



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 05:19 PM UTC

PDB ID : 9CW5 / pdb_00009cw5
Title : Structure of human endothelial nitric oxide synthase heme domain bound with 4-methyl-6-(3-((methylamino)methyl)-5-(trifluoromethyl)phenyl)pyridin-2-amine dihydrochloride
Authors : Li, H.; Poulos, T.L.
Deposited on : 2024-07-29
Resolution : 1.88 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

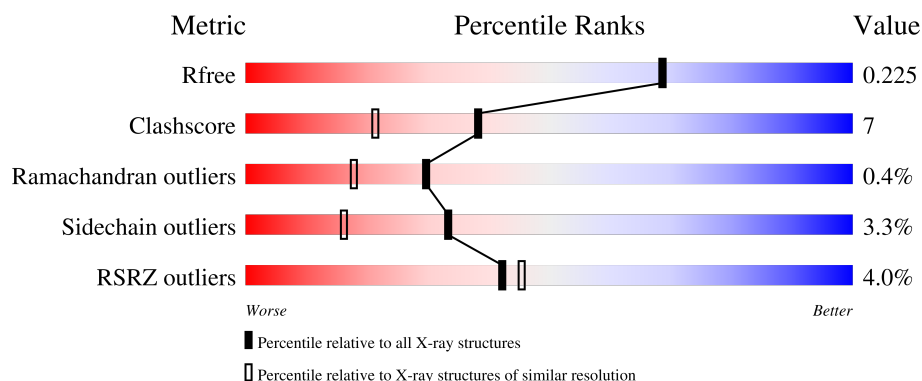
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.88 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}	180053	1220 (1.88-1.88)
Clashscore	190562	1234 (1.88-1.88)
Ramachandran outliers	187476	1222 (1.88-1.88)
Sidechain outliers	187428	1222 (1.88-1.88)
RSRZ outliers	180081	1220 (1.88-1.88)

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	440	9% 74% 15% • 9%
1	B	440	2% 78% 12% • 9%
1	C	440	3% 75% 16% • 9%
1	D	440	0% 79% 12% • 9%

2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 14164 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, endothelial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	401	Total	C	N	O	S	0	1	0
			3207	2043	564	584	16			
1	B	401	Total	C	N	O	S	0	3	0
			3211	2045	564	586	16			
1	C	401	Total	C	N	O	S	0	1	0
			3203	2040	563	584	16			
1	D	402	Total	C	N	O	S	0	1	0
			3214	2046	567	585	16			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	298	GLU	ASP	variant	UNP P29474
B	298	GLU	ASP	variant	UNP P29474
C	298	GLU	ASP	variant	UNP P29474
D	298	GLU	ASP	variant	UNP P29474

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



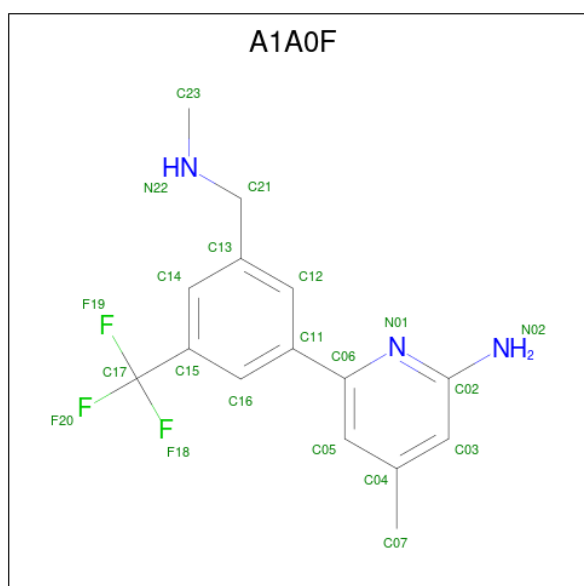
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	C	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	D	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- Molecule 3 is 5,6,7,8-TETRAHYDROBIOPTERIN (CCD ID: H4B) (formula: C₉H₁₅N₅O₃).



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 (6P)-4-methyl-6-{3-[(methylamino)methyl]-5-(trifluoromethyl)phenyl}pyridin-2-amine (CCD ID: A1A0F) (formula: C₁₅H₁₆F₃N₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	F	N	0	0
			21	15	3	3		
4	B	1	Total	C	F	N	0	0
			21	15	3	3		
4	C	1	Total	C	F	N	0	0
			21	15	3	3		
4	D	1	Total	C	F	N	0	0
			21	15	3	3		

- Molecule 5 is 2-[BIS-(2-HYDROXY-ETHYL)-AMINO]-2-HYDROXYMETHYL-PROPAN E-1,3-DIOL (CCD ID: BTB) (formula: C₈H₁₉NO₅).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	C	1	Total	C	N	O	0	0
			14	8	1	5		
5	C	1	Total	C	N	O	0	0
			14	8	1	5		
5	D	1	Total	C	N	O	0	0
			14	8	1	5		
5	D	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 7 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Cl	0	0
			1	1		
7	B	1	Total	Cl	0	0
			1	1		
7	C	1	Total	Cl	0	0
			1	1		
7	D	1	Total	Cl	0	0
			1	1		

- Molecule 8 is GADOLINIUM ION (CCD ID: GD3) (formula: Gd).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total 1	Gd 1	0	0
8	B	2	Total 2	Gd 2	0	0
8	D	1	Total 1	Gd 1	0	0

- Molecule 9 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	1	Total 1	Zn 1	0	0
9	C	1	Total 1	Zn 1	0	0

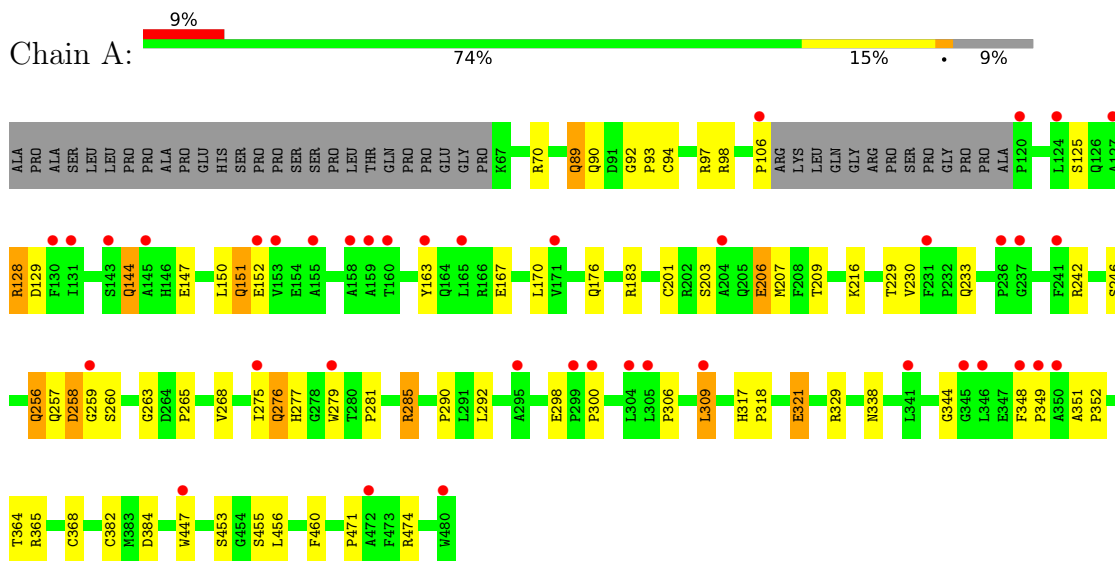
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	161	Total 161	O 161	0	0
10	B	226	Total 226	O 226	0	0
10	C	166	Total 166	O 166	0	0
10	D	254	Total 254	O 254	0	0

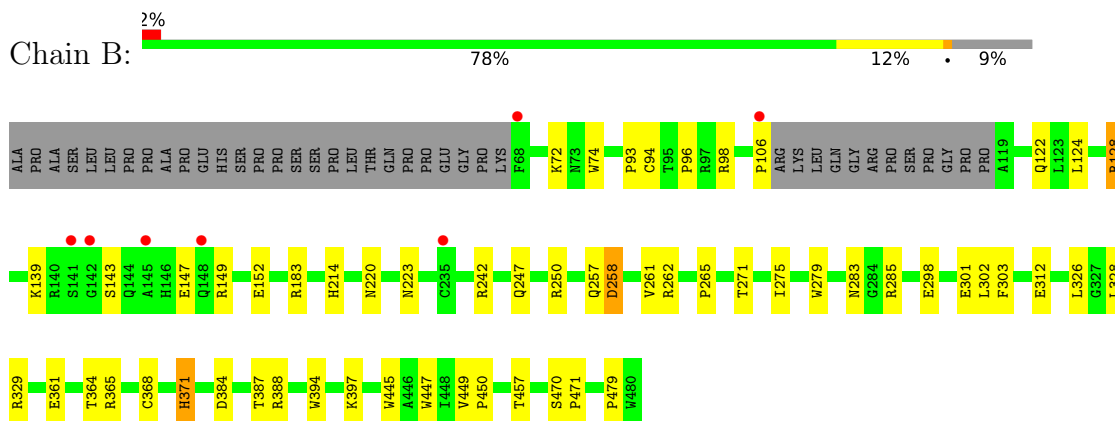
3 Residue-property plots [i](#)

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.

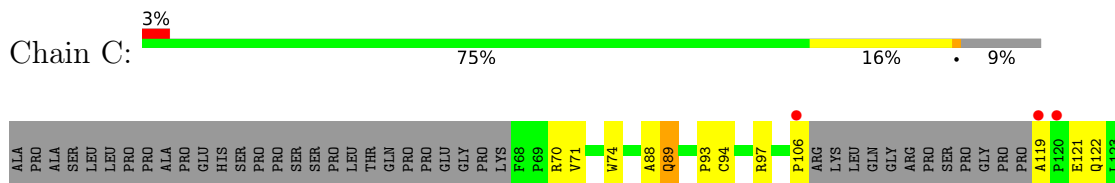
- Molecule 1: Nitric oxide synthase, endothelial

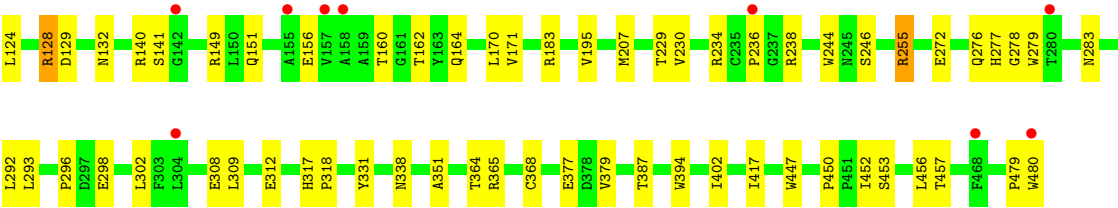


- Molecule 1: Nitric oxide synthase, endothelial

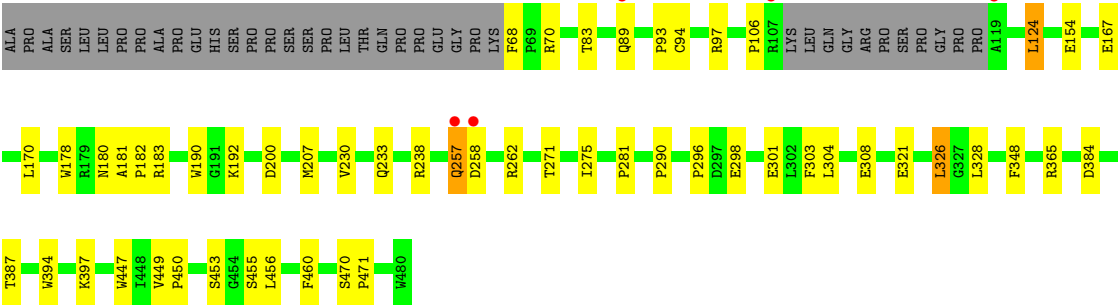
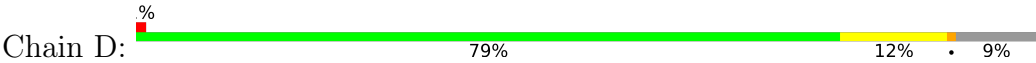


- Molecule 1: Nitric oxide synthase, endothelial





● Molecule 1: Nitric oxide synthase, endothelial



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	59.16Å 151.85Å 107.83Å 90.00° 90.73° 90.00°	Depositor
Resolution (Å)	46.66 – 1.88 46.66 – 1.88	Depositor EDS
% Data completeness (in resolution range)	99.8 (46.66-1.88) 99.9 (46.66-1.88)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.19 (at 1.88Å)	Xtriage
Refinement program	PHENIX 1.11.1_2575	Depositor
R, R_{free}	0.187 , 0.228 0.182 , 0.225	Depositor DCC
R_{free} test set	7746 reflections (3.99%)	wwPDB-VP
Wilson B-factor (Å ²)	32.2	Xtriage
Anisotropy	0.739	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 50.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.097 for h,-k,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	14164	wwPDB-VP
Average B, all atoms (Å ²)	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.32% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: CL, A1A0F, GOL, BTB, ZN, H4B, HEM, GD3

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	0.27	0/3302	0.48	0/4498
1	B	0.33	0/3312	0.55	2/4514 (0.0%)
1	C	0.26	0/3298	0.48	0/4495
1	D	0.35	0/3309	0.55	0/4509
All	All	0.30	0/13221	0.52	2/18016 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	371	HIS	CA-C-N	-5.29	117.47	123.13
1	B	371	HIS	C-N-CA	-5.29	117.47	123.13

