



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 4, 2024 – 02:13 AM EST

PDB ID : 1P6M
Title : Bovine endothelial NOS heme domain with (4S)-N-(4-amino-5-[aminoethyl]aminopentyl)-N'-nitroguanidine bound
Authors : Flinspach, M.L.; Li, H.; Jamal, J.; Yang, W.; Huang, H.; Hah, J.-M.; Gomez-Vidal, J.A.; Litzinger, E.A.; Silverman, R.B.; Poulos, T.L.
Deposited on : 2003-04-29
Resolution : 2.27 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 : 2.36
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) : 2.36

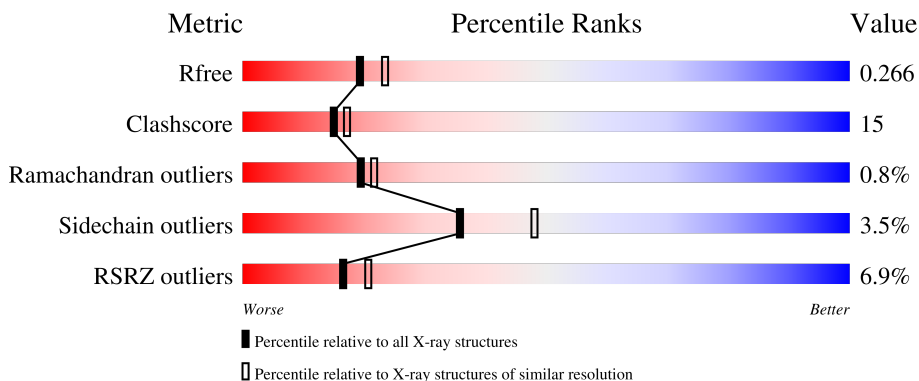
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

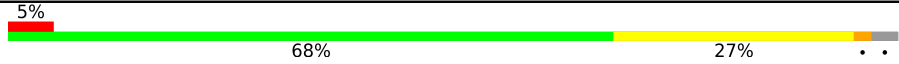

The reported resolution of this entry is 2.27 Å.

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	6980 (2.30-2.26)
Clashscore	141614	7711 (2.30-2.26)
Ramachandran outliers	138981	7597 (2.30-2.26)
Sidechain outliers	138945	7598 (2.30-2.26)
RSRZ outliers	127900	6849 (2.30-2.26)

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	417	
1	B	417	

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 6978 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

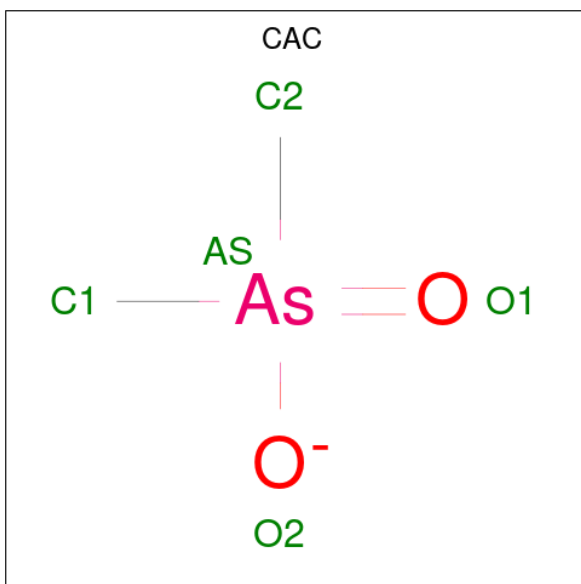
- Molecule 1 is a protein called Nitric-oxide synthase, endothelial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	404	3212	2042	567	587	16	0	0	0
1	B	402	3201	2035	565	585	16	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	100	ARG	CYS	SEE REMARK 999	UNP P29473
B	100	ARG	CYS	SEE REMARK 999	UNP P29473

- Molecule 2 is CACODYLATE ION (three-letter code: CAC) (formula: C₂H₆AsO₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	As	C		
2	A	1	3	1	2	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	As	C		
2	B	1	3	1	2	0	0

- Molecule 3 is ACETATE ION (three-letter code: ACT) (formula: $C_2H_3O_2$).



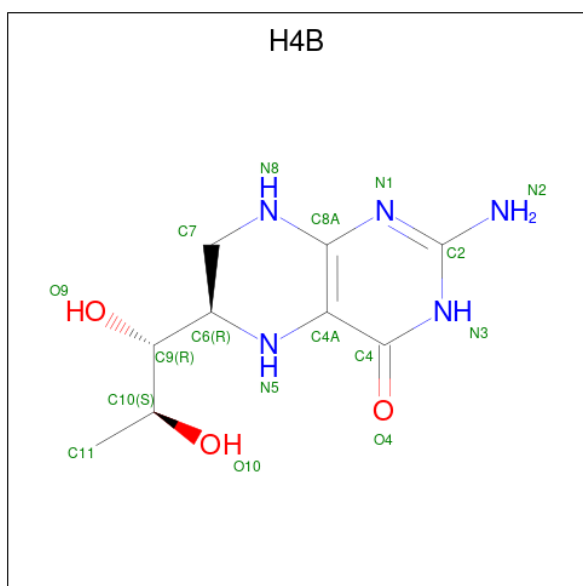
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
3	A	1	4	2	2	0	0
3	B	1	4	2	2	0	0

- Molecule 4 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).



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

- Molecule 5 is 5,6,7,8-TETRAHYDROBIOPTERIN (three-letter code: H4B) (formula: $C_9H_{15}N_5O_3$).



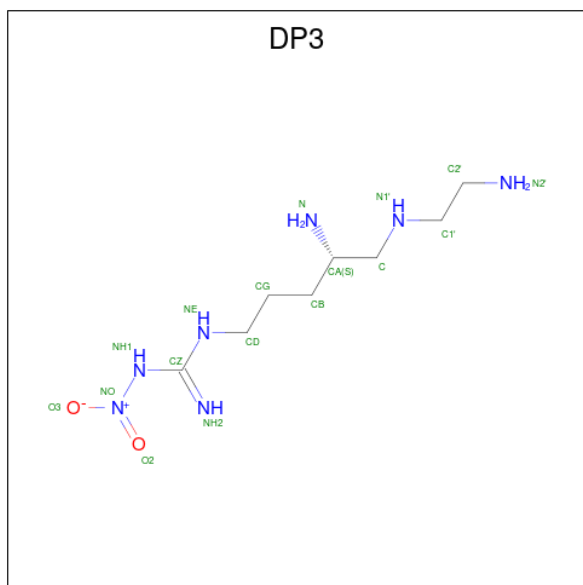
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
5	A	1	Total	C	N	O	0	0
			17	9	5	3		

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

- Molecule 6 is N-{(4S)-4-AMINO-5-[(2-AMINOETHYL)AMINO]PENTYL}-N'-NITROGUANIDINE (three-letter code: DP3) (formula: C₈H₂₁N₇O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
6	A	1	17	8	7	2	0	0
6	B	1	17	8	7	2	0	0

