



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 13, 2024 – 10:29 AM EDT

PDB ID : 1NGK
Title : Crystallographic Structure of Mycobacterium tuberculosis Hemoglobin O
Authors : Milani, M.; Savard, P.-Y.; Oullet, H.; Ascenzi, P.; Guertin, M.; Bolognesi, M.
Deposited on : 2002-12-17
Resolution : 2.11 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

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>.

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

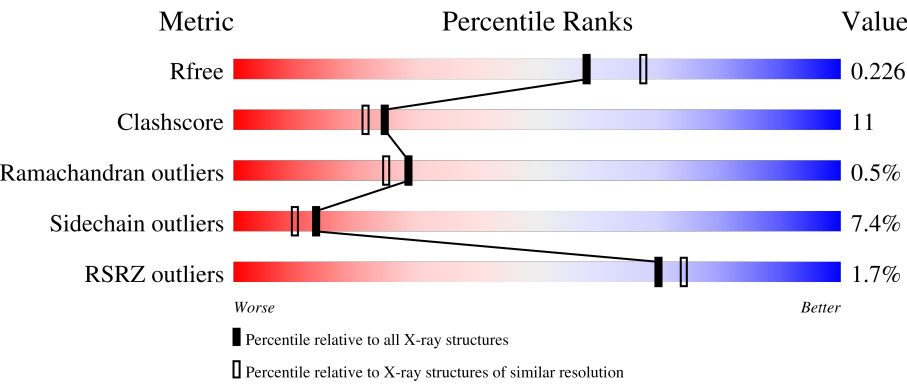
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36.2
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.11 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	6241 (2.14-2.10)
Clashscore	141614	6778 (2.14-2.10)
Ramachandran outliers	138981	6705 (2.14-2.10)
Sidechain outliers	138945	6706 (2.14-2.10)
RSRZ outliers	127900	6112 (2.14-2.10)

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 ≥ 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	128	<div><div>3%</div><div></div><div>74%</div><div>20%</div><div>5%</div><div></div></div>
1	B	128	<div><div>2%</div><div></div><div>75%</div><div>23%</div><div></div><div></div></div>
1	C	128	<div><div>%</div><div></div><div>76%</div><div>19%</div><div></div><div></div></div>
1	D	128	<div><div>2%</div><div></div><div>78%</div><div>18%</div><div></div><div></div></div>
1	E	128	<div><div>2%</div><div></div><div>71%</div><div>23%</div><div></div><div></div></div>

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Mol	Chain	Length	Quality of chain	
1	F	128	74%	20% 5% .
1	G	128	75%	23% ..
1	H	128	73%	22% . .
1	I	128	74%	22% . .
1	J	128	75%	23% ...
1	K	128	75%	20% . .
1	L	128	71%	25% . .

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 15104 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 Hemoglobin-like protein HbO.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	126	Total	C	N	O	S	18	5	0
			1078	675	194	204	5			
1	B	127	Total	C	N	O	S	33	5	0
			1085	680	195	205	5			
1	C	126	Total	C	N	O	S	7	6	0
			1087	680	195	207	5			
1	D	126	Total	C	N	O	S	22	6	0
			1089	681	198	205	5			
1	E	127	Total	C	N	O	S	44	7	0
			1106	692	202	207	5			
1	F	126	Total	C	N	O	S	25	6	0
			1089	681	198	205	5			
1	G	127	Total	C	N	O	S	13	0	0
			1045	656	190	194	5			
1	H	127	Total	C	N	O	S	15	1	0
			1054	661	191	197	5			
1	I	127	Total	C	N	O	S	4	2	0
			1066	668	197	196	5			
1	J	127	Total	C	N	O	S	45	1	0
			1056	662	194	195	5			
1	K	127	Total	C	N	O	S	21	1	0
			1056	662	194	195	5			
1	L	127	Total	C	N	O	S	23	0	0
			1045	656	190	194	5			

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



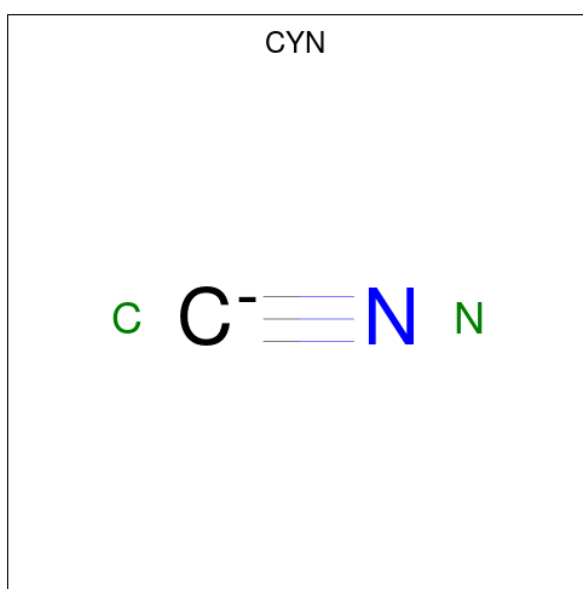
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	1
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	1
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	C	1	Total	O	S	0	1
			5	4	1		
2	C	1	Total	O	S	0	0
			5	4	1		
2	D	1	Total	O	S	0	1
			5	4	1		
2	E	1	Total	O	S	0	0
			5	4	1		
2	E	1	Total	O	S	0	1
			5	4	1		
2	G	1	Total	O	S	0	0
			5	4	1		
2	G	1	Total	O	S	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	I	1	Total	O	S	0	0
			5	4	1		
2	J	1	Total	O	S	0	1
			5	4	1		
2	J	1	Total	O	S	0	0
			5	4	1		
2	L	1	Total	O	S	0	0
			5	4	1		

- Molecule 3 is CYANIDE ION (three-letter code: CYN) (formula: CN).



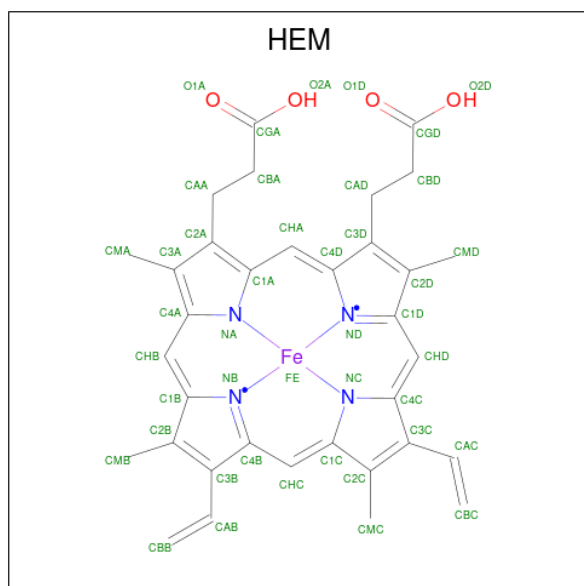
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	N	0	0
			2	1	1		
3	B	1	Total	C	N	0	0
			2	1	1		
3	C	1	Total	C	N	0	0
			2	1	1		
3	D	1	Total	C	N	0	0
			2	1	1		
3	E	1	Total	C	N	0	0
			2	1	1		
3	F	1	Total	C	N	0	0
			2	1	1		
3	G	1	Total	C	N	0	0
			2	1	1		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	H	1	Total C N 2 1 1	0	0
3	I	1	Total C N 2 1 1	0	0
3	J	1	Total C N 2 1 1	0	0
3	K	1	Total C N 2 1 1	0	0
3	L	1	Total C N 2 1 1	0	0

- Molecule 4 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).



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

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
4	G	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
4	H	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
4	I	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
4	J	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
4	K	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
4	L	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

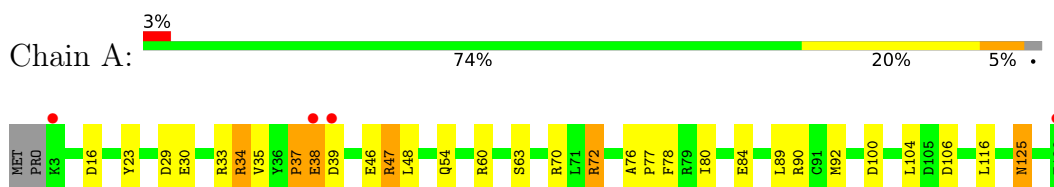
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	138	Total 138	O 138	0	0
5	B	123	Total 123	O 123	0	0
5	C	184	Total 184	O 184	0	0
5	D	136	Total 136	O 136	0	0
5	E	112	Total 112	O 112	0	0
5	F	123	Total 123	O 123	0	0
5	G	165	Total 165	O 165	0	0
5	H	128	Total 128	O 128	0	0
5	I	183	Total 183	O 183	0	0
5	J	101	Total 101	O 101	0	0
5	K	119	Total 119	O 119	0	0
5	L	106	Total 106	O 106	0	0

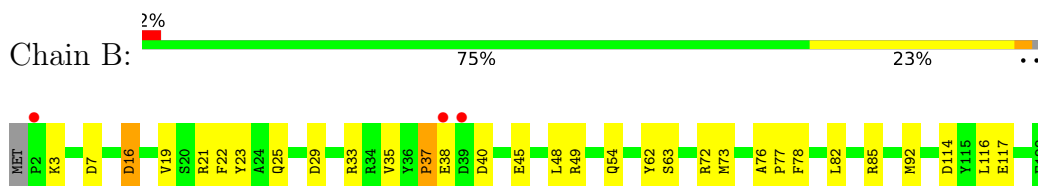
3 Residue-property plots [i](#)

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.

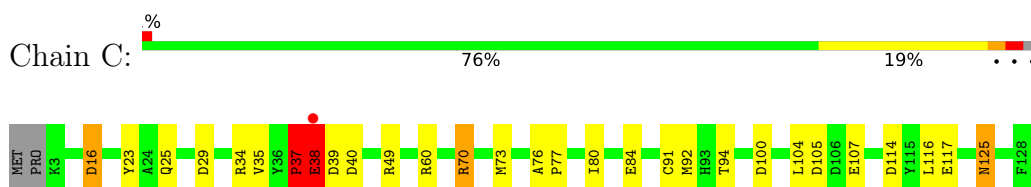
- Molecule 1: Hemoglobin-like protein HbO



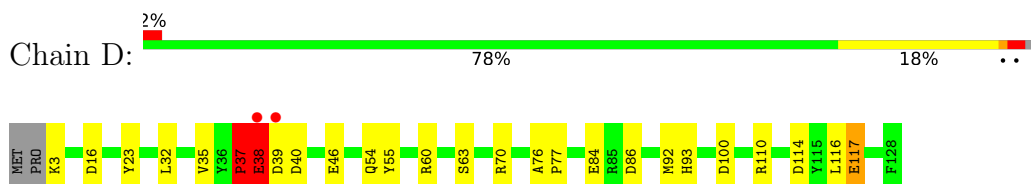
- Molecule 1: Hemoglobin-like protein HbO



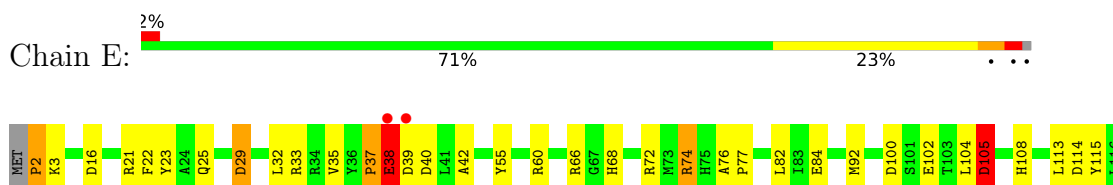
- Molecule 1: Hemoglobin-like protein HbO



- Molecule 1: Hemoglobin-like protein HbO

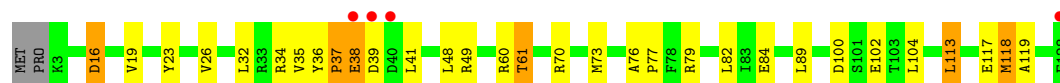
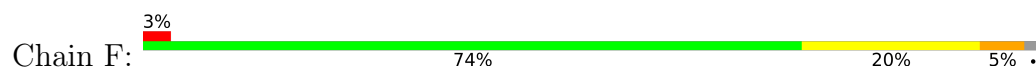


- Molecule 1: Hemoglobin-like protein HbO

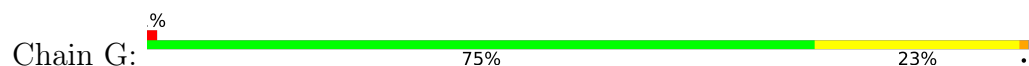




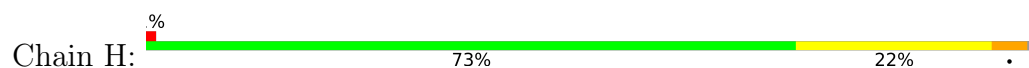
- Molecule 1: Hemoglobin-like protein HbO



- Molecule 1: Hemoglobin-like protein HbO



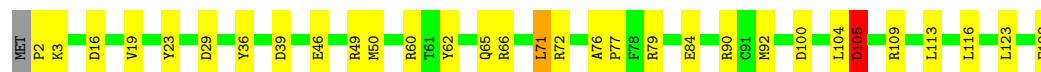
- Molecule 1: Hemoglobin-like protein HbO



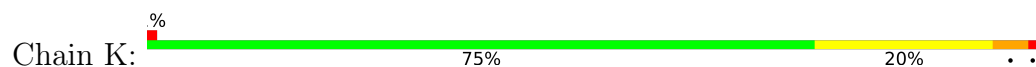
- Molecule 1: Hemoglobin-like protein HbO



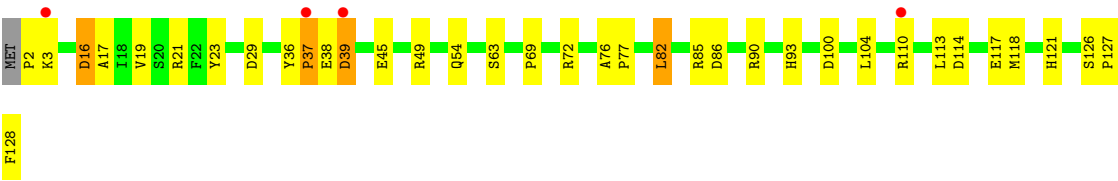
- Molecule 1: Hemoglobin-like protein HbO



- Molecule 1: Hemoglobin-like protein HbO



● Molecule 1: Hemoglobin-like protein HbO



4 Data and refinement statistics

Property	Value	Source
Space group	I 41 2 2	Depositor
Cell constants a, b, c, α , β , γ	187.03Å 187.03Å 274.86Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.11 29.79 – 2.11	Depositor EDS
% Data completeness (in resolution range)	99.7 (50.00-2.11) 99.7 (29.79-2.11)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.69 (at 2.12Å)	Xtriage
Refinement program	REFMAC 5.1.19	Depositor
R, R_{free}	0.186 , 0.226 0.185 , 0.226	Depositor DCC
R_{free} test set	6934 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	25.0	Xtriage
Anisotropy	0.059	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 56.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.015 for -1/2*h-1/2*k-1/2*l,-1/2*h-1/2*k+1/2*l,-h+k 0.011 for -1/2*h+1/2*k-1/2*l,1/2*h-1/2*k-1/2*l,-h-k	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	15104	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.36% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CYN, HEM, 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	0.51	0/1104	0.97	10/1490 (0.7%)
1	B	0.50	0/1112	0.92	7/1501 (0.5%)
1	C	0.49	0/1113	0.89	11/1502 (0.7%)
1	D	0.50	0/1115	0.88	10/1504 (0.7%)
1	E	0.46	0/1134	0.90	10/1531 (0.7%)
1	F	0.49	0/1115	0.88	6/1504 (0.4%)
1	G	0.47	0/1071	0.71	2/1445 (0.1%)
1	H	0.43	0/1080	0.70	4/1457 (0.3%)
1	I	0.49	0/1093	0.75	3/1474 (0.2%)
1	J	0.42	0/1082	0.83	6/1459 (0.4%)
1	K	0.48	0/1082	0.82	7/1459 (0.5%)
1	L	0.43	0/1071	0.88	8/1445 (0.6%)
All	All	0.47	0/13172	0.85	84/17771 (0.5%)

There are no bond length outliers.

