



# wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 21, 2023 – 04:46 PM JST

PDB ID : 7VLF  
Title : Oxy-deoxy intermediate of V2 hemoglobin at 26% oxygen saturation  
Authors : Numoto, N.; Onoda, S.; Kawano, Y.; Okumura, H.; Baba, S.; Fukumori, Y.;  
Miki, K.; Ito, N.  
Deposited on : 2021-10-02  
Resolution : 2.40 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

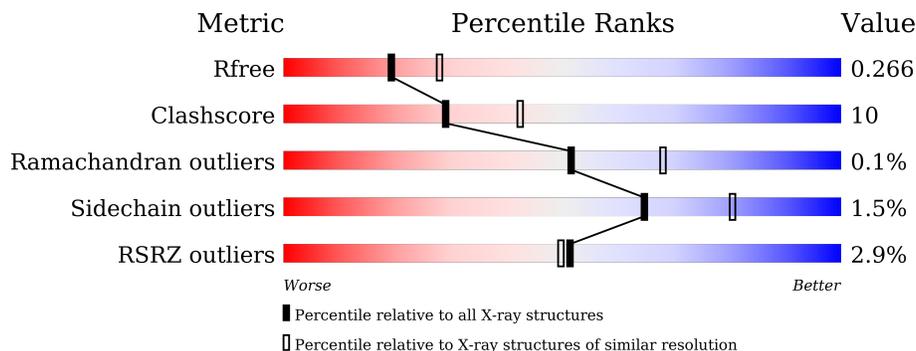
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 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.



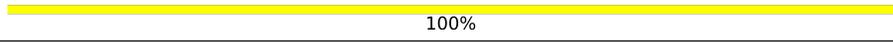
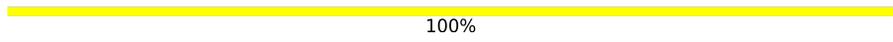
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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	146	83% (green), 17% (yellow)
1	E	146	84% (green), 14% (yellow), 2% (red), 2% (orange)
2	B	144	3% (red), 78% (green), 20% (yellow), 2% (orange)
2	F	144	2% (red), 89% (green), 11% (yellow)
3	C	150	4% (red), 72% (green), 28% (yellow)
3	G	150	5% (red), 79% (green), 20% (yellow)

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Mol	Chain	Length	Quality of chain
4	D	149	 5% 77% 23%
4	H	149	 3% 81% 17% ..
5	I	2	 100%
5	J	2	 100%

## 2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 9635 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 Extracellular A1 globin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	146	1151	736	198	209	8	0	0	0
1	E	146	1151	736	198	209	8	0	0	0

- Molecule 2 is a protein called Extracellular A2 globin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	143	1111	693	204	207	7	0	0	0
2	F	144	1120	697	206	210	7	0	0	0

- Molecule 3 is a protein called Extracellular B2 globin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	150	1158	718	211	221	8	0	0	0
3	G	150	1158	718	211	221	8	0	0	0

- Molecule 4 is a protein called Extracellular B1 globin.

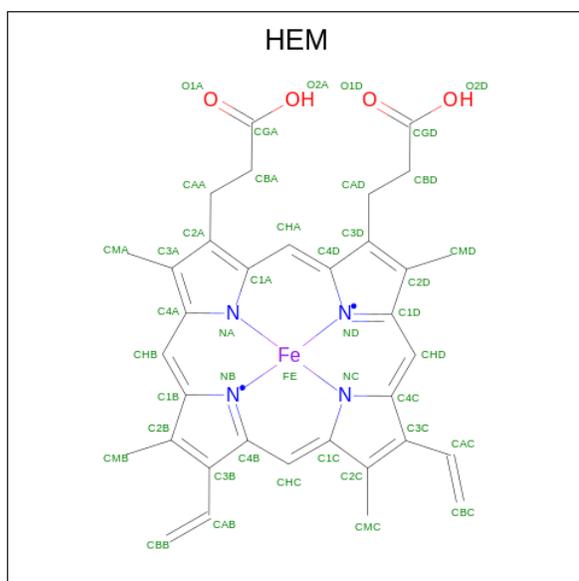
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	149	1140	727	196	210	7	0	0	0
4	H	147	1131	722	194	208	7	0	0	0

- Molecule 5 is an oligosaccharide called alpha-L-fucopyranose-(1-6)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	I	2	Total	C	N	O	0	0	0
			24	14	1	9			
5	J	2	Total	C	N	O	0	0	0
			24	14	1	9			

- Molecule 6 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula:  $C_{34}H_{32}FeN_4O_4$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
6	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
6	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
6	C	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
6	D	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
6	E	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
6	F	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
6	G	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

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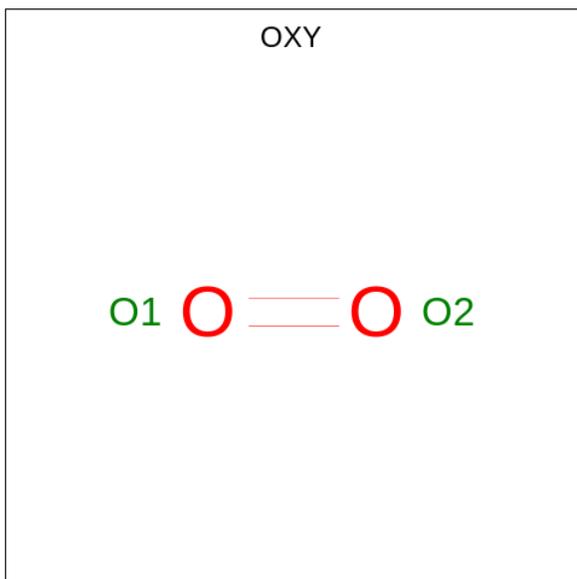
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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Fe	N			O
6	H	1	43	34	1	4	4	0	0

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	B	1	Total	Ca	0	0
			1	1		
7	F	1	Total	Ca	0	0
			1	1		

- Molecule 8 is OXYGEN MOLECULE (three-letter code: OXY) (formula: O<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	C	1	Total	O	0	0
			2	2		
8	D	1	Total	O	0	0
			2	2		
8	F	1	Total	O	0	0
			2	2		
8	G	1	Total	O	0	0
			2	2		

- Molecule 9 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	18	Total O 18 18	0	0
9	B	8	Total O 8 8	0	0
9	C	14	Total O 14 14	0	0
9	D	8	Total O 8 8	0	0
9	E	15	Total O 15 15	0	0
9	F	23	Total O 23 23	0	0
9	G	14	Total O 14 14	0	0
9	H	13	Total O 13 13	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: Extracellular A1 globin

Chain A:  83% 17%



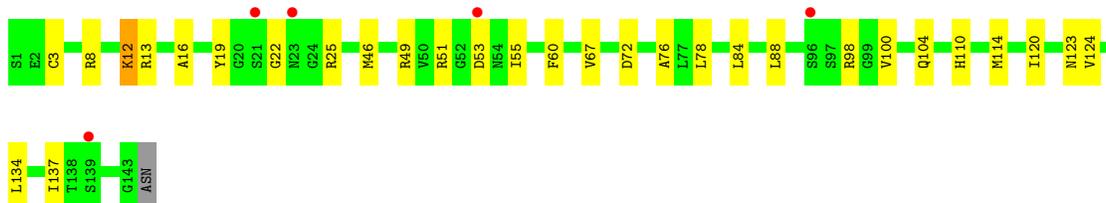
- Molecule 1: Extracellular A1 globin

Chain E:  84% 14% ..



- Molecule 2: Extracellular A2 globin

Chain B:  3% 78% 20% ..



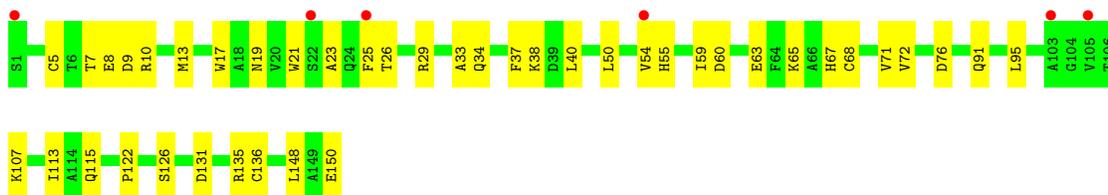
- Molecule 2: Extracellular A2 globin

Chain F:  2% 89% 11%

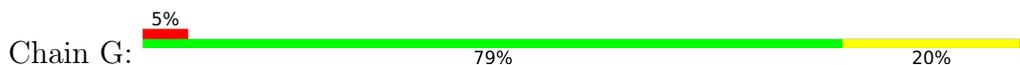


- Molecule 3: Extracellular B2 globin

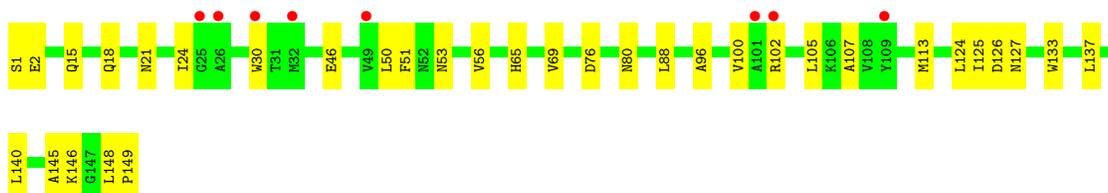
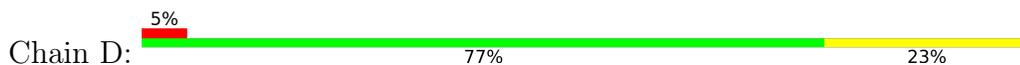
Chain C:  4% 72% 28%



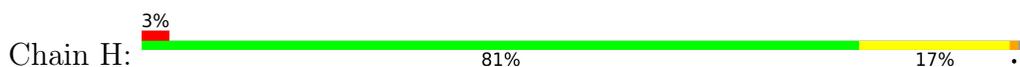
- Molecule 3: Extracellular B2 globin



- Molecule 4: Extracellular B1 globin



- Molecule 4: Extracellular B1 globin



- Molecule 5: alpha-L-fucopyranose-(1-6)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 5: alpha-L-fucopyranose-(1-6)-2-acetamido-2-deoxy-beta-D-glucopyranose



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 63	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	109.01Å 109.01Å 194.68Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	47.56 – 2.40 47.56 – 2.20	Depositor EDS
% Data completeness (in resolution range)	100.0 (47.56-2.40) 97.9 (47.56-2.20)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.07	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.28 (at 2.20Å)	Xtrriage
Refinement program	PHENIX 1.13_2998	Depositor
R, $R_{free}$	0.245 , 0.274 0.246 , 0.266	Depositor DCC
$R_{free}$ test set	3311 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	43.1	Xtrriage
Anisotropy	0.097	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 20.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.36$ , $\langle L^2 \rangle = 0.18$	Xtrriage
Estimated twinning fraction	0.138 for h,-h-k,-l	Xtrriage
Reported twinning fraction	0.200 for h,-h-k,-l	Depositor
Outliers	0 of 66052 reflections	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	9635	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	52.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.83% 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: FUC, NAG, CA, HEM, OXY

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	0.25	0/1178	0.36	0/1585
1	E	0.25	0/1178	0.37	0/1585
2	B	0.24	0/1134	0.36	0/1532
2	F	0.24	0/1143	0.37	0/1543
3	C	0.25	0/1181	0.41	0/1597
3	G	0.25	0/1181	0.39	0/1597
4	D	0.25	0/1164	0.39	0/1579
4	H	0.24	0/1154	0.39	0/1564
All	All	0.25	0/9313	0.38	0/12582

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1151	0	1123	19	0
1	E	1151	0	1123	17	0
2	B	1111	0	1071	29	0
2	F	1120	0	1077	14	0
3	C	1158	0	1115	35	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	G	1158	0	1115	32	0
4	D	1140	0	1140	30	0
4	H	1131	0	1131	17	0
5	I	24	0	22	0	0
5	J	24	0	22	0	0
6	A	43	0	30	3	0
6	B	43	0	30	3	0
6	C	43	0	30	2	0
6	D	43	0	30	2	0
6	E	43	0	30	1	0
6	F	43	0	30	3	0
6	G	43	0	30	2	0
6	H	43	0	30	3	0
7	B	1	0	0	0	0
7	F	1	0	0	0	0
8	C	2	0	0	0	0
8	D	2	0	0	0	0
8	F	2	0	0	0	0
8	G	2	0	0	0	0
9	A	18	0	0	0	0
9	B	8	0	0	1	0
9	C	14	0	0	2	0
9	D	8	0	0	2	0
9	E	15	0	0	0	0
9	F	23	0	0	3	0
9	G	14	0	0	1	0
9	H	13	0	0	1	0
All	All	9635	0	9179	179	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 10.

