



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 25, 2026 – 03:40 PM EDT

PDB ID : 3DWJ / pdb_00003dwj
Title : Heme-proximal W188H mutant of inducible nitric oxide synthase
Authors : Tejero, J.; Biswas, A.; Wang, Z.-Q.; Haque, M.M.; Hemann, C.; Zweier, J.L.;
Page, R.C.; Misra, S.; Stuehr, D.J.
Deposited on : 2008-07-22
Resolution : 2.75 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

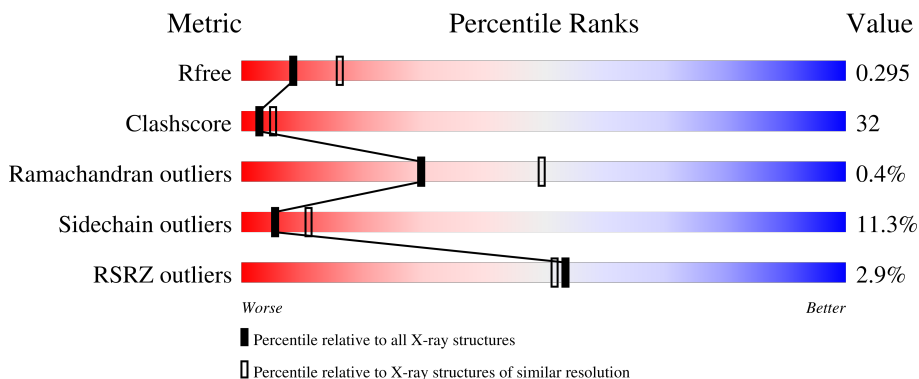
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.75 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1009 (2.76-2.76)
Clashscore	190562	1044 (2.76-2.76)
Ramachandran outliers	187476	1024 (2.76-2.76)
Sidechain outliers	187428	1024 (2.76-2.76)
RSRZ outliers	180081	1009 (2.76-2.76)

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	431	
1	B	431	

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 7127 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.

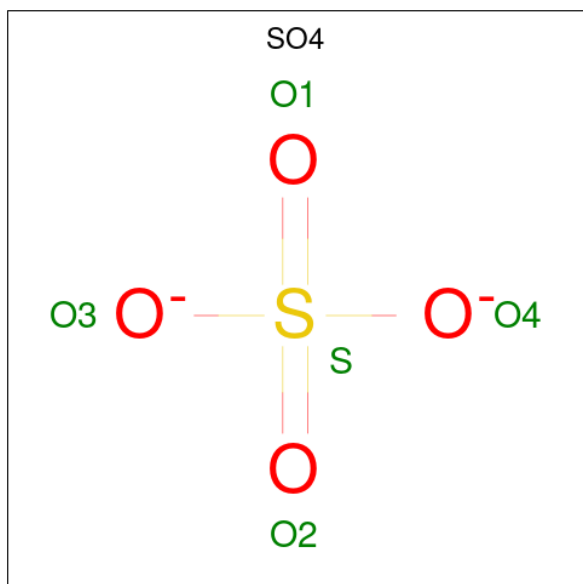
- Molecule 1 is a protein called Nitric oxide synthase, inducible.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	408	Total	C	N	O	S	0	0	0
			3331	2135	576	601	19			
1	B	412	Total	C	N	O	S	0	0	0
			3346	2143	579	604	20			

There are 2 discrepancies between the modelled and reference sequences:

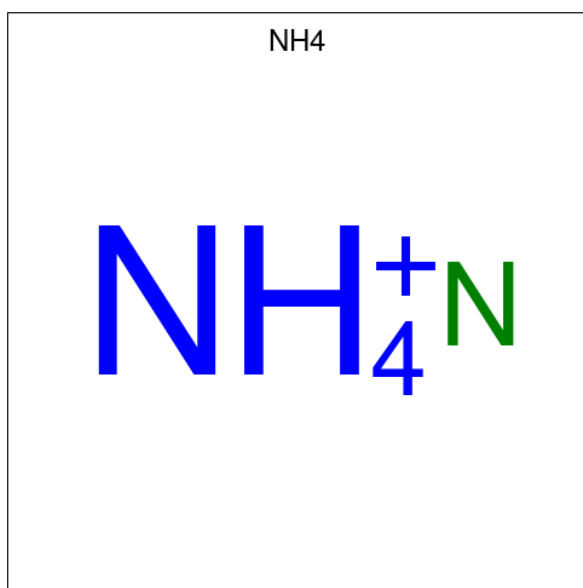
Chain	Residue	Modelled	Actual	Comment	Reference
A	188	HIS	TRP	engineered mutation	UNP P29477
B	188	HIS	TRP	engineered mutation	UNP P29477

