



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 9, 2023 – 10:48 AM EDT

PDB ID : 7TS1  
Title : Structure of human neuronal nitric oxide synthase R354A/G357D mutant heme domain in complex with 6-(3-(4,4-difluoropiperidin-1-yl)prop-1-yn-1-yl)-4-methylpyridin-2-amine  
Authors : Li, H.; Poulos, T.L.  
Deposited on : 2022-01-31  
Resolution : 2.06 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)  
Xtrriage (Phenix) : 1.13  
EDS : 2.35.1  
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) : 2.35.1

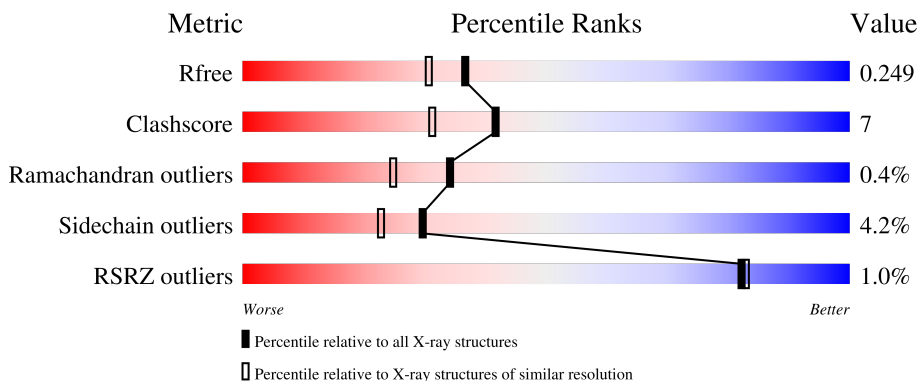
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

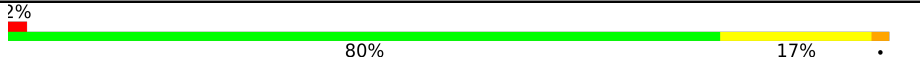



The reported resolution of this entry is 2.06 Å.

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	2684 (2.08-2.04)
Clashscore	141614	2801 (2.08-2.04)
Ramachandran outliers	138981	2768 (2.08-2.04)
Sidechain outliers	138945	2768 (2.08-2.04)
RSRZ outliers	127900	2646 (2.08-2.04)

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	423	 2% 80% 17%
1	B	423	 % 81% 16%
1	C	423	 % 77% 20%
1	D	423	 77% 20%

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 14585 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.

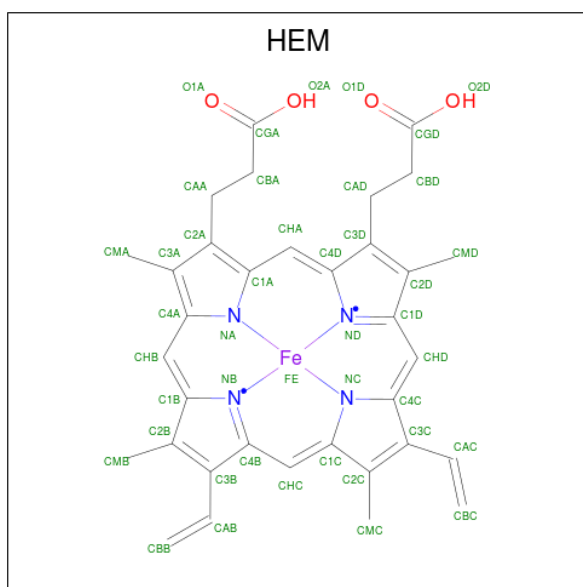
- Molecule 1 is a protein called Nitric oxide synthase, brain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	421	3444	2202	591	628	23	0	4	0
1	B	413	3371	2161	574	615	21	0	2	0
1	C	418	3417	2186	585	625	21	0	3	0
1	D	411	3355	2150	572	612	21	0	2	0

There are 16 discrepancies between the modelled and reference sequences:

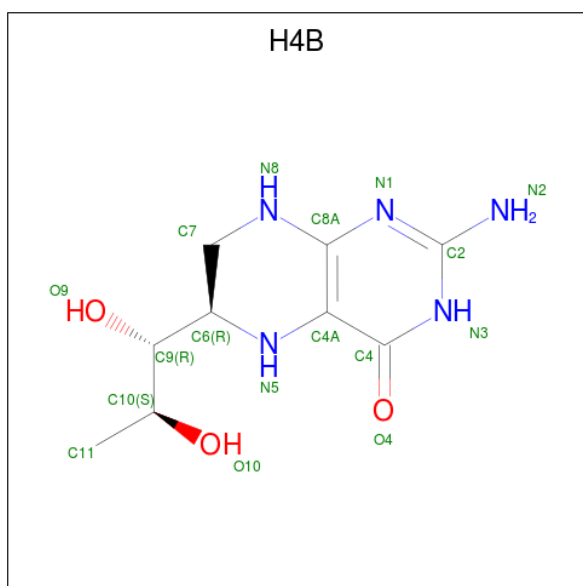
Chain	Residue	Modelled	Actual	Comment	Reference
A	354	ALA	ARG	engineered mutation	UNP P29475
A	357	ASP	GLY	engineered mutation	UNP P29475
A	723	LEU	-	expression tag	UNP P29475
A	724	VAL	-	expression tag	UNP P29475
B	354	ALA	ARG	engineered mutation	UNP P29475
B	357	ASP	GLY	engineered mutation	UNP P29475
B	723	LEU	-	expression tag	UNP P29475
B	724	VAL	-	expression tag	UNP P29475
C	354	ALA	ARG	engineered mutation	UNP P29475
C	357	ASP	GLY	engineered mutation	UNP P29475
C	723	LEU	-	expression tag	UNP P29475
C	724	VAL	-	expression tag	UNP P29475
D	354	ALA	ARG	engineered mutation	UNP P29475
D	357	ASP	GLY	engineered mutation	UNP P29475
D	723	LEU	-	expression tag	UNP P29475
D	724	VAL	-	expression tag	UNP P29475

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



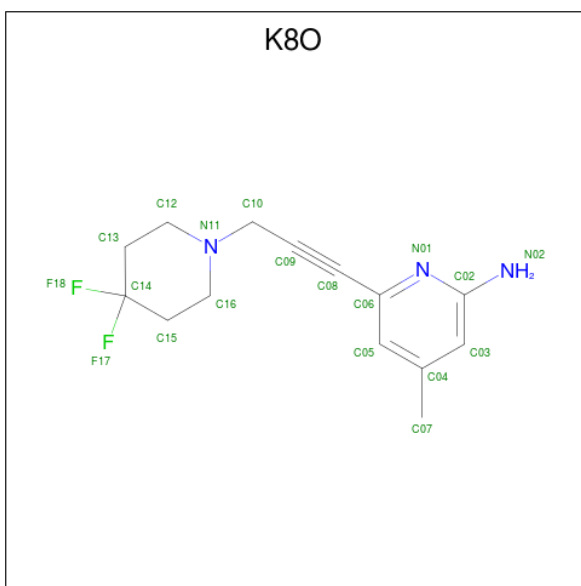
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf		
			Total	C	Fe	N			O	
2	A	1	Total	43	34	1	4	4	0	0
2	B	1	Total	43	34	1	4	4	0	0
2	C	1	Total	43	34	1	4	4	0	0
2	D	1	Total	43	34	1	4	4	0	0

- Molecule 3 is 5,6,7,8-TETRAHYDROBIOPTERIN (three-letter code: H4B) (formula:  $C_9H_{15}N_5O_3$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			17	9	5	3		
3	B	1	Total	C	N	O	0	0
			17	9	5	3		
3	C	1	Total	C	N	O	0	0
			17	9	5	3		
3	D	1	Total	C	N	O	0	0
			17	9	5	3		

- Molecule 4 is 6-[3-(4,4-difluoropiperidin-1-yl)prop-1-yn-1-yl]-4-methylpyridin-2-amine (three-letter code: K8O) (formula: C<sub>14</sub>H<sub>17</sub>F<sub>2</sub>N<sub>3</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	F	N	0	0
			19	14	2	3		
4	B	1	Total	C	F	N	0	0
			19	14	2	3		
4	C	1	Total	C	F	N	0	0
			19	14	2	3		
4	D	1	Total	C	F	N	0	0
			19	14	2	3		

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	C	1	Total C O 6 3 3	0	0
5	C	1	Total C O 6 3 3	0	0
5	C	1	Total C O 6 3 3	0	0
5	D	1	Total C O 6 3 3	0	0

- Molecule 6 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	B	1	Total Zn 1 1	0	0
6	C	1	Total Zn 1 1	0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	157	Total O 157 157	0	0

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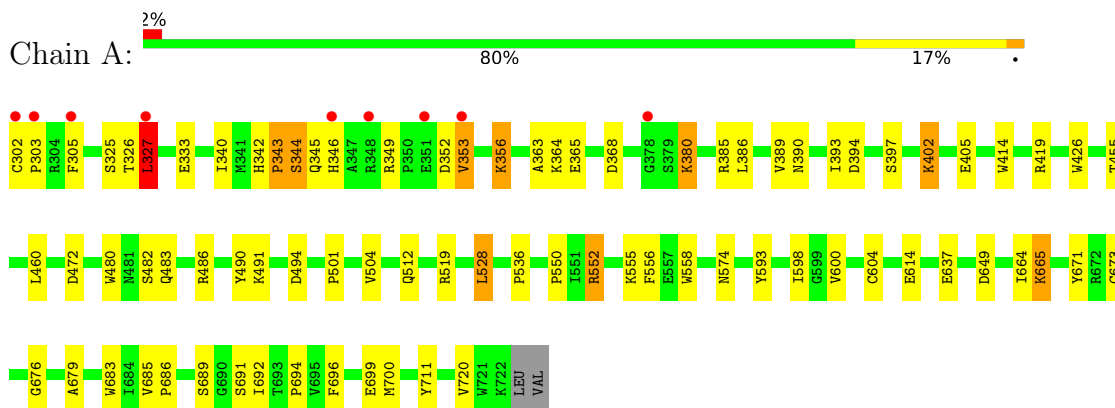
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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
7	B	183	Total 183	O 183	0	0
7	C	157	Total 157	O 157	0	0
7	D	147	Total 147	O 147	0	0

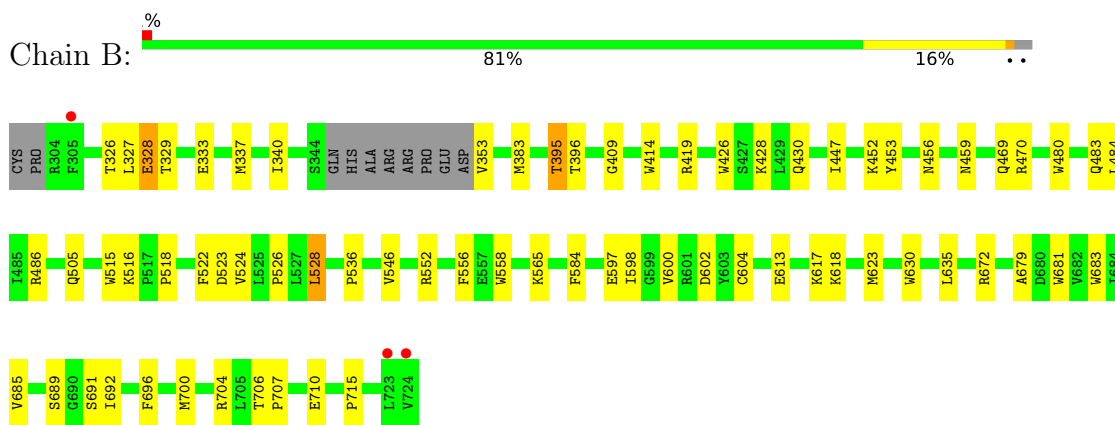
### 3 Residue-property plots [i](#)

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.

