



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2026 – 08:49 PM UTC

PDB ID : 5VVC / pdb_00005vvc
Title : Structure of human endothelial nitric oxide synthase heme domain in complex with 4-(2-(((2-Amino-4-methylquinolin-7-yl)methyl)amino)ethyl)-2-methylbenzonitrile
Authors : Chreifi, G.; Li, H.; Poulos, T.L.
Deposited on : 2017-05-19
Resolution : 2.40 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

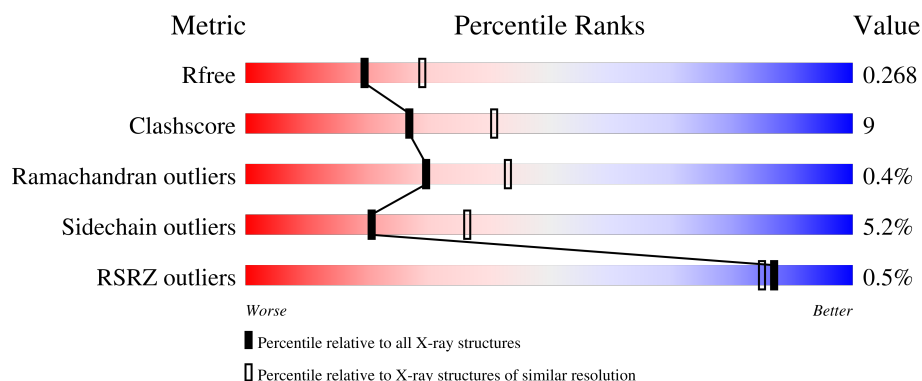
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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	 67% 22% • 8%
1	B	440	 75% 16% • 8%
1	C	440	 67% 21% • 9%
1	D	440	 76% 15% 8%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	BTB	B	505	-	-	X	-
5	BTB	C	506	-	-	X	-

2 Entry composition [i](#)

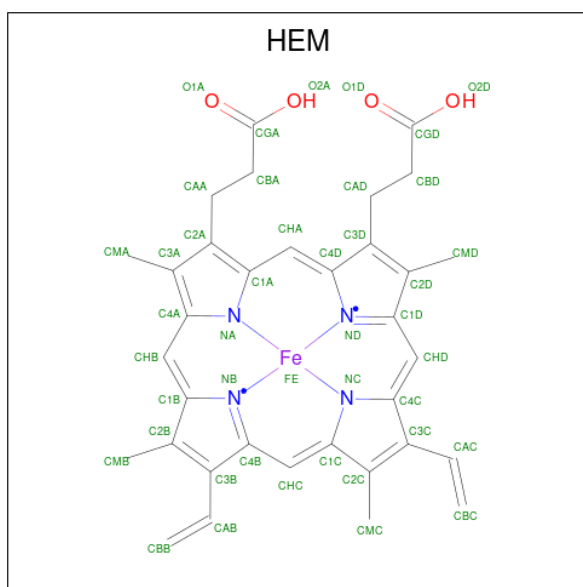
There are 10 unique types of molecules in this entry. The entry contains 13874 atoms, of which 0 are hydrogens and 0 are deuteriums.

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	404	Total	C	N	O	S	0	2	0
			3237	2062	570	589	16			
1	B	404	Total	C	N	O	S	0	3	0
			3241	2063	572	589	17			
1	C	401	Total	C	N	O	S	0	0	0
			3200	2038	563	583	16			
1	D	405	Total	C	N	O	S	0	3	0
			3249	2069	573	590	17			

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



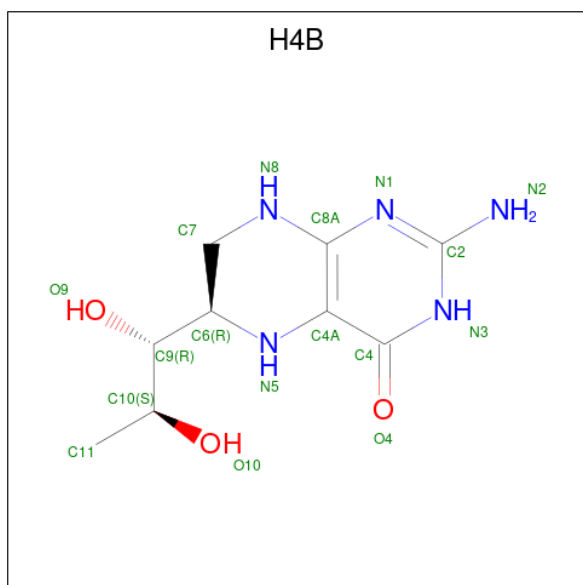
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	Fe	N O	0	0
			43	34	1	4 4		
2	B	1	Total	C	Fe	N O	0	0
			43	34	1	4 4		

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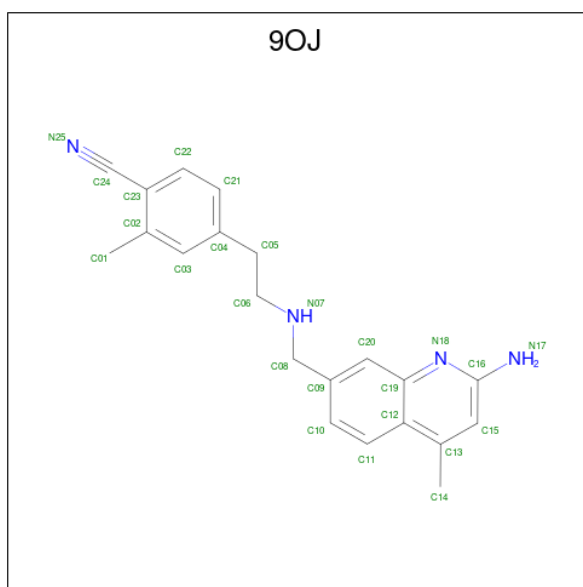
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
2	D	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

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



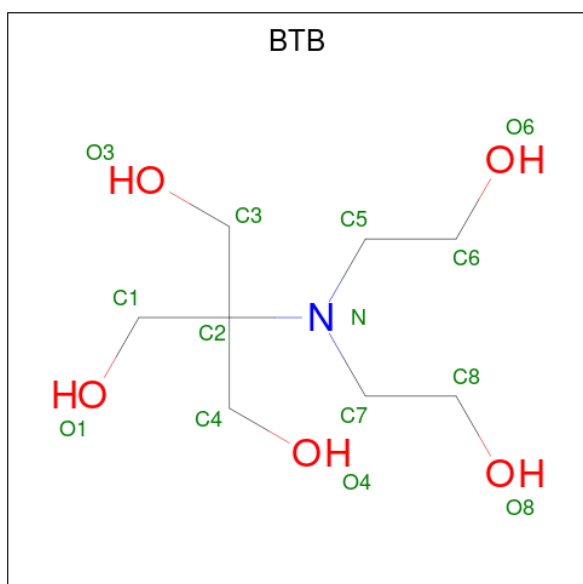
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			17	9	5	3		
3	B	1	Total	C	N	O	0	0
			17	9	5	3		
3	C	1	Total	C	N	O	0	0
			17	9	5	3		
3	D	1	Total	C	N	O	0	0
			17	9	5	3		

- Molecule 4 is 4-(2-[[[(2-amino-4-methylquinolin-7-yl)methyl]amino}ethyl)-2-methylbenzonitrile (CCD ID: 9OJ) (formula: $C_{21}H_{22}N_4$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	N	0	0
			25	21	4		
4	B	1	Total	C	N	0	0
			25	21	4		
4	C	1	Total	C	N	0	0
			25	21	4		
4	D	1	Total	C	N	0	0
			25	21	4		

- Molecule 5 is 2-[BIS-(2-HYDROXY-ETHYL)-AMINO]-2-HYDROXYMETHYL-PROPAN E-1,3-DIOL (CCD ID: BTB) (formula: $C_8H_{19}NO_5$).



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

- Molecule 6 is ZINC ION (CCD ID: ZN) (formula: Zn).

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

- Molecule 7 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

- Molecule 8 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

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

- Molecule 9 is GADOLINIUM ATOM (CCD ID: GD) (formula: Gd).

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

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	D	1	Total 1	Gd 1	0	0

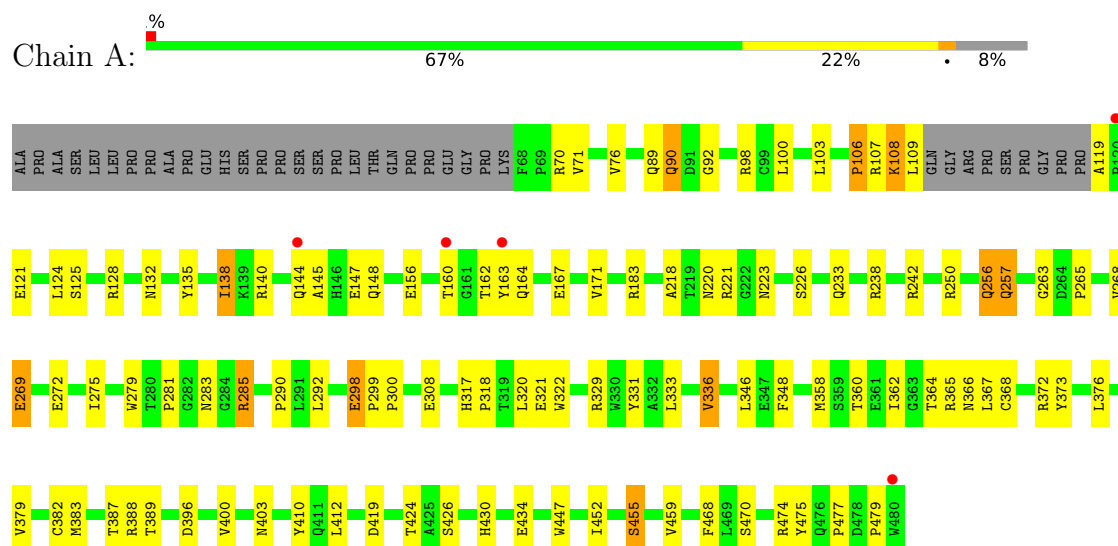
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	89	Total 89	O 89	0	0
10	B	111	Total 111	O 111	0	0
10	C	95	Total 95	O 95	0	0
10	D	136	Total 136	O 136	0	0

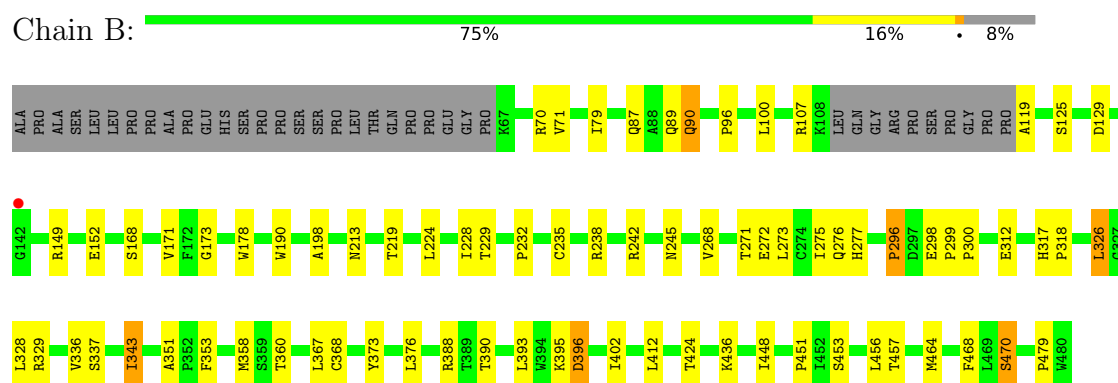
3 Residue-property plots [i](#)

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.