- Molecule 2 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



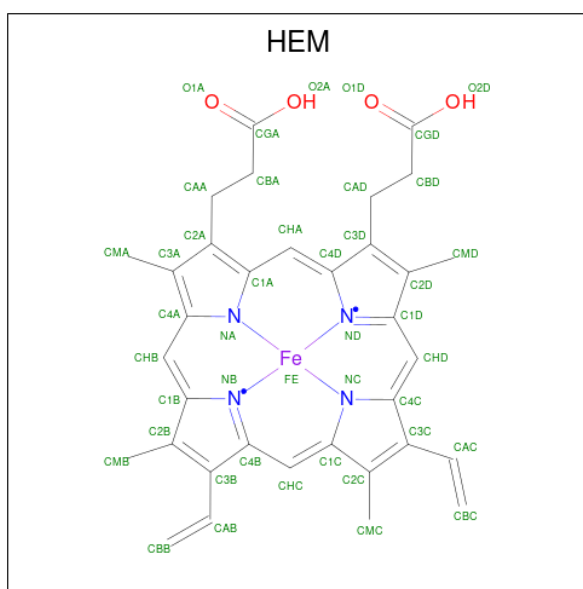
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 3 is AMMONIUM ION (CCD ID: NH4) (formula: H_4N).



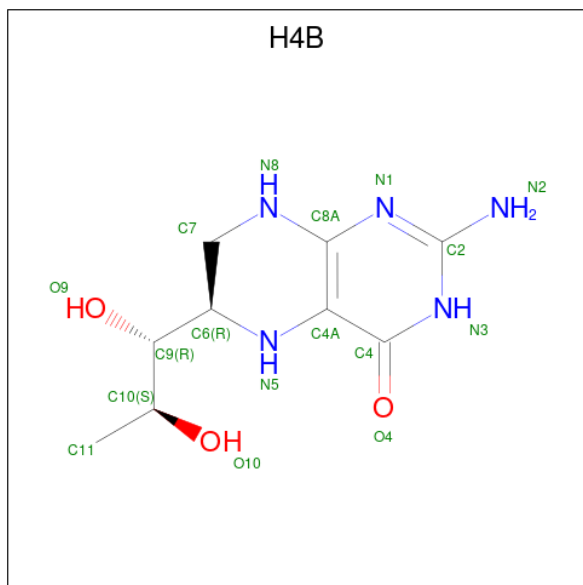
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total N 1 1	0	0
3	B	1	Total N 1 1	0	0

- Molecule 4 is PROTOPORPHYRIN IX CONTAINING FE (CCD ID: HEM) (formula: $\text{C}_{34}\text{H}_{32}\text{FeN}_4\text{O}_4$).



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

- Molecule 5 is 5,6,7,8-TETRAHYDROBIOPTERIN (CCD ID: 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		
5	B	1	Total	C	N	O	0	0
			17	9	5	3		

