



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 27, 2023 – 01:45 AM EDT

PDB ID : 3G1Q
Title : Crystal structure of sterol 14-alpha demethylase (CYP51) from Trypanosoma brucei in ligand free state
Authors : Lepesheva, G.I.; Hargrove, T.Y.; Harp, J.; Wawrzak, Z.; Waterman, M.R.; Park, H.
Deposited on : 2009-01-30
Resolution : 1.89 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35

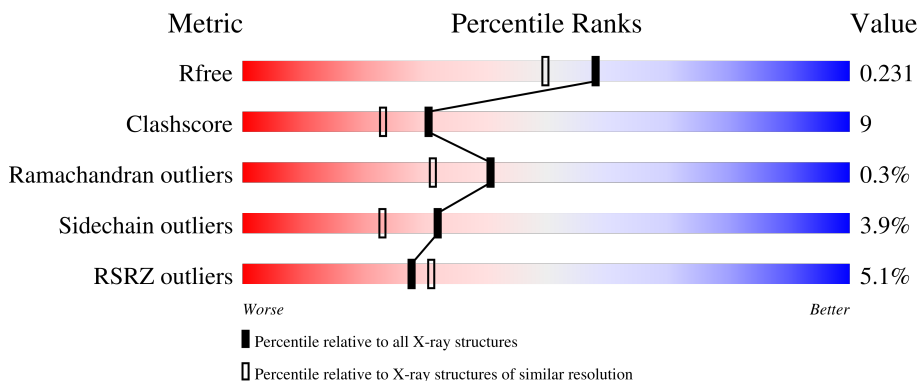
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.89 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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	450	<div style="display: flex; align-items: center;"> <div style="width: 5%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 83%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 13%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: red;"></div> </div> <p style="text-align: center;">5% 83% 13% ..</p>
1	B	450	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 80%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 18%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: red;"></div> </div> <p style="text-align: center;">4% 80% 18% ..</p>
1	C	450	<div style="display: flex; align-items: center;"> <div style="width: 7%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 84%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 14%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: red;"></div> </div> <p style="text-align: center;">7% 84% 14% ...</p>
1	D	450	<div style="display: flex; align-items: center;"> <div style="width: 5%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 81%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 16%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: red;"></div> </div> <p style="text-align: center;">5% 81% 16% ..</p>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 14858 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 Sterol 14-alpha-demethylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	448	3557	2271	621	638	27	0	0	0
1	B	444	3526	2254	615	630	27	0	0	0
1	C	447	3552	2270	621	634	27	0	0	0
1	D	448	3557	2271	621	638	27	0	0	0

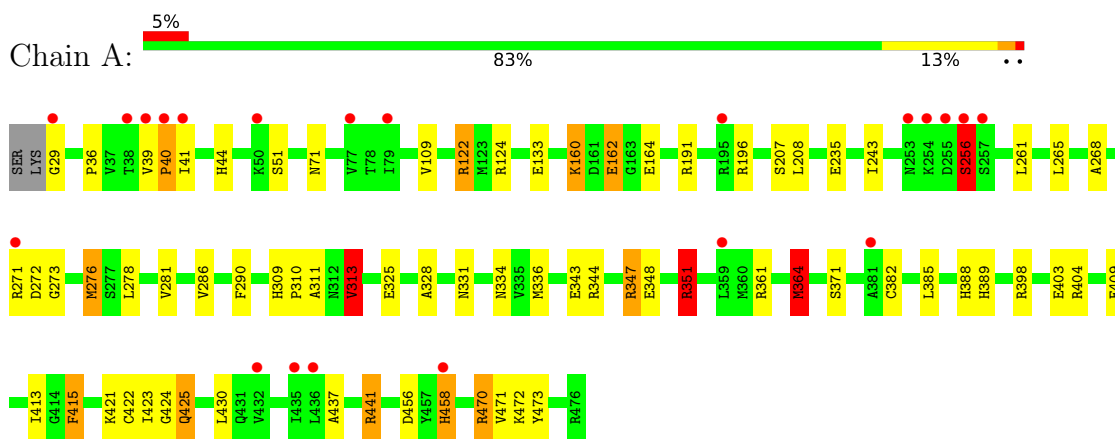
There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	27	SER	THR	engineered mutation	UNP Q385E8
A	28	LYS	ARG	engineered mutation	UNP Q385E8
A	29	GLY	PRO	engineered mutation	UNP Q385E8
A	30	LYS	THR	engineered mutation	UNP Q385E8
A	31	LEU	ASP	engineered mutation	UNP Q385E8
B	27	SER	THR	engineered mutation	UNP Q385E8
B	28	LYS	ARG	engineered mutation	UNP Q385E8
B	29	GLY	PRO	engineered mutation	UNP Q385E8
B	30	LYS	THR	engineered mutation	UNP Q385E8
B	31	LEU	ASP	engineered mutation	UNP Q385E8
C	27	SER	THR	engineered mutation	UNP Q385E8
C	28	LYS	ARG	engineered mutation	UNP Q385E8
C	29	GLY	PRO	engineered mutation	UNP Q385E8
C	30	LYS	THR	engineered mutation	UNP Q385E8
C	31	LEU	ASP	engineered mutation	UNP Q385E8
D	27	SER	THR	engineered mutation	UNP Q385E8
D	28	LYS	ARG	engineered mutation	UNP Q385E8
D	29	GLY	PRO	engineered mutation	UNP Q385E8
D	30	LYS	THR	engineered mutation	UNP Q385E8
D	31	LEU	ASP	engineered mutation	UNP Q385E8

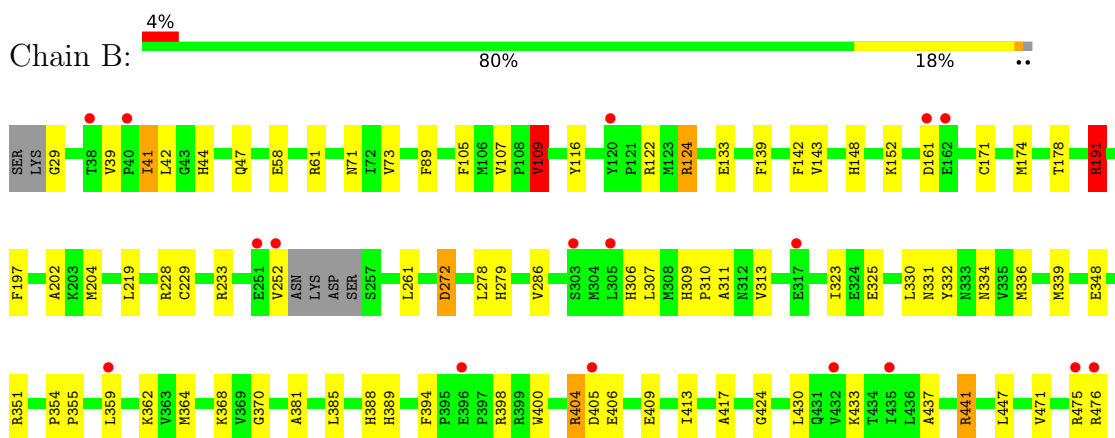
3 Residue-property plots [i](#)

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.

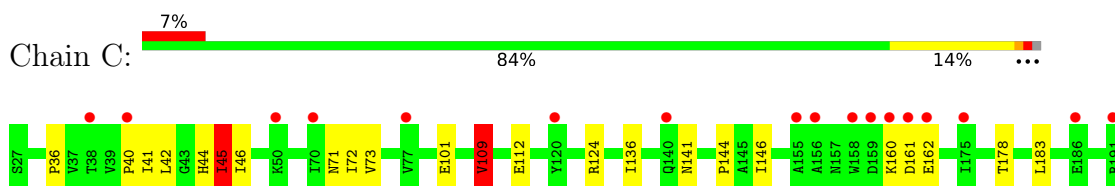
- Molecule 1: Sterol 14-alpha-demethylase

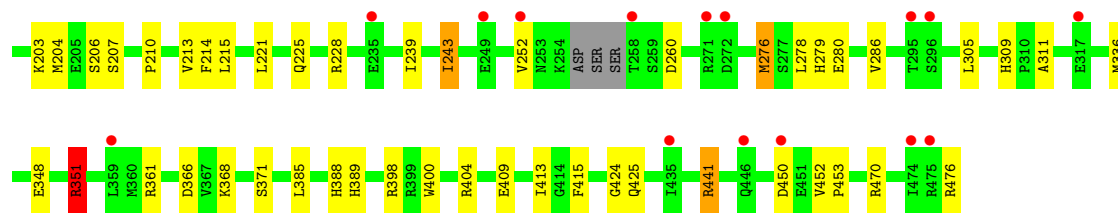


- Molecule 1: Sterol 14-alpha-demethylase

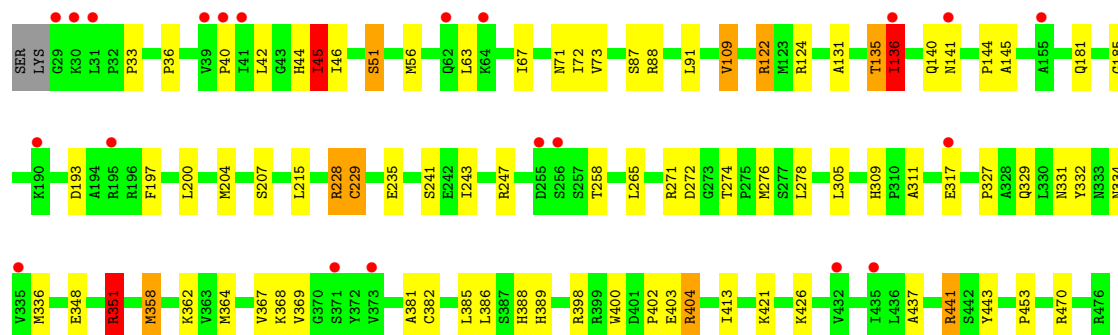
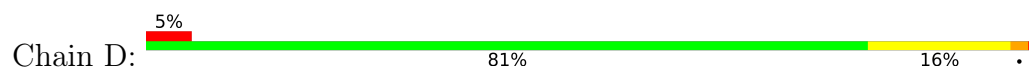


