wwPDB X-ray Structure Validation Summary Report (i)

May 24, 2022 – 10:18 am BST

PDB ID	:	7AVN
Title	:	Structure of marine actinobacteria clade rhodopsin (MacR) in orange form in P1 space group
Authors	:	Gushchin, I.; Polovinkin, V.; Kovalev, K.; Shevchenko, V.; Gordeliy, V.
Deposited on	:	2020-11-05
Resolution	:	1.60 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) symbol.

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

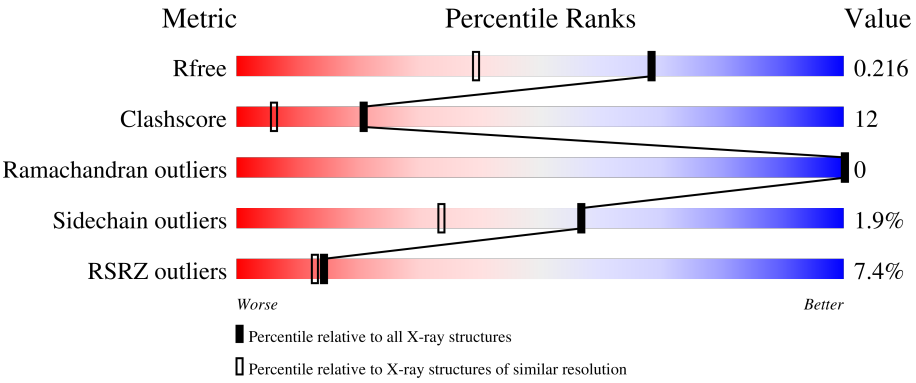
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.28.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.28.1

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 1.60 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	3398 (1.60-1.60)
Clashscore	141614	3665 (1.60-1.60)
Ramachandran outliers	138981	3564 (1.60-1.60)
Sidechain outliers	138945	3563 (1.60-1.60)
RSRZ outliers	127900	3321 (1.60-1.60)

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	220	6% 76% 22%
1	B	220	8% 83% 13%

2 Entry composition (i)

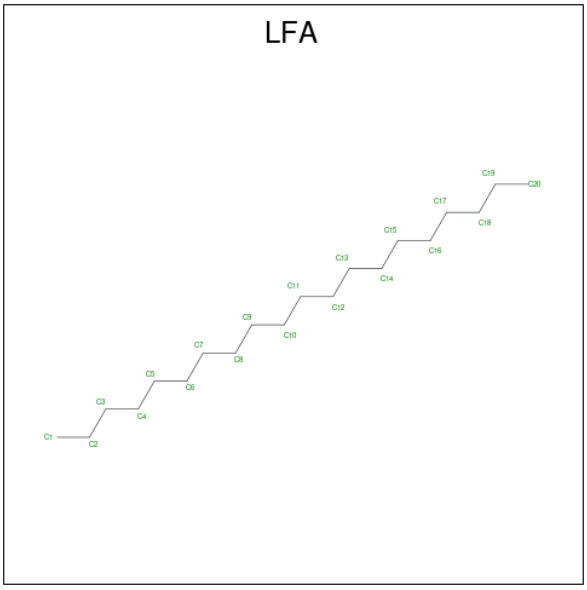
There are 5 unique types of molecules in this entry. The entry contains 4017 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Bacteriorhodopsin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	217	Total	C	N	O	S	0	17	0
			1772	1174	276	309	13			
1	B	217	Total	C	N	O	S	0	14	0
			1752	1160	276	302	14			

- Molecule 2 is EICOSANE (three-letter code: LFA) (formula: $C_{20}H_{42}$).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	C	0	0
			10	10		
2	A	1	Total	C	0	0
			16	16		
2	A	1	Total	C	0	0
			10	10		
2	A	1	Total	C	0	0
			6	6		

Continued on next page...

Continued from previous page...

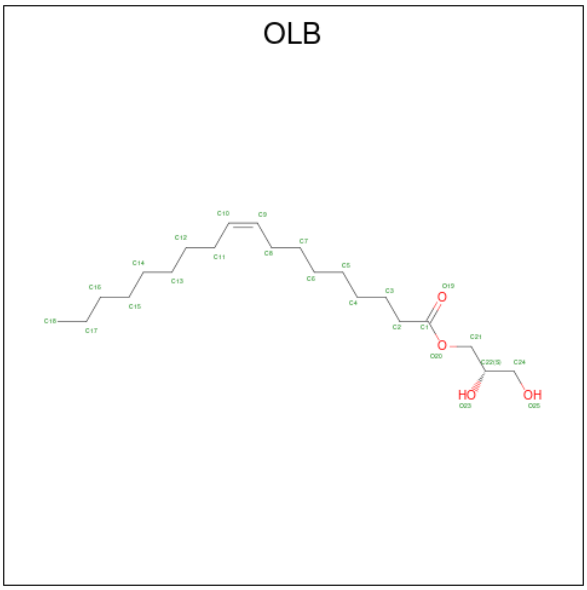
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C 8 8	0	0
2	A	1	Total C 12 12	0	0
2	A	1	Total C 10 10	0	0
2	A	1	Total C 10 10	0	0
2	A	1	Total C 18 18	0	0
2	A	1	Total C 6 6	0	0
2	A	1	Total C 6 6	0	0
2	A	1	Total C 13 13	0	0
2	A	1	Total C 6 6	0	0
2	B	1	Total C 8 8	0	0
2	B	1	Total C 8 8	0	0
2	B	1	Total C 10 10	0	0
2	B	1	Total C 16 16	0	0
2	B	1	Total C 6 6	0	0
2	B	1	Total C 16 16	0	0
2	B	1	Total C 12 12	0	0
2	B	1	Total C 6 6	0	0
2	B	1	Total C 8 8	0	0
2	B	1	Total C 7 7	0	0
2	B	1	Total C 7 7	0	0
2	B	1	Total C 10 10	0	0

Continued on next page...

Continued from previous page...

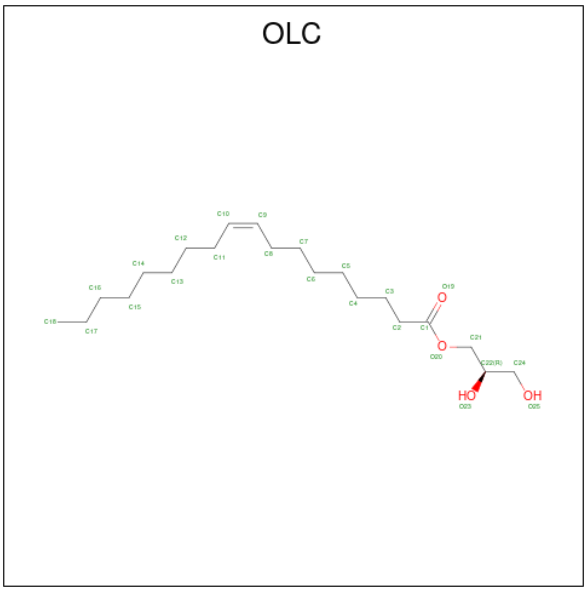
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total C 6 6	0	0

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



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 9 5 4	0	0
3	B	1	Total C O 14 10 4	0	0

- 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 13 9 4	0	0
4	A	1	Total C O 16 12 4	0	0
4	B	1	Total C O 16 12 4	0	0
4	B	1	Total C O 16 12 4	0	0

- Molecule 5 is water.

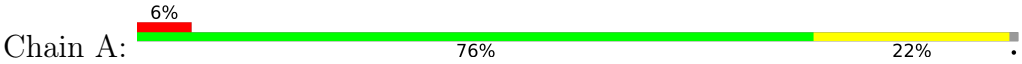
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	84	Total O 84 84	0	1
5	B	74	Total O 74 74	0	1

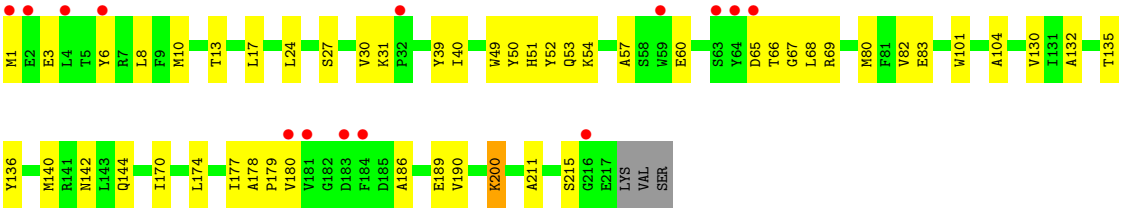
3 Residue-property plots (i)

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

• Molecule 1: Bacteriorhodopsin

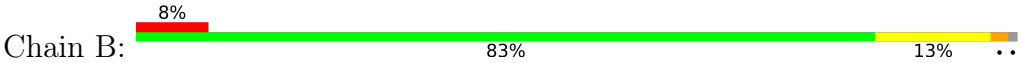
Chain A:

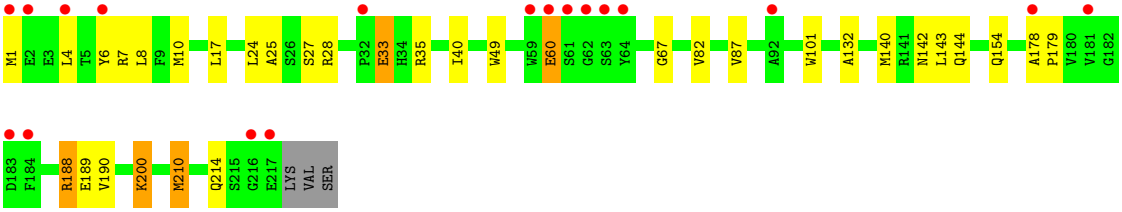




• Molecule 1: Bacteriorhodopsin

Chain B:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	40.69Å 56.63Å 57.39Å 63.66° 78.98° 80.33°	Depositor
Resolution (Å)	50.57 – 1.60 50.52 – 1.60	Depositor EDS
% Data completeness (in resolution range)	99.7 (50.57-1.60) 99.7 (50.52-1.60)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.96 (at 1.60Å)	Xtriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.175 , 0.204 0.186 , 0.216	Depositor DCC
R_{free} test set	3019 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å^2)	21.0	Xtriage
Anisotropy	0.257	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	(Not available) , (Not available)	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.009 for -h,-l,-k	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	4017	wwPDB-VP
Average B, all atoms (Å^2)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 12.29% 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: LFA, LYR, OLB, 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	0.65	0/1822	0.68	0/2477
1	B	0.63	0/1800	0.64	0/2449
All	All	0.64	0/3622	0.66	0/4926

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	1772	0	1803	54	0
1	B	1752	0	1776	35	0
2	A	131	0	243	5	0
2	B	120	0	227	7	0
3	A	9	0	7	4	0
3	B	14	0	17	3	0
4	A	29	0	36	4	0
4	B	32	0	42	2	0
5	A	84	0	0	5	0
5	B	74	0	0	8	0
All	All	4017	0	4151	98	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 12.

The worst 5 of 98 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)
4:A:315:OLC:C24	5:B:405:HOH:O	2.13	0.97
1:B:144:GLN:HG3	5:B:423[B]:HOH:O	1.63	0.96
1:A:144:GLN:HG3	5:A:417[B]:HOH:O	1.62	0.96
4:A:315:OLC:H24A	5:B:405:HOH:O	1.69	0.92
1:B:6:TYR:CE1	1:B:60:GLU:HG3	2.05	0.91

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	229/220 (104%)	227 (99%)	2 (1%)	0	100	100
1	B	227/220 (103%)	226 (100%)	1 (0%)	0	100	100
All	All	456/440 (104%)	453 (99%)	3 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	176/172 (102%)	175 (99%)	1 (1%)	86 77
1	B	172/172 (100%)	166 (96%)	6 (4%)	36 13
All	All	348/344 (101%)	341 (98%)	7 (2%)	57 31

5 of 7 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	60	GLU
1	B	188	ARG
1	B	210[B]	MET
1	B	210[A]	MET
1	B	33	GLU

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	214	GLN
1	B	214	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
1	LYR	A	200	1	27,29,30	1.23	3 (11%)	30,37,39	1.79	8 (26%)
1	LYR	B	200	1	27,29,30	1.30	3 (11%)	30,37,39	2.00	10 (33%)

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
1	LYR	A	200	1	-	2/22/40/42	0/1/1/1
1	LYR	B	200	1	-	1/22/40/42	0/1/1/1

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	200	LYR	C7-C80	4.02	1.41	1.35
1	B	200	LYR	C7-C80	3.17	1.40	1.35
1	B	200	LYR	C2-C3	3.01	1.42	1.33
1	A	200	LYR	C2-C3	2.46	1.40	1.33
1	A	200	LYR	C1-C2	-2.35	1.37	1.48

The worst 5 of 18 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	200	LYR	C1-NZ-CE	4.81	120.96	113.33
1	A	200	LYR	C1-NZ-CE	4.54	120.52	113.33
1	A	200	LYR	C10-C9-C80	-3.50	120.95	126.23
1	B	200	LYR	C15-C14-C12	-3.23	108.31	114.08
1	B	200	LYR	C13-C12-C11	-3.23	120.90	124.53

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	200	LYR	C2-C1-NZ-CE
1	A	200	LYR	CD-CE-NZ-C1
1	B	200	LYR	CD-CE-NZ-C1

There are no ring outliers.

2 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	200	LYR	6	0
1	B	200	LYR	4	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

32 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	LFA	A	306	-	11,11,19	0.12	0	10,10,18	0.08	0
2	LFA	B	307	-	11,11,19	0.10	0	10,10,18	0.10	0
4	OLC	B	316	-	15,15,24	1.22	1 (6%)	16,16,25	1.09	1 (6%)
2	LFA	A	305	-	7,7,19	0.09	0	6,6,18	0.10	0
4	OLC	A	316	-	15,15,24	1.09	1 (6%)	16,16,25	1.11	2 (12%)
2	LFA	A	304	-	5,5,19	0.11	0	4,4,18	0.13	0
2	LFA	A	310	-	5,5,19	0.13	0	4,4,18	0.08	0
2	LFA	A	301	-	9,9,19	0.16	0	8,8,18	0.10	0
2	LFA	B	306	-	15,15,19	0.12	0	14,14,18	0.17	0
2	LFA	A	308	-	9,9,19	0.13	0	8,8,18	0.10	0
4	OLC	A	315	-	12,12,24	1.28	1 (8%)	13,13,25	0.93	1 (7%)
2	LFA	A	303	-	9,9,19	0.13	0	8,8,18	0.14	0
2	LFA	A	311	-	5,5,19	0.11	0	4,4,18	0.13	0
3	OLB	A	314	-	8,8,24	1.02	1 (12%)	9,9,25	1.31	1 (11%)
2	LFA	B	301	-	7,7,19	0.12	0	6,6,18	0.12	0
2	LFA	B	305	-	5,5,19	0.10	0	4,4,18	0.11	0
2	LFA	B	308	-	5,5,19	0.09	0	4,4,18	0.14	0
2	LFA	B	304	-	15,15,19	0.17	0	14,14,18	0.10	0
2	LFA	B	311	-	6,6,19	0.14	0	5,5,18	0.14	0
2	LFA	B	310	-	6,6,19	0.12	0	5,5,18	0.09	0
2	LFA	B	313	-	5,5,19	0.11	0	4,4,18	0.12	0
2	LFA	B	312	-	9,9,19	0.11	0	8,8,18	0.11	0
2	LFA	A	312	-	12,12,19	0.08	0	11,11,18	0.10	0
2	LFA	A	302	-	15,15,19	0.14	0	14,14,18	0.15	0
2	LFA	B	303	-	9,9,19	0.12	0	8,8,18	0.11	0
2	LFA	A	307	-	9,9,19	0.12	0	8,8,18	0.12	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
2	LFA	B	309	-	7,7,19	0.13	0	6,6,18	0.13	0
4	OLC	B	315	-	15,15,24	1.15	1 (6%)	16,16,25	1.21	1 (6%)
2	LFA	A	313	-	5,5,19	0.15	0	4,4,18	0.11	0
3	OLB	B	314	-	13,13,24	1.20	1 (7%)	14,14,25	1.18	1 (7%)
2	LFA	A	309	-	17,17,19	0.11	0	16,16,18	0.13	0
2	LFA	B	302	-	7,7,19	0.12	0	6,6,18	0.09	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	LFA	A	306	-	-	5/9/9/17	-
2	LFA	B	307	-	-	6/9/9/17	-
4	OLC	B	316	-	-	7/15/15/24	-
2	LFA	A	305	-	-	3/5/5/17	-
4	OLC	A	316	-	-	4/15/15/24	-
2	LFA	A	304	-	-	2/3/3/17	-
2	LFA	A	310	-	-	2/3/3/17	-
2	LFA	A	301	-	-	5/7/7/17	-
2	LFA	B	306	-	-	5/13/13/17	-
2	LFA	A	308	-	-	5/7/7/17	-
4	OLC	A	315	-	-	6/12/12/24	-
2	LFA	A	303	-	-	7/7/7/17	-
2	LFA	A	311	-	-	2/3/3/17	-
3	OLB	A	314	-	-	2/7/7/24	-
2	LFA	B	301	-	-	4/5/5/17	-
2	LFA	B	305	-	-	2/3/3/17	-
2	LFA	B	308	-	-	1/3/3/17	-
2	LFA	B	304	-	-	5/13/13/17	-
2	LFA	B	311	-	-	0/4/4/17	-
2	LFA	B	310	-	-	1/4/4/17	-
2	LFA	B	313	-	-	0/3/3/17	-
2	LFA	B	312	-	-	1/7/7/17	-
2	LFA	A	312	-	-	3/10/10/17	-
2	LFA	A	302	-	-	8/13/13/17	-
2	LFA	B	303	-	-	2/7/7/17	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	LFA	A	307	-	-	3/7/7/17	-
2	LFA	B	309	-	-	3/5/5/17	-
4	OLC	B	315	-	-	4/15/15/24	-
2	LFA	A	313	-	-	1/3/3/17	-
3	OLB	B	314	-	-	5/13/13/24	-
2	LFA	A	309	-	-	7/15/15/17	-
2	LFA	B	302	-	-	2/5/5/17	-

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	316	OLC	O20-C1	4.59	1.46	1.33
4	B	315	OLC	O20-C1	4.29	1.45	1.33
4	A	315	OLC	O20-C1	4.25	1.45	1.33
3	B	314	OLB	O20-C1	4.22	1.45	1.33
4	A	316	OLC	O20-C1	4.04	1.45	1.33

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	315	OLC	O20-C1-C2	3.33	122.37	111.91
3	B	314	OLB	O20-C1-C2	3.18	121.88	111.91
4	B	316	OLC	O20-C1-C2	3.07	121.54	111.91
4	A	316	OLC	O20-C1-C2	3.01	121.35	111.91
4	A	315	OLC	O20-C1-C2	2.35	119.29	111.91

There are no chirality outliers.

