



# Full wwPDB X-ray Structure Validation Report ⓘ

May 14, 2020 – 12:19 pm BST

PDB ID : 4FA7  
Title : Structure of Recombinant Cytochrome ba3 Oxidase mutant A204F from *Thermus thermophilus*  
Authors : Li, Y.; Chen, Y.; Stout, C.D.  
Deposited on : 2012-05-21  
Resolution : 2.50 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

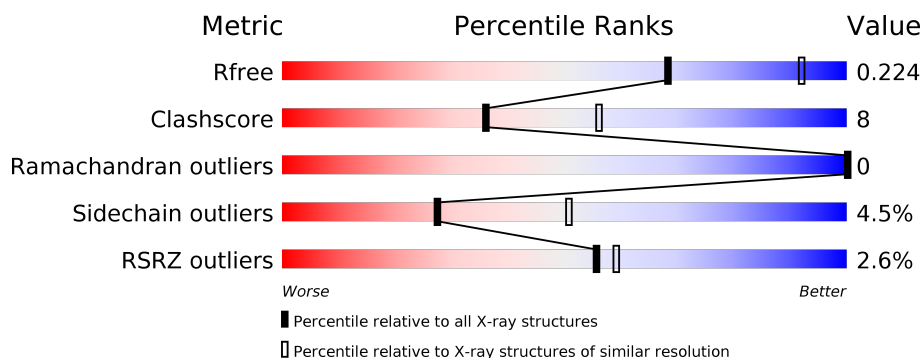
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	568	<div> <div>2%</div> <div> <div></div> <div>79%</div> <div>16%</div> <div>• •</div> </div> </div>
2	B	168	<div> <div>4%</div> <div> <div></div> <div>88%</div> <div>11%</div> <div>• •</div> </div> </div>
3	C	34	<div> <div></div> <div> <div>62%</div> <div>26%</div> <div>•</div> <div>9%</div> </div> </div>

## 2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 6393 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 Cytochrome c oxidase subunit 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	546	Total	C	N	O	S	1	0	0
			4298	2924	684	674	16			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-5	MET	-	EXPRESSION TAG	UNP Q5SJ79
A	-4	HIS	-	EXPRESSION TAG	UNP Q5SJ79
A	-3	HIS	-	EXPRESSION TAG	UNP Q5SJ79
A	-2	HIS	-	EXPRESSION TAG	UNP Q5SJ79
A	-1	HIS	-	EXPRESSION TAG	UNP Q5SJ79
A	0	HIS	-	EXPRESSION TAG	UNP Q5SJ79
A	1	HIS	-	EXPRESSION TAG	UNP Q5SJ79
A	204	PHE	ALA	ENGINEERED MUTATION	UNP Q5SJ79

- Molecule 2 is a protein called Cytochrome c oxidase subunit 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	166	Total	C	N	O	S	0	0	0
			1289	838	213	234	4			

- Molecule 3 is a protein called Cytochrome c oxidase polypeptide 2A.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	31	Total	C	N	O	0	0	0
			241	169	37	35			

- Molecule 4 is COPPER (II) ION (three-letter code: CU) (formula: Cu).

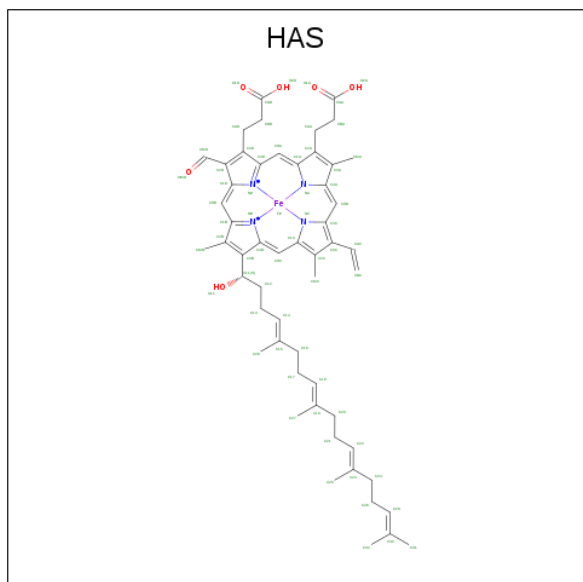
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Cu	0	0
			1	1		

- Molecule 5 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula:  $C_{34}H_{32}FeN_4O_4$ ).



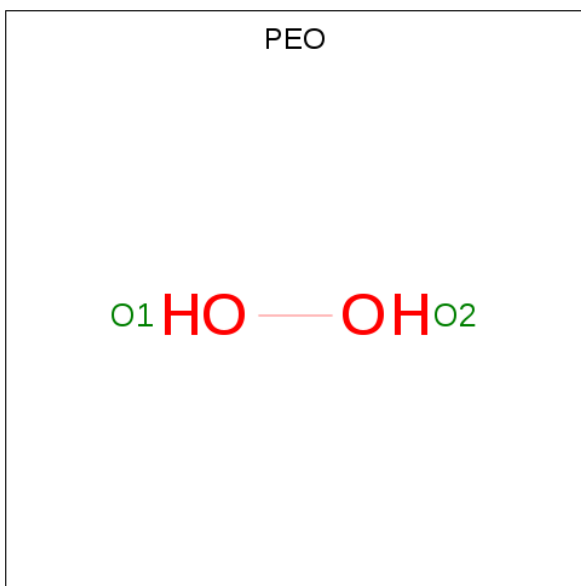
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 6 is HEME-AS (three-letter code: HAS) (formula:  $C_{54}H_{64}FeN_4O_6$ ).



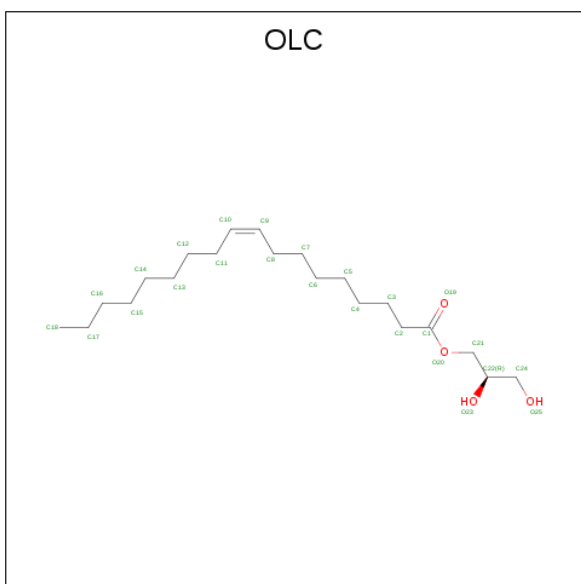
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	Fe	N	O	0	0
			65	54	1	4	6		

- Molecule 7 is HYDROGEN PEROXIDE (three-letter code: PEO) (formula:  $\text{H}_2\text{O}_2$ ).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	O	0	0
			2	2		

- Molecule 8 is (2R)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (three-letter code: OLC) (formula:  $\text{C}_{21}\text{H}_{40}\text{O}_4$ ).



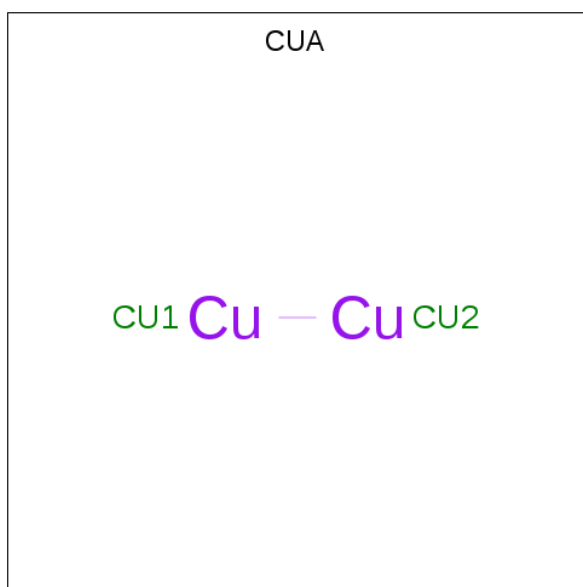
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	C	O	0	0
			25	21	4		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	C	O	0	0
			25	21	4		
8	A	1	Total	C	O	0	0
			23	19	4		
8	A	1	Total	C	O	0	0
			21	19	2		
8	A	1	Total	C	O	0	0
			18	14	4		
8	A	1	Total	C	O	0	0
			17	13	4		
8	A	1	Total	C	O	0	0
			8	4	4		
8	A	1	Total	C	O	0	0
			15	11	4		
8	A	1	Total	C	O	0	0
			20	16	4		
8	A	1	Total	C	O	0	0
			25	21	4		
8	A	1	Total	C	O	0	0
			21	17	4		
8	A	1	Total	C	O	0	0
			25	21	4		
8	B	1	Total	C	O	0	0
			25	21	4		
8	B	1	Total	C	O	0	0
			25	21	4		
8	B	1	Total	C	O	0	0
			25	21	4		
8	C	1	Total	C	O	0	0
			25	21	4		

- Molecule 9 is DINUCLEAR COPPER ION (three-letter code: CUA) (formula: Cu<sub>2</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	B	1	Total Cu 2 2	0	0

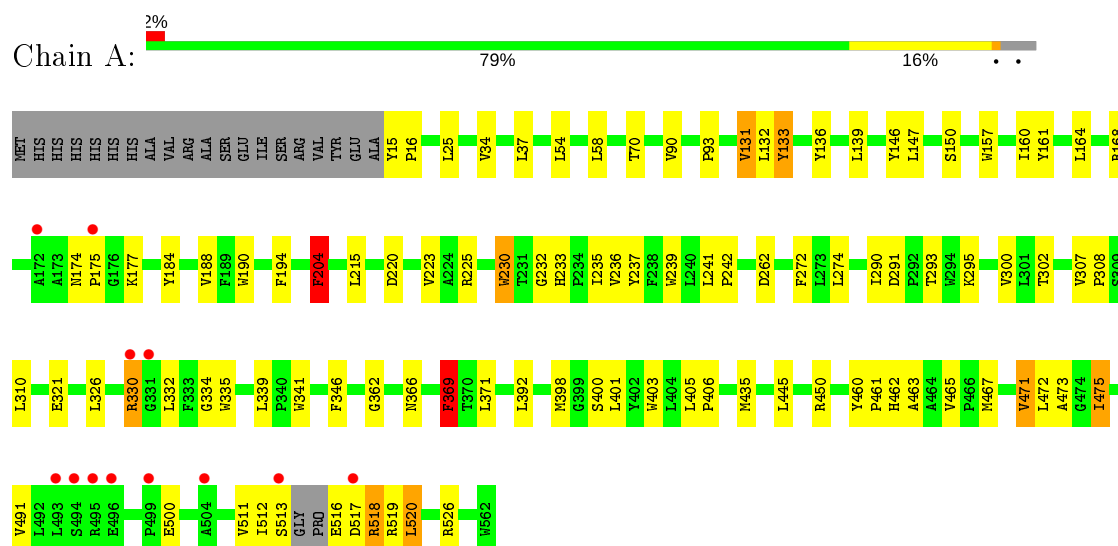
- Molecule 10 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	69	Total O 69 69	0	0
10	B	38	Total O 38 38	0	0
10	C	2	Total O 2 2	0	0

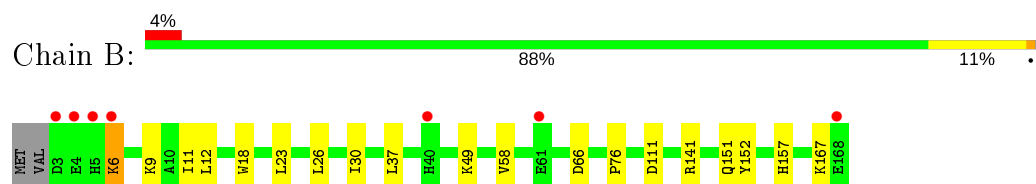
### 3 Residue-property plots [i](#)

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

#### • Molecule 1: Cytochrome c oxidase subunit 1



#### • Molecule 2: Cytochrome c oxidase subunit 2



#### • Molecule 3: Cytochrome c oxidase polypeptide 2A





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	143.55Å 98.21Å 94.86Å 90.00° 127.92° 90.00°	Depositor
Resolution (Å)	74.83 – 2.50 19.98 – 2.50	Depositor EDS
% Data completeness (in resolution range)	98.3 (74.83-2.50) 98.6 (19.98-2.50)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.40 (at 2.50Å)	Xtriage
Refinement program	REFMAC 5.5.0110	Depositor
R, $R_{free}$	0.169 , 0.220 0.173 , 0.224	Depositor DCC
$R_{free}$ test set	1767 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	25.9	Xtriage
Anisotropy	0.176	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 56.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	6393	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.33% of the height of the origin peak. No significant pseudotranslation is detected.*

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

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

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: OLC, PEO, CUA, HEM, HAS, CU

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	2.41	8/4453 (0.2%)	1.09	9/6115 (0.1%)
2	B	1.09	0/1325	0.88	1/1810 (0.1%)
3	C	1.15	0/247	1.03	2/335 (0.6%)
All	All	2.15	8/6025 (0.1%)	1.05	12/8260 (0.1%)

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	330	ARG	CZ-NH1	110.97	2.77	1.33
1	A	330	ARG	NE-CZ	72.61	2.27	1.33
1	A	330	ARG	CZ-NH2	-57.27	0.58	1.33
1	A	204	PHE	CB-CG	-7.94	1.37	1.51
1	A	133	TYR	CD1-CE1	-6.90	1.28	1.39
1	A	471	VAL	CB-CG1	6.13	1.65	1.52
1	A	133	TYR	CD2-CE2	-5.86	1.30	1.39
1	A	475	ILE	CA-CB	5.25	1.67	1.54

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	330	ARG	NE-CZ-NH2	30.65	135.62	120.30
1	A	330	ARG	NE-CZ-NH1	-27.43	106.58	120.30
1	A	330	ARG	CD-NE-CZ	-22.41	92.22	123.60
1	A	25	LEU	CB-CG-CD1	-7.85	97.66	111.00
1	A	131	VAL	CB-CA-C	7.65	125.94	111.40
1	A	369	PHE	N-CA-CB	-7.22	97.60	110.60
3	C	13	LEU	CA-CB-CG	6.62	130.53	115.30
1	A	131	VAL	N-CA-C	-5.71	95.58	111.00
3	C	20	LEU	CA-CB-CG	5.33	127.56	115.30
1	A	520	LEU	CB-CG-CD2	5.30	120.02	111.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	392	LEU	CA-CB-CG	5.00	126.80	115.30
2	B	66	ASP	CB-CG-OD2	-5.00	113.80	118.30

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	4298	0	4391	75	0
2	B	1289	0	1264	11	0
3	C	241	0	267	6	0
4	A	1	0	0	0	0
5	A	43	0	30	4	0
6	A	65	0	62	3	0
7	A	2	0	0	0	0
8	A	243	0	353	23	0
8	B	75	0	120	3	0
8	C	25	0	40	2	0
9	B	2	0	0	0	0
10	A	69	0	0	3	0
10	B	38	0	0	4	1
10	C	2	0	0	0	0
All	All	6393	0	6527	103	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 8.