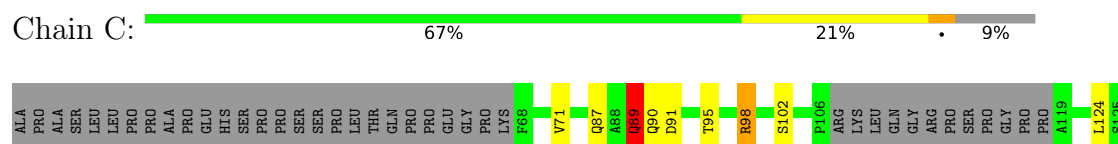
• Molecule 1: Nitric oxide synthase, endothelial

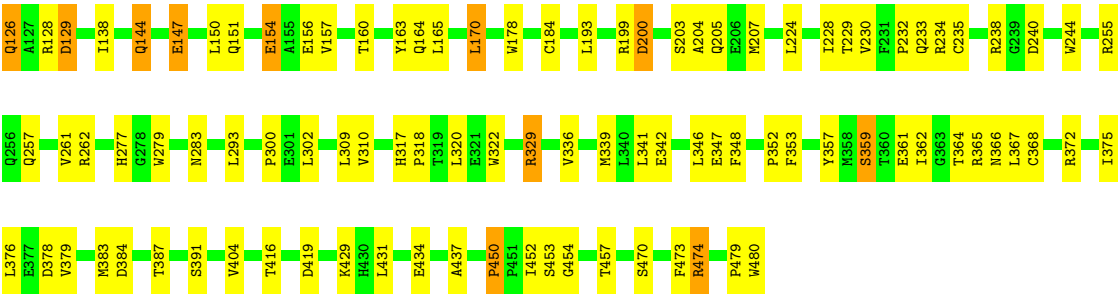


• Molecule 1: Nitric oxide synthase, endothelial

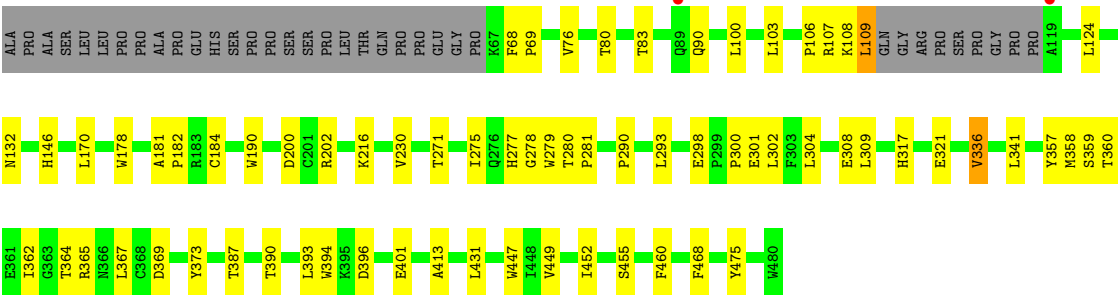


• Molecule 1: Nitric oxide synthase, endothelial





● 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	59.33Å 152.62Å 108.74Å 90.00° 90.57° 90.00°	Depositor
Resolution (Å)	88.56 – 2.40 88.56 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.9 (88.56-2.40) 99.9 (88.56-2.40)	Depositor EDS
R_{merge}	0.18	Depositor
R_{sym}	0.18	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.22 (at 2.40Å)	Xtriage
Refinement program	PHENIX 1.8.2_1309	Depositor
R, R_{free}	0.206 , 0.272 0.199 , 0.268	Depositor DCC
R_{free} test set	3766 reflections (1.98%)	wwPDB-VP
Wilson B-factor (Å ²)	42.9	Xtriage
Anisotropy	0.988	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 46.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.109 for h,-k,-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	13874	wwPDB-VP
Average B, all atoms (Å ²)	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.12% 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: 9OJ, ZN, GOL, CL, BTB, GD, H4B, 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	0.47	0/3335	0.84	0/4543
1	B	0.54	0/3339	0.86	0/4548
1	C	0.50	0/3292	0.84	2/4487 (0.0%)
1	D	0.59	0/3347	0.91	4/4559 (0.1%)
All	All	0.53	0/13313	0.86	6/18137 (0.0%)

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	336	VAL	CB-CA-C	-6.42	101.76	111.33
1	C	310	VAL	N-CA-C	5.97	112.60	106.21
1	D	278	GLY	N-CA-C	5.87	121.76	114.37
1	C	450	PRO	O-C-N	5.46	123.82	121.31
1	D	449	VAL	CA-C-N	5.28	123.51	119.66
1	D	449	VAL	C-N-CA	5.28	123.51	119.66

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	3237	0	3146	72	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	3241	0	3152	45	0
1	C	3200	0	3098	67	0
1	D	3249	0	3163	38	0
2	A	43	0	30	4	0
2	B	43	0	30	1	0
2	C	43	0	30	3	0
2	D	43	0	30	3	0
3	A	17	0	15	1	0
3	B	17	0	15	0	0
3	C	17	0	15	1	0
3	D	17	0	15	1	0
4	A	25	0	0	2	0
4	B	25	0	0	0	0
4	C	25	0	0	1	0
4	D	25	0	0	0	0
5	A	42	0	56	8	0
5	B	42	0	54	12	0
5	C	42	0	57	12	0
5	D	28	0	36	6	0
6	A	1	0	0	0	0
6	C	1	0	0	0	0
7	A	6	0	8	1	0
7	C	6	0	8	0	0
8	A	1	0	0	0	0
8	B	1	0	0	0	0
8	C	1	0	0	0	0
8	D	1	0	0	1	0
9	A	1	0	0	0	0
9	B	1	0	0	0	0
9	C	1	0	0	0	0
9	D	1	0	0	0	0
10	A	89	0	0	4	0
10	B	111	0	0	4	0
10	C	95	0	0	10	0
10	D	136	0	0	2	0
All	All	13874	0	12958	242	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 9.