- Molecule 1: Sterol 14-alpha-demethylase





• Molecule 1: Sterol 14-alpha-demethylase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	59.82Å 79.87Å 117.15Å 74.21° 81.56° 68.49°	Depositor
Resolution (Å)	28.62 – 1.89 27.99 – 1.89	Depositor EDS
% Data completeness (in resolution range)	97.5 (28.62-1.89) 97.4 (27.99-1.89)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.85 (at 1.89Å)	Xtrriage
Refinement program	REFMAC 5.4.0061	Depositor
R, R_{free}	0.195 , 0.234 0.193 , 0.231	Depositor DCC
R_{free} test set	7519 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	32.3	Xtrriage
Anisotropy	0.069	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.41 , 51.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	14858	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.28% 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: 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	1.29	8/3639 (0.2%)	1.07	16/4922 (0.3%)
1	B	1.29	10/3607 (0.3%)	0.98	9/4878 (0.2%)
1	C	1.15	5/3633 (0.1%)	0.96	8/4911 (0.2%)
1	D	1.07	4/3639 (0.1%)	0.92	10/4922 (0.2%)
All	All	1.21	27/14518 (0.2%)	0.98	43/19633 (0.2%)

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

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

All (27) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	109	VAL	CB-CG1	-7.94	1.36	1.52
1	A	351	ARG	CD-NE	-7.52	1.33	1.46
1	B	116	TYR	CD1-CE1	6.41	1.49	1.39
1	A	281	VAL	CB-CG2	6.32	1.66	1.52
1	C	101	GLU	CG-CD	6.18	1.61	1.51
1	D	229	CYS	CB-SG	-6.17	1.71	1.82
1	C	351	ARG	CD-NE	-5.88	1.36	1.46
1	A	382	CYS	CB-SG	-5.83	1.72	1.81
1	A	29	GLY	N-CA	5.81	1.54	1.46
1	A	415	PHE	CE2-CZ	5.81	1.48	1.37
1	B	89	PHE	CD2-CE2	5.72	1.50	1.39
1	D	235	GLU	CG-CD	5.70	1.60	1.51
1	D	382	CYS	CB-SG	-5.69	1.72	1.81
1	B	417	ALA	CA-CB	5.62	1.64	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	471	VAL	CA-CB	5.51	1.66	1.54
1	C	361	ARG	CZ-NH1	5.48	1.40	1.33
1	A	290	PHE	CD1-CE1	5.42	1.50	1.39
1	B	197	PHE	CD2-CE2	5.38	1.50	1.39
1	A	235	GLU	CG-CD	5.36	1.59	1.51
1	C	206	SER	CA-CB	5.35	1.60	1.52
1	B	107	VAL	CB-CG2	5.31	1.64	1.52
1	A	425	GLN	CB-CG	-5.26	1.38	1.52
1	B	286	VAL	CB-CG2	5.26	1.63	1.52
1	B	202	ALA	CA-CB	5.19	1.63	1.52
1	B	197	PHE	CE1-CZ	5.14	1.47	1.37
1	B	171	CYS	CB-SG	5.13	1.91	1.82
1	D	443	TYR	CD2-CE2	-5.02	1.31	1.39

All (43) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	351	ARG	NE-CZ-NH2	-18.76	110.92	120.30
1	A	351	ARG	NE-CZ-NH1	15.24	127.92	120.30
1	C	351	ARG	NE-CZ-NH2	-14.07	113.26	120.30
1	C	404	ARG	NE-CZ-NH2	-12.89	113.86	120.30
1	B	404	ARG	NE-CZ-NH2	-10.61	115.00	120.30
1	D	404	ARG	NE-CZ-NH2	-9.71	115.45	120.30
1	B	404	ARG	NE-CZ-NH1	9.60	125.10	120.30
1	C	404	ARG	NE-CZ-NH1	8.77	124.68	120.30
1	D	404	ARG	NE-CZ-NH1	8.62	124.61	120.30
1	D	351	ARG	NE-CZ-NH2	-8.52	116.04	120.30
1	C	351	ARG	NE-CZ-NH1	7.97	124.28	120.30
1	A	361	ARG	NE-CZ-NH2	-7.36	116.62	120.30
1	B	228	ARG	NE-CZ-NH2	-7.35	116.62	120.30
1	D	351	ARG	NE-CZ-NH1	7.34	123.97	120.30
1	A	347	ARG	NE-CZ-NH2	-7.18	116.71	120.30
1	A	471	VAL	CG1-CB-CG2	7.15	122.34	110.90
1	B	124	ARG	NE-CZ-NH1	6.98	123.79	120.30
1	A	351	ARG	CD-NE-CZ	6.97	133.36	123.60
1	A	344	ARG	NE-CZ-NH1	6.94	123.77	120.30
1	A	124	ARG	NE-CZ-NH1	6.53	123.56	120.30
1	B	109	VAL	CG1-CB-CG2	6.53	121.34	110.90
1	B	109	VAL	CA-CB-CG1	6.35	120.42	110.90
1	C	45	ILE	CB-CA-C	-6.32	98.96	111.60
1	B	228	ARG	NE-CZ-NH1	6.29	123.44	120.30
1	D	228	ARG	NE-CZ-NH2	-6.26	117.17	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	191	ARG	NE-CZ-NH2	6.23	123.41	120.30
1	D	136	ILE	CB-CA-C	-6.00	99.60	111.60
1	A	344	ARG	NE-CZ-NH2	-5.80	117.40	120.30
1	A	122	ARG	NE-CZ-NH1	5.78	123.19	120.30
1	A	364	MET	CG-SD-CE	5.78	109.44	100.20
1	A	313	VAL	CB-CA-C	-5.75	100.47	111.40
1	C	361	ARG	NE-CZ-NH2	-5.74	117.43	120.30
1	A	124	ARG	NE-CZ-NH2	-5.53	117.53	120.30
1	B	124	ARG	NE-CZ-NH2	-5.49	117.55	120.30
1	A	361	ARG	NE-CZ-NH1	5.34	122.97	120.30
1	D	247	ARG	NE-CZ-NH2	-5.30	117.65	120.30
1	C	366	ASP	CB-CG-OD1	5.25	123.03	118.30
1	C	221	LEU	CB-CG-CD1	-5.25	102.07	111.00
1	D	45	ILE	CB-CA-C	-5.23	101.14	111.60
1	A	347	ARG	NE-CZ-NH1	5.21	122.91	120.30
1	D	136	ILE	N-CA-C	5.21	125.08	111.00
1	D	229	CYS	CA-CB-SG	-5.19	104.66	114.00
1	A	122	ARG	NE-CZ-NH2	-5.06	117.77	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	135	THR	Peptide

5.2 Too-close contacts [\(i\)](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3557	0	3594	64	0
1	B	3526	0	3565	77	0
1	C	3552	0	3597	55	0
1	D	3557	0	3594	69	0
2	A	43	0	30	2	0
2	B	43	0	30	2	0
2	C	43	0	30	4	0
2	D	43	0	30	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	162	0	0	7	0
3	B	132	0	0	22	0
3	C	102	0	0	8	0
3	D	98	0	0	15	0
All	All	14858	0	14470	265	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 (265) 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:423:ILE:CG1	1:A:423:ILE:CD1	1.75	1.64
1:A:328:ALA:HA	1:A:441:ARG:HH2	1.08	1.12
1:D:135:THR:HB	1:D:136:ILE:HG13	1.37	1.06
1:C:228:ARG:HD2	3:C:514:HOH:O	1.57	1.03
1:A:348:GLU:OE1	1:A:351:ARG:HD3	1.61	0.99
1:A:44:HIS:HD2	1:A:71:ASN:H	1.13	0.94
1:B:229:CYS:CB	3:B:603:HOH:O	2.14	0.94
1:A:328:ALA:HA	1:A:441:ARG:NH2	1.82	0.94
1:A:388:HIS:HE1	1:A:413:ILE:H	1.16	0.92
1:B:362:LYS:HG3	1:B:364:MET:CE	2.02	0.90
1:D:388:HIS:HE1	1:D:413:ILE:H	1.08	0.90
1:A:364:MET:HA	1:A:364:MET:CE	2.02	0.90
1:B:406:GLU:HG3	3:D:535:HOH:O	1.75	0.87
1:B:388:HIS:HE1	1:B:413:ILE:H	1.19	0.86
1:C:388:HIS:HE1	1:C:413:ILE:H	1.20	0.85
1:B:336:MET:CE	1:B:430:LEU:CD1	2.55	0.85
1:A:336:MET:CE	1:A:430:LEU:HD13	2.05	0.85
1:B:44:HIS:HD2	1:B:71:ASN:H	1.23	0.85
1:A:409:GLU:OE2	1:C:368:LYS:HD2	1.75	0.85
1:B:336:MET:HE3	1:B:430:LEU:CD1	2.05	0.85
1:B:229:CYS:HB3	3:B:603:HOH:O	1.71	0.84
1:B:362:LYS:HG3	1:B:364:MET:HE3	1.58	0.84
1:B:336:MET:CE	1:B:430:LEU:HD13	2.08	0.83
1:C:210:PRO:O	1:C:213:VAL:HG12	1.78	0.83
1:B:252:VAL:HA	3:B:543:HOH:O	1.76	0.83
1:B:406:GLU:HB2	3:B:516:HOH:O	1.77	0.83
1:D:73:VAL:O	1:D:73:VAL:HG12	1.76	0.83
1:B:309:HIS:HD2	1:B:311:ALA:H	1.26	0.82
1:A:336:MET:HE1	1:A:430:LEU:HD13	1.62	0.82