- Molecule 7 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

- Molecule 8 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total Zn 1 1	0	0

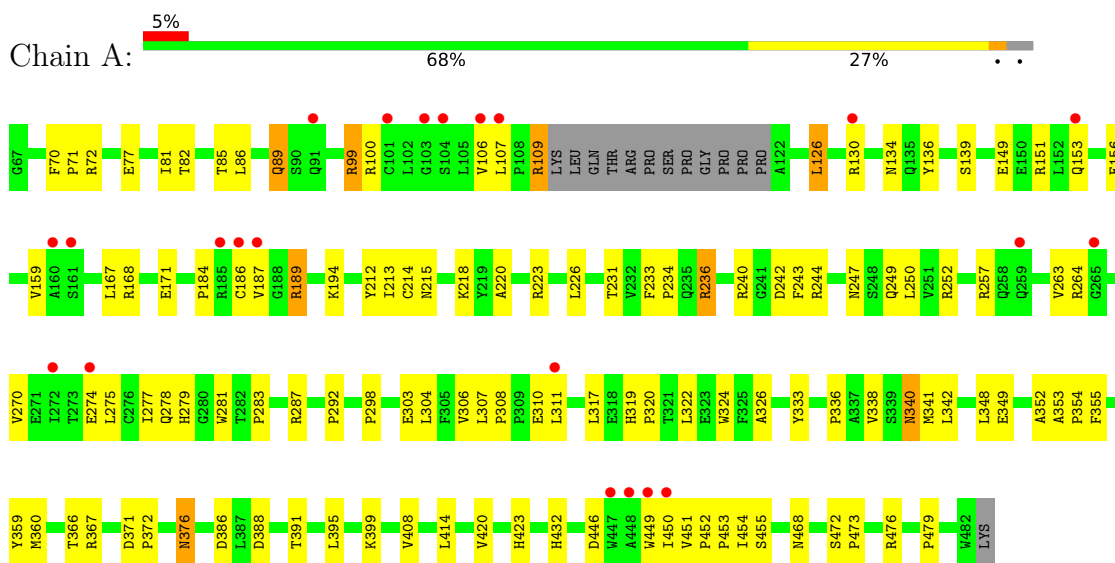
- Molecule 9 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	203	Total O 203 203	0	0
9	B	181	Total O 181 181	0	0

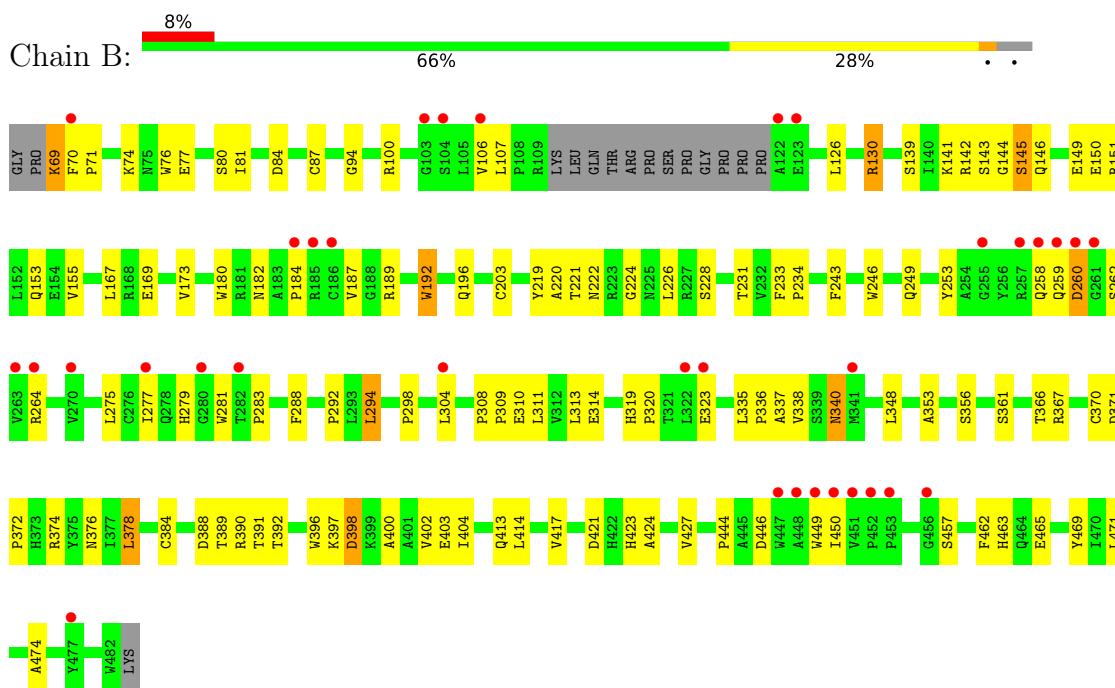
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Nitric-oxide synthase, endothelial



- Molecule 1: Nitric-oxide synthase, endothelial



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	58.03Å 106.08Å 156.67Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.85 – 2.27 46.85 – 2.20	Depositor EDS
% Data completeness (in resolution range)	83.7 (46.85-2.27) 81.1 (46.85-2.20)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.62 (at 2.20Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.215 , 0.278 0.204 , 0.266	Depositor DCC
R_{free} test set	1983 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å ²)	38.6	Xtrriage
Anisotropy	0.874	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 47.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6978	wwPDB-VP
Average B, all atoms (Å ²)	58.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.82% 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: ZN, GOL, DP3, HEM, CAC, H4B, ACT

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	0.35	0/3301	0.63	0/4497
1	B	0.35	0/3289	0.63	0/4480
All	All	0.35	0/6590	0.63	0/8977

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3212	0	3119	96	0
1	B	3201	0	3110	101	0
2	A	3	0	0	0	0
2	B	3	0	0	1	0
3	A	4	0	3	0	0
3	B	4	0	3	0	0
4	A	43	0	30	0	0
4	B	43	0	30	1	0
5	A	17	0	15	1	0
5	B	17	0	15	1	0
6	A	17	0	21	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	17	0	21	2	0
7	A	6	0	8	0	0
7	B	6	0	8	2	0
8	B	1	0	0	0	0
9	A	203	0	0	14	0
9	B	181	0	0	7	0
All	All	6978	0	6383	196	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 15.