The worst 5 of 179 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)
3:C:23:ALA:HA	3:C:29:ARG:HH12	1.25	0.97
3:C:9:ASP:OD2	3:C:135:ARG:NH2	2.21	0.73
3:C:107:LYS:HD2	3:C:150:GLU:HG2	1.70	0.73
6:G:200:HEM:HBC2	6:G:200:HEM:HHD	1.70	0.73
2:B:3:CYS:O	2:B:8:ARG:NH1	2.23	0.72

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	144/146 (99%)	140 (97%)	4 (3%)	0	100	100
1	E	144/146 (99%)	140 (97%)	3 (2%)	1 (1%)	22	32
2	B	141/144 (98%)	140 (99%)	1 (1%)	0	100	100
2	F	142/144 (99%)	140 (99%)	2 (1%)	0	100	100
3	C	148/150 (99%)	143 (97%)	5 (3%)	0	100	100
3	G	148/150 (99%)	142 (96%)	6 (4%)	0	100	100
4	D	147/149 (99%)	144 (98%)	3 (2%)	0	100	100
4	H	143/149 (96%)	141 (99%)	2 (1%)	0	100	100
All	All	1157/1178 (98%)	1130 (98%)	26 (2%)	1 (0%)	51	68

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	49	VAL

### 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	120/120 (100%)	119 (99%)	1 (1%)	81	91

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	120/120 (100%)	116 (97%)	4 (3%)	38	57
2	B	115/116 (99%)	113 (98%)	2 (2%)	60	78
2	F	116/116 (100%)	116 (100%)	0	100	100
3	C	124/124 (100%)	123 (99%)	1 (1%)	81	91
3	G	124/124 (100%)	122 (98%)	2 (2%)	62	79
4	D	122/122 (100%)	120 (98%)	2 (2%)	62	79
4	H	122/122 (100%)	120 (98%)	2 (2%)	62	79
All	All	963/964 (100%)	949 (98%)	14 (2%)	65	80

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

Mol	Chain	Res	Type
1	E	59	PHE
1	E	77	PHE
4	H	46	GLU
3	G	63	GLU
4	H	29	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 22 such sidechains are listed below:

Mol	Chain	Res	Type
2	F	142	GLN
3	G	34	GLN
3	G	24	GLN
3	G	115	GLN
4	D	34	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

4 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	NAG	I	1	5,4	14,14,15	0.22	0	17,19,21	0.73	1 (5%)
5	FUC	I	2	5	10,10,11	0.80	0	14,14,16	1.10	2 (14%)
5	NAG	J	1	5,4	14,14,15	0.51	0	17,19,21	0.70	1 (5%)
5	FUC	J	2	5	10,10,11	0.86	1 (10%)	14,14,16	1.12	2 (14%)

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
5	NAG	I	1	5,4	-	2/6/23/26	0/1/1/1
5	FUC	I	2	5	-	-	0/1/1/1
5	NAG	J	1	5,4	-	2/6/23/26	0/1/1/1
5	FUC	J	2	5	-	-	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	J	2	FUC	O5-C5	2.16	1.48	1.43

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	I	1	NAG	C1-O5-C5	2.61	115.73	112.19
5	J	2	FUC	C1-O5-C5	2.60	118.67	112.78
5	I	2	FUC	C1-O5-C5	2.57	118.61	112.78
5	J	2	FUC	O5-C5-C4	2.45	113.91	109.52
5	I	2	FUC	O5-C5-C4	2.35	113.73	109.52

There are no chirality outliers.

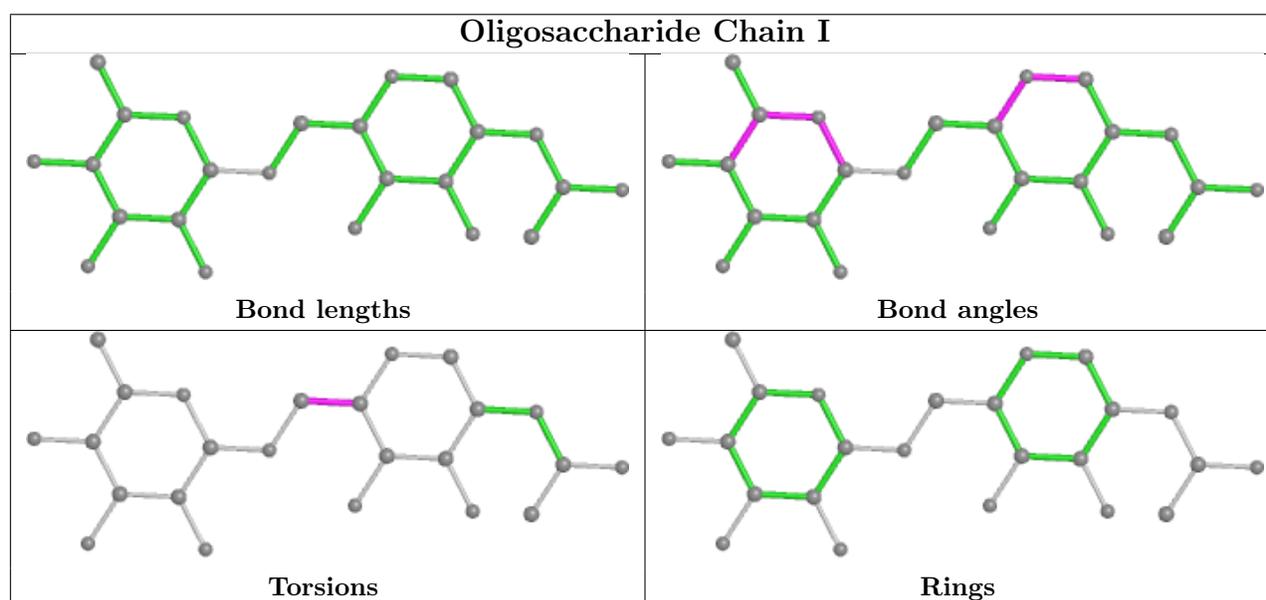
All (4) torsion outliers are listed below:

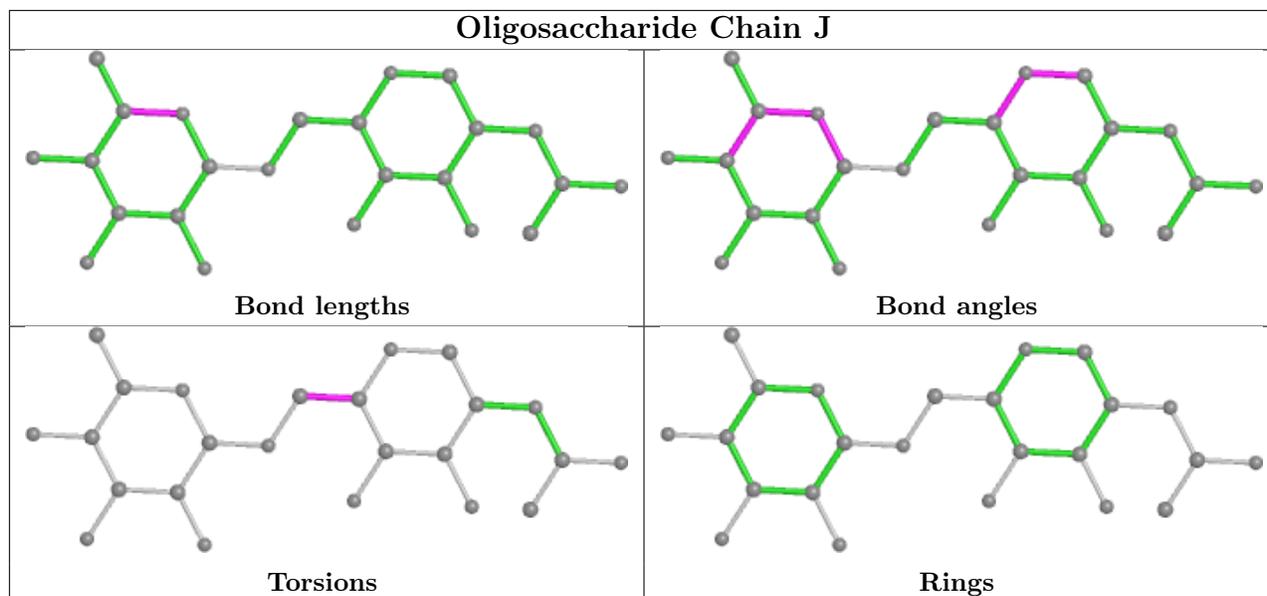
Mol	Chain	Res	Type	Atoms
5	I	1	NAG	O5-C5-C6-O6
5	J	1	NAG	O5-C5-C6-O6
5	I	1	NAG	C4-C5-C6-O6
5	J	1	NAG	C4-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.





## 5.6 Ligand geometry [i](#)

Of 14 ligands modelled in this entry, 2 are monoatomic - leaving 12 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	HEM	F	201	2,8	41,50,50	1.95	7 (17%)	45,82,82	1.57	6 (13%)
6	HEM	H	201	4	41,50,50	1.93	6 (14%)	45,82,82	1.64	7 (15%)
6	HEM	C	200	3,8	41,50,50	1.97	6 (14%)	45,82,82	1.72	6 (13%)
8	OXY	D	202	6	1,1,1	0.14	0	-		
6	HEM	G	200	3,8	41,50,50	1.98	7 (17%)	45,82,82	1.76	7 (15%)
8	OXY	G	201	6	1,1,1	0.13	0	-		
6	HEM	D	201	4,8	41,50,50	1.94	7 (17%)	45,82,82	1.64	6 (13%)
6	HEM	A	200	1	41,50,50	2.00	7 (17%)	45,82,82	1.71	7 (15%)
6	HEM	E	200	1	41,50,50	1.97	8 (19%)	45,82,82	1.65	7 (15%)
6	HEM	B	201	2	41,50,50	1.92	5 (12%)	45,82,82	1.63	8 (17%)
8	OXY	F	202	6	1,1,1	0.14	0	-		
8	OXY	C	201	6	1,1,1	0.14	0	-		

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	HEM	F	201	2,8	-	4/12/54/54	-
6	HEM	H	201	4	-	2/12/54/54	-
6	HEM	C	200	3,8	-	5/12/54/54	-
6	HEM	G	200	3,8	-	5/12/54/54	-
6	HEM	D	201	4,8	-	2/12/54/54	-
6	HEM	A	200	1	-	2/12/54/54	-
6	HEM	E	200	1	-	2/12/54/54	-
6	HEM	B	201	2	-	2/12/54/54	-

The worst 5 of 53 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	D	201	HEM	C3D-C2D	8.06	1.53	1.36
6	A	200	HEM	C3D-C2D	8.01	1.53	1.36
6	H	201	HEM	C3D-C2D	8.01	1.53	1.36
6	C	200	HEM	C3D-C2D	8.00	1.53	1.36
6	G	200	HEM	C3D-C2D	7.98	1.53	1.36

The worst 5 of 54 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	200	HEM	C4D-ND-C1D	6.71	112.00	105.07
6	C	200	HEM	C4D-ND-C1D	6.56	111.85	105.07
6	E	200	HEM	C4D-ND-C1D	6.27	111.55	105.07
6	G	200	HEM	C4D-ND-C1D	6.23	111.50	105.07
6	D	201	HEM	C4D-ND-C1D	6.17	111.45	105.07

There are no chirality outliers.

5 of 24 torsion outliers are listed below:

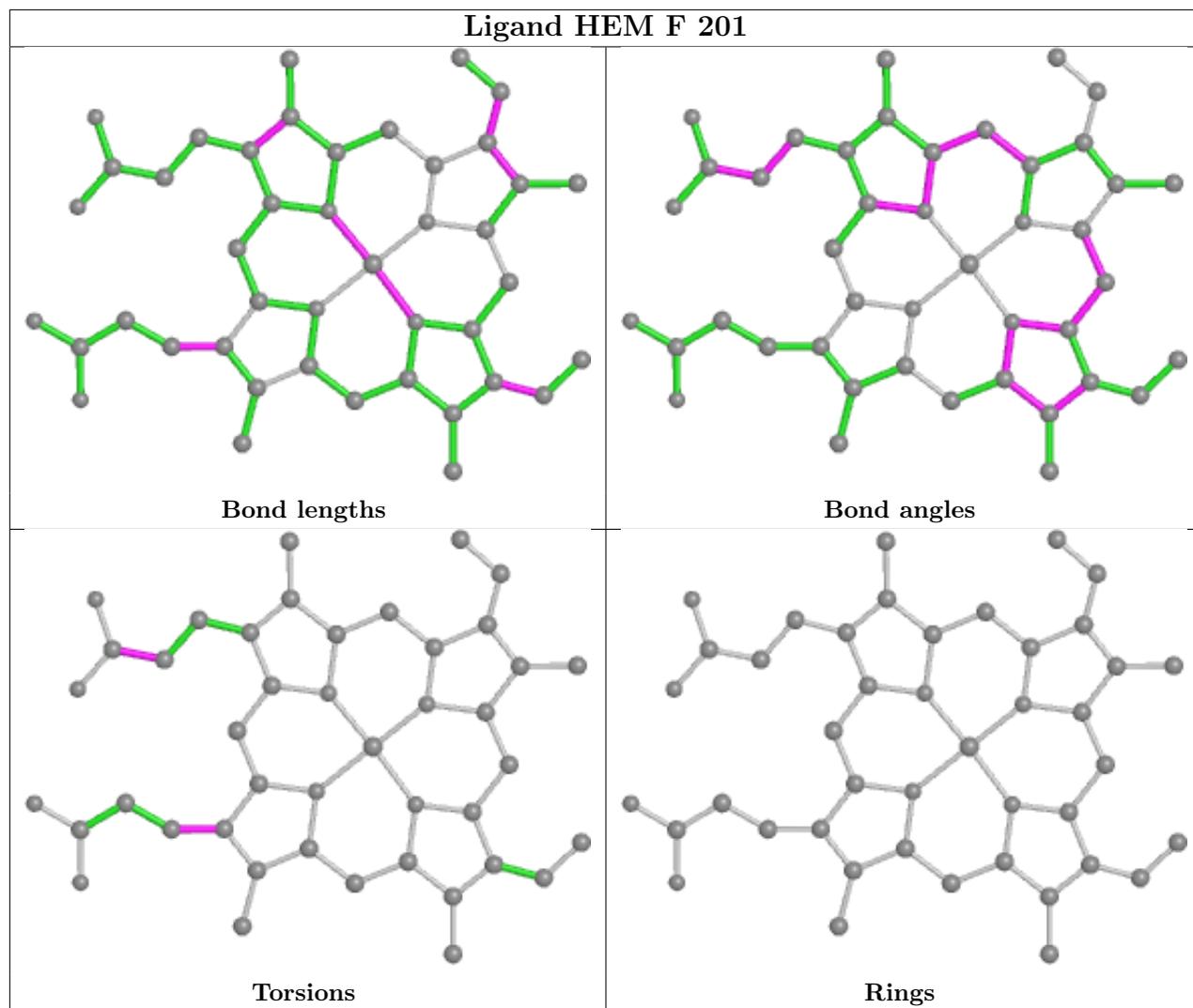
Mol	Chain	Res	Type	Atoms
6	B	201	HEM	C2B-C3B-CAB-CBB
6	C	200	HEM	C2B-C3B-CAB-CBB
6	C	200	HEM	C4B-C3B-CAB-CBB
6	F	201	HEM	C1A-C2A-CAA-CBA
6	F	201	HEM	C3A-C2A-CAA-CBA

