



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 18, 2024 – 06:27 PM EST

PDB ID : 4GP8  
Title : Structure of Recombinant Cytochrome ba3 Oxidase mutant Y133W+T231F  
from *Thermus thermophilus*  
Authors : Li, Y.; Chen, Y.; Stout, C.D.  
Deposited on : 2012-08-20  
Resolution : 2.80 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](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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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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 : 2.36  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

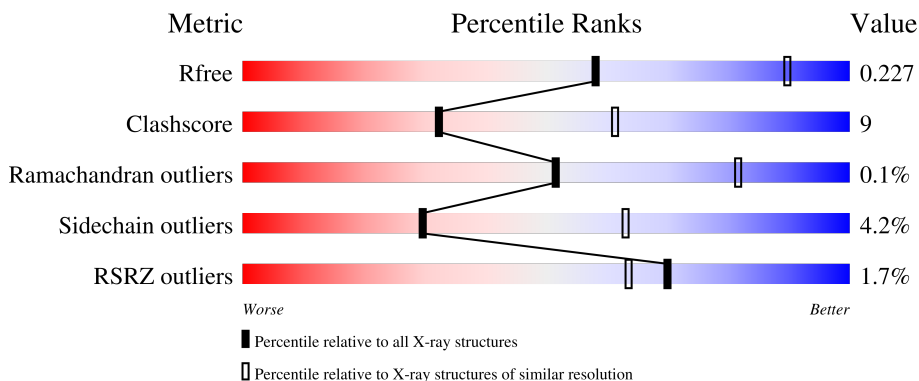
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.80 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	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	 74% 18% • 7%
2	B	168	 82% 16% ••
3	C	34	 82% 6% • 9%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
6	HAS	A	603	X	-	-	-
8	OLC	A	611	-	-	-	X
8	OLC	A	613	-	-	-	X

## 2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 6231 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
			Total	C	N	O	S			
1	A	529	4177	2854	655	652	16	0	3	0

There are 9 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	133	TRP	TYR	engineered mutation	UNP Q5SJ79
A	231	PHE	THR	engineered mutation	UNP Q5SJ79

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	166	1280	831	212	233	4	0	1	0

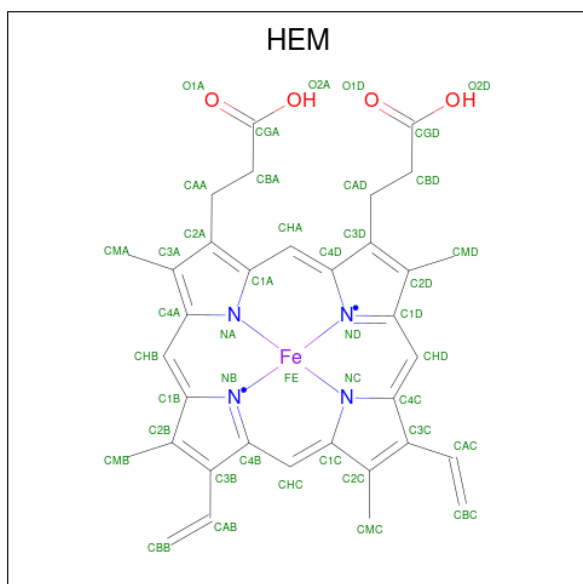
- Molecule 3 is a protein called Cytochrome c oxidase polypeptide 2A.

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

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

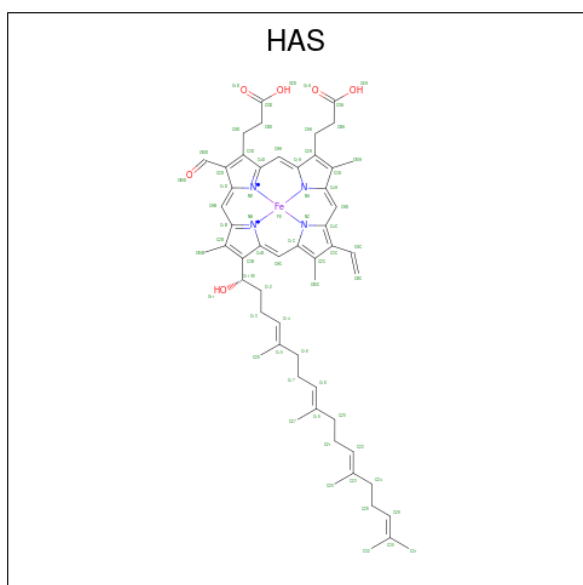
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Cu 1 1	0	0

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



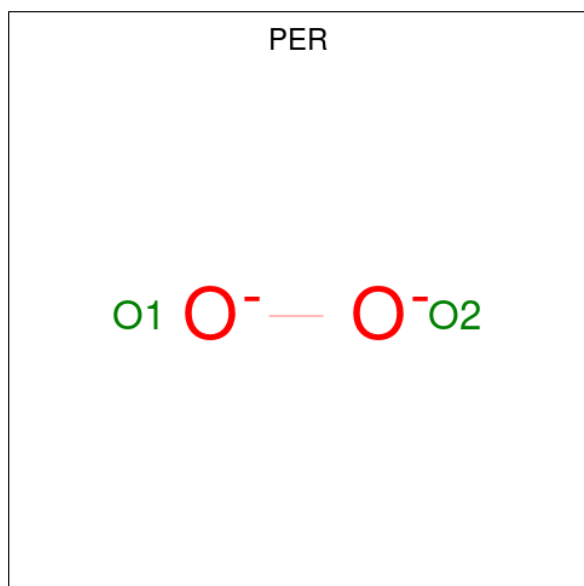
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C Fe N O 43 34 1 4 4	0	0

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



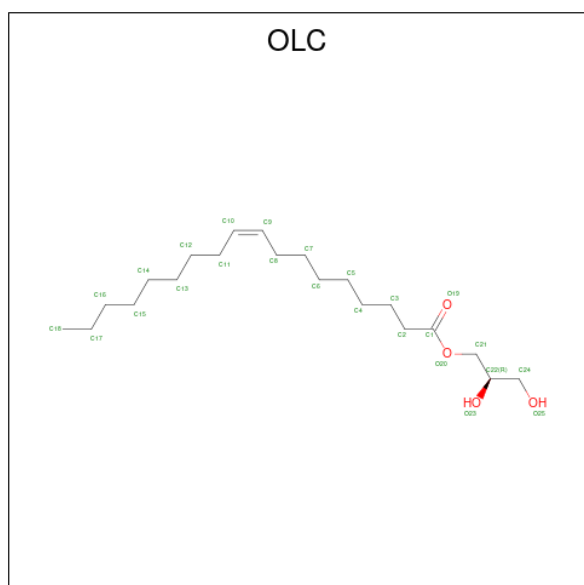
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Fe	N			O
6	A	1	65	54	1	4	6	0	0

- Molecule 7 is PEROXIDE ION (three-letter code: PER) (formula: O<sub>2</sub>).



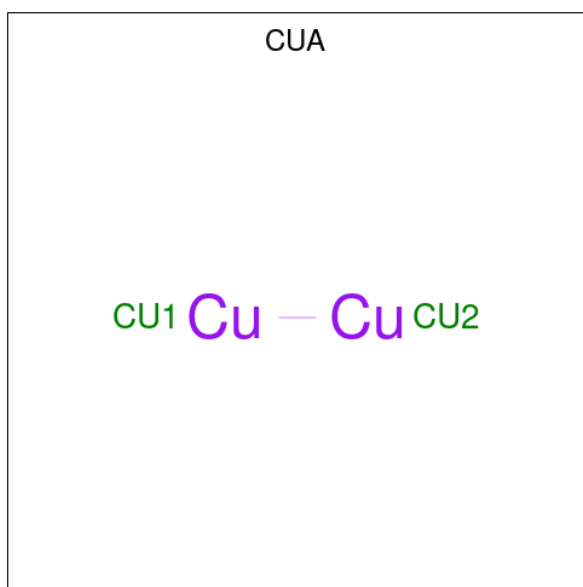
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
7	A	1	2	2	0	0

- Molecule 8 is (2R)-2,3-dihydroxypropyl (9Z)-octadec-9-enoate (three-letter code: OLC) (formula: C<sub>21</sub>H<sub>40</sub>O<sub>4</sub>).



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
			25	21	4		
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	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.

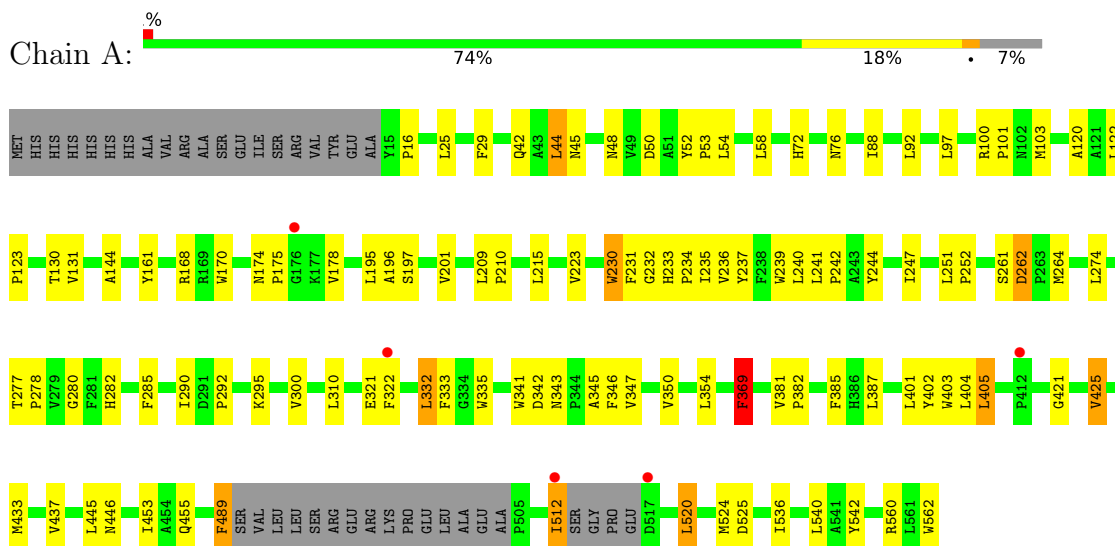
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	46	Total O 46 46	0	0
10	B	31	Total O 31 31	0	0



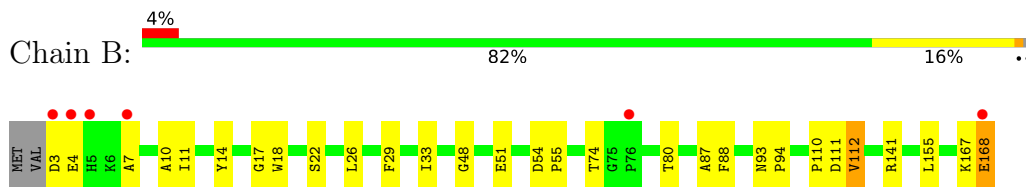
### 3 Residue-property plots [i](#)

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.