All (103) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:233:HIS:NE2	1:A:237:TYR:CE2	1.70	1.56
1:A:233:HIS:NE2	1:A:237:TYR:HE2	0.77	1.25
1:A:233:HIS:CE1	1:A:237:TYR:HE2	1.83	0.96
1:A:233:HIS:CD2	1:A:237:TYR:HE2	1.86	0.92

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:168:ARG:HH22	8:A:612:OLC:H6A	1.32	0.92
5:A:602:HEM:HBC2	5:A:602:HEM:HMC1	1.57	0.84
1:A:233:HIS:CE1	1:A:237:TYR:CE2	2.63	0.82
8:A:606:OLC:C12	8:A:614:OLC:H14A	2.13	0.79
8:A:606:OLC:H12A	8:A:614:OLC:H14A	1.64	0.79
5:A:602:HEM:CMC	5:A:602:HEM:HBC2	2.14	0.77
1:A:161:TYR:CE2	8:A:611:OLC:H21	2.21	0.76
1:A:233:HIS:CD2	1:A:237:TYR:CE2	2.65	0.75
8:B:203:OLC:H6	3:C:33:ARG:HE	1.55	0.71
6:A:603:HAS:HBC1	6:A:603:HAS:HMC1	1.77	0.67
8:A:607:OLC:H13A	8:A:614:OLC:H12	1.79	0.65
1:A:465:VAL:HG22	8:A:613:OLC:H3A	1.77	0.65
2:B:6:LYS:O	10:B:338:HOH:O	2.14	0.65
1:A:321:GLU:HA	1:A:335:TRP:CE3	2.33	0.64
1:A:236:VAL:HG12	1:A:239:TRP:CZ3	2.34	0.62
1:A:131:VAL:O	1:A:132:LEU:HD23	2.00	0.61
3:C:4:LYS:HG3	3:C:6:LYS:HG2	1.81	0.61
8:A:606:OLC:H12	8:A:614:OLC:H14A	1.83	0.61
1:A:168:ARG:NH2	8:A:612:OLC:H6A	2.12	0.61
2:B:6:LYS:C	10:B:338:HOH:O	2.39	0.60
1:A:241:LEU:N	1:A:242:PRO:CD	2.64	0.60
1:A:168:ARG:HH22	8:A:612:OLC:C6	2.11	0.58
2:B:9:LYS:N	10:B:338:HOH:O	2.35	0.58
1:A:146:TYR:HB3	1:A:204:PHE:CE1	2.37	0.58
1:A:400:SER:HA	1:A:403:TRP:NE1	2.19	0.57
1:A:160:ILE:HD13	1:A:194:PHE:HB2	1.87	0.56
5:A:602:HEM:CB	5:A:602:HEM:HMC1	2.34	0.56
1:A:220:ASP:O	1:A:223:VAL:HG12	2.07	0.55
1:A:233:HIS:O	1:A:236:VAL:HG22	2.08	0.53
1:A:513:SER:HB3	10:A:739:HOH:O	2.07	0.53
1:A:34:VAL:HA	1:A:37:LEU:HD12	1.91	0.53
1:A:398:MET:O	1:A:401:LEU:HB2	2.09	0.53
8:A:607:OLC:H13	8:A:613:OLC:H12	1.91	0.53
8:A:607:OLC:H13A	8:A:614:OLC:C12	2.39	0.52
1:A:463:ALA:O	1:A:467:MET:HG3	2.09	0.52
1:A:300:VAL:HG22	2:B:30:ILE:HD13	1.93	0.51
8:A:607:OLC:H15	8:A:613:OLC:H12	1.94	0.50
1:A:174:ASN:N	1:A:175:PRO:HD3	2.26	0.50
1:A:369:PHE:CD2	1:A:369:PHE:C	2.85	0.50
1:A:405:LEU:HD23	1:A:491:VAL:HG11	1.93	0.50
1:A:174:ASN:HB3	1:A:177:LYS:HD2	1.93	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:369:PHE:C	1:A:369:PHE:HD2	2.16	0.49
8:A:607:OLC:H14A	8:A:614:OLC:H12A	1.95	0.49
1:A:341:TRP:HB3	8:A:607:OLC:H24A	1.95	0.48
1:A:147:LEU:O	1:A:150:SER:HB2	2.12	0.48
1:A:291:ASP:OD2	1:A:293:THR:HB	2.13	0.48
1:A:366:ASN:HB3	6:A:603:HAS:HBD2	1.95	0.48
1:A:341:TRP:CE2	8:A:616:OLC:H3	2.48	0.48
1:A:445:LEU:HD13	1:A:462:HIS:O	2.13	0.48
1:A:15:TYR:N	1:A:16:PRO:CD	2.77	0.48
1:A:341:TRP:CZ2	8:A:616:OLC:H3	2.48	0.48
5:A:602:HEM:CBC	5:A:602:HEM:CMC	2.91	0.47
1:A:146:TYR:O	1:A:204:PHE:HE1	1.98	0.47
1:A:168:ARG:HD2	8:A:611:OLC:O23	2.14	0.47
1:A:70:THR:OG1	1:A:131:VAL:O	2.25	0.47
1:A:168:ARG:HH11	8:A:611:OLC:C22	2.29	0.46
1:A:160:ILE:HG12	1:A:190:TRP:HB3	1.98	0.46
1:A:511:VAL:HG12	1:A:512:ILE:O	2.16	0.46
8:A:605:OLC:H10	8:C:101:OLC:H8	1.97	0.45
1:A:184:TYR:O	1:A:188:VAL:HG13	2.16	0.45
1:A:220:ASP:HB3	1:A:223:VAL:HG12	1.98	0.45
1:A:435:MET:HB2	1:A:473:ALA:HB1	1.99	0.45
2:B:18:TRP:CE3	3:C:12:ILE:HD13	2.52	0.45
1:A:146:TYR:O	1:A:204:PHE:CE1	2.69	0.45
1:A:405:LEU:HB3	1:A:406:PRO:HD3	1.99	0.44
1:A:516:GLU:O	1:A:517:ASP:C	2.55	0.44
1:A:136:TYR:O	1:A:139:LEU:HB2	2.18	0.44
1:A:450:ARG:O	2:B:157:HIS:CD2	2.70	0.44
1:A:472:LEU:HD22	8:A:614:OLC:H11	1.99	0.43
1:A:405:LEU:HD23	1:A:491:VAL:CG1	2.48	0.43
8:A:614:OLC:C9	8:A:614:OLC:H13A	2.47	0.43
1:A:471:VAL:HG11	8:A:614:OLC:H4	2.00	0.43
1:A:233:HIS:C	1:A:233:HIS:CD2	2.92	0.43
1:A:157:TRP:HA	1:A:160:ILE:HD12	2.00	0.43
1:A:272:PHE:CE1	1:A:308:PRO:HB2	2.54	0.43
1:A:460:TYR:N	1:A:461:PRO:CD	2.82	0.43
1:A:307:VAL:HA	1:A:310:LEU:HD12	2.01	0.43
1:A:371:LEU:HD21	3:C:27:TYR:HD1	1.83	0.43
1:A:225:ARG:HG3	10:A:752:HOH:O	2.18	0.42
8:B:203:OLC:C6	3:C:33:ARG:HE	2.27	0.42
1:A:330:ARG:O	1:A:334:GLY:HA3	2.19	0.42
2:B:141:ARG:HH12	8:B:203:OLC:H22	1.84	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:151:GLN:O	2:B:152:TYR:C	2.58	0.42
1:A:232:GLY:O	1:A:235:ILE:HG22	2.20	0.42
1:A:90:VAL:O	1:A:93:PRO:HG2	2.20	0.42
2:B:11:ILE:HA	3:C:5:PRO:HG3	2.01	0.41
1:A:34:VAL:HA	1:A:37:LEU:CD1	2.50	0.41
2:B:23:LEU:HD12	2:B:23:LEU:HA	1.91	0.41
1:A:146:TYR:HB3	1:A:204:PHE:HE1	1.82	0.41
2:B:76:PRO:HD2	10:B:317:HOH:O	2.20	0.41
1:A:230:TRP:C	1:A:230:TRP:CD1	2.94	0.41
1:A:518:ARG:O	1:A:519:ARG:C	2.58	0.41
1:A:362:GLY:HA3	10:A:713:HOH:O	2.20	0.41
8:C:101:OLC:H4A	8:C:101:OLC:H7A	1.99	0.41
1:A:168:ARG:NH1	8:A:611:OLC:O20	2.54	0.40
1:A:339:LEU:HB3	1:A:346:PHE:CZ	2.56	0.40
1:A:302:THR:HG22	6:A:603:HAS:HMB2	2.03	0.40
1:A:164:LEU:HD23	1:A:164:LEU:HA	1.93	0.40
1:A:290:ILE:HB	1:A:295:LYS:HE3	2.02	0.40

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
10:B:327:HOH:O	10:B:327:HOH:O[2_556]	2.00	0.20

## 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	542/568 (95%)	518 (96%)	24 (4%)	0	100	100
2	B	164/168 (98%)	161 (98%)	3 (2%)	0	100	100
3	C	29/34 (85%)	29 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	735/770 (96%)	708 (96%)	27 (4%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	438/463 (95%)	422 (96%)	16 (4%)	34	60
2	B	134/138 (97%)	126 (94%)	8 (6%)	19	37
3	C	24/27 (89%)	21 (88%)	3 (12%)	4	8
All	All	596/628 (95%)	569 (96%)	27 (4%)	27	51

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	54	LEU
1	A	58	LEU
1	A	133	TYR
1	A	204	PHE
1	A	215	LEU
1	A	230	TRP
1	A	262	ASP
1	A	274	LEU
1	A	326	LEU
1	A	332	LEU
1	A	369	PHE
1	A	475	ILE
1	A	500	GLU
1	A	518	ARG
1	A	520	LEU
1	A	526	ARG
2	B	6	LYS
2	B	12	LEU

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Mol	Chain	Res	Type
2	B	26	LEU
2	B	37	LEU
2	B	49	LYS
2	B	58	VAL
2	B	111	ASP
2	B	167	LYS
3	C	17	LEU
3	C	20	LEU
3	C	24	LEU

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

Mol	Chain	Res	Type
1	A	254	GLN
1	A	446	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 21 ligands modelled in this entry, 1 is monoatomic - leaving 20 for Mogul analysis.

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



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
8	OLC	A	613	-	19,19,24	1.19	1 (5%)	20,20,25	1.25	3 (15%)
8	OLC	A	607	-	22,22,24	1.04	1 (4%)	23,23,25	1.23	4 (17%)
6	HAS	A	603	1,7	56,72,72	4.05	19 (33%)	50,109,109	3.17	19 (38%)
9	CUA	B	201	2	0,1,1	0.00	-	-		
8	OLC	B	204	-	24,24,24	1.02	1 (4%)	25,25,25	0.98	3 (12%)
8	OLC	A	616	-	24,24,24	1.05	1 (4%)	25,25,25	1.19	2 (8%)
5	HEM	A	602	1	27,50,50	2.12	10 (37%)	17,82,82	1.86	5 (29%)
8	OLC	A	609	-	17,17,24	1.25	1 (5%)	18,18,25	1.21	2 (11%)
8	OLC	A	615	-	20,20,24	1.24	1 (5%)	21,21,25	0.96	2 (9%)
8	OLC	A	612	-	14,14,24	1.28	1 (7%)	15,15,25	1.36	2 (13%)
8	OLC	B	203	-	24,24,24	1.23	1 (4%)	25,25,25	1.19	3 (12%)
8	OLC	A	611	-	7,7,24	1.27	1 (14%)	6,7,25	0.83	0
8	OLC	A	606	-	24,24,24	1.02	1 (4%)	25,25,25	1.28	3 (12%)
8	OLC	A	614	-	24,24,24	1.12	1 (4%)	25,25,25	1.21	3 (12%)
8	OLC	A	605	-	24,24,24	1.11	1 (4%)	25,25,25	0.99	2 (8%)
7	PEO	A	604	4,6	1,1,1	0.67	0	-		
8	OLC	B	202	-	24,24,24	1.23	1 (4%)	25,25,25	1.08	2 (8%)
8	OLC	A	610	-	16,16,24	1.41	1 (6%)	17,17,25	1.10	2 (11%)
8	OLC	C	101	-	24,24,24	1.06	1 (4%)	25,25,25	1.13	2 (8%)
8	OLC	A	608	-	20,20,24	1.24	1 (5%)	20,20,25	1.20	3 (15%)

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
8	OLC	B	203	-	-	13/24/24/24	-
8	OLC	A	607	-	-	10/22/22/24	-
6	HAS	A	603	1,7	-	0/35/122/122	-
8	OLC	A	609	-	-	4/17/17/24	-
8	OLC	B	204	-	-	12/24/24/24	-
8	OLC	A	613	-	-	13/19/19/24	-
5	HEM	A	602	1	-	0/6/54/54	-
8	OLC	A	616	-	-	13/24/24/24	-
8	OLC	A	615	-	-	6/20/20/24	-
8	OLC	A	612	-	-	5/14/14/24	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	OLC	A	611	-	-	4/6/6/24	-
8	OLC	A	606	-	-	12/24/24/24	-
8	OLC	A	614	-	-	11/24/24/24	-
8	OLC	A	605	-	-	16/24/24/24	-
8	OLC	B	202	-	-	12/24/24/24	-
8	OLC	A	610	-	-	8/16/16/24	-
8	OLC	C	101	-	-	16/24/24/24	-
8	OLC	A	608	-	-	10/19/19/24	-