All (84) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	J	2	PRO	CA-N-CD	-15.89	89.25	111.50
1	B	37[A]	PRO	CA-N-CD	-12.26	94.33	111.50
1	B	37[B]	PRO	CA-N-CD	-12.26	94.33	111.50
1	A	37[A]	PRO	CA-N-CD	-12.03	94.66	111.50
1	A	37[B]	PRO	CA-N-CD	-12.03	94.66	111.50
1	L	2	PRO	CA-N-CD	-11.80	94.98	111.50
1	L	37	PRO	CA-N-CD	-10.90	96.23	111.50
1	E	2	PRO	CA-N-CD	-10.67	96.56	111.50
1	K	69	PRO	CA-N-CD	-9.41	98.32	111.50
1	F	37[A]	PRO	CA-N-CD	-9.29	98.50	111.50
1	F	37[B]	PRO	CA-N-CD	-9.29	98.50	111.50
1	E	37[A]	PRO	CA-N-CD	-7.42	101.11	111.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	37[B]	PRO	CA-N-CD	-7.42	101.11	111.50
1	F	100	ASP	CB-CG-OD2	7.34	124.90	118.30
1	A	100	ASP	CB-CG-OD2	7.30	124.87	118.30
1	D	100	ASP	CB-CG-OD2	7.00	124.60	118.30
1	A	47	ARG	NE-CZ-NH2	-6.79	116.90	120.30
1	C	100	ASP	CB-CG-OD2	6.68	124.31	118.30
1	L	114	ASP	CB-CG-OD2	6.50	124.15	118.30
1	B	114	ASP	CB-CG-OD2	6.38	124.05	118.30
1	C	114	ASP	CB-CG-OD2	6.29	123.96	118.30
1	E	114	ASP	CB-CG-OD2	6.28	123.95	118.30
1	J	100	ASP	CB-CG-OD2	6.19	123.88	118.30
1	A	38[A]	GLU	N-CA-C	6.18	127.70	111.00
1	A	38[B]	GLU	N-CA-C	6.18	127.70	111.00
1	L	100	ASP	CB-CG-OD2	6.17	123.85	118.30
1	C	105	ASP	CB-CG-OD2	6.03	123.73	118.30
1	D	38[A]	GLU	N-CA-C	6.01	127.22	111.00
1	D	38[B]	GLU	N-CA-C	6.01	127.22	111.00
1	C	38[A]	GLU	N-CA-C	5.98	127.14	111.00
1	C	38[B]	GLU	N-CA-C	5.98	127.14	111.00
1	D	16	ASP	CB-CG-OD2	5.96	123.66	118.30
1	E	100	ASP	CB-CG-OD2	5.95	123.65	118.30
1	H	39	ASP	CB-CG-OD2	5.94	123.65	118.30
1	K	39	ASP	CB-CG-OD2	5.93	123.64	118.30
1	B	7	ASP	CB-CG-OD2	5.91	123.61	118.30
1	C	37[A]	PRO	CA-N-CD	-5.90	103.23	111.50
1	C	37[B]	PRO	CA-N-CD	-5.90	103.23	111.50
1	D	37[A]	PRO	CA-N-CD	-5.87	103.28	111.50
1	D	37[B]	PRO	CA-N-CD	-5.87	103.28	111.50
1	F	16	ASP	CB-CG-OD2	5.84	123.56	118.30
1	L	16	ASP	CB-CG-OD2	5.83	123.54	118.30
1	F	38[A]	GLU	N-CA-C	5.81	126.68	111.00
1	F	38[B]	GLU	N-CA-C	5.81	126.68	111.00
1	D	114	ASP	CB-CG-OD2	5.72	123.45	118.30
1	K	29	ASP	CB-CG-OD2	5.69	123.42	118.30
1	E	105	ASP	CB-CG-OD2	5.61	123.35	118.30
1	I	114	ASP	CB-CG-OD2	5.59	123.33	118.30
1	C	16	ASP	CB-CG-OD2	5.59	123.33	118.30
1	D	40[A]	ASP	CB-CG-OD2	5.56	123.31	118.30
1	D	40[B]	ASP	CB-CG-OD2	5.56	123.31	118.30
1	G	39	ASP	CB-CG-OD2	5.54	123.29	118.30
1	K	16	ASP	CB-CG-OD2	5.53	123.28	118.30
1	C	40[A]	ASP	CB-CG-OD2	5.52	123.27	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	40[B]	ASP	CB-CG-OD2	5.52	123.27	118.30
1	J	39	ASP	CB-CG-OD2	5.52	123.27	118.30
1	J	105	ASP	CB-CG-OD2	5.52	123.27	118.30
1	K	100	ASP	CB-CG-OD2	5.51	123.26	118.30
1	I	39	ASP	CB-CG-OD2	5.42	123.17	118.30
1	D	86	ASP	CB-CG-OD2	5.41	123.16	118.30
1	L	29	ASP	CB-CG-OD2	5.29	123.06	118.30
1	E	16	ASP	CB-CG-OD2	5.29	123.06	118.30
1	J	16	ASP	CB-CG-OD2	5.29	123.06	118.30
1	B	16	ASP	CB-CG-OD2	5.27	123.05	118.30
1	L	39	ASP	CB-CG-OD2	5.25	123.03	118.30
1	H	16	ASP	CB-CG-OD2	5.25	123.03	118.30
1	H	100	ASP	CB-CG-OD2	5.24	123.01	118.30
1	E	38[A]	GLU	N-CA-C	5.23	125.12	111.00
1	E	38[B]	GLU	N-CA-C	5.23	125.12	111.00
1	L	86	ASP	CB-CG-OD2	5.23	123.01	118.30
1	K	105	ASP	CB-CG-OD2	5.22	123.00	118.30
1	C	29	ASP	CB-CG-OD2	5.21	122.98	118.30
1	E	29	ASP	CB-CG-OD2	5.19	122.97	118.30
1	A	16	ASP	CB-CG-OD2	5.19	122.97	118.30
1	I	29	ASP	CB-CG-OD2	5.18	122.96	118.30
1	A	106	ASP	CB-CG-OD2	5.16	122.94	118.30
1	J	29	ASP	CB-CG-OD2	5.11	122.90	118.30
1	G	16	ASP	CB-CG-OD2	5.10	122.89	118.30
1	B	38[A]	GLU	N-CA-C	5.09	124.75	111.00
1	B	38[B]	GLU	N-CA-C	5.09	124.75	111.00
1	H	7	ASP	CB-CG-OD2	5.09	122.88	118.30
1	A	29	ASP	CB-CG-OD2	5.03	122.82	118.30
1	A	90	ARG	NE-CZ-NH2	-5.02	117.79	120.30
1	K	40	ASP	CB-CG-OD2	5.02	122.82	118.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1078	0	1021	23	0
1	B	1085	0	1029	18	0
1	C	1087	0	1026	23	0
1	D	1089	0	1033	19	0
1	E	1106	0	1048	24	0
1	F	1089	0	1033	22	0
1	G	1045	0	999	22	0
1	H	1054	0	1004	27	0
1	I	1066	0	1017	26	0
1	J	1056	0	1011	27	0
1	K	1056	0	1011	21	0
1	L	1045	0	999	24	0
2	A	25	0	0	1	0
2	B	10	0	0	1	0
2	C	10	0	0	0	0
2	D	5	0	0	0	0
2	E	10	0	0	1	0
2	G	10	0	0	0	0
2	I	5	0	0	0	0
2	J	10	0	0	1	0
2	L	5	0	0	0	0
3	A	2	0	0	0	0
3	B	2	0	0	0	0
3	C	2	0	0	0	0
3	D	2	0	0	0	0
3	E	2	0	0	0	0
3	F	2	0	0	0	0
3	G	2	0	0	0	0
3	H	2	0	0	0	0
3	I	2	0	0	0	0
3	J	2	0	0	0	0
3	K	2	0	0	1	0
3	L	2	0	0	0	0
4	A	43	0	30	2	0
4	B	43	0	30	1	0
4	C	43	0	30	3	0
4	D	43	0	30	2	0
4	E	43	0	30	3	0
4	F	43	0	30	2	0
4	G	43	0	30	2	0
4	H	43	0	30	3	0
4	I	43	0	30	1	0
4	J	43	0	30	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	K	43	0	30	3	0
4	L	43	0	30	1	0
5	A	138	0	0	3	0
5	B	123	0	0	4	0
5	C	184	0	0	4	0
5	D	136	0	0	3	0
5	E	112	0	0	2	0
5	F	123	0	0	6	0
5	G	165	0	0	2	0
5	H	128	0	0	7	0
5	I	183	0	0	7	0
5	J	101	0	0	3	0
5	K	119	0	0	6	0
5	L	106	0	0	4	0
All	All	15104	0	12591	275	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 11.

All (275) 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:C:25:GLN:HG2	5:C:2078:HOH:O	1.48	1.13
1:C:70:ARG:HH11	1:C:70:ARG:HG2	1.08	1.09
1:E:60:ARG:HD3	1:J:90:ARG:CZ	1.83	1.09
1:H:70:ARG:HD2	5:H:846:HOH:O	1.53	1.06
1:K:117:GLU:HG2	5:K:906:HOH:O	1.62	1.00
1:G:44:ALA:HA	1:G:47:ARG:HH12	1.26	0.99
1:I:23:TYR:OH	1:I:36:TYR:HE2	1.46	0.97
1:B:40[B]:ASP:OD1	5:B:2132:HOH:O	1.81	0.97
1:D:60:ARG:HD3	1:L:90:ARG:CZ	1.94	0.96
1:I:23:TYR:OH	1:I:36:TYR:CE2	2.17	0.96
1:H:72:ARG:HD3	5:H:897:HOH:O	1.62	0.96
1:E:60:ARG:HD3	1:J:90:ARG:NH1	1.79	0.95
1:C:70:ARG:HG2	1:C:70:ARG:NH1	1.83	0.92
1:H:80:ILE:H	1:H:125:ASN:HD21	1.16	0.92
1:A:34:ARG:HH11	1:A:34:ARG:CG	1.86	0.88
1:H:74:ARG:HG2	4:H:700:HEM:HBD2	1.53	0.88
1:L:72:ARG:HD3	5:L:2032:HOH:O	1.74	0.87
1:E:21:ARG:NH1	1:E:25:GLN:HE21	1.73	0.86
1:E:21:ARG:HH12	1:E:25:GLN:HE21	1.18	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:80:ILE:H	1:A:125:ASN:HD21	1.24	0.84
1:I:74:ARG:HD2	5:I:2054:HOH:O	1.78	0.84
1:C:80:ILE:H	1:C:125:ASN:HD21	1.24	0.84
1:G:23:TYR:OH	1:G:36:TYR:CE2	2.30	0.84
1:D:110:ARG:HG3	1:D:110:ARG:HH11	1.44	0.83
1:L:54:GLN:HE22	1:L:63:SER:H	1.25	0.83
1:J:23:TYR:HH	1:J:36:TYR:HE2	0.84	0.83
1:I:54:GLN:HE22	1:I:63:SER:H	1.24	0.83
1:G:47:ARG:HH11	1:G:47:ARG:HB2	1.44	0.82
1:A:34:ARG:HH11	1:A:34:ARG:HG2	1.45	0.82
1:H:54:GLN:HE22	1:H:63:SER:H	1.28	0.81
1:H:80:ILE:H	1:H:125:ASN:ND2	1.80	0.80
1:I:80:ILE:H	1:I:125:ASN:HD21	1.26	0.80
1:J:23:TYR:OH	1:J:36:TYR:HE2	1.64	0.80
1:F:61:THR:HG21	5:F:881:HOH:O	1.81	0.79
1:G:23:TYR:OH	1:G:36:TYR:HE2	1.65	0.79
4:K:700:HEM:HMC1	4:K:700:HEM:HBC2	1.64	0.78
1:H:23:TYR:OH	1:H:36:TYR:CE2	2.37	0.78
4:J:700:HEM:HMC1	4:J:700:HEM:HBC2	1.66	0.77
1:H:23:TYR:OH	1:H:36:TYR:HE2	1.67	0.77
1:D:54:GLN:HE22	1:D:63:SER:H	1.30	0.77
1:A:54:GLN:HE22	1:A:63:SER:H	1.31	0.76
4:I:700:HEM:HMC1	4:I:700:HEM:HBC2	1.69	0.75
4:E:700:HEM:HMC1	4:E:700:HEM:HBC2	1.69	0.75
1:C:25:GLN:HE22	1:C:94:THR:HB	1.52	0.74
1:L:23:TYR:OH	1:L:36:TYR:HE2	1.70	0.74
1:K:23:TYR:OH	1:K:36:TYR:CE2	2.40	0.73
1:E:60:ARG:HG3	2:E:2003:SO4:O2	1.88	0.73
1:I:80:ILE:H	1:I:125:ASN:ND2	1.86	0.73
1:L:23:TYR:HH	1:L:36:TYR:HE2	1.32	0.73
1:K:23:TYR:OH	1:K:36:TYR:HE2	1.72	0.73
4:C:700:HEM:HMC1	4:C:700:HEM:HBC2	1.71	0.72
1:G:29:ASP:O	1:G:33:ARG:HG2	1.89	0.72
1:C:25:GLN:NE2	5:C:2078:HOH:O	2.21	0.72
1:B:54:GLN:HE22	1:B:63:SER:H	1.37	0.72
1:C:70:ARG:HH11	1:C:70:ARG:CG	1.96	0.71
1:K:90:ARG:O	1:K:94:THR:HG23	1.90	0.71
1:A:34:ARG:HG2	1:A:34:ARG:NH1	2.03	0.70
1:A:30:GLU:O	1:A:34:ARG:HG3	1.92	0.69
1:K:74:ARG:HG2	4:K:700:HEM:HBD2	1.73	0.69
1:L:93:HIS:HE1	1:L:117:GLU:OE1	1.75	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:80:ILE:H	1:A:125:ASN:ND2	1.91	0.69
1:L:23:TYR:OH	1:L:36:TYR:CE2	2.44	0.69
1:C:80:ILE:H	1:C:125:ASN:ND2	1.90	0.69
1:E:29:ASP:O	1:E:33:ARG:HG2	1.93	0.69
1:A:72:ARG:HD2	5:A:2131:HOH:O	1.93	0.68
1:C:125:ASN:C	1:C:125:ASN:HD22	1.96	0.68
5:A:2138:HOH:O	1:G:30:GLU:HB2	1.94	0.68
1:G:47:ARG:NH1	5:G:2065:HOH:O	2.29	0.67
1:I:34:ARG:NH1	5:I:2038:HOH:O	2.27	0.66
4:L:700:HEM:HMC1	4:L:700:HEM:HBC2	1.78	0.65
1:D:60:ARG:HD3	1:L:90:ARG:NH2	2.11	0.65
1:H:74:ARG:HG2	4:H:700:HEM:CBD	2.27	0.65
1:C:35:VAL:HG11	1:C:84:GLU:HG2	1.78	0.64
1:F:118:MET:HG3	1:F:119:ALA:N	2.12	0.64
4:A:700:HEM:HBC2	4:A:700:HEM:HMC1	1.80	0.64
1:F:60:ARG:HH21	1:K:90:ARG:HD2	1.62	0.64
1:D:35:VAL:HG21	1:D:84:GLU:HG2	1.80	0.64
1:I:23:TYR:HH	1:I:36:TYR:HE2	0.72	0.64
1:J:23:TYR:OH	1:J:36:TYR:CE2	2.42	0.64
1:K:88:TRP:HE1	3:K:800:CYN:C	2.11	0.63
1:F:60:ARG:NH2	1:K:90:ARG:HD2	2.13	0.63
1:E:60:ARG:CD	1:J:90:ARG:CZ	2.71	0.63
4:C:700:HEM:HBC2	4:C:700:HEM:CMC	2.29	0.62
1:I:54:GLN:NE2	1:I:63:SER:H	1.95	0.62
1:I:125:ASN:C	1:I:125:ASN:HD22	2.03	0.62
1:G:90:ARG:NH1	5:G:2126:HOH:O	2.23	0.62
1:A:46:GLU:HG3	5:A:2064:HOH:O	2.00	0.62
1:G:44:ALA:HA	1:G:47:ARG:NH1	2.08	0.61
1:J:46:GLU:O	1:J:50:MET:HG3	1.99	0.61
1:F:102:GLU:HB2	5:F:869:HOH:O	1.99	0.61
4:D:700:HEM:HMC1	4:D:700:HEM:HBC2	1.83	0.61
1:C:25:GLN:CG	5:C:2078:HOH:O	2.23	0.60
1:F:113:LEU:O	1:F:117:GLU:HG3	2.01	0.60
1:I:54:GLN:HE22	1:I:63:SER:N	1.98	0.60
1:A:60:ARG:HD3	1:G:90:ARG:CZ	2.32	0.60
1:D:70[B]:ARG:HD3	5:D:2038:HOH:O	2.02	0.60
1:D:110:ARG:HG3	1:D:110:ARG:NH1	2.15	0.60
1:D:37[B]:PRO:O	1:D:39[B]:ASP:N	2.35	0.60
1:F:35:VAL:HG21	1:F:84:GLU:HG2	1.84	0.59
1:I:117:GLU:O	1:I:121[A]:HIS:CD2	2.55	0.59
1:I:85:ARG:HD2	1:I:121[A]:HIS:CD2	2.38	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:L:54:GLN:NE2	1:L:63:SER:H	1.98	0.59
2:B:2017:SO4:O2	1:J:79:ARG:NH2	2.33	0.58
1:E:60:ARG:HH11	1:J:90:ARG:NE	2.01	0.58
1:A:35:VAL:HG21	1:A:84:GLU:HG2	1.86	0.58
1:K:94:THR:HG22	5:K:860:HOH:O	2.03	0.58
4:E:700:HEM:HBC2	4:E:700:HEM:CMC	2.33	0.58
1:H:107[A]:GLU:CG	5:H:898:HOH:O	2.52	0.57
1:A:125:ASN:C	1:A:125:ASN:HD22	2.07	0.57
1:C:60:ARG:NH1	1:I:90:ARG:HD2	2.18	0.57
1:C:37[B]:PRO:O	1:C:39[B]:ASP:N	2.38	0.57
1:E:35:VAL:HG21	1:E:84:GLU:HG2	1.87	0.56
1:I:3:LYS:HE3	5:I:2022:HOH:O	2.04	0.56
1:H:118:MET:SD	1:H:118:MET:C	2.85	0.55
1:D:37[A]:PRO:HB2	5:D:2055:HOH:O	2.07	0.54
1:G:46:GLU:HG3	1:G:49:ARG:NH2	2.21	0.54
1:G:79:ARG:HH21	1:G:127:PRO:HD2	1.72	0.54
4:F:700:HEM:HBC2	4:F:700:HEM:HMC1	1.88	0.54
1:E:21:ARG:NH1	1:E:25:GLN:NE2	2.50	0.54
1:I:23:TYR:CZ	1:I:36:TYR:CE2	2.96	0.54
1:H:85:ARG:HH11	1:H:121:HIS:HD2	1.54	0.54
1:B:76:ALA:N	1:B:77:PRO:CD	2.72	0.53
1:E:76:ALA:N	1:E:77:PRO:CD	2.71	0.53
1:G:32:LEU:HD11	1:G:88:TRP:HA	1.91	0.53
1:F:38[A]:GLU:O	1:F:39[A]:ASP:OD1	2.26	0.53
1:F:73:MET:HG3	1:J:65:GLN:HE22	1.72	0.53
1:D:38[A]:GLU:O	1:D:39[A]:ASP:OD1	2.26	0.53
1:B:22:PHE:O	1:B:25:GLN:HB2	2.09	0.53
1:B:35:VAL:HG13	1:B:78:PHE:HB3	1.90	0.53
4:D:700:HEM:HBC2	4:D:700:HEM:CMC	2.39	0.52
1:G:47:ARG:HH11	1:G:47:ARG:CB	2.19	0.52
1:K:74:ARG:HG2	4:K:700:HEM:CBD	2.39	0.52
1:L:85:ARG:HH11	1:L:121:HIS:HD2	1.57	0.52
1:B:73:MET:HG3	1:I:65:GLN:HE22	1.74	0.52
1:K:29:ASP:O	1:K:33:ARG:HG2	2.09	0.52
1:L:76:ALA:N	1:L:77:PRO:CD	2.72	0.52
1:A:34:ARG:HH11	1:A:34:ARG:HG3	1.69	0.52
1:F:60:ARG:HH21	1:K:90:ARG:CD	2.22	0.52
4:H:700:HEM:HMC1	4:H:700:HEM:HBC2	1.90	0.52
1:I:63:SER:HB3	5:I:2186:HOH:O	2.10	0.52
1:L:93:HIS:CE1	1:L:117:GLU:OE1	2.62	0.52
1:L:85:ARG:HH11	1:L:121:HIS:CD2	2.28	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:38[A]:GLU:O	1:E:39[A]:ASP:OD1	2.28	0.51
1:G:76:ALA:N	1:G:77:PRO:CD	2.74	0.51
1:H:63:SER:HB2	5:H:891:HOH:O	2.09	0.51
1:H:107[A]:GLU:HG2	5:H:898:HOH:O	2.08	0.51
1:A:92:MET:HG3	1:A:116:LEU:HD13	1.92	0.51
1:B:21:ARG:NH1	1:B:25:GLN:HG2	2.26	0.51
1:F:76:ALA:N	1:F:77:PRO:CD	2.72	0.51
1:B:92:MET:CG	1:B:116:LEU:HD13	2.41	0.51
4:F:700:HEM:HBC2	4:F:700:HEM:CMC	2.40	0.51
1:H:54:GLN:NE2	1:H:63:SER:H	2.02	0.51
1:K:3:LYS:HD3	1:K:8:ALA:HA	1.93	0.51
1:B:29:ASP:O	1:B:33:ARG:HG2	2.11	0.51
1:J:109:ARG:HD3	5:J:2063:HOH:O	2.11	0.51
1:E:60:ARG:HD3	1:J:90:ARG:NH2	2.24	0.51
1:E:102:GLU:HB2	5:E:1258:HOH:O	2.11	0.51
1:E:68[B]:HIS:CE1	1:J:84:GLU:OE1	2.64	0.50
1:H:85:ARG:HH11	1:H:121:HIS:CD2	2.28	0.50
1:I:70:ARG:NH2	5:I:2188:HOH:O	2.43	0.50
1:C:125:ASN:ND2	1:C:125:ASN:C	2.64	0.50
1:K:30:GLU:CD	1:K:30:GLU:H	2.15	0.50
1:K:70[B]:ARG:HD3	5:K:859:HOH:O	2.11	0.50
1:L:16:ASP:HB2	5:L:2045:HOH:O	2.11	0.50
1:K:72:ARG:NH1	5:K:807:HOH:O	2.27	0.49
1:C:38[A]:GLU:O	1:C:39[A]:ASP:OD1	2.29	0.49
1:D:55:TYR:CZ	1:L:82:LEU:HD22	2.47	0.49
1:L:38:GLU:OE2	1:L:39:ASP:HB3	2.12	0.49
1:H:2:PRO:HB3	1:H:8:ALA:HA	1.94	0.49
1:A:76:ALA:N	1:A:77:PRO:CD	2.75	0.49
1:B:82:LEU:HD22	1:B:85:ARG:NH2	2.28	0.49
1:D:110:ARG:HH11	1:D:110:ARG:CG	2.21	0.49
1:C:16:ASP:HA	1:C:49:ARG:HD3	1.95	0.48
1:C:92:MET:CG	1:C:116:LEU:HD13	2.43	0.48
1:F:61:THR:HB	5:F:805:HOH:O	2.12	0.48
1:H:76:ALA:N	1:H:77:PRO:CD	2.76	0.48
1:J:71:LEU:HB3	1:J:123:LEU:HD21	1.96	0.48
1:H:90:ARG:CZ	5:H:802:HOH:O	2.61	0.48
1:F:35:VAL:HG21	1:F:84:GLU:CG	2.42	0.48
1:H:101:SER:HA	1:H:104:LEU:O	2.14	0.48
4:B:700:HEM:HMC1	4:B:700:HEM:HBC2	1.97	0.47
1:L:17:ALA:O	1:L:21:ARG:HD2	2.13	0.47
1:F:70[A]:ARG:HD3	5:F:898:HOH:O	2.12	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:L:49:ARG:NH2	5:L:2068:HOH:O	2.46	0.47
1:J:23:TYR:HE1	1:J:36:TYR:CD2	2.32	0.47
1:B:16:ASP:HA	1:B:49:ARG:HD3	1.96	0.47
1:E:105:ASP:HB3	1:E:108:HIS:H	1.79	0.47
1:H:125:ASN:C	1:H:125:ASN:HD22	2.17	0.47
1:K:63:SER:HB3	5:K:857:HOH:O	2.14	0.47
1:L:54:GLN:HE22	1:L:63:SER:N	2.05	0.47
1:C:92:MET:HG3	1:C:116:LEU:HD13	1.96	0.47
1:I:122:SER:C	5:I:2187:HOH:O	2.53	0.47
1:I:74:ARG:NH2	2:J:2018:SO4:O3	2.48	0.47
1:B:40[B]:ASP:HA	5:B:2132:HOH:O	2.15	0.47
1:D:93:HIS:NE2	1:D:117:GLU:OE1	2.47	0.47
1:K:76:ALA:N	1:K:77:PRO:CD	2.77	0.46
1:B:72:ARG:HB3	5:B:2104:HOH:O	2.14	0.46
1:E:40[A]:ASP:OD1	1:E:42:ALA:CB	2.64	0.46
1:E:66:ARG:NH2	1:E:74:ARG:HH21	2.14	0.46
1:E:60:ARG:NH1	1:J:90:ARG:NH2	2.64	0.46
1:F:79:ARG:NH2	5:I:2187:HOH:O	2.49	0.46
1:G:17:ALA:O	1:G:21:ARG:HD2	2.15	0.46
1:D:76:ALA:N	1:D:77:PRO:CD	2.79	0.46
1:H:19:VAL:HG12	1:H:45:GLU:HG3	1.98	0.46
1:J:92:MET:HG3	1:J:116:LEU:HD13	1.98	0.46
4:A:700:HEM:HBC2	4:A:700:HEM:CMC	2.46	0.46
1:C:107:GLU:HG3	5:C:2049:HOH:O	2.15	0.46
4:J:700:HEM:HHC	4:J:700:HEM:HBB2	1.98	0.46
1:J:23:TYR:CZ	1:J:36:TYR:CE2	3.04	0.45
1:J:49:ARG:NH1	5:J:2093:HOH:O	2.49	0.45
1:E:55:TYR:CZ	1:E:115:TYR:CE2	3.04	0.45
1:J:76:ALA:N	1:J:77:PRO:CD	2.79	0.45
1:J:105:ASP:O	1:J:109:ARG:HB2	2.17	0.45
1:L:126:SER:OG	1:L:127:PRO:HD2	2.16	0.45
4:E:700:HEM:HAD1	5:E:227:HOH:O	2.17	0.45
1:H:2:PRO:CB	1:H:8:ALA:HA	2.47	0.45
1:C:60:ARG:NH1	1:I:90:ARG:CD	2.78	0.45
1:C:73:MET:HG3	1:G:65:GLN:HE22	1.81	0.45
1:F:70[B]:ARG:HD2	5:J:2030:HOH:O	2.16	0.44
4:J:700:HEM:HBC2	4:J:700:HEM:CMC	2.43	0.44
1:K:34:ARG:NH1	5:K:904:HOH:O	2.49	0.44
1:A:38[A]:GLU:O	1:A:39[A]:ASP:OD1	2.35	0.44
1:G:120:ALA:HA	4:G:700:HEM:HMC1	1.99	0.44
1:F:70[B]:ARG:NE	5:F:909:HOH:O	2.51	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:32:LEU:HD11	1:I:88:TRP:HA	2.00	0.44
1:F:41[A]:LEU:HD23	5:F:877:HOH:O	2.16	0.44
1:H:54:GLN:HE22	1:H:63:SER:N	2.05	0.44
1:D:54:GLN:NE2	1:D:63:SER:H	2.06	0.43
1:G:23:TYR:CZ	1:G:36:TYR:CE2	3.06	0.43
1:D:110:ARG:NH1	1:D:110:ARG:CG	2.80	0.43
1:E:60:ARG:HH11	1:J:90:ARG:CZ	2.30	0.43
1:F:36:TYR:HB3	1:F:41[A]:LEU:HD21	2.00	0.43
1:L:19:VAL:HG12	1:L:45:GLU:HG3	2.00	0.43
1:C:76:ALA:N	1:C:77:PRO:CD	2.81	0.43
1:D:92:MET:CG	1:D:116:LEU:HD13	2.49	0.43
1:E:40[A]:ASP:OD1	1:E:42:ALA:HB2	2.19	0.43
1:F:26:VAL:HG22	1:F:32:LEU:HD13	2.00	0.43
1:K:105:ASP:HB2	1:K:108:HIS:CD2	2.53	0.43
1:J:92:MET:CG	1:J:116:LEU:HD13	2.48	0.43
1:B:19:VAL:HG12	1:B:45:GLU:HG3	2.00	0.43
1:C:25:GLN:NE2	1:C:91:CYS:HA	2.34	0.43
1:E:68[B]:HIS:HE1	1:J:84:GLU:OE1	2.00	0.43
1:H:72:ARG:NH2	1:H:124:VAL:O	2.52	0.42
1:B:82:LEU:HG	5:B:2024:HOH:O	2.19	0.42
4:G:700:HEM:CMC	4:G:700:HEM:HBC2	2.50	0.42
1:J:23:TYR:CE1	1:J:36:TYR:CE2	3.07	0.42
1:A:35:VAL:CG1	1:A:78:PHE:HB3	2.50	0.42
1:G:47:ARG:HB2	1:G:47:ARG:NH1	2.23	0.42
1:I:17:ALA:O	1:I:21:ARG:HD3	2.20	0.42
1:L:72:ARG:CD	5:L:2032:HOH:O	2.52	0.41
4:C:700:HEM:HMC1	4:C:700:HEM:CBC	2.46	0.41
1:G:118:MET:SD	1:G:118:MET:C	2.99	0.41
1:B:54:GLN:NE2	1:B:62:TYR:HB3	2.36	0.41
1:A:125:ASN:ND2	1:A:125:ASN:C	2.73	0.41
1:I:76:ALA:N	1:I:77:PRO:CD	2.83	0.41
1:F:16:ASP:HA	1:F:49:ARG:HD3	2.02	0.41
1:E:22:PHE:CD1	1:E:92:MET:HE2	2.55	0.41
1:A:34:ARG:CG	1:A:34:ARG:NH1	2.55	0.41
1:A:92:MET:CG	1:A:116:LEU:HD13	2.51	0.41
1:H:23:TYR:CZ	1:H:36:TYR:CE2	3.08	0.41
1:A:33:ARG:HG2	1:A:33:ARG:HH11	1.86	0.41
1:D:55:TYR:CE1	1:L:82:LEU:HD22	2.56	0.41
1:J:62:TYR:CE1	1:J:66:ARG:HG3	2.55	0.41
1:F:19:VAL:HG21	1:F:49:ARG:HA	2.01	0.41
1:H:32:LEU:HD21	1:H:88:TRP:HA	2.02	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:47:ARG:NH2	2:A:2011[A]:SO4:O2	2.45	0.40
1:B:92:MET:HG3	1:B:116:LEU:HD13	2.01	0.40
1:G:19:VAL:HG12	1:G:45:GLU:HG3	2.03	0.40
1:K:118:MET:C	1:K:118:MET:SD	2.99	0.40
1:A:70:ARG:HG3	5:H:911:HOH:O	2.22	0.40
1:J:19:VAL:HG21	1:J:49:ARG:HA	2.01	0.40
1:L:19:VAL:HG12	1:L:45:GLU:CG	2.52	0.40
1:B:92:MET:HG2	1:B:116:LEU:HD13	2.04	0.40
1:D:46:GLU:HG3	5:D:2110:HOH:O	2.21	0.40
1:I:29:ASP:O	1:I:33:ARG:HG2	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	129/128 (101%)	126 (98%)	3 (2%)	0	100	100
1	B	130/128 (102%)	122 (94%)	8 (6%)	0	100	100
1	C	130/128 (102%)	123 (95%)	5 (4%)	2 (2%)	10	5
1	D	130/128 (102%)	121 (93%)	7 (5%)	2 (2%)	10	5
1	E	132/128 (103%)	125 (95%)	4 (3%)	3 (2%)	6	2
1	F	130/128 (102%)	125 (96%)	5 (4%)	0	100	100
1	G	125/128 (98%)	123 (98%)	2 (2%)	0	100	100
1	H	126/128 (98%)	124 (98%)	2 (2%)	0	100	100
1	I	127/128 (99%)	125 (98%)	2 (2%)	0	100	100
1	J	126/128 (98%)	124 (98%)	1 (1%)	1 (1%)	19	14
1	K	126/128 (98%)	123 (98%)	1 (1%)	2 (2%)	9	4
1	L	125/128 (98%)	122 (98%)	3 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	1536/1536 (100%)	1483 (96%)	43 (3%)	10 (1%)	29	17

