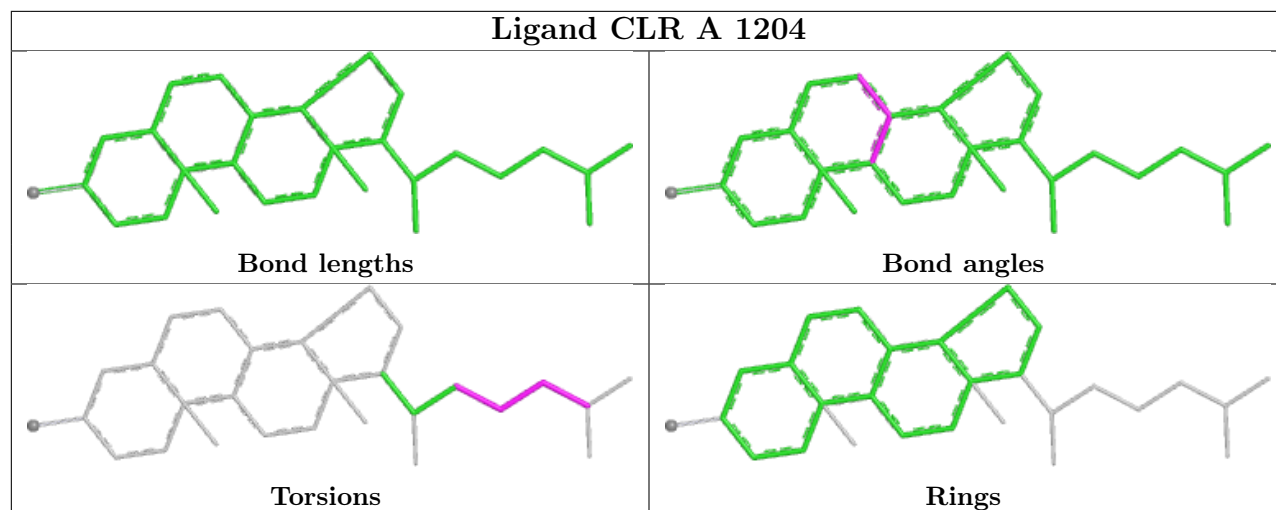
7 monomers are involved in 5 short contacts:

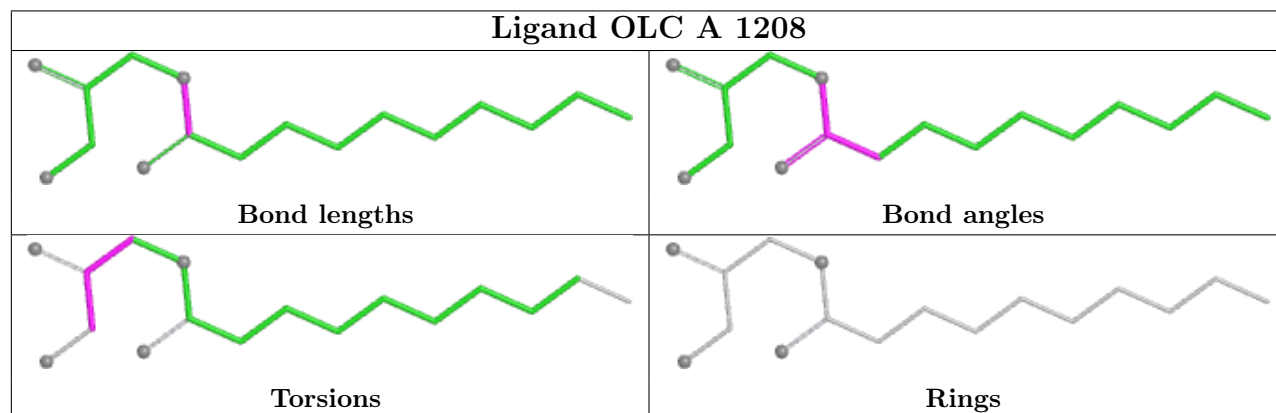
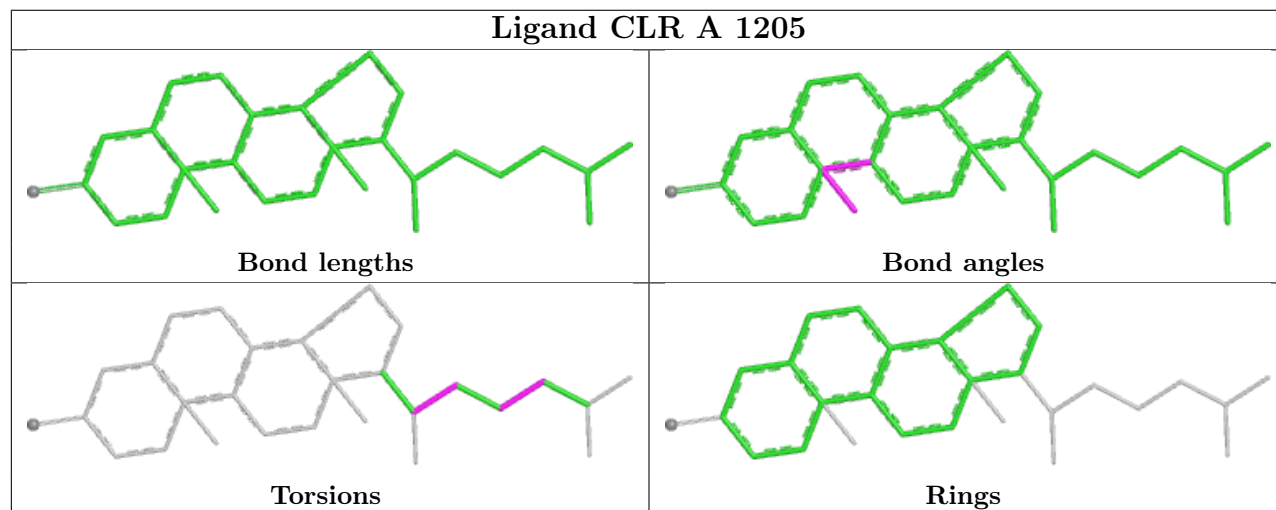
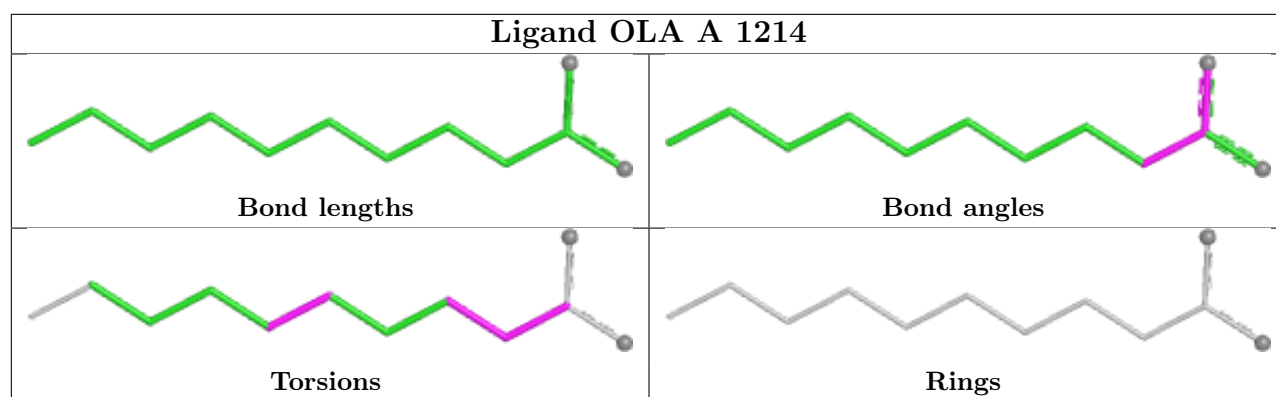
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	1222	OLC	1	0
4	A	1205	CLR	1	0
7	A	1226	OLA	1	0
5	A	1210	OLB	1	0
7	A	1227	OLA	1	0
6	A	1212	OLC	1	0
2	A	1201	ZMA	1	0