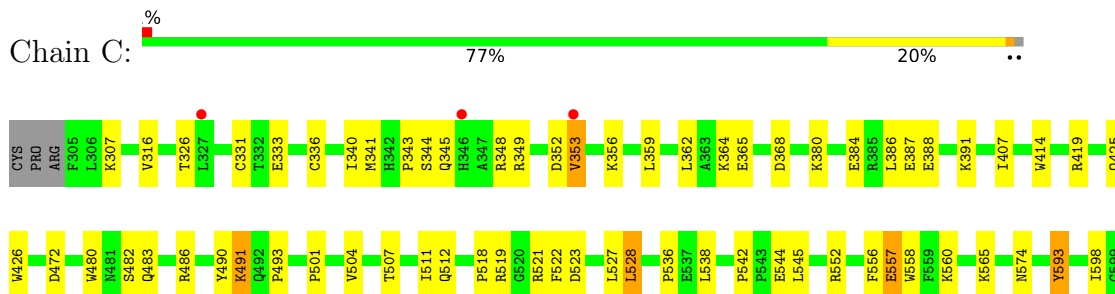
- Molecule 1: Nitric oxide synthase, brain



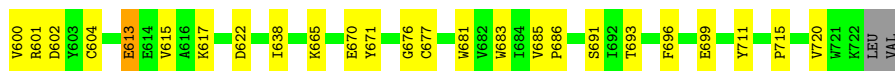
- Molecule 1: Nitric oxide synthase, brain



- Molecule 1: Nitric oxide synthase, brain

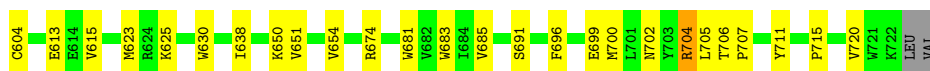
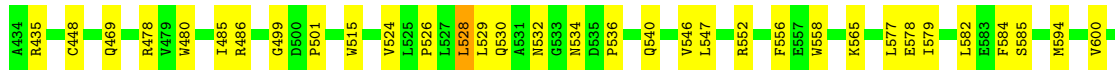
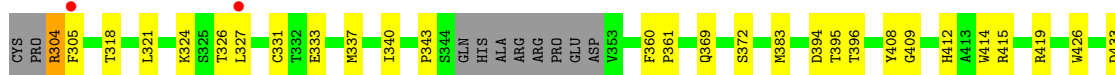






- Molecule 1: Nitric oxide synthase, brain

Chain D: 77% 20%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	51.55Å 162.87Å 117.13Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.27 – 2.06 49.26 – 2.06	Depositor EDS
% Data completeness (in resolution range)	98.8 (49.27-2.06) 99.1 (49.26-2.06)	Depositor EDS
$R_{merge}$	0.26	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.13 (at 2.07Å)	Xtrriage
Refinement program	PHENIX 1.11.1_2575	Depositor
R, $R_{free}$	0.202 , 0.257 0.192 , 0.249	Depositor DCC
$R_{free}$ test set	5928 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	34.9	Xtrriage
Anisotropy	0.961	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 32.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	0.447 for h,-k,-l	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	14585	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	49.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.87% 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: H4B, ZN, GOL, K8O, HEM

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	0.52	5/3555 (0.1%)	0.56	2/4825 (0.0%)
1	B	0.41	0/3472	0.55	0/4710
1	C	0.52	5/3524 (0.1%)	0.55	0/4783
1	D	0.44	1/3456 (0.0%)	0.56	0/4689
All	All	0.48	11/14007 (0.1%)	0.56	2/19007 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	1

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	344	SER	CB-OG	-9.42	1.30	1.42
1	C	344	SER	CB-OG	-8.21	1.31	1.42
1	A	344	SER	C-O	-7.20	1.09	1.23
1	C	344	SER	C-O	-6.48	1.11	1.23
1	A	342	HIS	C-O	-6.14	1.11	1.23
1	C	343	PRO	CA-C	-5.78	1.41	1.52
1	A	345	GLN	C-O	-5.69	1.12	1.23
1	C	345	GLN	C-O	-5.58	1.12	1.23
1	C	343	PRO	C-O	-5.51	1.12	1.23
1	D	448	CYS	CB-SG	-5.19	1.73	1.81
1	A	343	PRO	C-O	-5.10	1.13	1.23

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	327	LEU	CA-CB-CG	5.64	128.27	115.30
1	A	343	PRO	CA-N-CD	-5.07	104.41	111.50

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	593	TYR	Peptide

## 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	3444	0	3357	45	0
1	B	3371	0	3291	46	0
1	C	3417	0	3327	51	0
1	D	3355	0	3271	46	0
2	A	43	0	30	5	0
2	B	43	0	30	4	0
2	C	43	0	30	4	0
2	D	43	0	30	3	0
3	A	17	0	15	0	0
3	B	17	0	15	0	0
3	C	17	0	15	2	0
3	D	17	0	15	0	0
4	A	19	0	0	0	0
4	B	19	0	0	2	0
4	C	19	0	0	1	0
4	D	19	0	0	0	0
5	A	6	0	8	0	0
5	B	6	0	8	0	0
5	C	18	0	24	1	0
5	D	6	0	8	1	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
7	A	157	0	0	3	0
7	B	183	0	0	1	0
7	C	157	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	D	147	0	0	3	0
All	All	14585	0	13474	192	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 7.