All (196) 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:367:ARG:HH22	7:B:882:GOL:H11	1.09	1.07
1:B:258:GLN:HE21	1:B:264:ARG:HB2	1.23	1.02
1:B:367:ARG:NH2	7:B:882:GOL:H11	1.75	1.02
1:A:99:ARG:HB2	1:A:99:ARG:HH11	1.28	0.96
1:A:99:ARG:HB2	1:A:99:ARG:NH1	1.89	0.85
1:B:69:LYS:HD2	1:B:70:PHE:H	1.43	0.83
1:B:258:GLN:NE2	1:B:264:ARG:HB2	1.95	0.80
1:B:126:LEU:O	1:B:130:ARG:HG3	1.86	0.76
1:A:240:ARG:HD3	1:A:298:PRO:HB3	1.66	0.75
1:A:109:ARG:HH11	1:A:109:ARG:HG2	1.51	0.75
1:A:372:PRO:HA	1:A:376:ASN:ND2	2.02	0.75
1:A:72:ARG:HH12	1:A:81:ILE:HD12	1.53	0.74
1:B:396:TRP:CH2	1:B:397:LYS:HD3	2.25	0.72
1:A:126:LEU:HD11	1:A:156:GLU:HG2	1.73	0.71
1:A:338:VAL:HG23	9:A:979:HOH:O	1.89	0.71
1:B:308:PRO:HB2	1:B:311:LEU:HD13	1.72	0.71
1:B:258:GLN:HE21	1:B:264:ARG:CB	2.04	0.69
1:A:109:ARG:HG2	1:A:109:ARG:NH1	2.07	0.69
1:B:371:ASP:HB2	1:B:374:ARG:HG2	1.75	0.69
1:A:168:ARG:HB2	1:A:171:GLU:HG3	1.77	0.67
1:A:136:TYR:O	1:A:139:SER:HB3	1.94	0.67
1:B:275:LEU:O	1:B:279:HIS:HD2	1.78	0.67
1:A:340:ASN:H	1:A:340:ASN:HD22	1.43	0.66
1:B:249:GLN:HB3	9:B:1046:HOH:O	1.96	0.65
1:A:388:ASP:OD2	1:A:391:THR:HG22	1.96	0.65
1:A:281:TRP:HB2	1:A:304:LEU:HD21	1.79	0.65
1:B:259:GLN:HG2	1:B:260:ASP:H	1.62	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:322:LEU:HD13	1:A:324:TRP:CZ2	2.32	0.64
1:B:384:CYS:SG	2:B:852:CAC:AS	3.16	0.63
6:A:793:DP3:H1'1	9:A:1080:HOH:O	1.98	0.62
1:A:240:ARG:HD3	1:A:298:PRO:CB	2.29	0.62
1:B:423:HIS:O	1:B:427:VAL:HG13	1.99	0.62
1:B:371:ASP:HB2	1:B:374:ARG:CG	2.29	0.62
1:A:223:ARG:HD3	9:A:915:HOH:O	2.01	0.61
1:B:167:LEU:HG	1:B:348:LEU:HD12	1.83	0.61
1:B:388:ASP:OD1	1:B:390:ARG:HB3	2.01	0.60
1:A:109:ARG:HB2	9:A:1001:HOH:O	2.01	0.60
1:B:281:TRP:HB2	1:B:304:LEU:HD21	1.81	0.60
1:B:141:LYS:O	1:B:142:ARG:HG3	2.02	0.60
1:A:274:GLU:O	1:A:278:GLN:HG3	2.01	0.60
1:A:342:LEU:HD11	1:A:349:GLU:HB3	1.83	0.59
1:A:184:PRO:HB3	1:A:468:ASN:HD21	1.68	0.59
1:A:303:GLU:HG3	9:A:1008:HOH:O	2.04	0.58
1:B:169:GLU:O	1:B:173:VAL:HG23	2.04	0.57
1:B:310:GLU:OE2	1:B:310:GLU:N	2.34	0.57
1:B:259:GLN:HG2	1:B:260:ASP:N	2.20	0.57
1:A:149:GLU:O	1:A:153:GLN:HG2	2.05	0.57
1:A:270:VAL:O	1:A:274:GLU:HG3	2.05	0.57
1:B:463:HIS:ND1	9:B:1052:HOH:O	2.33	0.56
1:A:372:PRO:HB2	1:B:77:GLU:HG3	1.87	0.56
1:B:378:LEU:HB2	9:B:902:HOH:O	2.05	0.56
1:A:395:LEU:O	1:A:399:LYS:HG3	2.06	0.56
1:B:69:LYS:HD2	1:B:70:PHE:N	2.19	0.55
1:B:389:THR:HA	1:B:396:TRP:CD1	2.42	0.55
1:B:182:ASN:O	1:B:184:PRO:HD3	2.07	0.54
1:B:390:ARG:HE	1:B:391:THR:HG23	1.73	0.54
1:A:126:LEU:HD23	1:A:159:VAL:HG11	1.89	0.54
1:B:457:SER:HA	1:B:462:PHE:CG	2.43	0.54
1:A:257:ARG:HH21	1:A:263:VAL:CG2	2.21	0.54
1:A:184:PRO:HB3	1:A:468:ASN:ND2	2.22	0.53
1:A:340:ASN:HD22	1:A:340:ASN:N	2.04	0.53
1:B:281:TRP:O	1:B:283:PRO:HD3	2.09	0.53
4:B:500:HEM:HBB2	4:B:500:HEM:HHC	1.91	0.52
1:B:149:GLU:O	1:B:153:GLN:HG3	2.10	0.52
1:A:77:GLU:HG3	1:B:372:PRO:HG2	1.91	0.52
1:B:144:GLY:O	1:B:145:SER:O	2.28	0.52
1:B:310:GLU:H	1:B:310:GLU:CD	2.12	0.52
1:B:471:LEU:O	1:B:474:ALA:HB2	2.10	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:220:ALA:HB1	1:B:335:LEU:HD11	1.92	0.51
1:B:130:ARG:HH11	1:B:130:ARG:HB3	1.76	0.51
1:A:476:ARG:HG2	1:A:476:ARG:HH11	1.74	0.51
1:A:372:PRO:HA	1:A:376:ASN:HD21	1.75	0.51
1:B:424:ALA:O	1:B:427:VAL:HG22	2.11	0.51
1:B:337:ALA:HB2	1:B:356:SER:HB3	1.93	0.50
6:A:793:DP3:HG2	9:A:897:HOH:O	2.11	0.50
1:A:455:SER:OG	1:B:398:ASP:OD2	2.28	0.49
1:B:224:GLY:O	1:B:417:VAL:HA	2.12	0.49
1:A:472:SER:HA	1:A:473:PRO:C	2.32	0.49
1:B:340:ASN:HD22	1:B:340:ASN:H	1.58	0.49
1:A:249:GLN:HB3	9:A:1011:HOH:O	2.13	0.49
1:B:71:PRO:HG2	1:B:84:ASP:HB3	1.94	0.49
1:A:449:TRP:HA	5:A:760:H4B:N1	2.28	0.49
1:B:180:TRP:CE3	1:B:192:TRP:HA	2.48	0.49
1:A:326:ALA:HB3	9:A:1059:HOH:O	2.12	0.48
1:B:259:GLN:NE2	1:B:260:ASP:OD1	2.44	0.48
1:B:403:GLU:HA	1:B:403:GLU:OE2	2.12	0.48
1:B:246:TRP:HB2	1:B:294:LEU:HB3	1.95	0.48
1:A:338:VAL:HB	1:A:355:PHE:CZ	2.48	0.48
1:A:366:THR:HG21	1:A:454:ILE:HG23	1.95	0.48
1:B:69:LYS:CD	1:B:70:PHE:H	2.22	0.48
1:B:226:LEU:HD12	1:B:226:LEU:N	2.28	0.48
1:A:213:ILE:HG23	1:A:250:LEU:HD13	1.96	0.48
1:B:449:TRP:HA	5:B:761:H4B:N1	2.29	0.48
1:A:81:ILE:HG22	1:A:82:THR:N	2.28	0.48
1:A:187:VAL:HG22	1:A:187:VAL:O	2.14	0.48
1:B:292:PRO:CG	1:B:304:LEU:HD11	2.43	0.48
1:A:151:ARG:NH2	1:A:171:GLU:OE1	2.42	0.48
1:A:338:VAL:CG1	1:A:341:MET:HG3	2.44	0.48
1:A:340:ASN:H	1:A:340:ASN:ND2	2.12	0.48
