



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 24, 2021 – 11:39 AM GMT

PDB ID : 6ZTW  
Title : Crystal Structure of catalase HPII from Escherichia coli (serendipitously crystallized)  
Authors : Grzechowiak, M.; Sekula, B.; Ruszkowski, M.  
Deposited on : 2020-07-20  
Resolution : 1.84 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.

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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 : 2.17.1.dev1  
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) : 2.17.1.dev1

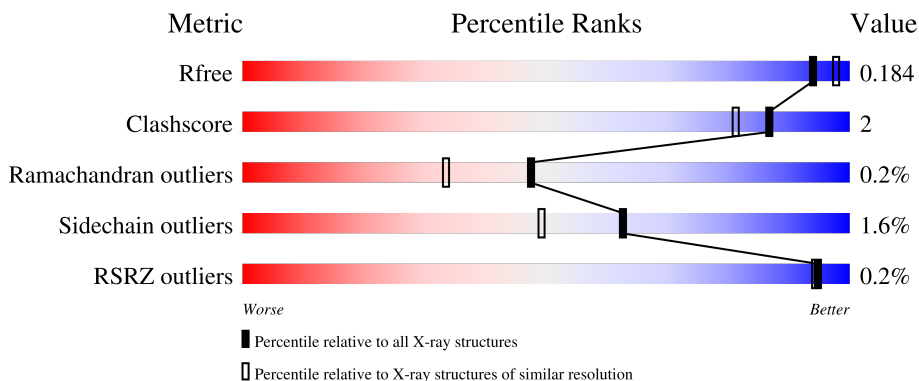
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.84 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	4003 (1.86-1.82)
Clashscore	141614	4233 (1.86-1.82)
Ramachandran outliers	138981	4185 (1.86-1.82)
Sidechain outliers	138945	4186 (1.86-1.82)
RSRZ outliers	127900	3957 (1.86-1.82)

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	753	90% 6% .
1	B	753	91% 5% .
1	C	753	91% 5% .
1	D	753	91% 5% .
1	E	753	89% 7% .

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Mol	Chain	Length	Quality of chain
1	F	753	 91% 5% .
1	G	753	 91% 5% .
1	H	753	 91% 5% .

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 51313 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.

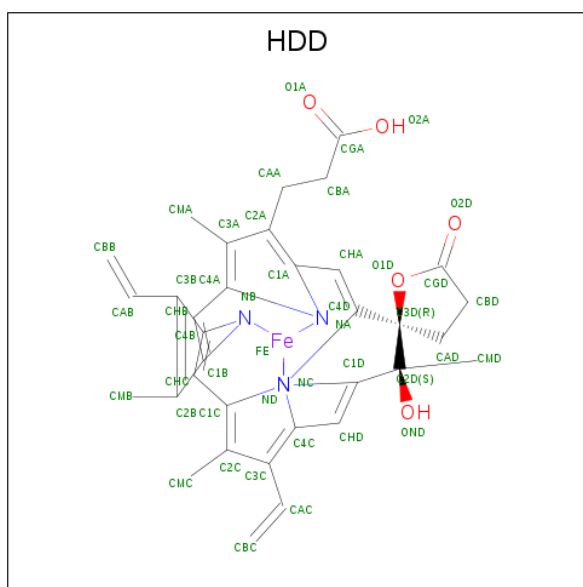
- Molecule 1 is a protein called Catalase HP11.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	726	5750	3649	1007	1082	12	0	1	0
1	B	726	5770	3663	1011	1084	12	0	3	0
1	C	726	5763	3656	1011	1084	12	0	1	0
1	D	726	5773	3664	1015	1082	12	0	3	0
1	E	726	5769	3660	1014	1083	12	0	3	0
1	F	726	5758	3654	1010	1082	12	0	2	0
1	G	727	5772	3661	1012	1087	12	0	3	0
1	H	726	5767	3662	1010	1083	12	0	3	0

There are 8 discrepancies between the modelled and reference sequences:

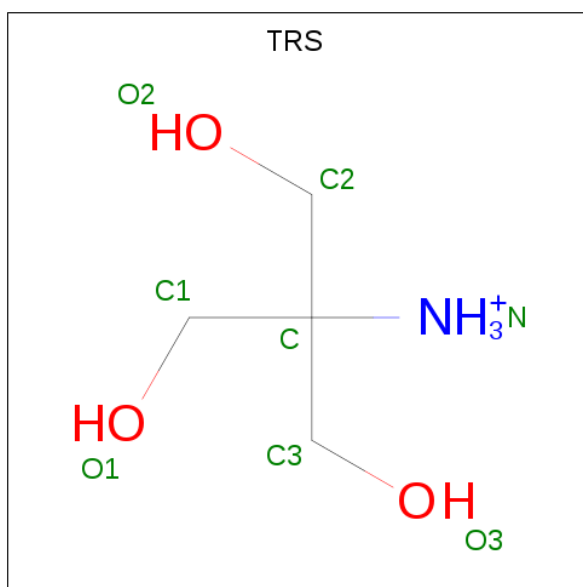
Chain	Residue	Modelled	Actual	Comment	Reference
A	99	ASN	SER	variant	UNP P21179
B	99	ASN	SER	variant	UNP P21179
C	99	ASN	SER	variant	UNP P21179
D	99	ASN	SER	variant	UNP P21179
E	99	ASN	SER	variant	UNP P21179
F	99	ASN	SER	variant	UNP P21179
G	99	ASN	SER	variant	UNP P21179
H	99	ASN	SER	variant	UNP P21179

- Molecule 2 is CIS-HEME D HYDROXYCHLORIN GAMMA-SPIROLACTONE (three-letter code: HDD) (formula: C<sub>34</sub>H<sub>32</sub>FeN<sub>4</sub>O<sub>5</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	Fe	N			O
2	A	1	44	34	1	4	5	0	0
2	B	1	44	34	1	4	5	0	0
2	C	1	44	34	1	4	5	0	0
2	D	1	44	34	1	4	5	0	0
2	E	1	44	34	1	4	5	0	0
2	F	1	44	34	1	4	5	0	0
2	G	1	44	34	1	4	5	0	0
2	H	1	44	34	1	4	5	0	0

- Molecule 3 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula:  $C_4H_{12}NO_3$ ).



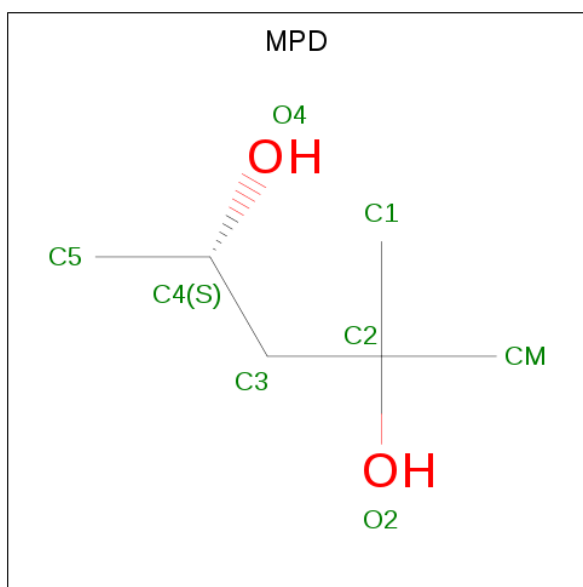
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	8	4	1	3	0	0
3	B	1	8	4	1	3	0	0
3	C	1	8	4	1	3	0	0
3	D	1	8	4	1	3	0	0
3	E	1	8	4	1	3	0	0
3	E	1	8	4	1	3	0	0
3	F	1	8	4	1	3	0	0
3	G	1	8	4	1	3	0	0
3	H	1	8	4	1	3	0	0

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



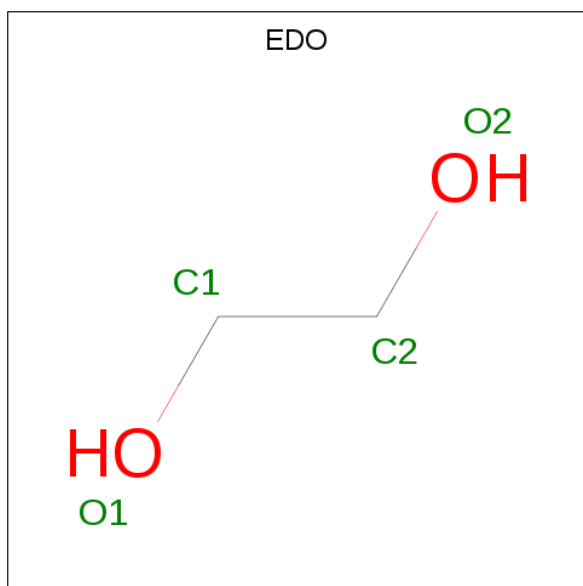
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	3	3		
4	A	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		
4	C	1	Total	C	O	0	0
			6	3	3		
4	E	1	Total	C	O	0	0
			6	3	3		
4	G	1	Total	C	O	0	0
			6	3	3		

- Molecule 5 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	0	0
			8	6	2		

- Molecule 6 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula:  $C_2H_6O_2$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total	C	O	0	0
			4	2	2		
6	B	1	Total	C	O	0	0
			4	2	2		
6	C	1	Total	C	O	0	0
			4	2	2		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	C	1	Total 4	C 2	O 2	0	0
6	E	1	Total 4	C 2	O 2	0	0
6	F	1	Total 4	C 2	O 2	0	0
6	F	1	Total 4	C 2	O 2	0	0