5 of 113 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	314	OLB	C21-C22-C24-O25
4	A	315	OLC	C21-C22-C24-O25
4	A	315	OLC	O20-C21-C22-C24
4	A	316	OLC	C21-C22-C24-O25
4	B	315	OLC	O20-C21-C22-O23

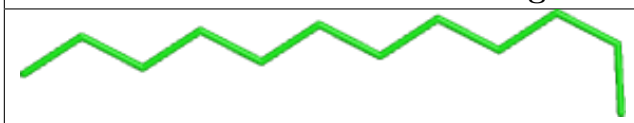
There are no ring outliers.

15 monomers are involved in 23 short contacts:

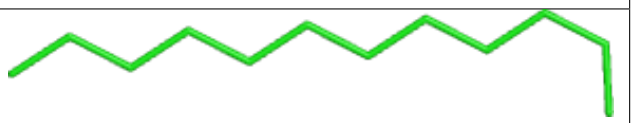
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	307	LFA	2	0
4	A	316	OLC	1	0
2	A	310	LFA	2	0
2	B	306	LFA	1	0
4	A	315	OLC	3	0
3	A	314	OLB	4	0
2	B	308	LFA	2	0
2	B	313	LFA	2	0
2	B	312	LFA	1	0
2	A	312	LFA	2	0
4	B	315	OLC	2	0
2	A	313	LFA	1	0
3	B	314	OLB	3	0
2	A	309	LFA	1	0
2	B	302	LFA	2	0

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.