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	38[A]	GLU
1	D	38[B]	GLU
1	K	105	ASP
1	C	38[A]	GLU
1	C	38[B]	GLU
1	E	38[A]	GLU
1	E	38[B]	GLU
1	K	3	LYS
1	E	105	ASP
1	J	105	ASP

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	112/109 (103%)	103 (92%)	9 (8%)	12	8
1	B	113/109 (104%)	107 (95%)	6 (5%)	22	20
1	C	113/109 (104%)	104 (92%)	9 (8%)	12	8
1	D	113/109 (104%)	107 (95%)	6 (5%)	22	20
1	E	115/109 (106%)	102 (89%)	13 (11%)	6	3
1	F	113/109 (104%)	102 (90%)	11 (10%)	8	5
1	G	108/109 (99%)	101 (94%)	7 (6%)	17	14
1	H	109/109 (100%)	100 (92%)	9 (8%)	11	7
1	I	110/109 (101%)	101 (92%)	9 (8%)	11	7
1	J	109/109 (100%)	101 (93%)	8 (7%)	14	10
1	K	109/109 (100%)	101 (93%)	8 (7%)	14	10
1	L	108/109 (99%)	99 (92%)	9 (8%)	11	7

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	1332/1308 (102%)	1228 (92%)	104 (8%)	13 9

All (104) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	23	TYR
1	A	34	ARG
1	A	37[A]	PRO
1	A	37[B]	PRO
1	A	48	LEU
1	A	72	ARG
1	A	89	LEU
1	A	104	LEU
1	A	125	ASN
1	B	3	LYS
1	B	23	TYR
1	B	37[A]	PRO
1	B	37[B]	PRO
1	B	48	LEU
1	B	117	GLU
1	C	23	TYR
1	C	34	ARG
1	C	37[A]	PRO
1	C	37[B]	PRO
1	C	70	ARG
1	C	104	LEU
1	C	117[A]	GLU
1	C	117[B]	GLU
1	C	125	ASN
1	D	3	LYS
1	D	23	TYR
1	D	32	LEU
1	D	37[A]	PRO
1	D	37[B]	PRO
1	D	117	GLU
1	E	2	PRO
1	E	3	LYS
1	E	23	TYR
1	E	32	LEU
1	E	37[A]	PRO
1	E	37[B]	PRO
1	E	72	ARG

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Mol	Chain	Res	Type
1	E	74	ARG
1	E	82	LEU
1	E	104	LEU
1	E	105	ASP
1	E	113	LEU
1	E	117	GLU
1	F	23	TYR
1	F	34	ARG
1	F	37[A]	PRO
1	F	37[B]	PRO
1	F	48	LEU
1	F	61	THR
1	F	82	LEU
1	F	89	LEU
1	F	104	LEU
1	F	113	LEU
1	F	118	MET
1	G	3	LYS
1	G	34	ARG
1	G	47	ARG
1	G	82	LEU
1	G	104	LEU
1	G	113	LEU
1	G	117	GLU
1	H	3	LYS
1	H	32	LEU
1	H	72	ARG
1	H	74	ARG
1	H	82	LEU
1	H	90	ARG
1	H	113	LEU
1	H	125	ASN
1	H	128	PHE
1	I	3	LYS
1	I	28	GLU
1	I	30	GLU
1	I	52	LEU
1	I	74	ARG
1	I	104	LEU
1	I	110	ARG
1	I	123	LEU
1	I	125	ASN

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Mol	Chain	Res	Type
1	J	3	LYS
1	J	60	ARG
1	J	71	LEU
1	J	72[A]	ARG
1	J	72[B]	ARG
1	J	104	LEU
1	J	113	LEU
1	J	128	PHE
1	K	30	GLU
1	K	32	LEU
1	K	69	PRO
1	K	74	ARG
1	K	82	LEU
1	K	104	LEU
1	K	113	LEU
1	K	128	PHE
1	L	3	LYS
1	L	37	PRO
1	L	69	PRO
1	L	82	LEU
1	L	104	LEU
1	L	110	ARG
1	L	113	LEU
1	L	118	MET
1	L	128	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	54	GLN
1	A	93	HIS
1	A	125	ASN
1	B	54	GLN
1	C	25	GLN
1	C	125	ASN
1	D	54	GLN
1	D	65	GLN
1	D	68	HIS
1	D	121	HIS
1	E	25	GLN
1	E	65	GLN
1	E	93	HIS

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Mol	Chain	Res	Type
1	F	65	GLN
1	G	65	GLN
1	G	68	HIS
1	H	25	GLN
1	H	54	GLN
1	H	121	HIS
1	H	125	ASN
1	I	54	GLN
1	I	65	GLN
1	I	125	ASN
1	J	65	GLN
1	J	93	HIS
1	K	108	HIS
1	L	54	GLN
1	L	93	HIS
1	L	121	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
2	SO4	A	2011[A]	-	4,4,4	0.14	0	6,6,6	0.08	0
2	SO4	A	2016	-	4,4,4	0.13	0	6,6,6	0.10	0
3	CYN	I	800	4	0,1,1	-	-	-		
2	SO4	J	2008[A]	-	4,4,4	0.17	0	6,6,6	0.10	0
4	HEM	A	700	3,1	41,50,50	1.85	7 (17%)	45,82,82	1.83	11 (24%)
2	SO4	C	2013	-	4,4,4	0.16	0	6,6,6	0.05	0
4	HEM	F	700	3,1	41,50,50	1.91	7 (17%)	45,82,82	1.71	8 (17%)
2	SO4	G	2001	-	4,4,4	0.15	0	6,6,6	0.07	0
3	CYN	K	800	4	0,1,1	-	-	-		
4	HEM	G	700	3,1	41,50,50	2.04	7 (17%)	45,82,82	1.57	6 (13%)
3	CYN	L	800	4	0,1,1	-	-	-		
3	CYN	D	800	4	0,1,1	-	-	-		
2	SO4	E	2003	-	4,4,4	0.15	0	6,6,6	0.12	0
3	CYN	F	800	4	0,1,1	-	-	-		
3	CYN	B	800	4	0,1,1	-	-	-		
3	CYN	E	800	4	0,1,1	-	-	-		
2	SO4	G	2002	-	4,4,4	0.15	0	6,6,6	0.14	0
2	SO4	B	2017	-	4,4,4	0.11	0	6,6,6	0.16	0
4	HEM	I	700	3,1	41,50,50	1.90	7 (17%)	45,82,82	1.62	6 (13%)
2	SO4	E	2006[A]	-	4,4,4	0.16	0	6,6,6	0.13	0
2	SO4	C	2009[A]	-	4,4,4	0.12	0	6,6,6	0.22	0
4	HEM	K	700	3,1	41,50,50	1.92	7 (17%)	45,82,82	1.61	6 (13%)
4	HEM	J	700	3,1	41,50,50	1.94	8 (19%)	45,82,82	1.75	9 (20%)
4	HEM	L	700	3,1	41,50,50	1.90	6 (14%)	45,82,82	1.74	7 (15%)
2	SO4	D	2010[A]	-	4,4,4	0.17	0	6,6,6	0.15	0
4	HEM	C	700	3,1	41,50,50	1.92	5 (12%)	45,82,82	1.79	9 (20%)
2	SO4	L	2005	-	4,4,4	0.15	0	6,6,6	0.13	0
2	SO4	A	2014	-	4,4,4	0.15	0	6,6,6	0.12	0
2	SO4	A	2004	-	4,4,4	0.16	0	6,6,6	0.13	0
2	SO4	A	2012	-	4,4,4	0.12	0	6,6,6	0.27	0
3	CYN	C	800	4	0,1,1	-	-	-		
2	SO4	I	2015	-	4,4,4	0.16	0	6,6,6	0.24	0
3	CYN	J	800	4	0,1,1	-	-	-		
4	HEM	D	700	3,1	41,50,50	1.90	7 (17%)	45,82,82	1.72	7 (15%)
4	HEM	H	700	3,1	41,50,50	1.92	7 (17%)	45,82,82	1.68	8 (17%)
2	SO4	B	2007[A]	-	4,4,4	0.13	0	6,6,6	0.29	0
3	CYN	A	800	4	0,1,1	-	-	-		
4	HEM	B	700	3,1	41,50,50	1.87	5 (12%)	45,82,82	1.80	9 (20%)
3	CYN	H	800	4	0,1,1	-	-	-		
4	HEM	E	700	3,1	41,50,50	1.90	6 (14%)	45,82,82	1.75	7 (15%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	CYN	G	800	4	0,1,1	-	-	-		
2	SO4	J	2018	-	4,4,4	0.14	0	6,6,6	0.10	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	HEM	H	700	3,1	-	5/12/54/54	-
4	HEM	B	700	3,1	-	4/12/54/54	-
4	HEM	I	700	3,1	-	5/12/54/54	-
4	HEM	A	700	3,1	-	4/12/54/54	-
4	HEM	F	700	3,1	-	6/12/54/54	-
4	HEM	C	700	3,1	-	6/12/54/54	-
4	HEM	G	700	3,1	-	4/12/54/54	-
4	HEM	E	700	3,1	-	6/12/54/54	-
4	HEM	K	700	3,1	-	7/12/54/54	-
4	HEM	J	700	3,1	-	5/12/54/54	-
4	HEM	L	700	3,1	-	5/12/54/54	-
4	HEM	D	700	3,1	-	4/12/54/54	-