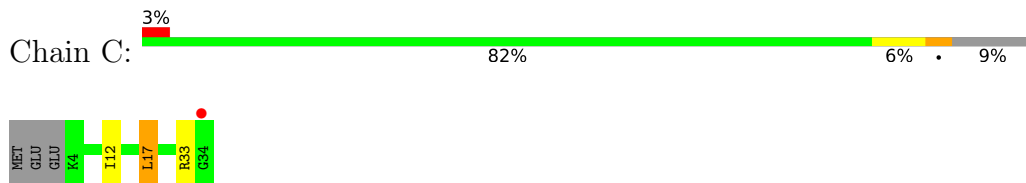
- Molecule 1: Cytochrome c oxidase subunit 1



- 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, $\alpha$ , $\beta$ , $\gamma$	143.38Å 98.88Å 95.49Å 90.00° 127.52° 90.00°	Depositor
Resolution (Å)	50.00 – 2.80 49.44 – 2.80	Depositor EDS
% Data completeness (in resolution range)	99.7 (50.00-2.80) 99.7 (49.44-2.80)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.15 (at 2.81Å)	Xtrriage
Refinement program	REFMAC 5.5.0110	Depositor
R, $R_{free}$	0.177 , 0.227 0.180 , 0.227	Depositor DCC
$R_{free}$ test set	1328 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	41.3	Xtrriage
Anisotropy	0.264	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 63.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	6231	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	29.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.86% 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 [i](#)

### 5.1 Standard geometry [i](#)

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

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# $ Z  > 5$	RMSZ	# $ Z  > 5$
1	A	0.86	0/4337	0.78	4/5960 (0.1%)
2	B	0.89	1/1322 (0.1%)	0.75	0/1809
3	C	0.92	0/247	0.76	0/335
All	All	0.87	1/5906 (0.0%)	0.77	4/8104 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	112	VAL	CB-CG2	-5.01	1.42	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	369	PHE	N-CA-CB	-6.28	99.30	110.60
1	A	50	ASP	CB-CG-OD2	5.85	123.56	118.30
1	A	342	ASP	CB-CG-OD1	5.33	123.10	118.30
1	A	131	VAL	N-CA-C	-5.30	96.69	111.00

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	4177	0	4248	78	0
2	B	1280	0	1238	17	0
3	C	241	0	267	3	0
4	A	1	0	0	0	0
5	A	43	0	30	3	0
6	A	65	0	62	1	0
7	A	2	0	0	0	0
8	A	268	0	393	19	0
8	B	50	0	80	8	0
8	C	25	0	40	0	0
9	B	2	0	0	0	0
10	A	46	0	0	1	0
10	B	31	0	0	1	0
All	All	6231	0	6358	110	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 9.

The worst 5 of 110 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:HE1	1:A:237:TYR:CE2	1.05	1.72
1:A:233:HIS:CE1	1:A:237:TYR:HE2	0.91	1.57
1:A:233:HIS:CE1	1:A:237:TYR:CE2	1.83	1.42
5:A:602:HEM:HMC2	5:A:602:HEM:HBC2	1.43	1.00
1:A:233:HIS:HE1	1:A:237:TYR:CZ	1.88	0.92

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	525/568 (92%)	501 (95%)	24 (5%)	0	100	100
2	B	165/168 (98%)	160 (97%)	4 (2%)	1 (1%)	25	56
3	C	29/34 (85%)	29 (100%)	0	0	100	100
All	All	719/770 (93%)	690 (96%)	28 (4%)	1 (0%)	51	81

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	110	PRO

### 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	424/462 (92%)	404 (95%)	20 (5%)	26	59
2	B	132/138 (96%)	129 (98%)	3 (2%)	50	82
3	C	24/27 (89%)	23 (96%)	1 (4%)	30	63
All	All	580/627 (92%)	556 (96%)	24 (4%)	30	64

5 of 24 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	425	VAL
1	A	520	LEU
1	A	512	ILE
1	A	536	ILE
1	A	230	TRP

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

Mol	Chain	Res	Type
1	A	233	HIS
1	A	446	ASN

*Continued on next page...*

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Mol	Chain	Res	Type
2	B	40	HIS

### 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 monosaccharides 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	$\# Z  > 2$
6	HAS	A	603	1,7	69,72,72	2.29	23 (33%)	73,109,109	1.48	10 (13%)
8	OLC	A	617	-	24,24,24	0.58	1 (4%)	25,25,25	0.66	0
8	OLC	A	616	-	20,20,24	0.52	0	21,21,25	0.76	0
7	PER	A	604	4,6	0,1,1	-	-	-	-	-
8	OLC	A	608	-	22,22,24	0.49	0	23,23,25	0.67	0
5	HEM	A	602	1	41,50,50	2.84	19 (46%)	45,82,82	2.12	13 (28%)
8	OLC	A	606	-	24,24,24	0.58	0	25,25,25	0.59	0
8	OLC	A	611	-	16,16,24	0.69	0	17,17,25	0.70	0
8	OLC	A	607	-	24,24,24	0.44	0	25,25,25	0.73	0
8	OLC	A	612	-	7,7,24	0.49	0	6,7,25	0.70	0
8	OLC	A	610	-	17,17,24	0.63	0	18,18,25	0.54	0
8	OLC	B	203	-	24,24,24	0.46	0	25,25,25	0.48	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
8	OLC	B	202	-	24,24,24	0.72	1 (4%)	25,25,25	0.86	1 (4%)
9	CUA	B	201	2	0,1,1	-	-	-		
8	OLC	A	615	-	24,24,24	0.64	1 (4%)	25,25,25	0.72	0
8	OLC	A	613	-	14,14,24	0.61	0	15,15,25	0.63	0
8	OLC	A	605	-	24,24,24	0.60	0	25,25,25	0.67	0
8	OLC	A	609	-	20,20,24	0.63	1 (5%)	20,20,25	0.70	1 (5%)
8	OLC	A	614	-	19,19,24	0.55	0	20,20,25	0.87	1 (5%)
8	OLC	C	101	-	24,24,24	0.84	1 (4%)	25,25,25	1.14	2 (8%)

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	A	609	-	-	6/19/19/24	-
8	OLC	A	610	-	-	10/17/17/24	-
8	OLC	A	608	-	-	8/22/22/24	-
6	HAS	A	603	1,7	1/1/8/18	5/40/82/82	-
8	OLC	A	614	-	-	12/19/19/24	-
8	OLC	B	202	-	-	7/24/24/24	-
8	OLC	B	203	-	-	11/24/24/24	-
8	OLC	A	615	-	-	15/24/24/24	-
8	OLC	A	613	-	-	6/14/14/24	-
8	OLC	A	617	-	-	15/24/24/24	-
8	OLC	A	606	-	-	12/24/24/24	-
8	OLC	A	611	-	-	7/16/16/24	-
8	OLC	A	607	-	-	13/24/24/24	-
8	OLC	A	612	-	-	6/6/6/24	-
8	OLC	C	101	-	-	10/24/24/24	-
8	OLC	A	616	-	-	11/20/20/24	-
5	HEM	A	602	1	-	4/12/54/54	-
8	OLC	A	605	-	-	13/24/24/24	-

The worst 5 of 47 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	603	HAS	C3C-C2C	7.86	1.51	1.40
6	A	603	HAS	C3C-CAC	-6.76	1.34	1.47
5	A	602	HEM	CAB-C3B	-5.83	1.31	1.47
5	A	602	HEM	C3B-C2B	5.80	1.49	1.37
5	A	602	HEM	FE-NB	5.76	2.25	1.96

The worst 5 of 28 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	602	HEM	C1B-NB-C4B	5.88	111.15	105.07
5	A	602	HEM	CHC-C4B-NB	5.73	130.65	124.43
6	A	603	HAS	C1D-ND-C4D	-5.37	99.52	105.07
5	A	602	HEM	CMA-C3A-C4A	-4.28	121.88	128.46
5	A	602	HEM	CHA-C4D-ND	3.84	129.12	124.38

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
6	A	603	HAS	NA

5 of 171 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	602	HEM	C2B-C3B-CAB-CBB
8	A	607	OLC	C21-C22-C24-O25
8	A	607	OLC	O20-C21-C22-C24
8	A	607	OLC	O20-C21-C22-O23
8	A	608	OLC	C21-C22-C24-O25

There are no ring outliers.

12 monomers are involved in 27 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	603	HAS	1	0
8	A	617	OLC	2	0
8	A	608	OLC	4	0
5	A	602	HEM	3	0
8	A	606	OLC	3	0
8	A	612	OLC	3	0
8	B	203	OLC	1	0
8	B	202	OLC	7	0
8	A	615	OLC	4	0