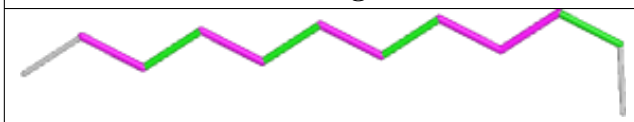
Ligand LFA A 306



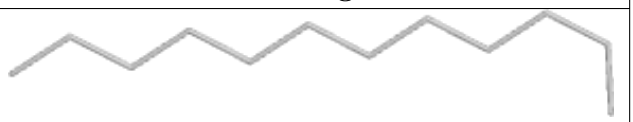
Bond lengths



Bond angles

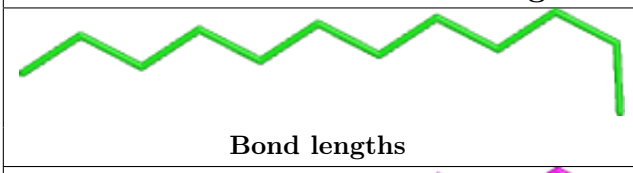


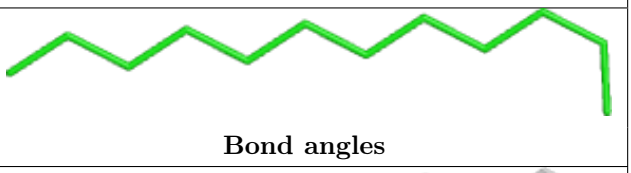
Torsions

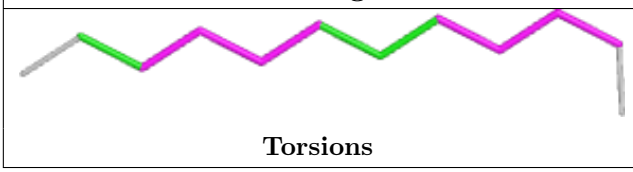


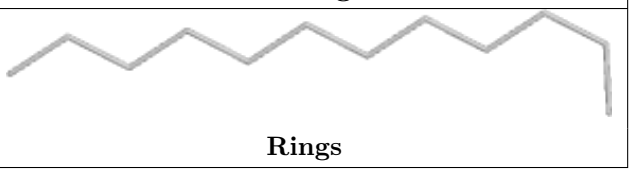
Rings

Ligand LFA B 307

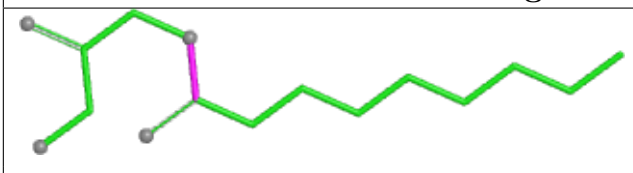

Bond lengths

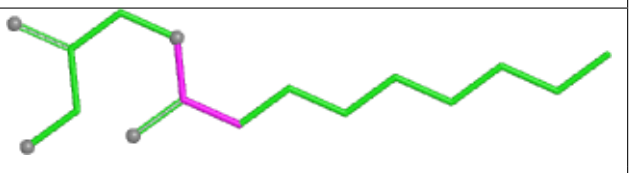

Bond angles

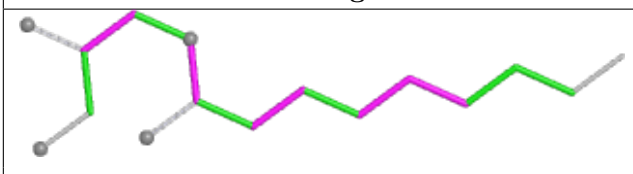

Torsions

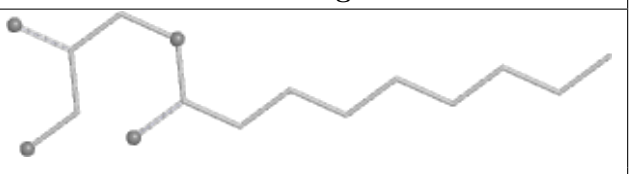

Rings

Ligand OLC B 316

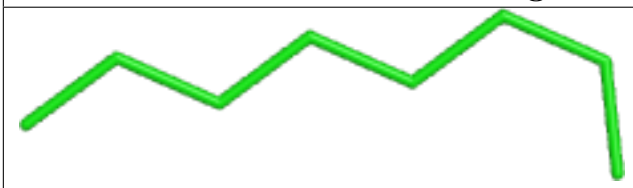

Bond lengths

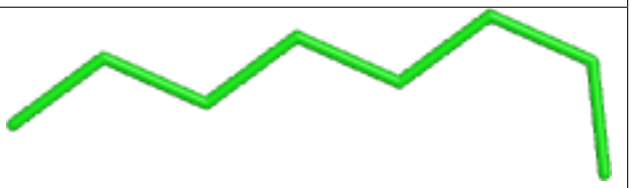

Bond angles

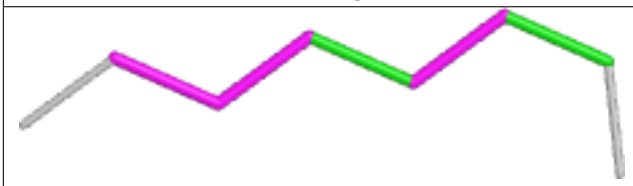

Torsions

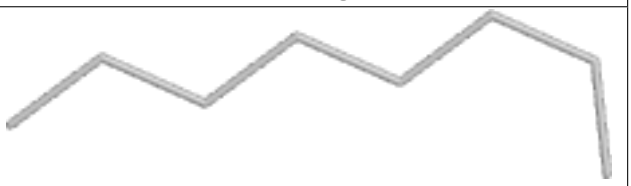

Rings

Ligand LFA A 305

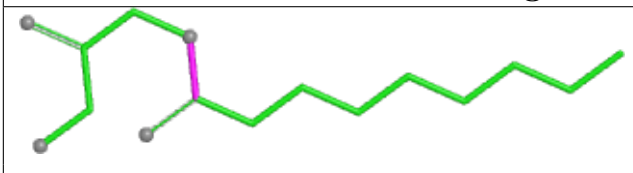

Bond lengths

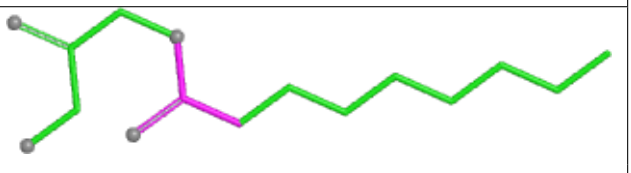

Bond angles

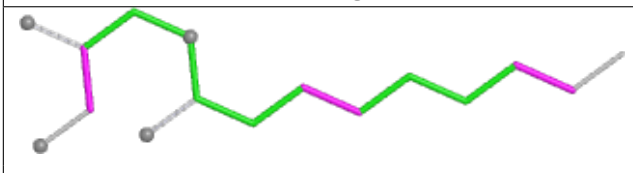

Torsions

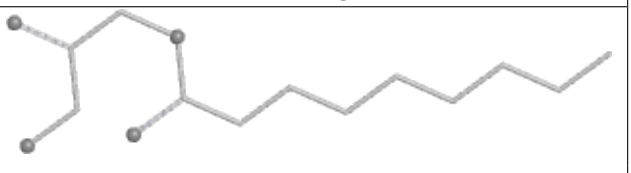

Rings

Ligand OLC A 316

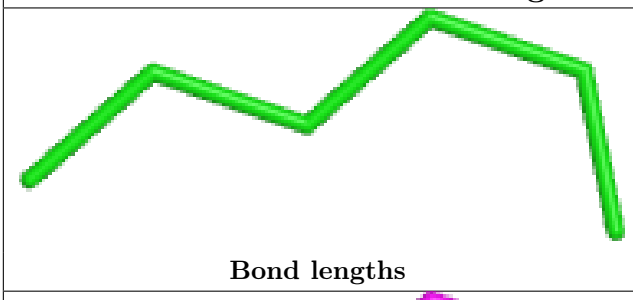

Bond lengths


Bond angles

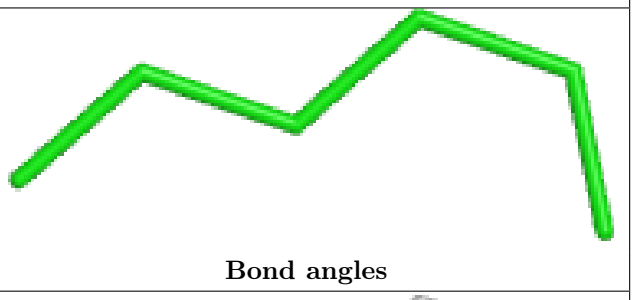

Torsions


Rings

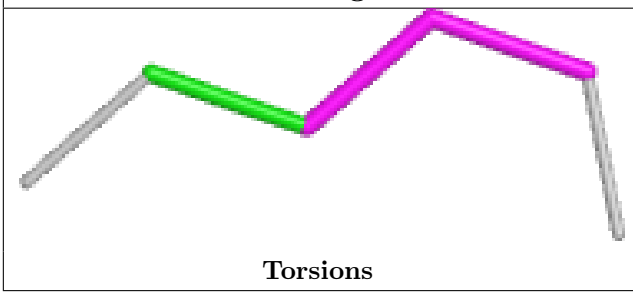
Ligand LFA A 304



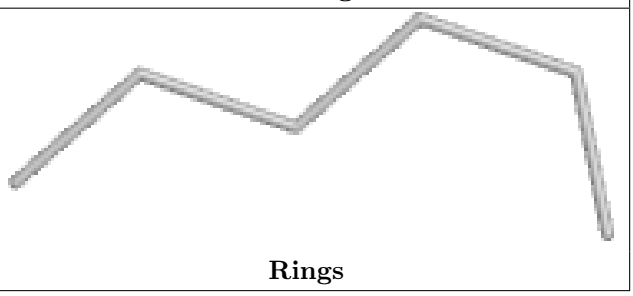
Bond lengths



Bond angles

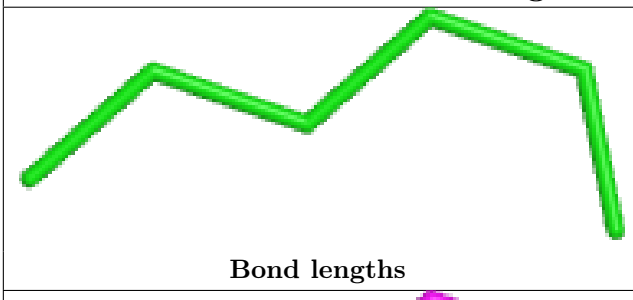


Torsions

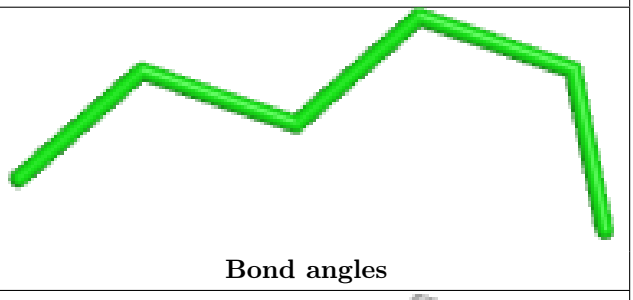


Rings

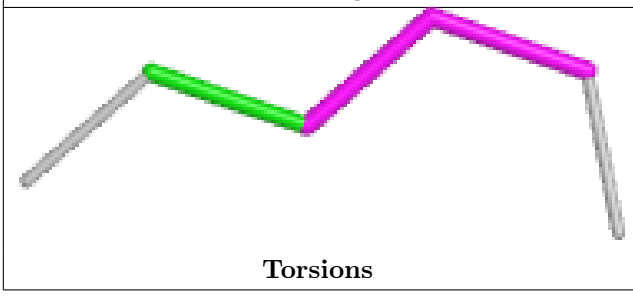
Ligand LFA A 310



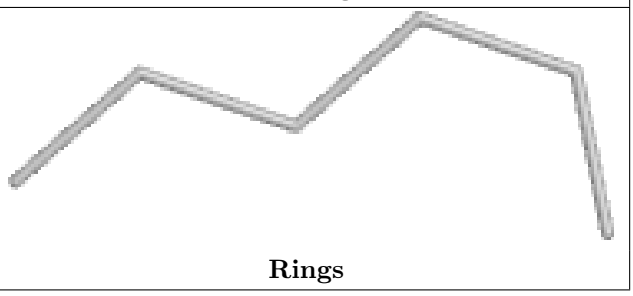
Bond lengths



Bond angles

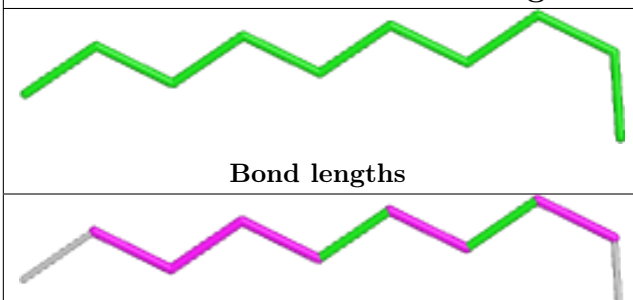


Torsions

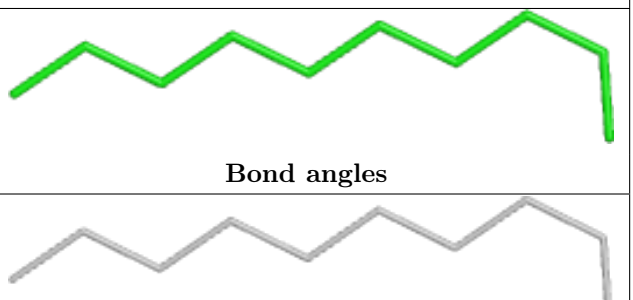


Rings

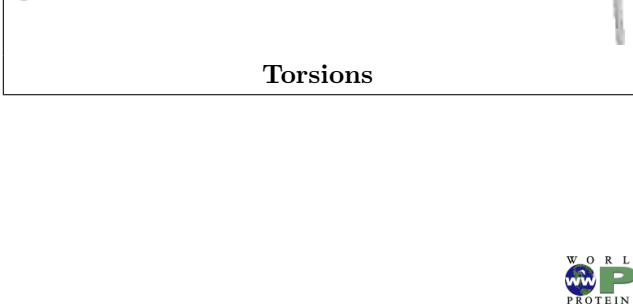
Ligand LFA A 301



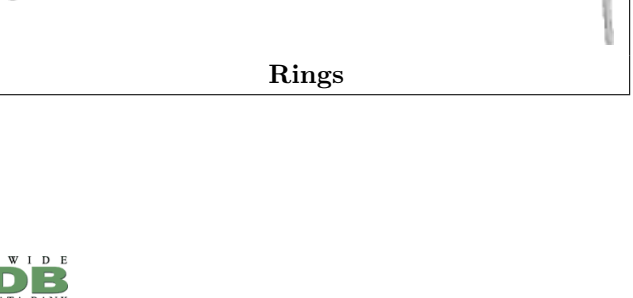
Bond lengths



Bond angles

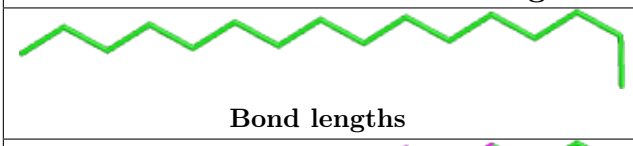


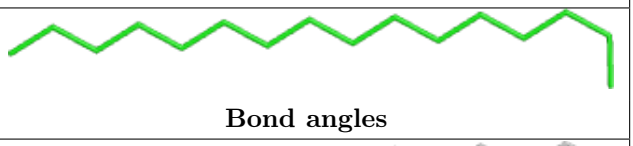
Torsions

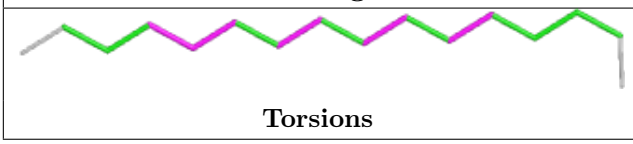


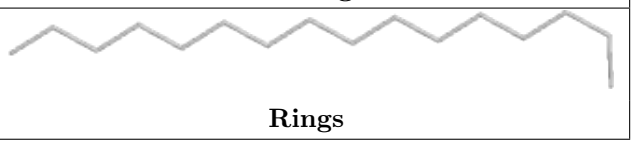
Rings

Ligand LFA B 306

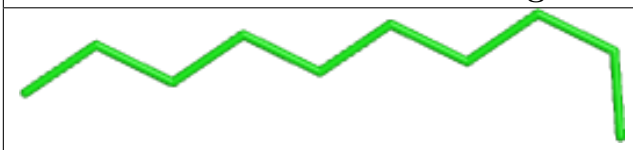

Bond lengths

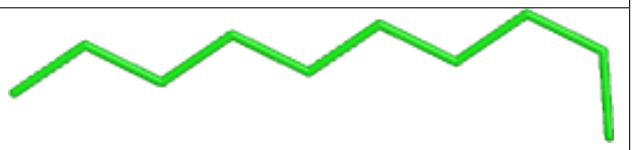

Bond angles

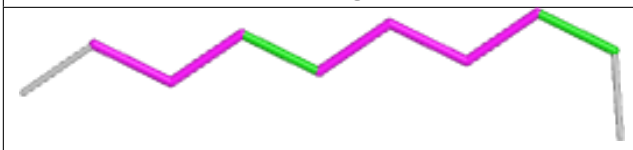

Torsions

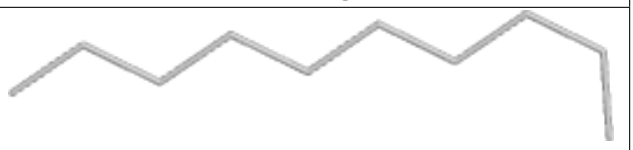

Rings

Ligand LFA A 308

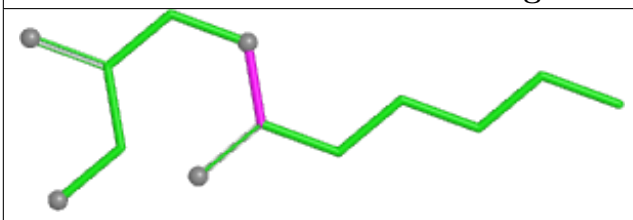

Bond lengths

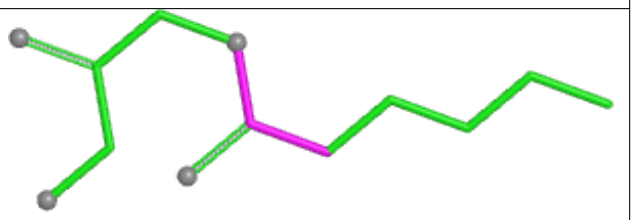

Bond angles

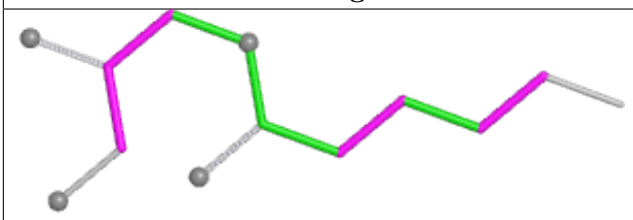

Torsions

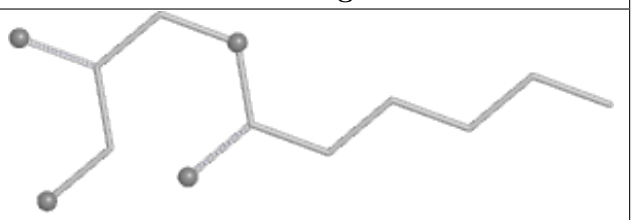

Rings

Ligand OLC A 315

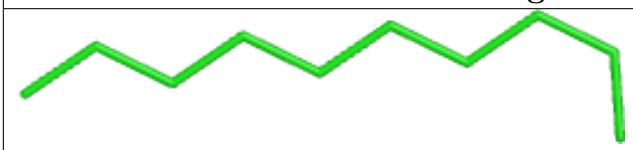

Bond lengths

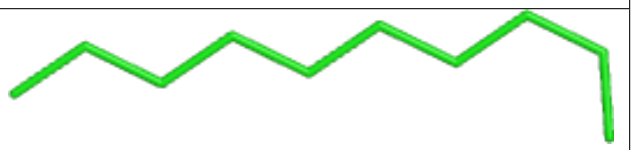

Bond angles

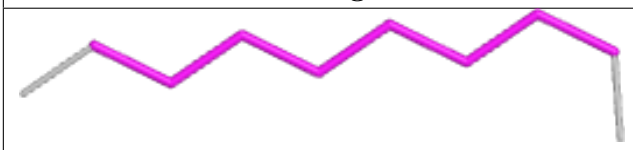

Torsions

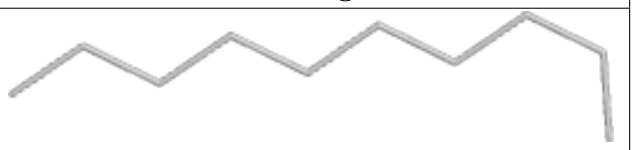

Rings

Ligand LFA A 303

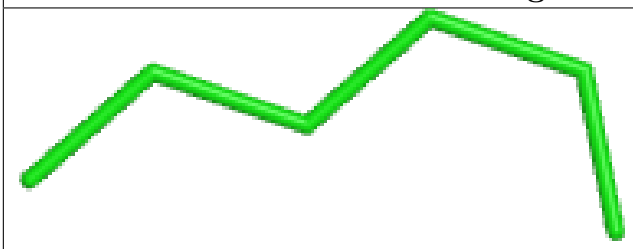

Bond lengths


Bond angles

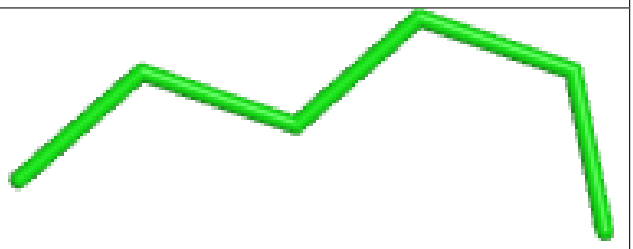

Torsions


Rings

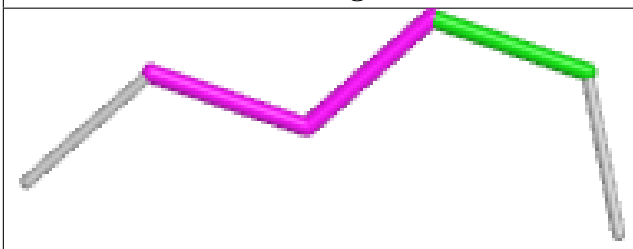
Ligand LFA A 311



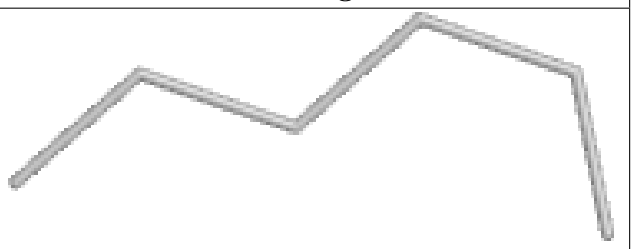
Bond lengths



Bond angles

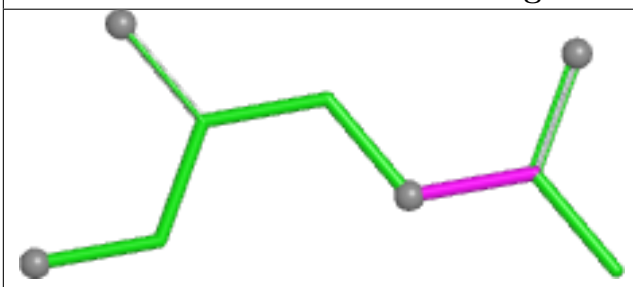


Torsions

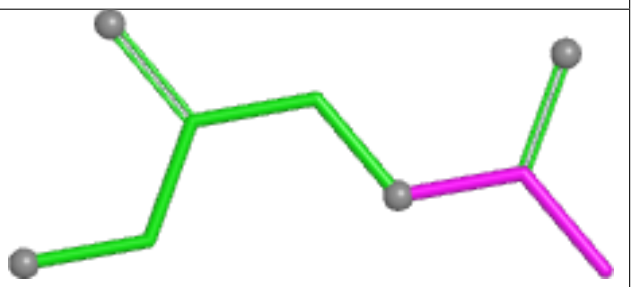


Rings

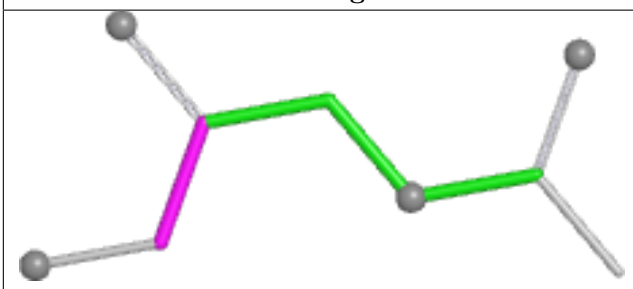
Ligand OLB A 314



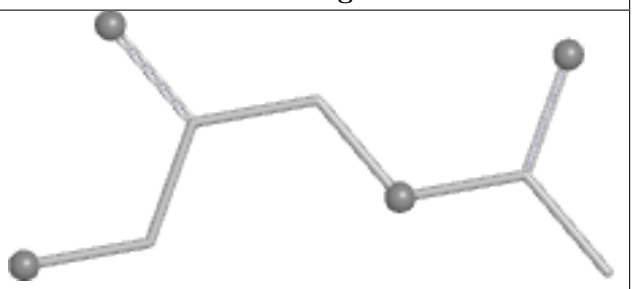
Bond lengths



Bond angles

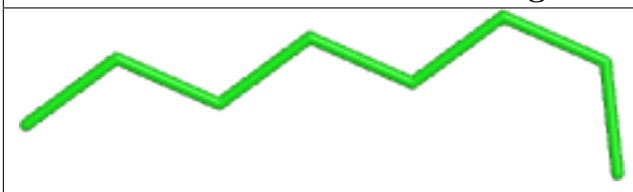


Torsions

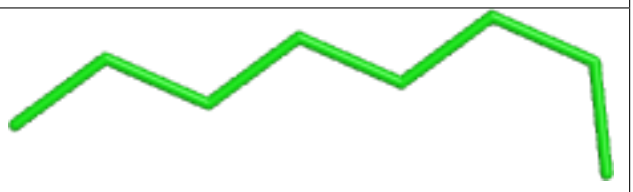


Rings

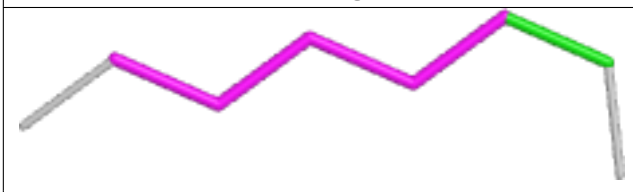
Ligand LFA B 301



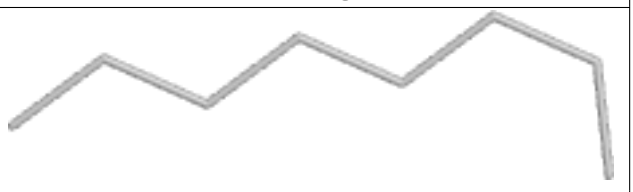
Bond lengths



Bond angles

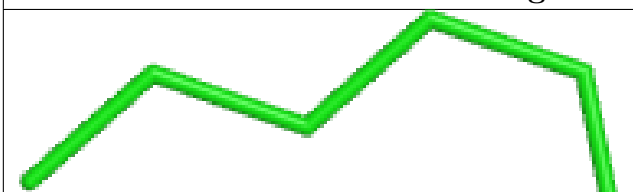


Torsions

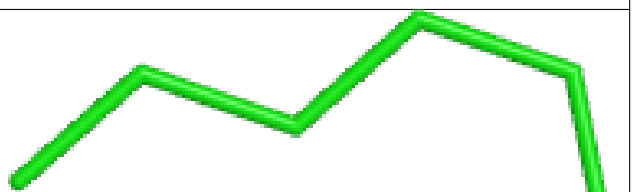


Rings

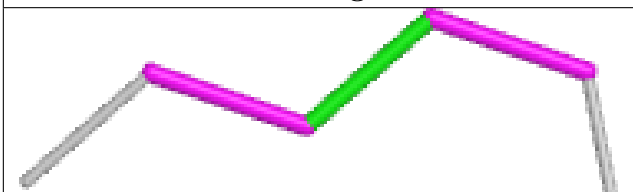
Ligand LFA B 305



