



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 19, 2023 – 06:23 PM EDT

PDB ID : 2FDU
Title : Microsomal P450 2A6 with the inhibitor N,N-Dimethyl(5-(pyridin-3-yl)furan-2-yl)methanamine bound
Authors : Yano, J.K.; Stout, C.D.; Johnson, E.F.
Deposited on : 2005-12-14
Resolution : 1.85 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)
Xtrriage (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

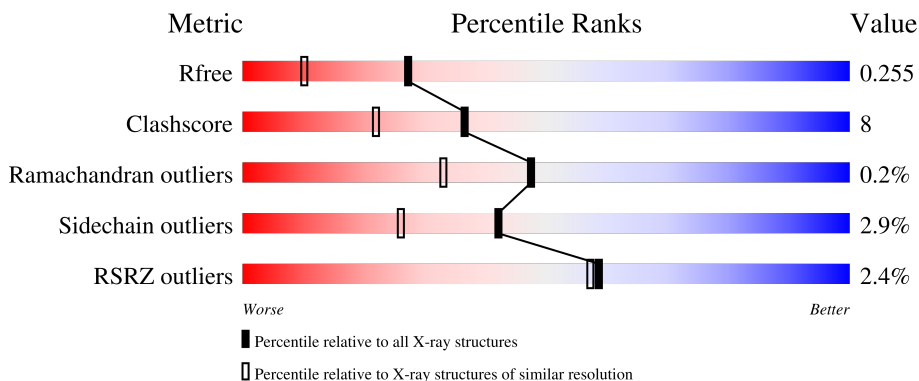
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.85 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	2469 (1.86-1.86)
Clashscore	141614	2625 (1.86-1.86)
Ramachandran outliers	138981	2592 (1.86-1.86)
Sidechain outliers	138945	2592 (1.86-1.86)
RSRZ outliers	127900	2436 (1.86-1.86)

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	476	 3% 86% 12% ..
1	B	476	 3% 79% 15% ..
1	C	476	 87% 9% ..
1	D	476	 3% 84% 13% ..

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 16510 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 Cytochrome P450 2A6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	465	3760	2414	650	678	18	0	0	0
1	B	463	3747	2406	647	676	18	0	0	0
1	C	464	3751	2408	648	677	18	0	0	0
1	D	464	3751	2408	648	677	18	0	0	0

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	23	MET	-	cloning artifact	UNP P11509
A	24	ALA	-	cloning artifact	UNP P11509
A	25	LYS	-	cloning artifact	UNP P11509
A	26	LYS	-	cloning artifact	UNP P11509
A	27	THR	-	cloning artifact	UNP P11509
A	28	SER	-	cloning artifact	UNP P11509
A	495	HIS	-	expression tag	UNP P11509
A	496	HIS	-	expression tag	UNP P11509
A	497	HIS	-	expression tag	UNP P11509
A	498	HIS	-	expression tag	UNP P11509
B	23	MET	-	cloning artifact	UNP P11509
B	24	ALA	-	cloning artifact	UNP P11509
B	25	LYS	-	cloning artifact	UNP P11509
B	26	LYS	-	cloning artifact	UNP P11509
B	27	THR	-	cloning artifact	UNP P11509
B	28	SER	-	cloning artifact	UNP P11509
B	495	HIS	-	expression tag	UNP P11509
B	496	HIS	-	expression tag	UNP P11509
B	497	HIS	-	expression tag	UNP P11509
B	498	HIS	-	expression tag	UNP P11509
C	23	MET	-	cloning artifact	UNP P11509

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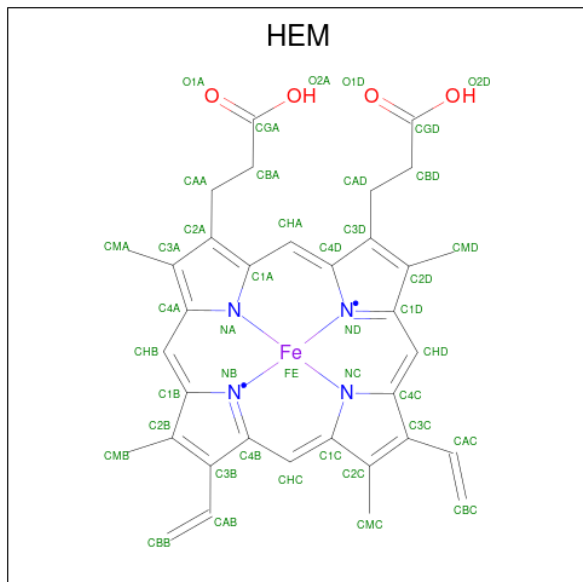
Chain	Residue	Modelled	Actual	Comment	Reference
C	24	ALA	-	cloning artifact	UNP P11509
C	25	LYS	-	cloning artifact	UNP P11509
C	26	LYS	-	cloning artifact	UNP P11509
C	27	THR	-	cloning artifact	UNP P11509
C	28	SER	-	cloning artifact	UNP P11509
C	495	HIS	-	expression tag	UNP P11509
C	496	HIS	-	expression tag	UNP P11509
C	497	HIS	-	expression tag	UNP P11509
C	498	HIS	-	expression tag	UNP P11509
D	23	MET	-	cloning artifact	UNP P11509
D	24	ALA	-	cloning artifact	UNP P11509
D	25	LYS	-	cloning artifact	UNP P11509
D	26	LYS	-	cloning artifact	UNP P11509
D	27	THR	-	cloning artifact	UNP P11509
D	28	SER	-	cloning artifact	UNP P11509
D	495	HIS	-	expression tag	UNP P11509
D	496	HIS	-	expression tag	UNP P11509
D	497	HIS	-	expression tag	UNP P11509
D	498	HIS	-	expression tag	UNP P11509

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



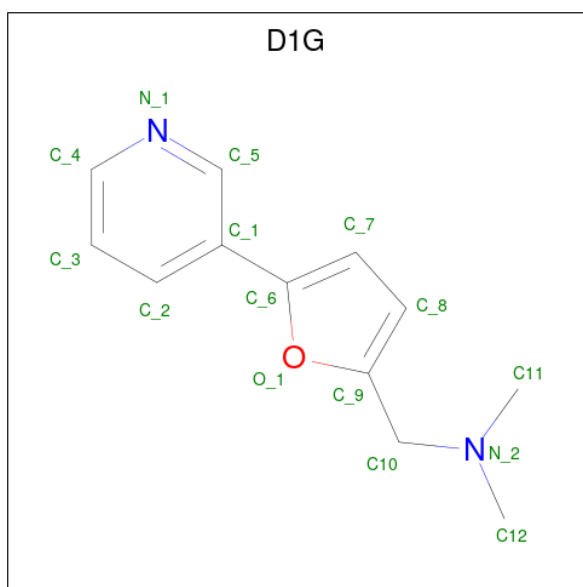
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total O S 5 4 1	0	0
2	A	1	Total O S 5 4 1	0	0

- Molecule 3 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).



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

- Molecule 4 is N,N-DIMETHYL(5-(PYRIDIN-3-YL)FURAN-2-YL)METHANAMINE (three-letter code: D1G) (formula: $C_{12}H_{14}N_2O$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			15	12	2	1		
4	B	1	Total	C	N	O	0	0
			15	12	2	1		
4	C	1	Total	C	N	O	0	0
			15	12	2	1		
4	D	1	Total	C	N	O	0	0
			15	12	2	1		

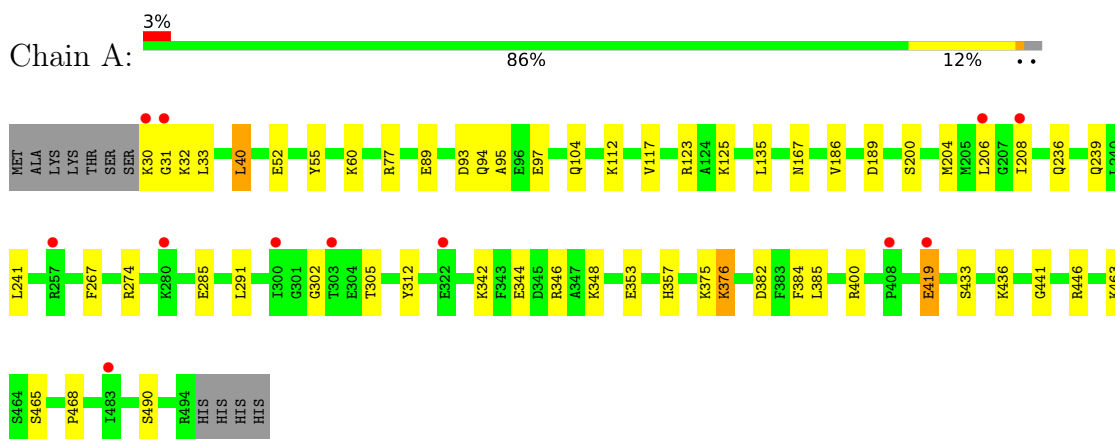
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	346	Total	O	0	0
			346	346		
5	B	228	Total	O	0	0
			228	228		
5	C	368	Total	O	0	0
			368	368		
5	D	317	Total	O	0	0
			317	317		

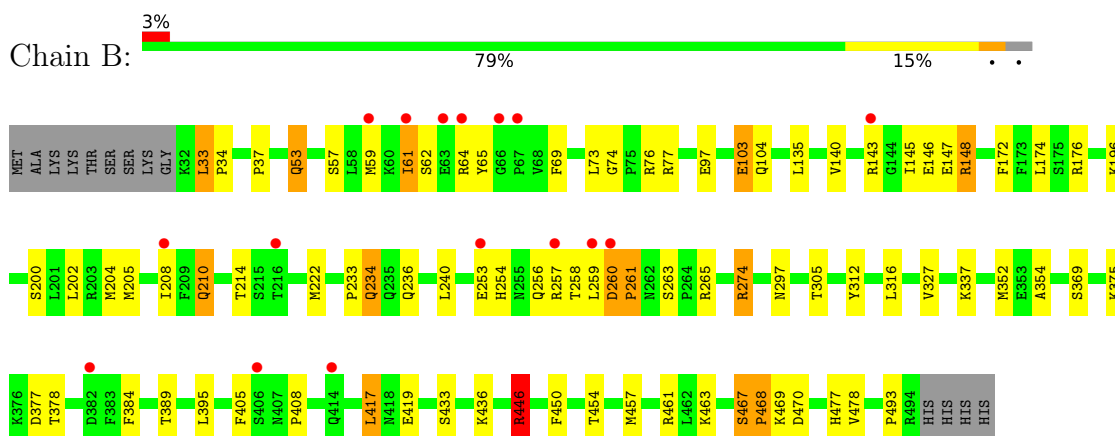
3 Residue-property plots [i](#)

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.