1:A:231:THR:O	1:A:353:ALA:HA	2.15	0.47
1:A:277:ILE:HD11	1:A:283:PRO:HB3	1.96	0.47
1:A:476:ARG:HG2	1:A:476:ARG:NH1	2.30	0.47
1:B:253:TYR:CE2	1:B:288:PHE:HD2	2.32	0.47
1:A:126:LEU:CD1	1:A:156:GLU:HG2	2.44	0.47
1:A:338:VAL:HG11	1:A:341:MET:HG3	1.97	0.47
1:B:308:PRO:HD2	1:B:311:LEU:HD22	1.97	0.46
1:B:167:LEU:HG	1:B:348:LEU:CD1	2.45	0.46
1:A:453:PRO:HG3	9:A:891:HOH:O	2.15	0.46
1:B:74:LYS:O	1:B:465:GLU:HG3	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:366:THR:O	1:B:370:CYS:HB2	2.16	0.46
1:B:336:PRO:O	1:B:336:PRO:HG2	2.16	0.46
1:A:292:PRO:HA	9:A:1038:HOH:O	2.15	0.46
1:A:360:MET:HA	1:A:420:VAL:O	2.15	0.46
1:A:352:ALA:HA	9:A:894:HOH:O	2.15	0.46
1:A:277:ILE:C	1:A:279:HIS:N	2.70	0.46
1:A:109:ARG:HH11	1:A:109:ARG:CG	2.22	0.45
1:A:130:ARG:O	1:A:134:ASN:ND2	2.49	0.45
1:A:86:LEU:O	1:A:89:GLN:HB2	2.16	0.45
1:A:333:TYR:HE1	1:A:359:TYR:HH	1.60	0.45
1:B:319:HIS:CG	1:B:320:PRO:HD2	2.51	0.45
1:A:257:ARG:HH21	1:A:263:VAL:HG23	1.81	0.45
1:A:336:PRO:HB3	1:A:359:TYR:CE2	2.52	0.45
1:A:72:ARG:NH1	1:A:81:ILE:HD12	2.26	0.45
1:B:446:ASP:O	1:B:450:ILE:HG12	2.17	0.45
1:A:212:TYR:O	1:A:215:ASN:HB2	2.16	0.45
1:A:214:CYS:O	1:A:218:LYS:HG3	2.17	0.45
1:B:233:PHE:HB3	1:B:234:PRO:HD2	1.97	0.45
1:B:234:PRO:HB2	1:B:243:PHE:CE1	2.51	0.45
1:B:400:ALA:O	1:B:404:ILE:HG13	2.16	0.45
1:B:187:VAL:O	1:B:187:VAL:HG22	2.17	0.45
1:B:371:ASP:CB	1:B:374:ARG:HG2	2.43	0.44
1:A:167:LEU:HG	1:A:348:LEU:HD12	1.99	0.44
1:B:87:CYS:HB3	1:B:469:TYR:CE2	2.52	0.44
1:B:143:SER:O	1:B:145:SER:N	2.47	0.44
1:B:323:GLU:N	1:B:323:GLU:OE2	2.50	0.44
1:B:226:LEU:CD1	1:B:226:LEU:H	2.30	0.44
1:A:77:GLU:HG3	1:B:372:PRO:CG	2.48	0.44
1:A:287:ARG:HD3	9:A:1015:HOH:O	2.17	0.44
1:B:74:LYS:HD3	1:B:76:TRP:CE2	2.53	0.44
1:B:277:ILE:HD11	1:B:283:PRO:HB3	1.99	0.44
1:B:361:SER:OG	1:B:421:ASP:HA	2.18	0.44
1:A:186:CYS:HB3	1:A:189:ARG:HD3	1.99	0.44
1:A:367:ARG:O	1:A:371:ASP:HB2	2.18	0.44
9:A:889:HOH:O	1:B:94:GLY:HA3	2.18	0.44
1:A:220:ALA:O	1:A:226:LEU:HA	2.17	0.43
1:A:109:ARG:HD3	1:A:109:ARG:HA	1.76	0.43
1:A:319:HIS:CG	1:A:320:PRO:HD2	2.53	0.43
1:A:244:ARG:NH1	1:A:479:PRO:O	2.52	0.43
1:B:376:ASN:HA	9:B:902:HOH:O	2.18	0.43
1:A:189:ARG:HB3	1:A:432:HIS:NE2	2.34	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:233:PHE:HB3	1:A:234:PRO:HD2	2.01	0.43
1:B:106:VAL:HG12	1:B:107:LEU:CD1	2.48	0.43
1:B:392:THR:HG22	9:B:994:HOH:O	2.18	0.43
1:B:414:LEU:C	1:B:414:LEU:HD23	2.39	0.43
1:B:337:ALA:CB	1:B:356:SER:HB3	2.50	0.42
1:B:396:TRP:CZ2	1:B:397:LYS:HD3	2.53	0.42
1:A:446:ASP:O	1:A:450:ILE:HG12	2.19	0.42
1:B:231:THR:O	1:B:353:ALA:HA	2.19	0.42
1:A:231:THR:O	1:A:354:PRO:HD2	2.19	0.42
1:A:243:PHE:O	1:A:244:ARG:HG2	2.18	0.42
1:A:451:VAL:HA	1:A:452:PRO:HD3	1.90	0.42
1:B:233:PHE:HB3	1:B:234:PRO:CD	2.50	0.42
1:B:340:ASN:HD22	1:B:340:ASN:N	2.15	0.42
1:A:70:PHE:CG	1:A:85:THR:HG22	2.55	0.42
1:A:72:ARG:HH11	1:A:72:ARG:HG2	1.84	0.42
1:A:275:LEU:O	1:A:279:HIS:HD2	2.01	0.42
1:B:388:ASP:C	1:B:390:ARG:H	2.22	0.42
1:A:71:PRO:HD3	9:B:1058:HOH:O	2.20	0.41
1:B:146:GLN:O	1:B:150:GLU:HG3	2.20	0.41
6:B:794:DP3:HA	9:B:1079:HOH:O	2.21	0.41
1:B:444:PRO:HB3	1:B:469:TYR:CE1	2.56	0.41
1:B:80:SER:O	1:B:81:ILE:HG12	2.20	0.41
1:B:151:ARG:O	1:B:155:VAL:HG23	2.21	0.41
1:A:218:LYS:HG2	1:A:311:LEU:HD22	2.02	0.41
1:A:236:ARG:HG2	1:A:242:ASP:CG	2.40	0.41
1:A:264:ARG:HH11	1:A:264:ARG:HG3	1.85	0.41
1:A:336:PRO:HB3	1:A:359:TYR:CZ	2.55	0.41
1:B:398:ASP:O	1:B:402:VAL:HG23	2.20	0.41
1:B:70:PHE:HA	1:B:71:PRO:HD2	1.87	0.41
1:B:196:GLN:HG2	1:B:219:TYR:CZ	2.56	0.41
1:B:189:ARG:O	1:B:192:TRP:HD1	2.04	0.41
1:A:317:LEU:HD22	1:A:408:VAL:HA	2.03	0.41
1:A:106:VAL:HG12	1:A:107:LEU:HG	2.03	0.41
1:A:307:LEU:HA	1:A:308:PRO:HD3	1.89	0.41
1:A:277:ILE:C	1:A:279:HIS:H	2.23	0.40
1:A:310:GLU:HG3	1:A:311:LEU:N	2.35	0.40
1:A:340:ASN:N	1:A:340:ASN:ND2	2.69	0.40
1:A:423:HIS:HB2	1:B:392:THR:HB	2.02	0.40
1:B:182:ASN:O	1:B:184:PRO:CD	2.69	0.40
1:B:221:THR:O	1:B:222:ASN:C	2.60	0.40
1:B:226:LEU:N	1:B:226:LEU:CD1	2.83	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:338:VAL:HG22	6:B:794:DP3:HG1	2.03	0.40
1:B:69:LYS:HD2	1:B:69:LYS:N	2.37	0.40
1:A:252:ARG:NH2	9:A:892:HOH:O	2.54	0.40
1:B:228:SER:HA	1:B:356:SER:O	2.22	0.40
1:B:313:LEU:HD12	1:B:314:GLU:H	1.86	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	400/417 (96%)	368 (92%)	32 (8%)	0	100	100
1	B	398/417 (95%)	364 (92%)	28 (7%)	6 (2%)	10	9
All	All	798/834 (96%)	732 (92%)	60 (8%)	6 (1%)	19	22