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:470:ARG:HD3	3:D:498:HOH:O	1.80	0.81
1:C:44:HIS:HD2	1:C:71:ASN:H	1.26	0.81
1:C:228:ARG:NH2	3:C:488:HOH:O	2.13	0.81
1:B:229:CYS:SG	3:B:603:HOH:O	2.39	0.80
1:D:388:HIS:CE1	1:D:413:ILE:H	1.97	0.80
1:A:309:HIS:HD2	1:A:311:ALA:H	1.29	0.80
1:C:389:HIS:HE1	1:C:398:ARG:HH11	1.28	0.79
1:D:207:SER:HB2	3:D:528:HOH:O	1.83	0.79
1:B:61:ARG:HD2	3:B:582:HOH:O	1.83	0.77
1:B:336:MET:HE1	1:B:430:LEU:HD13	1.66	0.77
1:A:403:GLU:HG2	3:A:578:HOH:O	1.83	0.76
1:A:364:MET:HA	1:A:364:MET:HE2	1.67	0.76
1:D:336:MET:HA	1:D:336:MET:CE	2.17	0.75
1:A:191:ARG:HE	1:A:196:ARG:HH12	1.33	0.74
1:B:336:MET:HE2	3:B:538:HOH:O	1.86	0.74
1:B:41:ILE:HG13	3:B:514:HOH:O	1.87	0.73
1:D:348:GLU:OE1	1:D:351:ARG:HD3	1.89	0.73
1:B:388:HIS:CE1	1:B:413:ILE:H	2.06	0.73
1:D:136:ILE:HA	3:D:547:HOH:O	1.88	0.72
1:A:389:HIS:HE1	1:A:398:ARG:HH11	1.35	0.72
1:D:389:HIS:HE1	1:D:398:ARG:HH11	1.37	0.71
1:D:229:CYS:SG	3:D:528:HOH:O	2.48	0.71
1:D:44:HIS:HD2	1:D:71:ASN:H	1.39	0.71
1:C:45:ILE:HG23	1:C:72:ILE:HG23	1.70	0.71
1:A:423:ILE:CD1	1:A:423:ILE:CB	2.66	0.71
1:D:336:MET:HE1	3:D:499:HOH:O	1.91	0.71
1:A:389:HIS:CE1	1:A:398:ARG:HH11	2.10	0.70
1:B:441:ARG:HG3	3:B:502:HOH:O	1.91	0.70
1:A:388:HIS:CE1	1:A:413:ILE:H	2.07	0.70
1:A:39:VAL:HG12	3:A:582:HOH:O	1.92	0.69
1:A:310:PRO:O	1:A:313:VAL:HG22	1.92	0.68
1:D:122:ARG:HD3	3:D:492:HOH:O	1.94	0.68
1:B:409:GLU:HB2	1:D:136:ILE:HG23	1.75	0.68
1:B:336:MET:CE	1:B:430:LEU:HD12	2.25	0.67
1:C:336:MET:CE	1:C:336:MET:HA	2.24	0.67
1:B:362:LYS:HG3	1:B:364:MET:HE1	1.76	0.67
1:B:139:PHE:HA	1:B:142:PHE:HB2	1.78	0.66
1:B:336:MET:HE1	1:B:430:LEU:CD1	2.24	0.66
1:D:331:ASN:H	1:D:334:ASN:HD22	1.42	0.66
1:B:364:MET:HE2	3:B:599:HOH:O	1.96	0.65
1:B:133:GLU:HG3	1:B:261:LEU:HD12	1.77	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:385:LEU:O	1:B:389:HIS:HD2	1.79	0.65
1:D:437:ALA:O	1:D:441:ARG:HB2	1.96	0.65
1:A:309:HIS:CD2	1:A:311:ALA:H	2.12	0.65
1:C:389:HIS:CE1	1:C:398:ARG:HH11	2.11	0.65
1:D:229:CYS:HB2	3:D:528:HOH:O	1.97	0.65
1:D:332:TYR:CE1	1:D:336:MET:HG3	2.32	0.65
1:D:73:VAL:O	1:D:73:VAL:CG1	2.45	0.64
1:D:389:HIS:CE1	1:D:398:ARG:HH11	2.15	0.64
1:D:185:GLY:HA3	1:D:258:THR:HG21	1.79	0.64
1:A:364:MET:HA	1:A:364:MET:HE3	1.78	0.64
1:B:310:PRO:O	1:B:313:VAL:HG23	1.98	0.63
1:A:336:MET:HE2	1:A:430:LEU:HD13	1.80	0.63
1:A:328:ALA:CA	1:A:441:ARG:HH22	1.99	0.62
1:C:441:ARG:HD3	3:C:574:HOH:O	1.99	0.61
1:C:348:GLU:OE1	1:C:351:ARG:HD3	2.01	0.61
1:A:456:ASP:OD2	1:A:458:HIS:CE1	2.53	0.61
1:D:336:MET:HA	1:D:336:MET:HE2	1.81	0.61
1:B:475:ARG:HD3	3:B:560:HOH:O	2.00	0.61
1:D:358:MET:CE	1:D:381:ALA:HB1	2.30	0.61
2:D:480:HEM:HBC2	2:D:480:HEM:HMC2	1.83	0.61
1:B:400:TRP:CZ3	3:B:602:HOH:O	2.52	0.60
1:C:309:HIS:CD2	1:C:311:ALA:H	2.19	0.60
1:A:351:ARG:HD2	1:A:404:ARG:HD2	1.83	0.60
1:D:44:HIS:CD2	1:D:71:ASN:H	2.20	0.60
1:B:331:ASN:H	1:B:334:ASN:ND2	1.99	0.59
1:B:362:LYS:CG	1:B:364:MET:HE1	2.33	0.59
1:C:252:VAL:HG12	1:C:252:VAL:O	2.03	0.59
1:B:279:HIS:HD2	3:B:519:HOH:O	1.86	0.59
1:A:256:SER:O	1:A:256:SER:OG	2.17	0.59
1:D:358:MET:HE2	1:D:381:ALA:HB1	1.84	0.59
1:D:141:ASN:HB3	3:D:540:HOH:O	2.02	0.58
1:D:362:LYS:HG2	1:D:364:MET:HE1	1.85	0.58
1:A:348:GLU:OE1	1:A:351:ARG:CD	2.43	0.57
1:D:228:ARG:HD2	3:D:518:HOH:O	2.03	0.57
1:A:265:LEU:O	1:A:276:MET:HE3	2.04	0.57
1:A:44:HIS:HD2	1:A:71:ASN:N	1.95	0.57
1:B:44:HIS:CD2	1:B:71:ASN:H	2.14	0.57
1:B:309:HIS:CD2	1:B:311:ALA:H	2.14	0.57
1:C:309:HIS:HD2	1:C:311:ALA:H	1.52	0.56
1:C:441:ARG:O	1:C:476:ARG:HD3	2.04	0.56
1:B:389:HIS:HE1	1:B:398:ARG:HH11	1.52	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:191:ARG:HG3	3:B:556:HOH:O	2.05	0.56
1:B:44:HIS:HD2	1:B:71:ASN:N	1.99	0.56
2:C:480:HEM:HBC2	2:C:480:HEM:HMC2	1.86	0.56
1:C:388:HIS:CE1	1:C:413:ILE:H	2.12	0.56
1:A:44:HIS:CD2	1:A:71:ASN:H	2.06	0.56
1:B:306:HIS:C	3:B:602:HOH:O	2.43	0.56
1:B:331:ASN:H	1:B:334:ASN:HD22	1.54	0.56
1:C:160:LYS:HE2	3:C:556:HOH:O	2.06	0.56
1:C:44:HIS:CD2	1:C:71:ASN:H	2.16	0.55
1:A:325:GLU:OE1	1:C:136:ILE:HG12	2.07	0.55
1:A:331:ASN:H	1:A:334:ASN:ND2	2.04	0.55
1:C:336:MET:HA	1:C:336:MET:HE2	1.89	0.55
1:D:145:ALA:HB1	1:D:181:GLN:HG3	1.88	0.55
1:B:339:MET:HE1	1:B:437:ALA:HB2	1.89	0.55
1:A:336:MET:CG	1:C:409:GLU:HG3	2.37	0.55
1:D:229:CYS:CB	3:D:528:HOH:O	2.55	0.54
1:D:265:LEU:O	1:D:276:MET:HE3	2.08	0.54
1:B:73:VAL:HG12	1:B:73:VAL:O	2.07	0.54
1:B:336:MET:HE3	1:B:430:LEU:HD12	1.83	0.54
1:D:331:ASN:H	1:D:334:ASN:ND2	2.05	0.54
1:D:140:GLN:HG2	3:D:537:HOH:O	2.08	0.53
1:A:162:GLU:OE1	1:A:472:LYS:HE3	2.08	0.53
1:C:44:HIS:HD2	1:C:71:ASN:N	2.00	0.53
1:A:191:ARG:NE	1:A:196:ARG:HH12	2.04	0.53
1:A:385:LEU:O	1:A:389:HIS:HD2	1.92	0.53
1:B:332:TYR:CE1	1:B:336:MET:HG3	2.44	0.53
1:C:73:VAL:HG12	1:C:73:VAL:O	2.10	0.52
1:D:364:MET:HA	1:D:364:MET:HE2	1.92	0.52
1:B:330:LEU:HA	1:B:334:ASN:HD22	1.75	0.52
1:A:41:ILE:HG22	1:A:41:ILE:O	2.09	0.52
1:A:424:GLY:HA3	2:A:480:HEM:C3C	2.45	0.52
2:B:480:HEM:HMC2	2:B:480:HEM:HBC2	1.91	0.52
1:A:364:MET:CE	1:A:364:MET:CA	2.82	0.51
1:B:105:PHE:HA	1:B:219:LEU:HD21	1.92	0.51
1:C:470:ARG:NE	3:C:571:HOH:O	2.39	0.51
1:B:309:HIS:HD2	1:B:311:ALA:N	2.02	0.51
1:D:87:SER:HB2	1:D:91:LEU:HD12	1.93	0.51
1:A:336:MET:HG3	1:C:409:GLU:HG3	1.93	0.51
1:C:42:LEU:HD13	1:C:46:ILE:HD13	1.92	0.51
1:B:364:MET:HE2	1:B:364:MET:HA	1.92	0.50
1:B:348:GLU:OE1	1:B:404:ARG:HD3	2.11	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:109:VAL:HG22	1:C:204:MET:HB3	1.93	0.50
1:D:358:MET:HE3	1:D:358:MET:HA	1.91	0.50
1:A:347:ARG:HD3	3:A:482:HOH:O	2.11	0.50
1:A:109:VAL:HG13	1:A:286:VAL:HG11	1.92	0.50
1:C:425:GLN:NE2	3:C:518:HOH:O	2.17	0.50
1:D:400:TRP:CH2	1:D:402:PRO:HG3	2.47	0.50
1:B:351:ARG:HD3	1:B:394:PHE:CD2	2.46	0.50
1:C:213:VAL:HG13	1:C:214:PHE:CD1	2.48	0.49
1:C:42:LEU:HD22	1:C:45:ILE:HD11	1.94	0.49
1:C:228:ARG:CD	3:C:514:HOH:O	2.33	0.49
1:C:305:LEU:HD13	1:C:453:PRO:HD2	1.93	0.49
1:C:415:PHE:CE1	1:C:425:GLN:HG3	2.48	0.49
1:A:331:ASN:H	1:A:334:ASN:HD22	1.59	0.49
1:D:135:THR:HB	1:D:136:ILE:CG1	2.25	0.49
1:D:426:LYS:HD2	3:D:546:HOH:O	2.12	0.49
1:A:164:GLU:HG2	1:A:470:ARG:NH2	2.28	0.48
1:B:323:ILE:HD12	1:B:441:ARG:HG2	1.96	0.48
1:C:160:LYS:HG3	1:C:162:GLU:O	2.13	0.48
1:B:389:HIS:CE1	1:B:398:ARG:HH11	2.30	0.48
1:B:109:VAL:HG23	3:B:603:HOH:O	2.13	0.47
1:B:424:GLY:HA3	2:B:480:HEM:C3C	2.48	0.47
2:C:480:HEM:HBC2	2:C:480:HEM:CMC	2.43	0.47
1:D:348:GLU:OE1	1:D:404:ARG:HD3	2.14	0.47
1:A:39:VAL:HA	1:A:40:PRO:HD2	1.70	0.47
1:A:422:CYS:HB3	1:A:425:GLN:HG3	1.95	0.47
1:C:146:ILE:HG23	1:C:178:THR:HG21	1.96	0.47
1:C:424:GLY:HA3	2:C:480:HEM:C3C	2.50	0.47
2:C:480:HEM:HBB2	2:C:480:HEM:HHC	1.97	0.47
1:B:279:HIS:CD2	3:B:519:HOH:O	2.65	0.47
1:D:305:LEU:HD13	1:D:453:PRO:HD2	1.97	0.47
1:B:58:GLU:OE1	1:B:61:ARG:NH1	2.49	0.46
1:B:161:ASP:HA	1:B:475:ARG:HB3	1.97	0.46
1:B:143:VAL:CG2	1:B:430:LEU:HD11	2.45	0.46
1:B:433:LYS:CE	3:B:538:HOH:O	2.64	0.46
1:C:183:LEU:O	1:C:260:ASP:HB2	2.15	0.46
1:D:336:MET:CE	1:D:336:MET:CA	2.93	0.46
1:A:41:ILE:N	3:A:582:HOH:O	2.48	0.46
2:A:480:HEM:HMC2	2:A:480:HEM:HBC2	1.98	0.46
1:D:36:PRO:O	1:D:44:HIS:HE1	1.98	0.46
1:D:272:ASP:HB3	1:D:274:THR:H	1.81	0.46
1:D:88:ARG:HH21	1:D:368:LYS:HG3	1.82	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:145:ALA:HB1	1:D:181:GLN:CG	2.46	0.45
1:A:415:PHE:CD2	1:A:425:GLN:HG2	2.51	0.45
1:C:36:PRO:O	1:C:44:HIS:HE1	1.99	0.45
1:A:133:GLU:HG3	1:A:261:LEU:HD12	1.99	0.45
1:B:362:LYS:CG	1:B:364:MET:CE	2.82	0.45
1:D:332:TYR:CZ	1:D:336:MET:HG3	2.52	0.45
1:B:389:HIS:HE1	1:B:398:ARG:HD2	1.82	0.45
1:C:213:VAL:HG11	3:C:522:HOH:O	2.17	0.45
1:A:268:ALA:HB3	1:A:276:MET:HE2	1.99	0.44
1:D:56:MET:HE1	1:D:386:LEU:HB2	1.99	0.44
1:D:271:ARG:NH2	3:D:491:HOH:O	2.50	0.44
1:B:29:GLY:N	3:B:590:HOH:O	2.50	0.44
1:C:112:GLU:O	1:C:279:HIS:HE1	2.01	0.44
1:B:41:ILE:HD12	1:B:42:LEU:HG	2.00	0.44
1:B:307:LEU:HA	3:B:602:HOH:O	2.17	0.44
1:D:131:ALA:O	1:D:135:THR:HG23	2.17	0.44
1:B:325:GLU:OE1	1:B:325:GLU:HA	2.17	0.43
1:D:45:ILE:H	1:D:45:ILE:HG13	1.63	0.43
1:B:354:PRO:HA	1:B:355:PRO:HD3	1.88	0.43
1:A:160:LYS:HG2	1:A:473:TYR:OH	2.19	0.43
1:A:313:VAL:HG22	3:A:558:HOH:O	2.18	0.43
1:B:368:LYS:HE2	1:B:370:GLY:O	2.18	0.43
1:D:364:MET:HA	1:D:364:MET:CE	2.48	0.43
1:A:313:VAL:CG2	3:A:558:HOH:O	2.66	0.43
1:B:409:GLU:HB2	1:D:136:ILE:CG2	2.47	0.43
1:A:271:ARG:C	1:A:273:GLY:H	2.20	0.43
1:D:73:VAL:HG11	1:D:215:LEU:HD21	2.01	0.43
1:C:141:ASN:O	1:C:144:PRO:HD2	2.18	0.42
1:B:41:ILE:N	3:B:514:HOH:O	2.51	0.42
1:D:336:MET:CE	3:D:499:HOH:O	2.60	0.42
1:D:348:GLU:HG3	1:D:400:TRP:CD1	2.54	0.42
1:B:174:MET:O	1:B:178:THR:HG23	2.19	0.42
1:C:40:PRO:HB2	1:C:41:ILE:HG13	2.02	0.42
1:D:109:VAL:HG22	1:D:204:MET:HB3	2.02	0.42
1:A:470:ARG:HD2	3:A:598:HOH:O	2.20	0.42
1:D:45:ILE:HG23	1:D:72:ILE:HG23	1.99	0.42
1:A:109:VAL:HG13	1:A:286:VAL:CG1	2.49	0.42
1:C:348:GLU:HG3	1:C:400:TRP:CD1	2.54	0.42
1:D:309:HIS:CD2	1:D:311:ALA:H	2.38	0.42
1:A:36:PRO:O	1:A:44:HIS:HE1	2.02	0.42
1:A:336:MET:HE2	1:A:430:LEU:CD1	2.49	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:437:ALA:O	1:A:441:ARG:HB2	2.20	0.42
1:C:207:SER:HA	1:C:225:GLN:HB3	2.02	0.42
1:C:276:MET:HG2	1:C:280:GLU:HB2	2.00	0.42
1:D:327:PRO:HG2	1:D:329:GLN:O	2.20	0.41
1:B:204:MET:CE	1:B:233:ARG:HA	2.50	0.41
1:D:51:SER:O	1:D:51:SER:OG	2.37	0.41
1:B:364:MET:CE	3:B:599:HOH:O	2.63	0.41
1:B:385:LEU:O	1:B:389:HIS:CD2	2.67	0.41
1:D:67:ILE:HD13	1:D:369:VAL:HG12	2.02	0.41
1:D:141:ASN:O	1:D:144:PRO:HD2	2.20	0.41
1:C:73:VAL:HG11	1:C:215:LEU:HG	2.01	0.41
1:D:33:PRO:HB2	1:D:63:LEU:HD22	2.02	0.41
1:B:368:LYS:HA	1:B:368:LYS:HD2	1.96	0.41
1:C:415:PHE:CZ	1:C:425:GLN:HG3	2.55	0.41
1:D:385:LEU:O	1:D:389:HIS:HD2	2.04	0.41
1:C:252:VAL:O	1:C:252:VAL:CG1	2.67	0.41
1:A:208:LEU:HA	1:A:208:LEU:HD23	1.88	0.41
1:A:456:ASP:OD1	1:A:458:HIS:ND1	2.54	0.41
1:C:146:ILE:HG23	1:C:178:THR:CG2	2.51	0.41
1:C:203:LYS:HE2	1:C:228:ARG:HB3	2.03	0.41
1:C:239:ILE:O	1:C:243:ILE:HD12	2.20	0.41
1:C:385:LEU:O	1:C:389:HIS:HD2	2.04	0.41
1:B:148:HIS:O	1:B:152:LYS:HG3	2.21	0.40
1:C:109:VAL:HG13	1:C:286:VAL:CG1	2.52	0.40
1:A:404:ARG:HH11	1:A:404:ARG:HD3	1.79	0.40
1:A:41:ILE:O	1:A:41:ILE:CG2	2.69	0.40
1:B:359:LEU:O	1:B:381:ALA:HA	2.21	0.40
1:D:185:GLY:CA	1:D:258:THR:HG21	2.48	0.40
1:D:200:LEU:O	1:D:204:MET:HG3	2.21	0.40
1:C:309:HIS:HD2	1:C:311:ALA:HB3	1.85	0.40
1:D:42:LEU:HD13	1:D:46:ILE:HD12	2.02	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	446/450 (99%)	432 (97%)	11 (2%)	3 (1%)	22	12
1	B	440/450 (98%)	426 (97%)	13 (3%)	1 (0%)	47	38
1	C	443/450 (98%)	429 (97%)	14 (3%)	0	100	100
1	D	446/450 (99%)	424 (95%)	20 (4%)	2 (0%)	34	24
All	All	1775/1800 (99%)	1711 (96%)	58 (3%)	6 (0%)	41	31

