Full wwPDB X-ray Structure Validation Report ⓘ

Oct 15, 2023 – 09:21 PM EDT

PDB ID	:	8E6M
Title	:	X-ray structure of the Deinococcus radiodurans Nramp/MntH divalent transition metal transporter WT in an inward-open, cadmium-bound state
Authors	:	Ray, S.; Gaudet, R.
Deposited on	:	2022-08-22
Resolution	:	2.48 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

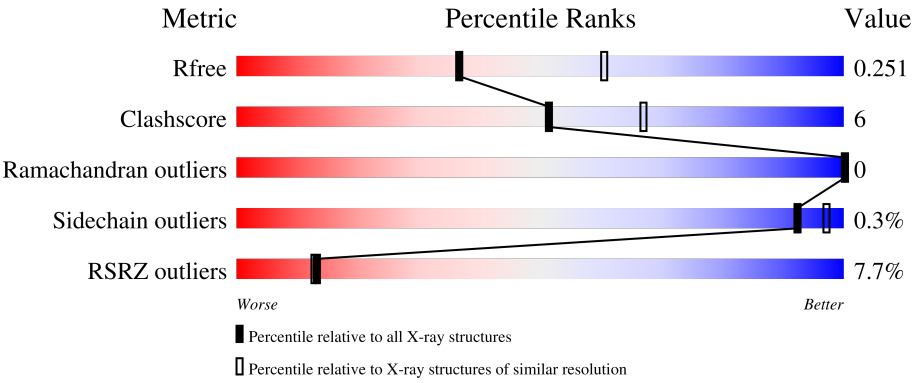
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.48 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	5857 (2.50-2.46)
Clashscore	141614	6594 (2.50-2.46)
Ramachandran outliers	138981	6469 (2.50-2.46)
Sidechain outliers	138945	6471 (2.50-2.46)
RSRZ outliers	127900	5738 (2.50-2.46)

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 <=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	414	7%, 84%, 9%, 6%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	OLC	A	515	-	-	-	X

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	OLC	A	517	-	-	-	X
4	OLC	A	520	-	-	-	X

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 3321 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 Divalent metal cation transporter MntH.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	388	Total	C	N	O	S	0	0	0
			2905	1914	483	491	17			

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	23	MET	-	expression tag	UNP Q9RTP8
A	24	HIS	-	expression tag	UNP Q9RTP8
A	25	HIS	-	expression tag	UNP Q9RTP8
A	26	HIS	-	expression tag	UNP Q9RTP8
A	27	HIS	-	expression tag	UNP Q9RTP8
A	28	HIS	-	expression tag	UNP Q9RTP8
A	29	HIS	-	expression tag	UNP Q9RTP8
A	30	HIS	-	expression tag	UNP Q9RTP8
A	31	HIS	-	expression tag	UNP Q9RTP8

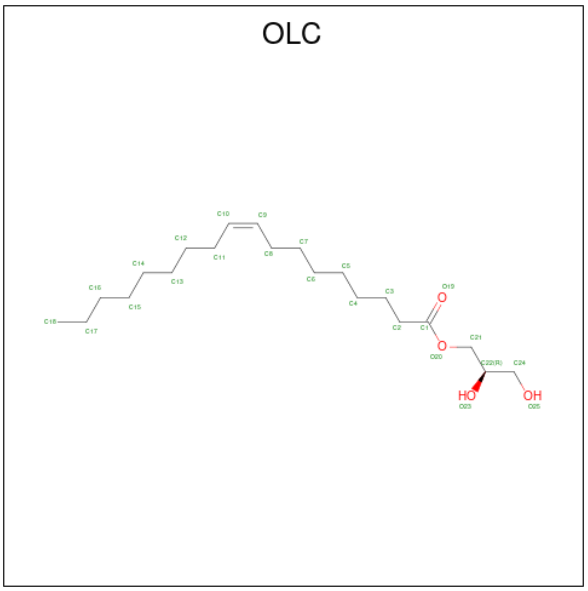
- Molecule 2 is CADMIUM ION (three-letter code: CD) (formula: Cd).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	Cd	0	0
			2	2		

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	Cl	0	0
			2	2		

- Molecule 4 is (2R)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (three-letter code: OLC) (formula: $C_{21}H_{40}O_4$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 25 21 4	0	0
4	A	1	Total C O 14 10 4	0	0
4	A	1	Total C O 22 18 4	0	0
4	A	1	Total C O 11 7 4	0	0
4	A	1	Total C O 25 21 4	0	0
4	A	1	Total C O 25 21 4	0	0
4	A	1	Total C O 24 20 4	0	0
4	A	1	Total C O 23 19 4	0	0
4	A	1	Total C O 21 17 4	0	0
4	A	1	Total C O 19 15 4	0	0
4	A	1	Total C O 19 15 4	0	0
4	A	1	Total C O 15 11 4	0	0
4	A	1	Total C O 23 19 4	0	0
4	A	1	Total C 11 11	0	0

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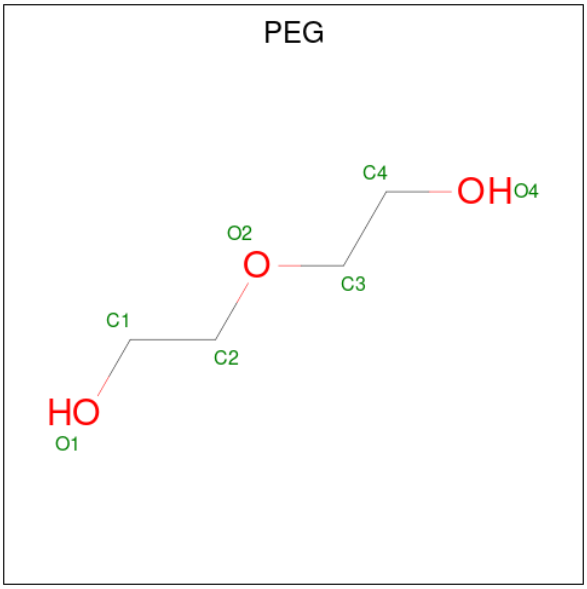
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 15 11 4	0	0
4	A	1	Total C 16 16	0	0
4	A	1	Total C 13 13	0	0
4	A	1	Total C O 14 10 4	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 12 12	0	0

- Molecule 5 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 4 2 2	0	0

- Molecule 6 is water.

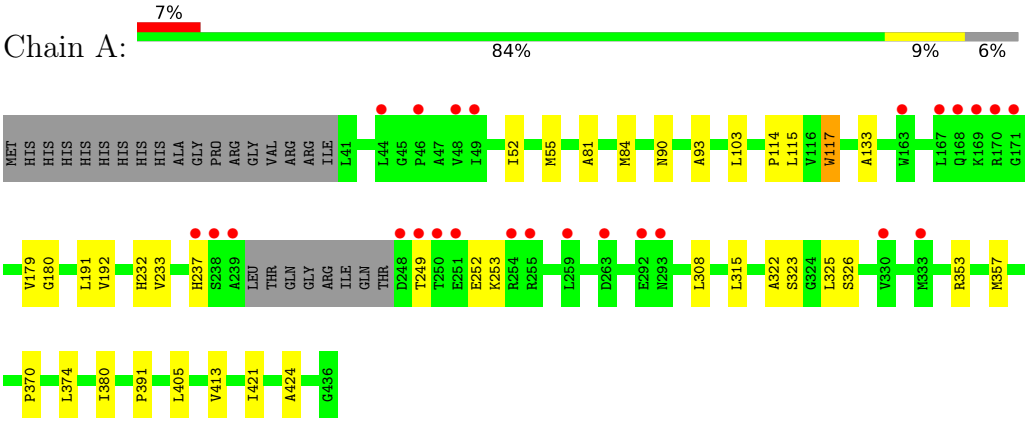
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	54	Total O 54 54	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

• Molecule 1: Divalent metal cation transporter MntH

Chain A:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 2 21 21	Depositor
Cell constants a, b, c, α, β, γ	59.14Å 71.37Å 99.05Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.54 – 2.48 45.54 – 2.48	Depositor EDS
% Data completeness (in resolution range)	97.3 (45.54-2.48) 84.6 (45.54-2.48)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.70 (at 2.48Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.203 , 0.250 0.206 , 0.251	Depositor DCC
R_{free} test set	1507 reflections (10.03%)	wwPDB-VP
Wilson B-factor (Å^2)	40.2	Xtriage
Anisotropy	0.265	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 64.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	3321	wwPDB-VP
Average B, all atoms (Å^2)	64.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.29% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: CL, PEG, CD, OLC

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	A	0.24	0/2969	0.44	0/4058

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	2905	0	3040	29	0
2	A	2	0	0	0	0
3	A	2	0	0	0	0
4	A	354	0	513	21	0
5	A	4	0	5	0	0
6	A	54	0	0	1	0
All	All	3321	0	3558	38	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (38) 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:253:LYS:HB3	1:A:405:LEU:HD11	1.73	0.71
1:A:115:LEU:HD21	4:A:508:OLC:H2A	1.77	0.67
1:A:114:PRO:HB3	4:A:522:OLC:H21	1.77	0.66
1:A:413:VAL:HG22	4:A:505:OLC:H5A	1.76	0.65
1:A:192:VAL:HA	4:A:507:OLC:H2A	1.79	0.65
1:A:179:VAL:HG11	4:A:524:OLC:H17A	1.78	0.64
1:A:421:ILE:HD11	4:A:511:OLC:H15	1.81	0.63
1:A:233:VAL:HG13	1:A:237:HIS:HB2	1.81	0.62
4:A:506:OLC:H24	4:A:519:OLC:H24A	1.82	0.61
1:A:81:ALA:HA	1:A:84:MET:HE2	1.85	0.57
1:A:55:MET:O	1:A:323:SER:OG	2.24	0.55
1:A:308:LEU:HD13	1:A:315:LEU:HD12	1.90	0.54
1:A:103:LEU:HD11	1:A:391:PRO:HB2	1.89	0.53
1:A:93:ALA:HB2	1:A:237:HIS:CE1	2.45	0.51
4:A:509:OLC:H9	4:A:514:OLC:H6	1.91	0.51
1:A:52:ILE:HD13	1:A:180:GLY:HA2	1.95	0.49
1:A:191:LEU:HB3	4:A:507:OLC:H5	1.95	0.48
1:A:424:ALA:HA	4:A:512:OLC:H5	1.95	0.48
1:A:179:VAL:HB	1:A:322:ALA:HB1	1.97	0.46
4:A:516:OLC:H6A	4:A:516:OLC:H3	1.66	0.46
1:A:90:ASN:ND2	4:A:510:OLC:H4A	2.30	0.46
4:A:512:OLC:H7A	4:A:512:OLC:H4	1.81	0.46
4:A:512:OLC:H12	4:A:512:OLC:H9	1.60	0.45
1:A:360:ALA:O	1:A:364:ILE:HG12	2.16	0.44
1:A:370:PRO:O	1:A:374:LEU:HG	2.17	0.44
1:A:326:SER:O	6:A:601:HOH:O	2.21	0.43
1:A:117:TRP:CD2	4:A:522:OLC:H3	2.53	0.43
4:A:505:OLC:H11A	4:A:505:OLC:H8A	1.71	0.43
1:A:133:ALA:HA	1:A:374:LEU:HD22	1.99	0.43
1:A:176:GLU:HA	1:A:179:VAL:HG22	2.01	0.43
1:A:325:LEU:HB3	4:A:524:OLC:H17	2.01	0.42
4:A:510:OLC:H21A	4:A:510:OLC:H2	1.66	0.42
1:A:353:ARG:HG3	1:A:357:MET:HE3	2.02	0.42
1:A:380:ILE:HG12	4:A:515:OLC:H9	2.02	0.41
4:A:505:OLC:H8A	4:A:506:OLC:H5	2.03	0.41
4:A:510:OLC:H6A	4:A:510:OLC:H3	1.65	0.41
1:A:249:THR:HG22	1:A:252:GLU:H	1.86	0.41
1:A:232:HIS:CE1	1:A:233:VAL:HG23	2.56	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	384/414 (93%)	380 (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	297/322 (92%)	296 (100%)	1 (0%)	92 97

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	117	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	82	ASN
1	A	232	HIS
1	A	237	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 25 ligands modelled in this entry, 4 are monoatomic - leaving 21 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	$\#\|Z\| > 2$
4	OLC	A	522	-	13,13,24	1.06	2 (15%)	14,14,25	0.98	1 (7%)
5	PEG	A	525	-	3,3,6	0.19	0	2,2,5	0.22	0
4	OLC	A	514	-	18,18,24	0.93	2 (11%)	18,19,25	1.02	1 (5%)
4	OLC	A	511	-	23,23,24	0.83	2 (8%)	24,24,25	0.96	1 (4%)
4	OLC	A	506	-	13,13,24	1.05	2 (15%)	14,14,25	1.11	1 (7%)
4	OLC	A	513	-	20,20,24	0.87	2 (10%)	21,21,25	1.02	1 (4%)
4	OLC	A	509	-	24,24,24	0.82	2 (8%)	25,25,25	0.95	1 (4%)
4	OLC	A	512	-	22,22,24	0.84	2 (9%)	23,23,25	1.03	1 (4%)
4	OLC	A	518	-	10,10,24	0.38	0	8,9,25	0.75	0
4	OLC	A	523	-	6,6,24	0.31	0	5,5,25	0.67	0
4	OLC	A	524	-	11,11,24	0.37	0	9,10,25	0.80	0
4	OLC	A	516	-	14,14,24	1.01	2 (14%)	15,15,25	1.00	1 (6%)
4	OLC	A	521	-	12,12,24	0.34	0	11,11,25	0.72	0
4	OLC	A	520	-	15,15,24	0.36	0	14,14,25	0.64	0
4	OLC	A	519	-	14,14,24	1.03	2 (14%)	15,15,25	1.07	1 (6%)
4	OLC	A	505	-	24,24,24	0.79	2 (8%)	25,25,25	0.96	1 (4%)
4	OLC	A	507	-	21,21,24	0.86	2 (9%)	22,22,25	0.96	1 (4%)
4	OLC	A	515	-	18,18,24	0.94	2 (11%)	18,19,25	1.05	1 (5%)
4	OLC	A	510	-	24,24,24	0.81	1 (4%)	25,25,25	0.98	1 (4%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
4	OLC	A	517	-	22,22,24	0.83	2 (9%)	23,23,25	0.91	1 (4%)
4	OLC	A	508	-	10,10,24	1.21	2 (20%)	11,11,25	1.13	1 (9%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	OLC	A	522	-	-	9/13/13/24	-
5	PEG	A	525	-	-	1/1/1/4	-
4	OLC	A	514	-	-	10/18/18/24	-
4	OLC	A	511	-	-	9/23/23/24	-
4	OLC	A	506	-	-	0/13/13/24	-
4	OLC	A	513	-	-	8/20/20/24	-
4	OLC	A	509	-	-	12/24/24/24	-
4	OLC	A	512	-	-	11/22/22/24	-
4	OLC	A	518	-	-	6/8/8/24	-
4	OLC	A	523	-	-	2/4/4/24	-
4	OLC	A	524	-	-	4/9/9/24	-
4	OLC	A	516	-	-	7/14/14/24	-
4	OLC	A	521	-	-	4/10/10/24	-
4	OLC	A	520	-	-	6/13/13/24	-
4	OLC	A	519	-	-	9/14/14/24	-
4	OLC	A	505	-	-	10/24/24/24	-
4	OLC	A	507	-	-	6/21/21/24	-
4	OLC	A	515	-	-	13/18/18/24	-
4	OLC	A	510	-	-	11/24/24/24	-
4	OLC	A	517	-	-	10/22/22/24	-
4	OLC	A	508	-	-	4/10/10/24	-