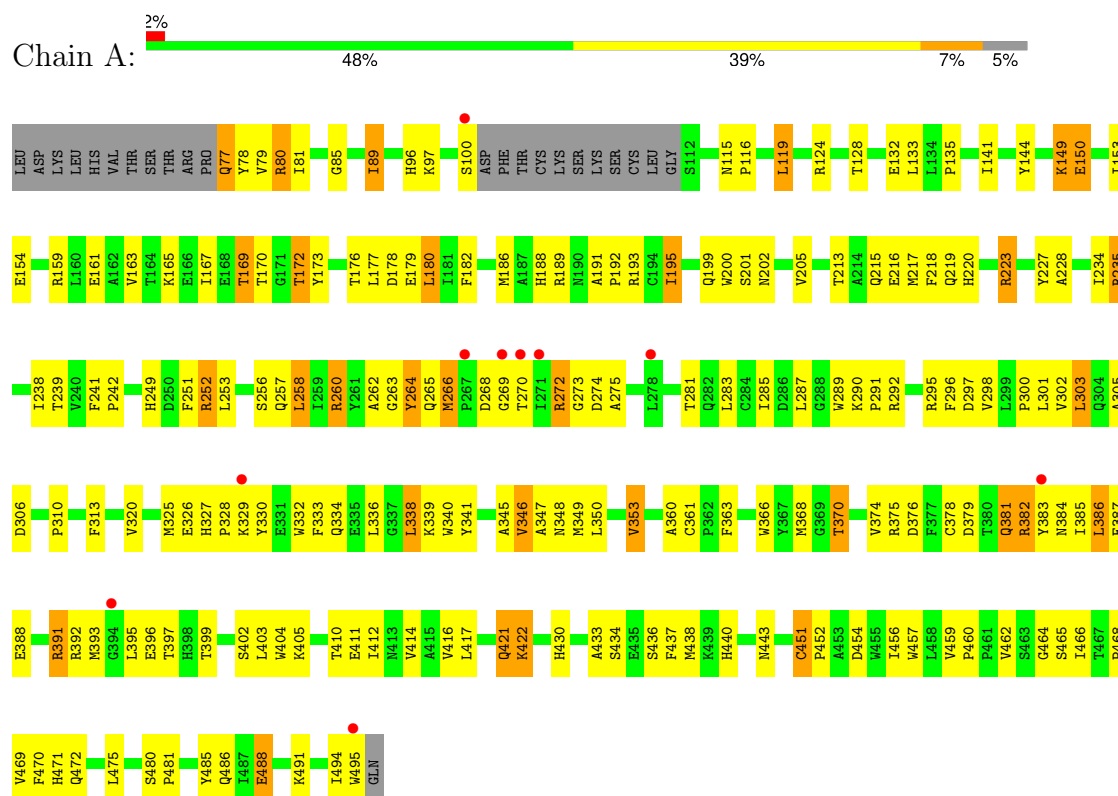
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	147	Total	O	0	0
			147	147		
6	B	176	Total	O	0	0
			176	176		

