wwPDB X-ray Structure Validation Summary Report (i)

Nov 14, 2020 – 07:15 PM GMT

PDB ID	:	7AKX
Title	:	Crystal structure of the viral rhodopsin OLPVR1 in P1 space group
Authors	:	Kovalev, K.; Zabelskii, D.; Alekseev, A.; Astashkin, R.; Gordeliy, V.
Deposited on	:	2020-10-02
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:

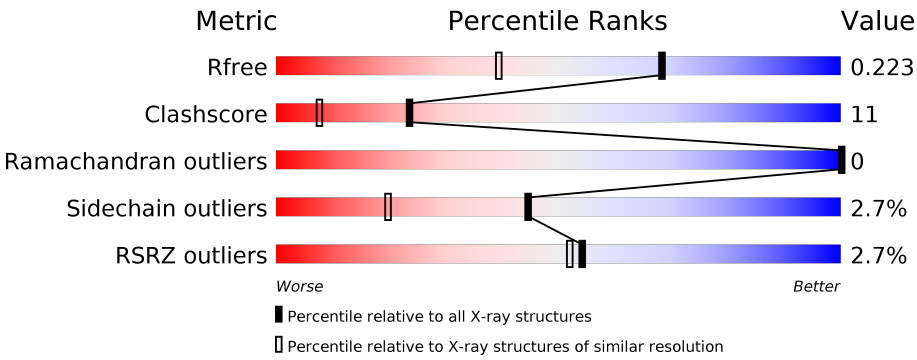
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.14.6
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.14.6

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 on 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	231	3% 83% 13%
1	B	231	2% 78% 16%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 4341 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.

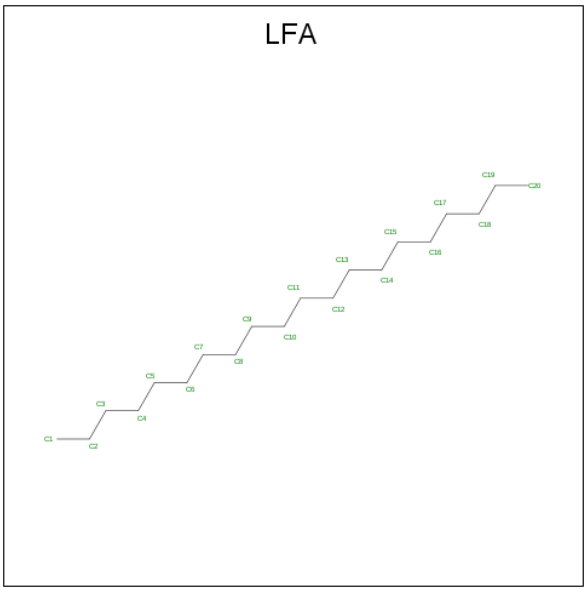
- Molecule 1 is a protein called viral rhodopsin OLPVR1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	224	1984	1378	273	321	12	0	6	0
1	B	224	1971	1364	274	321	12	0	7	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	224	LEU	-	expression tag	UNP F2Y337
A	225	GLU	-	expression tag	UNP F2Y337
A	226	HIS	-	expression tag	UNP F2Y337
A	227	HIS	-	expression tag	UNP F2Y337
A	228	HIS	-	expression tag	UNP F2Y337
A	229	HIS	-	expression tag	UNP F2Y337
A	230	HIS	-	expression tag	UNP F2Y337
A	231	HIS	-	expression tag	UNP F2Y337
B	224	LEU	-	expression tag	UNP F2Y337
B	225	GLU	-	expression tag	UNP F2Y337
B	226	HIS	-	expression tag	UNP F2Y337
B	227	HIS	-	expression tag	UNP F2Y337
B	228	HIS	-	expression tag	UNP F2Y337
B	229	HIS	-	expression tag	UNP F2Y337
B	230	HIS	-	expression tag	UNP F2Y337
B	231	HIS	-	expression tag	UNP F2Y337

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



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C 14 14	0	0
2	A	1	Total C 10 10	0	0
2	A	1	Total C 4 4	0	0
2	A	1	Total C 12 12	0	0
2	A	1	Total C 8 8	0	0
2	A	1	Total C 11 11	0	0
2	A	1	Total C 4 4	0	0
2	A	1	Total C 13 13	0	0
2	A	1	Total C 3 3	0	0
2	A	1	Total C 5 5	0	0
2	A	1	Total C 4 4	0	0
2	A	1	Total C 11 11	0	0
2	B	1	Total C 20 20	0	0
2	B	1	Total C 8 8	0	0

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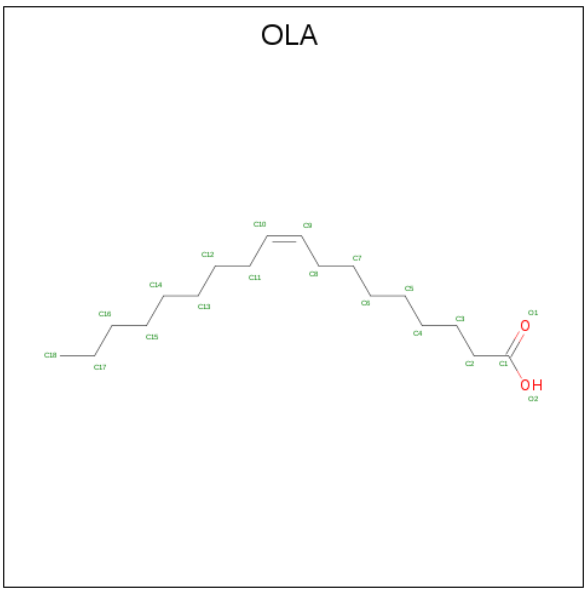
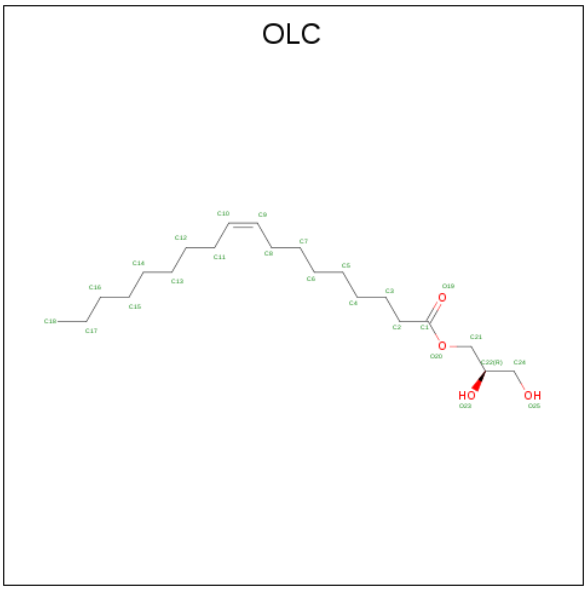
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total C 4 4	0	0
2	B	1	Total C 13 13	0	0
2	B	1	Total C 7 7	0	0
2	B	1	Total C 5 5	0	0
2	B	1	Total C 8 8	0	0
2	B	1	Total C 5 5	0	0
2	B	1	Total C 3 3	0	0
2	B	1	Total C 12 12	0	0
2	B	1	Total C 6 6	0	0
2	B	1	Total C 12 12	0	0
2	B	1	Total C 4 4	0	0
2	B	1	Total C 10 10	0	0

- Molecule 3 is OLEIC ACID (three-letter code: OLA) (formula: $C_{18}H_{34}O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
3	A	1	9	7	2	0	0
			Total	C	O		
3	A	1	11	9	2	0	0
			Total	C	O		
3	B	1	9	7	2	0	0
			Total	C	O		
3	B	1	11	9	2	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
			Total	C	O		
4	A	1	16	12	4	0	0
			Total	C	O		
4	B	1	16	12	4	0	0

- Molecule 5 is water.

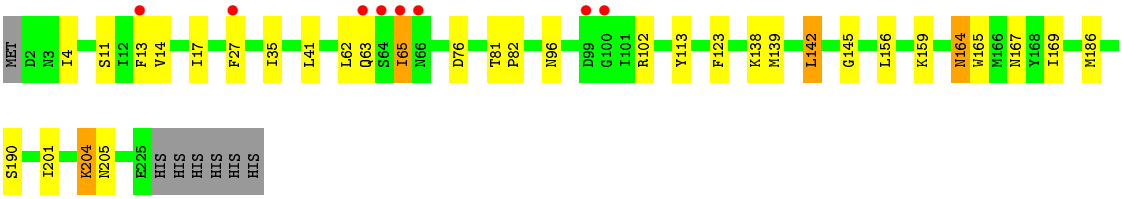
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
5	A	47	47	47	0	0
			Total	O		
5	B	51	51	51	0	0

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.

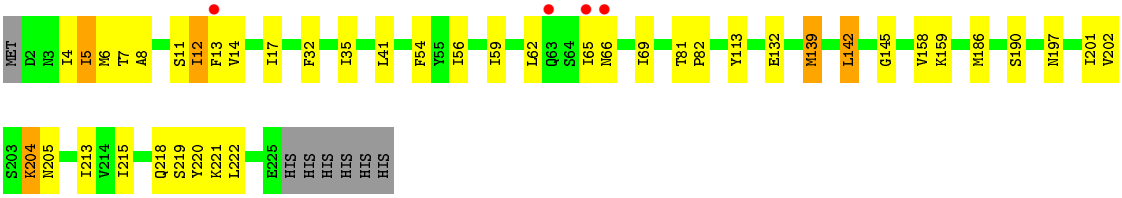
- Molecule 1: viral rhodopsin OLPVR1

Chain A:



- Molecule 1: viral rhodopsin OLPVR1

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	40.18Å 56.97Å 62.34Å 113.90° 90.01° 91.49°	Depositor
Resolution (Å)	20.00 – 1.60 40.16 – 1.60	Depositor EDS
% Data completeness (in resolution range)	95.2 (20.00-1.60) 95.2 (40.16-1.60)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.20 (at 1.60Å)	Xtriage
Refinement program	REFMAC 5.8.0257	Depositor
R, R_{free}	0.188 , 0.213 0.201 , 0.223	Depositor DCC
R_{free} test set	3143 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å^2)	24.9	Xtriage
Anisotropy	0.323	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 39.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.188 for h,-k,-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	4341	wwPDB-VP
Average B, all atoms (Å^2)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.65% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: OLA, OLC, LFA, LYR

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	0.61	0/2013	0.57	0/2732
1	B	0.61	0/1998	0.57	0/2714
All	All	0.61	0/4011	0.57	0/5446

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1984	0	2005	41	0
1	B	1971	0	1998	58	0
2	A	99	0	171	8	0
2	B	117	0	214	12	0
3	A	20	0	24	0	0
3	B	20	0	24	0	0
4	A	16	0	21	3	0
4	B	16	0	21	3	0
5	A	47	0	0	2	0
5	B	51	0	0	2	0
All	All	4341	0	4478	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 11.

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)
1:B:186[A]:MET:HE3	4:B:307:OLC:H24A	1.33	1.08
1:B:201[B]:ILE:HD12	5:B:401:HOH:O	1.63	0.99
1:B:11:SER:OG	1:B:201[B]:ILE:HD11	1.65	0.96
2:A:507:LFA:H201	2:B:316:LFA:C4	2.05	0.86
1:A:96:ASN:HD21	1:A:167:ASN:HD21	1.24	0.84

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	227/231 (98%)	227 (100%)	0	0	100	100
1	B	228/231 (99%)	228 (100%)	0	0	100	100
All	All	455/462 (98%)	455 (100%)	0	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	213/220 (97%)	207 (97%)	6 (3%)	43	18
1	B	212/220 (96%)	204 (96%)	8 (4%)	33	10
All	All	425/440 (97%)	411 (97%)	14 (3%)	44	14

5 of 14 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	5	ILE
1	B	12[A]	ILE
1	B	139[A]	MET
1	A	164	ASN
1	B	132	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	205	ASN
1	A	218	GLN
1	B	167	ASN
1	A	167	ASN
1	B	63	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	204	1	27,29,30	1.35	4 (14%)	30,37,39	1.87	9 (30%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
1	LYR	B	204	1	27,29,30	1.33	3 (11%)	30,37,39	2.04	8 (26%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	LYR	A	204	1	-	2/22/40/42	0/1/1/1
1	LYR	B	204	1	-	3/22/40/42	0/1/1/1

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	204	LYR	C7-C80	3.63	1.40	1.35
1	A	204	LYR	C7-C80	3.54	1.40	1.35
1	B	204	LYR	C2-C3	2.60	1.41	1.33
1	A	204	LYR	C2-C3	2.46	1.40	1.33
1	B	204	LYR	C6-C5	2.14	1.40	1.34

The worst 5 of 17 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	204	LYR	C13-C12-C11	-5.40	118.46	124.53
1	A	204	LYR	C1-NZ-CE	5.17	121.52	113.33
1	B	204	LYR	C1-NZ-CE	5.16	121.51	113.33
1	A	204	LYR	C13-C12-C11	-4.38	119.61	124.53
1	B	204	LYR	C6-C7-C80	-3.41	122.44	127.31

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	204	LYR	CG-CD-CE-NZ
1	B	204	LYR	CG-CD-CE-NZ
1	B	204	LYR	C2-C1-NZ-CE
1	A	204	LYR	CD-CE-NZ-C1
1	B	204	LYR	CD-CE-NZ-C1

There are no ring outliers.