All (45) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	603	HAS	C2B-C3B	18.99	1.50	1.34
6	A	603	HAS	C1B-NB	-10.62	1.35	1.49
6	A	603	HAS	C4A-C3A	9.09	1.50	1.38
6	A	603	HAS	C4B-NB	-8.50	1.38	1.49
6	A	603	HAS	C1C-C2C	7.56	1.48	1.38
6	A	603	HAS	C1A-C2A	6.93	1.47	1.38
6	A	603	HAS	C3C-C2C	6.52	1.49	1.40
8	B	203	OLC	O20-C1	5.50	1.49	1.33
8	B	202	OLC	O20-C1	5.26	1.48	1.33
5	A	602	HEM	C3D-C2D	5.22	1.53	1.37
8	A	614	OLC	O20-C1	5.11	1.48	1.33
8	A	615	OLC	O20-C1	5.11	1.48	1.33
8	A	608	OLC	O20-C1	4.95	1.48	1.33
8	A	605	OLC	O20-C1	4.85	1.47	1.33
8	A	610	OLC	O20-C1	4.82	1.47	1.33
8	A	616	OLC	O20-C1	4.75	1.47	1.33
8	C	101	OLC	O20-C1	4.74	1.47	1.33
8	A	606	OLC	O20-C1	4.69	1.47	1.33
8	A	609	OLC	O20-C1	4.64	1.46	1.33
8	A	613	OLC	O20-C1	4.63	1.46	1.33
8	A	612	OLC	O20-C1	4.48	1.46	1.33
8	B	204	OLC	O20-C1	4.40	1.46	1.33
6	A	603	HAS	CHD-C4C	-4.27	1.46	1.51
6	A	603	HAS	CHD-C4A	-4.13	1.46	1.51
8	A	607	OLC	O20-C1	4.08	1.45	1.33
6	A	603	HAS	CMD-C2D	3.83	1.51	1.44
5	A	602	HEM	C3C-C2C	-3.77	1.35	1.40
5	A	602	HEM	CAA-C2A	3.39	1.57	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	602	HEM	C3B-CAB	3.35	1.54	1.47
6	A	603	HAS	CBC-CAC	3.27	1.51	1.29
8	A	611	OLC	O20-C1	3.26	1.45	1.33
6	A	603	HAS	C3D-C2D	-3.06	1.30	1.34
6	A	603	HAS	CHC-C4B	-2.98	1.48	1.53
6	A	603	HAS	CHA-C1A	-2.96	1.44	1.51
6	A	603	HAS	CHA-C4D	-2.95	1.48	1.53
5	A	602	HEM	CAD-C3D	2.71	1.57	1.52
5	A	602	HEM	C3B-C2B	-2.66	1.36	1.40
5	A	602	HEM	C1D-ND	2.32	1.40	1.36
6	A	603	HAS	C11-C3B	-2.30	1.48	1.51
6	A	603	HAS	FE-NA	2.30	2.12	1.95
6	A	603	HAS	FE-NC	2.22	2.11	1.95
5	A	602	HEM	C4D-C3D	2.19	1.47	1.42
6	A	603	HAS	C2A-C3A	2.19	1.44	1.37
5	A	602	HEM	C3C-CAC	2.02	1.52	1.47
5	A	602	HEM	C4A-NA	2.00	1.40	1.36

All (62) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	603	HAS	CHB-C1B-NB	8.56	121.58	110.94
6	A	603	HAS	CHC-C4B-NB	7.70	125.28	110.75
6	A	603	HAS	CHA-C4D-ND	7.49	124.88	110.75
6	A	603	HAS	CAA-CBA-CGA	-7.09	100.78	112.67
6	A	603	HAS	CHD-C4A-C3A	-6.90	117.99	129.53
6	A	603	HAS	CHD-C4C-C3C	-5.09	122.94	129.61
6	A	603	HAS	C4C-C3C-C2C	4.84	111.84	104.41
6	A	603	HAS	C4A-C3A-C2A	-4.83	100.67	105.81
6	A	603	HAS	C25-C23-C24	4.05	122.08	115.27
6	A	603	HAS	C4C-CHD-C4A	3.97	122.55	112.87
6	A	603	HAS	C27-C19-C20	3.94	121.90	115.27
8	A	606	OLC	O20-C1-C2	3.91	124.17	111.91
5	A	602	HEM	C4C-C3C-C2C	3.64	109.44	106.90
8	C	101	OLC	O20-C1-C2	3.61	123.23	111.91
6	A	603	HAS	CHC-C1C-C2C	-3.47	123.45	129.45
8	A	609	OLC	O20-C1-C2	3.45	122.75	111.91
8	A	612	OLC	O20-C1-C2	3.44	122.69	111.91
8	A	612	OLC	O20-C1-O19	-3.27	115.33	123.59
8	B	202	OLC	O20-C1-C2	3.16	121.82	111.91
5	A	602	HEM	CMA-C3A-C4A	-3.12	123.66	128.46
8	B	203	OLC	O20-C1-C2	3.11	121.67	111.91

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	A	608	OLC	C21-O20-C1	3.00	125.99	116.11
8	A	608	OLC	O20-C1-C2	2.99	124.04	112.23
8	A	613	OLC	O20-C1-C2	2.97	121.23	111.91
5	A	602	HEM	CAD-CBD-CGD	-2.96	107.70	112.67
6	A	603	HAS	CMC-C2C-C3C	2.96	130.21	124.68
8	A	616	OLC	O20-C1-C2	2.95	121.17	111.91
8	A	609	OLC	O20-C1-O19	-2.91	116.24	123.59
8	B	202	OLC	O20-C21-C22	2.90	119.78	105.77
8	B	203	OLC	C21-O20-C1	2.84	127.64	117.12
8	A	607	OLC	O20-C1-O19	-2.81	116.49	123.59
8	C	101	OLC	O20-C1-O19	-2.81	116.49	123.59
8	A	613	OLC	O20-C1-O19	-2.75	116.65	123.59
6	A	603	HAS	C21-C22-C23	-2.75	121.05	127.66
6	A	603	HAS	C26-C15-C16	2.74	119.89	115.27
8	A	616	OLC	C21-O20-C1	2.69	127.07	117.12
6	A	603	HAS	CHB-C1B-C2B	2.64	122.94	114.70
8	A	614	OLC	O20-C21-C22	2.63	118.47	105.77
6	A	603	HAS	CBD-CAD-C3D	-2.62	109.72	114.35
8	A	613	OLC	O20-C21-C22	2.53	117.97	105.77
8	A	614	OLC	C21-O20-C1	2.52	126.44	117.12
8	A	606	OLC	C21-O20-C1	2.50	126.36	117.12
8	B	203	OLC	O20-C21-C22	2.48	117.75	105.77
8	A	614	OLC	O20-C1-C2	2.45	119.59	111.91
8	A	610	OLC	O20-C1-C2	2.43	119.54	111.91
8	A	610	OLC	O20-C1-O19	-2.39	117.57	123.59
8	B	204	OLC	C21-O20-C1	2.36	125.87	117.12
8	A	605	OLC	O20-C1-C2	2.34	119.26	111.91
6	A	603	HAS	CMA-C3A-C2A	2.32	129.31	124.94
8	A	608	OLC	O20-C1-O19	-2.26	116.04	123.14
8	A	607	OLC	C21-O20-C1	2.23	125.37	117.12
8	A	607	OLC	O20-C1-C2	2.20	118.82	111.91
8	A	615	OLC	O20-C1-C2	2.15	118.67	111.91
8	A	615	OLC	C21-O20-C1	2.15	125.09	117.12
8	B	204	OLC	O20-C1-O19	-2.14	118.20	123.59
6	A	603	HAS	C1A-C2A-C3A	-2.13	102.75	105.93
8	A	607	OLC	C3-C2-C1	-2.13	105.86	113.62
8	A	606	OLC	O20-C1-O19	-2.13	118.22	123.59
8	B	204	OLC	O20-C1-C2	2.10	118.51	111.91
5	A	602	HEM	C1D-C2D-C3D	-2.09	105.54	107.00
8	A	605	OLC	C21-O20-C1	2.05	124.70	117.12
5	A	602	HEM	CBA-CAA-C2A	-2.01	108.78	112.49

There are no chirality outliers.

All (165) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	A	615	OLC	C21-C22-C24-O25
8	A	613	OLC	C21-C22-C24-O25
8	A	607	OLC	C21-C22-C24-O25
8	A	607	OLC	O23-C22-C24-O25
8	B	204	OLC	C21-C22-C24-O25
8	A	612	OLC	O20-C21-C22-C24
8	A	611	OLC	O19-C1-O20-C21
8	A	610	OLC	O20-C21-C22-C24
8	A	606	OLC	O20-C21-C22-O23
8	B	202	OLC	C21-C22-C24-O25
8	B	202	OLC	O23-C22-C24-O25
8	A	608	OLC	C2-C1-O20-C21
8	A	610	OLC	O19-C1-O20-C21
8	A	610	OLC	C2-C1-O20-C21
8	A	613	OLC	O19-C1-O20-C21
8	A	608	OLC	O19-C1-O20-C21
8	A	613	OLC	C2-C1-O20-C21
8	A	616	OLC	O20-C21-C22-O23
8	A	612	OLC	O20-C21-C22-O23
8	A	616	OLC	C2-C1-O20-C21
8	A	614	OLC	C2-C3-C4-C5
8	A	610	OLC	O20-C21-C22-O23
8	A	616	OLC	O19-C1-O20-C21
8	B	203	OLC	C1-C2-C3-C4
8	A	614	OLC	C10-C11-C12-C13
8	B	204	OLC	C1-C2-C3-C4
8	A	616	OLC	C1-C2-C3-C4
8	A	609	OLC	C1-C2-C3-C4
8	C	101	OLC	C4-C5-C6-C7
8	B	202	OLC	C2-C1-O20-C21
8	A	613	OLC	O20-C21-C22-O23
8	A	607	OLC	O20-C21-C22-O23
8	C	101	OLC	O20-C21-C22-O23
8	C	101	OLC	C3-C4-C5-C6
8	A	605	OLC	C5-C6-C7-C8
8	A	607	OLC	O20-C21-C22-C24
8	C	101	OLC	O20-C21-C22-C24
8	A	605	OLC	C12-C13-C14-C15
8	A	605	OLC	C4-C5-C6-C7
8	A	607	OLC	C11-C12-C13-C14
8	B	202	OLC	O19-C1-O20-C21
8	C	101	OLC	C13-C14-C15-C16

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Mol	Chain	Res	Type	Atoms
8	A	605	OLC	C2-C3-C4-C5
8	B	202	OLC	C14-C15-C16-C17
8	B	204	OLC	C13-C14-C15-C16
8	B	202	OLC	C3-C4-C5-C6
8	A	606	OLC	C3-C4-C5-C6
8	A	609	OLC	C21-C22-C24-O25
8	A	616	OLC	C21-C22-C24-O25
8	A	610	OLC	C21-C22-C24-O25
8	B	202	OLC	C6-C7-C8-C9
8	B	203	OLC	C2-C3-C4-C5
8	A	614	OLC	C4-C5-C6-C7
8	A	607	OLC	C12-C13-C14-C15
8	B	203	OLC	C2-C1-O20-C21
8	A	614	OLC	C12-C13-C14-C15
8	A	614	OLC	C14-C15-C16-C17
8	B	204	OLC	C3-C4-C5-C6
8	A	608	OLC	C11-C12-C13-C14
8	A	606	OLC	C14-C15-C16-C17
8	A	615	OLC	O23-C22-C24-O25
8	A	610	OLC	O23-C22-C24-O25
8	A	613	OLC	C6-C7-C8-C9
8	C	101	OLC	C6-C7-C8-C9
8	A	605	OLC	C10-C11-C12-C13
8	A	605	OLC	C11-C12-C13-C14
8	B	203	OLC	O19-C1-O20-C21
8	B	204	OLC	C5-C6-C7-C8
8	A	615	OLC	C10-C11-C12-C13
8	B	203	OLC	C6-C7-C8-C9
8	B	204	OLC	C10-C11-C12-C13
8	C	101	OLC	C10-C11-C12-C13
8	A	614	OLC	C5-C6-C7-C8
8	A	613	OLC	O20-C21-C22-C24
8	A	615	OLC	C3-C4-C5-C6
8	A	606	OLC	C10-C11-C12-C13
8	B	203	OLC	C12-C13-C14-C15
8	A	616	OLC	C13-C14-C15-C16
8	A	605	OLC	C6-C7-C8-C9
8	A	616	OLC	C11-C12-C13-C14
8	A	612	OLC	C4-C5-C6-C7
8	A	613	OLC	O23-C22-C24-O25
8	B	204	OLC	O23-C22-C24-O25
8	A	609	OLC	O23-C22-C24-O25

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Mol	Chain	Res	Type	Atoms
8	A	609	OLC	C6-C7-C8-C9
8	A	606	OLC	C6-C7-C8-C9
8	A	611	OLC	O20-C21-C22-O23
8	A	613	OLC	C3-C4-C5-C6
8	B	202	OLC	C12-C13-C14-C15
8	A	607	OLC	C2-C1-O20-C21
8	A	605	OLC	C2-C1-O20-C21
8	A	605	OLC	C13-C14-C15-C16
8	A	613	OLC	C4-C5-C6-C7
8	A	616	OLC	C15-C16-C17-C18
8	A	614	OLC	C13-C14-C15-C16
8	A	605	OLC	O19-C1-O20-C21
8	B	204	OLC	C15-C16-C17-C18
8	C	101	OLC	C2-C3-C4-C5
8	A	606	OLC	C4-C5-C6-C7
8	A	605	OLC	C15-C16-C17-C18
8	A	607	OLC	O19-C1-O20-C21
8	B	204	OLC	C12-C13-C14-C15
8	A	605	OLC	C14-C15-C16-C17
8	C	101	OLC	C14-C15-C16-C17
8	A	611	OLC	O20-C21-C22-C24
8	A	606	OLC	C12-C13-C14-C15
8	C	101	OLC	C11-C12-C13-C14
8	B	203	OLC	C10-C11-C12-C13
8	B	202	OLC	C11-C12-C13-C14
8	A	612	OLC	C5-C6-C7-C8
8	A	616	OLC	C14-C15-C16-C17
8	B	203	OLC	C11-C12-C13-C14
8	B	203	OLC	C13-C14-C15-C16
8	B	203	OLC	C5-C6-C7-C8
8	A	608	OLC	C15-C16-C17-C18
8	A	616	OLC	C6-C7-C8-C9
8	A	606	OLC	O20-C21-C22-C24
8	A	616	OLC	C12-C13-C14-C15
8	A	608	OLC	C10-C11-C12-C13
8	B	204	OLC	C11-C12-C13-C14
8	A	605	OLC	C1-C2-C3-C4
8	B	202	OLC	C1-C2-C3-C4
8	A	613	OLC	C2-C3-C4-C5
8	C	101	OLC	O19-C1-O20-C21
8	C	101	OLC	C2-C1-O20-C21
8	B	203	OLC	C4-C5-C6-C7

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Mol	Chain	Res	Type	Atoms
8	A	615	OLC	C5-C6-C7-C8
8	A	614	OLC	C7-C8-C9-C10
8	A	614	OLC	C15-C16-C17-C18
8	C	101	OLC	C9-C10-C11-C12
8	A	613	OLC	C10-C11-C12-C13
8	C	101	OLC	C7-C8-C9-C10
8	C	101	OLC	C12-C13-C14-C15
8	A	606	OLC	C13-C14-C15-C16
8	B	202	OLC	C7-C8-C9-C10
8	A	610	OLC	O20-C1-C2-C3
8	A	606	OLC	C22-C21-O20-C1
8	A	616	OLC	C7-C8-C9-C10
8	B	204	OLC	O20-C21-C22-C24
8	A	613	OLC	C9-C10-C11-C12
8	B	203	OLC	C9-C10-C11-C12
8	A	616	OLC	C9-C10-C11-C12
8	A	608	OLC	C7-C8-C9-C10
8	A	607	OLC	C10-C11-C12-C13
8	B	202	OLC	C10-C11-C12-C13
8	A	607	OLC	C7-C8-C9-C10
8	B	203	OLC	C14-C15-C16-C17
8	A	611	OLC	C22-C21-O20-C1
8	A	605	OLC	O20-C21-C22-C24
8	A	608	OLC	C4-C5-C6-C7
8	A	605	OLC	C9-C10-C11-C12
8	A	615	OLC	C6-C7-C8-C9
8	A	610	OLC	O19-C1-C2-C3
8	A	608	OLC	O20-C1-C2-C3
8	A	613	OLC	C5-C6-C7-C8
8	C	101	OLC	C15-C16-C17-C18
8	A	614	OLC	O20-C1-C2-C3
8	A	606	OLC	O20-C1-C2-C3
8	A	612	OLC	C1-C2-C3-C4
8	A	608	OLC	O19-C1-C2-C3
8	B	204	OLC	C7-C8-C9-C10
8	A	608	OLC	C2-C3-C4-C5
8	A	614	OLC	O19-C1-C2-C3
8	A	606	OLC	O19-C1-C2-C3
8	A	605	OLC	C7-C8-C9-C10