All (192) 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:528:LEU:HD22	1:C:536:PRO:HB2	1.56	0.87
1:B:704:ARG:NH2	1:B:710:GLU:OE2	2.14	0.81
1:A:673[B]:CYS:SG	7:A:1054:HOH:O	2.43	0.77
1:A:528:LEU:HD22	1:A:536:PRO:HB2	1.67	0.76
1:D:304:ARG:NH1	7:D:902:HOH:O	2.19	0.75
1:B:704:ARG:HB3	1:B:704:ARG:NH1	2.02	0.75
1:C:711:TYR:OH	2:C:802:HEM:O1D	2.03	0.74
1:B:528:LEU:HD22	1:B:536:PRO:HB2	1.70	0.74
1:B:480:TRP:HB2	1:B:528:LEU:HB3	1.71	0.73
1:B:704:ARG:HB3	1:B:704:ARG:HH11	1.52	0.73
1:A:356:LYS:HE2	1:A:394:ASP:HA	1.72	0.71
1:B:327:LEU:HB3	1:B:704:ARG:NH1	2.07	0.69
1:D:528:LEU:HD22	1:D:536:PRO:HB2	1.76	0.67
1:B:483:GLN:HB2	1:B:486:ARG:HG3	1.76	0.67
2:A:801:HEM:HBB2	2:A:801:HEM:HHC	1.75	0.67
2:A:801:HEM:HMC2	2:A:801:HEM:HBC2	1.77	0.67
2:C:802:HEM:HBC2	2:C:802:HEM:HMC2	1.77	0.66
1:D:613:GLU:HG3	1:D:623:MET:HE1	1.78	0.65
1:D:700:MET:O	7:D:901:HOH:O	2.13	0.65
1:C:483:GLN:HB2	1:C:486:ARG:HG3	1.79	0.64
1:B:524:VAL:HG21	1:B:546:VAL:HG11	1.79	0.62
2:D:801:HEM:HBB2	2:D:801:HEM:HHC	1.80	0.62
1:C:480:TRP:HB2	1:C:528:LEU:HB3	1.82	0.61
1:C:364:LYS:NZ	1:C:368:ASP:OD2	2.30	0.60
1:A:419:ARG:NH1	1:A:711:TYR:OH	2.36	0.59
1:C:518:PRO:HG2	1:C:523:ASP:CG	2.23	0.59
2:D:801:HEM:HBC2	2:D:801:HEM:HMC2	1.84	0.59
1:D:337:MET:HB3	1:D:340:ILE:HG13	1.85	0.58
1:B:691:SER:HA	1:B:696:PHE:CG	2.39	0.56
1:B:327:LEU:HG	1:B:328:GLU:H	1.70	0.56
1:A:333:GLU:OE1	1:A:333:GLU:N	2.37	0.55
1:D:485:ILE:HD13	1:D:546:VAL:HG13	1.88	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:419:ARG:HD3	1:B:683:TRP:CD2	2.42	0.55
1:C:593:TYR:CD1	1:C:598:ILE:HD11	2.42	0.55
1:C:681:TRP:CZ2	1:C:685:VAL:HG21	2.43	0.54
1:D:600:VAL:O	1:D:604:CYS:HB2	2.08	0.53
1:A:600:VAL:O	1:A:604:CYS:HB2	2.08	0.53
1:A:353:VAL:HG22	1:A:472:ASP:HA	1.90	0.53
1:B:414:TRP:CE3	1:B:426:TRP:HA	2.44	0.52
1:C:387:GLU:O	1:C:391:LYS:HG2	2.09	0.52
1:D:480:TRP:HB2	1:D:528:LEU:HB3	1.90	0.52
2:C:802:HEM:HBA2	4:C:804:K8O:C09	2.40	0.52
1:D:711:TYR:OH	2:D:801:HEM:O1D	2.24	0.52
1:A:711:TYR:OH	2:A:801:HEM:O1D	2.18	0.52
1:C:340:ILE:HA	1:D:699:GLU:HG2	1.92	0.52
1:D:419:ARG:HD3	1:D:683:TRP:CD2	2.45	0.51
1:B:452:LYS:NZ	7:B:914:HOH:O	2.44	0.51
1:C:691:SER:HA	1:C:696:PHE:CG	2.45	0.51
1:D:691:SER:HA	1:D:696:PHE:CG	2.45	0.51
1:A:364:LYS:NZ	1:A:368:ASP:OD2	2.44	0.50
1:C:480:TRP:CE2	1:C:715:PRO:HB2	2.46	0.50
1:C:600:VAL:O	1:C:604:CYS:HB2	2.11	0.50
1:C:613:GLU:O	1:C:617:LYS:HG3	2.11	0.50
1:A:664:ILE:HG13	1:A:694:PRO:HB2	1.93	0.50
1:A:665:LYS:NZ	7:A:902:HOH:O	2.32	0.50
1:A:671:TYR:CE2	1:A:676:GLY:HA2	2.47	0.49
1:B:600:VAL:O	1:B:604:CYS:HB2	2.12	0.49
1:C:501:PRO:HA	1:C:504:VAL:HG23	1.95	0.49
1:A:402:LYS:HB2	1:A:405:GLU:HG3	1.93	0.49
1:A:333:GLU:O	1:B:329:THR:N	2.35	0.49
1:A:593:TYR:CD1	1:A:598:ILE:HD11	2.47	0.49
1:A:679:ALA:HB3	1:A:700:MET:HB3	1.95	0.48
1:D:321:LEU:HD21	1:D:705:LEU:HD11	1.95	0.48
1:B:681:TRP:CE2	1:B:685:VAL:HG21	2.48	0.48
1:A:689:SER:HB3	1:A:692:ILE:HD11	1.95	0.48
1:B:518:PRO:HG2	1:B:523:ASP:CG	2.33	0.48
1:D:327:LEU:HB3	1:D:704:ARG:HH12	1.77	0.48
1:D:556:PHE:HB3	1:D:558:TRP:CE2	2.49	0.48
1:A:480:TRP:HB2	1:A:528:LEU:HB3	1.95	0.48
1:D:480:TRP:CE2	1:D:715:PRO:HB2	2.48	0.48
2:A:801:HEM:HBB2	2:A:801:HEM:CHC	2.43	0.48
1:B:395:THR:HB	1:B:396:THR:HG23	1.96	0.48
1:C:542:PRO:HD2	1:C:545:LEU:HD12	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:407:ILE:HG21	5:C:806:GOL:H31	1.96	0.47
1:A:327:LEU:HD12	1:A:346:HIS:O	2.14	0.47
1:C:353:VAL:HG22	1:C:472:ASP:HA	1.95	0.47
1:B:623:MET:HA	1:B:630:TRP:CD1	2.49	0.47
1:C:419:ARG:HD3	1:C:683:TRP:CD2	2.49	0.47
1:C:544:GLU:OE2	7:C:901:HOH:O	2.20	0.47
1:A:356:LYS:HG3	1:A:393:ILE:HG22	1.96	0.47
1:C:491:LYS:HD2	1:C:504:VAL:HG11	1.96	0.47
1:D:594:MET:HA	1:D:654:VAL:O	2.15	0.47
1:D:706:THR:HA	1:D:707:PRO:C	2.34	0.46
1:C:419:ARG:NH1	1:C:711:TYR:OH	2.46	0.46
1:A:552:ARG:NH1	1:A:649:ASP:OD1	2.43	0.46
1:C:336:CYS:HB3	1:D:702:ASN:HB3	1.98	0.46
1:C:615:VAL:HG21	1:C:638:ILE:HD11	1.98	0.46
1:D:408:TYR:CE1	1:D:412:HIS:CE1	3.04	0.46
1:A:455:THR:HA	1:A:460:LEU:HD22	1.98	0.46
1:C:331:CYS:O	1:D:333:GLU:HA	2.15	0.46
1:C:699:GLU:HB3	1:D:340:ILE:HD13	1.98	0.46
1:D:515:TRP:CE2	1:D:526:PRO:HD3	2.50	0.45
1:B:480:TRP:CE2	1:B:715:PRO:HB2	2.51	0.45
1:A:691:SER:HA	1:A:696:PHE:CG	2.51	0.45
1:A:380:LYS:N	1:A:380:LYS:HE2	2.31	0.45
1:A:552:ARG:HH12	1:A:649:ASP:CG	2.20	0.45
1:B:597:GLU:OE2	4:B:804:K8O:N02	2.50	0.45
1:A:356:LYS:CE	1:A:394:ASP:HA	2.45	0.44
1:B:706:THR:HA	1:B:707:PRO:C	2.37	0.44
1:B:598:ILE:HA	1:B:602:ASP:HB2	1.99	0.44
1:D:623:MET:HA	1:D:630:TRP:CD1	2.52	0.44
1:A:490:TYR:CE1	1:A:519:ARG:HA	2.52	0.44
1:D:305:PHE:HD2	1:D:318:THR:HG21	1.82	0.44
1:B:522:PHE:HB2	1:B:565:LYS:HE3	1.99	0.44
1:C:307:LYS:HD3	1:C:316:VAL:HG11	1.99	0.44
1:D:478:ARG:HD2	1:D:585:SER:HB2	1.98	0.44
1:C:507:THR:O	1:C:511:ILE:HG13	2.18	0.44
1:C:598:ILE:HA	1:C:602:ASP:HB2	1.99	0.44
1:A:325:SER:OG	7:A:901:HOH:O	2.21	0.44
1:B:613:GLU:O	1:B:617:LYS:HB2	2.18	0.43
1:C:333:GLU:N	1:C:333:GLU:OE2	2.51	0.43
1:C:683:TRP:HA	3:C:803:H4B:N1	2.33	0.43
1:A:414:TRP:CE3	1:A:426:TRP:HA	2.53	0.43
1:C:490:TYR:CE1	1:C:519:ARG:HA	2.53	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:415:ARG:CZ	1:D:674:ARG:HD2	2.49	0.43
1:B:704:ARG:HH11	1:B:704:ARG:CB	2.28	0.43
1:D:360:PHE:N	1:D:361:PRO:HD2	2.33	0.43
1:C:387:GLU:HG3	1:C:388:GLU:N	2.33	0.43
1:C:493:PRO:HG2	7:C:936:HOH:O	2.16	0.43
1:C:686:PRO:HG2	1:C:693:THR:HG21	2.01	0.43
1:D:615:VAL:HG21	1:D:638:ILE:HD11	1.99	0.43
1:B:618:LYS:HE3	1:B:618:LYS:HB3	1.77	0.43
1:A:419:ARG:HD3	1:A:683:TRP:CD2	2.53	0.43
1:B:409:GLY:HA2	1:B:707:PRO:HG2	2.01	0.43
1:A:483:GLN:HB2	1:A:486:ARG:HG3	2.00	0.43
1:B:600:VAL:HA	1:B:635:LEU:HD11	2.01	0.43
2:C:802:HEM:HBC2	2:C:802:HEM:CMC	2.47	0.43
1:B:327:LEU:HG	1:B:328:GLU:N	2.33	0.42
1:C:414:TRP:CE3	1:C:426:TRP:HA	2.55	0.42
1:C:557:GLU:O	1:C:560:LYS:HG2	2.19	0.42
1:A:501:PRO:HA	1:A:504:VAL:HG23	2.00	0.42
1:C:348:ARG:O	1:C:362:LEU:HD11	2.19	0.42
1:C:671:TYR:CE2	1:C:676:GLY:HA2	2.54	0.42
1:B:414:TRP:CZ3	2:B:802:HEM:HMC3	2.54	0.42
1:B:528:LEU:HD23	1:B:528:LEU:HA	1.83	0.42
1:D:499:GLY:O	1:D:501:PRO:HD3	2.19	0.42
1:B:353:VAL:HG12	1:B:470:ARG:HD3	2.01	0.42
1:A:556:PHE:HB3	1:A:558:TRP:CE2	2.54	0.42
1:B:515:TRP:CE2	1:B:526:PRO:HD3	2.54	0.42
1:D:414:TRP:CE3	1:D:426:TRP:HA	2.55	0.42
1:D:486:ARG:HG2	7:D:941:HOH:O	2.19	0.42
1:C:341:MET:HE2	1:C:341:MET:HB2	1.98	0.42
1:B:469:GLN:HB3	1:B:584:PHE:CE2	2.53	0.42
1:A:483:GLN:HB2	1:A:486:ARG:CG	2.50	0.42
1:B:430:GLN:HG2	1:B:453:TYR:CZ	2.55	0.42
1:A:340:ILE:HB	1:A:343:PRO:HB3	2.01	0.42
2:B:802:HEM:HBA2	4:B:804:K8O:C09	2.50	0.42
1:C:527:LEU:O	1:C:538:LEU:HA	2.20	0.42
1:D:469:GLN:HB3	1:D:584:PHE:CE2	2.54	0.42
1:B:679:ALA:HB3	1:B:700:MET:HB3	2.00	0.41
1:C:601:ARG:HH12	3:C:803:H4B:C4	2.33	0.41
1:A:555:LYS:HA	1:A:555:LYS:HD3	1.90	0.41
1:B:414:TRP:CH2	2:B:802:HEM:HMC3	2.55	0.41
1:B:681:TRP:CZ2	1:B:685:VAL:HG21	2.55	0.41
1:D:578:GLU:HA	1:D:582:LEU:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:802:HEM:HHC	2:B:802:HEM:HBB2	2.02	0.41
1:B:689:SER:HB3	1:B:692:ILE:HG12	2.03	0.41
1:D:395:THR:OG1	1:D:396:THR:HG23	2.21	0.41
1:D:530:GLN:HG3	1:D:534:ASN:O	2.19	0.41
1:D:681:TRP:CZ2	1:D:685:VAL:HG21	2.55	0.41
1:B:456:ASN:HB3	1:B:459:ASN:O	2.20	0.41
1:C:384:GLU:HA	1:C:387:GLU:HG2	2.02	0.41
1:D:528:LEU:HD23	1:D:528:LEU:HA	1.92	0.41
1:A:380:LYS:HE2	1:A:380:LYS:H	1.86	0.41
2:A:801:HEM:HHC	2:A:801:HEM:CBB	2.47	0.41
1:C:333:GLU:HA	1:D:331:CYS:O	2.20	0.41
1:C:522:PHE:HB2	1:C:565:LYS:HE3	2.03	0.41
1:A:550:PRO:O	1:A:552:ARG:NH2	2.48	0.41
1:C:670:GLU:CB	1:C:677:CYS:HB2	2.51	0.41
1:D:324:LYS:HD2	5:D:804:GOL:H11	2.03	0.41
1:D:577:LEU:HD21	1:D:579:ILE:HD11	2.01	0.41
1:A:482:SER:HA	1:A:574:ASN:HB3	2.03	0.41
1:A:685:VAL:HA	1:A:686:PRO:HD3	1.95	0.41
1:B:447:ILE:HG23	1:B:484:LEU:HD13	2.03	0.41
1:B:515:TRP:CG	1:B:526:PRO:HG3	2.56	0.41
1:C:414:TRP:CH2	1:C:425:GLN:HB2	2.56	0.41
1:D:524:VAL:HG21	1:D:546:VAL:HG11	2.03	0.41
1:D:529:LEU:O	1:D:536:PRO:HA	2.21	0.41
1:A:356:LYS:HD3	1:A:394:ASP:OD2	2.21	0.41
1:A:699:GLU:HB3	1:B:340:ILE:HD13	2.03	0.41
1:B:556:PHE:HB3	1:B:558:TRP:CE2	2.56	0.40
1:C:556:PHE:HB3	1:C:558:TRP:CE2	2.55	0.40
1:A:556:PHE:HE1	1:A:637:GLU:HG3	1.87	0.40
1:B:337:MET:HB3	1:B:340:ILE:HG13	2.02	0.40
1:C:521:ARG:HG2	1:C:522:PHE:CE1	2.56	0.40
1:D:433:ASP:OD1	1:D:435:ARG:NH2	2.34	0.40
1:A:363:ALA:HB1	1:A:389:VAL:HG11	2.04	0.40
1:C:482:SER:HA	1:C:574:ASN:HB3	2.02	0.40
1:C:681:TRP:CE2	1:C:685:VAL:HG21	2.57	0.40
1:A:385:ARG:NE	1:A:405:GLU:OE1	2.39	0.40
1:D:409:GLY:HA3	1:D:579:ILE:HD13	2.02	0.40
1:D:547:LEU:HD21	1:D:651:VAL:HG22	2.03	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	423/423 (100%)	408 (96%)	12 (3%)	3 (1%)	22	11
1	B	411/423 (97%)	399 (97%)	12 (3%)	0	100	100
1	C	419/423 (99%)	403 (96%)	14 (3%)	2 (0%)	29	19
1	D	409/423 (97%)	396 (97%)	12 (3%)	1 (0%)	47	39
All	All	1662/1692 (98%)	1606 (97%)	50 (3%)	6 (0%)	34	25

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	303	PRO
1	D	343	PRO
1	C	353	VAL
1	A	305	PHE
1	C	622	ASP
1	A	353	VAL