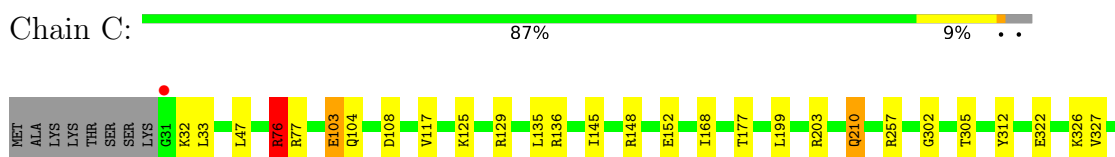
- Molecule 1: Cytochrome P450 2A6



- Molecule 1: Cytochrome P450 2A6

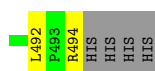
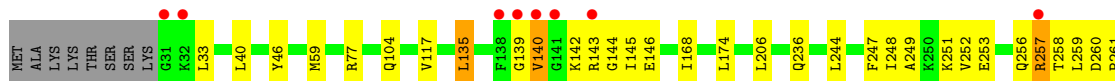
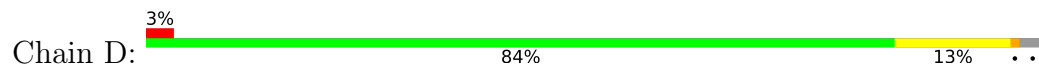


- Molecule 1: Cytochrome P450 2A6





- Molecule 1: Cytochrome P450 2A6



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	69.81Å 157.70Å 103.89Å 90.00° 92.23° 90.00°	Depositor
Resolution (Å)	50.00 – 1.85 47.22 – 1.79	Depositor EDS
% Data completeness (in resolution range)	(Not available) (50.00-1.85) 91.6 (47.22-1.79)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.73 (at 1.79Å)	Xtrriage
Refinement program	CNS	Depositor
R, R_{free}	0.186 , 0.223 0.223 , 0.255	Depositor DCC
R_{free} test set	9625 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	27.9	Xtrriage
Anisotropy	0.251	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 46.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.026 for h,-k,-l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	16510	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.05% 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: D1G, SO4, 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	0.89	0/3851	0.83	1/5186 (0.0%)
1	B	0.80	1/3838 (0.0%)	0.84	4/5170 (0.1%)
1	C	0.87	1/3842 (0.0%)	0.84	2/5175 (0.0%)
1	D	0.89	2/3842 (0.1%)	0.83	2/5175 (0.0%)
All	All	0.86	4/15373 (0.0%)	0.83	9/20706 (0.0%)

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

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

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	394	MET	SD-CE	-14.46	0.96	1.77
1	D	59	MET	SD-CE	-7.67	1.34	1.77
1	C	103	GLU	CG-CD	5.86	1.60	1.51
1	B	103	GLU	CG-CD	5.00	1.59	1.51

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	234	GLN	CA-CB-CG	6.57	127.86	113.40
1	D	104	GLN	N-CA-C	-6.35	93.85	111.00
1	A	104	GLN	N-CA-C	-6.01	94.78	111.00
1	C	76	ARG	NE-CZ-NH2	-5.96	117.32	120.30
1	B	446	ARG	NE-CZ-NH1	5.93	123.27	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	104	GLN	N-CA-C	-5.89	95.11	111.00
1	B	104	GLN	N-CA-C	-5.76	95.43	111.00
1	B	234	GLN	CB-CA-C	-5.46	99.48	110.40
1	D	168	ILE	CG1-CB-CG2	-5.12	100.13	111.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	46	TYR	Sidechain

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	3760	0	3747	51	0
1	B	3747	0	3731	80	0
1	C	3751	0	3734	47	0
1	D	3751	0	3734	61	0
2	A	10	0	0	0	0
3	A	43	0	30	5	0
3	B	43	0	30	1	0
3	C	43	0	30	4	0
3	D	43	0	30	4	0
4	A	15	0	14	3	0
4	B	15	0	14	3	0
4	C	15	0	14	3	0
4	D	15	0	14	4	0
5	A	346	0	0	8	0
5	B	228	0	0	10	0
5	C	368	0	0	5	0
5	D	317	0	0	5	0
All	All	16510	0	15122	241	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 8.