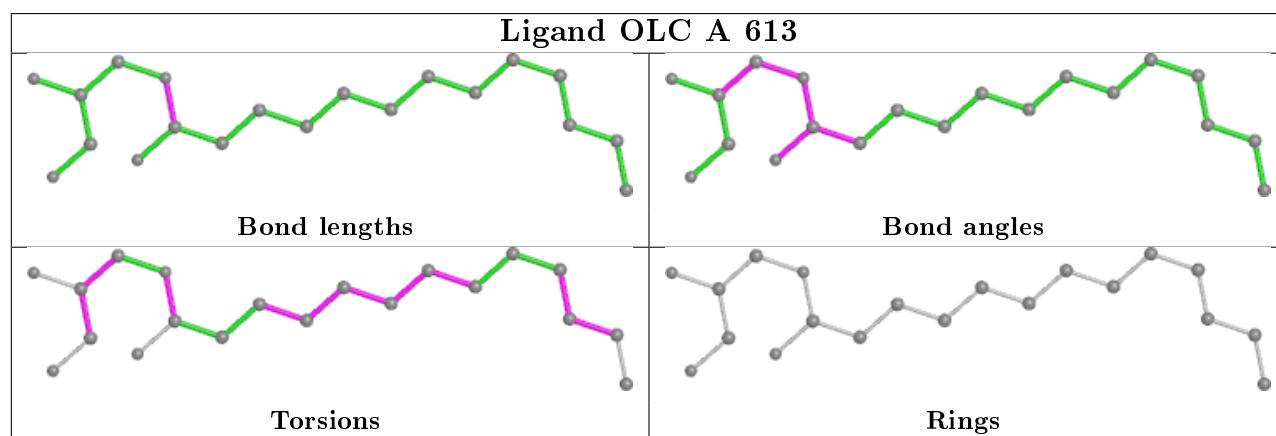
There are no ring outliers.

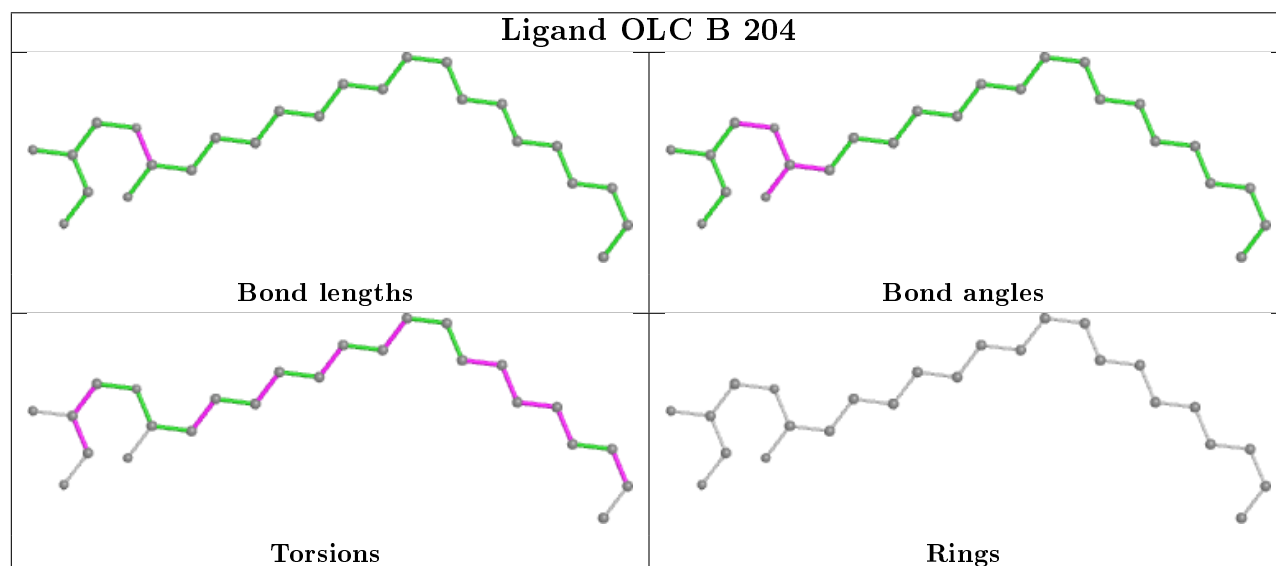
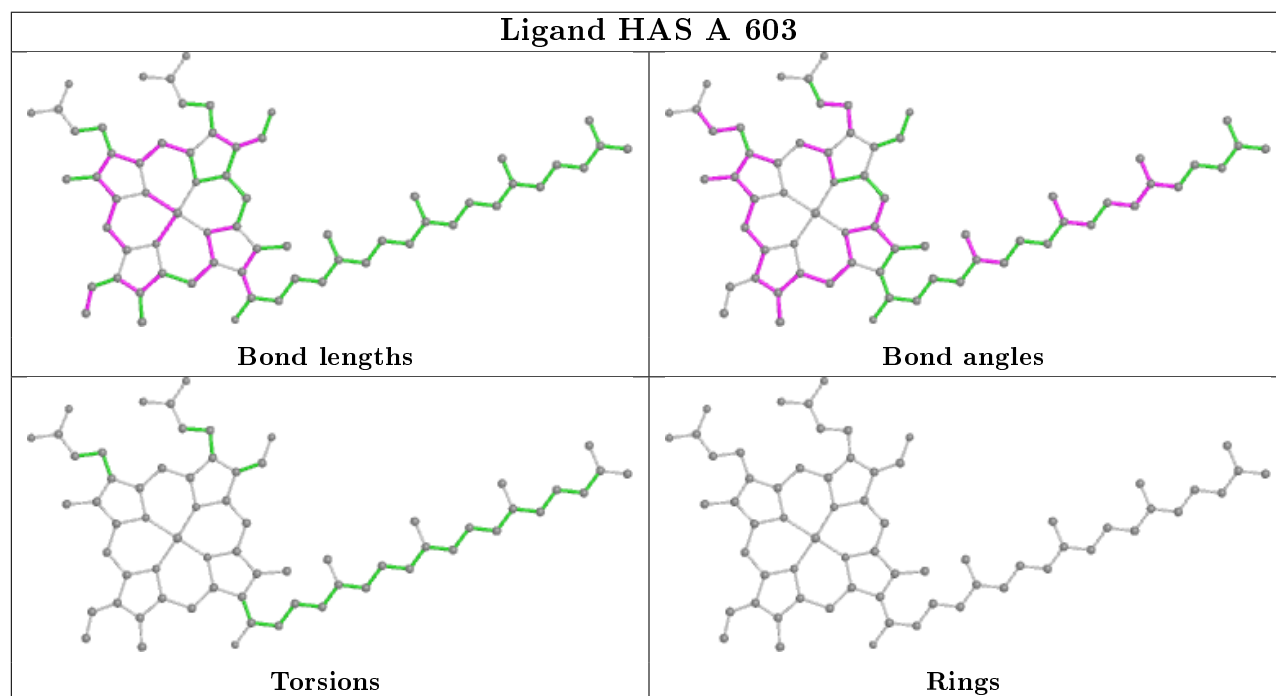
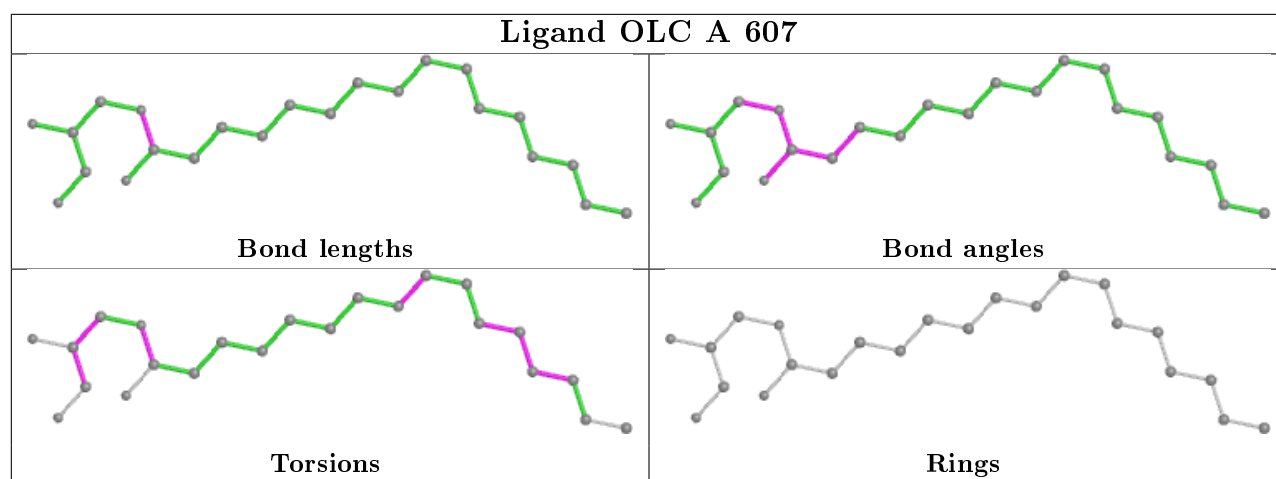
12 monomers are involved in 34 short contacts:

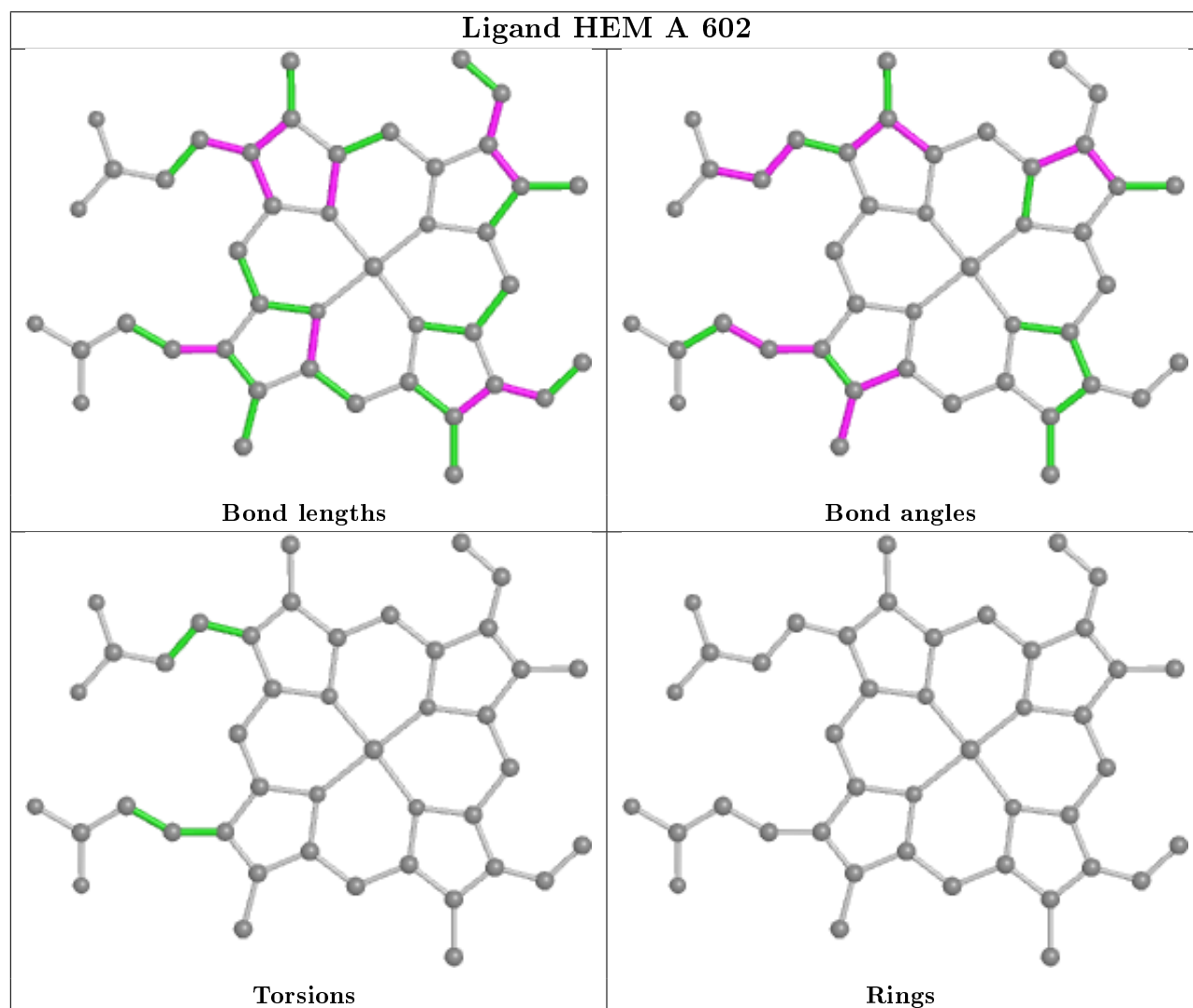
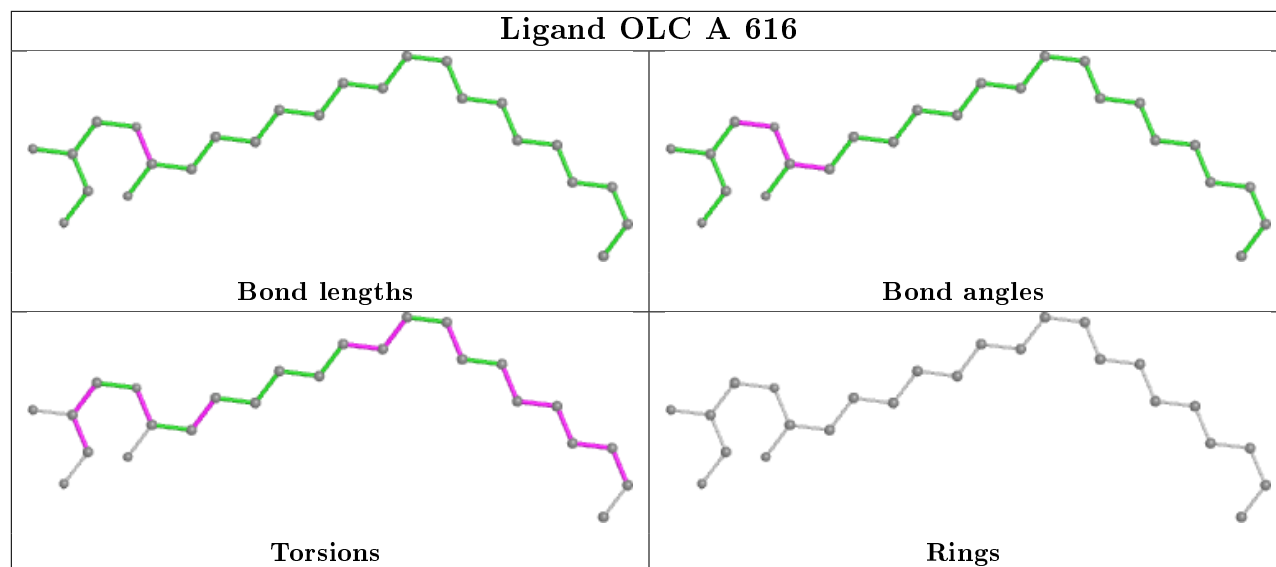