All (242) 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:A:138:ILE:HG13	1:A:140:ARG:HG3	1.66	0.77
1:A:298:GLU:HG3	1:A:299:PRO:HD2	1.67	0.74
1:C:156:GLU:OE2	1:C:164:GLN:N	2.22	0.72
1:C:147:GLU:HA	1:C:150:LEU:HD12	1.73	0.70
1:A:298:GLU:OE1	5:A:506:BTB:O4	2.10	0.69
1:A:125:SER:HA	1:A:128:ARG:HE	1.58	0.68
1:C:207:MET:HE3	1:C:293:LEU:HB3	1.75	0.68
5:C:505:BTB:O8	10:C:601:HOH:O	2.11	0.68
1:D:275:ILE:HD12	1:D:281:PRO:HG3	1.75	0.67
1:B:90:GLN:HB2	1:B:468:PHE:CD1	2.30	0.65
8:D:507:CL:CL	10:D:669:HOH:O	2.51	0.65
1:B:119:ALA:N	10:B:601:HOH:O	2.28	0.65
2:A:501:HEM:HMC2	2:A:501:HEM:HBC2	1.79	0.64
2:A:501:HEM:HBB2	2:A:501:HEM:HHC	1.79	0.64
2:C:501:HEM:HBB2	2:C:501:HEM:HHC	1.80	0.64
1:D:108:LYS:HD3	1:D:109:LEU:H	1.62	0.64
1:C:228:ILE:HG13	1:C:353:PHE:HB3	1.79	0.64
1:D:321:GLU:OE2	5:D:504:BTB:O3	2.17	0.63
1:B:277:HIS:CD2	1:B:300:PRO:HG2	2.35	0.61
1:B:298:GLU:OE2	5:B:505:BTB:N	2.33	0.61
1:D:100:LEU:HB3	1:D:103:LEU:HD22	1.82	0.61
1:C:235:CYS:H	1:C:238:ARG:HD3	1.66	0.61
2:B:501:HEM:HHC	2:B:501:HEM:HBB2	1.82	0.61
5:B:505:BTB:O4	5:B:505:BTB:O1	2.12	0.60
1:B:238:ARG:HG2	1:B:296:PRO:HB3	1.83	0.60
1:D:216:LYS:HB2	1:D:309:LEU:HD11	1.82	0.60
1:A:242:ARG:NH2	1:A:477:PRO:O	2.35	0.60
1:A:331:TYR:O	1:A:410:TYR:OH	2.19	0.60
1:C:367:LEU:HB3	1:C:375:ILE:HD13	1.84	0.59
1:C:126:GLN:HE22	5:C:506:BTB:H52	1.67	0.59
1:A:100:LEU:HB3	1:A:103:LEU:HD13	1.85	0.58
1:D:271:THR:O	1:D:275:ILE:HG12	2.03	0.58
1:C:262:ARG:NH1	1:C:283:ASN:O	2.36	0.58
1:D:475:TYR:OH	2:D:501:HEM:O1D	2.15	0.58
1:C:200:ASP:OD1	1:C:200:ASP:N	2.35	0.58
1:B:245:ASN:O	1:B:337:SER:OG	2.19	0.57
1:A:108:LYS:H	1:A:108:LYS:HE2	1.70	0.57
1:A:365:ARG:HH12	3:A:502:H4B:C4	2.19	0.56
1:A:382:CYS:HA	5:A:504:BTB:H11	1.86	0.56
1:D:321:GLU:OE1	5:D:504:BTB:O6	2.24	0.56
1:B:298:GLU:HG3	1:B:299:PRO:HD2	1.87	0.56
1:A:298:GLU:OE2	5:A:506:BTB:H31	2.06	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:92:GLY:HA2	1:A:107:ARG:HH21	1.71	0.55
1:B:326:LEU:HD12	5:B:508:BTB:H72	1.88	0.55
1:C:87:GLN:O	1:C:89:GLN:NE2	2.40	0.55
1:C:347:GLU:OE2	5:C:506:BTB:O4	2.24	0.54
1:C:144:GLN:NE2	10:C:608:HOH:O	2.31	0.54
1:A:92:GLY:N	1:B:96:PRO:O	2.34	0.54
5:B:508:BTB:O3	1:C:384:ASP:OD2	2.25	0.54
1:C:98:ARG:HG3	1:C:98:ARG:HH11	1.73	0.54
1:C:361:GLU:OE2	4:C:503:9OJ:N17	2.41	0.54
1:D:317:HIS:NE2	1:D:401:GLU:OE1	2.38	0.54
1:C:364:THR:O	1:C:368:CYS:HB2	2.08	0.54
1:A:455:SER:HB3	1:B:451:PRO:HB2	1.89	0.54
1:C:378:ASP:OD1	10:C:602:HOH:O	2.19	0.53
1:B:178:TRP:CE3	1:B:190:TRP:HA	2.44	0.53
1:C:128:ARG:NH1	1:C:154:GLU:OE1	2.41	0.53
1:C:368:CYS:SG	1:C:376:LEU:HD13	2.48	0.53
1:A:388:ARG:NH1	10:C:604:HOH:O	2.40	0.53
1:B:326:LEU:HB3	1:B:328:LEU:HG	1.90	0.53
2:D:501:HEM:HHC	2:D:501:HEM:HBB2	1.89	0.53
1:A:145:ALA:HA	1:A:148:GLN:HB3	1.90	0.52
5:B:505:BTB:H72	10:B:655:HOH:O	2.08	0.52
1:D:277:HIS:CD2	1:D:300:PRO:HG2	2.43	0.52
1:A:163:TYR:O	1:A:233:GLN:NE2	2.40	0.52
1:C:419:ASP:OD2	1:D:390:THR:OG1	2.19	0.52
1:B:298:GLU:CD	5:B:505:BTB:H41	2.35	0.52
1:A:106:PRO:O	1:A:108:LYS:NZ	2.36	0.52
1:C:474:ARG:NH1	5:C:506:BTB:O3	2.43	0.51
1:B:228:ILE:HG13	1:B:353:PHE:HB3	1.92	0.51
5:C:504:BTB:H31	10:C:655:HOH:O	2.09	0.51
1:A:379:VAL:O	1:A:383:MET:HG3	2.11	0.51
1:B:242:ARG:NH2	1:B:479:PRO:HD3	2.25	0.51
1:C:91:ASP:OD2	10:C:603:HOH:O	2.19	0.51
1:A:430:HIS:CE1	1:A:434:GLU:HG3	2.46	0.51
1:B:149:ARG:NH1	1:B:152:GLU:OE1	2.44	0.51
1:A:128:ARG:O	1:A:132:ASN:ND2	2.40	0.51
1:B:89:GLN:OE1	1:B:470:SER:N	2.39	0.50
1:B:358:MET:HE3	1:B:360:THR:OG1	2.11	0.50
1:A:368:CYS:SG	1:A:376:LEU:HD13	2.51	0.50
5:C:504:BTB:HO1	5:C:504:BTB:HO3	1.60	0.50
1:D:447:TRP:HA	3:D:502:H4B:N1	2.26	0.50
1:D:358:MET:HE3	1:D:360:THR:OG1	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:275:ILE:HD13	1:A:281:PRO:HG3	1.92	0.50
1:B:298:GLU:OE1	5:B:505:BTB:H41	2.12	0.50
1:C:129:ASP:OD2	1:C:129:ASP:N	2.36	0.50
1:A:396:ASP:OD2	1:B:453:SER:OG	2.24	0.50
1:A:144:GLN:CG	1:A:145:ALA:H	2.25	0.50
1:A:183:ARG:HD3	1:A:447:TRP:CD2	2.46	0.50
1:A:265:PRO:HA	1:A:268:VAL:HG23	1.92	0.50
1:A:156:GLU:OE2	1:A:164:GLN:N	2.36	0.49
1:D:290:PRO:HB3	1:D:304:LEU:HD23	1.93	0.49
1:C:450:PRO:HG2	1:C:457:THR:HG21	1.94	0.49
2:C:501:HEM:HBC2	2:C:501:HEM:HMC2	1.93	0.49
1:B:173:GLY:HA3	1:B:343:ILE:HD13	1.93	0.49
1:D:279:TRP:HB2	1:D:302:LEU:HD21	1.93	0.49
1:C:124:LEU:O	1:C:128:ARG:HG2	2.12	0.49
1:A:403:ASN:HB3	1:B:393:LEU:HD11	1.95	0.49
5:B:508:BTB:HO4	5:B:508:BTB:HO8	1.58	0.49
1:A:70:ARG:NH1	10:A:606:HOH:O	2.43	0.49
1:C:126:GLN:NE2	5:C:506:BTB:H52	2.27	0.48
1:A:250:ARG:HE	1:A:250:ARG:HA	1.76	0.48
1:D:357:TYR:CD2	1:D:362:ILE:HD11	2.48	0.48
1:B:368:CYS:SG	1:B:402:ILE:HD13	2.53	0.48
5:B:508:BTB:O8	5:B:508:BTB:O4	2.25	0.48
1:C:365:ARG:HH12	3:C:502:H4B:C4	2.27	0.48
1:B:453:SER:HB3	1:B:456:LEU:HD12	1.95	0.47
1:A:292:LEU:HD22	1:A:300:PRO:HB2	1.96	0.47
1:B:229:THR:O	1:B:351:ALA:HA	2.14	0.47
1:C:244:TRP:CH2	1:C:300:PRO:HG3	2.49	0.47
1:C:364:THR:HG21	1:C:452:ILE:HG23	1.95	0.47
1:C:184:CYS:HB2	2:C:501:HEM:ND	2.30	0.47
1:B:70:ARG:HE	1:B:79:ILE:HD13	1.79	0.47
1:D:181:ALA:HA	1:D:182:PRO:HD3	1.81	0.47
1:A:167:GLU:OE2	7:A:508:GOL:O1	2.33	0.46
1:D:455:SER:HA	1:D:460:PHE:CG	2.50	0.46
1:C:257:GLN:NE2	10:C:604:HOH:O	2.20	0.46
1:C:359:SER:OG	1:C:419:ASP:HA	2.15	0.46
1:A:242:ARG:NE	1:A:479:PRO:HD3	2.30	0.46
1:A:366:ASN:OD1	1:A:372:ARG:NH1	2.47	0.46
1:D:367:LEU:HA	1:D:373:TYR:HB2	1.98	0.46
1:A:475:TYR:OH	2:A:501:HEM:O1D	2.22	0.46
1:C:203:SER:OG	1:C:204:ALA:N	2.48	0.46
1:A:336:VAL:HG21	4:A:503:9OJ:C10	2.46	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:144:GLN:HA	1:C:147:GLU:HG3	1.98	0.46
1:A:107:ARG:H	1:A:107:ARG:HG2	1.61	0.45
1:C:379:VAL:O	1:C:383:MET:HG3	2.15	0.45
1:D:413:ALA:O	10:D:601:HOH:O	2.20	0.45
2:A:501:HEM:HBA1	4:A:503:9OJ:C20	2.47	0.45
5:A:505:BTB:H72	10:A:602:HOH:O	2.15	0.45
1:B:367:LEU:HA	1:B:373:TYR:HB2	1.98	0.45
1:D:365:ARG:NH2	1:D:369:ASP:OD2	2.43	0.45
1:C:429:LYS:HD2	1:C:429:LYS:HA	1.77	0.45
5:A:506:BTB:H32	5:A:506:BTB:H52	1.78	0.45
1:A:321:GLU:H	1:A:321:GLU:CD	2.24	0.45
1:B:448:ILE:HG21	1:B:464:MET:HE1	1.98	0.45
1:D:170:LEU:HD11	1:D:230:VAL:HG11	1.98	0.45
1:B:242:ARG:HH21	1:B:479:PRO:HD3	1.82	0.45
1:A:156:GLU:O	1:A:160:THR:OG1	2.32	0.45
1:C:98:ARG:HG3	1:C:98:ARG:NH1	2.32	0.45
1:D:200:ASP:O	1:D:202:ARG:HG2	2.17	0.45
1:D:293:LEU:O	1:D:301:GLU:N	2.35	0.45
1:C:90:GLN:NE2	5:C:506:BTB:H81	2.32	0.44
1:C:341:LEU:HB3	1:C:348:PHE:HB2	1.99	0.44
5:C:506:BTB:H71	5:C:506:BTB:H41	1.74	0.44
1:D:68:PHE:CD2	1:D:83:THR:HG22	2.52	0.44
1:A:220:ASN:OD1	1:A:223:ASN:HB3	2.16	0.44
1:C:165:LEU:HG	1:C:346:LEU:HD12	1.98	0.44
1:C:434:GLU:HA	1:C:437:ALA:HB3	1.99	0.44
1:A:419:ASP:OD2	1:B:390:THR:OG1	2.33	0.44
1:C:224:LEU:HD12	1:C:416:THR:HB	2.00	0.44
1:C:404:VAL:HG23	1:D:393:LEU:HD12	1.98	0.44
5:C:506:BTB:H52	5:C:506:BTB:H12	1.69	0.44
1:B:388:ARG:HE	1:B:388:ARG:HB2	1.53	0.44
1:D:109:LEU:H	1:D:109:LEU:HG	1.64	0.44
1:A:90:GLN:HG3	1:A:468:PHE:CE1	2.53	0.44
1:C:339:MET:HE2	1:C:473:PHE:HB3	1.99	0.44
1:C:233:GLN:HB3	1:C:348:PHE:CE1	2.53	0.44
1:C:479:PRO:HG2	1:C:480:TRP:CE3	2.53	0.44
1:A:167:GLU:O	1:A:171:VAL:HG23	2.18	0.44
1:B:424:THR:OG1	1:B:457:THR:HB	2.18	0.44
1:A:279:TRP:CD1	1:A:290:PRO:HG3	2.53	0.43
1:A:367:LEU:HA	1:A:373:TYR:HB2	1.99	0.43
1:C:205:GLN:NE2	10:C:621:HOH:O	2.50	0.43
1:C:244:TRP:CD1	1:C:479:PRO:HG3	2.53	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:A:505:BTB:H11	5:A:505:BTB:H52	1.63	0.43
1:B:436:LYS:HE2	1:B:436:LYS:HB3	1.75	0.43
1:D:90:GLN:HB3	1:D:468:PHE:CD1	2.54	0.43
1:D:178:TRP:CE3	1:D:190:TRP:HA	2.52	0.43
1:D:280:THR:HA	1:D:281:PRO:HD3	1.84	0.43
1:D:308:GLU:OE1	1:D:308:GLU:N	2.43	0.43
1:D:387:THR:HA	1:D:394:TRP:CD1	2.53	0.43
1:C:279:TRP:HB2	1:C:302:LEU:HD21	2.00	0.43
1:A:135:TYR:CD1	1:A:138:ILE:HD11	2.53	0.43
1:A:263:GLY:HA2	1:A:285:ARG:HA	1.99	0.43
1:A:424:THR:HB	1:A:459:VAL:HG13	2.00	0.43
1:B:376:LEU:HD12	1:B:376:LEU:HA	1.78	0.43
1:C:255:ARG:HA	1:C:261:VAL:HG22	2.00	0.43
1:C:342:GLU:HG3	5:C:506:BTB:H32	2.01	0.43
1:C:357:TYR:CD2	1:C:362:ILE:HD11	2.54	0.43
1:A:364:THR:O	1:A:368:CYS:HB2	2.18	0.43
1:B:317:HIS:CG	1:B:318:PRO:HD2	2.54	0.43
1:B:412:LEU:HD12	1:B:412:LEU:HA	1.78	0.43
5:D:504:BTB:H12	5:D:504:BTB:H52	1.74	0.43
1:D:298:GLU:OE2	5:D:505:BTB:O8	2.20	0.43
5:D:504:BTB:H71	5:D:504:BTB:H42	1.70	0.43
5:B:505:BTB:H82	10:B:686:HOH:O	2.18	0.43
1:A:98:ARG:NH1	1:A:98:ARG:HG3	2.34	0.43
1:A:124:LEU:O	1:A:128:ARG:HG2	2.19	0.43
1:D:132:ASN:OD1	1:D:146:HIS:NE2	2.50	0.43
1:A:98:ARG:HG3	1:A:98:ARG:HH11	1.83	0.42
1:A:362:ILE:HA	1:A:366:ASN:HD22	1.85	0.42
1:C:157:VAL:HG23	1:C:163:TYR:HB3	2.01	0.42
1:A:233:GLN:HB3	1:A:348:PHE:CE1	2.55	0.42
1:B:396:ASP:OD1	1:B:396:ASP:N	2.52	0.42
5:B:508:BTB:H52	5:B:508:BTB:H31	1.76	0.42
1:C:147:GLU:O	1:C:151:GLN:HG2	2.19	0.42
1:C:366:ASN:OD1	1:C:372:ARG:NH1	2.48	0.42
1:C:170:LEU:HD11	1:C:230:VAL:HG21	2.01	0.42
1:C:95:THR:HG23	1:C:98:ARG:NH1	2.34	0.42
1:C:453:SER:HA	1:D:452:ILE:HG22	2.02	0.42
5:D:505:BTB:H72	5:D:505:BTB:H61	1.35	0.42
1:A:308:GLU:CD	1:A:308:GLU:H	2.28	0.42
1:A:474:ARG:NH1	10:A:611:HOH:O	2.52	0.42
1:D:184:CYS:HB2	2:D:501:HEM:ND	2.34	0.42
5:C:505:BTB:H62	10:C:601:HOH:O	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:268:VAL:O	1:B:272:GLU:HG3	2.20	0.42
1:A:412:LEU:HD12	1:A:412:LEU:HA	1.85	0.41
1:D:68:PHE:HA	1:D:69:PRO:HD3	1.86	0.41
1:C:329:ARG:NH1	10:C:616:HOH:O	2.47	0.41
1:A:218:ALA:HB1	1:A:333:LEU:HD11	2.01	0.41
1:A:317:HIS:CG	1:A:318:PRO:HD2	2.55	0.41
1:B:219:THR:O	1:B:224:LEU:HD12	2.20	0.41
1:D:431:LEU:HD23	1:D:431:LEU:HA	1.90	0.41
1:B:198:ALA:O	1:B:232:PRO:HD3	2.20	0.41
1:B:395:LYS:NZ	10:B:618:HOH:O	2.53	0.41
1:C:453:SER:O	1:C:454:GLY:C	2.64	0.41
1:A:144:GLN:CD	1:A:145:ALA:H	2.29	0.41
1:A:364:THR:HG21	1:A:452:ILE:HG23	2.02	0.41
1:A:387:THR:O	5:A:505:BTB:H61	2.20	0.41
5:A:504:BTB:H42	5:A:504:BTB:H71	1.76	0.41
1:B:273:LEU:HD23	1:B:273:LEU:HA	1.87	0.41
1:A:119:ALA:HB3	10:A:677:HOH:O	2.20	0.41
1:C:320:LEU:HD13	1:C:322:TRP:CZ2	2.56	0.41
1:B:312:GLU:CD	1:B:329:ARG:HH21	2.29	0.41
1:A:256:GLN:HB2	1:A:257:GLN:H	1.73	0.41
1:A:269:GLU:O	1:A:272:GLU:HB3	2.21	0.41
1:A:320:LEU:HD13	1:A:322:TRP:CZ2	2.55	0.41
1:B:100:LEU:HD23	1:B:100:LEU:HA	1.92	0.41
1:C:277:HIS:CD2	1:C:300:PRO:HG2	2.56	0.41
1:A:358:MET:HE3	1:A:360:THR:OG1	2.21	0.41
1:A:162:THR:OG1	1:A:163:TYR:N	2.54	0.40
1:A:396:ASP:O	1:A:400:VAL:HG23	2.22	0.40
5:B:505:BTB:H11	5:B:505:BTB:H52	1.52	0.40
1:C:317:HIS:CG	1:C:318:PRO:HD2	2.56	0.40
1:A:242:ARG:HD3	1:A:479:PRO:HG3	2.04	0.40
1:C:431:LEU:HD23	1:C:431:LEU:HA	1.81	0.40
1:A:233:GLN:NE2	1:A:346:LEU:HD13	2.36	0.40
1:B:271:THR:O	1:B:275:ILE:HG13	2.20	0.40
1:C:178:TRP:HZ3	1:C:193:LEU:HB2	1.87	0.40
1:C:199:ARG:O	1:C:232:PRO:HG3	2.21	0.40
1:C:229:THR:O	1:C:352:PRO:HD2	2.20	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	402/440 (91%)	371 (92%)	28 (7%)	3 (1%)	18	28
1	B	403/440 (92%)	389 (96%)	14 (4%)	0	100	100
1	C	397/440 (90%)	371 (94%)	24 (6%)	2 (0%)	24	37
1	D	404/440 (92%)	390 (96%)	13 (3%)	1 (0%)	43	58
All	All	1606/1760 (91%)	1521 (95%)	79 (5%)	6 (0%)	30	43

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	90	GLN
1	A	283	ASN
1	C	89	GLN
1	A	106	PRO
1	C	154	GLU
1	D	106	PRO

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	345/373 (92%)	322 (93%)	23 (7%)	15	26
1	B	346/373 (93%)	327 (94%)	19 (6%)	19	34
1	C	340/373 (91%)	318 (94%)	22 (6%)	15	27
1	D	347/373 (93%)	337 (97%)	10 (3%)	37	60

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
All	All	1378/1492 (92%)	1304 (95%)	74 (5%)	21	35

All (74) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	71	VAL
1	A	76	VAL
1	A	89	GLN
1	A	108	LYS
1	A	109	LEU
1	A	121	GLU
1	A	138	ILE
1	A	147	GLU
1	A	221	ARG
1	A	226	SER
1	A	238	ARG
1	A	256	GLN
1	A	257	GLN
1	A	269	GLU
1	A	285	ARG
1	A	298	GLU
1	A	329	ARG
1	A	336	VAL
1	A	389	THR
1	A	426[A]	SER
1	A	426[B]	SER
1	A	455	SER
1	A	470	SER
1	B	71	VAL
1	B	87	GLN
1	B	90	GLN
1	B	107	ARG
1	B	125	SER
1	B	129	ASP
1	B	168[A]	SER
1	B	168[B]	SER
1	B	171	VAL
1	B	213	ASN
1	B	235[A]	CYS
1	B	235[B]	CYS
1	B	276	GLN
1	B	296	PRO