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3207	0	3112	45	0
1	B	3211	0	3114	38	0
1	C	3203	0	3103	41	0
1	D	3214	0	3116	35	2
2	A	43	0	30	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	43	0	30	3	0
2	C	43	0	30	3	0
2	D	43	0	30	7	0
3	A	17	0	15	1	0
3	B	17	0	15	2	0
3	C	17	0	15	2	0
3	D	17	0	15	3	0
4	A	21	0	0	0	0
4	B	21	0	0	2	0
4	C	21	0	0	0	0
4	D	21	0	0	1	0
5	A	42	0	56	8	1
5	B	42	0	55	6	1
5	C	28	0	36	4	0
5	D	28	0	35	6	0
6	A	18	0	24	1	0
6	B	6	0	8	0	0
6	C	18	0	24	0	0
6	D	6	0	8	3	0
7	A	1	0	0	0	0
7	B	1	0	0	1	0
7	C	1	0	0	0	0
7	D	1	0	0	1	0
8	A	1	0	0	0	0
8	B	2	0	0	0	0
8	D	1	0	0	0	0
9	A	1	0	0	0	0
9	C	1	0	0	0	0
10	A	161	0	0	2	0
10	B	226	0	0	3	0
10	C	166	0	0	1	0
10	D	254	0	0	2	0
All	All	14164	0	12871	180	2

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 (180) 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)
4:D:503:A1A0F:N22	7:D:507:CL:CL	2.46	0.86

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:A:505:BTB:O3	5:A:505:BTB:O4	2.00	0.78
4:B:503:A1A0F:N22	7:B:507:CL:CL	2.53	0.78
1:A:70:ARG:NH2	10:A:603:HOH:O	2.24	0.71
1:A:147:GLU:O	1:A:151:GLN:NE2	2.22	0.70
2:D:501:HEM:HMC2	2:D:501:HEM:HBC2	1.73	0.70
1:C:128:ARG:O	1:C:132:ASN:ND2	2.25	0.70
1:B:279:TRP:HB2	1:B:302:LEU:HD21	1.74	0.69
1:B:247:GLN:HB2	1:B:250:ARG:HD3	1.75	0.69
2:D:501:HEM:HBB2	2:D:501:HEM:HHC	1.76	0.67
3:D:502:H4B:HN5	6:D:506:GOL:H12	1.61	0.65
2:C:501:HEM:HBB2	2:C:501:HEM:HHC	1.81	0.63
1:C:129:ASP:HA	1:C:132:ASN:HD22	1.63	0.63
1:A:128:ARG:HH11	1:A:128:ARG:HB2	1.65	0.62
1:D:70:ARG:NH2	10:D:601:HOH:O	2.16	0.62
2:A:501:HEM:HBB2	2:A:501:HEM:HHC	1.82	0.61
2:B:501:HEM:HBC2	2:B:501:HEM:HMC2	1.82	0.61
1:C:207:MET:HE3	1:C:293:LEU:HB3	1.82	0.60
1:A:321:GLU:H	1:A:321:GLU:CD	2.08	0.59
2:A:501:HEM:HMC2	2:A:501:HEM:HBC2	1.84	0.59
1:C:88:ALA:HB3	1:D:97:ARG:HD3	1.83	0.59
1:C:279:TRP:HB2	1:C:302:LEU:HD11	1.85	0.59
1:D:275:ILE:HD12	1:D:281:PRO:HG3	1.85	0.58
1:C:160:THR:HG23	1:C:162:THR:H	1.69	0.57
1:D:124:LEU:HD11	1:D:154:GLU:HG3	1.85	0.57
1:A:298:GLU:OE1	5:A:506:BTB:O4	2.23	0.56
1:A:147:GLU:HA	1:A:150:LEU:HD12	1.86	0.56
2:C:501:HEM:HBC2	2:C:501:HEM:HMC2	1.87	0.56
1:A:97:ARG:HH11	1:A:97:ARG:HB2	1.71	0.56
1:D:183:ARG:HB2	2:D:501:HEM:HBD2	1.88	0.56
1:C:119:ALA:HB1	1:C:122:GLN:HB2	1.87	0.56
1:D:180:ASN:O	1:D:182:PRO:HD3	2.06	0.55
1:A:242:ARG:HD2	1:A:349:PRO:HB2	1.88	0.55
1:D:453:SER:HB3	1:D:456:LEU:HD12	1.88	0.55
1:D:298:GLU:CD	5:D:505:BTB:H41	2.32	0.55
1:A:275:ILE:HD11	1:A:281:PRO:HB3	1.86	0.55
1:A:256:GLN:C	1:A:258:ASP:H	2.15	0.55
1:D:397:LYS:NZ	10:D:607:HOH:O	2.39	0.54
1:A:263:GLY:H	1:A:285:ARG:HG3	1.72	0.54
1:D:170:LEU:HD11	1:D:230:VAL:HG11	1.89	0.54
1:D:178:TRP:CE3	1:D:190:TRP:HA	2.43	0.53
1:C:234:ARG:HA	1:C:238:ARG:HH21	1.73	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:292:LEU:HD22	1:A:300:PRO:HB2	1.90	0.53
1:A:365:ARG:HH12	3:A:502:H4B:C4	2.21	0.53
1:A:183:ARG:HD3	1:A:447:TRP:CD2	2.45	0.52
1:D:271:THR:O	1:D:275:ILE:HG12	2.09	0.52
1:C:74:TRP:HB3	6:D:506:GOL:H32	1.91	0.52
1:C:365:ARG:HH12	3:C:502:H4B:C4	2.21	0.52
1:C:124:LEU:O	1:C:128:ARG:HG3	2.09	0.52
1:C:450:PRO:HG2	1:C:457:THR:HG21	1.91	0.52
1:A:167:GLU:OE2	6:A:507:GOL:H2	2.10	0.52
1:C:453:SER:HB3	1:C:456:LEU:HD12	1.91	0.52
1:B:447:TRP:HA	3:B:502:H4B:N1	2.24	0.52
1:B:183:ARG:HB2	2:B:501:HEM:HBD2	1.91	0.51
5:B:509:BTB:O6	5:B:509:BTB:O1	2.26	0.51
5:D:505:BTB:O4	5:D:505:BTB:H52	2.10	0.51
1:A:93:PRO:HB3	1:A:106:PRO:HB3	1.92	0.50
1:B:93:PRO:HB3	1:B:106:PRO:HB3	1.94	0.50
1:C:149:ARG:NH2	1:C:164:GLN:O	2.40	0.50
1:C:479:PRO:HD2	1:C:480:TRP:CZ3	2.46	0.50
1:D:93:PRO:HB3	1:D:106:PRO:HB2	1.93	0.50
1:A:176:GLN:HB2	1:A:471:PRO:HG2	1.93	0.49
1:D:447:TRP:HA	3:D:502:H4B:N1	2.26	0.49
1:C:171:VAL:HG22	1:C:195:VAL:HB	1.95	0.49
1:B:326:LEU:HB3	1:B:328:LEU:HG	1.93	0.49
1:C:93:PRO:HB3	1:C:106:PRO:HB3	1.94	0.48
1:C:246:SER:HA	1:C:338:ASN:HB3	1.94	0.48
1:A:384:ASP:OD1	5:A:504:BTB:O3	2.31	0.48
1:A:147:GLU:OE1	1:A:147:GLU:N	2.37	0.48
1:A:455:SER:HA	1:A:460:PHE:CG	2.48	0.48
1:A:92:GLY:N	1:B:96:PRO:O	2.40	0.48
1:A:163:TYR:OH	1:A:344:GLY:O	2.26	0.48
1:B:271:THR:O	1:B:275:ILE:HG13	2.13	0.48
1:D:298:GLU:OE2	5:D:505:BTB:H41	2.14	0.48
1:B:301:GLU:HB3	1:B:303:PHE:CE1	2.49	0.48
1:B:371:HIS:H	1:B:371:HIS:HD1	1.62	0.47
1:A:97:ARG:HG2	1:A:98:ARG:HG2	1.96	0.47
1:D:257:GLN:H	1:D:257:GLN:HG2	1.32	0.47
1:C:156:GLU:O	1:C:160:THR:HG22	2.15	0.47
5:C:504:BTB:O8	5:C:504:BTB:H62	2.14	0.47
5:B:509:BTB:H72	5:B:509:BTB:H31	1.63	0.47
1:A:364:THR:O	1:A:368:CYS:HB2	2.15	0.47
5:A:505:BTB:H11	5:A:505:BTB:H51	1.45	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:D:504:BTB:H32	5:D:504:BTB:H51	1.73	0.47
5:A:504:BTB:H51	5:A:504:BTB:H32	1.56	0.47
1:D:321:GLU:OE2	5:D:504:BTB:O4	2.32	0.47
1:B:384:ASP:OD1	5:B:509:BTB:H31	2.15	0.47
5:A:506:BTB:H72	5:A:506:BTB:H41	1.54	0.46
1:B:258:ASP:OD1	1:B:258:ASP:N	2.34	0.46
1:D:308:GLU:H	1:D:308:GLU:CD	2.23	0.46
1:B:450:PRO:HG3	1:B:457:THR:HG21	1.96	0.46
1:D:183:ARG:HB2	2:D:501:HEM:CGD	2.46	0.46
1:B:365:ARG:HH12	3:B:502:H4B:C4	2.27	0.46
5:C:505:BTB:H72	5:C:505:BTB:H32	1.38	0.46
1:A:233:GLN:HB3	1:A:348:PHE:CE2	2.51	0.46
1:A:265:PRO:HA	1:A:268:VAL:HG23	1.98	0.46
1:B:124:LEU:HB3	1:B:128:ARG:HH12	1.81	0.46
1:C:183:ARG:HD3	1:C:447:TRP:CD2	2.51	0.46
1:B:250:ARG:HA	1:B:250:ARG:HD2	1.67	0.46
1:D:181:ALA:HB1	2:D:501:HEM:HBD1	1.98	0.46
1:C:364:THR:O	1:C:368:CYS:HB2	2.15	0.46
1:A:207:MET:HE2	1:A:207:MET:HB3	1.83	0.45
1:D:326:LEU:HB3	1:D:328:LEU:HG	1.98	0.45
1:B:242:ARG:NH2	1:B:479:PRO:HD3	2.32	0.45
2:B:501:HEM:HHC	2:B:501:HEM:HBB2	1.97	0.45
5:B:509:BTB:O1	1:C:377:GLU:OE1	2.34	0.45
1:D:290:PRO:HB3	1:D:304:LEU:HD23	1.98	0.45
1:C:447:TRP:HA	3:C:502:H4B:N1	2.31	0.45
1:D:365:ARG:HH22	6:D:506:GOL:H2	1.82	0.45
1:A:201:CYS:SG	1:A:206:GLU:HB3	2.57	0.45
1:A:229:THR:O	1:A:352:PRO:HD2	2.17	0.45
1:A:279:TRP:CG	1:A:290:PRO:HG3	2.52	0.45
5:B:509:BTB:H81	5:B:509:BTB:H52	1.71	0.44
5:C:505:BTB:O4	5:C:505:BTB:O3	2.27	0.44
1:A:453:SER:HB3	1:A:456:LEU:HD12	1.99	0.44
1:B:106:PRO:HG3	10:B:670:HOH:O	2.16	0.44
1:B:149:ARG:NH1	1:B:152:GLU:OE1	2.51	0.44
1:D:301:GLU:HB3	1:D:303:PHE:CE1	2.53	0.44
1:A:170:LEU:HD11	1:A:230:VAL:HG11	1.99	0.44
1:C:387:THR:HA	1:C:394:TRP:CD1	2.52	0.44
1:B:261:VAL:HG11	1:B:265:PRO:HA	2.00	0.44
1:B:285:ARG:NH1	10:B:601:HOH:O	2.34	0.44
1:C:170:LEU:HD11	1:C:230:VAL:HG11	1.99	0.44
1:C:276:GLN:O	1:C:278:GLY:N	2.45	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:364:THR:O	1:B:368:CYS:HB2	2.19	0.43
1:C:364:THR:HG21	1:C:452:ILE:HG23	1.99	0.43
1:C:292:LEU:HD23	1:C:292:LEU:HA	1.90	0.43
1:C:244:TRP:CD1	1:C:479:PRO:HG2	2.53	0.43
1:B:72:LYS:HD3	1:B:74:TRP:CZ2	2.54	0.43
1:B:361:GLU:OE2	4:B:503:A1A0F:N02	2.52	0.43
1:C:317:HIS:CG	1:C:318:PRO:HD2	2.54	0.43
1:C:379:VAL:HG21	1:C:402:ILE:HD11	2.01	0.43
1:B:262:ARG:NE	1:B:283:ASN:O	2.46	0.43
1:A:128:ARG:HB2	1:A:128:ARG:NH1	2.32	0.42
1:B:397:LYS:NZ	10:B:618:HOH:O	2.51	0.42
1:A:97:ARG:HB2	1:A:97:ARG:NH1	2.34	0.42
1:A:306:PRO:HB2	1:A:309:LEU:HB2	2.01	0.42
1:B:298:GLU:OE1	5:B:505:BTB:H72	2.19	0.42
1:C:70:ARG:NE	10:C:621:HOH:O	2.51	0.42
1:A:89:GLN:HG3	1:A:90:GLN:N	2.34	0.42
1:A:233:GLN:OE1	10:A:601:HOH:O	2.22	0.42
1:A:317:HIS:CG	1:A:318:PRO:HD2	2.54	0.42
1:B:214:HIS:CD2	1:B:214:HIS:C	2.97	0.42
1:C:255:ARG:HB2	1:C:255:ARG:NH1	2.34	0.42
1:C:296:PRO:O	1:C:298:GLU:HG2	2.19	0.42
1:D:183:ARG:HB2	2:D:501:HEM:CBD	2.49	0.42
1:D:387:THR:HA	1:D:394:TRP:CD1	2.55	0.42
1:A:246:SER:HA	1:A:338:ASN:HB3	2.02	0.42
1:B:220:ASN:HB3	1:B:223:ASN:O	2.19	0.42
1:D:455:SER:HA	1:D:460:PHE:CG	2.55	0.42
1:A:150:LEU:HB2	1:A:151:GLN:HE21	1.85	0.42
1:B:312:GLU:CD	1:B:329:ARG:HH21	2.28	0.42
1:C:183:ARG:HB2	2:C:501:HEM:HBD2	2.02	0.42
1:C:283:ASN:O	1:C:283:ASN:ND2	2.53	0.42
1:C:312:GLU:HA	1:C:331:TYR:HA	2.01	0.42
1:D:238:ARG:HG3	1:D:296:PRO:HB3	2.01	0.42
1:D:365:ARG:HH12	3:D:502:H4B:C4	2.32	0.42
1:A:229:THR:O	1:A:351:ALA:HA	2.20	0.42
1:B:387:THR:HA	1:B:394:TRP:CD1	2.55	0.42
1:B:326:LEU:HD12	5:C:504:BTB:H41	2.01	0.41
1:C:236:PRO:C	1:C:238:ARG:H	2.28	0.41
1:A:94:CYS:HB3	1:B:94:CYS:HB3	2.01	0.41
1:A:258:ASP:O	1:A:260:SER:N	2.45	0.41
1:D:298:GLU:OE1	5:D:505:BTB:H51	2.21	0.41
1:B:139:LYS:N	1:B:139:LYS:HD2	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:276:GLN:C	1:C:278:GLY:H	2.28	0.41
1:D:449:VAL:HA	1:D:450:PRO:HD3	1.91	0.41
1:B:445:TRP:CE2	1:B:449:VAL:HG21	2.55	0.41
1:C:94:CYS:HB3	1:D:94:CYS:HB3	2.01	0.41
5:A:505:BTB:H41	5:A:505:BTB:H72	1.71	0.41
1:B:143:SER:O	1:B:147:GLU:HG2	2.20	0.41
1:A:276:GLN:OE1	1:A:277:HIS:ND1	2.54	0.40
1:A:382:CYS:HA	5:A:504:BTB:H11	2.03	0.40
1:D:68:PHE:CD2	1:D:83:THR:HA	2.57	0.40
1:D:233:GLN:HB3	1:D:348:PHE:CE2	2.56	0.40
1:D:470:SER:HA	1:D:471:PRO:C	2.46	0.40
2:D:501:HEM:HBB2	2:D:501:HEM:CHC	2.48	0.40
1:B:183:ARG:HD3	1:B:447:TRP:CD2	2.57	0.40
1:B:470:SER:HA	1:B:471:PRO:C	2.47	0.40
1:C:229:THR:O	1:C:351:ALA:HA	2.22	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:167:GLU:OE1	5:B:505:BTB:O1[1_554]	2.09	0.11
1:D:384:ASP:OD2	5:A:505:BTB:O6[1_655]	2.13	0.07