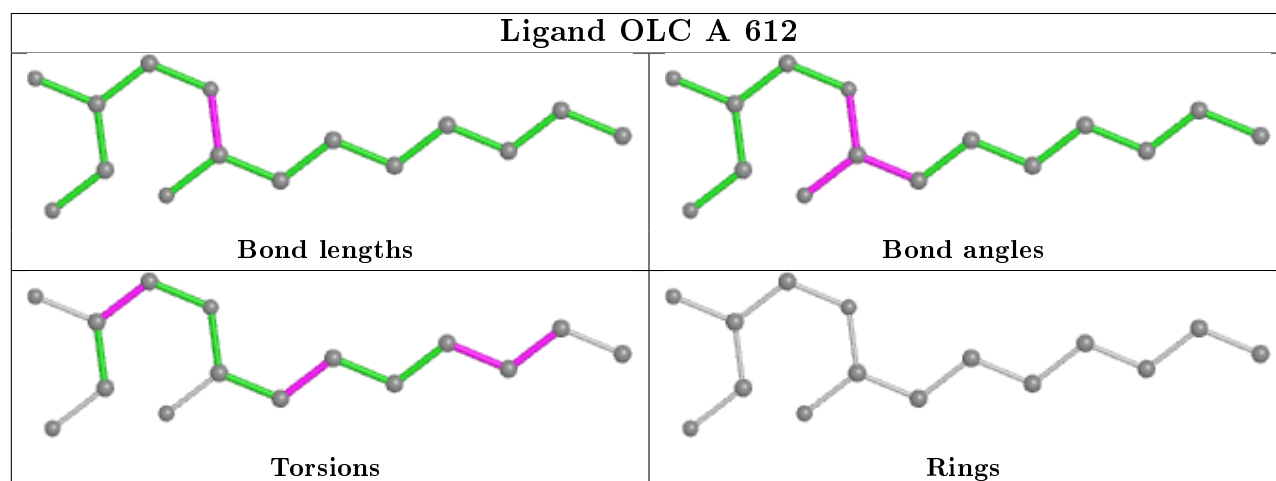
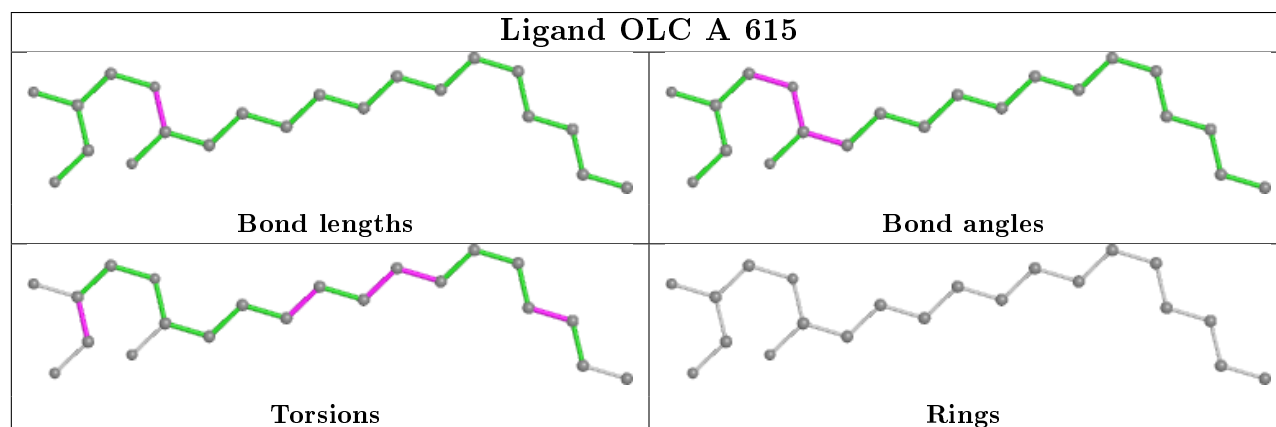
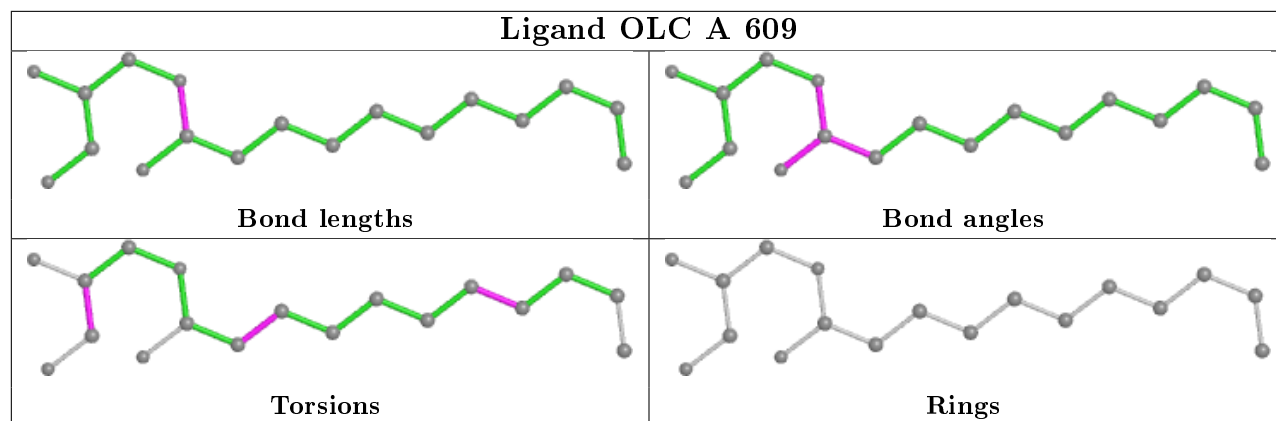
Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	A	613	OLC	3	0
8	A	607	OLC	6	0
6	A	603	HAS	3	0
8	A	616	OLC	2	0
5	A	602	HEM	4	0
8	A	612	OLC	3	0
8	B	203	OLC	3	0
8	A	611	OLC	4	0
8	A	606	OLC	3	0
8	A	614	OLC	9	0
8	A	605	OLC	1	0
8	C	101	OLC	2	0

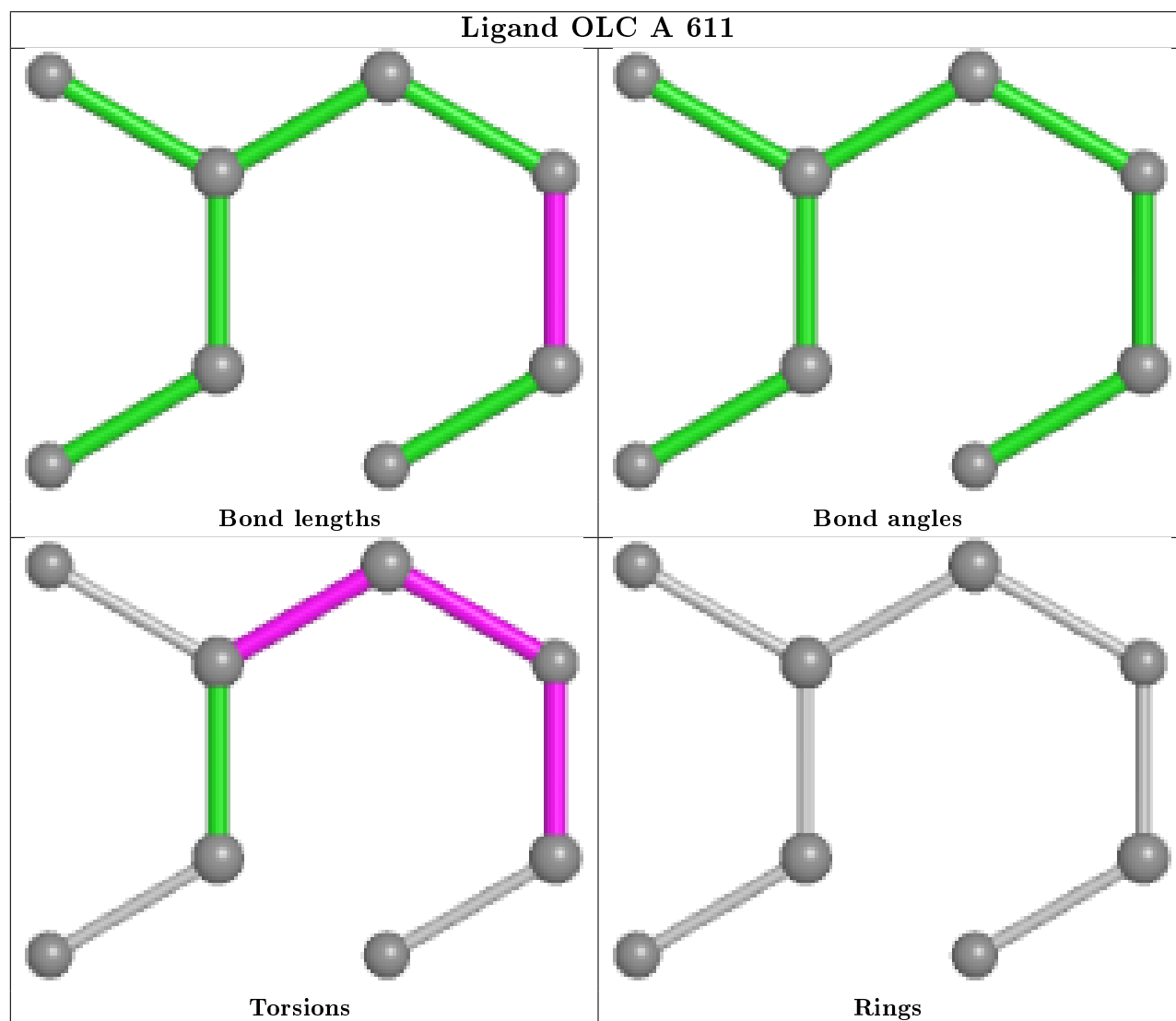
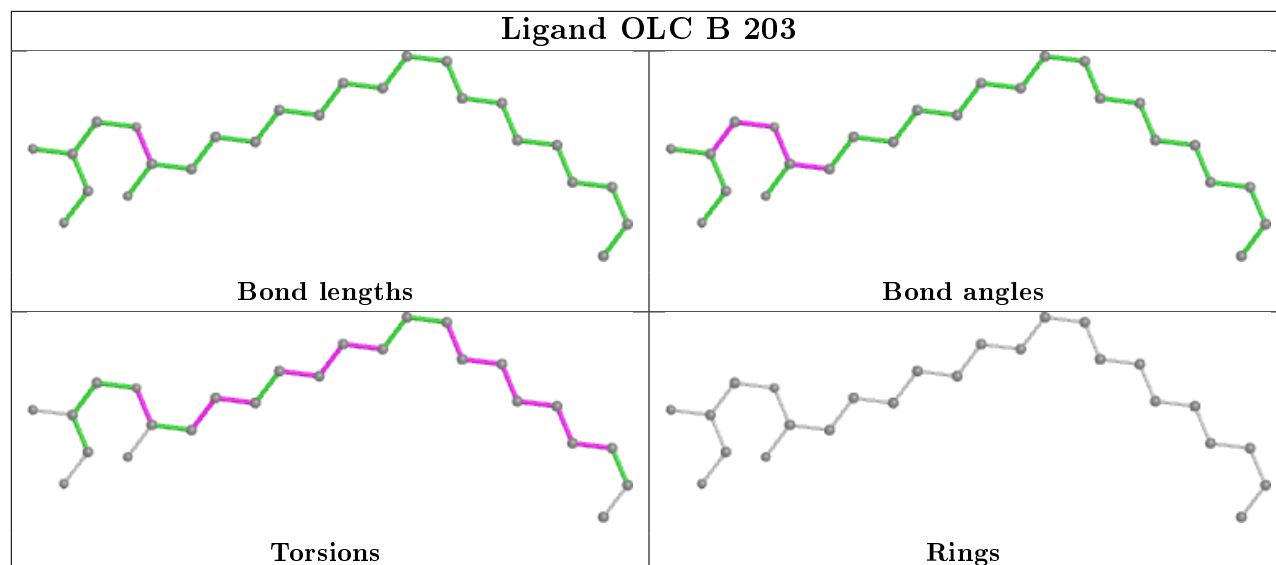
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