All (79) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	G	700	HEM	C3D-C2D	8.05	1.53	1.36
4	K	700	HEM	C3D-C2D	7.84	1.53	1.36
4	I	700	HEM	C3D-C2D	7.73	1.53	1.36
4	J	700	HEM	C3D-C2D	7.71	1.53	1.36
4	C	700	HEM	C3D-C2D	7.68	1.53	1.36
4	B	700	HEM	C3D-C2D	7.66	1.53	1.36
4	H	700	HEM	C3D-C2D	7.51	1.52	1.36
4	F	700	HEM	C3D-C2D	7.50	1.52	1.36
4	L	700	HEM	C3D-C2D	7.48	1.52	1.36
4	A	700	HEM	C3D-C2D	7.45	1.52	1.36
4	E	700	HEM	C3D-C2D	7.33	1.52	1.36
4	D	700	HEM	C3D-C2D	7.24	1.52	1.36
4	G	700	HEM	C3C-C2C	-5.00	1.33	1.40
4	L	700	HEM	C3C-C2C	-4.83	1.33	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	700	HEM	C3C-C2C	-4.72	1.33	1.40
4	D	700	HEM	C3C-C2C	-4.60	1.34	1.40
4	K	700	HEM	C3C-C2C	-4.23	1.34	1.40
4	F	700	HEM	C3C-C2C	-4.15	1.34	1.40
4	H	700	HEM	C3C-C2C	-4.10	1.34	1.40
4	E	700	HEM	C3C-C2C	-4.07	1.34	1.40
4	B	700	HEM	C3C-CAC	4.03	1.56	1.47
4	B	700	HEM	C3C-C2C	-3.95	1.34	1.40
4	I	700	HEM	C3C-C2C	-3.87	1.35	1.40
4	H	700	HEM	C3C-CAC	3.80	1.55	1.47
4	F	700	HEM	C3C-CAC	3.76	1.55	1.47
4	J	700	HEM	C3C-CAC	3.76	1.55	1.47
4	J	700	HEM	C3C-C2C	-3.73	1.35	1.40
4	A	700	HEM	C3C-C2C	-3.68	1.35	1.40
4	C	700	HEM	C3C-CAC	3.62	1.55	1.47
4	D	700	HEM	C3C-CAC	3.61	1.55	1.47
4	A	700	HEM	C3C-CAC	3.56	1.55	1.47
4	E	700	HEM	C3C-CAC	3.55	1.55	1.47
4	K	700	HEM	C3C-CAC	3.52	1.55	1.47
4	G	700	HEM	C3C-CAC	3.52	1.55	1.47
4	I	700	HEM	C3C-CAC	3.47	1.54	1.47
4	L	700	HEM	C3C-CAC	3.43	1.54	1.47
4	E	700	HEM	FE-ND	3.40	2.13	1.96
4	J	700	HEM	CAB-C3B	2.94	1.55	1.47
4	G	700	HEM	CAB-C3B	2.83	1.55	1.47
4	C	700	HEM	CAB-C3B	2.78	1.55	1.47
4	D	700	HEM	CAB-C3B	2.76	1.54	1.47
4	K	700	HEM	CAB-C3B	2.72	1.54	1.47
4	I	700	HEM	FE-ND	2.67	2.10	1.96
4	H	700	HEM	CAB-C3B	2.66	1.54	1.47
4	L	700	HEM	CAB-C3B	2.57	1.54	1.47
4	E	700	HEM	CAB-C3B	2.56	1.54	1.47
4	J	700	HEM	FE-NB	2.50	2.09	1.96
4	H	700	HEM	CMB-C2B	2.50	1.56	1.50
4	G	700	HEM	CMB-C2B	2.47	1.56	1.50
4	B	700	HEM	CAB-C3B	2.47	1.54	1.47
4	I	700	HEM	CAB-C3B	2.47	1.54	1.47
4	A	700	HEM	CAA-C2A	2.44	1.55	1.52
4	C	700	HEM	CMB-C2B	2.41	1.55	1.50
4	K	700	HEM	FE-ND	2.37	2.08	1.96
4	G	700	HEM	CMD-C2D	2.30	1.55	1.50
4	F	700	HEM	CAB-C3B	2.28	1.53	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	H	700	HEM	CAA-C2A	2.25	1.55	1.52
4	D	700	HEM	CAA-C2A	2.24	1.55	1.52
4	L	700	HEM	FE-NB	2.22	2.07	1.96
4	I	700	HEM	CMB-C2B	2.21	1.55	1.50
4	D	700	HEM	CMB-C2B	2.21	1.55	1.50
4	J	700	HEM	FE-ND	2.20	2.07	1.96
4	J	700	HEM	CMD-C2D	2.19	1.55	1.50
4	A	700	HEM	CMD-C2D	2.17	1.55	1.50
4	H	700	HEM	FE-NB	2.17	2.07	1.96
4	A	700	HEM	CMB-C2B	2.15	1.55	1.50
4	G	700	HEM	FE-ND	2.12	2.07	1.96
4	B	700	HEM	FE-ND	2.12	2.07	1.96
4	A	700	HEM	CAB-C3B	2.11	1.53	1.47
4	K	700	HEM	CMB-C2B	2.11	1.55	1.50
4	F	700	HEM	CAA-C2A	2.10	1.55	1.52
4	L	700	HEM	CMD-C2D	2.10	1.55	1.50
4	K	700	HEM	CMD-C2D	2.09	1.55	1.50
4	F	700	HEM	CMB-C2B	2.05	1.55	1.50
4	J	700	HEM	CAA-C2A	2.03	1.55	1.52
4	E	700	HEM	CMB-C2B	2.02	1.55	1.50
4	I	700	HEM	CMA-C3A	2.02	1.55	1.51
4	F	700	HEM	CMD-C2D	2.02	1.55	1.50
4	D	700	HEM	CMD-C2D	2.01	1.55	1.50

All (93) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	700	HEM	C4D-ND-C1D	6.29	111.56	105.07
4	J	700	HEM	C4D-ND-C1D	6.25	111.53	105.07
4	C	700	HEM	C4D-ND-C1D	6.08	111.36	105.07
4	I	700	HEM	C4D-ND-C1D	6.06	111.33	105.07
4	L	700	HEM	C4D-ND-C1D	5.87	111.14	105.07
4	G	700	HEM	C4D-ND-C1D	5.82	111.09	105.07
4	E	700	HEM	C4D-ND-C1D	5.78	111.05	105.07
4	A	700	HEM	C4D-ND-C1D	5.73	111.00	105.07
4	H	700	HEM	C4D-ND-C1D	5.71	110.98	105.07
4	F	700	HEM	C4D-ND-C1D	5.64	110.89	105.07
4	D	700	HEM	C4D-ND-C1D	5.50	110.75	105.07
4	K	700	HEM	C4D-ND-C1D	5.24	110.48	105.07
4	C	700	HEM	CBA-CAA-C2A	-4.92	104.22	112.62
4	A	700	HEM	CBA-CAA-C2A	-4.81	104.41	112.62
4	D	700	HEM	CBA-CAA-C2A	-4.64	104.70	112.62

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	700	HEM	CBA-CAA-C2A	-4.57	104.82	112.62
4	B	700	HEM	CBA-CAA-C2A	-4.52	104.91	112.62
4	F	700	HEM	CBA-CAA-C2A	-4.13	105.57	112.62
4	K	700	HEM	CBA-CAA-C2A	-4.04	105.73	112.62
4	L	700	HEM	CBA-CAA-C2A	-3.98	105.83	112.62
4	G	700	HEM	C4C-CHD-C1D	3.77	127.53	122.56
4	H	700	HEM	C4C-CHD-C1D	3.54	127.23	122.56
4	J	700	HEM	CBA-CAA-C2A	-3.51	106.63	112.62
4	G	700	HEM	CAA-CBA-CGA	-3.33	104.42	113.76
4	L	700	HEM	C4C-CHD-C1D	3.11	126.66	122.56
4	H	700	HEM	CBA-CAA-C2A	-3.11	107.32	112.62
4	C	700	HEM	CAD-CBD-CGD	-3.10	106.93	113.60
4	I	700	HEM	CAD-CBD-CGD	-3.08	106.97	113.60
4	E	700	HEM	C1B-NB-C4B	3.01	108.19	105.07
4	E	700	HEM	CAD-CBD-CGD	-2.91	107.34	113.60
4	A	700	HEM	CAD-CBD-CGD	-2.90	107.36	113.60
4	A	700	HEM	C1B-NB-C4B	2.89	108.06	105.07
4	I	700	HEM	CBA-CAA-C2A	-2.87	107.72	112.62
4	H	700	HEM	CAD-CBD-CGD	-2.86	107.45	113.60
4	F	700	HEM	CAD-CBD-CGD	-2.84	107.48	113.60
4	C	700	HEM	C4C-CHD-C1D	2.82	126.28	122.56
4	D	700	HEM	CAD-CBD-CGD	-2.80	107.58	113.60
4	J	700	HEM	C4C-CHD-C1D	2.78	126.23	122.56
4	J	700	HEM	C4B-CHC-C1C	2.77	126.21	122.56
4	K	700	HEM	CAA-CBA-CGA	-2.74	106.08	113.76
4	J	700	HEM	CMA-C3A-C4A	-2.69	124.34	128.46
4	A	700	HEM	C4B-CHC-C1C	2.67	126.08	122.56
4	C	700	HEM	CMA-C3A-C4A	-2.66	124.38	128.46
4	I	700	HEM	C4C-CHD-C1D	2.64	126.05	122.56
4	L	700	HEM	C4B-CHC-C1C	2.64	126.04	122.56
4	F	700	HEM	C1B-NB-C4B	2.63	107.78	105.07
4	K	700	HEM	C4C-CHD-C1D	2.63	126.02	122.56
4	E	700	HEM	C4C-CHD-C1D	2.62	126.02	122.56
4	A	700	HEM	CMD-C2D-C1D	2.60	129.00	125.04
4	B	700	HEM	C4C-CHD-C1D	2.58	125.96	122.56
4	E	700	HEM	C4B-CHC-C1C	2.56	125.94	122.56
4	B	700	HEM	CMA-C3A-C4A	-2.56	124.53	128.46
4	F	700	HEM	C1D-C2D-C3D	-2.55	104.27	106.96
4	D	700	HEM	C4C-CHD-C1D	2.49	125.84	122.56
4	J	700	HEM	C1B-NB-C4B	2.49	107.64	105.07
4	H	700	HEM	C4B-CHC-C1C	2.49	125.84	122.56
4	B	700	HEM	CAD-C3D-C4D	2.48	128.99	124.66

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	700	HEM	CAD-C3D-C4D	2.46	128.96	124.66
4	L	700	HEM	CBD-CAD-C3D	-2.43	105.87	112.63
4	L	700	HEM	O1A-CGA-CBA	-2.42	115.31	123.08
4	B	700	HEM	C1B-NB-C4B	2.40	107.56	105.07
4	I	700	HEM	O1A-CGA-CBA	-2.40	115.38	123.08
4	A	700	HEM	C4B-C3B-C2B	2.39	109.01	107.11
4	J	700	HEM	O1A-CGA-CBA	-2.38	115.43	123.08
4	B	700	HEM	CAD-CBD-CGD	-2.38	108.49	113.60
4	H	700	HEM	O1A-CGA-CBA	-2.37	115.47	123.08
4	A	700	HEM	CMA-C3A-C4A	-2.35	124.85	128.46
4	H	700	HEM	CMD-C2D-C1D	2.33	128.58	125.04
4	F	700	HEM	C4B-CHC-C1C	2.32	125.61	122.56
4	C	700	HEM	CBD-CAD-C3D	-2.28	106.30	112.63
4	K	700	HEM	C1B-NB-C4B	2.27	107.42	105.07
4	L	700	HEM	CAD-CBD-CGD	-2.25	108.77	113.60
4	B	700	HEM	C4B-CHC-C1C	2.23	125.50	122.56
4	E	700	HEM	CAD-C3D-C4D	2.22	128.54	124.66
4	D	700	HEM	C1B-NB-C4B	2.19	107.34	105.07
4	J	700	HEM	CAD-CBD-CGD	-2.15	108.98	113.60
4	C	700	HEM	C1D-C2D-C3D	-2.14	104.71	106.96
4	D	700	HEM	C1D-C2D-C3D	-2.13	104.72	106.96
4	G	700	HEM	C3B-C2B-C1B	2.13	108.06	106.49
4	A	700	HEM	CHA-C4D-ND	2.12	127.00	124.38
4	F	700	HEM	CBD-CAD-C3D	-2.11	106.76	112.63
4	F	700	HEM	CMA-C3A-C4A	-2.10	125.23	128.46
4	K	700	HEM	O1A-CGA-CBA	-2.10	116.33	123.08
4	A	700	HEM	C1D-C2D-C3D	-2.10	104.75	106.96
4	J	700	HEM	C1D-C2D-C3D	-2.09	104.76	106.96
4	B	700	HEM	CHD-C1D-ND	2.09	126.70	124.43
4	A	700	HEM	CAD-C3D-C4D	2.07	128.28	124.66
4	H	700	HEM	CBB-CAB-C3B	-2.07	117.32	127.62
4	C	700	HEM	CBB-CAB-C3B	-2.07	117.34	127.62
4	I	700	HEM	CBD-CAD-C3D	-2.06	106.90	112.63
4	G	700	HEM	CAD-CBD-CGD	-2.05	109.19	113.60
4	G	700	HEM	C2C-C3C-C4C	2.03	108.31	106.90
4	C	700	HEM	C4B-CHC-C1C	2.00	125.20	122.56

There are no chirality outliers.

All (61) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	H	700	HEM	C2A-CAA-CBA-CGA

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Mol	Chain	Res	Type	Atoms
4	I	700	HEM	C2A-CAA-CBA-CGA
4	J	700	HEM	C2A-CAA-CBA-CGA
4	C	700	HEM	C2B-C3B-CAB-CBB
4	E	700	HEM	C2B-C3B-CAB-CBB
4	F	700	HEM	C2B-C3B-CAB-CBB
4	K	700	HEM	C2B-C3B-CAB-CBB
4	C	700	HEM	C4B-C3B-CAB-CBB
4	E	700	HEM	C4B-C3B-CAB-CBB
4	F	700	HEM	C4B-C3B-CAB-CBB
4	K	700	HEM	C4B-C3B-CAB-CBB
4	K	700	HEM	C2A-CAA-CBA-CGA
4	L	700	HEM	C2A-CAA-CBA-CGA
4	A	700	HEM	CAA-CBA-CGA-O2A
4	D	700	HEM	CAD-CBD-CGD-O2D
4	E	700	HEM	CAD-CBD-CGD-O2D
4	I	700	HEM	CAD-CBD-CGD-O2D
4	J	700	HEM	CAD-CBD-CGD-O2D
4	K	700	HEM	CAD-CBD-CGD-O2D
4	A	700	HEM	CAD-CBD-CGD-O2D
4	C	700	HEM	CAA-CBA-CGA-O2A
4	F	700	HEM	CAA-CBA-CGA-O2A
4	C	700	HEM	CAA-CBA-CGA-O1A
4	D	700	HEM	CAA-CBA-CGA-O1A
4	D	700	HEM	CAA-CBA-CGA-O2A
4	F	700	HEM	CAA-CBA-CGA-O1A
4	C	700	HEM	CAD-CBD-CGD-O2D
4	E	700	HEM	CAA-CBA-CGA-O2A
4	A	700	HEM	CAA-CBA-CGA-O1A
4	B	700	HEM	CAA-CBA-CGA-O2A
4	E	700	HEM	CAA-CBA-CGA-O1A
4	K	700	HEM	CAD-CBD-CGD-O1D
4	L	700	HEM	CAD-CBD-CGD-O1D
4	L	700	HEM	CAD-CBD-CGD-O2D
4	B	700	HEM	CAA-CBA-CGA-O1A
4	H	700	HEM	CAD-CBD-CGD-O2D
4	B	700	HEM	CAD-CBD-CGD-O2D
4	C	700	HEM	CAD-CBD-CGD-O1D
4	F	700	HEM	CAD-CBD-CGD-O1D
4	F	700	HEM	CAD-CBD-CGD-O2D
4	G	700	HEM	CAA-CBA-CGA-O1A
4	H	700	HEM	CAD-CBD-CGD-O1D
4	J	700	HEM	CAA-CBA-CGA-O1A

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Mol	Chain	Res	Type	Atoms
4	J	700	HEM	CAD-CBD-CGD-O1D
4	D	700	HEM	CAD-CBD-CGD-O1D
4	E	700	HEM	CAD-CBD-CGD-O1D
4	J	700	HEM	CAA-CBA-CGA-O2A
4	B	700	HEM	CAD-CBD-CGD-O1D
4	I	700	HEM	CAD-CBD-CGD-O1D
4	A	700	HEM	CAD-CBD-CGD-O1D
4	G	700	HEM	CAA-CBA-CGA-O2A
4	I	700	HEM	CAA-CBA-CGA-O1A
4	G	700	HEM	CAD-CBD-CGD-O1D
4	G	700	HEM	CAD-CBD-CGD-O2D
4	H	700	HEM	CAA-CBA-CGA-O2A
4	I	700	HEM	CAA-CBA-CGA-O2A
4	H	700	HEM	CAA-CBA-CGA-O1A
4	L	700	HEM	CAA-CBA-CGA-O2A
4	K	700	HEM	CAA-CBA-CGA-O1A
4	L	700	HEM	CAA-CBA-CGA-O1A
4	K	700	HEM	CAA-CBA-CGA-O2A