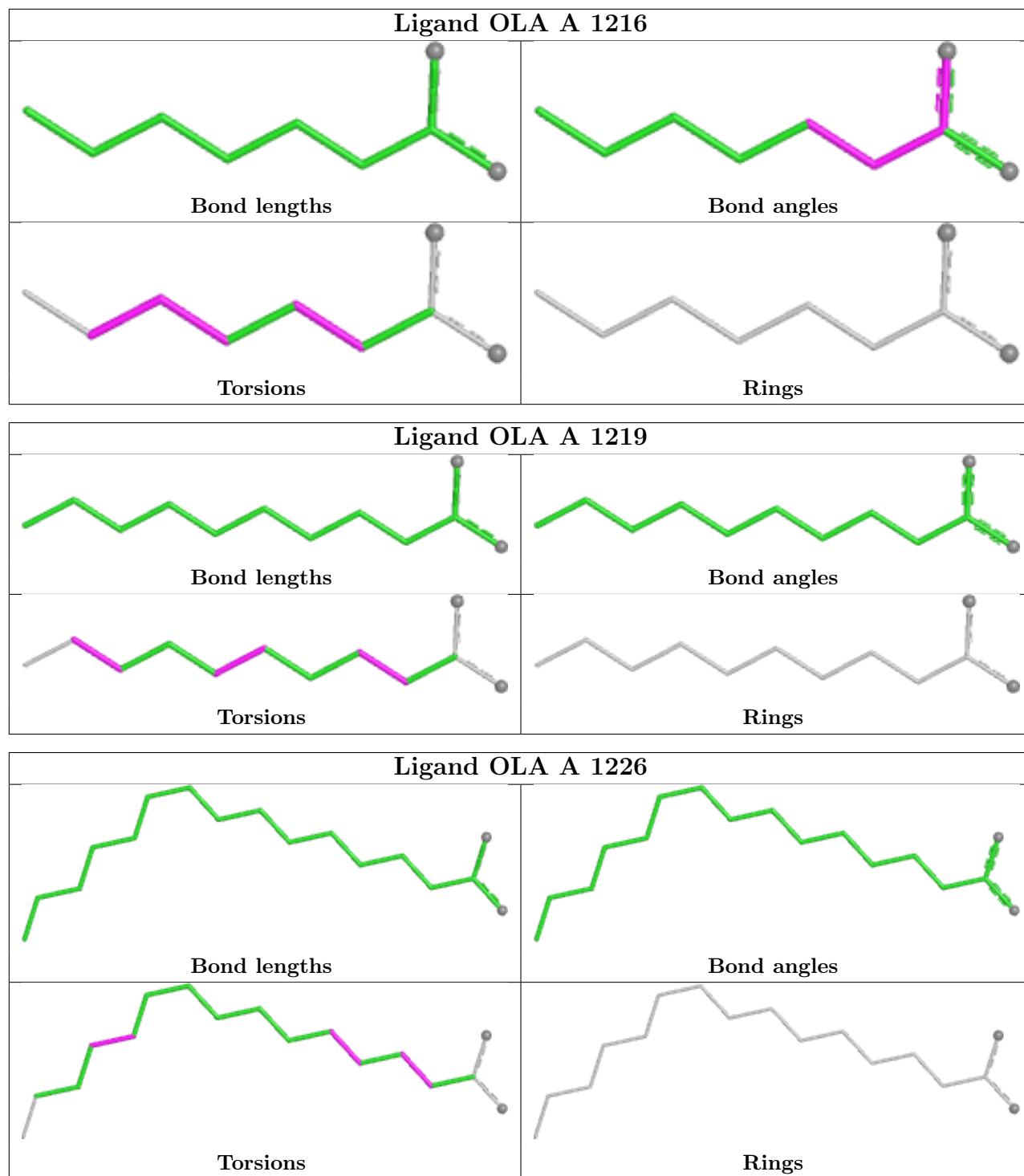
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

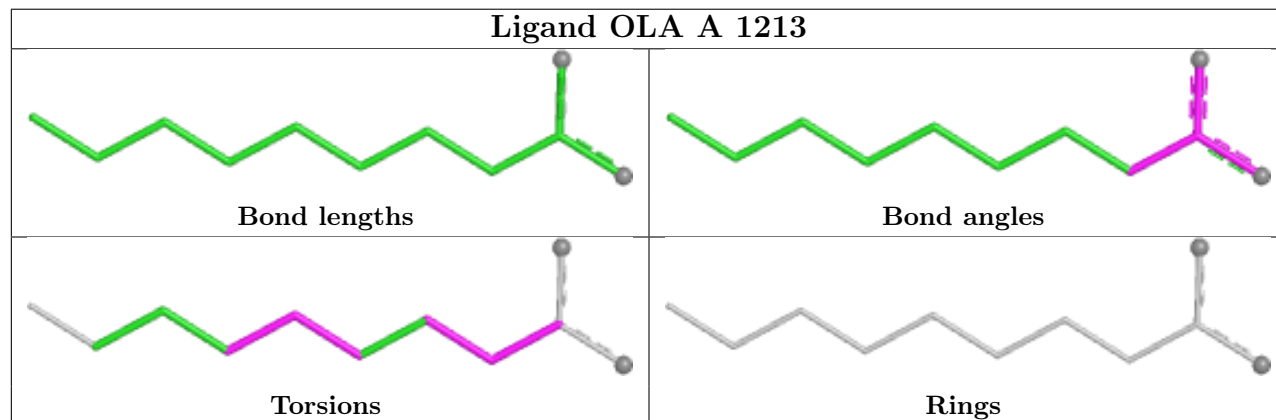
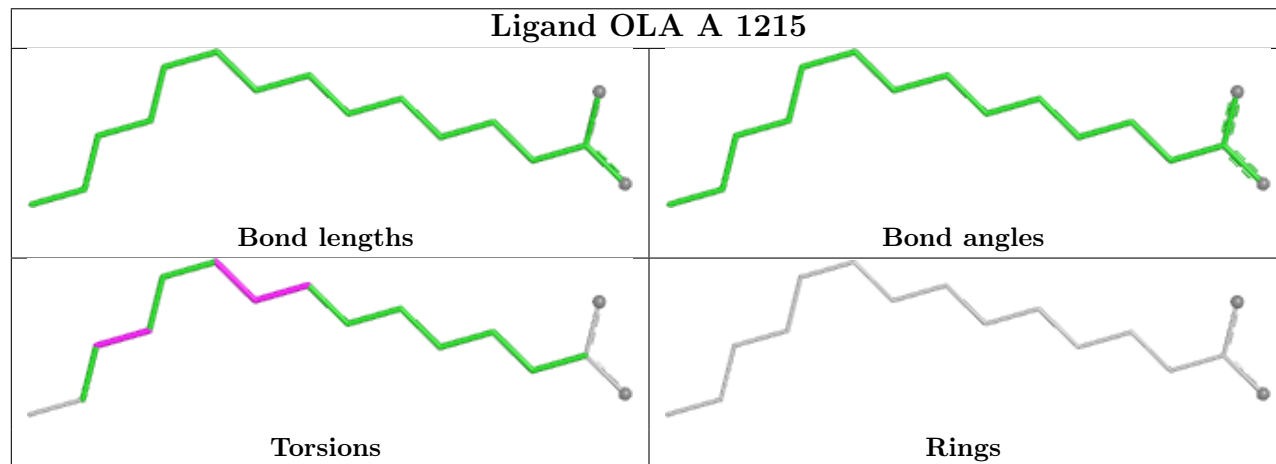
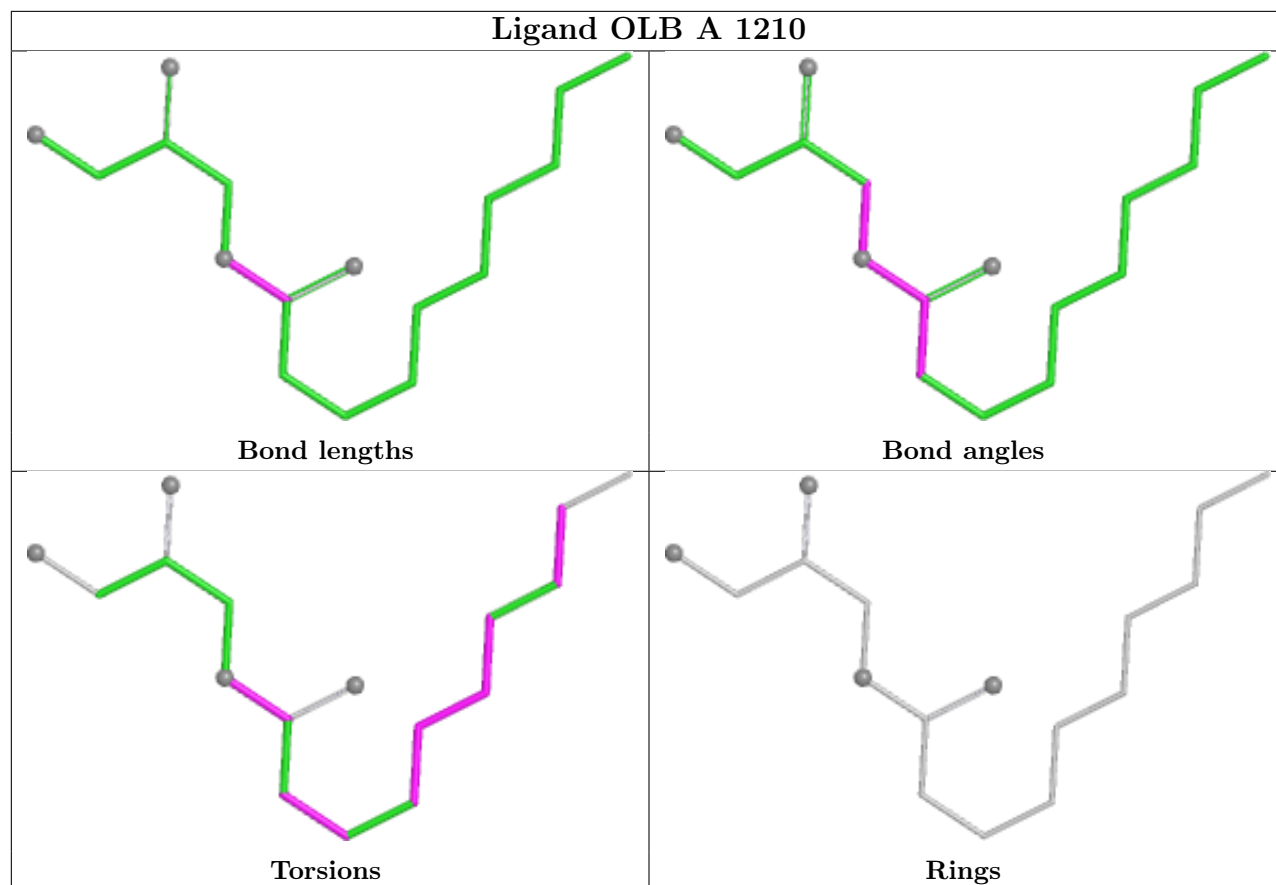