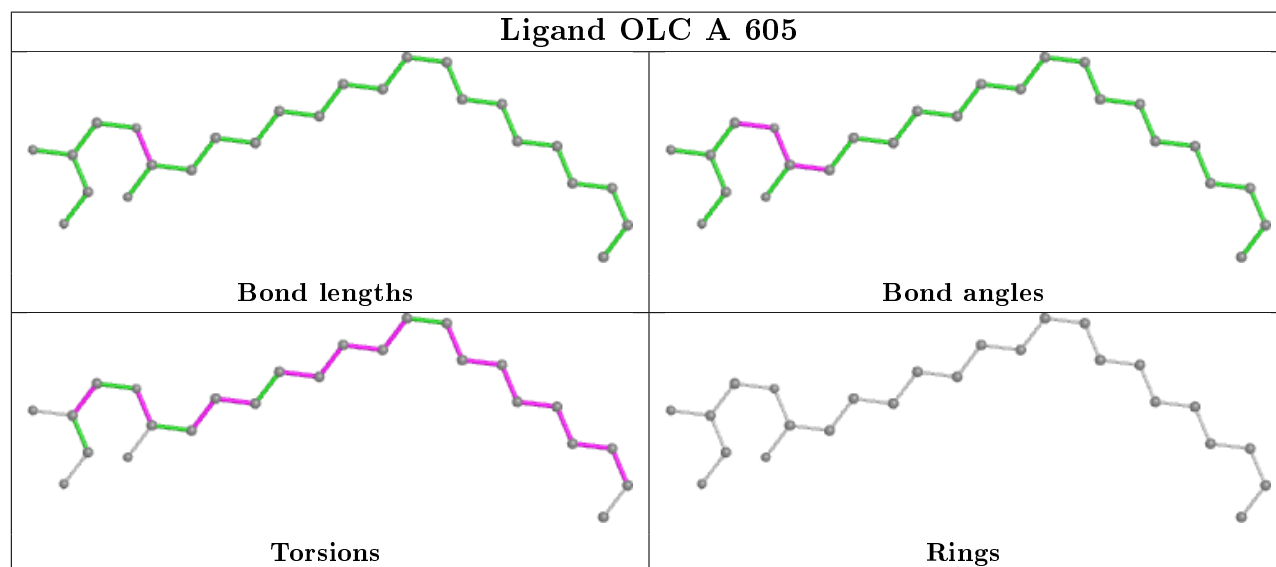
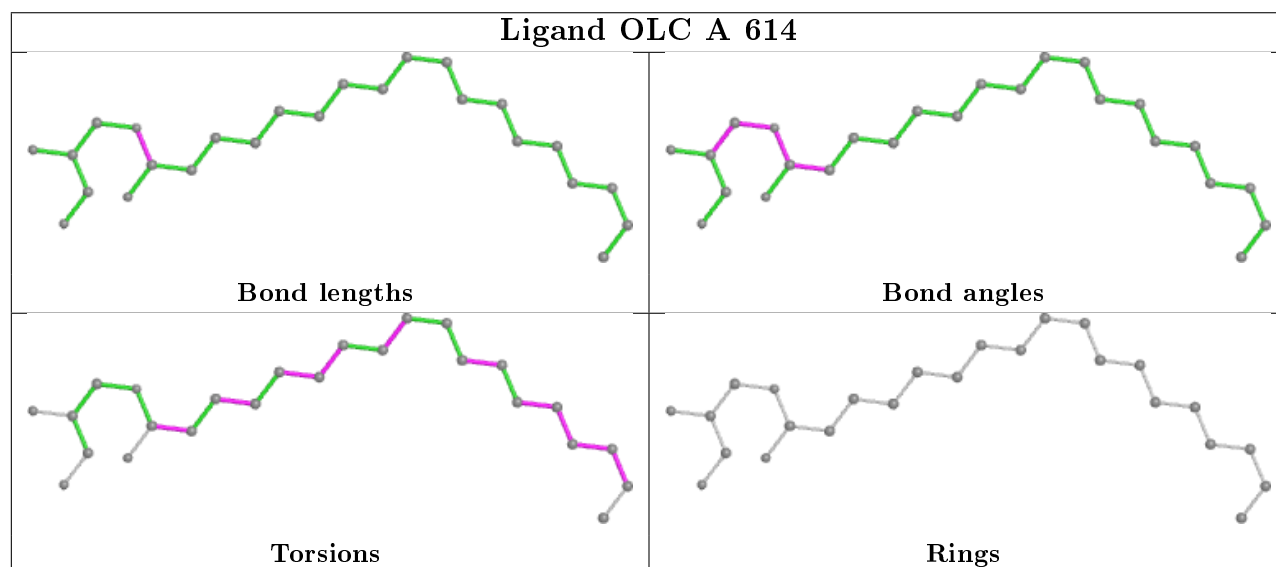
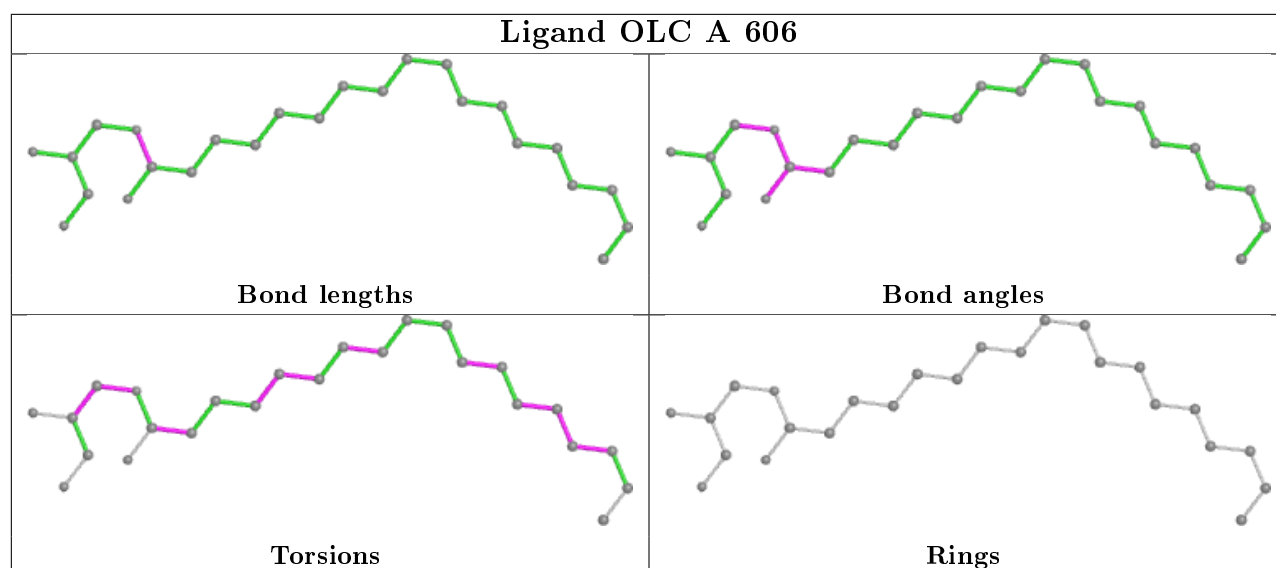


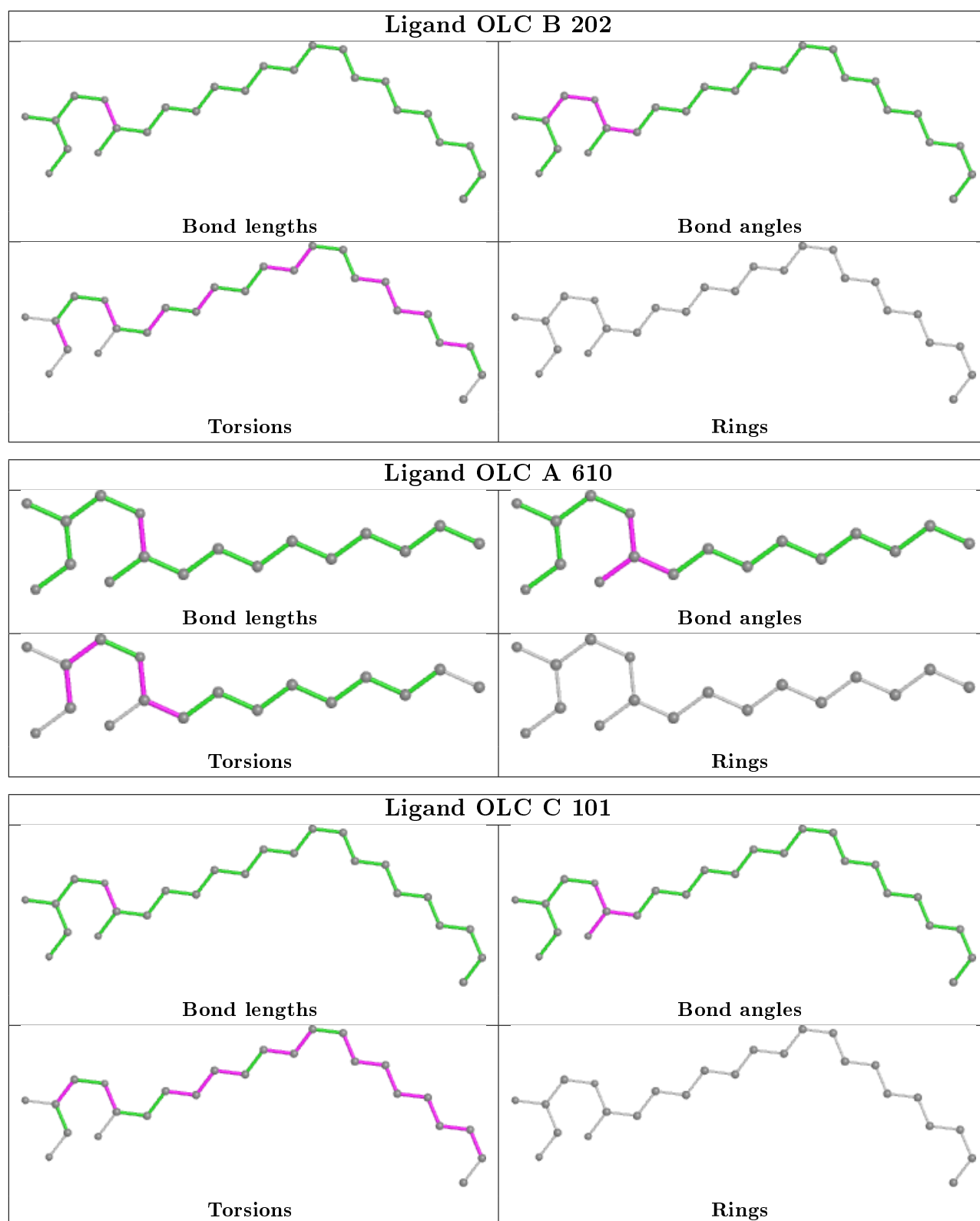


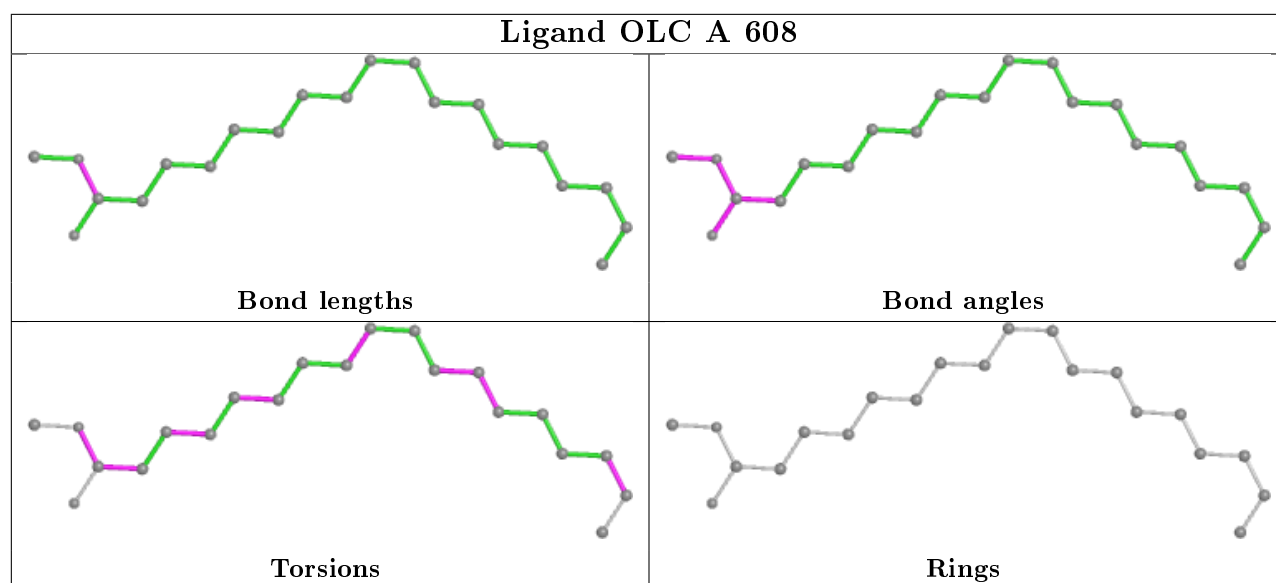












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.



## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	546/568 (96%)	-0.64	12 (2%) 62 65	10, 20, 44, 71	2 (0%)
2	B	166/168 (98%)	-0.52	7 (4%) 36 39	12, 22, 44, 87	1 (0%)
3	C	31/34 (91%)	-0.96	0 100 100	15, 20, 37, 43	0
All	All	743/770 (96%)	-0.62	19 (2%) 56 59	10, 21, 44, 87	3 (0%)

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	6	LYS	6.1
2	B	5	HIS	4.8
2	B	3	ASP	4.6
1	A	499	PRO	4.4
1	A	517	ASP	4.3
2	B	4	GLU	3.3
1	A	495	ARG	3.3
1	A	496	GLU	3.1
1	A	513	SER	2.8
2	B	168	GLU	2.8
1	A	493	LEU	2.8
1	A	330	ARG	2.7
2	B	40	HIS	2.6
1	A	175	PRO	2.5
1	A	504	ALA	2.2
1	A	172	ALA	2.2
1	A	331	GLY	2.1
1	A	494	SER	2.1
2	B	61	GLU	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 6.4 Ligands [i](#)

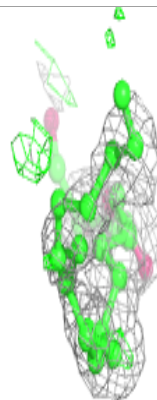
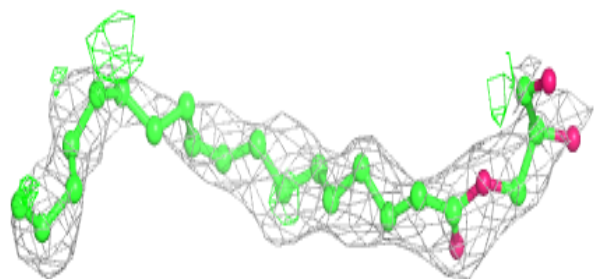
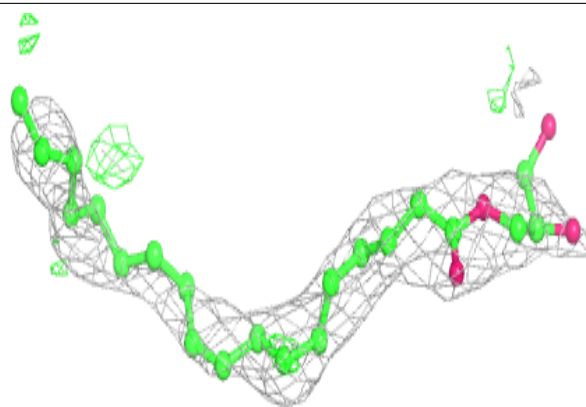
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
8	OLC	B	204	25/25	0.62	0.30	52,64,74,74	0
8	OLC	C	101	25/25	0.67	0.37	65,68,89,92	0
8	OLC	A	610	17/25	0.67	0.26	50,57,71,72	0
8	OLC	B	203	25/25	0.71	0.25	45,60,72,73	0
8	OLC	B	202	25/25	0.71	0.26	52,57,71,74	0
8	OLC	A	612	15/25	0.75	0.31	55,64,71,71	0
8	OLC	A	615	21/25	0.75	0.24	51,58,65,66	0
8	OLC	A	605	25/25	0.79	0.26	35,45,67,69	0
8	OLC	A	608	21/25	0.79	0.27	50,54,62,63	0
8	OLC	A	613	20/25	0.80	0.22	43,50,60,62	0
8	OLC	A	609	18/25	0.82	0.21	47,60,66,67	0
8	OLC	A	606	25/25	0.82	0.21	44,53,69,70	0
8	OLC	A	616	25/25	0.84	0.28	46,52,57,60	0
8	OLC	A	611	8/25	0.89	0.25	50,57,62,63	0
8	OLC	A	614	25/25	0.89	0.16	31,42,50,51	0
8	OLC	A	607	23/25	0.91	0.15	27,41,49,51	0
6	HAS	A	603	65/65	0.98	0.10	8,14,21,26	0
5	HEM	A	602	43/43	0.98	0.09	2,11,16,21	0
9	CUA	B	201	2/2	0.99	0.04	13,13,13,15	0
7	PEO	A	604	2/2	0.99	0.08	7,7,7,14	0
4	CU	A	601	1/1	1.00	0.05	15,15,15,15	0