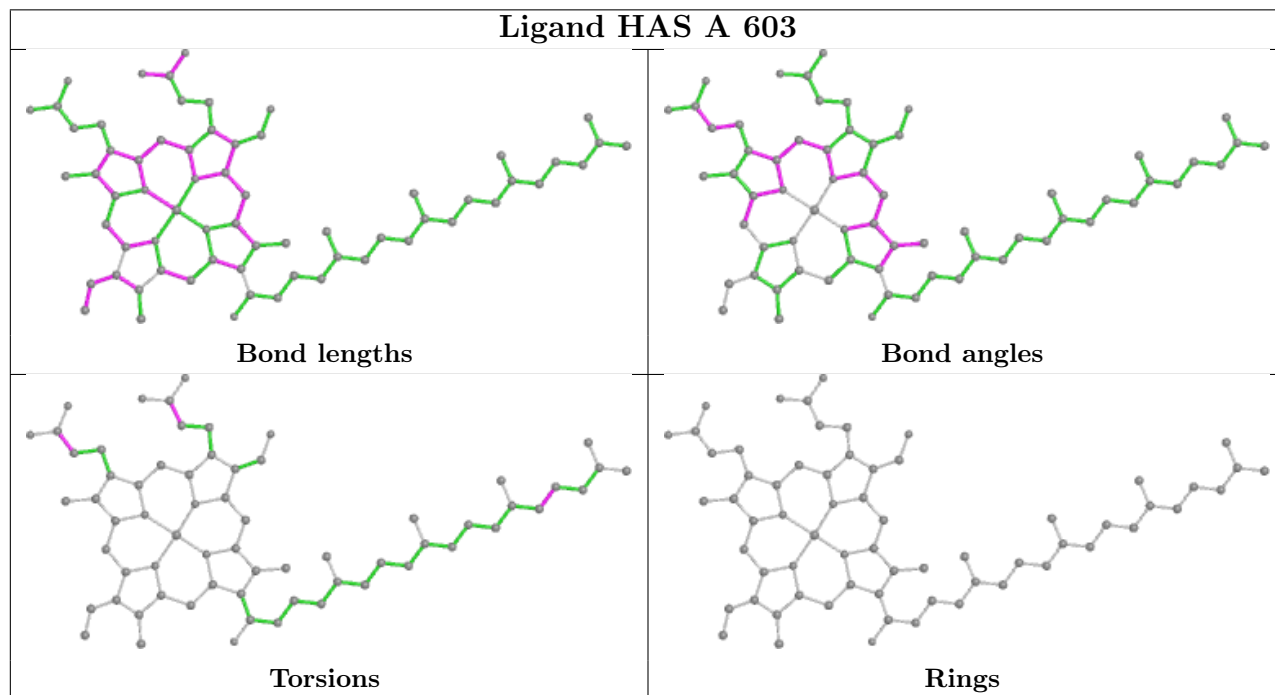
*Continued on next page...*

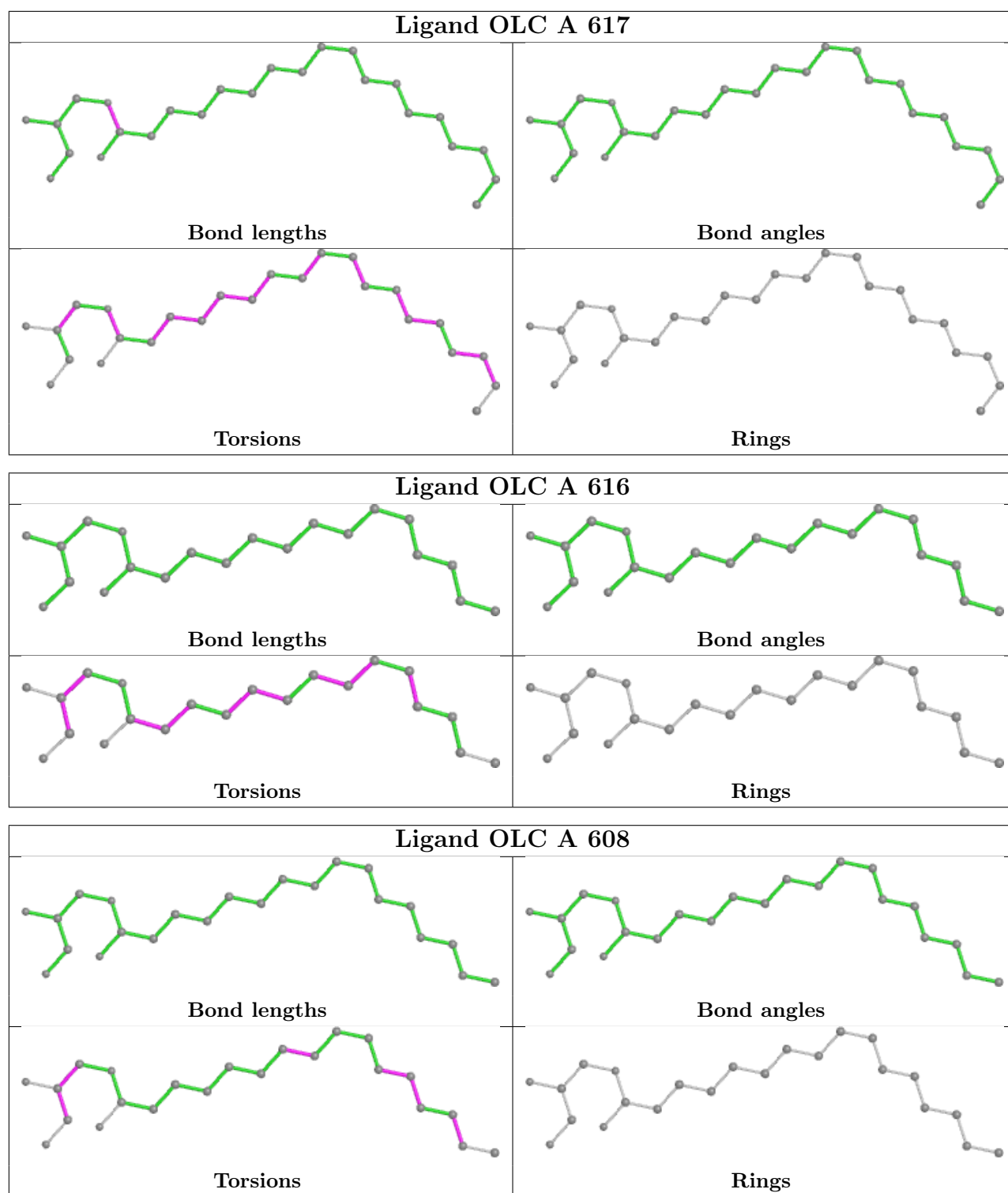


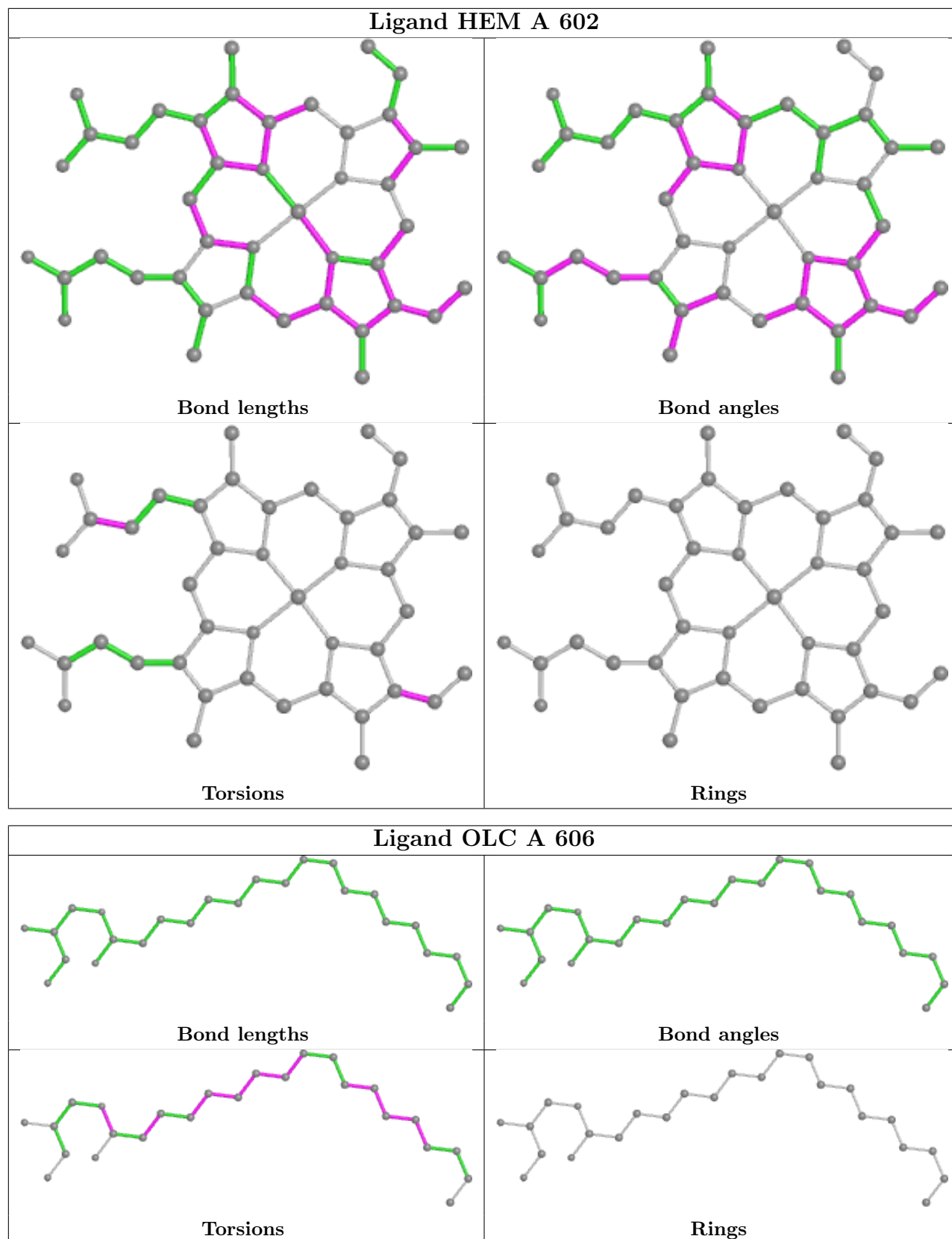
*Continued from previous page...*

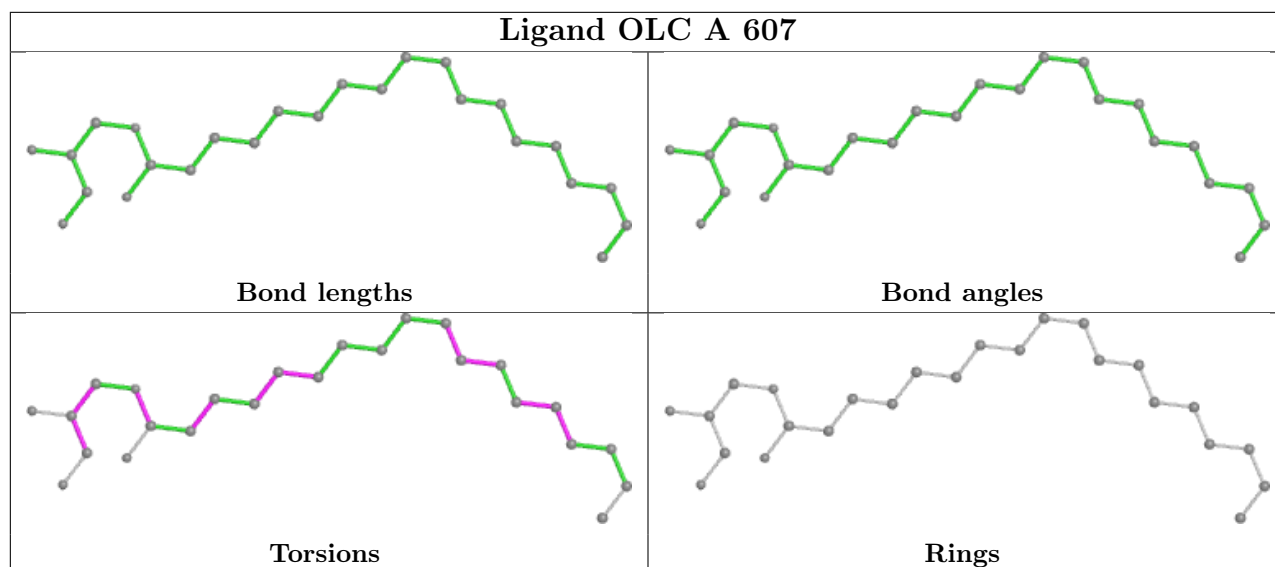
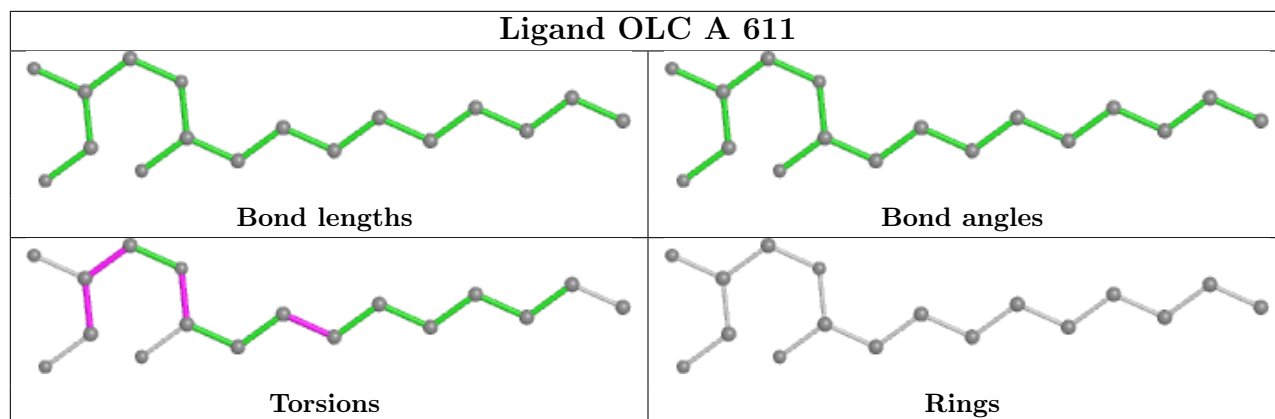
Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	A	613	OLC	2	0
8	A	605	OLC	5	0
8	A	614	OLC	1	0

