



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 20, 2026 – 08:20 AM UTC

PDB ID : 2WH8 / pdb_00002wh8
Title : Interaction of Mycobacterium tuberculosis CYP130 with heterocyclic arylamines
Authors : Podust, L.M.; Ouellet, H.; von Kries, J.P.; Ortiz de Montellano, P.R.
Deposited on : 2009-05-01
Resolution : 1.70 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

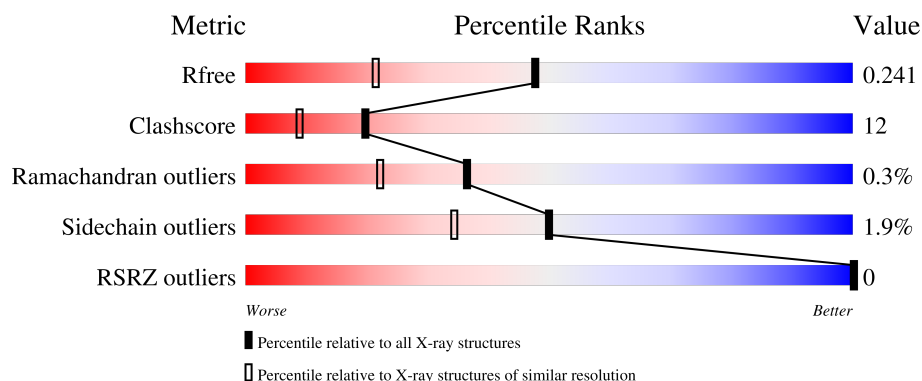
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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	5551 (1.70-1.70)
Clashscore	190562	5924 (1.70-1.70)
Ramachandran outliers	187476	5846 (1.70-1.70)
Sidechain outliers	187428	5846 (1.70-1.70)
RSRZ outliers	180081	5554 (1.70-1.70)

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	413	 76% 18% • 5%
1	B	413	 80% 14% • 5%
1	C	413	 77% 16% • 6%
1	D	413	 79% 14% • 6%

2 Entry composition [i](#)

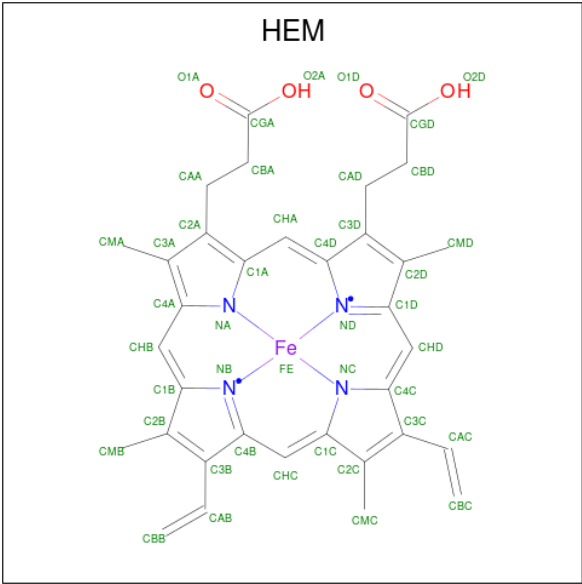
There are 4 unique types of molecules in this entry. The entry contains 13225 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 PUTATIVE CYTOCHROME P450 130.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	392	Total	C	N	O	S	0	5	0
			3030	1909	538	567	16			
1	B	392	Total	C	N	O	S	0	3	0
			3025	1905	539	564	17			
1	C	388	Total	C	N	O	S	0	3	0
			2993	1889	531	558	15			
1	D	389	Total	C	N	O	S	0	8	0
			3050	1918	545	570	17			

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



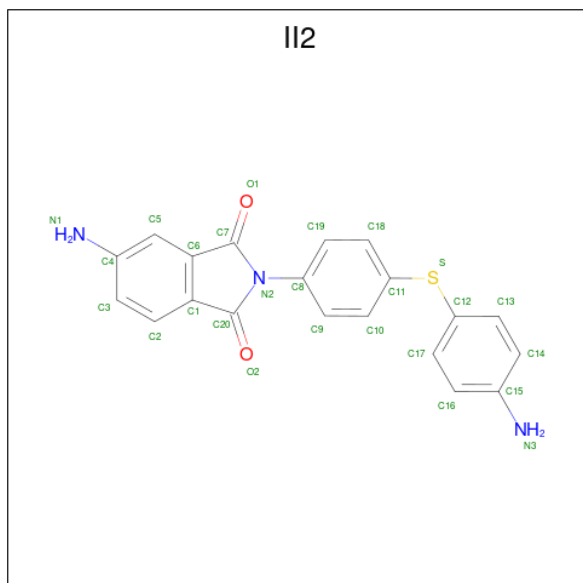
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	Fe	N O	0	0
			43	34	1	4 4		
2	B	1	Total	C	Fe	N O	0	0
			43	34	1	4 4		

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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-AMINO-2-{4-[(4-AMINOPHENYL)SULFANYL]PHENYL}-1H-ISOINDOL E-1,3(2H)-DIONE (CCD ID: II2) (formula: C₂₀H₁₅N₃O₂S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 26	C 20	N 3	O 2	S 1	0	0
3	B	1	Total 26	C 20	N 3	O 2	S 1	0	0
3	C	1	Total 26	C 20	N 3	O 2	S 1	0	0
3	D	1	Total 26	C 20	N 3	O 2	S 1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	208	Total	O	0	0
			208	208		
4	B	233	Total	O	0	0
			233	233		
4	C	171	Total	O	0	0
			171	171		

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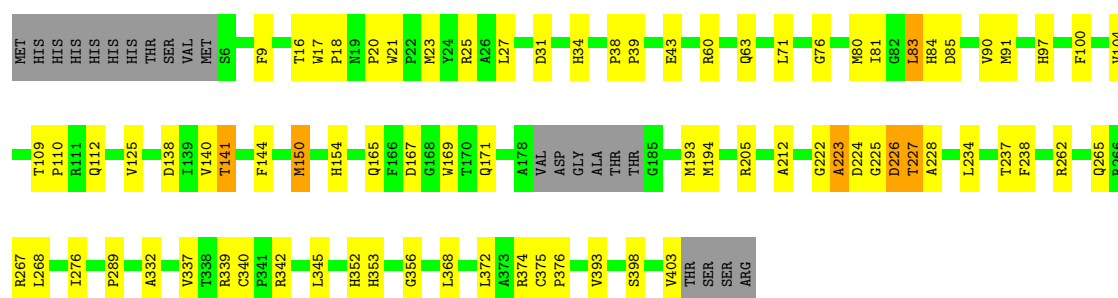
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	239	Total 239	O 239	0	0

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.

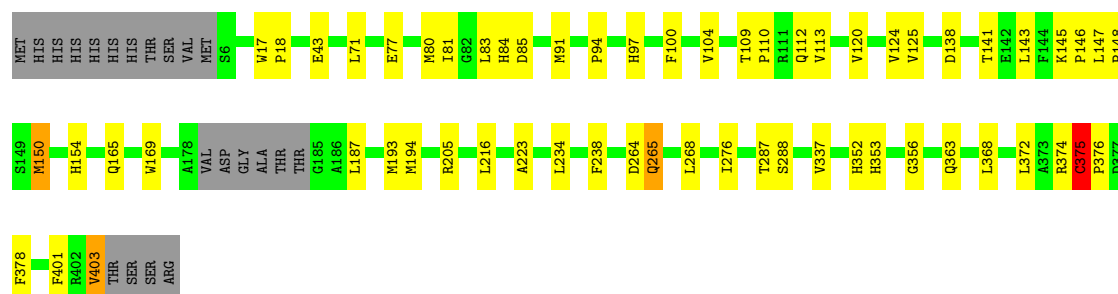
• Molecule 1: PUTATIVE CYTOCHROME P450 130

Chain A: 



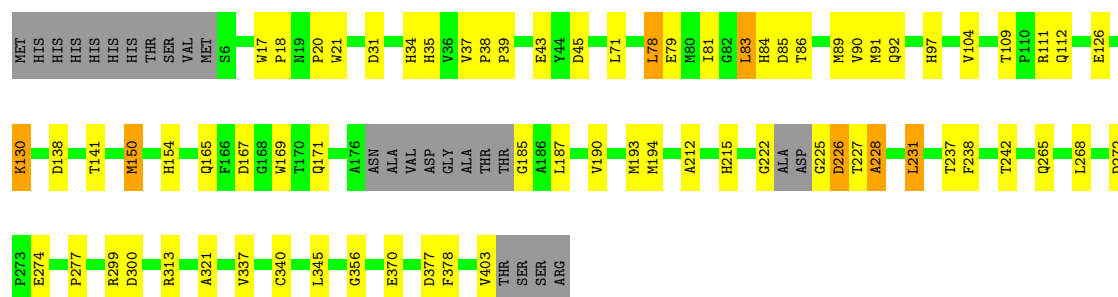
• Molecule 1: PUTATIVE CYTOCHROME P450 130

Chain B: 



• Molecule 1: PUTATIVE CYTOCHROME P450 130

Chain C: 



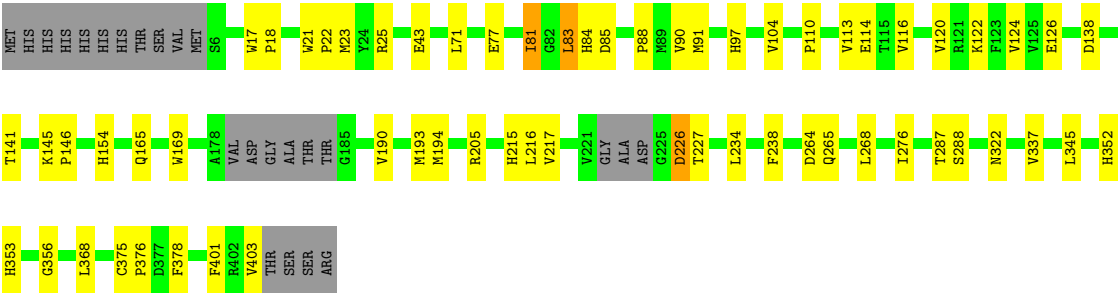
● Molecule 1: PUTATIVE CYTOCHROME P450 130

Chain D:

79%

14%

• 6%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	53.71Å 84.90Å 90.16Å 96.56° 90.02° 108.43°	Depositor
Resolution (Å)	89.44 – 1.70 89.44 – 1.70	Depositor EDS
% Data completeness (in resolution range)	95.9 (89.44-1.70) 85.6 (89.44-1.70)	Depositor EDS
R_{merge}	0.03	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.08 (at 1.69Å)	Xtriage
Refinement program	REFMAC 5.4.0067	Depositor
R, R_{free}	0.199 , 0.259 0.217 , 0.241	Depositor DCC
R_{free} test set	14173 reflections (9.47%)	wwPDB-VP
Wilson B-factor (Å ²)	18.9	Xtriage
Anisotropy	0.150	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 33.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.430 for h,-h-k,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	13225	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 91.07 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.7550e-08. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

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

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: HEM, II2

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	1.08	0/3105	1.08	3/4241 (0.1%)
1	B	1.08	0/3100	1.03	5/4232 (0.1%)
1	C	1.02	0/3067	1.07	11/4188 (0.3%)
1	D	1.10	1/3124 (0.0%)	1.05	1/4263 (0.0%)
All	All	1.07	1/12396 (0.0%)	1.06	20/16924 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	88	PRO	C-O	5.42	1.30	1.23

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	228	ALA	N-CA-C	-9.79	99.65	111.69
1	C	228	ALA	N-CA-C	-7.45	102.85	112.23
1	A	262	ARG	CA-C-N	-6.72	112.70	119.56
1	A	262	ARG	C-N-CA	-6.72	112.70	119.56
1	C	274	GLU	N-CA-C	-6.52	105.30	113.18
1	C	340	CYS	CA-C-N	-6.40	113.70	120.03
1	C	340	CYS	C-N-CA	-6.40	113.70	120.03
1	D	215	HIS	N-CA-C	6.14	118.06	111.36
1	C	215	HIS	N-CA-C	5.55	117.33	111.28
1	C	21	TRP	CA-C-N	-5.49	112.87	118.85
1	C	21	TRP	C-N-CA	-5.49	112.87	118.85
1	B	375	CYS	CA-C-N	5.36	125.68	119.47
1	B	375	CYS	C-N-CA	5.36	125.68	119.47
1	C	272	ASP	CA-C-N	5.22	124.94	119.82
1	C	272	ASP	C-N-CA	5.22	124.94	119.82
1	B	363	GLN	N-CA-C	5.18	116.93	111.28

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	94	PRO	N-CA-C	-5.18	105.50	110.47
1	B	265	GLN	N-CA-C	-5.09	105.42	111.69
1	C	37	VAL	N-CA-C	5.09	113.19	108.15
1	C	227	THR	N-CA-C	-5.07	107.16	113.19

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3030	0	2924	80	0
1	B	3025	0	2928	75	0
1	C	2993	0	2887	79	0
1	D	3050	0	2945	48	0
2	A	43	0	30	4	0
2	B	43	0	30	4	0
2	C	43	0	30	2	0
2	D	43	0	30	3	0
3	A	26	0	15	6	0
3	B	26	0	15	7	0
3	C	26	0	15	8	0
3	D	26	0	15	6	0
4	A	208	0	0	11	1
4	B	233	0	0	4	0
4	C	171	0	0	6	0
4	D	239	0	0	2	1
All	All	13225	0	11864	280	1

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 12.