All (241) 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:D:394:MET:CE	1:D:394:MET:CG	2.21	1.18
1:B:208:ILE:HD11	1:B:240:LEU:HB2	1.13	1.12
1:D:394:MET:CE	1:D:394:MET:SD	0.96	1.06
1:D:253:GLU:HG3	1:D:257:ARG:HH21	1.21	1.01
1:D:142:LYS:HG3	1:D:144:GLY:H	1.26	1.01
1:C:32:LYS:HB3	1:C:384:PHE:HB3	1.41	1.00
1:C:418:ASN:HD22	1:C:422:GLN:HB2	1.28	0.99
1:D:394:MET:CG	1:D:394:MET:HE3	1.85	0.98
1:D:394:MET:SD	1:D:394:MET:HE1	1.58	0.98
1:D:394:MET:SD	1:D:394:MET:HE3	1.58	0.98
1:D:394:MET:SD	1:D:394:MET:HE2	1.58	0.96
1:D:139:GLY:O	1:D:142:LYS:HG2	1.65	0.95
1:A:30:LYS:HG2	1:A:382:ASP:O	1.65	0.95
1:A:30:LYS:HD3	1:A:32:LYS:HB3	1.53	0.91
1:A:32:LYS:HD2	1:A:33:LEU:H	1.35	0.90
1:B:77:ARG:HH12	1:B:389:THR:HG23	1.37	0.86
1:A:30:LYS:HG3	1:A:31:GLY:N	1.88	0.86
1:D:344:GLU:HG3	5:D:794:HOH:O	1.75	0.84
1:C:32:LYS:HE2	1:C:384:PHE:HB2	1.59	0.83
1:B:77:ARG:HG2	1:B:77:ARG:HH11	1.42	0.83
1:A:342:LYS:HE2	1:A:344:GLU:OE1	1.79	0.82
1:C:375:LYS:HB2	1:C:376:LYS:HE2	1.60	0.82
1:C:257:ARG:HH11	1:C:257:ARG:HG2	1.44	0.82
1:A:97:GLU:HG2	1:A:376:LYS:HE3	1.60	0.81
1:D:142:LYS:HG3	1:D:144:GLY:N	1.96	0.80
1:A:94:GLN:HG3	5:A:2700:HOH:O	1.81	0.80
1:B:208:ILE:CD1	1:B:240:LEU:HB2	2.05	0.80
1:B:53:GLN:HA	1:B:53:GLN:NE2	1.96	0.79
1:D:394:MET:HE3	1:D:394:MET:HG2	1.64	0.77
1:B:61:ILE:HD12	1:B:65:TYR:CD2	2.19	0.77
1:A:419:GLU:HA	1:A:419:GLU:OE1	1.83	0.75
1:B:202:LEU:HD23	1:B:205:MET:HE3	1.66	0.75
1:B:37:PRO:HD3	1:B:61:ILE:HD13	1.69	0.74
1:B:64:ARG:HG2	1:B:64:ARG:HH11	1.52	0.72
1:D:375:LYS:HE2	5:D:545:HOH:O	1.88	0.72
1:A:346:ARG:HD2	1:A:353:GLU:OE1	1.90	0.71
1:B:463:LYS:HD2	5:B:629:HOH:O	1.89	0.71
1:B:477:HIS:HD2	5:B:585:HOH:O	1.74	0.70
1:B:254:HIS:HA	1:B:257:ARG:HD2	1.73	0.69
1:C:125:LYS:NZ	1:C:129:ARG:HH12	1.90	0.69
1:B:305:THR:HG21	4:B:501:D1G:C12	2.23	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:253:GLU:HG3	1:D:257:ARG:NH2	2.02	0.68
1:A:125:LYS:HD2	5:A:2556:HOH:O	1.93	0.67
1:B:305:THR:HG21	4:B:501:D1G:H123	1.76	0.67
1:C:199:LEU:HD21	1:C:203:ARG:NH2	2.10	0.66
1:D:463:LYS:HD3	1:D:492:LEU:HD11	1.77	0.66
1:B:253:GLU:O	1:B:256:GLN:HG2	1.96	0.65
1:D:305:THR:HG21	4:D:501:D1G:C12	2.27	0.65
1:B:202:LEU:HD23	1:B:205:MET:CE	2.27	0.64
1:B:305:THR:HG23	5:B:587:HOH:O	1.96	0.64
1:D:305:THR:HG23	5:D:713:HOH:O	1.97	0.64
1:C:257:ARG:HH11	1:C:257:ARG:CG	2.12	0.63
1:A:30:LYS:HG3	1:A:32:LYS:H	1.64	0.63
1:B:53:GLN:NE2	1:B:478:VAL:HB	2.14	0.62
1:B:208:ILE:HD11	1:B:240:LEU:CB	2.09	0.62
1:B:73:LEU:HA	1:B:222:MET:HE2	1.82	0.61
1:C:400:ARG:HD2	5:C:761:HOH:O	2.00	0.61
1:B:210:GLN:O	1:B:214:THR:HG23	1.99	0.61
1:C:414:GLN:HG3	5:C:863:HOH:O	2.00	0.61
1:C:418:ASN:HB2	1:C:422:GLN:H	1.66	0.61
1:B:33:LEU:HD12	1:B:34:PRO:HD2	1.82	0.60
1:B:77:ARG:HH11	1:B:77:ARG:CG	2.07	0.60
1:B:61:ILE:HD11	1:B:69:PHE:CD1	2.37	0.60
1:A:60:LYS:HE2	5:A:2796:HOH:O	2.02	0.60
1:D:420:LYS:HG3	1:D:422:GLN:OE1	2.02	0.60
1:D:253:GLU:CG	1:D:257:ARG:HH21	2.07	0.60
1:C:322:GLU:O	1:C:326:LYS:HG3	2.02	0.59
1:A:302:GLY:HA2	3:A:500:HEM:HMC3	1.84	0.59
1:A:112:LYS:NZ	5:A:2809:HOH:O	2.36	0.58
1:B:450:PHE:O	1:B:454:THR:HG23	2.03	0.58
1:C:375:LYS:CB	1:C:376:LYS:HE2	2.31	0.58
1:B:233:PRO:O	1:B:236:GLN:HG3	2.03	0.58
1:A:30:LYS:HG3	1:A:31:GLY:H	1.66	0.58
1:B:254:HIS:O	1:B:258:THR:HG22	2.03	0.58
1:B:61:ILE:HD12	1:B:65:TYR:HD2	1.69	0.57
1:D:143:ARG:HA	1:D:146:GLU:HB3	1.86	0.57
1:D:140:VAL:HA	1:D:145:ILE:HG21	1.86	0.57
1:D:327:VAL:HG11	1:D:457:MET:CE	2.34	0.57
1:B:172:PHE:O	1:B:176:ARG:HG3	2.05	0.56
1:D:271:PHE:HB3	1:D:291:LEU:HD13	1.86	0.56
1:A:30:LYS:CD	1:A:32:LYS:HB3	2.33	0.56
1:C:305:THR:HG21	4:C:501:D1G:C12	2.36	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:206:LEU:HD12	5:A:2779:HOH:O	2.04	0.56
1:C:32:LYS:HB3	1:C:384:PHE:CB	2.27	0.56
1:A:40:LEU:HD11	1:C:47:LEU:HD11	1.88	0.56
1:A:305:THR:HG21	4:A:501:D1G:C12	2.36	0.55
1:D:271:PHE:CG	1:D:291:LEU:HD13	2.41	0.55
1:B:200:SER:O	1:B:204:MET:HG3	2.05	0.55
1:A:342:LYS:CE	1:A:344:GLU:OE1	2.53	0.55
1:D:461:ARG:HG3	1:D:492:LEU:HB2	1.87	0.55
1:B:461:ARG:NH1	1:B:493:PRO:O	2.40	0.54
1:A:465:SER:HB2	5:B:670:HOH:O	2.05	0.54
1:C:346:ARG:HG2	1:C:353:GLU:OE1	2.08	0.54
1:D:461:ARG:HH12	1:D:494:ARG:HA	1.73	0.54
1:A:32:LYS:CD	1:A:33:LEU:H	2.15	0.54
1:B:259:LEU:HD12	1:B:260:ASP:H	1.72	0.53
1:B:64:ARG:HG2	1:B:64:ARG:NH1	2.22	0.53
1:A:346:ARG:HD2	1:A:353:GLU:CD	2.29	0.53
1:A:305:THR:HG23	5:A:2568:HOH:O	2.09	0.53
3:C:500:HEM:NC	4:C:501:D1G:H111	2.24	0.53
1:C:76:ARG:NH2	1:C:103:GLU:HG3	2.24	0.52
1:B:143:ARG:O	1:B:147:GLU:HG3	2.09	0.52
1:B:53:GLN:HE22	1:B:478:VAL:HB	1.75	0.52
1:A:357:HIS:NE2	1:A:446:ARG:NH2	2.56	0.52
1:B:469:LYS:HG3	1:B:470:ASP:N	2.24	0.52
1:C:33:LEU:HD11	1:C:77:ARG:CZ	2.40	0.52
1:D:461:ARG:NH1	1:D:494:ARG:HA	2.25	0.52
1:D:206:LEU:HD12	5:D:611:HOH:O	2.08	0.52
1:D:476:LYS:HB2	1:D:485:ARG:HA	1.91	0.52
1:D:142:LYS:CG	1:D:144:GLY:H	2.10	0.51
1:C:305:THR:HG23	5:C:574:HOH:O	2.10	0.51
1:A:33:LEU:HD11	1:A:77:ARG:CZ	2.41	0.51
1:B:37:PRO:CD	1:B:61:ILE:HD13	2.41	0.51
1:B:327:VAL:HG13	1:B:352:MET:HE2	1.91	0.51
1:D:139:GLY:O	1:D:142:LYS:CG	2.50	0.51
1:D:260:ASP:O	1:D:262:ASN:N	2.44	0.51
1:B:73:LEU:HA	1:B:222:MET:CE	2.40	0.51
1:C:369:SER:HB2	1:C:395:LEU:HG	1.92	0.51
1:B:337:LYS:HG2	5:B:626:HOH:O	2.10	0.50
1:D:244:LEU:HB3	1:D:296:LEU:HD11	1.93	0.50
1:B:327:VAL:HG11	1:B:457:MET:CE	2.42	0.50
1:B:57:SER:O	1:B:61:ILE:HG23	2.12	0.50
1:D:248:ILE:O	1:D:252:VAL:HG12	2.12	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:252:VAL:O	1:D:256:GLN:HG3	2.13	0.49
1:A:208:ILE:HD13	1:A:241:LEU:CD2	2.43	0.49
1:A:208:ILE:HD13	1:A:241:LEU:HD23	1.95	0.49
1:D:271:PHE:CB	1:D:291:LEU:HD13	2.43	0.49
1:A:305:THR:HG21	4:A:501:D1G:H123	1.95	0.49
1:B:76:ARG:CZ	1:B:103:GLU:HG3	2.43	0.48
1:C:76:ARG:CZ	1:C:103:GLU:HG3	2.43	0.48
1:A:376:LYS:HD3	1:A:376:LYS:N	2.29	0.48
1:C:418:ASN:CB	1:C:422:GLN:H	2.27	0.48
1:A:433:SER:HB3	3:A:500:HEM:HBA1	1.95	0.48
1:B:77:ARG:CG	1:B:77:ARG:NH1	2.68	0.48
1:B:354:ALA:HB2	1:B:417:LEU:HD13	1.95	0.48
1:D:247:PHE:O	1:D:251:LYS:HG2	2.14	0.47
1:D:253:GLU:O	1:D:256:GLN:HB2	2.15	0.47
1:B:274:ARG:NH2	5:B:695:HOH:O	2.47	0.47
1:A:55:TYR:CZ	1:A:400:ARG:NH2	2.83	0.47
1:D:405:PHE:O	1:D:408:PRO:HD3	2.14	0.47
1:B:77:ARG:HH12	1:B:389:THR:CG2	2.18	0.47
1:C:418:ASN:HB2	1:C:422:GLN:N	2.30	0.47
1:B:327:VAL:HG13	1:B:352:MET:CE	2.45	0.47
1:B:405:PHE:O	1:B:408:PRO:HD3	2.15	0.47
1:D:117:VAL:HG22	3:D:500:HEM:HAD1	1.96	0.47
1:D:305:THR:HG21	4:D:501:D1G:H123	1.96	0.46
1:D:326:LYS:HE2	1:D:351:TYR:CZ	2.50	0.46
1:B:433:SER:HB3	3:B:500:HEM:HBA1	1.96	0.46
1:A:95:ALA:HB1	1:A:436:LYS:HG3	1.98	0.46
1:A:291:LEU:HD12	1:A:291:LEU:O	2.16	0.46
1:C:125:LYS:NZ	1:C:129:ARG:NH1	2.63	0.46
1:D:135:LEU:HD12	1:D:135:LEU:HA	1.77	0.46
1:D:326:LYS:HE3	5:D:817:HOH:O	2.15	0.46
1:B:77:ARG:NH1	1:B:389:THR:HG23	2.17	0.46
1:D:327:VAL:HG11	1:D:457:MET:SD	2.55	0.46
1:B:77:ARG:NE	5:B:678:HOH:O	2.48	0.45
1:D:305:THR:HG21	4:D:501:D1G:H122	1.98	0.45
1:A:357:HIS:CE1	1:A:446:ARG:NH2	2.84	0.45
1:C:76:ARG:HG2	1:C:390:GLU:OE1	2.16	0.45
1:C:117:VAL:HG22	3:C:500:HEM:HAD1	1.97	0.45
1:A:342:LYS:HE2	1:A:344:GLU:CG	2.46	0.45
1:B:377:ASP:HB3	1:B:384:PHE:CE1	2.52	0.45
1:C:257:ARG:CG	1:C:257:ARG:NH1	2.74	0.45
1:D:433:SER:HB3	3:D:500:HEM:HBA1	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:249:ALA:HA	1:D:252:VAL:CG1	2.47	0.45
1:A:123:ARG:HA	1:A:285:GLU:HG3	1.98	0.45
1:D:326:LYS:HE2	1:D:351:TYR:CE1	2.52	0.45
1:A:89:GLU:O	1:A:93:ASP:HB2	2.17	0.45
1:B:143:ARG:HD2	1:B:146:GLU:OE2	2.17	0.45
1:B:148:ARG:HA	1:B:148:ARG:HD3	1.76	0.45
1:A:441:GLY:HA3	3:A:500:HEM:C3C	2.53	0.44
1:B:258:THR:HG23	1:B:265:ARG:HH22	1.82	0.44
1:B:59:MET:O	1:B:62:SER:OG	2.29	0.44
1:B:260:ASP:HB2	1:B:263:SER:HB3	1.98	0.44
3:D:500:HEM:C1D	4:D:501:D1G:H113	2.52	0.44
1:A:274:ARG:HA	1:A:274:ARG:HD2	1.73	0.44
1:A:97:GLU:CG	1:A:376:LYS:HE3	2.40	0.44
1:B:37:PRO:HD3	1:B:61:ILE:CD1	2.43	0.44
1:B:196:LYS:HD2	5:B:703:HOH:O	2.16	0.44
1:C:346:ARG:CG	1:C:353:GLU:OE1	2.65	0.44
1:D:418:ASN:OD1	1:D:420:LYS:HG2	2.18	0.44
1:C:355:VAL:O	1:C:359:ILE:HG13	2.17	0.44
1:A:94:GLN:NE2	5:A:2700:HOH:O	2.25	0.43
1:B:74:GLY:N	1:B:222:MET:HE2	2.33	0.43
1:B:469:LYS:HE3	1:B:470:ASP:OD1	2.18	0.43
1:C:210:GLN:HB3	5:C:779:HOH:O	2.18	0.43
1:D:258:THR:OG1	1:D:265:ARG:NH1	2.45	0.43
1:A:239:GLN:HA	1:A:239:GLN:OE1	2.18	0.43
1:B:140:VAL:HA	1:B:145:ILE:HG21	2.00	0.43
1:C:103:GLU:HB2	1:C:108:ASP:OD2	2.18	0.43
1:D:264:PRO:HG3	1:D:273:ILE:CD1	2.49	0.43
1:C:305:THR:HG21	4:C:501:D1G:H123	2.00	0.43
1:C:476:LYS:HB2	1:C:485:ARG:HA	2.01	0.43
1:B:375:LYS:HB3	1:B:375:LYS:HE3	1.85	0.43
1:B:446:ARG:HH11	1:B:446:ARG:HB3	1.84	0.43
1:C:168:ILE:C	1:C:168:ILE:HD12	2.39	0.43
1:A:117:VAL:HG22	3:A:500:HEM:HAD1	2.01	0.43
1:A:200:SER:O	1:A:204:MET:HG3	2.19	0.42
1:A:463:LYS:HB3	1:A:490:SER:OG	2.18	0.42
1:B:204:MET:O	1:B:208:ILE:HG12	2.18	0.42
1:B:297:ASN:HA	4:B:501:D1G:N_1	2.35	0.42
1:C:375:LYS:HB2	1:C:376:LYS:CE	2.41	0.42
1:D:139:GLY:C	1:D:142:LYS:HG2	2.37	0.42
3:D:500:HEM:HBB2	3:D:500:HEM:HMB2	2.00	0.42
1:D:272:LEU:HD23	1:D:272:LEU:HA	1.89	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:327:VAL:HG13	1:C:352:MET:HE2	2.01	0.42
1:A:375:LYS:NZ	5:A:2807:HOH:O	2.46	0.42
1:A:186:VAL:HA	1:A:267:PHE:HB3	2.02	0.41
1:B:253:GLU:HA	1:B:256:GLN:HG2	2.01	0.41
1:C:136:ARG:HG2	5:C:841:HOH:O	2.20	0.41
1:C:125:LYS:HZ3	1:C:129:ARG:NH1	2.19	0.41
1:C:376:LYS:HE3	1:C:376:LYS:HB2	1.78	0.41
1:C:441:GLY:HA3	3:C:500:HEM:C3C	2.55	0.41
1:B:254:HIS:O	1:B:257:ARG:HG2	2.21	0.41
1:C:125:LYS:HZ1	1:C:129:ARG:HH12	1.66	0.41
1:D:142:LYS:HE2	1:D:144:GLY:H	1.84	0.41
1:D:249:ALA:HA	1:D:252:VAL:HG12	2.03	0.41
1:A:30:LYS:CG	1:A:32:LYS:H	2.31	0.41
1:B:77:ARG:CD	5:B:678:HOH:O	2.68	0.41
1:B:258:THR:HG23	1:B:265:ARG:HH12	1.84	0.41
1:B:97:GLU:OE1	1:B:378:THR:HG23	2.21	0.41
1:B:436:LYS:HE3	1:B:436:LYS:HB3	1.78	0.41
1:B:467:SER:O	1:B:470:ASP:N	2.53	0.41
3:A:500:HEM:C1D	4:A:501:D1G:H113	2.56	0.41
1:A:384:PHE:C	1:A:385:LEU:HD12	2.42	0.41
1:B:210:GLN:HG2	5:B:666:HOH:O	2.21	0.41
1:B:377:ASP:HB3	1:B:384:PHE:CZ	2.56	0.41
1:B:467:SER:O	1:B:468:PRO:C	2.60	0.40
1:C:418:ASN:ND2	1:C:422:GLN:HB2	2.12	0.40
1:D:327:VAL:HG13	1:D:352:MET:HE2	2.03	0.40
1:A:52:GLU:OE1	1:B:236:GLN:HG2	2.21	0.40
1:D:259:LEU:HD12	1:D:260:ASP:N	2.36	0.40
1:B:145:ILE:HD12	1:B:145:ILE:HA	1.72	0.40
1:C:145:ILE:HD12	1:C:145:ILE:HA	1.86	0.40
1:C:152:GLU:HG3	1:C:177:THR:HG23	2.03	0.40
1:C:345:ASP:O	1:C:349:MET:HG3	2.20	0.40
1:D:33:LEU:HD11	1:D:77:ARG:CZ	2.52	0.40
1:B:369:SER:HB2	1:B:395:LEU:HG	2.02	0.40
1:C:302:GLY:HA2	3:C:500:HEM:HMC2	2.04	0.40
1:D:264:PRO:HG3	1:D:273:ILE:HD12	2.04	0.40
1:D:420:LYS:HG2	1:D:420:LYS:H	1.58	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	463/476 (97%)	452 (98%)	11 (2%)	0	100	100
1	B	461/476 (97%)	446 (97%)	14 (3%)	1 (0%)	47	33
1	C	462/476 (97%)	451 (98%)	11 (2%)	0	100	100
1	D	462/476 (97%)	442 (96%)	18 (4%)	2 (0%)	34	19
All	All	1848/1904 (97%)	1791 (97%)	54 (3%)	3 (0%)	47	33