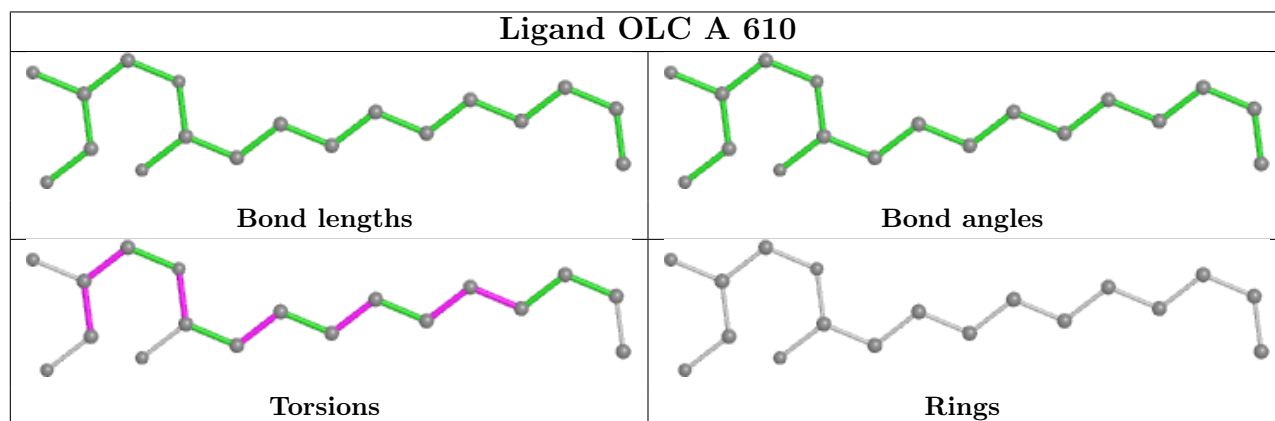
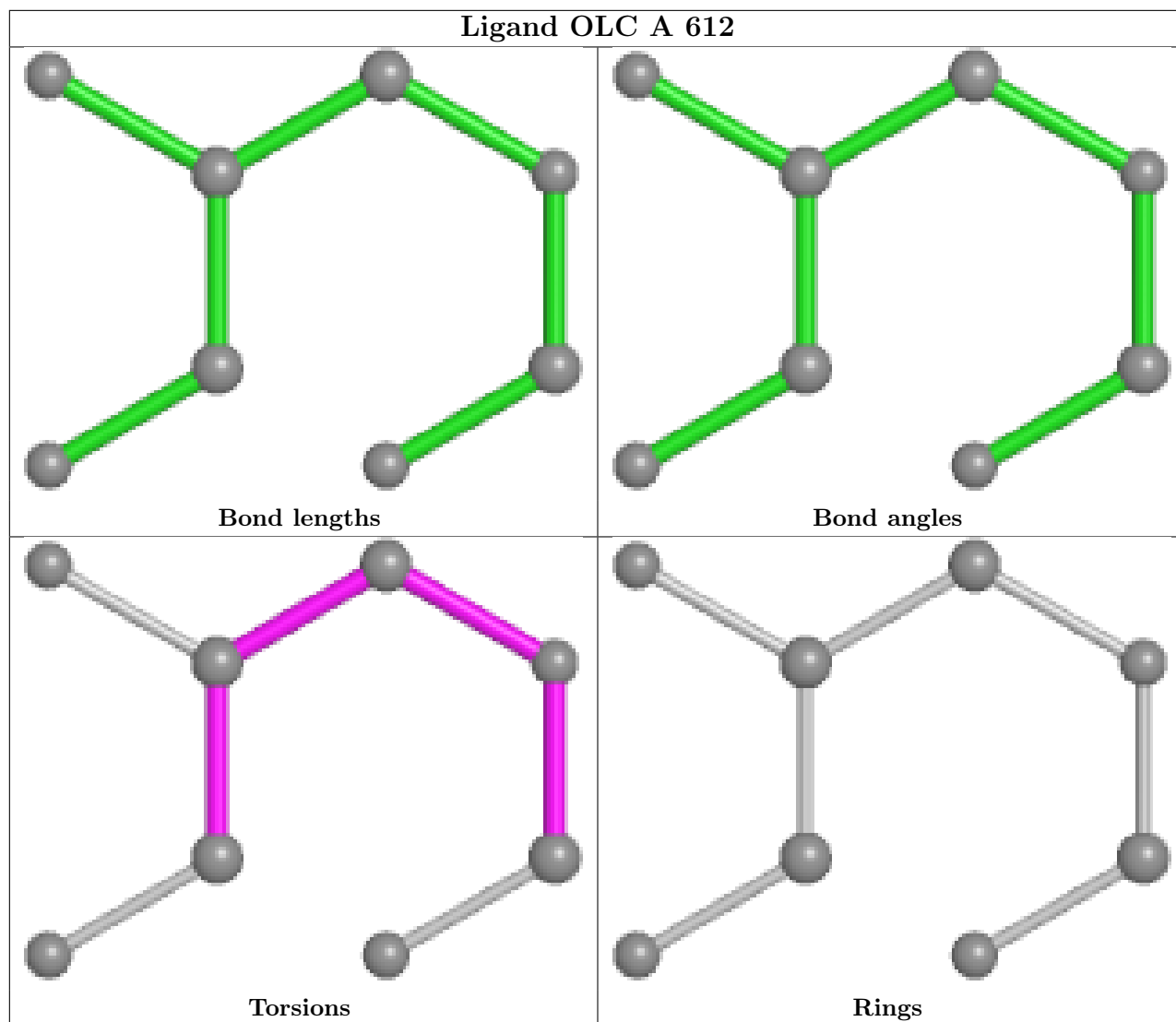
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