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	40	PRO
1	A	256	SER
1	B	272	ASP
1	D	136	ILE
1	A	272	ASP
1	D	40	PRO

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	390/392 (100%)	372 (95%)	18 (5%)	27	17
1	B	386/392 (98%)	373 (97%)	13 (3%)	37	28
1	C	389/392 (99%)	377 (97%)	12 (3%)	40	32
1	D	390/392 (100%)	372 (95%)	18 (5%)	27	17
All	All	1555/1568 (99%)	1494 (96%)	61 (4%)	32	23

All (61) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	51	SER
1	A	122	ARG

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Mol	Chain	Res	Type
1	A	160	LYS
1	A	162	GLU
1	A	207	SER
1	A	243	ILE
1	A	256	SER
1	A	276	MET
1	A	278	LEU
1	A	313	VAL
1	A	343	GLU
1	A	351	ARG
1	A	364	MET
1	A	371	SER
1	A	421	LYS
1	A	441	ARG
1	A	458	HIS
1	A	470	ARG
1	B	39	VAL
1	B	41	ILE
1	B	47	GLN
1	B	109	VAL
1	B	122	ARG
1	B	124	ARG
1	B	191	ARG
1	B	272	ASP
1	B	278	LEU
1	B	405	ASP
1	B	441	ARG
1	B	447	LEU
1	B	476	ARG
1	C	45	ILE
1	C	109	VAL
1	C	124	ARG
1	C	161	ASP
1	C	243	ILE
1	C	276	MET
1	C	278	LEU
1	C	351	ARG
1	C	371	SER
1	C	441	ARG
1	C	450	ASP
1	C	452	VAL
1	D	45	ILE