All (29) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	512	OLC	O20-C1	2.56	1.40	1.33
4	A	515	OLC	O20-C1	2.55	1.40	1.33
4	A	510	OLC	O20-C1	2.49	1.40	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	513	OLC	O20-C1	2.49	1.40	1.33
4	A	508	OLC	O20-C1	2.46	1.40	1.33
4	A	509	OLC	O20-C1	2.45	1.40	1.33
4	A	522	OLC	O20-C1	2.45	1.40	1.33
4	A	514	OLC	O20-C1	2.44	1.40	1.33
4	A	506	OLC	O20-C1	2.43	1.40	1.33
4	A	511	OLC	O20-C1	2.43	1.40	1.33
4	A	519	OLC	O20-C1	2.43	1.40	1.33
4	A	507	OLC	O20-C1	2.41	1.40	1.33
4	A	516	OLC	O20-C1	2.39	1.40	1.33
4	A	505	OLC	O20-C1	2.36	1.40	1.33
4	A	517	OLC	O20-C1	2.32	1.40	1.33
4	A	519	OLC	O20-C21	-2.16	1.40	1.45
4	A	505	OLC	O20-C21	-2.15	1.40	1.45
4	A	507	OLC	O20-C21	-2.15	1.40	1.45
4	A	508	OLC	O20-C21	-2.14	1.40	1.45
4	A	517	OLC	O20-C21	-2.12	1.40	1.45
4	A	509	OLC	O20-C21	-2.12	1.40	1.45
4	A	511	OLC	O20-C21	-2.10	1.40	1.45
4	A	516	OLC	O20-C21	-2.09	1.40	1.45
4	A	514	OLC	O20-C21	-2.08	1.40	1.45
4	A	522	OLC	O20-C21	-2.06	1.40	1.45
4	A	513	OLC	O20-C21	-2.05	1.40	1.45
4	A	506	OLC	O20-C21	-2.04	1.40	1.45
4	A	515	OLC	O20-C21	-2.03	1.40	1.45
4	A	512	OLC	O20-C21	-2.02	1.40	1.45

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	515	OLC	O20-C1-C2	2.94	121.14	111.91
4	A	512	OLC	O20-C1-C2	2.87	120.92	111.91
4	A	510	OLC	O20-C1-C2	2.82	120.75	111.91
4	A	506	OLC	O20-C1-C2	2.79	120.65	111.91
4	A	513	OLC	O20-C1-C2	2.73	120.48	111.91
4	A	511	OLC	O20-C1-C2	2.70	120.39	111.91
4	A	508	OLC	O20-C1-C2	2.70	120.38	111.91
4	A	509	OLC	O20-C1-C2	2.67	120.27	111.91
4	A	519	OLC	O20-C1-C2	2.62	120.13	111.91
4	A	514	OLC	O20-C1-C2	2.57	119.99	111.91
4	A	507	OLC	O20-C1-C2	2.56	119.95	111.91
4	A	517	OLC	O20-C1-C2	2.50	119.76	111.91

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	505	OLC	O20-C1-C2	2.43	119.54	111.91
4	A	522	OLC	O20-C1-C2	2.42	119.49	111.91
4	A	516	OLC	O20-C1-C2	2.32	119.20	111.91

There are no chirality outliers.

All (152) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	505	OLC	C21-C22-C24-O25
4	A	508	OLC	O20-C21-C22-C24
4	A	510	OLC	C2-C1-O20-C21
4	A	510	OLC	O19-C1-O20-C21
4	A	512	OLC	C21-C22-C24-O25
4	A	512	OLC	C2-C1-O20-C21
4	A	512	OLC	O19-C1-O20-C21
4	A	513	OLC	O20-C21-C22-C24
4	A	513	OLC	O20-C21-C22-O23
4	A	514	OLC	C9-C10-C11-C12
4	A	514	OLC	O23-C22-C24-O25
4	A	514	OLC	O20-C21-C22-O23
4	A	515	OLC	C2-C1-O20-C21
4	A	515	OLC	O19-C1-O20-C21
4	A	518	OLC	C9-C10-C11-C12
4	A	519	OLC	O20-C21-C22-O23
4	A	516	OLC	O19-C1-O20-C21
4	A	516	OLC	C2-C1-O20-C21
4	A	522	OLC	C2-C1-O20-C21
4	A	509	OLC	O19-C1-O20-C21
4	A	522	OLC	O19-C1-O20-C21
4	A	509	OLC	C2-C1-O20-C21
4	A	508	OLC	C2-C1-O20-C21
4	A	508	OLC	O19-C1-O20-C21
4	A	519	OLC	C2-C1-O20-C21
4	A	508	OLC	O20-C21-C22-O23
4	A	519	OLC	O19-C1-O20-C21
4	A	507	OLC	C2-C1-O20-C21
4	A	514	OLC	C2-C1-O20-C21
4	A	509	OLC	O20-C21-C22-C24
4	A	516	OLC	O20-C21-C22-C24
4	A	522	OLC	O20-C21-C22-C24
4	A	522	OLC	O20-C21-C22-O23
4	A	514	OLC	O19-C1-O20-C21

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Mol	Chain	Res	Type	Atoms
4	A	509	OLC	C1-C2-C3-C4
4	A	515	OLC	O23-C22-C24-O25
4	A	519	OLC	C1-C2-C3-C4
4	A	505	OLC	C1-C2-C3-C4
4	A	507	OLC	C1-C2-C3-C4
4	A	515	OLC	C1-C2-C3-C4
4	A	507	OLC	O19-C1-O20-C21
4	A	510	OLC	C1-C2-C3-C4
4	A	509	OLC	O20-C21-C22-O23
4	A	516	OLC	O20-C21-C22-O23
4	A	509	OLC	C2-C3-C4-C5
4	A	513	OLC	C1-C2-C3-C4
4	A	513	OLC	C6-C7-C8-C9
4	A	520	OLC	C14-C15-C16-C17
4	A	523	OLC	C13-C14-C15-C16
4	A	505	OLC	C11-C12-C13-C14
4	A	513	OLC	C4-C5-C6-C7
4	A	518	OLC	C5-C6-C7-C8
4	A	512	OLC	C2-C3-C4-C5
4	A	519	OLC	C3-C4-C5-C6
4	A	514	OLC	C21-C22-C24-O25
4	A	515	OLC	C21-C22-C24-O25
4	A	522	OLC	C21-C22-C24-O25
4	A	515	OLC	O20-C21-C22-O23
4	A	510	OLC	C13-C14-C15-C16
4	A	509	OLC	C3-C4-C5-C6
4	A	514	OLC	C2-C3-C4-C5
4	A	521	OLC	C4-C5-C6-C7
4	A	505	OLC	C5-C6-C7-C8
4	A	517	OLC	C2-C3-C4-C5
4	A	521	OLC	C5-C6-C7-C8
4	A	511	OLC	C2-C1-O20-C21
4	A	512	OLC	C12-C13-C14-C15
4	A	524	OLC	C13-C14-C15-C16
4	A	514	OLC	C1-C2-C3-C4
4	A	505	OLC	C14-C15-C16-C17
4	A	510	OLC	C14-C15-C16-C17
4	A	507	OLC	C2-C3-C4-C5
4	A	511	OLC	C6-C7-C8-C9
4	A	515	OLC	C6-C7-C8-C9
4	A	516	OLC	C3-C4-C5-C6
4	A	518	OLC	C2-C3-C4-C5

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Mol	Chain	Res	Type	Atoms
5	A	525	PEG	O2-C3-C4-O4
4	A	511	OLC	O19-C1-O20-C21
4	A	522	OLC	C3-C4-C5-C6
4	A	515	OLC	C3-C4-C5-C6
4	A	516	OLC	C2-C3-C4-C5
4	A	510	OLC	C6-C7-C8-C9
4	A	513	OLC	C10-C11-C12-C13
4	A	524	OLC	C10-C11-C12-C13
4	A	522	OLC	C1-C2-C3-C4
4	A	514	OLC	O20-C21-C22-C24
4	A	520	OLC	C11-C12-C13-C14
4	A	510	OLC	C5-C6-C7-C8
4	A	520	OLC	C6-C7-C8-C9
4	A	511	OLC	C4-C5-C6-C7
4	A	507	OLC	C3-C4-C5-C6
4	A	517	OLC	C12-C13-C14-C15
4	A	515	OLC	C4-C5-C6-C7
4	A	515	OLC	C2-C3-C4-C5
4	A	511	OLC	C3-C4-C5-C6
4	A	505	OLC	O23-C22-C24-O25
4	A	512	OLC	O23-C22-C24-O25
4	A	509	OLC	C5-C6-C7-C8
4	A	519	OLC	O20-C21-C22-C24
4	A	516	OLC	C5-C6-C7-C8
4	A	505	OLC	C15-C16-C17-C18
4	A	513	OLC	C11-C12-C13-C14
4	A	517	OLC	C13-C14-C15-C16
4	A	523	OLC	C14-C15-C16-C17
4	A	509	OLC	C10-C11-C12-C13
4	A	518	OLC	C4-C5-C6-C7
4	A	517	OLC	C4-C5-C6-C7
4	A	514	OLC	C5-C6-C7-C8
4	A	524	OLC	C15-C16-C17-C18
4	A	517	OLC	C2-C1-O20-C21
4	A	510	OLC	C4-C5-C6-C7
4	A	509	OLC	C15-C16-C17-C18
4	A	518	OLC	C3-C4-C5-C6
4	A	520	OLC	C15-C16-C17-C18
4	A	515	OLC	C9-C10-C11-C12
4	A	524	OLC	C7-C8-C9-C10
4	A	517	OLC	O19-C1-O20-C21
4	A	522	OLC	O23-C22-C24-O25

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Mol	Chain	Res	Type	Atoms
4	A	517	OLC	C3-C4-C5-C6
4	A	522	OLC	C2-C3-C4-C5
4	A	519	OLC	C4-C5-C6-C7
4	A	510	OLC	C3-C4-C5-C6
4	A	507	OLC	C11-C12-C13-C14
4	A	511	OLC	C2-C3-C4-C5
4	A	512	OLC	C10-C11-C12-C13
4	A	511	OLC	C1-C2-C3-C4
4	A	509	OLC	C13-C14-C15-C16
4	A	521	OLC	C9-C10-C11-C12
4	A	512	OLC	C13-C14-C15-C16
4	A	520	OLC	C3-C4-C5-C6
4	A	509	OLC	C7-C8-C9-C10
4	A	510	OLC	C7-C8-C9-C10
4	A	511	OLC	C9-C10-C11-C12
4	A	512	OLC	C9-C10-C11-C12
4	A	521	OLC	C10-C11-C12-C13
4	A	513	OLC	C2-C3-C4-C5
4	A	515	OLC	C7-C8-C9-C10
4	A	518	OLC	C7-C8-C9-C10
4	A	517	OLC	C9-C10-C11-C12
4	A	520	OLC	C13-C14-C15-C16
4	A	512	OLC	O20-C1-C2-C3
4	A	505	OLC	C2-C1-O20-C21
4	A	510	OLC	C11-C12-C13-C14
4	A	517	OLC	C21-C22-C24-O25
4	A	512	OLC	O19-C1-C2-C3
4	A	505	OLC	C4-C5-C6-C7
4	A	505	OLC	O19-C1-O20-C21
4	A	515	OLC	O20-C1-C2-C3
4	A	519	OLC	O20-C1-C2-C3
4	A	511	OLC	C14-C15-C16-C17
4	A	519	OLC	O19-C1-C2-C3
4	A	517	OLC	C11-C12-C13-C14

There are no ring outliers.

14 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	522	OLC	2	0
4	A	514	OLC	1	0
4	A	511	OLC	1	0

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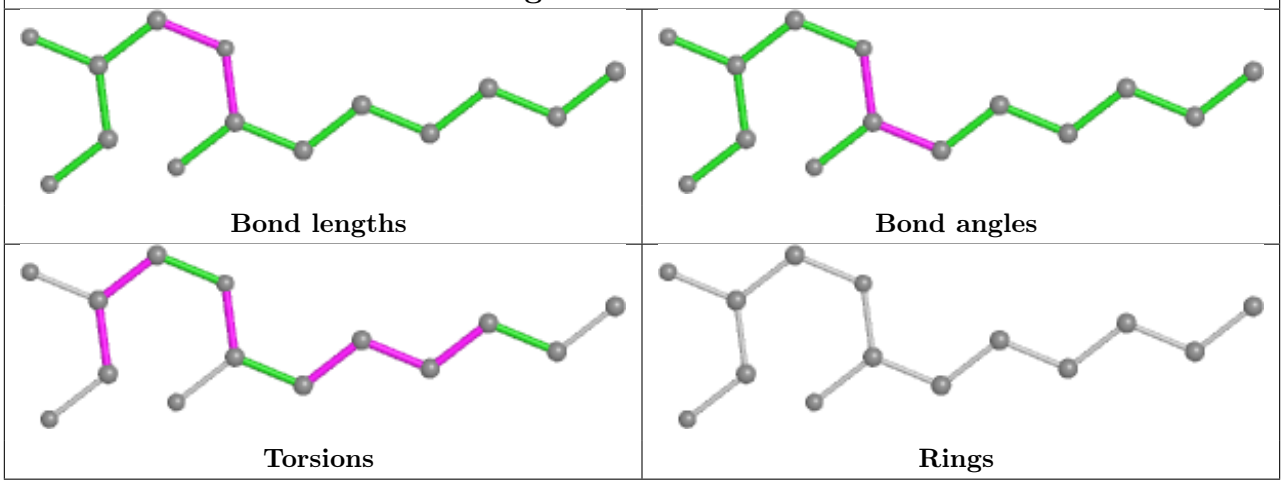
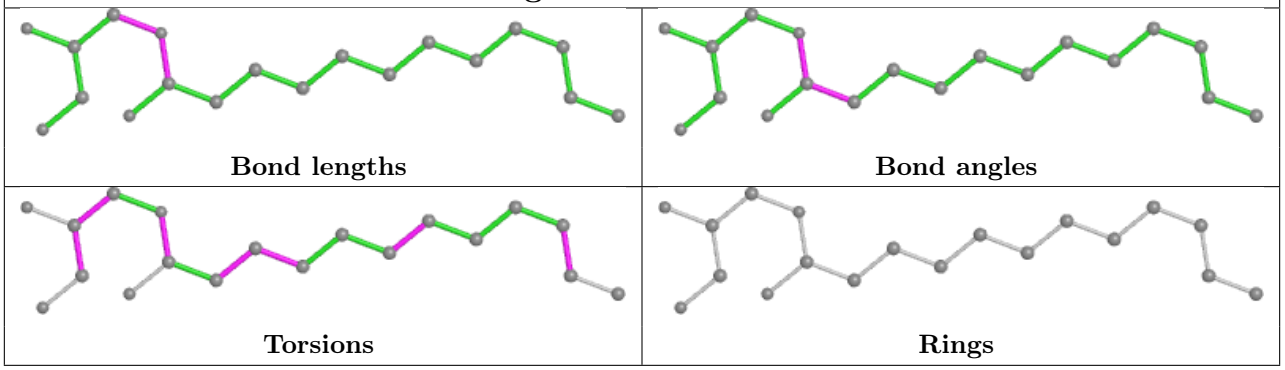
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	506	OLC	2	0
4	A	509	OLC	1	0
4	A	512	OLC	3	0
4	A	524	OLC	2	0
4	A	516	OLC	1	0
4	A	519	OLC	1	0
4	A	505	OLC	3	0
4	A	507	OLC	2	0
4	A	515	OLC	1	0
4	A	510	OLC	3	0
4	A	508	OLC	1	0