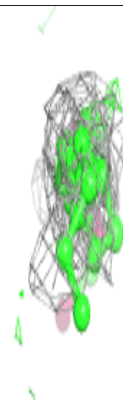
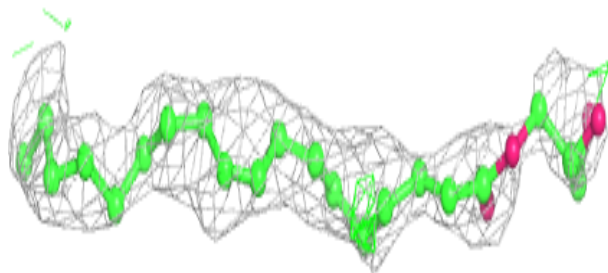
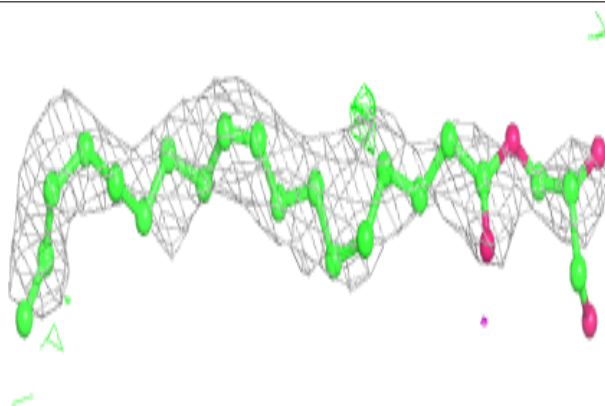
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around OLC B 204:**

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

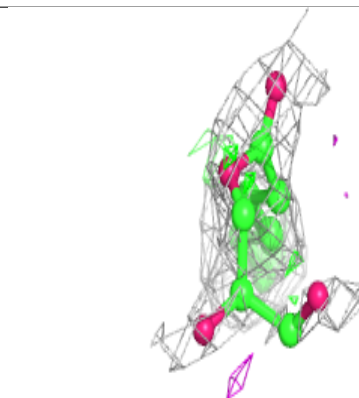
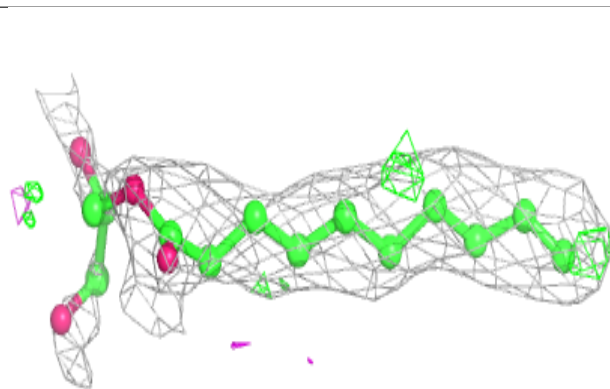
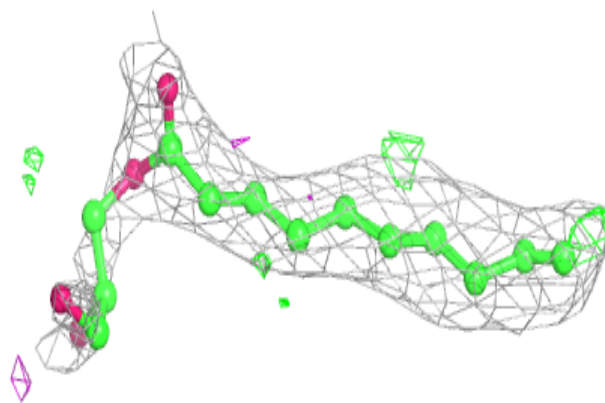
**Electron density around OLC C 101:**

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

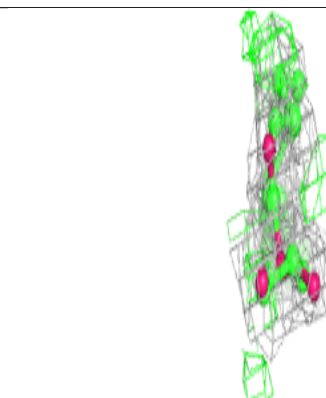
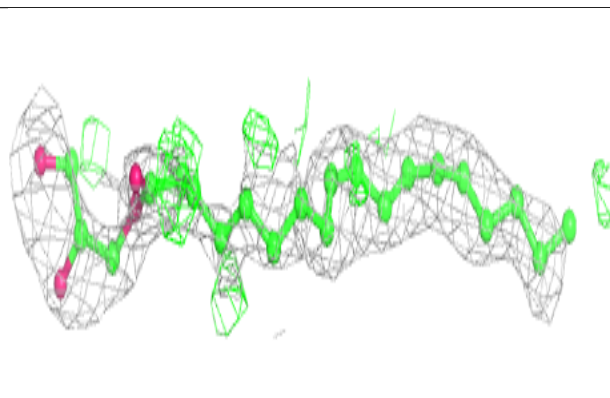
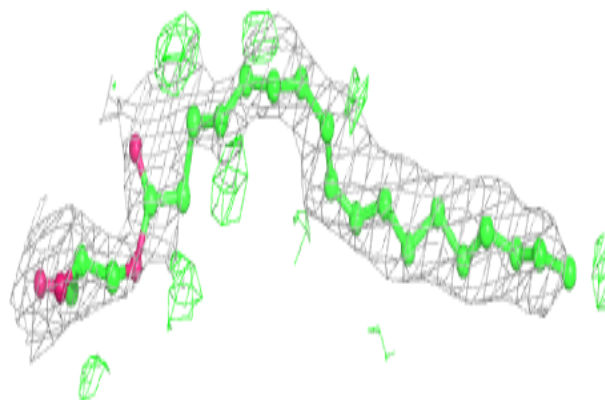


**Electron density around OLC A 610:**

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

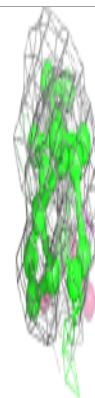
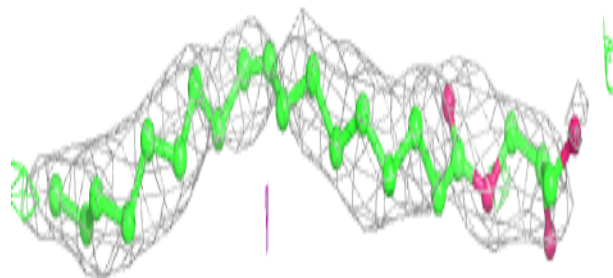
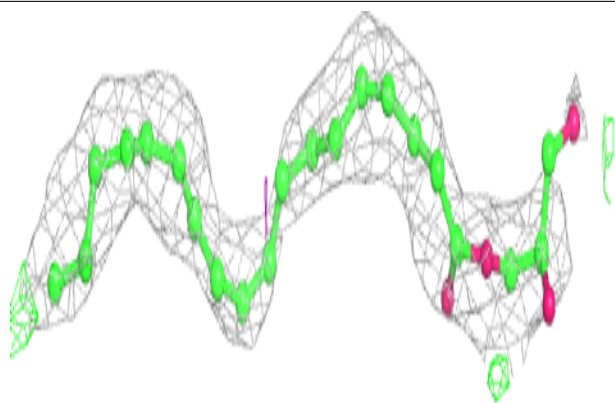
**Electron density around OLC B 203:**

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

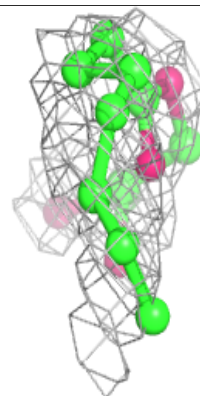
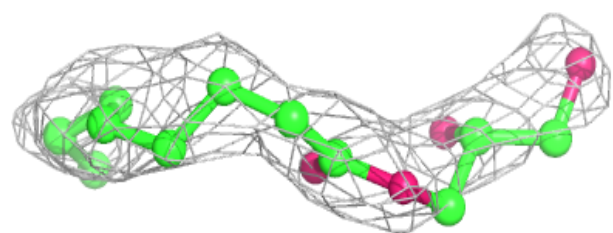
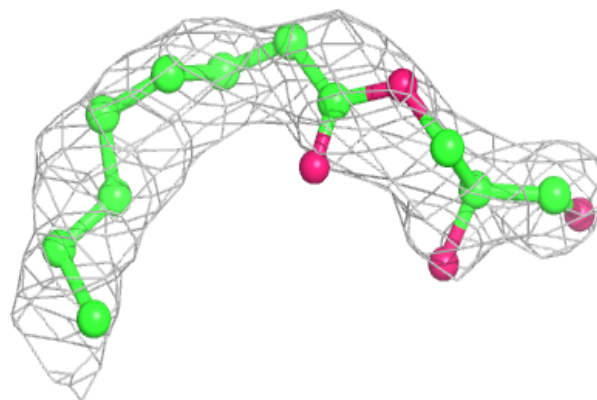


**Electron density around OLC B 202:**

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

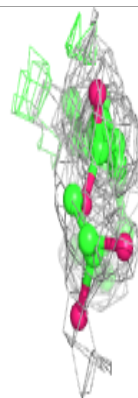
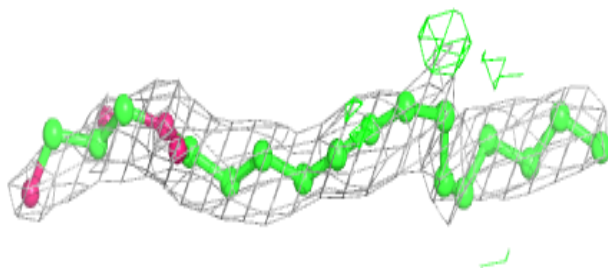
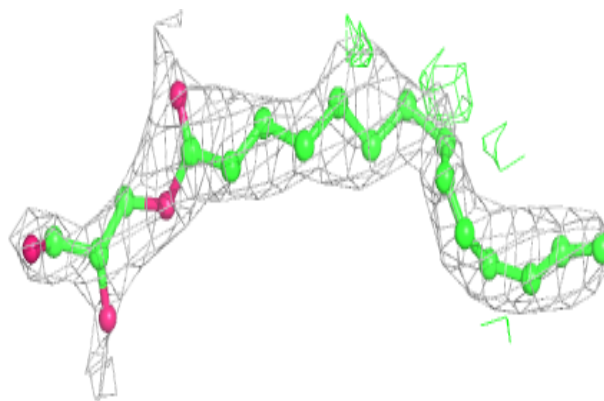
**Electron density around OLC A 612:**

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

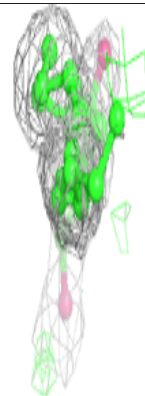
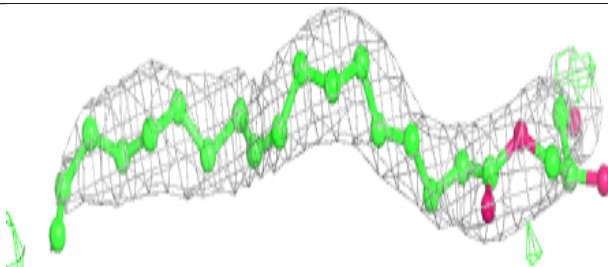
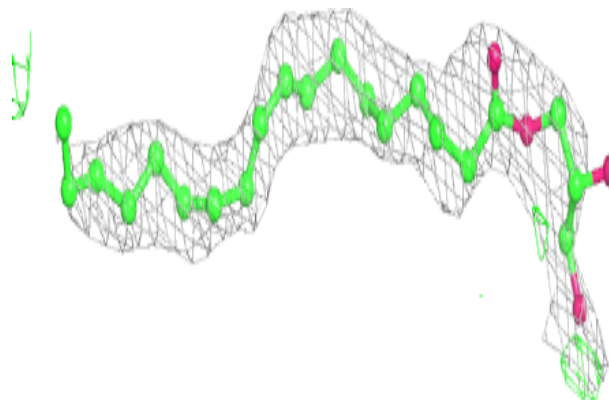


**Electron density around OLC A 615:**

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

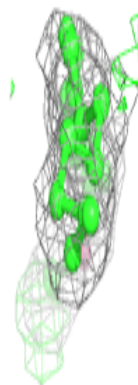
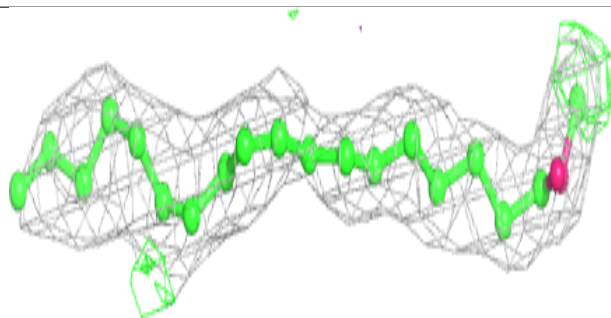
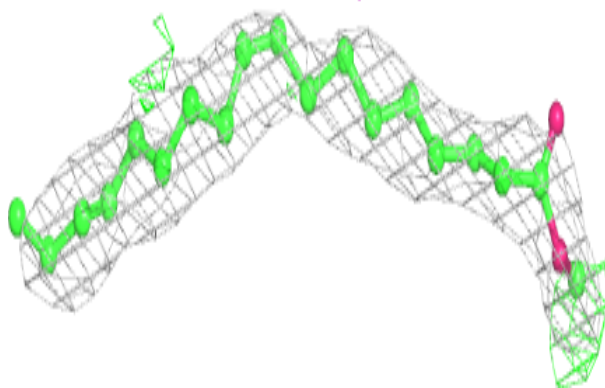
**Electron density around OLC A 605:**