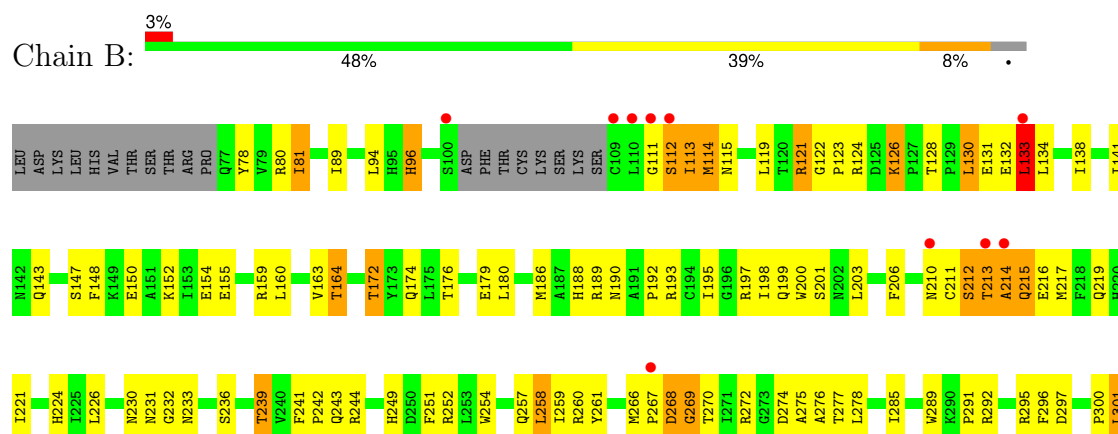
3 Residue-property plots

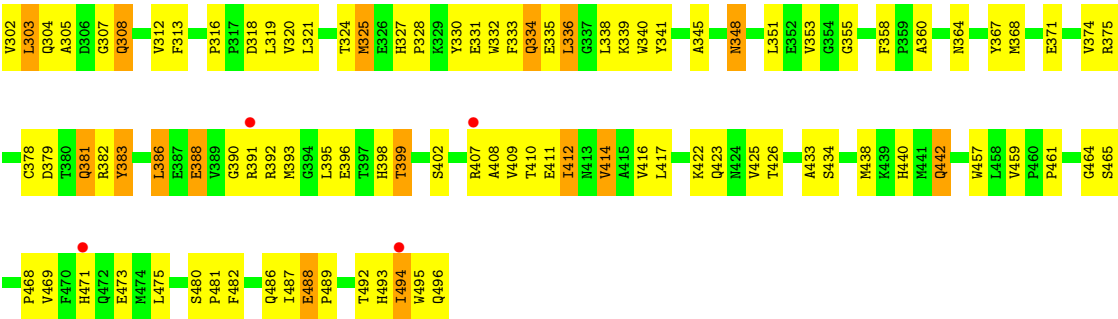
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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, inducible



• Molecule 1: Nitric oxide synthase, inducible





4 Data and refinement statistics

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α , β , γ	214.60Å 214.60Å 111.93Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	43.77 – 2.75 43.77 – 2.75	Depositor EDS
% Data completeness (in resolution range)	92.3 (43.77-2.75) 94.5 (43.77-2.75)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.52 (at 2.77Å)	Xtriage
Refinement program	PHENIX phenix	Depositor
R, R_{free}	0.226 , 0.294 0.226 , 0.295	Depositor DCC
R_{free} test set	1898 reflections (4.76%)	wwPDB-VP
Wilson B-factor (Å ²)	56.0	Xtriage
Anisotropy	0.701	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 76.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.55$, $\langle L^2 \rangle = 0.40$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	7127	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.34% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: HEM, H4B, SO4, NH4

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	0.56	1/3428 (0.0%)	1.00	16/4660 (0.3%)
1	B	0.60	1/3443 (0.0%)	1.06	21/4683 (0.4%)
All	All	0.58	2/6871 (0.0%)	1.03	37/9343 (0.4%)

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	A	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	382	ARG	C-N	-8.69	1.20	1.33
1	A	494	ILE	C-N	7.30	1.43	1.33

All (37) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	215	GLN	N-CA-CB	13.94	134.05	110.49
1	B	113	ILE	N-CA-CB	-12.61	84.64	111.37
1	A	495	TRP	CB-CA-C	-11.91	87.47	110.10
1	B	215	GLN	N-CA-C	-11.79	85.70	110.80
1	A	150	GLU	N-CA-CB	-11.51	91.61	110.59
1	A	149	LYS	N-CA-C	11.25	124.65	111.71
1	B	383	TYR	N-CA-C	-10.69	100.53	114.31
1	B	112	SER	N-CA-C	10.48	128.12	113.56
1	B	383	TYR	N-CA-CB	9.41	123.41	110.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	150	GLU	CB-CA-C	-8.48	97.86	110.24
1	B	112	SER	CB-CA-C	-8.10	95.74	111.06
1	B	382	ARG	O-C-N	-6.67	113.05	120.58
1	B	214	ALA	N-CA-C	-6.57	103.78	112.72
1	A	266	MET	CA-C-N	6.49	126.18	119.56
1	A	266	MET	C-N-CA	6.49	126.18	119.56
1	B	212	SER	N-CA-C	6.47	123.74	114.16
1	B	213	THR	N-CA-C	-6.41	97.93	108.76
1	B	122	GLY	CA-C-N	6.11	126.95	120.11
1	B	122	GLY	C-N-CA	6.11	126.95	120.11
1	B	113	ILE	N-CA-C	-5.95	99.75	108.97
1	B	488	GLU	CA-C-N	5.90	127.21	119.84
1	B	488	GLU	C-N-CA	5.90	127.21	119.84
1	A	150	GLU	N-CA-C	-5.79	98.16	108.13
1	A	172	THR	N-CA-C	-5.79	99.97	107.73
1	B	214	ALA	N-CA-CB	5.56	119.28	110.22
1	A	329	LYS	CB-CA-C	5.41	121.18	110.42
1	A	451	CYS	CA-C-N	-5.41	114.39	119.90
1	A	451	CYS	C-N-CA	-5.41	114.39	119.90
1	B	269	GLY	N-CA-C	-5.34	108.27	115.21
1	B	382	ARG	N-CA-C	5.30	117.22	108.48
1	A	488	GLU	CA-C-N	5.26	126.41	119.84
1	A	488	GLU	C-N-CA	5.26	126.41	119.84
1	A	252	ARG	N-CA-C	5.13	116.32	108.52
1	A	269	GLY	N-CA-C	-5.09	108.59	115.21
1	A	270	THR	CB-CA-C	-5.04	102.52	114.16
1	B	133	LEU	N-CA-C	5.03	117.88	111.69
1	B	113	ILE	CB-CA-C	-5.00	103.75	111.31