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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

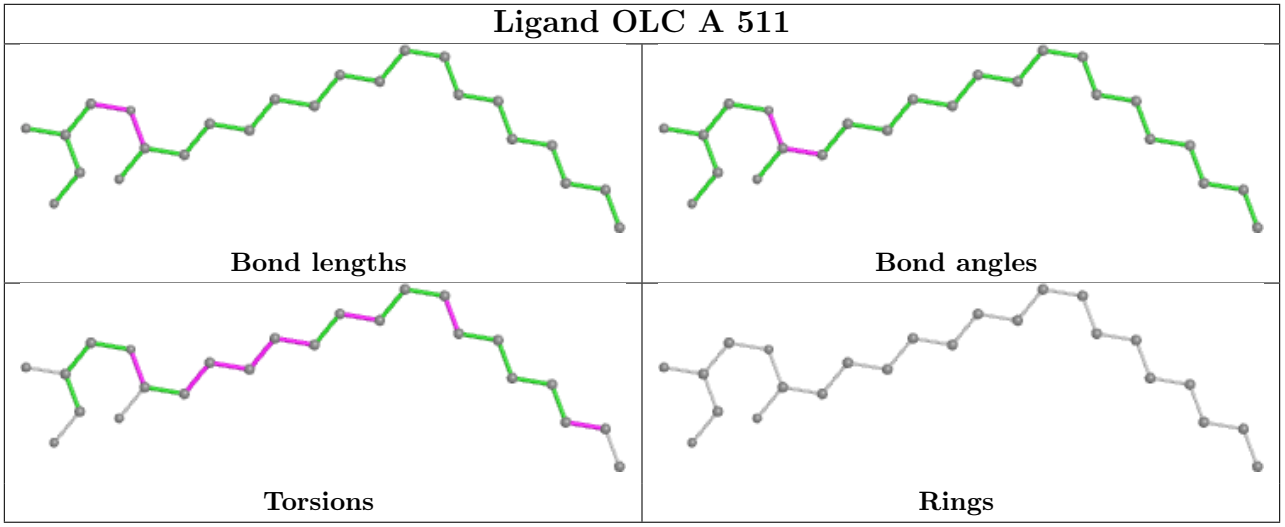
Ligand OLC A 522



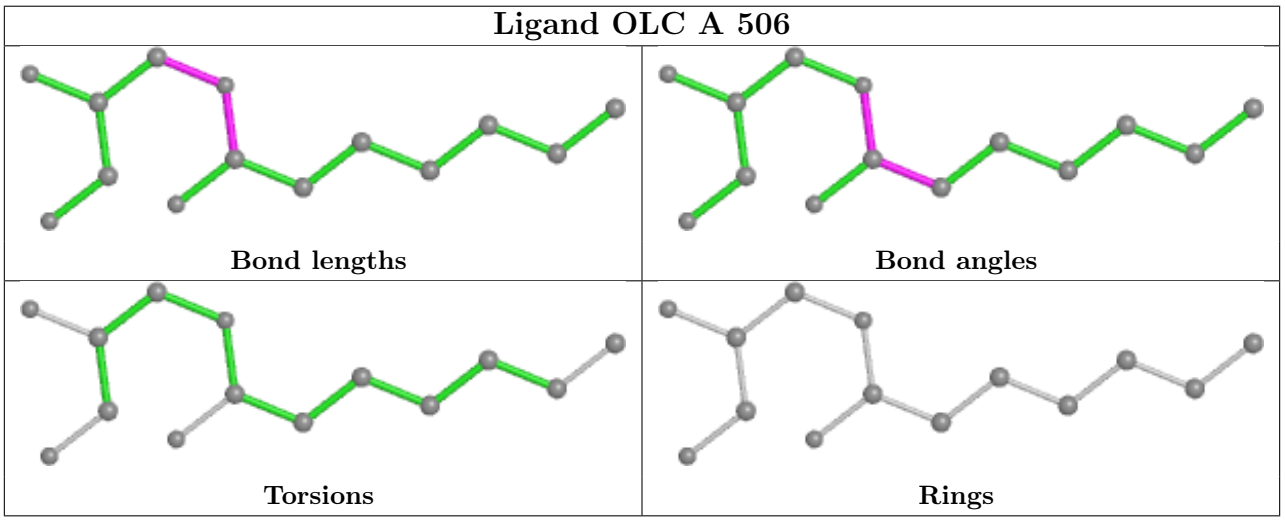
Ligand OLC A 514



Ligand OLC A 511



Ligand OLC A 506



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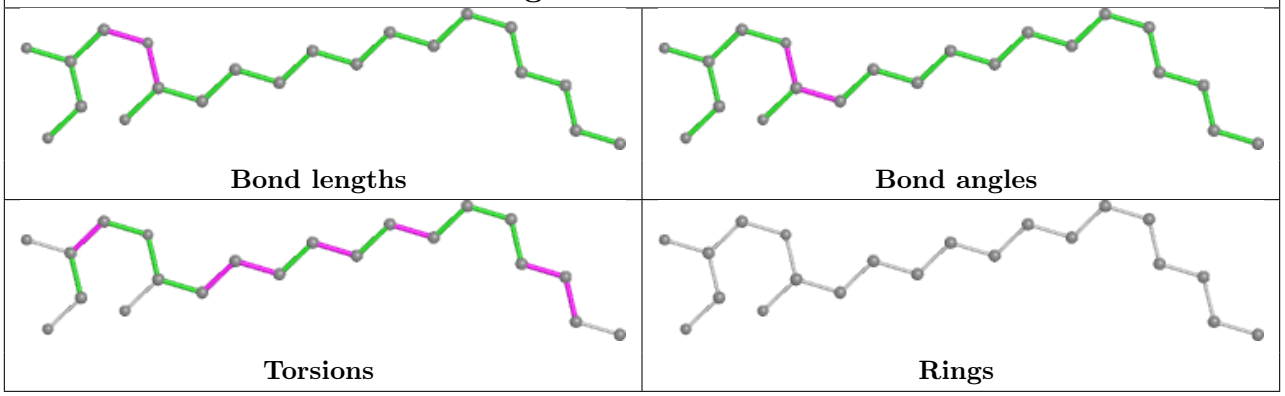

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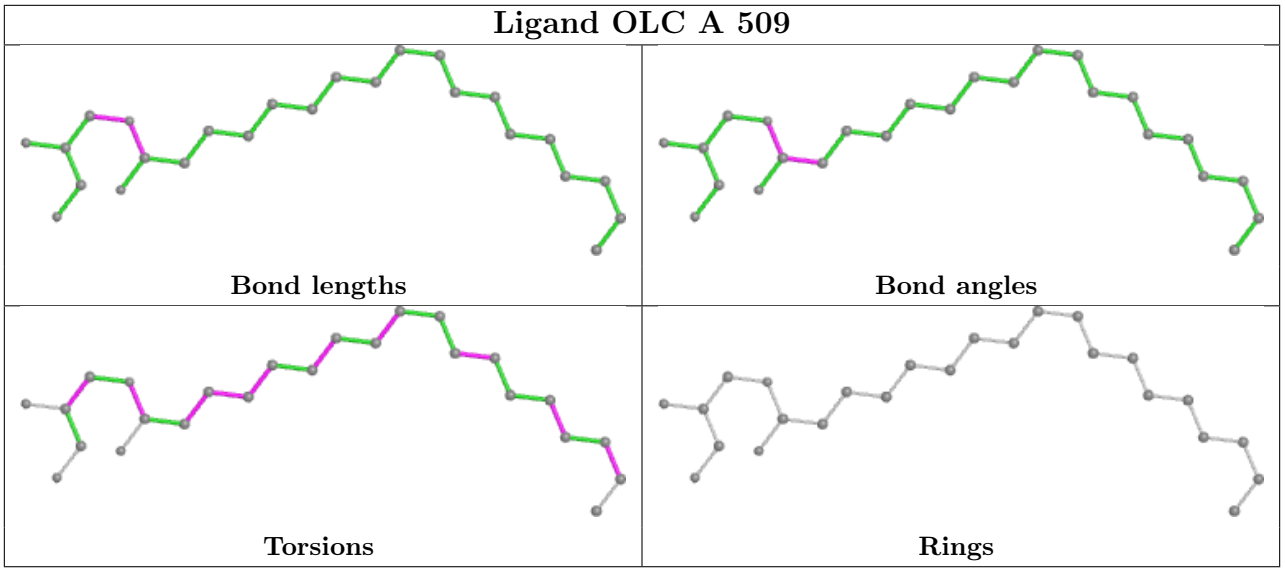

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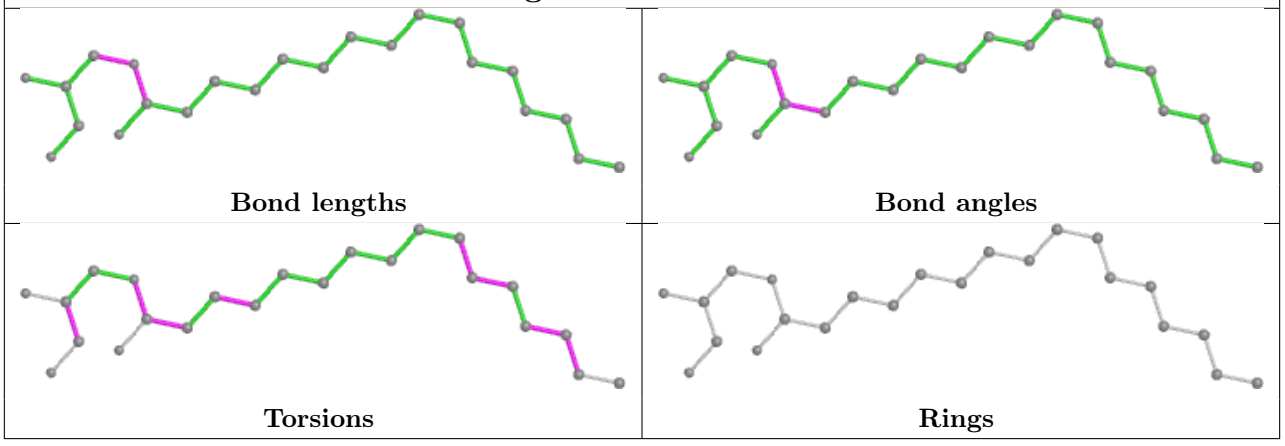

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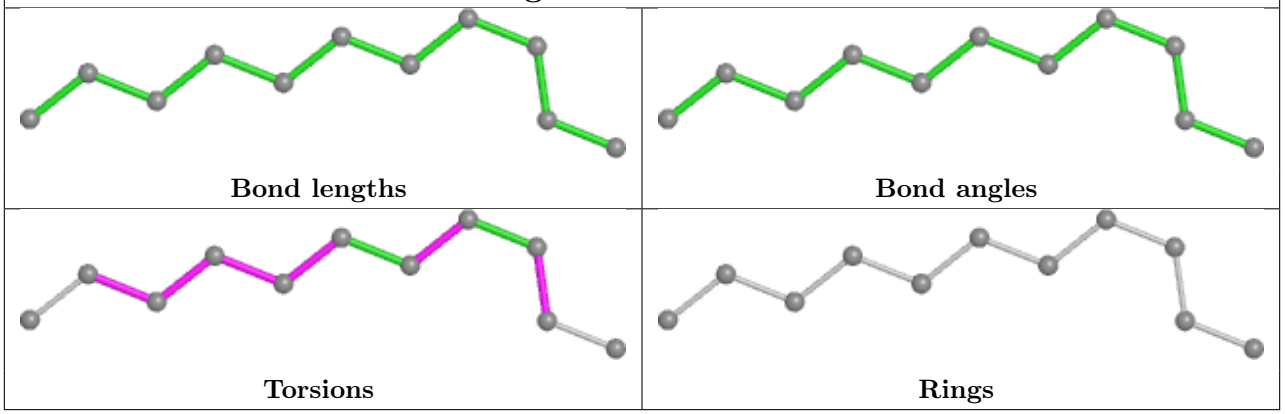

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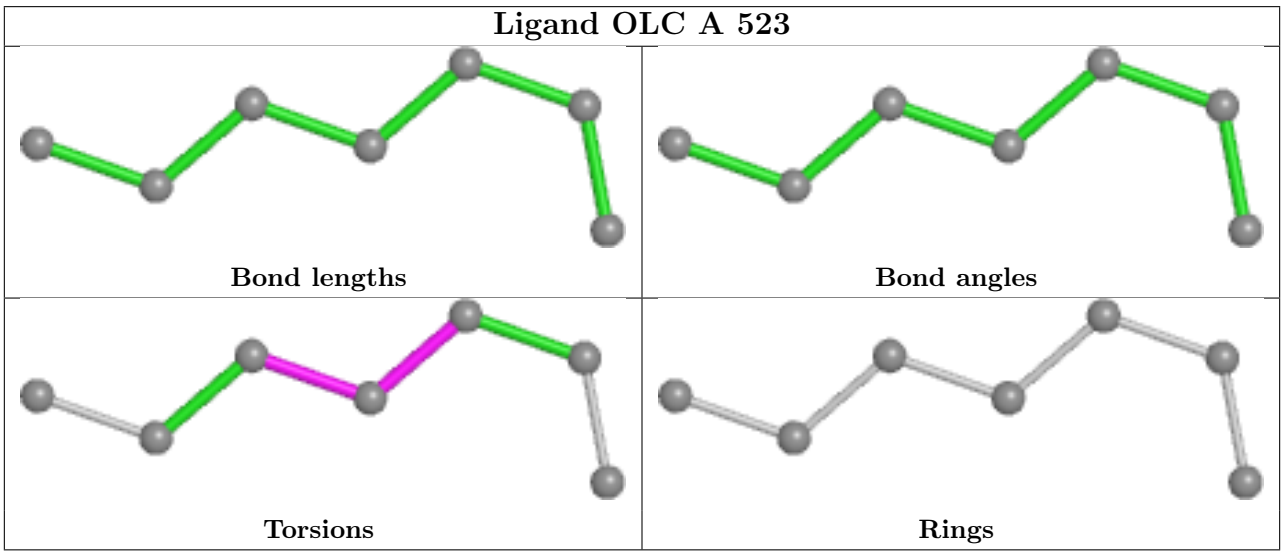