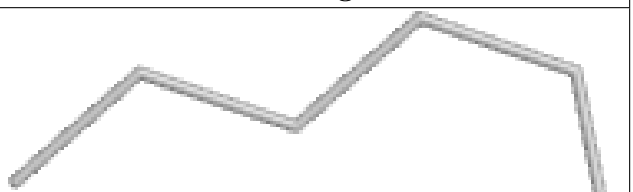
Bond lengths



Bond angles

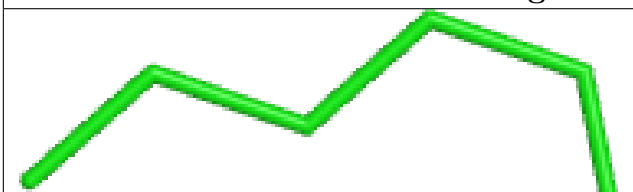


Torsions

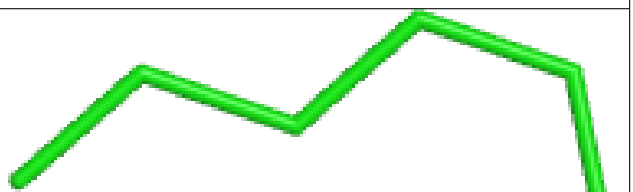


Rings

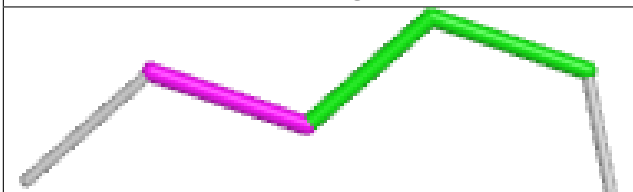
Ligand LFA B 308



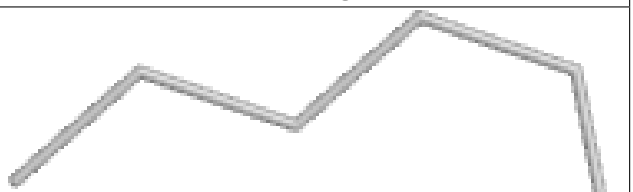
Bond lengths



Bond angles

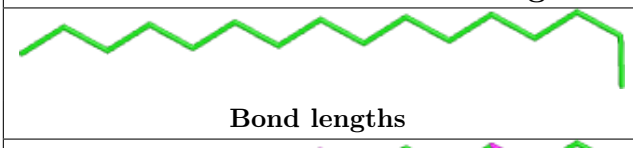


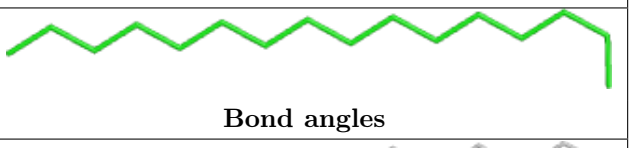
Torsions

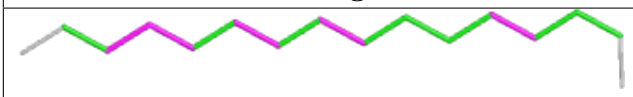


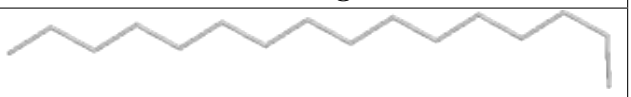
Rings

Ligand LFA B 304

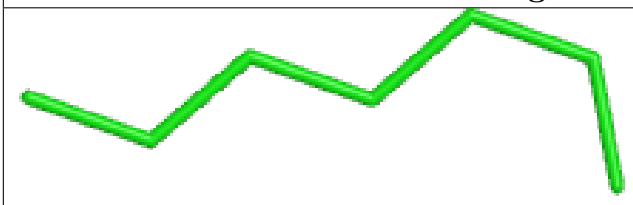

Bond lengths

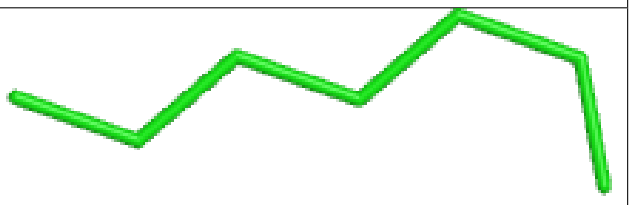

Bond angles

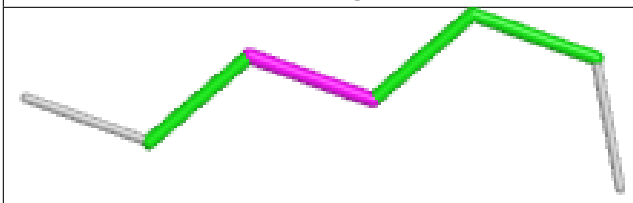

Torsions

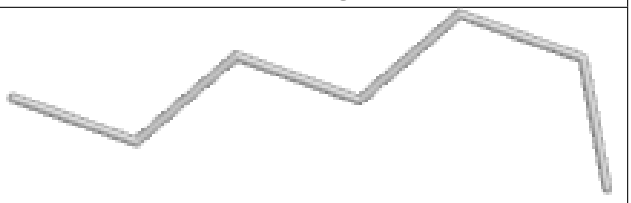

Rings

Ligand LFA B 310

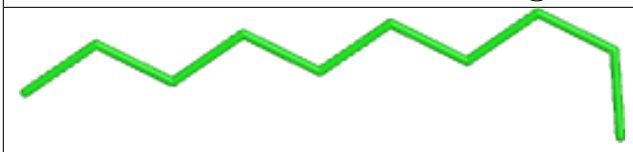

Bond lengths

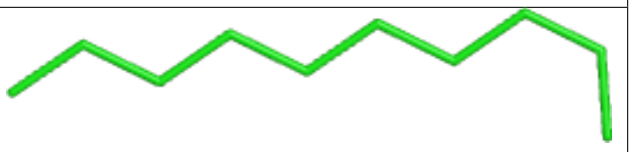

Bond angles


Torsions

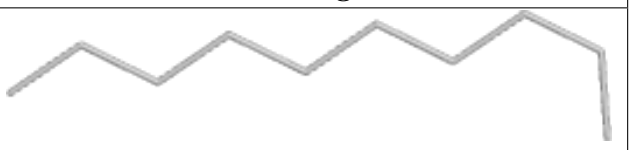

Rings

Ligand LFA B 312


Bond lengths


Bond angles


Torsions


Rings

Ligand LFA A 312

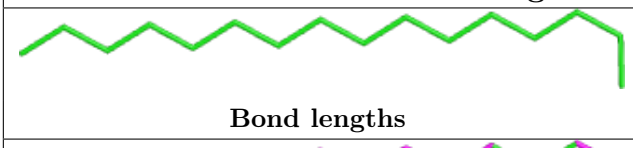

Bond lengths

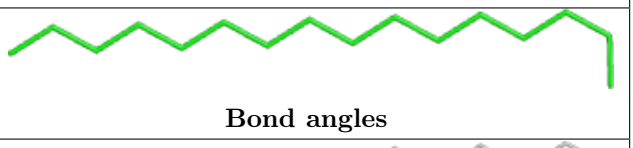

Bond angles

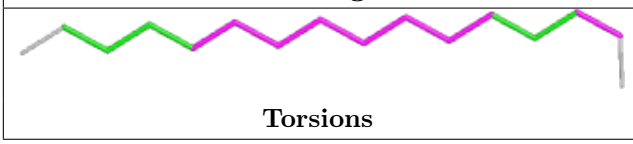

Torsions

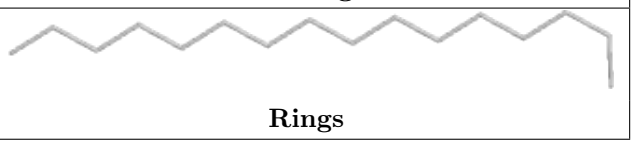

Rings

Ligand LFA A 302

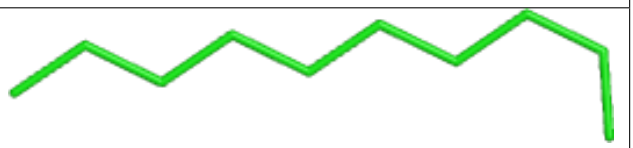


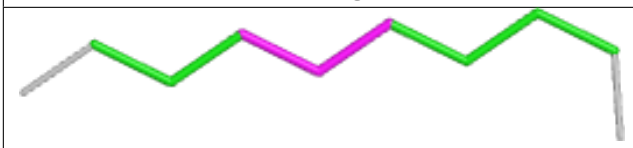


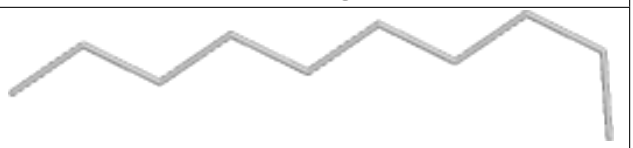




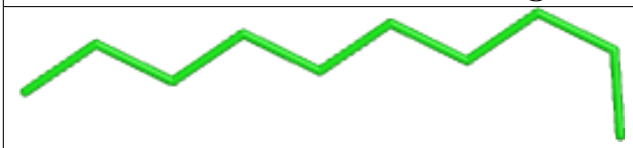
Ligand LFA B 303

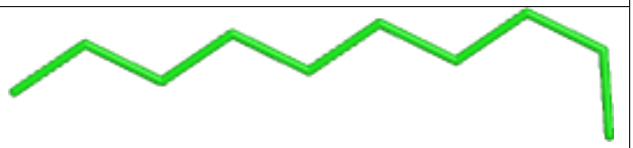


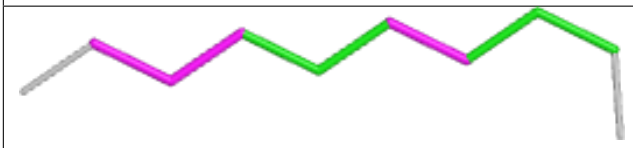


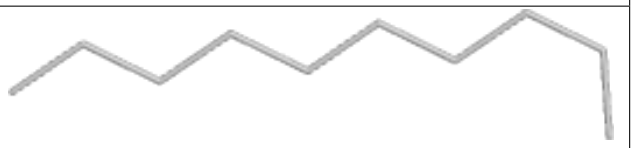


Ligand LFA A 307

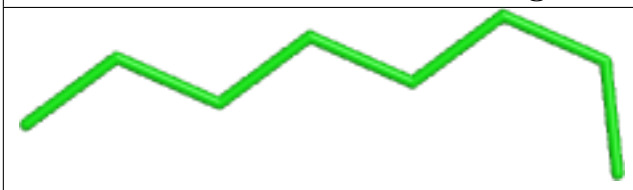


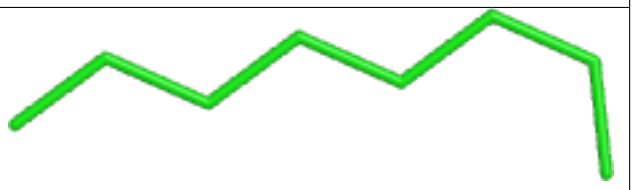


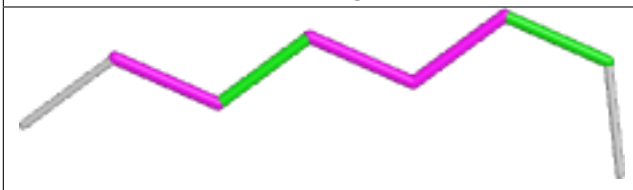


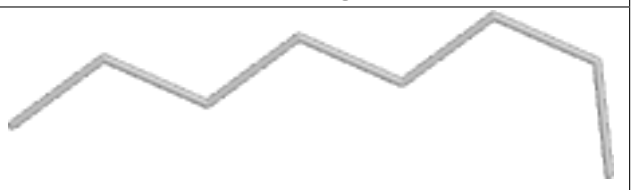


Ligand LFA B 309

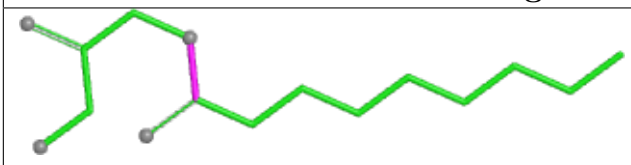




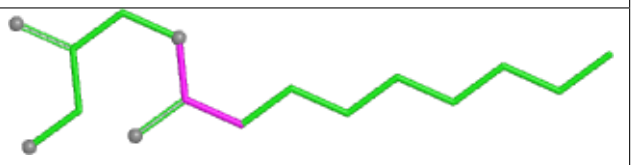




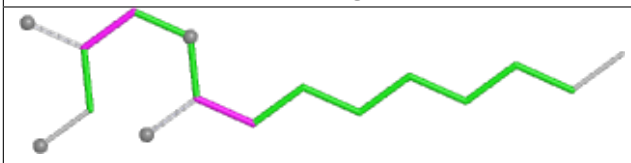
Ligand OLC B 315



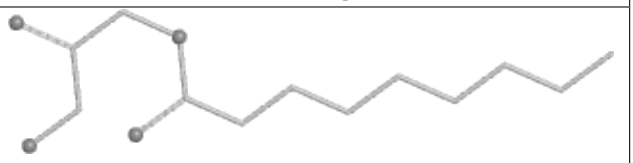
Bond lengths



Bond angles

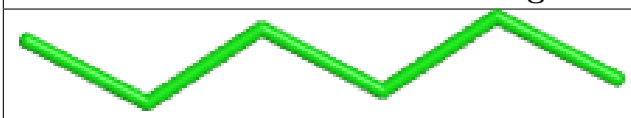


Torsions

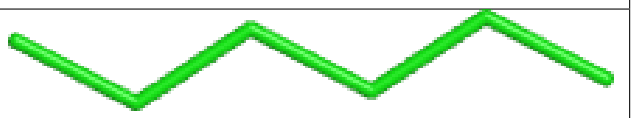


Rings

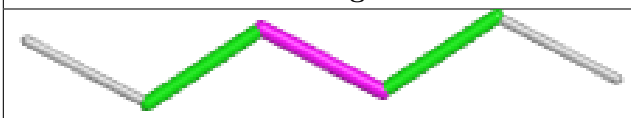
Ligand LFA A 313



Bond lengths



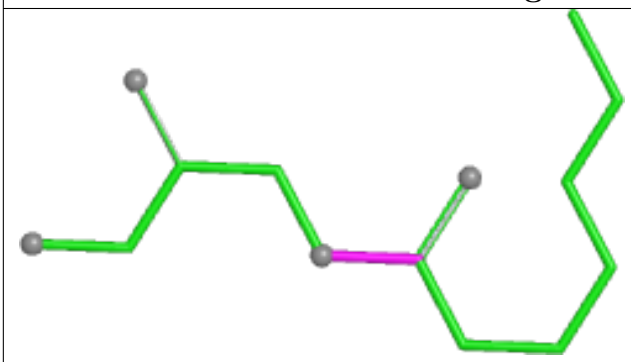
Bond angles



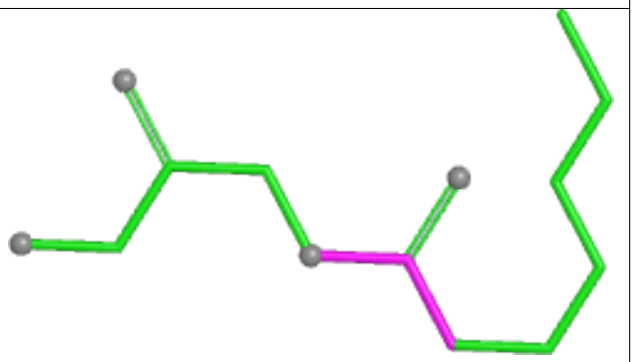
Torsions

Rings

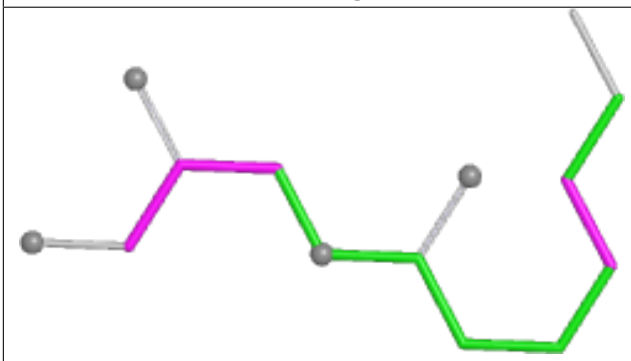
Ligand OLB B 314



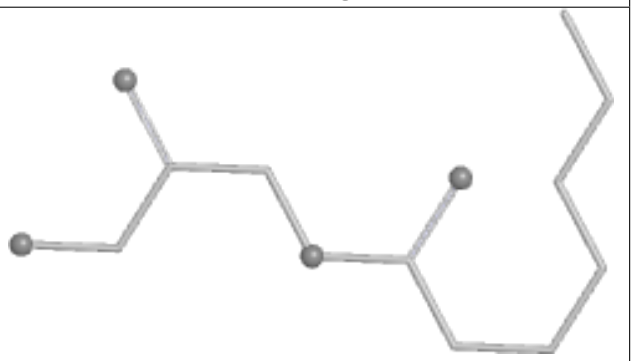
Bond lengths



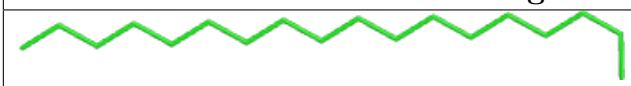
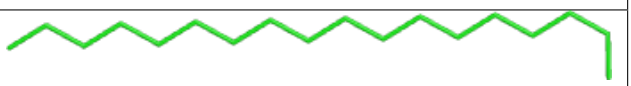
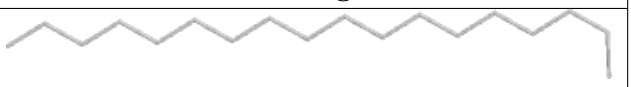
Bond angles

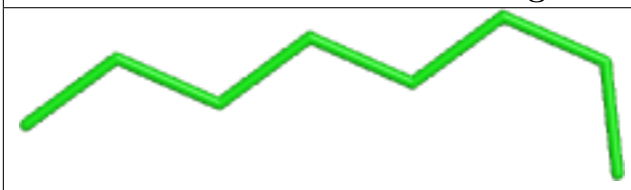
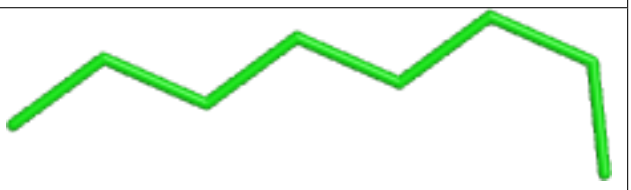
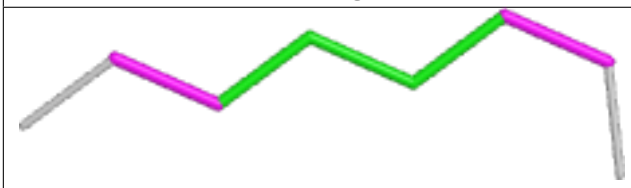
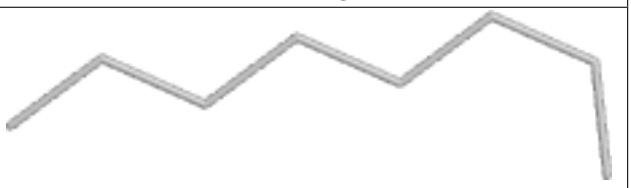


Torsions



Rings

Ligand LFA A 309	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand LFA B 302	
 Bond lengths	 Bond angles
 Torsions	 Rings

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{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	216/220 (98%)	0.21	14 (6%)	18	17	14, 25, 51, 68	6 (2%)
1	B	216/220 (98%)	0.25	18 (8%)	11	10	15, 25, 52, 74	5 (2%)
All	All	432/440 (98%)	0.23	32 (7%)	14	13	14, 25, 51, 74	11 (2%)

The worst 5 of 32 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	61	SER	5.7
1	B	181	VAL	5.4
1	A	1[A]	MET	5.2
1	A	181	VAL	5.0
1	B	184	PHE	4.6

6.2 Non-standard residues in protein, DNA, RNA chains

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
1	LYR	A	200	29/30	0.94	0.10	13,16,18,19	0
1	LYR	B	200	29/30	0.95	0.10	12,16,19,20	0

6.3 Carbohydrates

There are no monosaccharides in this entry.