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	398/440 (90%)	379 (95%)	15 (4%)	4 (1%)	12	3
1	B	400/440 (91%)	393 (98%)	7 (2%)	0	100	100
1	C	398/440 (90%)	385 (97%)	11 (3%)	2 (0%)	24	13
1	D	399/440 (91%)	391 (98%)	7 (2%)	1 (0%)	36	26

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	1595/1760 (91%)	1548 (97%)	40 (2%)	7 (0%)	30	18

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	144	GLN
1	A	203	SER
1	A	257	GLN
1	C	89	GLN
1	C	277	HIS
1	D	89	GLN
1	A	259	GLY

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	342/373 (92%)	324 (95%)	18 (5%)	20	6
1	B	343/373 (92%)	337 (98%)	6 (2%)	53	40
1	C	341/373 (91%)	328 (96%)	13 (4%)	29	13
1	D	342/373 (92%)	334 (98%)	8 (2%)	44	29
All	All	1368/1492 (92%)	1323 (97%)	45 (3%)	33	16

All (45) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	89	GLN
1	A	125	SER
1	A	128	ARG
1	A	129	ASP
1	A	144	GLN
1	A	151	GLN
1	A	152	GLU
1	A	206	GLU

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Mol	Chain	Res	Type
1	A	209	THR
1	A	216	LYS
1	A	256	GLN
1	A	258	ASP
1	A	276	GLN
1	A	285	ARG
1	A	309	LEU
1	A	321	GLU
1	A	329	ARG
1	A	474	ARG
1	B	98	ARG
1	B	122	GLN
1	B	128	ARG
1	B	257	GLN
1	B	258	ASP
1	B	388	ARG
1	C	71	VAL
1	C	89	GLN
1	C	97	ARG
1	C	121	GLU
1	C	128	ARG
1	C	140	ARG
1	C	141	SER
1	C	151	GLN
1	C	255	ARG
1	C	272	GLU
1	C	308	GLU
1	C	309	LEU
1	C	417	ILE
1	D	124	LEU
1	D	192	LYS
1	D	200	ASP
1	D	207	MET
1	D	257	GLN
1	D	258	ASP
1	D	262	ARG
1	D	326	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	205	GLN

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Mol	Chain	Res	Type
1	A	256	GLN
1	A	476	GLN
1	C	133	GLN
1	D	90	GLN
1	D	408	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 40 ligands modelled in this entry, 10 are monoatomic - leaving 30 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	BTB	C	505	-	13,13,13	0.40	0	7,16,16	0.48	0
3	H4B	D	502	-	17,18,18	0.95	0	14,26,26	1.71	4 (28%)
5	BTB	D	505	-	13,13,13	0.67	0	7,16,16	1.39	2 (28%)
5	BTB	A	504	8	13,13,13	0.48	0	7,16,16	1.33	1 (14%)
5	BTB	B	504	8	13,13,13	0.41	0	7,16,16	0.60	0
5	BTB	A	505	-	13,13,13	0.46	0	7,16,16	0.68	0
3	H4B	A	502	-	17,18,18	0.84	0	14,26,26	1.87	4 (28%)
5	BTB	B	505	-	13,13,13	0.48	0	7,16,16	1.05	1 (14%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	GOL	C	507	-	5,5,5	0.34	0	5,5,5	0.23	0
3	H4B	B	502	-	17,18,18	0.93	0	14,26,26	2.07	6 (42%)
5	BTB	C	504	8	13,13,13	0.41	0	7,16,16	1.02	1 (14%)
2	HEM	C	501	1	50,50,50	1.65	8 (16%)	67,82,82	1.41	11 (16%)
4	A1A0F	B	503	-	22,22,22	0.55	0	31,32,32	1.45	4 (12%)
4	A1A0F	A	503	-	22,22,22	0.30	0	31,32,32	1.30	3 (9%)
6	GOL	B	506	-	5,5,5	0.33	0	5,5,5	0.49	0
2	HEM	B	501	1	50,50,50	1.57	7 (14%)	67,82,82	1.56	15 (22%)
5	BTB	A	506	-	13,13,13	0.35	0	7,16,16	0.39	0
3	H4B	C	502	-	17,18,18	0.98	0	14,26,26	2.09	6 (42%)
2	HEM	D	501	1	50,50,50	1.63	7 (14%)	67,82,82	1.42	13 (19%)
4	A1A0F	C	503	-	22,22,22	0.37	0	31,32,32	1.44	4 (12%)
4	A1A0F	D	503	-	22,22,22	0.51	0	31,32,32	1.34	3 (9%)
6	GOL	A	512	-	5,5,5	0.61	0	5,5,5	1.63	2 (40%)
5	BTB	D	504	8	13,13,13	0.43	0	7,16,16	0.81	0
6	GOL	A	508	-	5,5,5	0.35	0	5,5,5	0.34	0
5	BTB	B	509	-	13,13,13	0.47	0	7,16,16	0.77	0
6	GOL	A	507	-	5,5,5	0.38	0	5,5,5	0.43	0
6	GOL	C	506	-	5,5,5	0.36	0	5,5,5	0.43	0
6	GOL	C	508	-	5,5,5	0.34	0	5,5,5	0.27	0
2	HEM	A	501	1	50,50,50	1.64	7 (14%)	67,82,82	1.34	8 (11%)
6	GOL	D	506	-	5,5,5	0.41	0	5,5,5	0.44	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
5	BTB	C	505	-	-	9/21/21/21	-
3	H4B	D	502	-	-	0/8/17/17	0/2/2/2
5	BTB	D	505	-	-	6/21/21/21	-
5	BTB	A	504	8	-	5/21/21/21	-
5	BTB	B	504	8	-	3/21/21/21	-
5	BTB	A	505	-	-	13/21/21/21	-
3	H4B	A	502	-	-	1/8/17/17	0/2/2/2
5	BTB	B	505	-	-	17/21/21/21	-
6	GOL	C	507	-	-	0/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	H4B	B	502	-	-	0/8/17/17	0/2/2/2
5	BTB	C	504	8	-	6/21/21/21	-
2	HEM	C	501	1	-	1/14/54/54	-
4	A1A0F	B	503	-	-	4/13/13/13	0/2/2/2
4	A1A0F	A	503	-	-	5/13/13/13	0/2/2/2
6	GOL	B	506	-	-	2/4/4/4	-
2	HEM	B	501	1	-	2/14/54/54	-
5	BTB	A	506	-	-	1/21/21/21	-
3	H4B	C	502	-	-	0/8/17/17	0/2/2/2
2	HEM	D	501	1	-	3/14/54/54	-
4	A1A0F	C	503	-	-	5/13/13/13	0/2/2/2
4	A1A0F	D	503	-	-	4/13/13/13	0/2/2/2
6	GOL	A	512	-	-	3/4/4/4	-
5	BTB	D	504	8	-	1/21/21/21	-
6	GOL	A	508	-	-	1/4/4/4	-
5	BTB	B	509	-	-	17/21/21/21	-
6	GOL	A	507	-	-	4/4/4/4	-
6	GOL	C	506	-	-	2/4/4/4	-
6	GOL	C	508	-	-	4/4/4/4	-
2	HEM	A	501	1	-	2/14/54/54	-
6	GOL	D	506	-	-	0/4/4/4	-

All (29) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	501	HEM	FE-NB	5.38	2.11	1.94
2	B	501	HEM	FE-NC	5.20	2.12	1.95
2	A	501	HEM	FE-NB	5.18	2.10	1.94
2	D	501	HEM	FE-NC	5.16	2.12	1.95
2	C	501	HEM	FE-NC	5.05	2.11	1.95
2	A	501	HEM	FE-ND	4.86	2.09	1.94
2	C	501	HEM	FE-ND	4.52	2.08	1.94
2	C	501	HEM	FE-NB	4.39	2.08	1.94
2	A	501	HEM	FE-NC	4.08	2.08	1.95
2	B	501	HEM	FE-NA	3.95	2.08	1.95
2	D	501	HEM	FE-NA	3.42	2.06	1.95
2	C	501	HEM	FE-NA	3.40	2.06	1.95
2	C	501	HEM	CAB-C3B	3.20	1.55	1.47
2	A	501	HEM	CAB-C3B	3.18	1.55	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	HEM	FE-NB	3.14	2.04	1.94
2	B	501	HEM	CAB-C3B	2.99	1.55	1.47
2	B	501	HEM	FE-ND	2.96	2.04	1.94
2	C	501	HEM	CAC-C3C	2.95	1.55	1.47
2	B	501	HEM	CAC-C3C	2.92	1.55	1.47
2	A	501	HEM	CAC-C3C	2.89	1.55	1.47
2	D	501	HEM	CAB-C3B	2.82	1.54	1.47
2	D	501	HEM	CAC-C3C	2.80	1.54	1.47
2	A	501	HEM	FE-NA	2.69	2.04	1.95
2	B	501	HEM	CMC-C2C	2.35	1.55	1.50
2	D	501	HEM	CMC-C2C	2.35	1.55	1.50
2	C	501	HEM	CMC-C2C	2.32	1.55	1.50
2	D	501	HEM	FE-ND	2.30	2.02	1.94
2	C	501	HEM	CMB-C2B	2.24	1.55	1.50
2	A	501	HEM	CMD-C2D	2.10	1.55	1.50