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

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	380/378 (100%)	359 (94%)	21 (6%)	21	13
1	B	371/378 (98%)	360 (97%)	11 (3%)	41	35
1	C	376/378 (100%)	360 (96%)	16 (4%)	29	22
1	D	369/378 (98%)	354 (96%)	15 (4%)	30	23

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
All	All	1496/1512 (99%)	1433 (96%)	63 (4%)	30	23

All (63) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	302	CYS
1	A	326	THR
1	A	327	LEU
1	A	344	SER
1	A	349	ARG
1	A	352	ASP
1	A	356	LYS
1	A	365	GLU
1	A	380	LYS
1	A	386	LEU
1	A	390	ASN
1	A	397	SER
1	A	402	LYS
1	A	491	LYS
1	A	494	ASP
1	A	512	GLN
1	A	528	LEU
1	A	552	ARG
1	A	614	GLU
1	A	665	LYS
1	A	720	VAL
1	B	326	THR
1	B	328	GLU
1	B	333	GLU
1	B	383	MET
1	B	395	THR
1	B	428	LYS
1	B	505	GLN
1	B	516	LYS
1	B	528	LEU
1	B	552	ARG
1	B	672	ARG
1	C	326	THR
1	C	349	ARG
1	C	352	ASP
1	C	356	LYS
1	C	359	LEU

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Mol	Chain	Res	Type
1	C	365	GLU
1	C	380	LYS
1	C	386	LEU
1	C	491	LYS
1	C	512	GLN
1	C	528	LEU
1	C	552	ARG
1	C	557	GLU
1	C	613	GLU
1	C	665	LYS
1	C	720	VAL
1	D	304	ARG
1	D	326	THR
1	D	369	GLN
1	D	372	SER
1	D	383	MET
1	D	394	ASP
1	D	528	LEU
1	D	532	ASN
1	D	540	GLN
1	D	552	ARG
1	D	565	LYS
1	D	625	LYS
1	D	650	LYS
1	D	704	ARG
1	D	720	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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

Of 20 ligands modelled in this entry, 2 are monoatomic - leaving 18 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	GOL	C	801	-	5,5,5	0.37	0	5,5,5	0.36	0
2	HEM	C	802	1	41,50,50	1.49	5 (12%)	45,82,82	1.78	8 (17%)
5	GOL	C	805	-	5,5,5	0.36	0	5,5,5	0.45	0
3	H4B	D	802	-	16,18,18	0.88	1 (6%)	11,26,26	2.56	5 (45%)
3	H4B	B	803	-	16,18,18	1.07	1 (6%)	11,26,26	2.41	5 (45%)
4	K8O	D	803	-	20,20,20	2.43	4 (20%)	26,28,28	2.50	9 (34%)
5	GOL	A	804	-	5,5,5	0.23	0	5,5,5	0.75	0
2	HEM	D	801	1	41,50,50	1.41	4 (9%)	45,82,82	1.49	5 (11%)
5	GOL	D	804	-	5,5,5	0.35	0	5,5,5	0.27	0
4	K8O	B	804	-	20,20,20	2.39	5 (25%)	26,28,28	2.20	10 (38%)
5	GOL	C	806	-	5,5,5	0.22	0	5,5,5	0.93	0
3	H4B	A	802	-	16,18,18	0.79	0	11,26,26	2.56	5 (45%)
2	HEM	B	802	1	41,50,50	1.41	4 (9%)	45,82,82	1.79	7 (15%)
4	K8O	A	803	-	20,20,20	2.32	5 (25%)	26,28,28	1.93	6 (23%)
3	H4B	C	803	-	16,18,18	0.84	0	11,26,26	2.58	5 (45%)
2	HEM	A	801	1	41,50,50	1.44	4 (9%)	45,82,82	1.58	7 (15%)
5	GOL	B	805	-	5,5,5	0.41	0	5,5,5	0.23	0
4	K8O	C	804	-	20,20,20	2.44	5 (25%)	26,28,28	2.16	10 (38%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	GOL	C	801	-	-	2/4/4/4	-
2	HEM	C	802	1	-	2/12/54/54	-
5	GOL	C	805	-	-	4/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	H4B	D	802	-	-	0/8/17/17	0/2/2/2
3	H4B	B	803	-	-	0/8/17/17	0/2/2/2
4	K8O	D	803	-	-	4/5/18/18	0/2/2/2
5	GOL	A	804	-	-	2/4/4/4	-
2	HEM	D	801	1	-	1/12/54/54	-
5	GOL	D	804	-	-	2/4/4/4	-
4	K8O	B	804	-	-	2/5/18/18	0/2/2/2
5	GOL	C	806	-	-	2/4/4/4	-
3	H4B	A	802	-	-	0/8/17/17	0/2/2/2
2	HEM	B	802	1	-	0/12/54/54	-
4	K8O	A	803	-	-	3/5/18/18	0/2/2/2
3	H4B	C	803	-	-	0/8/17/17	0/2/2/2
2	HEM	A	801	1	-	2/12/54/54	-
5	GOL	B	805	-	-	1/4/4/4	-
4	K8O	C	804	-	-	3/5/18/18	0/2/2/2

All (38) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	804	K8O	C06-C08	-9.02	1.29	1.44
4	B	804	K8O	C06-C08	-8.42	1.30	1.44
4	D	803	K8O	C06-C08	-8.35	1.30	1.44
4	A	803	K8O	C06-C08	-8.29	1.30	1.44
2	D	801	HEM	C3C-C2C	-4.41	1.34	1.40
4	D	803	K8O	C15-C14	3.80	1.54	1.50
4	B	804	K8O	C15-C14	3.78	1.54	1.50
2	C	802	HEM	C3C-C2C	-3.73	1.35	1.40
4	D	803	K8O	F18-C14	-3.72	1.31	1.38
2	B	802	HEM	C3C-C2C	-3.59	1.35	1.40
4	B	804	K8O	F18-C14	-3.58	1.31	1.38
2	A	801	HEM	C3C-CAC	3.53	1.55	1.47
2	A	801	HEM	C3C-C2C	-3.48	1.35	1.40
2	C	802	HEM	C3C-CAC	3.31	1.54	1.47
4	A	803	K8O	F18-C14	-3.24	1.32	1.38
2	B	802	HEM	C3C-CAC	3.23	1.54	1.47
4	A	803	K8O	F17-C14	-3.22	1.32	1.38
4	C	804	K8O	C15-C14	3.20	1.53	1.50
4	C	804	K8O	F17-C14	-3.19	1.32	1.38
2	D	801	HEM	C3C-CAC	3.17	1.54	1.47
4	D	803	K8O	F17-C14	-3.15	1.32	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	803	K8O	C15-C14	3.15	1.53	1.50
2	B	802	HEM	CAB-C3B	3.12	1.55	1.47
3	B	803	H4B	C4A-C4	-3.05	1.37	1.41
2	C	802	HEM	CAB-C3B	3.01	1.55	1.47
4	C	804	K8O	F18-C14	-3.00	1.33	1.38
4	B	804	K8O	F17-C14	-2.96	1.33	1.38
2	D	801	HEM	CAB-C3B	2.81	1.55	1.47
2	A	801	HEM	CAB-C3B	2.77	1.55	1.47
2	A	801	HEM	CMB-C2B	2.49	1.56	1.50
4	B	804	K8O	C13-C14	2.48	1.52	1.50
2	B	802	HEM	CMB-C2B	2.42	1.55	1.50
4	A	803	K8O	C13-C14	2.40	1.52	1.50
4	C	804	K8O	C13-C14	2.29	1.52	1.50
2	C	802	HEM	C3B-C2B	-2.19	1.32	1.37
3	D	802	H4B	C4A-C4	-2.13	1.38	1.41
2	C	802	HEM	CMD-C2D	2.10	1.55	1.50
2	D	801	HEM	C3B-C2B	-2.08	1.33	1.37

All (82) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	803	K8O	C13-C12-N11	-5.84	105.47	111.23
2	C	802	HEM	CBA-CAA-C2A	-5.80	102.72	112.62
2	B	802	HEM	CBA-CAA-C2A	-5.64	102.99	112.62
2	D	801	HEM	CBA-CAA-C2A	-5.15	103.83	112.62
3	D	802	H4B	C8A-C4A-C4	5.14	119.14	114.57
3	A	802	H4B	C8A-C4A-C4	4.90	118.92	114.57
4	D	803	K8O	F17-C14-C13	-4.89	106.18	109.37
4	A	803	K8O	C05-C06-N01	-4.88	118.61	123.61
3	B	803	H4B	C8A-C4A-C4	4.82	118.85	114.57
2	B	802	HEM	C4B-CHC-C1C	4.65	128.70	122.56
3	C	803	H4B	C8A-C4A-C4	4.62	118.67	114.57
2	A	801	HEM	CBA-CAA-C2A	-4.55	104.85	112.62
4	D	803	K8O	C08-C06-N01	4.49	123.81	116.55
4	B	804	K8O	C13-C12-N11	-4.46	106.83	111.23
4	B	804	K8O	C05-C06-N01	-4.40	119.10	123.61
2	A	801	HEM	C4B-CHC-C1C	4.36	128.31	122.56
4	D	803	K8O	C05-C06-N01	-4.05	119.46	123.61
2	C	802	HEM	C4B-CHC-C1C	4.02	127.86	122.56
4	C	804	K8O	C08-C06-N01	4.01	123.03	116.55
4	C	804	K8O	C13-C12-N11	-3.93	107.36	111.23
4	B	804	K8O	C15-C16-N11	-3.89	107.40	111.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	803	K8O	C15-C16-N11	-3.76	107.53	111.23
4	A	803	K8O	C08-C06-N01	3.67	122.48	116.55
4	C	804	K8O	F17-C14-C13	-3.66	106.98	109.37
4	D	803	K8O	C09-C10-N11	-3.55	106.67	113.89
4	C	804	K8O	C05-C06-N01	-3.52	120.00	123.61
3	A	802	H4B	C4-C4A-N5	3.51	122.06	119.12
4	D	803	K8O	F17-C14-C15	3.43	111.60	109.37
4	C	804	K8O	C12-C13-C14	-3.43	107.76	111.43
3	C	803	H4B	N1-C2-N3	-3.39	120.10	125.42
4	B	804	K8O	C06-N01-C02	3.37	122.39	116.90
4	C	804	K8O	N02-C02-N01	3.34	121.77	116.49
3	B	803	H4B	N1-C2-N3	-3.33	120.19	125.42
3	D	802	H4B	N1-C2-N3	-3.30	120.24	125.42
4	B	804	K8O	C09-C10-N11	-3.28	107.22	113.89
4	C	804	K8O	C15-C16-N11	-3.28	108.00	111.23
3	D	802	H4B	C2-N3-C4	3.26	121.11	115.93
3	C	803	H4B	C4-C4A-N5	3.22	121.82	119.12
4	D	803	K8O	C12-C13-C14	-3.18	108.03	111.43
4	D	803	K8O	C05-C06-C08	-3.14	116.47	119.83
3	A	802	H4B	N1-C2-N3	-3.13	120.50	125.42
4	B	804	K8O	C08-C06-N01	3.10	121.56	116.55
3	C	803	H4B	C2-N3-C4	3.07	120.80	115.93
2	B	802	HEM	C4D-ND-C1D	3.04	108.22	105.07
4	A	803	K8O	C06-N01-C02	2.95	121.70	116.90
3	A	802	H4B	C2-N3-C4	2.93	120.58	115.93
2	B	802	HEM	CBD-CAD-C3D	-2.92	104.51	112.63
3	B	803	H4B	C2-N1-C8A	2.90	121.04	114.54
2	B	802	HEM	C3D-C4D-ND	-2.90	106.94	110.17
3	C	803	H4B	C2-N1-C8A	2.87	120.98	114.54
2	D	801	HEM	CMC-C2C-C3C	2.81	129.94	124.68
2	B	802	HEM	CMC-C2C-C3C	2.81	129.93	124.68
2	D	801	HEM	C4B-CHC-C1C	2.76	126.21	122.56
4	B	804	K8O	C10-N11-C12	-2.76	108.50	111.71
3	B	803	H4B	C2-N3-C4	2.73	120.27	115.93
4	B	804	K8O	F17-C14-C15	2.70	111.12	109.37
4	C	804	K8O	C05-C06-C08	-2.69	116.95	119.83
3	D	802	H4B	C2-N1-C8A	2.67	120.51	114.54
2	C	802	HEM	C4D-ND-C1D	2.64	107.80	105.07
2	C	802	HEM	CBD-CAD-C3D	-2.63	105.33	112.63
3	A	802	H4B	C2-N1-C8A	2.62	120.41	114.54
4	D	803	K8O	C06-N01-C02	2.62	121.16	116.90
4	A	803	K8O	N02-C02-N01	2.59	120.58	116.49