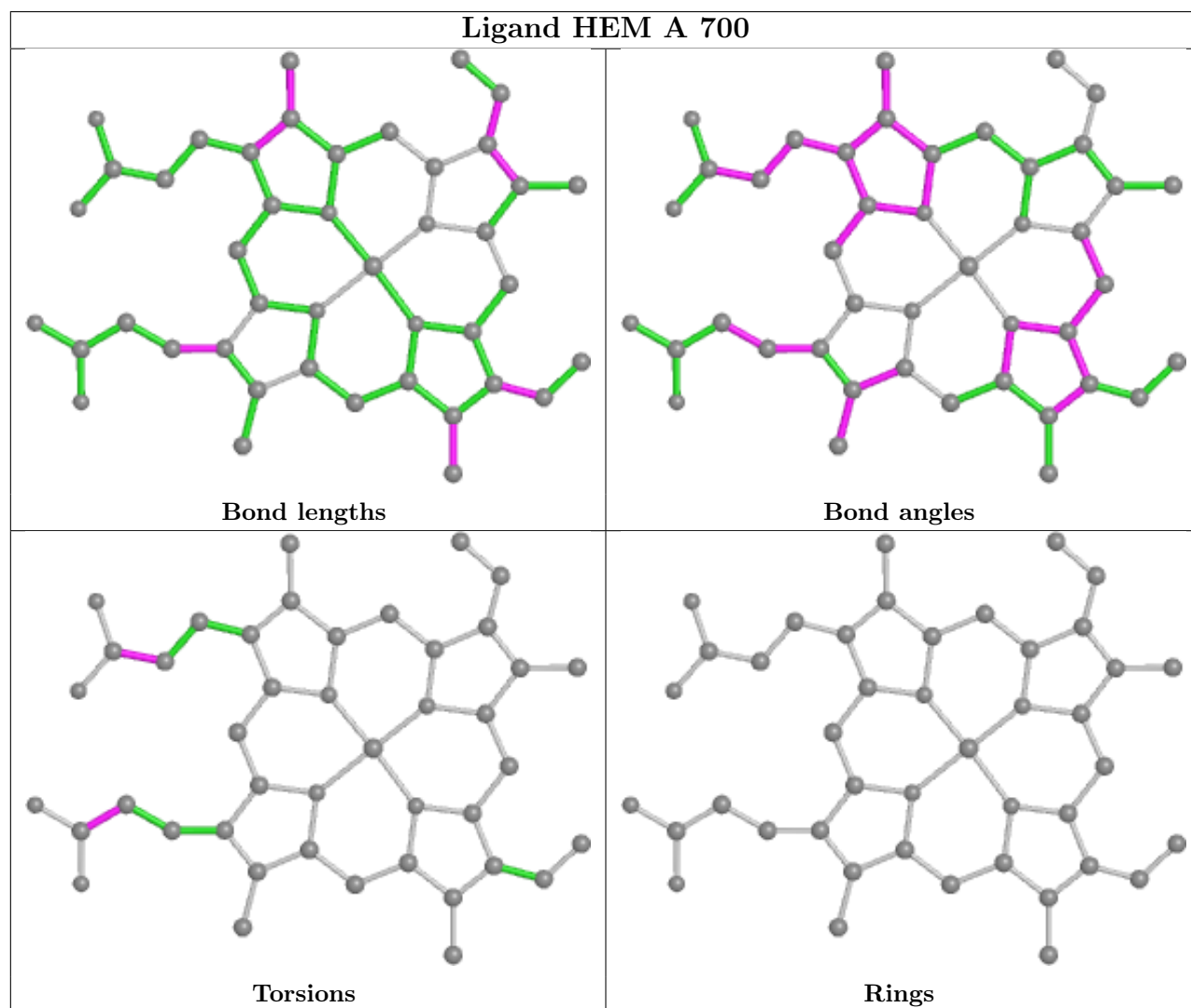
There are no ring outliers.

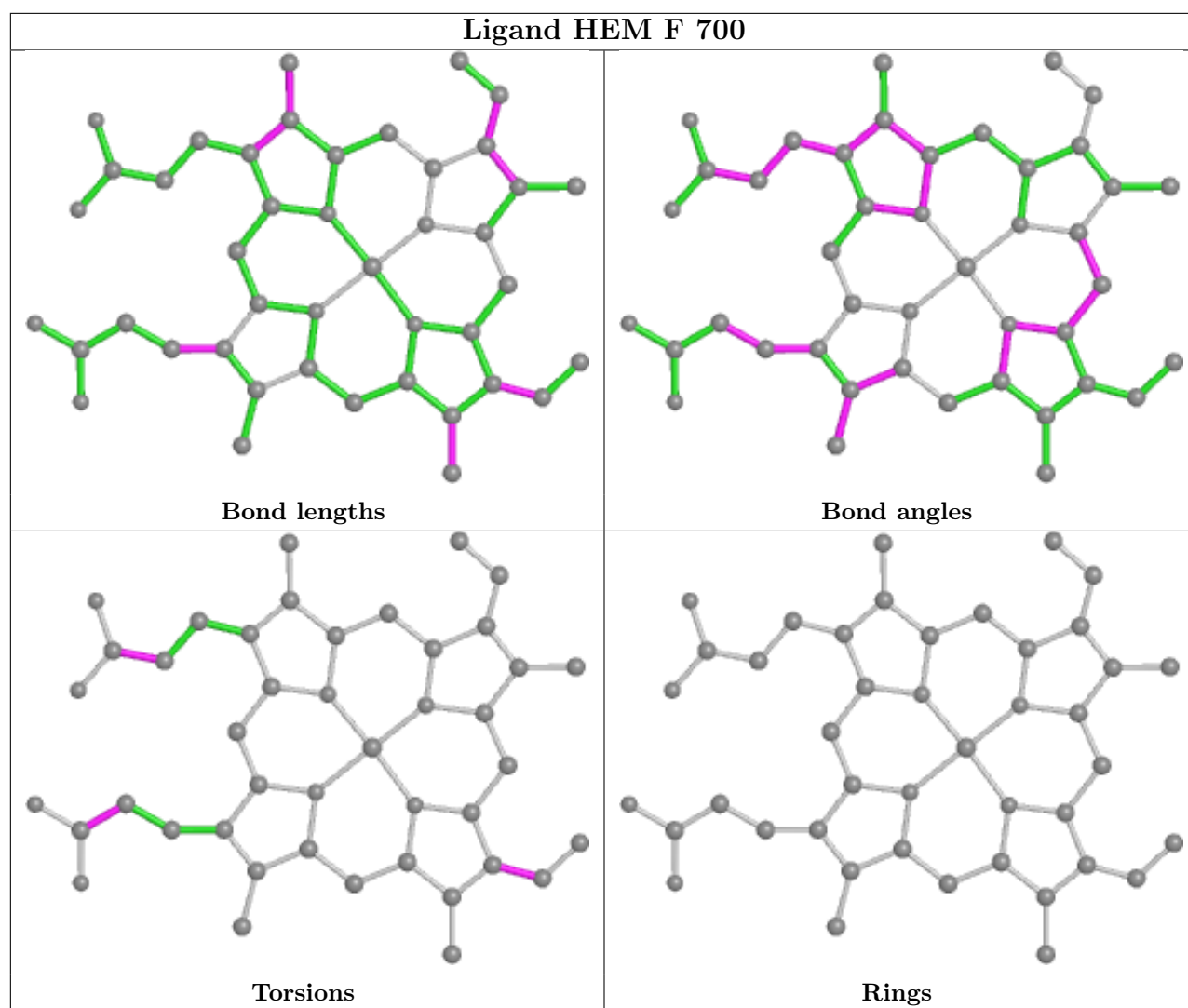
17 monomers are involved in 31 short contacts:

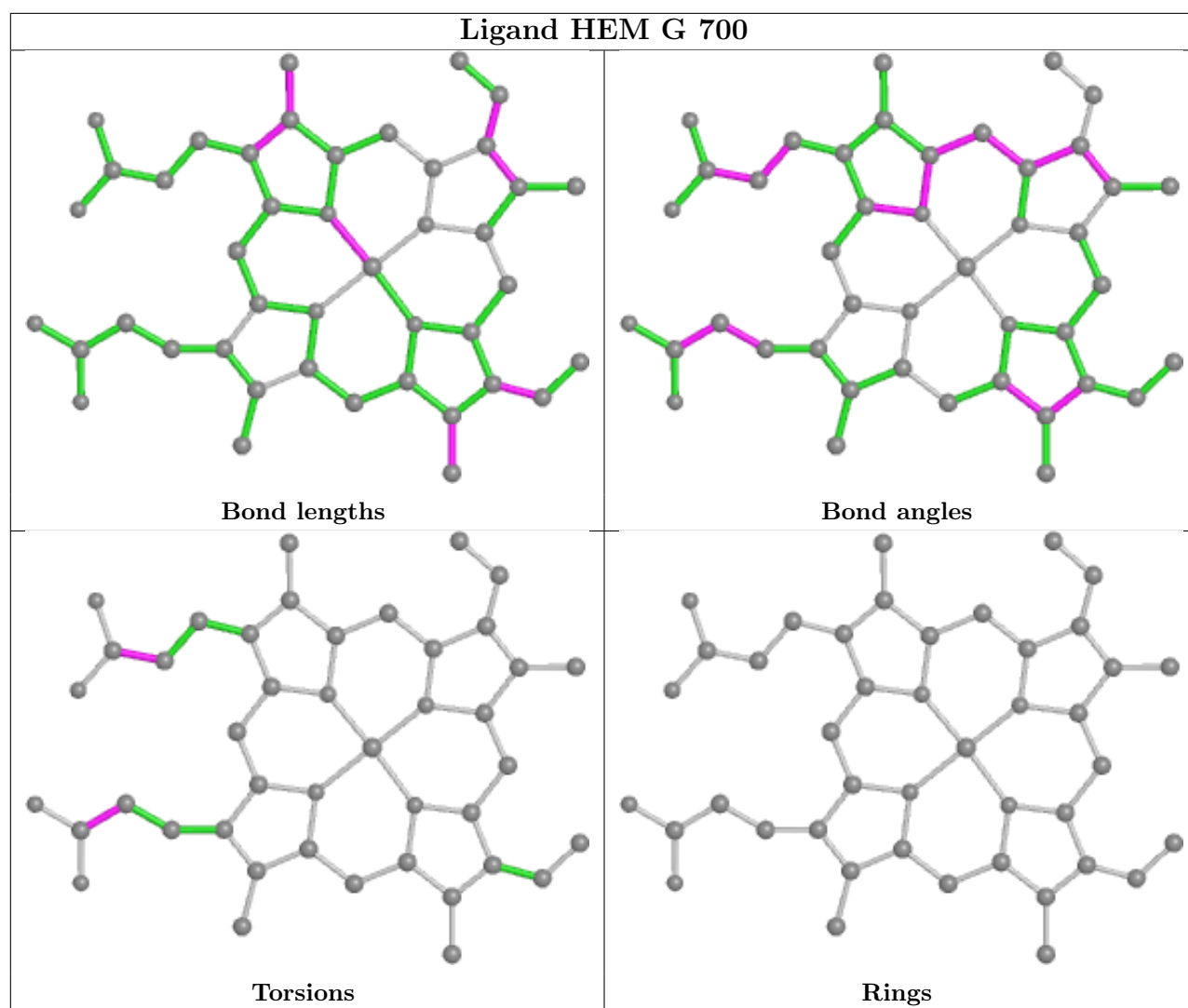
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	2011[A]	SO4	1	0
4	A	700	HEM	2	0
4	F	700	HEM	2	0
3	K	800	CYN	1	0
4	G	700	HEM	2	0
2	E	2003	SO4	1	0
2	B	2017	SO4	1	0
4	I	700	HEM	1	0
4	K	700	HEM	3	0
4	J	700	HEM	3	0
4	L	700	HEM	1	0
4	C	700	HEM	3	0
4	D	700	HEM	2	0
4	H	700	HEM	3	0
4	B	700	HEM	1	0
4	E	700	HEM	3	0
2	J	2018	SO4	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

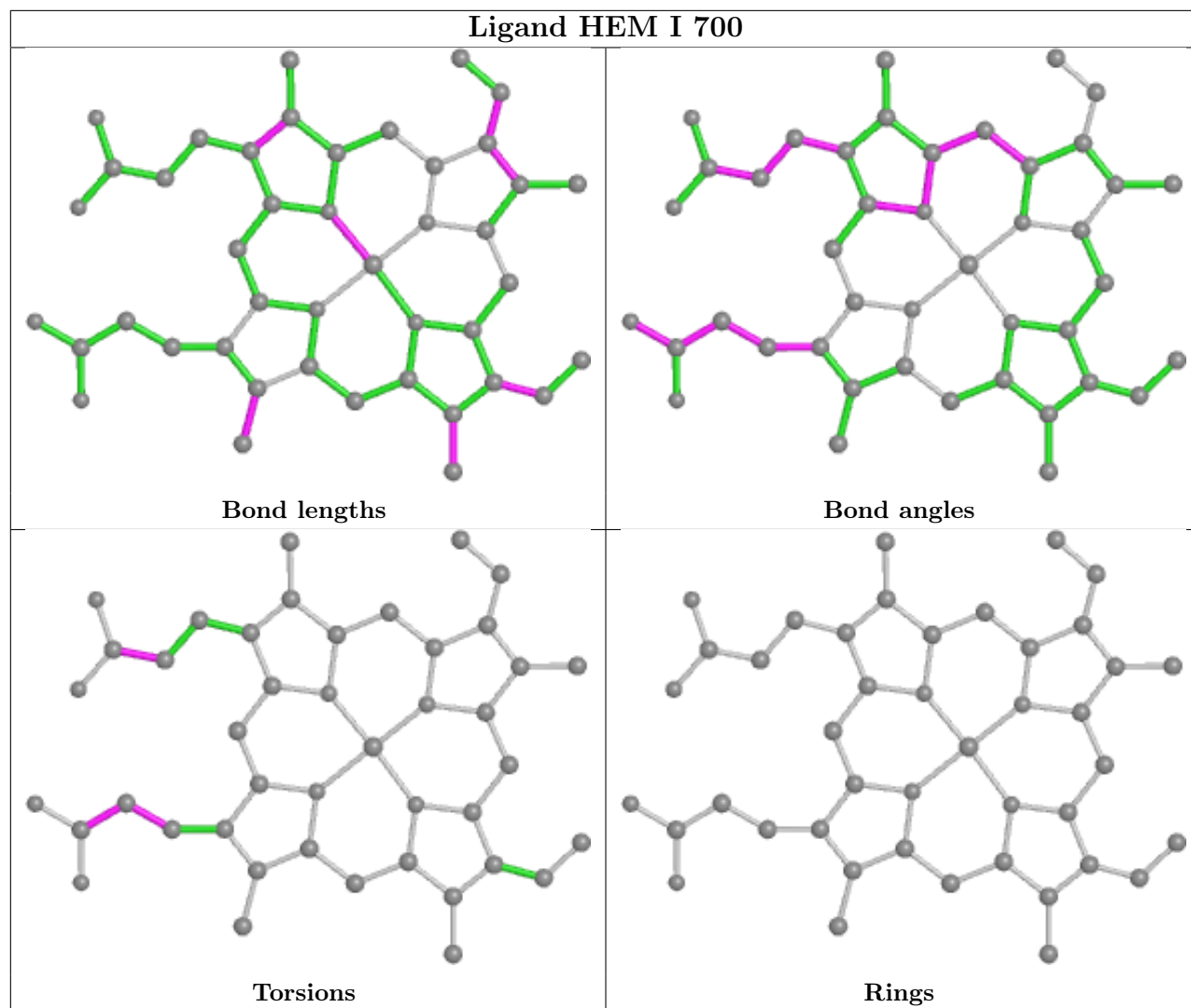
bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 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.