All (88) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	502	H4B	C2-N1-C8A	4.41	121.14	113.36
4	C	503	A1A0F	C06-N01-C02	4.28	121.18	118.52
4	D	503	A1A0F	C06-N01-C02	4.26	121.17	118.52
2	B	501	HEM	CBD-CAD-C3D	-4.21	100.89	112.53
3	C	502	H4B	C2-N1-C8A	4.01	120.44	113.36
3	A	502	H4B	C2-N1-C8A	3.95	120.33	113.36
3	D	502	H4B	C2-N1-C8A	3.86	120.18	113.36
4	B	503	A1A0F	C06-N01-C02	3.62	120.77	118.52
2	B	501	HEM	C3B-C2B-C1B	3.60	109.12	106.41
4	B	503	A1A0F	C11-C06-N01	3.55	121.16	116.04
4	A	503	A1A0F	C06-N01-C02	3.41	120.64	118.52
4	D	503	A1A0F	C11-C06-N01	3.36	120.89	116.04
2	B	501	HEM	CHD-C1D-ND	3.34	128.02	124.42
2	D	501	HEM	CBD-CAD-C3D	-3.33	103.32	112.53
3	C	502	H4B	O4-C4-C4A	-3.33	119.24	127.26
2	C	501	HEM	CBA-CAA-C2A	-3.29	103.43	112.53
4	C	503	A1A0F	C11-C06-N01	3.28	120.78	116.04
2	D	501	HEM	CBA-CAA-C2A	-3.25	103.54	112.53
2	C	501	HEM	CBD-CAD-C3D	-3.22	103.64	112.53
2	C	501	HEM	C2A-C1A-NA	-3.20	106.60	110.15
3	B	502	H4B	C11-C10-C9	-3.16	108.24	112.11
5	A	504	BTB	O3-C3-C2	3.12	118.74	111.40
2	B	501	HEM	C3B-C4B-NB	-3.07	107.26	109.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	502	H4B	O4-C4-C4A	-3.07	119.86	127.26
2	A	501	HEM	C3B-C2B-C1B	3.02	108.68	106.41
2	C	501	HEM	C3B-C4B-NB	-2.99	107.32	109.47
4	B	503	A1A0F	C05-C06-C11	-2.96	117.80	121.82
2	B	501	HEM	O1D-CGD-CBD	-2.93	113.79	123.09
6	A	512	GOL	O2-C2-C1	-2.91	97.13	109.18
2	A	501	HEM	C2A-C1A-NA	-2.85	106.99	110.15
2	B	501	HEM	C1B-NB-C4B	2.84	108.57	105.21
2	A	501	HEM	CBD-CAD-C3D	-2.79	104.81	112.53
2	D	501	HEM	C2A-C1A-NA	-2.78	107.07	110.15
3	B	502	H4B	O4-C4-C4A	-2.72	120.69	127.26
4	A	503	A1A0F	C11-C06-N01	2.72	119.97	116.04
2	C	501	HEM	C3D-C4D-ND	-2.68	107.23	110.17
3	B	502	H4B	C4A-C4-N3	2.67	119.47	112.13
3	C	502	H4B	C2-N3-C4	-2.66	120.30	125.11
3	C	502	H4B	C4A-C4-N3	2.64	119.37	112.13
3	A	502	H4B	C4A-C4-N3	2.64	119.37	112.13
2	A	501	HEM	C4D-ND-C1D	2.61	108.30	105.21
2	A	501	HEM	C1B-NB-C4B	2.57	108.25	105.21
2	B	501	HEM	O2D-CGD-CBD	2.54	122.01	114.00
2	D	501	HEM	C4D-ND-C1D	2.51	108.18	105.21
3	C	502	H4B	C11-C10-C9	-2.50	109.05	112.11
2	D	501	HEM	C3B-C2B-C1B	2.49	108.28	106.41
2	B	501	HEM	C3D-C4D-ND	-2.47	107.46	110.17
3	D	502	H4B	O4-C4-C4A	-2.47	121.30	127.26
2	B	501	HEM	CAD-C3D-C2D	-2.45	123.27	127.87
2	C	501	HEM	C4D-ND-C1D	2.43	108.08	105.21
3	A	502	H4B	C2-N3-C4	-2.43	120.71	125.11
2	B	501	HEM	C4D-ND-C1D	2.39	108.04	105.21
2	D	501	HEM	C3D-C4D-ND	-2.38	107.56	110.17
2	D	501	HEM	CAD-C3D-C2D	-2.37	123.43	127.87
5	D	505	BTB	O1-C1-C2	-2.36	105.85	111.40
2	D	501	HEM	C4A-NA-C1A	2.35	109.65	105.82
3	D	502	H4B	C4A-C4-N3	2.34	118.56	112.13
4	C	503	A1A0F	C05-C06-C11	-2.33	118.66	121.82
2	D	501	HEM	O1D-CGD-CBD	-2.29	115.83	123.09
2	B	501	HEM	CBA-CAA-C2A	-2.28	106.24	112.53
2	A	501	HEM	C3D-C4D-ND	-2.25	107.70	110.17
2	D	501	HEM	CHD-C1D-ND	2.23	126.82	124.42
2	A	501	HEM	O1D-CGD-CBD	-2.22	116.04	123.09
2	B	501	HEM	C2D-C1D-ND	-2.19	107.38	109.90
5	C	504	BTB	O3-C3-C2	2.17	116.51	111.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	512	GOL	O1-C1-C2	-2.17	100.60	110.38
3	B	502	H4B	C2-N3-C4	-2.17	121.19	125.11
2	B	501	HEM	C2B-C1B-NB	-2.15	107.36	109.84
2	D	501	HEM	C1B-NB-C4B	2.15	107.75	105.21
2	C	501	HEM	O1D-CGD-CBD	-2.13	116.32	123.09
2	A	501	HEM	C3B-C4B-NB	-2.13	107.94	109.47
2	C	501	HEM	C4C-NC-C1C	2.12	109.28	105.82
4	D	503	A1A0F	C05-C06-N01	-2.11	119.89	122.34
2	C	501	HEM	C1B-NB-C4B	2.10	107.69	105.21
2	B	501	HEM	CAD-C3D-C4D	2.10	128.35	124.70
4	C	503	A1A0F	N02-C02-N01	2.09	119.95	116.59
2	D	501	HEM	O2D-CGD-CBD	2.07	120.54	114.00
5	B	505	BTB	O3-C3-C2	-2.06	106.55	111.40
5	D	505	BTB	C6-C5-N	2.05	119.61	111.59
3	C	502	H4B	O10-C10-C9	-2.04	106.39	109.77
3	D	502	H4B	C2-N3-C4	-2.04	121.42	125.11
2	C	501	HEM	C4A-NA-C1A	2.03	109.14	105.82
4	B	503	A1A0F	C16-C11-C12	2.03	121.32	118.35
2	C	501	HEM	O2D-CGD-CBD	2.02	120.39	114.00
3	B	502	H4B	N3-C2-N1	-2.02	119.62	123.32
2	B	501	HEM	C2A-C1A-NA	-2.01	107.92	110.15
4	A	503	A1A0F	C05-C06-C11	-2.00	119.10	121.82
2	D	501	HEM	CAD-C3D-C4D	2.00	128.18	124.70

There are no chirality outliers.

All (121) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	503	A1A0F	C13-C21-N22-C23
4	C	503	A1A0F	C13-C21-N22-C23
5	A	504	BTB	O1-C1-C2-N
5	A	504	BTB	C1-C2-C4-O4
5	A	504	BTB	C3-C2-C4-O4
5	A	504	BTB	N-C2-C4-O4
5	A	505	BTB	C1-C2-C4-O4
5	A	505	BTB	C1-C2-N-C5
5	A	505	BTB	C1-C2-N-C7
5	A	505	BTB	C3-C2-N-C5
5	A	505	BTB	C3-C2-N-C7
5	A	505	BTB	C4-C2-N-C5
5	A	505	BTB	C4-C2-N-C7
5	B	504	BTB	O1-C1-C2-C3

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Mol	Chain	Res	Type	Atoms
5	B	504	BTB	O1-C1-C2-C4
5	B	504	BTB	O1-C1-C2-N
5	B	505	BTB	O1-C1-C2-C3
5	B	505	BTB	O1-C1-C2-C4
5	B	505	BTB	O1-C1-C2-N
5	B	505	BTB	C1-C2-C3-O3
5	B	505	BTB	C4-C2-C3-O3
5	B	505	BTB	N-C2-C3-O3
5	B	505	BTB	C1-C2-C4-O4
5	B	505	BTB	C3-C2-C4-O4
5	B	505	BTB	N-C2-C4-O4
5	B	505	BTB	C1-C2-N-C5
5	B	505	BTB	C1-C2-N-C7
5	B	505	BTB	C3-C2-N-C5
5	B	505	BTB	C3-C2-N-C7
5	B	505	BTB	C4-C2-N-C5
5	B	505	BTB	C4-C2-N-C7
5	B	509	BTB	O1-C1-C2-C3
5	B	509	BTB	O1-C1-C2-C4
5	B	509	BTB	O1-C1-C2-N
5	B	509	BTB	C1-C2-C3-O3
5	B	509	BTB	C4-C2-C3-O3
5	B	509	BTB	N-C2-C3-O3
5	B	509	BTB	C1-C2-C4-O4
5	B	509	BTB	C3-C2-C4-O4
5	B	509	BTB	N-C2-C4-O4
5	B	509	BTB	C1-C2-N-C7
5	B	509	BTB	C3-C2-N-C7
5	C	504	BTB	O1-C1-C2-C3
5	C	504	BTB	C4-C2-C3-O3
5	C	505	BTB	C1-C2-C3-O3
5	C	505	BTB	N-C2-C3-O3
5	C	505	BTB	C1-C2-N-C5
5	C	505	BTB	C1-C2-N-C7
5	C	505	BTB	C3-C2-N-C5
5	C	505	BTB	C3-C2-N-C7
5	C	505	BTB	C4-C2-N-C5
5	C	505	BTB	C4-C2-N-C7
5	D	505	BTB	C1-C2-C3-O3
5	D	505	BTB	C4-C2-C3-O3
5	D	505	BTB	N-C2-C3-O3
5	D	505	BTB	C6-C5-N-C7

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Mol	Chain	Res	Type	Atoms
6	A	507	GOL	O1-C1-C2-C3
6	A	507	GOL	C1-C2-C3-O3
6	A	507	GOL	O2-C2-C3-O3
6	A	512	GOL	O1-C1-C2-C3
6	B	506	GOL	O1-C1-C2-C3
6	C	506	GOL	O1-C1-C2-C3
6	C	508	GOL	O1-C1-C2-C3
6	C	508	GOL	O1-C1-C2-O2
6	A	512	GOL	C1-C2-C3-O3
6	C	508	GOL	C1-C2-C3-O3
5	B	505	BTB	N-C5-C6-O6
5	B	505	BTB	N-C7-C8-O8
5	B	509	BTB	N-C5-C6-O6
5	A	505	BTB	C1-C2-C3-O3
5	B	509	BTB	C8-C7-N-C5
5	D	505	BTB	N-C7-C8-O8
6	A	507	GOL	O1-C1-C2-O2
6	A	512	GOL	O1-C1-C2-O2
6	B	506	GOL	O1-C1-C2-O2
6	C	506	GOL	O1-C1-C2-O2
6	C	508	GOL	O2-C2-C3-O3
5	A	505	BTB	C3-C2-C4-O4
5	D	504	BTB	C3-C2-C4-O4
5	A	505	BTB	N-C7-C8-O8
2	D	501	HEM	C4B-C3B-CAB-CBB
5	A	505	BTB	N-C2-C4-O4
5	B	509	BTB	C1-C2-N-C5
5	B	509	BTB	C3-C2-N-C5
5	B	509	BTB	C4-C2-N-C5
5	B	509	BTB	C4-C2-N-C7
5	C	504	BTB	N-C2-C3-O3
5	D	505	BTB	N-C5-C6-O6
4	C	503	A1A0F	C05-C06-C11-C12
5	C	504	BTB	N-C7-C8-O8
5	A	505	BTB	N-C5-C6-O6
4	D	503	A1A0F	C05-C06-C11-C12
5	C	504	BTB	C1-C2-C3-O3
5	C	505	BTB	C4-C2-C3-O3
4	C	503	A1A0F	C05-C06-C11-C16
4	D	503	A1A0F	C05-C06-C11-C16
4	C	503	A1A0F	N01-C06-C11-C12
2	A	501	HEM	C2A-CAA-CBA-CGA

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Mol	Chain	Res	Type	Atoms
4	C	503	A1A0F	N01-C06-C11-C16
4	D	503	A1A0F	N01-C06-C11-C12
4	B	503	A1A0F	C05-C06-C11-C12
2	D	501	HEM	CAD-CBD-CGD-O2D
4	D	503	A1A0F	N01-C06-C11-C16
2	D	501	HEM	CAD-CBD-CGD-O1D
2	C	501	HEM	C2A-CAA-CBA-CGA
4	B	503	A1A0F	N01-C06-C11-C12
2	B	501	HEM	CAD-CBD-CGD-O2D
4	B	503	A1A0F	C05-C06-C11-C16
2	A	501	HEM	C4B-C3B-CAB-CBB
2	B	501	HEM	CAD-CBD-CGD-O1D
4	B	503	A1A0F	N01-C06-C11-C16
4	A	503	A1A0F	C05-C06-C11-C12
4	A	503	A1A0F	C05-C06-C11-C16
4	A	503	A1A0F	N01-C06-C11-C12
3	A	502	H4B	N5-C6-C9-O9
4	A	503	A1A0F	N01-C06-C11-C16
5	A	504	BTB	N-C2-C3-O3
5	A	505	BTB	N-C2-C3-O3
5	A	506	BTB	C4-C2-N-C7
5	C	504	BTB	O1-C1-C2-N
6	A	508	GOL	O2-C2-C3-O3

There are no ring outliers.