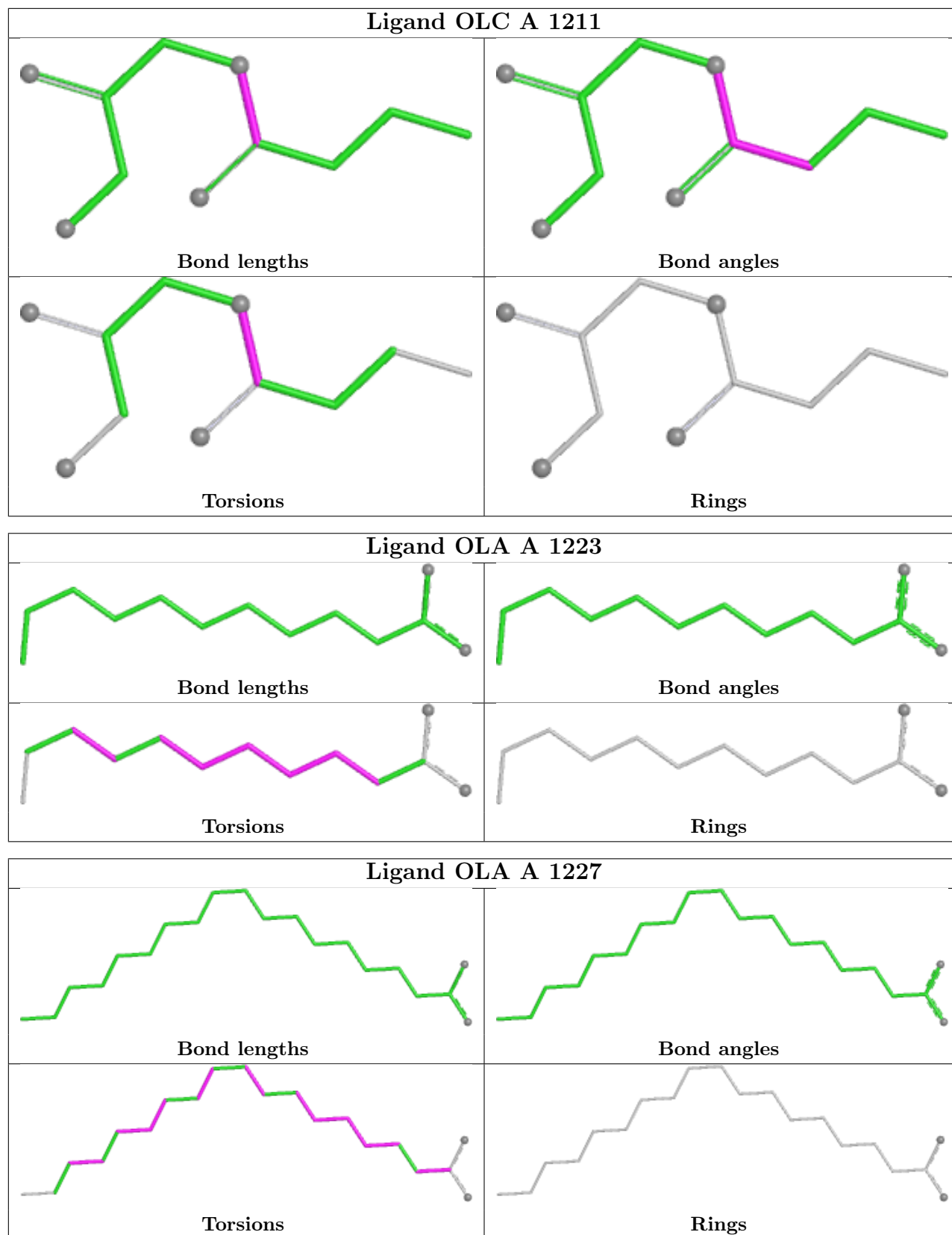


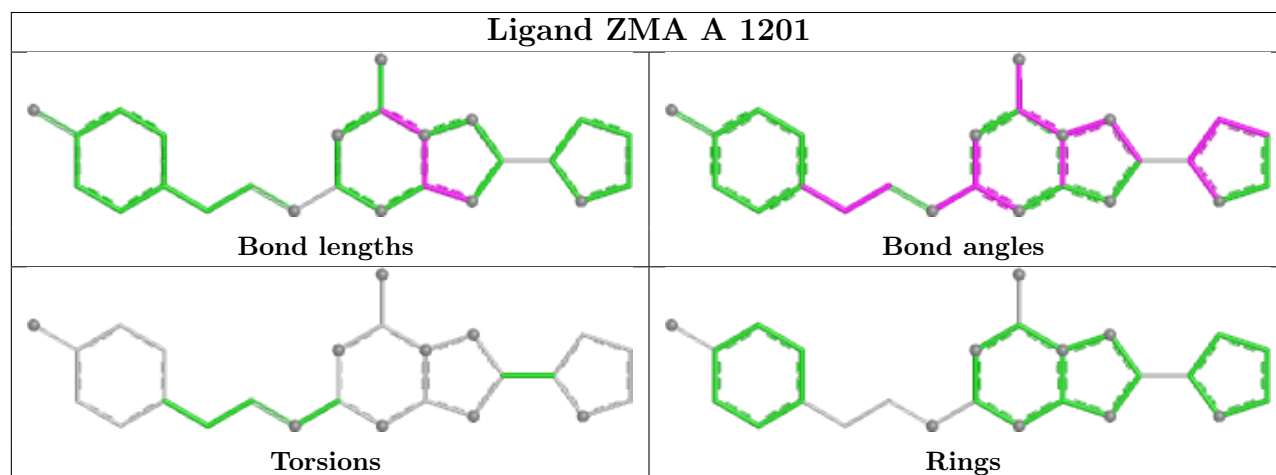
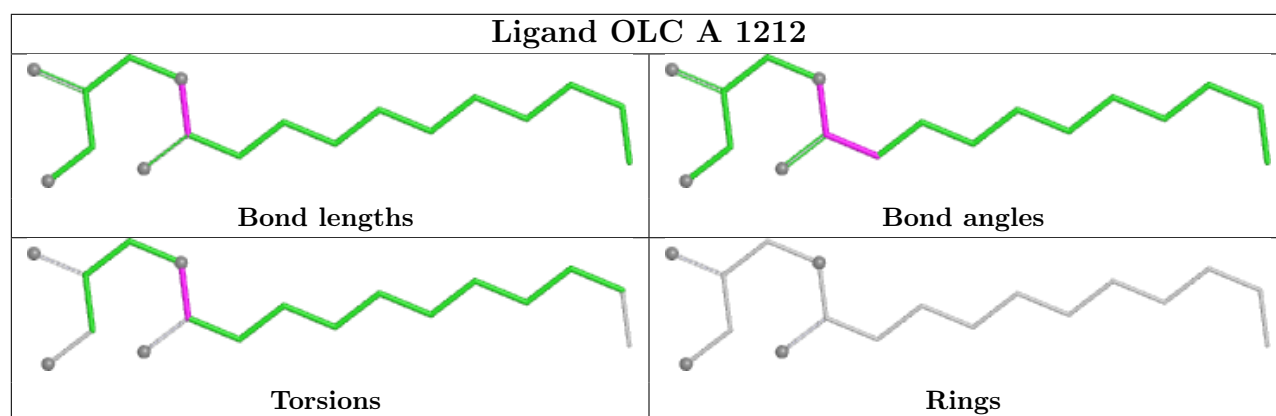
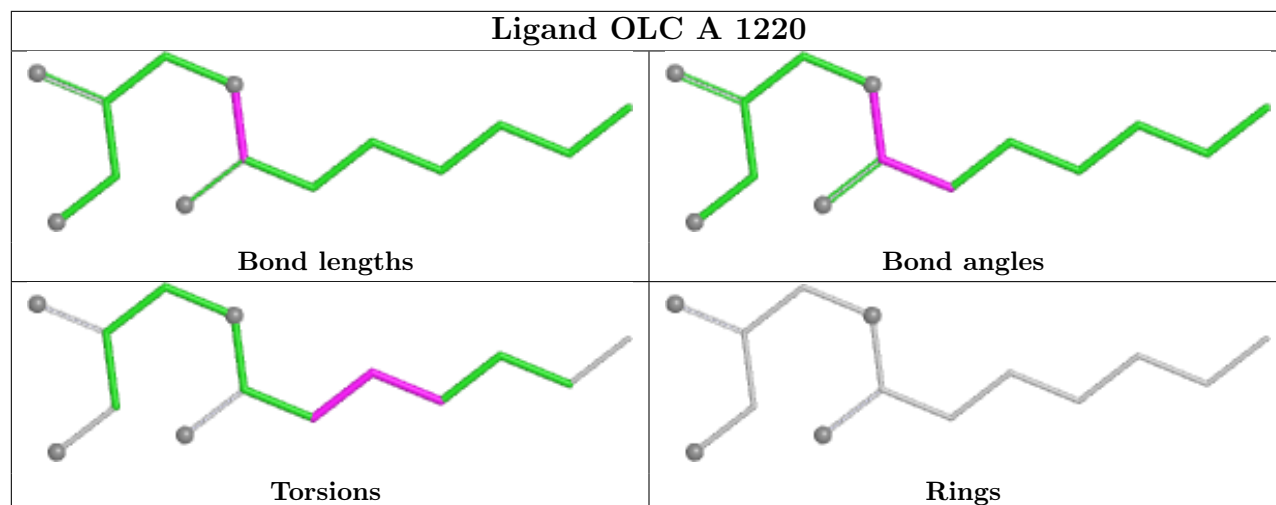