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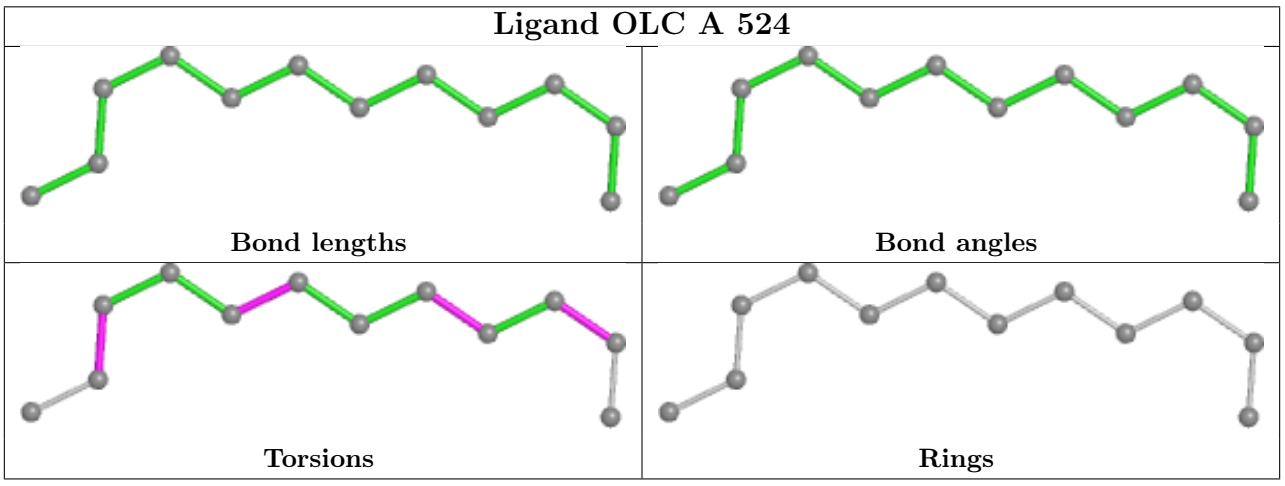
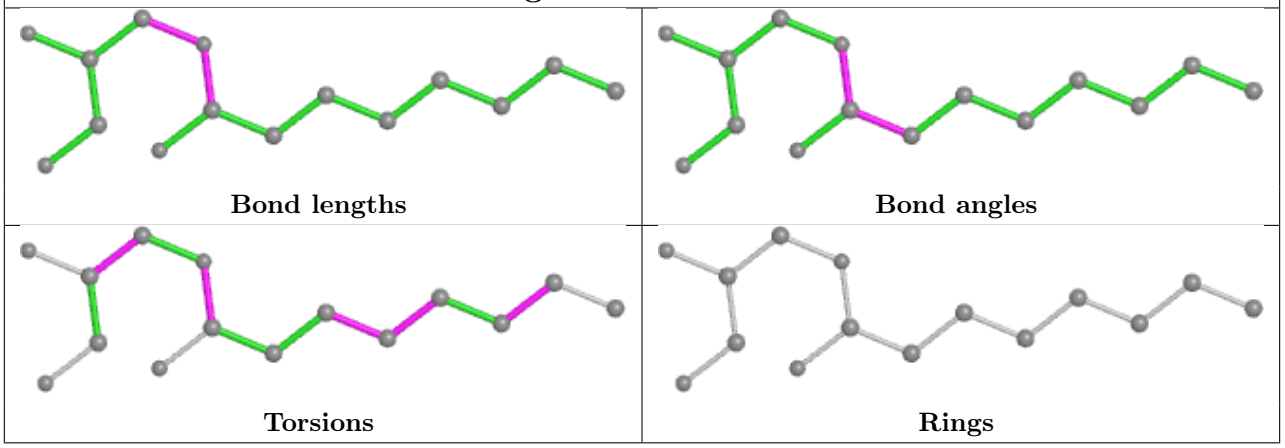
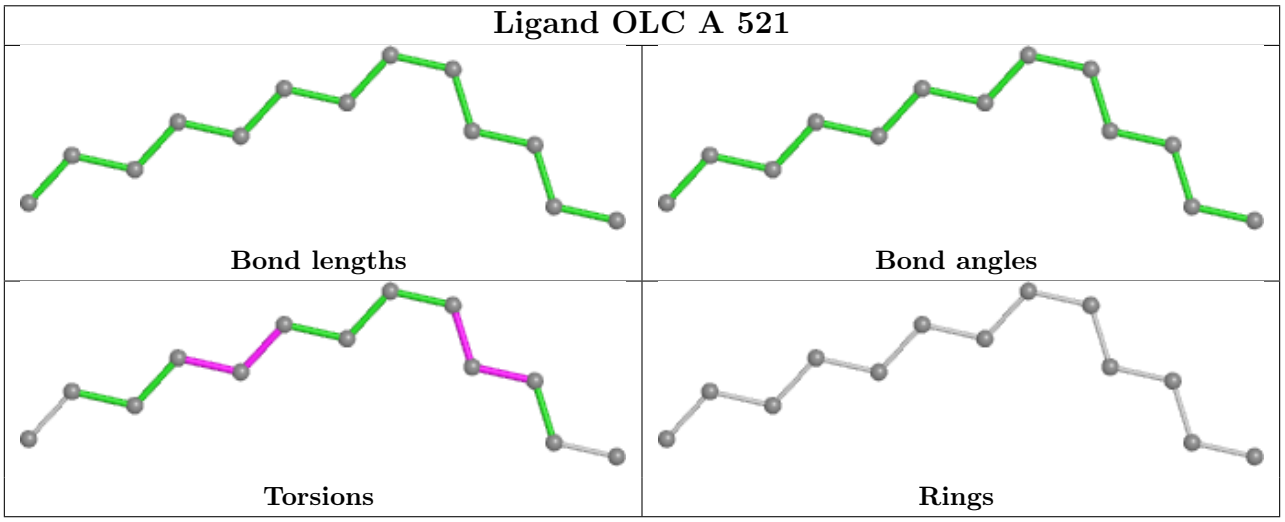


Ligand OLC A 516



Ligand OLC A 521



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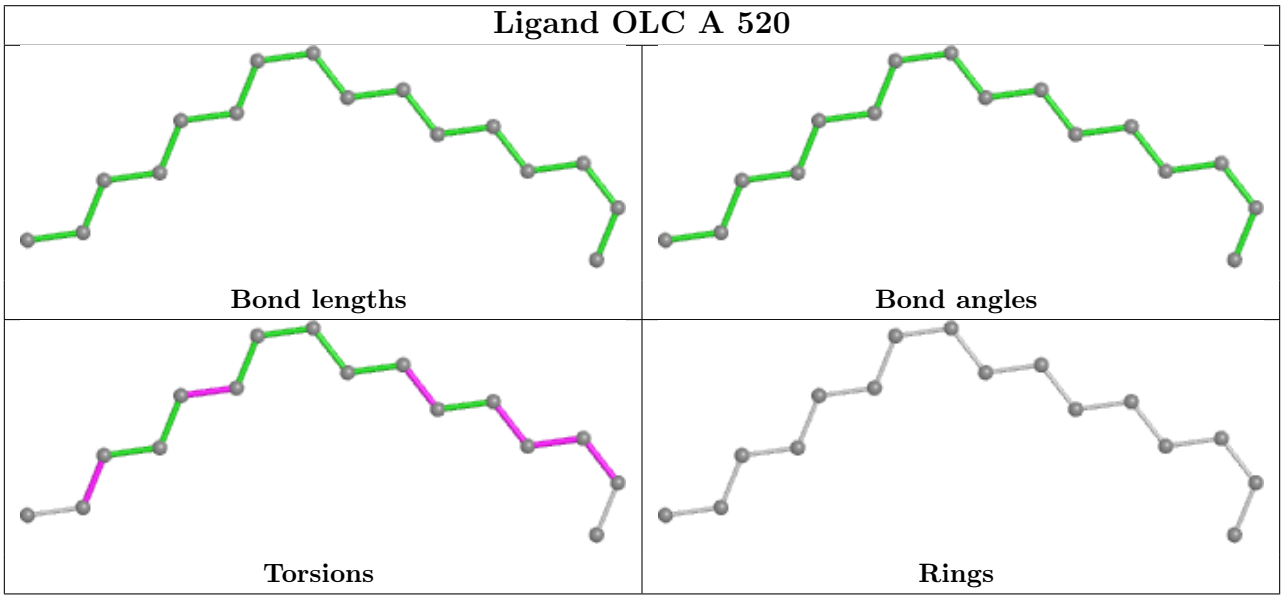

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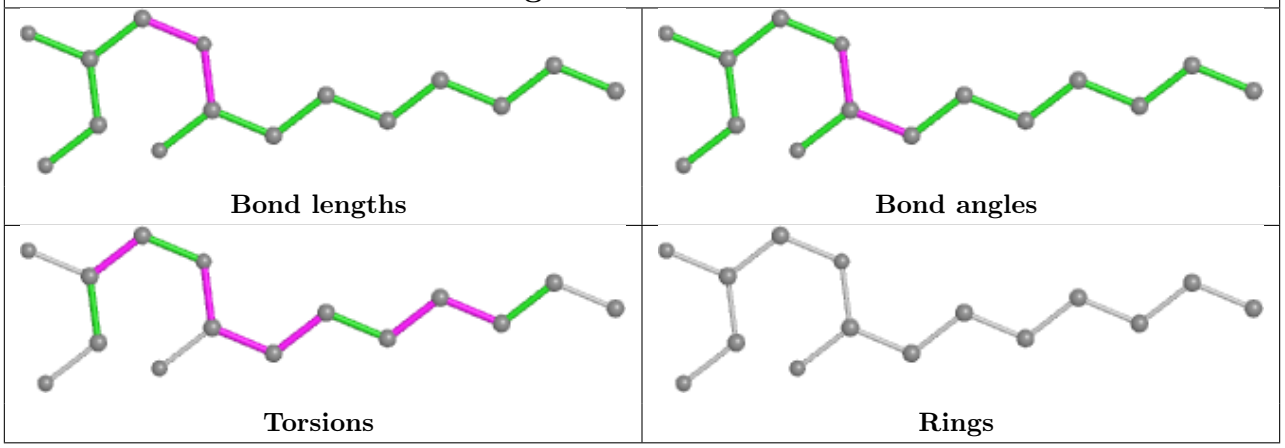

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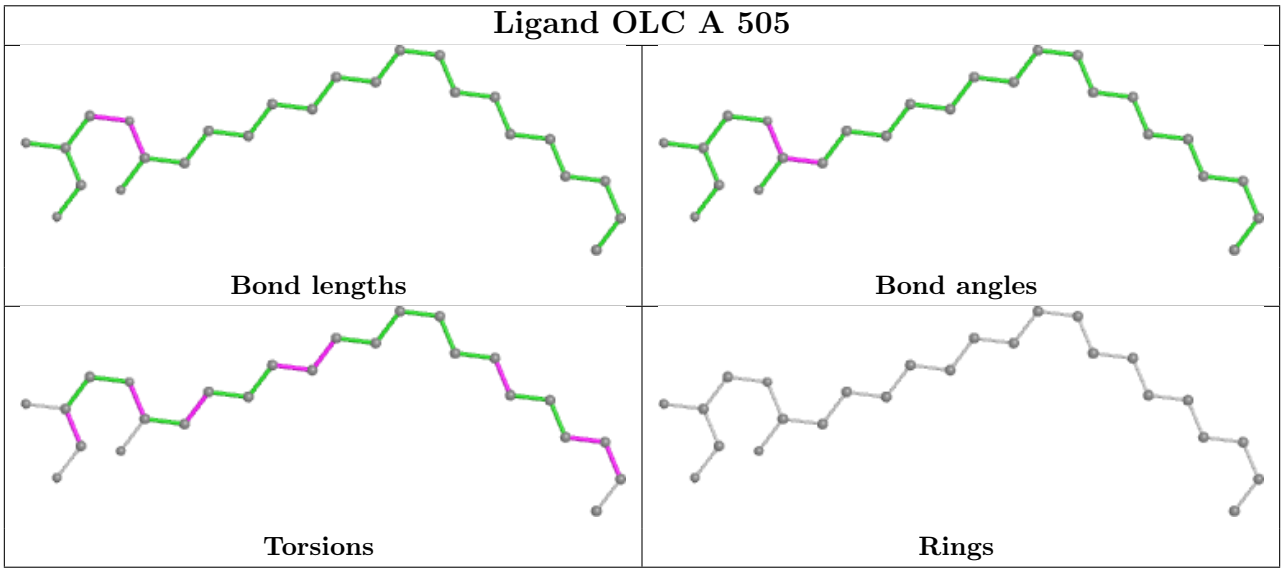

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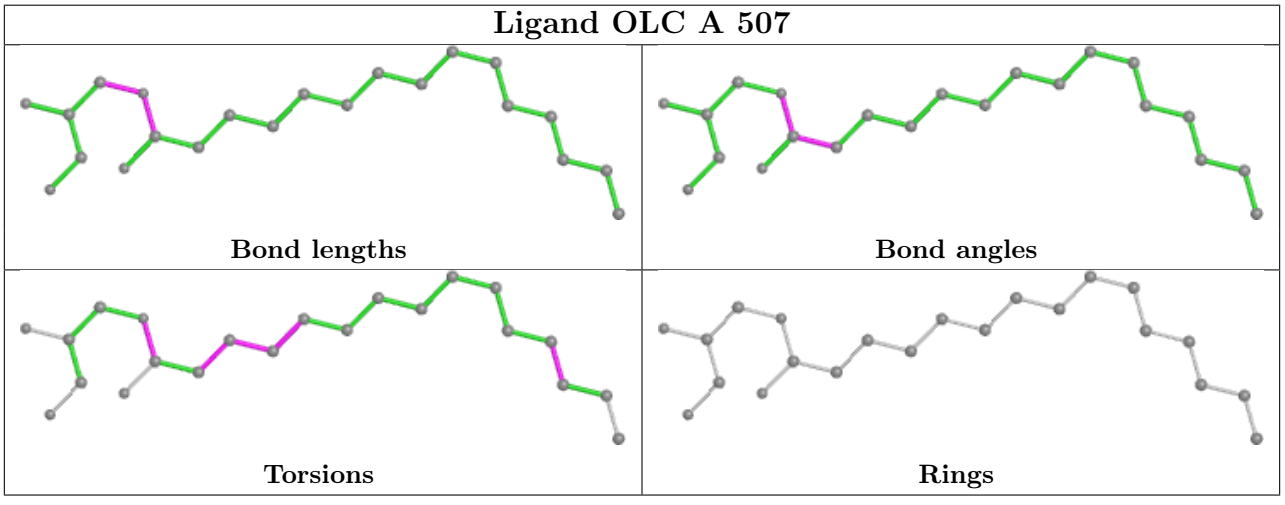
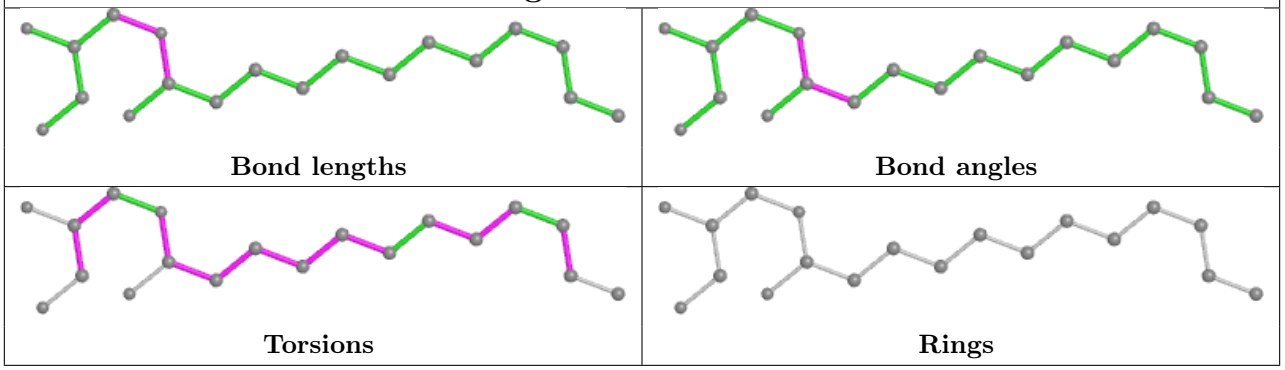