21 monomers are involved in 55 short contacts:

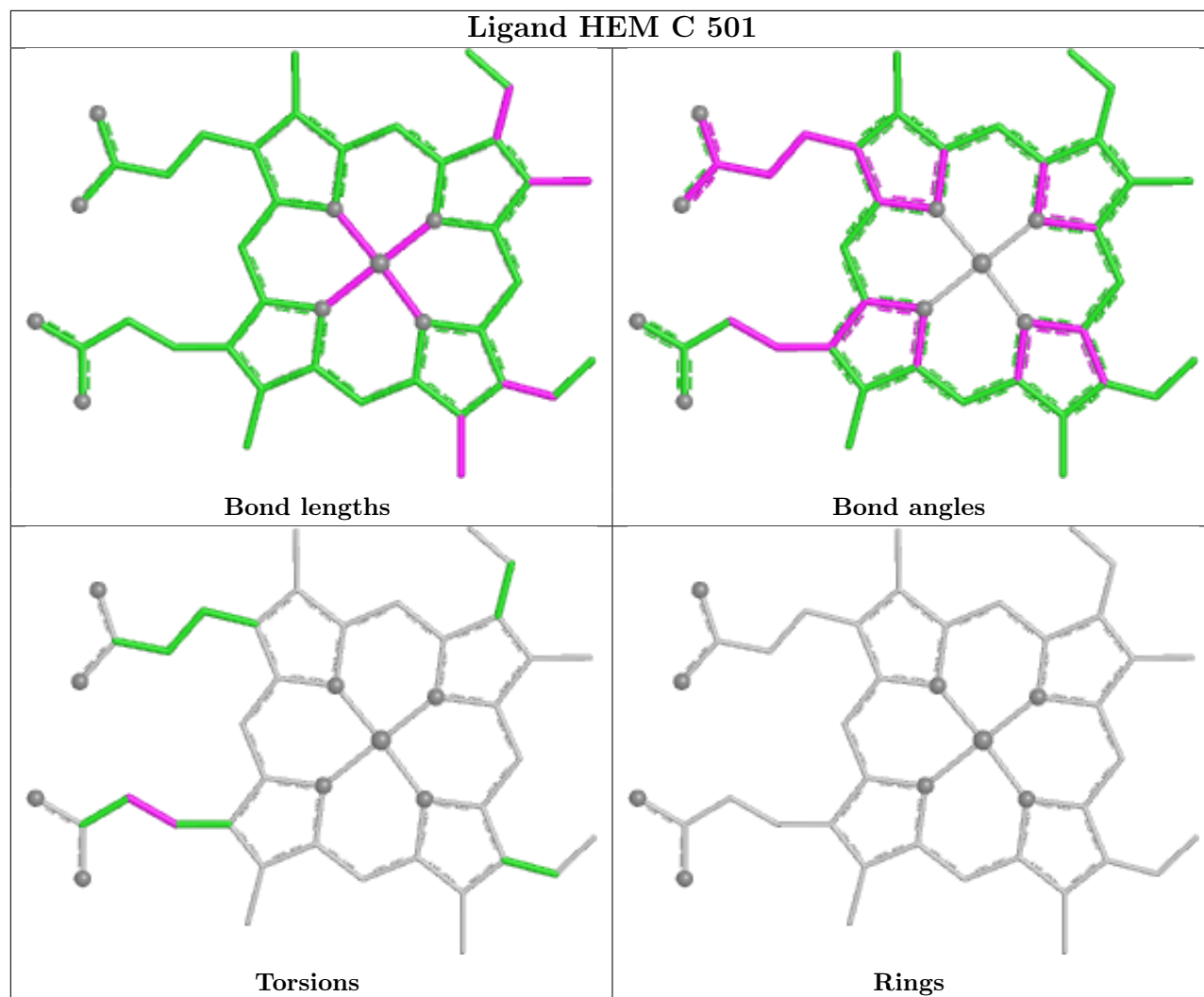
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	505	BTB	2	0
3	D	502	H4B	3	0
5	D	505	BTB	4	0
5	A	504	BTB	3	0
5	A	505	BTB	3	1
3	A	502	H4B	1	0
5	B	505	BTB	1	1
3	B	502	H4B	2	0
5	C	504	BTB	2	0
2	C	501	HEM	3	0
4	B	503	A1A0F	2	0
2	B	501	HEM	3	0
5	A	506	BTB	2	0
3	C	502	H4B	2	0

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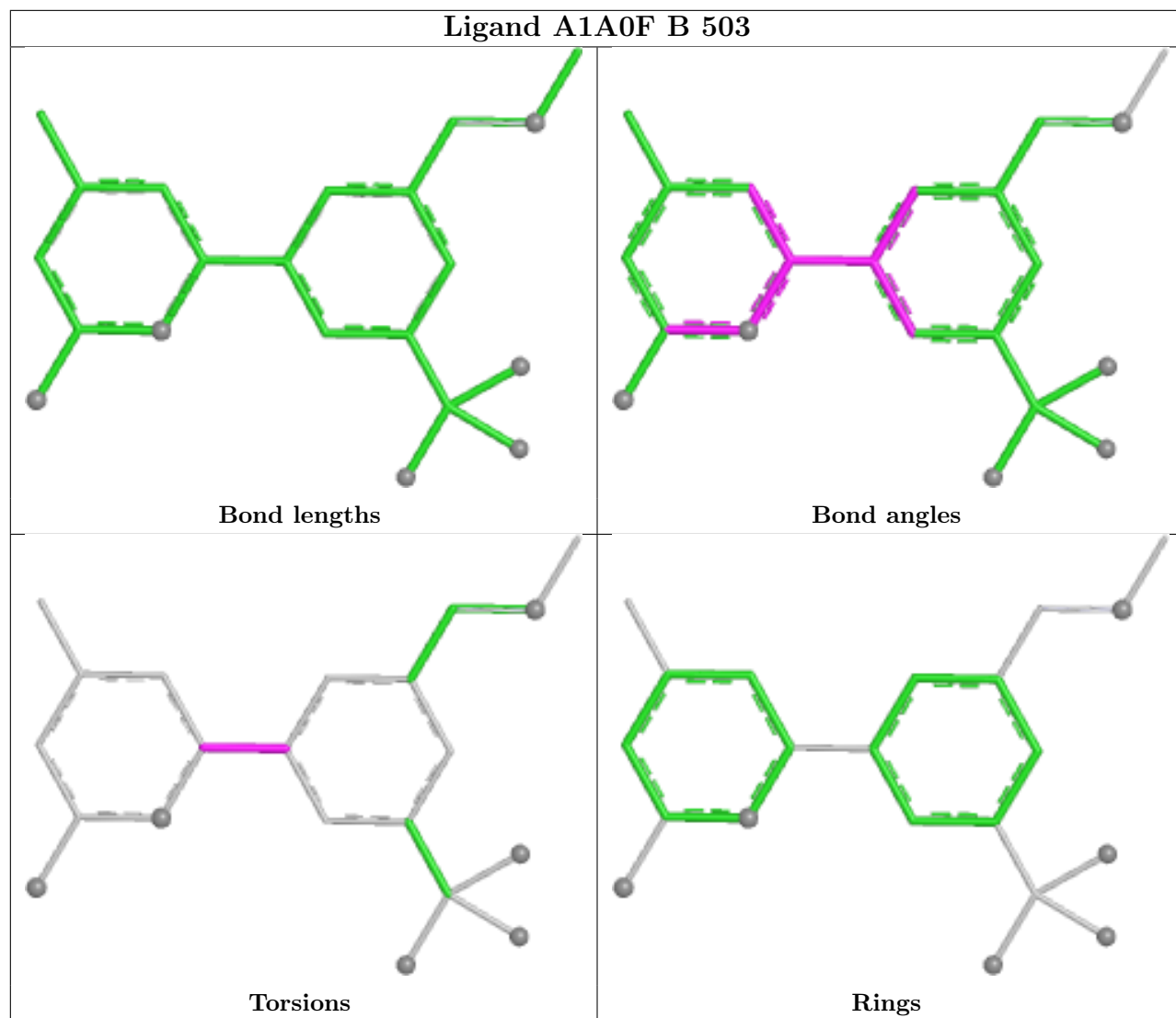
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	501	HEM	7	0
4	D	503	A1A0F	1	0
5	D	504	BTB	2	0
5	B	509	BTB	5	0
6	A	507	GOL	1	0
2	A	501	HEM	2	0
6	D	506	GOL	3	0

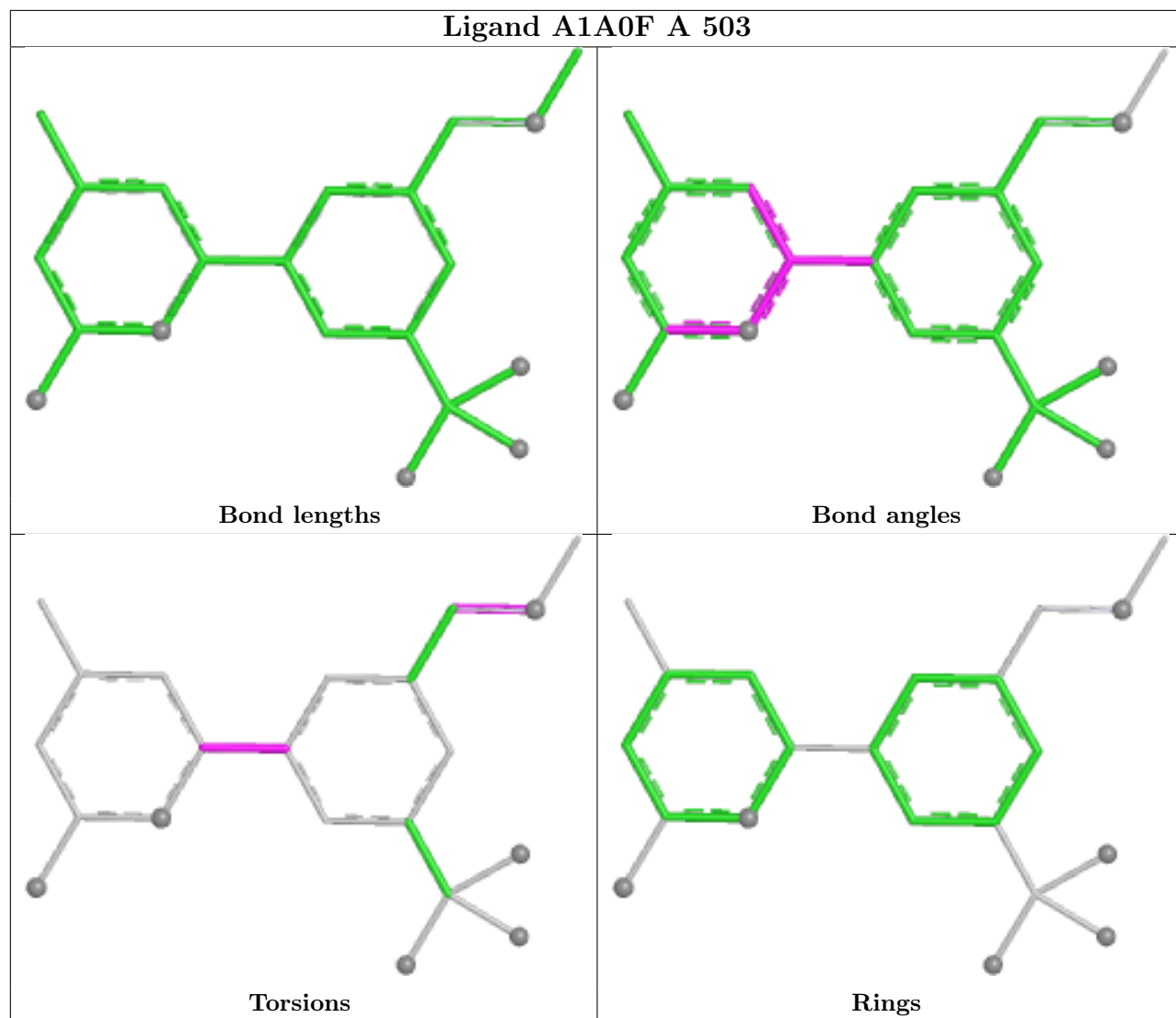
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