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Mol	Chain	Res	Type
1	B	326	LEU
1	B	336	VAL
1	B	343	ILE
1	B	396	ASP
1	B	470	SER
1	C	71	VAL
1	C	89	GLN
1	C	98	ARG
1	C	102	SER
1	C	126	GLN
1	C	129	ASP
1	C	138	ILE
1	C	144	GLN
1	C	147	GLU
1	C	160	THR
1	C	170	LEU
1	C	200	ASP
1	C	234	ARG
1	C	240	ASP
1	C	309	LEU
1	C	329	ARG
1	C	336	VAL
1	C	359	SER
1	C	387	THR
1	C	391	SER
1	C	470	SER
1	C	474	ARG
1	D	76	VAL
1	D	80	THR
1	D	107	ARG
1	D	109	LEU
1	D	124	LEU
1	D	336	VAL
1	D	341	LEU
1	D	359	SER
1	D	364	THR
1	D	396	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	430	HIS

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Mol	Chain	Res	Type
1	C	133	GLN
1	C	194	GLN
1	C	461	HIS
1	D	257	GLN
1	D	277	HIS
1	D	283	ASN

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 35 ligands modelled in this entry, 10 are monoatomic - leaving 25 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	$\# Z > 2$
2	HEM	A	501	1	50,50,50	1.78	9 (18%)	67,82,82	1.28	8 (11%)
7	GOL	C	508	-	5,5,5	0.39	0	5,5,5	0.41	0
3	H4B	B	502	-	17,18,18	0.96	1 (5%)	14,26,26	1.95	4 (28%)
4	9OJ	C	503	-	27,27,27	2.44	1 (3%)	35,37,37	1.48	7 (20%)
5	BTB	C	505	-	13,13,13	0.34	0	7,16,16	0.42	0
5	BTB	D	504	9	13,13,13	0.45	0	7,16,16	0.52	0
4	9OJ	D	503	-	27,27,27	2.25	1 (3%)	35,37,37	1.22	5 (14%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	H4B	C	502	-	17,18,18	0.79	0	14,26,26	2.00	5 (35%)
5	BTB	C	506	-	13,13,13	0.59	0	7,16,16	0.99	0
5	BTB	B	504	9	13,13,13	0.53	0	7,16,16	0.40	0
3	H4B	D	502	-	17,18,18	0.89	0	14,26,26	1.68	5 (35%)
2	HEM	D	501	1	50,50,50	2.09	10 (20%)	67,82,82	1.54	9 (13%)
4	9OJ	A	503	-	27,27,27	2.19	2 (7%)	35,37,37	1.20	4 (11%)
5	BTB	B	508	9	13,13,13	0.48	0	7,16,16	0.52	0
5	BTB	A	505	-	13,13,13	0.39	0	7,16,16	0.57	0
5	BTB	A	506	-	13,13,13	0.35	0	7,16,16	0.53	0
7	GOL	A	508	-	5,5,5	0.38	0	5,5,5	0.32	0
5	BTB	B	505	-	13,13,13	0.44	0	7,16,16	0.50	0
5	BTB	A	504	9	13,13,13	0.40	0	7,16,16	0.55	0
2	HEM	C	501	1	50,50,50	2.15	8 (16%)	67,82,82	1.55	10 (14%)
2	HEM	B	501	1	50,50,50	2.00	9 (18%)	67,82,82	1.61	15 (22%)
5	BTB	C	504	-	13,13,13	0.49	0	7,16,16	0.83	0
5	BTB	D	505	-	13,13,13	0.53	0	7,16,16	0.84	0
3	H4B	A	502	-	17,18,18	0.76	0	14,26,26	1.91	4 (28%)
4	9OJ	B	503	-	27,27,27	2.24	3 (11%)	35,37,37	1.41	7 (20%)

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
2	HEM	A	501	1	-	3/14/54/54	-
7	GOL	C	508	-	-	2/4/4/4	-
3	H4B	B	502	-	-	3/8/17/17	0/2/2/2
4	9OJ	C	503	-	-	1/9/9/9	0/3/3/3
5	BTB	C	505	-	-	5/21/21/21	-
5	BTB	D	504	9	-	3/21/21/21	-
4	9OJ	D	503	-	-	1/9/9/9	0/3/3/3
3	H4B	C	502	-	-	0/8/17/17	0/2/2/2
5	BTB	C	506	-	-	10/21/21/21	-
5	BTB	B	504	9	-	3/21/21/21	-
3	H4B	D	502	-	-	0/8/17/17	0/2/2/2
2	HEM	D	501	1	-	1/14/54/54	-
4	9OJ	A	503	-	-	3/9/9/9	0/3/3/3
5	BTB	B	508	9	-	5/21/21/21	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	BTB	A	505	-	-	7/21/21/21	-
5	BTB	A	506	-	-	7/21/21/21	-
7	GOL	A	508	-	-	3/4/4/4	-
5	BTB	B	505	-	-	9/21/21/21	-
5	BTB	A	504	9	-	6/21/21/21	-
2	HEM	C	501	1	-	2/14/54/54	-
2	HEM	B	501	1	-	1/14/54/54	-
5	BTB	C	504	-	-	5/21/21/21	-
5	BTB	D	505	-	-	12/21/21/21	-
3	H4B	A	502	-	-	1/8/17/17	0/2/2/2
4	9OJ	B	503	-	-	1/9/9/9	0/3/3/3

All (44) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	503	9OJ	C23-C24	-11.70	1.27	1.44
4	D	503	9OJ	C23-C24	-10.73	1.29	1.44
4	B	503	9OJ	C23-C24	-10.46	1.29	1.44
4	A	503	9OJ	C23-C24	-10.27	1.29	1.44
2	C	501	HEM	FE-NB	8.07	2.19	1.94
2	D	501	HEM	C3D-C2D	7.62	1.53	1.36
2	C	501	HEM	C3D-C2D	7.47	1.52	1.36
2	A	501	HEM	C3D-C2D	7.39	1.52	1.36
2	B	501	HEM	C3D-C2D	7.24	1.52	1.36
2	D	501	HEM	FE-NB	6.62	2.15	1.94
2	B	501	HEM	FE-NB	5.89	2.13	1.94
2	D	501	HEM	FE-NC	5.66	2.13	1.95
2	B	501	HEM	FE-NC	5.56	2.13	1.95
2	C	501	HEM	FE-ND	5.17	2.10	1.94
2	C	501	HEM	FE-NA	4.68	2.10	1.95
2	A	501	HEM	FE-ND	4.47	2.08	1.94
2	B	501	HEM	FE-ND	3.99	2.07	1.94
2	D	501	HEM	FE-ND	3.69	2.06	1.94
2	A	501	HEM	FE-NA	3.44	2.06	1.95
2	D	501	HEM	CAB-C3B	3.19	1.55	1.47
2	B	501	HEM	FE-NA	3.15	2.05	1.95
2	D	501	HEM	CAC-C3C	3.15	1.55	1.47
2	C	501	HEM	CAB-C3B	3.14	1.55	1.47
2	B	501	HEM	CAC-C3C	3.01	1.55	1.47
2	C	501	HEM	CAC-C3C	2.98	1.55	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	501	HEM	FE-NA	2.95	2.04	1.95
2	B	501	HEM	CAB-C3B	2.94	1.55	1.47
2	A	501	HEM	FE-NB	2.84	2.03	1.94
2	A	501	HEM	CAB-C3B	2.82	1.54	1.47
2	A	501	HEM	FE-NC	2.81	2.04	1.95
2	A	501	HEM	CAC-C3C	2.67	1.54	1.47
2	A	501	HEM	CMC-C2C	2.32	1.55	1.50
4	B	503	9OJ	C19-N18	-2.26	1.34	1.37
2	C	501	HEM	CMB-C2B	2.22	1.55	1.50
2	B	501	HEM	CMC-C2C	2.16	1.55	1.50
2	D	501	HEM	CMD-C2D	2.12	1.55	1.50
2	B	501	HEM	CMB-C2B	2.12	1.55	1.50
2	D	501	HEM	CMB-C2B	2.12	1.55	1.50
2	D	501	HEM	CMC-C2C	2.11	1.55	1.50
2	A	501	HEM	C2A-C3A	-2.09	1.33	1.38
3	B	502	H4B	C7-C6	2.09	1.54	1.52
4	A	503	9OJ	C12-C19	-2.05	1.39	1.42
2	C	501	HEM	CMA-C3A	2.04	1.54	1.50
4	B	503	9OJ	C13-C12	-2.02	1.38	1.42

All (83) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	HEM	C4D-ND-C1D	5.67	111.93	105.21
2	D	501	HEM	C4D-ND-C1D	5.47	111.68	105.21
2	C	501	HEM	C4D-ND-C1D	5.44	111.65	105.21
3	B	502	H4B	C2-N1-C8A	4.61	121.49	113.36
2	A	501	HEM	C4D-ND-C1D	4.39	110.41	105.21
3	A	502	H4B	C2-N1-C8A	4.29	120.93	113.36
3	C	502	H4B	C2-N1-C8A	4.27	120.90	113.36
2	D	501	HEM	CBD-CAD-C3D	-4.04	101.36	112.53
3	D	502	H4B	C2-N1-C8A	3.71	119.90	113.36
4	C	503	9OJ	C02-C03-C04	-3.59	118.18	122.22
2	D	501	HEM	CBA-CAA-C2A	-3.58	102.63	112.53
2	D	501	HEM	C3B-C2B-C1B	3.48	109.02	106.41
2	C	501	HEM	C3B-C4B-NB	-3.48	106.97	109.47
2	C	501	HEM	C1B-NB-C4B	3.44	109.28	105.21
4	C	503	9OJ	C06-C05-C04	-3.36	105.26	112.83
2	B	501	HEM	C3B-C2B-C1B	3.18	108.80	106.41
3	C	502	H4B	O4-C4-C4A	-3.16	119.64	127.26
2	B	501	HEM	CBD-CAD-C3D	-3.09	103.99	112.53
4	A	503	9OJ	C06-C05-C04	-3.00	106.07	112.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	502	H4B	O4-C4-C4A	-2.99	120.05	127.26
2	B	501	HEM	C2A-C1A-NA	-2.87	106.97	110.15
2	B	501	HEM	CBA-CAA-C2A	-2.79	104.82	112.53
4	B	503	9OJ	C09-C20-C19	-2.77	118.91	121.11
3	C	502	H4B	C2-N3-C4	-2.75	120.11	125.11
4	C	503	9OJ	C02-C23-C24	2.71	121.92	119.06
2	A	501	HEM	C3B-C2B-C1B	2.68	108.42	106.41
2	C	501	HEM	C3B-C2B-C1B	2.68	108.42	106.41
2	D	501	HEM	C1B-NB-C4B	2.66	108.36	105.21
2	B	501	HEM	C1B-NB-C4B	2.64	108.34	105.21
4	D	503	9OJ	C08-N07-C06	-2.63	103.95	113.20
3	D	502	H4B	C2-N3-C4	-2.62	120.36	125.11
3	C	502	H4B	C4A-C4-N3	2.62	119.32	112.13
4	C	503	9OJ	C13-C12-C19	2.61	119.59	118.00
4	B	503	9OJ	C03-C02-C23	2.60	121.23	117.52
4	B	503	9OJ	C13-C12-C19	2.58	119.57	118.00
3	A	502	H4B	C4A-C4-N3	2.57	119.19	112.13
3	B	502	H4B	O4-C4-C4A	-2.57	121.07	127.26
2	D	501	HEM	CMD-C2D-C1D	2.53	128.99	125.03
2	B	501	HEM	O1A-CGA-CBA	-2.53	115.06	123.09
2	C	501	HEM	C2A-C1A-NA	-2.51	107.36	110.15
4	C	503	9OJ	C12-C19-N18	-2.51	120.14	122.80
4	D	503	9OJ	C13-C12-C19	2.50	119.53	118.00
3	A	502	H4B	C2-N3-C4	-2.50	120.58	125.11
3	B	502	H4B	C4A-C4-N3	2.46	118.89	112.13
2	C	501	HEM	CHC-C1C-NC	2.45	127.12	124.45
2	B	501	HEM	CAD-CBD-CGD	-2.44	107.19	113.67
2	C	501	HEM	CMD-C2D-C1D	2.43	128.83	125.03
4	B	503	9OJ	C12-C19-N18	-2.42	120.24	122.80
2	C	501	HEM	CAD-C3D-C4D	2.39	128.86	124.70
2	C	501	HEM	CBA-CAA-C2A	-2.38	105.94	112.53
2	C	501	HEM	C2B-C1B-NB	-2.38	107.11	109.84
2	A	501	HEM	CBD-CAD-C3D	-2.34	106.05	112.53
4	B	503	9OJ	C08-N07-C06	-2.34	104.97	113.20
2	D	501	HEM	C2B-C1B-NB	-2.33	107.16	109.84
4	D	503	9OJ	C03-C02-C23	2.33	120.85	117.52
2	B	501	HEM	C3B-C4B-NB	-2.33	107.80	109.47
2	D	501	HEM	C3B-C4B-NB	-2.28	107.83	109.47
2	B	501	HEM	C2B-C1B-NB	-2.27	107.23	109.84
4	D	503	9OJ	C12-C19-N18	-2.27	120.40	122.80
3	C	502	H4B	N2-C2-N3	2.23	121.46	116.76
3	D	502	H4B	C4A-C4-N3	2.21	118.20	112.13

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	HEM	CMD-C2D-C1D	2.21	128.49	125.03
2	A	501	HEM	C3B-C4B-NB	-2.17	107.91	109.47
2	B	501	HEM	C3D-C4D-ND	-2.16	107.80	110.17
4	A	503	9OJ	C12-C19-N18	-2.16	120.51	122.80
2	B	501	HEM	O2A-CGA-CBA	2.14	120.78	114.00
4	B	503	9OJ	C02-C03-C04	-2.14	119.81	122.22
3	B	502	H4B	N3-C2-N1	-2.14	119.41	123.32
2	B	501	HEM	CAA-CBA-CGA	-2.14	108.00	113.67
4	C	503	9OJ	N17-C16-N18	2.11	119.98	118.24
4	A	503	9OJ	C15-C13-C12	2.11	119.97	117.84
4	B	503	9OJ	C06-C05-C04	-2.10	108.10	112.83
2	D	501	HEM	C4C-NC-C1C	2.09	109.23	105.82
2	A	501	HEM	CAD-CBD-CGD	-2.09	108.12	113.67
2	A	501	HEM	C1B-NB-C4B	2.09	107.68	105.21
3	D	502	H4B	O4-C4-C4A	-2.08	122.25	127.26
4	C	503	9OJ	C03-C02-C23	2.06	120.46	117.52
2	A	501	HEM	CAA-C2A-C1A	2.05	128.95	124.94
2	B	501	HEM	C4A-NA-C1A	2.04	109.14	105.82
2	B	501	HEM	CAB-C3B-C2B	-2.03	121.82	128.43
4	D	503	9OJ	C09-C20-C19	-2.03	119.50	121.11
3	D	502	H4B	C4-C4A-N5	2.02	121.79	116.27
4	A	503	9OJ	C03-C02-C23	2.01	120.39	117.52

There are no chirality outliers.