All (280) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:194[A]:MET:HE2	1:B:238:PHE:CE2	1.35	1.61
1:A:194[B]:MET:HE1	1:A:234:LEU:CD1	1.61	1.30
1:B:205:ARG:NH2	1:B:223:ALA:HA	1.44	1.30
1:B:194[B]:MET:HB2	1:C:194[B]:MET:CE	1.66	1.25
1:B:194[A]:MET:CE	1:B:238:PHE:CE2	2.20	1.25
1:B:194[B]:MET:CB	1:C:194[B]:MET:CE	2.13	1.23
1:A:194[B]:MET:CE	1:A:234:LEU:HD13	1.78	1.13
1:A:226:ASP:HA	1:A:227:THR:CB	1.81	1.10
1:A:194[B]:MET:HA	1:A:194[B]:MET:HE3	1.35	1.09
1:B:194[B]:MET:HB2	1:C:194[B]:MET:HE1	1.14	1.08
1:A:205:ARG:NH2	1:A:223:ALA:HA	1.71	1.05
1:B:205:ARG:NH2	1:B:223:ALA:CA	2.26	0.98
1:A:227:THR:HG21	4:A:2124:HOH:O	1.67	0.95
1:A:194[B]:MET:HE1	1:A:234:LEU:HD13	0.97	0.94
1:A:194[B]:MET:HE3	1:A:194[B]:MET:CA	1.92	0.94
1:B:205:ARG:HH21	1:B:223:ALA:HA	1.29	0.94
1:A:226:ASP:HA	1:A:227:THR:HB	1.51	0.93
1:A:226:ASP:HA	1:A:227:THR:OG1	1.70	0.92
1:A:205:ARG:HH22	1:A:224:ASP:H	1.16	0.91
1:D:71:LEU:HD12	3:D:460:II2:H10	1.49	0.91
1:B:194[A]:MET:HE2	1:B:238:PHE:HE2	1.09	0.91
1:C:112[B]:GLN:HE21	1:C:112[B]:GLN:HA	1.36	0.90
1:A:205:ARG:HH21	1:A:223:ALA:HA	1.37	0.90
1:B:264:ASP:O	1:B:268:LEU:HD13	1.73	0.88
1:C:112[B]:GLN:HA	1:C:112[B]:GLN:NE2	1.84	0.88
1:C:71:LEU:HD12	3:C:460:II2:H18	1.54	0.87
1:B:194[B]:MET:CB	1:C:194[B]:MET:HE2	1.94	0.86
1:B:205:ARG:HH22	1:B:223:ALA:HA	1.39	0.85
1:B:194[B]:MET:HB3	1:C:194[B]:MET:CE	2.07	0.85
1:B:193:MET:HE2	1:B:238:PHE:CZ	2.11	0.84
1:B:193:MET:CE	1:B:238:PHE:CZ	2.63	0.82
1:B:71:LEU:HD12	3:B:460:II2:H10	1.62	0.82
1:B:193:MET:CE	1:B:238:PHE:CE2	2.63	0.82
1:D:193:MET:CE	1:D:238:PHE:CZ	2.63	0.81
1:A:226:ASP:CA	1:A:227:THR:CB	2.59	0.81
1:C:138:ASP:HB3	1:C:141:THR:OG1	1.80	0.81
1:A:138:ASP:HB3	1:A:141:THR:OG1	1.81	0.80
1:A:226:ASP:CA	1:A:227:THR:OG1	2.30	0.80
1:D:193:MET:HE2	1:D:238:PHE:CZ	2.17	0.80
1:C:91:MET:HE3	3:C:460:II2:H19	1.63	0.79
1:B:194[A]:MET:HE2	1:B:238:PHE:CZ	2.15	0.79
1:A:265:GLN:NE2	1:A:337:VAL:H	1.81	0.78