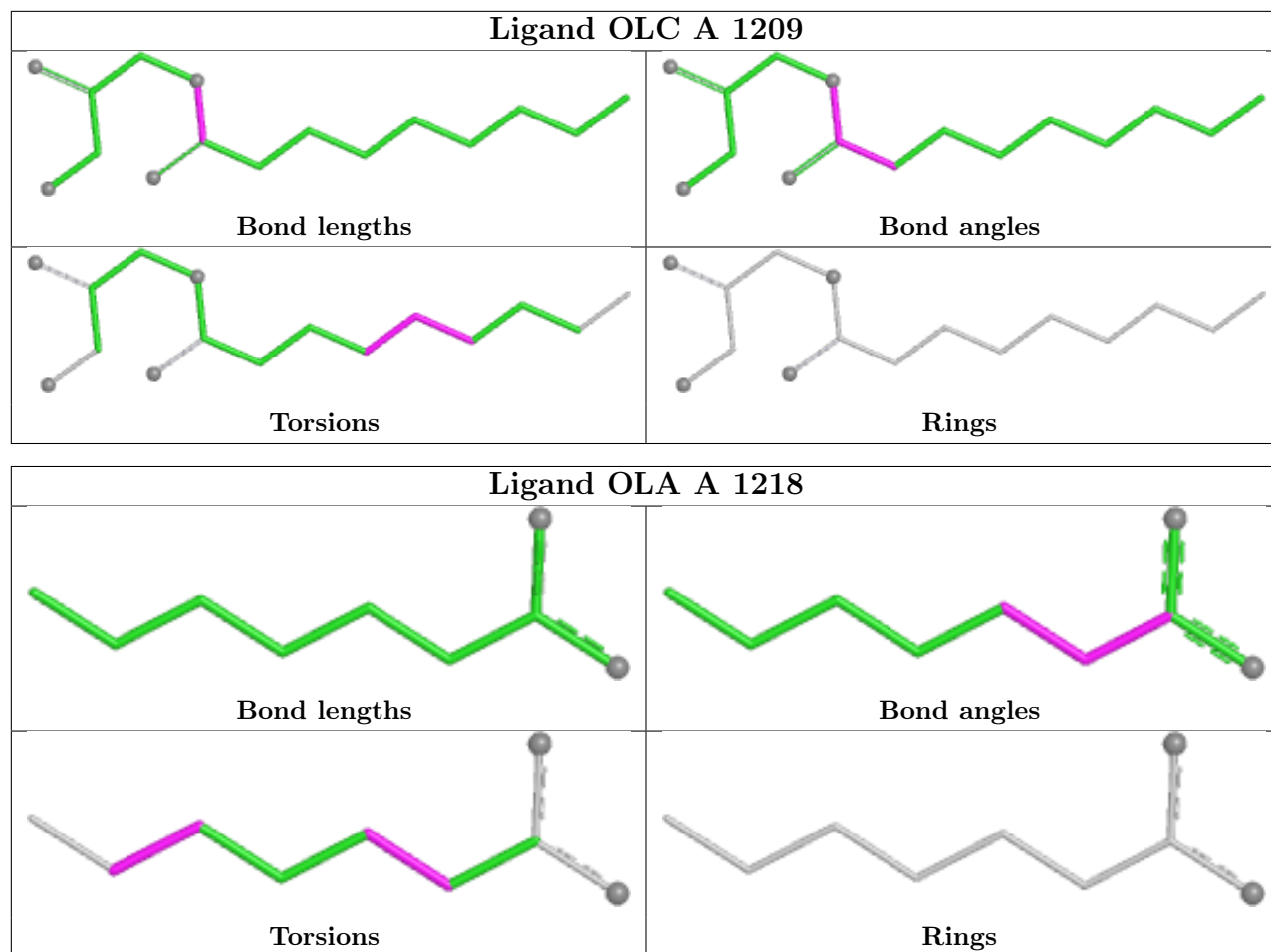












5.7 Other polymers [i](#)

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 [i](#)