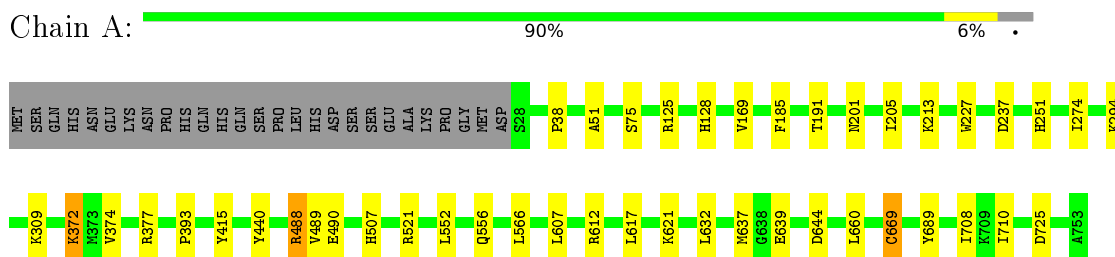
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	593	Total 593	O 593	0	0
7	B	602	Total 602	O 602	0	0
7	C	581	Total 581	O 581	0	0
7	D	659	Total 659	O 659	0	0
7	E	571	Total 571	O 571	0	0
7	F	569	Total 569	O 569	0	0
7	G	588	Total 588	O 588	0	0
7	H	532	Total 532	O 532	0	0

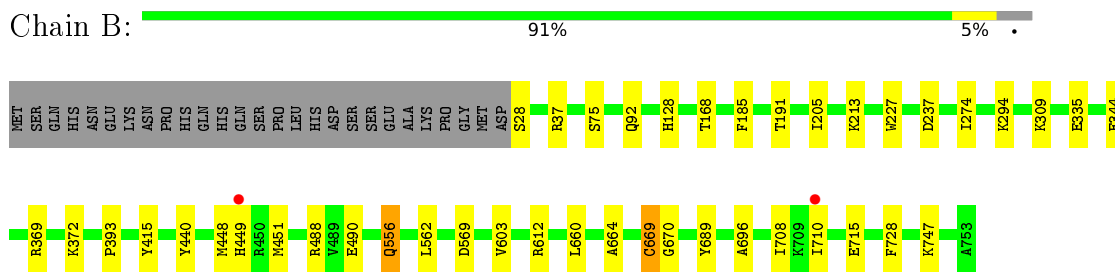
### 3 Residue-property plots [i](#)

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.

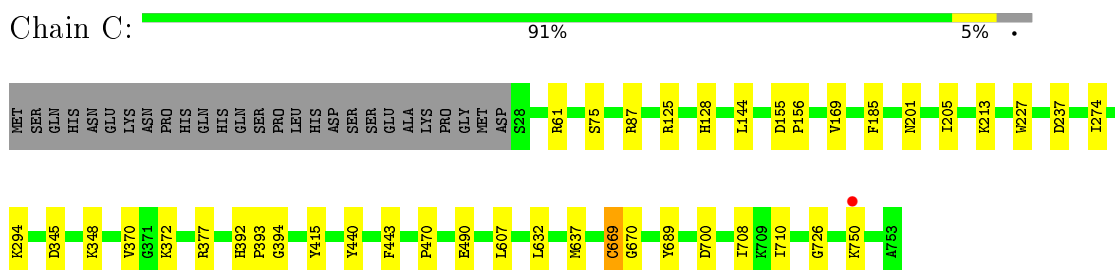
- Molecule 1: Catalase HP1I



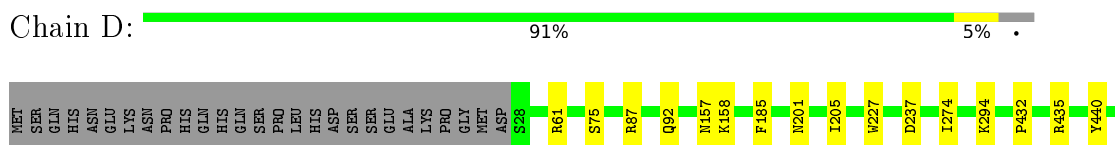
- Molecule 1: Catalase HP1I



- Molecule 1: Catalase HP1I



- Molecule 1: Catalase HP1I





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	121.19Å 168.07Å 137.98Å 90.00° 105.24° 90.00°	Depositor
Resolution (Å)	78.25 – 1.84 78.25 – 1.84	Depositor EDS
% Data completeness (in resolution range)	98.4 (78.25-1.84) 98.4 (78.25-1.84)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.88 (at 1.84Å)	Xtrriage
Refinement program	PHENIX 1.16_3549	Depositor
R, $R_{free}$	0.144 , 0.184 0.144 , 0.184	Depositor DCC
$R_{free}$ test set	2262 reflections (0.50%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	18.2	Xtrriage
Anisotropy	0.493	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 49.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	51313	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	22.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 37.19 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 4.4531e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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: HDD, MPD, OCS, TRS, GOL, EDO

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	0.38	0/5900	0.52	0/8020
1	B	0.38	0/5924	0.51	0/8052
1	C	0.37	0/5911	0.52	0/8035
1	D	0.39	0/5933	0.53	0/8064
1	E	0.36	0/5922	0.51	0/8049
1	F	0.37	0/5911	0.51	0/8034
1	G	0.37	0/5925	0.51	0/8053
1	H	0.36	0/5924	0.50	0/8052
All	All	0.37	0/47350	0.51	0/64359

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	5750	0	5581	24	0
1	B	5770	0	5603	26	0
1	C	5763	0	5586	21	0
1	D	5773	0	5615	26	0
1	E	5769	0	5606	34	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	5758	0	5595	25	0
1	G	5772	0	5601	22	0
1	H	5767	0	5604	22	0
2	A	44	0	31	3	0
2	B	44	0	31	1	0
2	C	44	0	31	3	0
2	D	44	0	31	3	0
2	E	44	0	31	4	0
2	F	44	0	31	2	0
2	G	44	0	31	3	0
2	H	44	0	31	2	0
3	A	8	0	12	0	0
3	B	8	0	12	0	0
3	C	8	0	12	0	0
3	D	8	0	12	1	0
3	E	16	0	24	1	0
3	F	8	0	12	1	0
3	G	8	0	12	0	0
3	H	8	0	12	0	0
4	A	12	0	16	0	0
4	B	6	0	8	0	0
4	C	6	0	8	0	0
4	E	6	0	8	0	0
4	G	6	0	8	1	0
5	B	8	0	14	0	0
6	B	8	0	12	0	0
6	C	8	0	12	0	0
6	E	4	0	6	0	0
6	F	8	0	12	0	0
7	A	593	0	0	2	0
7	B	602	0	0	3	0
7	C	581	0	0	3	0
7	D	659	0	0	4	0
7	E	571	0	0	4	0
7	F	569	0	0	2	0
7	G	588	0	0	3	0
7	H	532	0	0	1	0
All	All	51313	0	45251	188	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 2.

The worst 5 of 188 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:708:ILE:HG13	1:B:710:ILE:HG12	1.68	0.76
1:C:708:ILE:HG13	1:C:710:ILE:HG12	1.69	0.73
1:B:449[B]:HIS:NE2	7:B:901:HOH:O	2.23	0.71
1:F:708:ILE:HG13	1:F:710:ILE:HG12	1.73	0.70
1:F:509[A]:ARG:NH1	7:F:901:HOH:O	2.26	0.69

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	724/753 (96%)	705 (97%)	18 (2%)	1 (0%)	51	37
1	B	726/753 (96%)	707 (97%)	18 (2%)	1 (0%)	51	37
1	C	725/753 (96%)	707 (98%)	17 (2%)	1 (0%)	51	37
1	D	727/753 (96%)	709 (98%)	17 (2%)	1 (0%)	51	37
1	E	726/753 (96%)	708 (98%)	17 (2%)	1 (0%)	51	37
1	F	725/753 (96%)	709 (98%)	15 (2%)	1 (0%)	51	37
1	G	727/753 (96%)	710 (98%)	15 (2%)	2 (0%)	41	27
1	H	726/753 (96%)	707 (97%)	17 (2%)	2 (0%)	41	27
All	All	5806/6024 (96%)	5662 (98%)	134 (2%)	10 (0%)	47	33

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	G	28	SER
1	A	75	SER
1	B	75	SER
1	D	75	SER
1	F	75	SER

### 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	611/635 (96%)	599 (98%)	12 (2%)	55	40
1	B	613/635 (96%)	600 (98%)	13 (2%)	53	38
1	C	612/635 (96%)	603 (98%)	9 (2%)	65	52
1	D	614/635 (97%)	608 (99%)	6 (1%)	76	68
1	E	613/635 (96%)	602 (98%)	11 (2%)	59	44
1	F	612/635 (96%)	602 (98%)	10 (2%)	62	49
1	G	614/635 (97%)	603 (98%)	11 (2%)	59	44
1	H	613/635 (96%)	603 (98%)	10 (2%)	62	49
All	All	4902/5080 (96%)	4820 (98%)	82 (2%)	62	47

5 of 82 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	440	TYR
1	G	606	LEU
1	F	571	LEU
1	G	237	ASP
1	H	227	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	556	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.



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

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

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
1	OCS	B	669	1	7,8,9	1.04	1 (14%)	6,11,13	0.92	0
1	OCS	H	669	1	7,8,9	1.02	1 (14%)	6,11,13	0.89	0
1	OCS	A	669	1	7,8,9	1.54	1 (14%)	6,11,13	1.82	2 (33%)
1	OCS	D	669	1	7,8,9	1.03	1 (14%)	6,11,13	1.07	1 (16%)
1	OCS	C	669	1	7,8,9	1.48	1 (14%)	6,11,13	1.69	2 (33%)
1	OCS	G	669	1	7,8,9	1.55	1 (14%)	6,11,13	2.15	2 (33%)
1	OCS	F	669	1	7,8,9	1.04	1 (14%)	6,11,13	0.69	0
1	OCS	E	669	1	7,8,9	1.51	1 (14%)	6,11,13	1.42	1 (16%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	OCS	B	669	1	-	3/4/7/9	-
1	OCS	H	669	1	-	2/4/7/9	-
1	OCS	A	669	1	-	2/4/7/9	-
1	OCS	D	669	1	-	1/4/7/9	-
1	OCS	C	669	1	-	1/4/7/9	-
1	OCS	G	669	1	-	4/4/7/9	-
1	OCS	F	669	1	-	3/4/7/9	-
1	OCS	E	669	1	-	1/4/7/9	-

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	669	OCS	OD1-SG	3.57	1.55	1.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	G	669	OCS	OD1-SG	3.53	1.55	1.45
1	A	669	OCS	OD1-SG	3.53	1.55	1.45
1	C	669	OCS	OD1-SG	3.47	1.55	1.45
1	F	669	OCS	OD2-SG	2.28	1.55	1.47

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	G	669	OCS	OD1-SG-CB	-3.62	102.64	106.94
1	G	669	OCS	OD2-SG-OD3	3.42	119.63	111.27
1	A	669	OCS	OD1-SG-CB	-2.91	103.48	106.94
1	C	669	OCS	OD2-SG-OD3	2.87	118.30	111.27
1	A	669	OCS	OD2-SG-OD3	2.86	118.26	111.27

There are no chirality outliers.