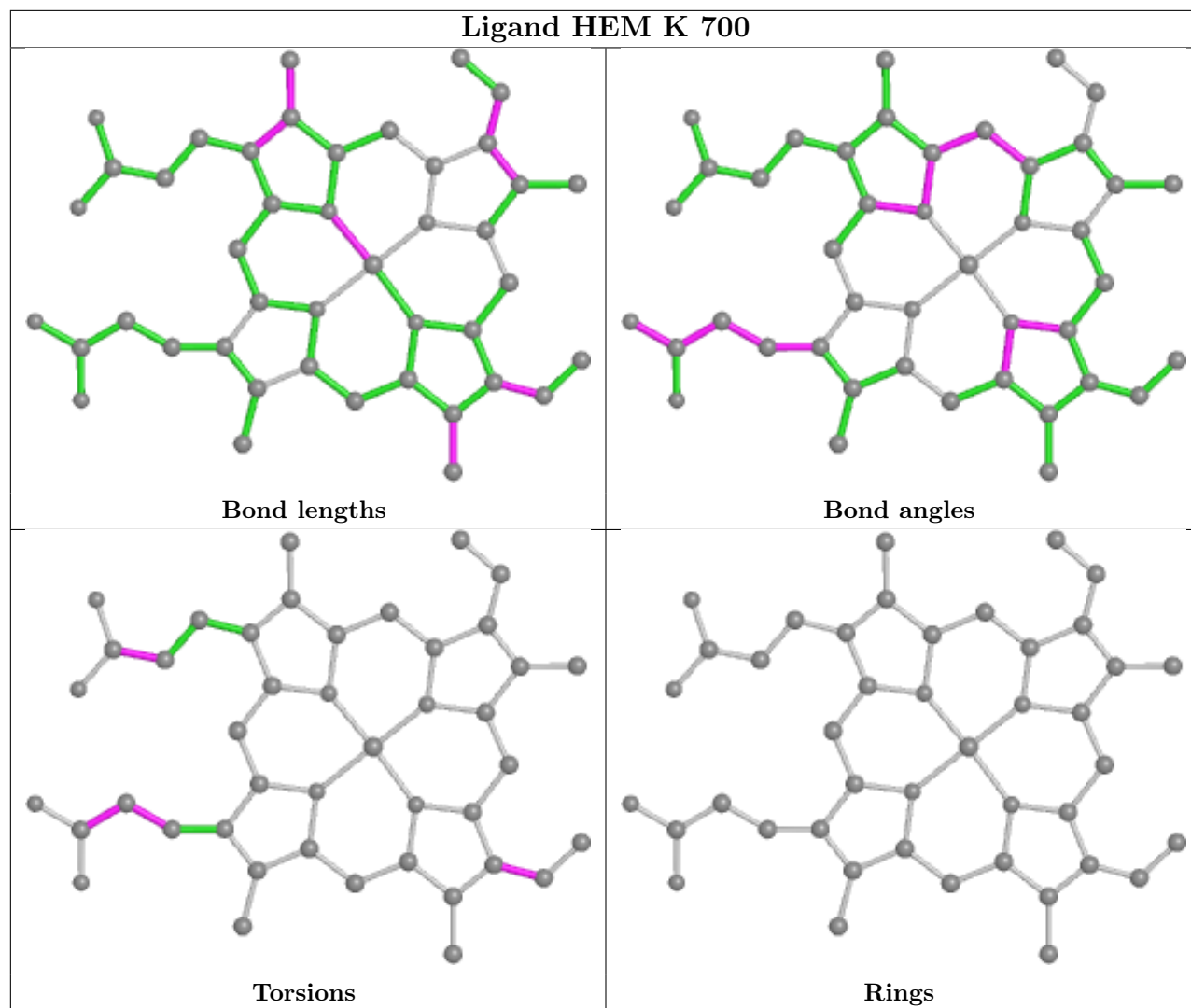


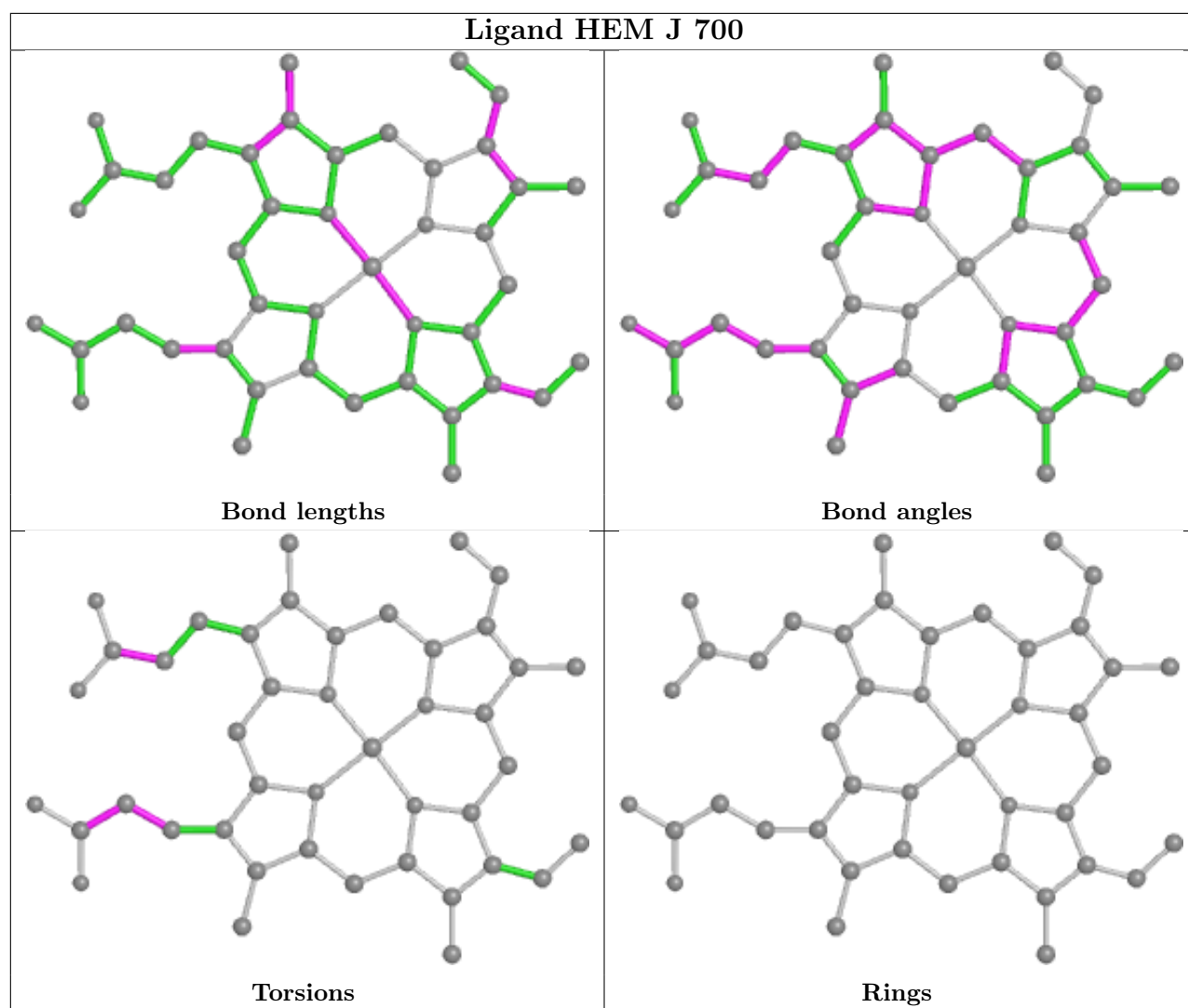


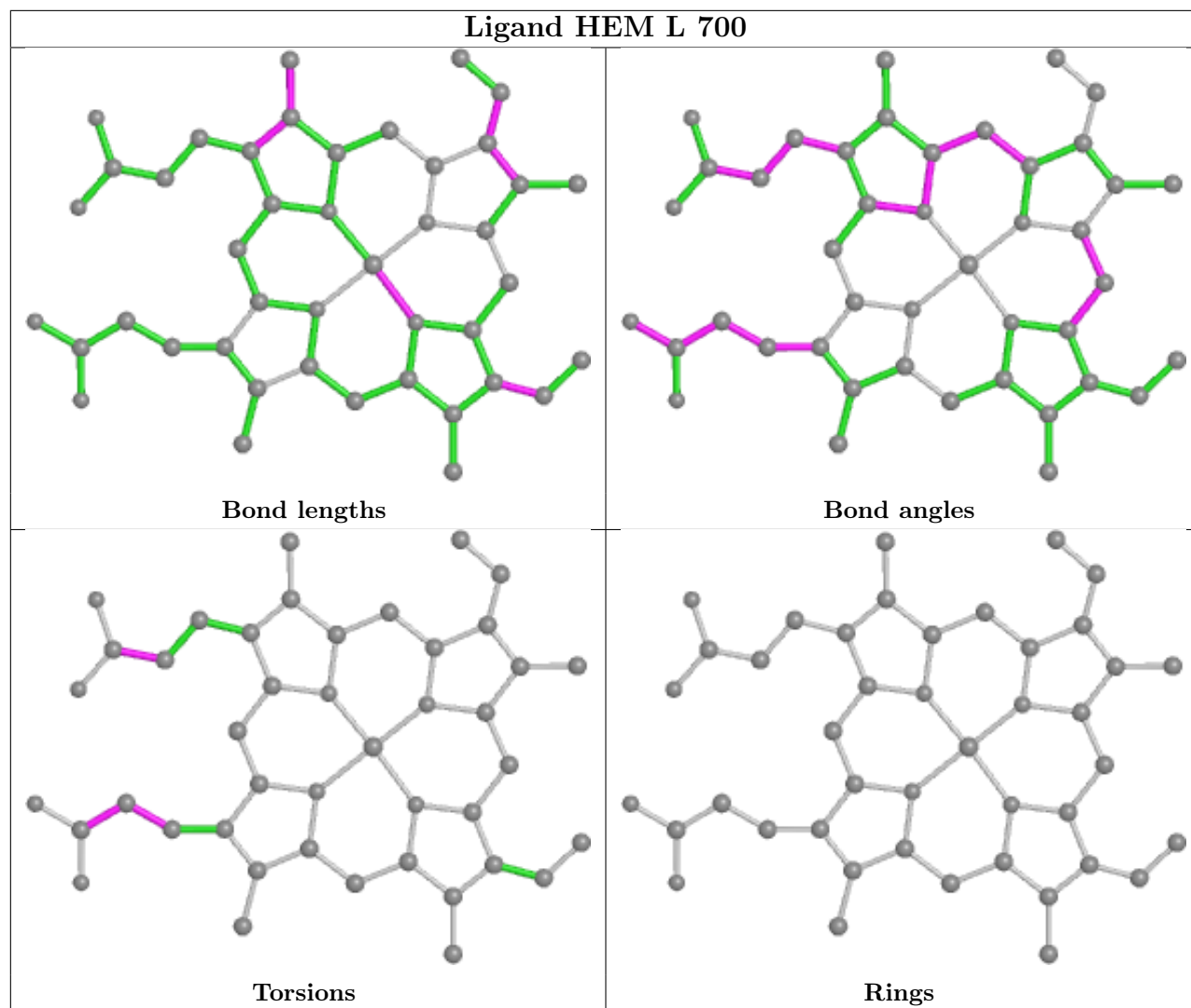


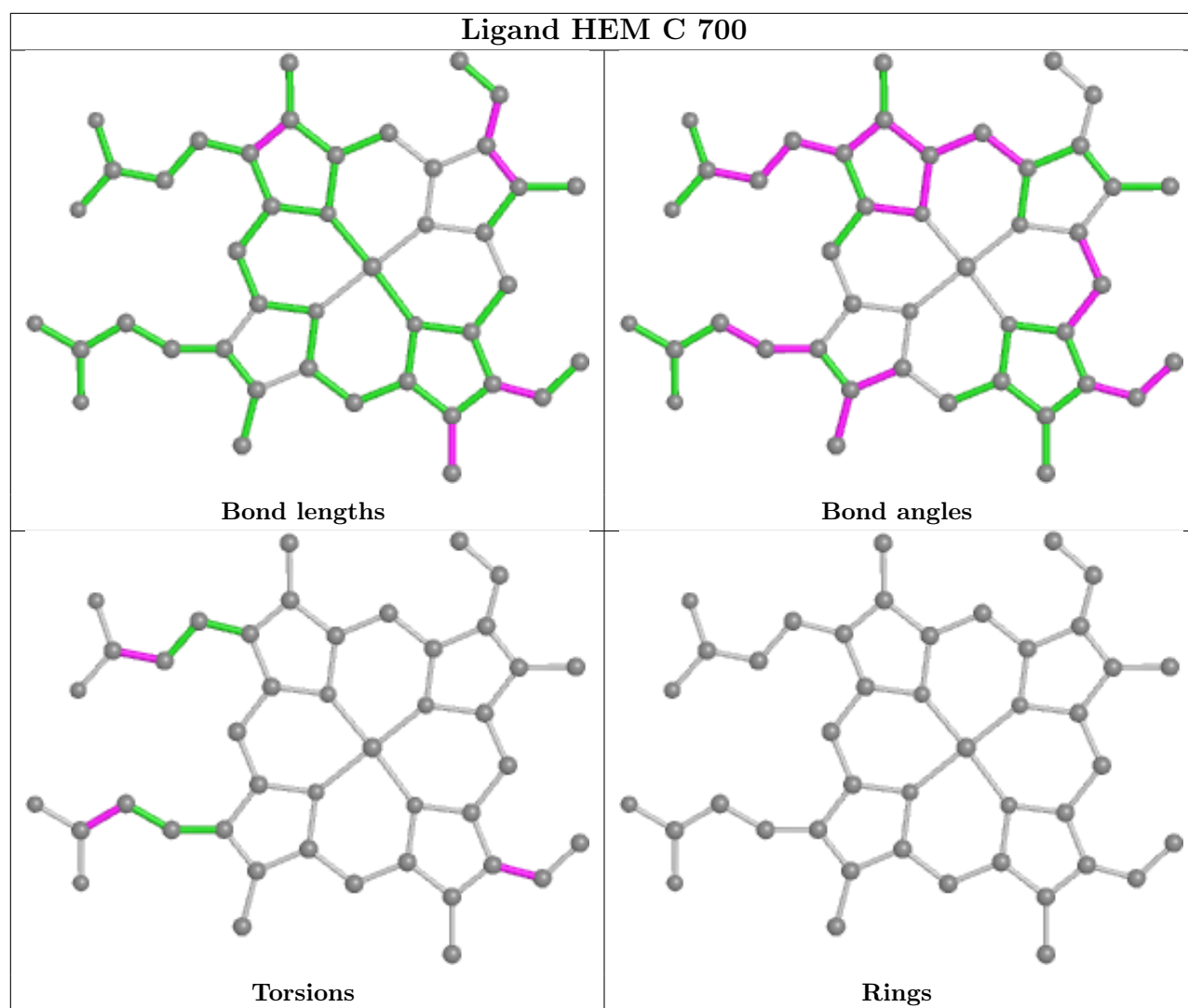
Ligand HEM I 700

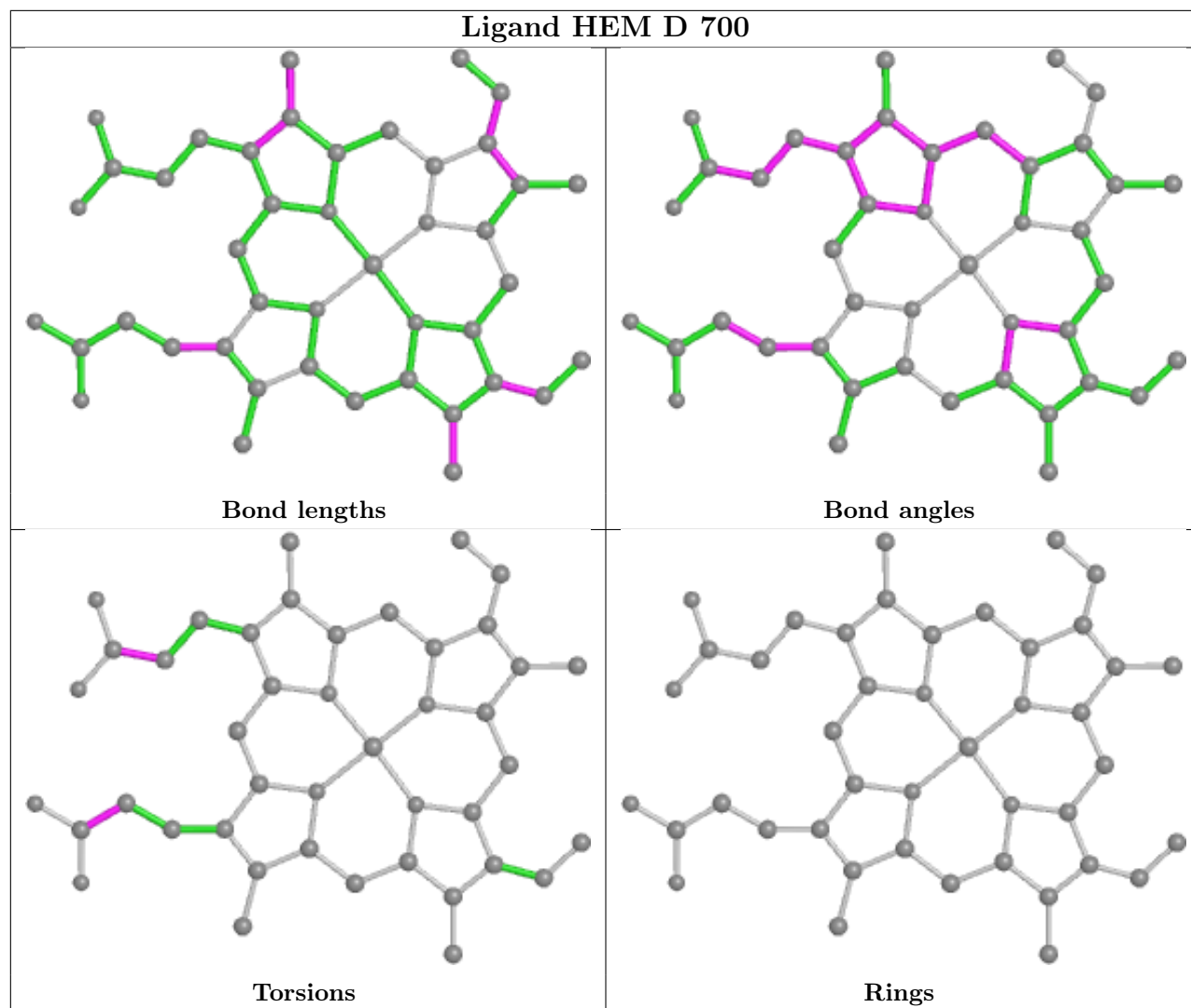


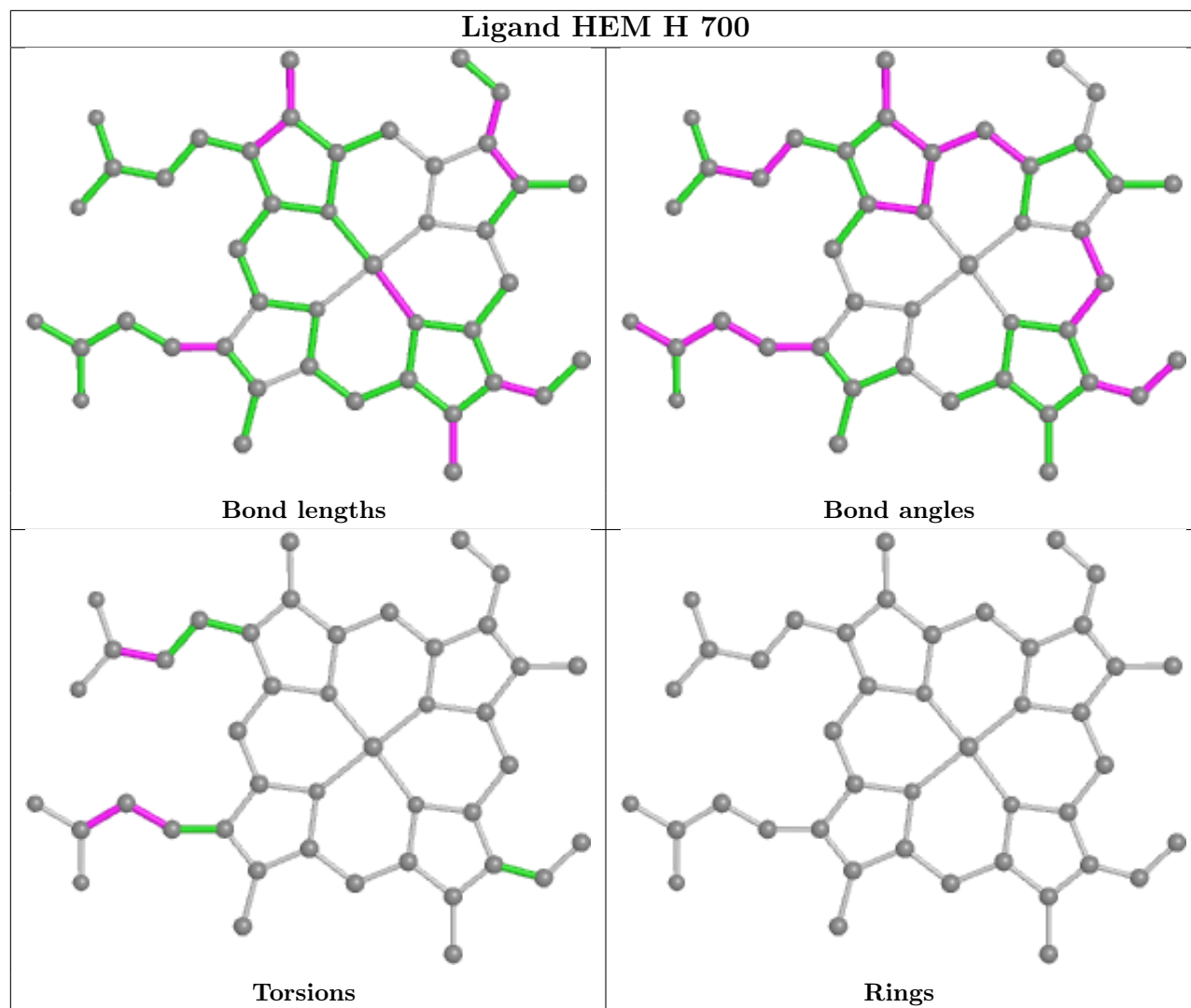


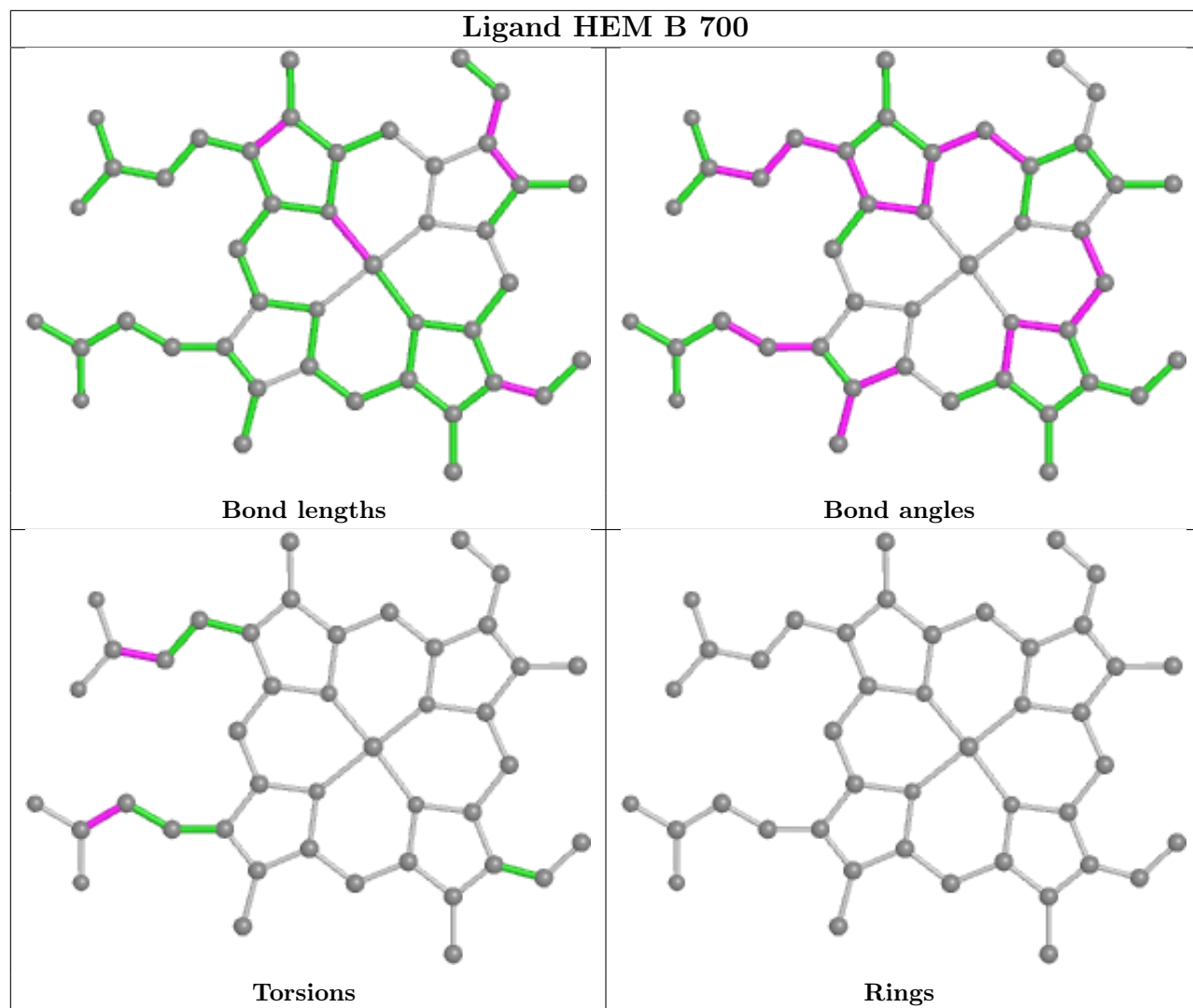


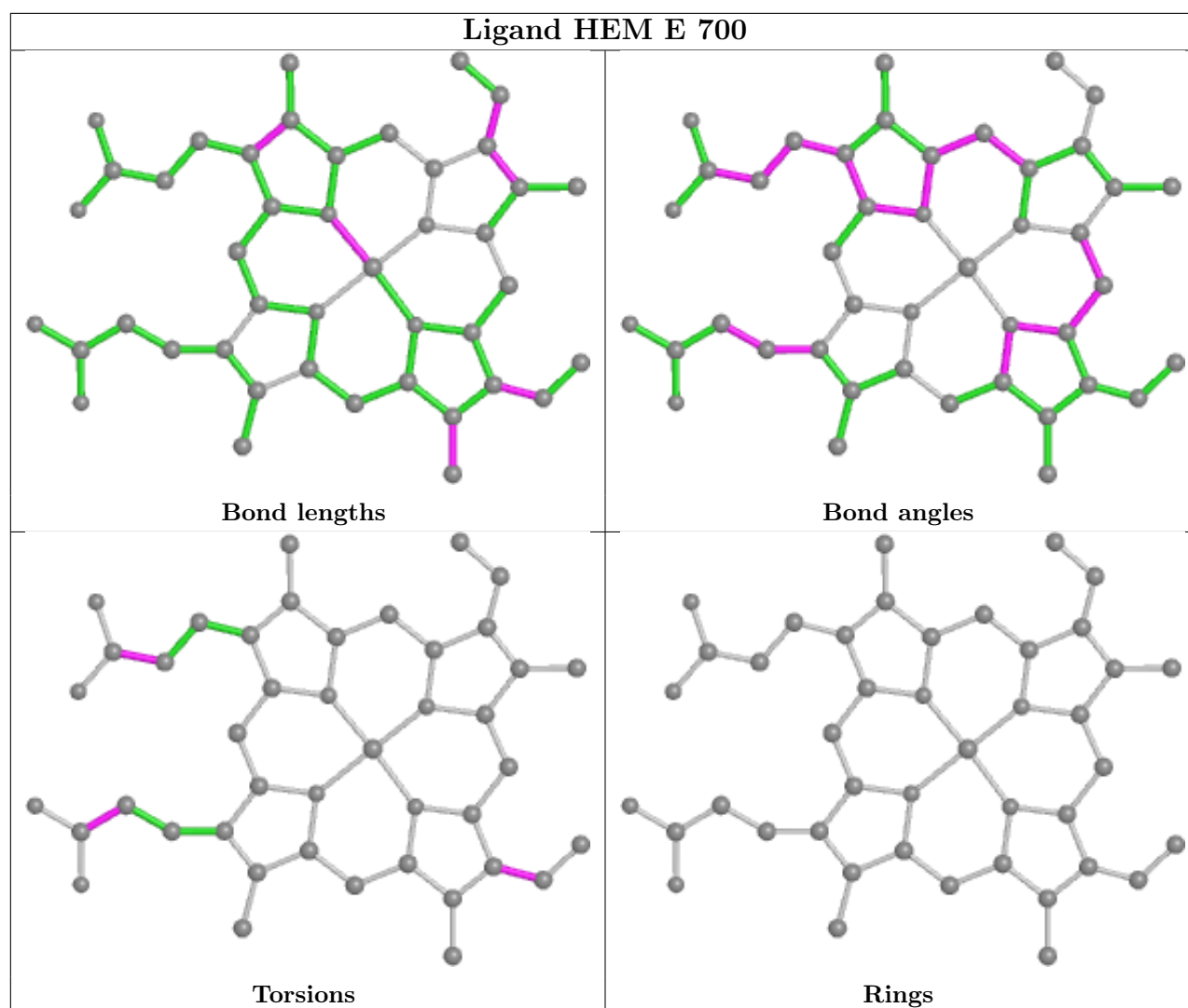












5.7 Other polymers [i](#)

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, 95th 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 ²)	Q < 0.9
1	A	126/128 (98%)	-0.47	4 (3%)	47	54	14, 20, 31, 44	4 (3%)
1	B	127/128 (99%)	-0.35	3 (2%)	59	64	15, 21, 32, 59	7 (5%)
1	C	126/128 (98%)	-0.43	1 (0%)	86	88	11, 17, 30, 40	2 (1%)
1	D	126/128 (98%)	-0.33	2 (1%)	72	76	14, 21, 32, 43	6 (4%)
1	E	126/128 (98%)	-0.27	3 (2%)	59	64	19, 26, 37, 46	9 (7%)
1	F	126/128 (98%)	-0.25	4 (3%)	47	54	15, 23, 33, 40	6 (4%)
1	G	127/128 (99%)	-0.45	1 (0%)	86	88	13, 20, 35, 46	3 (2%)
1	H	127/128 (99%)	-0.37	1 (0%)	86	88	17, 26, 38, 46	4 (3%)
1	I	127/128 (99%)	-0.45	2 (1%)	72	76	14, 21, 33, 38	1 (0%)
1	J	126/128 (98%)	-0.23	0	100	100	19, 31, 44, 49	9 (7%)
1	K	127/128 (99%)	-0.28	1 (0%)	86	88	16, 26, 39, 49	6 (4%)
1	L	126/128 (98%)	-0.26	4 (3%)	47	54	17, 30, 43, 53	5 (3%)
All	All	1517/1536 (98%)	-0.34	26 (1%)	70	74	11, 24, 38, 59	62 (4%)

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	2	PRO	9.8
1	B	38[A]	GLU	5.9
1	C	38[A]	GLU	5.1
1	F	38[A]	GLU	5.0
1	F	39[A]	ASP	4.8
1	K	2	PRO	4.2
1	B	39[A]	ASP	4.2
1	A	38[A]	GLU	4.2
1	D	39[A]	ASP	4.0
1	H	2	PRO	4.0
1	D	38[A]	GLU	3.9

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Mol	Chain	Res	Type	RSRZ
1	E	38[A]	GLU	3.6
1	E	39[A]	ASP	3.5
1	A	39[A]	ASP	3.2
1	L	37	PRO	3.2
1	A	3	LYS	3.1
1	L	3	LYS	3.0
1	E	128	PHE	2.8
1	A	128	PHE	2.7
1	G	39	ASP	2.3
1	I	110	ARG	2.3
1	L	39	ASP	2.2
1	F	128	PHE	2.1
1	I	39	ASP	2.0
1	F	40[A]	ASP	2.0
1	L	110	ARG	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, 95th 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 ²)	Q<0.9
2	SO4	J	2018	5/5	0.65	0.33	97,97,98,98	0