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

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ > 2		OWAB(Å ²)	Q < 0.9
1	A	395/447 (88%)	0.13	17 (4%)	40 42	14, 44, 108, 156	12 (3%)

All (17) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1106[A]	LEU	5.0
1	A	29[A]	TRP	4.3
1	A	1061	PHE	3.7
1	A	1056	PRO	3.2
1	A	308	LEU	3.2
1	A	-2	ASP	3.0
1	A	1105	TYR	2.7
1	A	0	ALA	2.4
1	A	1063	HIS	2.4
1	A	307	VAL	2.4
1	A	35	SER	2.4
1	A	205[A]	ARG	2.3
1	A	1065	PHE	2.3
1	A	1084	VAL	2.3
1	A	1021	ASP	2.2
1	A	1010	LEU	2.1
1	A	1043	ALA	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

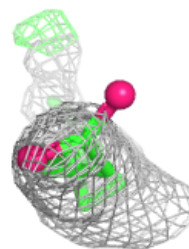
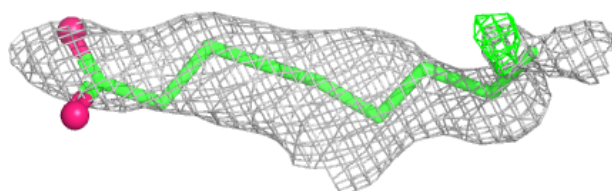
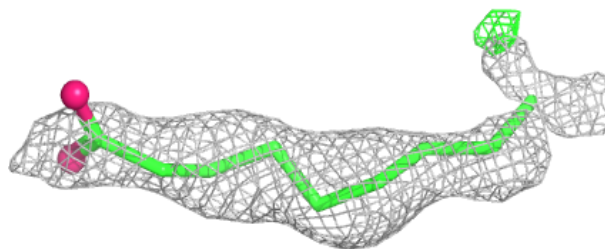
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
7	OLA	A	1217	11/20	0.69	0.18	97,100,104,106	0
7	OLA	A	1223	13/20	0.73	0.15	84,91,111,112	0
7	OLA	A	1226	17/20	0.73	0.19	79,89,98,98	0
7	OLA	A	1214	12/20	0.80	0.14	75,83,102,104	0
7	OLA	A	1219	12/20	0.80	0.14	80,85,104,104	0
6	OLC	A	1211	11/25	0.81	0.13	110,111,113,114	0
5	OLB	A	1210	17/25	0.81	0.16	71,81,88,91	0
8	PEG	A	1225	7/7	0.81	0.14	95,96,98,98	0
7	OLA	A	1227	20/20	0.83	0.14	80,86,105,107	0
7	OLA	A	1224	19/20	0.83	0.16	75,87,94,95	0
6	OLC	A	1222	11/25	0.84	0.14	100,103,107,107	0
6	OLC	A	1208	17/25	0.84	0.14	69,77,92,92	0
6	OLC	A	1209	16/25	0.84	0.18	75,82,89,89	0
7	OLA	A	1218	9/20	0.84	0.16	84,88,97,97	0
6	OLC	A	1207	17/25	0.84	0.13	62,76,89,90	0
7	OLA	A	1213	11/20	0.85	0.15	50,64,91,93	0
7	OLA	A	1215	16/20	0.85	0.14	61,84,97,99	0
6	OLC	A	1212	18/25	0.87	0.12	69,75,89,91	0
6	OLC	A	1221	17/25	0.87	0.12	73,79,87,89	0
6	OLC	A	1220	14/25	0.88	0.14	76,85,92,94	0
5	OLB	A	1206	18/25	0.89	0.12	59,70,101,102	0
4	CLR	A	1205	28/28	0.90	0.10	49,55,78,81	0
7	OLA	A	1216	9/20	0.90	0.14	65,71,76,78	0
4	CLR	A	1204	28/28	0.92	0.09	47,56,66,67	0
4	CLR	A	1203	28/28	0.93	0.08	44,50,76,78	0
2	ZMA	A	1201	25/25	0.97	0.06	28,30,51,58	0
3	NA	A	1202	1/1	0.98	0.09	35,35,35,35	0

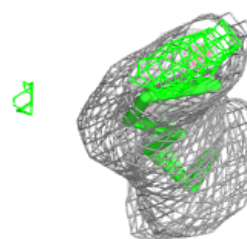
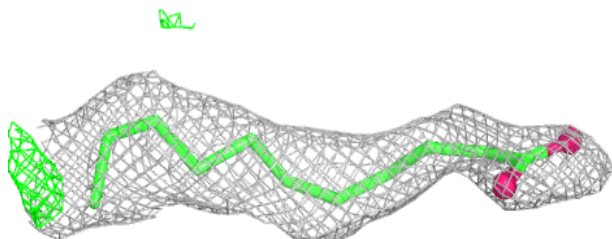
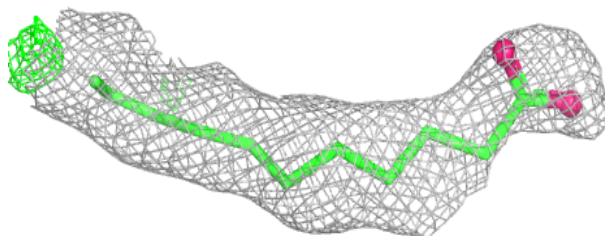
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around OLA A 1217:

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

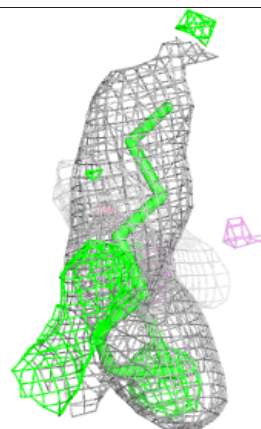
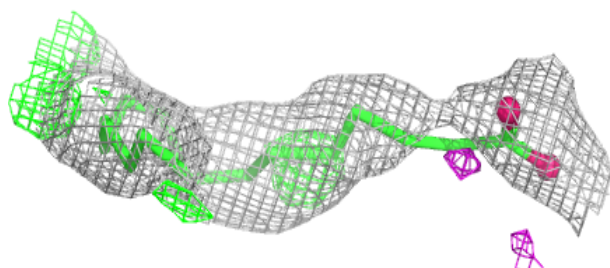
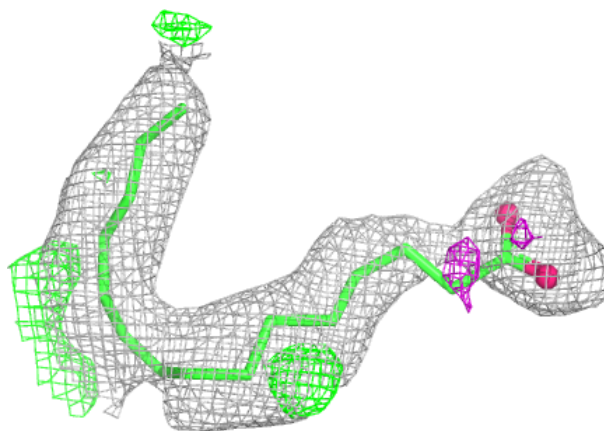
**Electron density around OLA A 1223:**