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:34:HIS:NE2	4:C:2007:HOH:O	2.17	0.78
1:A:71:LEU:HD12	3:A:460:II2:H10	1.65	0.78
1:B:372:LEU:O	1:B:376:PRO:HG3	1.84	0.78
3:A:460:II2:H18	3:A:460:II2:C13	2.13	0.77
1:B:187:LEU:HD23	3:C:460:II2:H3	1.67	0.76
1:A:97:HIS:HE1	2:A:450:HEM:O1D	1.67	0.76
1:A:194[B]:MET:CE	1:A:194[B]:MET:HA	2.15	0.75
1:D:265:GLN:NE2	1:D:337:VAL:H	1.84	0.75
1:D:81:ILE:CD1	1:D:83:LEU:HD22	2.17	0.74
1:A:205:ARG:HH22	1:A:224:ASP:N	1.86	0.74
3:B:460:II2:H3	1:C:187:LEU:HD23	1.68	0.74
1:B:265:GLN:NE2	1:B:337:VAL:H	1.86	0.73
4:B:2092:HOH:O	1:D:84:HIS:HE1	1.71	0.73
1:A:227:THR:HG22	1:A:227:THR:O	1.87	0.72
1:C:126:GLU:O	1:C:130:LYS:HE3	1.89	0.72
1:A:226:ASP:N	1:A:227:THR:OG1	2.22	0.72
3:B:460:II2:C13	3:B:460:II2:H18	2.18	0.72
1:B:91:MET:HE3	3:B:460:II2:H9	1.71	0.71
3:A:460:II2:C13	3:A:460:II2:C18	2.67	0.71
1:A:165:GLN:HG2	1:A:169:TRP:CZ2	2.26	0.71
1:B:193:MET:HE3	1:B:238:PHE:CE2	2.25	0.70
1:B:205:ARG:HH21	1:B:223:ALA:CA	1.98	0.70
1:D:193:MET:HE3	1:D:238:PHE:CE2	2.26	0.70
1:C:112[B]:GLN:O	1:C:154:HIS:HE1	1.73	0.70
1:A:91:MET:HE3	3:A:460:II2:H9	1.72	0.69
1:B:100:PHE:HB3	4:B:2089:HOH:O	1.92	0.69
1:C:112[A]:GLN:O	1:C:154:HIS:HE1	1.75	0.69
1:C:97:HIS:HD2	4:C:2051:HOH:O	1.76	0.68
1:D:91:MET:HE3	3:D:460:II2:H9	1.76	0.67
1:B:97:HIS:HE1	2:B:450:HEM:O1D	1.77	0.67
1:C:97:HIS:HE1	2:C:450:HEM:O1D	1.78	0.67
1:C:130:LYS:HE3	1:C:130:LYS:N	2.10	0.67
3:D:460:II2:C17	3:D:460:II2:C18	2.72	0.67
3:B:460:II2:C3	1:C:187:LEU:HD23	2.25	0.66
1:B:84:HIS:HE1	4:D:2089:HOH:O	1.79	0.66
1:B:138:ASP:HB3	1:B:141:THR:OG1	1.95	0.66
1:D:81:ILE:HD13	1:D:83:LEU:HD22	1.76	0.66
3:D:460:II2:C17	3:D:460:II2:H18	2.26	0.66
1:A:194[B]:MET:CE	1:A:194[B]:MET:CA	2.72	0.66
1:C:78:LEU:CD1	1:C:84:HIS:HA	2.26	0.65
2:A:450:HEM:HMB1	2:A:450:HEM:HBB2	1.76	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:205:ARG:HH22	1:B:223:ALA:CA	2.03	0.65
1:A:81:ILE:HD11	1:A:83:LEU:HD22	1.79	0.65
1:C:222:GLY:HA2	1:C:225:GLY:O	1.97	0.65
1:B:194[A]:MET:CE	1:B:238:PHE:CD2	2.79	0.65
1:C:222:GLY:CA	1:C:225:GLY:O	2.45	0.64
1:A:138:ASP:OD2	1:A:398[A]:SER:HB2	1.97	0.64
3:B:460:II2:C13	3:B:460:II2:C18	2.75	0.64
1:D:288[B]:SER:OG	1:D:322:ASN:ND2	2.28	0.64
1:C:265:GLN:NE2	1:C:337:VAL:H	1.95	0.63
1:B:194[B]:MET:CB	1:C:194[B]:MET:HE3	2.24	0.63
1:B:165:GLN:HG2	1:B:169:TRP:CZ2	2.33	0.63
1:C:377:ASP:O	1:C:403:VAL:HG23	1.98	0.62
1:C:109:THR:OG1	1:C:112[A]:GLN:OE1	2.10	0.62
1:C:84:HIS:HD2	1:C:85:ASP:OD1	1.83	0.61
1:D:97:HIS:HE1	2:D:450:HEM:O1D	1.82	0.61
1:A:81:ILE:CD1	1:A:83:LEU:HD22	2.30	0.61
1:D:165:GLN:HG2	1:D:169:TRP:CZ2	2.34	0.61
1:B:205:ARG:NH2	1:B:223:ALA:CB	2.62	0.61
1:C:165:GLN:HG2	1:C:169:TRP:CZ2	2.37	0.60
1:B:81:ILE:HG12	1:C:187:LEU:HD22	1.84	0.60
1:C:222:GLY:HA2	1:C:226:ASP:O	2.00	0.60
1:B:145:LYS:HB3	1:B:146:PRO:HD3	1.83	0.60
1:A:227:THR:O	1:A:227:THR:CG2	2.49	0.59
1:D:97:HIS:HD2	4:D:2093:HOH:O	1.85	0.59
4:A:2062:HOH:O	1:C:84:HIS:HE1	1.84	0.59
1:C:154:HIS:HD2	4:C:2023:HOH:O	1.85	0.59
1:A:63:GLN:HG3	4:A:2043:HOH:O	2.03	0.58
1:B:145:LYS:HB3	1:B:146:PRO:CD	2.33	0.58
1:B:375:CYS:HB3	1:B:403:VAL:HG12	1.84	0.58
1:A:112:GLN:O	1:A:154:HIS:HE1	1.87	0.58
1:B:104:VAL:CG1	1:B:216:LEU:HD11	2.34	0.58
1:A:81:ILE:HD11	1:A:83:LEU:CD2	2.32	0.58
1:C:193:MET:HE2	1:C:238:PHE:CZ	2.39	0.58
1:B:125:VAL:HG13	1:B:374:ARG:CZ	2.34	0.57
1:B:187:LEU:HD23	3:C:460:II2:C3	2.33	0.57
1:A:43:GLU:CD	1:A:43:GLU:H	2.12	0.57
1:D:276:ILE:HG23	1:D:368:LEU:HD23	1.86	0.57
1:A:100:PHE:HB3	4:A:2065:HOH:O	2.05	0.57
1:A:97:HIS:HD2	4:A:2067:HOH:O	1.87	0.57
1:C:31:ASP:OD2	1:C:34:HIS:ND1	2.34	0.56
1:C:104:VAL:HG22	1:C:212:ALA:HB1	1.87	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:84:HIS:HE1	4:C:2049:HOH:O	1.88	0.56
3:A:460:II2:C18	3:A:460:II2:H13	2.35	0.56
1:B:84:HIS:HD2	1:B:85:ASP:OD1	1.88	0.56
1:A:225:GLY:C	1:A:227:THR:OG1	2.49	0.56
1:C:337:VAL:O	4:C:2132:HOH:O	2.18	0.56
1:D:375:CYS:N	1:D:376:PRO:HD3	2.21	0.56
1:A:193:MET:HE2	1:A:238:PHE:CZ	2.41	0.56
1:A:276:ILE:HG23	1:A:368:LEU:HD23	1.88	0.56
1:A:97:HIS:CE1	2:A:450:HEM:O1D	2.56	0.55
1:B:109:THR:HB	1:B:110:PRO:HD2	1.88	0.55
1:C:112[B]:GLN:O	1:C:154:HIS:CE1	2.57	0.55
1:B:194[B]:MET:HB3	1:C:194[B]:MET:HE2	1.76	0.55
1:D:205[B]:ARG:HG2	1:D:217:VAL:CG1	2.36	0.55
1:B:112:GLN:O	1:B:154:HIS:HE1	1.89	0.55
1:D:84:HIS:HD2	1:D:85:ASP:OD1	1.90	0.55
1:A:154:HIS:HD2	4:A:2037:HOH:O	1.89	0.55
3:C:460:II2:C10	3:C:460:II2:C13	2.83	0.54
1:C:265:GLN:HE22	1:C:337:VAL:H	1.56	0.54
1:A:205:ARG:NH2	1:A:223:ALA:CA	2.59	0.54
1:A:224:ASP:O	1:A:225:GLY:C	2.51	0.54
1:C:193:MET:HE2	1:C:238:PHE:CE1	2.43	0.54
1:B:77:GLU:O	1:B:81:ILE:HG22	2.08	0.54
1:B:378:PHE:HB2	1:B:401:PHE:CE1	2.43	0.53
1:D:77:GLU:O	1:D:81:ILE:HG22	2.09	0.53
1:D:90:VAL:HG21	3:D:460:II2:C10	2.38	0.53
1:D:122:LYS:O	1:D:126[B]:GLU:HG3	2.08	0.53
1:B:97:HIS:HD2	4:B:2096:HOH:O	1.91	0.53
1:B:375:CYS:N	1:B:376:PRO:HD3	2.24	0.53
1:A:356:GLY:HA3	2:A:450:HEM:C3C	2.44	0.53
1:D:81:ILE:HD12	1:D:83:LEU:HD22	1.89	0.53
1:A:265:GLN:HE22	1:A:337:VAL:H	1.53	0.52
1:B:375:CYS:HB3	1:B:403:VAL:CG1	2.39	0.52
1:C:313:ARG:NE	4:C:2123:HOH:O	2.34	0.52
1:B:194[B]:MET:HB2	1:C:194[B]:MET:HE3	1.80	0.52
1:A:84:HIS:HD2	1:A:85:ASP:OD1	1.93	0.52
1:C:112[A]:GLN:O	1:C:154:HIS:CE1	2.59	0.52
1:D:110:PRO:O	1:D:113:VAL:HG22	2.10	0.52
1:B:264:ASP:O	1:B:268:LEU:CD1	2.52	0.51
1:C:226:ASP:C	1:C:228:ALA:H	2.17	0.51
1:B:104:VAL:HG12	1:B:216:LEU:HD11	1.93	0.51
3:C:460:II2:C13	3:C:460:II2:H10	2.39	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:460:II2:C18	3:D:460:II2:H17	2.41	0.51
1:B:194[A]:MET:HE1	1:B:238:PHE:CD2	2.46	0.50
1:C:356:GLY:HA3	2:C:450:HEM:C3C	2.46	0.50
1:C:86:THR:HB	1:C:231:LEU:HD13	1.94	0.50
1:A:125:VAL:HG13	1:A:374:ARG:CZ	2.42	0.50
3:B:460:II2:C18	3:B:460:II2:H13	2.40	0.50
1:D:104:VAL:CG1	1:D:216:LEU:HD11	2.42	0.50
1:A:342:ARG:N	4:A:2168:HOH:O	2.44	0.49
1:D:375:CYS:N	1:D:376:PRO:CD	2.74	0.49
1:C:43:GLU:H	1:C:43:GLU:CD	2.19	0.49
1:A:17:TRP:N	1:A:18:PRO:CD	2.74	0.49
1:B:187:LEU:HD13	1:C:81:ILE:O	2.12	0.49
1:C:242:THR:OG1	3:C:460:II2:H9	2.12	0.49
1:A:374:ARG:C	1:A:376:PRO:HD3	2.38	0.49
1:C:226:ASP:C	1:C:228:ALA:N	2.70	0.49
1:B:17:TRP:N	1:B:18:PRO:CD	2.75	0.49
1:A:16:THR:C	1:A:18:PRO:HD2	2.38	0.49
1:A:140:VAL:HA	1:A:144:PHE:HB2	1.94	0.49
1:A:193:MET:HE3	1:A:237:THR:HG22	1.95	0.48
1:A:34:HIS:NE2	4:A:2012:HOH:O	2.35	0.48
1:A:194[B]:MET:HE1	1:A:234:LEU:HD11	1.77	0.48
1:C:126:GLU:O	1:C:130:LYS:CE	2.60	0.48
1:D:138:ASP:HB3	1:D:141:THR:OG1	2.12	0.48
1:B:352:HIS:O	1:B:353:HIS:C	2.56	0.48
1:C:112[B]:GLN:NE2	1:C:112[B]:GLN:CA	2.68	0.48
1:D:264:ASP:O	1:D:268:LEU:HD13	2.14	0.48
1:A:265:GLN:HE21	1:A:337:VAL:H	1.61	0.48
1:A:112:GLN:O	1:A:154:HIS:CE1	2.67	0.48
1:C:81:ILE:HD11	1:C:83:LEU:HD22	1.95	0.48
1:B:81:ILE:CG1	1:C:187:LEU:HD22	2.44	0.48
1:C:167:ASP:OD1	1:C:171:GLN:NE2	2.37	0.48
1:D:81:ILE:HG12	1:D:81:ILE:O	2.13	0.47
1:D:352:HIS:O	1:D:353:HIS:C	2.56	0.47
1:A:104:VAL:HG22	1:A:212:ALA:HB1	1.96	0.47
1:A:167:ASP:OD1	1:A:171:GLN:NE2	2.35	0.47
1:B:124:VAL:HG22	1:B:143:LEU:HD11	1.96	0.47
1:B:403:VAL:HA	4:B:2217:HOH:O	2.15	0.47
1:C:321:ALA:HB1	1:C:345:LEU:HD12	1.97	0.47
1:D:17:TRP:N	1:D:18:PRO:CD	2.77	0.47
1:C:79:GLU:OE2	1:C:79:GLU:HA	2.13	0.47
1:C:104:VAL:CG2	1:C:212:ALA:HB1	2.45	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:109:THR:HB	1:A:110:PRO:HD2	1.97	0.47
1:C:112[B]:GLN:HE21	1:C:112[B]:GLN:CA	2.15	0.47
1:C:138:ASP:HB3	1:C:141:THR:HG1	1.78	0.46
1:B:276:ILE:HG23	1:B:368:LEU:HD23	1.98	0.46
1:A:227:THR:CG2	4:A:2124:HOH:O	2.42	0.46
1:B:265:GLN:HE21	1:B:337:VAL:H	1.60	0.46
1:C:370:GLU:OE1	1:C:370:GLU:HA	2.16	0.46
1:C:17:TRP:N	1:C:18:PRO:CD	2.78	0.46
1:B:205:ARG:HH21	1:B:223:ALA:CB	2.28	0.46
1:C:35:HIS:HE2	1:C:45:ASP:HB2	1.80	0.46
1:B:97:HIS:CE1	2:B:450:HEM:O1D	2.64	0.46
1:D:113:VAL:HG23	1:D:114:GLU:N	2.31	0.45
1:B:194[B]:MET:HE3	1:C:194[B]:MET:HB2	1.33	0.45
1:D:190:VAL:O	1:D:194[B]:MET:HG3	2.15	0.45
1:D:194[A]:MET:SD	1:D:234:LEU:HD13	2.56	0.45
1:D:378:PHE:HB2	1:D:401:PHE:CE1	2.52	0.45
1:A:20:PRO:HG2	1:A:21:TRP:CE3	2.52	0.45
1:C:150:MET:HE2	1:C:150:MET:HB2	1.71	0.45
1:C:111:ARG:HG3	1:C:111:ARG:NH1	2.31	0.45
1:B:80:MET:O	1:C:185:GLY:HA2	2.17	0.45
1:D:193:MET:CE	1:D:238:PHE:CE2	2.91	0.44
1:A:289:PRO:O	1:A:393:VAL:HA	2.18	0.44
1:B:110:PRO:O	1:B:113:VAL:HG12	2.17	0.44
1:C:193:MET:HE3	1:C:237:THR:HG22	1.99	0.44
1:D:265:GLN:HE21	1:D:337:VAL:H	1.59	0.44
1:B:147:LEU:HB3	1:B:148:PRO:HD3	1.98	0.44
1:B:125:VAL:HG13	1:B:374:ARG:NH1	2.33	0.44
1:B:356:GLY:HA3	2:B:450:HEM:C3C	2.53	0.44
1:C:130:LYS:HE3	1:C:130:LYS:H	1.83	0.43
1:D:193:MET:CE	1:D:238:PHE:CE1	3.00	0.43
1:D:356:GLY:HA3	2:D:450:HEM:C3C	2.52	0.43
1:C:378:PHE:C	1:C:378:PHE:CD2	2.95	0.43
1:A:23:MET:HE3	1:A:23:MET:HB3	1.89	0.43
1:D:21:TRP:N	1:D:22:PRO:CD	2.82	0.43
1:D:265:GLN:NE2	1:D:337:VAL:HG22	2.34	0.43
1:B:287:THR:O	1:B:288:SER:C	2.61	0.43
1:A:332:ALA:HB3	4:A:2158:HOH:O	2.18	0.43
1:A:352:HIS:O	1:A:353:HIS:C	2.62	0.43
1:C:90:VAL:HG11	3:C:460:II2:C18	2.49	0.43
1:A:31:ASP:OD2	1:A:34:HIS:ND1	2.47	0.43
1:A:194[B]:MET:CE	1:A:234:LEU:CD1	2.55	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:299:ARG:NH1	1:C:300:ASP:O	2.52	0.43
1:D:81:ILE:HD12	1:D:81:ILE:HG21	1.76	0.42
1:A:222:GLY:O	1:A:223:ALA:C	2.61	0.42
1:B:120:VAL:HG13	1:B:147:LEU:HD11	2.00	0.42
1:C:17:TRP:O	1:C:20:PRO:HD3	2.19	0.42
1:C:194[A]:MET:HE2	1:C:238:PHE:CE2	2.55	0.42
1:D:116:VAL:HB	1:D:154:HIS:CD2	2.54	0.42
1:C:78:LEU:HD11	1:C:84:HIS:HA	1.98	0.42
1:D:287:THR:O	1:D:288[B]:SER:C	2.62	0.42
1:A:60:ARG:NH1	4:A:2036:HOH:O	2.53	0.41
1:A:372:LEU:HD23	1:A:372:LEU:HA	1.88	0.41
1:A:375:CYS:N	1:A:376:PRO:HD3	2.35	0.41
1:C:38:PRO:O	1:C:39:PRO:C	2.63	0.41
1:D:145:LYS:HB3	1:D:146:PRO:CD	2.50	0.41
1:A:104:VAL:CG2	1:A:212:ALA:HB1	2.50	0.41
1:D:23[B]:MET:HE2	1:D:23[B]:MET:HB3	1.94	0.41
1:D:90:VAL:CG1	2:D:450:HEM:HAD2	2.49	0.41
1:A:9:PHE:HD1	1:A:27:LEU:HD11	1.86	0.41
1:D:265:GLN:HE22	1:D:337:VAL:H	1.64	0.41
1:B:150:MET:HE2	1:B:150:MET:HB2	1.77	0.41
1:D:226:ASP:CG	1:D:227:THR:N	2.79	0.41
1:B:194[A]:MET:SD	1:B:234:LEU:HD13	2.60	0.41
1:A:38:PRO:O	1:A:39:PRO:C	2.64	0.41
1:B:194[B]:MET:HB3	1:C:194[B]:MET:HE3	1.90	0.41
2:B:450:HEM:CMB	2:B:450:HEM:HBB2	2.52	0.40
1:D:120:VAL:O	1:D:124:VAL:HG23	2.21	0.40
1:A:76:GLY:O	1:A:80:MET:HG2	2.21	0.40
1:A:90[A]:VAL:HG11	3:A:460:II2:C10	2.51	0.40
1:A:150:MET:HE2	1:A:150:MET:HB2	1.89	0.40
1:A:267:ARG:O	1:A:268:LEU:C	2.61	0.40
1:A:339:ARG:O	1:A:340:CYS:HB2	2.20	0.40
1:B:194[B]:MET:HE1	1:C:190:VAL:HG12	2.04	0.40
1:C:89:MET:HA	1:C:92:GLN:NE2	2.36	0.40