All (94) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	HEM	C1A-C2A-CAA-CBA
5	A	504	BTB	O1-C1-C2-C3
5	A	504	BTB	O1-C1-C2-C4
5	A	504	BTB	O1-C1-C2-N
5	A	504	BTB	C1-C2-C3-O3
5	A	504	BTB	C4-C2-C3-O3
5	A	504	BTB	N-C2-C3-O3
5	A	505	BTB	C1-C2-C3-O3
5	A	505	BTB	C4-C2-C3-O3
5	A	505	BTB	N-C2-C3-O3
5	A	505	BTB	C1-C2-C4-O4
5	A	505	BTB	C3-C2-C4-O4
5	A	505	BTB	N-C2-C4-O4
5	A	506	BTB	O1-C1-C2-C3
5	A	506	BTB	O1-C1-C2-C4

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Mol	Chain	Res	Type	Atoms
5	A	506	BTB	O1-C1-C2-N
5	A	506	BTB	C1-C2-C4-O4
5	A	506	BTB	C3-C2-C4-O4
5	A	506	BTB	N-C2-C4-O4
5	B	504	BTB	O1-C1-C2-C3
5	B	504	BTB	O1-C1-C2-C4
5	B	504	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	C3-C2-C4-O4
5	B	505	BTB	N-C2-C4-O4
5	C	504	BTB	O1-C1-C2-C3
5	C	504	BTB	O1-C1-C2-C4
5	C	504	BTB	O1-C1-C2-N
5	C	504	BTB	C6-C5-N-C7
5	C	505	BTB	C4-C2-C3-O3
5	C	505	BTB	N-C2-C3-O3
5	C	505	BTB	C1-C2-C4-O4
5	C	505	BTB	N-C2-C4-O4
5	C	506	BTB	O1-C1-C2-C3
5	C	506	BTB	O1-C1-C2-C4
5	C	506	BTB	O1-C1-C2-N
5	C	506	BTB	C1-C2-C3-O3
5	C	506	BTB	C4-C2-C3-O3
5	C	506	BTB	N-C2-C3-O3
5	C	506	BTB	N-C2-C4-O4
5	D	505	BTB	O1-C1-C2-C3
5	D	505	BTB	O1-C1-C2-C4
5	D	505	BTB	O1-C1-C2-N
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	C1-C2-C4-O4
5	D	505	BTB	C3-C2-C4-O4
5	D	505	BTB	N-C2-C4-O4
5	D	505	BTB	C6-C5-N-C7
7	A	508	GOL	O1-C1-C2-C3
7	C	508	GOL	O1-C1-C2-C3
5	B	505	BTB	N-C5-C6-O6
5	B	508	BTB	N-C5-C6-O6
5	C	504	BTB	N-C5-C6-O6

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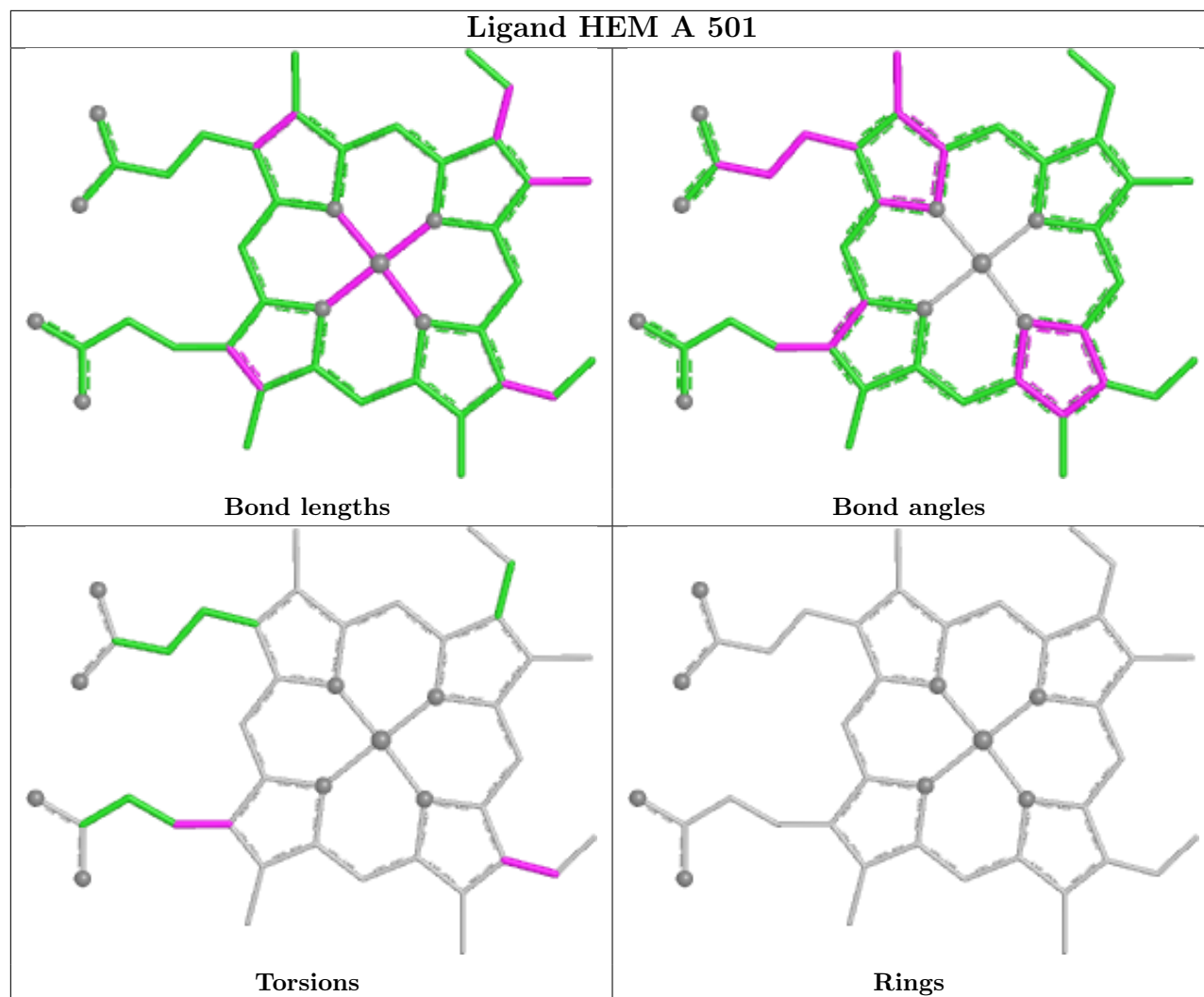
Mol	Chain	Res	Type	Atoms
5	A	505	BTB	N-C5-C6-O6
7	C	508	GOL	O1-C1-C2-O2
5	D	505	BTB	N-C7-C8-O8
5	B	508	BTB	O1-C1-C2-C3
5	B	508	BTB	C3-C2-C4-O4
7	A	508	GOL	O1-C1-C2-O2
4	B	503	9OJ	C04-C05-C06-N07
5	C	506	BTB	N-C7-C8-O8
5	D	504	BTB	N-C7-C8-O8
3	B	502	H4B	C7-C6-C9-O9
5	D	504	BTB	N-C5-C6-O6
2	A	501	HEM	C3A-C2A-CAA-CBA
4	C	503	9OJ	C04-C05-C06-N07
5	B	505	BTB	C1-C2-C4-O4
5	C	506	BTB	C3-C2-C4-O4
5	A	506	BTB	N-C5-C6-O6
4	D	503	9OJ	C04-C05-C06-N07
5	C	506	BTB	C8-C7-N-C5
7	A	508	GOL	O2-C2-C3-O3
2	C	501	HEM	C1A-C2A-CAA-CBA
2	A	501	HEM	C4B-C3B-CAB-CBB
2	B	501	HEM	C4B-C3B-CAB-CBB
2	C	501	HEM	C4B-C3B-CAB-CBB
2	D	501	HEM	C4B-C3B-CAB-CBB
5	D	504	BTB	C4-C2-C3-O3
5	B	508	BTB	O1-C1-C2-N
4	A	503	9OJ	C02-C23-C24-N25
3	B	502	H4B	C7-C6-C9-C10
4	A	503	9OJ	C05-C06-N07-C08
5	B	508	BTB	O1-C1-C2-C4
5	C	505	BTB	C3-C2-C4-O4
5	B	505	BTB	O1-C1-C2-C3
4	A	503	9OJ	C04-C05-C06-N07
3	A	502	H4B	N5-C6-C9-O9
3	B	502	H4B	N5-C6-C9-O9
5	B	505	BTB	O1-C1-C2-N
5	D	505	BTB	C1-C2-N-C5

There are no ring outliers.

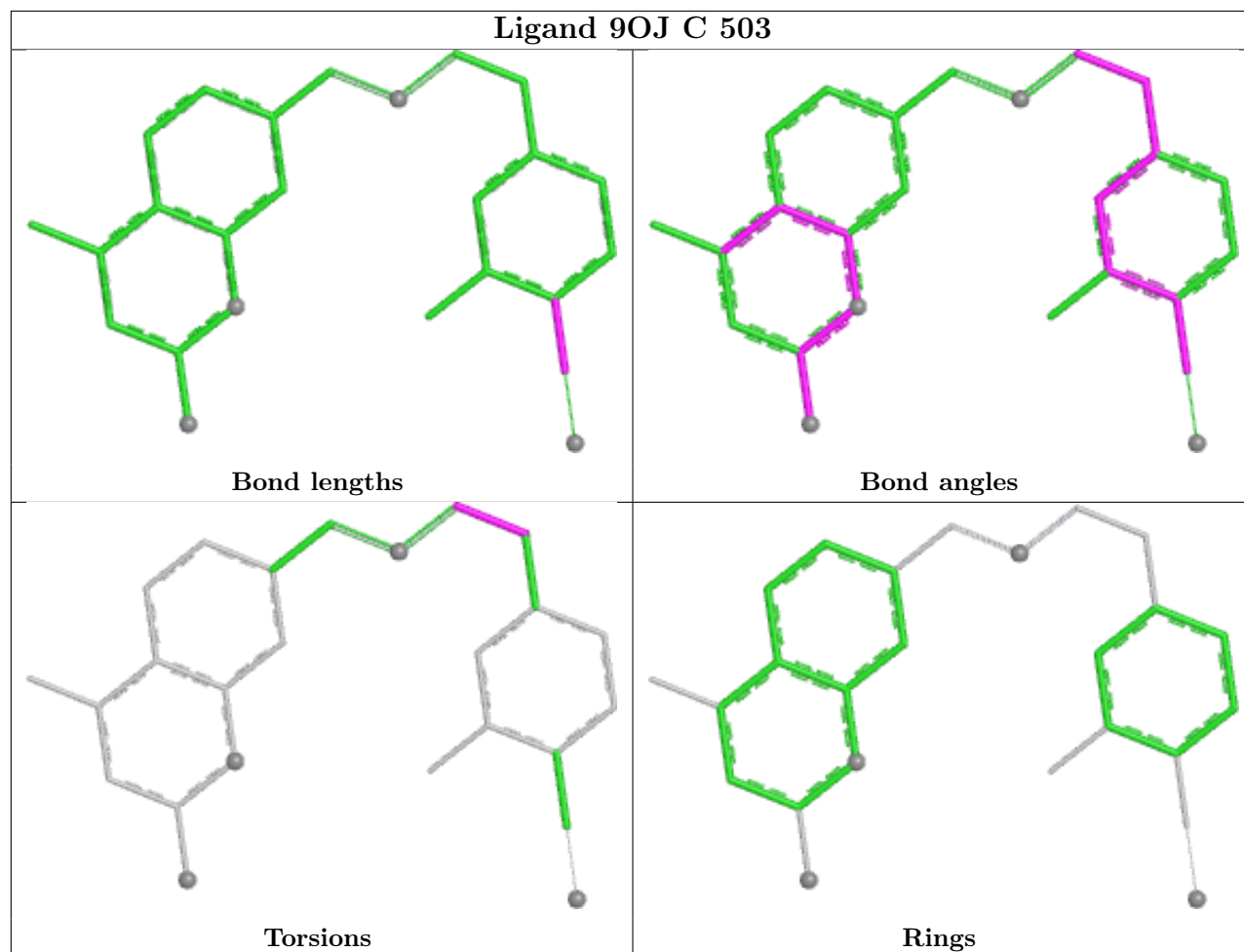
20 monomers are involved in 55 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	HEM	4	0
4	C	503	9OJ	1	0
5	C	505	BTB	2	0
5	D	504	BTB	4	0
3	C	502	H4B	1	0
5	C	506	BTB	8	0
3	D	502	H4B	1	0
2	D	501	HEM	3	0
4	A	503	9OJ	2	0
5	B	508	BTB	5	0
5	A	505	BTB	3	0
5	A	506	BTB	3	0
7	A	508	GOL	1	0
5	B	505	BTB	7	0
5	A	504	BTB	2	0
2	C	501	HEM	3	0
2	B	501	HEM	1	0
5	C	504	BTB	2	0
5	D	505	BTB	2	0
3	A	502	H4B	1	0