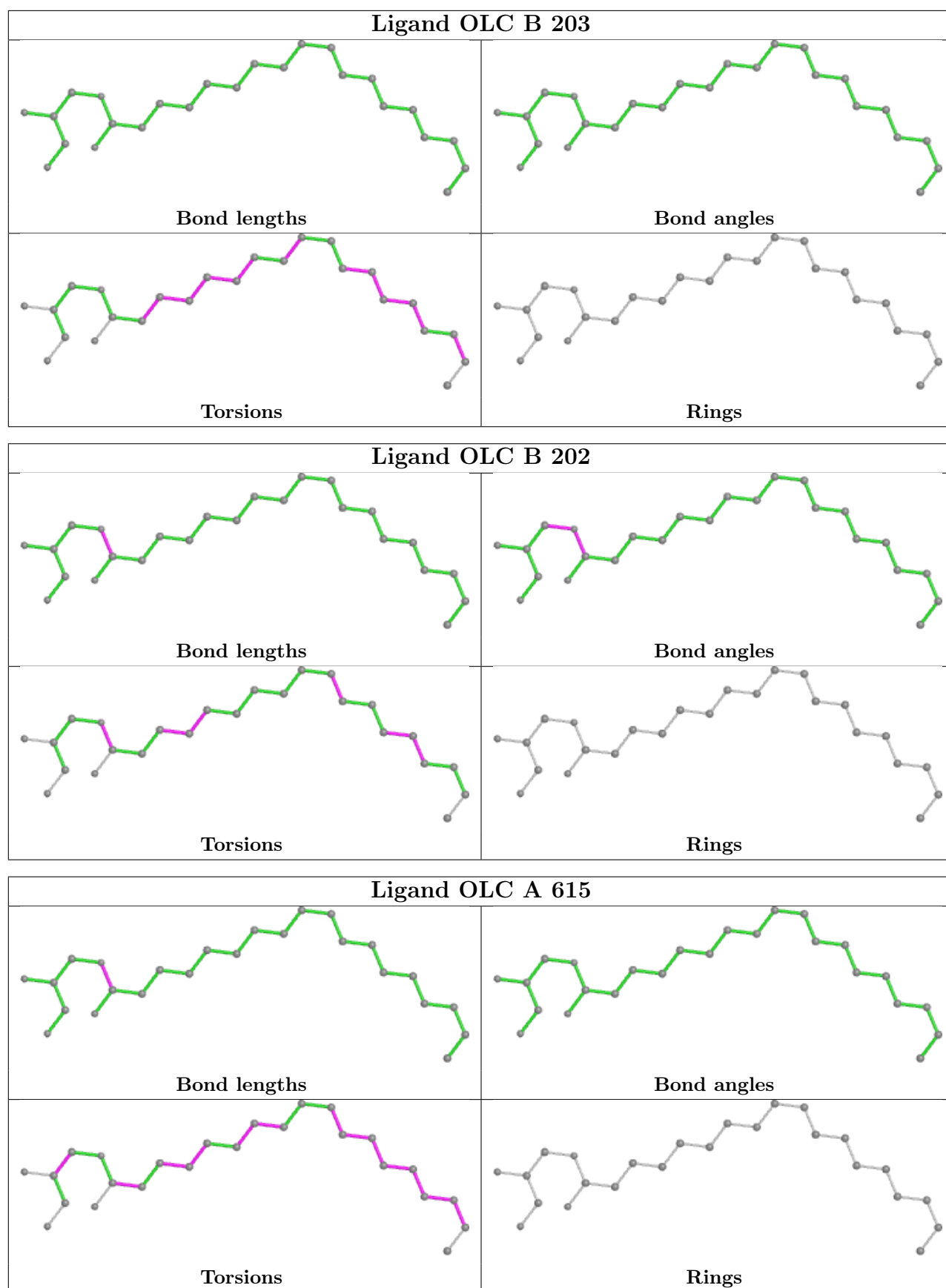


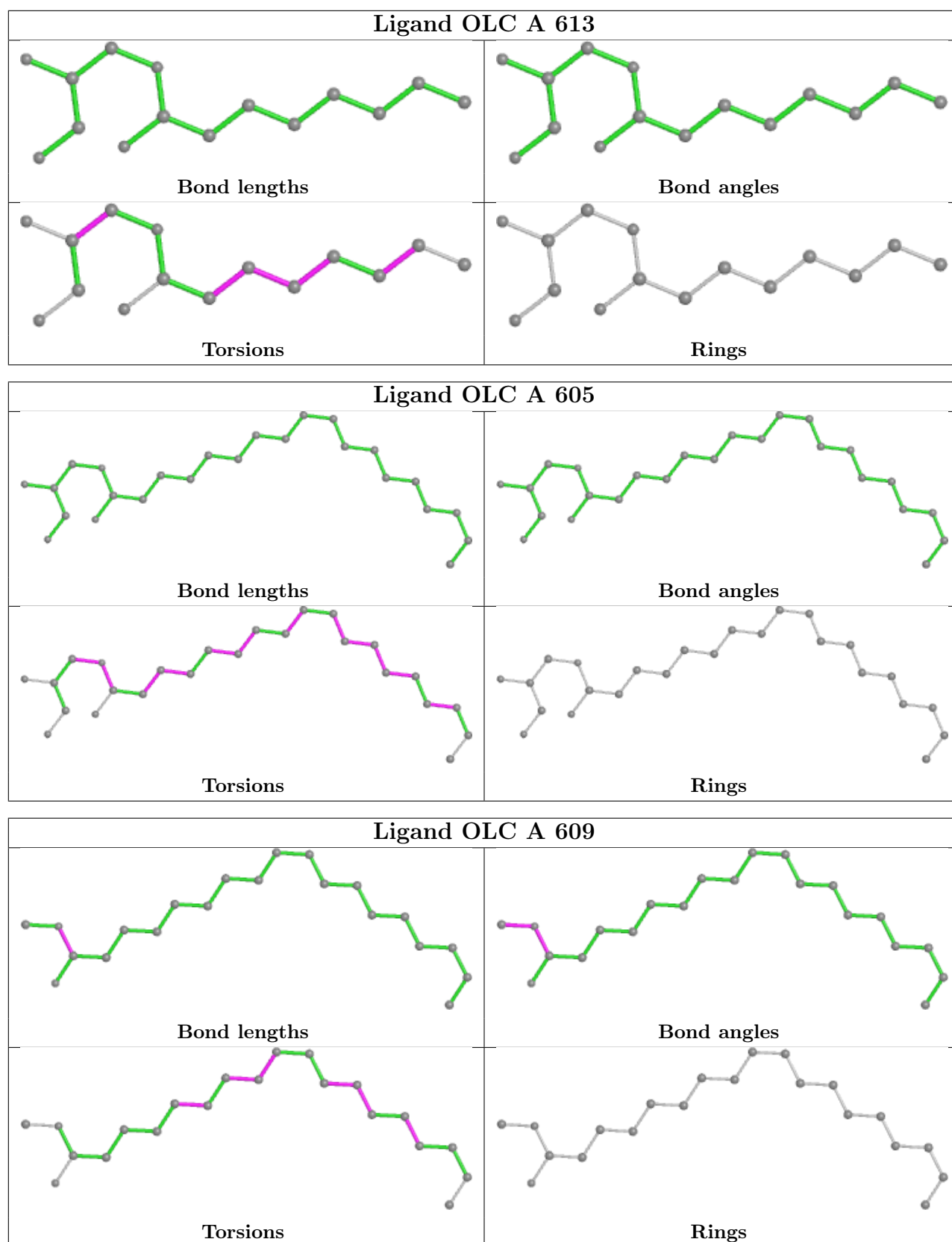


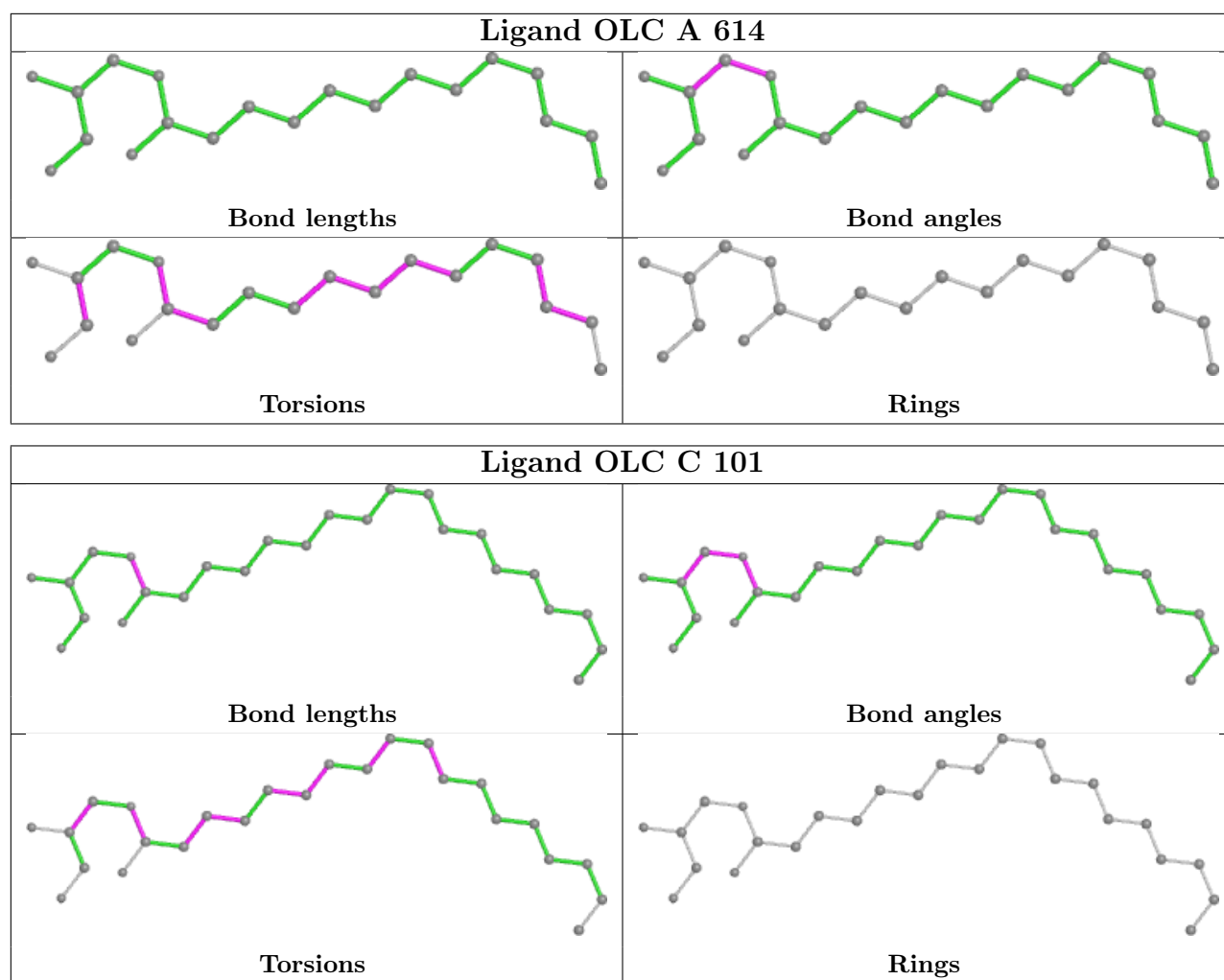












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.



## 6 Fit of model and data [i](#)

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

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	529/568 (93%)	-0.54	5 (0%) 84 80	16, 26, 43, 61	0
2	B	166/168 (98%)	-0.42	6 (3%) 42 32	18, 26, 39, 56	0
3	C	31/34 (91%)	-0.71	1 (3%) 47 37	21, 24, 39, 45	0
All	All	726/770 (94%)	-0.52	12 (1%) 70 63	16, 26, 43, 61	0

The worst 5 of 12 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	512	ILE	3.5
1	A	176	GLY	3.3
1	A	412	PRO	3.2
2	B	5	HIS	2.6
2	B	3	ASP	2.6

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

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

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

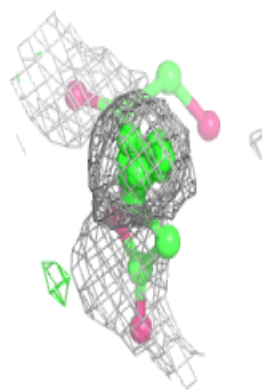
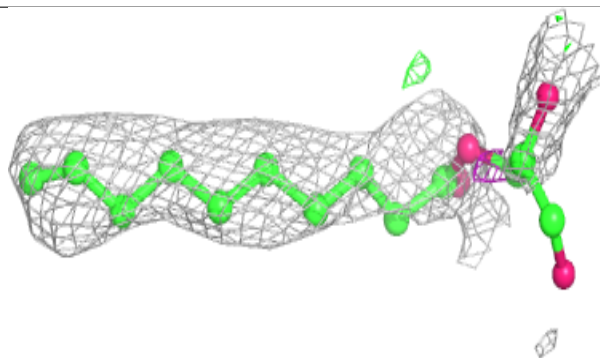
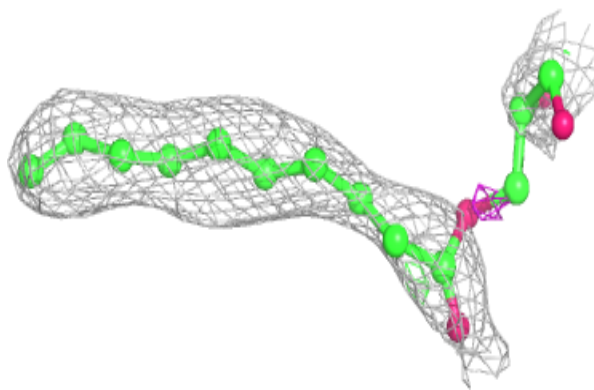
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 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	A	611	17/25	0.43	0.46	67,77,85,85	0
8	OLC	A	614	20/25	0.67	0.33	61,65,70,70	0
8	OLC	A	605	25/25	0.69	0.34	57,64,74,76	0
8	OLC	B	202	25/25	0.69	0.28	56,63,77,79	0
8	OLC	A	617	25/25	0.70	0.38	65,71,75,75	0
8	OLC	A	615	25/25	0.71	0.32	47,60,71,73	0
8	OLC	A	606	25/25	0.75	0.29	48,70,88,88	0
8	OLC	C	101	25/25	0.75	0.24	48,51,58,61	0
8	OLC	A	616	21/25	0.78	0.25	59,64,66,67	0
8	OLC	A	610	18/25	0.80	0.27	52,62,69,70	0
8	OLC	A	607	25/25	0.80	0.28	53,63,77,79	0
8	OLC	A	613	15/25	0.80	0.41	60,65,71,71	0
8	OLC	A	609	21/25	0.82	0.25	51,56,64,65	0
8	OLC	B	203	25/25	0.83	0.27	52,62,66,70	0
8	OLC	A	612	8/25	0.85	0.19	67,71,72,73	0
8	OLC	A	608	23/25	0.89	0.23	41,47,53,54	0
5	HEM	A	602	43/43	0.97	0.12	16,19,22,22	0
6	HAS	A	603	65/65	0.98	0.14	11,17,33,38	0
7	PER	A	604	2/2	0.98	0.16	28,28,28,28	0
9	CUA	B	201	2/2	0.99	0.07	21,21,21,23	0
4	CU	A	601	1/1	1.00	0.09	22,22,22,22	0