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	HEM	CBD-CAD-C3D	-2.59	105.44	112.63
2	C	802	HEM	C1B-NB-C4B	2.58	107.73	105.07
2	C	802	HEM	CMC-C2C-C3C	2.56	129.46	124.68
2	C	802	HEM	C3B-C2B-C1B	2.50	108.34	106.49
3	D	802	H4B	C4-C4A-N5	2.49	121.21	119.12
4	C	804	K8O	C06-N01-C02	2.46	120.91	116.90
4	C	804	K8O	C09-C10-N11	-2.43	108.95	113.89
4	B	804	K8O	F17-C14-C13	-2.35	107.84	109.37
2	A	801	HEM	CMC-C2C-C3C	2.24	128.88	124.68
2	A	801	HEM	C1B-NB-C4B	2.24	107.39	105.07
2	A	801	HEM	C4B-C3B-C2B	2.17	108.84	107.11
2	D	801	HEM	C3B-C2B-C1B	2.16	108.09	106.49
4	A	803	K8O	F17-C14-C13	-2.13	107.98	109.37
4	B	804	K8O	F18-C14-C15	-2.13	107.98	109.37
2	B	802	HEM	CMA-C3A-C4A	-2.12	125.21	128.46
3	B	803	H4B	N2-C2-N3	2.05	120.44	117.25
2	D	801	HEM	CHA-C4D-ND	2.04	126.90	124.38
2	C	802	HEM	CMA-C3A-C4A	-2.01	125.37	128.46
2	A	801	HEM	CAD-CBD-CGD	-2.01	109.29	113.60

There are no chirality outliers.

All (30) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	803	K8O	C08-C09-C10-N11
4	A	803	K8O	C09-C10-N11-C12
4	B	804	K8O	C09-C10-N11-C12
4	C	804	K8O	C08-C09-C10-N11
4	C	804	K8O	C09-C10-N11-C16
4	C	804	K8O	C09-C10-N11-C12
4	D	803	K8O	C09-C10-N11-C16
4	D	803	K8O	C09-C10-N11-C12
5	C	801	GOL	O1-C1-C2-C3
5	C	805	GOL	O1-C1-C2-C3
5	C	805	GOL	C1-C2-C3-O3
5	D	804	GOL	O1-C1-C2-O2
5	D	804	GOL	O1-C1-C2-C3
5	A	804	GOL	C1-C2-C3-O3
5	C	806	GOL	O1-C1-C2-C3
5	C	801	GOL	O1-C1-C2-O2
5	C	806	GOL	O1-C1-C2-O2
5	C	805	GOL	O1-C1-C2-O2

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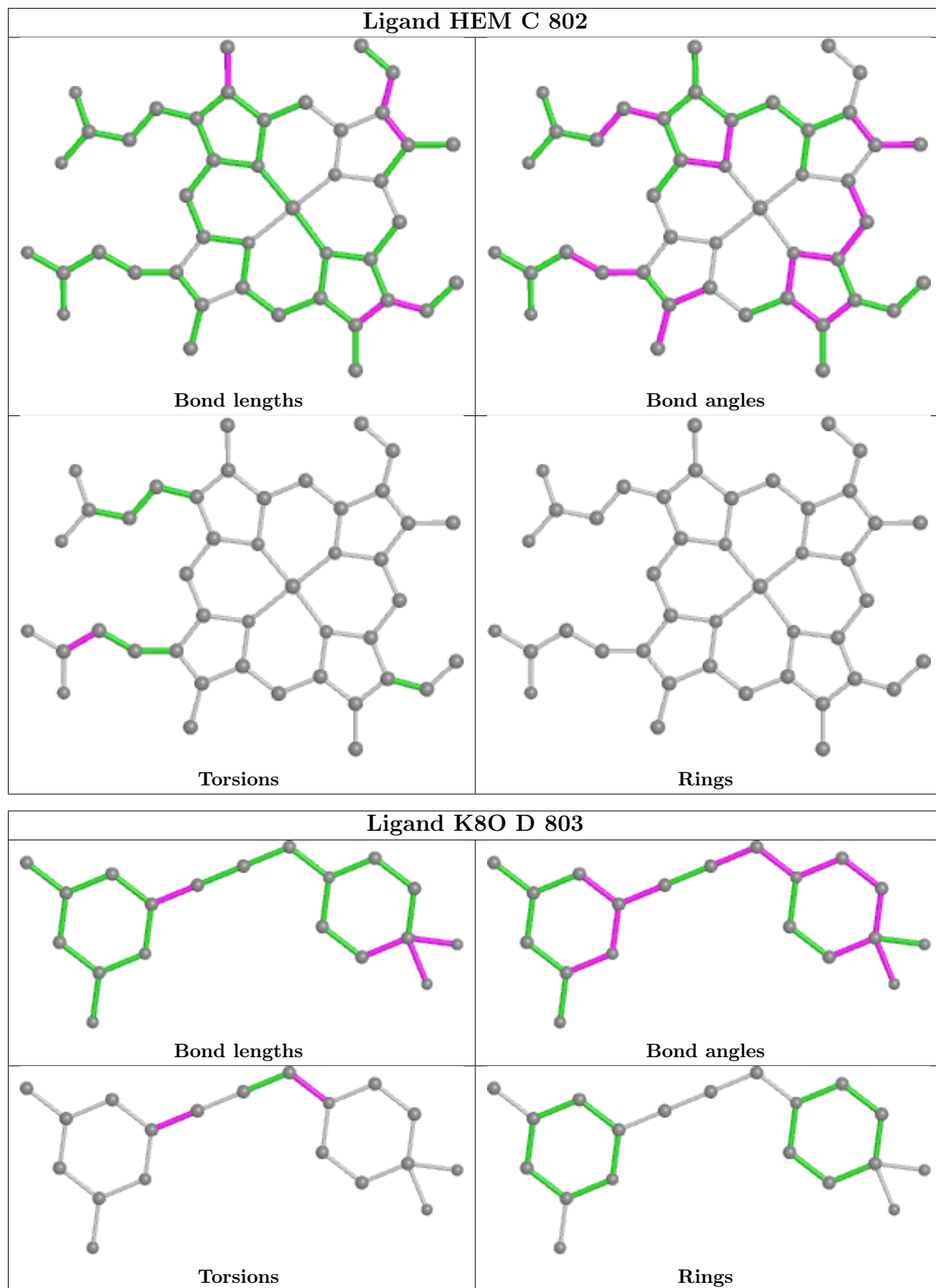
Mol	Chain	Res	Type	Atoms
5	C	805	GOL	O2-C2-C3-O3
4	A	803	K8O	C09-C10-N11-C16
4	B	804	K8O	C09-C10-N11-C16
5	A	804	GOL	O2-C2-C3-O3
4	D	803	K8O	C05-C06-C08-C09
2	D	801	HEM	C4B-C3B-CAB-CBB
2	A	801	HEM	CAA-CBA-CGA-O2A
4	D	803	K8O	N01-C06-C08-C09
2	A	801	HEM	CAA-CBA-CGA-O1A
2	C	802	HEM	CAA-CBA-CGA-O2A
2	C	802	HEM	CAA-CBA-CGA-O1A
5	B	805	GOL	O2-C2-C3-O3