All (1) 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)
4:A:2124:HOH:O	4:D:2129:HOH:O[1_554]	1.97	0.23

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	393/413 (95%)	378 (96%)	12 (3%)	3 (1%)	16	5
1	B	391/413 (95%)	380 (97%)	11 (3%)	0	100	100
1	C	385/413 (93%)	372 (97%)	12 (3%)	1 (0%)	36	22
1	D	391/413 (95%)	379 (97%)	11 (3%)	1 (0%)	36	22
All	All	1560/1652 (94%)	1509 (97%)	46 (3%)	5 (0%)	36	22

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	226	ASP
1	A	227	THR
1	A	223	ALA
1	A	226	ASP
1	D	226	ASP

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	317/343 (92%)	311 (98%)	6 (2%)	50	34
1	B	317/343 (92%)	312 (98%)	5 (2%)	55	41
1	C	312/343 (91%)	305 (98%)	7 (2%)	45	29
1	D	321/343 (94%)	315 (98%)	6 (2%)	50	34
All	All	1267/1372 (92%)	1243 (98%)	24 (2%)	50	34

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	ARG
1	A	83	LEU
1	A	141	THR
1	A	150	MET
1	A	345	LEU
1	A	403	VAL
1	B	43	GLU
1	B	83	LEU
1	B	150	MET
1	B	375	CYS
1	B	403	VAL
1	C	78	LEU
1	C	83	LEU
1	C	130	LYS
1	C	150	MET
1	C	231	LEU
1	C	268	LEU
1	C	277	PRO
1	D	25	ARG
1	D	43	GLU
1	D	81	ILE
1	D	83	LEU
1	D	345	LEU
1	D	403	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	84	HIS
1	A	97	HIS
1	A	154	HIS
1	A	215	HIS
1	A	265	GLN
1	B	84	HIS
1	B	97	HIS
1	B	154	HIS
1	B	265	GLN
1	C	84	HIS
1	C	97	HIS
1	C	154	HIS
1	C	265	GLN

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Mol	Chain	Res	Type
1	D	84	HIS
1	D	97	HIS
1	D	215	HIS
1	D	260	HIS
1	D	265	GLN

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](#)

8 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	II2	A	460	2	29,29,29	2.92	10 (34%)	42,42,42	2.99	17 (40%)
3	II2	B	460	2	29,29,29	2.87	9 (31%)	42,42,42	2.71	19 (45%)
3	II2	C	460	2	29,29,29	2.58	7 (24%)	42,42,42	2.89	16 (38%)
2	HEM	C	450	3,1	50,50,50	1.89	8 (16%)	67,82,82	1.51	12 (17%)
2	HEM	A	450	3,1	50,50,50	1.85	11 (22%)	67,82,82	1.47	11 (16%)
2	HEM	B	450	3,1	50,50,50	1.74	10 (20%)	67,82,82	1.60	13 (19%)
3	II2	D	460	2	29,29,29	2.73	7 (24%)	42,42,42	2.72	17 (40%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	HEM	D	450	3,1	50,50,50	1.92	10 (20%)	67,82,82	1.58	11 (16%)

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
3	II2	A	460	2	-	0/8/24/24	0/4/4/4
3	II2	B	460	2	-	0/8/24/24	0/4/4/4
3	II2	C	460	2	-	0/8/24/24	0/4/4/4
2	HEM	C	450	3,1	-	3/14/54/54	-
2	HEM	A	450	3,1	-	4/14/54/54	-
2	HEM	B	450	3,1	-	5/14/54/54	-
3	II2	D	460	2	-	0/8/24/24	0/4/4/4
2	HEM	D	450	3,1	-	2/14/54/54	-

All (72) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	450	HEM	C3D-C2D	8.60	1.55	1.36
2	D	450	HEM	C3D-C2D	8.07	1.54	1.36
3	A	460	II2	C8-N2	-7.83	1.32	1.44
3	B	460	II2	C8-N2	-7.81	1.32	1.44
3	D	460	II2	C8-N2	-7.43	1.33	1.44
2	B	450	HEM	C3D-C2D	6.91	1.51	1.36
3	C	460	II2	C8-N2	-6.81	1.33	1.44
2	A	450	HEM	C3D-C2D	6.51	1.50	1.36
3	B	460	II2	O1-C7	6.21	1.35	1.22
3	D	460	II2	O1-C7	6.14	1.34	1.22
3	C	460	II2	O1-C7	5.86	1.34	1.22
3	A	460	II2	O1-C7	5.83	1.34	1.22
3	B	460	II2	C11-S	-5.60	1.67	1.77
3	A	460	II2	C11-S	-5.33	1.67	1.77
3	A	460	II2	O2-C20	5.13	1.32	1.22
2	D	450	HEM	FE-ND	5.12	2.10	1.94
3	D	460	II2	C11-S	-5.03	1.68	1.77
3	B	460	II2	C1-C6	4.97	1.49	1.39
3	B	460	II2	C20-N2	-4.92	1.31	1.41
2	A	450	HEM	FE-NA	4.89	2.11	1.95
3	C	460	II2	O2-C20	4.89	1.32	1.22

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	460	II2	C1-C6	4.80	1.49	1.39
3	B	460	II2	O2-C20	4.79	1.32	1.22
3	A	460	II2	C20-N2	-4.69	1.32	1.41
3	D	460	II2	O2-C20	4.62	1.31	1.22
3	D	460	II2	C20-N2	-4.54	1.32	1.41
3	C	460	II2	C20-N2	-4.46	1.32	1.41
3	A	460	II2	C7-N2	-4.37	1.32	1.41
3	D	460	II2	C1-C6	4.28	1.48	1.39
3	C	460	II2	C1-C6	4.28	1.48	1.39
2	C	450	HEM	FE-ND	4.22	2.07	1.94
2	A	450	HEM	FE-ND	3.94	2.07	1.94
3	B	460	II2	C7-N2	-3.90	1.33	1.41
3	D	460	II2	C7-N2	-3.80	1.33	1.41
2	C	450	HEM	FE-NB	3.79	2.06	1.94
3	C	460	II2	C11-S	-3.77	1.70	1.77
2	D	450	HEM	CAB-C3B	3.56	1.56	1.47
2	D	450	HEM	CAC-C3C	3.40	1.56	1.47
2	B	450	HEM	CAC-C3C	3.39	1.56	1.47
2	D	450	HEM	FE-NB	3.32	2.05	1.94
2	B	450	HEM	FE-NB	3.29	2.05	1.94
2	C	450	HEM	FE-NA	3.23	2.05	1.95
2	B	450	HEM	CAB-C3B	3.13	1.55	1.47
2	A	450	HEM	CAB-C3B	3.11	1.55	1.47
3	C	460	II2	C7-N2	-3.10	1.35	1.41
2	A	450	HEM	CAC-C3C	3.00	1.55	1.47
2	A	450	HEM	CMB-C2B	2.92	1.56	1.50
2	C	450	HEM	CAC-C3C	2.91	1.55	1.47
2	B	450	HEM	FE-NA	2.80	2.04	1.95
3	A	460	II2	C12-S	-2.76	1.72	1.77
2	A	450	HEM	FE-NC	2.69	2.04	1.95
2	C	450	HEM	CAB-C3B	2.65	1.54	1.47
2	B	450	HEM	FE-NC	2.53	2.03	1.95
2	B	450	HEM	CMD-C2D	2.48	1.55	1.50
2	A	450	HEM	CMC-C2C	2.45	1.55	1.50
2	D	450	HEM	CMC-C2C	2.44	1.55	1.50
2	B	450	HEM	FE-ND	2.39	2.02	1.94
2	A	450	HEM	FE-NB	2.34	2.02	1.94
2	C	450	HEM	CMB-C2B	2.31	1.55	1.50
2	A	450	HEM	CMA-C3A	2.27	1.55	1.50
2	D	450	HEM	FE-NA	2.21	2.02	1.95
3	A	460	II2	C2-C1	-2.20	1.36	1.39
3	B	460	II2	C12-S	-2.17	1.73	1.77

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	460	II2	C5-C4	2.13	1.43	1.39
2	C	450	HEM	FE-NC	2.13	2.02	1.95
2	B	450	HEM	CMC-C2C	2.13	1.55	1.50
2	A	450	HEM	CAD-C3D	2.10	1.56	1.51
2	D	450	HEM	CMA-C3A	2.07	1.55	1.50
2	B	450	HEM	CAD-C3D	2.05	1.56	1.51
3	B	460	II2	C14-C15	2.04	1.44	1.40
2	D	450	HEM	FE-NC	2.04	2.01	1.95
2	D	450	HEM	CMB-C2B	2.01	1.54	1.50

All (116) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	460	II2	C1-C6-C7	-8.60	100.72	108.26
3	C	460	II2	C1-C6-C7	-8.34	100.95	108.26
3	D	460	II2	C1-C6-C7	-7.62	101.58	108.26
3	B	460	II2	C1-C6-C7	-7.48	101.71	108.26
2	D	450	HEM	C4D-ND-C1D	6.39	112.77	105.21
3	C	460	II2	C6-C7-N2	6.23	111.64	105.70
3	C	460	II2	C5-C6-C7	6.12	139.90	129.39
3	A	460	II2	O1-C7-N2	-5.89	117.62	125.17
3	A	460	II2	C5-C6-C7	5.88	139.49	129.39
3	A	460	II2	C3-C4-N1	-5.80	110.21	120.90
2	C	450	HEM	C4D-ND-C1D	5.75	112.02	105.21
3	D	460	II2	C5-C6-C7	5.68	139.13	129.39
3	C	460	II2	C3-C4-N1	-5.67	110.46	120.90
3	B	460	II2	C5-C6-C7	5.62	139.03	129.39
3	D	460	II2	C3-C4-N1	-5.45	110.86	120.90
3	D	460	II2	C6-C7-N2	5.45	110.90	105.70
3	A	460	II2	C6-C7-N2	5.38	110.83	105.70
3	B	460	II2	C3-C4-N1	-5.23	111.27	120.90
3	D	460	II2	C1-C20-N2	5.16	110.62	105.70
3	C	460	II2	C1-C20-N2	5.04	110.50	105.70
3	A	460	II2	C8-N2-C7	-4.98	118.09	124.11
2	B	450	HEM	CHD-C1D-ND	4.82	129.61	124.42
3	B	460	II2	C6-C7-N2	4.62	110.11	105.70
3	C	460	II2	C8-N2-C20	4.56	129.61	124.11
3	A	460	II2	C8-N2-C20	4.44	129.48	124.11
3	B	460	II2	O1-C7-N2	-4.40	119.53	125.17
3	B	460	II2	C1-C20-N2	4.35	109.85	105.70
2	A	450	HEM	C4D-ND-C1D	4.25	110.24	105.21
2	D	450	HEM	C3B-C2B-C1B	4.16	109.53	106.41