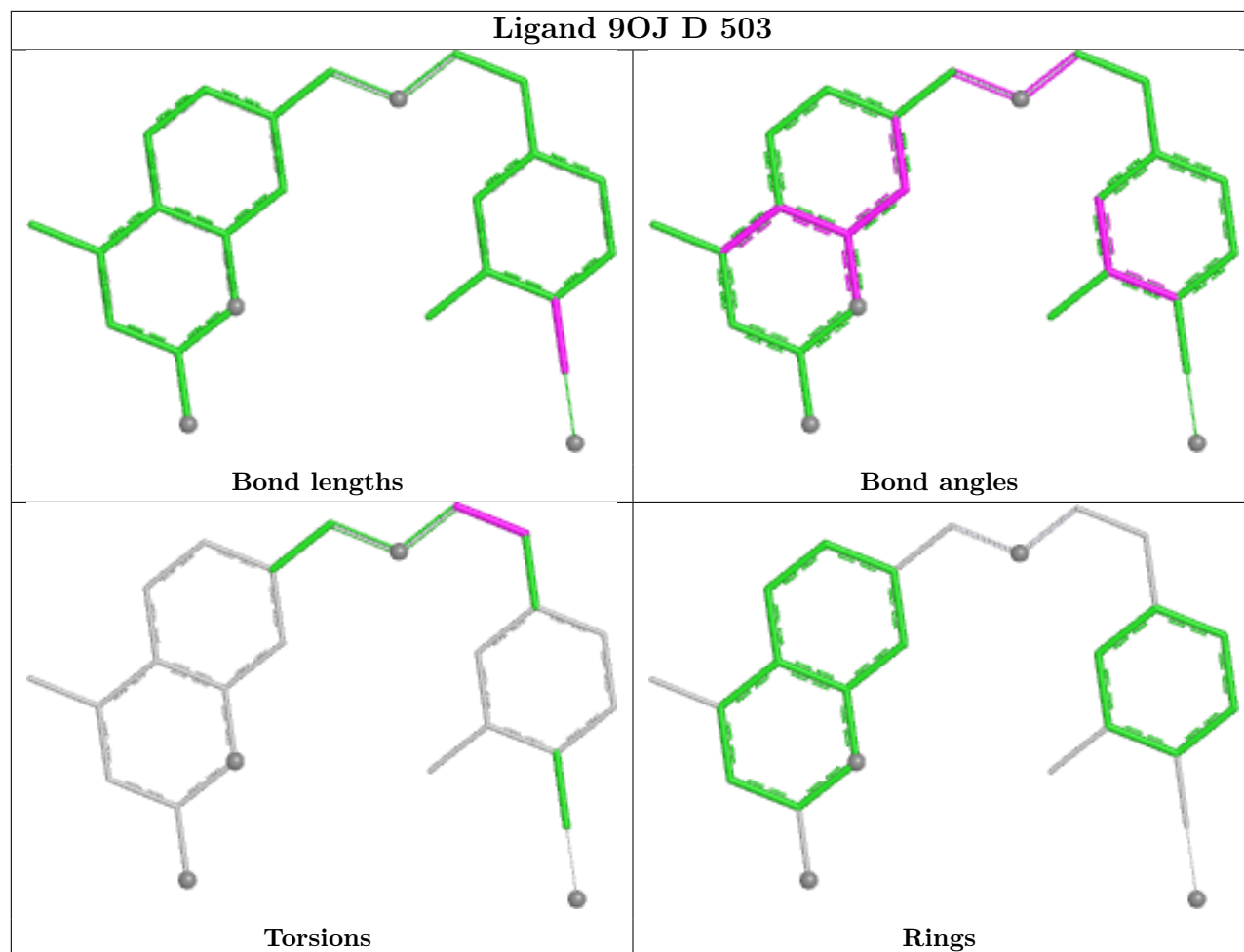
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