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Mol	Chain	Res	Type
1	D	51	SER
1	D	109	VAL
1	D	122	ARG
1	D	124	ARG
1	D	136	ILE
1	D	193	ASP
1	D	197	PHE
1	D	241	SER
1	D	243	ILE
1	D	278	LEU
1	D	317	GLU
1	D	351	ARG
1	D	358	MET
1	D	367	VAL
1	D	403	GLU
1	D	421	LYS
1	D	441	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (35) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	44	HIS
1	A	62	GLN
1	A	309	HIS
1	A	334	ASN
1	A	388	HIS
1	A	389	HIS
1	B	44	HIS
1	B	47	GLN
1	B	62	GLN
1	B	177	ASN
1	B	181	GLN
1	B	279	HIS
1	B	309	HIS
1	B	329	GLN
1	B	333	ASN
1	B	334	ASN
1	B	388	HIS
1	B	389	HIS
1	B	425	GLN
1	C	44	HIS
1	C	62	GLN

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Mol	Chain	Res	Type
1	C	279	HIS
1	C	309	HIS
1	C	333	ASN
1	C	334	ASN
1	C	388	HIS
1	C	389	HIS
1	D	44	HIS
1	D	253	ASN
1	D	279	HIS
1	D	309	HIS
1	D	334	ASN
1	D	388	HIS
1	D	389	HIS
1	D	425	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

4 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	HEM	C	480	1	41,50,50	2.17	12 (29%)	45,82,82	1.72	14 (31%)
2	HEM	D	480	1	41,50,50	2.26	15 (36%)	45,82,82	2.11	14 (31%)
2	HEM	A	480	1	41,50,50	2.13	11 (26%)	45,82,82	1.98	8 (17%)
2	HEM	B	480	1	41,50,50	1.99	9 (21%)	45,82,82	1.71	8 (17%)

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	C	480	1	-	0/12/54/54	-
2	HEM	D	480	1	-	0/12/54/54	-
2	HEM	A	480	1	-	2/12/54/54	-
2	HEM	B	480	1	-	0/12/54/54	-

All (47) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	480	HEM	C3D-C2D	6.95	1.51	1.36
2	B	480	HEM	C3D-C2D	5.72	1.48	1.36
2	A	480	HEM	C3C-CAC	5.57	1.59	1.47
2	C	480	HEM	C3D-C2D	5.52	1.48	1.36
2	C	480	HEM	C3C-C2C	-5.43	1.32	1.40
2	A	480	HEM	C3D-C2D	4.92	1.47	1.36
2	D	480	HEM	CMB-C2B	4.79	1.60	1.50
2	D	480	HEM	CAA-C2A	4.77	1.59	1.52
2	C	480	HEM	CAA-C2A	4.53	1.58	1.52
2	A	480	HEM	CMD-C2D	4.36	1.60	1.50
2	D	480	HEM	C3B-C2B	-4.22	1.28	1.37
2	A	480	HEM	CMB-C2B	4.15	1.59	1.50
2	B	480	HEM	CAA-C2A	4.13	1.58	1.52
2	B	480	HEM	C3C-C2C	-3.90	1.35	1.40
2	A	480	HEM	CMA-C3A	3.78	1.59	1.51
2	A	480	HEM	C3C-C2C	-3.71	1.35	1.40
2	B	480	HEM	CAB-C3B	3.63	1.57	1.47
2	C	480	HEM	CAB-C3B	3.58	1.57	1.47
2	C	480	HEM	CMB-C2B	3.51	1.58	1.50
2	C	480	HEM	CMC-C2C	3.48	1.59	1.51
2	B	480	HEM	CMD-C2D	3.44	1.58	1.50
2	C	480	HEM	CMD-C2D	3.41	1.58	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	480	HEM	CMD-C2D	3.27	1.57	1.50
2	A	480	HEM	C4A-NA	3.26	1.42	1.36
2	C	480	HEM	C3C-CAC	3.25	1.54	1.47
2	D	480	HEM	CAB-C3B	3.21	1.56	1.47
2	B	480	HEM	CMB-C2B	3.13	1.57	1.50
2	B	480	HEM	C3C-CAC	3.13	1.54	1.47
2	D	480	HEM	C1A-NA	3.02	1.42	1.36
2	C	480	HEM	CMA-C3A	2.86	1.57	1.51
2	A	480	HEM	C1D-C2D	-2.86	1.39	1.44
2	C	480	HEM	C3B-C2B	-2.71	1.31	1.37
2	B	480	HEM	C1A-NA	2.52	1.41	1.36
2	D	480	HEM	FE-NB	2.50	2.09	1.96
2	A	480	HEM	C4D-ND	-2.50	1.36	1.40
2	D	480	HEM	O2D-CGD	-2.40	1.22	1.30
2	B	480	HEM	C4A-NA	2.38	1.41	1.36
2	A	480	HEM	CAB-C3B	2.27	1.53	1.47
2	C	480	HEM	C1A-NA	2.25	1.40	1.36
2	A	480	HEM	O2D-CGD	-2.19	1.23	1.30
2	D	480	HEM	FE-ND	2.17	2.07	1.96
2	D	480	HEM	C3C-CAC	2.16	1.52	1.47
2	D	480	HEM	C1B-NB	-2.13	1.36	1.40
2	C	480	HEM	CAD-C3D	2.07	1.56	1.51
2	D	480	HEM	CHA-C4D	2.07	1.40	1.35
2	D	480	HEM	CBA-CGA	2.07	1.55	1.50
2	D	480	HEM	C2C-C1C	2.01	1.47	1.42

All (44) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	480	HEM	C4D-ND-C1D	6.28	111.56	105.07
2	A	480	HEM	C4C-CHD-C1D	5.78	130.18	122.56
2	D	480	HEM	C4C-CHD-C1D	5.75	130.15	122.56
2	B	480	HEM	C4C-CHD-C1D	5.30	129.56	122.56
2	A	480	HEM	C4D-ND-C1D	4.65	109.87	105.07
2	A	480	HEM	CMC-C2C-C3C	4.41	132.93	124.68
2	A	480	HEM	CMD-C2D-C1D	4.37	131.69	125.04
2	D	480	HEM	CAD-CBD-CGD	-4.10	104.78	113.60
2	A	480	HEM	C4A-C3A-C2A	3.91	109.71	107.00
2	B	480	HEM	C4D-ND-C1D	3.82	109.02	105.07
2	B	480	HEM	CMC-C2C-C3C	3.51	131.24	124.68
2	C	480	HEM	C4B-CHC-C1C	3.22	126.81	122.56
2	C	480	HEM	C4D-ND-C1D	3.14	108.31	105.07

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	480	HEM	C2C-C3C-C4C	3.13	109.08	106.90
2	C	480	HEM	CMA-C3A-C4A	-3.03	123.80	128.46
2	D	480	HEM	CHD-C1D-ND	2.94	127.63	124.43
2	B	480	HEM	C4A-C3A-C2A	2.94	109.04	107.00
2	C	480	HEM	O2D-CGD-CBD	2.85	123.18	114.03
2	B	480	HEM	O2D-CGD-CBD	2.79	123.01	114.03
2	C	480	HEM	CMC-C2C-C3C	2.79	129.89	124.68
2	A	480	HEM	CHA-C4D-ND	2.75	127.78	124.38
2	D	480	HEM	CMC-C2C-C3C	2.74	129.80	124.68
2	B	480	HEM	C3B-C2B-C1B	2.69	108.48	106.49
2	C	480	HEM	C4A-C3A-C2A	2.68	108.86	107.00
2	C	480	HEM	CHD-C1D-ND	2.66	127.32	124.43
2	C	480	HEM	CAD-CBD-CGD	-2.66	107.88	113.60
2	D	480	HEM	C4B-C3B-C2B	2.61	109.19	107.11
2	B	480	HEM	CBA-CAA-C2A	-2.56	108.25	112.62
2	D	480	HEM	O2A-CGA-CBA	2.51	122.10	114.03
2	B	480	HEM	O1D-CGD-CBD	-2.42	115.32	123.08
2	A	480	HEM	C4B-C3B-C2B	2.42	109.03	107.11
2	A	480	HEM	CMD-C2D-C3D	-2.32	119.83	126.12
2	D	480	HEM	CBD-CAD-C3D	-2.32	106.19	112.63
2	D	480	HEM	O2D-CGD-CBD	2.27	121.32	114.03
2	C	480	HEM	CMD-C2D-C1D	2.25	128.47	125.04
2	D	480	HEM	CAB-C3B-C2B	-2.22	121.28	128.60
2	D	480	HEM	C4A-C3A-C2A	2.21	108.53	107.00
2	C	480	HEM	CHA-C4D-ND	2.14	127.03	124.38
2	D	480	HEM	C4B-CHC-C1C	2.14	125.38	122.56
2	C	480	HEM	C3B-C2B-C1B	2.14	108.07	106.49
2	D	480	HEM	O1A-CGA-CBA	-2.13	116.24	123.08
2	C	480	HEM	O1D-CGD-CBD	-2.13	116.25	123.08
2	C	480	HEM	CAB-C3B-C2B	-2.11	121.65	128.60
2	C	480	HEM	C4B-C3B-C2B	2.02	108.72	107.11

There are no chirality outliers.