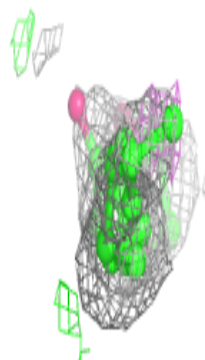
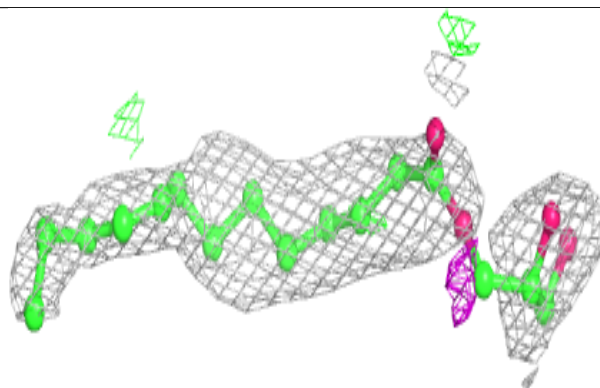
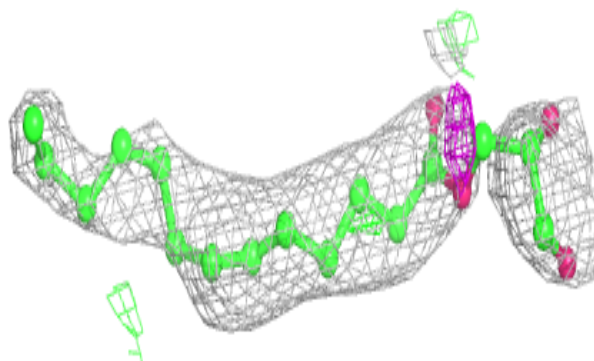
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around OLC A 611:**

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

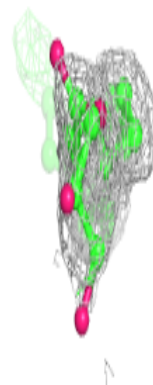
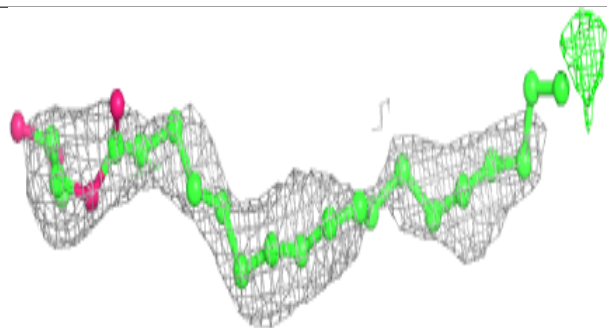
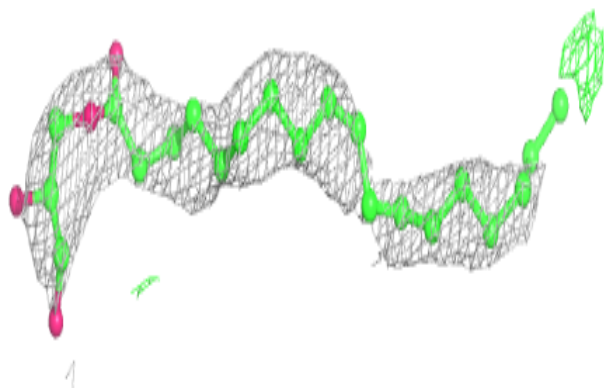
**Electron density around OLC A 614:**

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

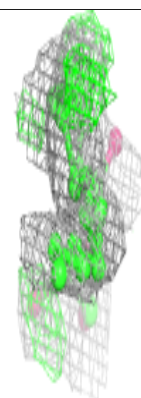
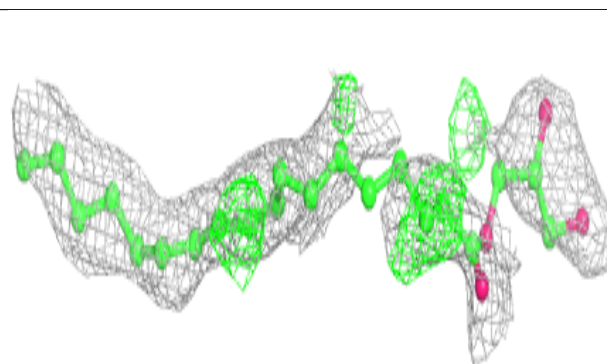
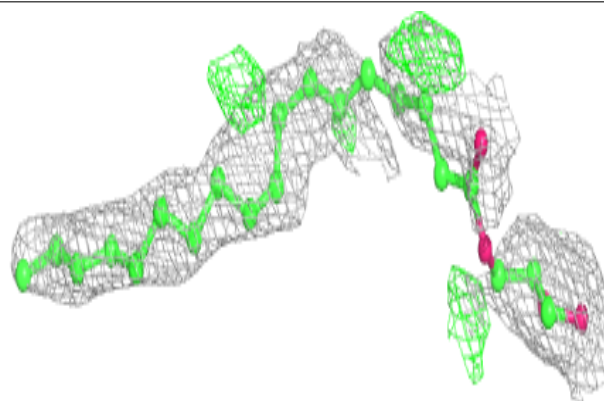


**Electron density around OLC A 605:**

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

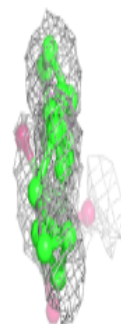
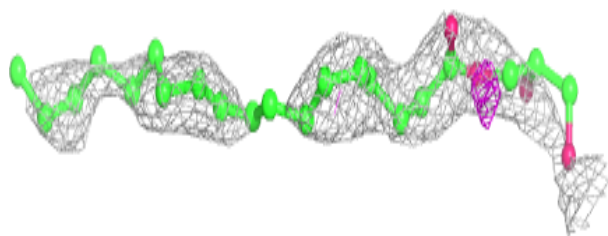
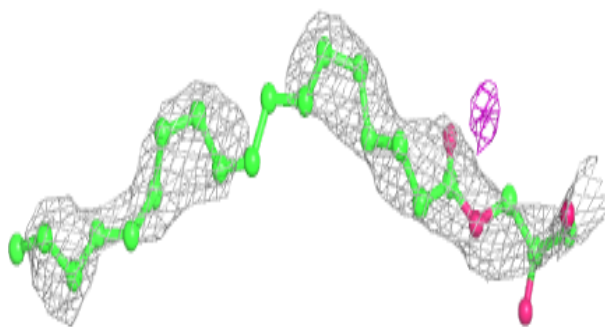
**Electron density around OLC B 202:**

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

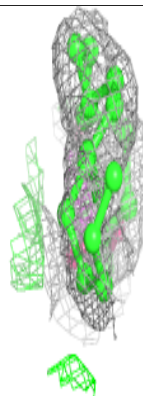
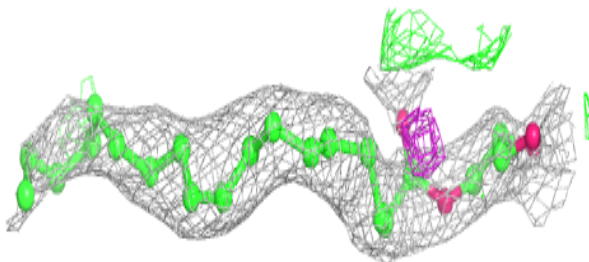
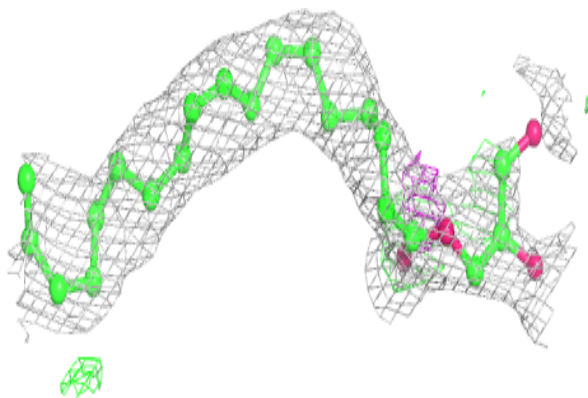


**Electron density around OLC A 617:**

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

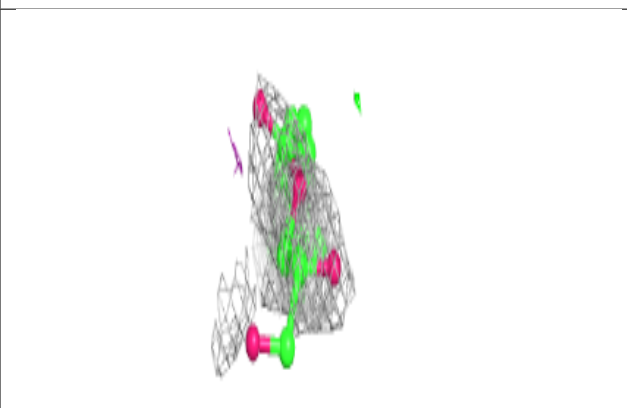
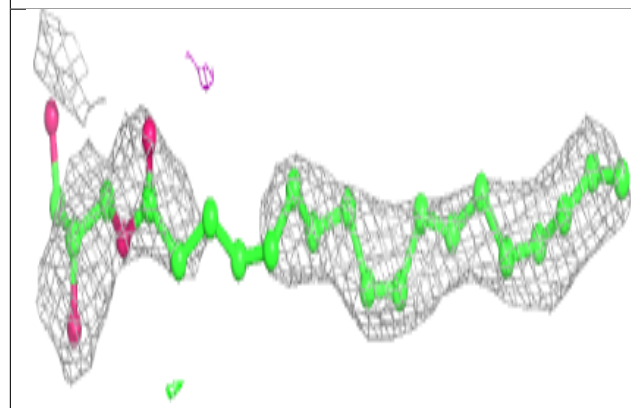
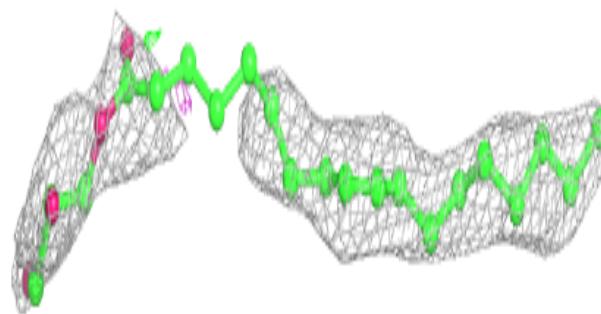
**Electron density around OLC A 615:**