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	382	ARG	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	3331	0	3230	195	1
1	B	3346	0	3231	227	6
2	A	5	0	0	0	0
3	A	1	0	0	1	0
3	B	1	0	0	0	0
4	A	43	0	30	7	0
4	B	43	0	30	7	0
5	A	17	0	15	2	0
5	B	17	0	15	1	0
6	A	147	0	0	44	2
6	B	176	0	0	48	13
All	All	7127	0	6551	429	15

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 32.

All (429) 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:396:GLU:CB	6:B:1193:HOH:O	1.70	1.29
1:A:195:ILE:HD11	6:A:1006:HOH:O	1.11	1.22
1:A:297:ASP:HB2	6:A:1048:HOH:O	1.09	1.21
1:B:216:GLU:OE1	6:B:1189:HOH:O	1.52	1.21
1:A:124:ARG:NH2	6:A:1015:HOH:O	1.71	1.21
1:A:462:VAL:HB	6:A:1028:HOH:O	1.37	1.19
1:B:213:THR:OG1	1:B:216:GLU:HB2	1.41	1.17
1:B:216:GLU:HB2	6:B:1189:HOH:O	1.44	1.14
1:A:382:ARG:NH1	6:A:977:HOH:O	1.78	1.11
1:A:326:GLU:OE2	1:A:422:LYS:HE3	1.52	1.08
1:A:334:GLN:OE1	6:A:1039:HOH:O	1.71	1.06
1:B:213:THR:O	6:B:1040:HOH:O	1.71	1.06
1:A:77:GLN:O	6:A:992:HOH:O	1.77	1.02
1:A:235:ARG:HG3	1:A:235:ARG:HH11	1.26	1.00
1:B:132:GLU:OE1	6:B:1142:HOH:O	1.79	1.00
1:A:169:THR:HG22	1:A:170:THR:HG23	1.44	0.99
1:B:386:LEU:HB2	6:B:1165:HOH:O	1.62	0.98
1:A:438:MET:HE2	1:A:469:VAL:HG12	1.45	0.98
1:B:396:GLU:OE2	6:B:1110:HOH:O	1.80	0.97
1:A:297:ASP:CB	6:A:1048:HOH:O	1.79	0.97
1:B:471:HIS:NE2	6:B:1135:HOH:O	1.98	0.97
1:B:371:GLU:OE1	6:B:1155:HOH:O	1.84	0.94
1:A:213:THR:OG1	1:A:216:GLU:HG3	1.68	0.94