2 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	204	LYR	6	0
1	B	204	LYR	6	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	513	-	4,4,19	0.14	0	3,3,18	0.23	0
3	OLA	B	308	-	7,10,19	0.20	0	6,10,19	0.10	0
2	LFA	A	510	-	3,3,19	0.22	0	2,2,18	0.46	0
2	LFA	B	312	-	2,2,19	0.02	0	0,1,18	0.00	-
2	LFA	B	313	-	11,11,19	0.09	0	10,10,18	0.07	0
2	LFA	A	514	-	3,3,19	0.23	0	2,2,18	0.45	0
2	LFA	A	515	-	10,10,19	0.09	0	9,9,18	0.08	0
2	LFA	B	310	-	7,7,19	0.10	0	6,6,18	0.06	0
2	LFA	B	314	-	5,5,19	0.13	0	4,4,18	0.09	0
3	OLA	A	504	-	5,8,19	0.22	0	4,8,19	0.14	0
2	LFA	B	316	-	3,3,19	0.21	0	2,2,18	0.43	0
2	LFA	A	506	-	11,11,19	0.08	0	10,10,18	0.09	0
2	LFA	B	302	-	7,7,19	0.11	0	6,6,18	0.07	0
2	LFA	B	315	-	11,11,19	0.10	0	10,10,18	0.07	0
2	LFA	A	501	-	13,13,19	0.08	0	12,12,18	0.07	0
4	OLC	B	307	-	15,15,24	1.14	1 (6%)	16,16,25	0.97	1 (6%)
3	OLA	A	505	-	7,10,19	0.20	0	6,10,19	0.12	0
2	LFA	A	507	-	7,7,19	0.10	0	6,6,18	0.08	0
2	LFA	B	301	-	19,19,19	0.08	0	18,18,18	0.05	0
3	OLA	B	304	-	5,8,19	0.24	0	4,8,19	0.18	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	LFA	A	503	-	3,3,19	0.21	0	2,2,18	0.44	0
2	LFA	A	502	-	9,9,19	0.10	0	8,8,18	0.09	0
2	LFA	B	303	-	3,3,19	0.23	0	2,2,18	0.44	0
2	LFA	B	317	-	9,9,19	0.10	0	8,8,18	0.06	0
2	LFA	A	509	-	10,10,19	0.12	0	9,9,18	0.07	0
2	LFA	A	512	-	2,2,19	0.08	0	0,1,18	0.00	-
2	LFA	B	309	-	4,4,19	0.13	0	3,3,18	0.21	0
2	LFA	B	305	-	12,12,19	0.08	0	11,11,18	0.05	0
4	OLC	A	508	-	15,15,24	1.15	1 (6%)	16,16,25	0.93	1 (6%)
2	LFA	A	511	-	12,12,19	0.10	0	11,11,18	0.06	0
2	LFA	B	311	-	4,4,19	0.14	0	3,3,18	0.22	0
2	LFA	B	306	-	6,6,19	0.10	0	5,5,18	0.11	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	513	-	-	2/2/2/17	-
3	OLA	B	308	-	-	2/6/8/17	-
2	LFA	A	510	-	-	0/1/1/17	-
2	LFA	B	313	-	-	7/9/9/17	-
2	LFA	A	514	-	-	0/1/1/17	-
2	LFA	A	515	-	-	6/8/8/17	-
2	LFA	B	310	-	-	4/5/5/17	-
2	LFA	B	314	-	-	1/3/3/17	-
3	OLA	A	504	-	-	3/4/6/17	-
2	LFA	B	316	-	-	1/1/1/17	-
2	LFA	A	506	-	-	4/9/9/17	-
2	LFA	B	302	-	-	3/5/5/17	-
2	LFA	B	315	-	-	6/9/9/17	-
2	LFA	A	501	-	-	7/11/11/17	-
4	OLC	B	307	-	-	12/15/15/24	-
3	OLA	A	505	-	-	3/6/8/17	-
2	LFA	A	507	-	-	3/5/5/17	-
2	LFA	B	301	-	-	9/17/17/17	-
3	OLA	B	304	-	-	1/4/6/17	-
2	LFA	A	503	-	-	0/1/1/17	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	LFA	A	502	-	-	4/7/7/17	-
2	LFA	B	303	-	-	0/1/1/17	-
2	LFA	B	317	-	-	5/7/7/17	-
2	LFA	A	509	-	-	5/8/8/17	-
2	LFA	B	309	-	-	1/2/2/17	-
2	LFA	B	305	-	-	4/10/10/17	-
4	OLC	A	508	-	-	8/15/15/24	-
2	LFA	A	511	-	-	5/10/10/17	-
2	LFA	B	311	-	-	1/2/2/17	-
2	LFA	B	306	-	-	2/4/4/17	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	508	OLC	O20-C1	4.26	1.45	1.33
4	B	307	OLC	O20-C1	4.21	1.45	1.33

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	307	OLC	O20-C1-C2	2.61	120.09	111.91
4	A	508	OLC	O20-C1-C2	2.52	119.82	111.91

There are no chirality outliers.

5 of 109 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	307	OLC	C21-C22-C24-O25
4	A	508	OLC	C21-C22-C24-O25
4	A	508	OLC	O20-C21-C22-C24
4	A	508	OLC	O20-C21-C22-O23
2	A	501	LFA	C9-C10-C11-C12

There are no ring outliers.

12 monomers are involved in 22 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	313	LFA	1	0
2	B	310	LFA	2	0

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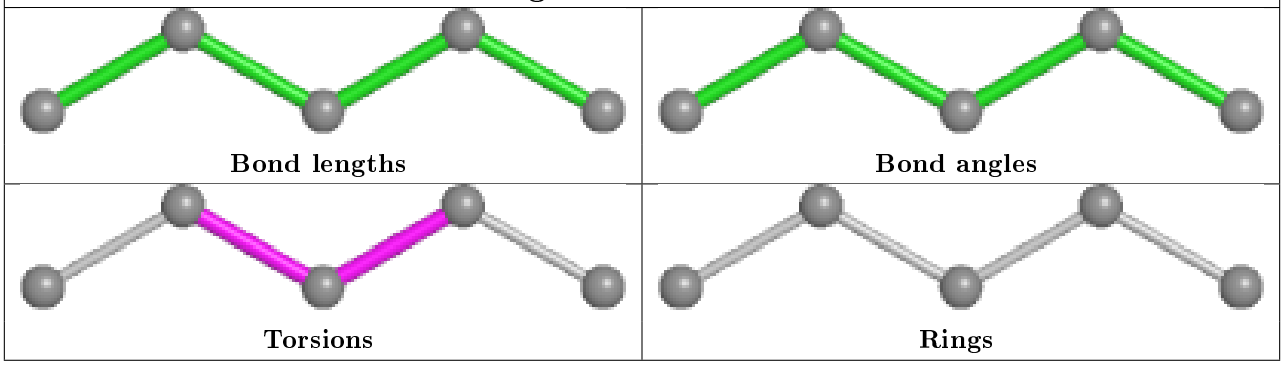
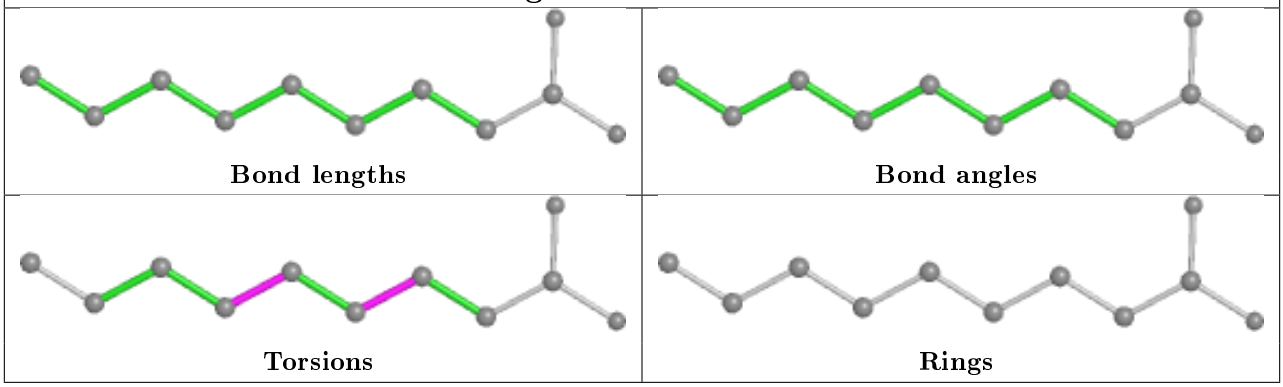
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	316	LFA	5	0
2	B	315	LFA	1	0
4	B	307	OLC	3	0
2	A	507	LFA	4	0
2	B	301	LFA	1	0
2	A	502	LFA	4	0
2	B	303	LFA	1	0
4	A	508	OLC	3	0
2	B	311	LFA	2	0
2	B	306	LFA	1	0

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.