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	140	VAL
1	B	261	PRO
1	D	261	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	412/422 (98%)	402 (98%)	10 (2%)	49	33
1	B	411/422 (97%)	393 (96%)	18 (4%)	28	12
1	C	411/422 (97%)	403 (98%)	8 (2%)	57	43
1	D	411/422 (97%)	400 (97%)	11 (3%)	44	29
All	All	1645/1688 (98%)	1598 (97%)	47 (3%)	42	26

All (47) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	40	LEU
1	A	135	LEU
1	A	167	ASN
1	A	189	ASP
1	A	236	GLN
1	A	312	TYR
1	A	348	LYS
1	A	376	LYS
1	A	419	GLU
1	A	468	PRO
1	B	33	LEU
1	B	53	GLN
1	B	61	ILE
1	B	135	LEU
1	B	148	ARG
1	B	174	LEU
1	B	210	GLN
1	B	234	GLN
1	B	260	ASP
1	B	261	PRO
1	B	274	ARG
1	B	312	TYR
1	B	316	LEU
1	B	417	LEU
1	B	419	GLU
1	B	446	ARG
1	B	467	SER
1	B	468	PRO
1	C	76	ARG
1	C	135	LEU
1	C	148	ARG
1	C	210	GLN
1	C	312	TYR
1	C	376	LYS
1	C	417	LEU
1	C	418	ASN
1	D	40	LEU
1	D	135	LEU
1	D	174	LEU
1	D	236	GLN
1	D	257	ARG
1	D	279	GLU
1	D	312	TYR

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Mol	Chain	Res	Type
1	D	337	LYS
1	D	417	LEU
1	D	420	LYS
1	D	469	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	94	GLN
1	A	283	ASN
1	C	418	ASN
1	C	422	GLN
1	D	340	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](#)

10 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
4	D1G	D	501	3	13,16,16	1.73	2 (15%)	12,21,21	1.08	1 (8%)
3	HEM	C	500	1,4	41,50,50	2.00	9 (21%)	45,82,82	1.72	8 (17%)
4	D1G	C	501	3	13,16,16	1.75	3 (23%)	12,21,21	0.94	0
3	HEM	B	500	1,4	41,50,50	2.09	13 (31%)	45,82,82	1.61	7 (15%)
2	SO4	A	2502	-	4,4,4	0.65	0	6,6,6	0.42	0
3	HEM	D	500	1,4	41,50,50	2.01	16 (39%)	45,82,82	1.68	8 (17%)
4	D1G	A	501	3	13,16,16	1.50	3 (23%)	12,21,21	0.93	0
4	D1G	B	501	3	13,16,16	1.74	3 (23%)	12,21,21	0.79	0
2	SO4	A	2503	-	4,4,4	0.73	0	6,6,6	0.25	0
3	HEM	A	500	1,4	41,50,50	2.23	16 (39%)	45,82,82	1.77	10 (22%)