Ligand OLC A 515



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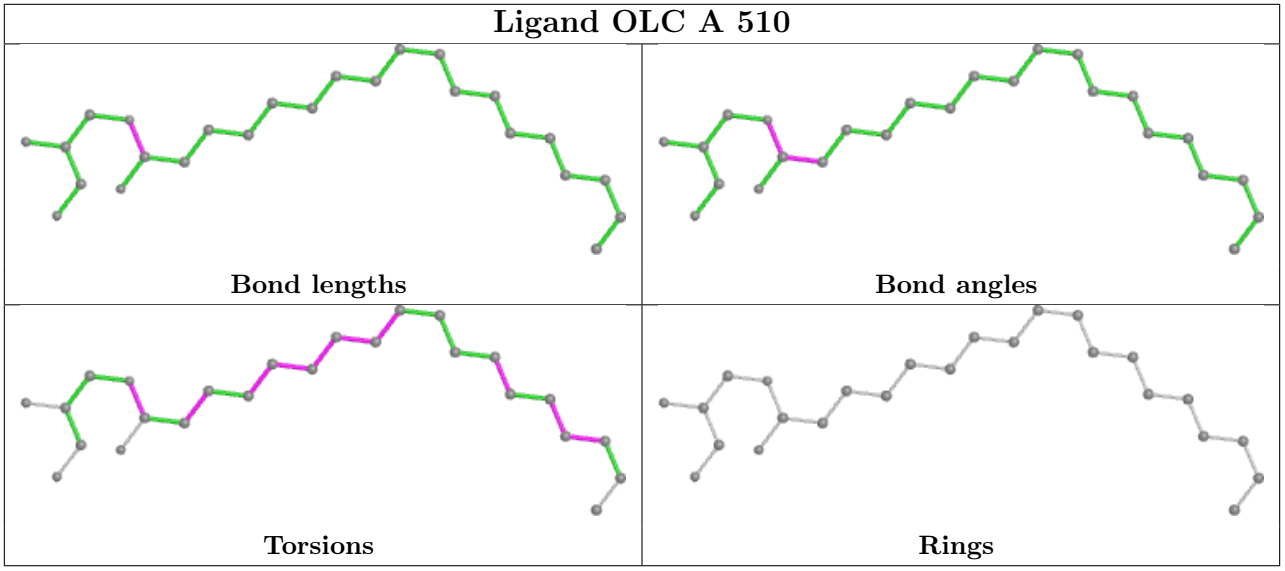

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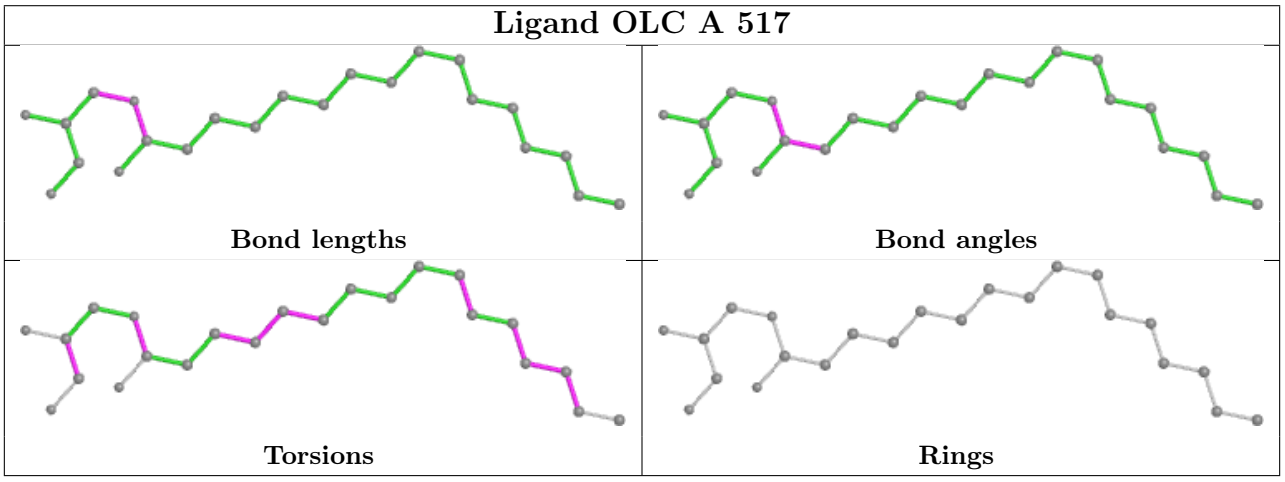

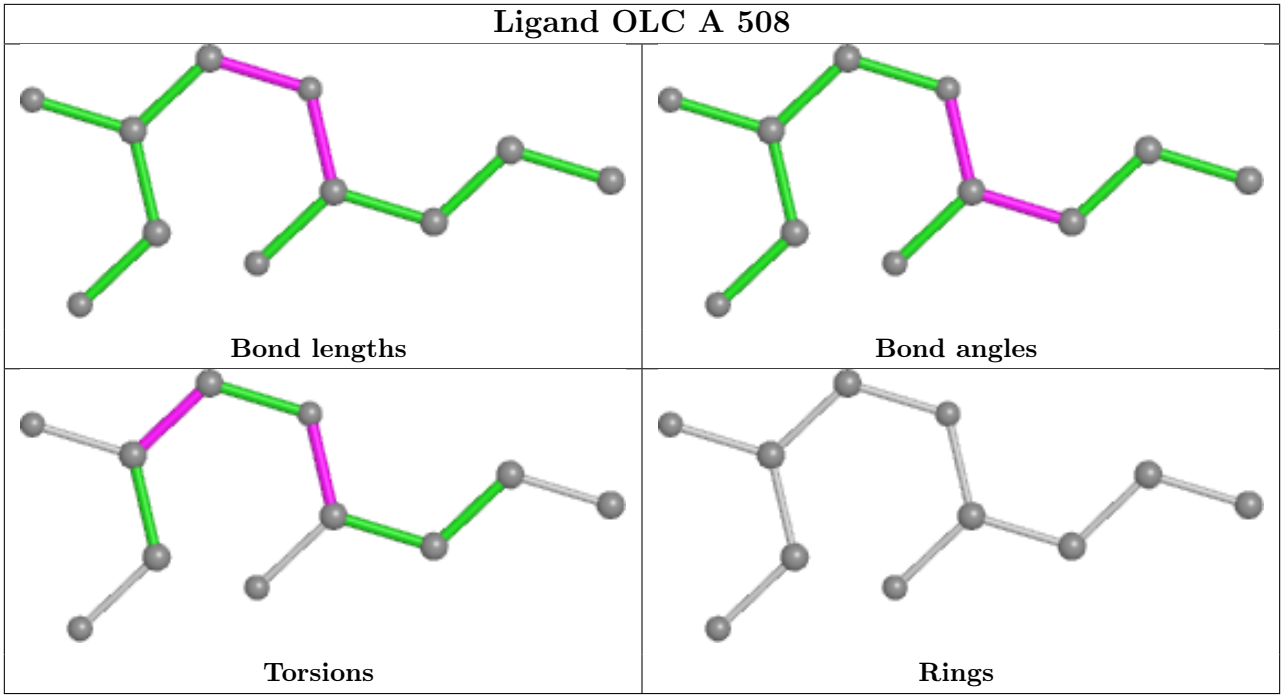

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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^{th} 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	388/414 (93%)	0.20	30 (7%)	13	13	32, 53, 115, 182	0

All (30) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	49	ILE	6.1
1	A	170	ARG	5.9
1	A	173	ARG	5.1
1	A	174	PRO	5.1
1	A	248	ASP	5.0
1	A	238	SER	5.0
1	A	46	PRO	4.2
1	A	237	HIS	4.0
1	A	44	LEU	3.9
1	A	172	THR	3.7
1	A	249	THR	3.7
1	A	330	VAL	3.6
1	A	255	ARG	3.5
1	A	168	GLN	3.5
1	A	169	LYS	3.4
1	A	292	GLU	3.2
1	A	333	MET	3.1
1	A	171	GLY	2.9
1	A	251	GLU	2.8
1	A	48	VAL	2.8
1	A	239	ALA	2.7
1	A	263	ASP	2.6
1	A	366	LEU	2.5
1	A	293	ASN	2.5
1	A	167	LEU	2.5
1	A	250	THR	2.4
1	A	175	LEU	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	259	LEU	2.3
1	A	163	TRP	2.2
1	A	254	ARG	2.1

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	OLC	A	522	14/25	0.44	0.40	65,84,98,112	0
4	OLC	A	517	23/25	0.60	0.49	60,101,114,124	0
4	OLC	A	520	16/25	0.62	0.46	69,84,99,100	0
4	OLC	A	514	19/25	0.67	0.33	74,93,104,104	0
4	OLC	A	515	19/25	0.69	0.42	65,81,95,105	0
4	OLC	A	521	13/25	0.70	0.39	66,76,82,84	0
4	OLC	A	511	24/25	0.72	0.32	67,83,98,103	0
4	OLC	A	512	23/25	0.72	0.28	60,79,98,113	0
4	OLC	A	513	21/25	0.74	0.31	56,76,88,93	0
5	PEG	A	525	4/7	0.78	0.13	62,70,72,72	0
4	OLC	A	509	25/25	0.79	0.33	67,83,102,111	0
4	OLC	A	524	12/25	0.81	0.20	65,79,90,92	0
4	OLC	A	505	25/25	0.81	0.24	63,87,97,99	0
4	OLC	A	519	15/25	0.82	0.25	57,89,106,108	0
4	OLC	A	510	25/25	0.82	0.20	59,74,85,96	0
4	OLC	A	516	15/25	0.83	0.33	64,79,92,94	0
4	OLC	A	518	11/25	0.83	0.22	74,87,90,90	0
4	OLC	A	507	22/25	0.85	0.28	47,66,92,105	0
4	OLC	A	508	11/25	0.85	0.21	59,68,72,83	0
2	CD	A	501	1/1	0.85	0.10	83,83,83,83	1

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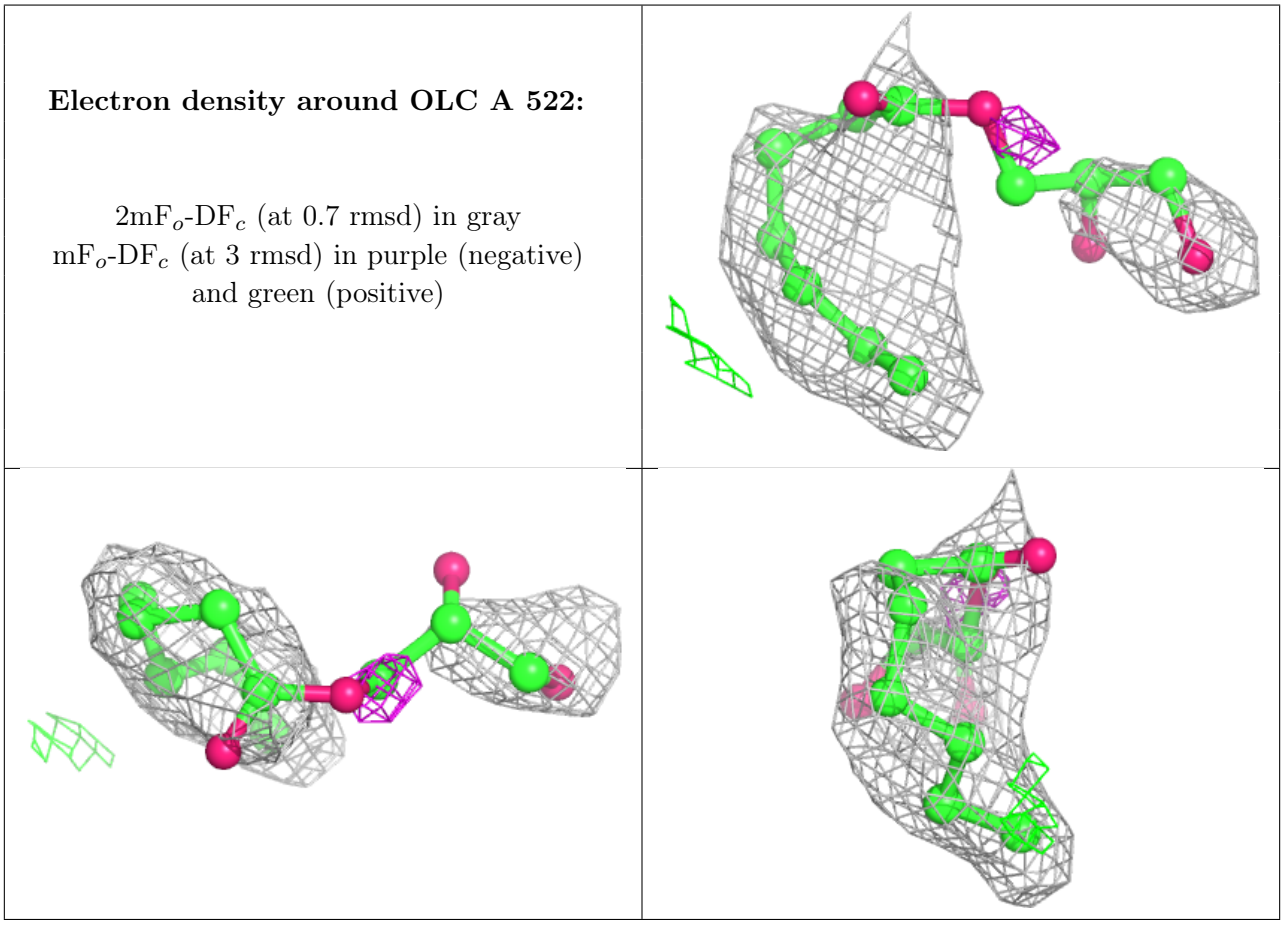
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	OLC	A	506	14/25	0.86	0.21	52,73,97,102	0
4	OLC	A	523	7/25	0.87	0.24	76,79,89,90	0
3	CL	A	504	1/1	0.93	0.08	63,63,63,63	0
3	CL	A	503	1/1	0.93	0.12	70,70,70,70	0
2	CD	A	502	1/1	0.99	0.12	65,65,65,65	0

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

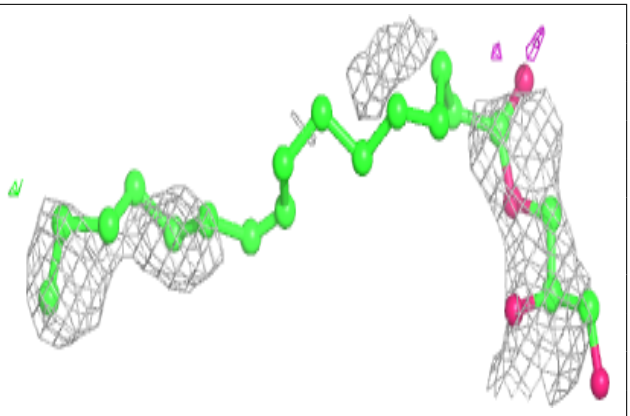
Electron density around OLC A 522:

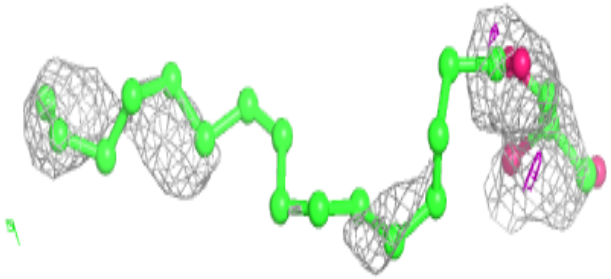
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

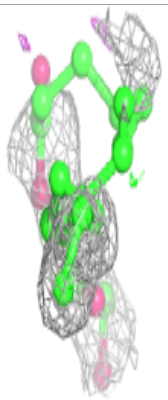


Electron density around OLC A 517:

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

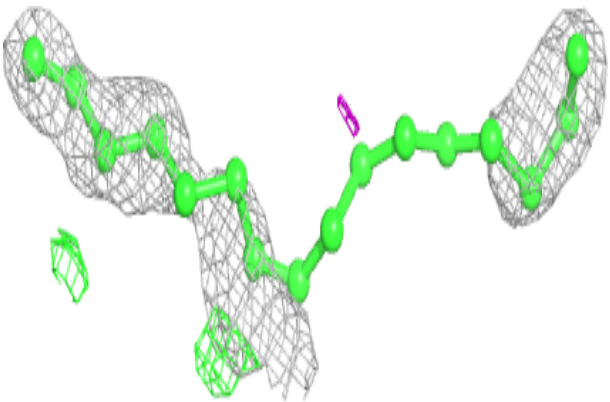


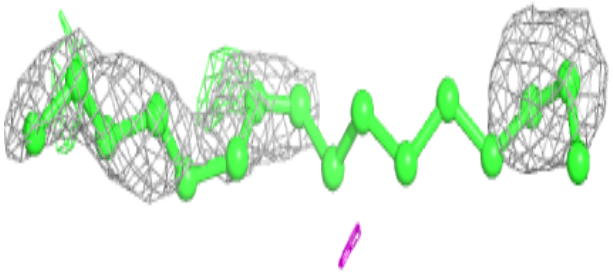


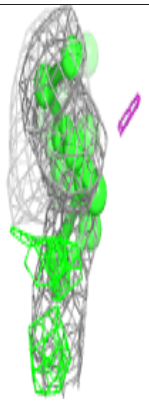


Electron density around OLC A 520:

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

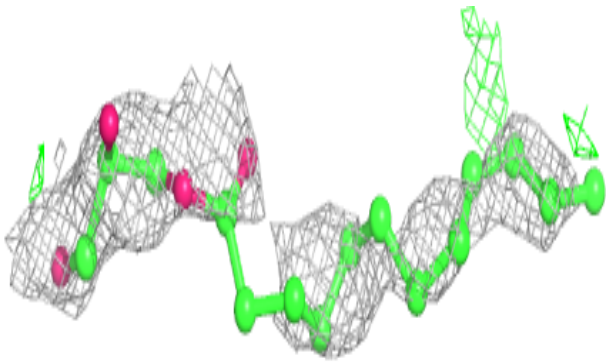


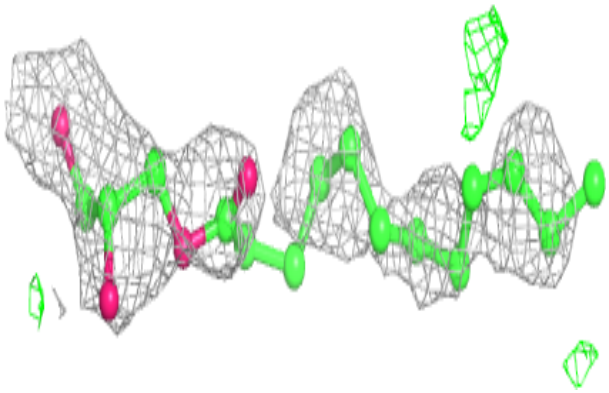


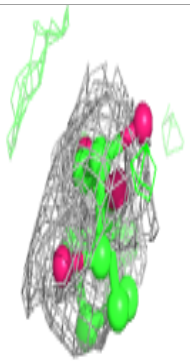


Electron density around OLC A 514:

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

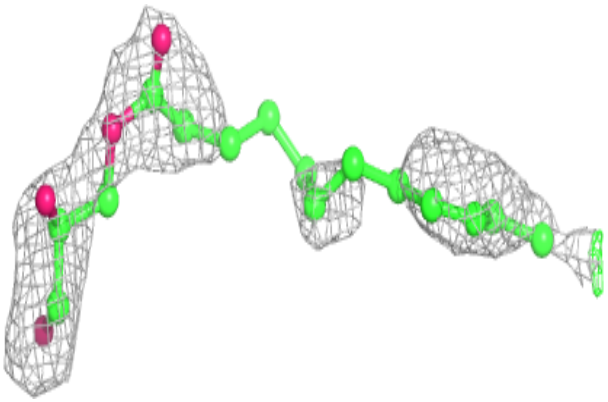


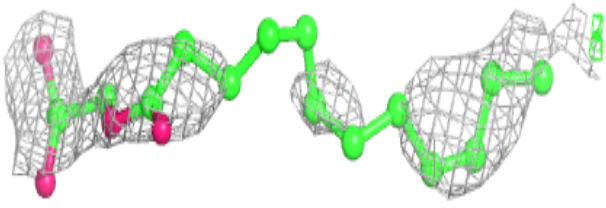


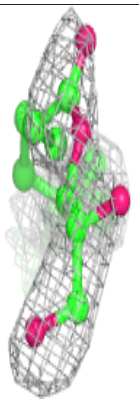


Electron density around OLC A 515:

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

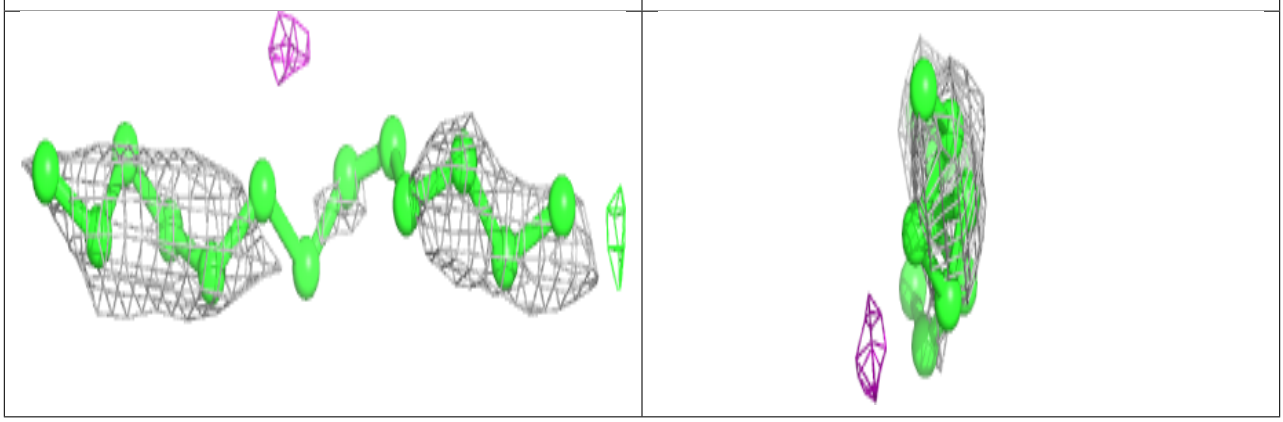






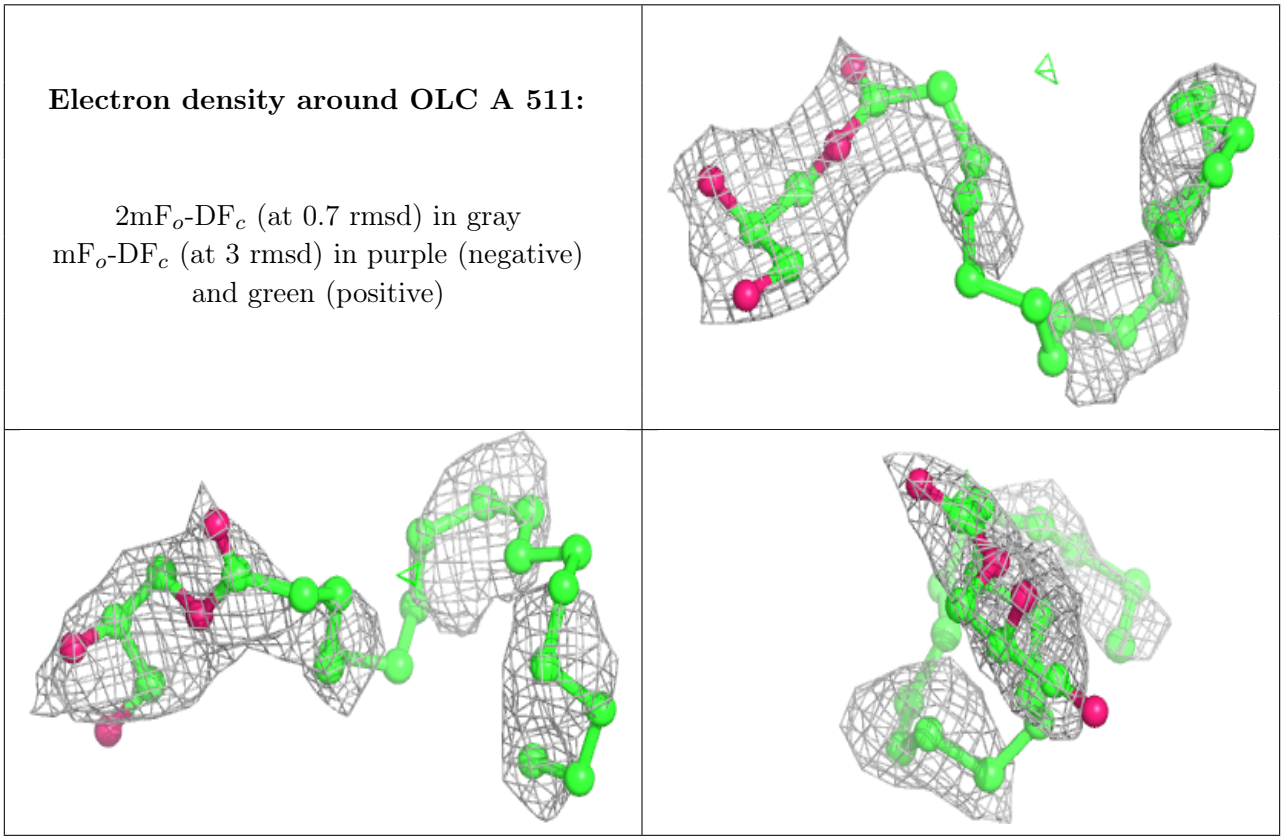
Electron density around OLC A 521:

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



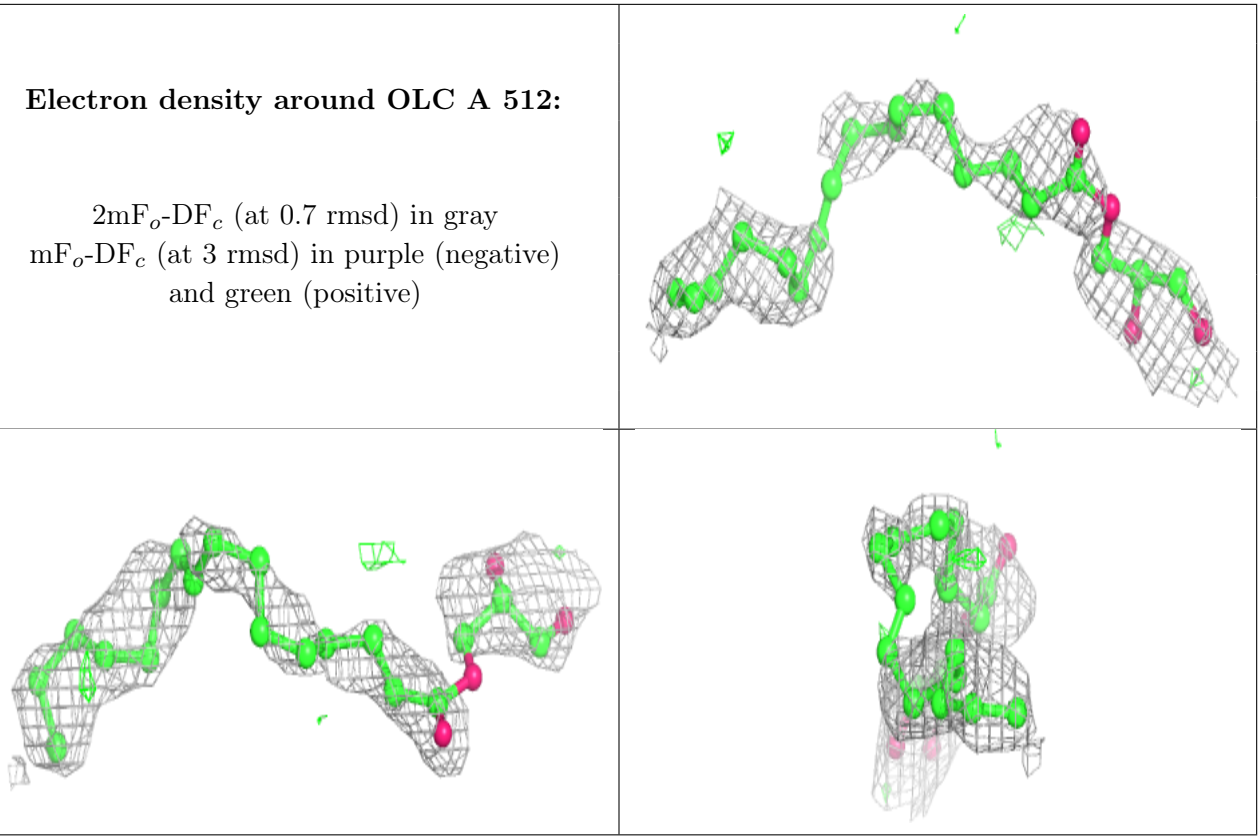
Electron density around OLC A 511:

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



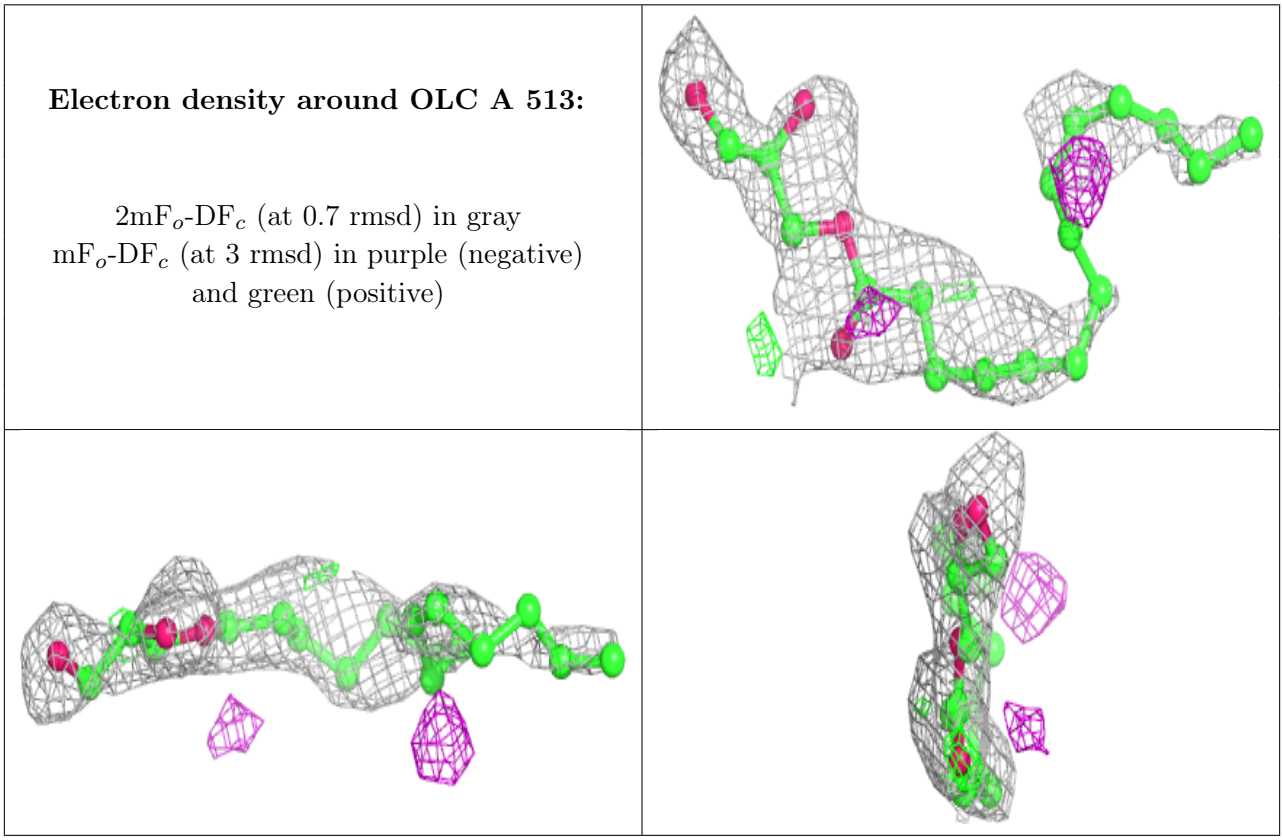
Electron density around OLC A 512:

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



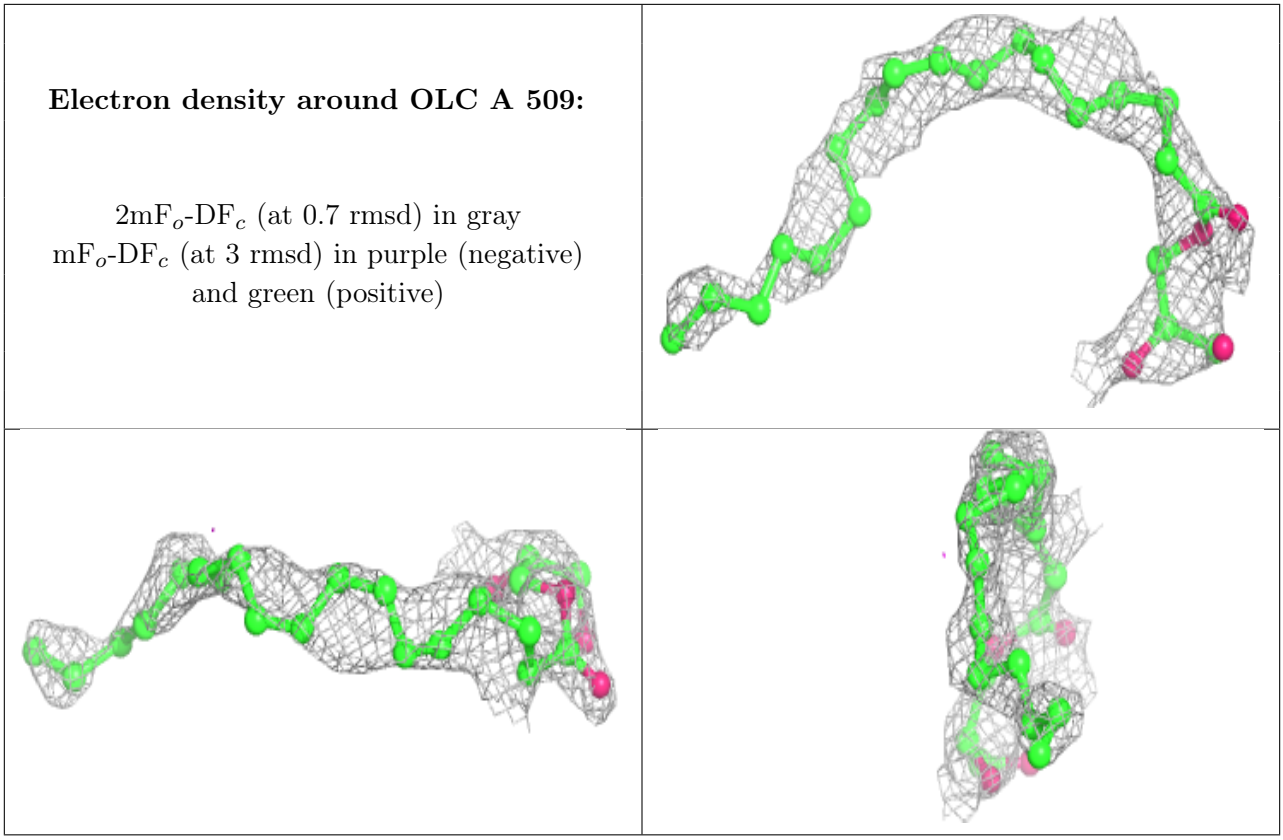
Electron density around OLC A 513:

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



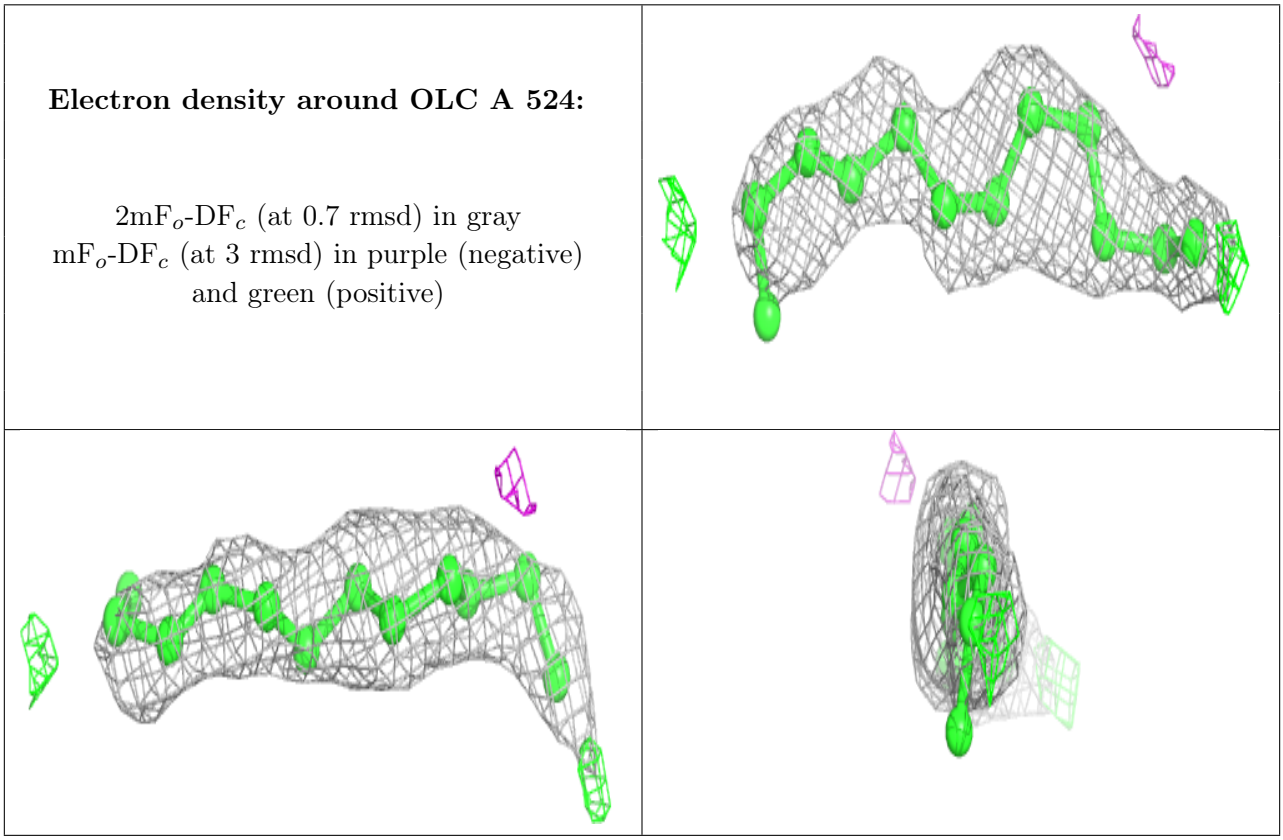
Electron density around OLC A 509:

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



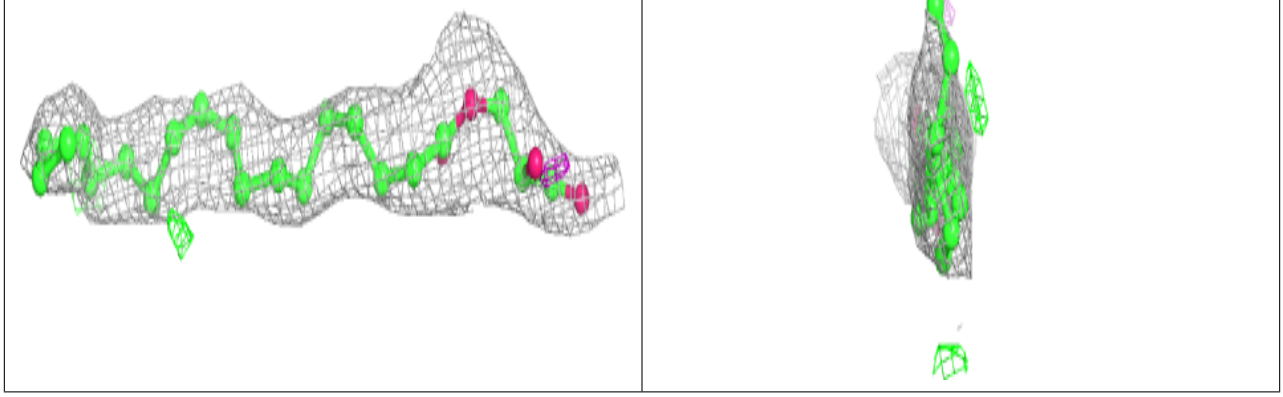
Electron density around OLC A 524:

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



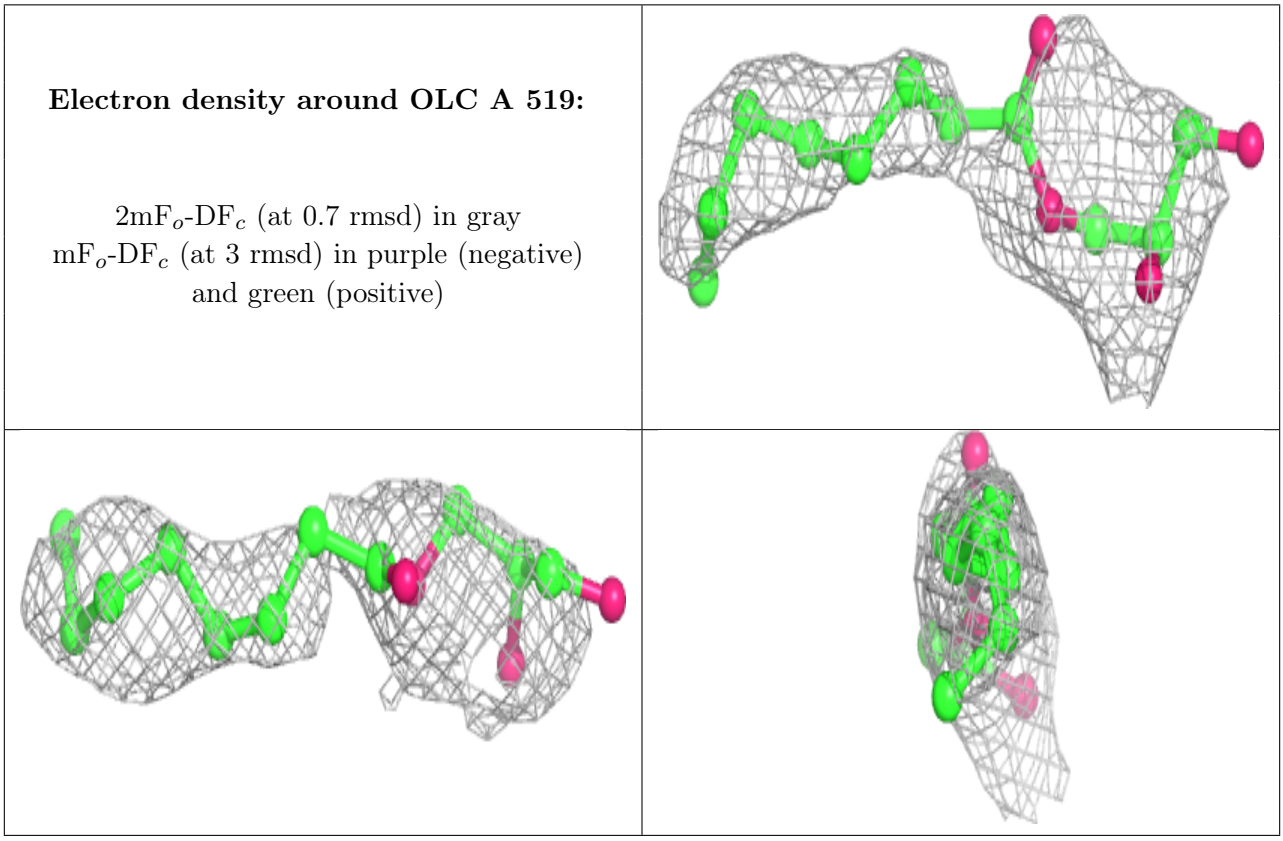
Electron density around OLC A 505:

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



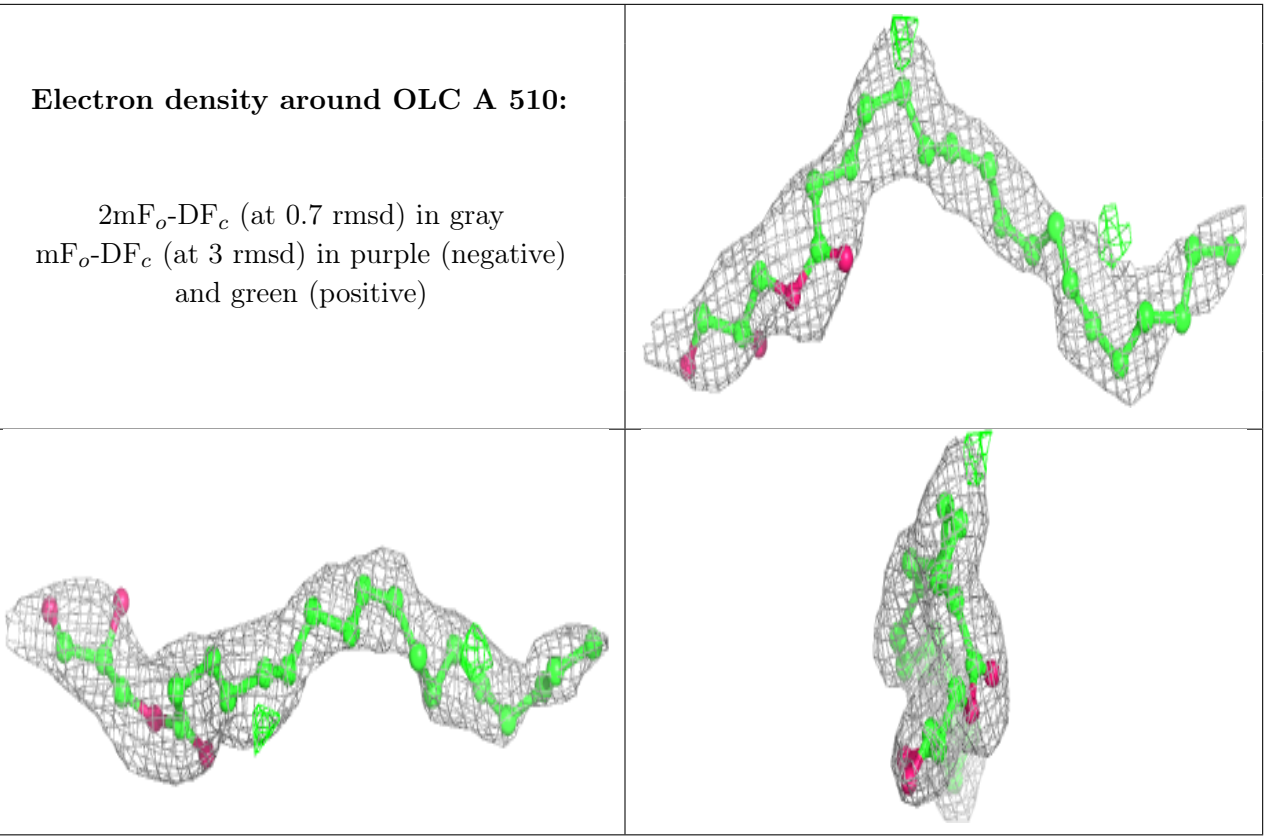
Electron density around OLC A 519:

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



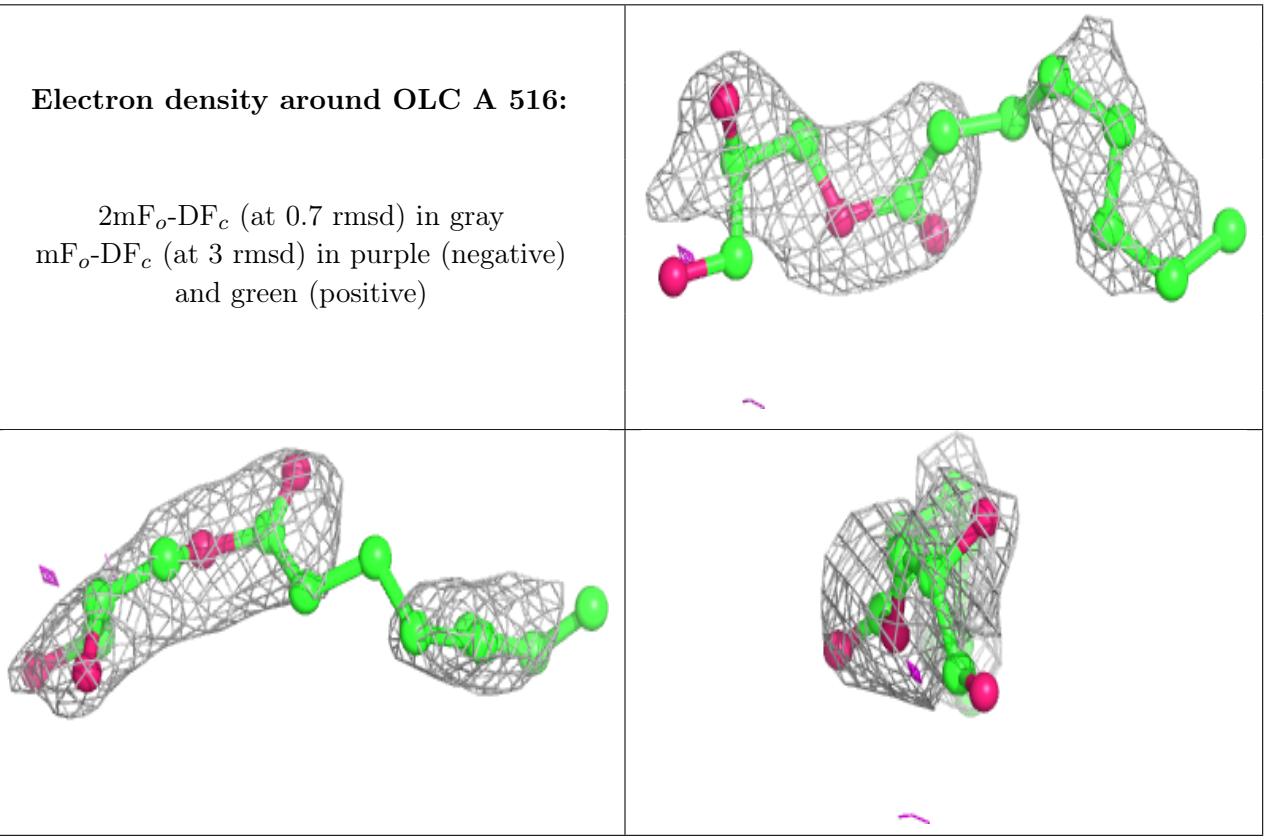
Electron density around OLC A 510:

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



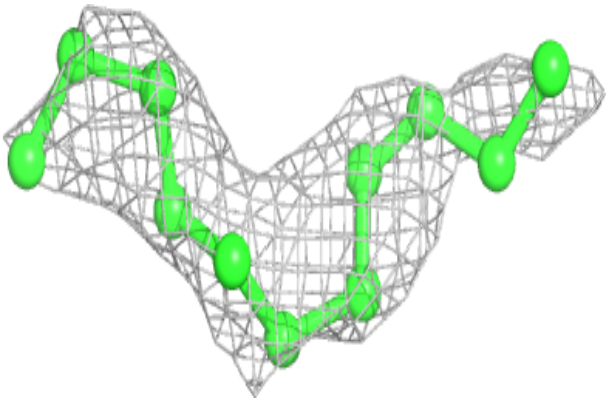
Electron density around OLC A 516:

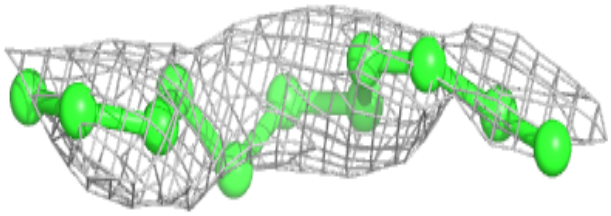
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

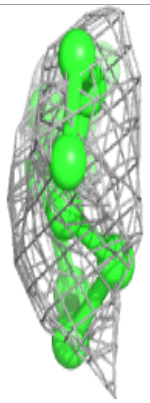


Electron density around OLC A 518:

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

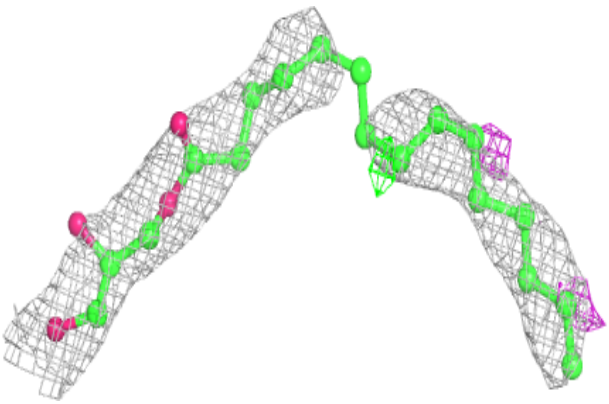


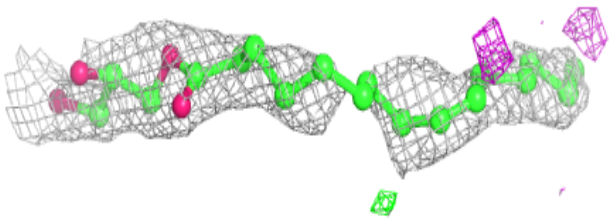


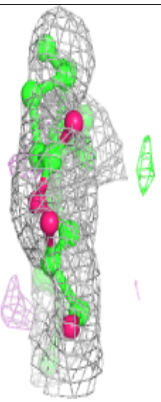


Electron density around OLC A 507:

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

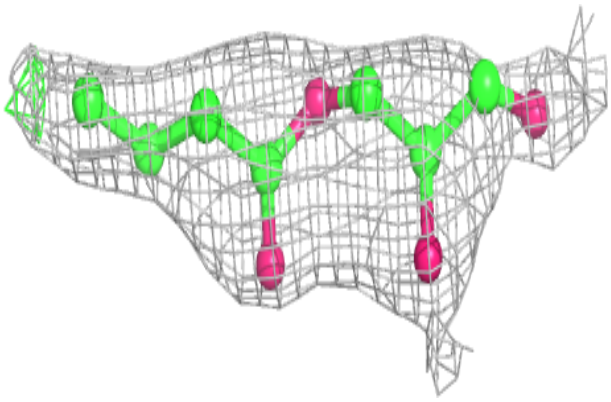


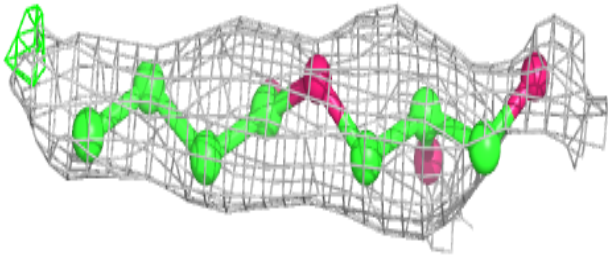


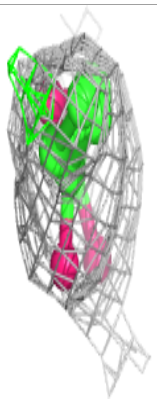


Electron density around OLC A 508:

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

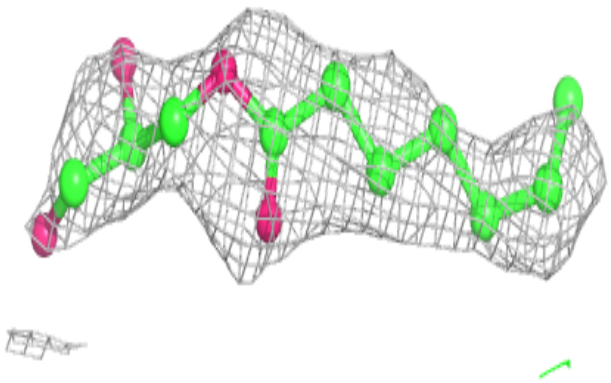


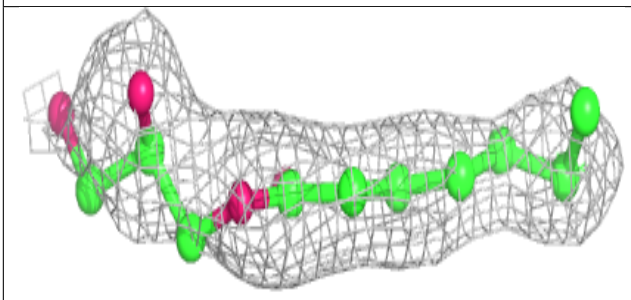


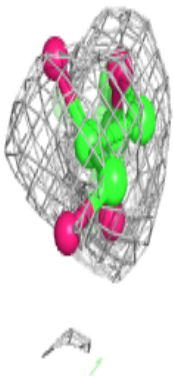


Electron density around OLC A 506:

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

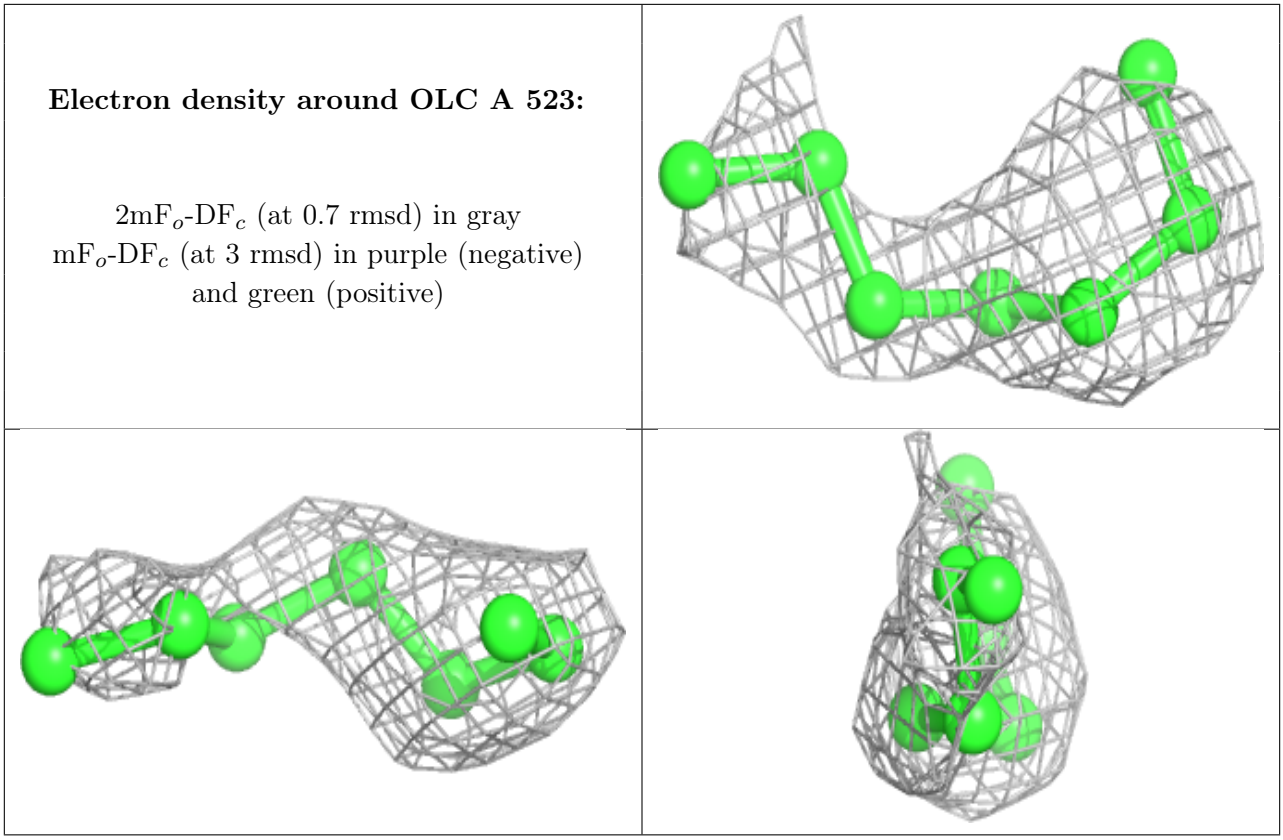






Electron density around OLC A 523:

$2mF_o$-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.