6.4 Ligands (i)

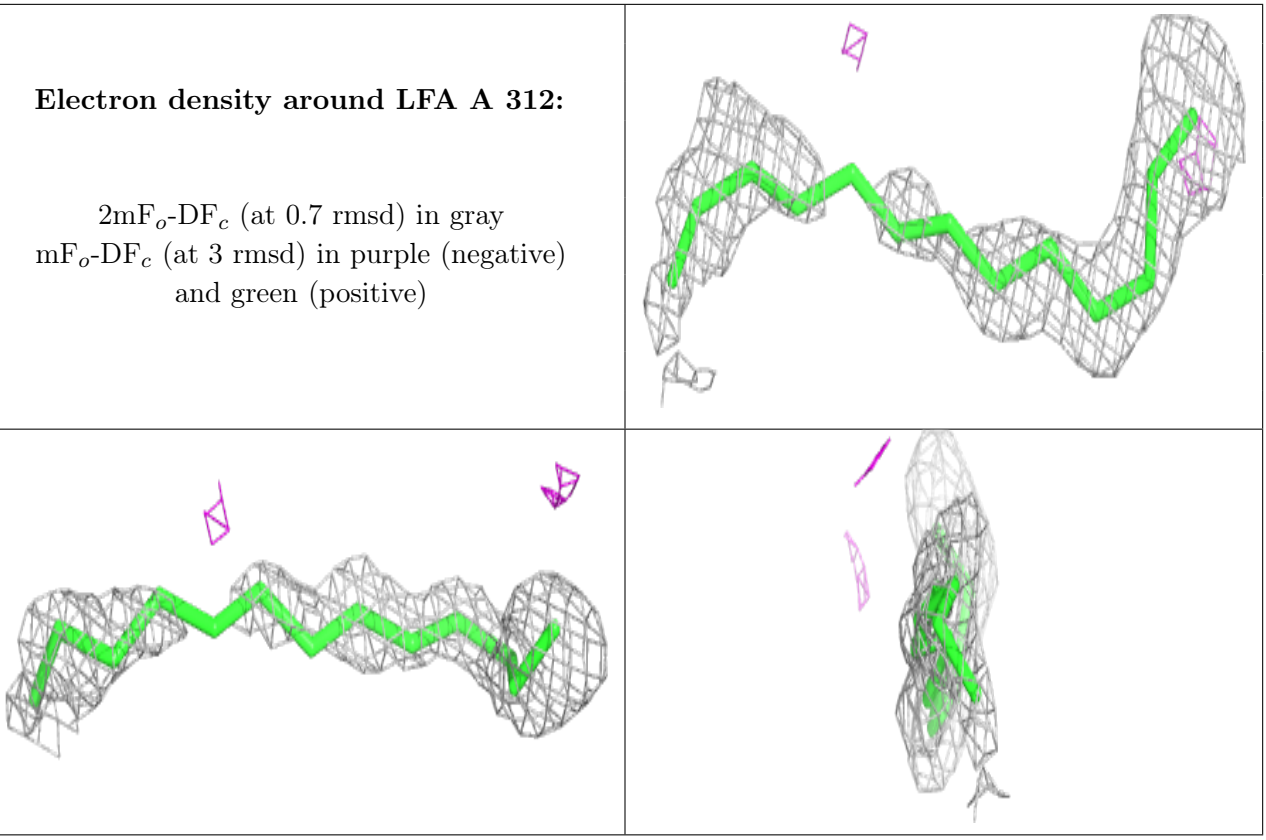
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
2	LFA	A	312	13/20	0.55	0.32	42,51,61,61	0
2	LFA	A	313	6/20	0.65	0.25	39,47,50,53	0
4	OLC	B	316	16/25	0.67	0.19	38,53,61,62	0
4	OLC	B	315	16/25	0.68	0.17	53,60,76,76	0
2	LFA	A	307	10/20	0.68	0.16	33,52,56,57	0
2	LFA	A	308	10/20	0.70	0.22	38,47,55,58	0
4	OLC	A	315	13/25	0.73	0.16	44,52,66,67	0
2	LFA	A	310	6/20	0.73	0.15	38,43,46,50	0
2	LFA	B	313	6/20	0.73	0.19	39,44,56,58	0
2	LFA	A	301	10/20	0.74	0.21	34,47,57,60	0
2	LFA	B	307	12/20	0.74	0.17	41,50,55,56	0
2	LFA	B	308	6/20	0.75	0.16	41,45,50,53	0
2	LFA	A	306	12/20	0.76	0.17	40,44,55,58	0
2	LFA	B	306	16/20	0.77	0.17	37,43,53,53	0
2	LFA	B	312	10/20	0.77	0.15	37,50,57,57	0
2	LFA	B	309	8/20	0.78	0.14	44,46,52,53	0
2	LFA	A	311	6/20	0.78	0.12	39,47,50,52	0
2	LFA	A	309	18/20	0.78	0.17	36,44,47,49	0
2	LFA	B	302	8/20	0.79	0.20	42,46,48,53	0
2	LFA	B	310	7/20	0.81	0.16	40,42,49,50	0
2	LFA	B	311	7/20	0.82	0.17	42,47,58,63	0
2	LFA	A	302	16/20	0.83	0.15	33,38,51,51	0
2	LFA	B	304	16/20	0.84	0.15	34,41,50,50	0
2	LFA	A	304	6/20	0.85	0.16	39,44,47,48	0
2	LFA	A	303	10/20	0.86	0.18	42,44,57,57	0
4	OLC	A	316	16/25	0.86	0.14	46,52,59,63	0
2	LFA	B	301	8/20	0.86	0.15	37,41,52,56	0
3	OLB	B	314	14/25	0.86	0.10	37,44,57,63	0
2	LFA	A	305	8/20	0.87	0.19	41,49,63,65	0
2	LFA	B	303	10/20	0.87	0.14	32,41,52,53	0
3	OLB	A	314	9/25	0.88	0.15	29,41,49,64	0
2	LFA	B	305	6/20	0.90	0.21	40,45,51,52	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.

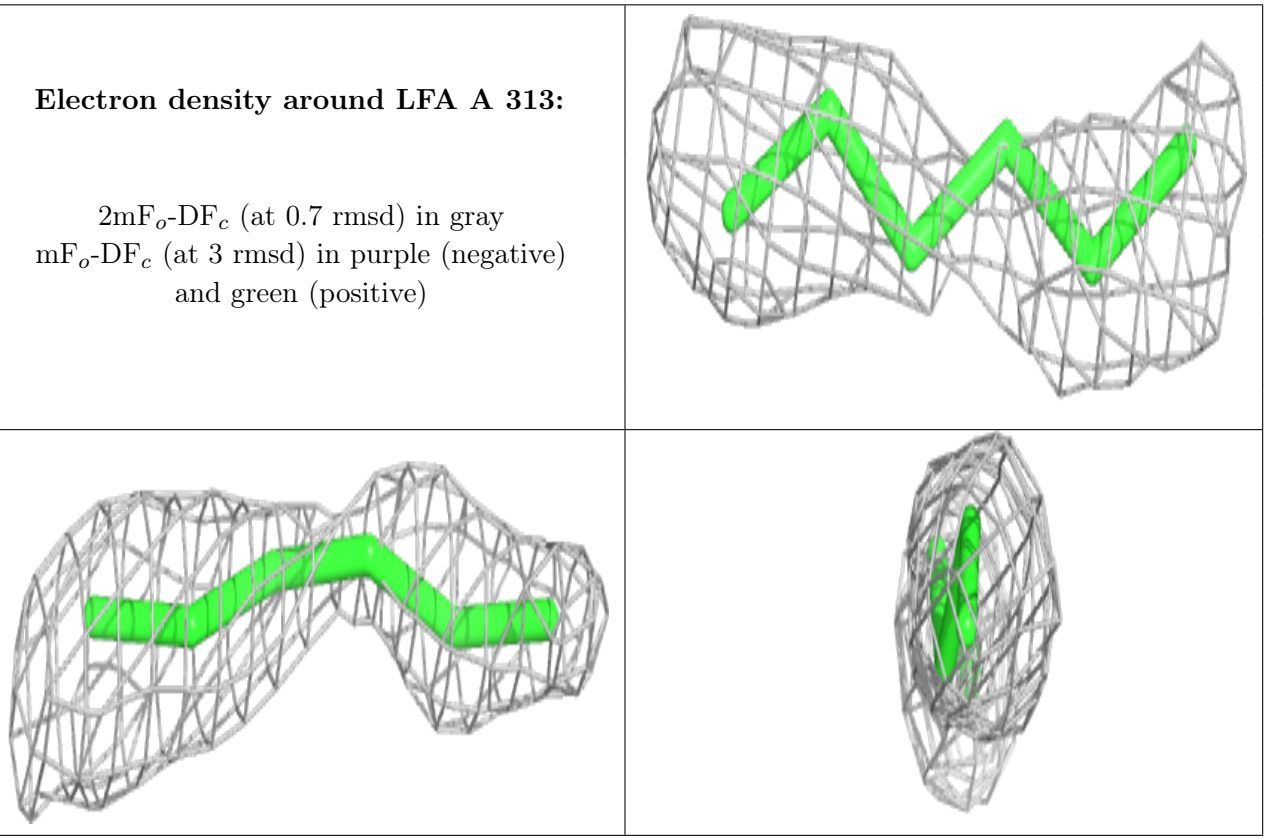
Electron density around LFA A 312:

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



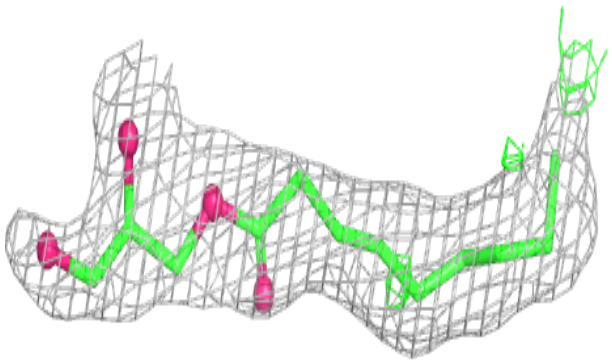
Electron density around LFA A 313:

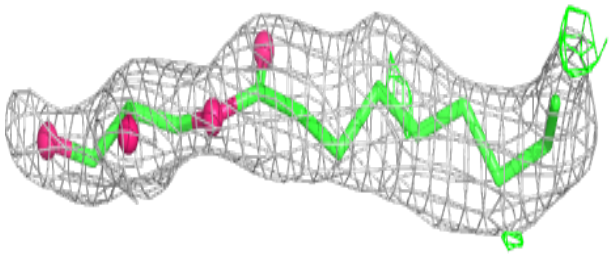
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

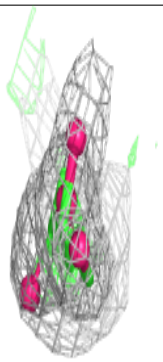


Electron density around OLC B 316:

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

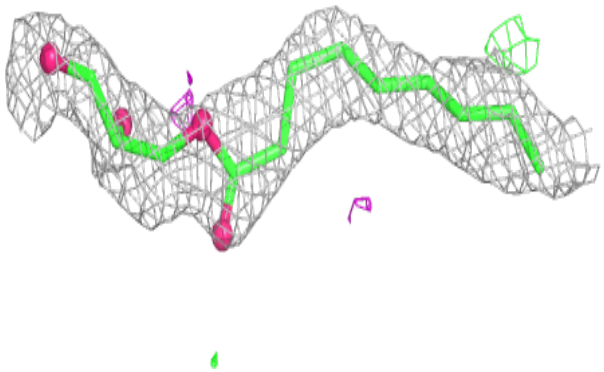


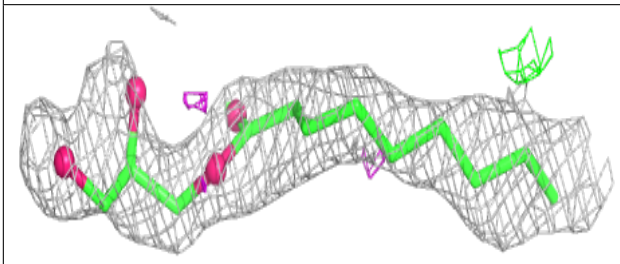


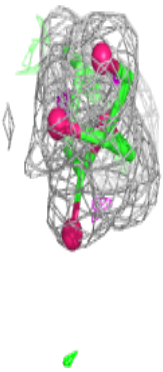


Electron density around OLC B 315:

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

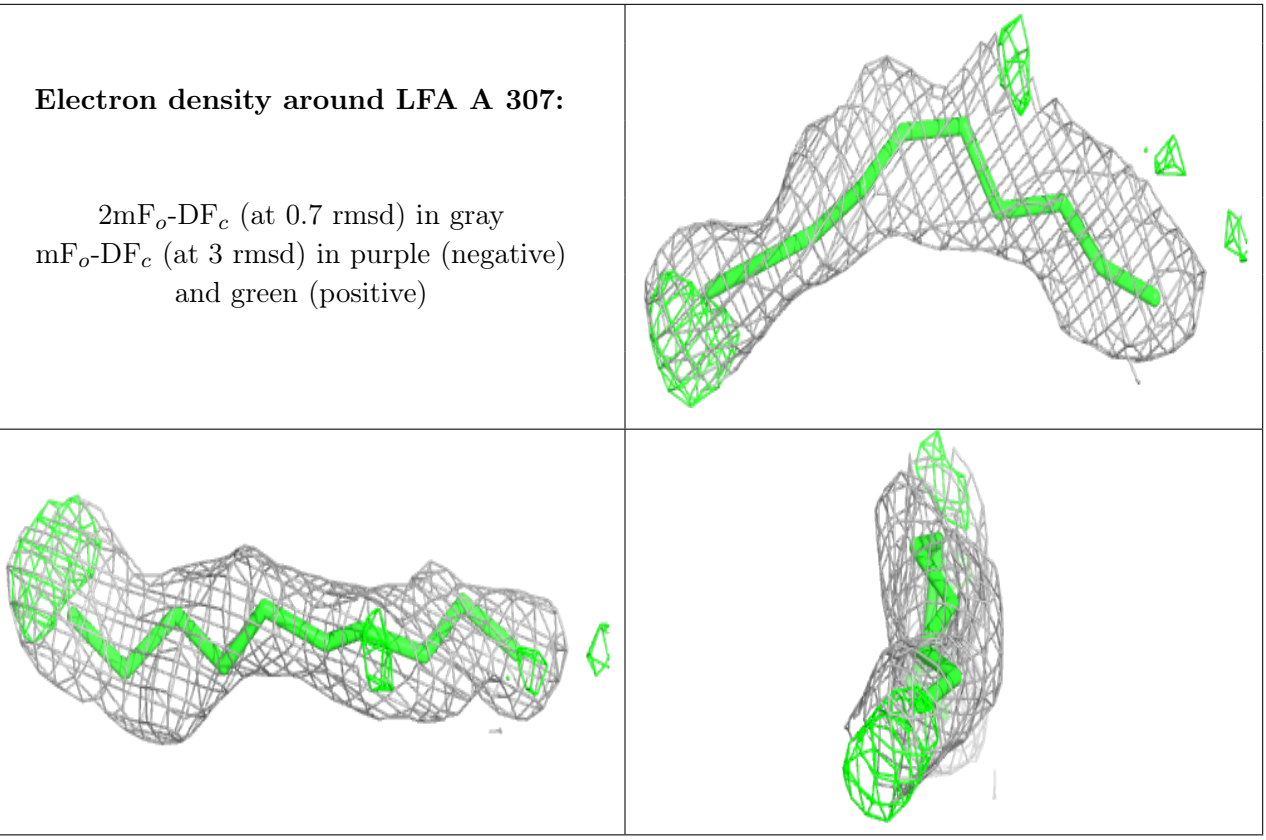






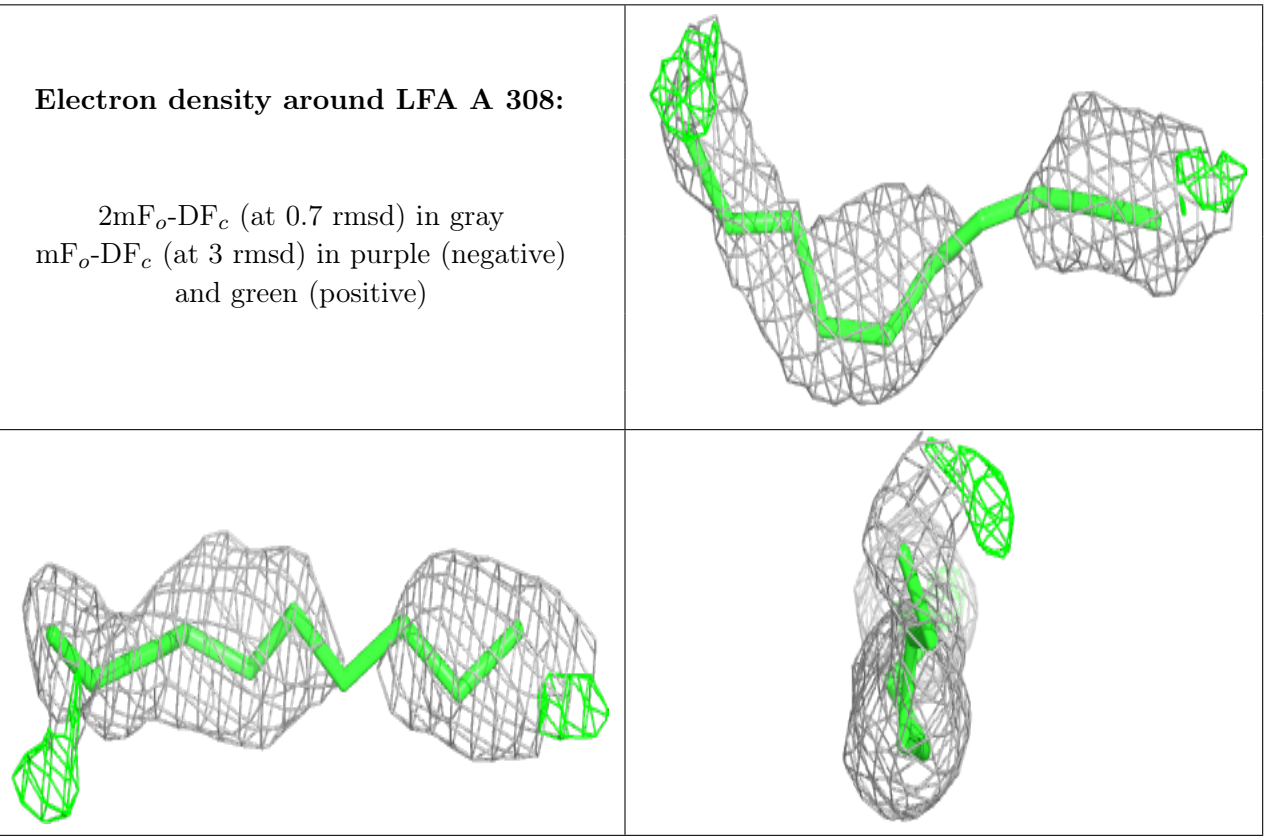
Electron density around LFA A 307:

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



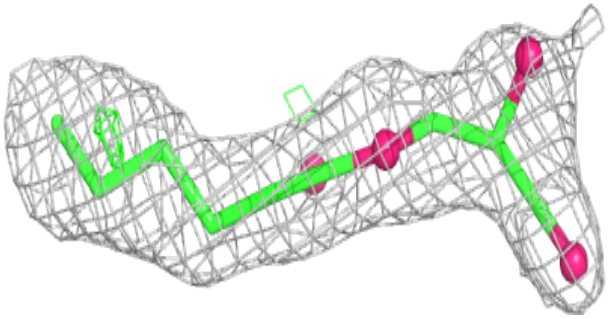
Electron density around LFA A 308:

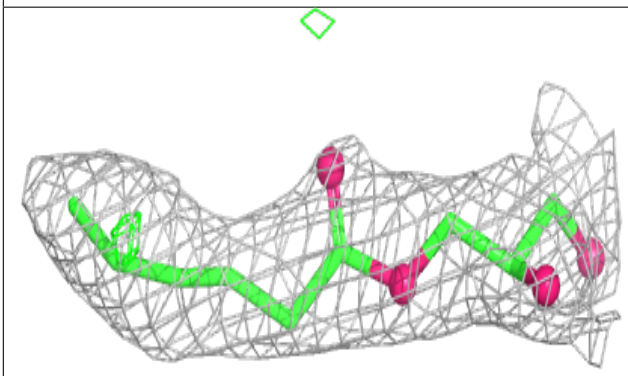
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

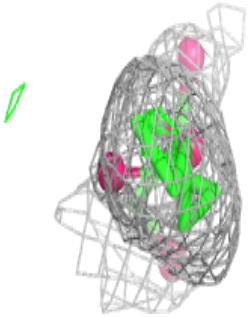


Electron density around OLC A 315:

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

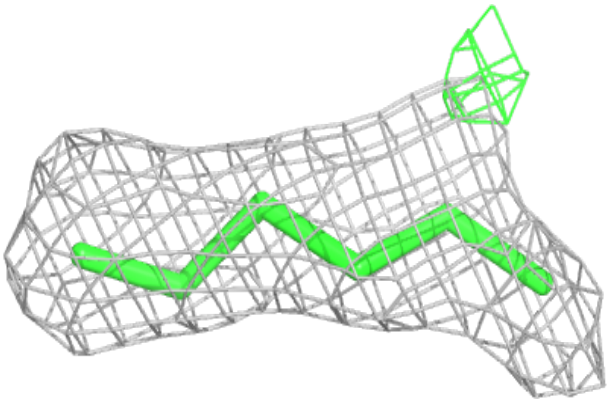


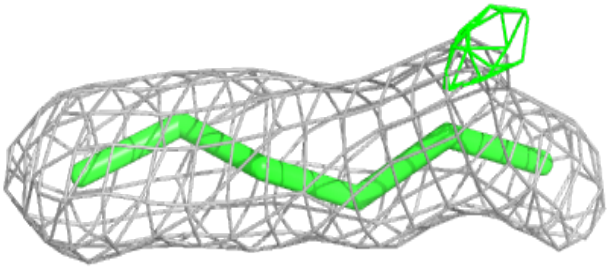


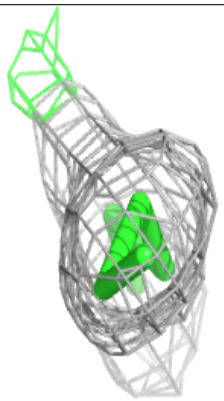


Electron density around LFA A 310:

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

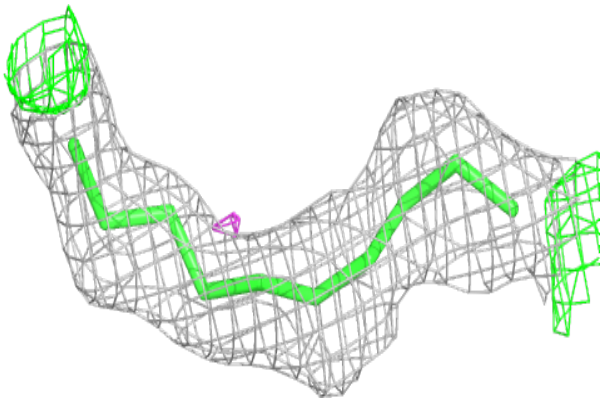


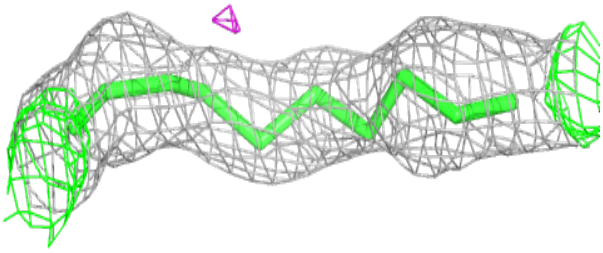


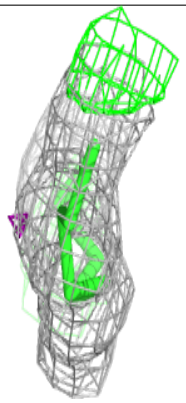


Electron density around LFA A 301:

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

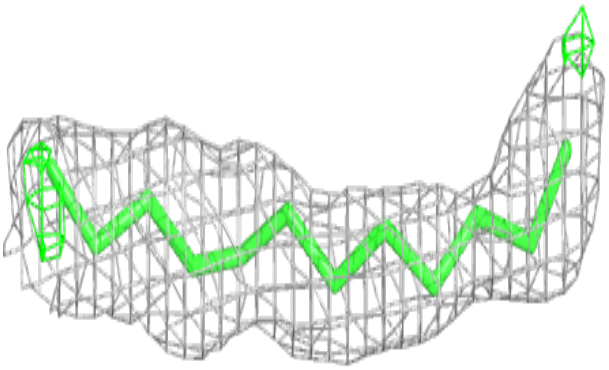


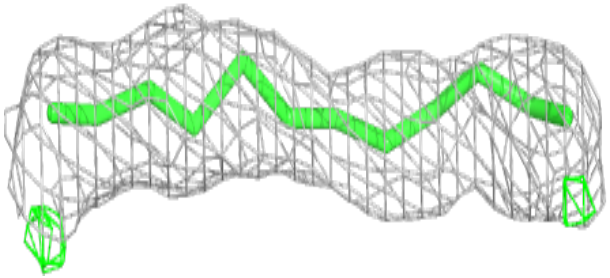


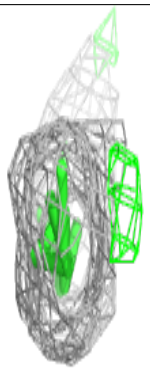


Electron density around LFA B 307:

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

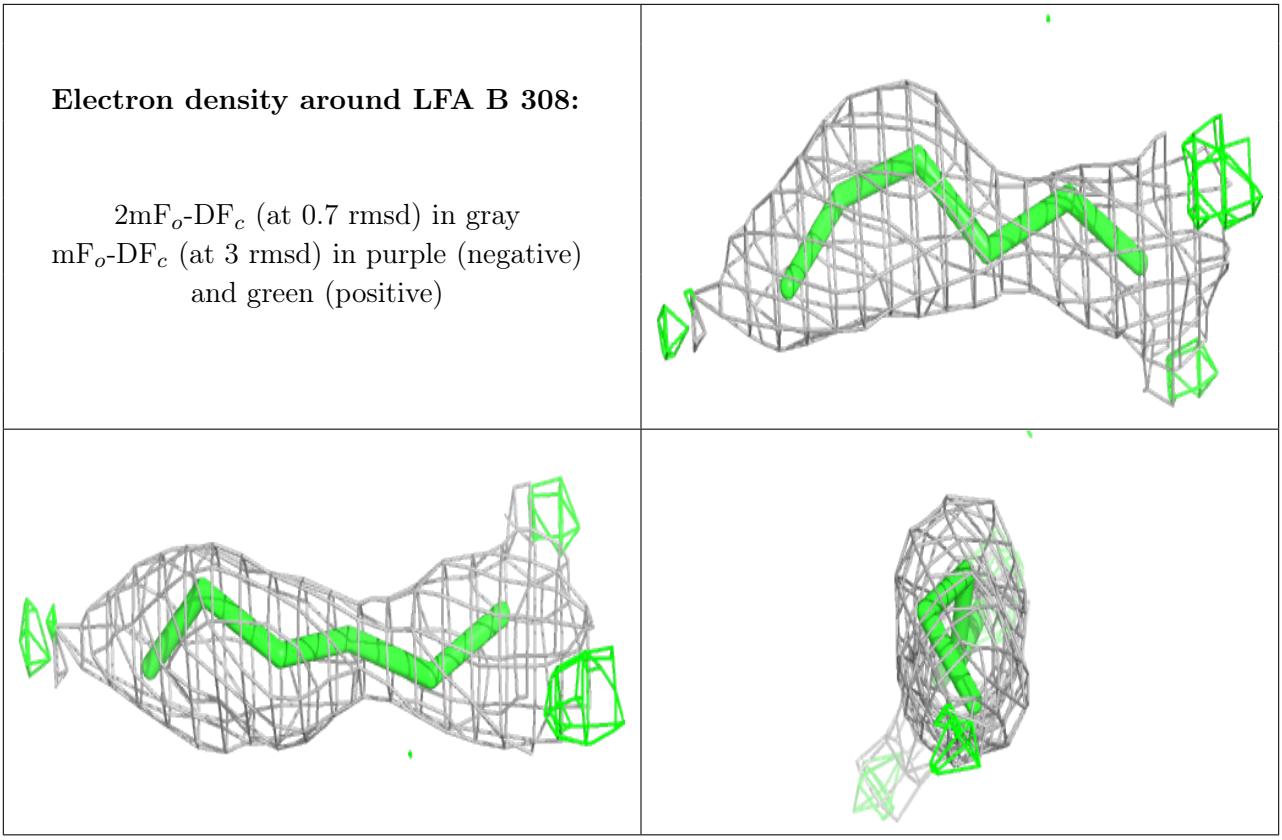






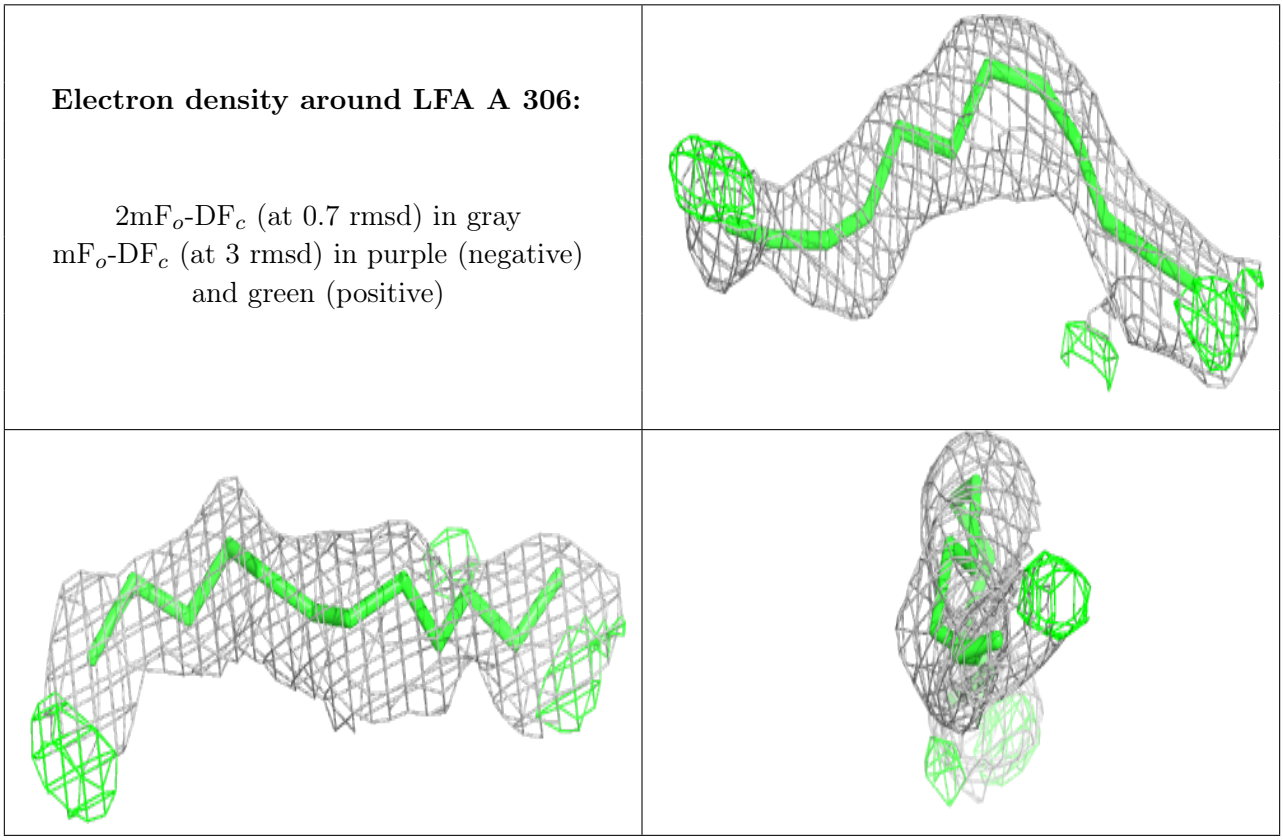
Electron density around LFA B 308:

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



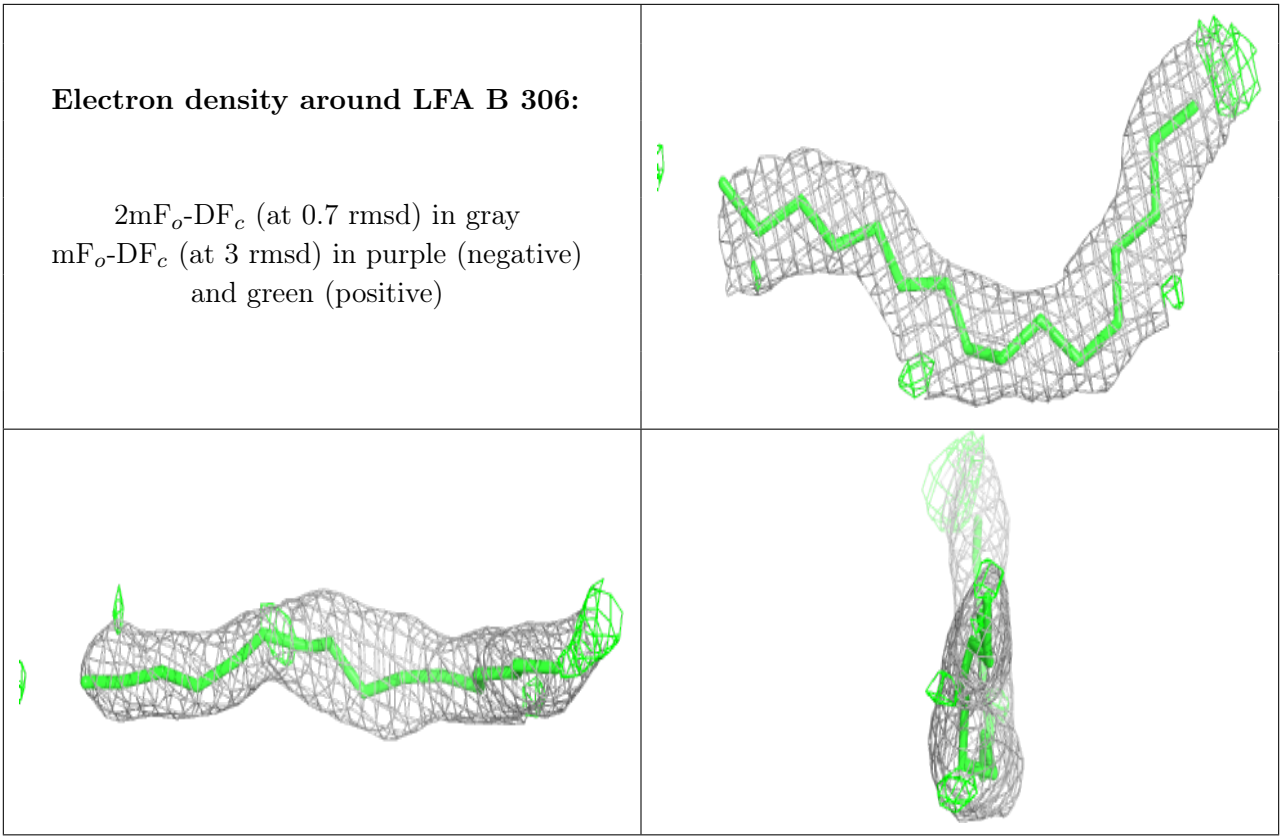
Electron density around LFA A 306:

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



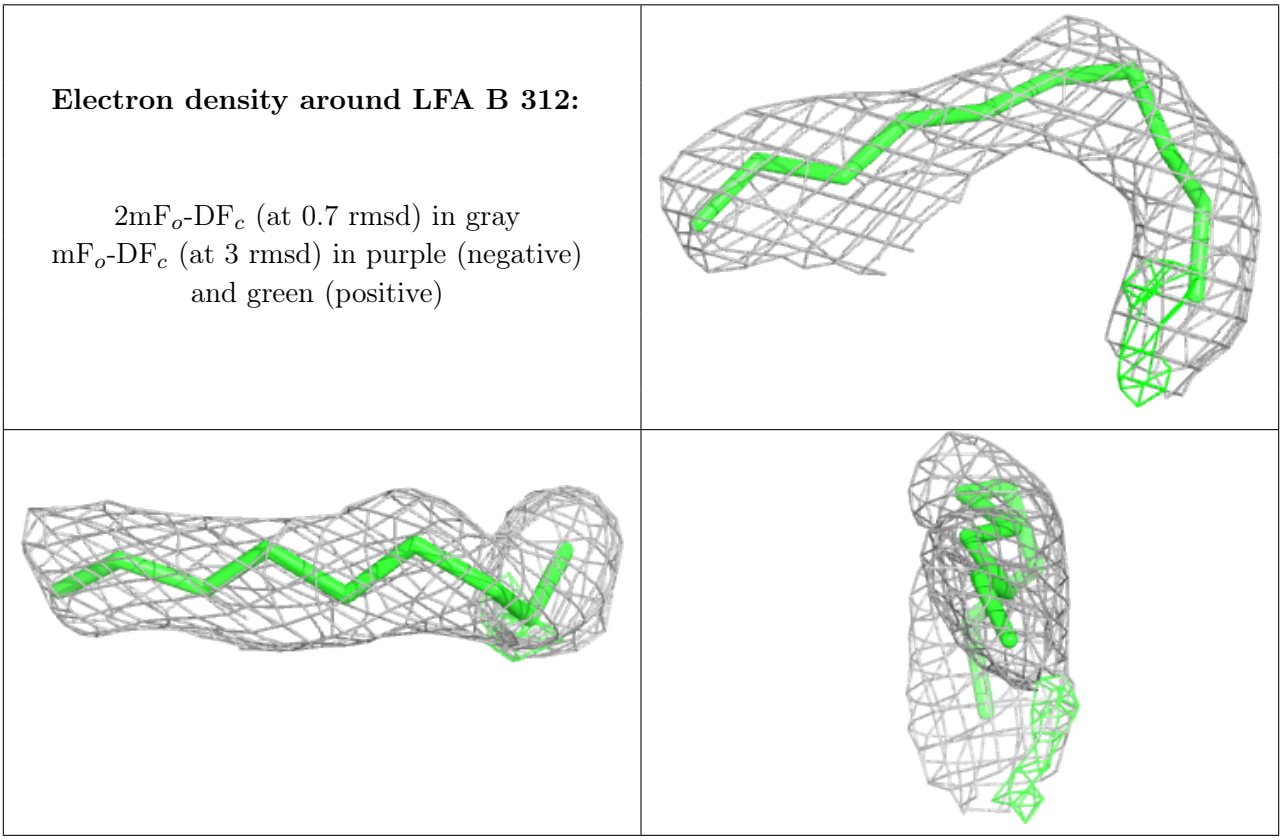
Electron density around LFA B 306:

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



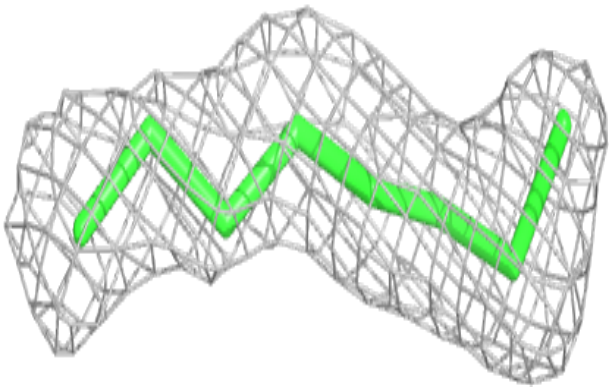
Electron density around LFA B 312:

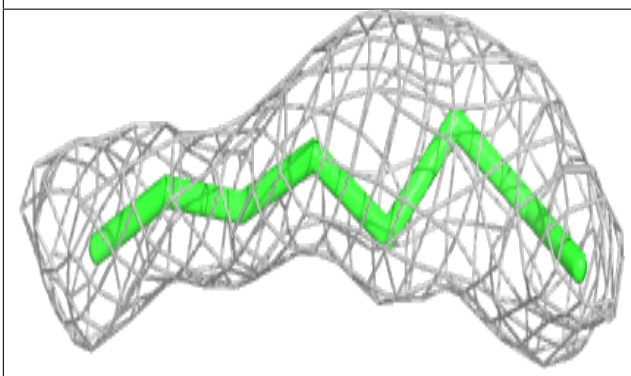
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

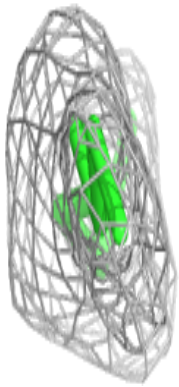


Electron density around LFA B 309:

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

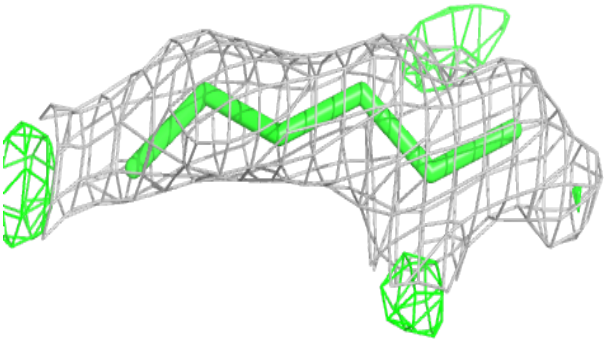


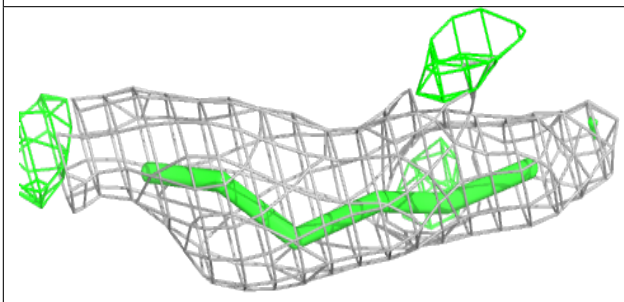


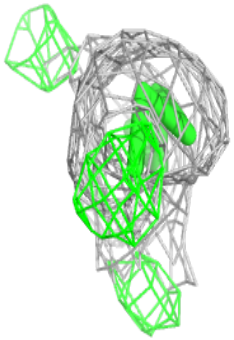


Electron density around LFA A 311:

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

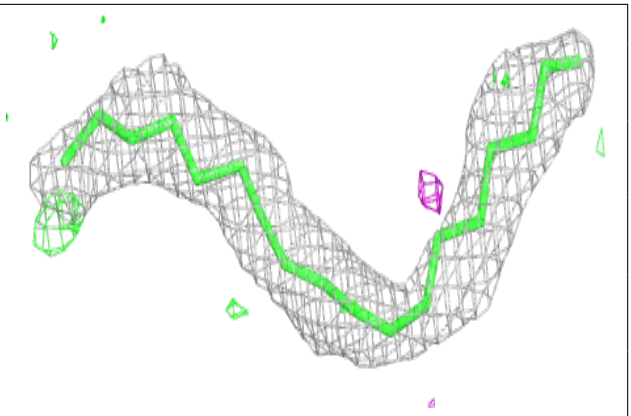


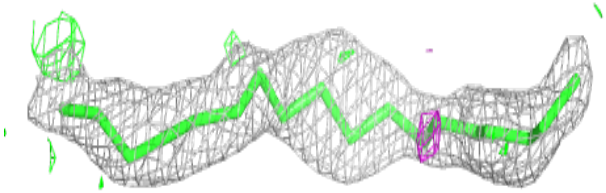


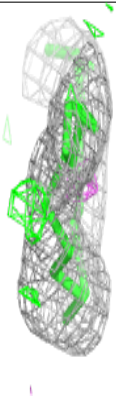


Electron density around LFA A 309:

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

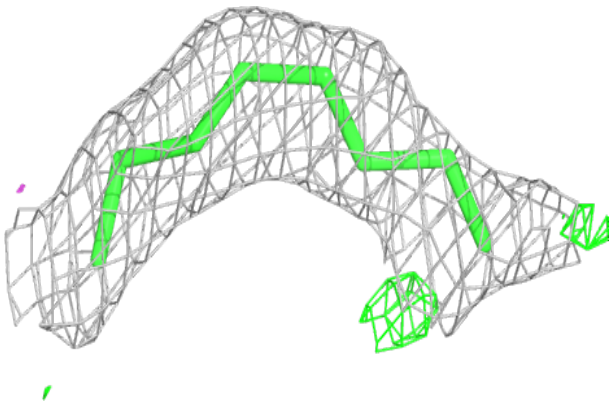


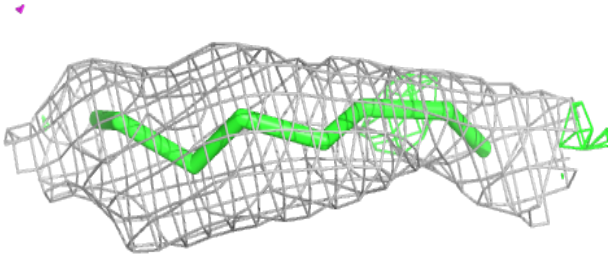


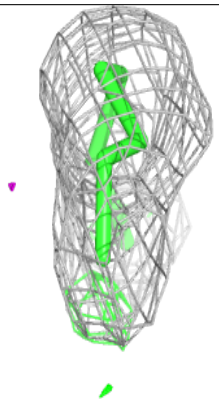


Electron density around LFA B 302:

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

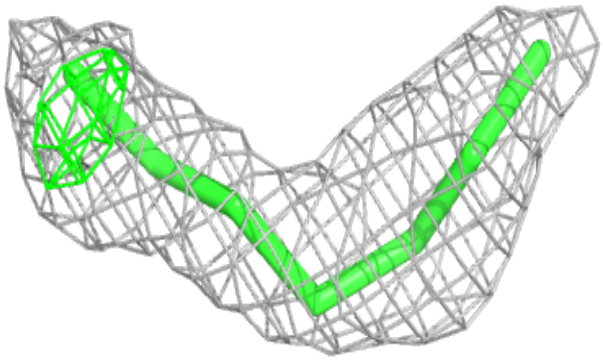


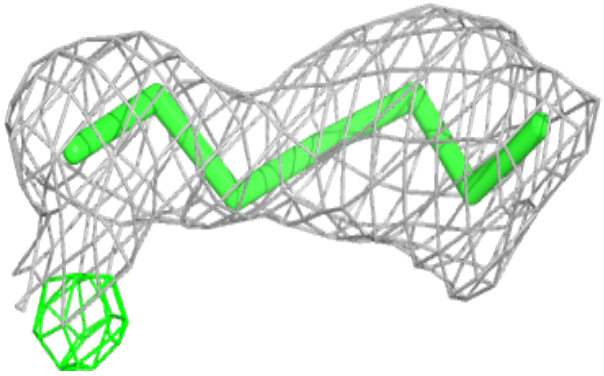


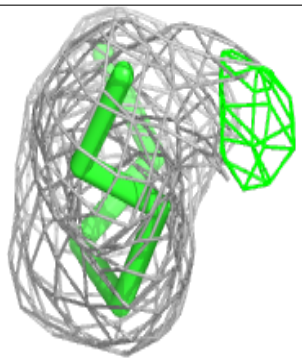


Electron density around LFA B 310:

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

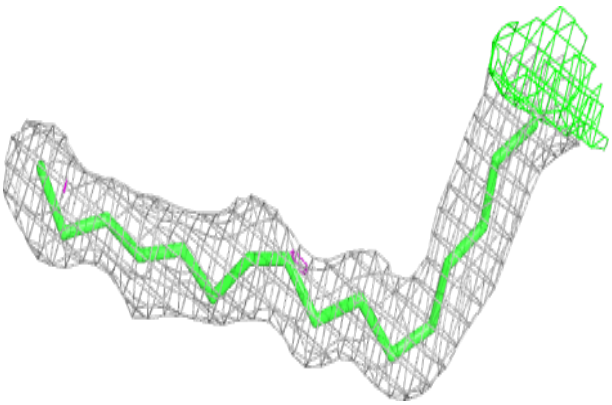


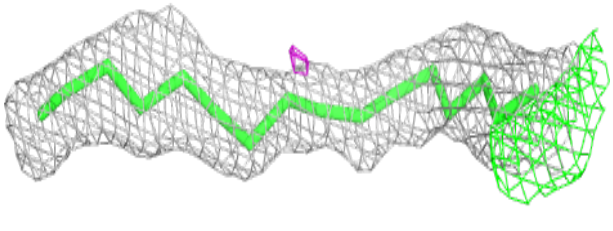


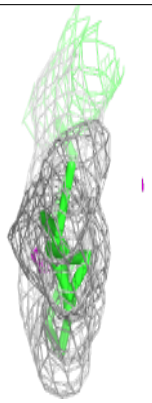


Electron density around LFA A 302:

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

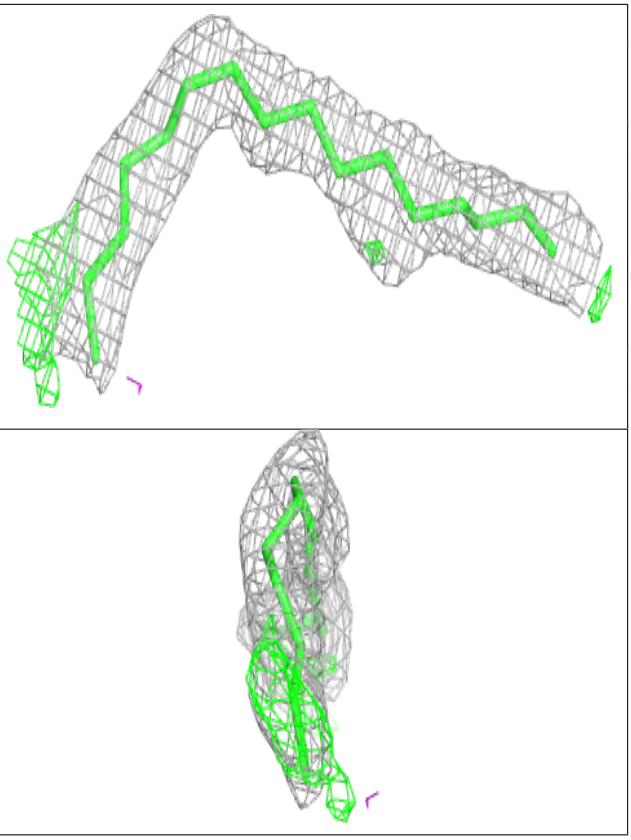






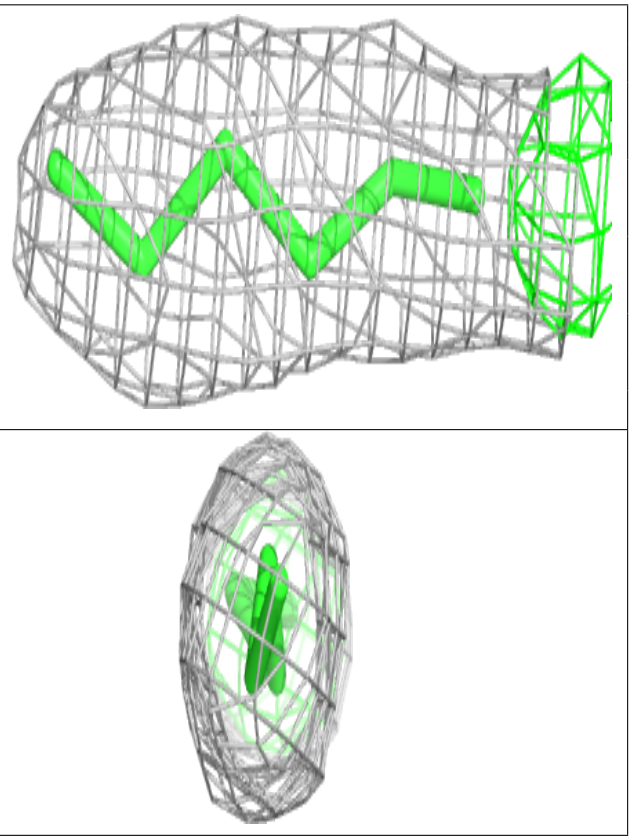
Electron density around LFA B 304:

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



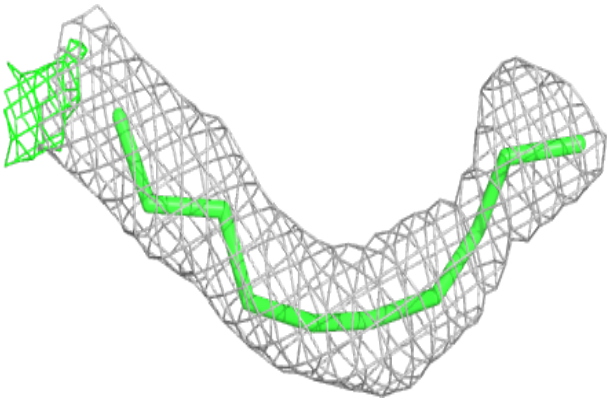
Electron density around LFA A 304:

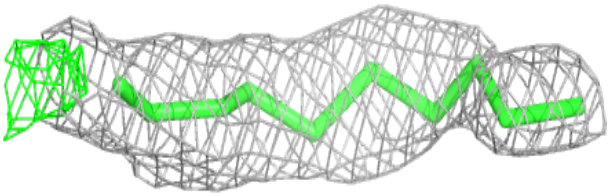
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

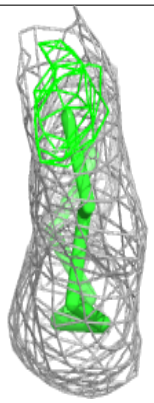


Electron density around LFA A 303:

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

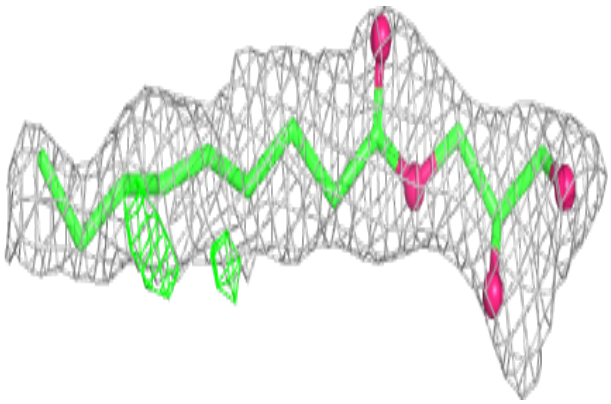


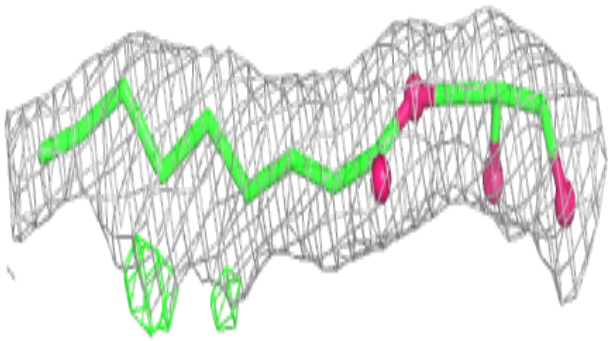


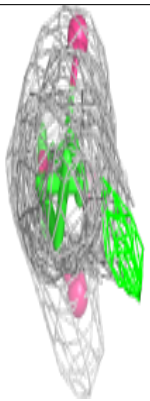


Electron density around OLC A 316:

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

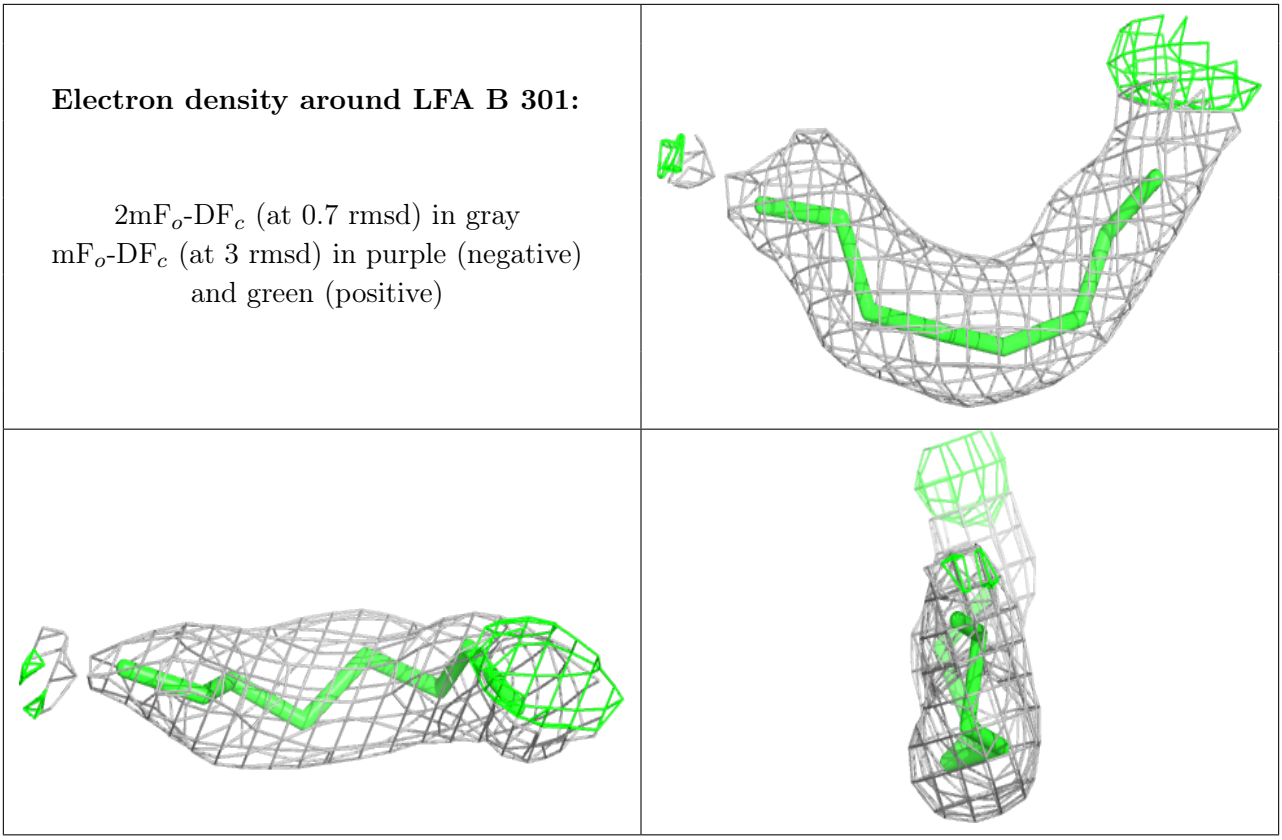






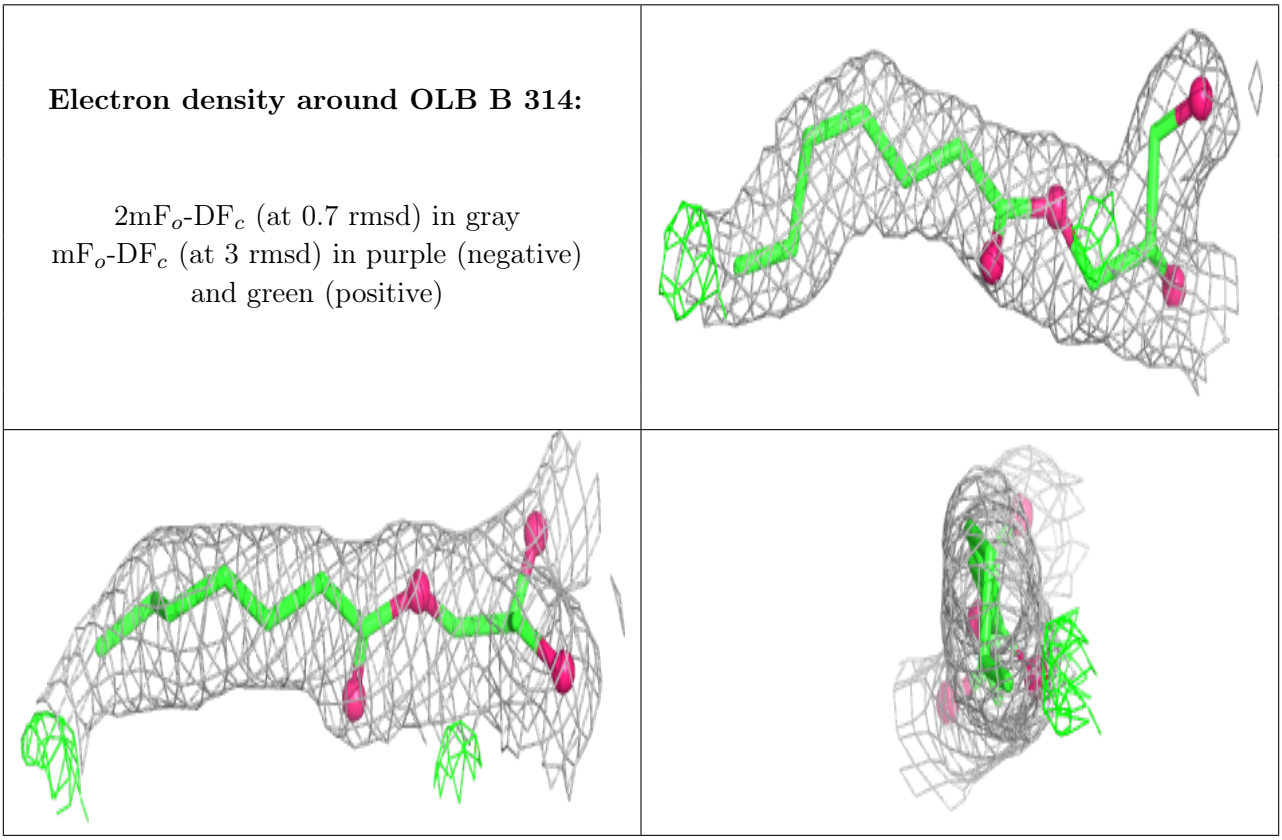
Electron density around LFA B 301:

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



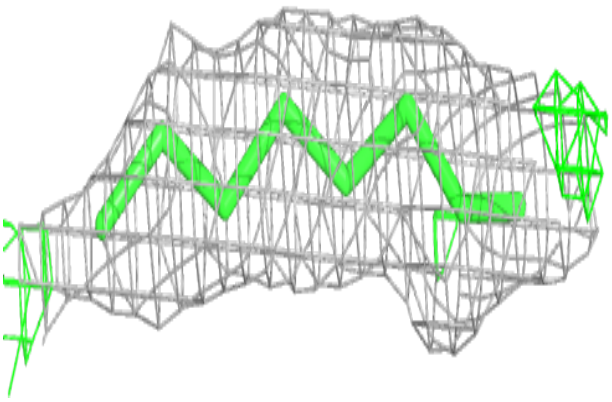
Electron density around OLB B 314:

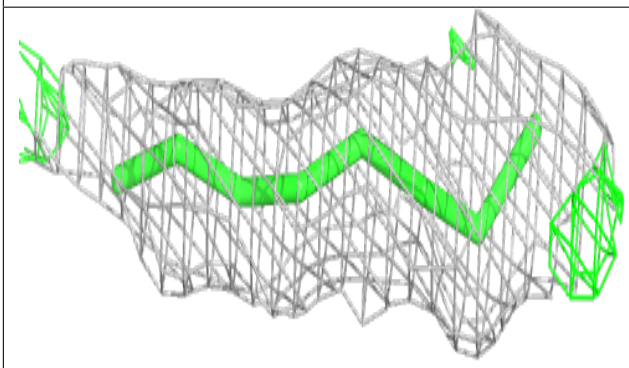
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

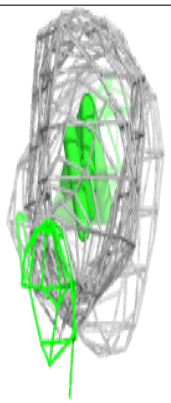


Electron density around LFA A 305:

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

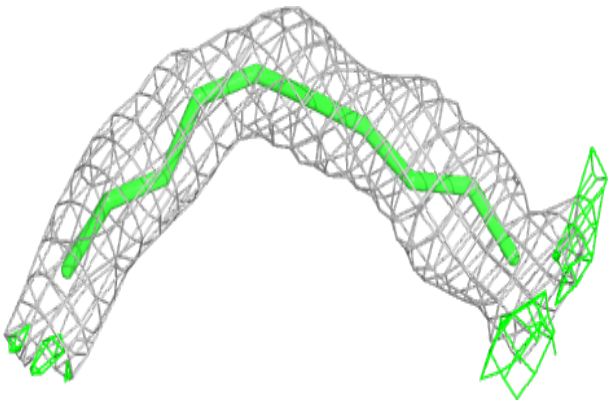


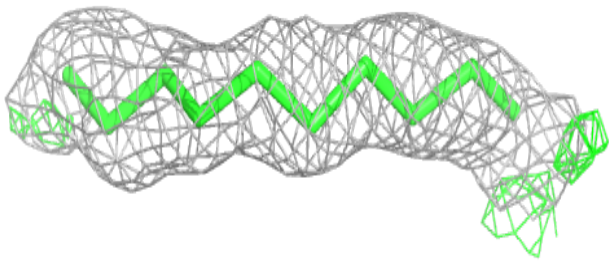


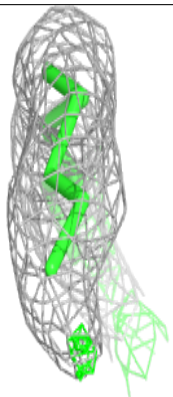


Electron density around LFA B 303:

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

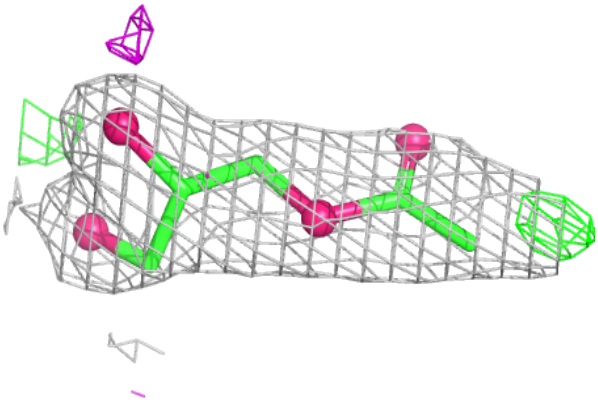


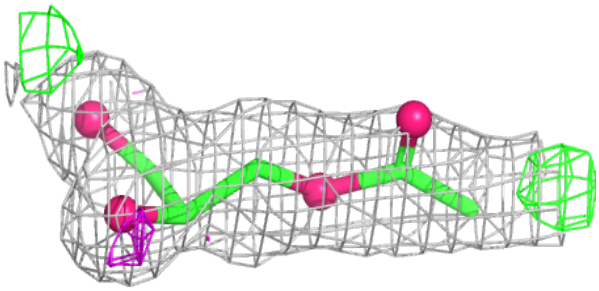


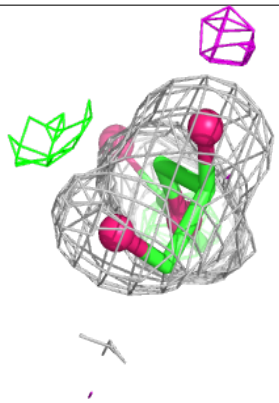


Electron density around OLB A 314:

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

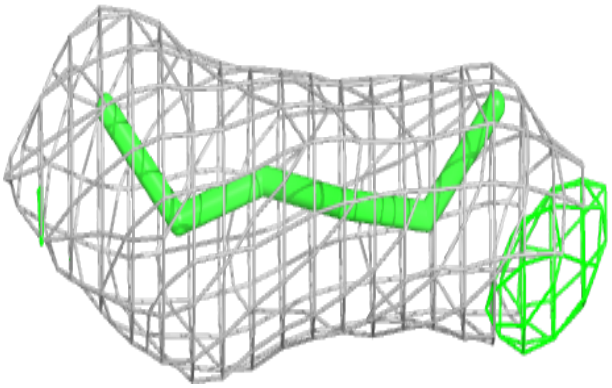


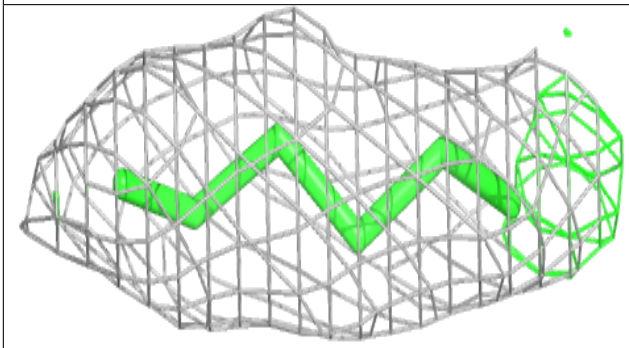


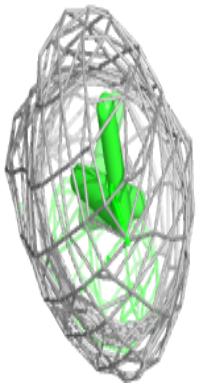


Electron density around LFA B 305:

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







6.5 Other polymers (i)

There are no such residues in this entry.