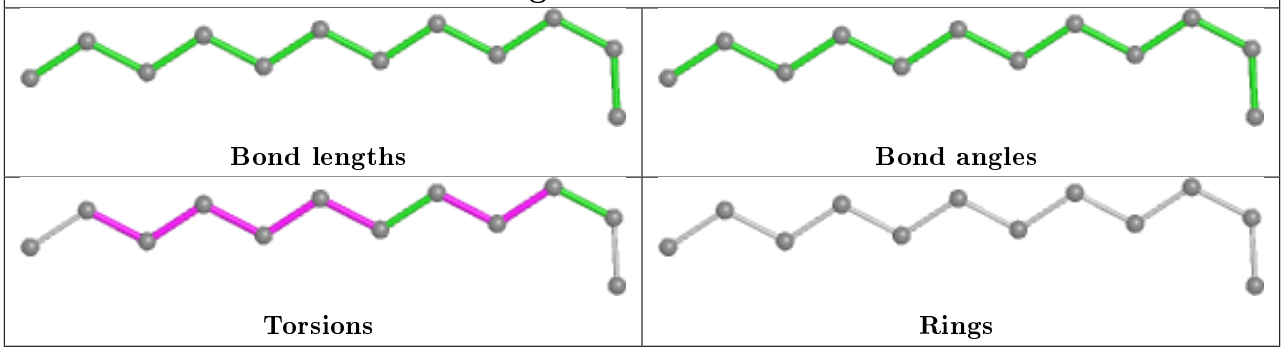
Ligand LFA A 513



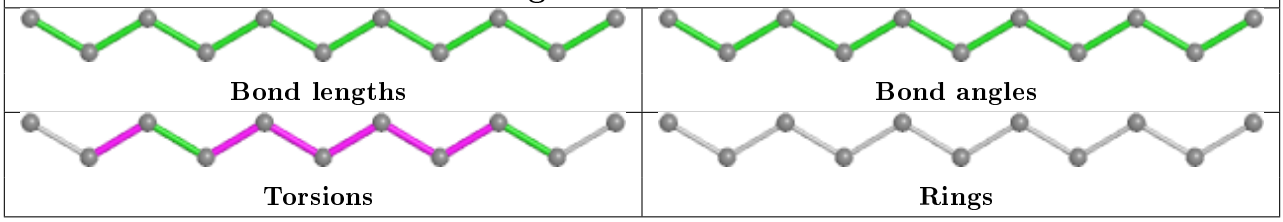
Ligand OLA B 308



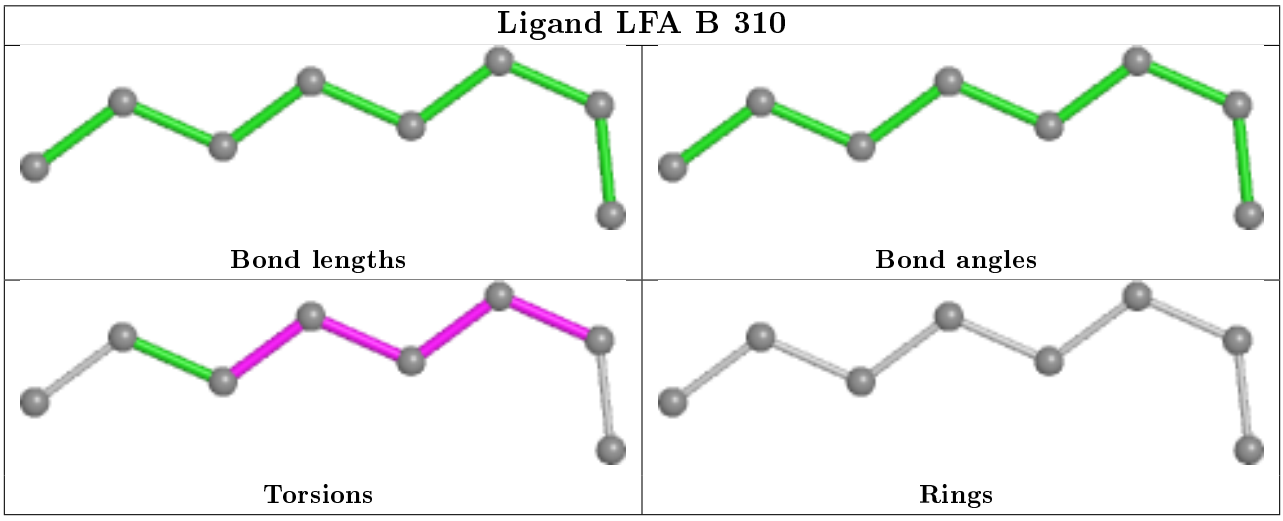
Ligand LFA B 313



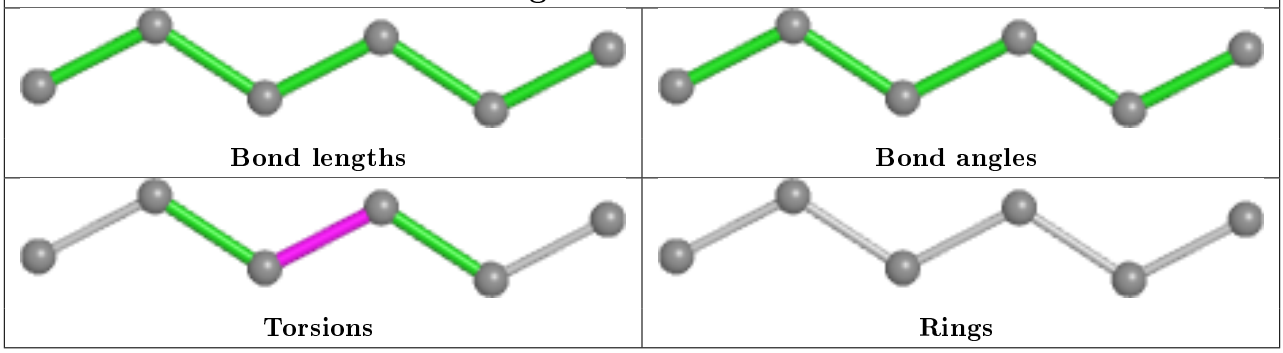
Ligand LFA A 515



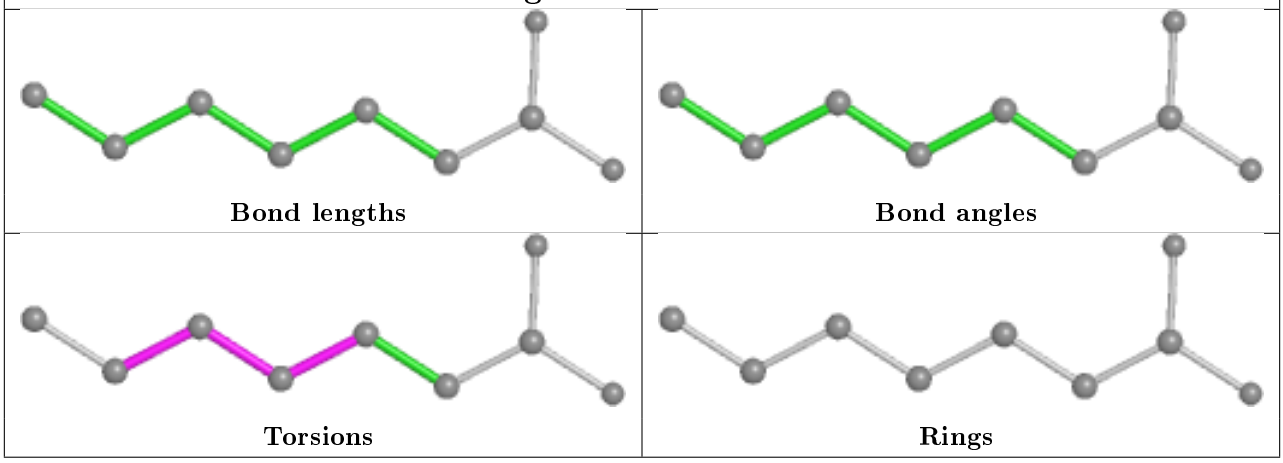
Ligand LFA B 310



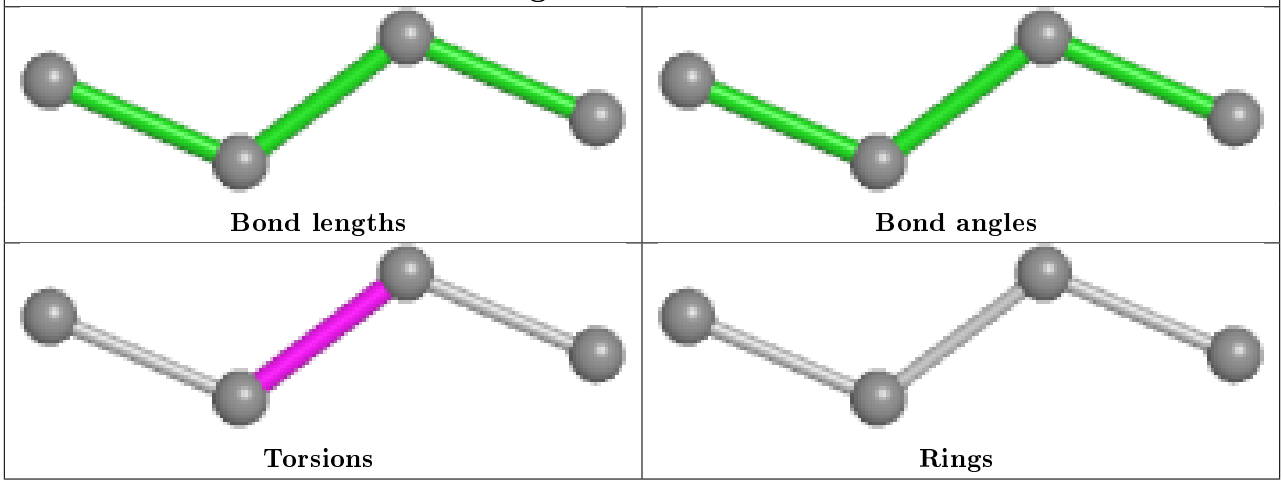
Ligand LFA B 314



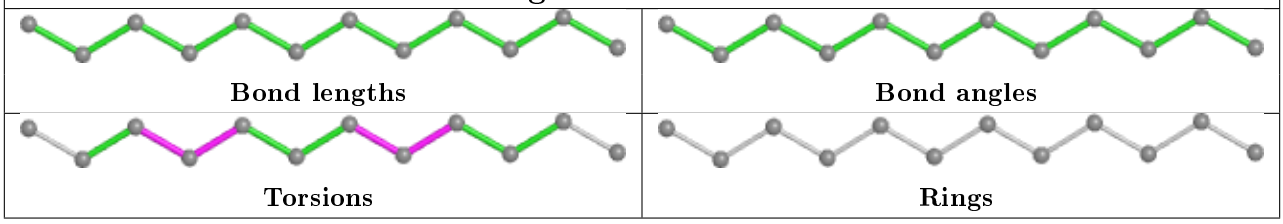
Ligand OLA A 504



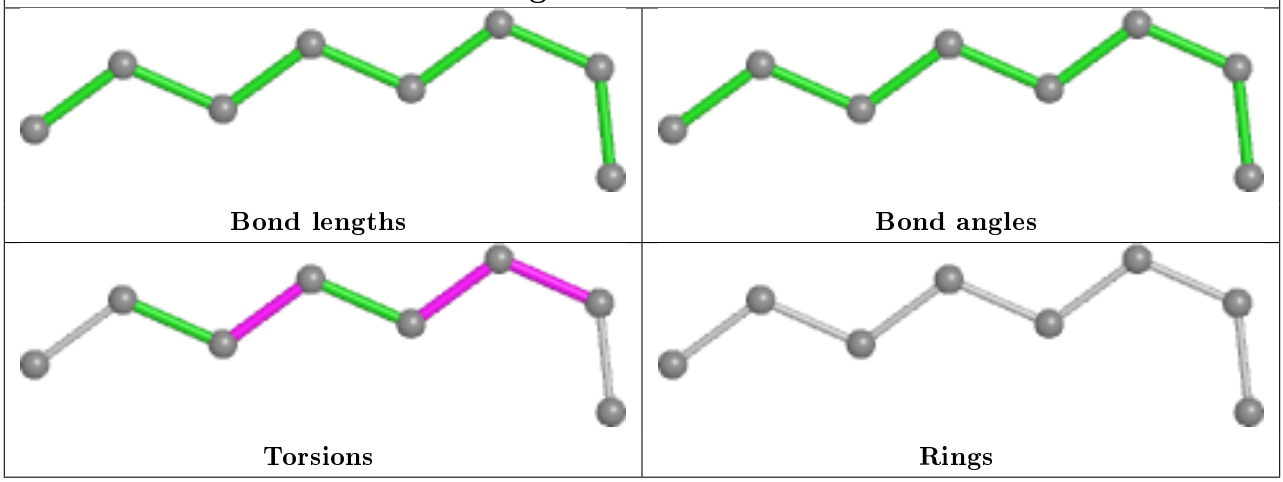
Ligand LFA B 316



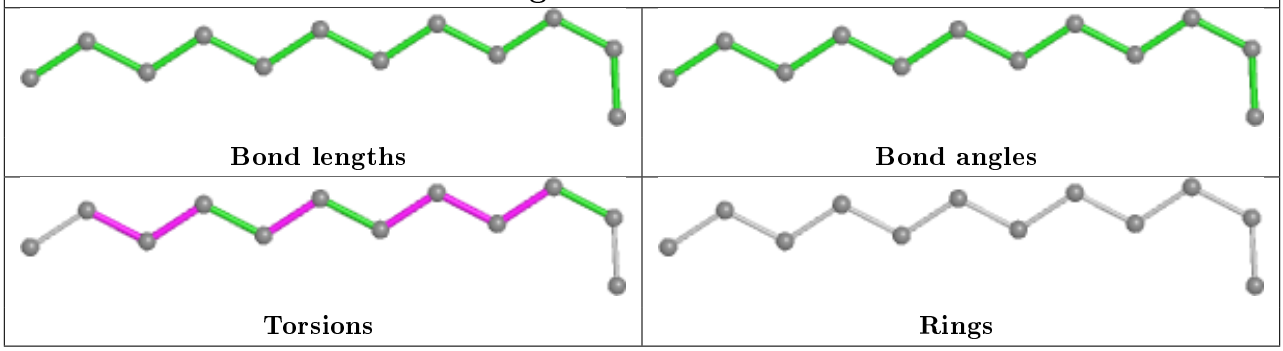
Ligand LFA A 506



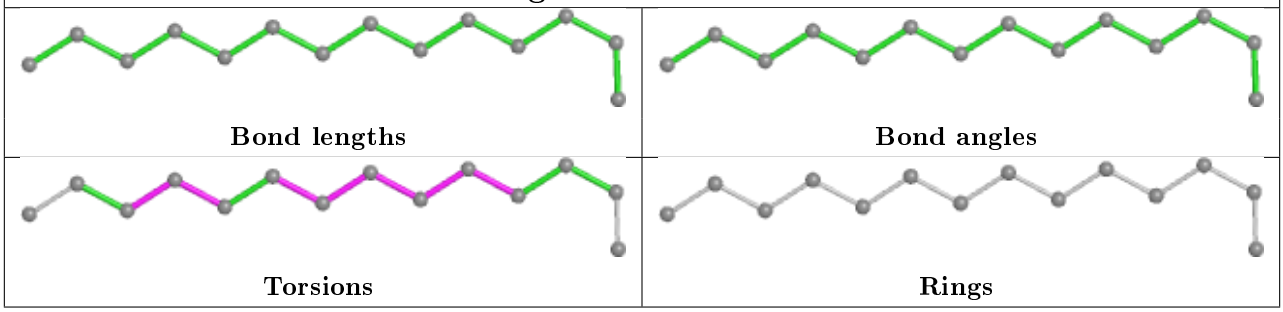
Ligand LFA B 302



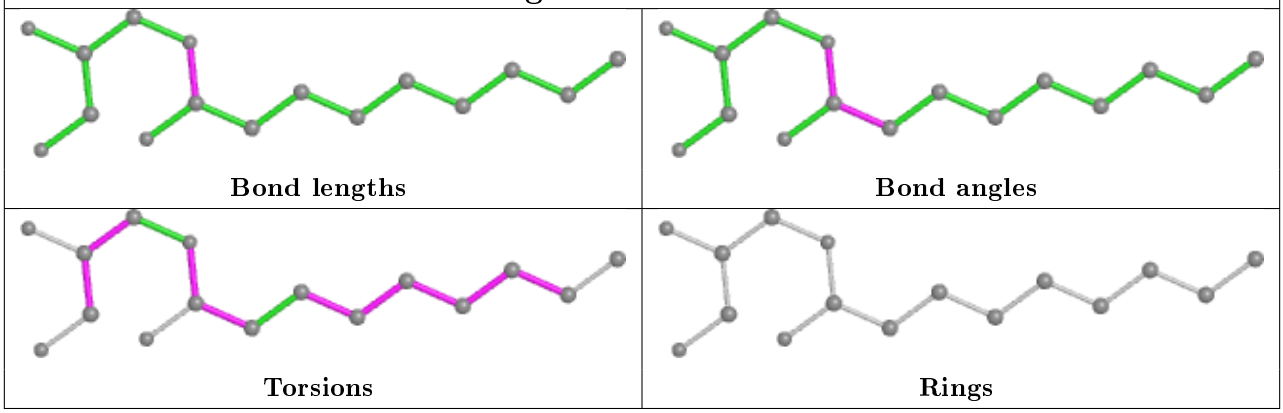
Ligand LFA B 315



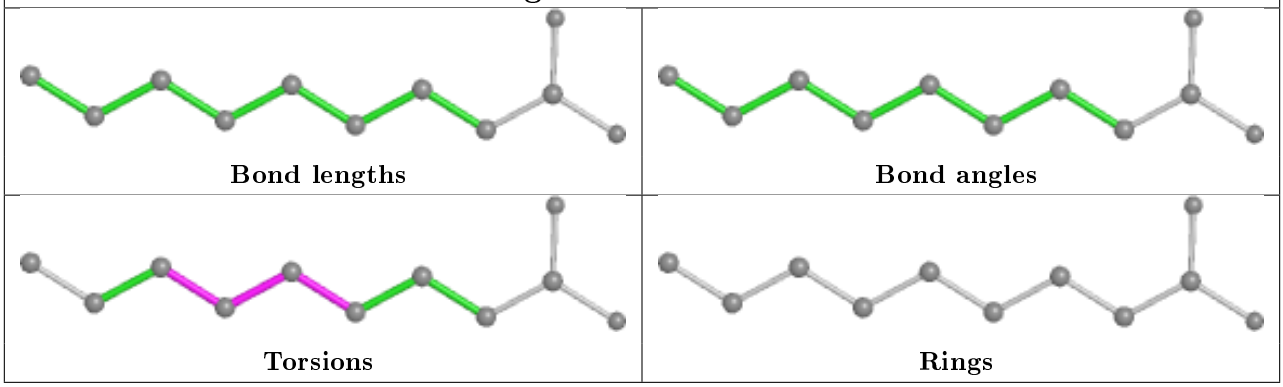
Ligand LFA A 501



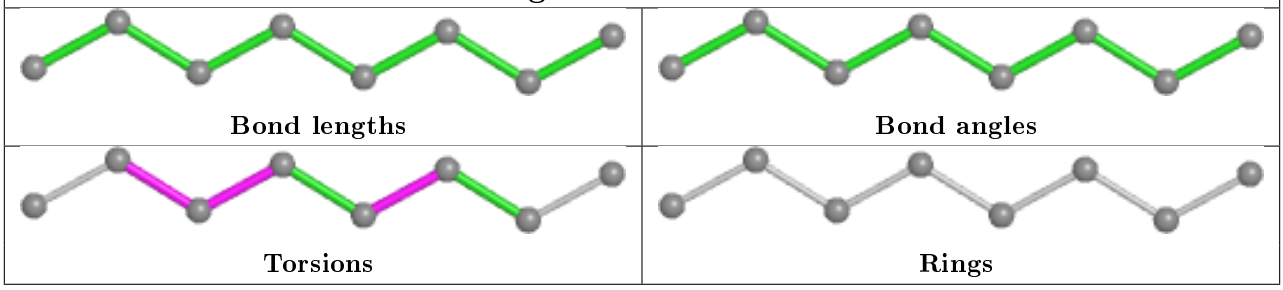
Ligand OLC B 307



Ligand OLA A 505



Ligand LFA A 507



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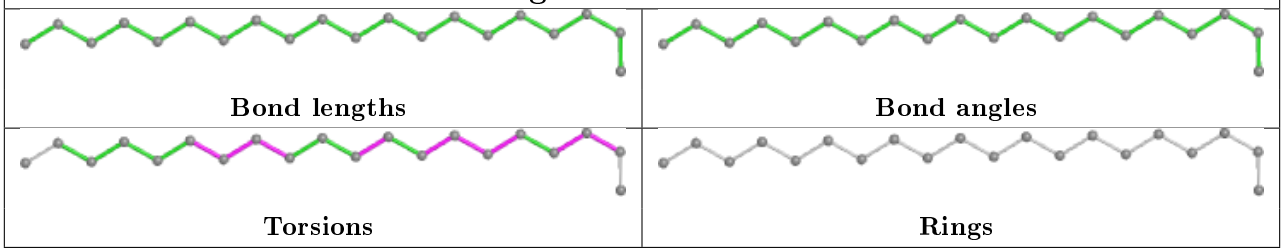