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:132:GLU:CB	6:B:1152:HOH:O	2.14	0.94
1:A:381:GLN:HB3	6:A:1046:HOH:O	1.67	0.93
1:B:132:GLU:HB2	6:B:1152:HOH:O	1.69	0.93
1:A:266:MET:O	6:A:1013:HOH:O	1.85	0.93
1:B:396:GLU:HB2	6:B:1193:HOH:O	1.41	0.91
1:A:376:ASP:OD1	1:A:382:ARG:NH2	2.04	0.90
1:B:214:ALA:O	1:B:313:PHE:CZ	2.24	0.90
1:B:213:THR:OG1	1:B:216:GLU:CB	2.19	0.90
1:A:201:SER:HA	6:A:922:HOH:O	1.72	0.89
1:B:368:MET:HE2	1:B:433:ALA:CB	2.04	0.88
1:B:321:LEU:HD12	6:B:1180:HOH:O	1.73	0.87
1:B:438:MET:HE3	1:B:469:VAL:HG12	1.54	0.87
1:A:80:ARG:NH2	6:A:954:HOH:O	1.69	0.86
1:B:224:HIS:HD1	1:B:239:THR:HG22	1.39	0.86
1:B:285:ILE:HD12	1:B:291:PRO:HD3	1.55	0.86
1:B:150:GLU:HG2	6:B:1179:HOH:O	1.72	0.86
1:A:274:ASP:OD1	6:A:1003:HOH:O	1.94	0.85
1:A:124:ARG:NE	6:A:1047:HOH:O	2.09	0.85
1:A:165:LYS:O	1:A:169:THR:HB	1.77	0.84
1:A:274:ASP:CG	6:A:1003:HOH:O	2.19	0.84
1:B:141:ILE:HD11	1:B:163:VAL:HG21	1.60	0.83
1:B:224:HIS:HD1	1:B:239:THR:CG2	1.91	0.83
1:B:128:THR:HG21	1:B:133:LEU:CD1	2.09	0.83
1:A:274:ASP:OD2	6:A:1003:HOH:O	1.96	0.83
1:A:100:SER:O	6:A:1020:HOH:O	1.96	0.82
1:B:96:HIS:ND1	6:B:1153:HOH:O	2.05	0.81
1:A:85:GLY:HA2	6:A:1046:HOH:O	1.79	0.81
1:A:116:PRO:HG2	1:A:119:LEU:HB2	1.61	0.80
1:B:132:GLU:OE2	6:B:1152:HOH:O	1.98	0.80
1:A:385:ILE:HD11	1:A:412:ILE:HD13	1.64	0.79
1:B:396:GLU:N	6:B:1193:HOH:O	2.16	0.78
1:A:159:ARG:O	1:A:163:VAL:HG23	1.84	0.78
1:A:393:MET:HB3	1:A:395:LEU:HD13	1.65	0.78
1:A:150:GLU:HB2	6:A:1012:HOH:O	1.83	0.78
1:A:161:GLU:O	1:A:165:LYS:HG2	1.84	0.77
1:B:128:THR:CB	1:B:133:LEU:HD13	2.14	0.77
1:A:436:SER:HB3	6:A:913:HOH:O	1.85	0.77
1:B:396:GLU:HB3	6:B:1193:HOH:O	1.52	0.76
1:A:382:ARG:NH2	6:A:1032:HOH:O	2.17	0.76
1:B:128:THR:CG2	1:B:133:LEU:HD13	2.16	0.76
1:A:169:THR:CG2	1:A:170:THR:HG23	2.15	0.76

