



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 20, 2024 – 07:02 AM EST

PDB ID : 4M08  
Title : Crystal Structure of Mutant Chlorite Dismutase from Candidatus Nitrospira defluvii W145V  
Authors : Gysel, K.; Hagmueller, A.; Djinovic-Carugo, K.  
Deposited on : 2013-08-01  
Resolution : 2.80 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

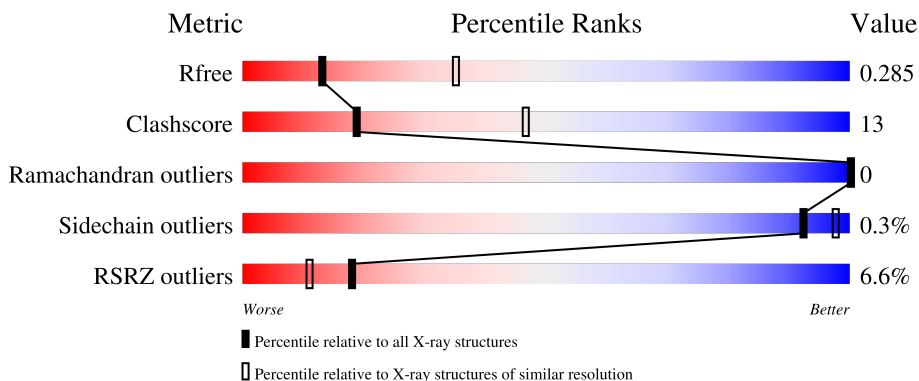
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

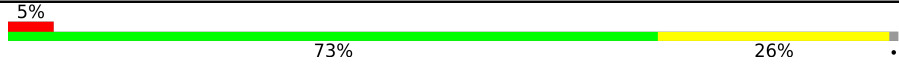



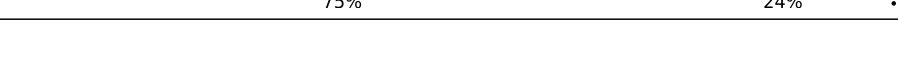
The reported resolution of this entry is 2.80 Å.

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	241	
1	B	241	
1	C	241	
1	D	241	
1	E	241	

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:

<b>Mol</b>	<b>Type</b>	<b>Chain</b>	<b>Res</b>	<b>Chirality</b>	<b>Geometry</b>	<b>Clashes</b>	<b>Electron density</b>
5	EDO	B	304	-	-	-	X
5	EDO	B	310	-	-	-	X
5	EDO	C	310	-	-	-	X

## 2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 10082 atoms, of which 18 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 Chlorite dismutase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	238	1912	1217	334	355	6	0	0	0
1	B	238	1912	1217	334	355	6	0	0	0
1	C	238	1912	1217	334	355	6	0	0	0
1	D	238	1912	1217	334	355	6	0	0	0
1	E	238	1912	1217	334	355	6	0	0	0

There are 20 discrepancies between the modelled and reference sequences:

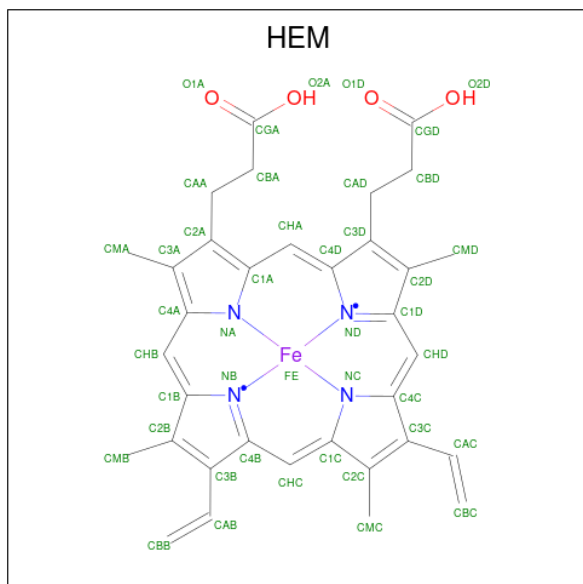
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP B3U4H7
A	-1	ALA	-	expression tag	UNP B3U4H7
A	0	MET	-	expression tag	UNP B3U4H7
A	145	VAL	TRP	engineered mutation	UNP B3U4H7
B	-2	GLY	-	expression tag	UNP B3U4H7
B	-1	ALA	-	expression tag	UNP B3U4H7
B	0	MET	-	expression tag	UNP B3U4H7
B	145	VAL	TRP	engineered mutation	UNP B3U4H7
C	-2	GLY	-	expression tag	UNP B3U4H7
C	-1	ALA	-	expression tag	UNP B3U4H7
C	0	MET	-	expression tag	UNP B3U4H7
C	145	VAL	TRP	engineered mutation	UNP B3U4H7
D	-2	GLY	-	expression tag	UNP B3U4H7
D	-1	ALA	-	expression tag	UNP B3U4H7
D	0	MET	-	expression tag	UNP B3U4H7
D	145	VAL	TRP	engineered mutation	UNP B3U4H7
E	-2	GLY	-	expression tag	UNP B3U4H7
E	-1	ALA	-	expression tag	UNP B3U4H7
E	0	MET	-	expression tag	UNP B3U4H7

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Chain	Residue	Modelled	Actual	Comment	Reference
E	145	VAL	TRP	engineered mutation	UNP B3U4H7

- Molecule 2 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula:  $C_{34}H_{32}FeN_4O_4$ ).



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

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula:  $O_4S$ ).



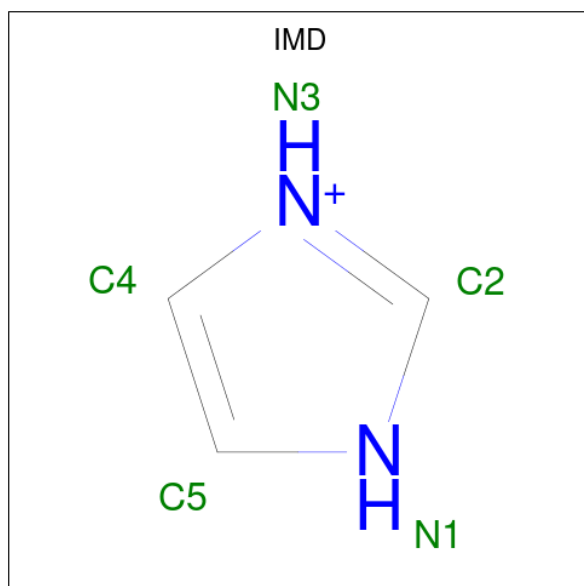
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	C	1	Total O S 5 4 1	0	0
3	C	1	Total O S 5 4 1	0	0
3	C	1	Total O S 5 4 1	0	0
3	D	1	Total O S 5 4 1	0	0
3	D	1	Total O S 5 4 1	0	0
3	D	1	Total O S 5 4 1	0	0
3	E	1	Total O S 5 4 1	0	0
3	E	1	Total O S 5 4 1	0	0

- Molecule 4 is IMIDAZOLE (three-letter code: IMD) (formula: C<sub>3</sub>H<sub>5</sub>N<sub>2</sub>).



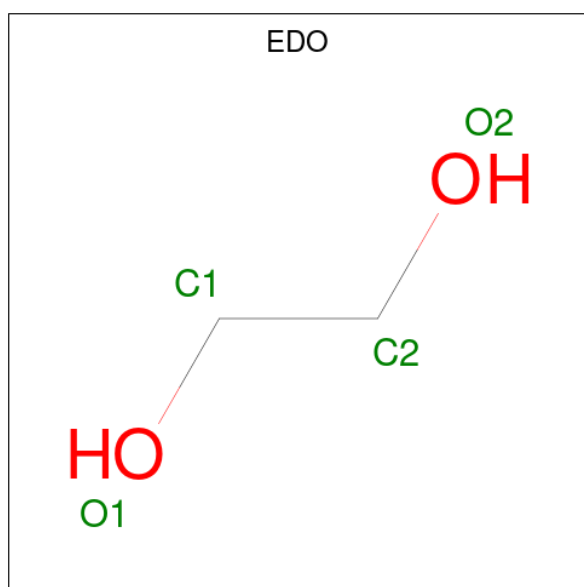
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N 5 3 2	0	0
4	B	1	Total C N 5 3 2	0	0
4	C	1	Total C N 5 3 2	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	D	1	Total	C	N	0	0
			5	3	2		
4	E	1	Total	C	N	0	0
			5	3	2		

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	O	0	0	
			4	2	2			
5	A	1	Total	C	O	0	0	
			4	2	2			
5	B	1	Total	C	O	0	0	
			4	2	2			
5	B	1	Total	C	H	O	0	0
			10	2	6	2		
5	B	1	Total	C	O	0	0	
			4	2	2			
5	B	1	Total	C	O	0	0	
			4	2	2			
5	C	1	Total	C	O	0	0	
			4	2	2			
5	C	1	Total	C	O	0	0	
			4	2	2			
5	E	1	Total	C	H	O	0	0
			10	2	6	2		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	E	1	Total	C	H	O	0	0
			10	2	6	2		

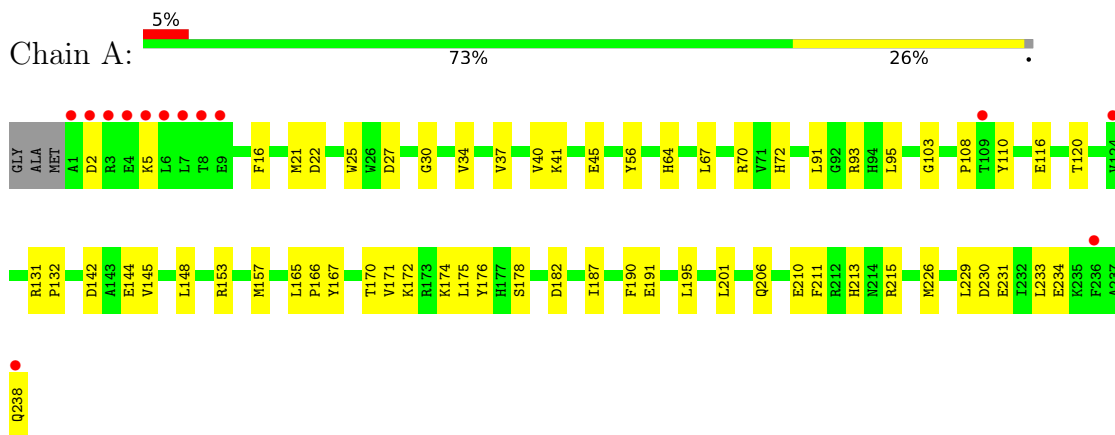
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	27	Total	O	0	0
			27	27		
6	B	31	Total	O	0	0
			31	31		
6	C	40	Total	O	0	0
			40	40		
6	D	8	Total	O	0	0
			8	8		
6	E	8	Total	O	0	0
			8	8		

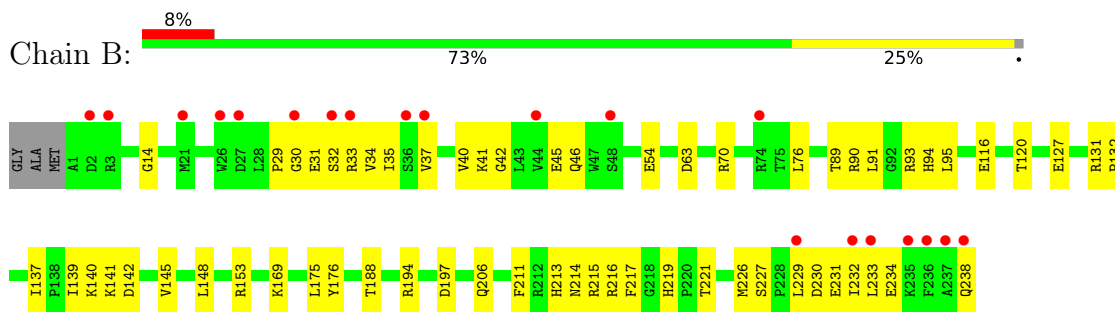
### 3 Residue-property plots [i](#)

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.