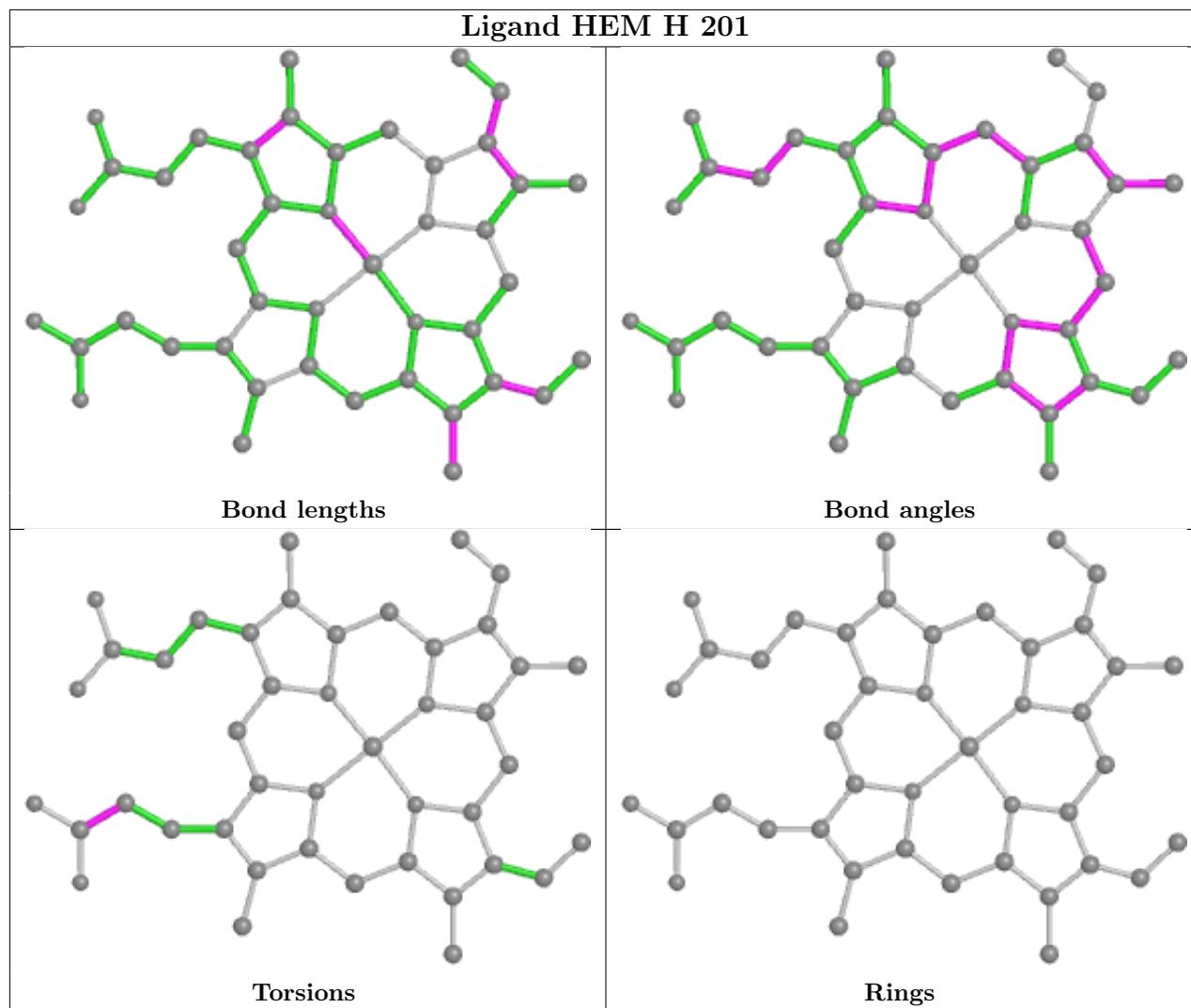
There are no ring outliers.

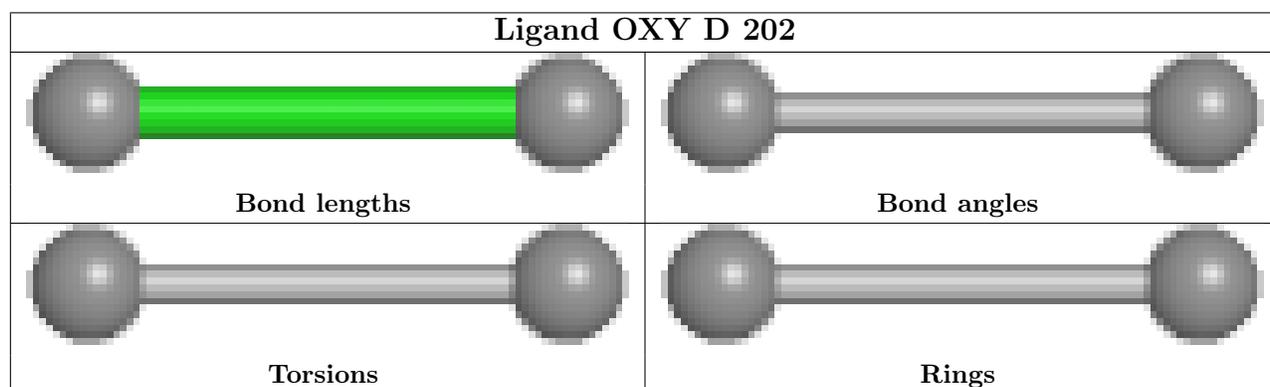
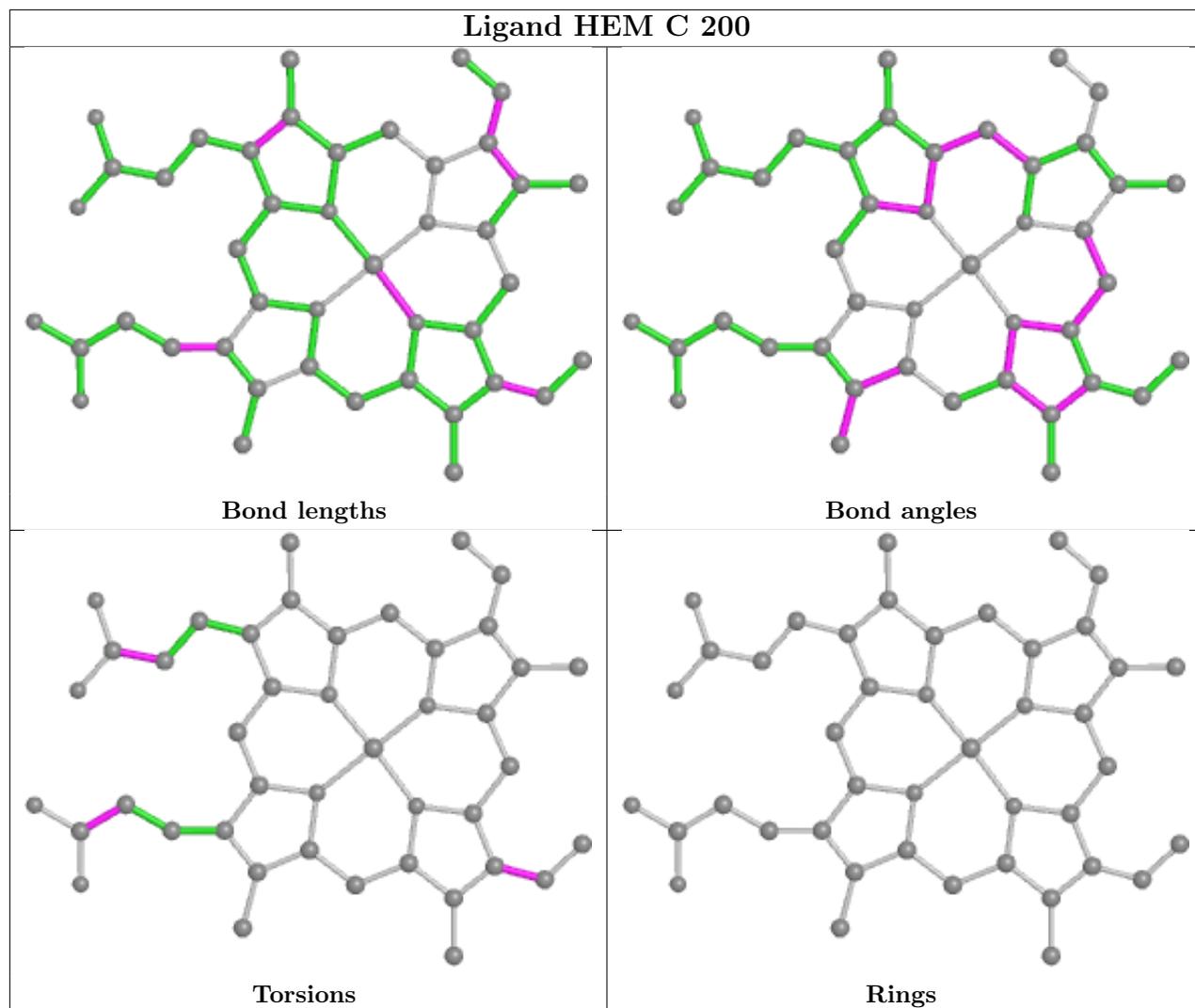
8 monomers are involved in 19 short contacts:

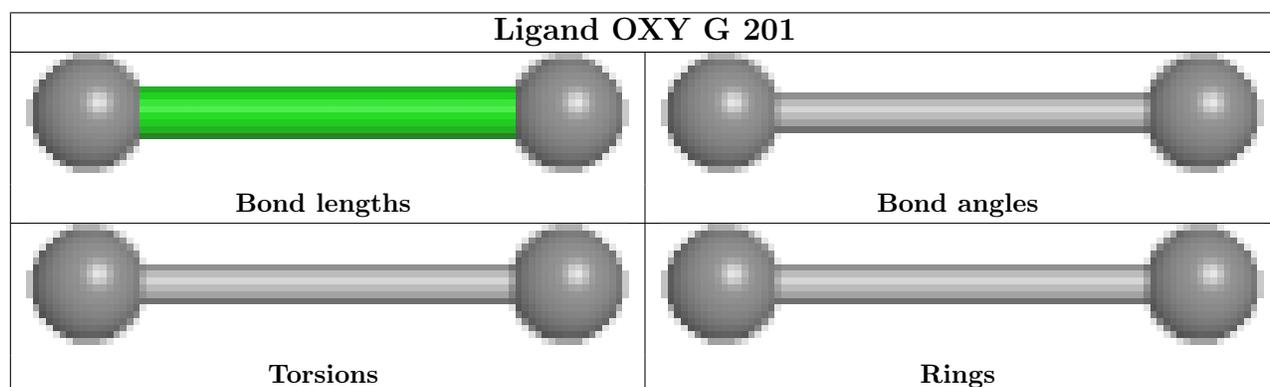
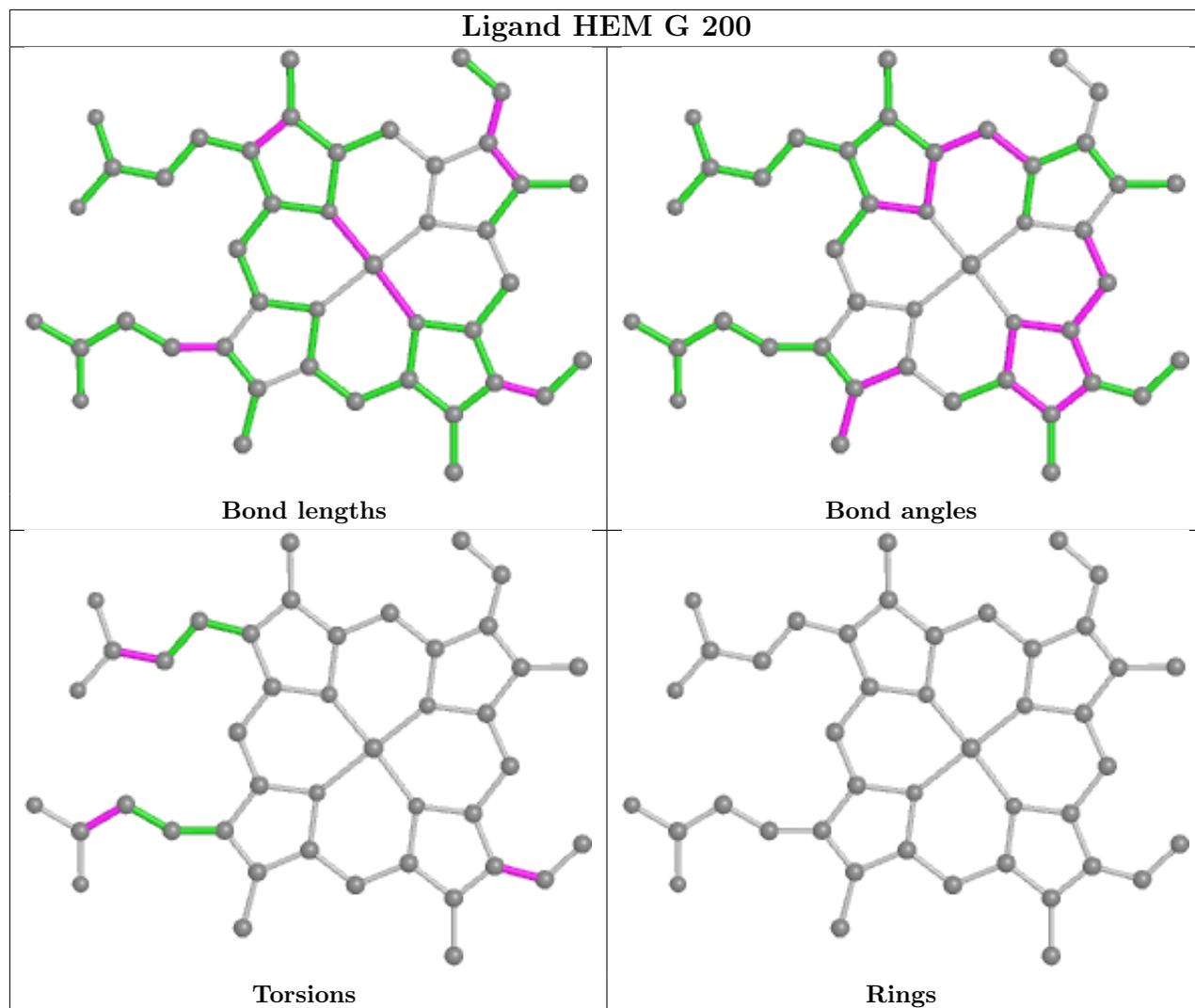
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	F	201	HEM	3	0
6	H	201	HEM	3	0
6	C	200	HEM	2	0
6	G	200	HEM	2	0
6	D	201	HEM	2	0
6	A	200	HEM	3	0
6	E	200	HEM	1	0
6	B	201	HEM	3	0

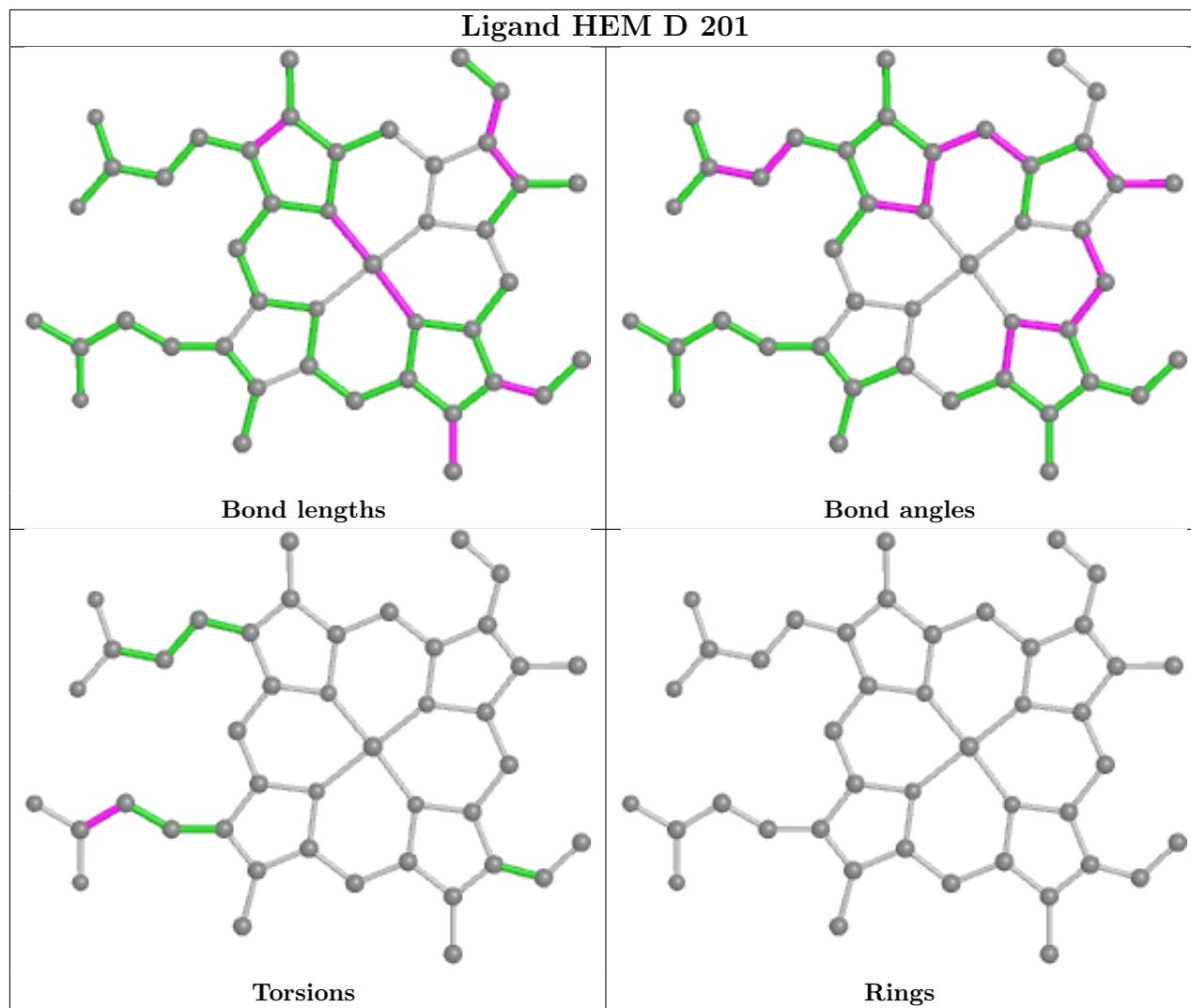
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