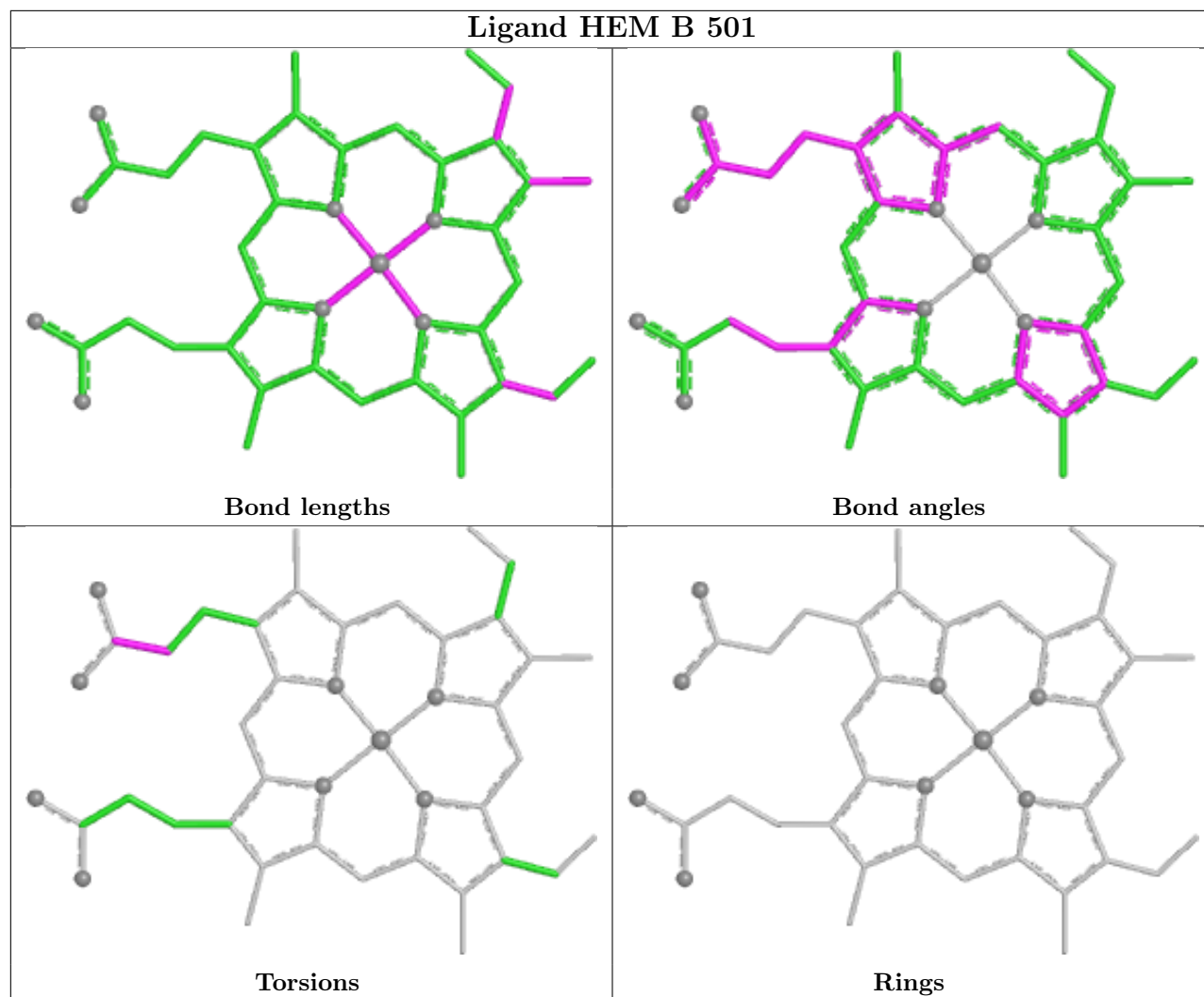


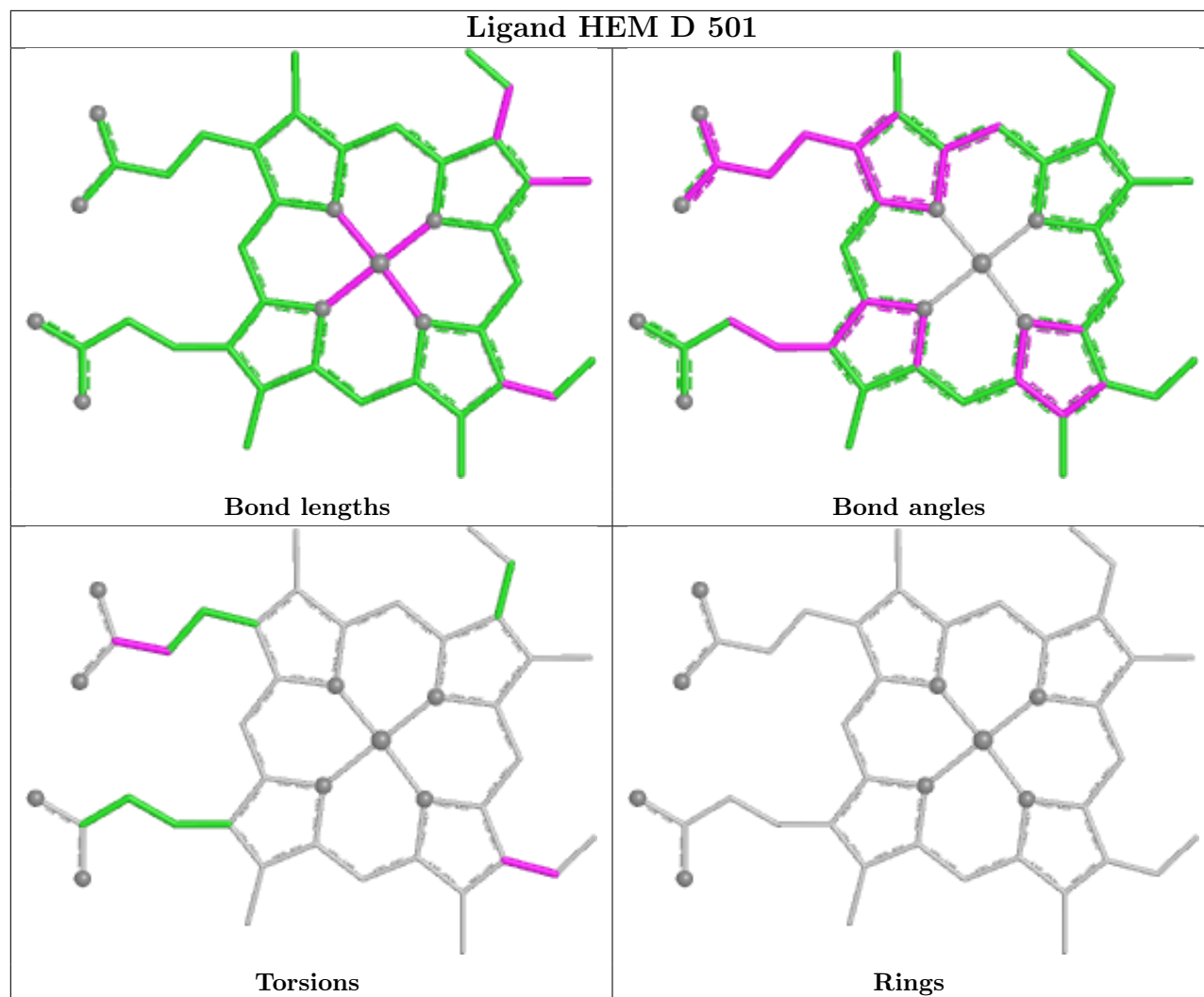
Ligand A1A0F B 503



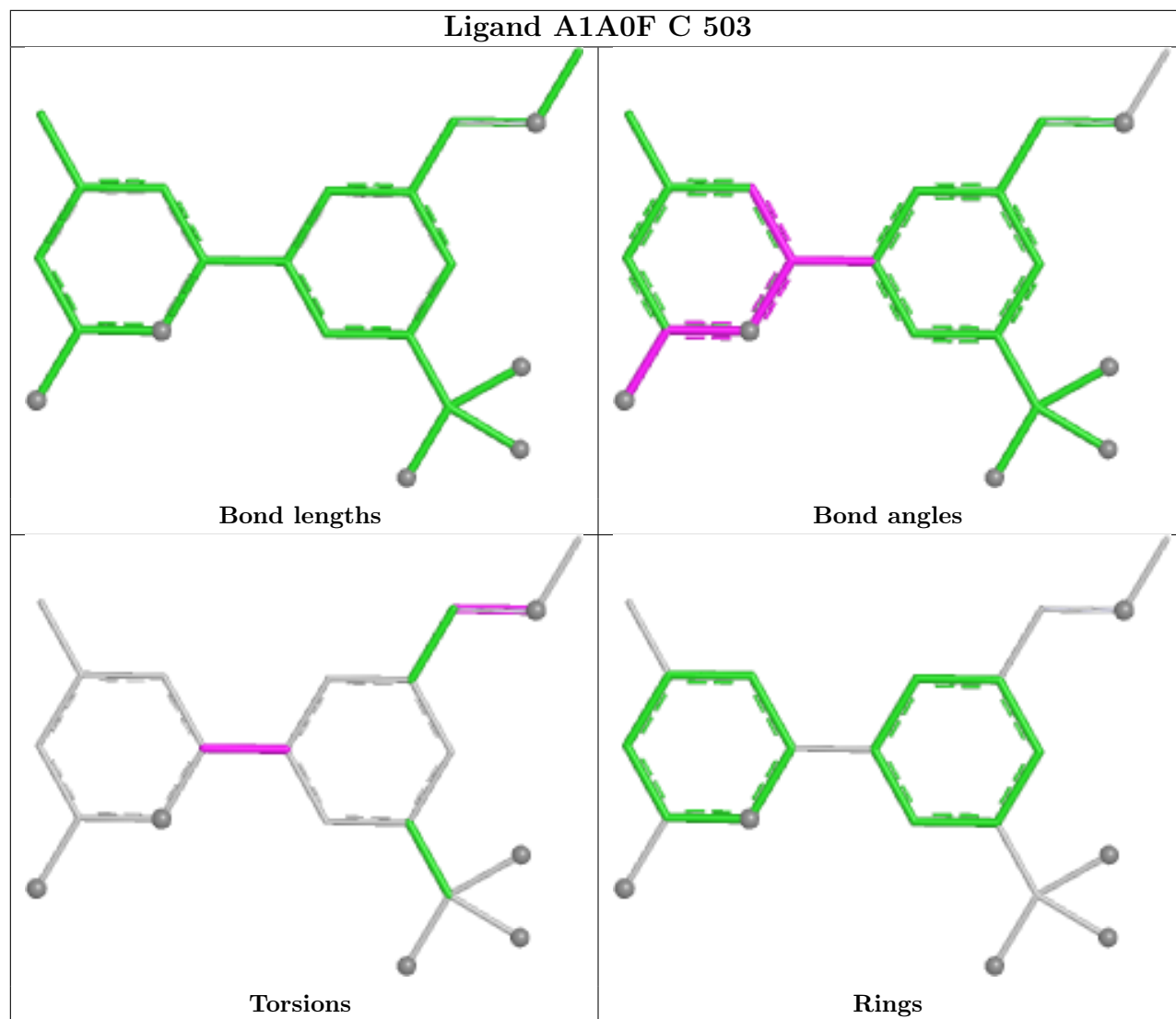
Ligand A1A0F A 503



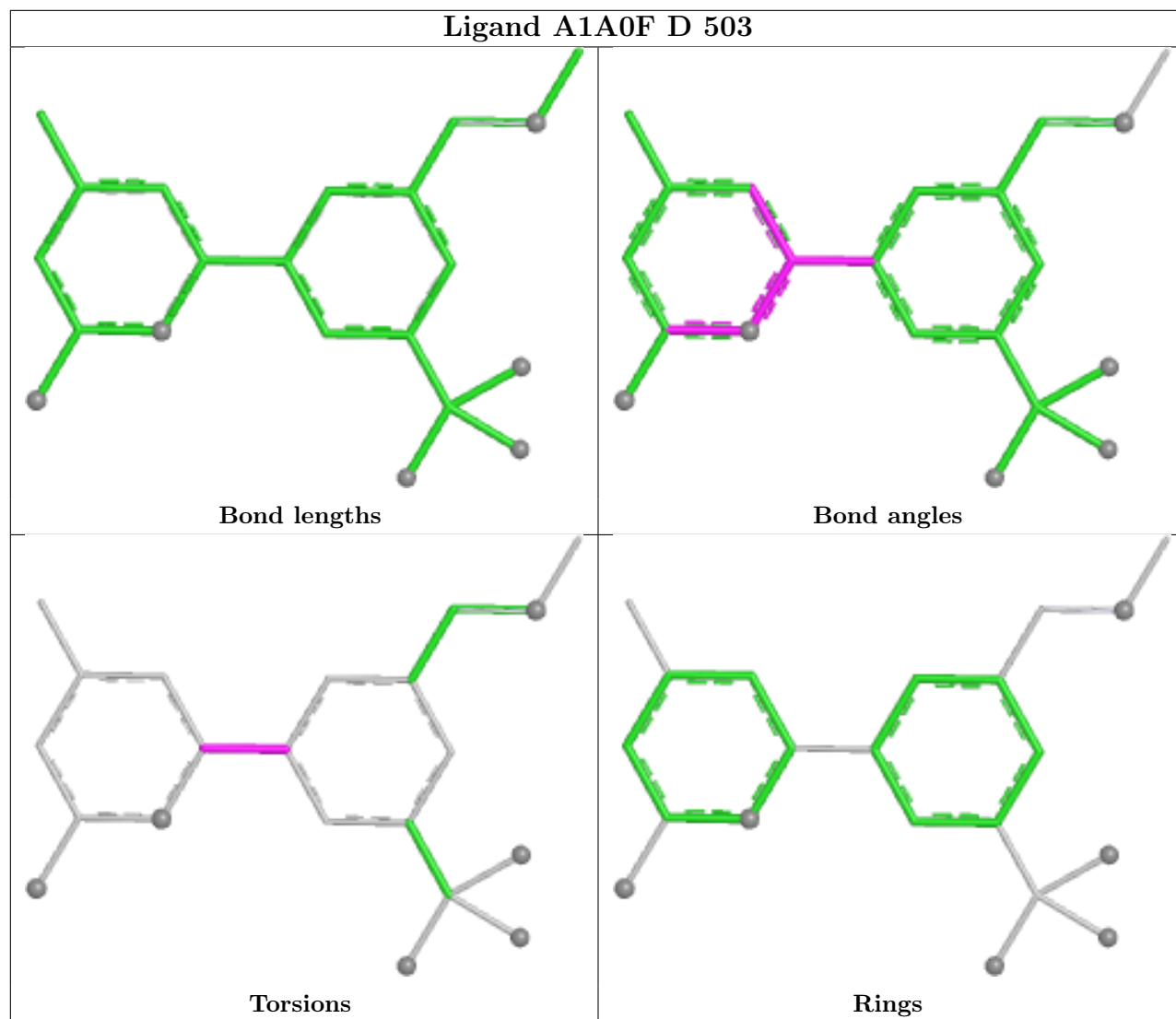


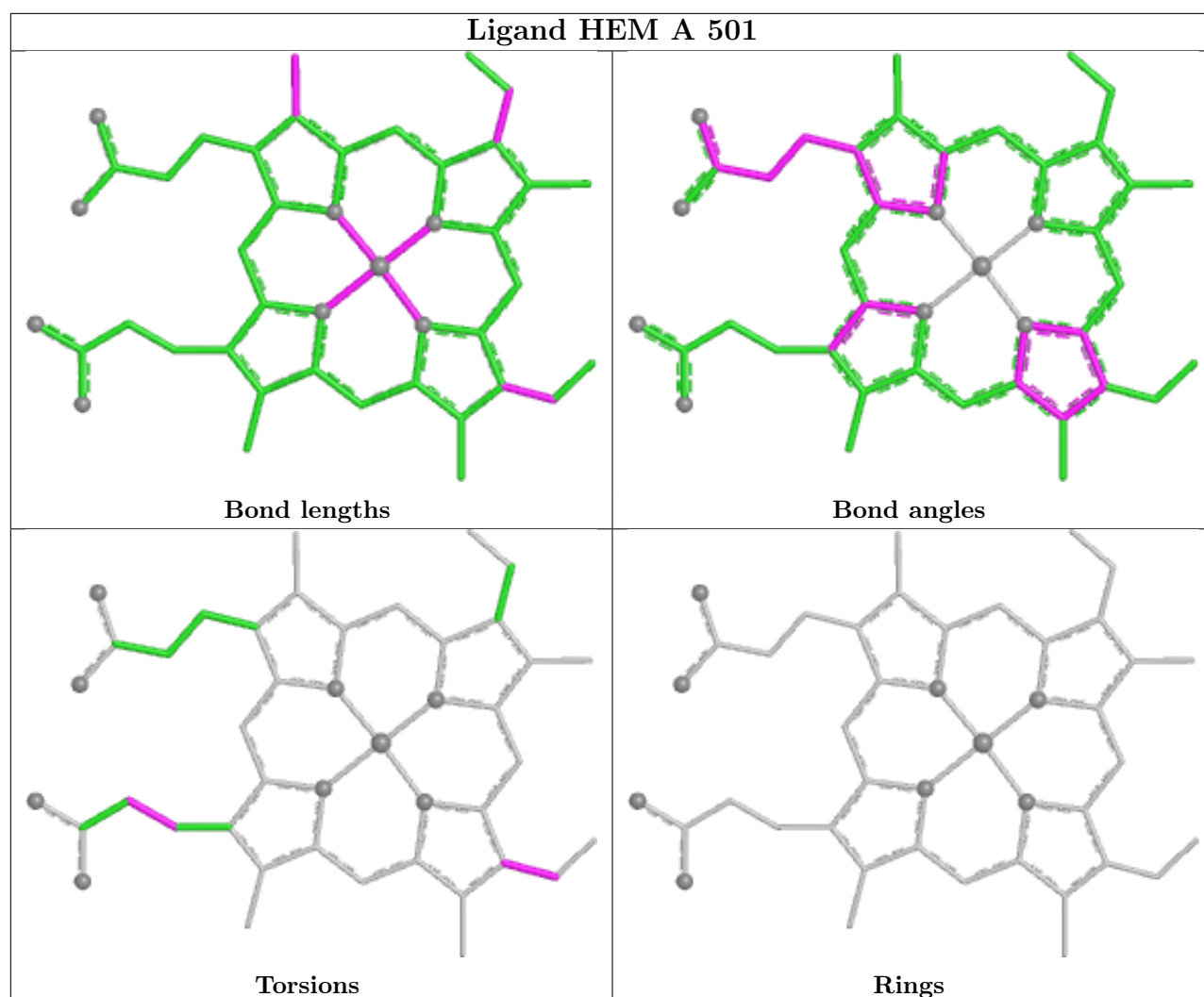


Ligand A1A0F C 503



Ligand A1A0F D 503





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	401/440 (91%)	0.71	40 (9%) 12 14	24, 58, 108, 139	1 (0%)
1	B	401/440 (91%)	0.05	7 (1%) 69 74	20, 39, 77, 113	3 (0%)
1	C	401/440 (91%)	0.40	12 (2%) 52 57	25, 53, 96, 125	1 (0%)
1	D	402/440 (91%)	-0.03	5 (1%) 76 81	23, 38, 65, 125	1 (0%)
All	All	1605/1760 (91%)	0.28	64 (3%) 42 45	20, 46, 95, 139	6 (0%)

All (64) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	204	ALA	6.0
1	A	106	PRO	4.2
1	C	106	PRO	3.9
1	A	159	ALA	3.4
1	A	275	ILE	3.3
1	A	345	GLY	3.1
1	A	346	LEU	3.1
1	A	120	PRO	3.1
1	D	257	GLN	3.0
1	A	472	ALA	3.0
1	A	158	ALA	2.9
1	A	124	LEU	2.8
1	C	119	ALA	2.8
1	A	237	GLY	2.8
1	A	160	THR	2.8
1	A	304	LEU	2.8
1	A	299	PRO	2.7
1	A	447	TRP	2.7
1	A	145	ALA	2.6
1	A	131	ILE	2.6
1	C	142	GLY	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	295	ALA	2.5
1	A	155	ALA	2.5
1	D	119	ALA	2.5
1	A	153	VAL	2.4
1	D	89	GLN	2.4
1	A	350	ALA	2.4
1	A	163	TYR	2.4
1	A	309	LEU	2.3
1	A	236	PRO	2.3
1	B	106	PRO	2.3
1	B	68	PHE	2.3
1	C	120	PRO	2.3
1	B	142	GLY	2.3
1	A	143	SER	2.3
1	A	171	VAL	2.3
1	C	155	ALA	2.2
1	A	231	PHE	2.2
1	C	157	VAL	2.2
1	C	158	ALA	2.2
1	D	107	ARG	2.2
1	B	141[A]	SER	2.2
1	A	300	PRO	2.2
1	B	145	ALA	2.2
1	A	259	GLY	2.1
1	A	165	LEU	2.1
1	A	341	LEU	2.1
1	A	480	TRP	2.1
1	B	235	CYS	2.1
1	A	127	ALA	2.1
1	A	241	PHE	2.1
1	A	348	PHE	2.1
1	D	258	ASP	2.1
1	A	152	GLU	2.1
1	C	480	TRP	2.1
1	A	130	PHE	2.0
1	B	148	GLN	2.0
1	A	349	PRO	2.0
1	A	279	TRP	2.0
1	A	305	LEU	2.0
1	C	304	LEU	2.0
1	C	468	PHE	2.0
1	C	280	THR	2.0

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Mol	Chain	Res	Type	RSRZ
1	C	236	PRO	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 oligosaccharides 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
5	BTB	C	505	14/14	0.68	0.15	95,101,107,112	0