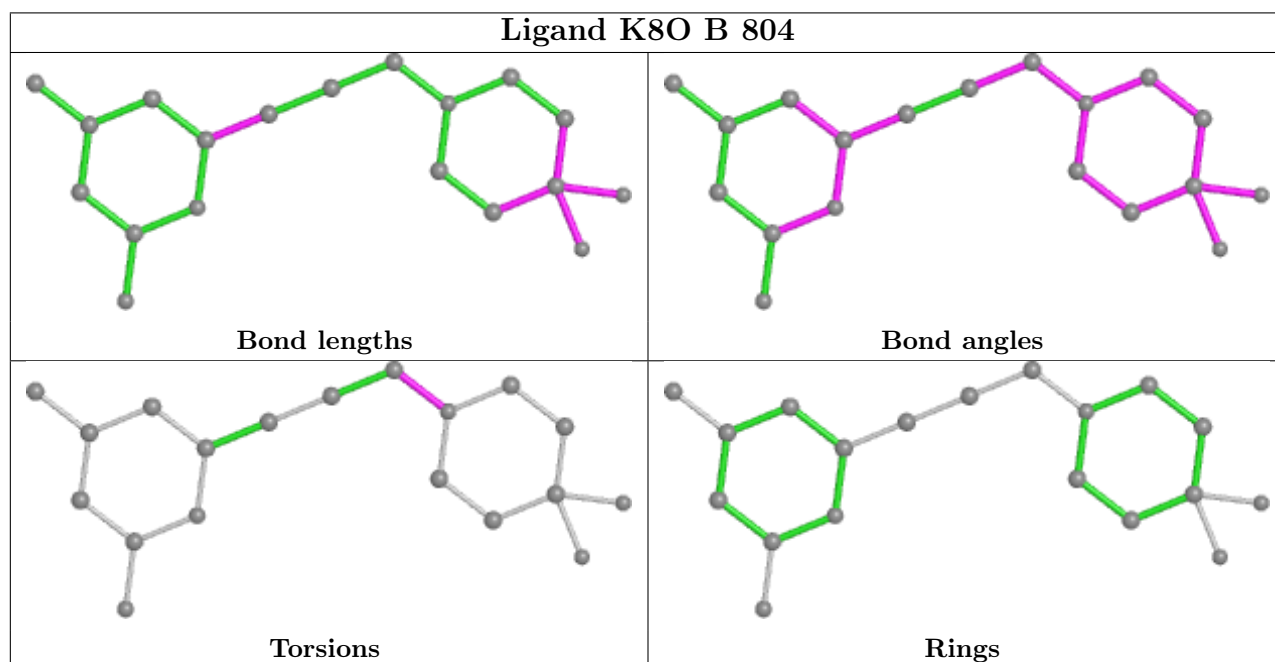
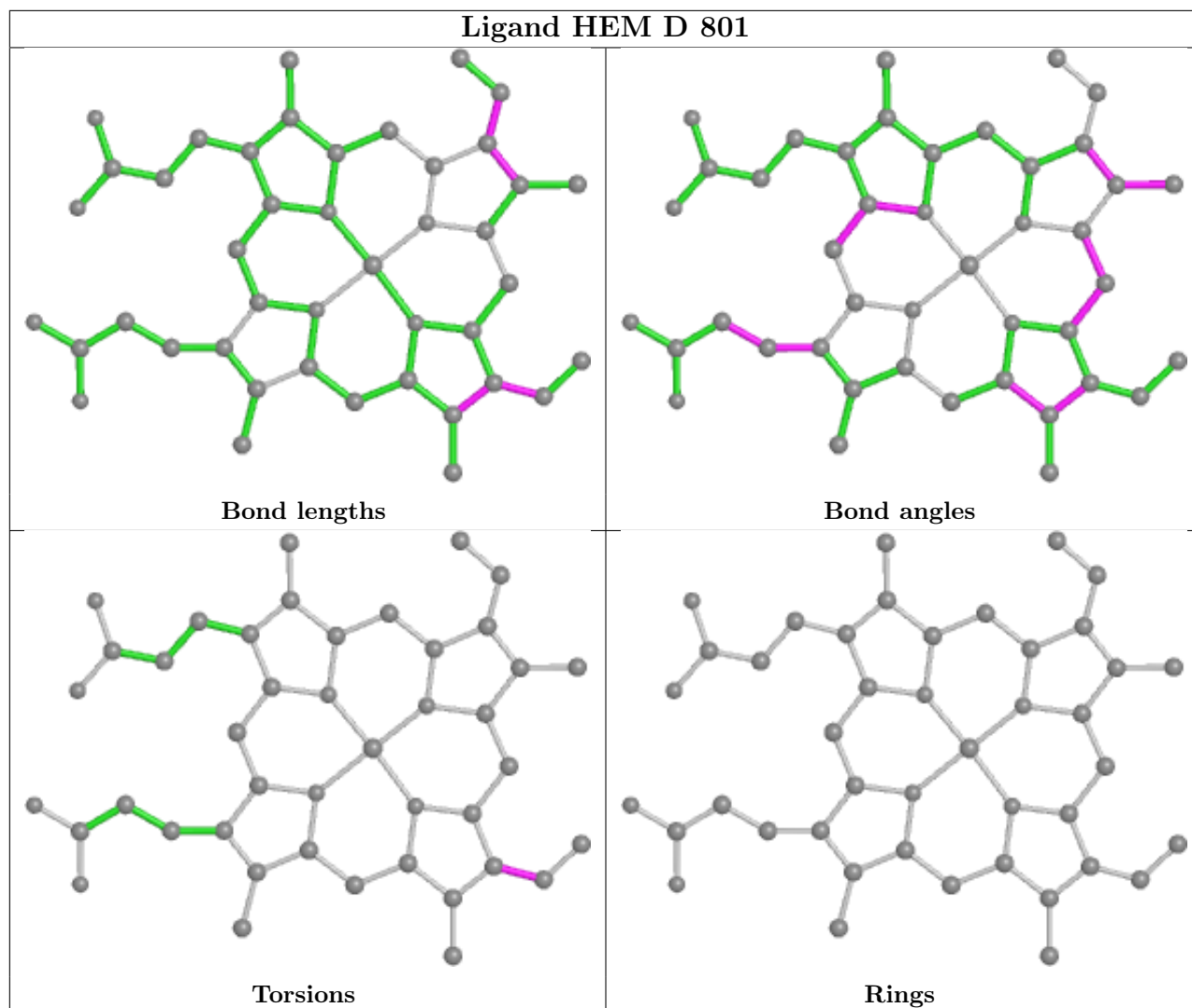
There are no ring outliers.

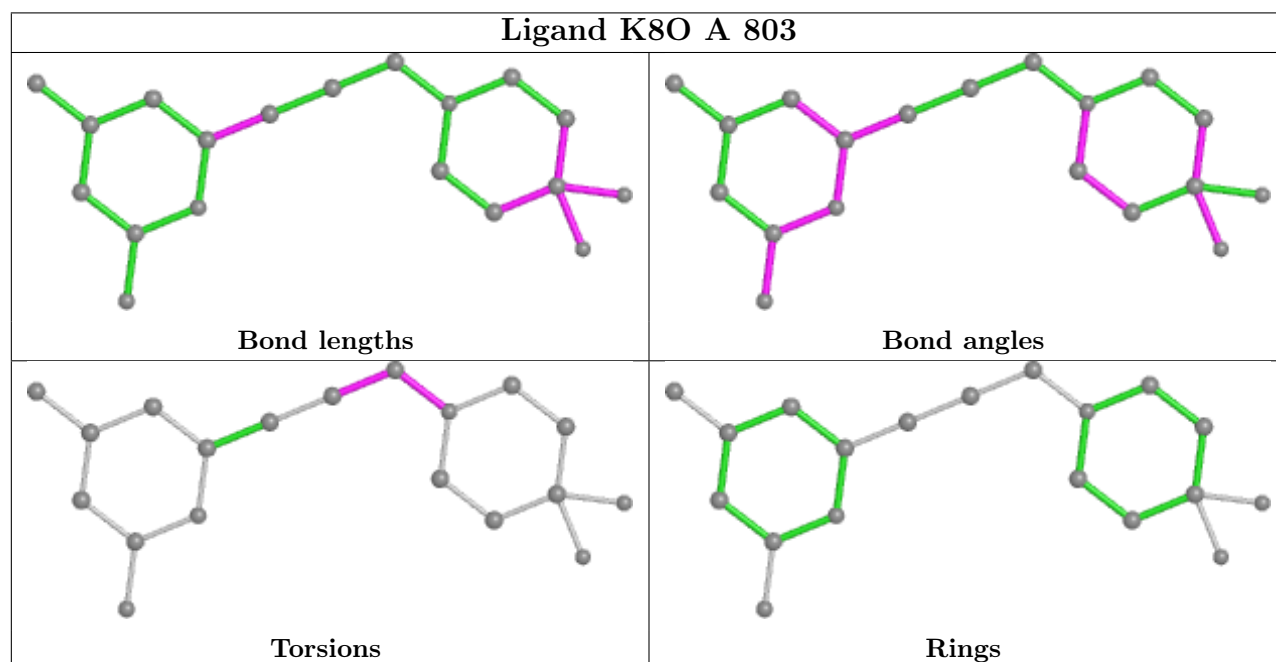
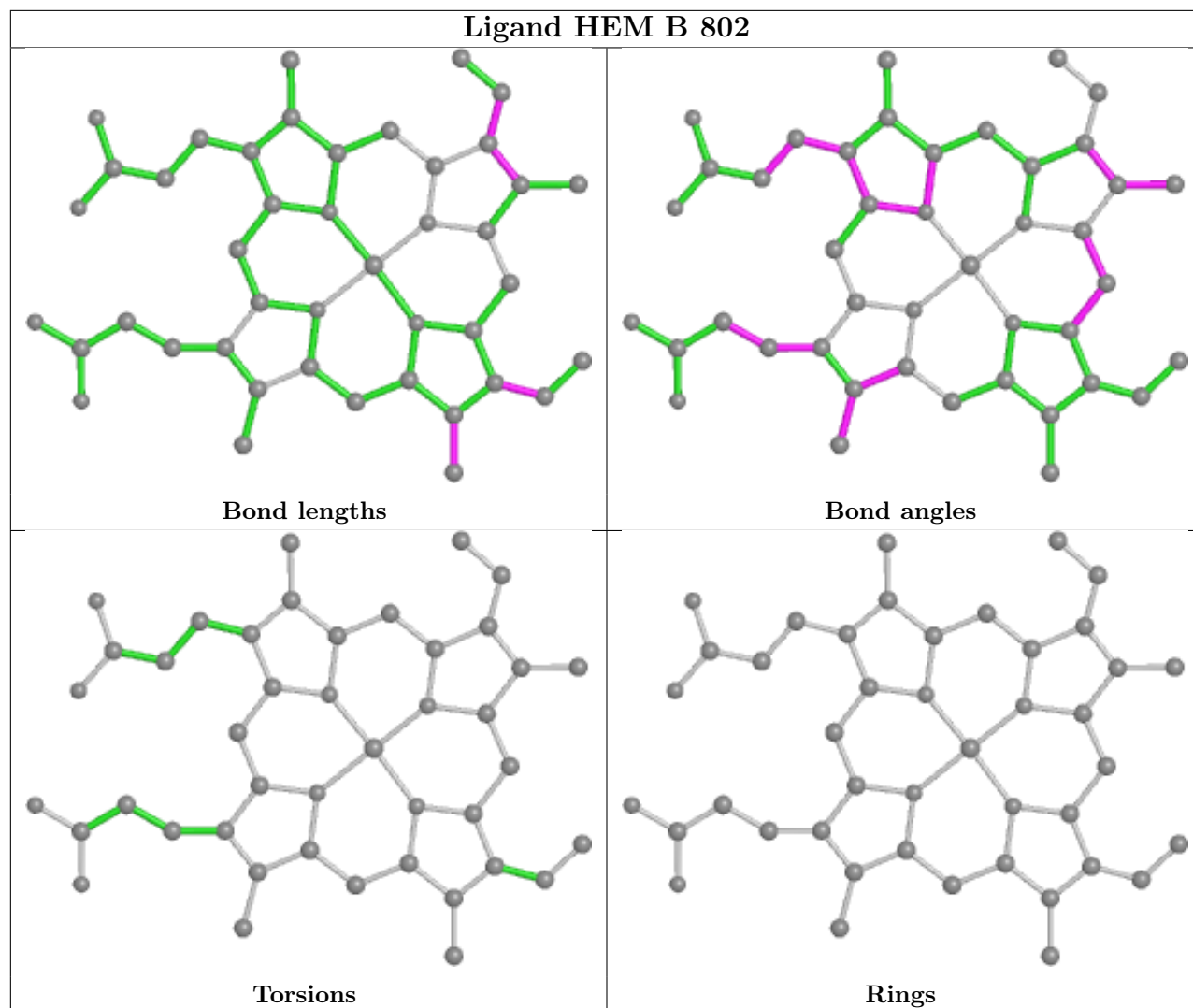
9 monomers are involved in 21 short contacts:

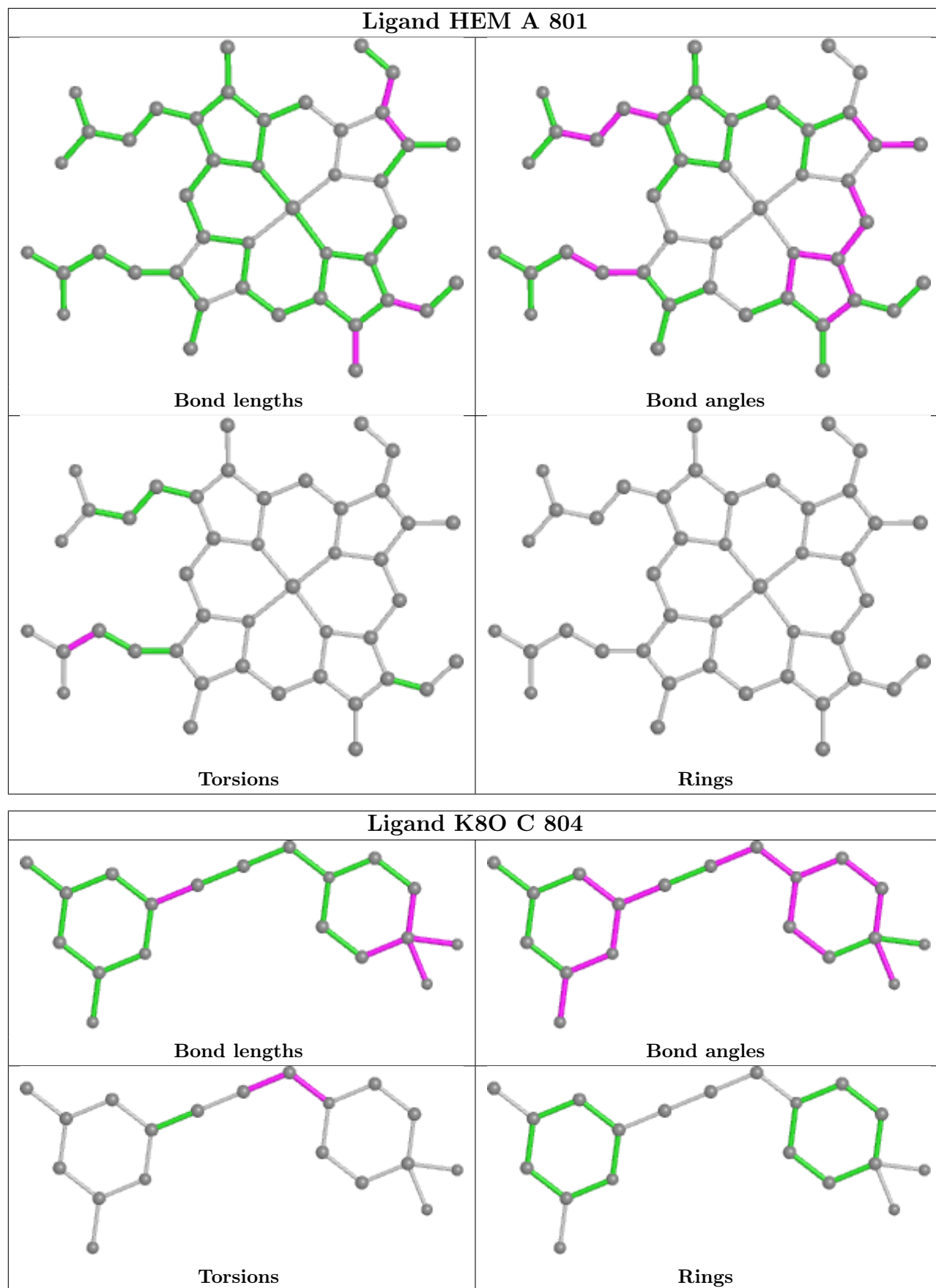
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	802	HEM	4	0
2	D	801	HEM	3	0
5	D	804	GOL	1	0
4	B	804	K8O	2	0
5	C	806	GOL	1	0
2	B	802	HEM	4	0
3	C	803	H4B	2	0
2	A	801	HEM	5	0
4	C	804	K8O	1	0

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









## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

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

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

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	421/423 (99%)	-0.08	9 (2%) 63 65	30, 50, 85, 124	0
1	B	413/423 (97%)	-0.21	3 (0%) 87 88	29, 45, 73, 109	0
1	C	418/423 (98%)	-0.13	3 (0%) 87 88	28, 47, 81, 107	0
1	D	411/423 (97%)	-0.13	2 (0%) 91 91	29, 42, 69, 106	0
All	All	1663/1692 (98%)	-0.14	17 (1%) 82 83	28, 46, 79, 124	0

All (17) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	723	LEU	5.6
1	B	724	VAL	4.3
1	A	302	CYS	4.3
1	A	303	PRO	3.8
1	A	378	GLY	3.7
1	A	353	VAL	3.5
1	C	346	HIS	3.1
1	B	305	PHE	3.1
1	A	346	HIS	3.0
1	A	348	ARG	2.9
1	A	327	LEU	2.9
1	C	353	VAL	2.5
1	A	351	GLU	2.5
1	D	305	PHE	2.5
1	C	327	LEU	2.3
1	A	305	PHE	2.3
1	D	327	LEU	2.2

### 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](#)

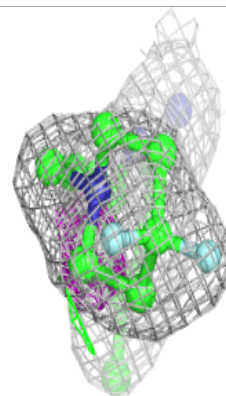
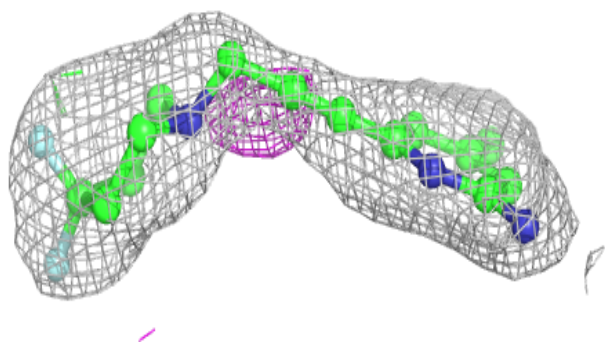
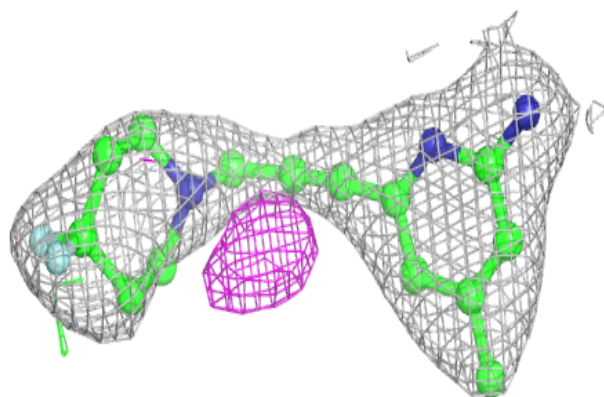
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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	GOL	C	805	6/6	0.85	0.26	74,79,82,82	0
5	GOL	D	804	6/6	0.87	0.13	62,69,72,74	0
5	GOL	B	805	6/6	0.89	0.19	65,68,72,73	0
5	GOL	C	801	6/6	0.91	0.24	64,72,73,75	0
5	GOL	A	804	6/6	0.93	0.15	50,55,59,66	0
4	K8O	C	804	19/19	0.94	0.17	27,57,87,88	0
4	K8O	A	803	19/19	0.94	0.21	36,58,102,103	0
4	K8O	D	803	19/19	0.95	0.17	30,44,76,80	0
4	K8O	B	804	19/19	0.95	0.16	31,49,76,79	0
5	GOL	C	806	6/6	0.96	0.15	52,53,60,66	0
3	H4B	B	803	17/17	0.97	0.11	25,39,48,50	0
3	H4B	D	802	17/17	0.97	0.11	36,42,47,50	0
3	H4B	C	803	17/17	0.98	0.11	41,46,50,52	0
3	H4B	A	802	17/17	0.98	0.11	32,47,51,51	0
2	HEM	C	802	43/43	0.99	0.13	25,36,51,59	0
2	HEM	D	801	43/43	0.99	0.13	24,32,50,53	0
2	HEM	A	801	43/43	0.99	0.11	25,37,54,55	0
2	HEM	B	802	43/43	0.99	0.12	27,35,52,60	0
6	ZN	B	801	1/1	1.00	0.13	42,42,42,42	0
6	ZN	C	807	1/1	1.00	0.14	42,42,42,42	0

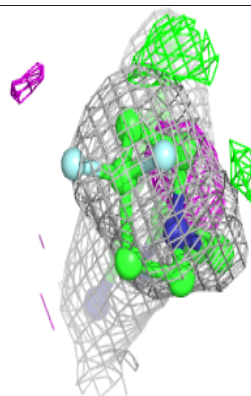
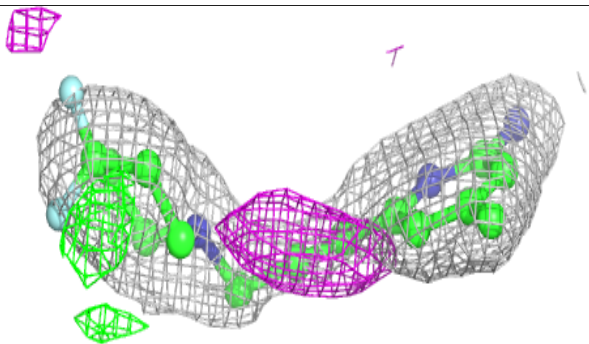
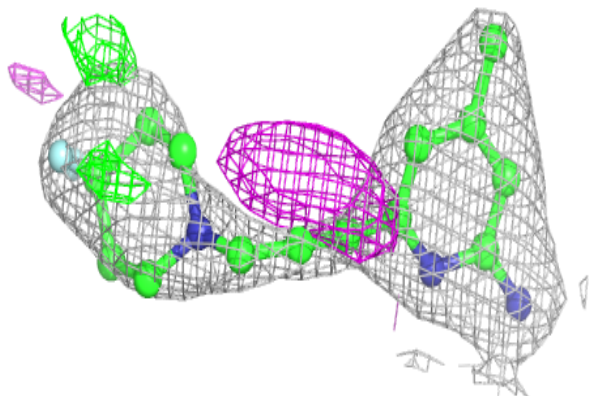
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around K8O C 804:**

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

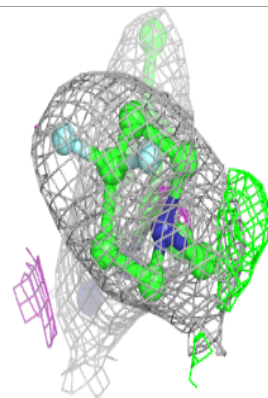
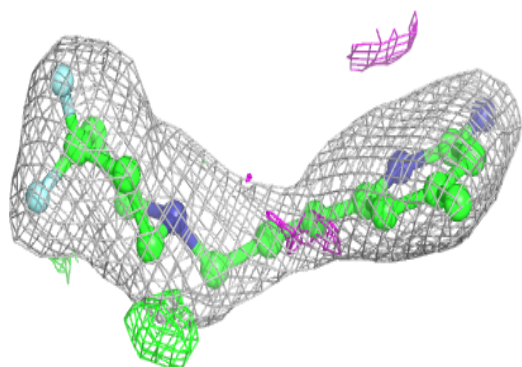
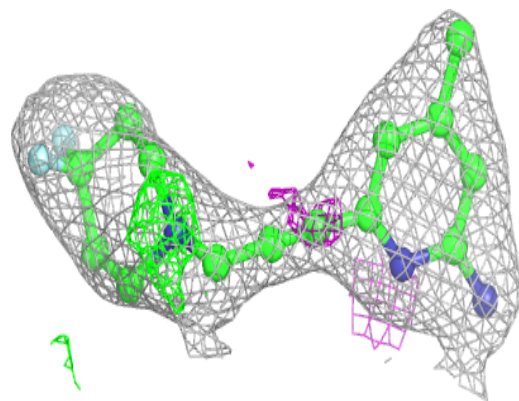
**Electron density around K8O A 803:**