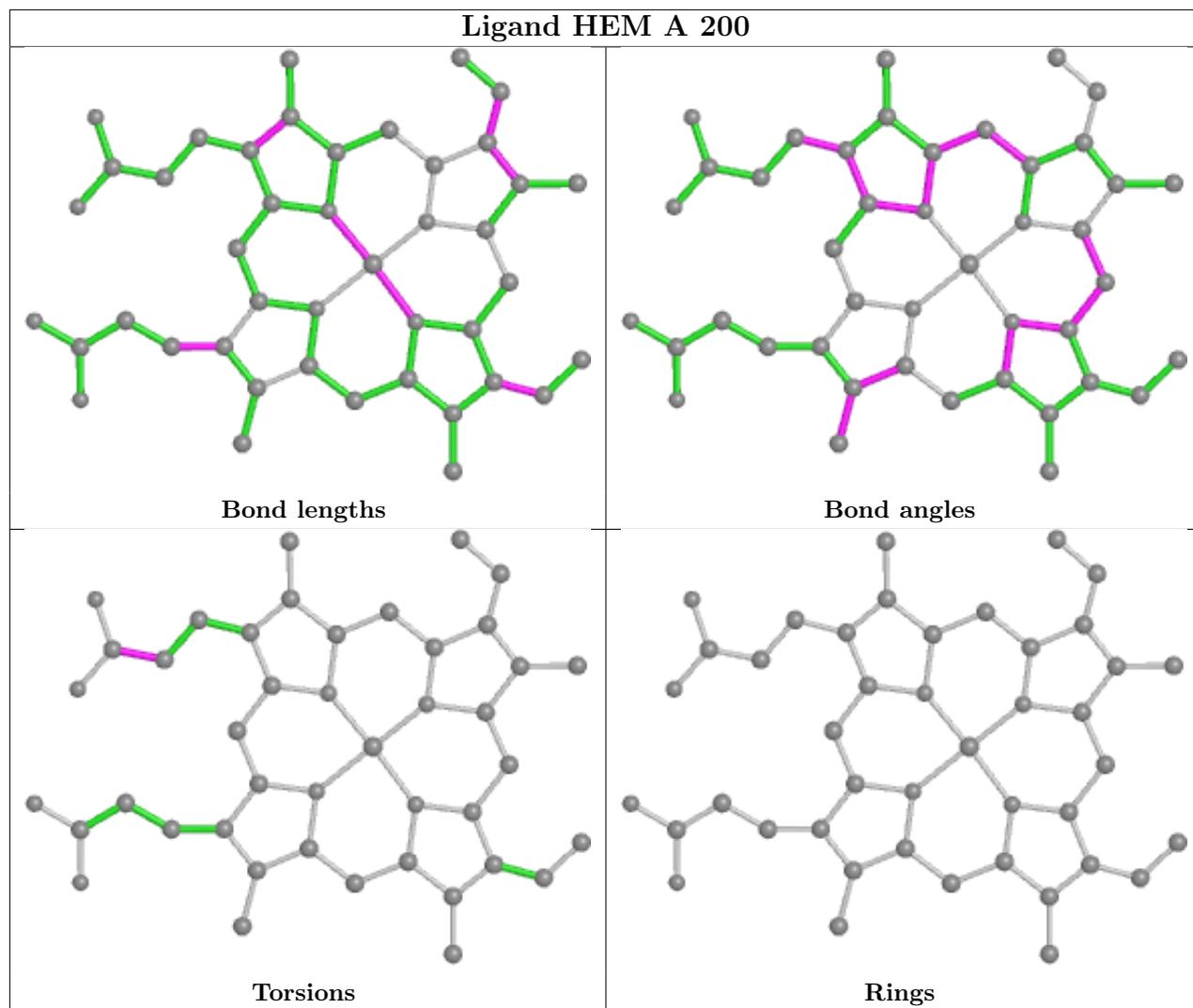


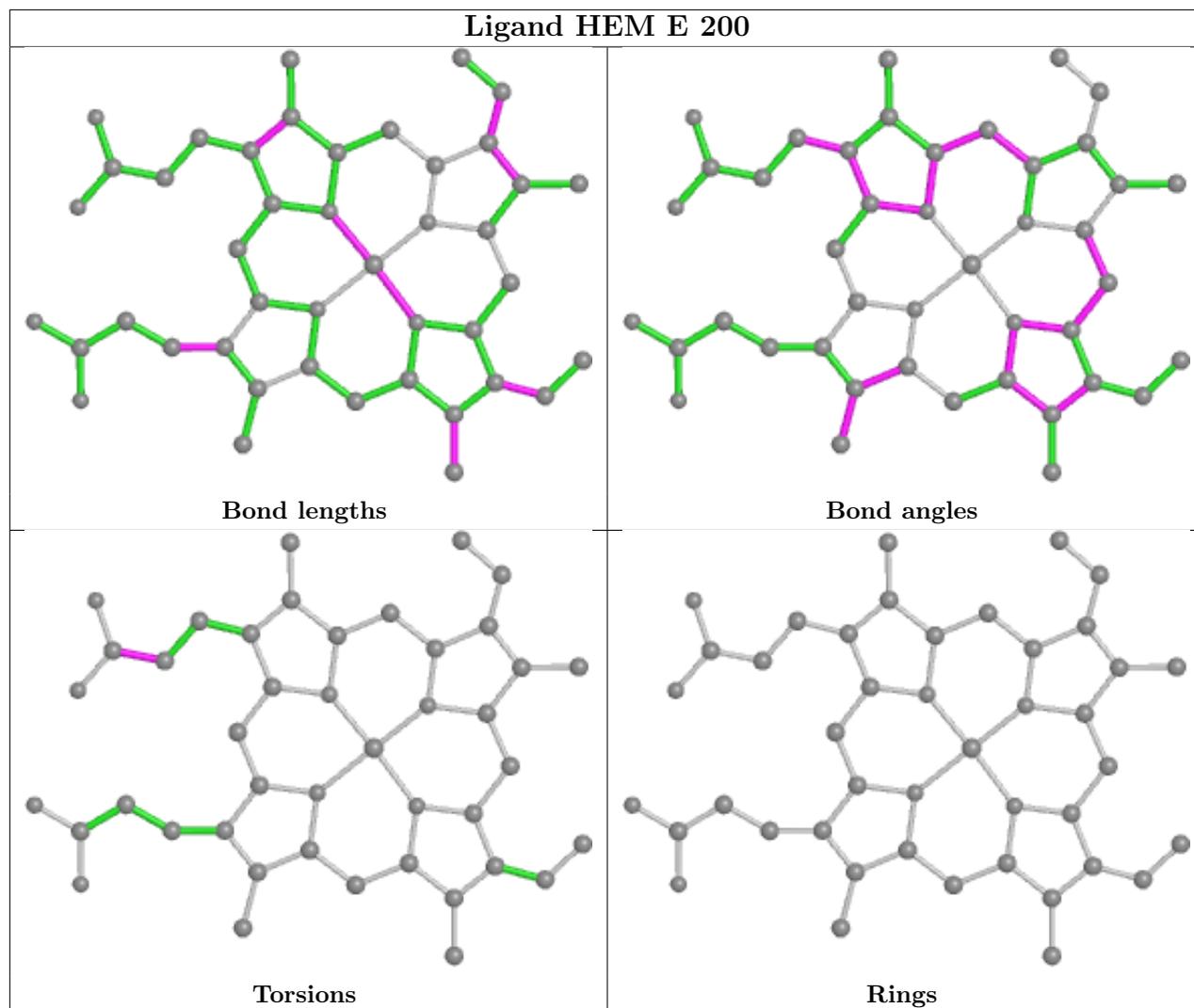


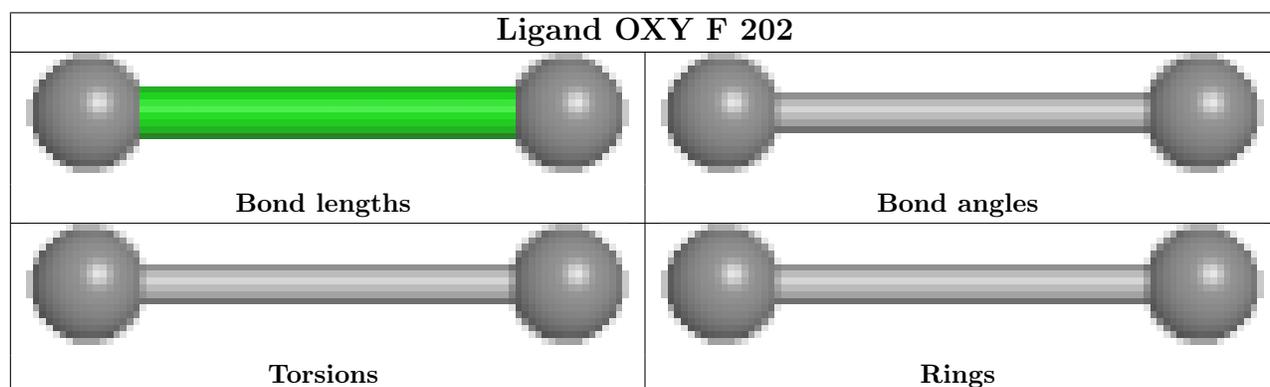
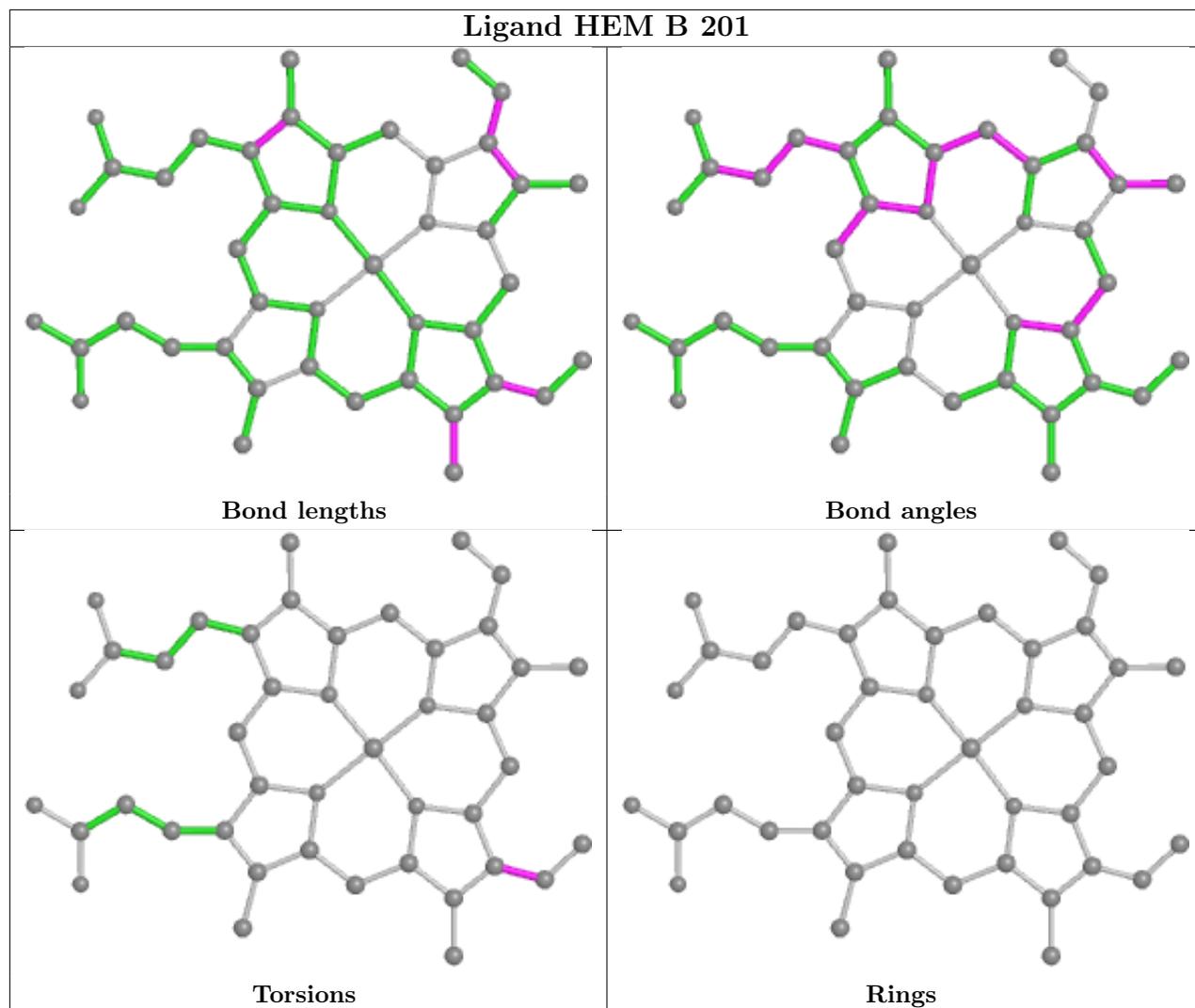


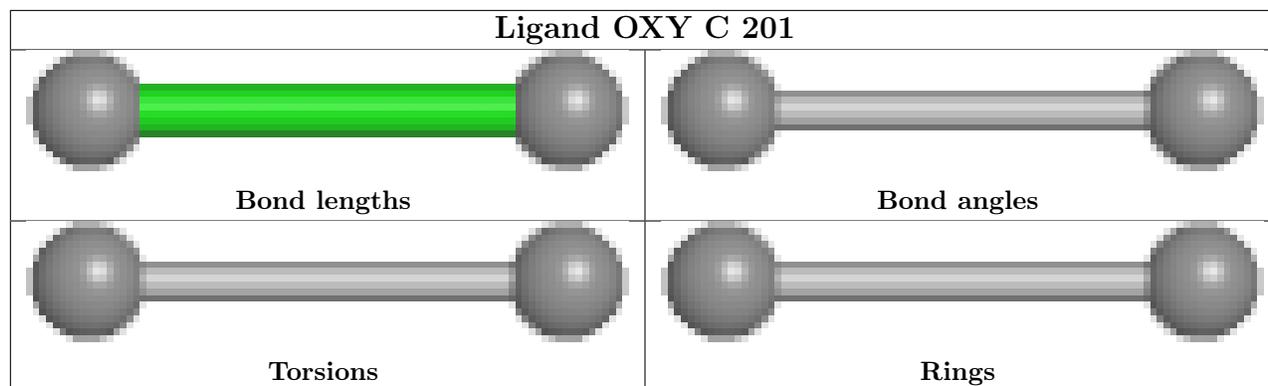












## 5.7 Other polymers [i](#)

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	146/146 (100%)	-0.16	0 <span style="border: 1px solid blue; padding: 2px;">100</span> <span style="border: 1px solid blue; padding: 2px;">100</span>	32, 43, 58, 64	0
1	E	146/146 (100%)	-0.04	0 <span style="border: 1px solid blue; padding: 2px;">100</span> <span style="border: 1px solid blue; padding: 2px;">100</span>	35, 48, 62, 69	0
2	B	143/144 (99%)	0.27	5 (3%) <span style="border: 1px solid red; padding: 2px;">44</span> <span style="border: 1px solid red; padding: 2px;">43</span>	44, 54, 68, 77	0
2	F	144/144 (100%)	0.11	3 (2%) <span style="border: 1px solid blue; padding: 2px;">63</span> <span style="border: 1px solid blue; padding: 2px;">61</span>	34, 50, 72, 87	0
3	C	150/150 (100%)	0.28	6 (4%) <span style="border: 1px solid red; padding: 2px;">38</span> <span style="border: 1px solid red; padding: 2px;">37</span>	35, 57, 76, 92	0
3	G	150/150 (100%)	0.29	7 (4%) <span style="border: 1px solid red; padding: 2px;">31</span> <span style="border: 1px solid red; padding: 2px;">30</span>	42, 56, 77, 96	0
4	D	149/149 (100%)	0.21	8 (5%) <span style="border: 1px solid red; padding: 2px;">25</span> <span style="border: 1px solid red; padding: 2px;">24</span>	34, 53, 72, 81	0
4	H	147/149 (98%)	0.25	5 (3%) <span style="border: 1px solid red; padding: 2px;">45</span> <span style="border: 1px solid red; padding: 2px;">44</span>	37, 52, 72, 84	0
All	All	1175/1178 (99%)	0.15	34 (2%) <span style="border: 1px solid gray; padding: 2px;">51</span> <span style="border: 1px solid gray; padding: 2px;">50</span>	32, 51, 73, 96	0

The worst 5 of 34 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	C	54	VAL	4.3
3	G	105	VAL	4.1
3	C	1	SER	4.0
3	C	22	SER	3.7
4	H	24	ILE	3.7

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

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

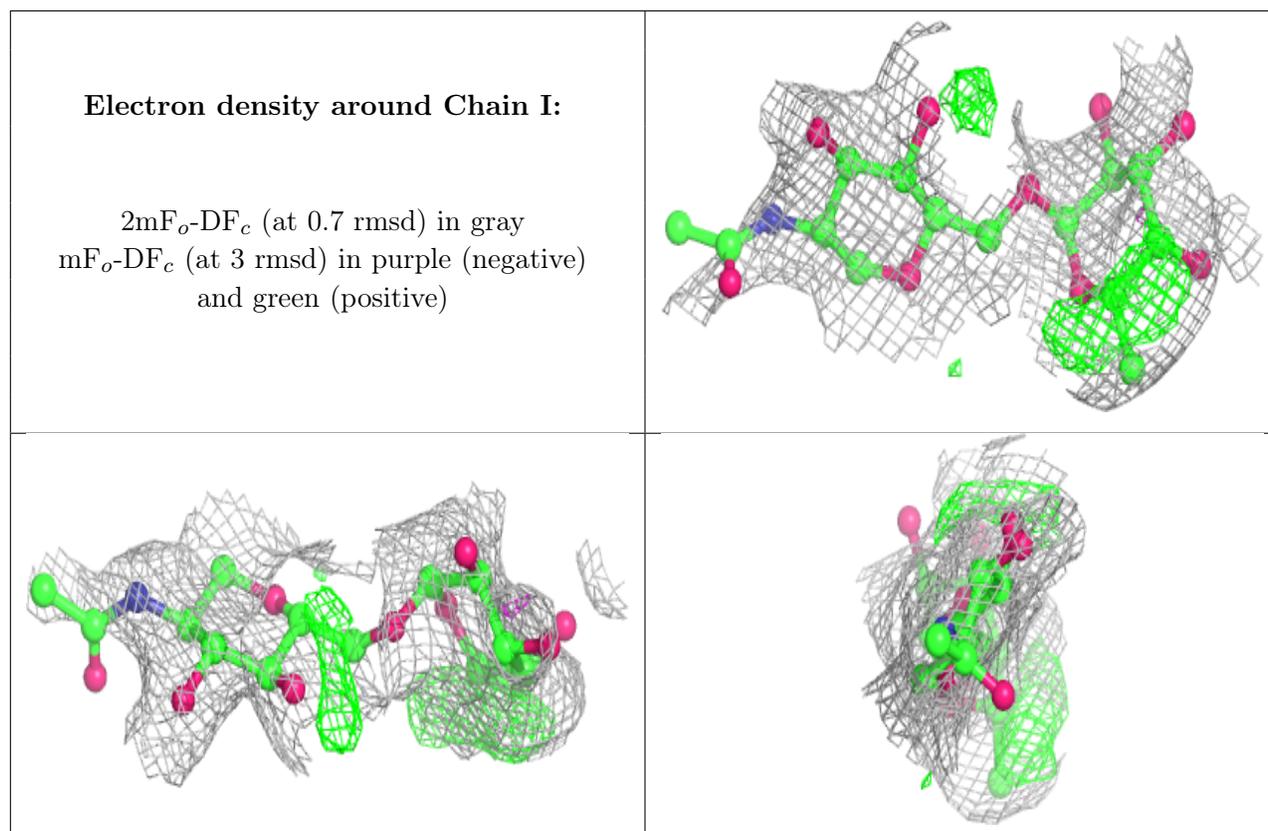
### 6.3 Carbohydrates [i](#)