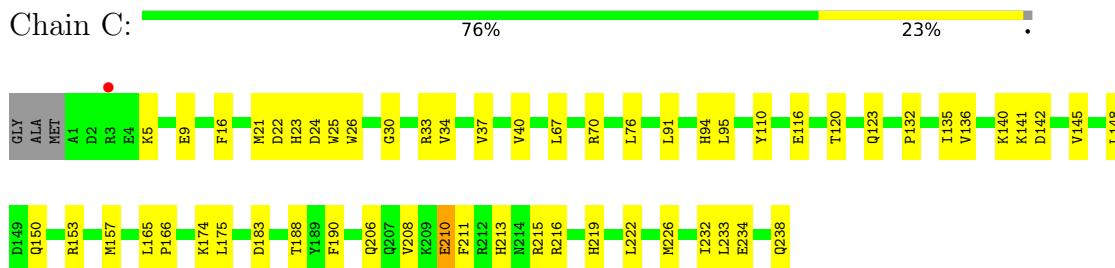
- Molecule 1: Chlorite dismutase



- Molecule 1: Chlorite dismutase

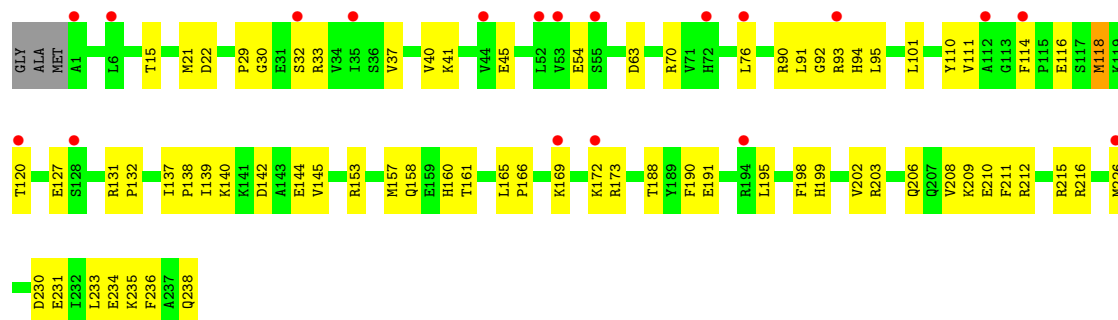


- Molecule 1: Chlorite dismutase

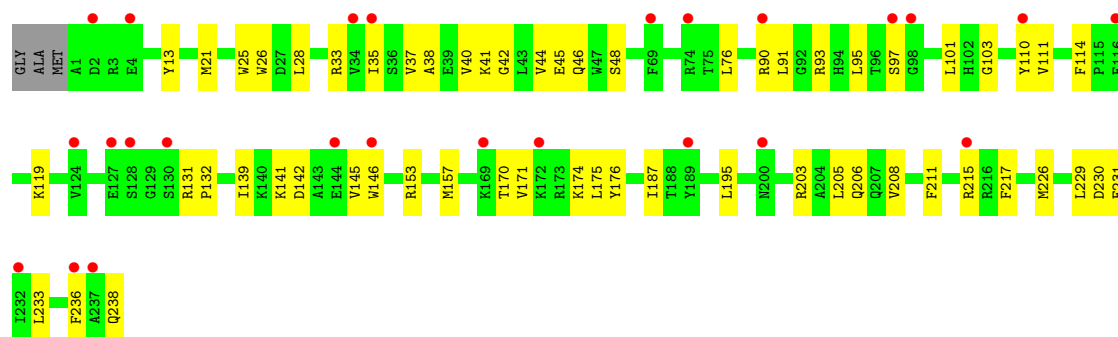
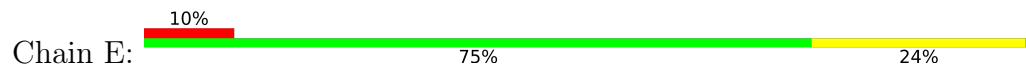


- Molecule 1: Chlorite dismutase





● Molecule 1: Chlorite dismutase



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	145.83Å 145.83Å 137.22Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	63.15 – 2.80 64.39 – 2.80	Depositor EDS
% Data completeness (in resolution range)	91.8 (63.15-2.80) 96.7 (64.39-2.80)	Depositor EDS
$R_{merge}$	0.20	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.56 (at 2.81Å)	Xtrriage
Refinement program	PHENIX 1.8.2_1309	Depositor
R, $R_{free}$	0.221 , 0.280 0.227 , 0.285	Depositor DCC
$R_{free}$ test set	2065 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	52.3	Xtrriage
Anisotropy	0.308	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 61.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.54$ , $\langle L^2 \rangle = 0.39$	Xtrriage
Estimated twinning fraction	0.000 for -h,-k,l	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	10082	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	62.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.02% 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, EDO, IMD, SO4

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	0/1956	0.43	0/2644
1	B	0.26	0/1956	0.45	0/2644
1	C	0.28	0/1956	0.46	0/2644
1	D	0.24	0/1956	0.43	0/2644
1	E	0.24	0/1956	0.43	0/2644
All	All	0.25	0/9780	0.44	0/13220

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	1912	0	1892	47	0
1	B	1912	0	1892	44	0
1	C	1912	0	1892	44	0
1	D	1912	0	1892	56	0
1	E	1912	0	1892	47	0
2	A	43	0	30	8	0
2	B	43	0	30	6	0
2	C	43	0	30	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	43	0	30	8	0
2	E	43	0	30	10	0
3	A	35	0	0	1	0
3	B	20	0	0	0	0
3	C	30	0	0	1	0
3	D	15	0	0	1	0
3	E	10	0	0	1	0
4	A	5	0	5	2	0
4	B	5	0	5	1	0
4	C	5	0	5	3	0
4	D	5	0	5	2	0
4	E	5	0	5	3	0
5	A	8	0	12	0	0
5	B	16	6	24	0	0
5	C	8	0	12	2	0
5	E	8	12	12	0	0
6	A	27	0	0	1	0
6	B	31	0	0	2	0
6	C	40	0	0	1	0
6	D	8	0	0	1	0
6	E	8	0	0	0	0
All	All	10064	18	9695	258	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 13.

All (258) 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:40:VAL:HG21	1:B:91:LEU:HD23	1.49	0.94
2:B:301:HEM:HBC2	2:B:301:HEM:HMC2	1.49	0.94
1:A:40:VAL:HG21	1:A:91:LEU:HD23	1.48	0.93
1:C:142:ASP:HB3	1:C:215:ARG:HG2	1.49	0.93
2:E:301:HEM:HMC2	2:E:301:HEM:HBC2	1.51	0.92
2:C:302:HEM:HBC2	2:C:302:HEM:HMC2	1.51	0.91
1:E:142:ASP:HB3	1:E:215:ARG:HG2	1.54	0.89
1:D:142:ASP:HB3	1:D:215:ARG:HG2	1.61	0.83
2:A:301:HEM:HHC	2:A:301:HEM:HBB2	1.59	0.83
2:E:301:HEM:HBA1	2:E:301:HEM:HHA	1.64	0.79
1:C:175:LEU:HB2	4:C:305:IMD:C5	2.13	0.78
1:D:110:TYR:OH	1:D:153:ARG:NH2	2.16	0.78