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	145	SER
1	B	260	ASP
1	B	192	TRP
1	B	262	SER
1	B	309	PRO
1	B	298	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	343/355 (97%)	329 (96%)	14 (4%)	30	41
1	B	342/355 (96%)	332 (97%)	10 (3%)	42	56
All	All	685/710 (96%)	661 (96%)	24 (4%)	36	48

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

Mol	Chain	Res	Type
1	A	89	GLN
1	A	99	ARG
1	A	100	ARG
1	A	109	ARG
1	A	126	LEU
1	A	189	ARG
1	A	194	LYS
1	A	236	ARG
1	A	247	ASN
1	A	306	VAL
1	A	340	ASN
1	A	376	ASN
1	A	386	ASP
1	A	414	LEU
1	B	69	LYS
1	B	100	ARG
1	B	130	ARG
1	B	139	SER
1	B	203	CYS
1	B	294	LEU
1	B	340	ASN
1	B	378	LEU
1	B	398	ASP
1	B	413	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	91	GLN
1	A	191	GLN
1	A	207	GLN

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Mol	Chain	Res	Type
1	A	278	GLN
1	A	279	HIS
1	A	285	ASN
1	A	340	ASN
1	A	376	ASN
1	A	413	GLN
1	A	468	ASN
1	B	89	GLN
1	B	146	GLN
1	B	191	GLN
1	B	222	ASN
1	B	258	GLN
1	B	278	GLN
1	B	279	HIS
1	B	340	ASN
1	B	405	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 13 ligands modelled in this entry, 1 is monoatomic - leaving 12 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	H4B	A	760	-	16,18,18	1.99	3 (18%)	11,26,26	4.26	8 (72%)
7	GOL	B	882	-	5,5,5	0.29	0	5,5,5	0.33	0
5	H4B	B	761	-	16,18,18	2.03	3 (18%)	11,26,26	4.34	9 (81%)
4	HEM	B	500	1	41,50,50	1.19	4 (9%)	45,82,82	1.57	5 (11%)
2	CAC	A	850	1	0,2,4	-	-	0,1,6	-	-
2	CAC	B	852	-	0,2,4	-	-	0,1,6	-	-
6	DP3	B	794	-	11,16,16	1.69	4 (36%)	11,18,18	1.67	3 (27%)
6	DP3	A	793	-	11,16,16	1.51	3 (27%)	11,18,18	1.65	3 (27%)
3	ACT	B	861	-	3,3,3	0.88	0	3,3,3	0.73	0
7	GOL	A	880	-	5,5,5	0.22	0	5,5,5	0.24	0
4	HEM	A	500	1	41,50,50	1.24	3 (7%)	45,82,82	1.41	5 (11%)
3	ACT	A	860	-	3,3,3	0.96	0	3,3,3	0.76	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	H4B	A	760	-	-	0/8/17/17	0/2/2/2
7	GOL	B	882	-	-	2/4/4/4	-
5	H4B	B	761	-	-	0/8/17/17	0/2/2/2
4	HEM	B	500	1	-	3/12/54/54	-
6	DP3	B	794	-	-	3/13/16/16	-
4	HEM	A	500	1	-	4/12/54/54	-
7	GOL	A	880	-	-	0/4/4/4	-
6	DP3	A	793	-	-	5/13/16/16	-

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	760	H4B	C4-N3	4.73	1.41	1.33
5	B	761	H4B	C4-N3	4.66	1.41	1.33
5	B	761	H4B	C4A-N5	4.32	1.46	1.38
5	A	760	H4B	C4A-N5	3.93	1.46	1.38
5	A	760	H4B	C6-N5	3.58	1.53	1.45
6	B	794	DP3	CB-CA	3.50	1.58	1.53
4	A	500	HEM	C4A-NA	3.40	1.43	1.36
4	A	500	HEM	CAB-C3B	-3.33	1.38	1.47
5	B	761	H4B	C6-N5	3.21	1.52	1.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	500	HEM	C3C-CAC	-2.98	1.41	1.47
6	A	793	DP3	CB-CA	2.89	1.57	1.53
4	B	500	HEM	C3C-CAC	-2.87	1.41	1.47
4	B	500	HEM	CAB-C3B	-2.81	1.39	1.47
4	B	500	HEM	C1A-NA	2.43	1.41	1.36
6	A	793	DP3	CD-NE	2.23	1.51	1.46
6	B	794	DP3	CZ-NH2	2.19	1.35	1.29
6	B	794	DP3	CD-NE	2.18	1.51	1.46
6	B	794	DP3	C-N1'	2.18	1.50	1.47
4	B	500	HEM	CHA-C4D	2.08	1.40	1.35
6	A	793	DP3	CZ-NH2	2.02	1.35	1.29