2	SO4	B	2017	5/5	0.73	0.22	92,93,93,93	0
2	SO4	I	2015	5/5	0.77	0.16	69,70,71,72	0
2	SO4	E	2003	5/5	0.80	0.20	79,80,81,82	0
2	SO4	A	2016	5/5	0.85	0.19	94,94,95,95	0
2	SO4	G	2002	5/5	0.85	0.20	84,85,85,85	0
2	SO4	G	2001	5/5	0.86	0.25	94,95,95,95	0
2	SO4	L	2005	5/5	0.86	0.17	78,79,79,80	0

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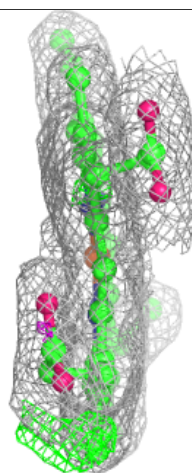
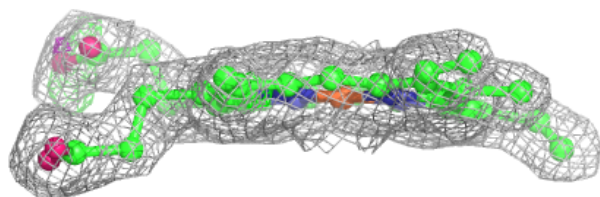
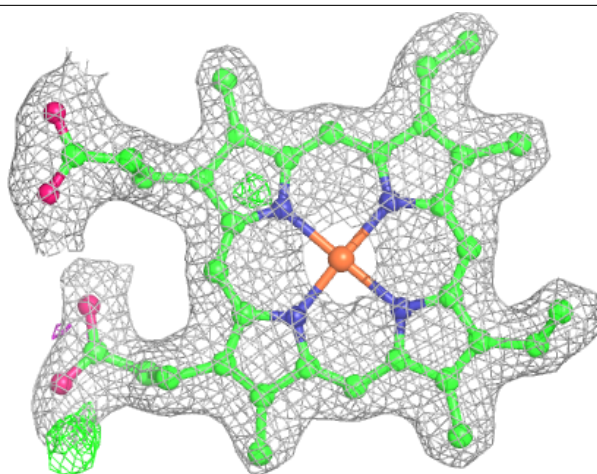
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	SO4	A	2012	5/5	0.88	0.18	67,67,69,69	0
2	SO4	A	2004	5/5	0.91	0.22	85,85,85,85	0
2	SO4	A	2011[A]	5/5	0.92	0.19	42,43,44,44	5
2	SO4	E	2006[A]	5/5	0.93	0.15	47,48,49,49	5
2	SO4	C	2013	5/5	0.93	0.24	80,80,80,81	0
2	SO4	B	2007[A]	5/5	0.94	0.12	20,20,22,22	5
2	SO4	J	2008[A]	5/5	0.95	0.14	29,29,30,30	5
2	SO4	D	2010[A]	5/5	0.95	0.13	26,26,28,28	5
2	SO4	A	2014	5/5	0.95	0.14	66,66,66,67	0
3	CYN	E	800	2/2	0.96	0.14	19,19,19,22	0
4	HEM	J	700	43/43	0.97	0.11	16,20,30,36	0
3	CYN	I	800	2/2	0.98	0.08	16,16,16,22	0
3	CYN	J	800	2/2	0.98	0.10	16,16,16,20	0
3	CYN	L	800	2/2	0.98	0.09	21,21,21,22	0
4	HEM	A	700	43/43	0.98	0.09	10,14,21,22	0
4	HEM	D	700	43/43	0.98	0.12	11,15,22,24	0
4	HEM	E	700	43/43	0.98	0.10	14,19,26,28	0
4	HEM	F	700	43/43	0.98	0.12	13,15,23,26	0
4	HEM	G	700	43/43	0.98	0.09	11,16,29,38	0
4	HEM	H	700	43/43	0.98	0.09	13,17,22,29	0
4	HEM	I	700	43/43	0.98	0.10	10,14,22,29	0
2	SO4	C	2009[A]	5/5	0.98	0.11	10,13,15,17	5
4	HEM	K	700	43/43	0.98	0.12	13,17,27,34	0
4	HEM	L	700	43/43	0.98	0.08	14,19,26,30	0
3	CYN	B	800	2/2	0.99	0.07	16,16,16,19	0
3	CYN	A	800	2/2	0.99	0.05	11,11,11,14	0
3	CYN	K	800	2/2	0.99	0.10	17,17,17,24	0
3	CYN	F	800	2/2	0.99	0.09	17,17,17,21	0
3	CYN	G	800	2/2	0.99	0.12	20,20,20,23	0
4	HEM	B	700	43/43	0.99	0.08	11,16,20,24	0
4	HEM	C	700	43/43	0.99	0.09	7,11,18,20	0
3	CYN	H	800	2/2	0.99	0.07	14,14,14,16	0
3	CYN	C	800	2/2	1.00	0.07	8,8,8,10	0
3	CYN	D	800	2/2	1.00	0.16	14,14,14,14	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.