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
4	D1G	D	501	3	-	0/3/8/8	0/2/2/2
3	HEM	C	500	1,4	-	4/12/54/54	-
4	D1G	C	501	3	-	0/3/8/8	0/2/2/2
3	HEM	B	500	1,4	-	2/12/54/54	-
3	HEM	D	500	1,4	-	2/12/54/54	-
4	D1G	A	501	3	-	0/3/8/8	0/2/2/2
4	D1G	B	501	3	-	0/3/8/8	0/2/2/2
3	HEM	A	500	1,4	-	2/12/54/54	-

All (65) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	500	HEM	C3C-CAC	-4.94	1.37	1.47
3	A	500	HEM	C1D-ND	-4.79	1.28	1.38
3	A	500	HEM	C4D-ND	-4.64	1.32	1.40
3	D	500	HEM	C3C-CAC	-4.58	1.38	1.47
3	C	500	HEM	C3C-CAC	-4.45	1.38	1.47
3	B	500	HEM	C3C-CAC	-4.29	1.39	1.47
4	D	501	D1G	C10-C-9	-4.21	1.46	1.51
3	B	500	HEM	C4D-ND	-4.19	1.33	1.40
4	B	501	D1G	C10-C-9	-4.18	1.47	1.51
3	D	500	HEM	C1B-NB	-4.08	1.33	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	500	HEM	CMA-C3A	4.06	1.60	1.51
3	A	500	HEM	CMD-C2D	3.85	1.58	1.50
4	C	501	D1G	C10-C-9	-3.83	1.47	1.51
3	C	500	HEM	C4D-ND	-3.68	1.34	1.40
3	B	500	HEM	C1D-ND	-3.53	1.31	1.38
3	A	500	HEM	C4D-C3D	-3.53	1.39	1.45
3	B	500	HEM	C1D-C2D	-3.44	1.37	1.44
3	D	500	HEM	CMD-C2D	3.44	1.58	1.50
3	B	500	HEM	CMB-C2B	3.43	1.58	1.50
3	C	500	HEM	C1D-C2D	-3.31	1.38	1.44
3	A	500	HEM	C1B-NB	-3.31	1.34	1.40
3	C	500	HEM	C1D-ND	-3.31	1.32	1.38
3	A	500	HEM	CMA-C3A	3.29	1.58	1.51
3	A	500	HEM	CBB-CAB	3.20	1.46	1.30
3	D	500	HEM	CMA-C3A	3.07	1.58	1.51
3	B	500	HEM	C3B-C2B	3.04	1.43	1.37
3	C	500	HEM	C4D-C3D	-3.02	1.39	1.45
3	A	500	HEM	CBD-CGD	2.97	1.57	1.50
3	C	500	HEM	C3B-C2B	2.96	1.43	1.37
3	B	500	HEM	CBB-CAB	2.96	1.44	1.30
3	B	500	HEM	CMA-C3A	2.94	1.57	1.51
3	D	500	HEM	C3B-C4B	-2.91	1.39	1.44
3	D	500	HEM	CBB-CAB	2.89	1.44	1.30
3	D	500	HEM	O2A-CGA	-2.88	1.21	1.30
3	B	500	HEM	C4D-C3D	-2.88	1.40	1.45
3	D	500	HEM	C4D-ND	-2.73	1.35	1.40
3	C	500	HEM	CBB-CAB	2.70	1.43	1.30
3	A	500	HEM	CMC-C2C	2.59	1.57	1.51
3	D	500	HEM	CHB-C1B	2.56	1.41	1.35
3	D	500	HEM	C4A-NA	-2.50	1.31	1.36
3	A	500	HEM	C1D-C2D	-2.49	1.39	1.44
3	C	500	HEM	C3B-C4B	-2.46	1.40	1.44
3	B	500	HEM	CMC-C2C	2.42	1.57	1.51
3	A	500	HEM	FE-ND	2.42	2.08	1.96
3	D	500	HEM	C4D-C3D	-2.41	1.40	1.45
4	C	501	D1G	C-8-C-9	-2.41	1.36	1.39
3	A	500	HEM	C4A-NA	-2.41	1.31	1.36
3	A	500	HEM	CHB-C1B	2.41	1.41	1.35
4	A	501	D1G	C10-C-9	-2.39	1.49	1.51
4	C	501	D1G	C-3-C-2	2.36	1.42	1.36
4	B	501	D1G	C-5-N-1	2.30	1.36	1.32
4	A	501	D1G	C-3-C-4	2.29	1.44	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	500	HEM	CHD-C1D	-2.26	1.34	1.41
4	D	501	D1G	C-3-C-2	2.25	1.41	1.36
3	D	500	HEM	CMC-C2C	2.24	1.56	1.51
3	D	500	HEM	CHD-C1D	-2.23	1.34	1.41
3	D	500	HEM	C3B-C2B	2.16	1.41	1.37
3	A	500	HEM	C4B-NB	-2.14	1.34	1.38
3	B	500	HEM	C4B-NB	-2.11	1.34	1.38
3	B	500	HEM	CBD-CGD	2.09	1.55	1.50
4	A	501	D1G	C-3-C-2	2.09	1.41	1.36
3	D	500	HEM	C1D-ND	-2.08	1.34	1.38
3	A	500	HEM	CBD-CAD	2.06	1.58	1.52
3	D	500	HEM	C2C-C1C	-2.05	1.37	1.42
4	B	501	D1G	C-3-C-2	2.01	1.41	1.36

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	500	HEM	C4B-CHC-C1C	6.40	131.00	122.56
3	D	500	HEM	C4B-CHC-C1C	5.82	130.24	122.56
3	B	500	HEM	C4C-CHD-C1D	5.69	130.07	122.56
3	D	500	HEM	C4C-CHD-C1D	5.66	130.03	122.56
3	A	500	HEM	C4B-CHC-C1C	5.54	129.87	122.56
3	A	500	HEM	C4C-CHD-C1D	5.53	129.86	122.56
3	B	500	HEM	C4B-CHC-C1C	5.17	129.38	122.56
3	C	500	HEM	C4C-CHD-C1D	5.05	129.22	122.56
3	B	500	HEM	C3B-C2B-C1B	-3.07	104.21	106.49
3	A	500	HEM	O2A-CGA-CBA	3.00	123.65	114.03
3	C	500	HEM	O2A-CGA-CBA	2.94	123.47	114.03
3	A	500	HEM	CHB-C1B-NB	-2.82	120.89	124.38
3	A	500	HEM	C4B-C3B-C2B	-2.78	104.91	107.11
3	A	500	HEM	C4D-ND-C1D	2.74	107.91	105.07
3	C	500	HEM	C3B-C2B-C1B	-2.70	104.48	106.49
3	B	500	HEM	C4D-ND-C1D	2.66	107.83	105.07
3	D	500	HEM	O2A-CGA-CBA	2.58	122.33	114.03
3	D	500	HEM	CMC-C2C-C3C	2.52	129.38	124.68
3	D	500	HEM	C2C-C3C-C4C	-2.50	105.15	106.90
4	D	501	D1G	C10-C-9-C-8	2.47	133.08	129.06
3	A	500	HEM	CMA-C3A-C4A	-2.46	124.69	128.46
3	C	500	HEM	C2C-C3C-C4C	-2.43	105.20	106.90
3	B	500	HEM	O2A-CGA-CBA	2.41	121.76	114.03
3	A	500	HEM	O1A-CGA-CBA	-2.29	115.73	123.08
3	A	500	HEM	CMA-C3A-C2A	2.19	129.07	124.94

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	500	HEM	C4D-ND-C1D	2.16	107.31	105.07
3	A	500	HEM	CBA-CAA-C2A	-2.14	108.97	112.62
3	D	500	HEM	C1B-NB-C4B	2.13	107.28	105.07
3	C	500	HEM	C4D-ND-C1D	2.13	107.27	105.07
3	C	500	HEM	CMA-C3A-C4A	-2.09	125.24	128.46
3	B	500	HEM	C2C-C3C-C4C	-2.08	105.44	106.90
3	C	500	HEM	O1A-CGA-CBA	-2.06	116.47	123.08
3	D	500	HEM	C4B-C3B-C2B	-2.05	105.49	107.11
3	B	500	HEM	CHB-C1B-NB	-2.04	121.86	124.38

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	500	HEM	CAA-CBA-CGA-O1A
3	D	500	HEM	CAA-CBA-CGA-O1A
3	C	500	HEM	CAA-CBA-CGA-O1A
3	A	500	HEM	CAA-CBA-CGA-O1A
3	D	500	HEM	CAA-CBA-CGA-O2A
3	B	500	HEM	CAA-CBA-CGA-O2A
3	A	500	HEM	CAA-CBA-CGA-O2A
3	C	500	HEM	CAA-CBA-CGA-O2A
3	C	500	HEM	CAD-CBD-CGD-O2D
3	C	500	HEM	CAD-CBD-CGD-O1D