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	761	H4B	C8A-C4A-C4	9.30	122.83	114.57
5	A	760	H4B	C8A-C4A-C4	9.19	122.73	114.57
5	B	761	H4B	C2-N3-C4	5.80	125.14	115.93
5	A	760	H4B	C2-N3-C4	5.66	124.92	115.93
5	A	760	H4B	N1-C2-N3	-4.85	117.82	125.42
5	B	761	H4B	N1-C2-N3	-4.70	118.04	125.42
4	B	500	HEM	C3B-C2B-C1B	4.22	109.62	106.49
4	B	500	HEM	C2C-C3C-C4C	-3.99	104.11	106.90
6	A	793	DP3	CB-CA-C	3.79	114.97	109.52
4	B	500	HEM	CBA-CAA-C2A	-3.72	106.27	112.62
5	B	761	H4B	N2-C2-N1	3.69	122.99	117.25
5	A	760	H4B	N2-C2-N1	3.62	122.88	117.25
5	B	761	H4B	C4A-C4-N3	-3.62	113.73	124.01
4	A	500	HEM	C4A-C3A-C2A	-3.58	104.50	107.00
5	A	760	H4B	C4A-C4-N3	-3.58	113.85	124.01
6	B	794	DP3	CB-CA-C	3.56	114.64	109.52
5	B	761	H4B	C4-C4A-N5	-3.56	116.14	119.12
5	A	760	H4B	C2-N1-C8A	3.50	122.38	114.54
4	B	500	HEM	C4B-C3B-C2B	-3.48	104.35	107.11
4	A	500	HEM	CMD-C2D-C1D	3.37	130.17	125.04
5	B	761	H4B	C2-N1-C8A	3.26	121.86	114.54
5	B	761	H4B	C4A-N5-C6	-3.12	112.67	121.16
5	A	760	H4B	C4-C4A-N5	-2.96	116.64	119.12
4	A	500	HEM	C2C-C3C-C4C	-2.90	104.87	106.90
5	A	760	H4B	C4A-N5-C6	-2.80	113.53	121.16
6	B	794	DP3	CD-NE-CZ	2.75	128.53	123.50
6	A	793	DP3	CD-NE-CZ	2.49	128.05	123.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	500	HEM	CMA-C3A-C2A	2.39	129.45	124.94
6	B	794	DP3	NE-CZ-NH2	-2.34	115.87	120.26
4	B	500	HEM	C4B-CHC-C1C	2.30	125.59	122.56
6	A	793	DP3	NE-CZ-NH2	-2.20	116.13	120.26
4	A	500	HEM	CBD-CAD-C3D	-2.14	106.68	112.63
5	B	761	H4B	O9-C9-C6	2.07	113.93	108.98

There are no chirality outliers.

All (17) torsion outliers are listed below:

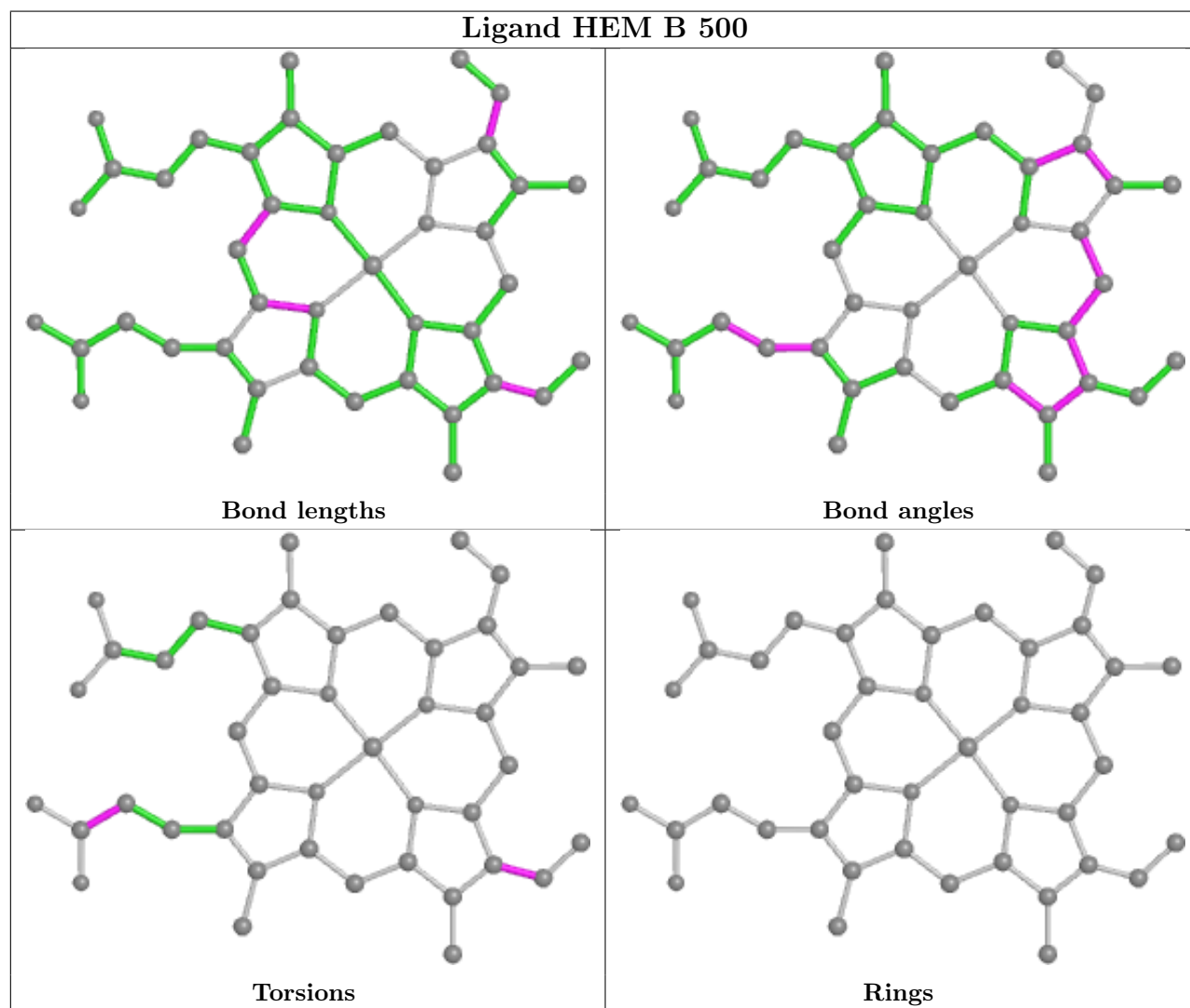
Mol	Chain	Res	Type	Atoms
6	B	794	DP3	N1'-C1'-C2'-N2'
7	B	882	GOL	O1-C1-C2-O2
7	B	882	GOL	O1-C1-C2-C3
6	A	793	DP3	NE-CD-CG-CB
6	A	793	DP3	N1'-C-CA-N
6	A	793	DP3	N1'-C-CA-CB
6	B	794	DP3	NE-CD-CG-CB
6	B	794	DP3	CA-CB-CG-CD
6	A	793	DP3	N1'-C1'-C2'-N2'
4	B	500	HEM	C4B-C3B-CAB-CBB
6	A	793	DP3	CA-CB-CG-CD
4	A	500	HEM	CAD-CBD-CGD-O2D
4	A	500	HEM	CAD-CBD-CGD-O1D
4	A	500	HEM	CAA-CBA-CGA-O2A
4	B	500	HEM	CAA-CBA-CGA-O2A
4	A	500	HEM	CAA-CBA-CGA-O1A
4	B	500	HEM	CAA-CBA-CGA-O1A