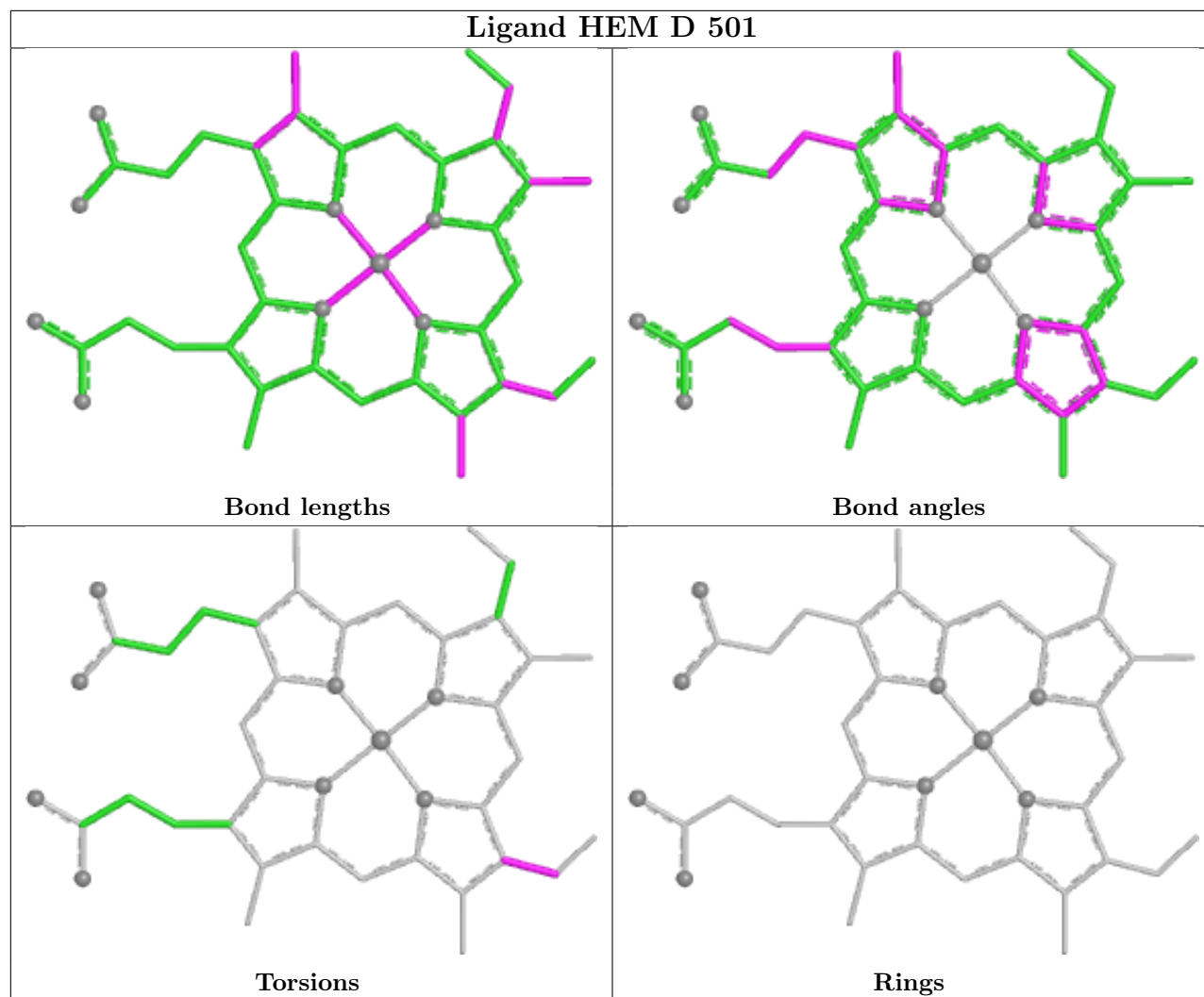


Ligand 9OJ C 503

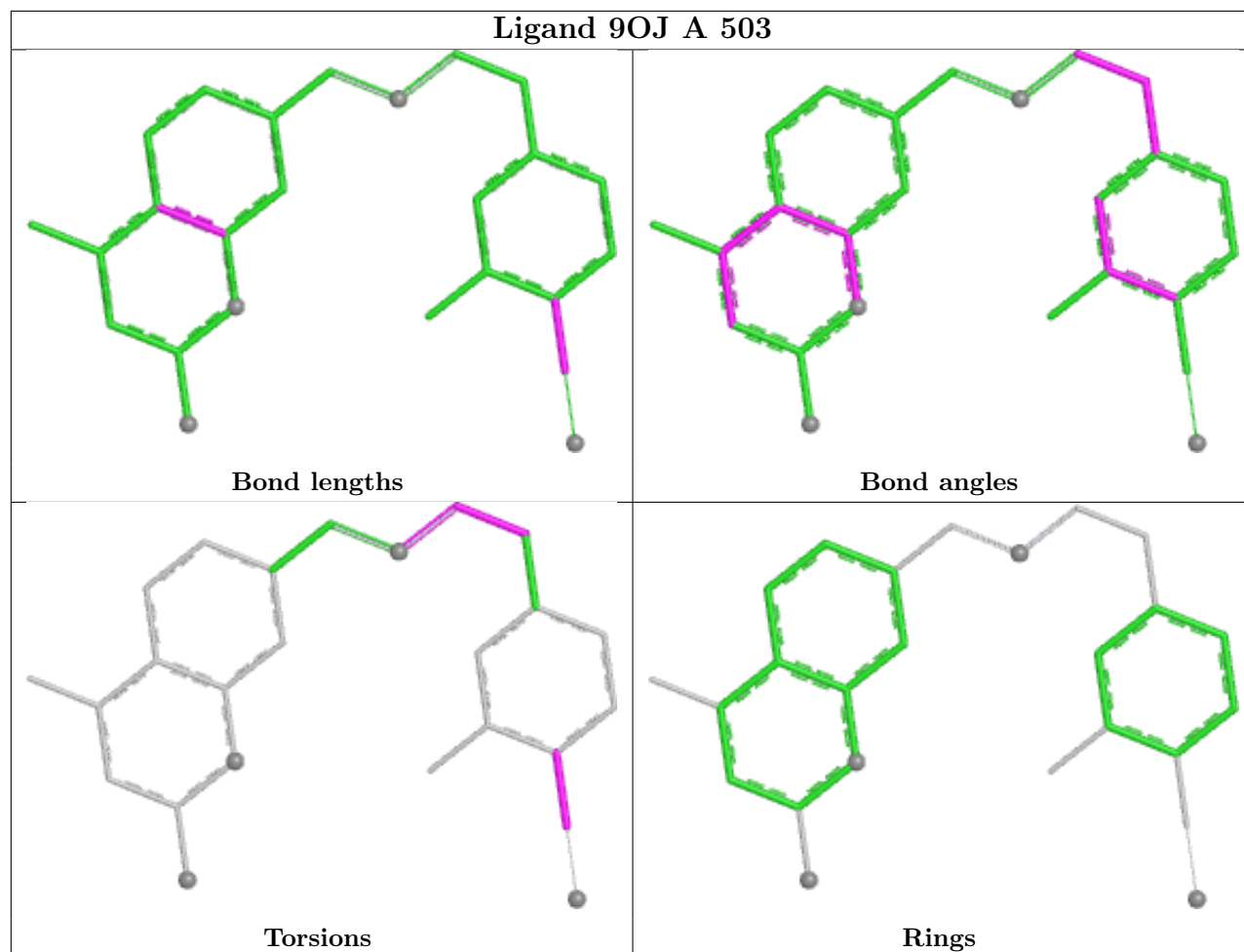


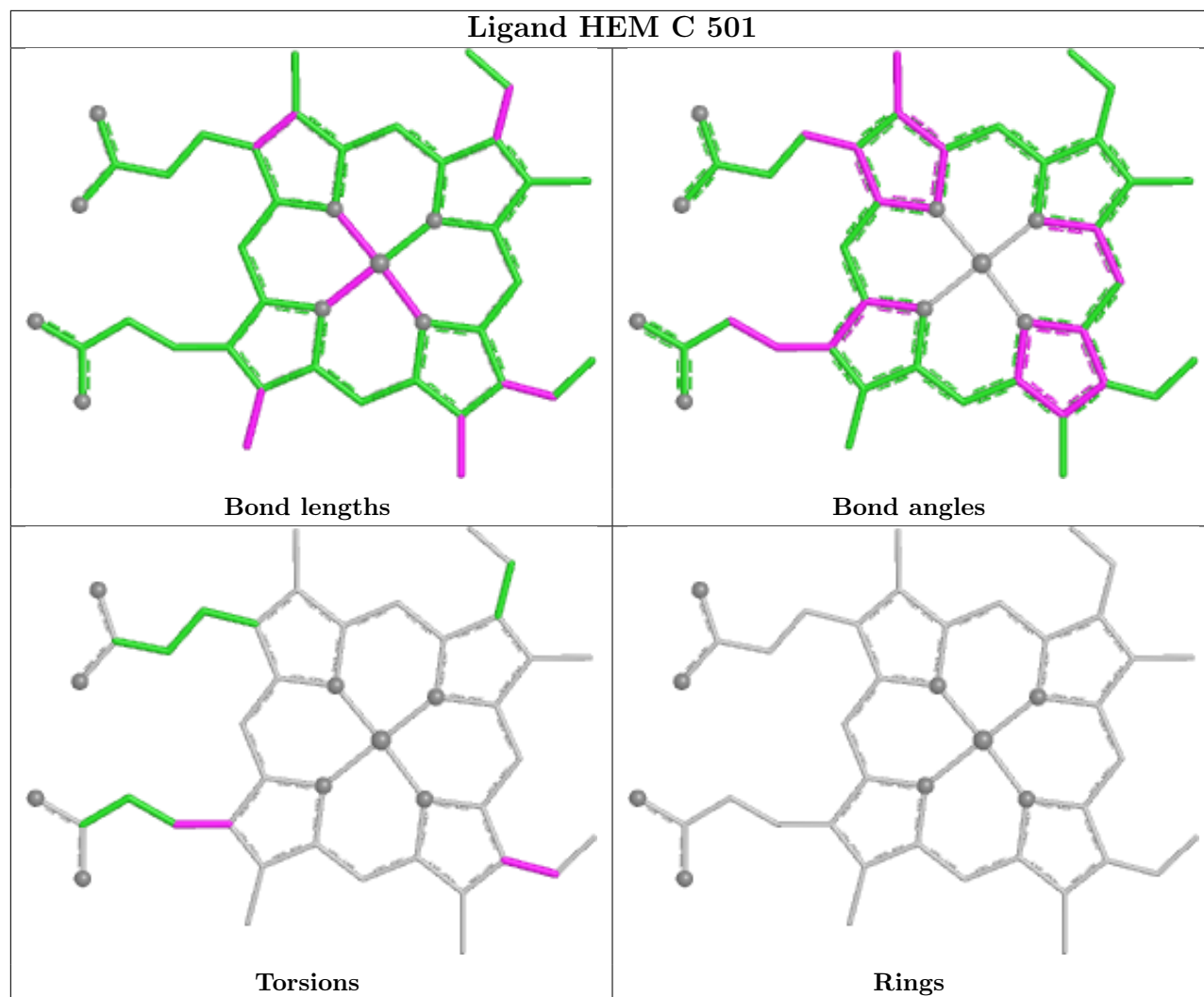
Ligand 9OJ D 503

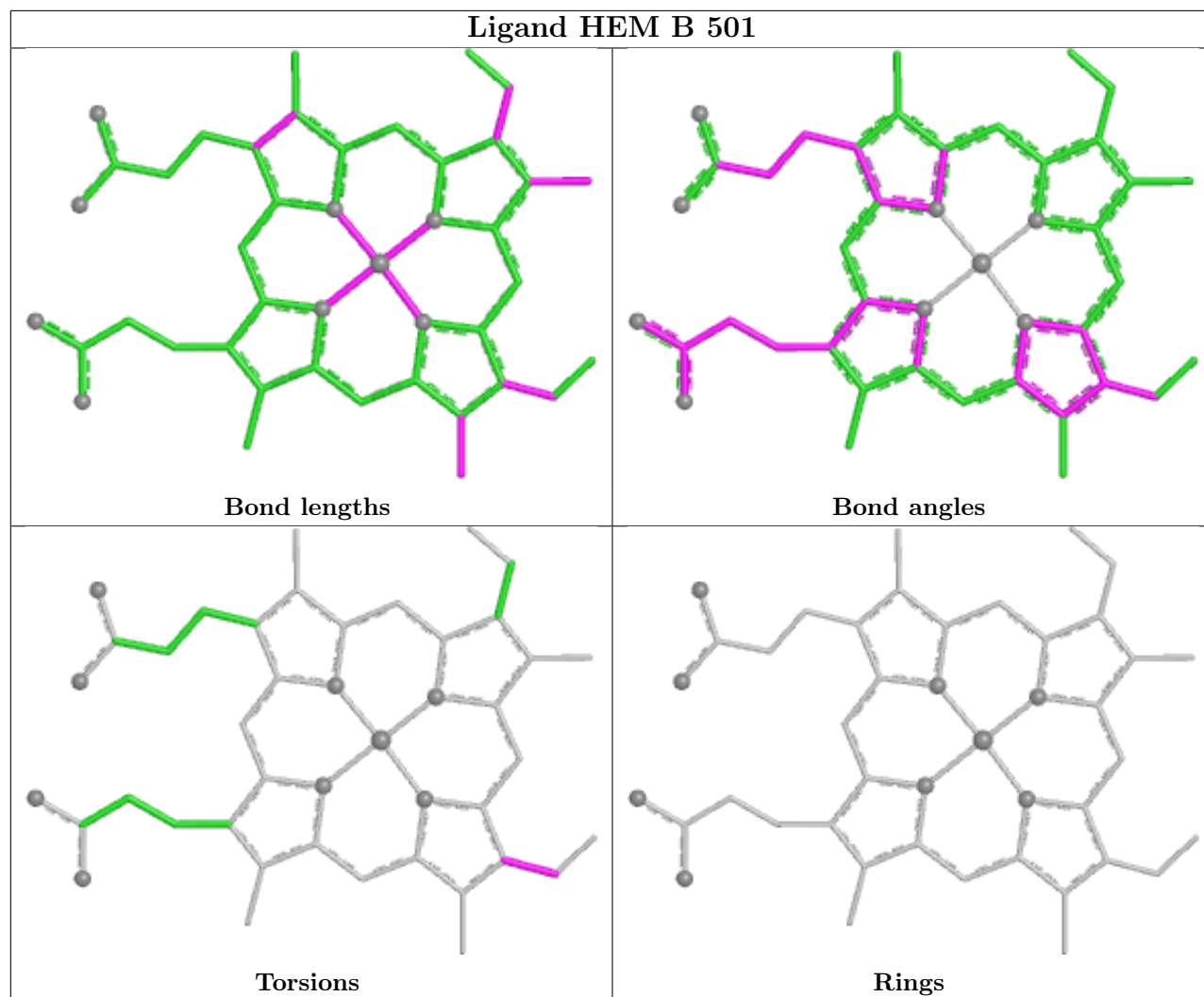


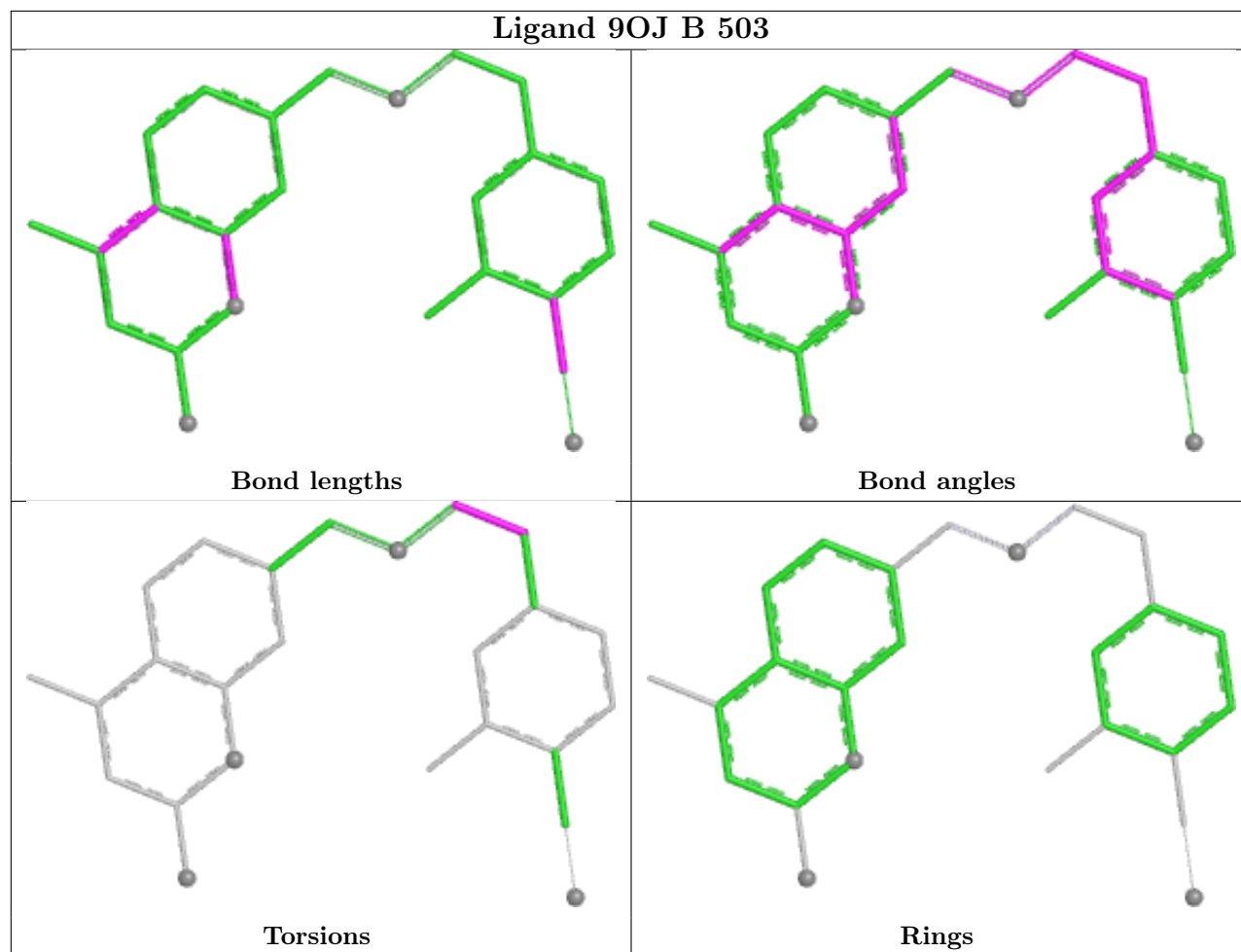


Ligand 9OJ A 503









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 [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, 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	404/440 (91%)	0.15	5 (1%) 76 73	28, 63, 110, 141	2 (0%)
1	B	404/440 (91%)	-0.19	1 (0%) 91 89	27, 47, 78, 122	3 (0%)
1	C	401/440 (91%)	0.04	0 100 100	31, 57, 99, 129	0
1	D	405/440 (92%)	-0.23	2 (0%) 87 85	27, 46, 75, 118	3 (0%)
All	All	1614/1760 (91%)	-0.06	8 (0%) 87 85	27, 52, 97, 141	8 (0%)

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	119	ALA	2.7
1	A	480	TRP	2.7
1	A	144	GLN	2.5
1	A	120	PRO	2.3
1	B	142	GLY	2.3
1	D	89	GLN	2.0
1	A	160	THR	2.0
1	A	163	TYR	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 ⓘ

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.

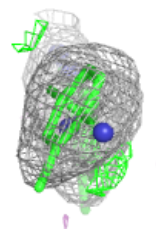
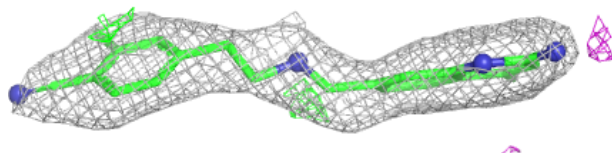
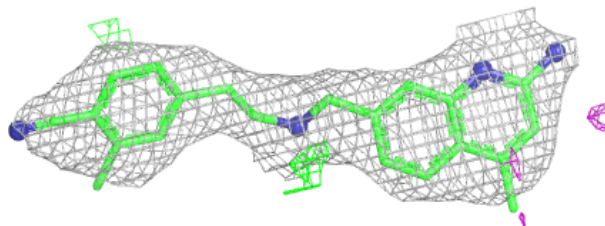
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	BTB	A	505	14/14	0.76	0.14	81,90,93,94	0
5	BTB	C	505	14/14	0.78	0.12	100,106,109,110	0
5	BTB	B	505	14/14	0.82	0.12	63,68,77,81	0
5	BTB	A	506	14/14	0.82	0.14	114,120,123,123	0
5	BTB	C	506	14/14	0.82	0.12	83,88,90,92	0
5	BTB	D	505	14/14	0.82	0.12	67,79,81,83	0
5	BTB	C	504	14/14	0.87	0.12	49,66,73,74	0
5	BTB	D	504	14/14	0.89	0.13	50,69,74,75	0
4	9OJ	A	503	25/25	0.89	0.11	39,51,63,68	0
4	9OJ	D	503	25/25	0.90	0.12	31,48,60,62	0
7	GOL	C	508	6/6	0.90	0.09	73,76,78,79	0
5	BTB	B	504	14/14	0.91	0.12	32,58,67,70	0
7	GOL	A	508	6/6	0.91	0.09	74,81,86,87	0
4	9OJ	B	503	25/25	0.91	0.10	36,44,53,60	0
8	CL	B	506	1/1	0.91	0.17	67,67,67,67	0
4	9OJ	C	503	25/25	0.92	0.09	47,54,58,61	0
5	BTB	A	504	14/14	0.92	0.09	89,93,95,95	0
5	BTB	B	508	14/14	0.93	0.10	47,76,83,83	0
3	H4B	A	502	17/17	0.94	0.08	47,55,58,60	0
3	H4B	C	502	17/17	0.94	0.07	44,54,59,59	0
3	H4B	B	502	17/17	0.95	0.06	28,41,44,45	0
8	CL	C	509	1/1	0.95	0.08	67,67,67,67	0
9	GD	A	510	1/1	0.96	0.06	137,137,137,137	0
8	CL	A	509	1/1	0.97	0.06	64,64,64,64	0
3	H4B	D	502	17/17	0.97	0.05	30,37,40,43	0
2	HEM	D	501	43/43	0.97	0.07	30,39,48,52	0
8	CL	D	507	1/1	0.97	0.08	53,53,53,53	0
2	HEM	A	501	43/43	0.97	0.08	39,52,60,62	0
2	HEM	C	501	43/43	0.98	0.07	31,47,59,63	0
2	HEM	B	501	43/43	0.98	0.07	31,44,53,59	0
9	GD	C	510	1/1	0.98	0.04	119,119,119,119	0
9	GD	B	507	1/1	0.99	0.06	55,55,55,55	0
6	ZN	A	507	1/1	0.99	0.02	51,51,51,51	0
9	GD	D	506	1/1	0.99	0.04	53,53,53,53	0
6	ZN	C	507	1/1	1.00	0.01	48,48,48,48	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.