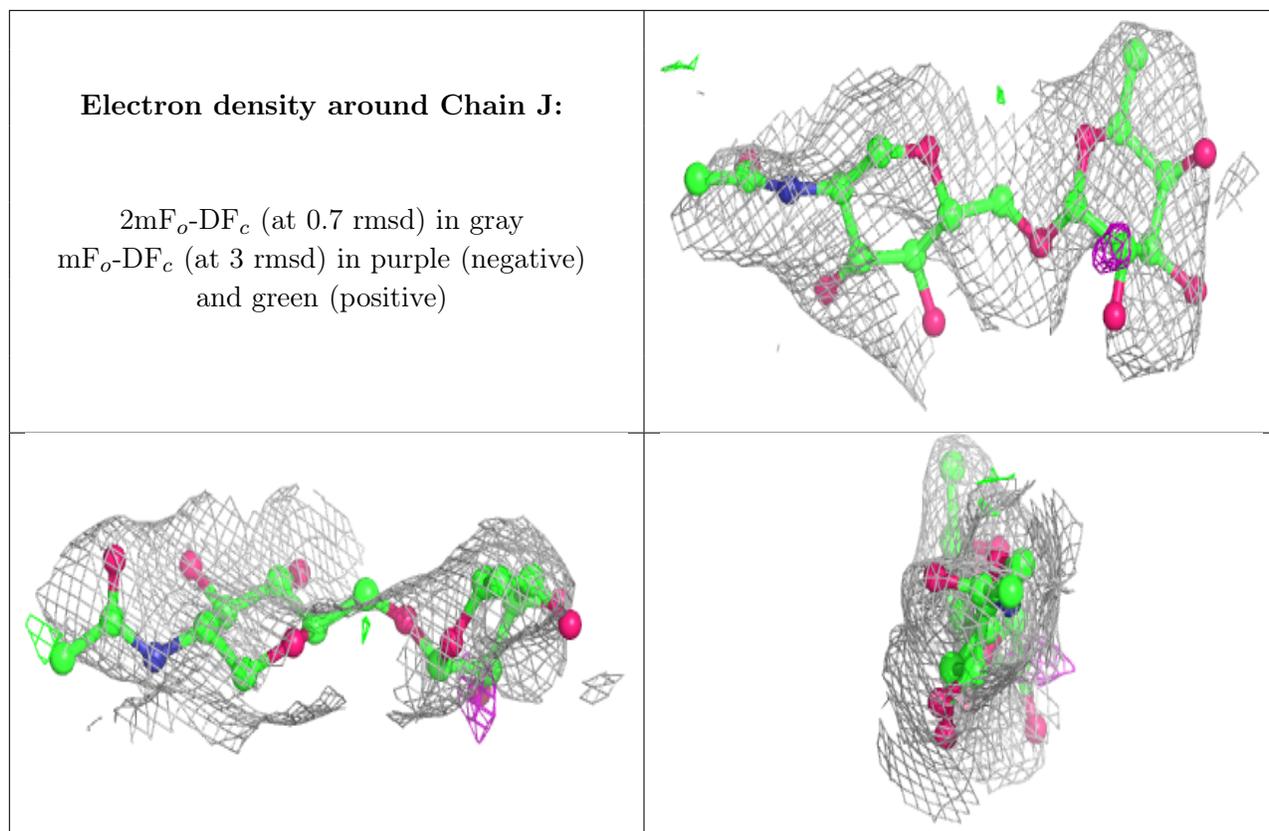
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

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(Å <sup>2</sup> )	Q<0.9
5	FUC	I	2	10/11	0.40	0.27	76,83,86,90	0
5	FUC	J	2	10/11	0.57	0.29	57,71,76,82	0
5	NAG	I	1	14/15	0.59	0.25	79,82,94,95	0
5	NAG	J	1	14/15	0.64	0.18	74,82,89,92	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.



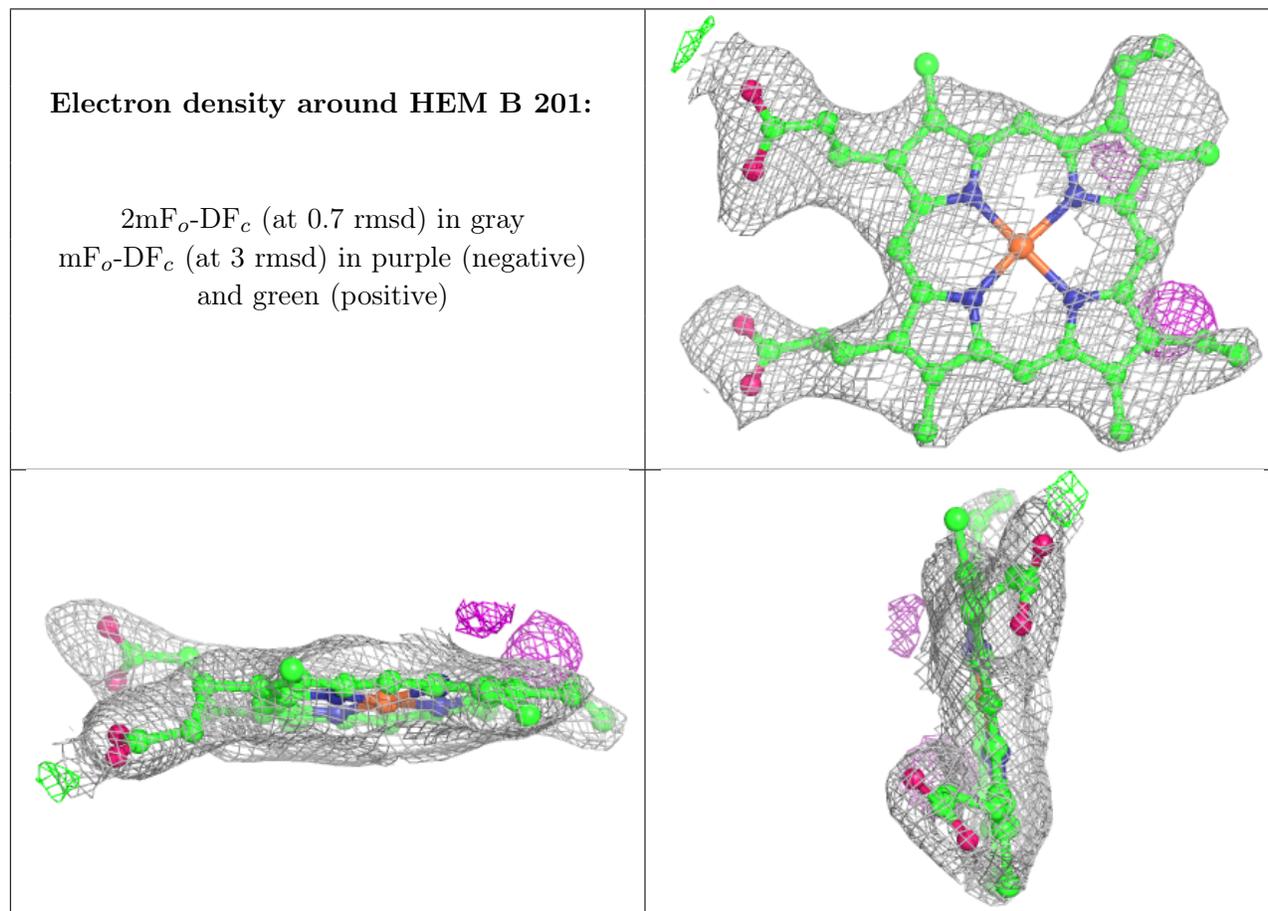


## 6.4 Ligands [i](#)

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.

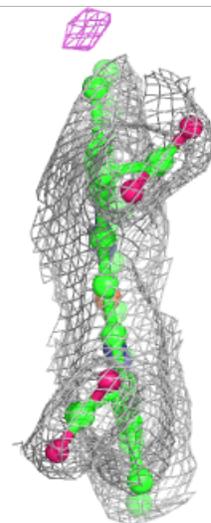
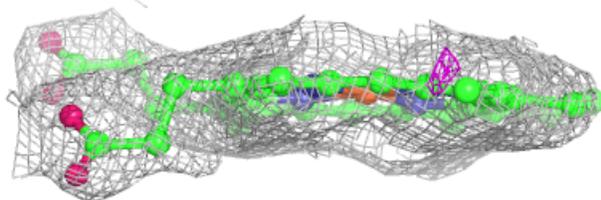
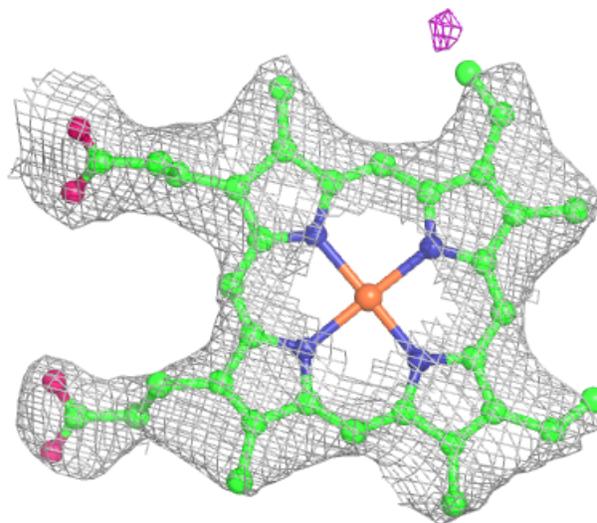
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
7	CA	B	202	1/1	0.80	0.07	69,69,69,69	0
6	HEM	B	201	43/43	0.90	0.18	56,57,63,69	0
6	HEM	G	200	43/43	0.91	0.16	50,57,65,68	0
6	HEM	C	200	43/43	0.92	0.19	43,52,62,71	0
6	HEM	D	201	43/43	0.93	0.17	45,55,65,71	0
6	HEM	H	201	43/43	0.93	0.19	42,51,57,66	0
6	HEM	F	201	43/43	0.93	0.20	39,53,68,72	0
6	HEM	E	200	43/43	0.95	0.16	39,48,56,72	0
7	CA	F	203	1/1	0.95	0.08	63,63,63,63	0
6	HEM	A	200	43/43	0.97	0.13	30,38,50,57	0
8	OXY	C	201	2/2	0.97	0.26	50,50,50,51	2
8	OXY	D	202	2/2	0.98	0.29	51,51,51,51	2
8	OXY	F	202	2/2	0.98	0.18	51,51,51,51	2
8	OXY	G	201	2/2	0.98	0.13	55,55,55,57	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.