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

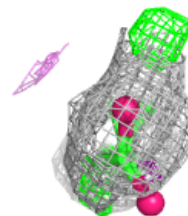
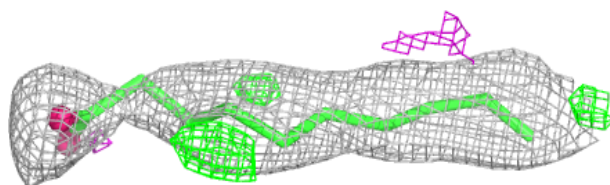
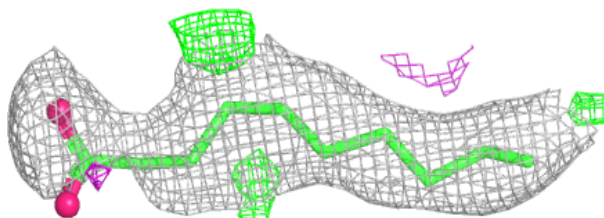


Electron density around OLA A 1226:

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

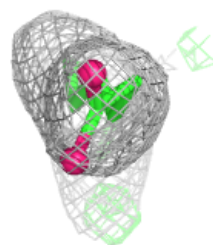
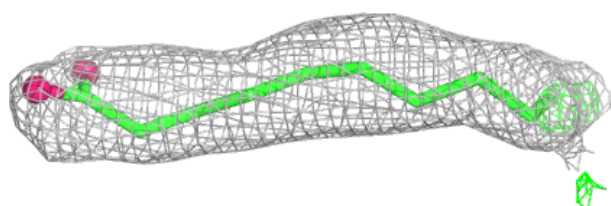
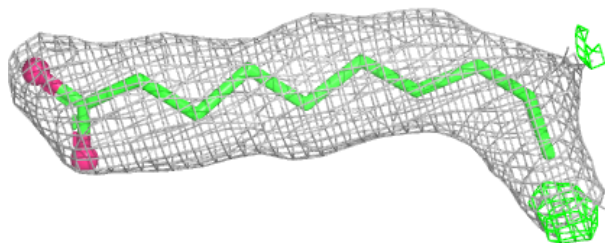
**Electron density around OLA A 1214:**

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

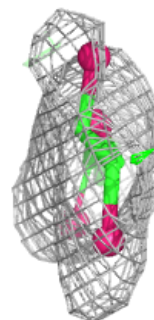
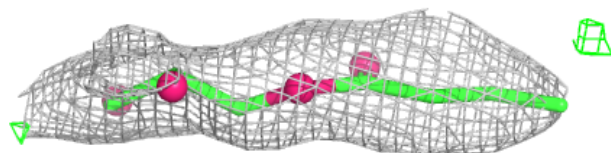
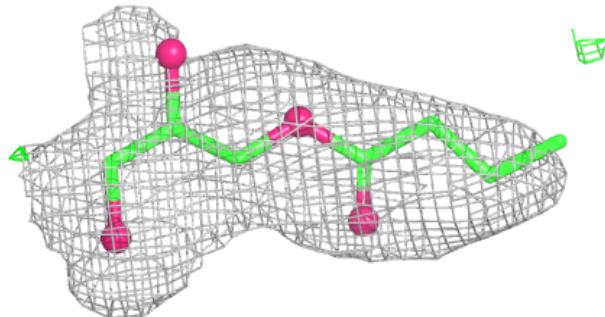


Electron density around OLA A 1219:

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

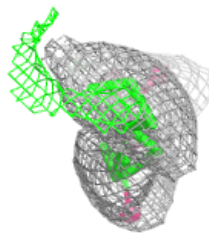
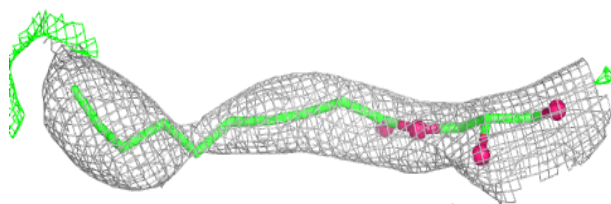
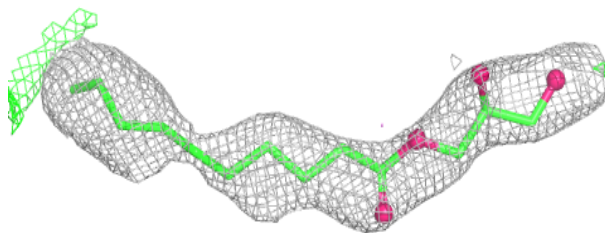
**Electron density around OLC A 1211:**

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

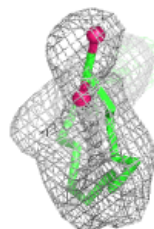
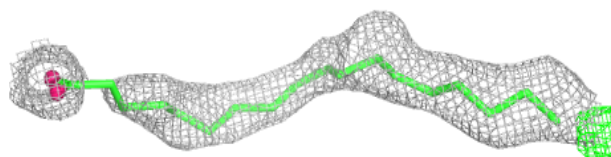
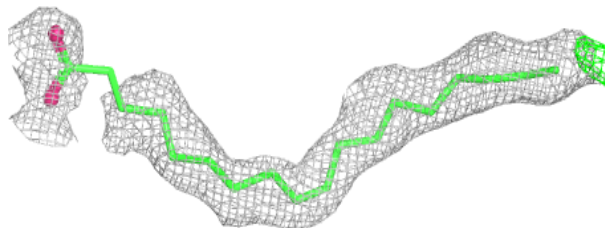


Electron density around OLB A 1210:

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

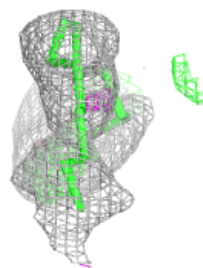
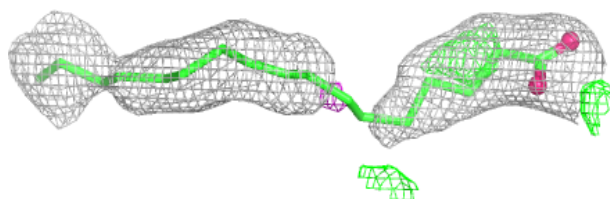
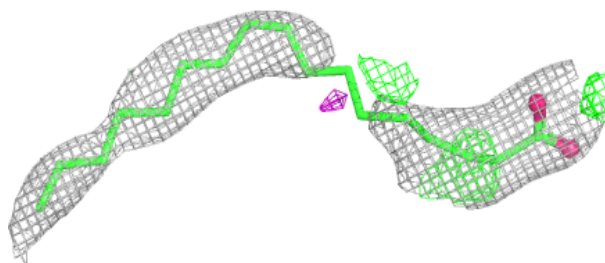
**Electron density around OLA A 1227:**

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

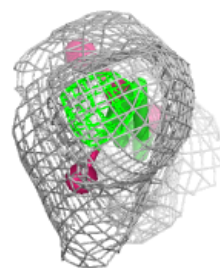
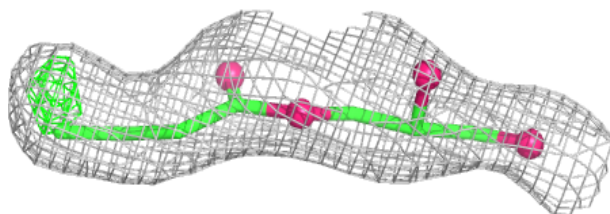
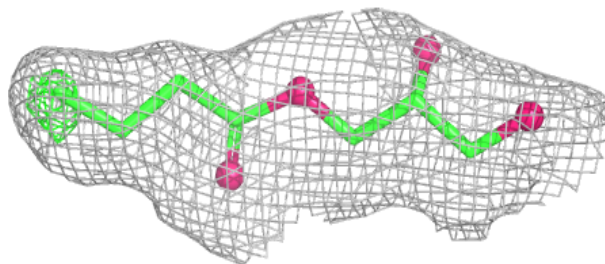


Electron density around OLA A 1224:

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

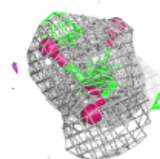
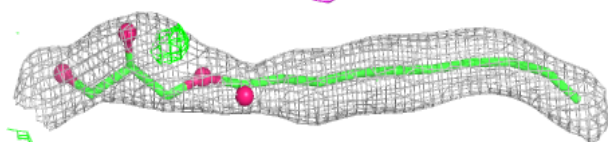
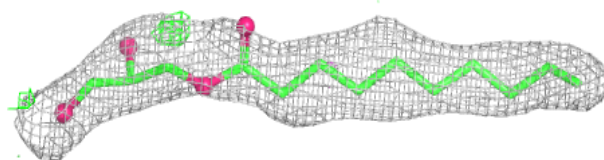
**Electron density around OLC A 1222:**

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

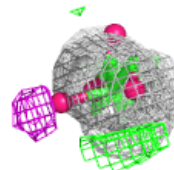
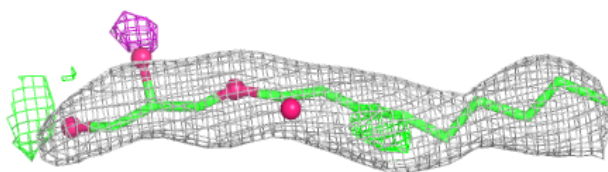
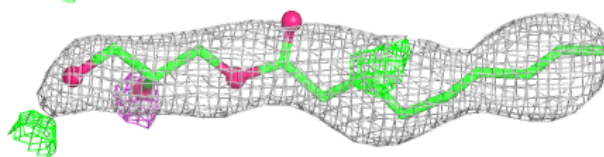


Electron density around OLC A 1208:

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

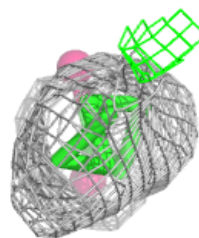
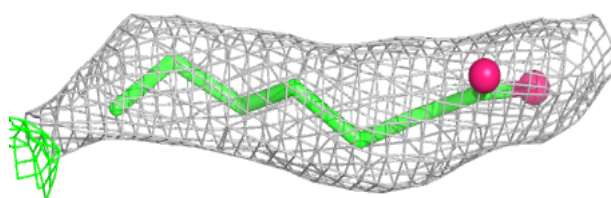
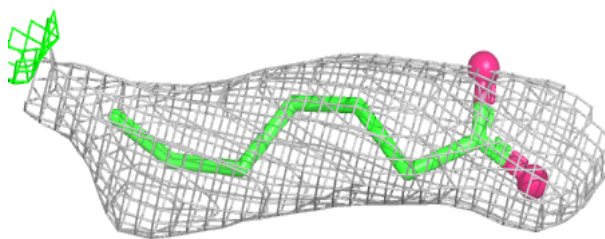
**Electron density around OLC A 1209:**

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

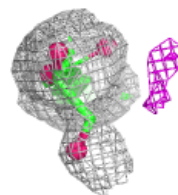
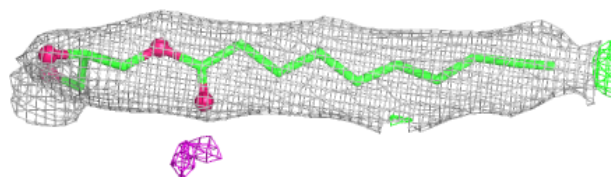
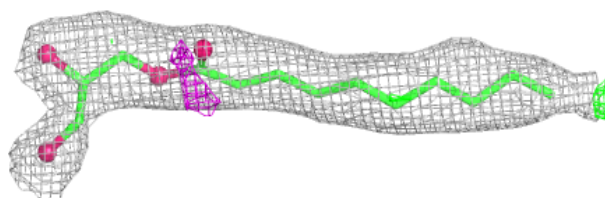


Electron density around OLA A 1218:

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

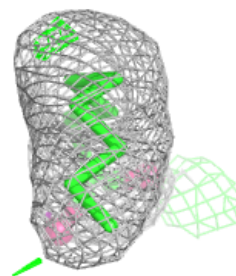
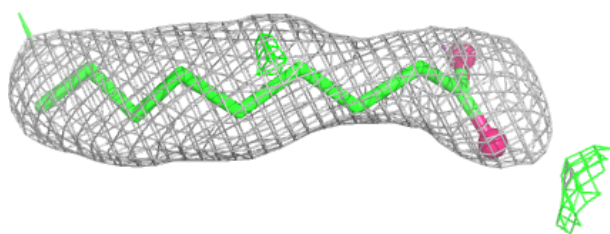
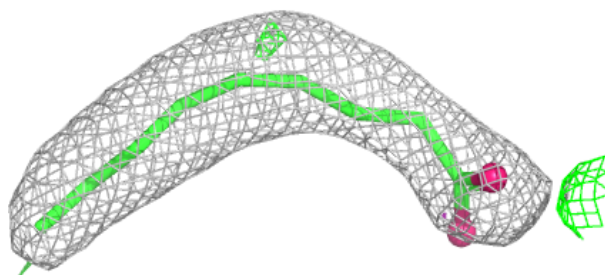
**Electron density around OLC A 1207:**

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

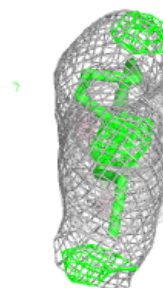
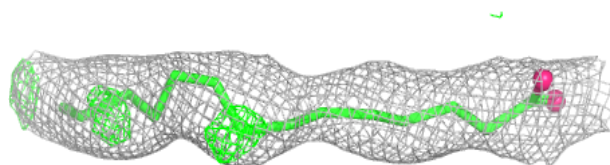
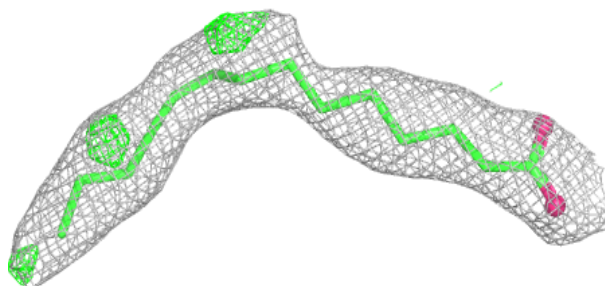


Electron density around OLA A 1213:

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

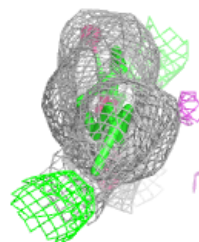
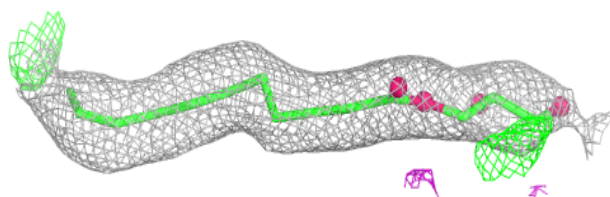
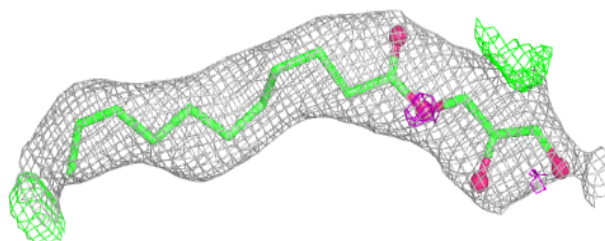
**Electron density around OLA A 1215:**

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

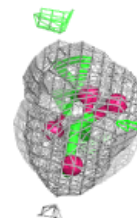
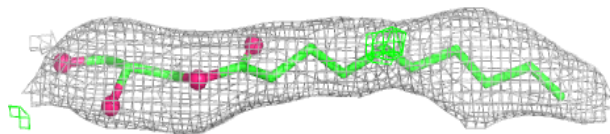
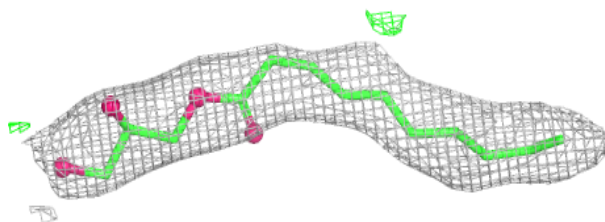