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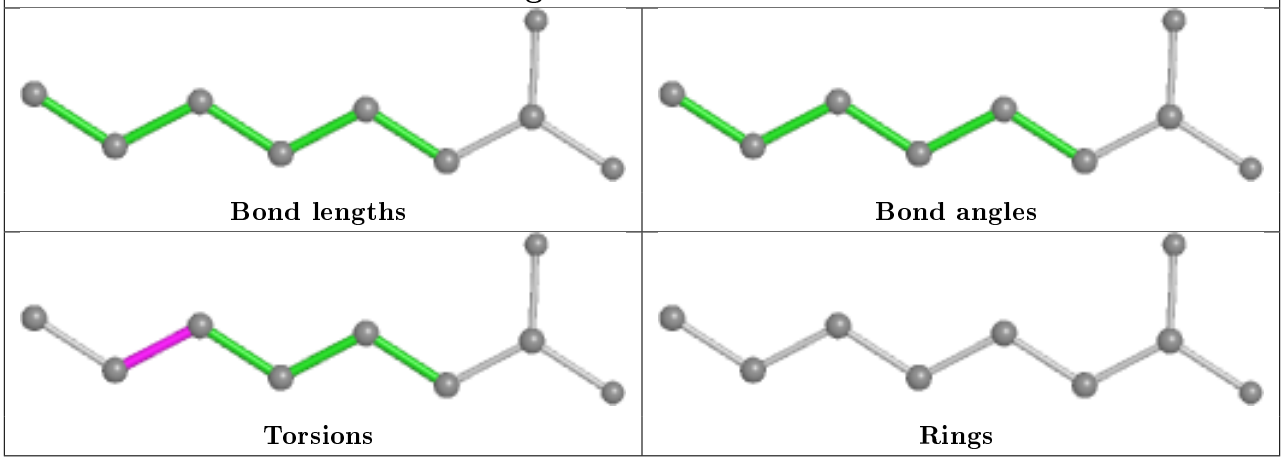

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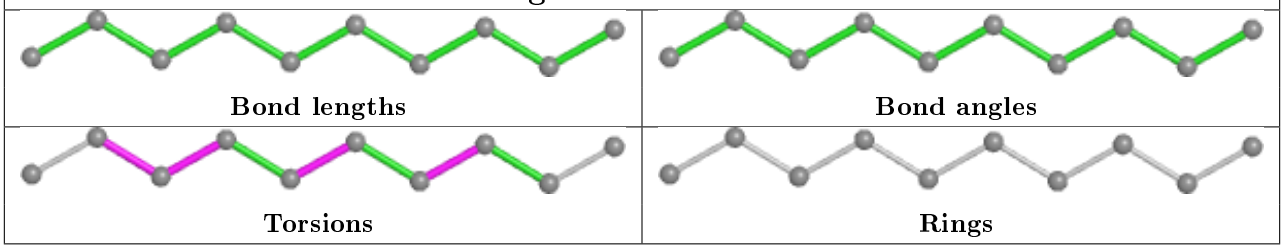
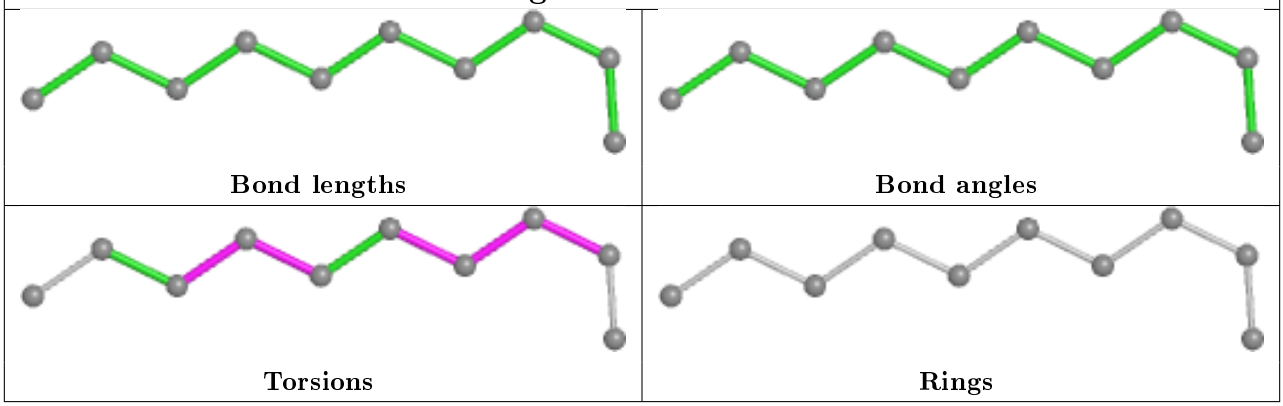
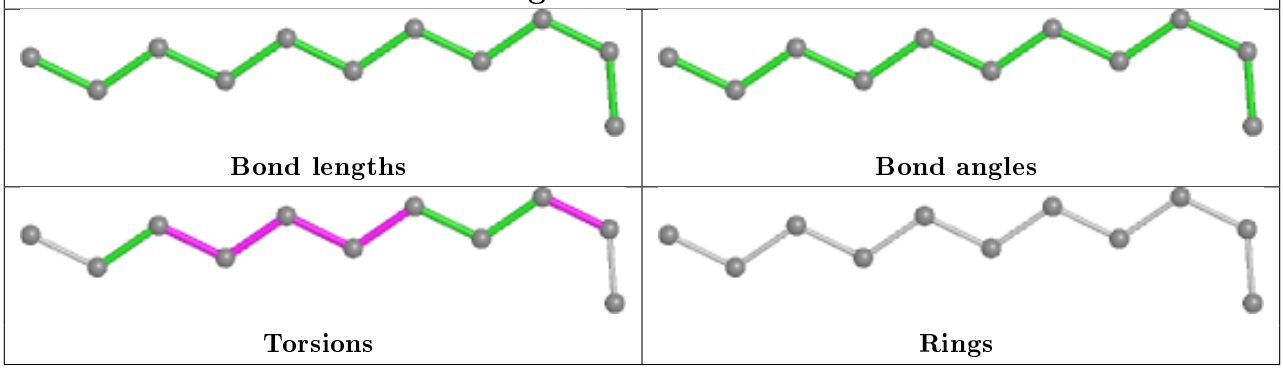