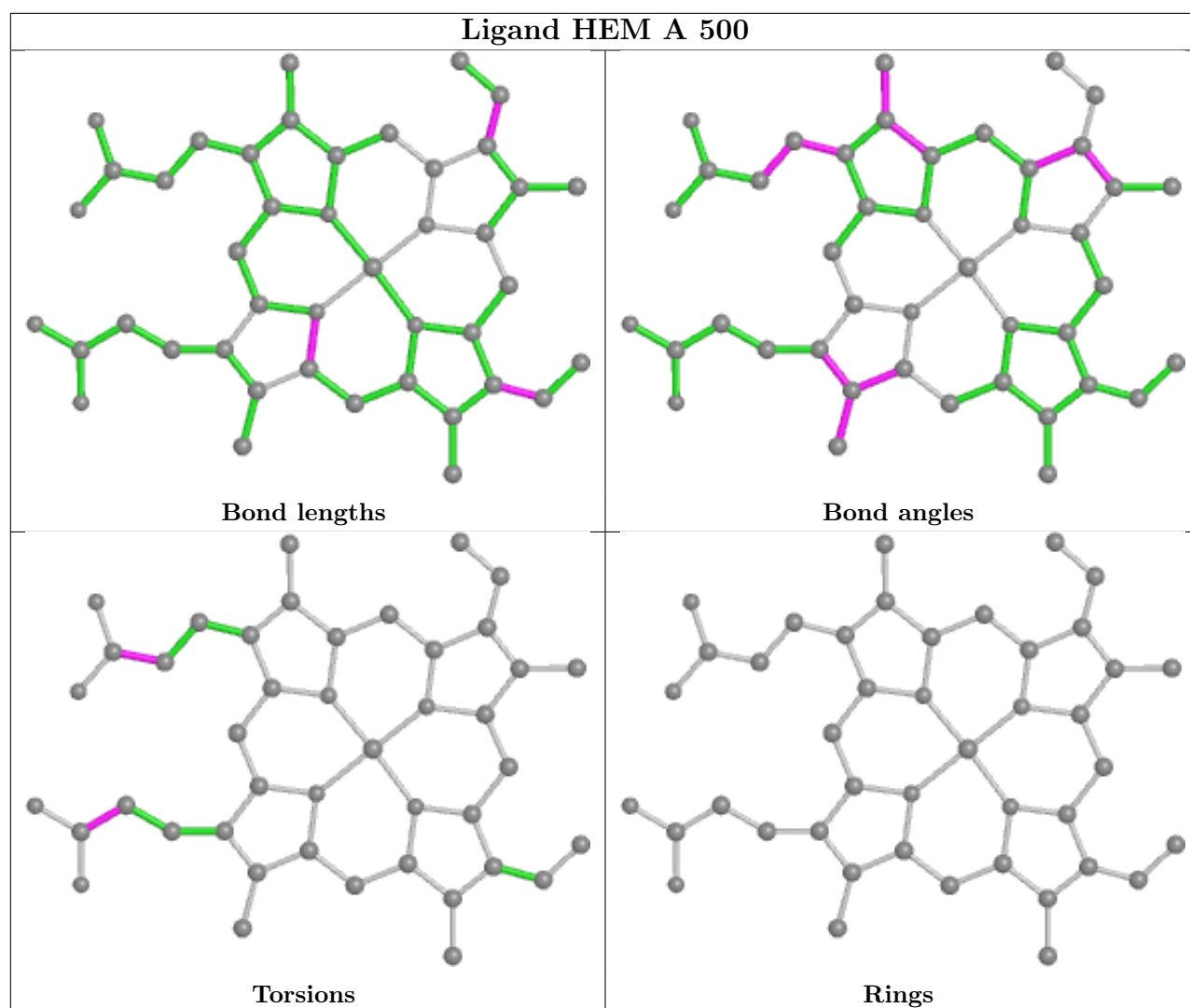
There are no ring outliers.

7 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	760	H4B	1	0
7	B	882	GOL	2	0
5	B	761	H4B	1	0
4	B	500	HEM	1	0
2	B	852	CAC	1	0
6	B	794	DP3	2	0
6	A	793	DP3	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	404/417 (96%)	0.32	22 (5%) 25 31	38, 56, 80, 96	0
1	B	402/417 (96%)	0.42	34 (8%) 10 14	34, 57, 81, 102	0
All	All	806/834 (96%)	0.37	56 (6%) 16 21	34, 56, 81, 102	0

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	259	GLN	4.9
1	B	270	VAL	4.8
1	B	261	GLY	4.4
1	B	122	ALA	4.2
1	B	451	VAL	3.9
1	B	260	ASP	3.9
1	A	160	ALA	3.8
1	B	447	TRP	3.6
1	B	277	ILE	3.6
1	A	449	TRP	3.6
1	B	448	ALA	3.5
1	B	304	LEU	3.3
1	A	450	ILE	3.2
1	B	123	GLU	3.2
1	A	259	GLN	3.2
1	A	447	TRP	3.1
1	A	448	ALA	3.0
1	B	449	TRP	2.9
1	A	274	GLU	2.9
1	B	70	PHE	2.8
1	B	106	VAL	2.7
1	B	323	GLU	2.7
1	B	450	ILE	2.6
1	A	153	GLN	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	452	PRO	2.5
1	B	456	GLY	2.5
1	B	263	VAL	2.5
1	A	130	ARG	2.5
1	B	258	GLN	2.4
1	A	106	VAL	2.4
1	B	322	LEU	2.4
1	B	103	GLY	2.4
1	B	477	TYR	2.4
1	B	184	PRO	2.4
1	B	280	GLY	2.3
1	A	185	ARG	2.3
1	A	186	CYS	2.3
1	B	104	SER	2.3
1	B	257	ARG	2.3
1	B	282	THR	2.2
1	A	161	SER	2.2
1	B	185	ARG	2.2
1	A	187	VAL	2.2
1	A	311	LEU	2.2
1	A	103	GLY	2.2
1	A	272	ILE	2.1
1	B	186	CYS	2.1
1	A	91	GLN	2.1
1	A	101	CYS	2.1
1	A	107	LEU	2.1
1	B	341	MET	2.1
1	A	104	SER	2.1
1	B	453	PRO	2.0
1	B	264	ARG	2.0
1	A	265	GLY	2.0
1	B	255	GLY	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