5 of 17 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	669	OCS	N-CA-CB-SG
1	B	669	OCS	N-CA-CB-SG
1	C	669	OCS	N-CA-CB-SG
1	D	669	OCS	N-CA-CB-SG
1	E	669	OCS	N-CA-CB-SG

There are no ring outliers.

6 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	669	OCS	1	0
1	A	669	OCS	1	0
1	D	669	OCS	1	0
1	C	669	OCS	2	0
1	G	669	OCS	2	0
1	F	669	OCS	2	0

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry

31 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	TRS	C	802	-	7,7,7	0.24	0	9,9,9	0.53	0
3	TRS	B	802	-	7,7,7	0.25	0	9,9,9	0.40	0
2	HDD	E	801	1	38,52,52	0.63	0	28,89,89	1.59	5 (17%)
4	GOL	A	803	-	5,5,5	0.77	0	5,5,5	1.01	0
3	TRS	G	802	-	7,7,7	0.30	0	9,9,9	0.35	0
4	GOL	C	805	-	5,5,5	0.93	0	5,5,5	0.98	0
6	EDO	C	804	-	3,3,3	0.54	0	2,2,2	0.12	0
4	GOL	G	803	-	5,5,5	0.83	0	5,5,5	1.07	0
5	MPD	B	803	-	7,7,7	0.29	0	9,10,10	0.32	0
2	HDD	A	801	1	38,52,52	0.78	0	28,89,89	1.44	5 (17%)
2	HDD	G	801	1	38,52,52	0.74	0	28,89,89	1.73	8 (28%)
6	EDO	E	804	-	3,3,3	0.53	0	2,2,2	0.34	0
3	TRS	E	802	-	7,7,7	0.30	0	9,9,9	0.35	0
6	EDO	B	805	-	3,3,3	0.49	0	2,2,2	0.26	0
2	HDD	F	801	7,1	38,52,52	0.71	0	28,89,89	1.64	6 (21%)
4	GOL	A	804	-	5,5,5	0.86	0	5,5,5	1.06	0
3	TRS	A	802	-	7,7,7	0.24	0	9,9,9	0.33	0
3	TRS	E	803	-	7,7,7	0.38	0	9,9,9	0.53	0
4	GOL	B	806	-	5,5,5	0.85	0	5,5,5	1.01	0
6	EDO	F	803	-	3,3,3	0.46	0	2,2,2	0.34	0
2	HDD	B	801	1	38,52,52	0.72	0	28,89,89	1.45	4 (14%)
6	EDO	F	804	-	3,3,3	0.47	0	2,2,2	0.35	0
3	TRS	F	802	-	7,7,7	0.26	0	9,9,9	0.31	0
3	TRS	H	802	-	7,7,7	0.26	0	9,9,9	0.41	0
2	HDD	C	801	7,1	38,52,52	0.66	0	28,89,89	1.70	5 (17%)
2	HDD	D	801	1	38,52,52	0.75	0	28,89,89	1.66	7 (25%)
4	GOL	E	805	-	5,5,5	0.84	0	5,5,5	1.13	0
2	HDD	H	801	7,1	38,52,52	0.72	0	28,89,89	1.76	7 (25%)
6	EDO	B	804	-	3,3,3	0.54	0	2,2,2	0.29	0
6	EDO	C	803	-	3,3,3	0.47	0	2,2,2	0.20	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	TRS	D	802	-	7,7,7	0.28	0	9,9,9	0.32	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
3	TRS	C	802	-	-	2/9/9/9	-
3	TRS	B	802	-	-	3/9/9/9	-
2	HDD	E	801	1	-	0/3/89/89	0/1/9/9
4	GOL	A	803	-	-	4/4/4/4	-
3	TRS	G	802	-	-	0/9/9/9	-
4	GOL	C	805	-	-	0/4/4/4	-
6	EDO	C	804	-	-	0/1/1/1	-
4	GOL	G	803	-	-	1/4/4/4	-
5	MPD	B	803	-	-	3/5/5/5	-
2	HDD	A	801	1	-	0/3/89/89	0/1/9/9
2	HDD	G	801	1	-	0/3/89/89	0/1/9/9
6	EDO	E	804	-	-	0/1/1/1	-
3	TRS	E	802	-	-	0/9/9/9	-
6	EDO	B	805	-	-	1/1/1/1	-
2	HDD	F	801	7,1	-	0/3/89/89	0/1/9/9
4	GOL	A	804	-	-	4/4/4/4	-
3	TRS	A	802	-	-	3/9/9/9	-
3	TRS	E	803	-	-	0/9/9/9	-
4	GOL	B	806	-	-	2/4/4/4	-
6	EDO	F	803	-	-	0/1/1/1	-
2	HDD	B	801	1	-	0/3/89/89	0/1/9/9
6	EDO	F	804	-	-	0/1/1/1	-
3	TRS	F	802	-	-	4/9/9/9	-
3	TRS	H	802	-	-	3/9/9/9	-
2	HDD	C	801	7,1	-	0/3/89/89	0/1/9/9
2	HDD	D	801	1	-	0/3/89/89	0/1/9/9
4	GOL	E	805	-	-	0/4/4/4	-
2	HDD	H	801	7,1	-	0/3/89/89	0/1/9/9
6	EDO	B	804	-	-	0/1/1/1	-
6	EDO	C	803	-	-	0/1/1/1	-
3	TRS	D	802	-	-	1/9/9/9	-

There are no bond length outliers.

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	801	HDD	O1D-CGD-O2D	5.04	125.30	120.80
2	G	801	HDD	O1D-CGD-O2D	4.85	125.13	120.80
2	C	801	HDD	O1D-CGD-O2D	4.71	125.00	120.80
2	E	801	HDD	O1D-CGD-O2D	4.63	124.94	120.80
2	B	801	HDD	O1D-CGD-O2D	4.53	124.84	120.80

There are no chirality outliers.

5 of 31 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	804	GOL	C1-C2-C3-O3
4	B	806	GOL	O1-C1-C2-C3
5	B	803	MPD	O2-C2-C3-C4
4	A	803	GOL	O1-C1-C2-O2
4	A	803	GOL	O1-C1-C2-C3

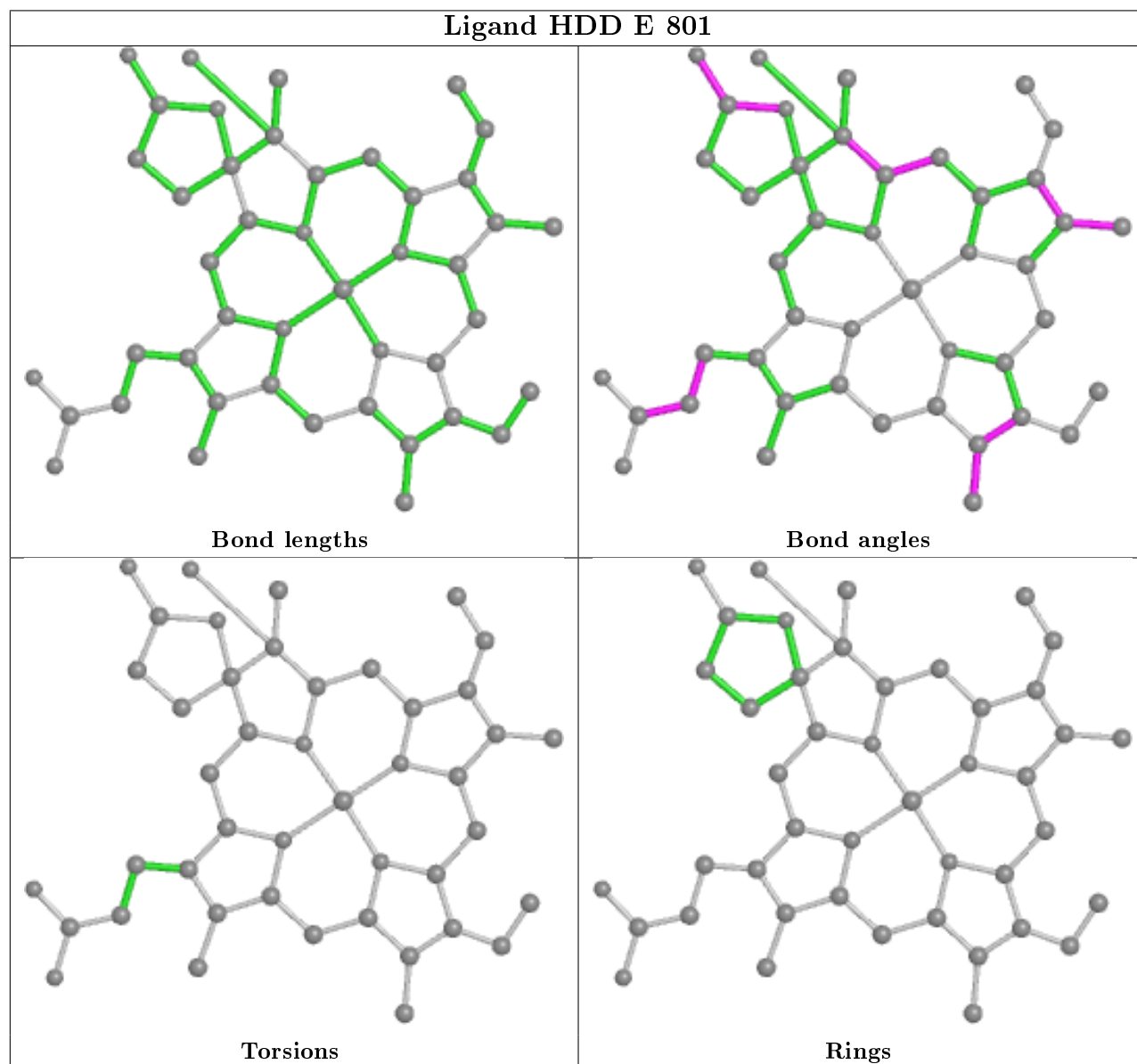
There are no ring outliers.