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:260:ARG:HB3	6:A:1000:HOH:O	1.85	0.76
1:B:214:ALA:O	1:B:313:PHE:HZ	1.68	0.76
1:B:128:THR:HG21	1:B:133:LEU:HD13	1.68	0.75
1:B:124:ARG:NH1	6:B:1146:HOH:O	2.18	0.74
1:B:471:HIS:CD2	6:B:1135:HOH:O	2.40	0.73
1:A:438:MET:HE3	1:A:469:VAL:HA	1.68	0.73
1:A:77:GLN:HE21	1:A:78:TYR:N	1.85	0.73
1:B:332:TRP:HE3	1:B:392:ARG:NH1	1.87	0.73
1:A:376:ASP:OD1	1:A:382:ARG:CZ	2.37	0.72
1:A:85:GLY:HA2	1:A:381:GLN:HE21	1.53	0.72
1:A:260:ARG:HD2	6:A:975:HOH:O	1.88	0.72
1:A:200:TRP:CE3	6:A:922:HOH:O	2.43	0.72
4:B:901:HEM:O1A	6:B:1151:HOH:O	2.08	0.71
1:A:241:PHE:HB3	1:A:242:PRO:CD	2.19	0.71
1:B:126:LYS:HE2	6:B:1146:HOH:O	1.89	0.71
1:B:128:THR:HB	1:B:133:LEU:HD13	1.70	0.71
1:B:80:ARG:HE	1:B:89:ILE:HD13	1.55	0.70
1:A:275:ALA:HB3	1:A:381:GLN:O	1.91	0.70
1:A:325:MET:HE3	1:A:416:VAL:HG22	1.73	0.70
1:B:210:ASN:O	1:B:210:ASN:CG	2.30	0.69
1:A:262:ALA:HB3	6:A:1048:HOH:O	1.91	0.69
1:A:417:LEU:O	1:A:421:GLN:HG2	1.91	0.69
1:A:89:ILE:HD13	1:A:89:ILE:H	1.57	0.69
1:A:438:MET:CE	1:A:469:VAL:HA	2.23	0.69
1:A:213:THR:OG1	1:A:216:GLU:CG	2.41	0.68
1:B:96:HIS:CE1	6:B:1153:HOH:O	2.42	0.68
1:B:252:ARG:NH2	1:B:489:PRO:HD3	2.09	0.68
1:B:114:MET:O	6:B:1080:HOH:O	2.12	0.68
1:A:438:MET:CE	1:A:469:VAL:HG12	2.24	0.67
1:A:375:ARG:HH21	5:A:902:H4B:C4	2.08	0.67
1:B:128:THR:HG21	1:B:133:LEU:HD12	1.75	0.67
1:B:410:THR:O	1:B:414:VAL:HG13	1.95	0.67
1:A:410:THR:O	1:A:414:VAL:HG23	1.95	0.66
1:B:494:ILE:HD11	6:B:1094:HOH:O	1.94	0.66
1:B:390:GLY:HA2	6:B:1037:HOH:O	1.96	0.66
4:A:901:HEM:HBB2	6:A:1025:HOH:O	1.96	0.66
1:A:235:ARG:HG3	1:A:235:ARG:NH1	1.97	0.66
1:A:433:ALA:O	6:A:913:HOH:O	2.14	0.66
1:A:153:ILE:HD12	1:A:153:ILE:H	1.59	0.66
1:A:368:MET:HE3	1:A:370:THR:HG23	1.78	0.66
1:A:235:ARG:HH11	1:A:235:ARG:CG	2.07	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:289:TRP:CE2	1:A:300:PRO:HD3	2.31	0.65
1:B:334:GLN:CG	6:B:1104:HOH:O	2.44	0.65
3:A:497:NH4:N	6:A:1043:HOH:O	2.30	0.64
1:A:326:GLU:OE2	1:A:422:LYS:CE	2.39	0.64
1:B:334:GLN:C	1:B:336:LEU:H	2.06	0.63
1:A:201:SER:CA	6:A:922:HOH:O	2.39	0.62
1:B:334:GLN:HG2	6:B:1104:HOH:O	1.98	0.62
1:B:211:CYS:SG	6:B:1040:HOH:O	2.56	0.62
1:B:396:GLU:HG3	1:B:399:THR:HB	1.81	0.62
1:B:244:ARG:HA	6:B:1072:HOH:O	1.99	0.62
1:B:148:PHE:HE1	1:B:152:LYS:HD2	1.65	0.62
1:A:303:LEU:O	1:A:310:PRO:HA	2.00	0.62
1:A:85:GLY:HA2	1:A:381:GLN:NE2	2.15	0.61
1:A:375:ARG:NH2	5:A:902:H4B:O4	2.33	0.61
1:B:292:ARG:HB2	1:B:297:ASP:OD2	2.00	0.61
1:B:188:HIS:CD2	4:B:901:HEM:C4C	2.88	0.61
1:A:223:ARG:HD3	6:A:956:HOH:O	1.99	0.61
1:A:285:ILE:HD12	1:A:291:PRO:HG3	1.83	0.61
1:A:465:SER:O	1:A:471:HIS:HE1	1.84	0.61
1:B:132:GLU:HB3	6:B:1152:HOH:O	1.90	0.61