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

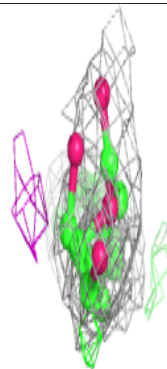
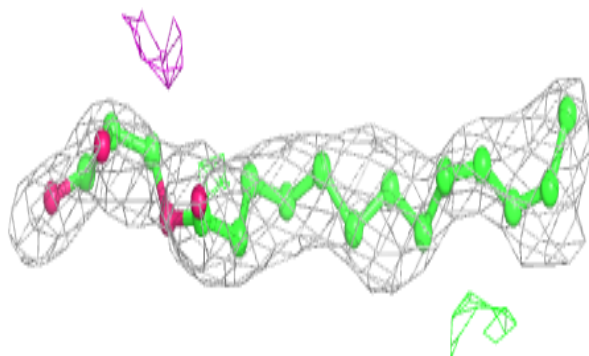
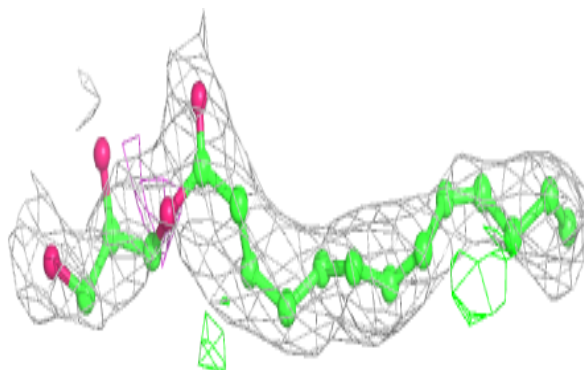


**Electron density around OLC A 608:**

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

**Electron density around OLC A 613:**

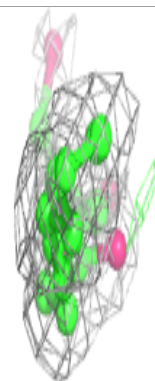
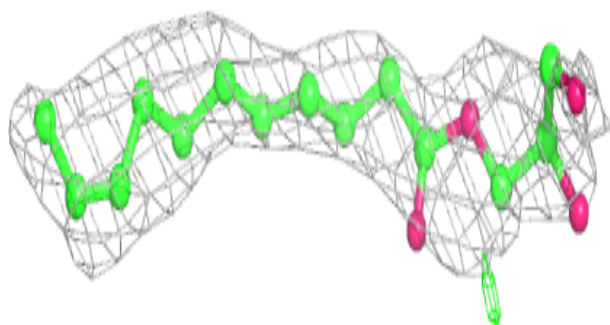
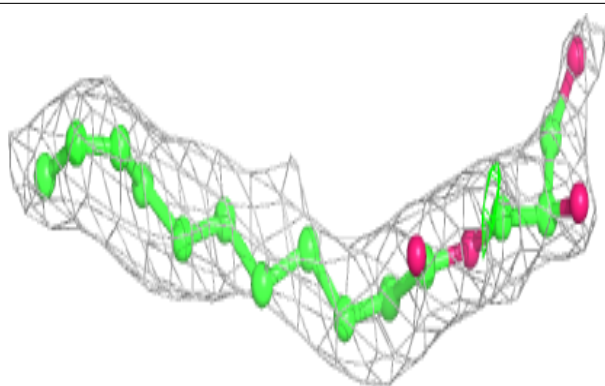
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



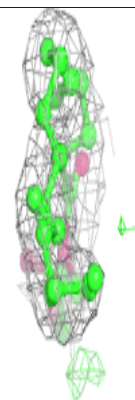
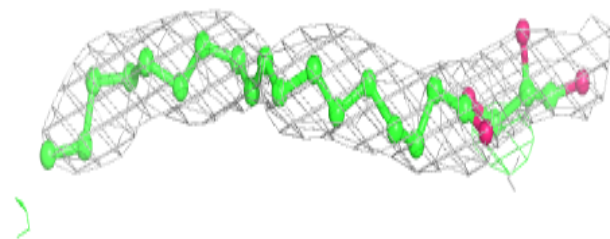
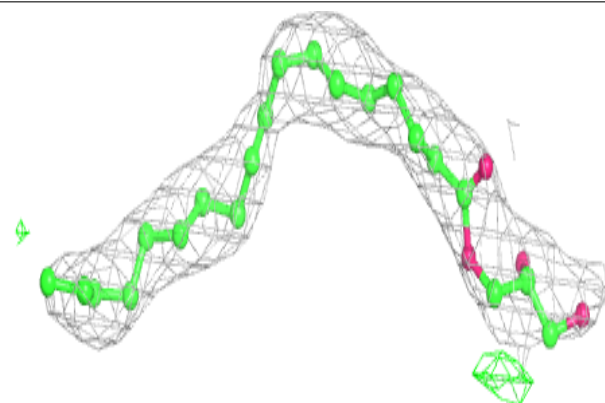


**Electron density around OLC A 609:**

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

**Electron density around OLC A 606:**

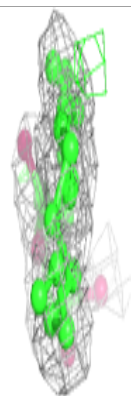
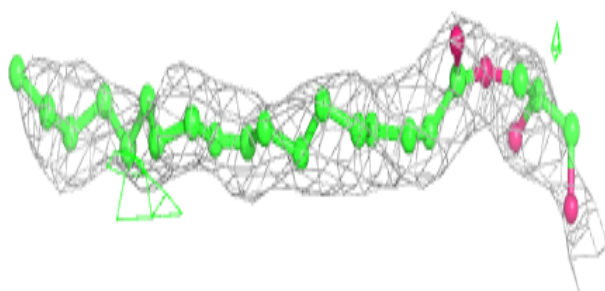
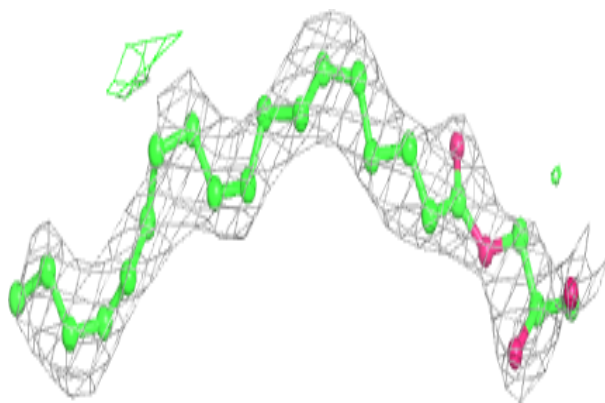
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



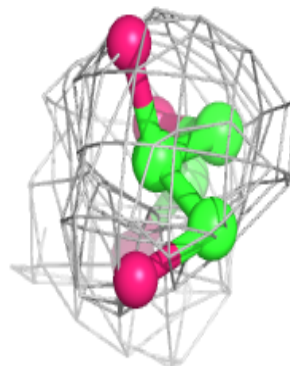
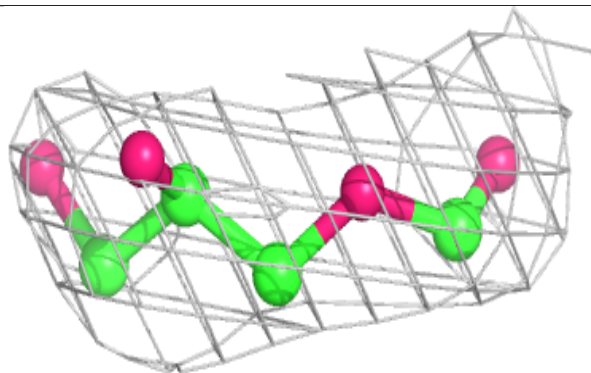
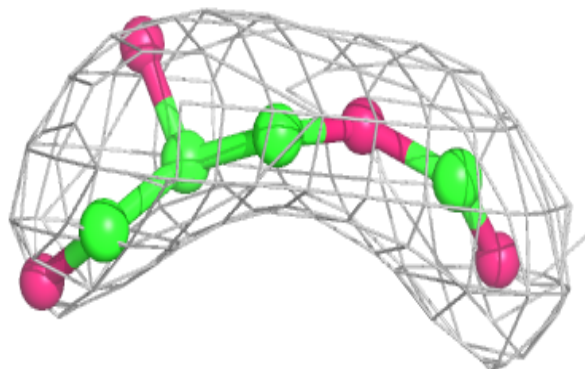


**Electron density around OLC A 616:**

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

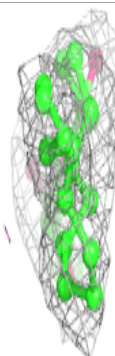
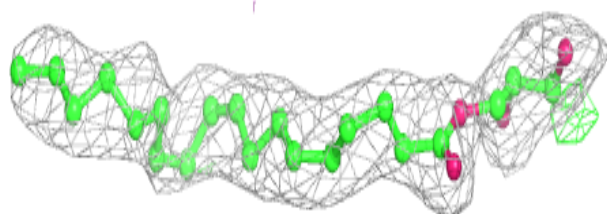
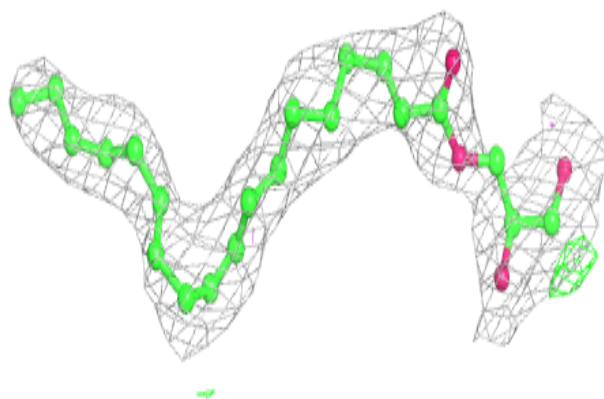
**Electron density around OLC A 611:**

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

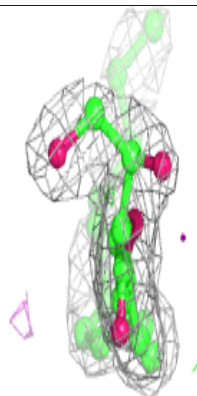
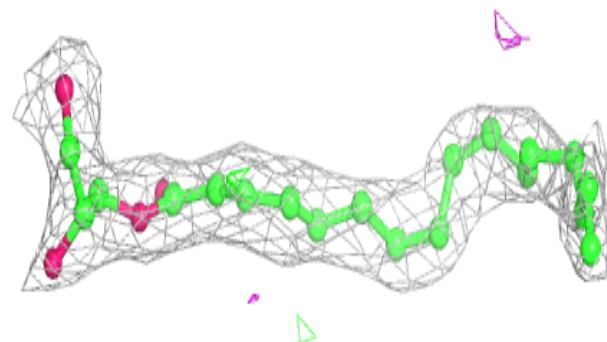
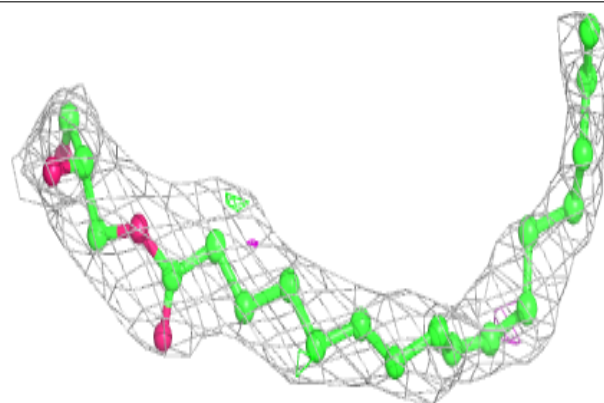


**Electron density around OLC A 614:**

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

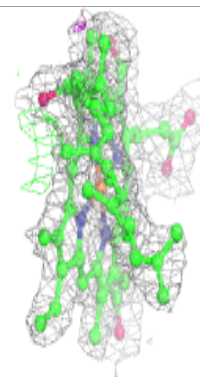
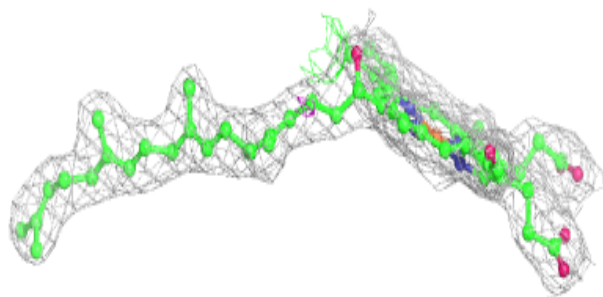
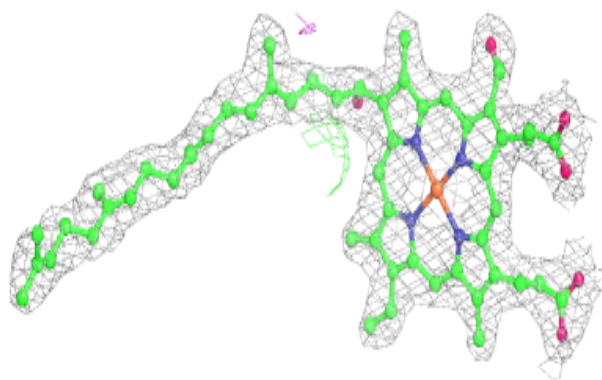
**Electron density around OLC A 607:**

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



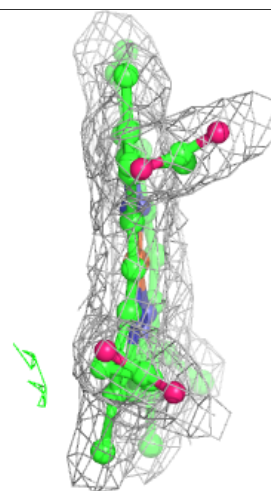
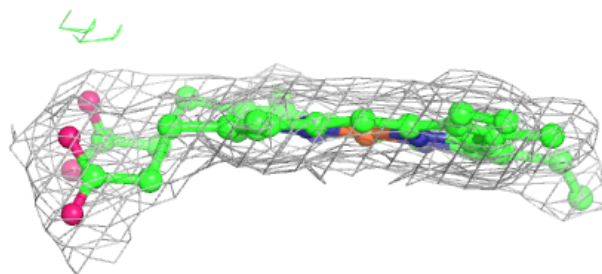
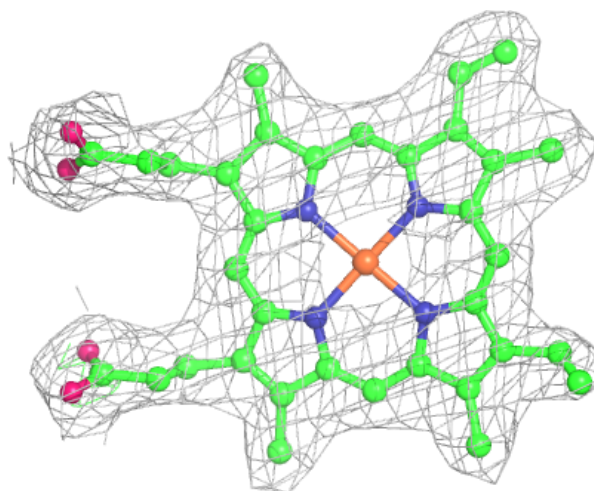
**Electron density around HAS A 603:**

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



**Electron density around HEM A 602:**

$2mF_o-DF_c$  (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.