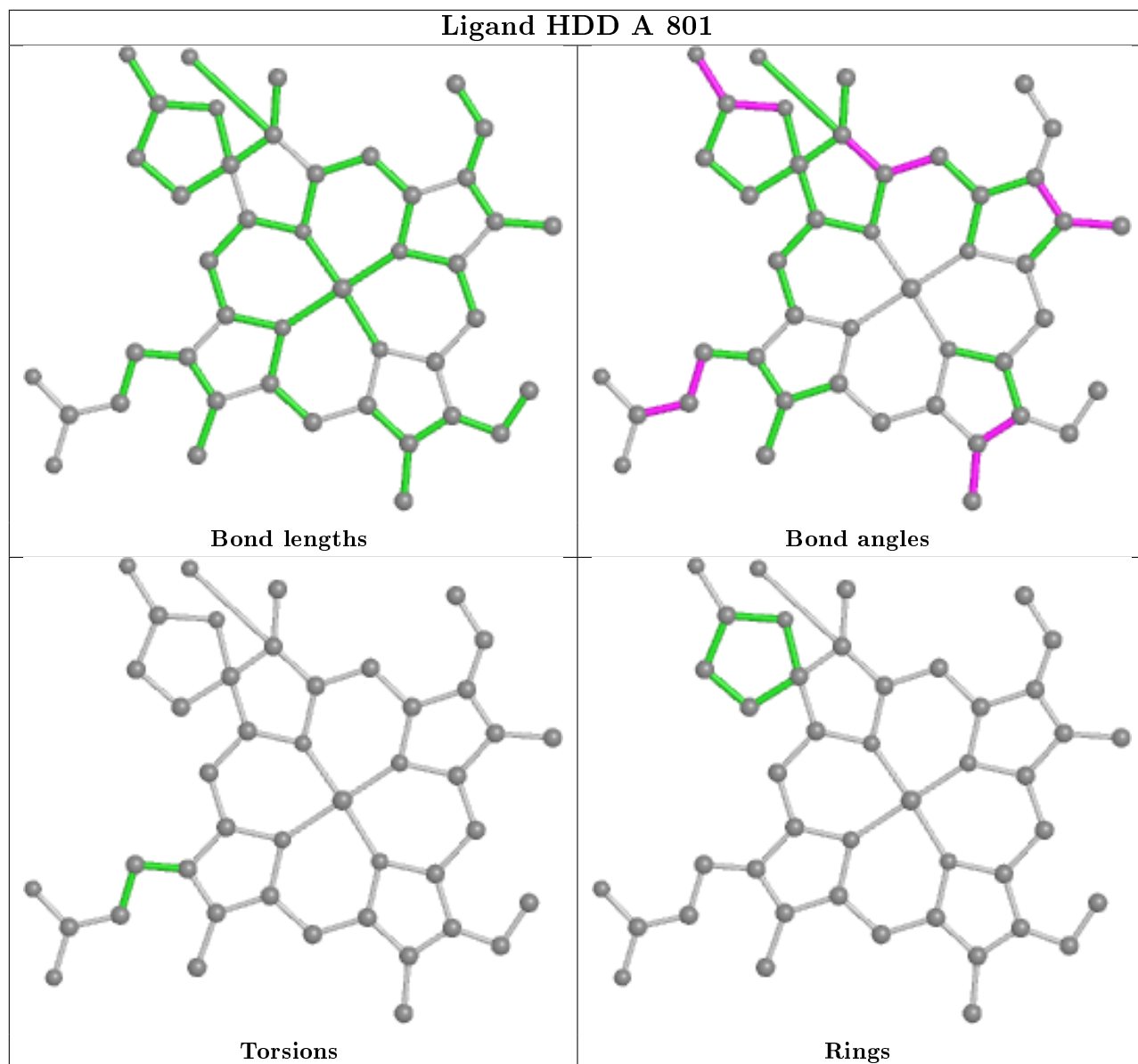
12 monomers are involved in 25 short contacts:

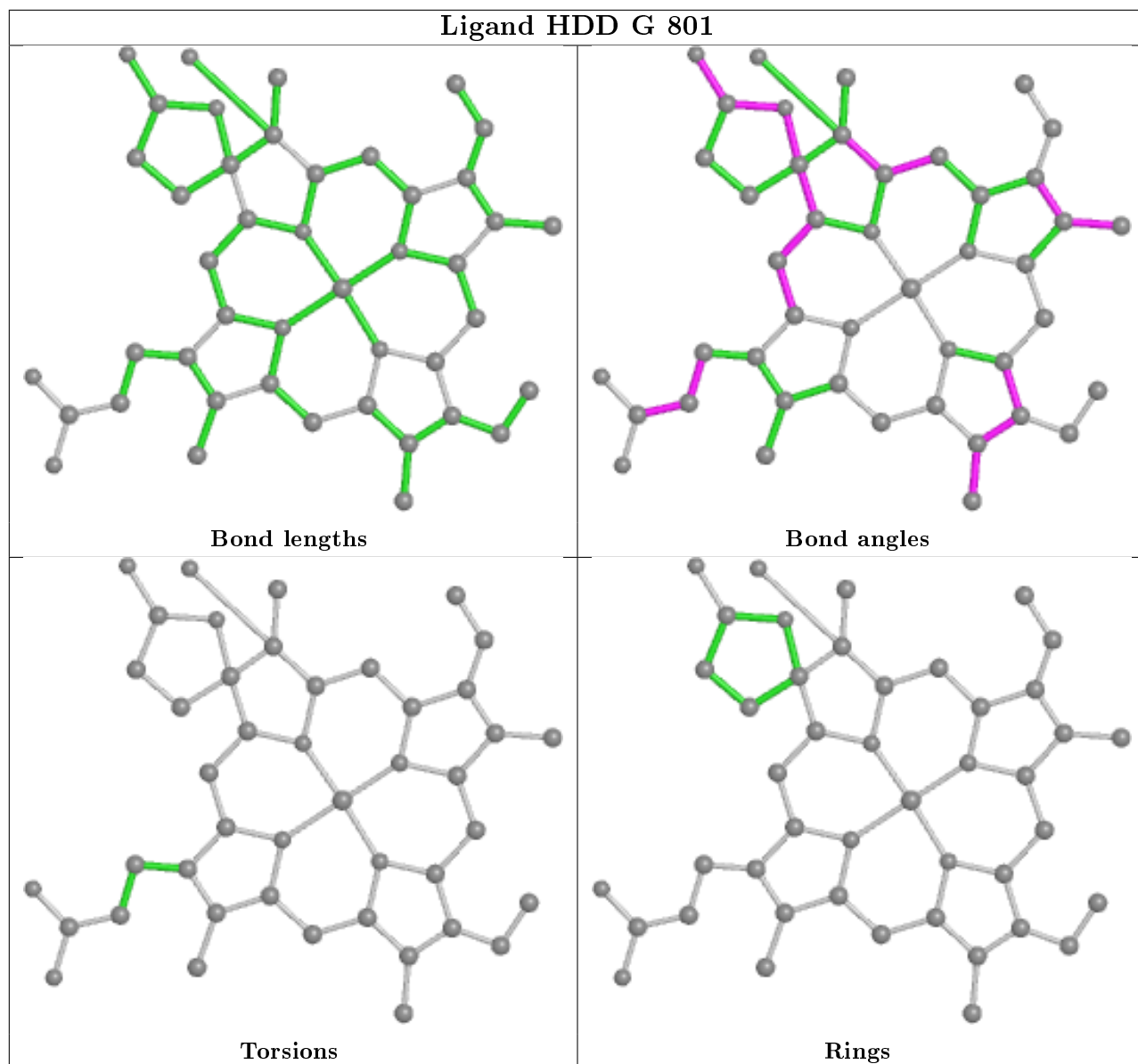
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	801	HDD	4	0
4	G	803	GOL	1	0
2	A	801	HDD	3	0
2	G	801	HDD	3	0
3	E	802	TRS	1	0
2	F	801	HDD	2	0
2	B	801	HDD	1	0
3	F	802	TRS	1	0
2	C	801	HDD	3	0
2	D	801	HDD	3	0
2	H	801	HDD	2	0
3	D	802	TRS	1	0