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

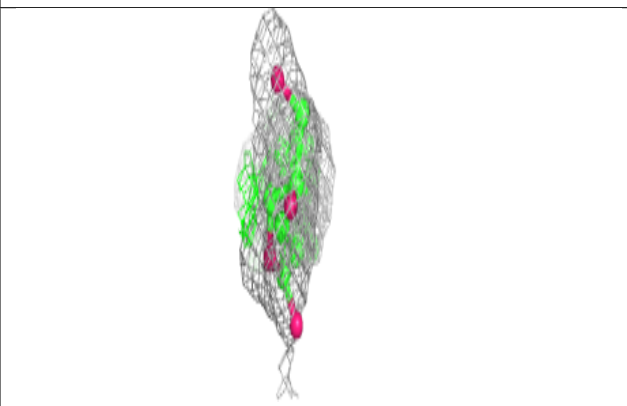
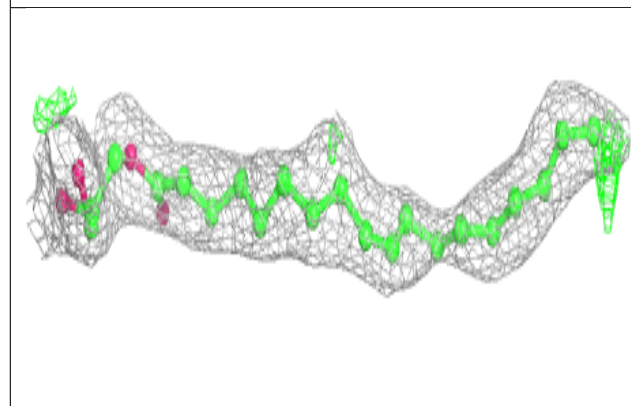
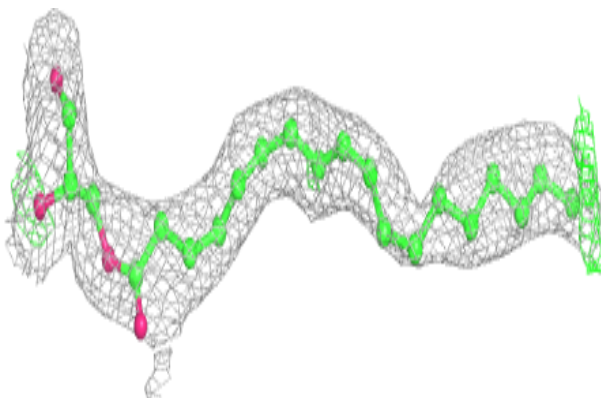


**Electron density around OLC A 606:**

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

**Electron density around OLC C 101:**

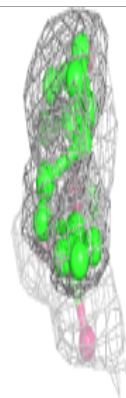
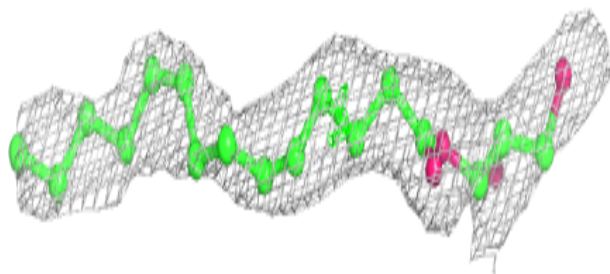
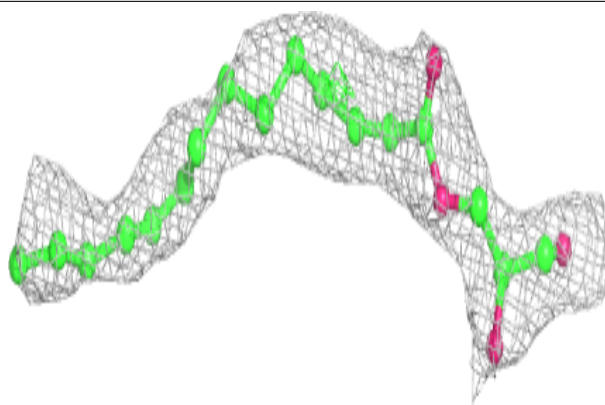
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



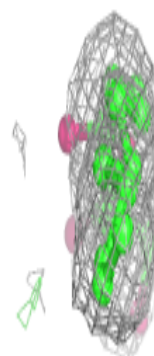
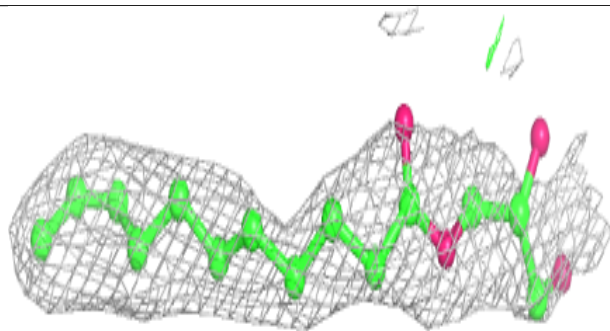
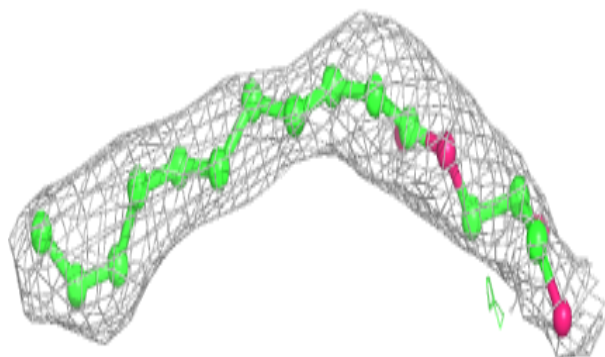


**Electron density around OLC A 616:**

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

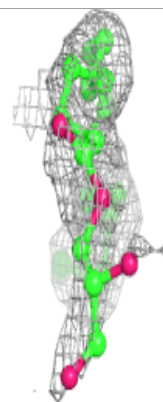
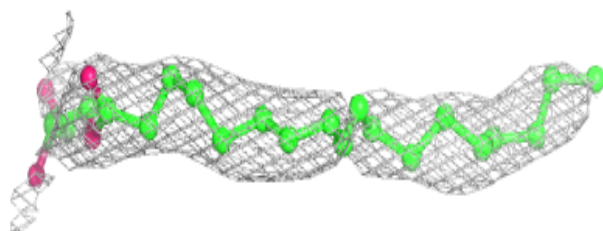
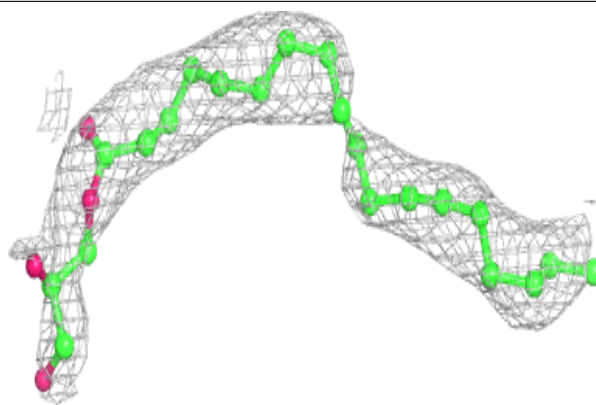
**Electron density around OLC A 610:**

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

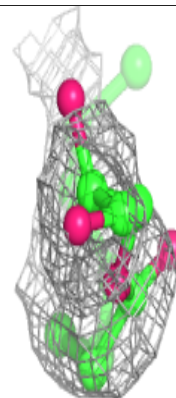
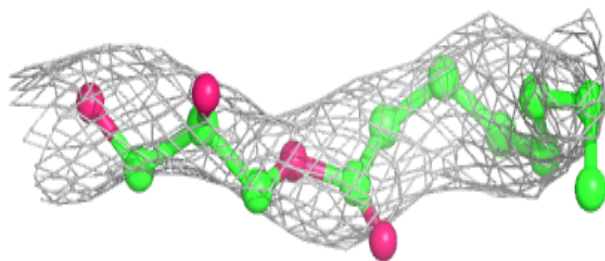
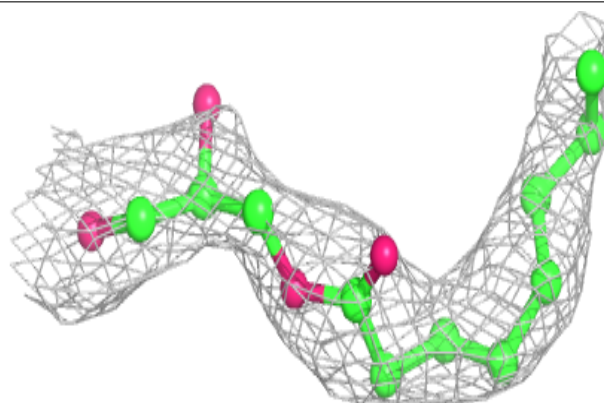