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

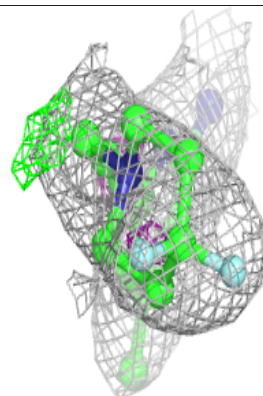
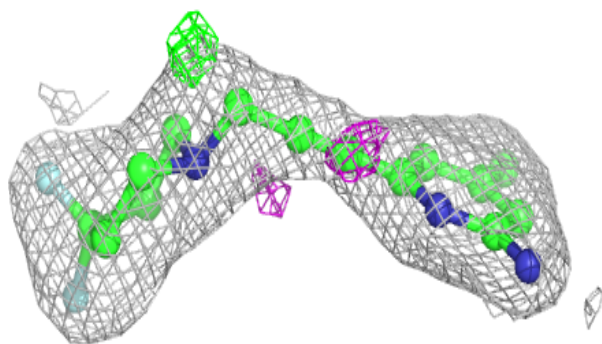
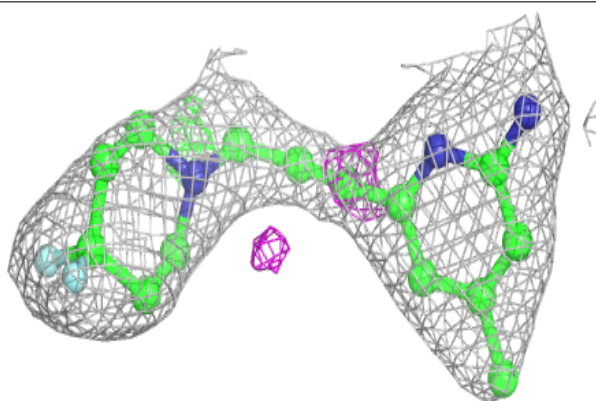


**Electron density around K8O D 803:**

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

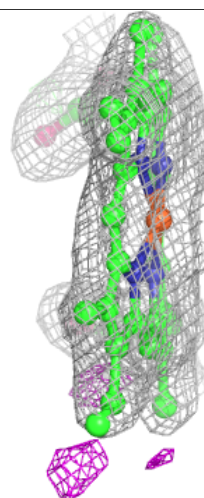
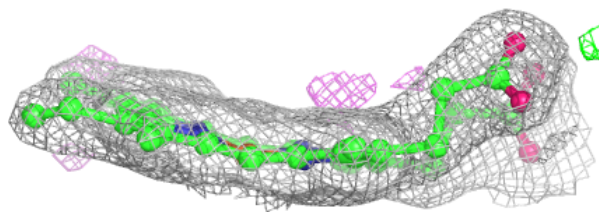
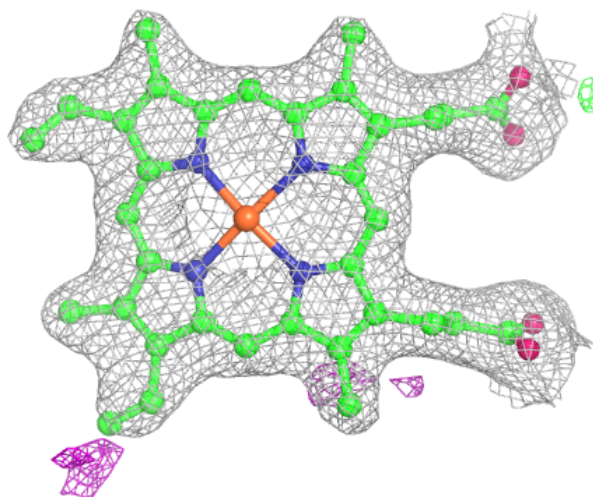
**Electron density around K8O B 804:**

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



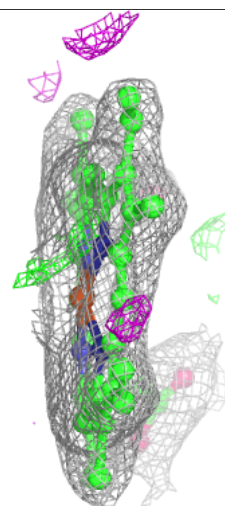
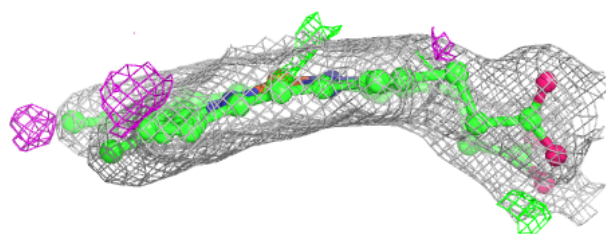
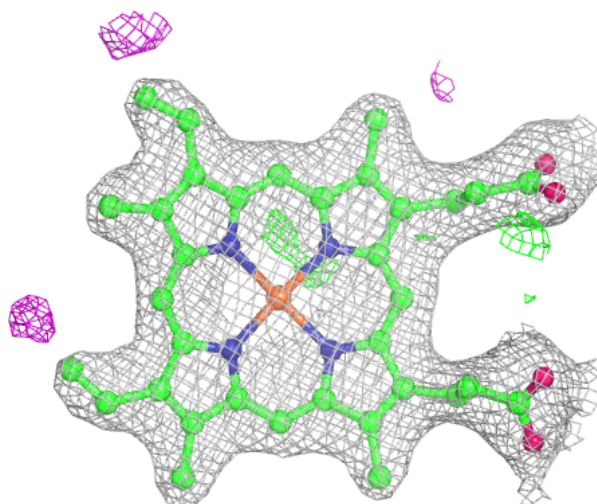
**Electron density around HEM C 802:**

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



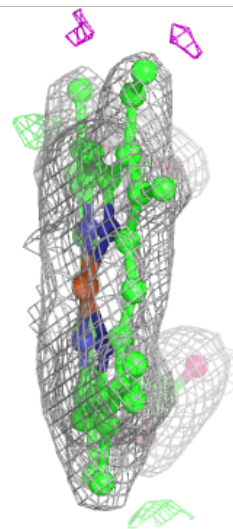
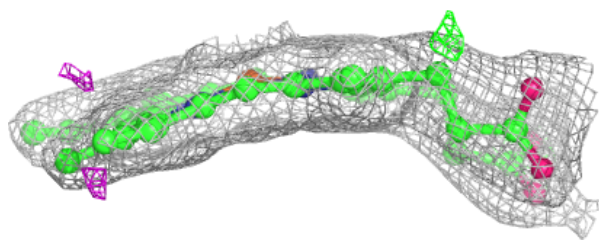
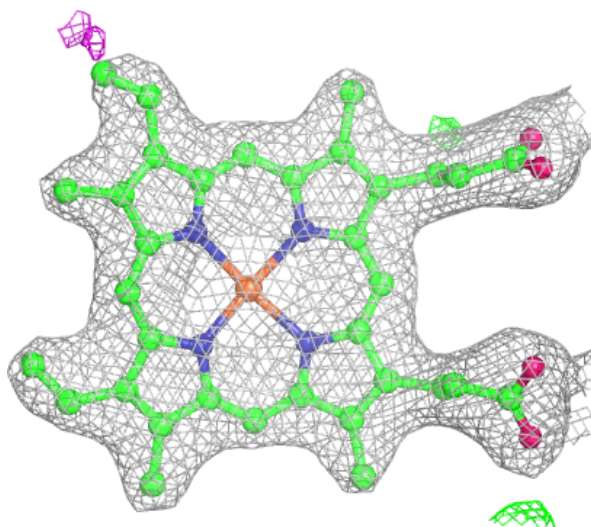
**Electron density around HEM D 801:**

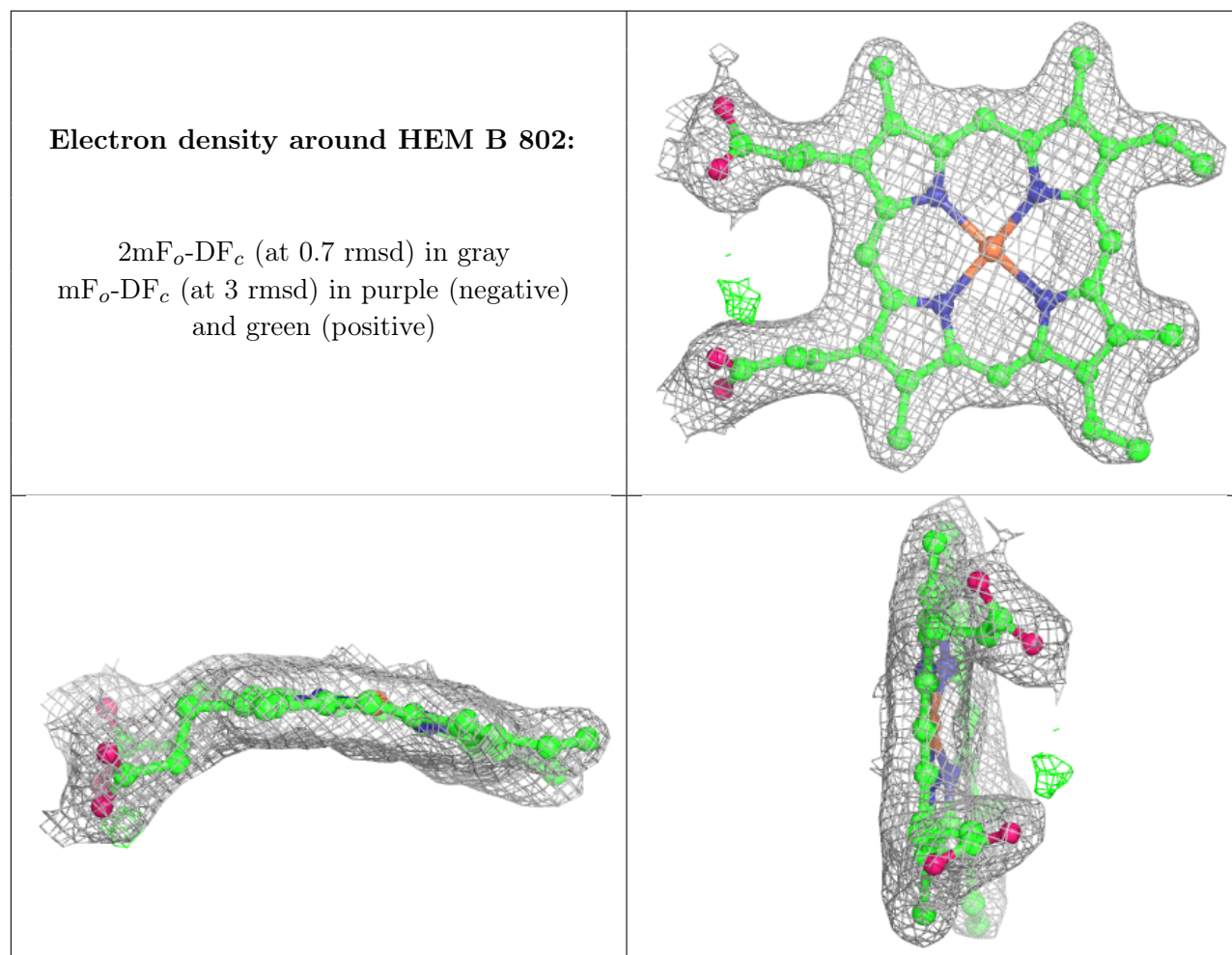
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around HEM A 801:**

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





## 6.5 Other polymers [i](#)

There are no such residues in this entry.