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	460	II2	C3-C4-C5	4.07	123.85	118.62
2	B	450	HEM	C4D-ND-C1D	4.06	110.01	105.21
3	A	460	II2	C3-C2-C1	-3.99	114.28	120.86
3	C	460	II2	O2-C20-C1	-3.92	121.07	128.66
3	A	460	II2	C3-C4-C5	3.88	123.61	118.62
3	A	460	II2	C1-C20-N2	3.74	109.27	105.70
2	D	450	HEM	CHC-C4B-NB	3.72	128.43	124.42
3	D	460	II2	C19-C18-C11	-3.72	116.20	120.48
3	D	460	II2	C3-C4-C5	3.69	123.36	118.62
3	B	460	II2	C19-C18-C11	-3.68	116.23	120.48
3	D	460	II2	O1-C7-N2	-3.64	120.50	125.17
3	C	460	II2	O1-C7-N2	-3.58	120.58	125.17
3	C	460	II2	C3-C4-C5	3.57	123.21	118.62
3	B	460	II2	C9-C8-N2	3.50	123.84	119.65
3	C	460	II2	C5-C4-N1	3.42	126.34	120.56
3	B	460	II2	C3-C2-C1	-3.42	115.23	120.86
3	A	460	II2	C6-C5-C4	-3.35	114.86	120.32
2	A	450	HEM	CHA-C4D-ND	3.34	128.50	124.37
3	A	460	II2	O2-C20-C1	-3.33	122.21	128.66
3	A	460	II2	C5-C4-N1	3.31	126.14	120.56
2	C	450	HEM	CHC-C4B-NB	3.29	127.97	124.42
3	C	460	II2	C3-C2-C1	-3.26	115.48	120.86
2	A	450	HEM	CHD-C1D-ND	3.26	127.93	124.42
3	D	460	II2	C14-C13-C12	3.25	124.23	120.48
3	C	460	II2	C8-N2-C7	-3.22	120.22	124.11
2	B	450	HEM	C3B-C2B-C1B	3.10	108.74	106.41
3	D	460	II2	C3-C2-C1	-3.09	115.76	120.86
3	D	460	II2	C5-C4-N1	3.08	125.77	120.56
3	B	460	II2	C6-C1-C20	-2.95	105.67	108.26
3	B	460	II2	C8-N2-C7	-2.94	120.55	124.11
2	B	450	HEM	CHC-C1C-NC	2.94	127.65	124.45
2	D	450	HEM	O1D-CGD-CBD	-2.93	113.81	123.09
2	B	450	HEM	C1B-NB-C4B	2.92	108.67	105.21
3	D	460	II2	O2-C20-C1	-2.85	123.14	128.66
2	B	450	HEM	CMA-C3A-C4A	-2.77	121.21	125.42
3	A	460	II2	C2-C1-C6	2.75	124.20	121.06
3	B	460	II2	C6-C5-C4	-2.74	115.86	120.32
2	D	450	HEM	CHD-C4C-NC	2.72	127.41	124.45
2	A	450	HEM	C1B-NB-C4B	2.69	108.40	105.21
3	D	460	II2	C6-C1-C20	-2.68	105.91	108.26
2	C	450	HEM	CHD-C4C-NC	2.67	127.36	124.45
3	B	460	II2	C19-C8-N2	-2.65	116.48	119.65

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	460	II2	C6-C5-C4	-2.62	116.05	120.32
3	A	460	II2	O2-C20-N2	2.62	128.53	125.17
3	D	460	II2	C6-C5-C4	-2.58	116.11	120.32
3	B	460	II2	C5-C4-N1	2.56	124.88	120.56
2	C	450	HEM	CMA-C3A-C4A	-2.54	121.55	125.42
3	C	460	II2	O2-C20-N2	2.54	128.43	125.17
2	B	450	HEM	C3B-C4B-NB	-2.52	107.66	109.47
2	B	450	HEM	C2B-C1B-NB	-2.50	106.97	109.84
2	C	450	HEM	CMA-C3A-C2A	2.48	130.87	125.62
3	D	460	II2	C18-C19-C8	2.47	123.42	120.30
2	B	450	HEM	O2D-CGD-CBD	2.46	121.78	114.00
2	A	450	HEM	CMA-C3A-C4A	-2.46	121.67	125.42
3	B	460	II2	C16-C17-C12	2.45	123.31	120.48
3	C	460	II2	C10-C9-C8	2.43	123.38	120.30
2	C	450	HEM	O1D-CGD-CBD	-2.42	115.43	123.09
2	B	450	HEM	O1D-CGD-CBD	-2.40	115.48	123.09
3	B	460	II2	C18-C19-C8	2.37	123.31	120.30
3	A	460	II2	C19-C18-C11	-2.37	117.75	120.48
2	D	450	HEM	CHA-C4D-ND	2.36	127.29	124.37
2	B	450	HEM	CHA-C4D-ND	2.34	127.26	124.37
2	B	450	HEM	C4A-C3A-C2A	2.32	109.48	106.82
2	A	450	HEM	CHC-C4B-NB	2.32	126.92	124.42
2	B	450	HEM	CHD-C1D-C2D	-2.30	121.39	125.03
2	C	450	HEM	C1B-NB-C4B	2.30	107.93	105.21
2	A	450	HEM	CBA-CAA-C2A	-2.28	106.24	112.53
3	D	460	II2	C17-C16-C15	2.26	123.43	120.66
3	C	460	II2	C2-C1-C6	2.26	123.65	121.06
2	A	450	HEM	CMA-C3A-C2A	2.26	130.41	125.62
2	C	450	HEM	C3B-C2B-C1B	2.19	108.06	106.41
2	A	450	HEM	CHB-C1B-NB	2.18	127.06	124.37
2	C	450	HEM	CBB-CAB-C3B	-2.16	116.71	127.53
3	B	460	II2	C8-N2-C20	2.16	126.72	124.11
2	D	450	HEM	CMA-C3A-C4A	-2.16	122.13	125.42
2	D	450	HEM	C1B-NB-C4B	2.16	107.77	105.21
2	C	450	HEM	CHA-C4D-ND	2.15	127.03	124.37
2	A	450	HEM	C3B-C2B-C1B	2.13	108.01	106.41
2	C	450	HEM	CHD-C1D-ND	2.11	126.69	124.42
3	A	460	II2	C2-C3-C4	2.09	123.22	120.66
2	D	450	HEM	CHD-C1D-ND	2.07	126.65	124.42
2	D	450	HEM	O2D-CGD-CBD	2.06	120.51	114.00
2	A	450	HEM	CBB-CAB-C3B	-2.04	117.31	127.53
3	D	460	II2	C8-N2-C20	2.03	126.57	124.11

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	450	HEM	CHB-C4A-NA	2.01	127.51	123.86
2	C	450	HEM	C1D-C2D-C3D	-2.01	104.86	106.98
3	B	460	II2	C2-C1-C6	2.00	123.35	121.06

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	450	HEM	C2A-CAA-CBA-CGA
2	D	450	HEM	C2A-CAA-CBA-CGA
2	C	450	HEM	C2A-CAA-CBA-CGA
2	A	450	HEM	C2A-CAA-CBA-CGA
2	A	450	HEM	CAA-CBA-CGA-O2A
2	A	450	HEM	CAA-CBA-CGA-O1A
2	C	450	HEM	CAA-CBA-CGA-O2A
2	C	450	HEM	CAA-CBA-CGA-O1A
2	B	450	HEM	CAA-CBA-CGA-O1A
2	B	450	HEM	CAA-CBA-CGA-O2A
2	B	450	HEM	CAD-CBD-CGD-O2D
2	A	450	HEM	CAD-CBD-CGD-O2D
2	B	450	HEM	CAD-CBD-CGD-O1D
2	D	450	HEM	CAD-CBD-CGD-O1D

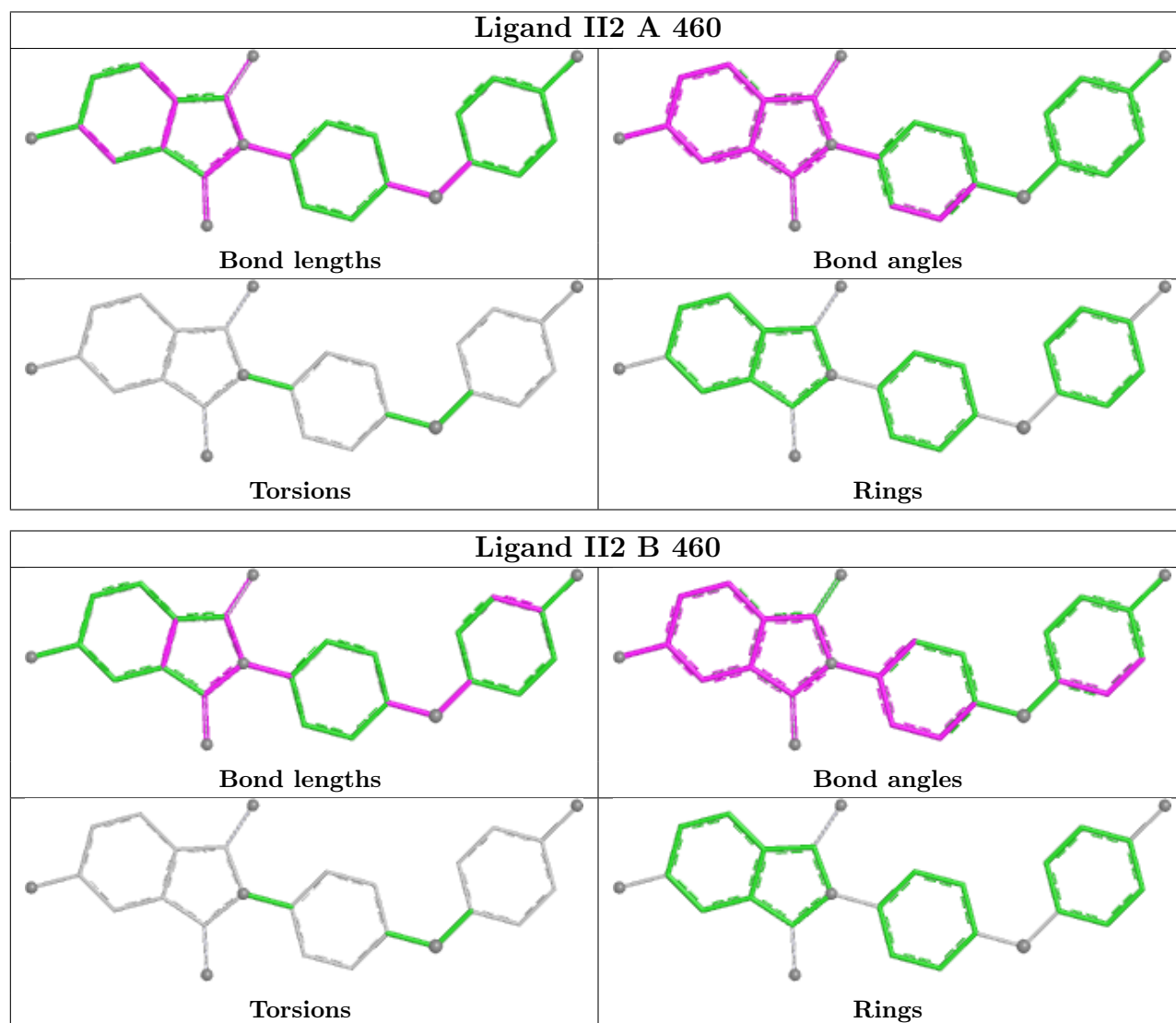
There are no ring outliers.