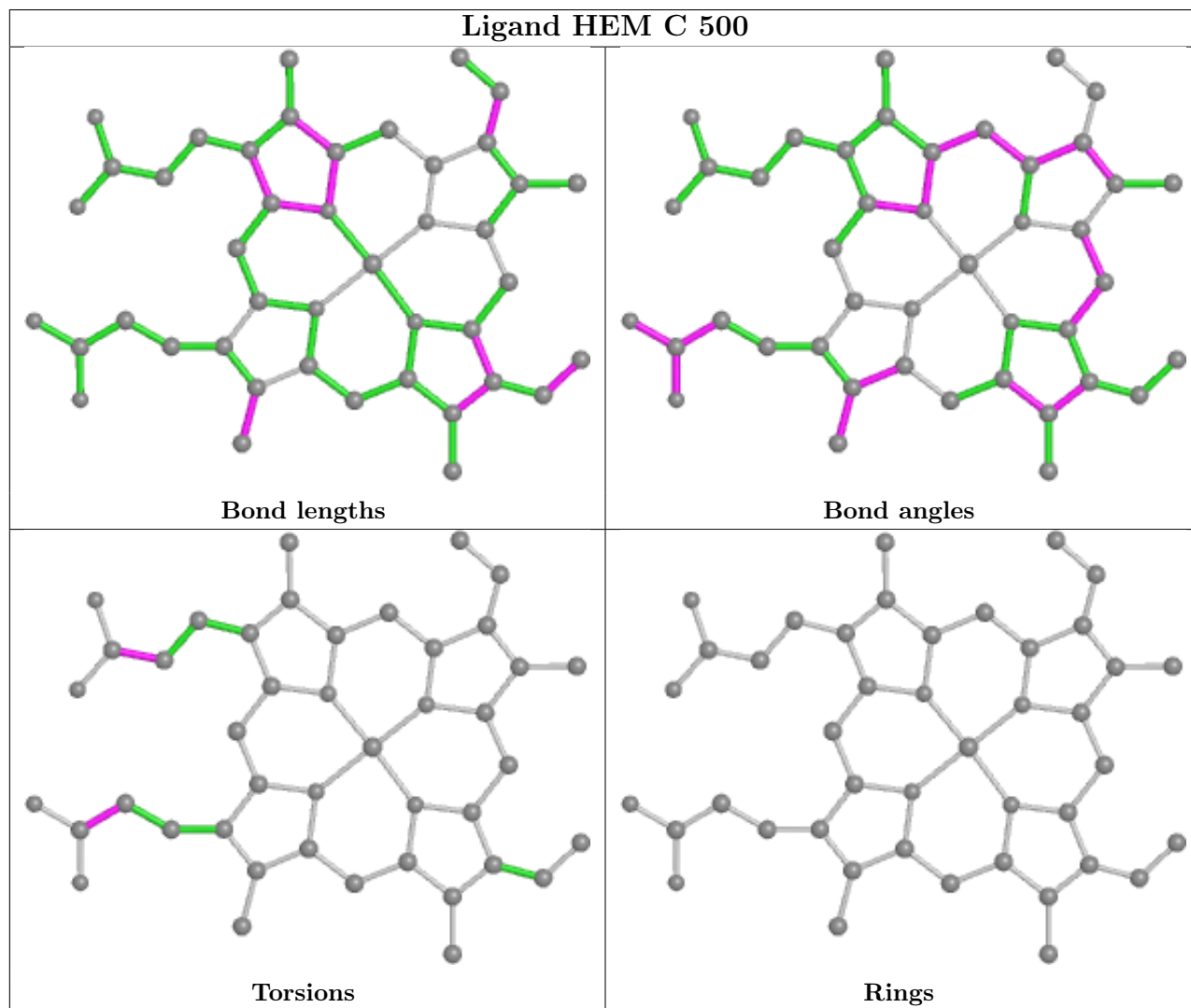
There are no ring outliers.

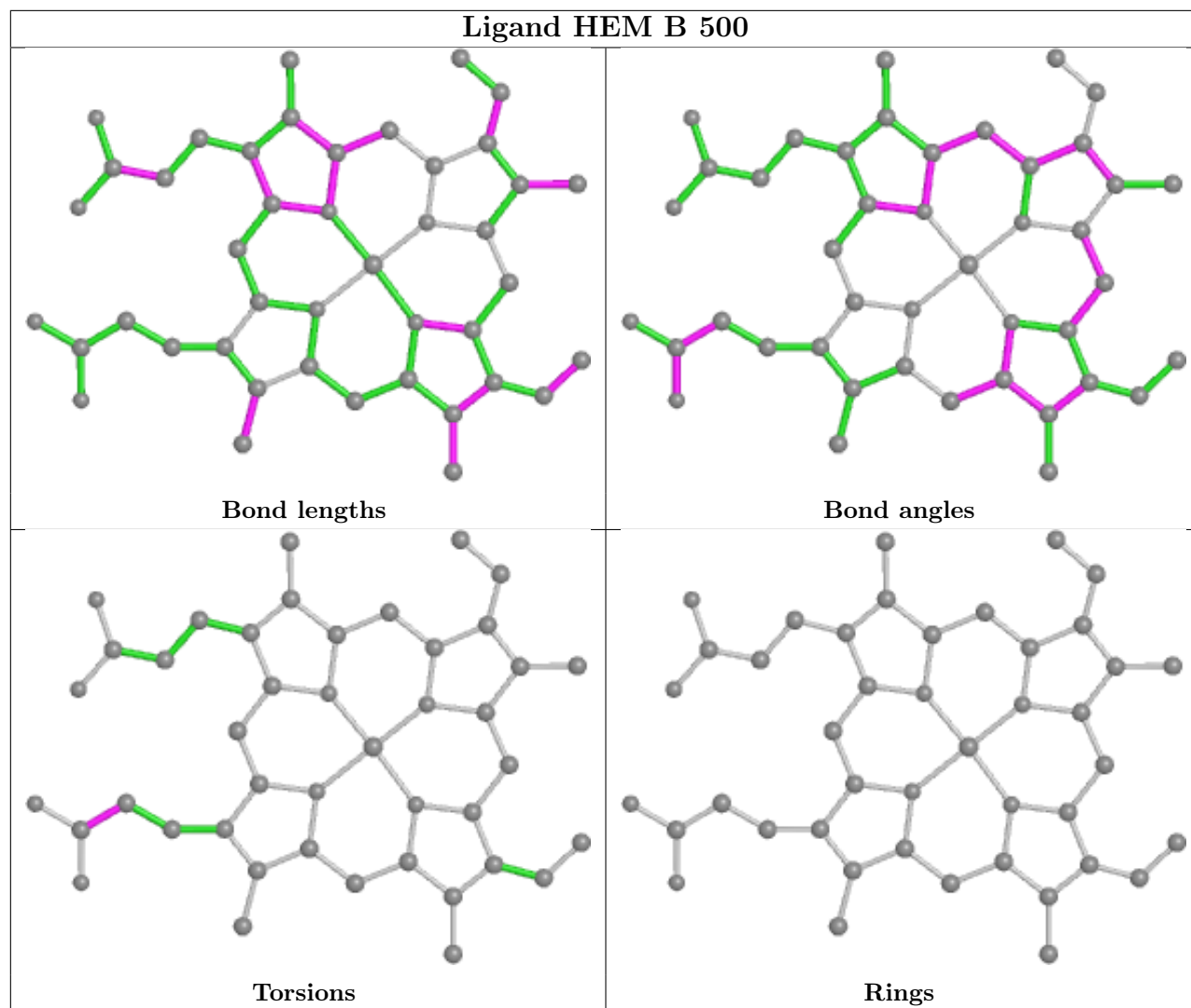
8 monomers are involved in 24 short contacts:

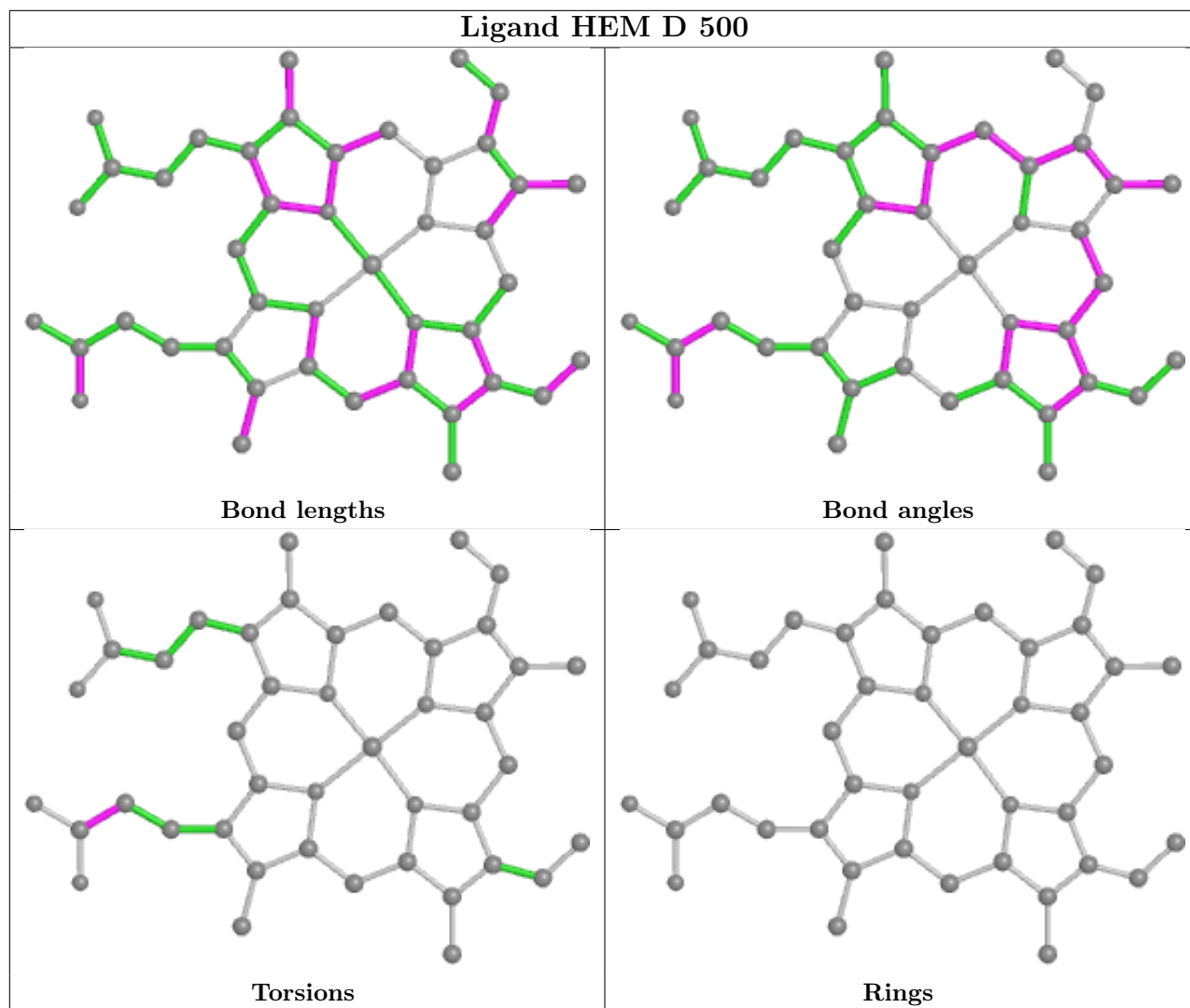
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	501	D1G	4	0
3	C	500	HEM	4	0
4	C	501	D1G	3	0
3	B	500	HEM	1	0
3	D	500	HEM	4	0
4	A	501	D1G	3	0
4	B	501	D1G	3	0
3	A	500	HEM	5	0