Electron density around OLC A 1212:

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

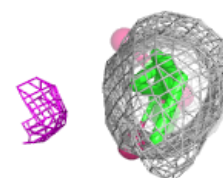
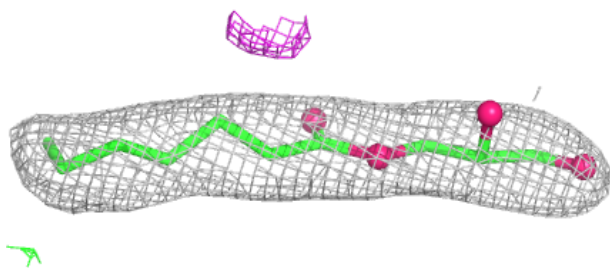
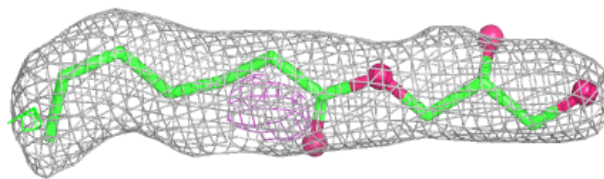
**Electron density around OLC A 1221:**

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

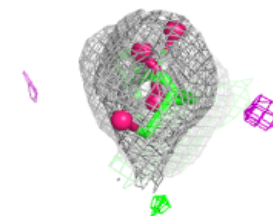
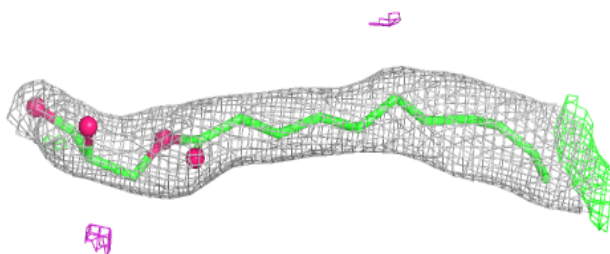
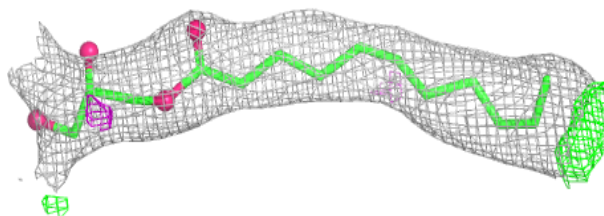


Electron density around OLC A 1220:

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

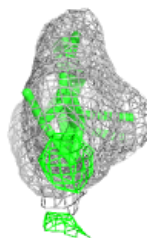
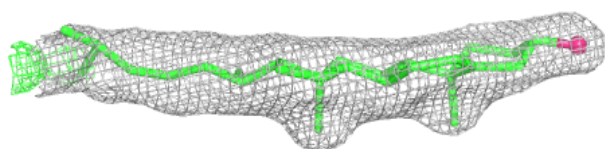
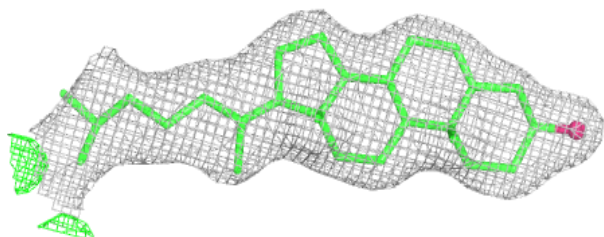
**Electron density around OLB A 1206:**

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

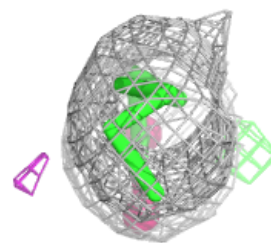
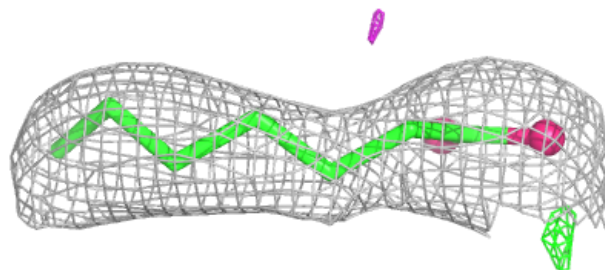
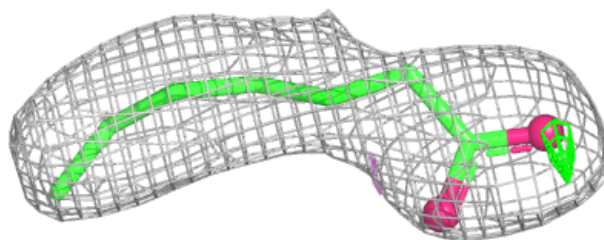


Electron density around CLR A 1205:

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

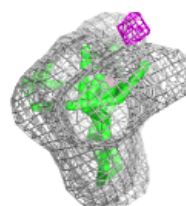
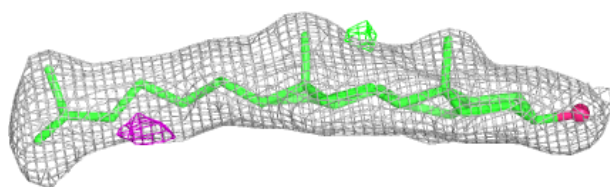
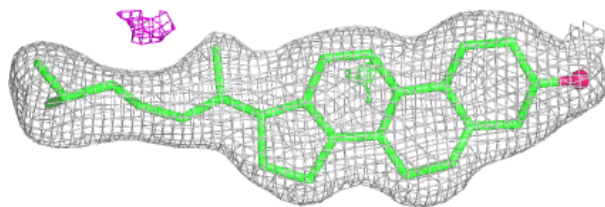
**Electron density around OLA A 1216:**

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

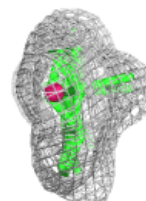
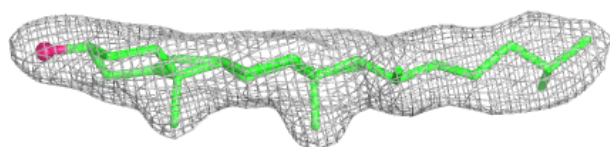
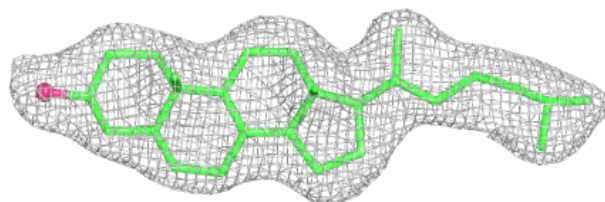


Electron density around CLR A 1204:

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

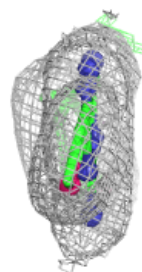
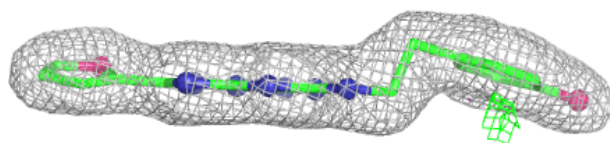
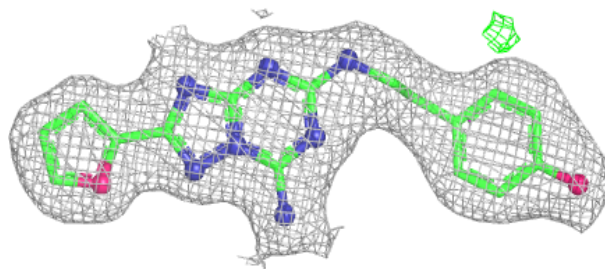
**Electron density around CLR A 1203:**

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



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)



6.5 Other polymers [i](#)

There are no such residues in this entry.