8 monomers are involved in 40 short contacts:

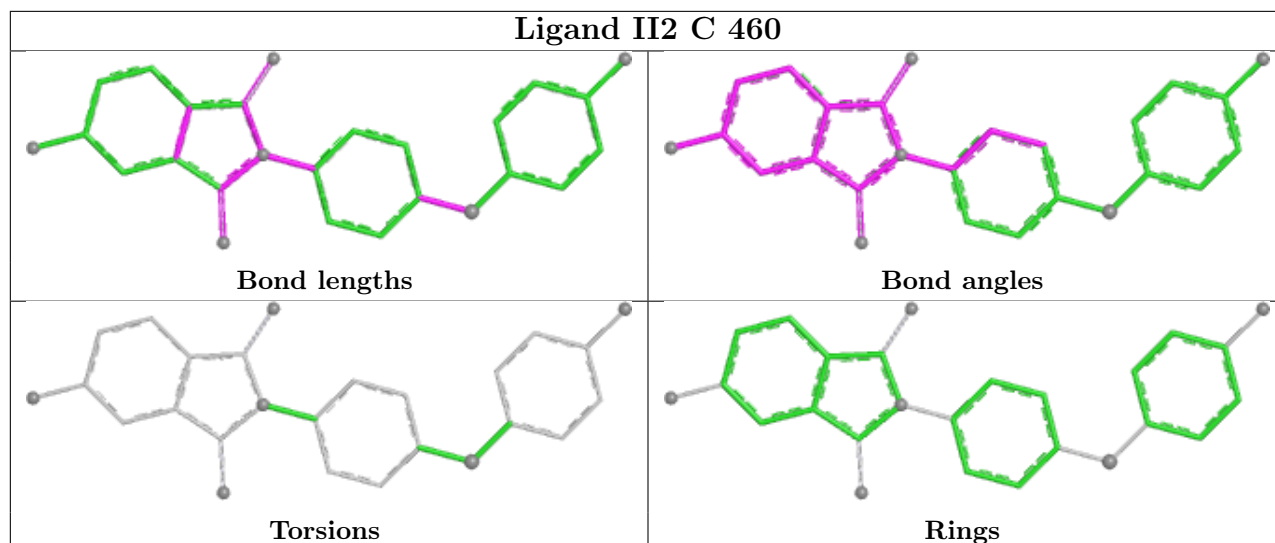
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	460	II2	6	0
3	B	460	II2	7	0
3	C	460	II2	8	0
2	C	450	HEM	2	0
2	A	450	HEM	4	0
2	B	450	HEM	4	0
3	D	460	II2	6	0
2	D	450	HEM	3	0

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

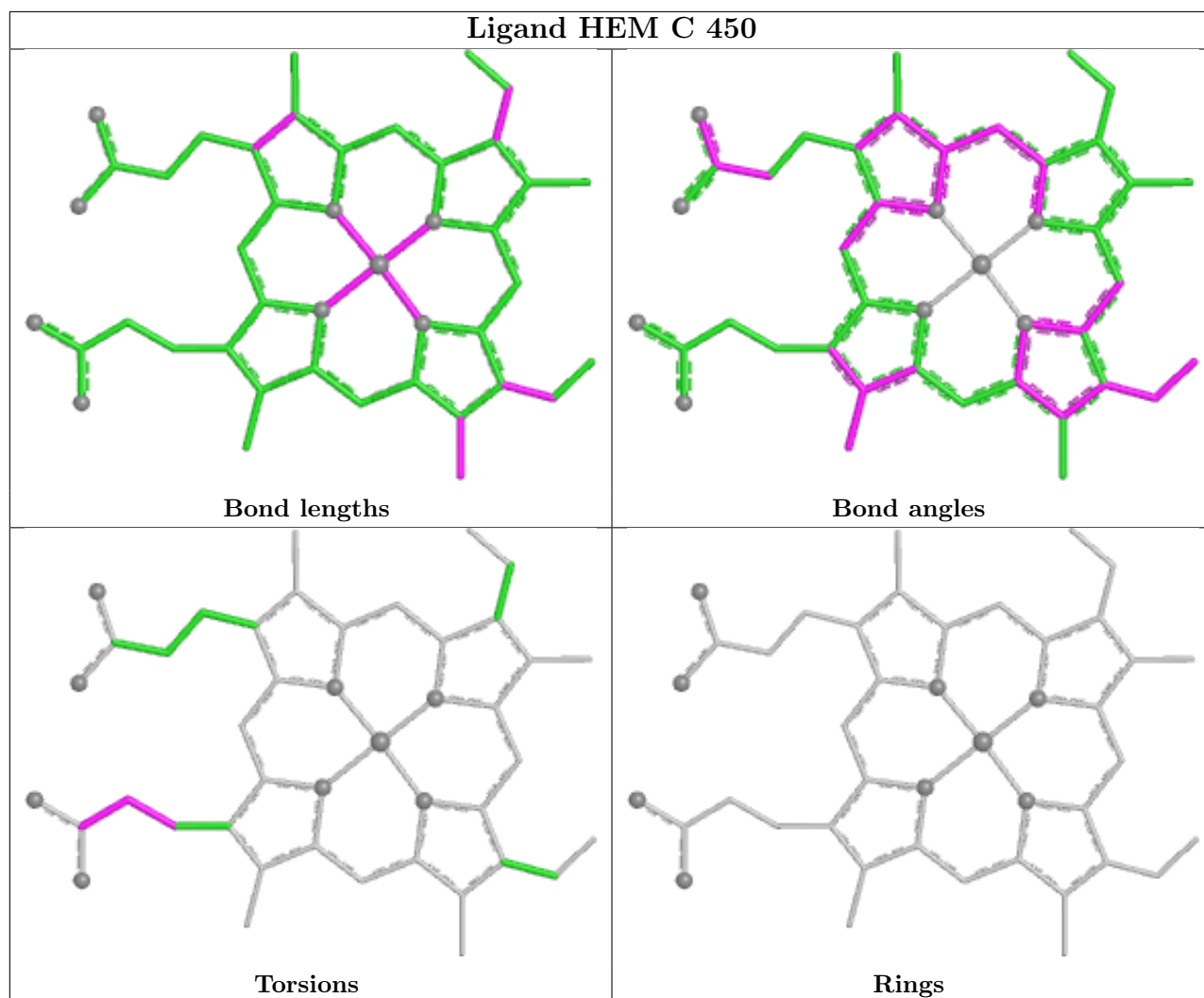
highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified 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.