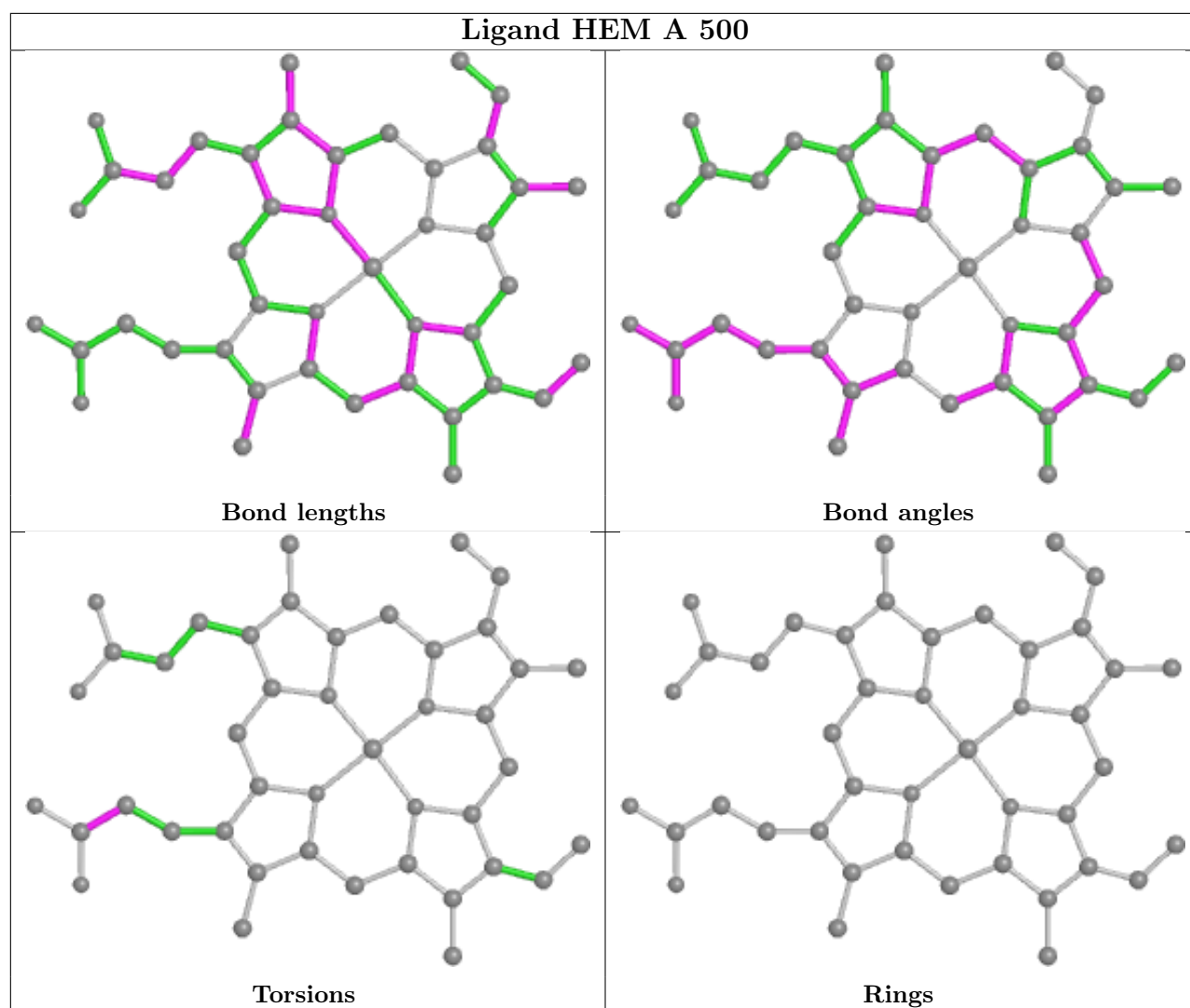
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

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	465/476 (97%)	0.34	12 (2%) 56 54	17, 28, 46, 66	0
1	B	463/476 (97%)	0.50	16 (3%) 44 41	20, 34, 55, 67	0
1	C	464/476 (97%)	0.03	2 (0%) 92 92	18, 28, 46, 65	0
1	D	464/476 (97%)	0.44	14 (3%) 50 48	18, 29, 55, 68	0
All	All	1856/1904 (97%)	0.33	44 (2%) 59 57	17, 30, 50, 68	0

All (44) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	31	GLY	8.3
1	A	30	LYS	4.6
1	A	31	GLY	3.9
1	D	139	GLY	3.7
1	D	31	GLY	3.5
1	D	143	ARG	3.4
1	B	257	ARG	3.3
1	D	138	PHE	3.2
1	B	259	LEU	3.1
1	D	280	LYS	3.1
1	D	420	LYS	3.1
1	D	141	GLY	3.1
1	B	253	GLU	2.9
1	B	64	ARG	2.8
1	A	300	ILE	2.8
1	B	143	ARG	2.8
1	D	419	GLU	2.6
1	C	418	ASN	2.6
1	B	414	GLN	2.6
1	B	382	ASP	2.6
1	A	408	PRO	2.5

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Mol	Chain	Res	Type	RSRZ
1	D	140	VAL	2.5
1	B	63	GLU	2.5
1	B	61	ILE	2.4
1	B	208	ILE	2.4
1	D	257	ARG	2.4
1	B	66	GLY	2.4
1	A	419	GLU	2.4
1	B	406	SER	2.3
1	A	208	ILE	2.3
1	A	206	LEU	2.3
1	D	422	GLN	2.3
1	B	260	ASP	2.3
1	A	303	THR	2.3
1	A	322	GLU	2.2
1	D	32	LYS	2.2
1	A	280	LYS	2.2
1	D	263	SER	2.1
1	A	483	ILE	2.1
1	B	67	PRO	2.1
1	D	399	LEU	2.1
1	B	216	THR	2.1
1	B	59	MET	2.0
1	A	257	ARG	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](#)

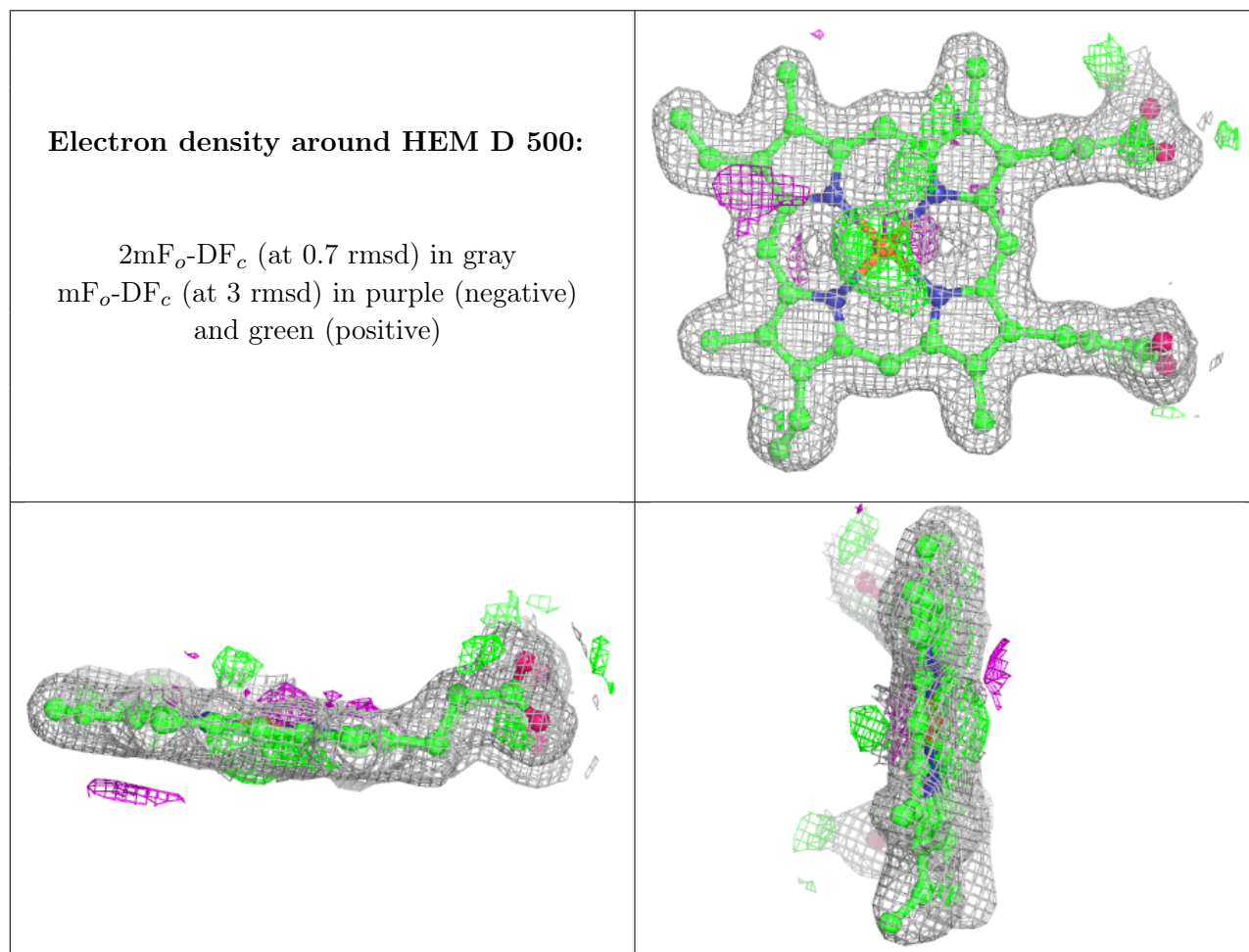
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