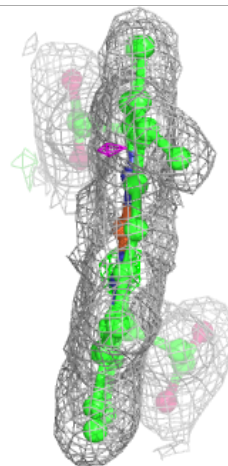
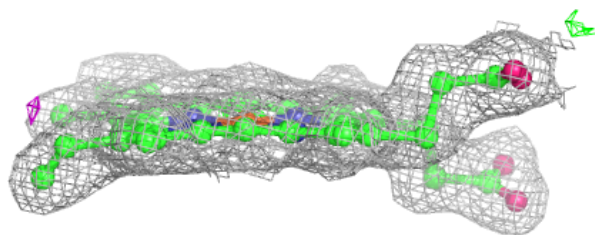
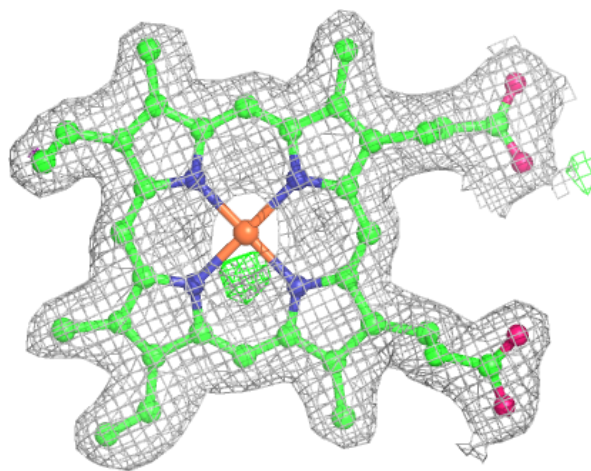
Electron density around HEM J 700:

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and green (positive)



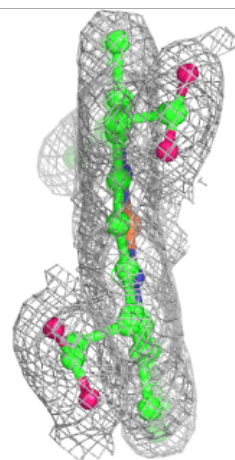
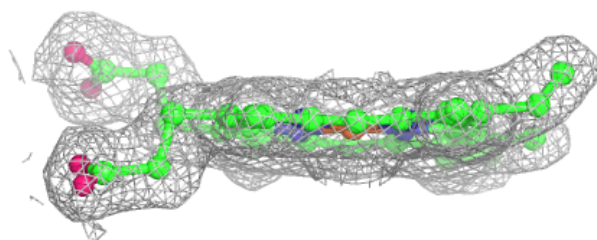
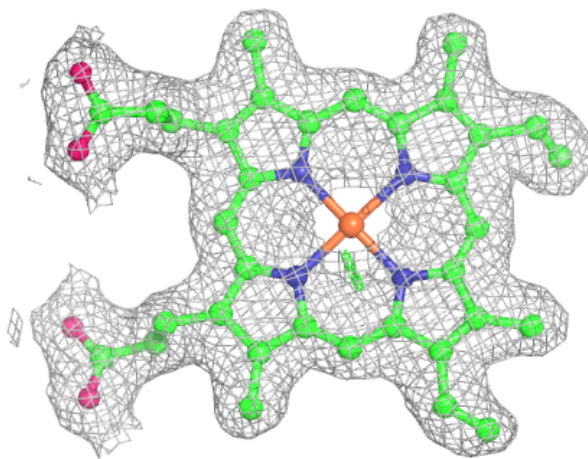
Electron density around HEM A 700:

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and green (positive)



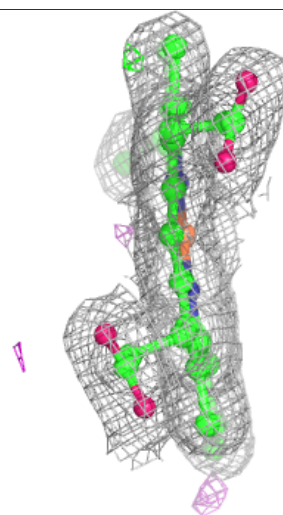
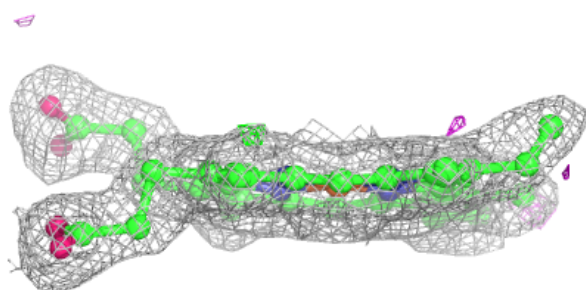
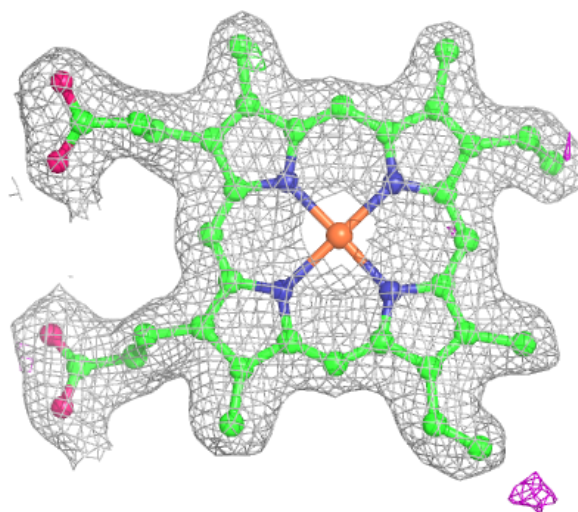
Electron density around HEM D 700:

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



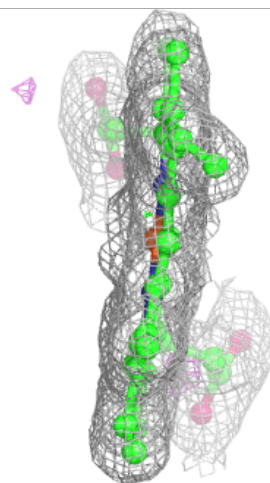
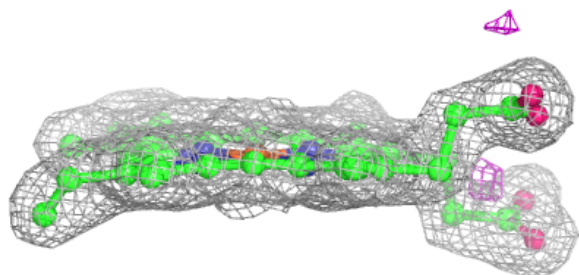
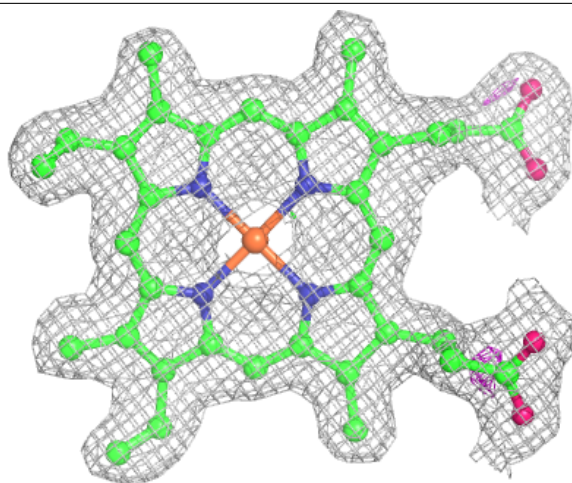
Electron density around HEM E 700:

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and green (positive)



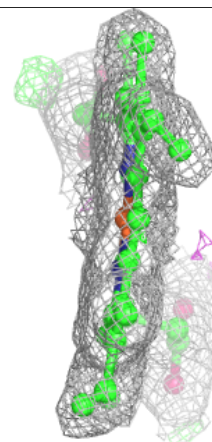
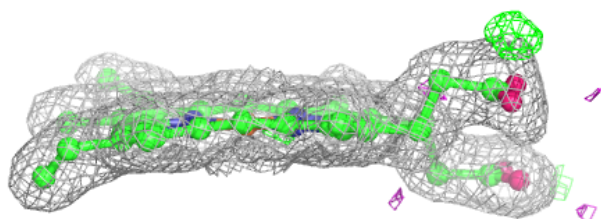
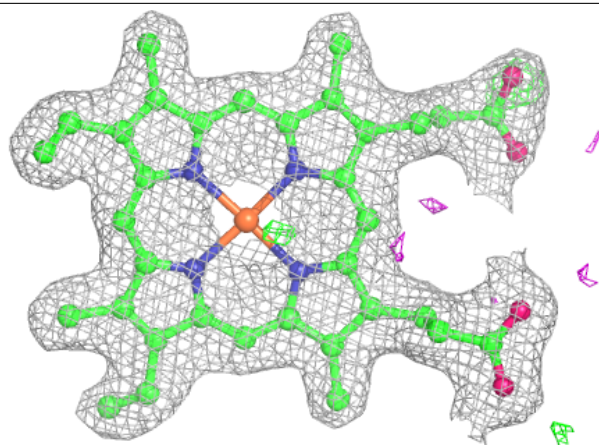
Electron density around HEM F 700:

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



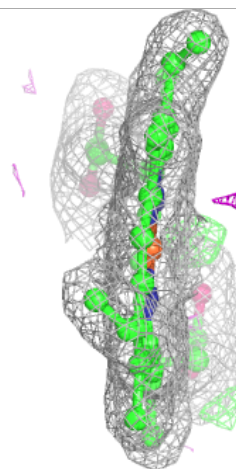
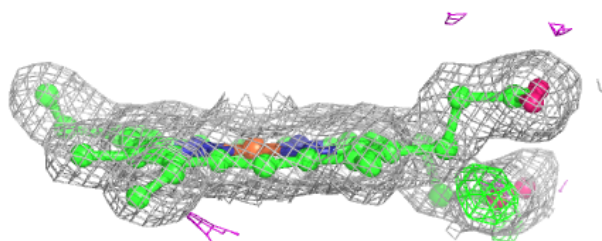
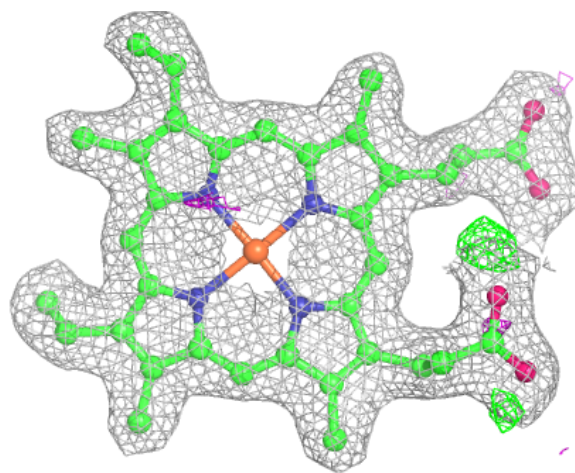
Electron density around HEM G 700:

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



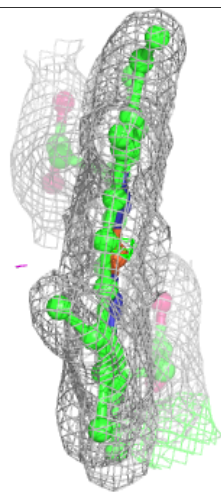
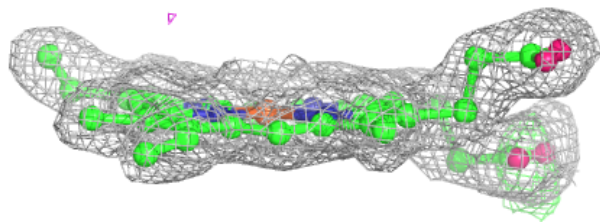
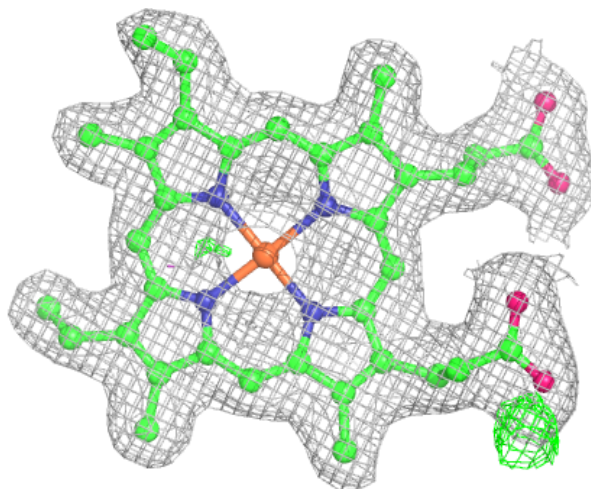
Electron density around HEM H 700:

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



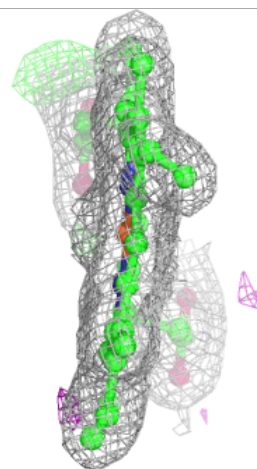
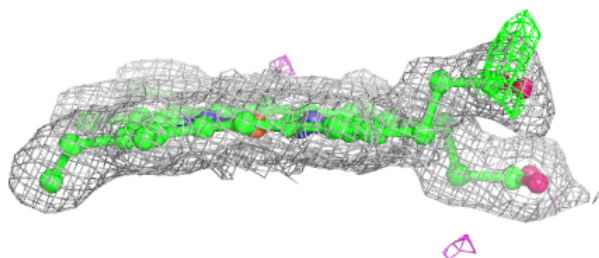
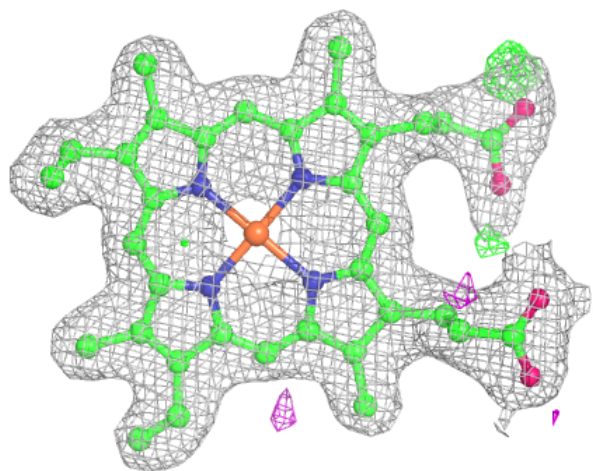
Electron density around HEM I 700:

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



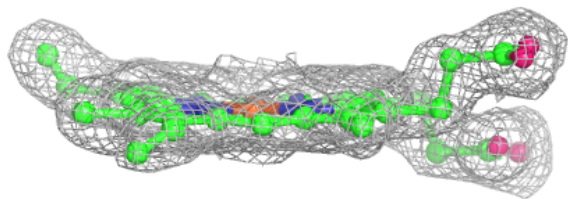
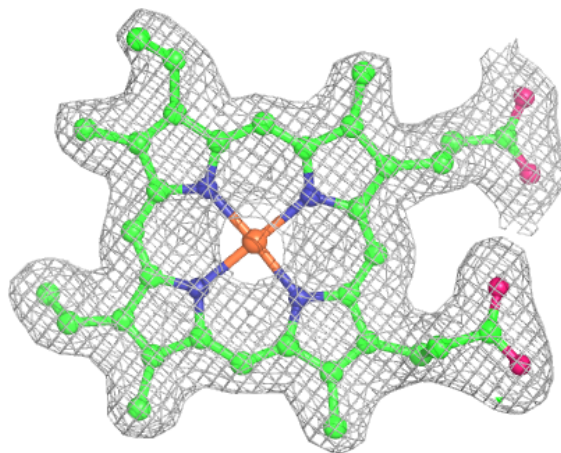
Electron density around HEM K 700:

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and green (positive)



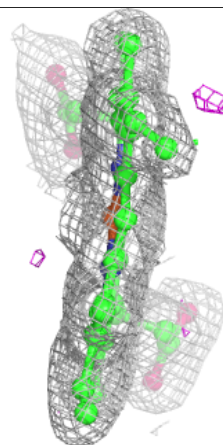
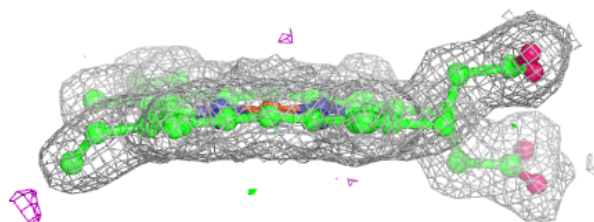
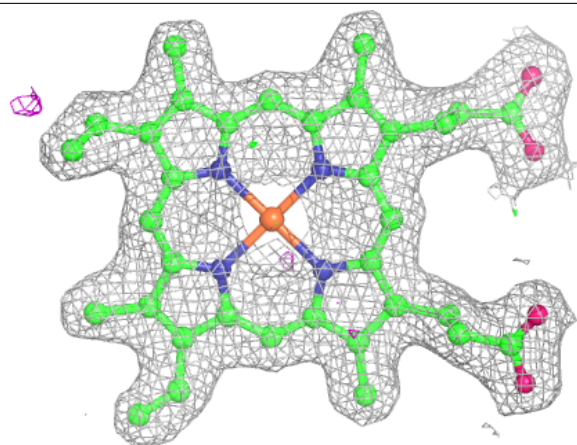
Electron density around HEM L 700:

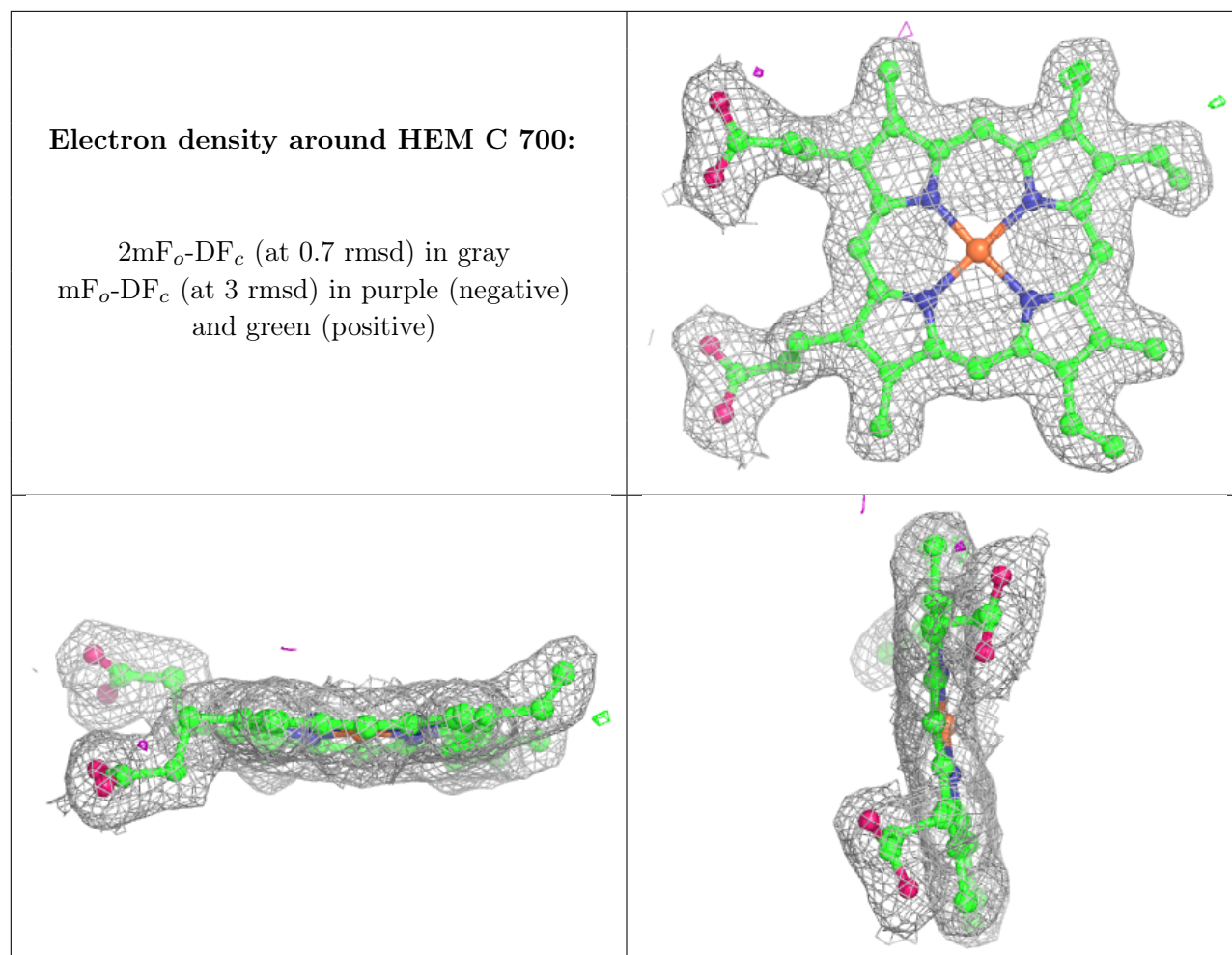
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around HEM B 700:

$2mF_o-DF_c$ (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.