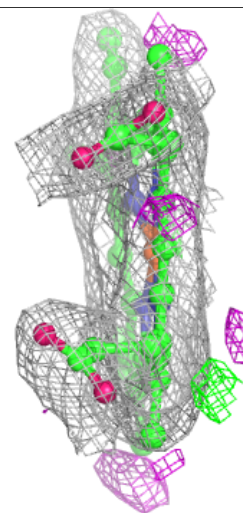
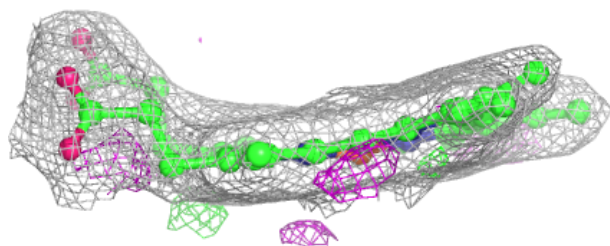
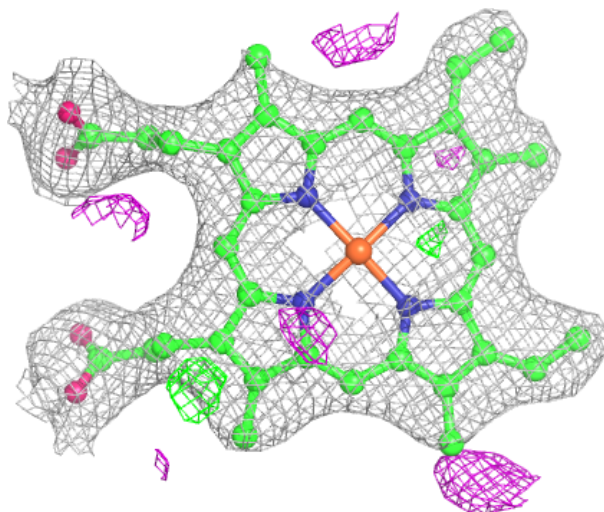
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

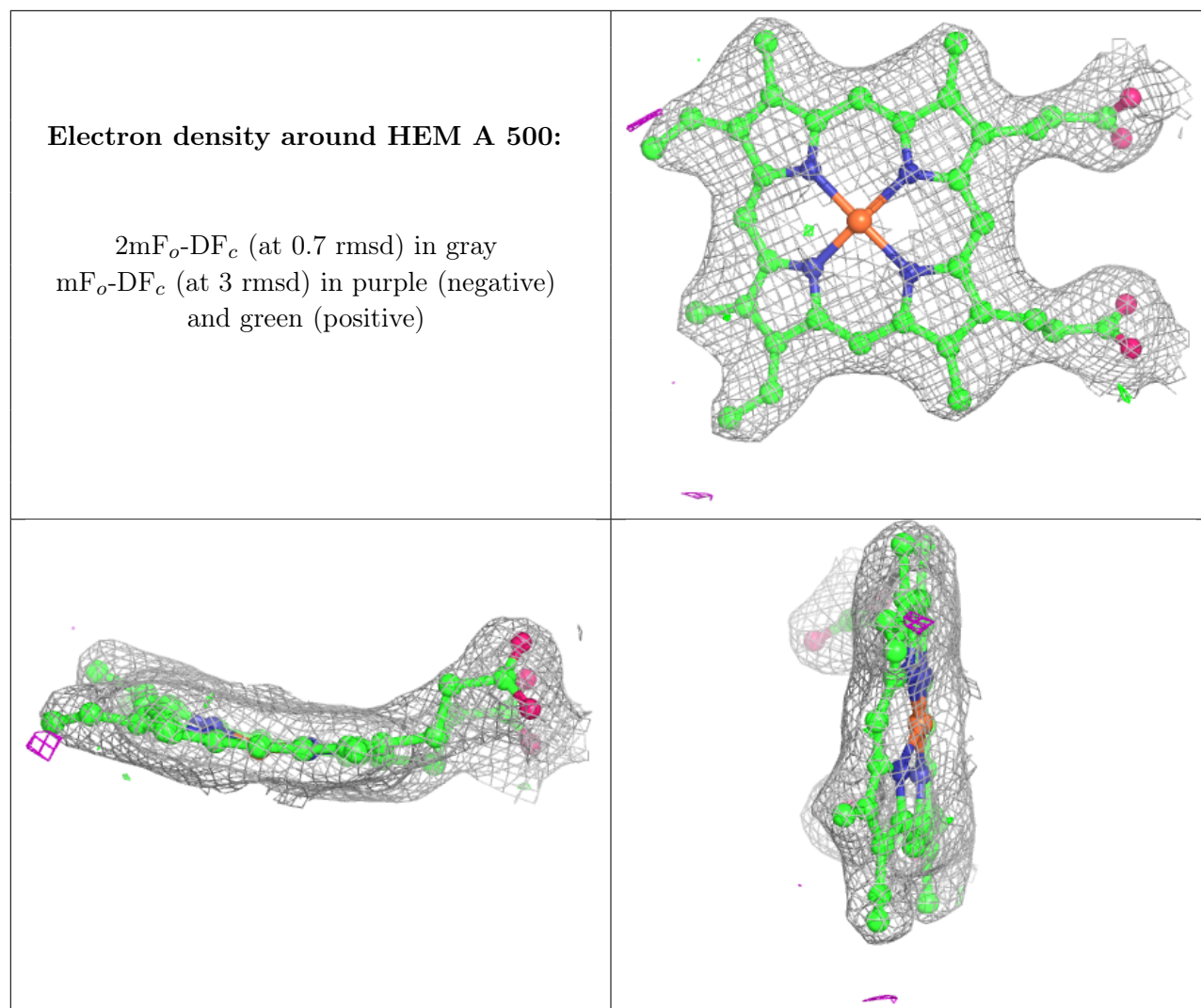
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
7	GOL	B	882	6/6	0.84	0.32	53,58,60,60	0
6	DP3	B	794	17/17	0.90	0.27	65,74,80,81	0
2	CAC	B	852	3/5	0.91	0.29	145,145,145,145	0
7	GOL	A	880	6/6	0.91	0.25	61,63,64,70	0
6	DP3	A	793	17/17	0.91	0.28	53,68,85,85	0
3	ACT	B	861	4/4	0.93	0.20	78,78,79,81	0
3	ACT	A	860	4/4	0.95	0.17	59,59,60,60	0
5	H4B	B	761	17/17	0.96	0.28	33,38,43,50	0
5	H4B	A	760	17/17	0.97	0.26	41,43,46,49	0
4	HEM	B	500	43/43	0.97	0.18	31,38,49,54	0
4	HEM	A	500	43/43	0.98	0.21	31,41,54,59	0
2	CAC	A	850	3/5	0.98	0.09	87,87,87,95	0
8	ZN	B	900	1/1	0.99	0.16	55,55,55,55	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)





6.5 Other polymers [i](#)

There are no such residues in this entry.