All (2) torsion outliers are listed below:

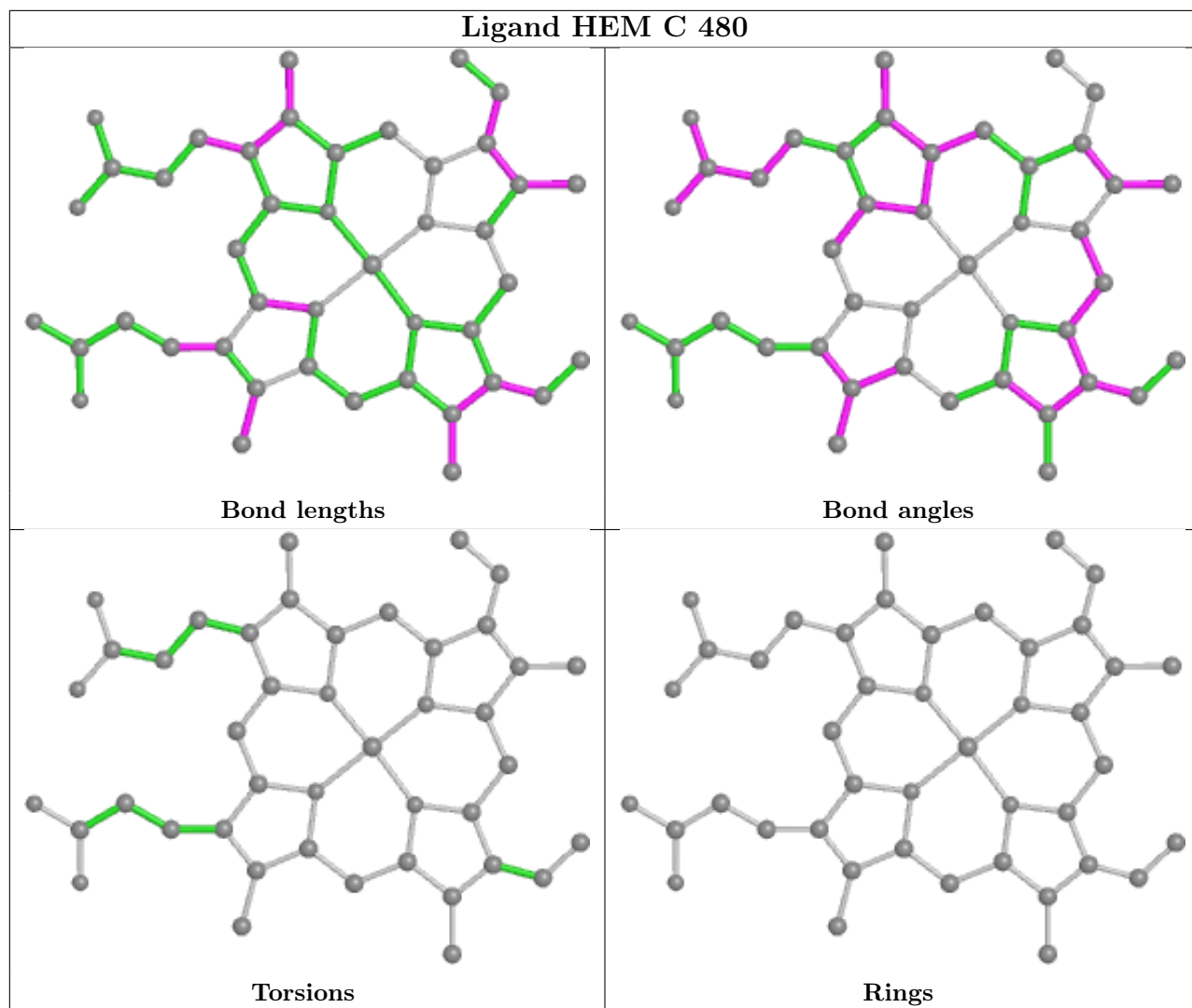
Mol	Chain	Res	Type	Atoms
2	A	480	HEM	C4B-C3B-CAB-CBB
2	A	480	HEM	C2B-C3B-CAB-CBB

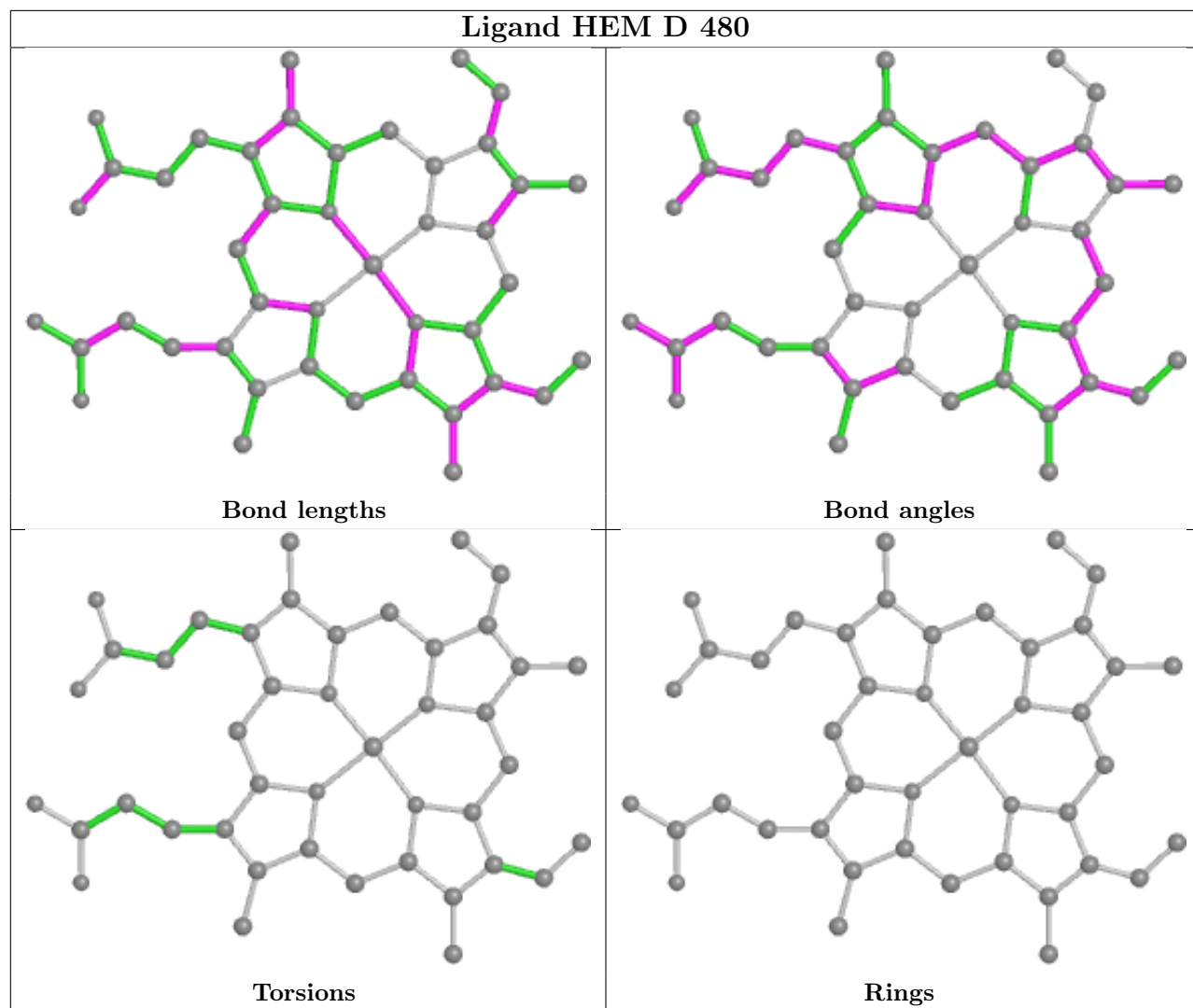
There are no ring outliers.

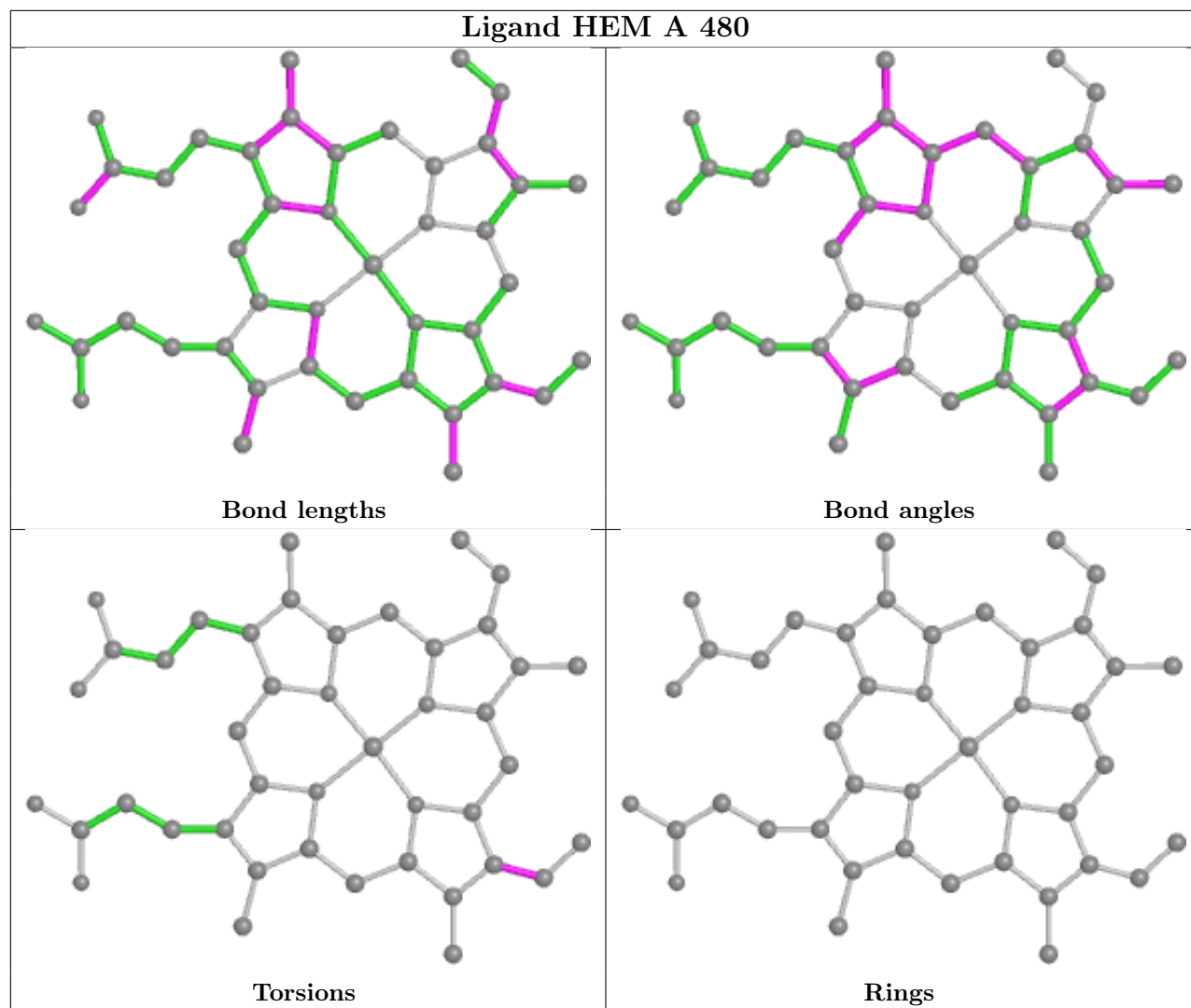
4 monomers are involved in 9 short contacts:

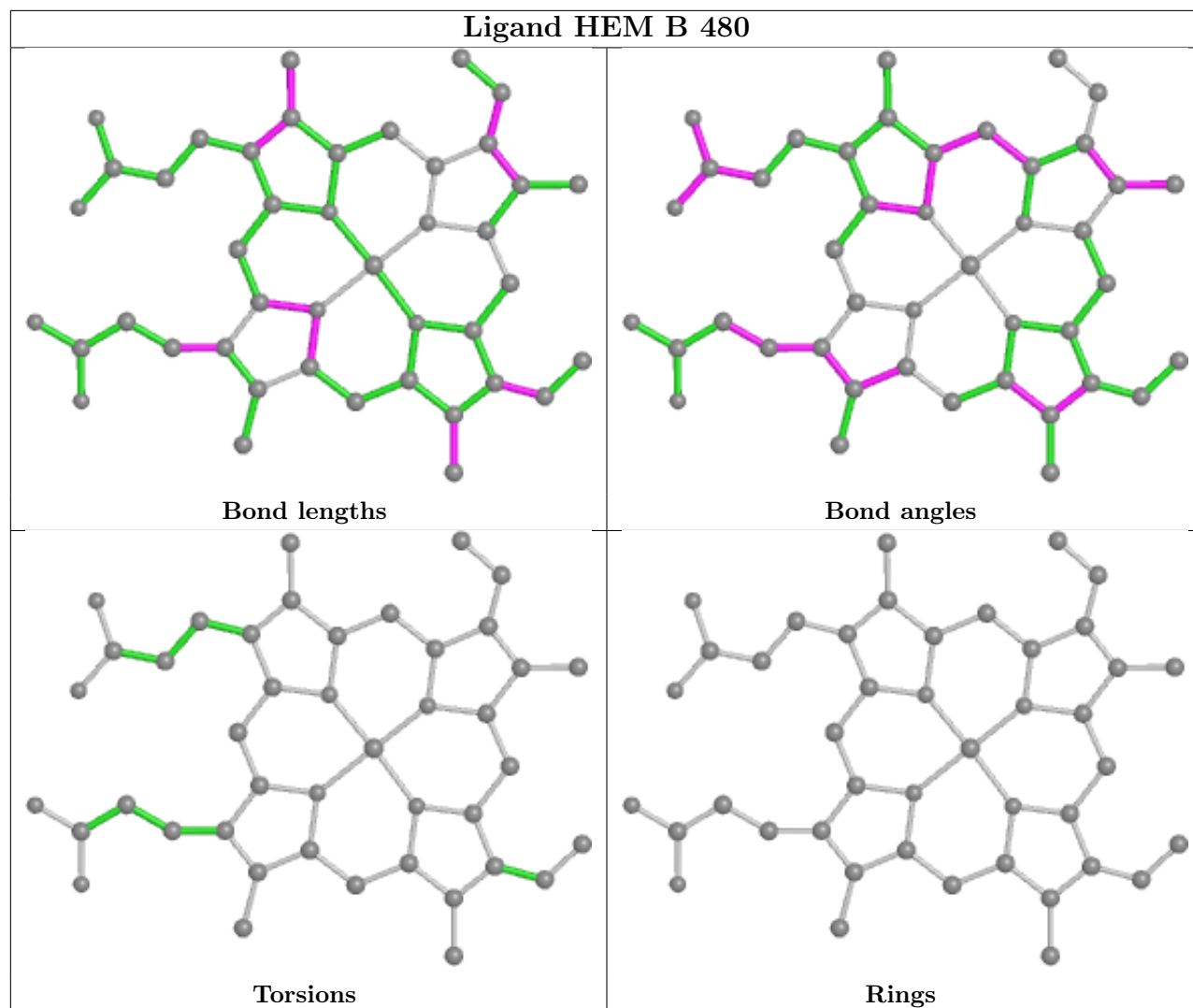
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	480	HEM	4	0
2	D	480	HEM	1	0
2	A	480	HEM	2	0
2	B	480	HEM	2	0

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









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	448/450 (99%)	0.18	21 (4%) 31 34	16, 30, 47, 70	0
1	B	444/450 (98%)	0.25	17 (3%) 40 43	19, 33, 49, 61	0
1	C	447/450 (99%)	0.37	32 (7%) 15 17	21, 37, 58, 70	0
1	D	448/450 (99%)	0.34	21 (4%) 31 34	25, 39, 57, 69	0
All	All	1787/1800 (99%)	0.28	91 (5%) 28 31	16, 35, 55, 70	0

All (91) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	252	VAL	8.4
1	A	256	SER	8.1
1	A	257	SER	4.9
1	A	40	PRO	4.8
1	A	38	THR	4.3
1	A	29	GLY	4.0
1	C	159	ASP	4.0
1	A	41	ILE	3.9
1	D	41	ILE	3.9
1	D	195	ARG	3.8
1	C	155	ALA	3.7
1	D	255	ASP	3.6
1	B	40	PRO	3.6
1	D	40	PRO	3.5
1	A	254	LYS	3.4
1	C	249	GLU	3.4
1	B	251	GLU	3.4
1	A	195	ARG	3.4
1	D	30	LYS	3.3
1	D	64	LYS	3.3
1	B	162	GLU	3.3

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Mol	Chain	Res	Type	RSRZ
1	D	29	GLY	3.2
1	B	405	ASP	3.2
1	C	161	ASP	3.2
1	A	435	ILE	3.1
1	A	253	ASN	3.1
1	D	373	VAL	3.1
1	D	39	VAL	3.0
1	D	31	LEU	3.0
1	C	435	ILE	3.0
1	A	381	ALA	3.0
1	A	432	VAL	2.9
1	C	450	ASP	2.9
1	C	175	ILE	2.8
1	C	120	TYR	2.8
1	A	255	ASP	2.8
1	C	475	ARG	2.7
1	C	252	VAL	2.7
1	B	38	THR	2.7
1	C	160	LYS	2.7
1	B	161	ASP	2.7
1	C	50	LYS	2.6
1	A	39	VAL	2.6
1	D	371	SER	2.6
1	C	140	GLN	2.6
1	D	136	ILE	2.5
1	D	432	VAL	2.5
1	B	359	LEU	2.5
1	C	446	GLN	2.5
1	C	38	THR	2.4
1	A	359	LEU	2.4
1	A	436	LEU	2.4
1	C	40	PRO	2.4
1	C	271	ARG	2.4
1	C	191	ARG	2.4
1	C	258	THR	2.4
1	B	432	VAL	2.4
1	C	235	GLU	2.4
1	C	186	GLU	2.3
1	D	256	SER	2.3
1	B	396	GLU	2.3
1	C	162	GLU	2.2
1	C	317	GLU	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	335	VAL	2.2
1	C	272	ASP	2.2
1	D	155	ALA	2.2
1	A	271	ARG	2.2
1	D	141	ASN	2.2
1	C	296	SER	2.2
1	D	62	GLN	2.2
1	D	435	ILE	2.2
1	A	458	HIS	2.1
1	B	435	ILE	2.1
1	B	120	TYR	2.1
1	B	303	SER	2.1
1	C	77	VAL	2.1
1	B	475	ARG	2.1
1	C	156	ALA	2.1
1	A	79	ILE	2.1
1	C	474	ILE	2.1
1	D	317	GLU	2.1
1	C	359	LEU	2.1
1	A	50	LYS	2.1
1	B	317	GLU	2.0
1	A	77	VAL	2.0
1	B	305	LEU	2.0
1	C	70	ILE	2.0
1	C	295	THR	2.0
1	B	476	ARG	2.0
1	C	158	TRP	2.0
1	D	190	LYS	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