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

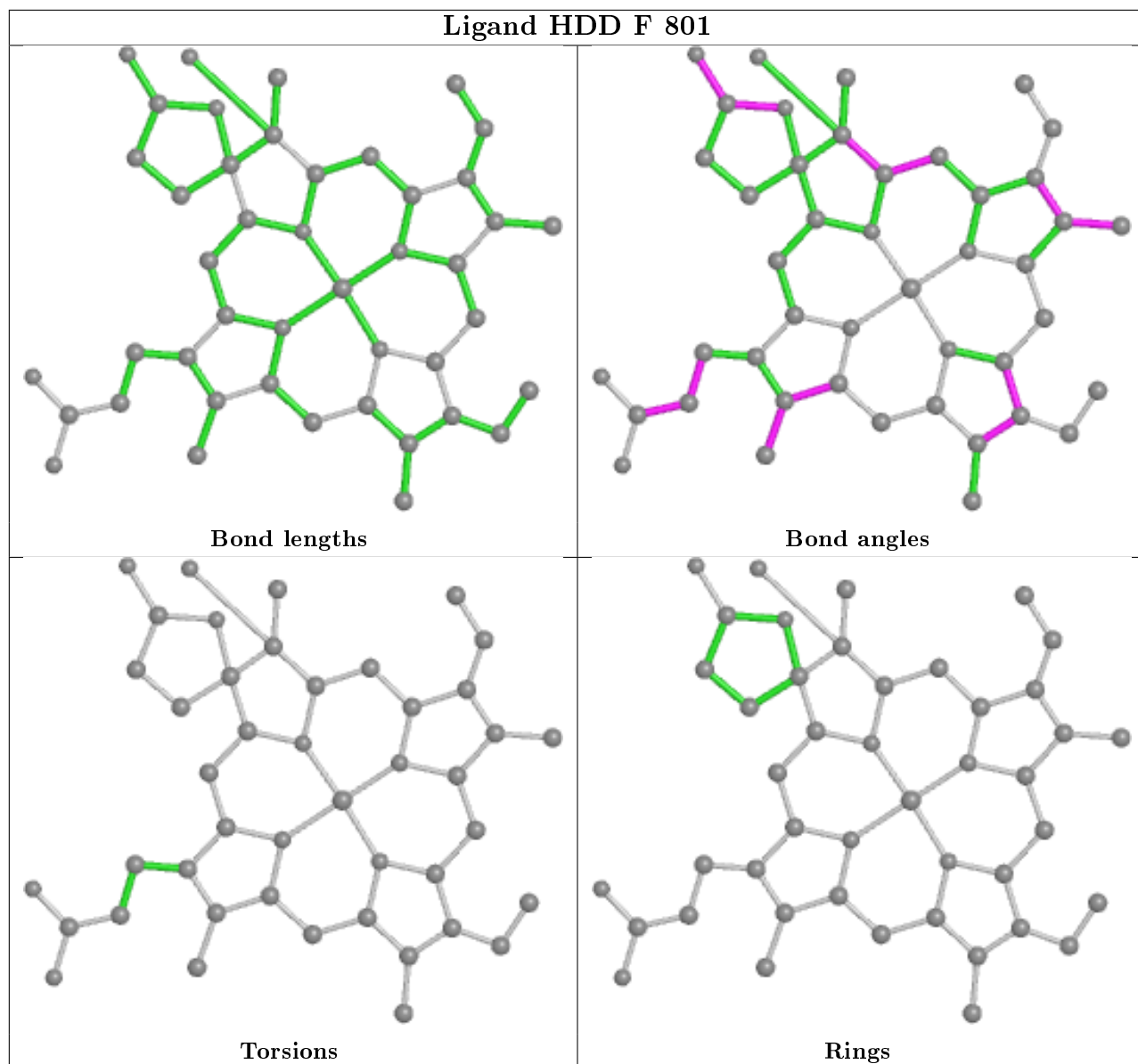
average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