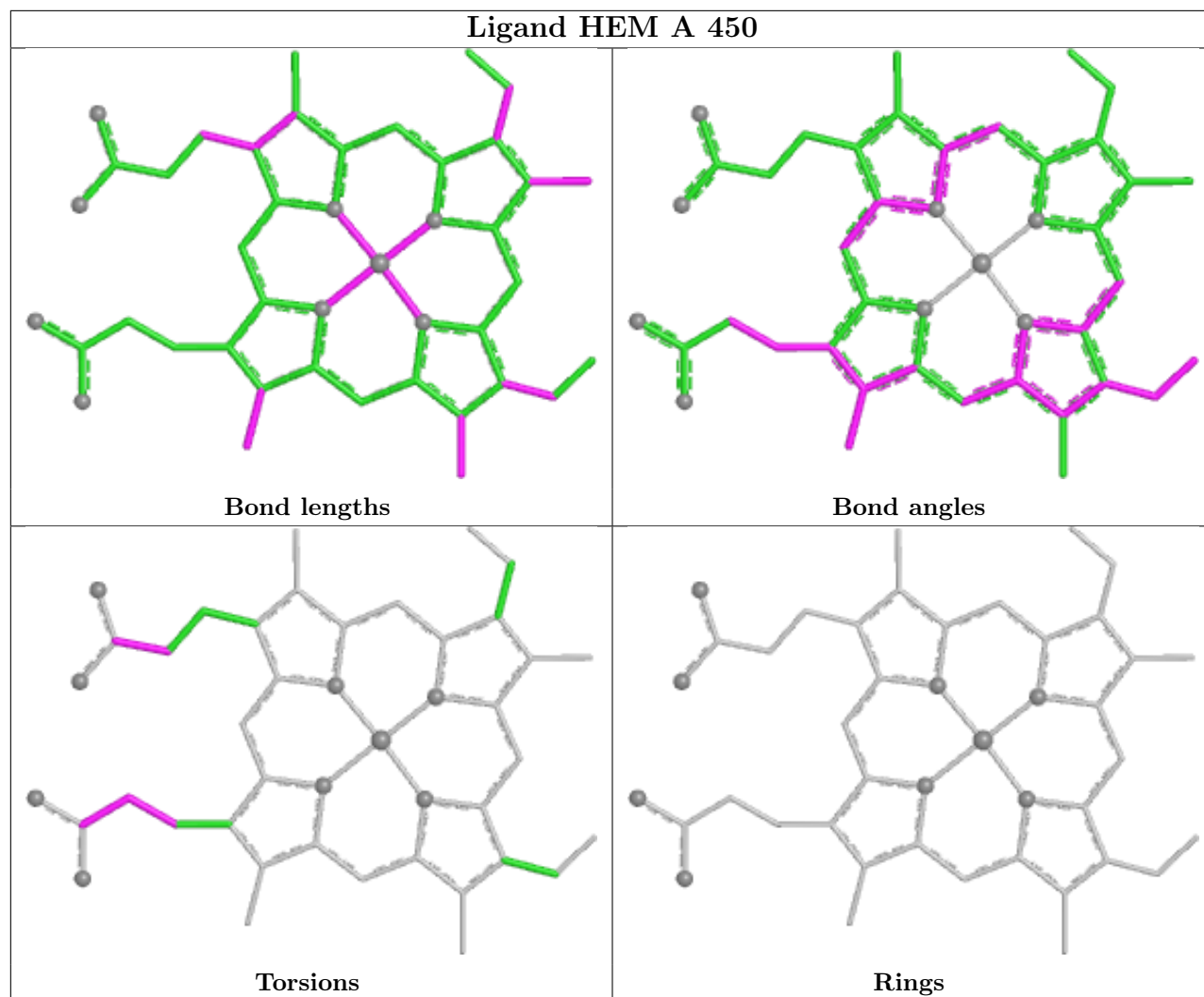


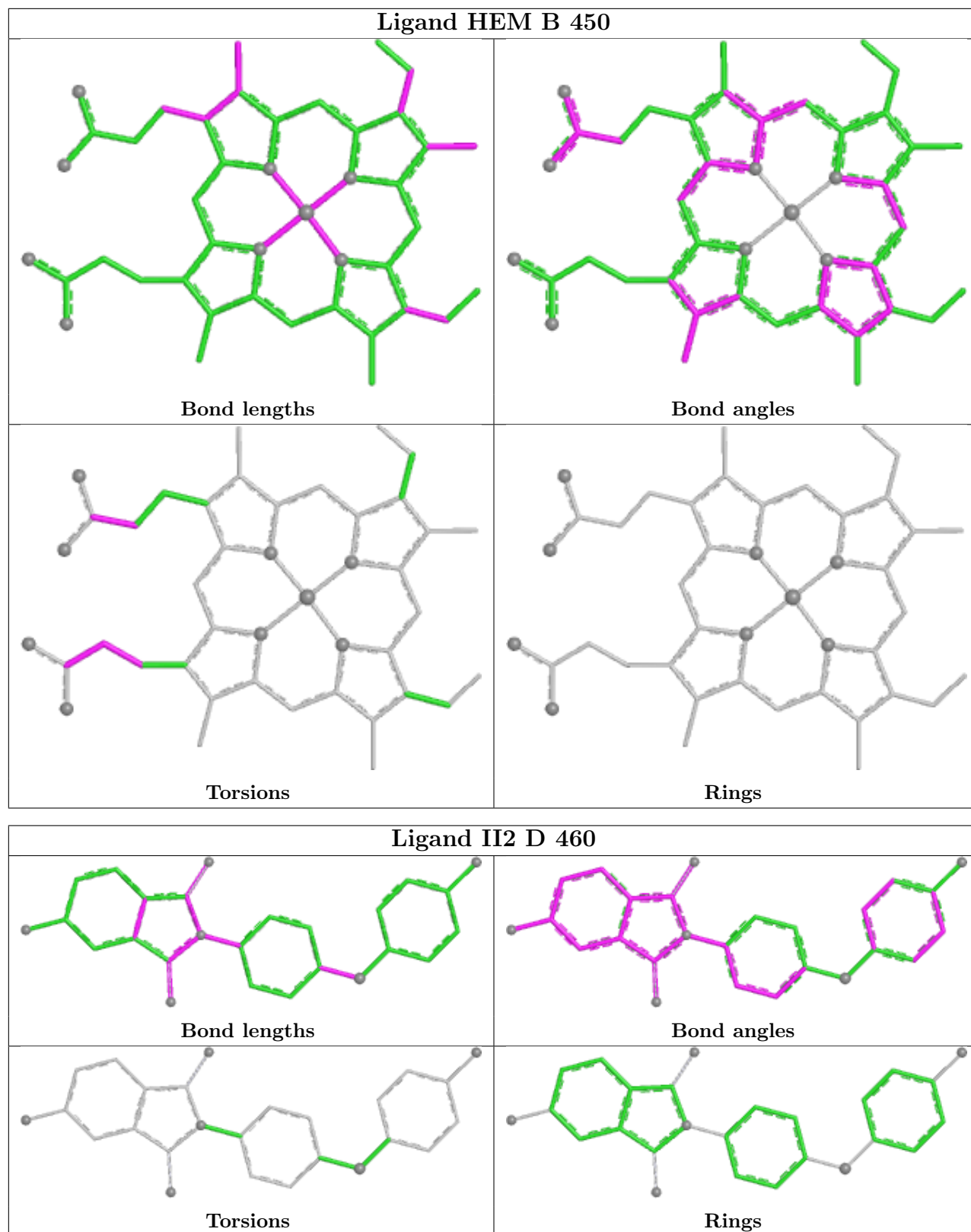
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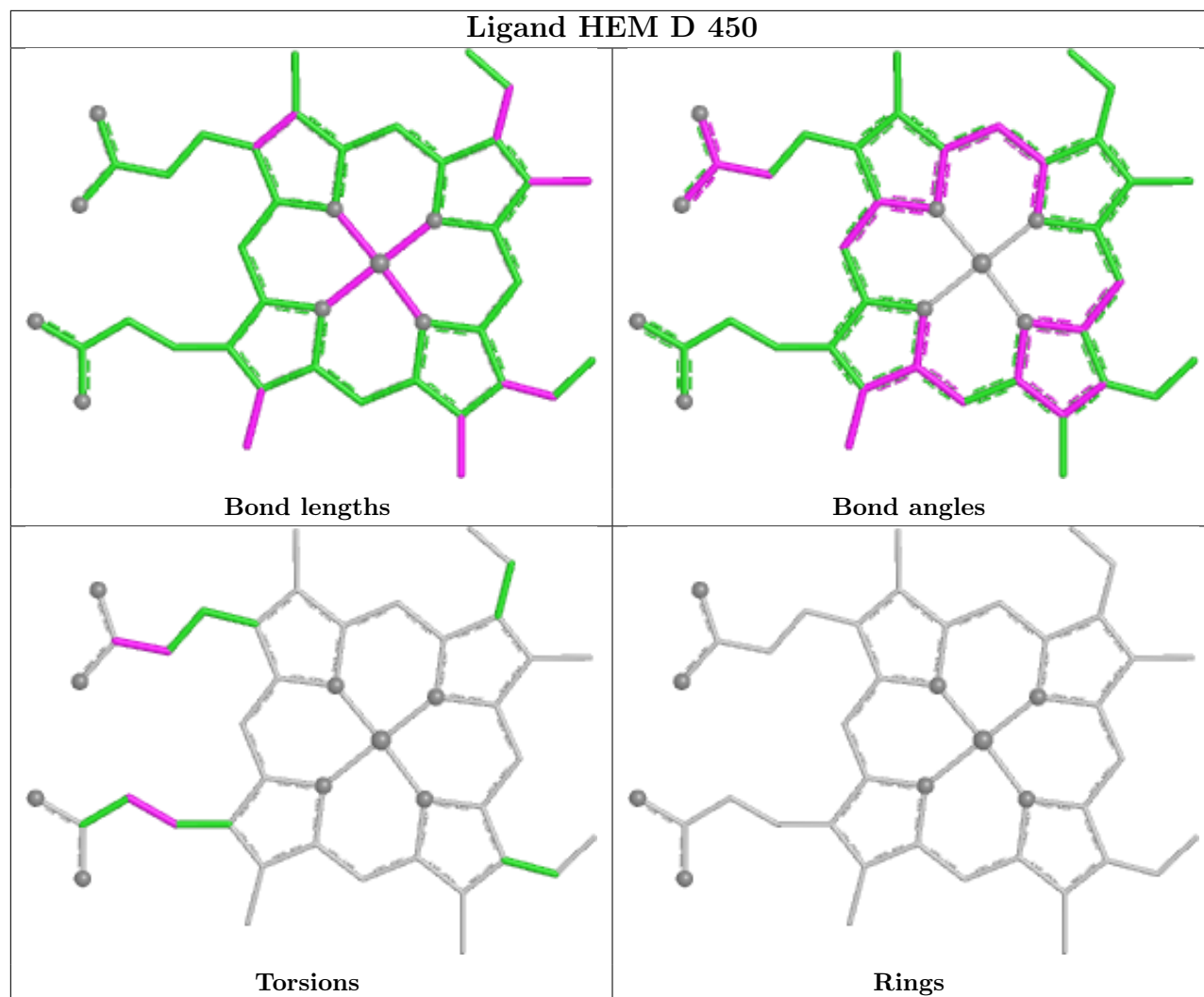


Ligand HEM C 450









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	392/413 (94%)	-0.90	0 100 100	6, 21, 34, 40	5 (1%)
1	B	392/413 (94%)	-0.99	0 100 100	8, 19, 35, 45	3 (0%)
1	C	388/413 (93%)	-0.87	0 100 100	9, 23, 35, 46	3 (0%)
1	D	389/413 (94%)	-0.99	0 100 100	6, 18, 33, 45	8 (2%)
All	All	1561/1652 (94%)	-0.94	0 100 100	6, 20, 35, 46	19 (1%)

There are no RSRZ outliers to report.

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.

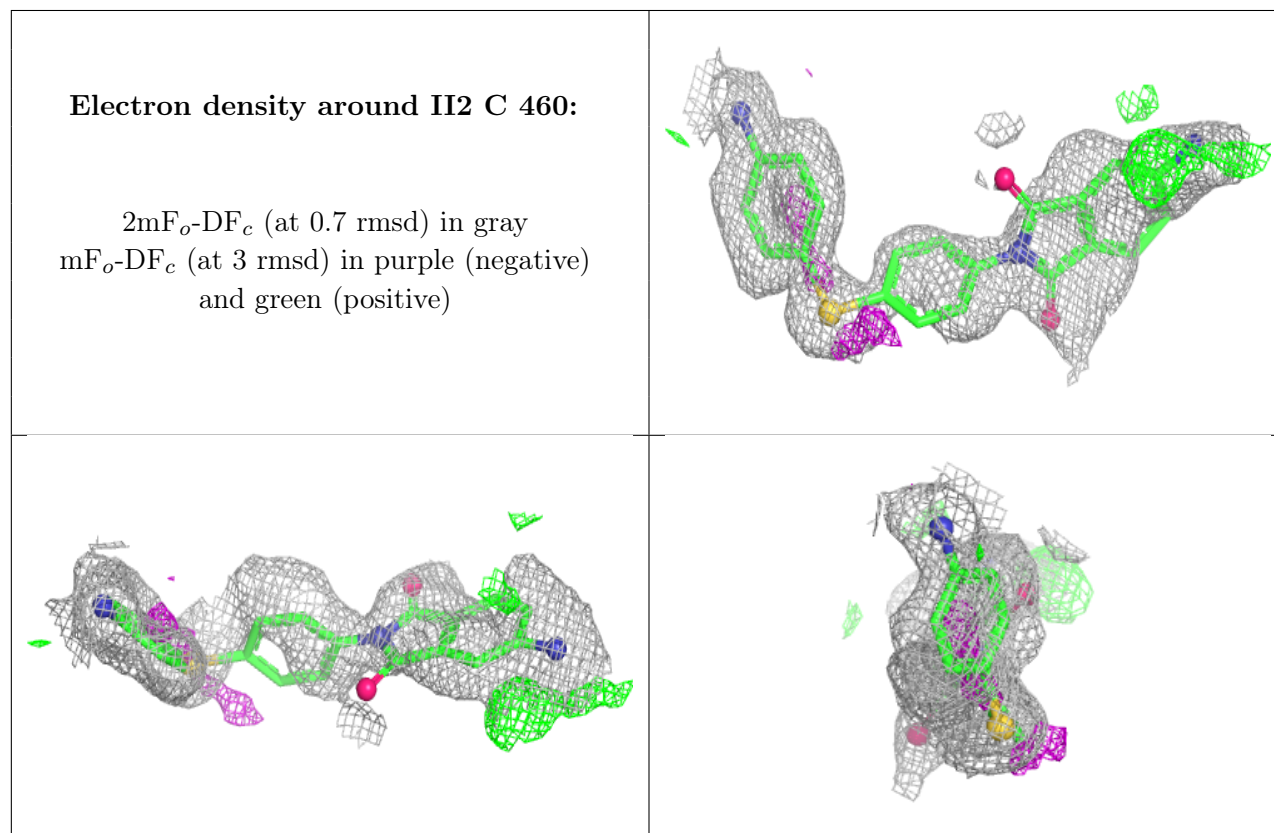
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	II2	C	460	26/26	0.98	0.06	11,37,43,44	0
3	II2	D	460	26/26	0.98	0.06	12,35,41,44	0
3	II2	A	460	26/26	0.99	0.06	10,37,41,41	0
3	II2	B	460	26/26	0.99	0.06	11,36,40,43	0

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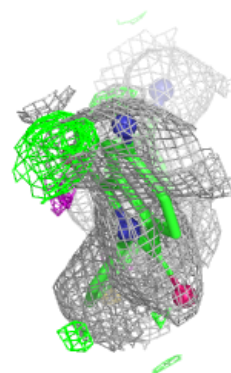
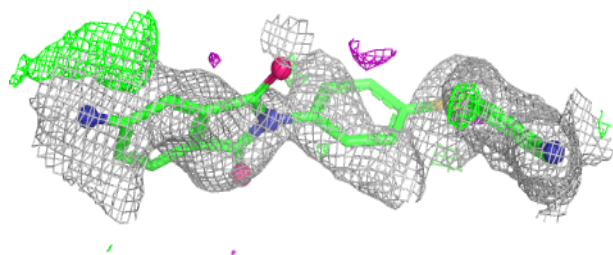
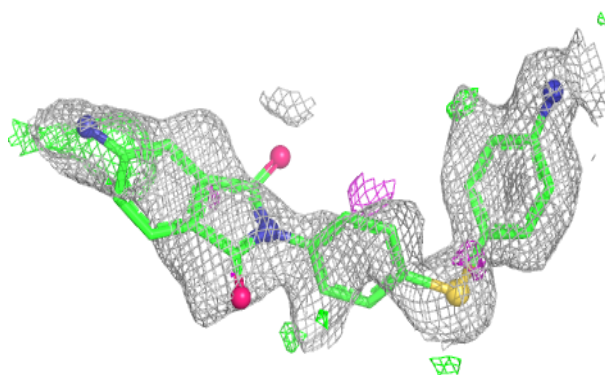
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	HEM	A	450	43/43	1.00	0.03	8,11,14,18	0
2	HEM	B	450	43/43	1.00	0.03	8,11,14,17	0
2	HEM	C	450	43/43	1.00	0.03	10,12,15,19	0
2	HEM	D	450	43/43	1.00	0.03	8,11,13,16	0

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.