**Electron density around OLC A 607:**

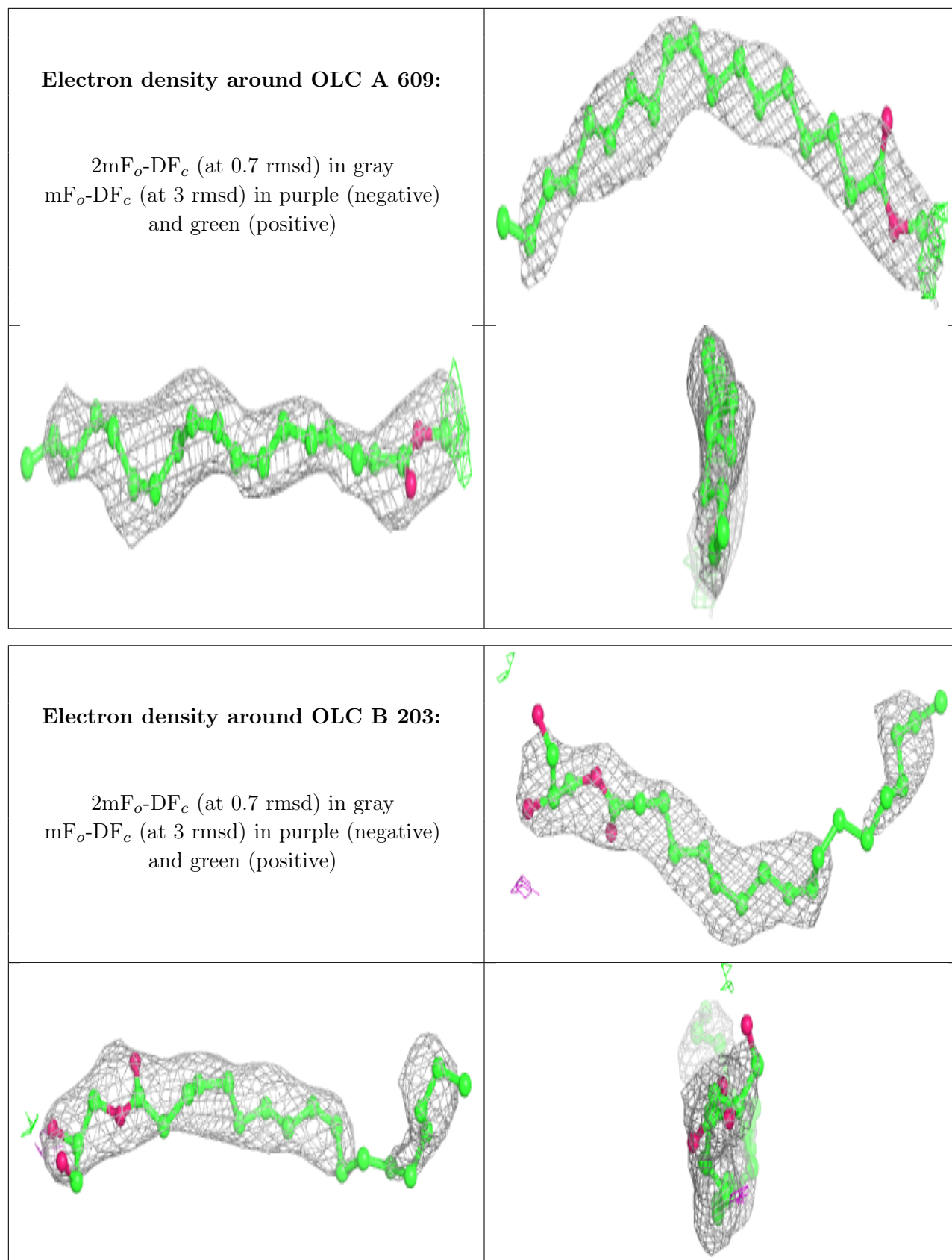
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around 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)

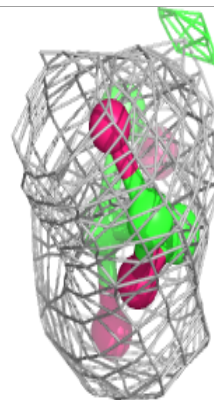
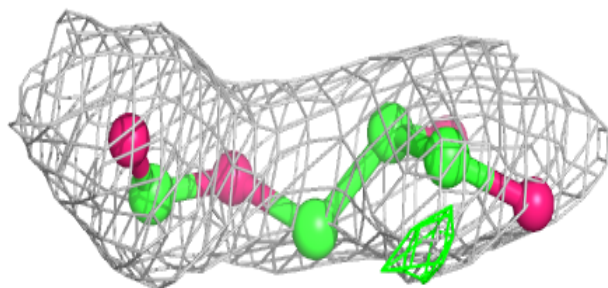
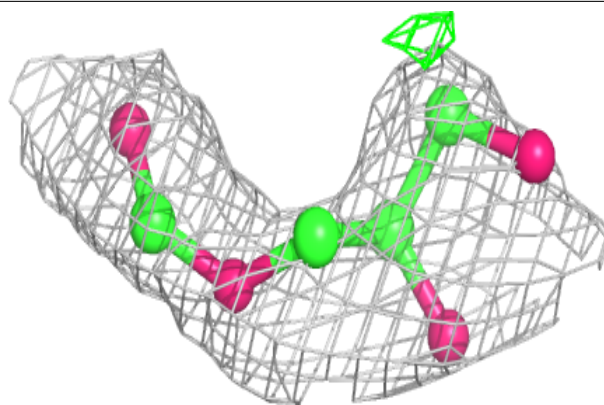




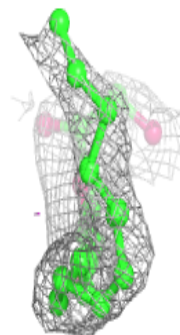
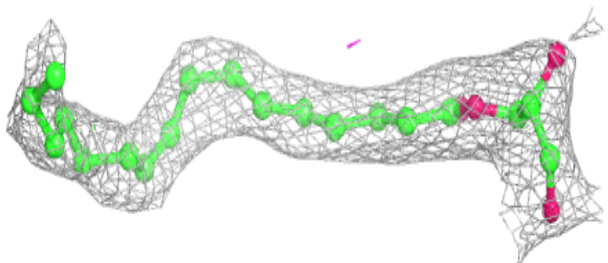
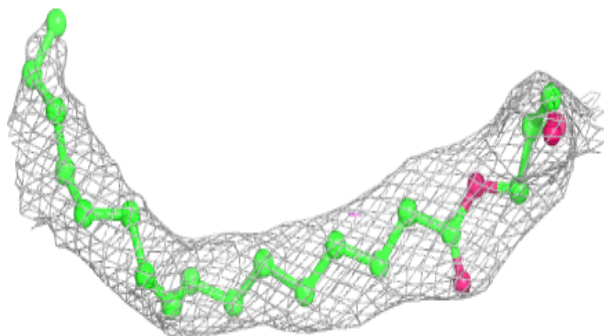


**Electron density around OLC A 612:**

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

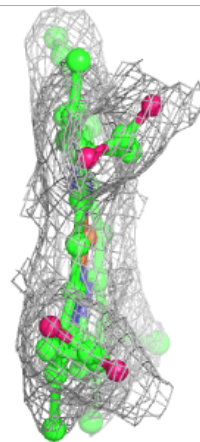
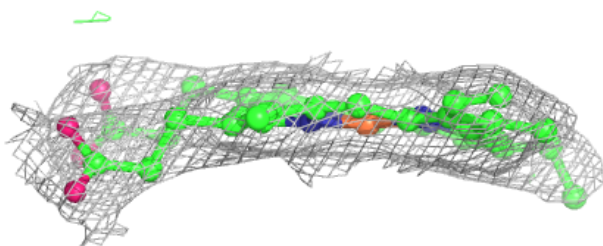
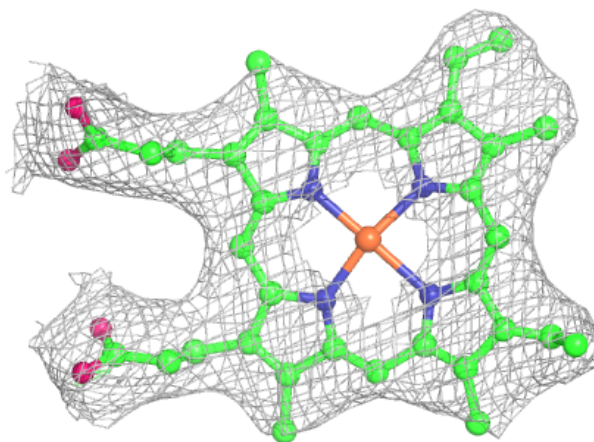
**Electron density around OLC A 608:**

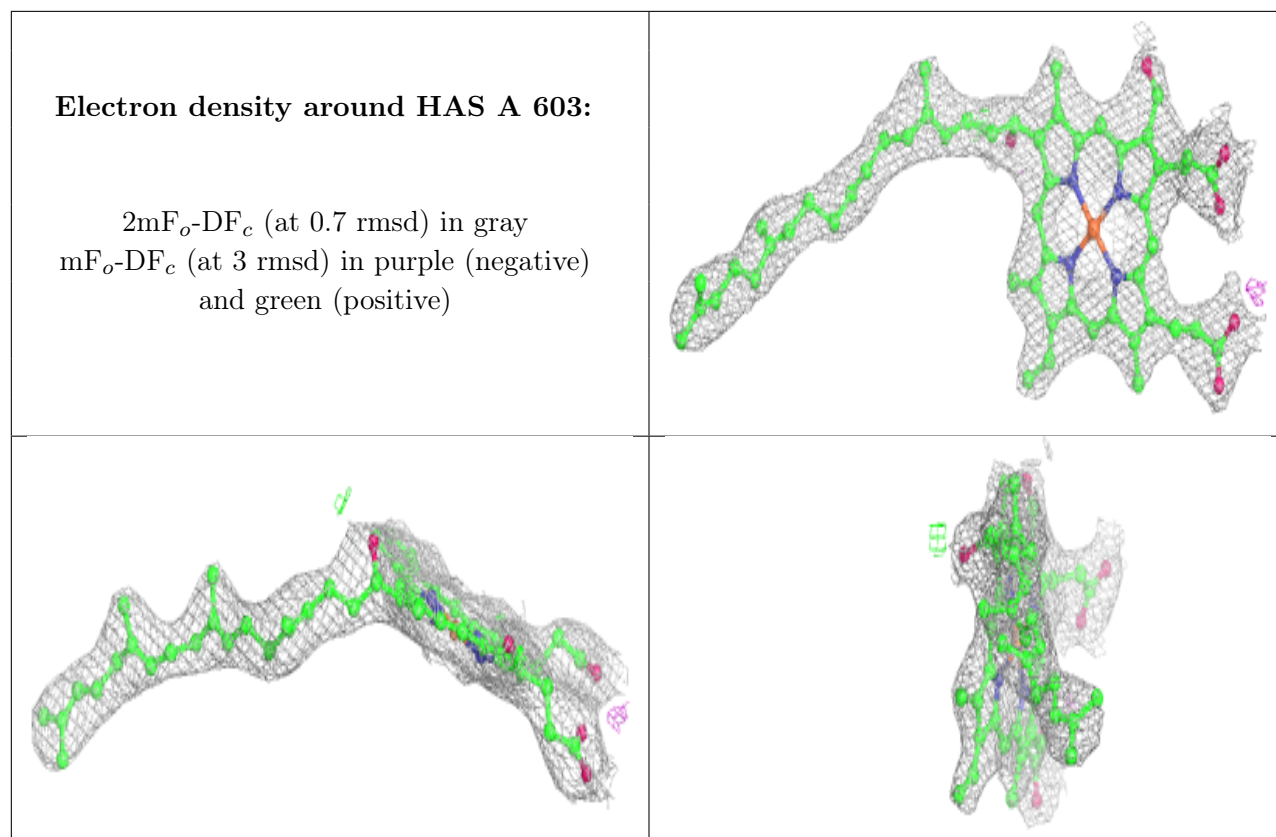
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around 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.