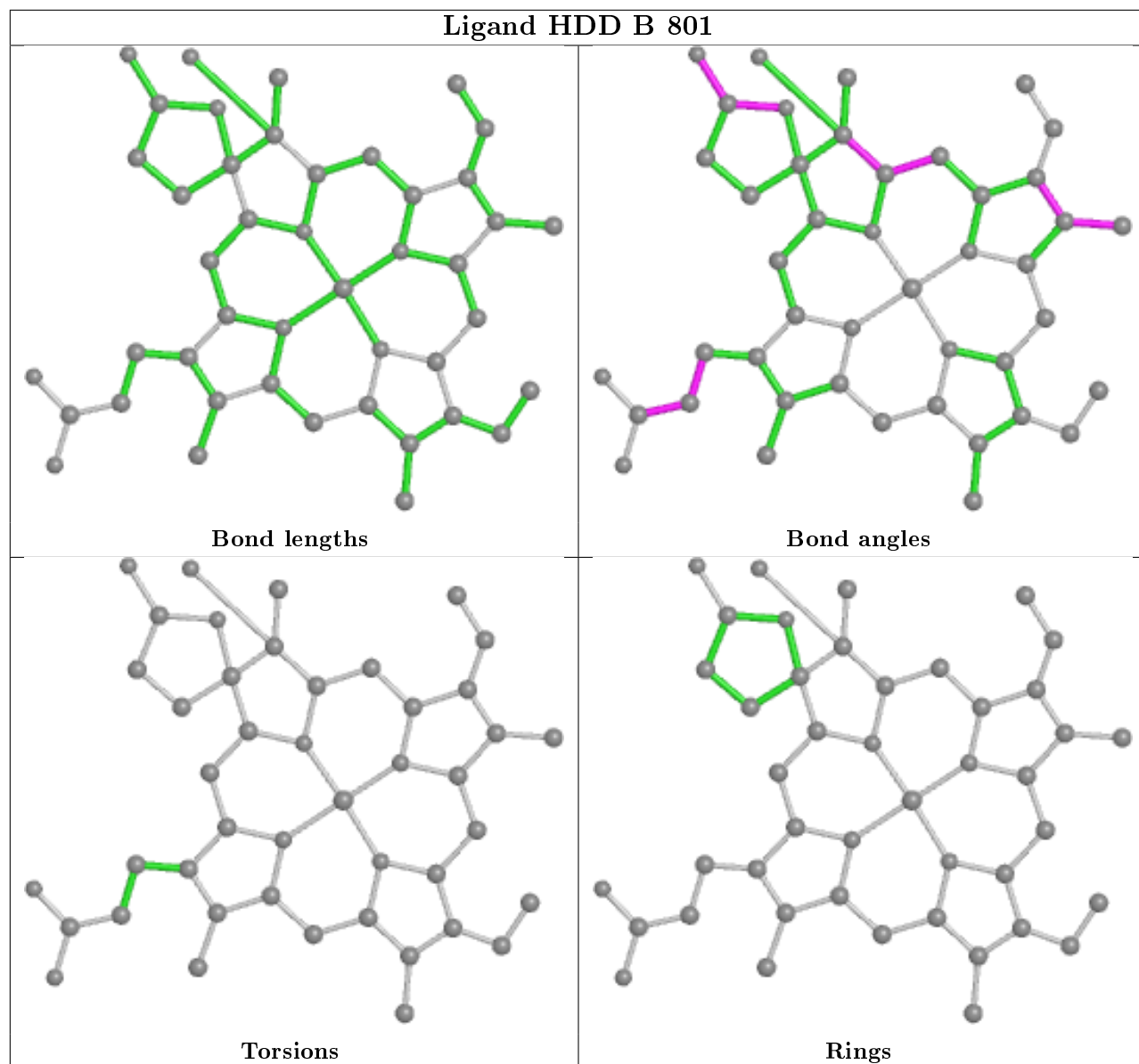


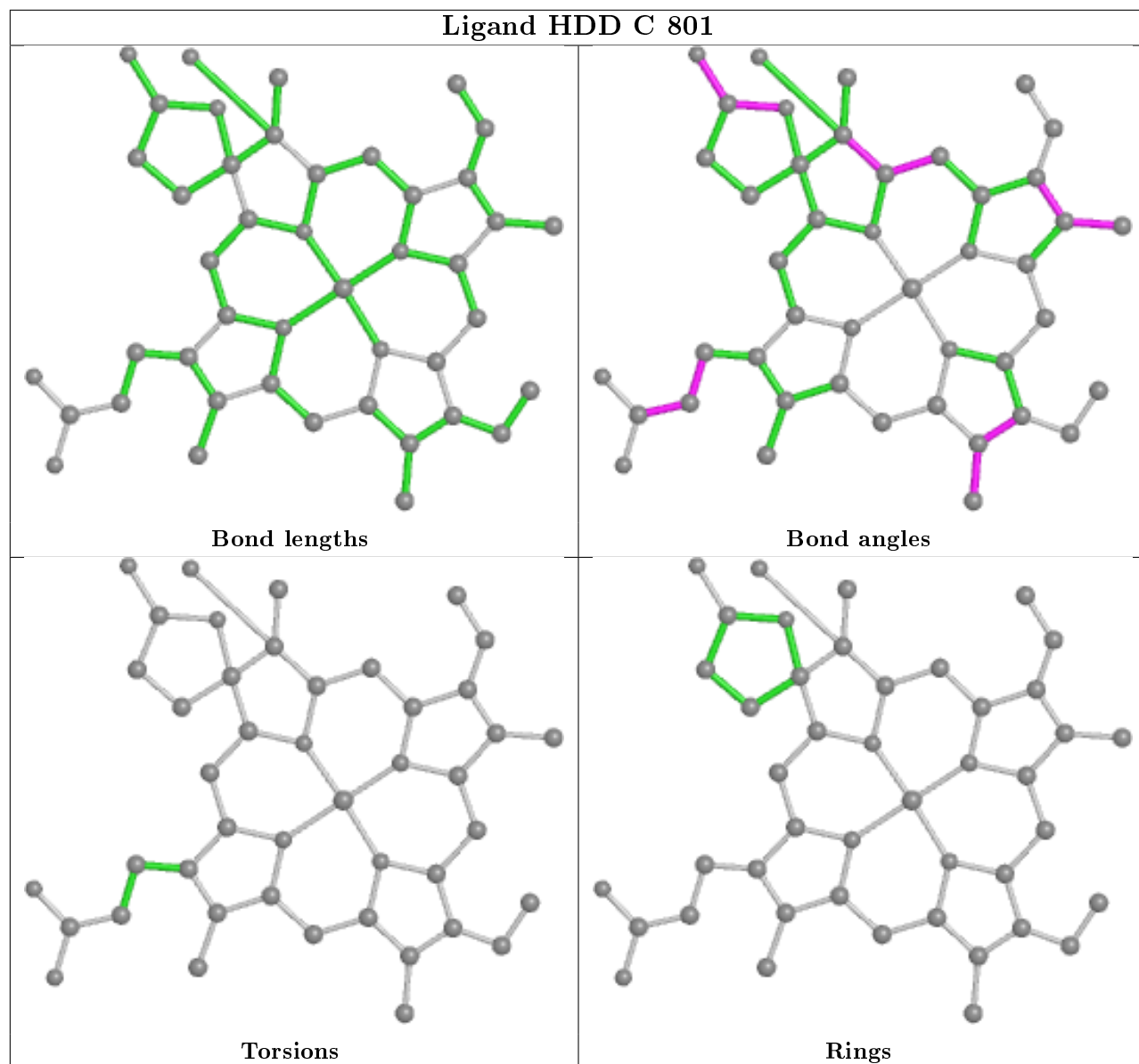


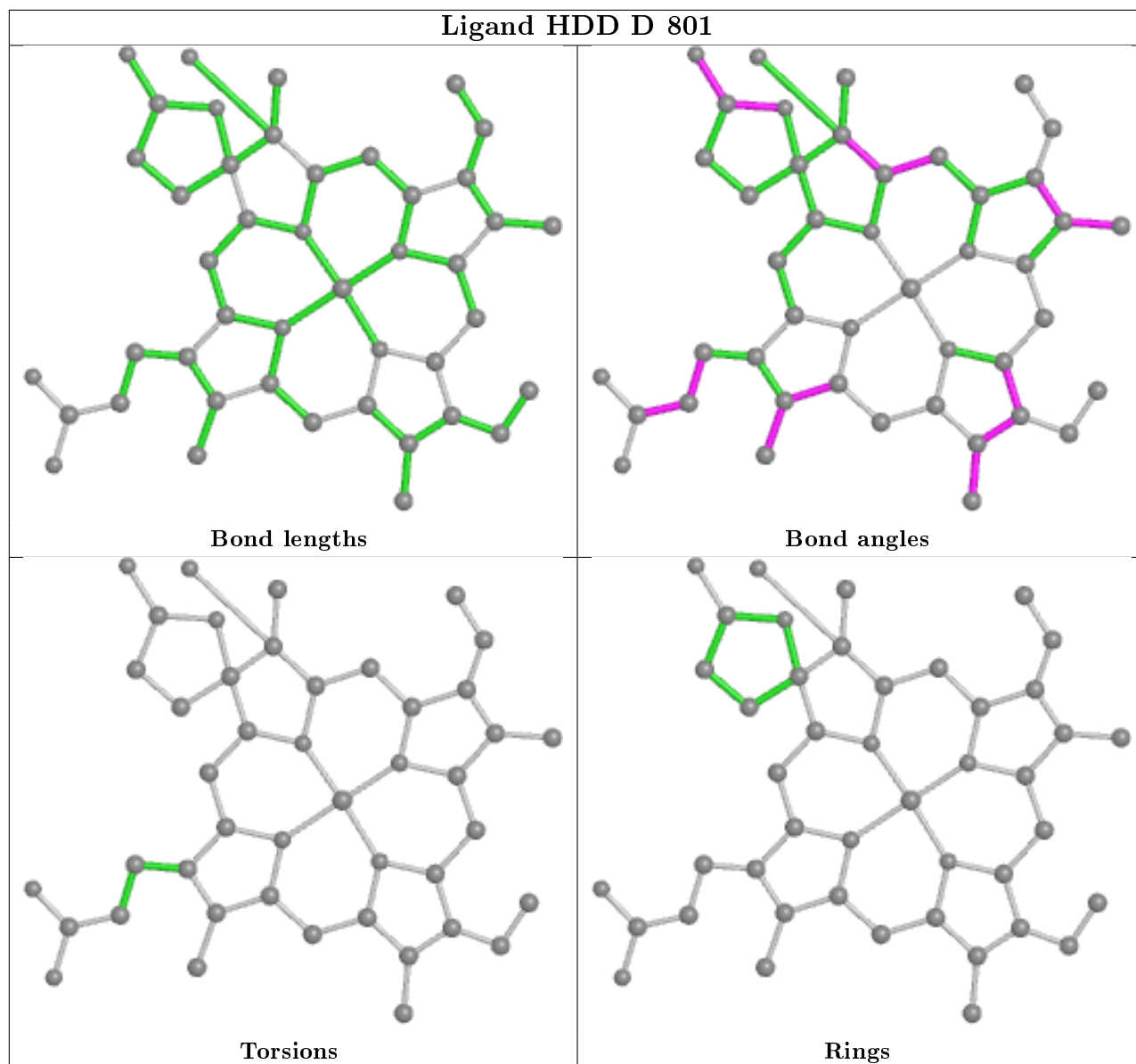


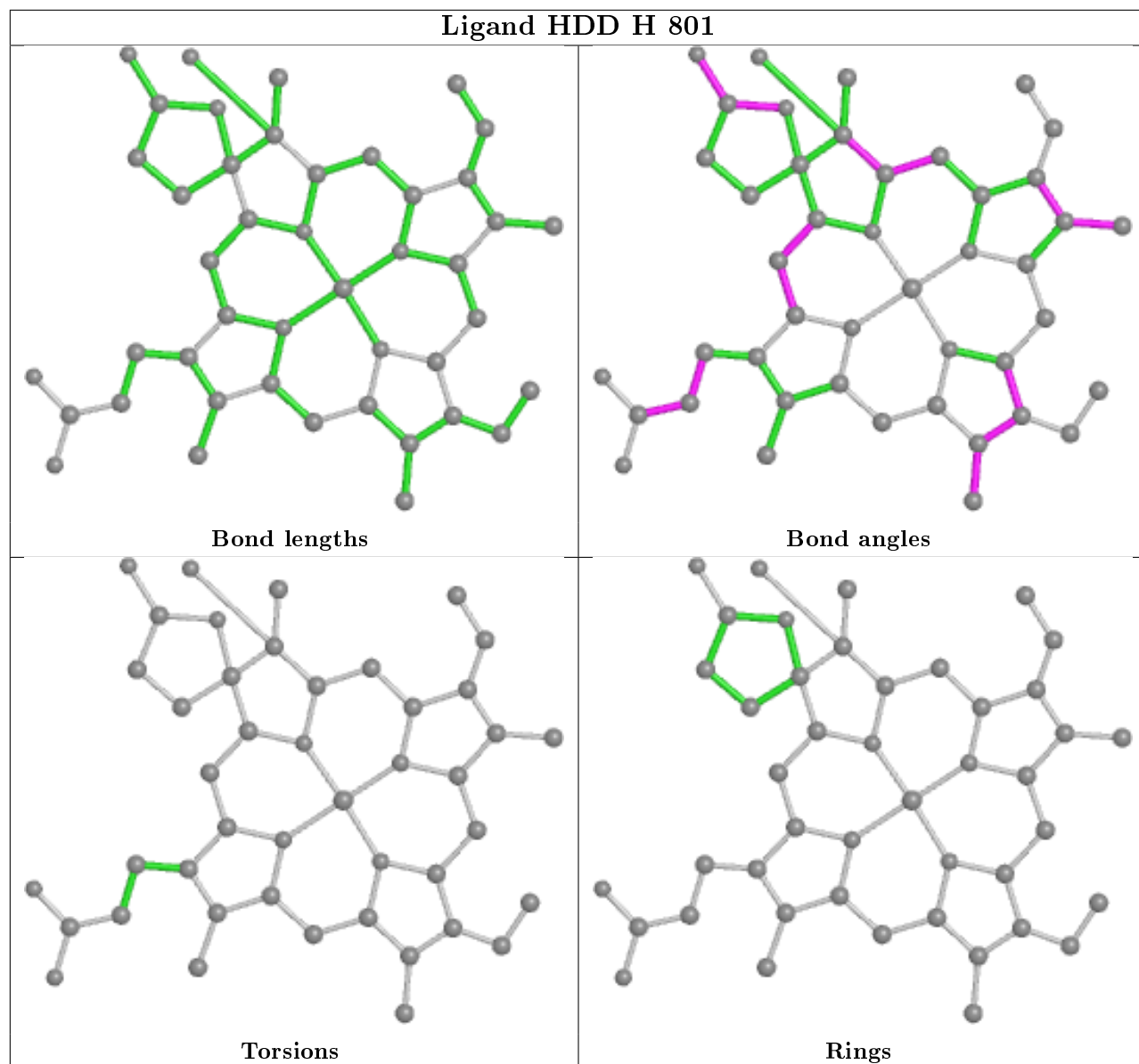












## 5.7 Other polymers [\(i\)](#)

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	725/753 (96%)	-0.76	0 100   100	11, 18, 38, 61	0
1	B	725/753 (96%)	-0.73	2 (0%) 94   93	10, 19, 34, 70	1 (0%)
1	C	725/753 (96%)	-0.74	1 (0%) 95   94	10, 19, 38, 87	1 (0%)
1	D	725/753 (96%)	-0.79	1 (0%) 95   94	11, 17, 31, 51	0
1	E	725/753 (96%)	-0.73	0 100   100	12, 20, 36, 62	1 (0%)
1	F	725/753 (96%)	-0.72	0 100   100	12, 20, 38, 54	1 (0%)
1	G	726/753 (96%)	-0.76	3 (0%) 92   92	11, 20, 38, 88	0
1	H	725/753 (96%)	-0.63	2 (0%) 94   93	11, 23, 47, 91	0
All	All	5801/6024 (96%)	-0.73	9 (0%) 95   94	10, 19, 39, 91	4 (0%)

The worst 5 of 9 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	725	ASP	3.7
1	G	749	ASP	3.6
1	C	750	LYS	3.3
1	D	449[A]	HIS	2.6
1	B	710	ILE	2.5

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

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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
1	OCS	B	669	9/10	0.94	0.10	23,28,49,53	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
1	OCS	G	669	9/10	0.95	0.12	24,32,47,59	0
1	OCS	H	669	9/10	0.96	0.11	41,46,55,56	0
1	OCS	D	669	9/10	0.97	0.09	15,25,37,50	0
1	OCS	E	669	9/10	0.97	0.08	19,21,34,44	0
1	OCS	F	669	9/10	0.97	0.09	25,29,42,50	0
1	OCS	A	669	9/10	0.97	0.10	25,30,41,53	0
1	OCS	C	669	9/10	0.97	0.11	26,29,42,49	0