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:301:HEM:HMC1	2:A:301:HEM:HBC2	1.66	0.77
2:C:302:HEM:HMB1	2:C:302:HEM:HBB2	1.67	0.77
1:D:199:HIS:NE2	1:D:203:ARG:HD2	2.00	0.77
2:E:301:HEM:HMB1	2:E:301:HEM:HBB2	1.66	0.77
1:C:40:VAL:HG21	1:C:91:LEU:HD23	1.66	0.76
2:D:301:HEM:HMB1	2:D:301:HEM:HBB2	1.67	0.75
1:C:148:LEU:O	1:C:153:ARG:NH1	2.19	0.74
1:D:209:LYS:HG3	1:D:212:ARG:NH2	2.02	0.74
1:E:40:VAL:HG21	1:E:91:LEU:HD23	1.70	0.73
1:B:148:LEU:O	1:B:153:ARG:NH1	2.20	0.73
1:D:40:VAL:HG21	1:D:91:LEU:HD23	1.71	0.73
2:D:301:HEM:HMC1	2:D:301:HEM:HBC2	1.70	0.72
1:A:142:ASP:HB3	1:A:215:ARG:HG2	1.73	0.71
1:A:110:TYR:CD2	1:A:157:MET:HG3	2.26	0.70
1:B:41:LYS:O	1:B:45:GLU:HG3	1.91	0.70
1:A:2:ASP:HB3	1:A:5:LYS:HD2	1.73	0.70
1:B:142:ASP:HB3	1:B:215:ARG:HG2	1.74	0.70
2:B:301:HEM:HBB2	2:B:301:HEM:HMB2	1.72	0.70
1:C:175:LEU:HB2	4:C:305:IMD:H5	1.74	0.69
1:D:173:ARG:HB2	4:D:304:IMD:H4	1.74	0.69
1:D:234:GLU:O	1:D:238:GLN:NE2	2.24	0.69
1:C:141:LYS:NZ	6:C:429:HOH:O	2.25	0.68
1:E:33:ARG:NH1	1:E:238:GLN:O	2.26	0.68
1:E:110:TYR:CD2	1:E:157:MET:HG3	2.30	0.67
1:C:206:GLN:HG2	1:C:211:PHE:CZ	2.32	0.65
1:A:174:LYS:C	4:A:306:IMD:H5	2.17	0.65
1:C:140:LYS:HB3	1:C:216:ARG:HB3	1.79	0.65
1:A:2:ASP:CB	1:A:5:LYS:HD2	2.26	0.65
1:A:148:LEU:O	1:A:153:ARG:NH1	2.29	0.65
1:B:33:ARG:NH1	1:B:238:GLN:O	2.29	0.65
1:A:37:VAL:HG13	1:A:233:LEU:HB3	1.79	0.64
2:B:301:HEM:HBC2	2:B:301:HEM:CMC	2.27	0.63
1:D:76:LEU:HD12	1:E:195:LEU:CD1	2.28	0.63
1:D:118:MET:HE1	1:D:161:THR:HB	1.80	0.63
2:E:301:HEM:HBC2	2:E:301:HEM:CMC	2.26	0.63
1:E:175:LEU:HB2	4:E:304:IMD:N3	2.13	0.63
1:D:172:LYS:HB3	1:D:191:GLU:HB2	1.80	0.63
1:A:27:ASP:OD1	1:E:93:ARG:NH1	2.32	0.62
2:D:301:HEM:HBC2	2:D:301:HEM:CMC	2.29	0.62
1:E:142:ASP:OD1	1:E:145:VAL:HG23	1.99	0.62
1:A:175:LEU:HB2	4:A:306:IMD:C5	2.27	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:142:ASP:HB3	1:E:215:ARG:CG	2.26	0.62
1:B:227:SER:HB3	1:B:232:ILE:HD11	1.82	0.62
1:D:139:ILE:HD11	2:D:301:HEM:HAC	1.82	0.62
1:A:142:ASP:OD1	1:A:145:VAL:HG23	2.00	0.61
1:A:30:GLY:O	1:A:34:VAL:HG23	2.00	0.61
1:B:40:VAL:HG21	1:B:91:LEU:CD2	2.28	0.61
1:B:219:HIS:NE2	5:C:301:EDO:H12	2.16	0.61
2:A:301:HEM:HBC2	2:A:301:HEM:CMC	2.30	0.61
1:D:160:HIS:ND1	1:D:210:GLU:OE2	2.34	0.60
1:E:37:VAL:CG1	1:E:233:LEU:HB3	2.31	0.60
1:B:127:GLU:OE1	1:B:169:LYS:HE2	2.02	0.59
1:E:37:VAL:HG13	1:E:233:LEU:HB3	1.83	0.59
1:B:116:GLU:O	1:B:120:THR:HG23	2.02	0.59
1:B:142:ASP:OD1	1:B:145:VAL:HG23	2.01	0.59
1:E:25:TRP:CH2	1:E:91:LEU:HD13	2.37	0.59
2:C:302:HEM:HBC2	2:C:302:HEM:CMC	2.28	0.59
1:C:234:GLU:HG2	1:C:238:GLN:HE22	1.67	0.59
1:D:21:MET:HE1	1:D:94:HIS:CB	2.33	0.58
1:D:37:VAL:HG13	1:D:233:LEU:HB3	1.85	0.58
2:C:302:HEM:HBB2	2:C:302:HEM:CMB	2.32	0.58
1:E:45:GLU:HA	1:E:48:SER:HB3	1.85	0.58
2:E:301:HEM:HBB2	2:E:301:HEM:CMB	2.34	0.58
1:D:30:GLY:HA2	1:D:33:ARG:HE	1.68	0.58
1:B:132:PRO:HD2	1:B:226:MET:HB3	1.86	0.58
1:E:175:LEU:HB2	4:E:304:IMD:C4	2.34	0.58
1:C:37:VAL:HG13	1:C:233:LEU:HB3	1.85	0.57
2:D:301:HEM:HBB2	2:D:301:HEM:CMB	2.33	0.57
1:C:142:ASP:CB	1:C:215:ARG:HG2	2.27	0.57
1:B:145:VAL:CG2	1:B:213:HIS:HB3	2.35	0.57
1:D:118:MET:CE	1:D:161:THR:HB	2.35	0.56
2:B:301:HEM:HBB2	2:B:301:HEM:CMB	2.35	0.56
1:C:145:VAL:CG2	1:C:213:HIS:HB3	2.35	0.56
6:D:405:HOH:O	1:E:203:ARG:HD3	2.05	0.56
1:A:131:ARG:NH2	1:A:231:GLU:OE2	2.34	0.56
1:D:131:ARG:NH2	1:D:231:GLU:OE2	2.39	0.56
1:D:195:LEU:N	3:D:303:SO4:O4	2.37	0.56
1:B:234:GLU:O	1:B:238:GLN:HG3	2.05	0.56
1:B:206:GLN:HG2	1:B:211:PHE:CZ	2.41	0.56
1:B:131:ARG:NH2	1:B:231:GLU:OE2	2.39	0.56
1:E:206:GLN:HG2	1:E:211:PHE:CZ	2.40	0.56
1:A:22:ASP:OD2	1:C:23:HIS:ND1	2.33	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:301:HEM:HHA	2:B:301:HEM:HBA1	1.86	0.55
1:B:31:GLU:O	1:B:35:ILE:HD13	2.06	0.55
1:B:41:LYS:HD3	1:B:230:ASP:OD1	2.07	0.55
1:E:205:LEU:O	1:E:208:VAL:HG22	2.06	0.54
1:D:29:PRO:HG2	1:D:32:SER:OG	2.07	0.54
1:D:21:MET:HE1	1:D:94:HIS:HB3	1.89	0.54
1:B:217:PHE:O	6:B:421:HOH:O	2.18	0.54
1:C:30:GLY:O	1:C:34:VAL:HG23	2.07	0.54
1:D:188:THR:HB	1:D:190:PHE:CZ	2.42	0.54
1:A:170:THR:HG23	1:A:171:VAL:HG23	1.90	0.53
1:D:54:GLU:OE1	1:D:70:ARG:NH2	2.41	0.53
1:D:127:GLU:OE1	1:D:169:LYS:HE2	2.07	0.53
1:E:28:LEU:O	1:E:33:ARG:NH2	2.41	0.53
1:E:37:VAL:HG13	1:E:233:LEU:HD13	1.91	0.53
1:E:90:ARG:HA	1:E:93:ARG:HD3	1.90	0.53
1:C:5:LYS:O	1:C:9:GLU:HB2	2.08	0.53
1:C:136:VAL:HB	1:C:222:LEU:HB2	1.90	0.53
1:D:140:LYS:HB3	1:D:216:ARG:HB3	1.91	0.53
1:B:221:THR:HG23	1:C:183:ASP:OD1	2.09	0.53
1:B:131:ARG:HH21	1:B:231:GLU:CD	2.11	0.52
1:D:142:ASP:OD1	1:D:145:VAL:HG23	2.09	0.52
1:C:67:LEU:HD13	1:C:232:ILE:HG21	1.90	0.52
1:D:206:GLN:HG2	1:D:211:PHE:CZ	2.44	0.52
1:E:110:TYR:OH	1:E:153:ARG:NH2	2.42	0.52
1:A:21:MET:HE1	1:A:95:LEU:HD21	1.91	0.52
1:B:140:LYS:HB3	1:B:216:ARG:HB3	1.92	0.52
1:E:21:MET:CE	1:E:95:LEU:HD21	2.40	0.52
1:A:72:HIS:HE2	1:A:176:TYR:HH	1.56	0.52
1:B:229:LEU:O	1:B:233:LEU:HG	2.09	0.52
1:B:90:ARG:HA	1:B:93:ARG:HD3	1.91	0.52
1:E:170:THR:HG23	1:E:171:VAL:HG23	1.91	0.51
2:E:301:HEM:HHA	2:E:301:HEM:CBA	2.38	0.51
1:A:182:ASP:HB2	6:A:401:HOH:O	2.11	0.51
1:E:229:LEU:O	1:E:233:LEU:HG	2.11	0.51
1:A:229:LEU:O	1:A:233:LEU:HG	2.10	0.50
1:D:37:VAL:O	1:D:41:LYS:HG3	2.11	0.50
1:D:116:GLU:O	1:D:120:THR:HG23	2.11	0.50
1:C:16:PHE:CE2	1:C:70:ARG:HD3	2.47	0.50
1:B:29:PRO:HG2	1:B:32:SER:OG	2.11	0.50
1:D:173:ARG:HB2	4:D:304:IMD:C4	2.40	0.50
1:E:139:ILE:HD11	2:E:301:HEM:HAC	1.92	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:195:LEU:CD1	1:E:76:LEU:HD12	2.42	0.50
1:D:21:MET:HE1	1:D:94:HIS:HB2	1.94	0.50
1:D:91:LEU:HD21	1:D:233:LEU:HD22	1.94	0.50
1:A:234:GLU:O	1:A:238:GLN:NE2	2.42	0.50
1:A:108:PRO:HA	2:A:301:HEM:O2A	2.12	0.49
1:C:215:ARG:HH21	5:C:301:EDO:H22	1.77	0.49
1:E:131:ARG:NH2	1:E:231:GLU:OE2	2.35	0.49
1:D:132:PRO:HD2	1:D:226:MET:HB3	1.95	0.49
1:D:41:LYS:HE3	1:D:230:ASP:OD1	2.12	0.49
1:C:165:LEU:HB2	1:C:166:PRO:HD3	1.94	0.49
1:D:33:ARG:HD2	1:D:236:PHE:O	2.12	0.49
1:A:16:PHE:CE2	1:A:70:ARG:HD3	2.48	0.49
1:C:142:ASP:OD1	1:C:145:VAL:HG23	2.12	0.49
1:E:174:LYS:HA	3:E:302:SO4:O2	2.12	0.49
2:E:301:HEM:NC	4:E:304:IMD:N1	2.59	0.49
1:E:26:TRP:CH2	1:E:236:PHE:HA	2.49	0.48
1:E:41:LYS:O	1:E:44:VAL:HG22	2.14	0.48
1:A:93:ARG:HG2	1:C:26:TRP:CG	2.49	0.48
1:B:30:GLY:O	1:B:34:VAL:HG23	2.14	0.48
1:C:22:ASP:HB3	1:C:24:ASP:OD1	2.14	0.48
1:E:141:LYS:HB2	1:E:146:TRP:CZ2	2.48	0.48
1:C:21:MET:HE3	1:C:94:HIS:O	2.14	0.47
1:E:229:LEU:HG	1:E:233:LEU:HD11	1.95	0.47
1:C:208:VAL:HG23	1:C:210:GLU:HG3	1.94	0.47
1:E:21:MET:CE	1:E:91:LEU:HD11	2.44	0.47
1:B:37:VAL:HG13	1:B:233:LEU:HD13	1.96	0.47
1:A:132:PRO:HD2	1:A:226:MET:HB3	1.96	0.47
1:D:90:ARG:HA	1:D:93:ARG:HD3	1.95	0.47
1:D:208:VAL:HG23	1:D:210:GLU:HG2	1.96	0.47
1:E:41:LYS:NZ	1:E:230:ASP:OD1	2.48	0.47
1:A:41:LYS:HD3	1:A:230:ASP:OD1	2.14	0.47
1:D:142:ASP:OD1	1:D:144:GLU:HG2	2.16	0.46
1:E:45:GLU:O	1:E:48:SER:OG	2.21	0.46
1:D:63:ASP:OD1	1:D:63:ASP:N	2.49	0.46
1:A:190:PHE:CZ	2:A:301:HEM:HMC3	2.51	0.46
1:B:54:GLU:OE1	1:B:70:ARG:NH2	2.49	0.46
1:B:175:LEU:HB2	4:B:305:IMD:N1	2.31	0.46
1:D:21:MET:HE3	1:D:94:HIS:O	2.16	0.45
1:B:63:ASP:OD1	1:B:63:ASP:N	2.48	0.45
1:A:41:LYS:O	1:A:45:GLU:HG3	2.17	0.45
3:A:311:SO4:O3	1:E:13:TYR:OH	2.24	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:42:GLY:O	1:E:46:GLN:HG3	2.17	0.45
1:A:167:TYR:HA	1:A:170:THR:HG22	1.99	0.44
1:D:15:THR:HA	1:D:101:LEU:O	2.17	0.44
1:B:142:ASP:CB	1:B:215:ARG:HG2	2.44	0.44
1:A:116:GLU:O	1:A:120:THR:HG23	2.17	0.44
1:A:37:VAL:HG13	1:A:233:LEU:HD13	2.00	0.44
1:B:89:THR:O	1:B:93:ARG:N	2.46	0.44
1:C:76:LEU:HD12	1:C:76:LEU:HA	1.82	0.44
1:E:35:ILE:O	1:E:38:ALA:HB3	2.18	0.44
1:A:37:VAL:CG1	1:A:233:LEU:HB3	2.45	0.44
1:C:120:THR:O	1:C:123:GLN:HB2	2.17	0.44
1:A:142:ASP:OD1	1:A:144:GLU:HG2	2.18	0.43
1:C:188:THR:HB	1:C:190:PHE:CZ	2.53	0.43
1:C:174:LYS:C	4:C:305:IMD:H5	2.38	0.43
1:E:21:MET:HE1	1:E:91:LEU:HD11	1.99	0.43
1:C:22:ASP:O	1:C:25:TRP:HB3	2.18	0.43
1:D:208:VAL:CG2	1:D:210:GLU:HG2	2.49	0.43
1:A:64:HIS:NE2	1:E:97:SER:O	2.52	0.43
1:C:37:VAL:HG13	1:C:233:LEU:HD13	2.00	0.43
1:B:142:ASP:HA	1:B:215:ARG:CG	2.49	0.43
1:E:26:TRP:HH2	1:E:236:PHE:HA	1.83	0.43
1:A:229:LEU:HG	1:A:233:LEU:HD11	2.01	0.43
2:A:301:HEM:HMC1	2:A:301:HEM:CBC	2.43	0.43
1:B:91:LEU:O	1:B:95:LEU:HG	2.19	0.43
1:D:198:PHE:O	1:D:202:VAL:HG23	2.18	0.43
1:B:42:GLY:O	1:B:46:GLN:HG3	2.19	0.43
1:B:194:ARG:O	1:B:197:ASP:HB2	2.19	0.43
1:C:142:ASP:HB3	1:C:215:ARG:CG	2.36	0.43
1:C:142:ASP:HA	1:C:215:ARG:HG3	2.00	0.42
1:D:190:PHE:CZ	2:D:301:HEM:HMC3	2.54	0.42
1:B:63:ASP:O	6:B:417:HOH:O	2.22	0.42
1:D:110:TYR:CD2	1:D:157:MET:HG3	2.54	0.42
1:A:157:MET:SD	2:A:301:HEM:HBD1	2.60	0.42
1:A:238:GLN:N	1:A:238:GLN:OE1	2.53	0.42
1:E:114:PHE:O	1:E:119:LYS:HE3	2.19	0.42
1:A:201:LEU:HD21	2:A:301:HEM:HBB2	2.01	0.42
1:A:206:GLN:HG2	1:A:211:PHE:CZ	2.54	0.42
1:E:103:GLY:HA3	1:E:176:TYR:HB3	2.01	0.42
1:B:137:ILE:HB	1:B:188:THR:OG1	2.20	0.42
1:E:111:VAL:HA	1:E:114:PHE:CD2	2.55	0.42
1:D:21:MET:HE2	1:D:22:ASP:N	2.35	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:216:ARG:NH2	1:C:219:HIS:O	2.53	0.42
1:D:33:ARG:HH22	1:D:238:GLN:C	2.23	0.42
1:D:231:GLU:O	1:D:235:LYS:HG3	2.20	0.42
1:A:176:TYR:HB2	1:A:187:ILE:HB	2.02	0.42
1:C:116:GLU:O	1:C:120:THR:HG23	2.20	0.42
1:D:238:GLN:OE1	1:D:238:GLN:N	2.53	0.41
1:E:101:LEU:HB3	1:E:187:ILE:HD11	2.02	0.41
1:E:132:PRO:HD2	1:E:226:MET:HB3	2.01	0.41
1:B:14:GLY:HA3	1:B:176:TYR:CE2	2.54	0.41
1:B:141:LYS:HD3	1:B:214:ASN:OD1	2.20	0.41
1:B:142:ASP:HA	1:B:215:ARG:HG3	2.02	0.41
1:D:41:LYS:O	1:D:45:GLU:HG3	2.21	0.41
1:B:139:ILE:HD11	2:B:301:HEM:HAC	2.03	0.41
1:C:33:ARG:O	1:C:37:VAL:HG23	2.21	0.41
1:C:132:PRO:HD2	1:C:226:MET:HB3	2.01	0.41
1:C:135:ILE:HA	1:C:222:LEU:O	2.21	0.41
1:D:137:ILE:HA	1:D:138:PRO:HD2	1.96	0.41
1:D:111:VAL:HA	1:D:114:PHE:CD2	2.56	0.41
1:C:21:MET:CE	1:C:22:ASP:H	2.34	0.41
2:D:301:HEM:HMB1	2:D:301:HEM:CBB	2.45	0.41
1:A:178:SER:OG	1:A:182:ASP:OD1	2.38	0.41
2:D:301:HEM:HMC1	2:D:301:HEM:CBC	2.44	0.41
1:E:217:PHE:CE1	2:E:301:HEM:HBC1	2.56	0.41
2:E:301:HEM:HMC2	2:E:301:HEM:CBC	2.37	0.41
1:A:145:VAL:CG2	1:A:213:HIS:HB3	2.50	0.41
1:D:118:MET:HE1	1:D:158:GLN:O	2.21	0.41
1:A:103:GLY:HA3	1:A:176:TYR:HB3	2.02	0.40
1:A:165:LEU:HB2	1:A:166:PRO:HD3	2.03	0.40
1:B:76:LEU:HD12	1:B:76:LEU:HA	1.95	0.40
1:A:25:TRP:CH2	1:A:91:LEU:HD13	2.57	0.40
1:C:91:LEU:O	1:C:95:LEU:HG	2.21	0.40
1:D:92:GLY:HA2	1:D:95:LEU:HD12	2.02	0.40
1:D:165:LEU:HB2	1:D:166:PRO:HD3	2.02	0.40
1:A:56:TYR:O	1:A:67:LEU:HD12	2.20	0.40
1:B:90:ARG:O	1:B:94:HIS:HD2	2.04	0.40
1:C:110:TYR:CD2	1:C:157:MET:HG3	2.56	0.40
1:D:33:ARG:O	1:D:37:VAL:HG23	2.22	0.40
1:A:172:LYS:HB3	1:A:191:GLU:HB2	2.04	0.40
1:C:21:MET:HE1	1:C:94:HIS:HB3	2.04	0.40
1:C:150:GLN:N	3:C:303:SO4:O4	2.43	0.40
1:D:33:ARG:HH12	1:D:238:GLN:C	2.24	0.40