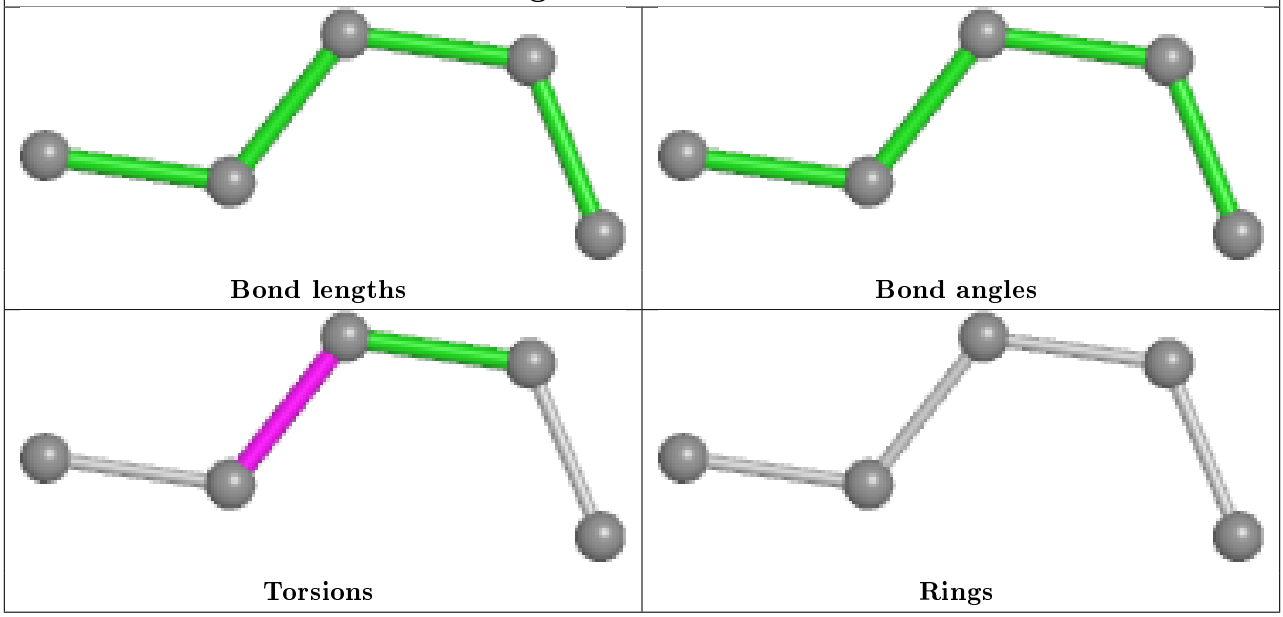
Ligand LFA B 317



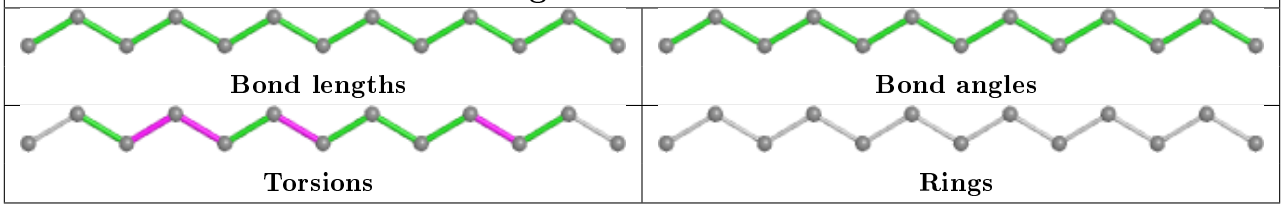
Ligand LFA A 509



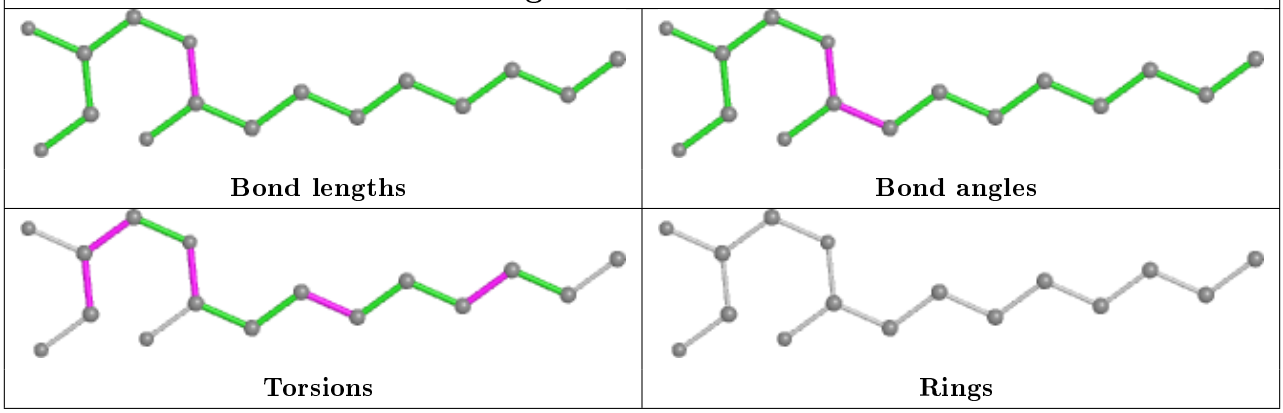
Ligand LFA B 309



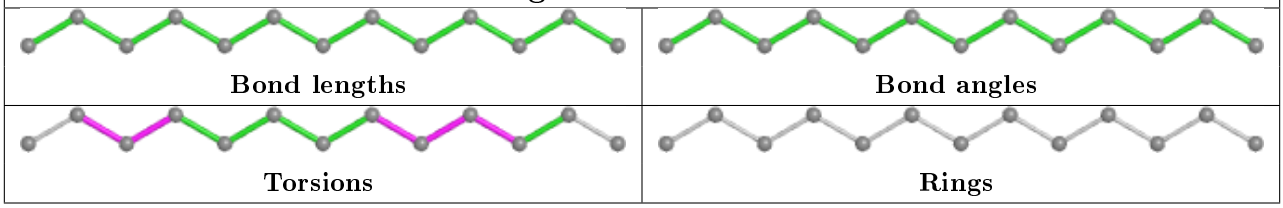
Ligand LFA B 305



Ligand OLC A 508



Ligand LFA A 511



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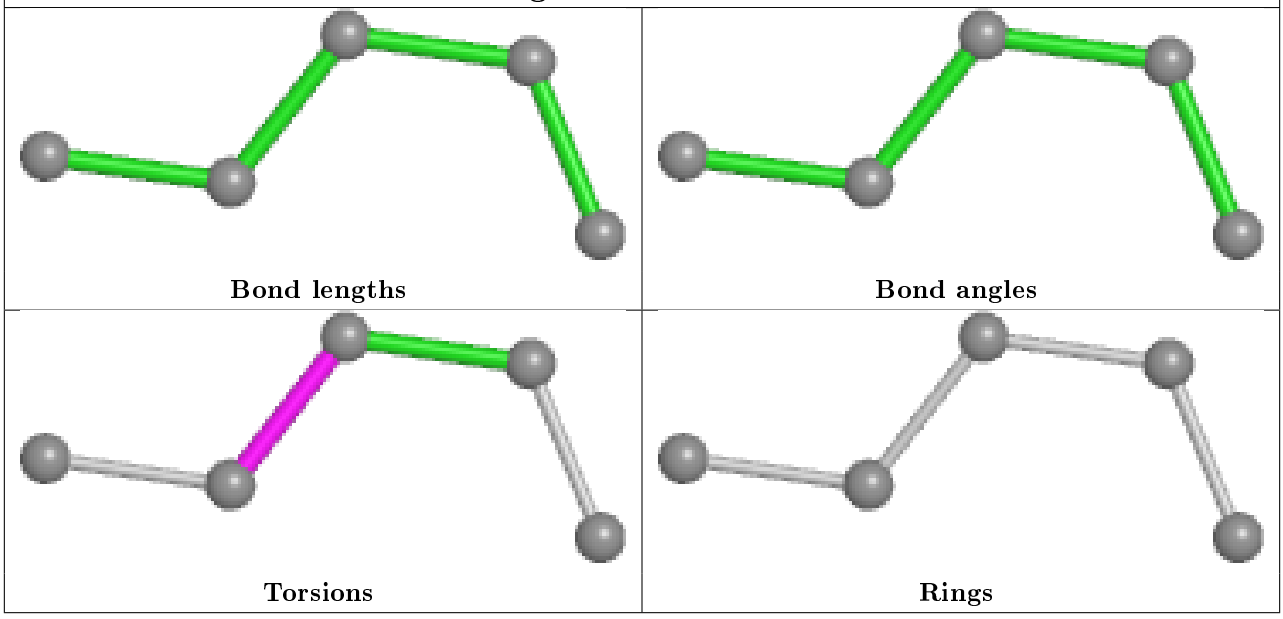
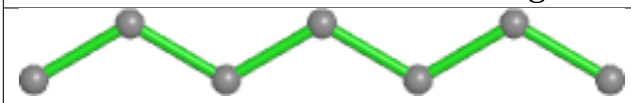
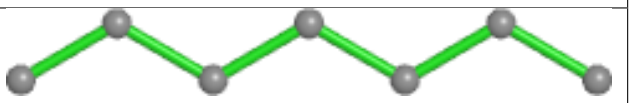
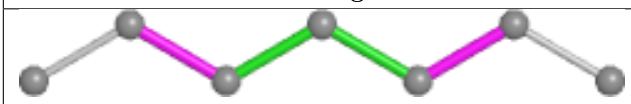
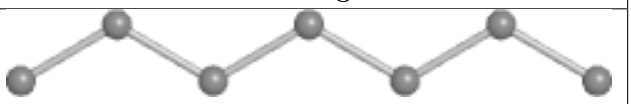


Ligand LFA B 306	
 Bond lengths	 Bond angles
 Torsions	 Rings

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 (i)

6.1 Protein, DNA and RNA chains (i)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	223/231 (96%)	-0.26	8 (3%)	42	40	19, 29, 50, 78	0
1	B	223/231 (96%)	-0.29	4 (1%)	68	67	18, 28, 50, 99	0
All	All	446/462 (96%)	-0.28	12 (2%)	54	52	18, 28, 50, 99	0

The worst 5 of 12 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	65	ILE	6.8
1	B	65	ILE	6.5
1	B	66	ASN	5.4
1	A	66	ASN	5.3
1	A	99	ASP	4.0

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
1	LYR	A	204	29/30	0.95	0.07	19,22,27,29	0
1	LYR	B	204	29/30	0.96	0.07	19,23,27,30	0

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

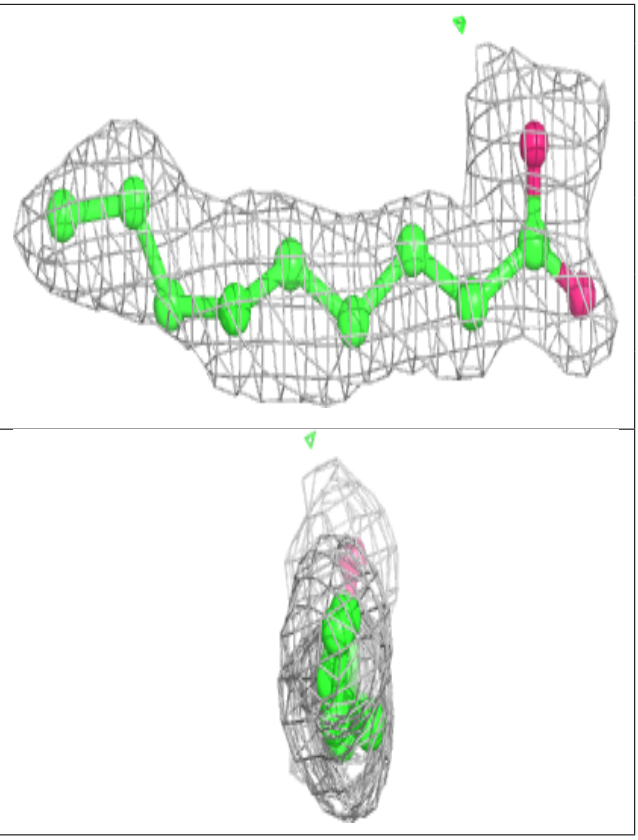
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	OLA	A	505	11/20	0.58	0.14	54,59,80,81	0
2	LFA	B	310	8/20	0.72	0.21	46,48,58,60	0
2	LFA	B	306	7/20	0.73	0.14	57,63,73,75	0
2	LFA	A	515	11/20	0.77	0.15	51,56,61,62	0
2	LFA	A	511	13/20	0.77	0.15	47,60,65,65	0
2	LFA	B	313	12/20	0.77	0.14	41,46,59,59	0
2	LFA	B	317	10/20	0.79	0.17	54,60,65,65	0
2	LFA	B	316	4/20	0.80	0.31	48,51,51,52	0
2	LFA	A	506	12/20	0.80	0.16	45,49,56,60	0
3	OLA	B	304	9/20	0.82	0.15	40,48,55,57	0
2	LFA	B	311	5/20	0.83	0.12	39,42,47,52	0
2	LFA	B	315	12/20	0.83	0.13	46,56,62,64	0
2	LFA	B	301	20/20	0.84	0.13	49,55,66,74	0
2	LFA	A	514	4/20	0.84	0.11	42,51,52,55	0
2	LFA	A	509	11/20	0.85	0.11	44,46,52,55	0
3	OLA	B	308	11/20	0.87	0.09	52,55,62,62	0
2	LFA	B	305	13/20	0.87	0.12	43,52,56,59	0
4	OLC	A	508	16/25	0.87	0.15	35,46,52,53	8
2	LFA	B	302	8/20	0.87	0.12	41,47,54,55	0
2	LFA	B	314	6/20	0.87	0.11	55,58,59,59	0
3	OLA	A	504	9/20	0.87	0.14	48,54,60,62	0
4	OLC	B	307	16/25	0.88	0.15	41,48,56,60	8
2	LFA	A	502	10/20	0.88	0.11	44,48,53,59	0
2	LFA	B	312	3/20	0.88	0.16	38,38,43,51	0
2	LFA	A	501	14/20	0.89	0.10	42,51,59,60	0
2	LFA	A	510	4/20	0.89	0.15	46,47,49,50	0
2	LFA	A	513	5/20	0.90	0.09	38,39,41,44	0
2	LFA	B	309	5/20	0.90	0.10	55,58,62,64	0
2	LFA	B	303	4/20	0.91	0.09	48,48,49,54	0
2	LFA	A	507	8/20	0.92	0.13	43,57,65,69	0
2	LFA	A	503	4/20	0.94	0.11	40,44,44,44	0
2	LFA	A	512	3/20	0.96	0.14	39,39,44,52	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.

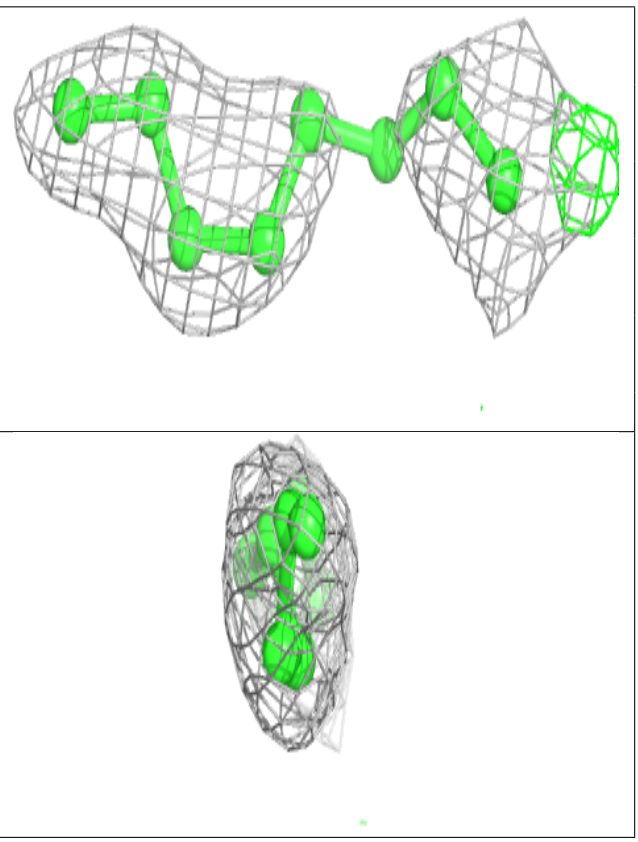
Electron density around OLA A 505:

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



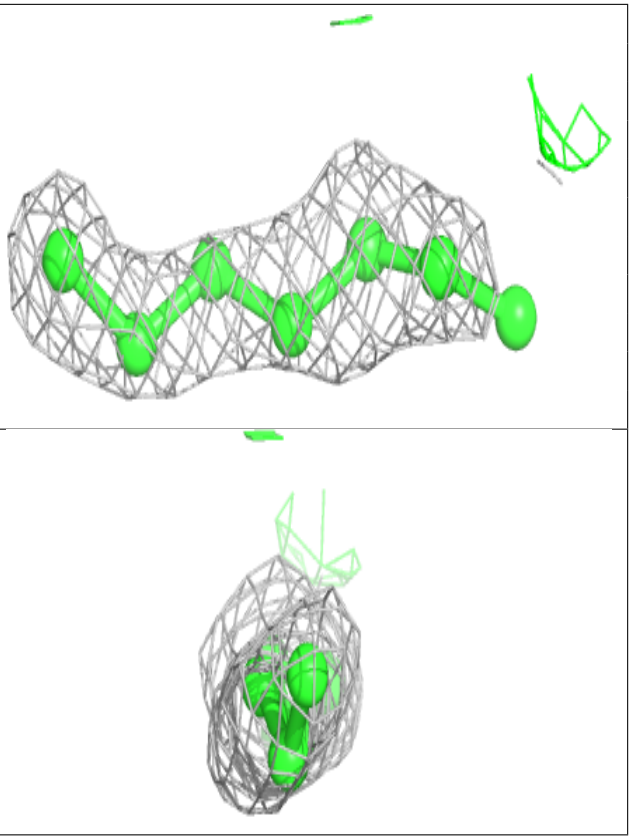
Electron density around LFA B 310:

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



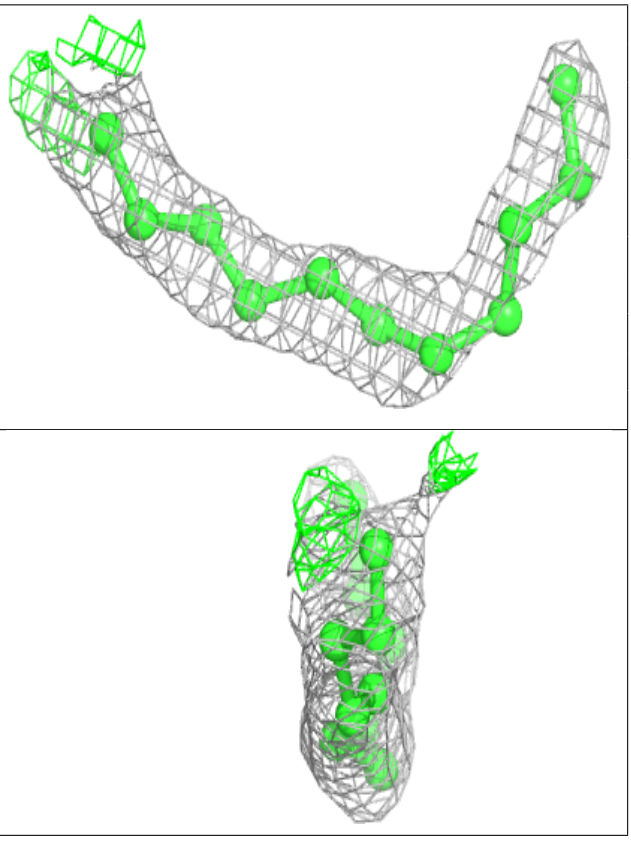
Electron density around LFA B 306:

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



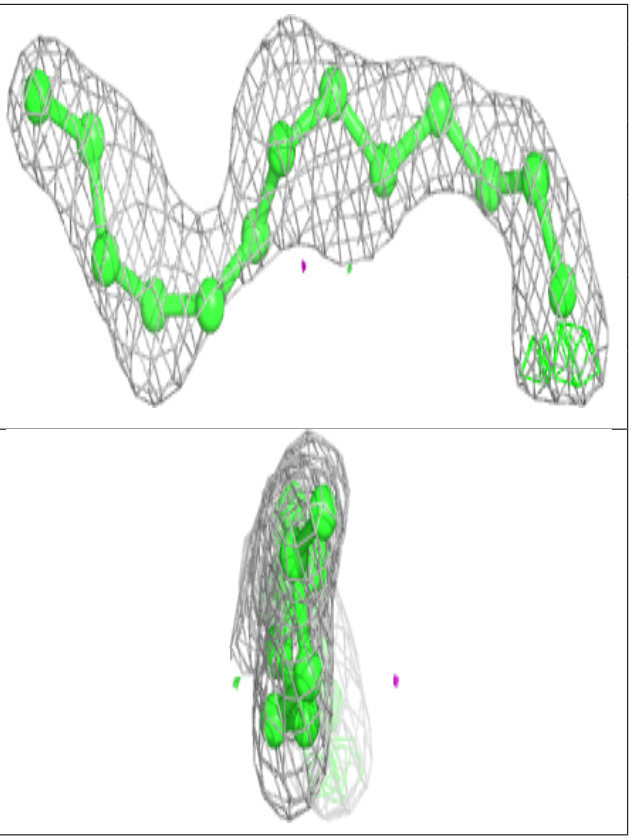
Electron density around LFA A 515:

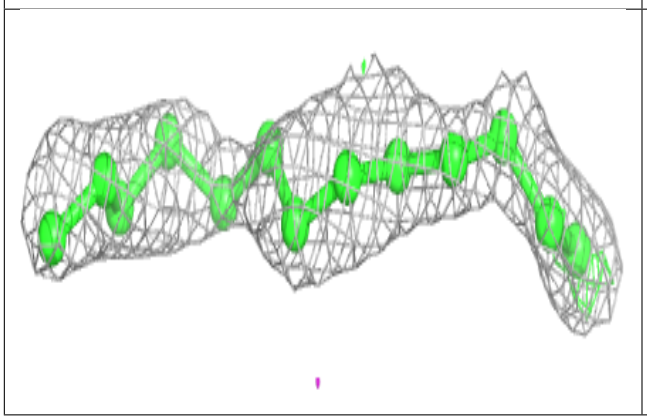
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around LFA A 511:

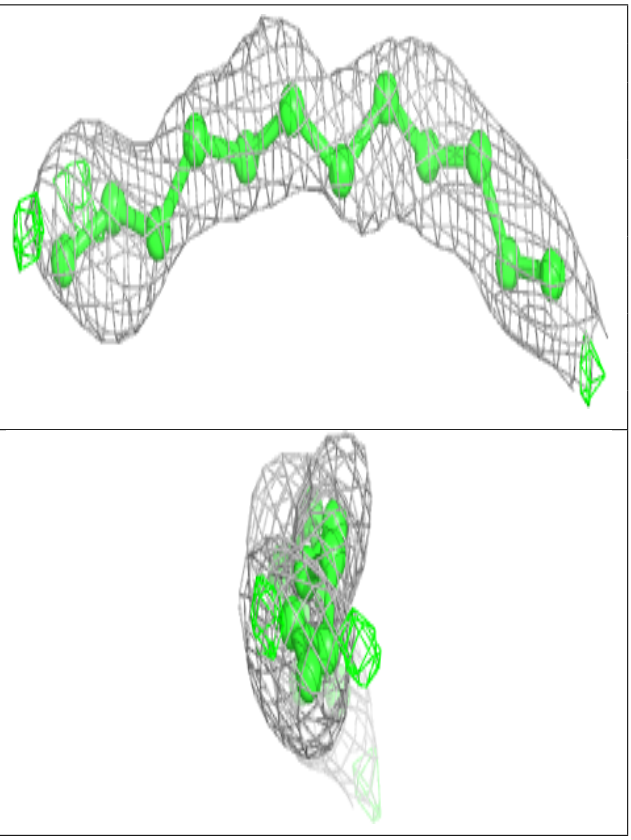
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

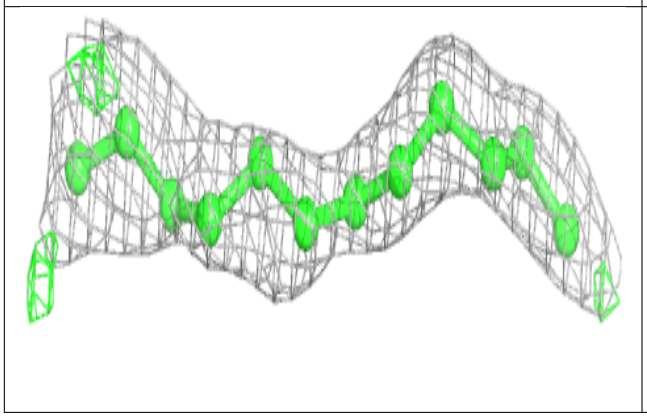




Electron density around LFA B 313:

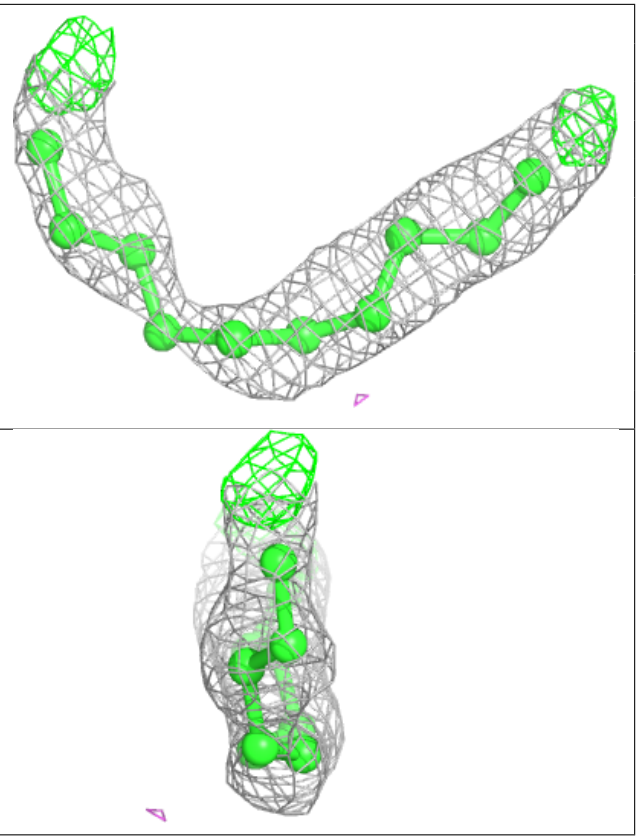
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

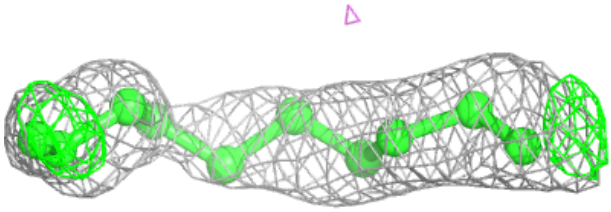




Electron density around LFA B 317:

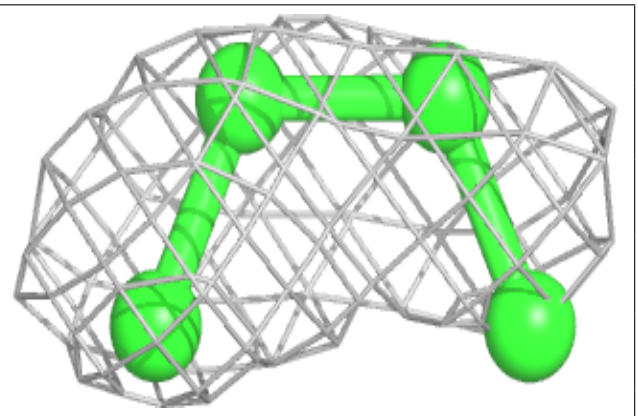
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

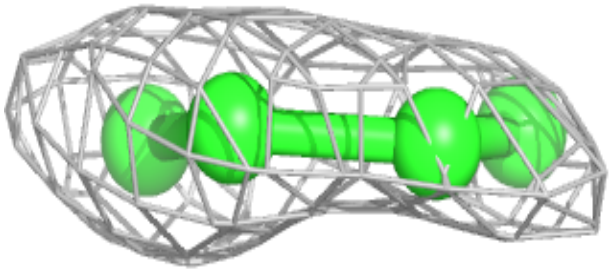


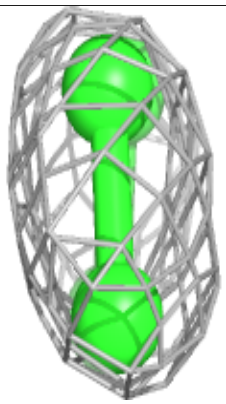


Electron density around LFA B 316:

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

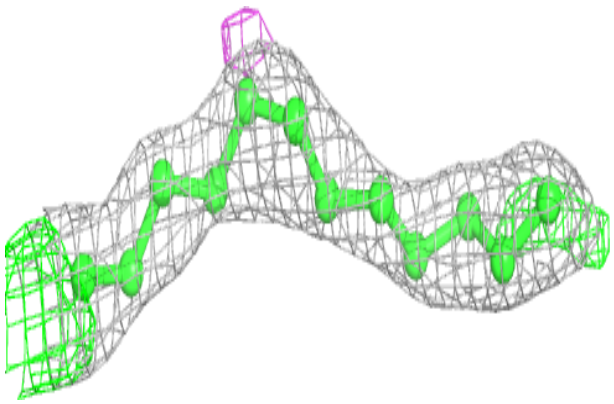


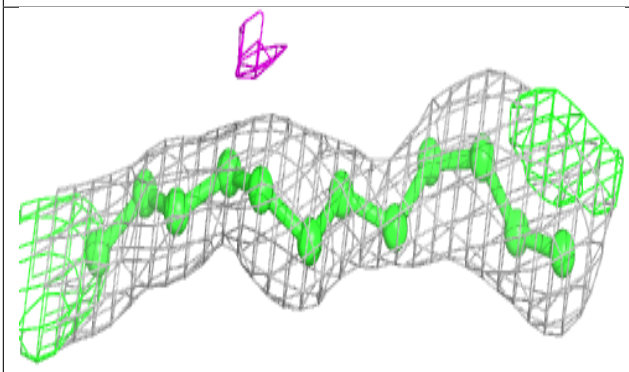


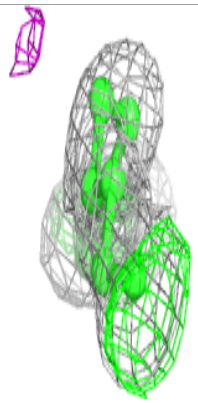


Electron density around LFA A 506:

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

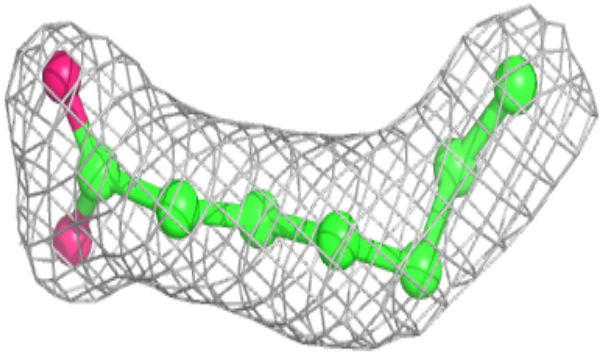


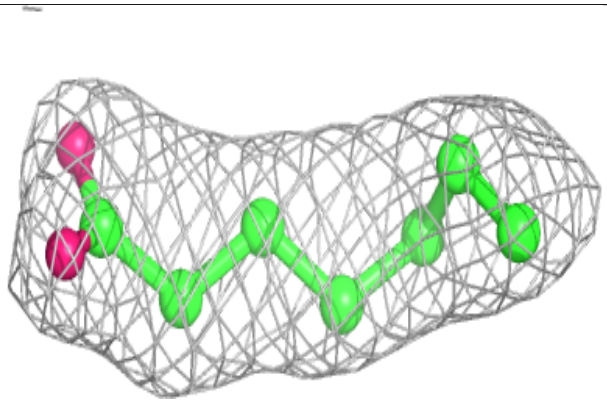


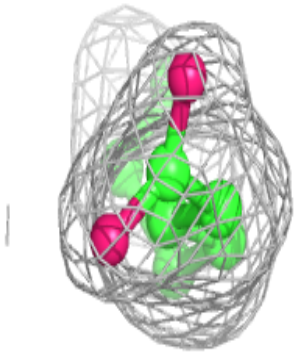


Electron density around OLA B 304:

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

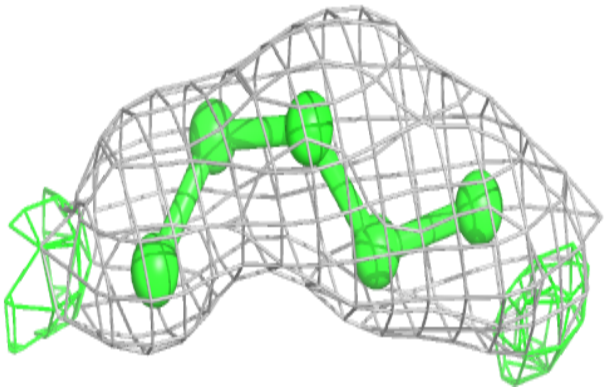


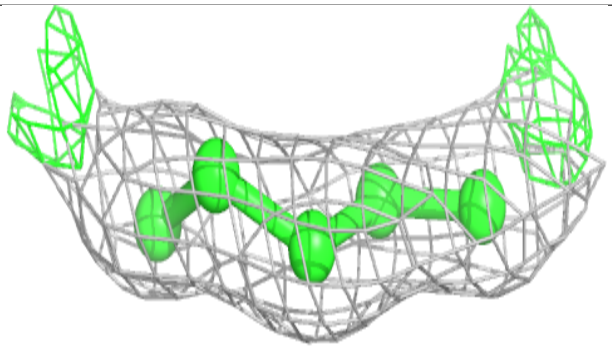


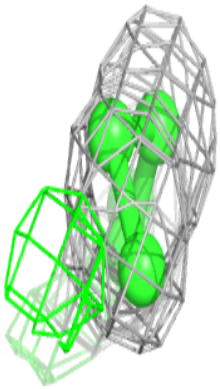


Electron density around LFA B 311:

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

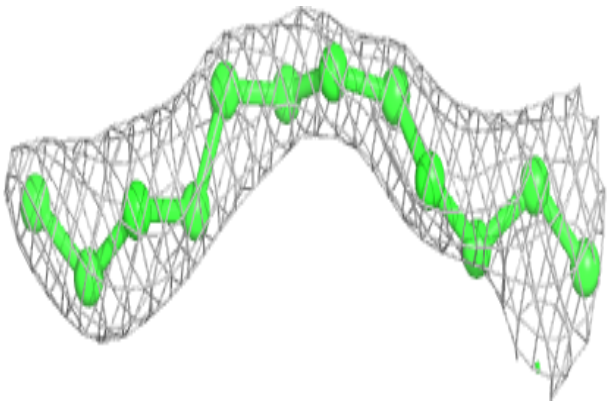


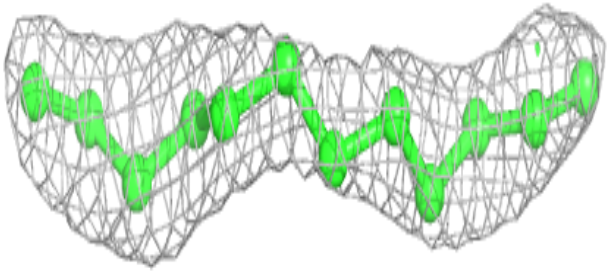


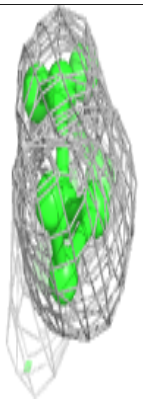


Electron density around LFA B 315:

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

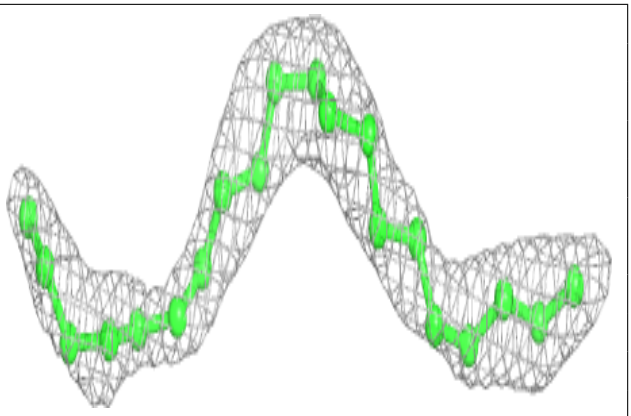


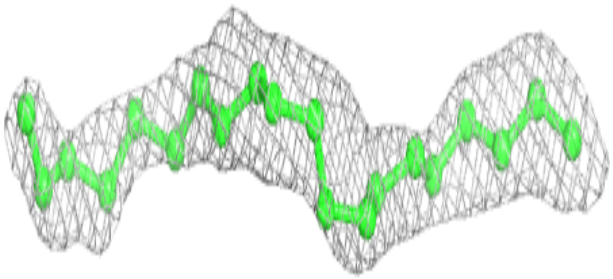


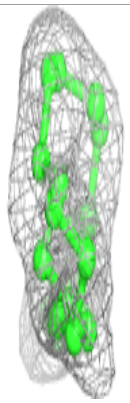


Electron density around LFA B 301:

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

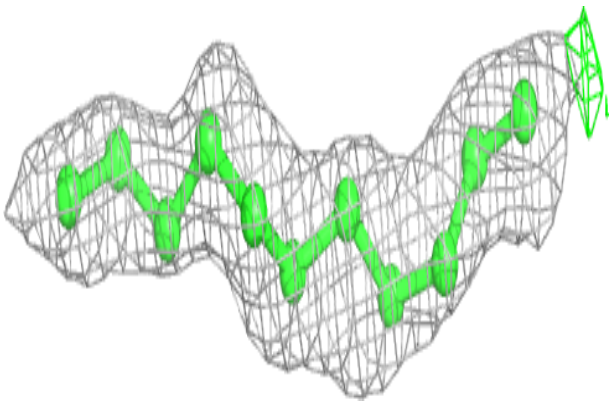


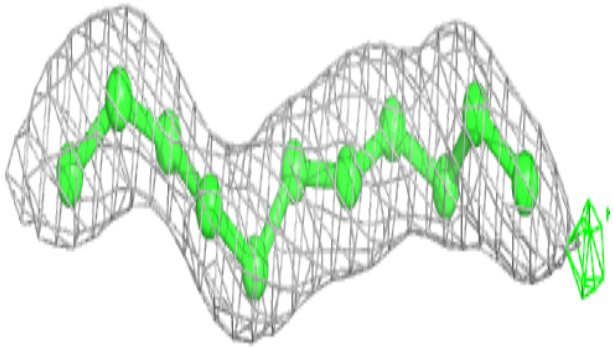


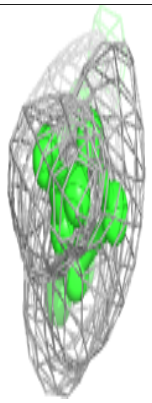


Electron density around LFA A 509:

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

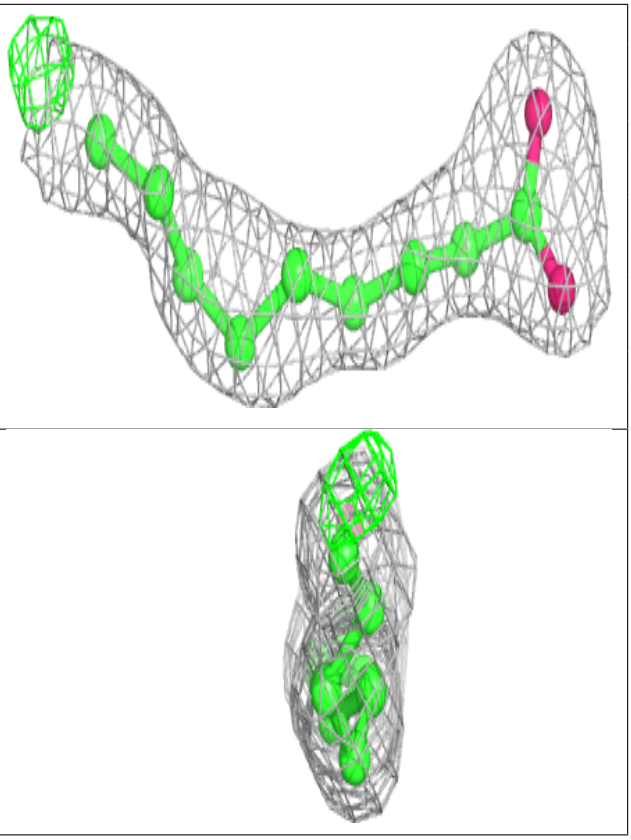


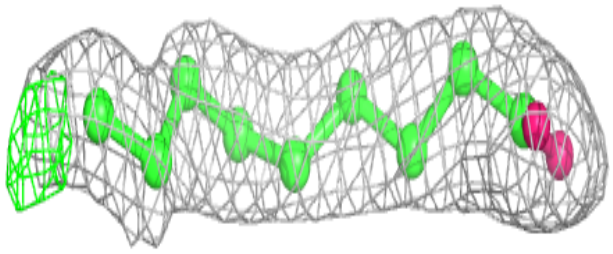




Electron density around OLA B 308:

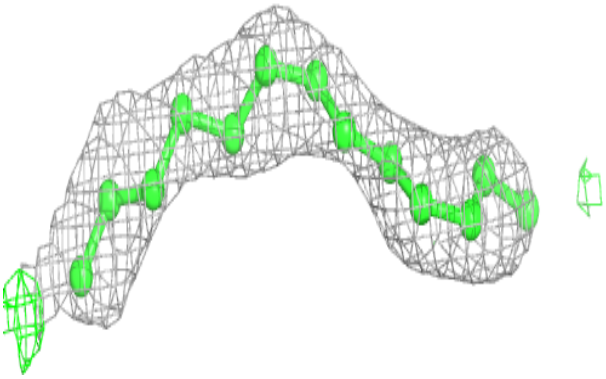
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

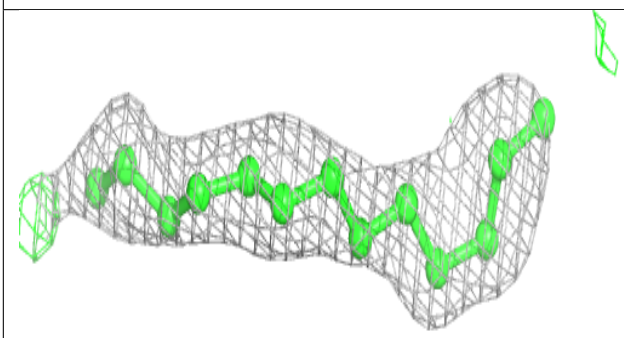


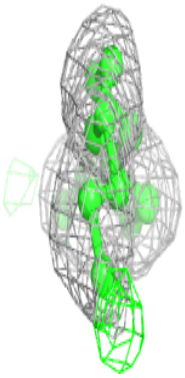


Electron density around LFA B 305:

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

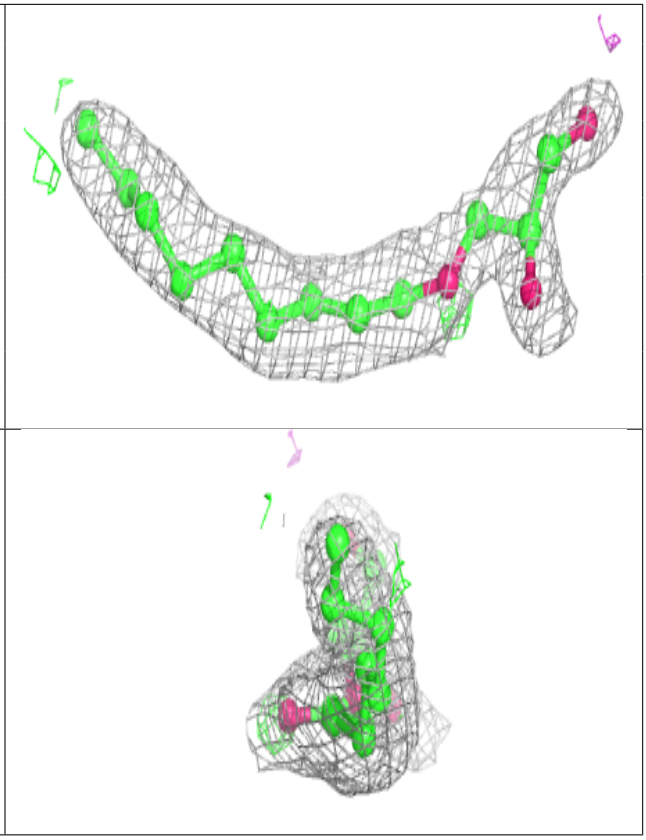






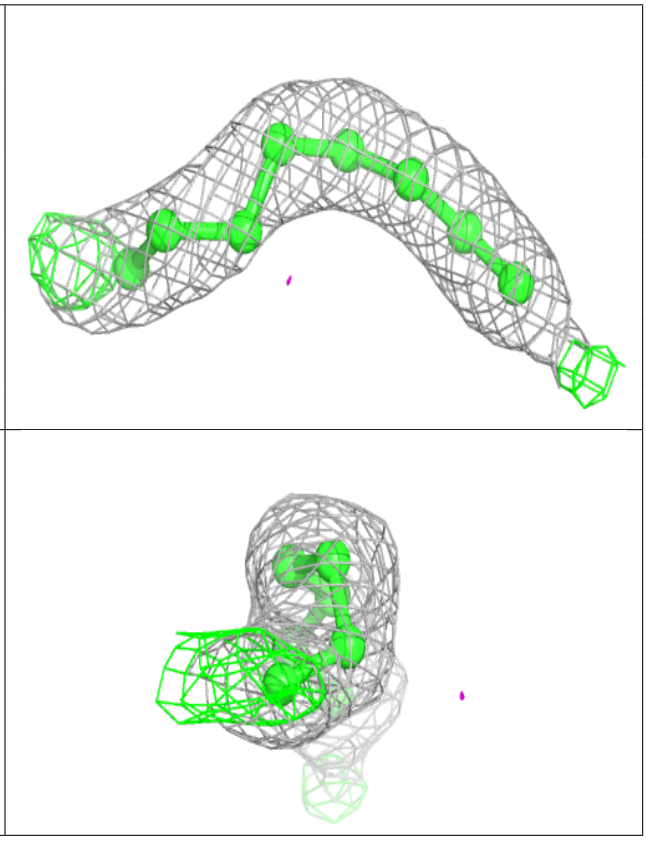
Electron density around OLC A 508:

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



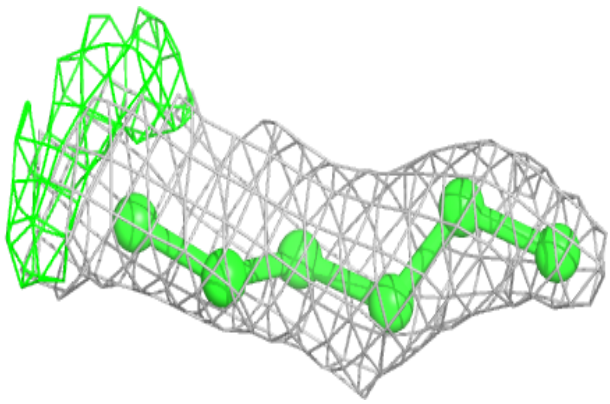
Electron density around LFA B 302:

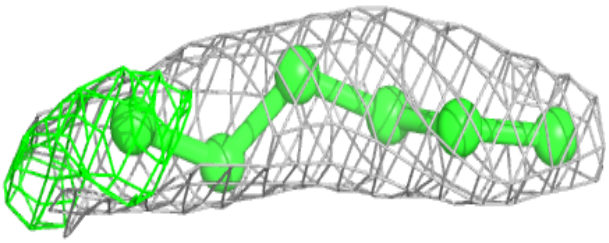
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

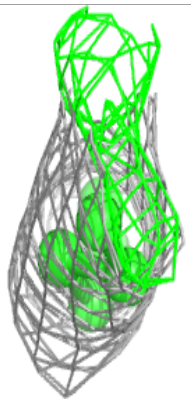


Electron density around LFA B 314:

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

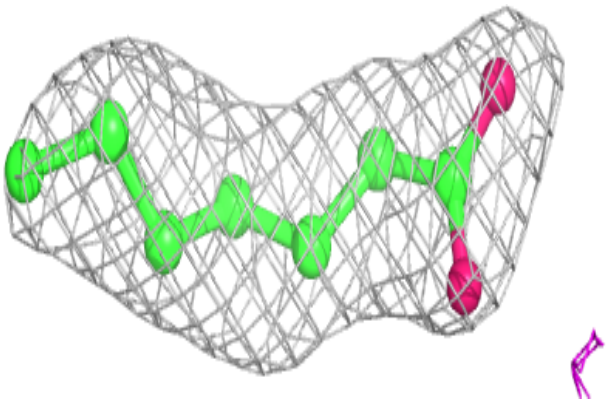


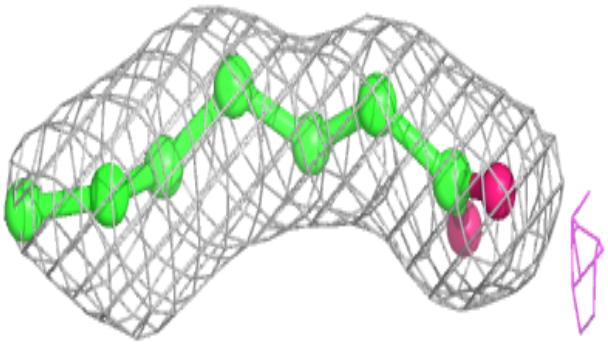


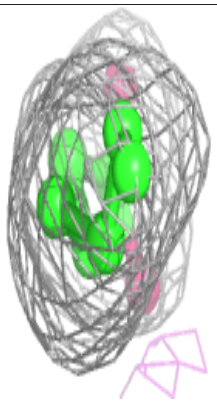


Electron density around OLA A 504:

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

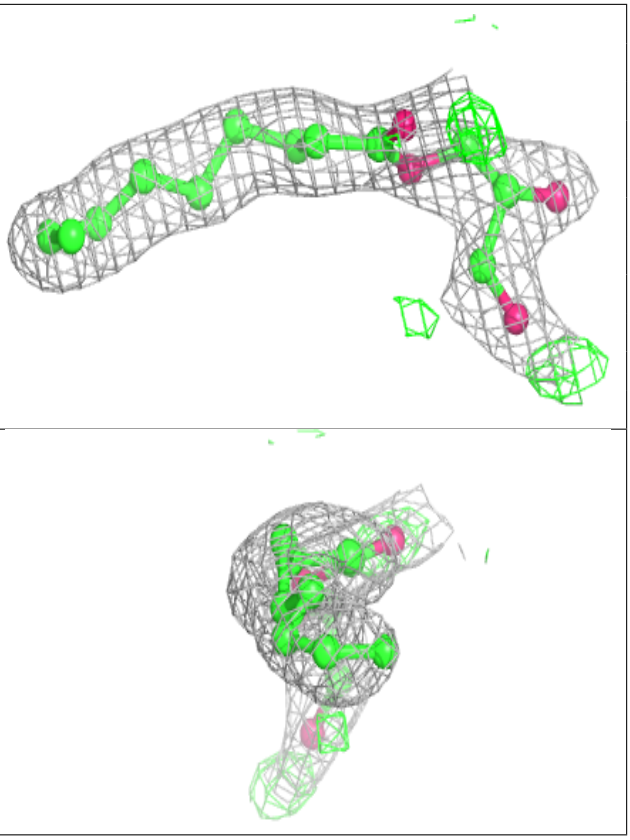


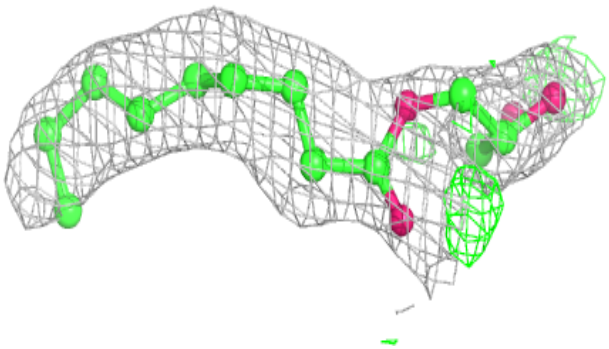




Electron density around OLC B 307:

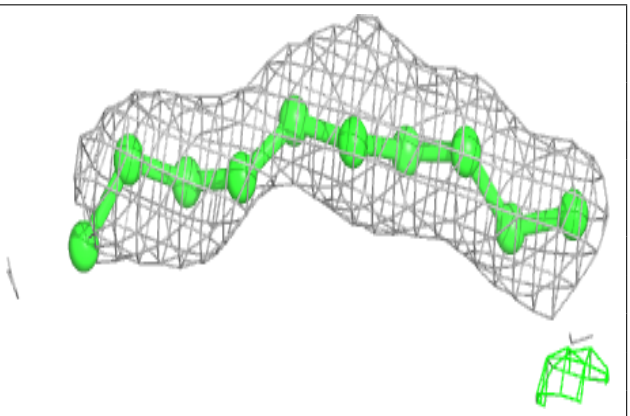
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

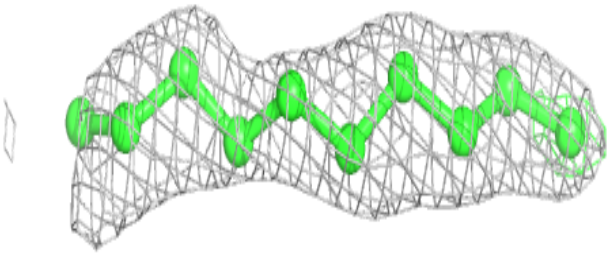


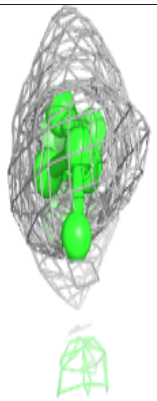


Electron density around LFA A 502:

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

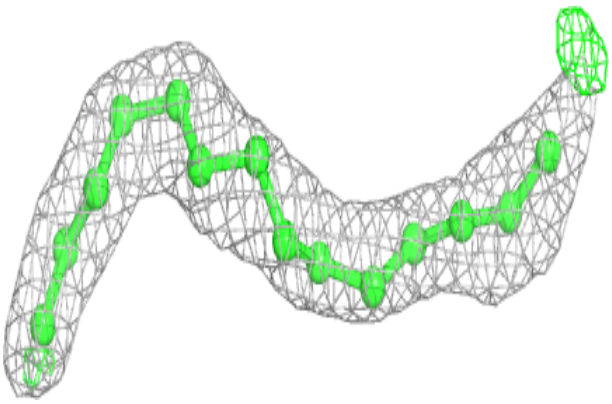


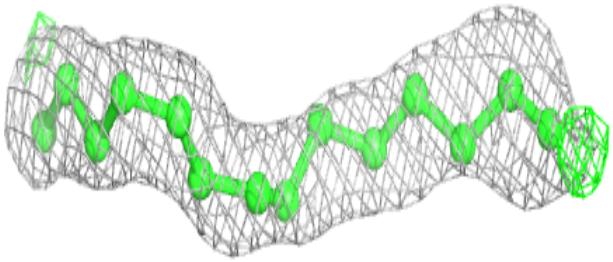


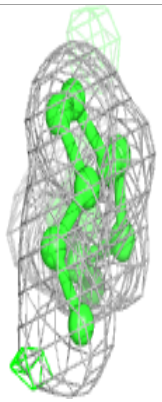


Electron density around LFA A 501:

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

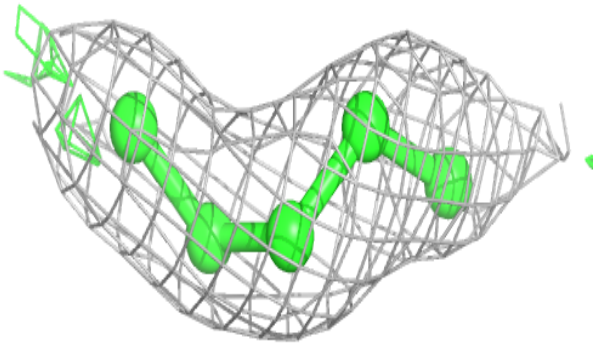


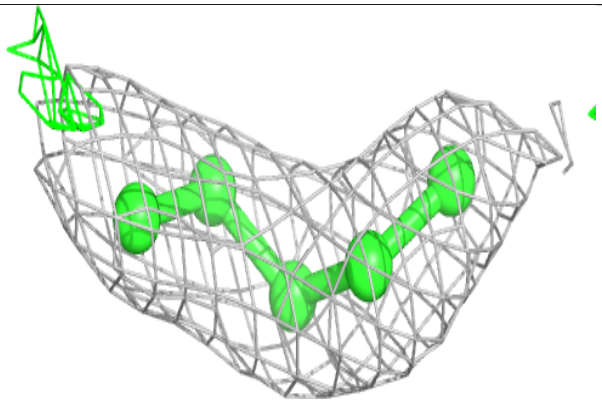


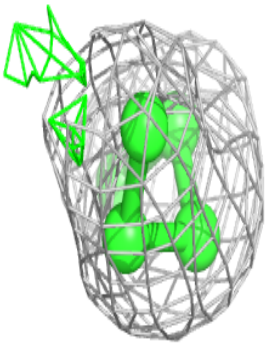


Electron density around LFA A 513:

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

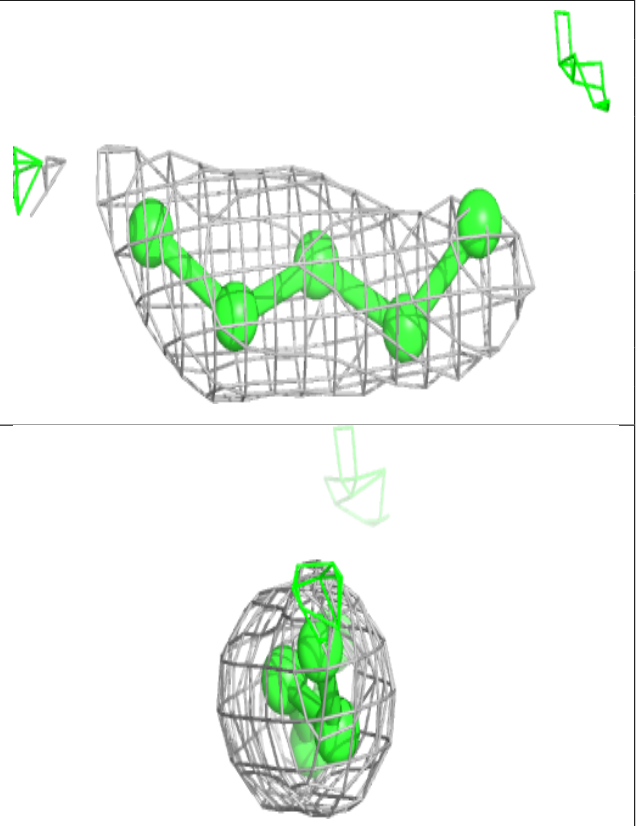


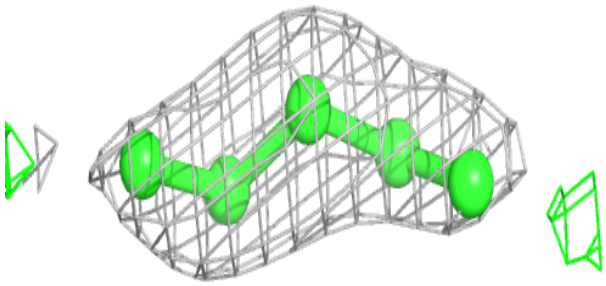




Electron density around LFA B 309:

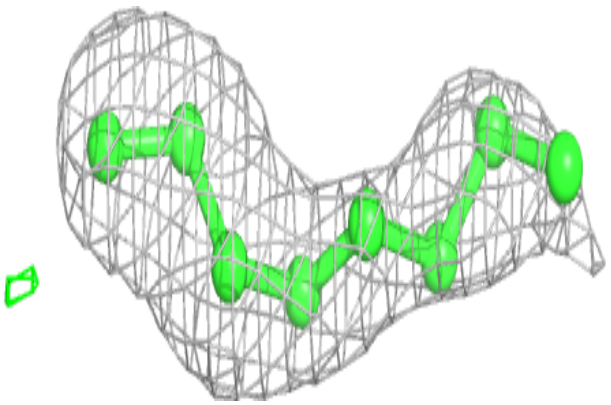
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

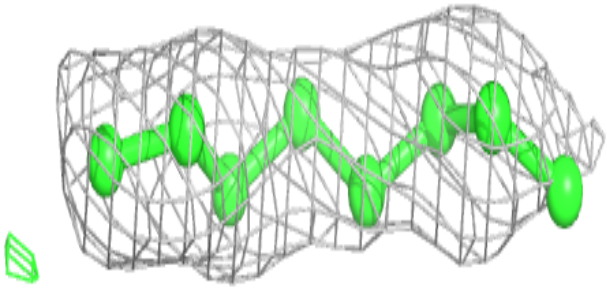


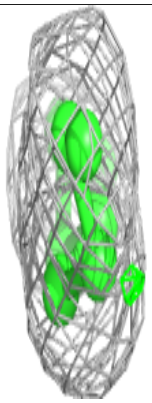


Electron density around LFA A 507:

$2mF_o$-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.