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

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

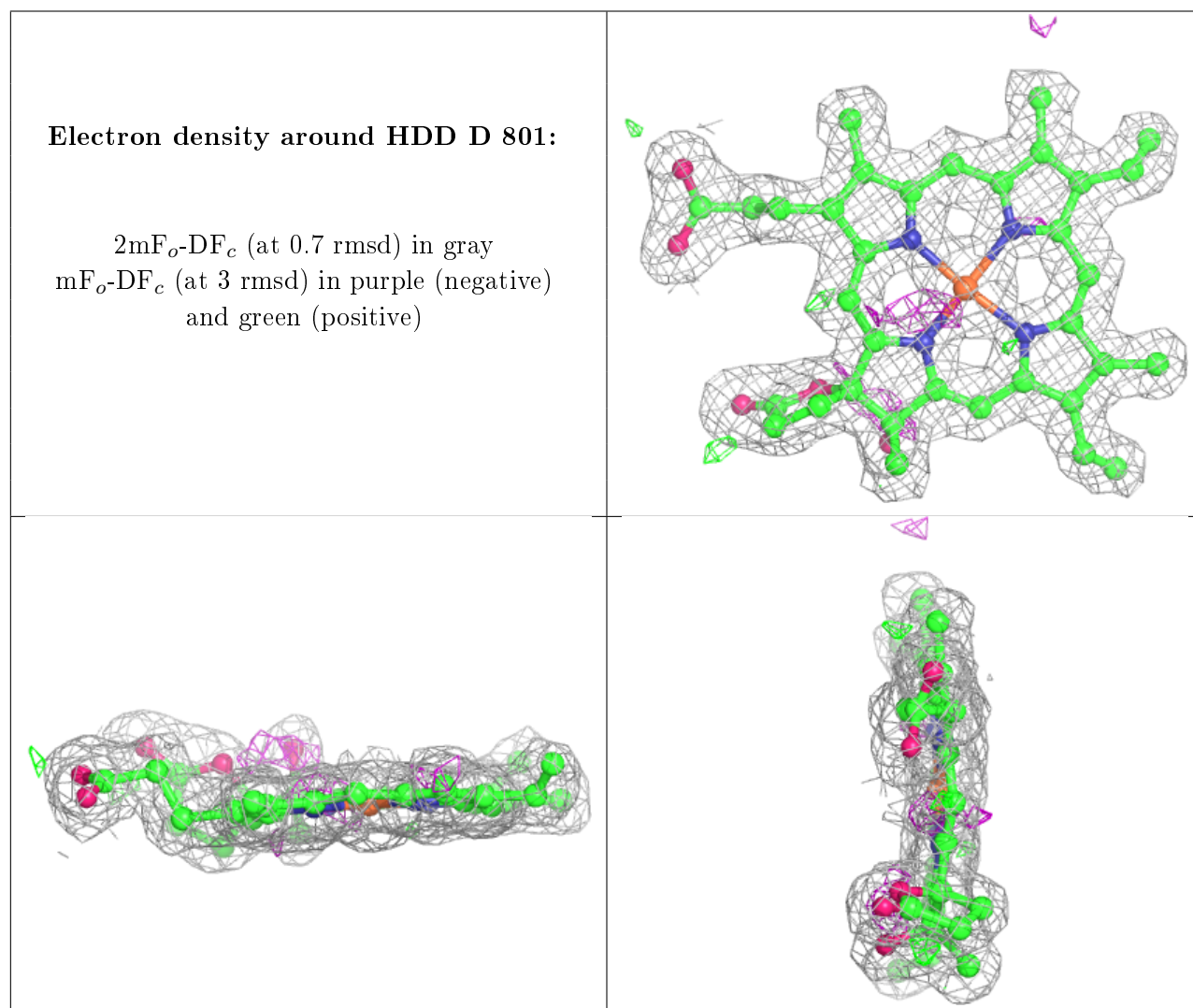
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	EDO	E	804	4/4	0.74	0.17	41,41,42,45	0
6	EDO	B	804	4/4	0.79	0.12	36,40,47,51	0
4	GOL	A	804	6/6	0.79	0.21	42,45,49,51	0
4	GOL	B	806	6/6	0.82	0.15	57,61,63,64	0
6	EDO	C	804	4/4	0.83	0.14	34,44,50,55	0
4	GOL	G	803	6/6	0.83	0.15	52,54,58,61	0
6	EDO	F	803	4/4	0.85	0.09	49,49,51,52	0
4	GOL	C	805	6/6	0.86	0.12	50,53,54,57	0
4	GOL	A	803	6/6	0.86	0.14	50,53,55,57	0
6	EDO	F	804	4/4	0.86	0.10	44,47,49,50	0
6	EDO	C	803	4/4	0.87	0.10	48,48,49,52	0
6	EDO	B	805	4/4	0.90	0.16	41,43,47,48	0
3	TRS	D	802	8/8	0.90	0.17	21,31,35,39	0
5	MPD	B	803	8/8	0.91	0.16	39,41,43,47	0
3	TRS	H	802	8/8	0.91	0.15	21,31,35,36	0
4	GOL	E	805	6/6	0.92	0.18	36,43,51,52	0
3	TRS	F	802	8/8	0.92	0.14	23,27,31,31	0
3	TRS	E	803	8/8	0.93	0.08	33,38,40,40	0
3	TRS	C	802	8/8	0.93	0.10	16,22,24,26	0
3	TRS	G	802	8/8	0.93	0.14	20,25,28,34	0
3	TRS	A	802	8/8	0.94	0.13	18,26,31,31	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	TRS	B	802	8/8	0.94	0.14	20,22,23,24	0
3	TRS	E	802	8/8	0.96	0.12	20,25,32,36	0
2	HDD	D	801	44/44	0.97	0.08	7,12,19,21	0
2	HDD	F	801	44/44	0.97	0.08	10,16,24,25	0
2	HDD	A	801	44/44	0.97	0.08	10,13,21,24	0
2	HDD	B	801	44/44	0.97	0.08	9,14,22,23	0
2	HDD	C	801	44/44	0.97	0.08	7,14,20,25	0
2	HDD	H	801	44/44	0.98	0.07	9,15,21,25	0
2	HDD	E	801	44/44	0.98	0.08	9,14,20,26	0
2	HDD	G	801	44/44	0.98	0.08	8,14,19,23	0

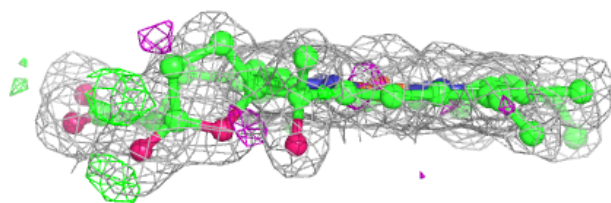
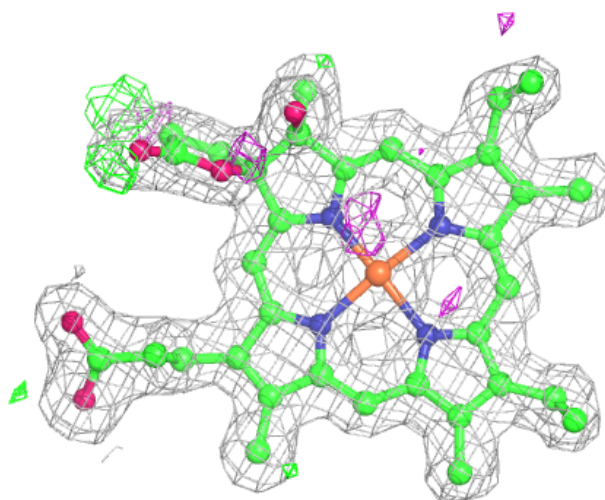
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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





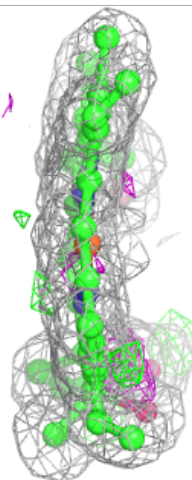
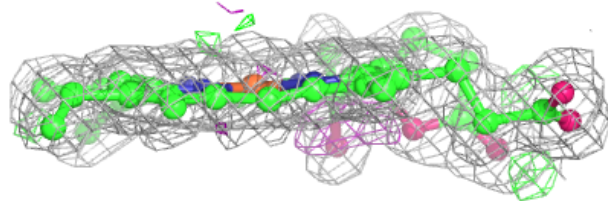
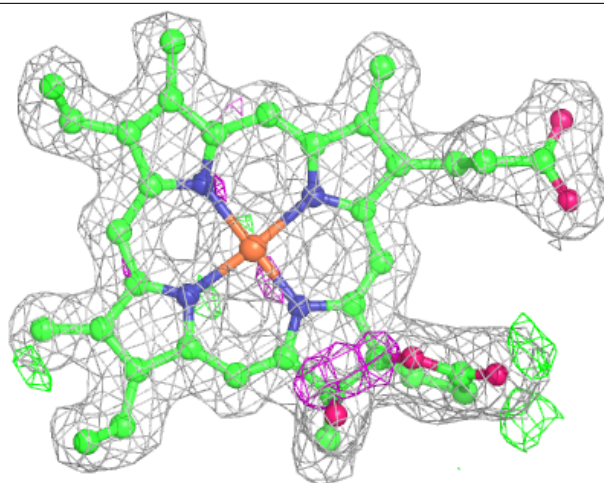
**Electron density around HDD F 801:**