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	236/241 (98%)	233 (99%)	3 (1%)	0	100	100
1	B	236/241 (98%)	231 (98%)	5 (2%)	0	100	100
1	C	236/241 (98%)	231 (98%)	5 (2%)	0	100	100
1	D	236/241 (98%)	232 (98%)	4 (2%)	0	100	100
1	E	236/241 (98%)	231 (98%)	5 (2%)	0	100	100
All	All	1180/1205 (98%)	1158 (98%)	22 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	205/206 (100%)	204 (100%)	1 (0%)	88	96
1	B	205/206 (100%)	205 (100%)	0	100	100
1	C	205/206 (100%)	204 (100%)	1 (0%)	88	96
1	D	205/206 (100%)	204 (100%)	1 (0%)	88	96
1	E	205/206 (100%)	205 (100%)	0	100	100
All	All	1025/1030 (100%)	1022 (100%)	3 (0%)	92	98

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	210	GLU
1	C	210	GLU
1	D	118	MET

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	94	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](#)

42 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	SO4	C	308	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	B	302	-	4,4,4	0.15	0	6,6,6	0.09	0
5	EDO	B	306	-	3,3,3	0.49	0	2,2,2	0.24	0
3	SO4	C	309	-	4,4,4	0.14	0	6,6,6	0.07	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	IMD	D	304	2	3,5,5	0.40	0	4,5,5	0.62	0
3	SO4	B	303	-	4,4,4	0.14	0	6,6,6	0.07	0
3	SO4	D	305	-	4,4,4	0.15	0	6,6,6	0.04	0
4	IMD	B	305	2	3,5,5	0.44	0	4,5,5	0.59	0
5	EDO	B	310	-	3,3,3	0.46	0	2,2,2	0.29	0
3	SO4	E	303	-	4,4,4	0.15	0	6,6,6	0.06	0
3	SO4	C	304	-	4,4,4	0.15	0	6,6,6	0.09	0
2	HEM	C	302	1,4	41,50,50	1.98	7 (17%)	45,82,82	1.80	7 (15%)
2	HEM	A	301	1,4	41,50,50	1.99	6 (14%)	45,82,82	1.76	8 (17%)
3	SO4	B	309	-	4,4,4	0.14	0	6,6,6	0.10	0
3	SO4	C	306	-	4,4,4	0.14	0	6,6,6	0.09	0
5	EDO	E	306	-	3,3,3	0.49	0	2,2,2	0.26	0
5	EDO	B	307	-	3,3,3	0.45	0	2,2,2	0.38	0
3	SO4	A	309	-	4,4,4	0.14	0	6,6,6	0.07	0
2	HEM	E	301	1,4	41,50,50	1.94	7 (17%)	45,82,82	1.76	7 (15%)
2	HEM	B	301	1,4	41,50,50	1.98	8 (19%)	45,82,82	1.73	7 (15%)
4	IMD	E	304	2	3,5,5	0.40	0	4,5,5	0.68	0
3	SO4	E	302	-	4,4,4	0.13	0	6,6,6	0.09	0
3	SO4	C	307	-	4,4,4	0.12	0	6,6,6	0.12	0
2	HEM	D	301	1,4	41,50,50	1.99	6 (14%)	45,82,82	1.76	6 (13%)
5	EDO	A	307	-	3,3,3	0.44	0	2,2,2	0.36	0
3	SO4	A	304	-	4,4,4	0.14	0	6,6,6	0.09	0
3	SO4	B	308	-	4,4,4	0.15	0	6,6,6	0.04	0
4	IMD	A	306	2	3,5,5	0.41	0	4,5,5	0.63	0
5	EDO	C	301	-	3,3,3	0.47	0	2,2,2	0.24	0
3	SO4	A	305	-	4,4,4	0.13	0	6,6,6	0.11	0
3	SO4	D	302	-	4,4,4	0.13	0	6,6,6	0.09	0
4	IMD	C	305	2	3,5,5	0.44	0	4,5,5	0.55	0
5	EDO	C	310	-	3,3,3	0.48	0	2,2,2	0.36	0
3	SO4	A	302	-	4,4,4	0.13	0	6,6,6	0.07	0
3	SO4	C	303	-	4,4,4	0.15	0	6,6,6	0.08	0
3	SO4	D	303	-	4,4,4	0.14	0	6,6,6	0.08	0
3	SO4	A	311	-	4,4,4	0.15	0	6,6,6	0.04	0
5	EDO	B	304	-	3,3,3	0.48	0	2,2,2	0.25	0
5	EDO	E	305	-	3,3,3	0.46	0	2,2,2	0.26	0
3	SO4	A	308	-	4,4,4	0.14	0	6,6,6	0.09	0
5	EDO	A	310	-	3,3,3	0.44	0	2,2,2	0.35	0
3	SO4	A	303	-	4,4,4	0.13	0	6,6,6	0.09	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
4	IMD	D	304	2	-	-	0/1/1/1
4	IMD	B	305	2	-	-	0/1/1/1
5	EDO	B	310	-	-	0/1/1/1	-
2	HEM	C	302	1,4	-	0/12/54/54	-
2	HEM	A	301	1,4	-	1/12/54/54	-
5	EDO	E	306	-	-	1/1/1/1	-
5	EDO	B	307	-	-	0/1/1/1	-
2	HEM	E	301	1,4	-	4/12/54/54	-
2	HEM	B	301	1,4	-	2/12/54/54	-
4	IMD	E	304	2	-	-	0/1/1/1
5	EDO	B	304	-	-	0/1/1/1	-
2	HEM	D	301	1,4	-	0/12/54/54	-
5	EDO	A	307	-	-	0/1/1/1	-
4	IMD	A	306	2	-	-	0/1/1/1
5	EDO	C	301	-	-	0/1/1/1	-
4	IMD	C	305	2	-	-	0/1/1/1
5	EDO	C	310	-	-	0/1/1/1	-
5	EDO	B	306	-	-	0/1/1/1	-
5	EDO	E	305	-	-	1/1/1/1	-
5	EDO	A	310	-	-	0/1/1/1	-