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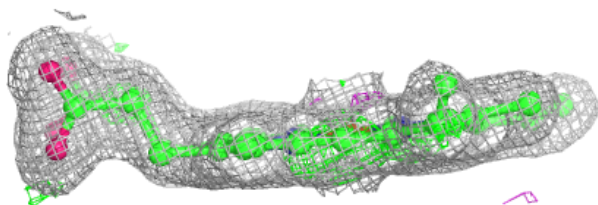
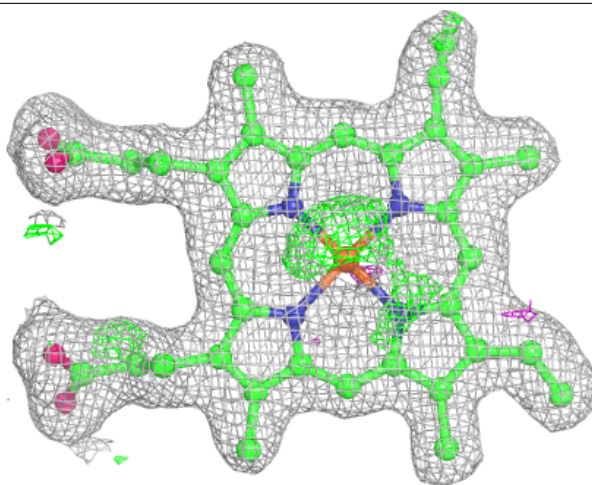
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	SO4	A	2502	5/5	0.86	0.19	61,62,64,67	0
2	SO4	A	2503	5/5	0.91	0.16	54,55,57,60	0
4	D1G	A	501	15/15	0.91	0.16	23,27,30,30	0
4	D1G	B	501	15/15	0.92	0.14	30,34,36,36	0
4	D1G	D	501	15/15	0.93	0.15	29,34,35,35	0
4	D1G	C	501	15/15	0.94	0.12	29,31,35,35	0
3	HEM	D	500	43/43	0.94	0.15	17,21,23,30	0
3	HEM	B	500	43/43	0.96	0.14	19,24,27,31	0
3	HEM	C	500	43/43	0.97	0.13	18,22,24,26	0
3	HEM	A	500	43/43	0.97	0.13	17,19,22,26	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.



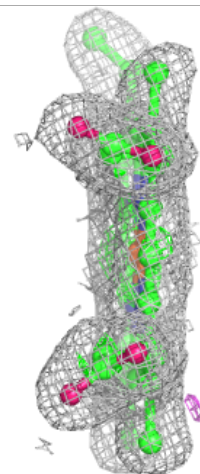
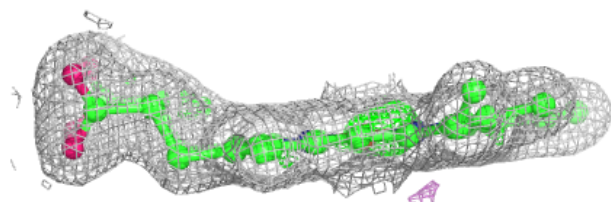
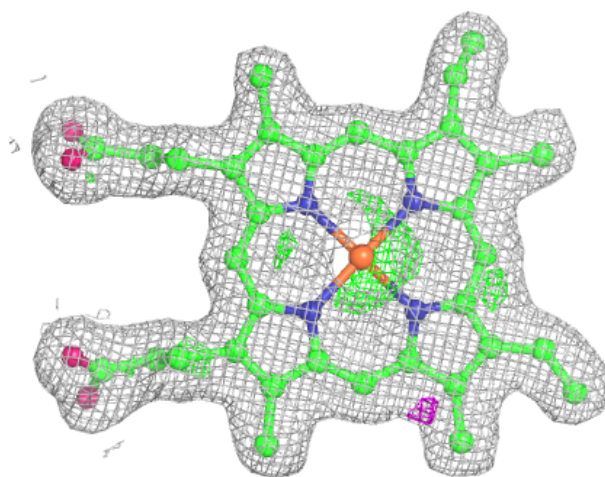
Electron density around HEM B 500:

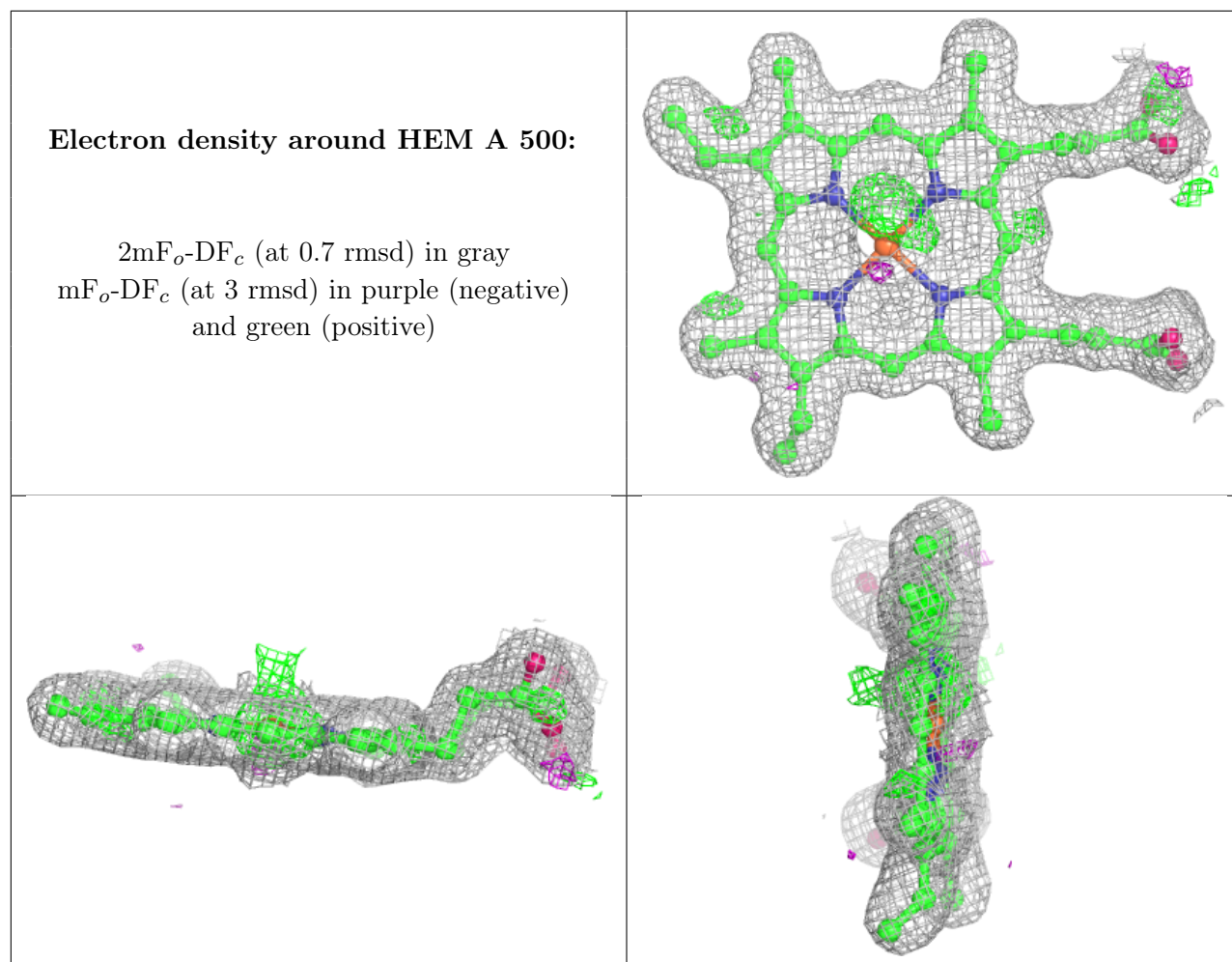
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around HEM C 500:

$2mF_o-DF_c$ (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.