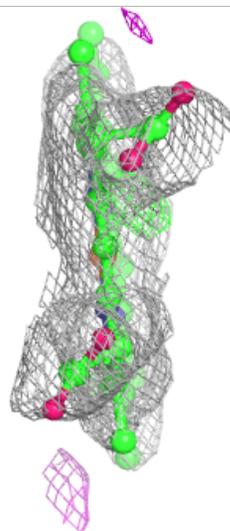
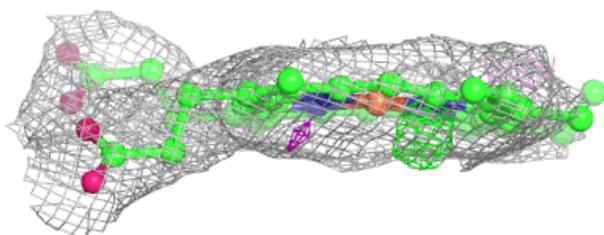
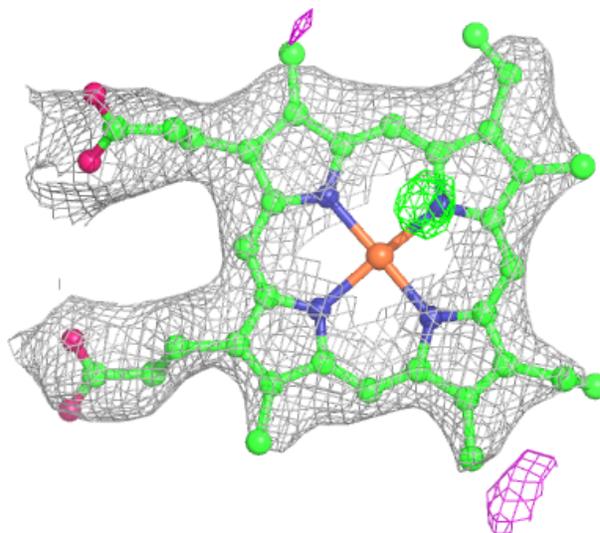
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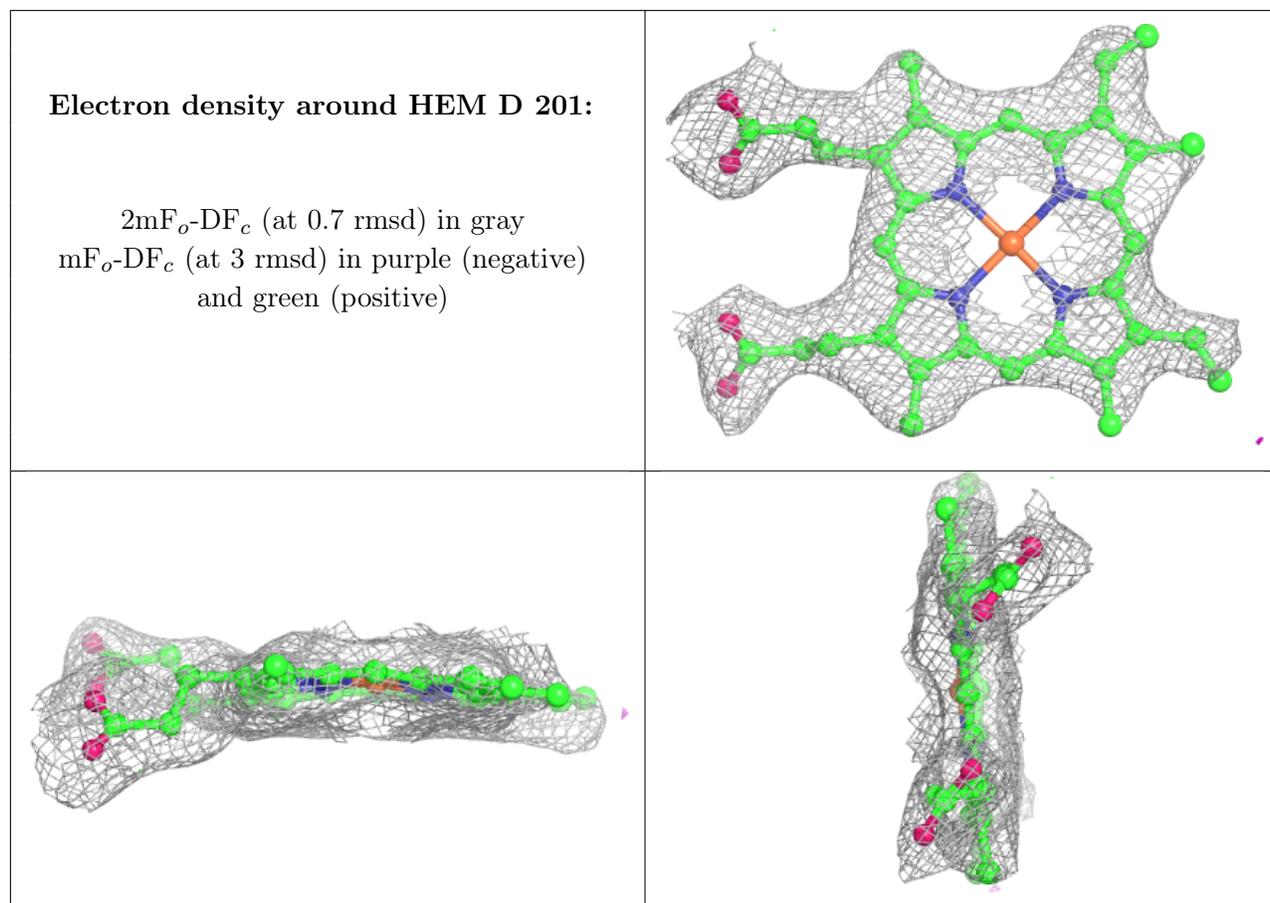
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

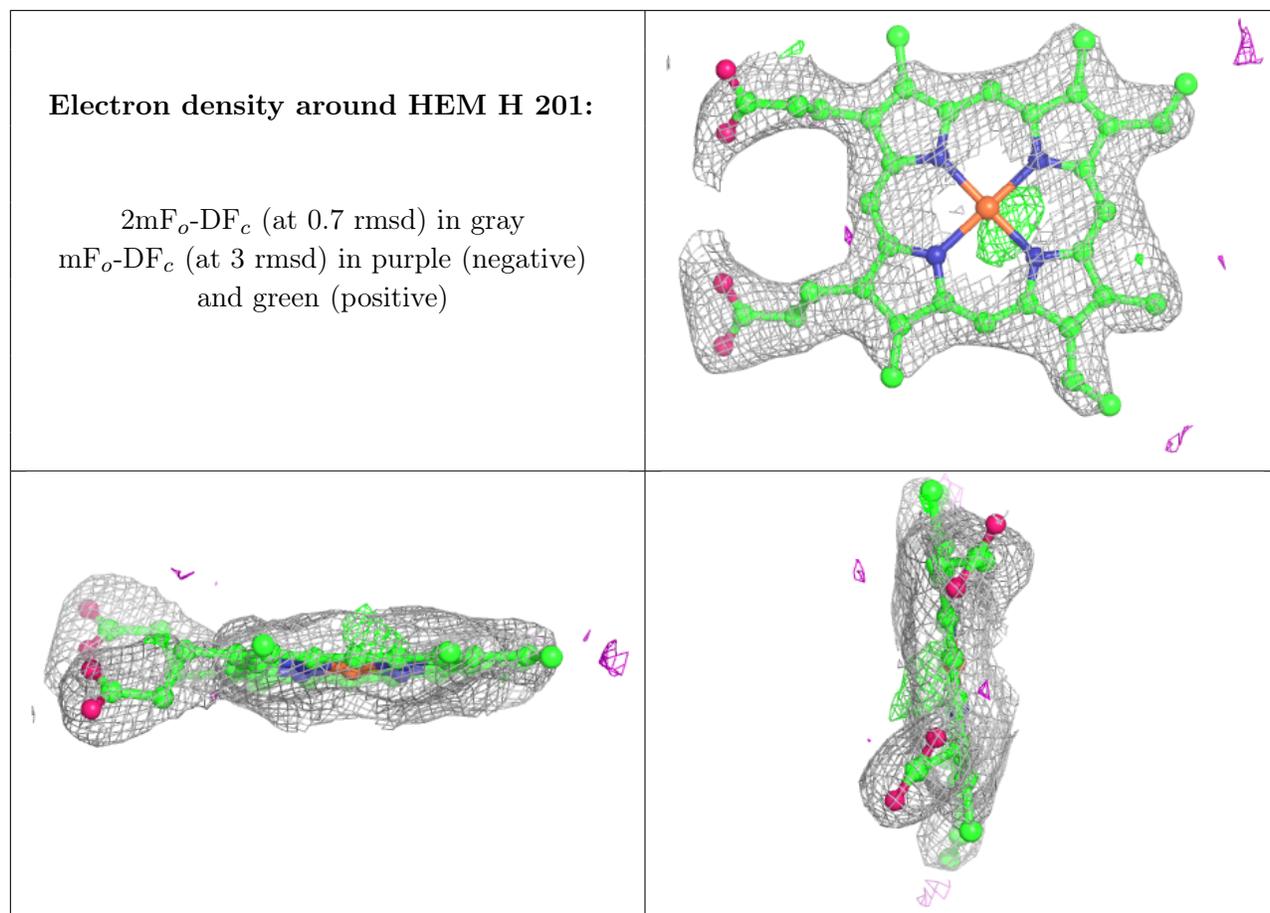


**Electron density around HEM C 200:**

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

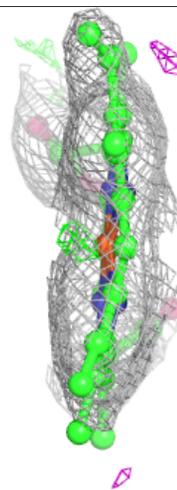
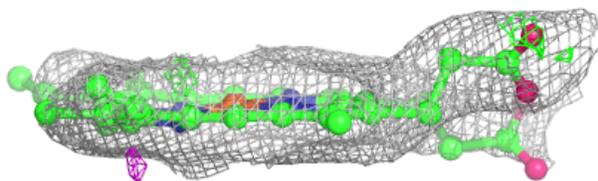
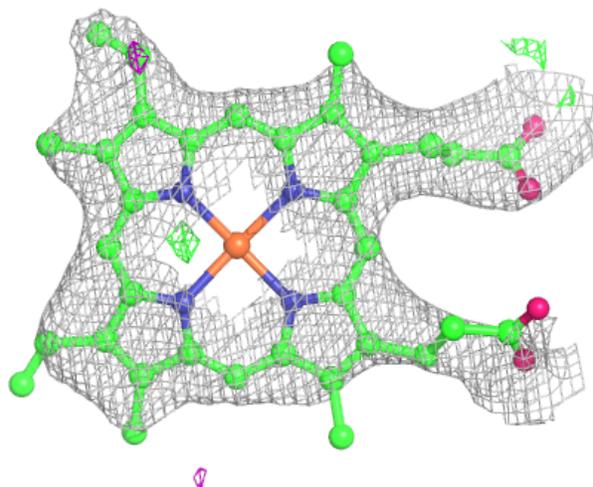






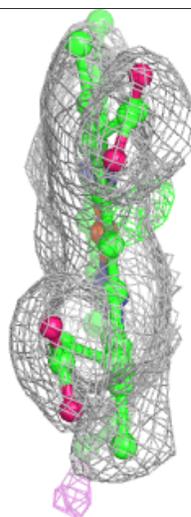
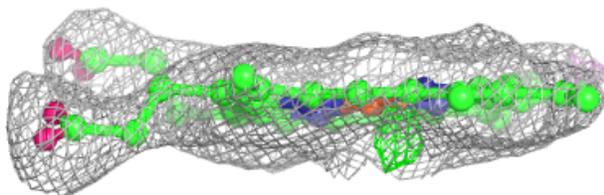
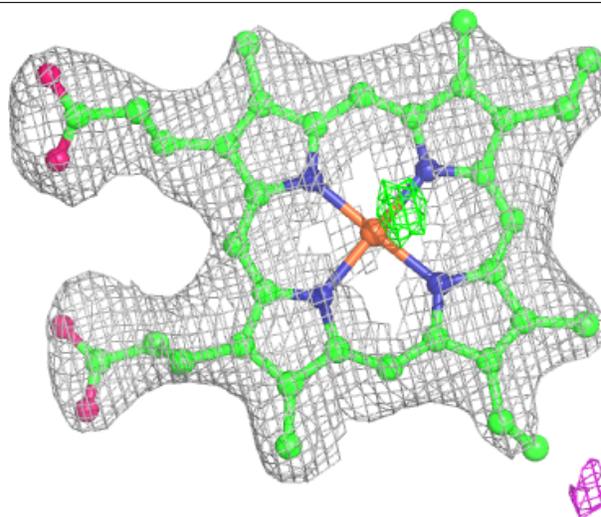
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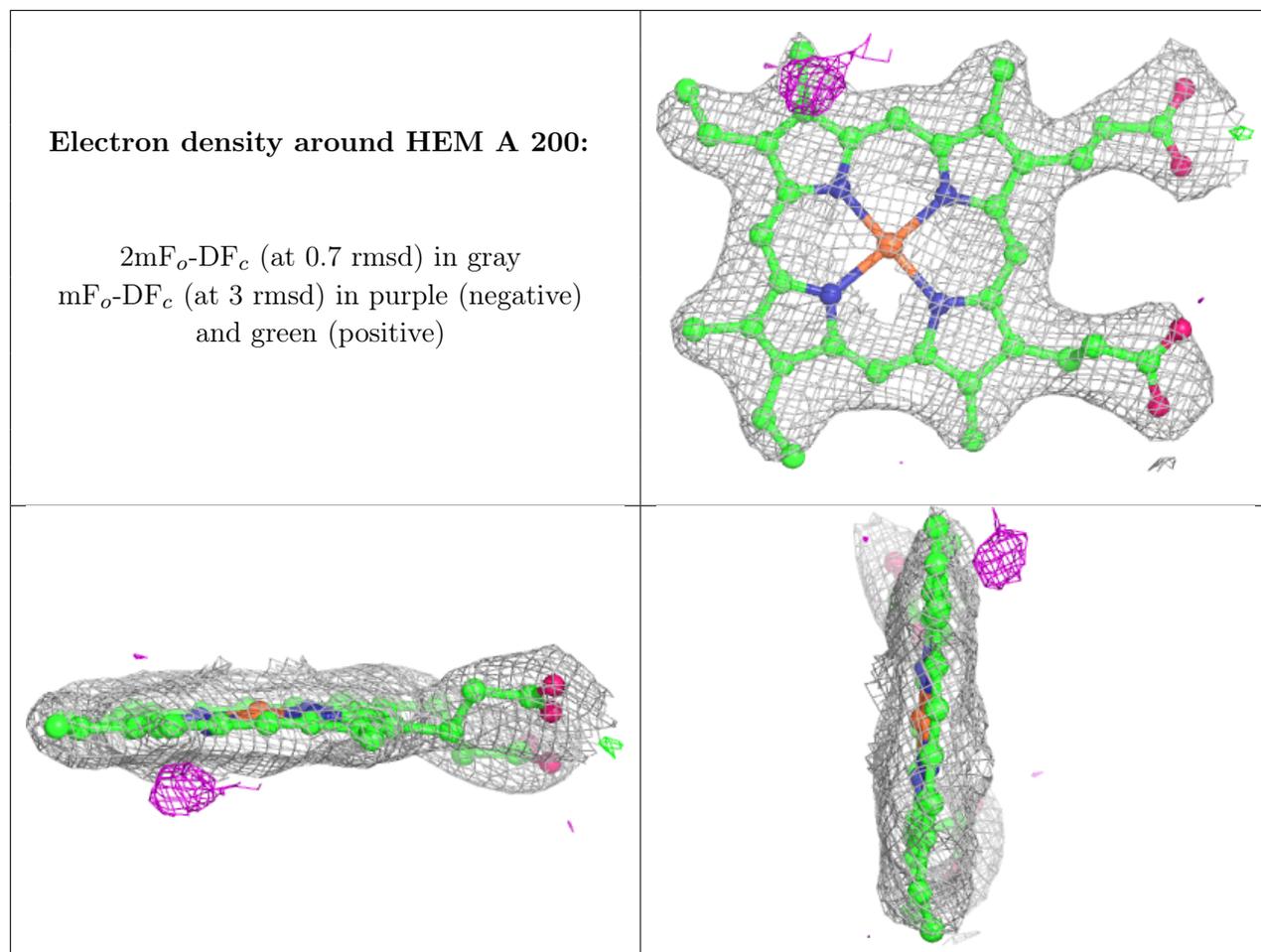
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 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around HEM E 200:**