All (34) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	301	HEM	C3D-C2D	8.09	1.53	1.36
2	B	301	HEM	C3D-C2D	8.06	1.53	1.36
2	A	301	HEM	C3D-C2D	8.05	1.53	1.36
2	C	302	HEM	C3D-C2D	8.04	1.53	1.36
2	D	301	HEM	C3D-C2D	7.99	1.53	1.36
2	B	301	HEM	C3C-C2C	-4.36	1.34	1.40
2	A	301	HEM	C3C-C2C	-4.34	1.34	1.40
2	D	301	HEM	C3C-C2C	-4.34	1.34	1.40
2	C	302	HEM	C3C-C2C	-4.30	1.34	1.40
2	E	301	HEM	C3C-C2C	-4.18	1.34	1.40
2	D	301	HEM	C3C-CAC	3.65	1.55	1.47
2	A	301	HEM	C3C-CAC	3.63	1.55	1.47
2	C	302	HEM	C3C-CAC	3.62	1.55	1.47
2	E	301	HEM	C3C-CAC	3.51	1.55	1.47
2	B	301	HEM	C3C-CAC	3.45	1.54	1.47
2	A	301	HEM	FE-ND	3.02	2.11	1.96
2	D	301	HEM	CAB-C3B	3.01	1.55	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	302	HEM	CAB-C3B	2.97	1.55	1.47
2	D	301	HEM	FE-ND	2.91	2.11	1.96
2	A	301	HEM	CAB-C3B	2.91	1.55	1.47
2	B	301	HEM	CAB-C3B	2.90	1.55	1.47
2	E	301	HEM	CAB-C3B	2.90	1.55	1.47
2	B	301	HEM	FE-ND	2.87	2.11	1.96
2	C	302	HEM	FE-ND	2.31	2.08	1.96
2	C	302	HEM	FE-NB	2.22	2.07	1.96
2	B	301	HEM	CAA-C2A	2.20	1.55	1.52
2	A	301	HEM	FE-NB	2.20	2.07	1.96
2	E	301	HEM	CAA-C2A	2.12	1.55	1.52
2	D	301	HEM	FE-NB	2.12	2.07	1.96
2	E	301	HEM	FE-ND	2.04	2.07	1.96
2	E	301	HEM	FE-NB	2.03	2.06	1.96
2	B	301	HEM	CMD-C2D	2.01	1.55	1.50
2	C	302	HEM	CMB-C2B	2.01	1.55	1.50
2	B	301	HEM	CMB-C2B	2.01	1.55	1.50

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	302	HEM	C4D-ND-C1D	7.07	112.37	105.07
2	E	301	HEM	C4D-ND-C1D	6.89	112.19	105.07
2	B	301	HEM	C4D-ND-C1D	6.70	111.99	105.07
2	D	301	HEM	C4D-ND-C1D	6.63	111.92	105.07
2	A	301	HEM	C4D-ND-C1D	6.52	111.81	105.07
2	D	301	HEM	C4C-CHD-C1D	4.12	127.99	122.56
2	C	302	HEM	C4C-CHD-C1D	3.60	127.31	122.56
2	A	301	HEM	C4C-CHD-C1D	3.44	127.10	122.56
2	E	301	HEM	C4C-CHD-C1D	3.07	126.61	122.56
2	B	301	HEM	C4B-CHC-C1C	2.99	126.50	122.56
2	B	301	HEM	C1B-NB-C4B	2.97	108.14	105.07
2	D	301	HEM	C1B-NB-C4B	2.83	108.00	105.07
2	E	301	HEM	C1B-NB-C4B	2.82	107.99	105.07
2	A	301	HEM	C1B-NB-C4B	2.79	107.96	105.07
2	A	301	HEM	CAA-CBA-CGA	-2.78	105.96	113.76
2	A	301	HEM	C4B-CHC-C1C	2.74	126.18	122.56
2	B	301	HEM	C4C-CHD-C1D	2.73	126.17	122.56
2	E	301	HEM	C4B-CHC-C1C	2.68	126.10	122.56
2	D	301	HEM	C4B-CHC-C1C	2.68	126.09	122.56
2	C	302	HEM	C1B-NB-C4B	2.66	107.82	105.07
2	C	302	HEM	C4B-CHC-C1C	2.44	125.77	122.56

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	301	HEM	C3B-C2B-C1B	2.43	108.29	106.49
2	A	301	HEM	CBD-CAD-C3D	-2.40	105.97	112.63
2	B	301	HEM	CBA-CAA-C2A	-2.33	108.65	112.62
2	E	301	HEM	C3B-C2B-C1B	2.29	108.19	106.49
2	A	301	HEM	C3B-C2B-C1B	2.21	108.13	106.49
2	B	301	HEM	CAD-C3D-C4D	2.18	128.47	124.66
2	B	301	HEM	C3B-C2B-C1B	2.18	108.10	106.49
2	A	301	HEM	CHC-C4B-C3B	2.15	127.86	124.57
2	E	301	HEM	CAA-CBA-CGA	-2.09	107.90	113.76
2	C	302	HEM	C3B-C2B-C1B	2.09	108.03	106.49
2	D	301	HEM	CAA-CBA-CGA	-2.04	108.03	113.76
2	C	302	HEM	CBA-CAA-C2A	-2.04	109.13	112.62
2	E	301	HEM	C4A-C3A-C2A	2.01	108.39	107.00
2	C	302	HEM	CBD-CAD-C3D	-2.00	107.06	112.63

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	301	HEM	C1A-C2A-CAA-CBA
2	E	301	HEM	C1A-C2A-CAA-CBA
2	E	301	HEM	C3A-C2A-CAA-CBA
2	E	301	HEM	C2D-C3D-CAD-CBD
2	E	301	HEM	C4D-C3D-CAD-CBD
5	E	305	EDO	O1-C1-C2-O2
5	E	306	EDO	O1-C1-C2-O2
2	A	301	HEM	C4B-C3B-CAB-CBB
2	B	301	HEM	C3A-C2A-CAA-CBA

There are no ring outliers.

15 monomers are involved in 52 short contacts:

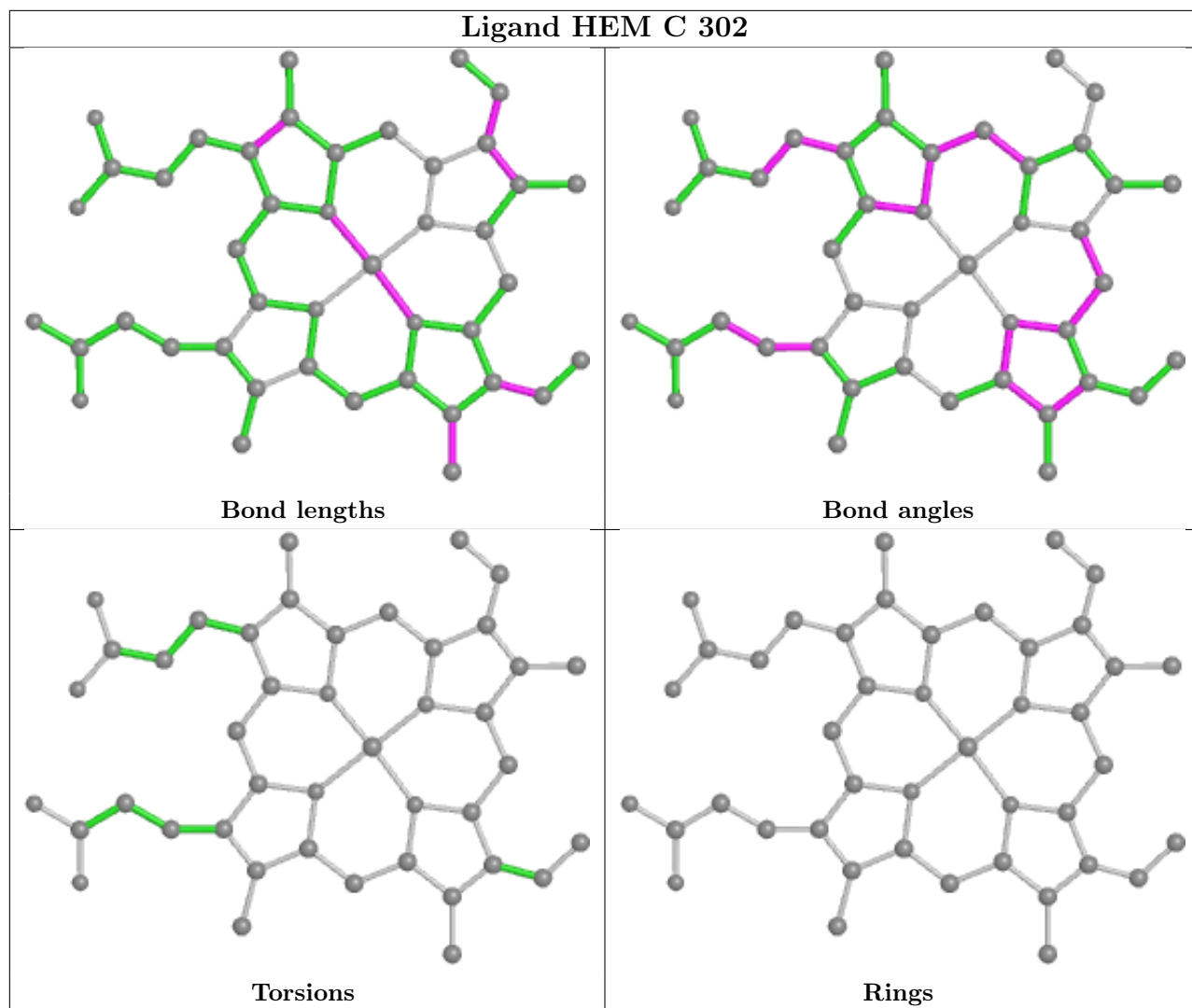
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	304	IMD	2	0
4	B	305	IMD	1	0
2	C	302	HEM	4	0
2	A	301	HEM	8	0
2	E	301	HEM	10	0
2	B	301	HEM	6	0
4	E	304	IMD	3	0
3	E	302	SO4	1	0