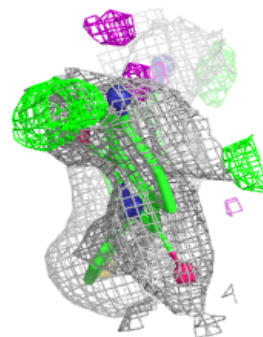
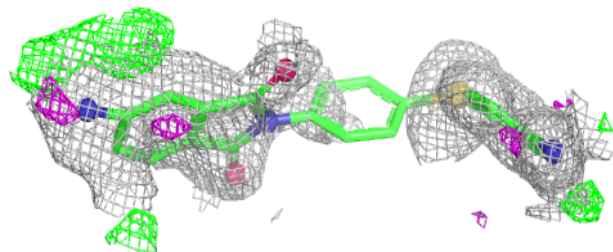
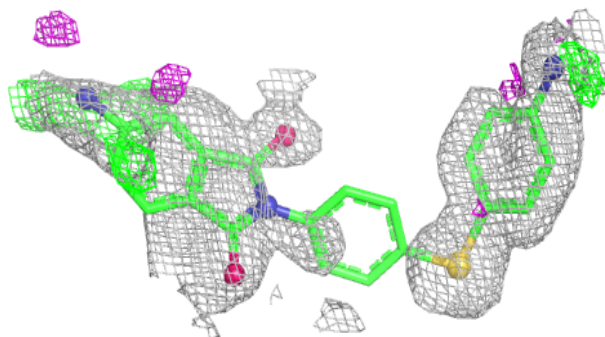


Electron density around II2 D 460:

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

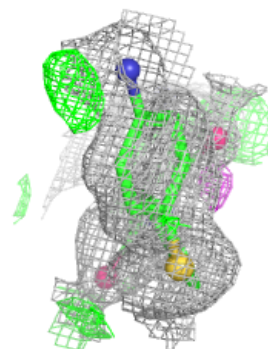
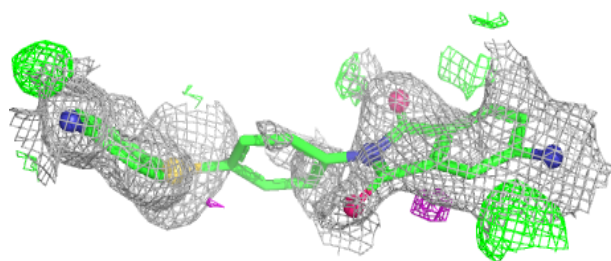
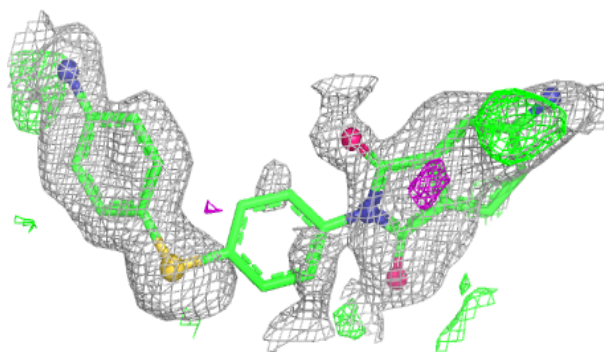
**Electron density around II2 A 460:**

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



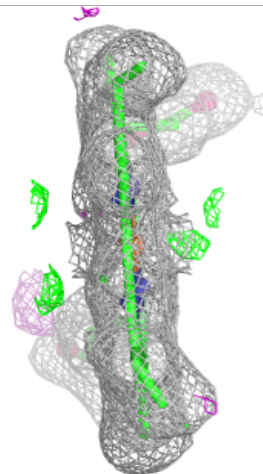
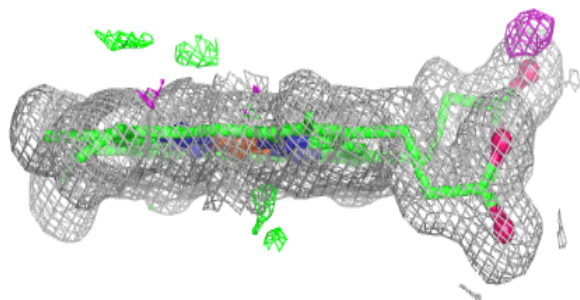
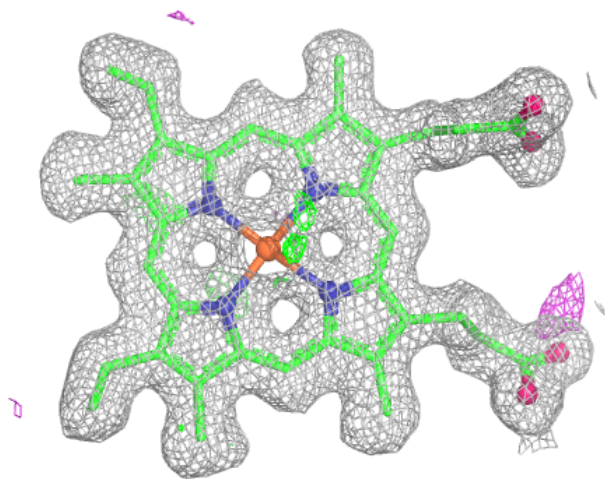
Electron density around II2 B 460:

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



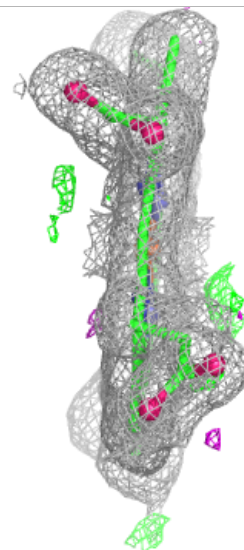
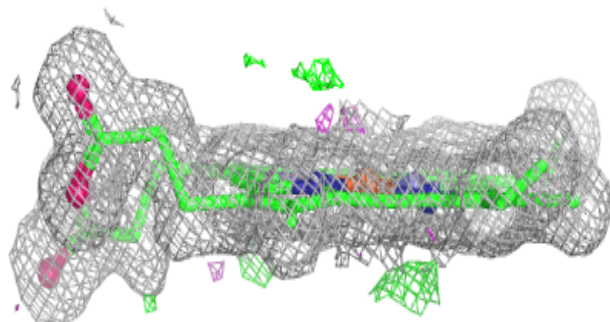
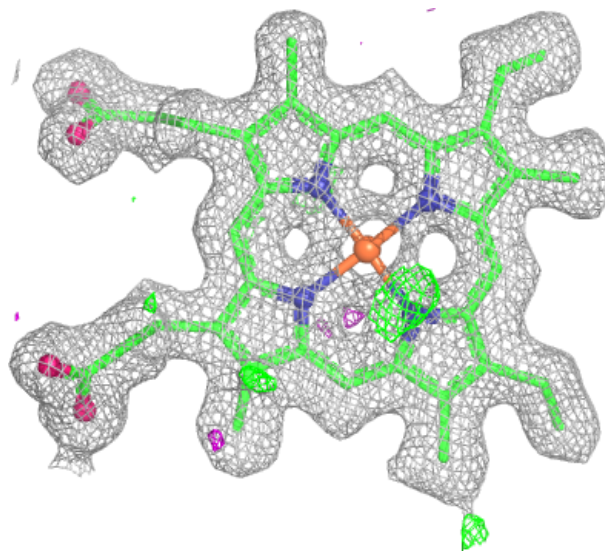
Electron density around HEM A 450:

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



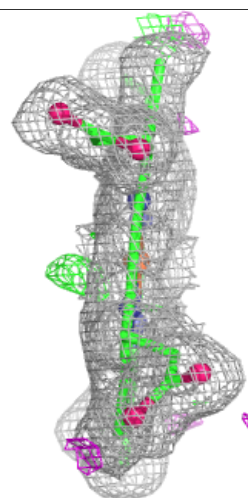
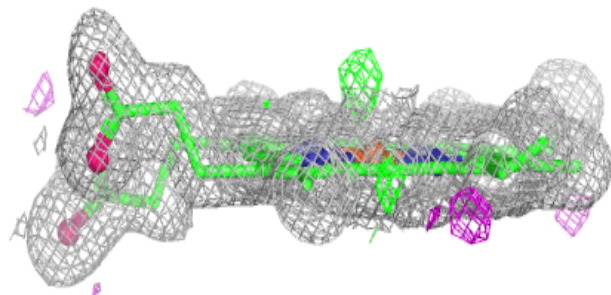
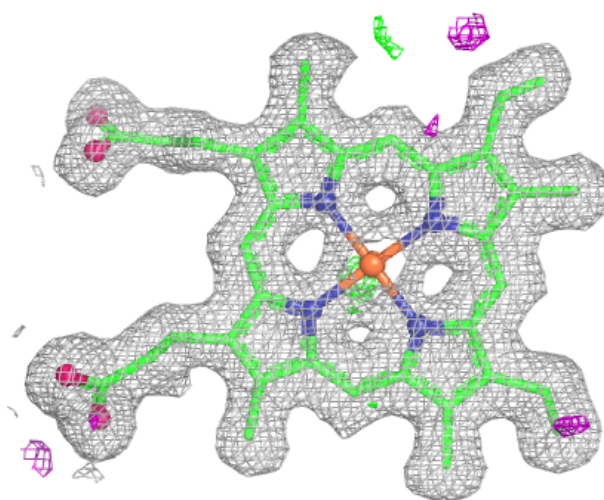
Electron density around HEM B 450:

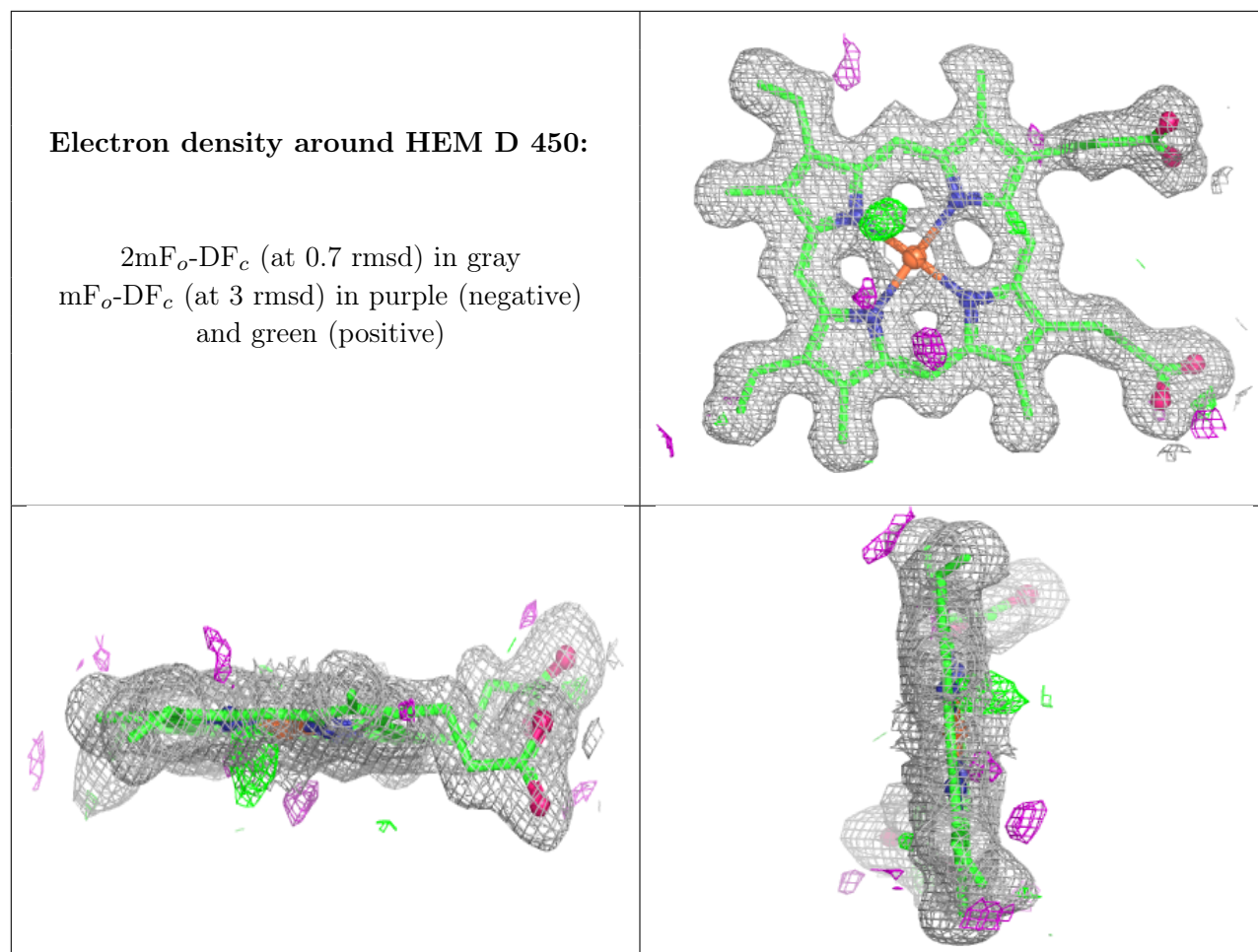
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around HEM C 450:

$2mF_o-DF_c$ (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.