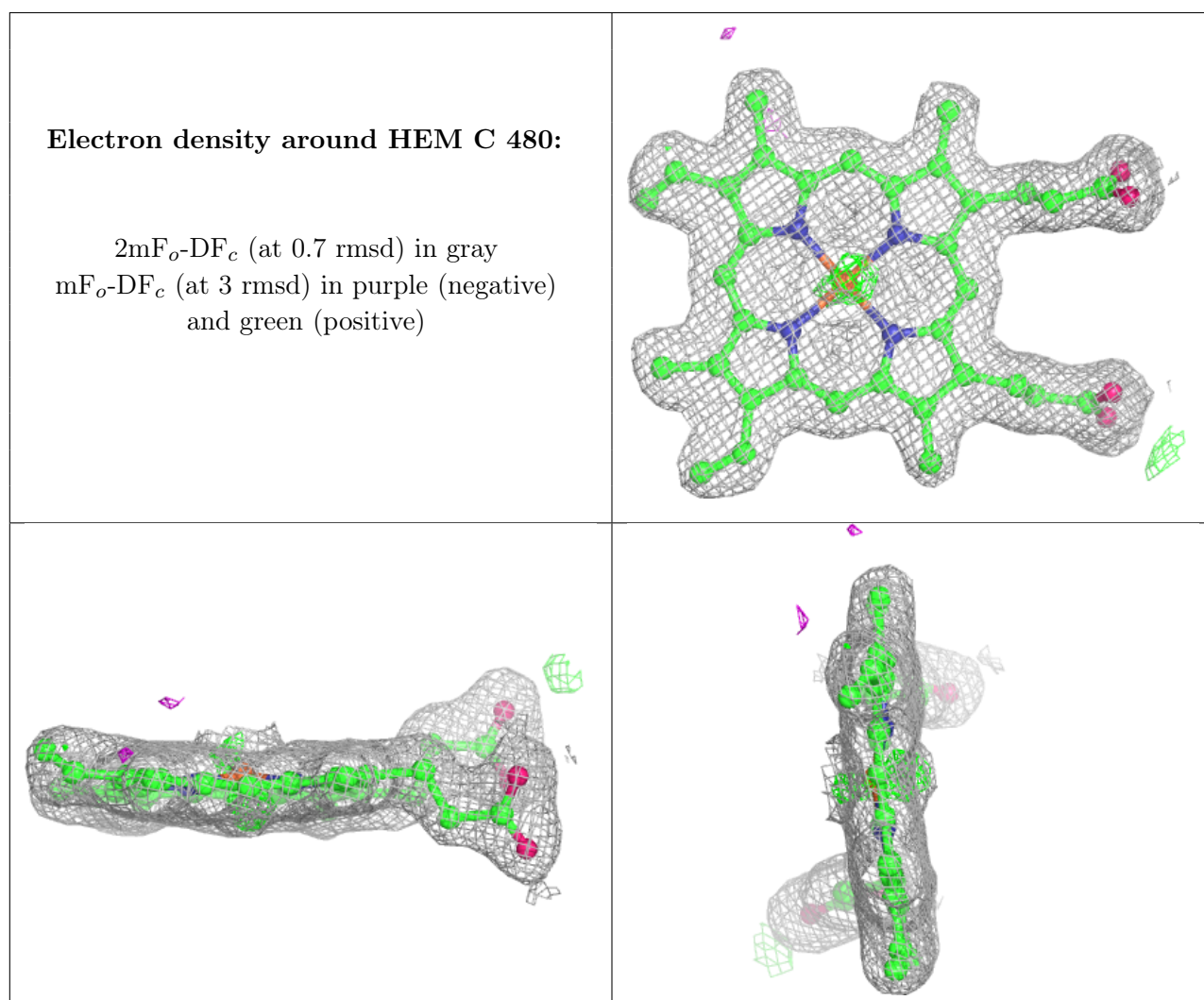
6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q < 0.9' lists the number of atoms with occupancy less than 0.9.

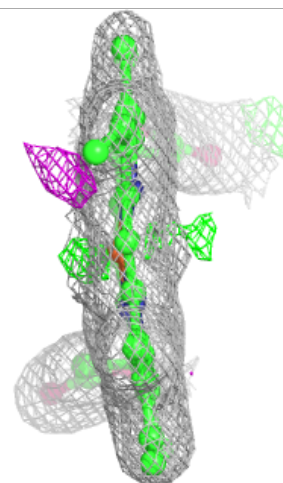
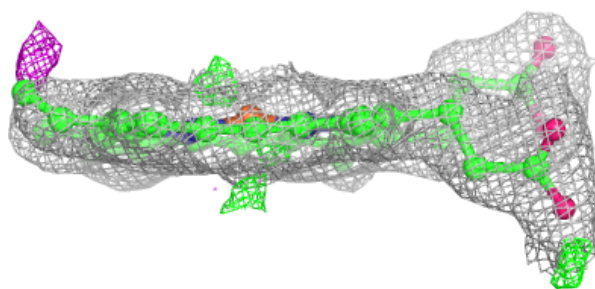
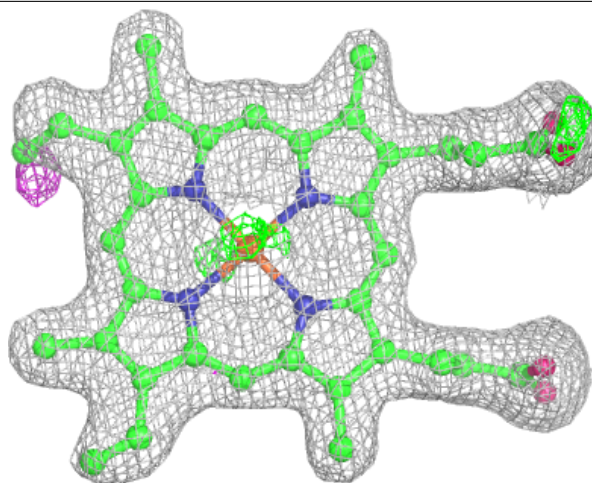
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	HEM	C	480	43/43	0.98	0.13	17,21,26,34	0
2	HEM	D	480	43/43	0.98	0.12	22,28,35,40	0
2	HEM	A	480	43/43	0.99	0.13	14,18,26,34	0
2	HEM	B	480	43/43	0.99	0.13	18,21,27,35	0

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



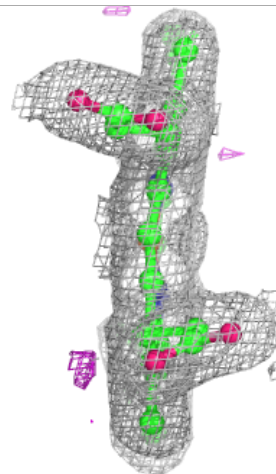
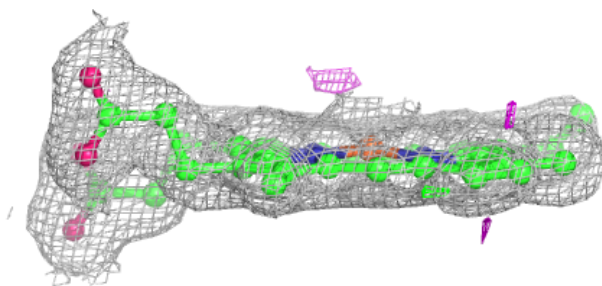
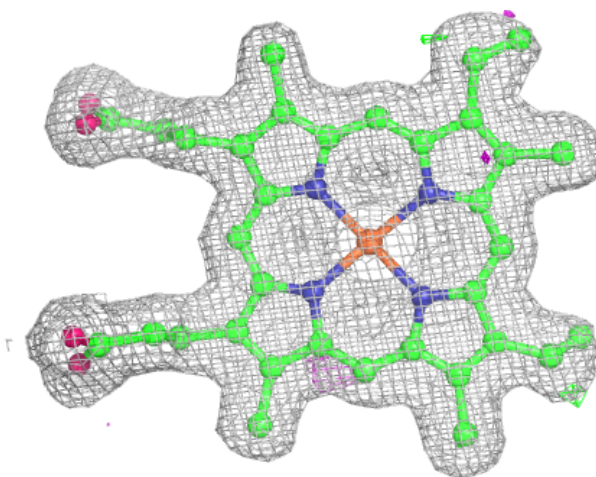
Electron density around HEM D 480:

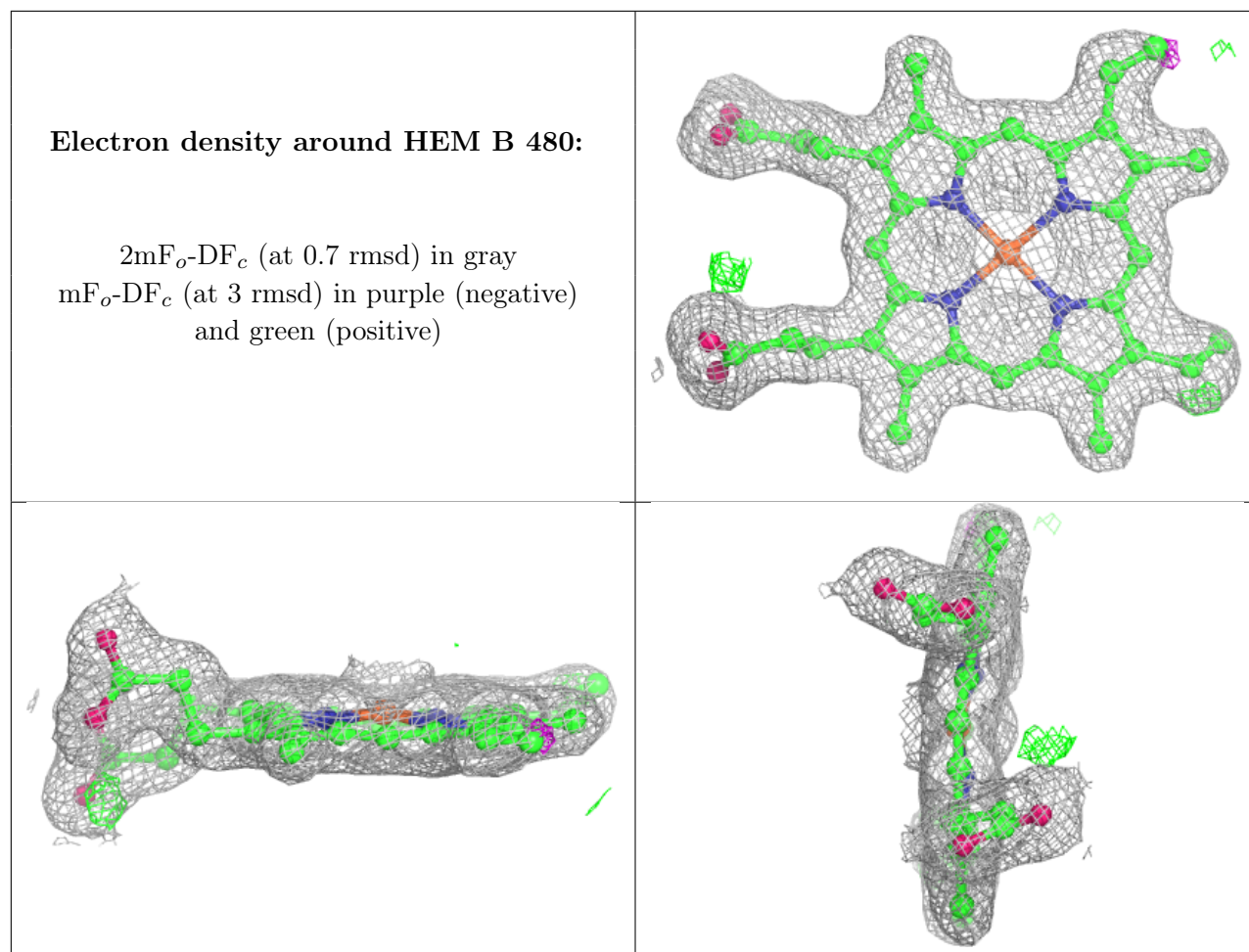
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around HEM A 480:

$2mF_o-DF_c$ (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.