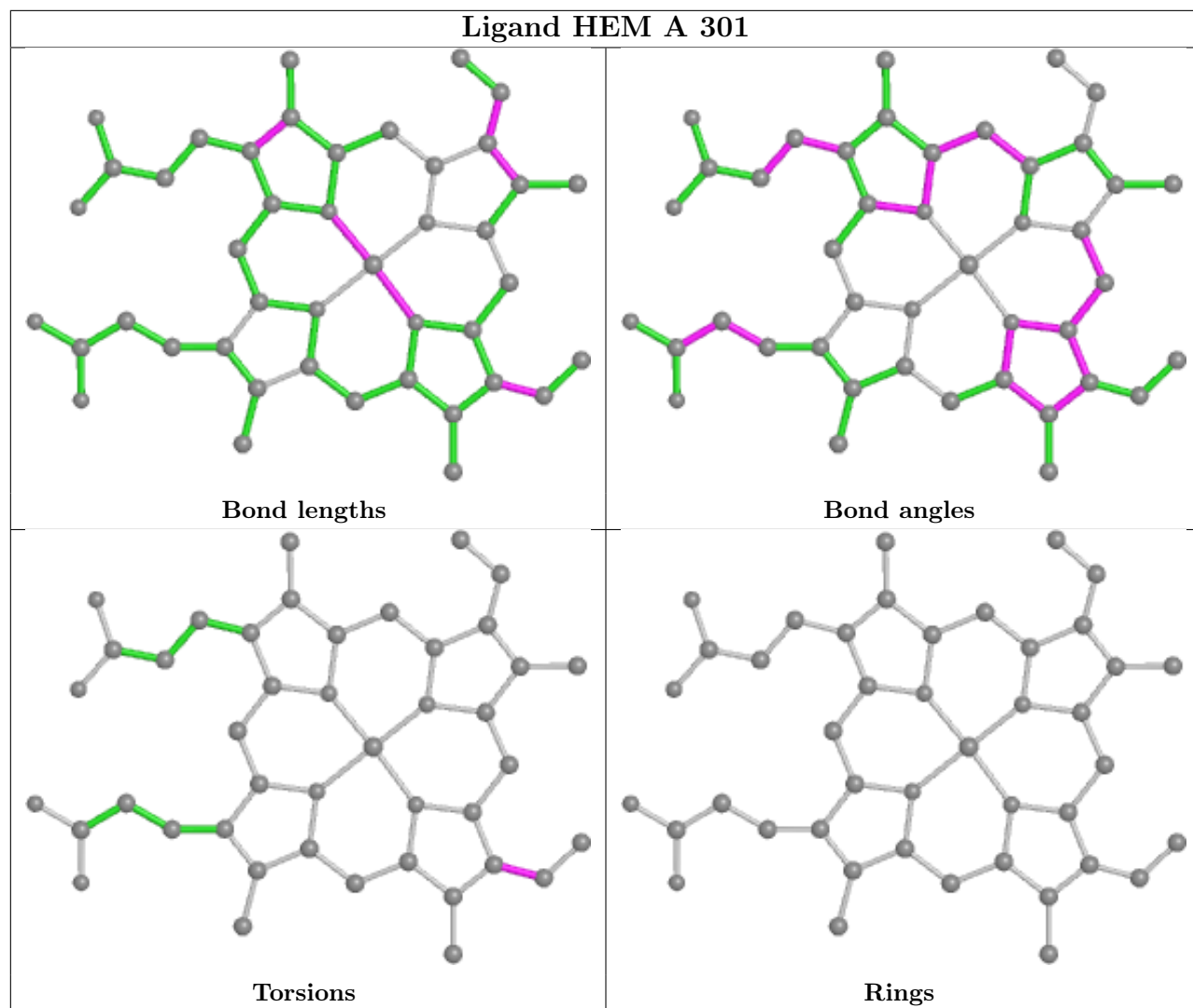
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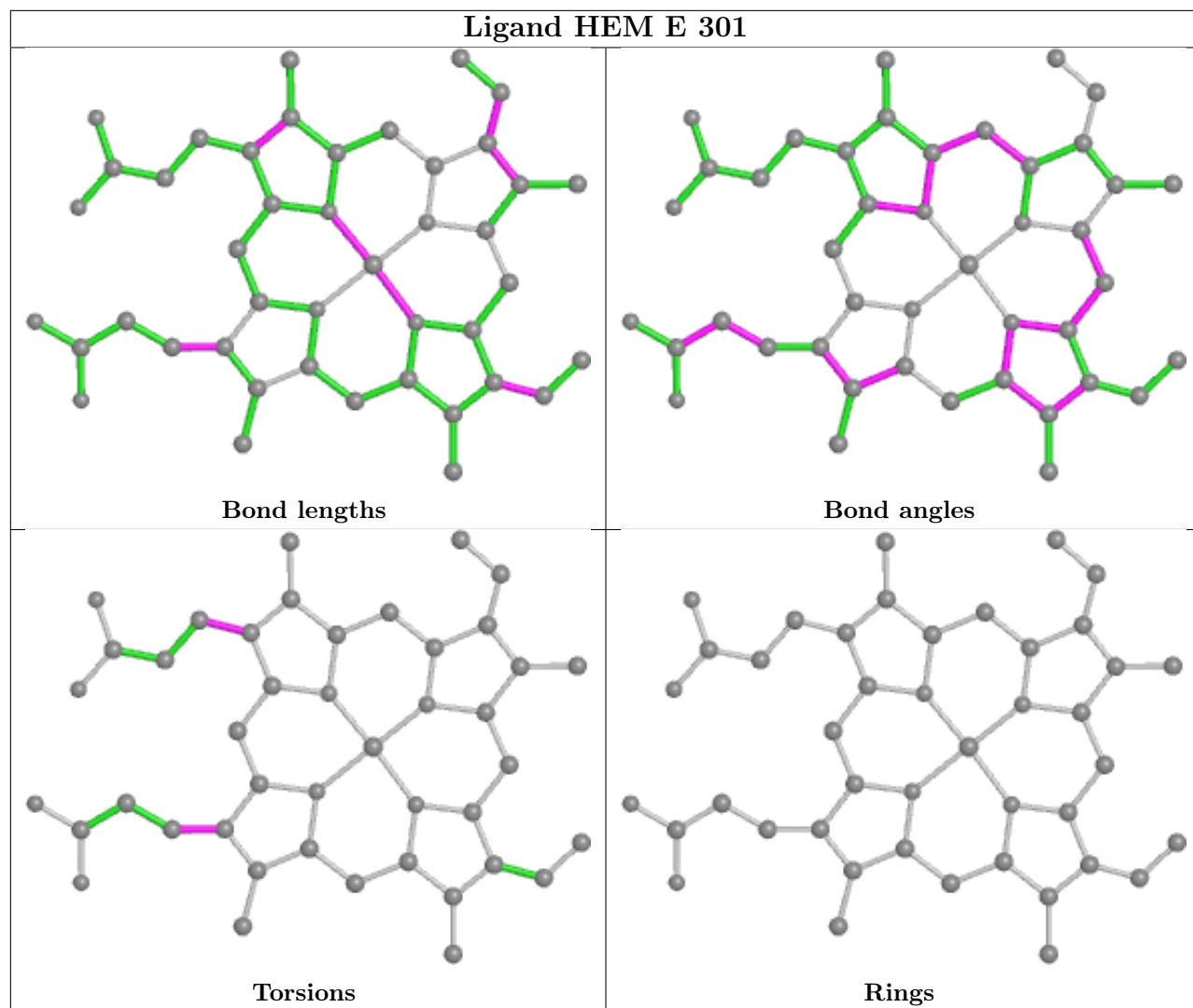
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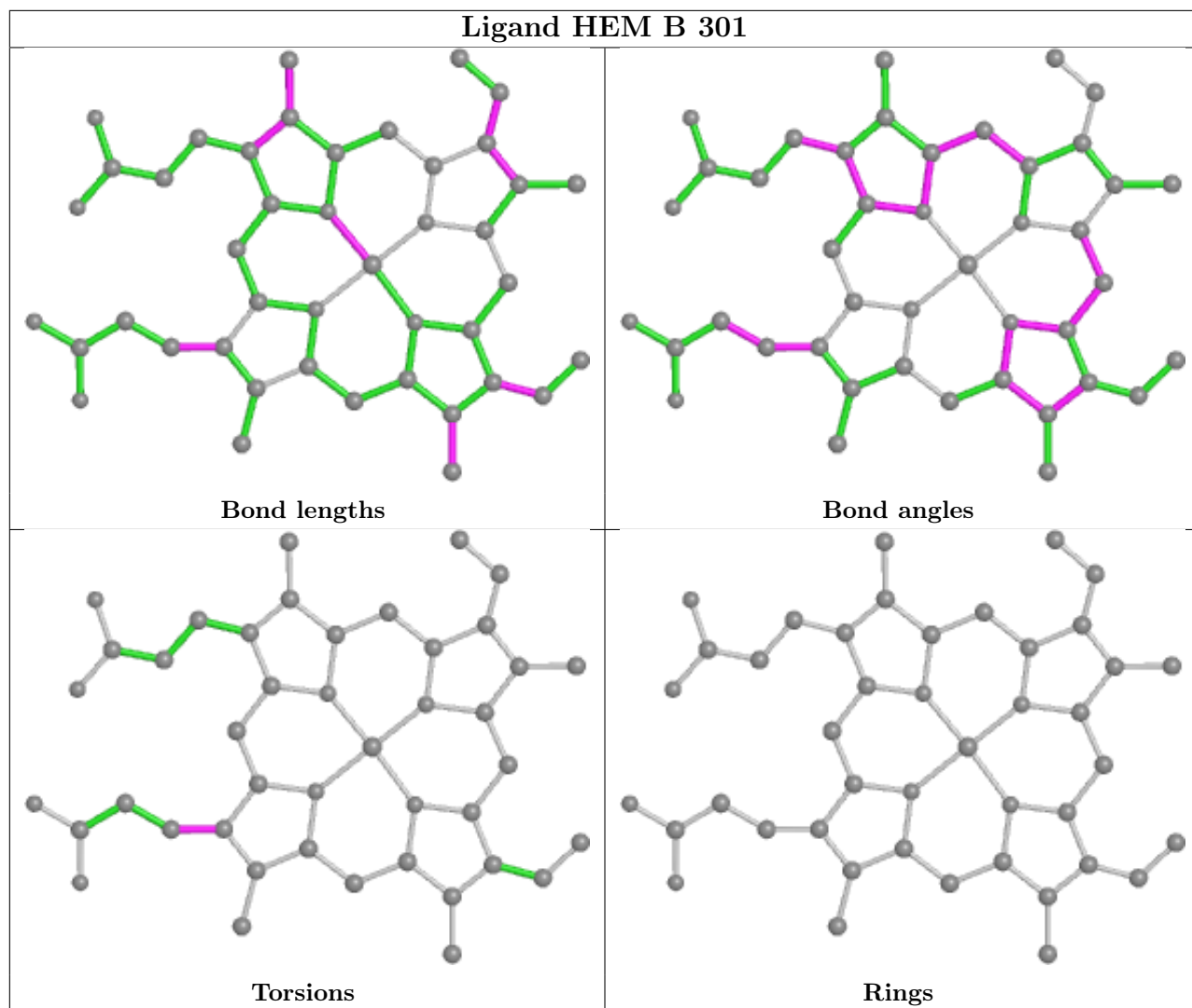
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	301	HEM	8	0
4	A	306	IMD	2	0
5	C	301	EDO	2	0
4	C	305	IMD	3	0
3	C	303	SO4	1	0
3	D	303	SO4	1	0
3	A	311	SO4	1	0