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



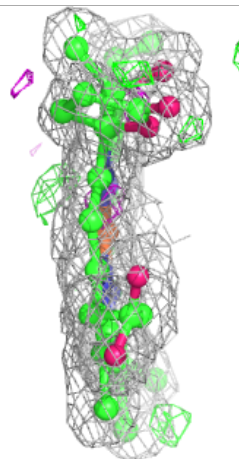
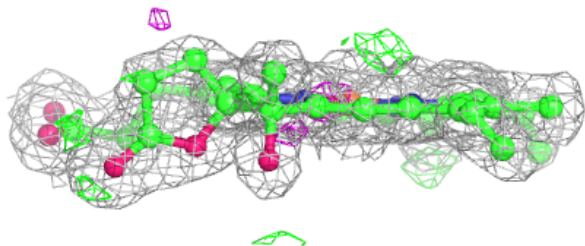
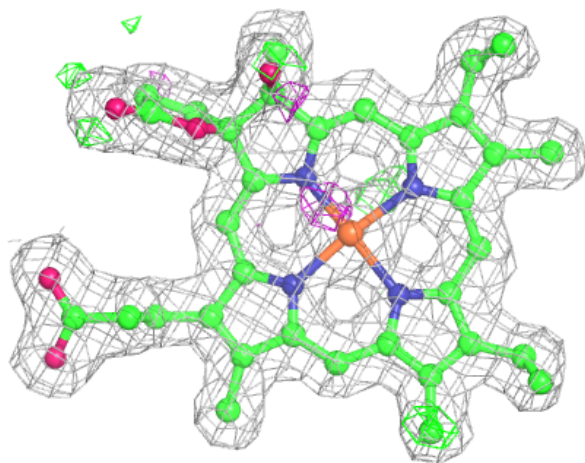
**Electron density around HDD A 801:**

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



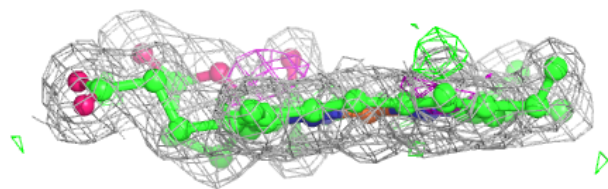
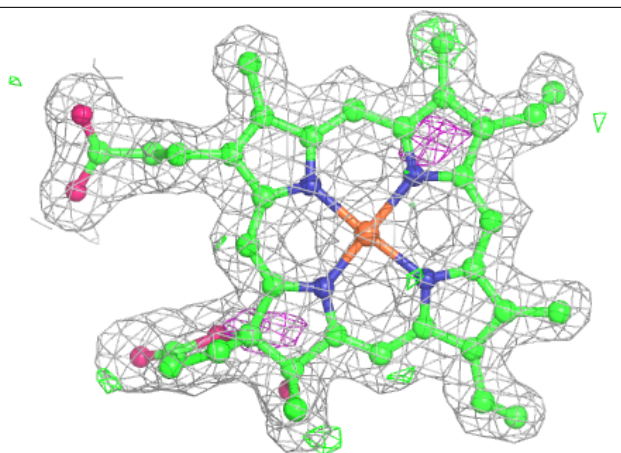
**Electron density around HDD B 801:**

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



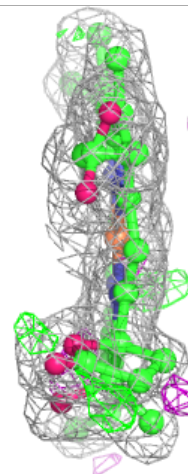
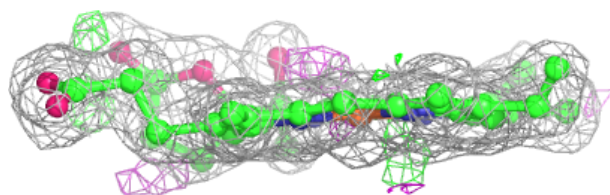
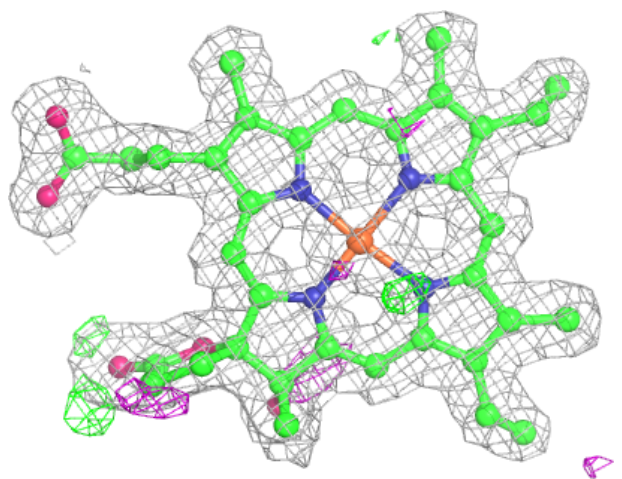
**Electron density around HDD C 801:**

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



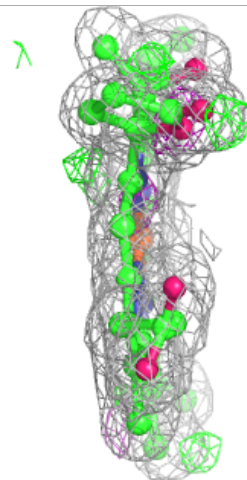
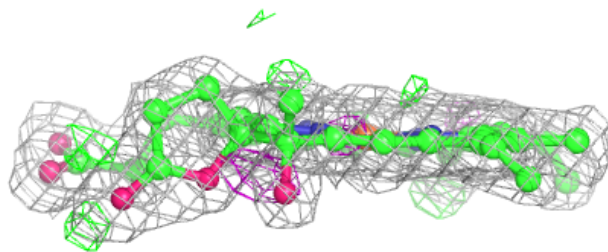
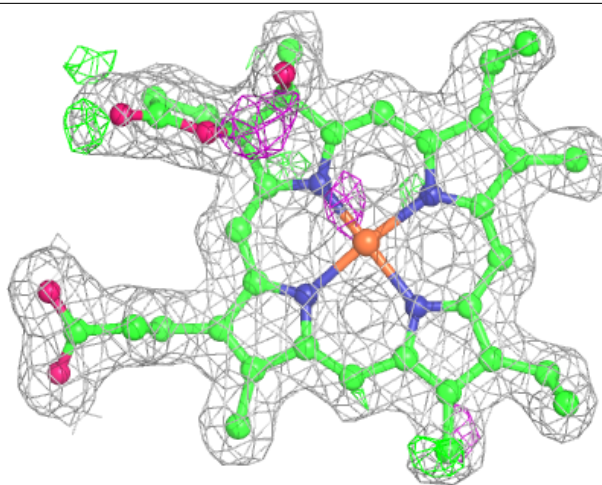
**Electron density around HDD H 801:**

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

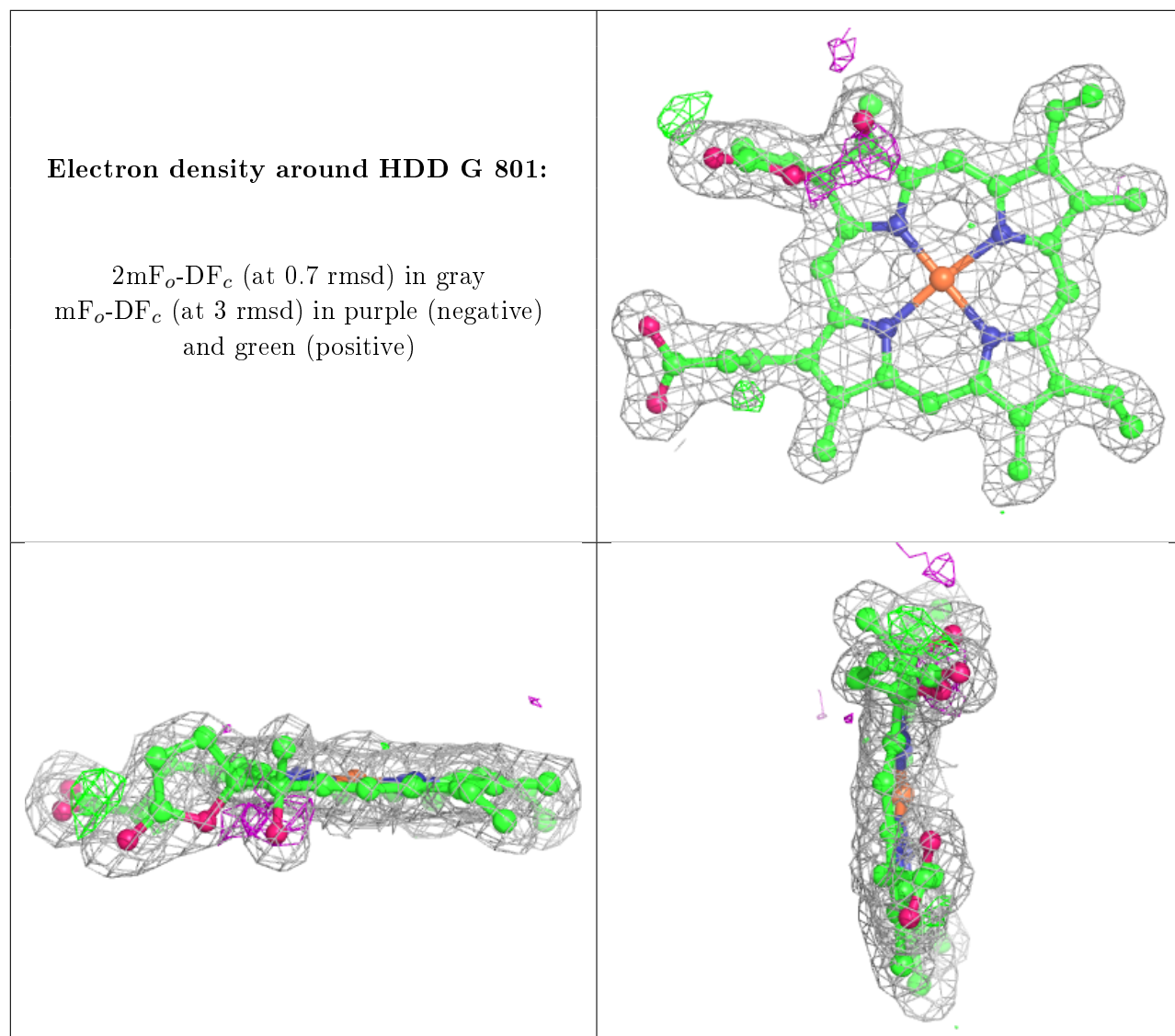


**Electron density around HDD E 801:**

$2mF_o-DF_c$  (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.