6	GOL	C	507	6/6	0.69	0.13	73,79,81,87	0
5	BTB	A	506	14/14	0.73	0.14	86,98,104,105	0
6	GOL	C	508	6/6	0.74	0.11	73,79,81,85	0
5	BTB	D	505	14/14	0.78	0.16	47,71,80,81	0
5	BTB	B	505	14/14	0.81	0.13	44,74,78,80	0
5	BTB	A	505	14/14	0.83	0.16	61,75,85,87	0
6	GOL	A	507	6/6	0.83	0.11	58,63,75,79	0
6	GOL	A	508	6/6	0.84	0.14	62,81,83,88	0
5	BTB	D	504	14/14	0.85	0.15	33,70,84,91	0
5	BTB	B	509	14/14	0.85	0.14	31,60,74,75	0
6	GOL	D	506	6/6	0.85	0.15	50,63,66,67	0
6	GOL	B	506	6/6	0.88	0.18	60,70,74,76	0
5	BTB	B	504	14/14	0.89	0.13	42,51,66,68	0
5	BTB	A	504	14/14	0.90	0.13	36,75,81,83	0
3	H4B	A	502	17/17	0.90	0.10	46,50,67,70	0
3	H4B	C	502	17/17	0.90	0.10	40,48,56,60	0
4	A1A0F	A	503	21/21	0.90	0.12	36,53,69,75	0
4	A1A0F	C	503	21/21	0.90	0.12	38,45,75,79	0
6	GOL	A	512	6/6	0.92	0.11	33,51,67,73	0
4	A1A0F	D	503	21/21	0.93	0.09	23,32,55,62	0
4	A1A0F	B	503	21/21	0.93	0.09	27,35,55,61	0

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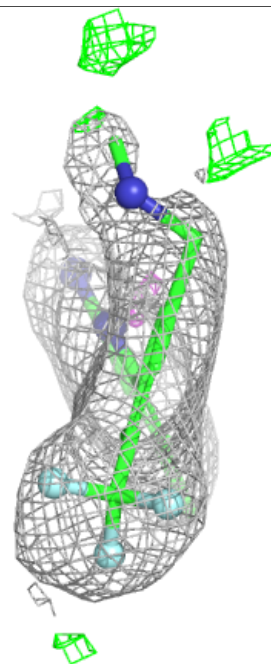
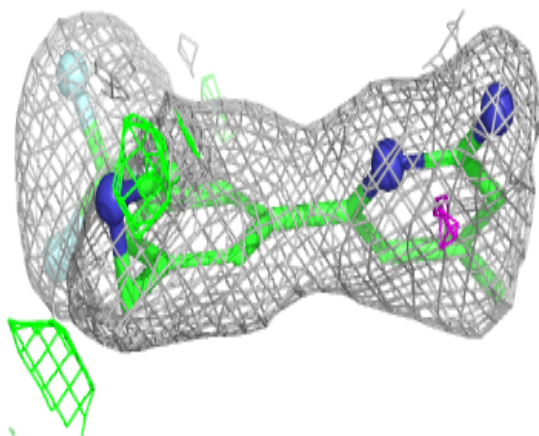
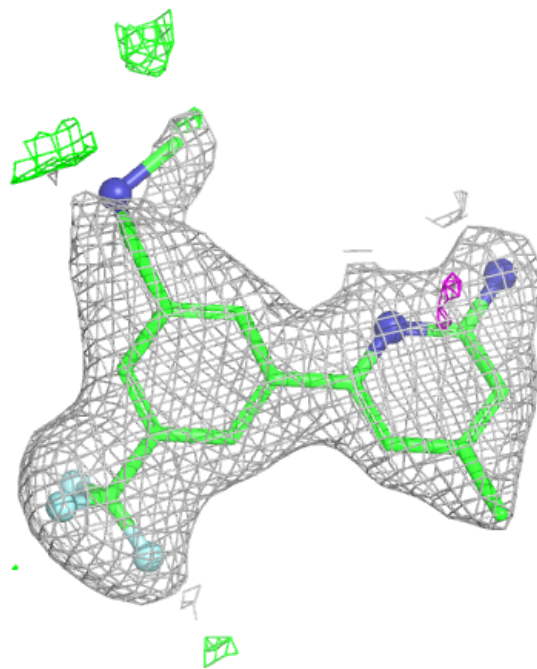
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
6	GOL	C	506	6/6	0.93	0.07	47,53,59,60	0
3	H4B	D	502	17/17	0.94	0.07	31,39,46,48	0
3	H4B	B	502	17/17	0.94	0.07	32,42,48,49	0
5	BTB	C	504	14/14	0.95	0.11	21,63,72,78	0
2	HEM	A	501	43/43	0.96	0.11	37,50,65,73	0
8	GD3	D	508	1/1	0.96	0.05	46,46,46,46	0
2	HEM	C	501	43/43	0.98	0.07	27,38,54,58	0
7	CL	A	509	1/1	0.98	0.05	47,47,47,47	0
8	GD3	A	510	1/1	0.98	0.03	65,65,65,65	1
8	GD3	B	508	1/1	0.98	0.04	43,43,43,43	0
8	GD3	B	510	1/1	0.98	0.04	48,48,48,48	1
2	HEM	B	501	43/43	0.98	0.07	21,29,46,50	0
9	ZN	A	511	1/1	0.98	0.03	40,40,40,40	0
7	CL	C	509	1/1	0.99	0.04	40,40,40,40	0
2	HEM	D	501	43/43	0.99	0.05	20,26,42,51	0
7	CL	B	507	1/1	0.99	0.04	31,31,31,31	0
7	CL	D	507	1/1	1.00	0.03	35,35,35,35	0
9	ZN	C	510	1/1	1.00	0.02	32,32,32,32	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.

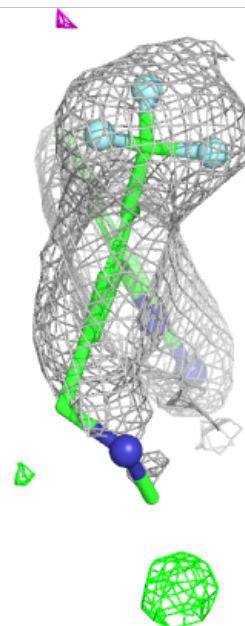
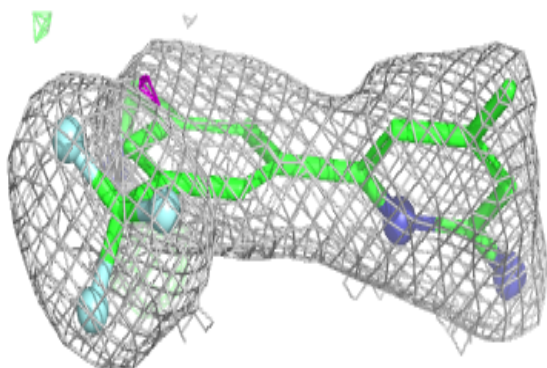
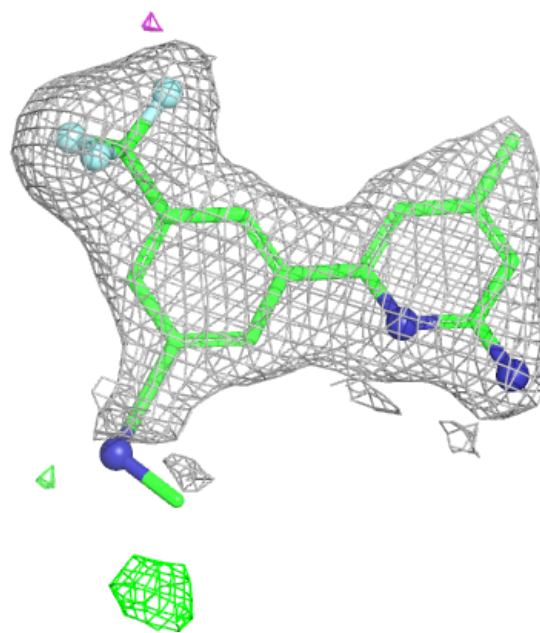
Electron density around A1A0F A 503:

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



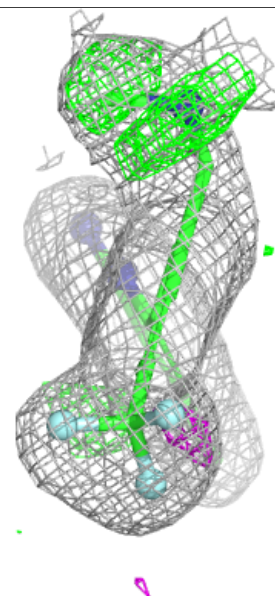
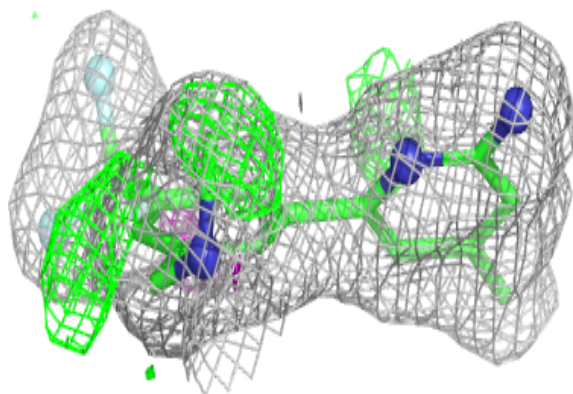
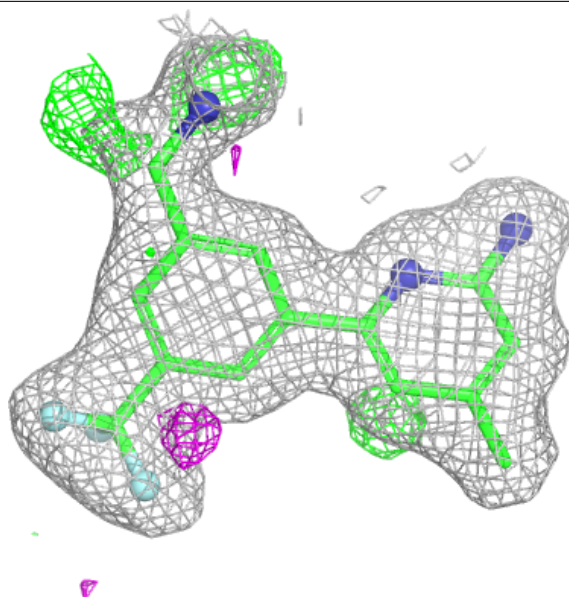
Electron density around A1A0F C 503:

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



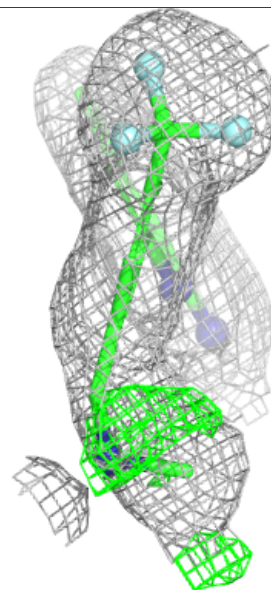
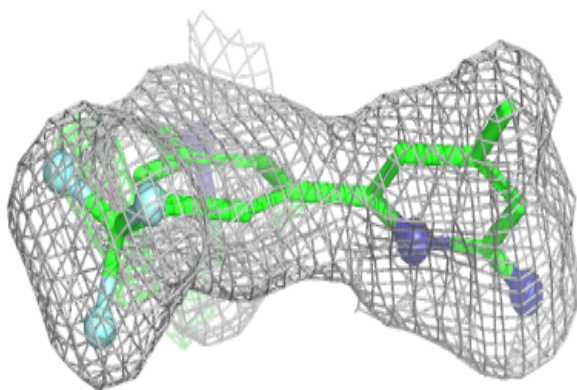
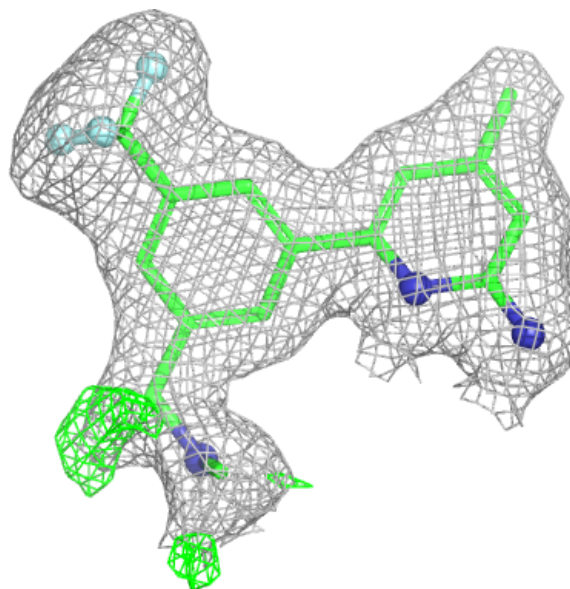
Electron density around A1A0F D 503:

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



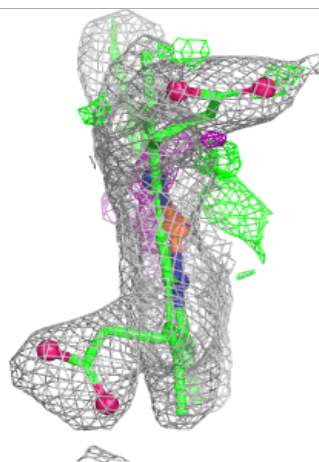
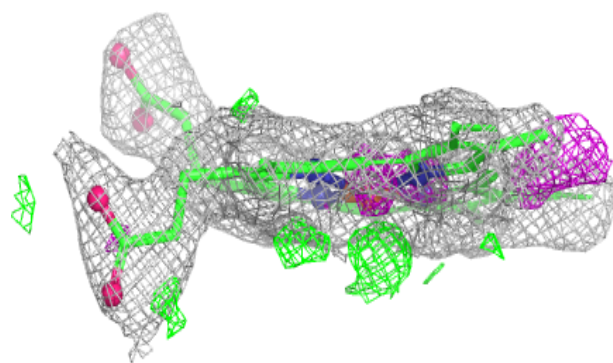
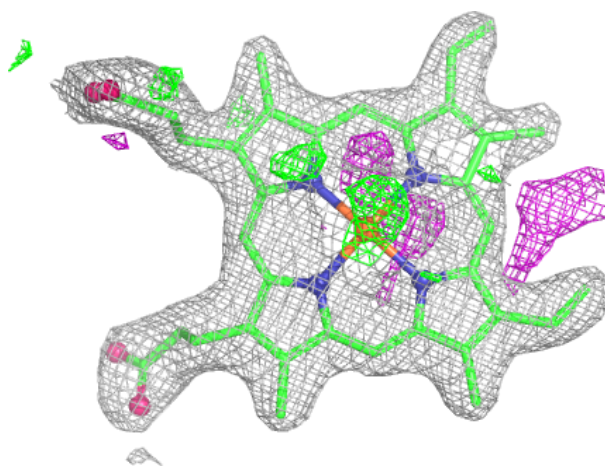
Electron density around A1A0F B 503:

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



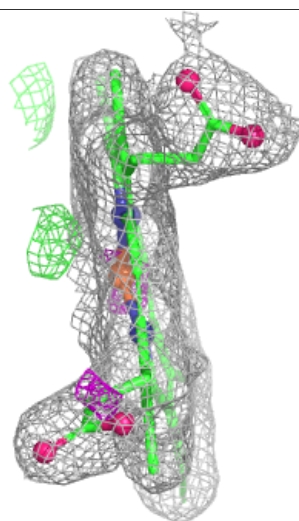
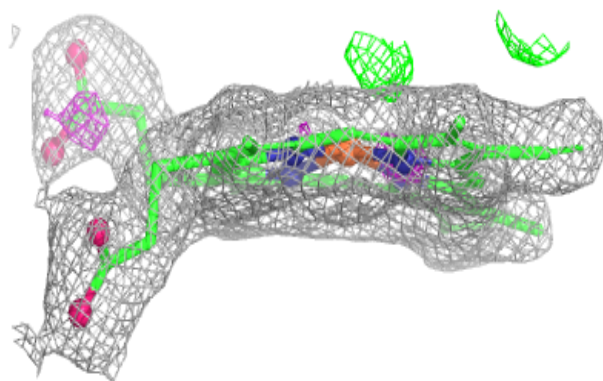
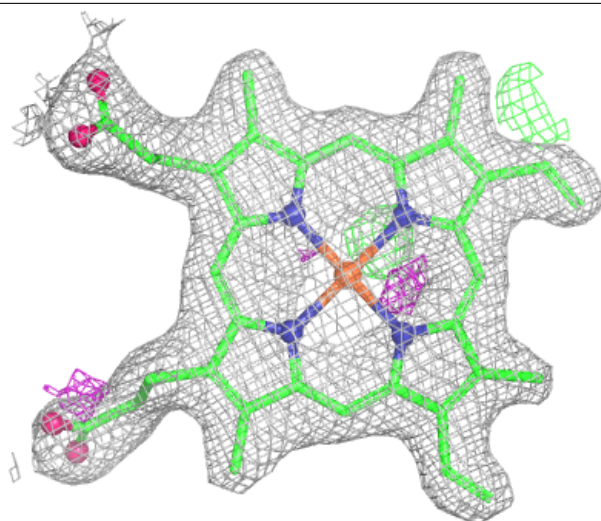
Electron density around HEM A 501:

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



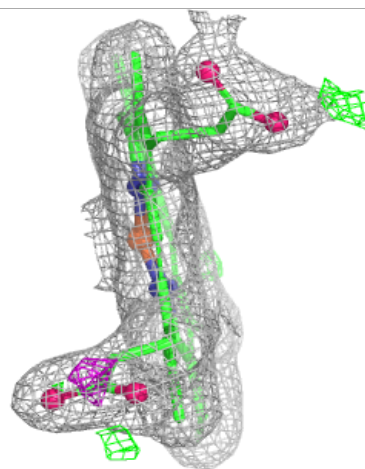
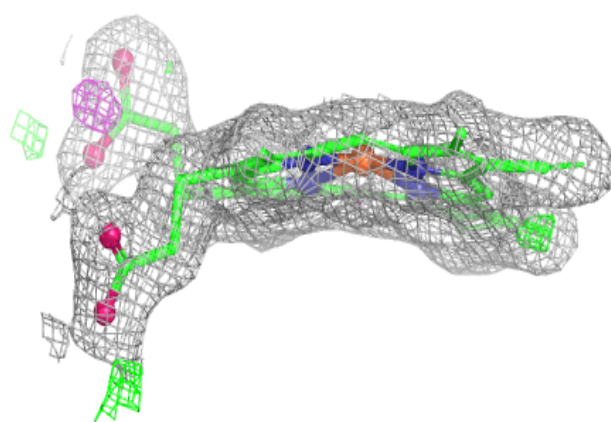
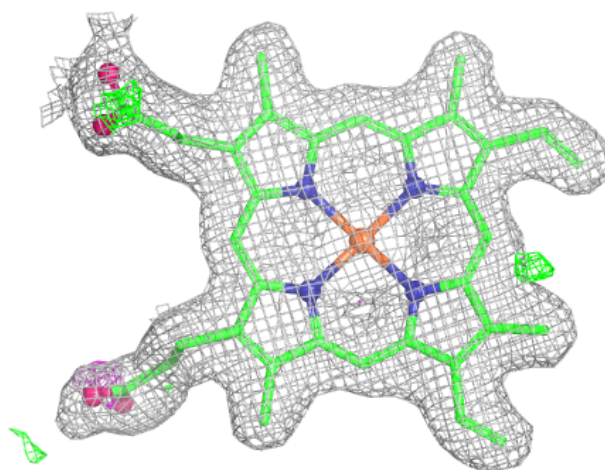
Electron density around HEM C 501:

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



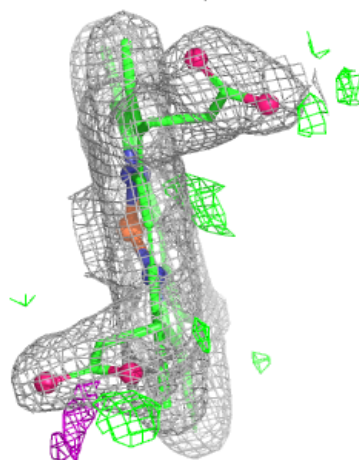
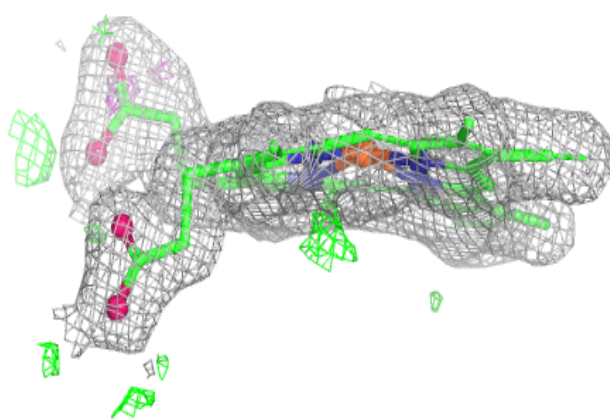
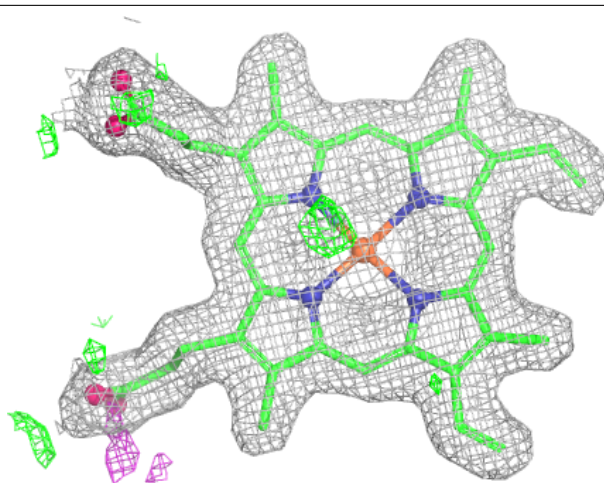
Electron density around HEM B 501:

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



Electron density around HEM D 501:

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



6.5 Other polymers ⓘ

There are no such residues in this entry.