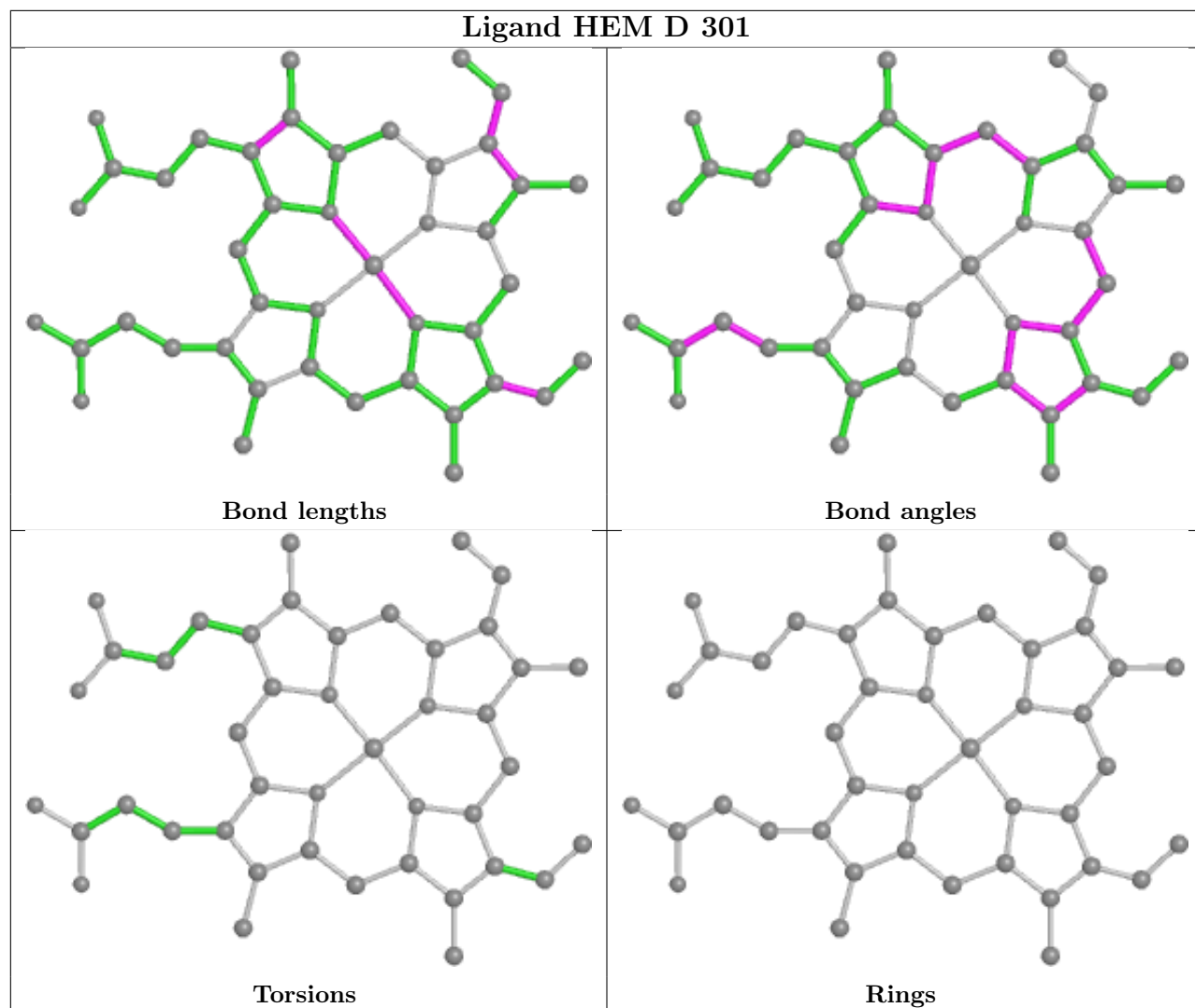
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

### 6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	238/241 (98%)	0.43	13 (5%) 25 16	24, 53, 89, 142	0
1	B	238/241 (98%)	0.59	20 (8%) 11 5	18, 48, 118, 142	0
1	C	238/241 (98%)	0.19	1 (0%) 92 91	13, 37, 75, 113	0
1	D	238/241 (98%)	0.66	19 (7%) 12 6	38, 74, 112, 129	0
1	E	238/241 (98%)	0.75	25 (10%) 6 3	42, 79, 115, 133	0
All	All	1190/1205 (98%)	0.52	78 (6%) 18 11	13, 59, 110, 142	0

All (78) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	238	GLN	6.5
1	E	236	PHE	6.4
1	B	233	LEU	5.9
1	A	3	ARG	5.3
1	B	236	PHE	4.9
1	A	1	ALA	4.9
1	B	36	SER	4.5
1	A	8	THR	4.4
1	D	112	ALA	4.4
1	B	37	VAL	4.4
1	B	237	ALA	4.4
1	B	3	ARG	4.3
1	B	26	TRP	4.1
1	A	236	PHE	4.0
1	D	53	VAL	3.8
1	A	4	GLU	3.7
1	D	226	MET	3.7
1	E	35	ILE	3.7
1	D	52	LEU	3.7
1	D	35	ILE	3.7

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	E	128	SER	3.6
1	E	127	GLU	3.6
1	E	116	GLU	3.5
1	A	5	LYS	3.5
1	D	128	SER	3.5
1	E	34	VAL	3.4
1	A	7	LEU	3.3
1	A	2	ASP	3.2
1	D	72	HIS	3.1
1	E	110	TYR	3.1
1	B	30	GLY	3.0
1	C	3	ARG	3.0
1	E	2	ASP	2.9
1	E	90	ARG	2.9
1	E	146	TRP	2.8
1	B	229	LEU	2.8
1	D	6	LEU	2.8
1	B	33	ARG	2.8
1	B	232	ILE	2.7
1	B	74	ARG	2.7
1	B	27	ASP	2.7
1	D	172	LYS	2.7
1	E	237	ALA	2.6
1	B	235	LYS	2.5
1	D	120	THR	2.5
1	D	93	ARG	2.5
1	E	232	ILE	2.5
1	E	169	LYS	2.4
1	A	124	VAL	2.4
1	A	9	GLU	2.3
1	E	69	PHE	2.3
1	D	32	SER	2.3
1	E	189	TYR	2.3
1	D	1	ALA	2.2
1	E	74	ARG	2.2
1	B	44	VAL	2.2
1	E	172	LYS	2.2
1	E	200	ASN	2.2
1	A	6	LEU	2.2
1	E	98	GLY	2.2
1	D	194	ARG	2.2
1	B	2	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	21	MET	2.1
1	D	169	LYS	2.1
1	A	109	THR	2.1
1	B	32	SER	2.1
1	D	44	VAL	2.1
1	E	124	VAL	2.1
1	D	76	LEU	2.1
1	E	130	SER	2.1
1	A	238	GLN	2.1
1	E	97	SER	2.1
1	E	215	ARG	2.1
1	D	114	PHE	2.1
1	B	48	SER	2.0
1	E	144	GLU	2.0
1	D	55	SER	2.0
1	E	4	GLU	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no 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(Å <sup>2</sup> )	Q<0.9
5	EDO	C	310	4/4	0.59	0.44	77,80,90,91	0
5	EDO	B	310	4/4	0.64	0.49	76,95,110,116	0
5	EDO	B	304	4/4	0.67	0.41	45,52,56,58	0
5	EDO	C	301	4/4	0.70	0.37	44,47,50,53	0
5	EDO	E	306	4/4	0.71	0.28	43,66,83,83	0
5	EDO	E	305	4/4	0.74	0.39	78,97,109,109	0
3	SO4	C	309	5/5	0.77	0.30	118,130,136,141	0