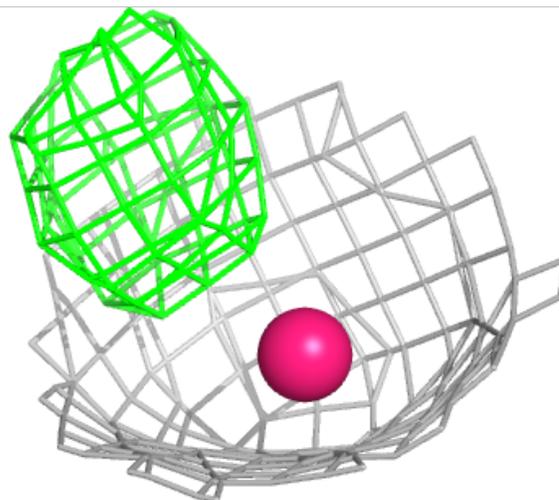
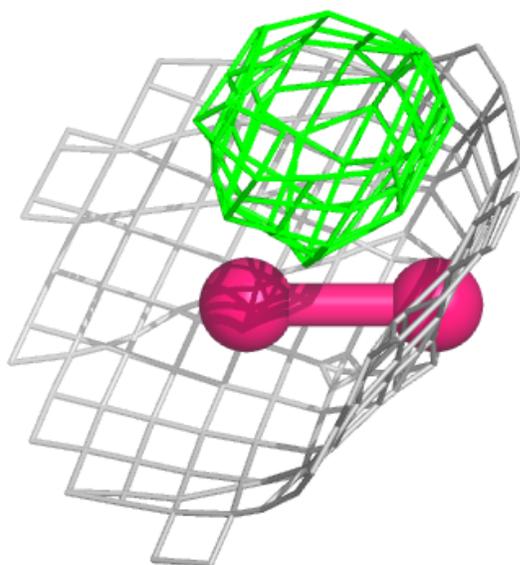
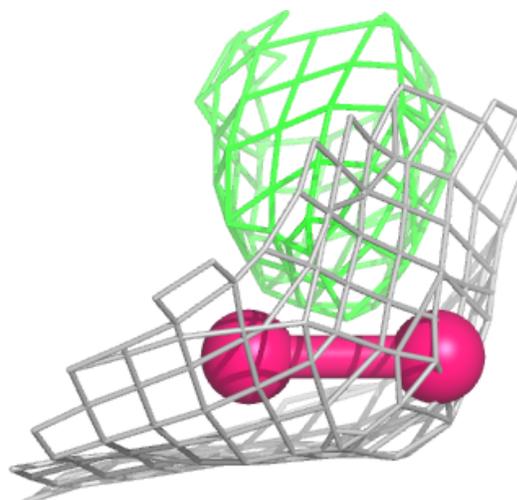
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





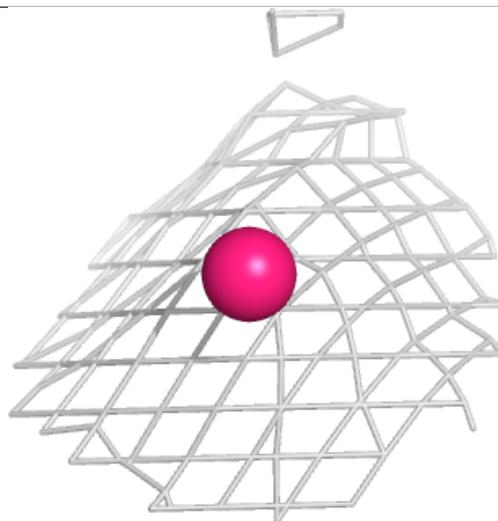
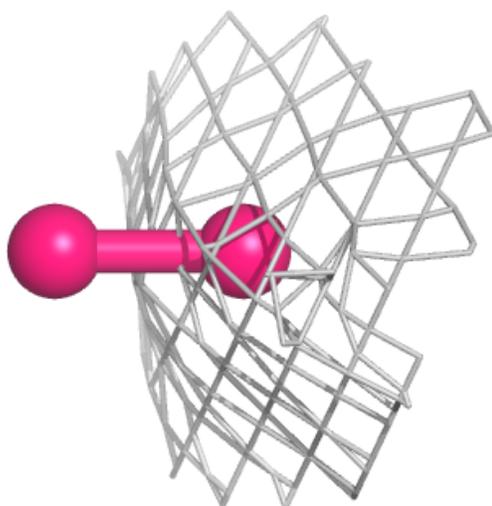
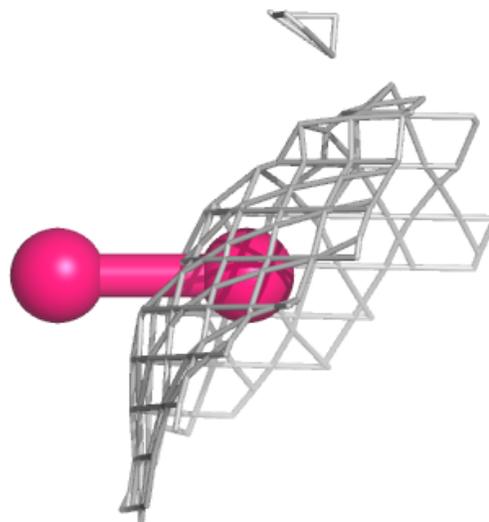
**Electron density around OXY C 201:**

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



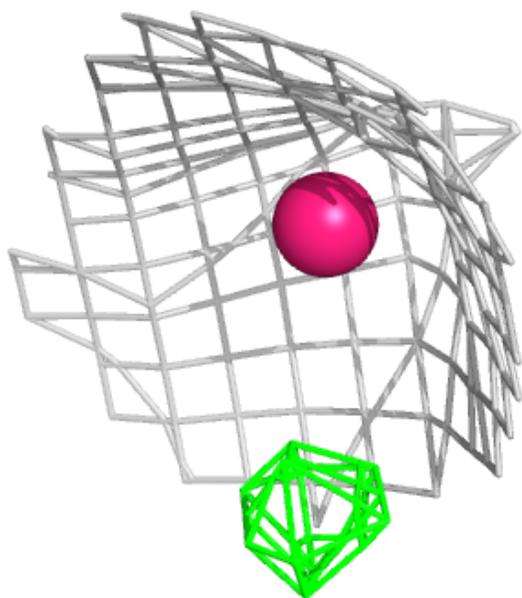
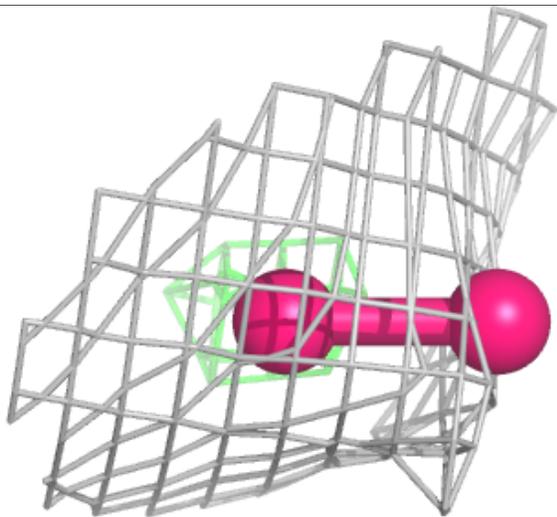
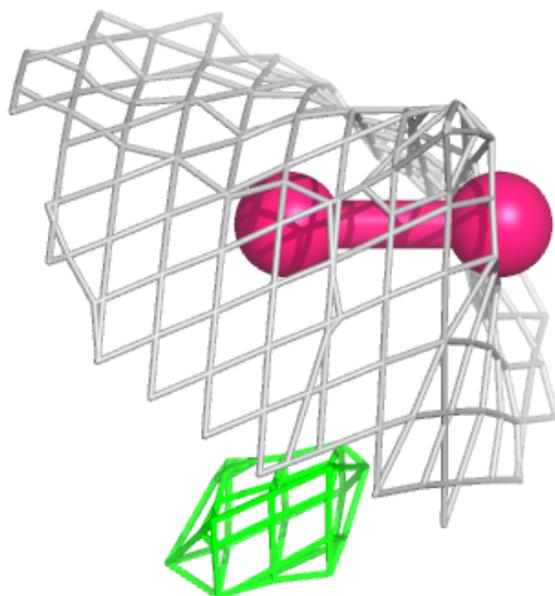
**Electron density around OXY D 202:**

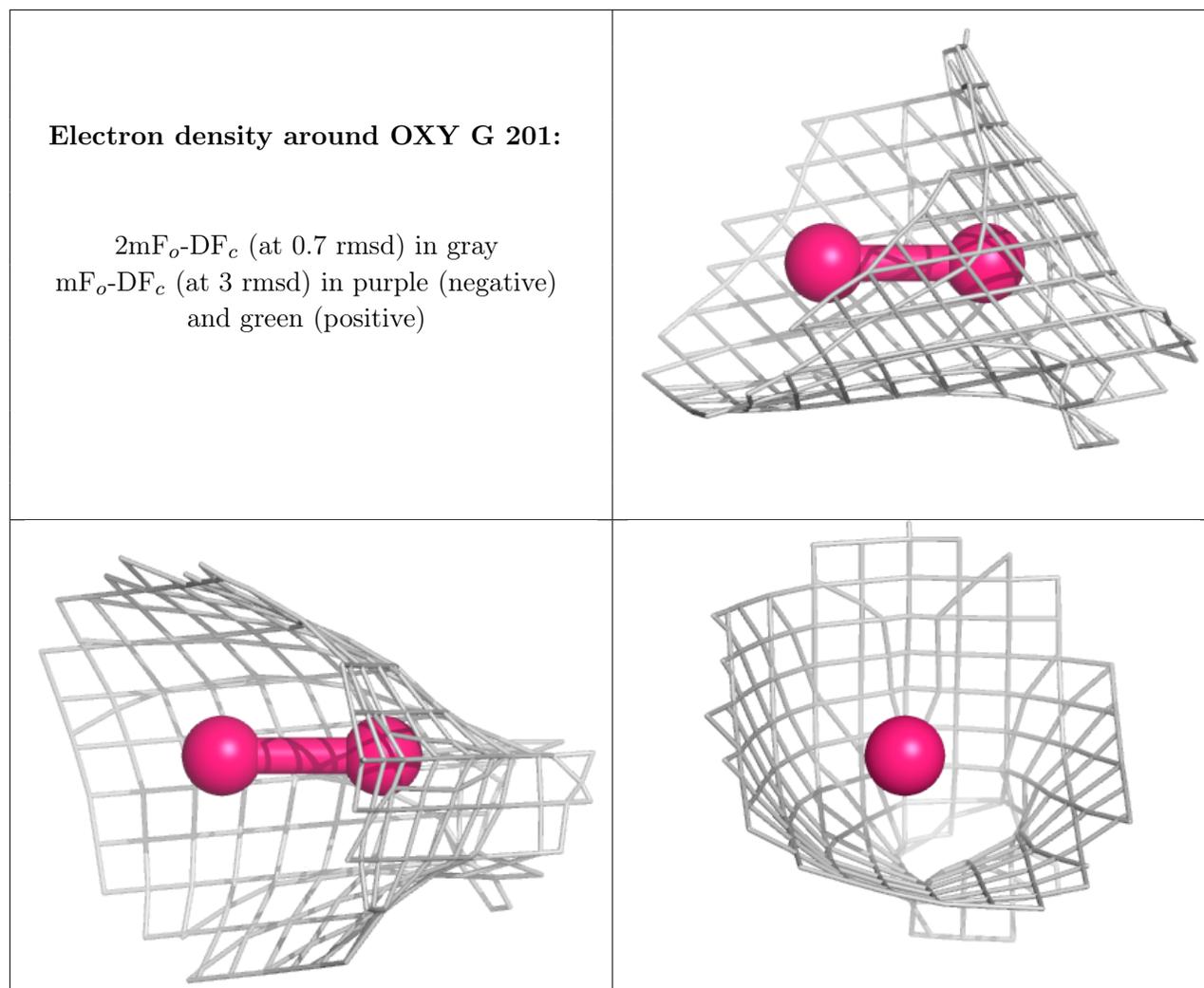
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around OXY F 202:**

$2mF_o-DF_c$  (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.