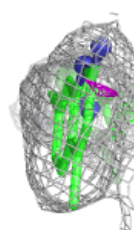
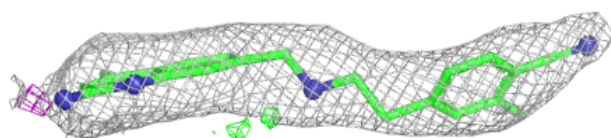
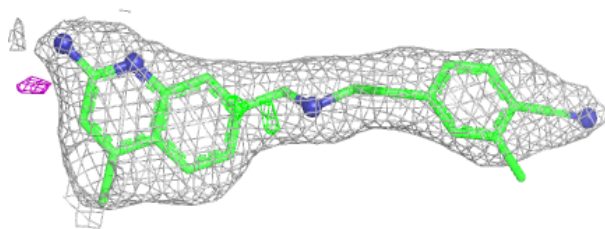
Electron density around 9OJ A 503:

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

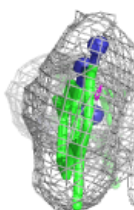
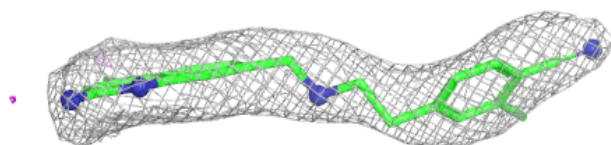
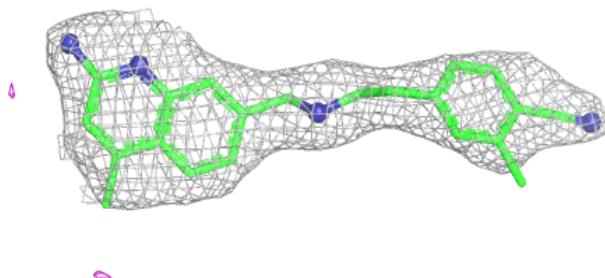


Electron density around 9OJ D 503:

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

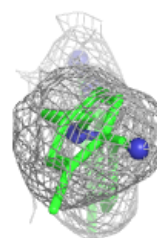
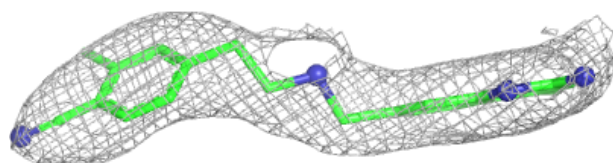
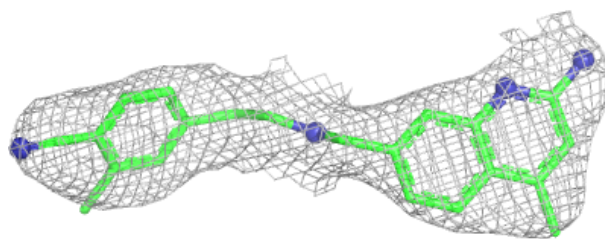
**Electron density around 9OJ B 503:**

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



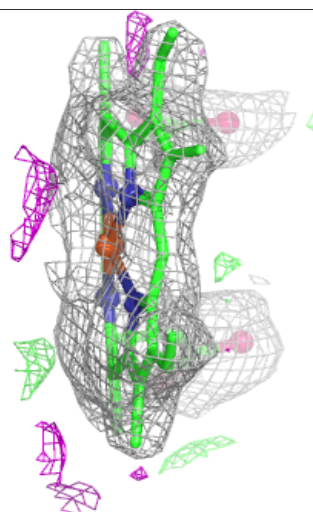
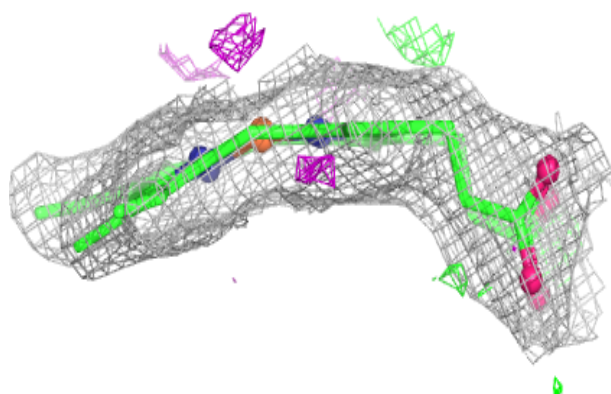
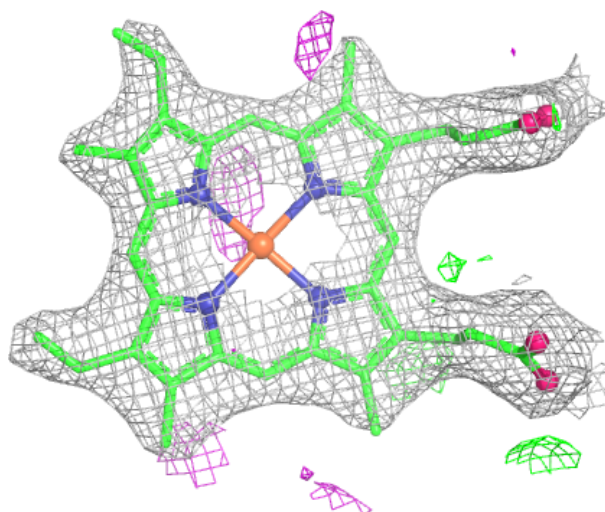
Electron density around 9OJ C 503:

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



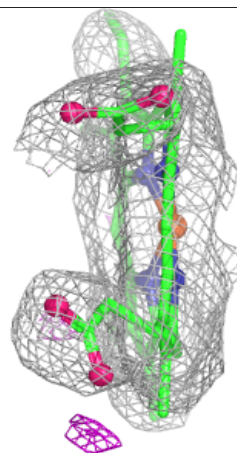
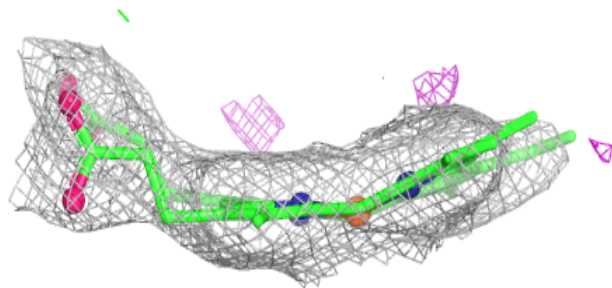
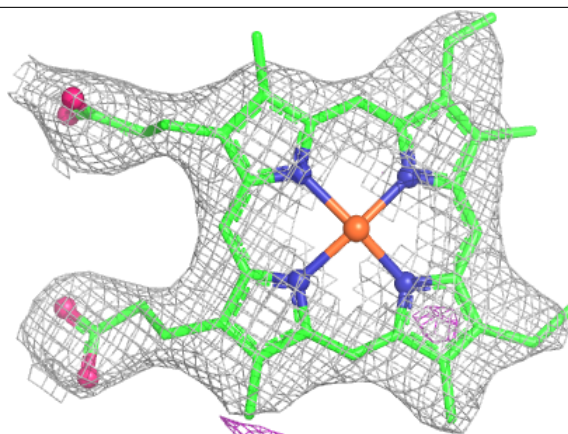
Electron density around HEM D 501:

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



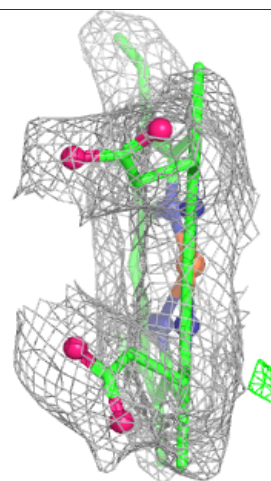
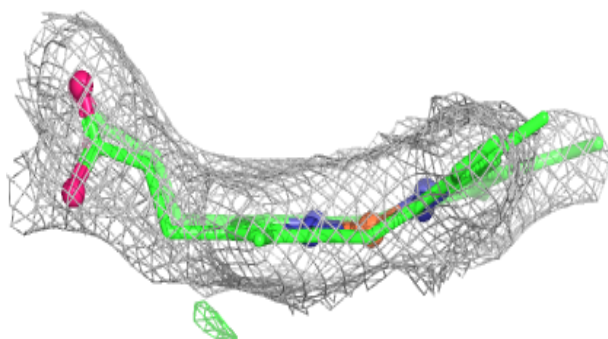
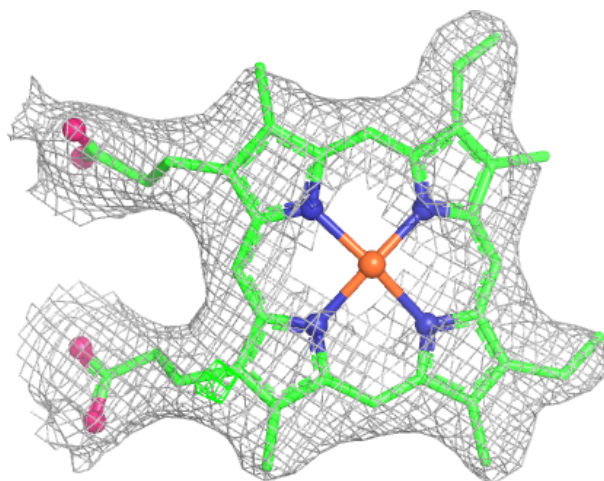
Electron density around HEM A 501:

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



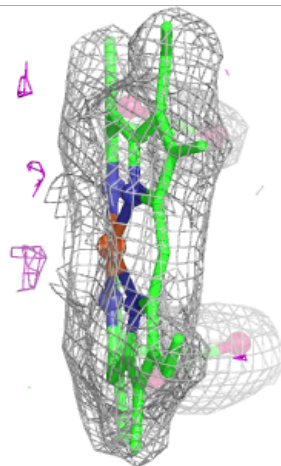
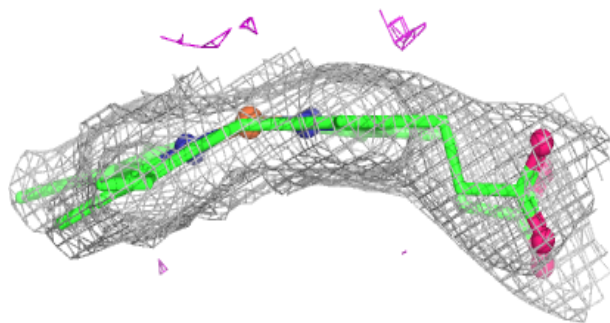
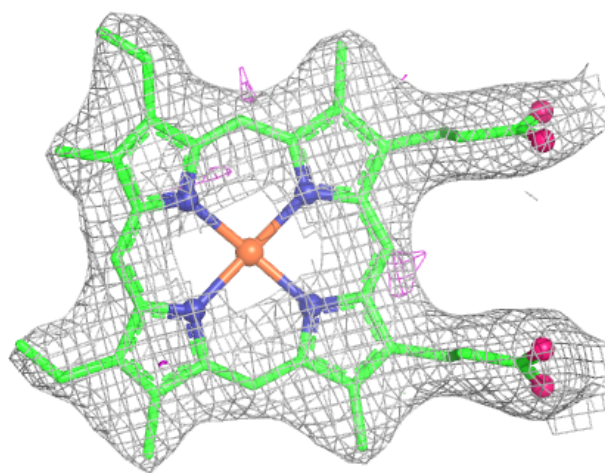
Electron density around HEM C 501:

$2mF_o-DF_c$ (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)



6.5 Other polymers [i](#)

There are no such residues in this entry.