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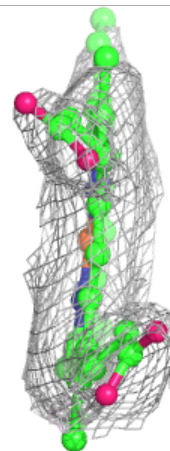
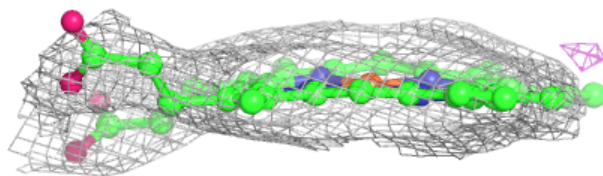
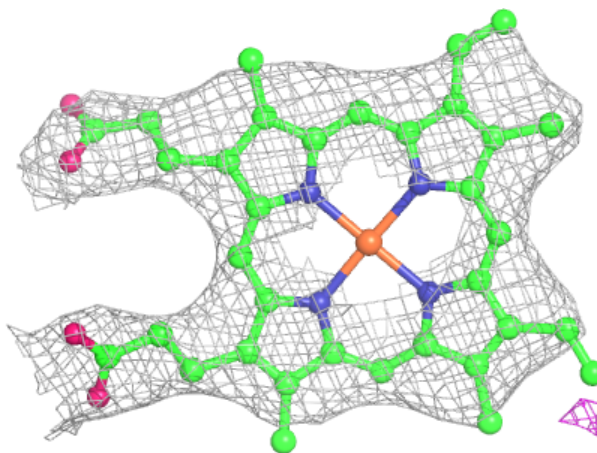
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	SO4	C	308	5/5	0.79	0.28	134,135,137,140	0
5	EDO	B	306	4/4	0.83	0.19	55,55,59,64	0
3	SO4	E	303	5/5	0.84	0.22	107,108,112,119	0
3	SO4	A	305	5/5	0.85	0.26	86,92,102,114	0
3	SO4	A	311	5/5	0.85	0.25	122,125,131,137	0
3	SO4	A	303	5/5	0.85	0.24	96,103,106,109	0
3	SO4	D	305	5/5	0.86	0.21	120,129,132,133	0
5	EDO	B	307	4/4	0.86	0.22	72,73,74,79	0
3	SO4	C	307	5/5	0.88	0.24	81,94,101,104	0
5	EDO	A	307	4/4	0.88	0.23	41,44,47,52	0
3	SO4	C	304	5/5	0.89	0.20	98,101,106,107	0
3	SO4	C	303	5/5	0.90	0.19	80,82,91,96	0
3	SO4	E	302	5/5	0.91	0.17	75,89,95,97	0
3	SO4	D	302	5/5	0.91	0.22	90,93,96,103	0
4	IMD	D	304	5/5	0.91	0.25	73,75,83,87	0
3	SO4	B	308	5/5	0.92	0.15	73,78,82,91	0
3	SO4	B	309	5/5	0.92	0.14	54,61,80,83	0
3	SO4	D	303	5/5	0.92	0.17	89,91,95,106	0
3	SO4	A	304	5/5	0.94	0.18	75,86,92,93	0
2	HEM	E	301	43/43	0.96	0.20	44,63,76,92	0
3	SO4	A	302	5/5	0.96	0.10	61,66,82,92	0
3	SO4	A	309	5/5	0.96	0.20	53,64,72,79	0
2	HEM	A	301	43/43	0.96	0.20	26,40,58,71	0
2	HEM	D	301	43/43	0.96	0.24	35,59,92,103	0
4	IMD	A	306	5/5	0.97	0.16	29,36,48,53	0
5	EDO	A	310	4/4	0.97	0.26	44,45,50,54	0
4	IMD	B	305	5/5	0.97	0.23	16,23,30,49	0
2	HEM	C	302	43/43	0.97	0.21	9,26,42,57	0
4	IMD	E	304	5/5	0.97	0.23	87,87,88,90	0
3	SO4	B	302	5/5	0.98	0.16	29,40,55,63	0
3	SO4	A	308	5/5	0.98	0.14	34,38,46,54	0
2	HEM	B	301	43/43	0.98	0.21	13,30,48,56	0
4	IMD	C	305	5/5	0.98	0.24	13,26,32,45	0
3	SO4	C	306	5/5	0.99	0.14	27,31,48,58	0
3	SO4	B	303	5/5	0.99	0.13	30,49,61,67	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.

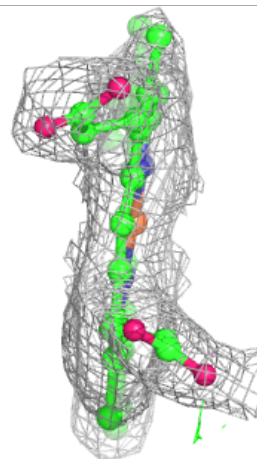
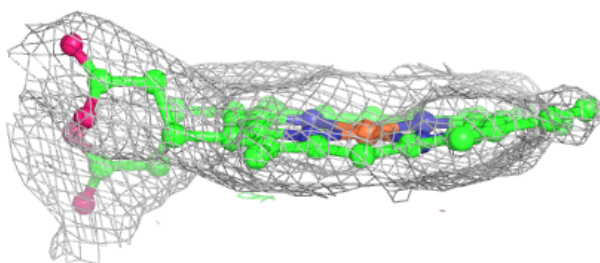
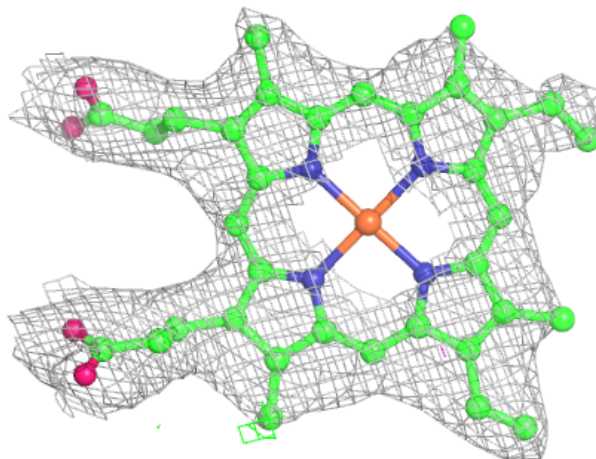
**Electron density around HEM E 301:**

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



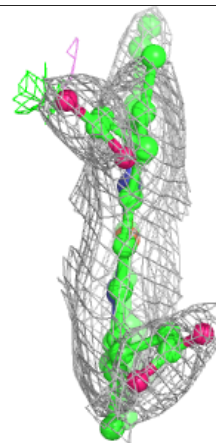
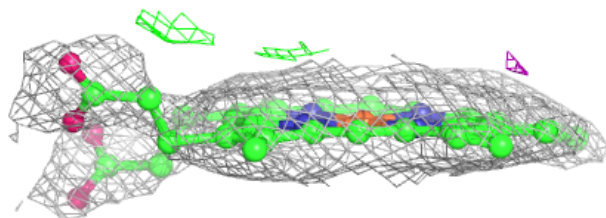
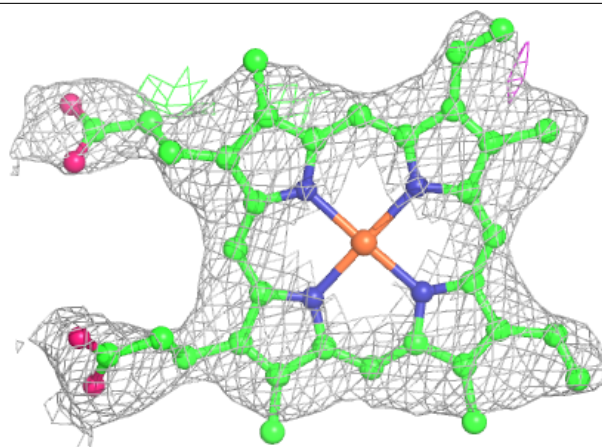
**Electron density around HEM A 301:**

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



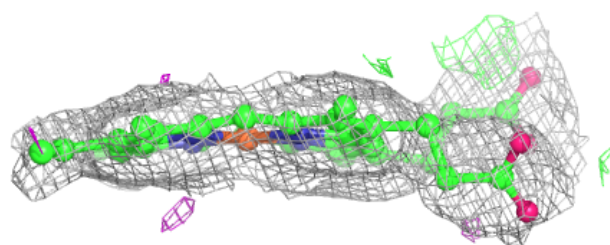
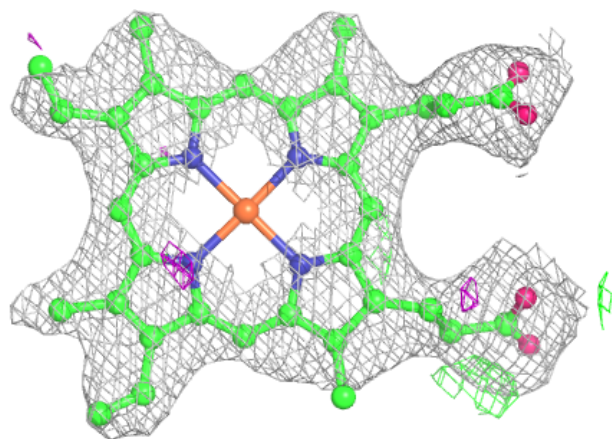
**Electron density around HEM D 301:**

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

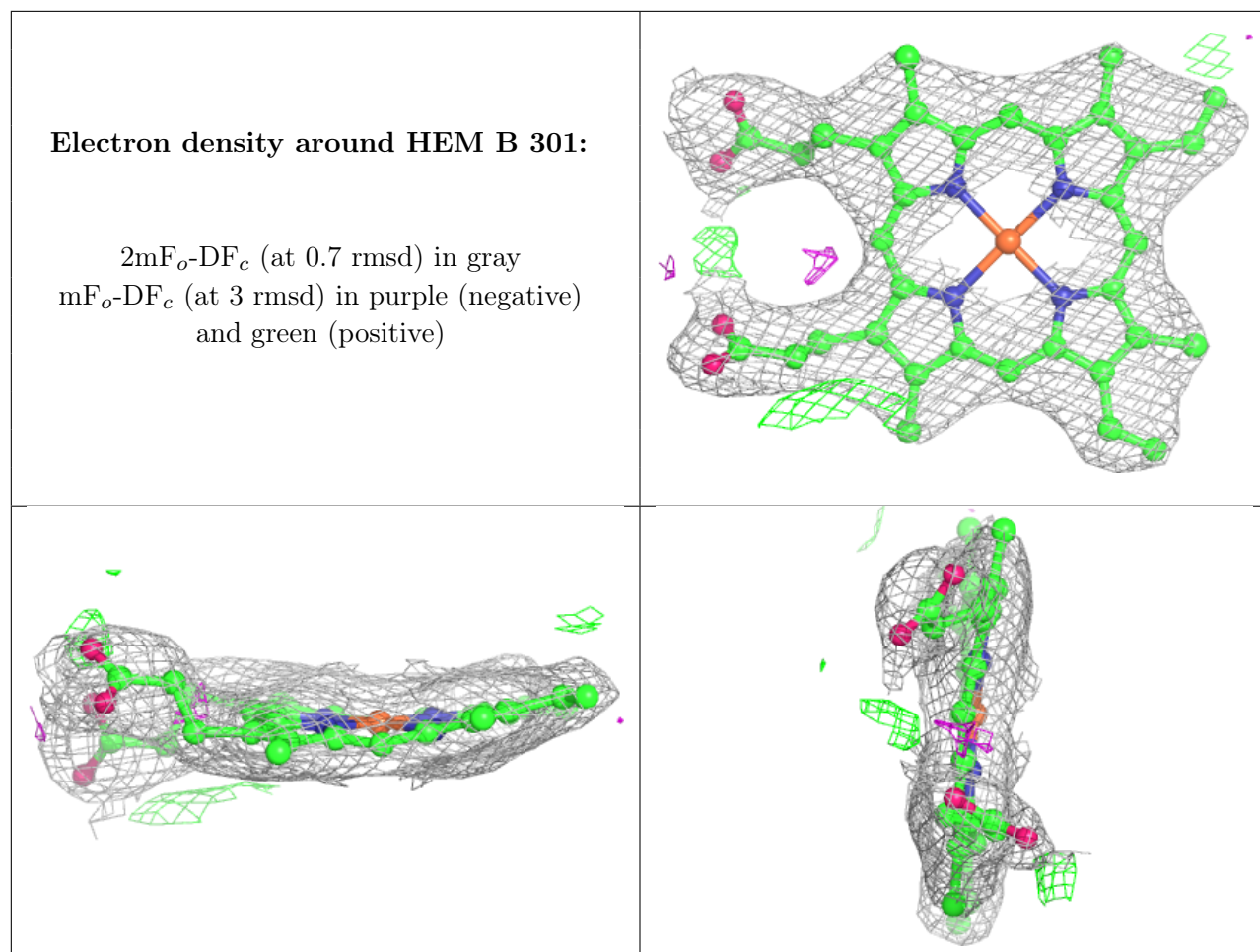


**Electron density around HEM C 302:**

$2mF_o-DF_c$  (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.