1:A:265:GLN:HG3	1:A:265:GLN:O	2.00	0.61
1:B:134:LEU:HD11	1:B:164:THR:HG23	1.82	0.61
4:B:901:HEM:HMC1	4:B:901:HEM:HBC2	1.83	0.61
1:A:213:THR:HG1	1:A:216:GLU:HG3	1.63	0.60
1:A:149:LYS:HG2	1:A:150:GLU:HG3	1.83	0.60
1:B:226:LEU:HD23	1:B:226:LEU:O	2.02	0.60
1:B:408:ALA:O	1:B:412:ILE:HG13	2.00	0.60
1:B:422:LYS:CG	1:B:423:GLN:HG3	2.32	0.60
1:A:375:ARG:NH1	1:A:379:ASP:OD1	2.34	0.60
1:A:393:MET:CE	1:A:411:GLU:HG3	2.32	0.60
1:B:266:MET:HE2	1:B:272:ARG:HD2	1.82	0.60
1:A:199:GLN:HE22	1:A:202:ASN:HD22	1.50	0.60
1:B:148:PHE:CE1	1:B:152:LYS:HD2	2.37	0.60
1:B:188:HIS:CD2	4:B:901:HEM:C3C	2.89	0.59
1:B:393:MET:HE1	1:B:411:GLU:HG2	1.83	0.59
1:B:325:MET:HE1	1:B:416:VAL:HA	1.85	0.59
1:B:388:GLU:HA	1:B:388:GLU:OE2	2.02	0.59
1:B:241:PHE:HB3	1:B:242:PRO:CD	2.31	0.59
1:B:143:GLN:NE2	1:B:186:MET:HE2	2.18	0.59
1:B:141:ILE:CD1	1:B:163:VAL:HG21	2.32	0.58
1:B:465:SER:O	1:B:471:HIS:HE1	1.86	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:221:ILE:HG21	1:B:301:LEU:HD21	1.85	0.58
1:B:459:VAL:HG22	1:B:469:VAL:HG23	1.85	0.58
1:B:381:GLN:H	1:B:381:GLN:NE2	2.02	0.58
4:B:901:HEM:HBC2	4:B:901:HEM:CMC	2.34	0.58
1:B:193:ARG:HD3	1:B:457:TRP:CD2	2.38	0.58
1:B:334:GLN:C	1:B:336:LEU:N	2.59	0.58
1:A:382:ARG:NE	6:A:1003:HOH:O	2.36	0.58
1:B:190:ASN:O	1:B:192:PRO:HD3	2.04	0.58
1:B:215:GLN:HE21	1:B:219:GLN:HE21	1.50	0.58
1:B:340:TRP:HZ3	1:B:383:TYR:CE1	2.22	0.57
1:A:217:MET:CE	1:A:303:LEU:HB3	2.35	0.57
1:A:368:MET:HE3	1:A:370:THR:CG2	2.35	0.57
1:B:381:GLN:HE21	1:B:381:GLN:N	2.03	0.57
1:B:232:GLY:O	1:B:425:VAL:HA	2.04	0.57
1:B:396:GLU:CG	1:B:399:THR:HB	2.34	0.57
1:A:216:GLU:HG2	6:A:1010:HOH:O	2.04	0.57
1:A:330:TYR:HB3	1:A:332:TRP:CE2	2.40	0.57
1:B:375:ARG:NH1	1:B:379:ASP:OD2	2.38	0.56
1:B:368:MET:CE	1:B:433:ALA:HB1	2.36	0.56
1:A:391:ARG:NH1	6:A:1021:HOH:O	1.88	0.56
1:B:141:ILE:HD13	1:B:159:ARG:HG3	1.88	0.56
1:B:368:MET:HE2	1:B:433:ALA:HB1	1.85	0.56
1:B:261:TYR:CE1	1:B:296:PHE:HB3	2.42	0.55
1:A:200:TRP:CD2	6:A:922:HOH:O	2.59	0.55
1:A:217:MET:HE3	1:A:303:LEU:HB3	1.88	0.55
1:B:434:SER:HB3	1:B:468:PRO:HD2	1.87	0.55
1:B:318:ASP:CG	6:B:1166:HOH:O	2.50	0.55
1:B:327:HIS:ND1	1:B:328:PRO:HD2	2.22	0.55
1:B:482:PHE:HE1	6:B:1160:HOH:O	1.89	0.55
1:B:368:MET:CE	1:B:433:ALA:CB	2.83	0.54
1:A:438:MET:HE3	1:A:469:VAL:CA	2.38	0.54
1:B:126:LYS:HD3	1:B:126:LYS:N	2.22	0.54
1:B:152:LYS:HE2	1:B:155:GLU:CD	2.32	0.54
1:B:348:ASN:HD22	1:B:348:ASN:H	1.56	0.54
1:A:485:TYR:OH	4:A:901:HEM:O2D	2.15	0.54
1:B:333:PHE:O	1:B:336:LEU:HB2	2.08	0.54
1:B:438:MET:HE2	1:B:438:MET:HA	1.88	0.53
1:A:154:GLU:CD	1:A:154:GLU:H	2.15	0.53
1:A:327:HIS:CE1	1:A:328:PRO:HD2	2.41	0.53
1:A:327:HIS:ND1	1:A:328:PRO:HD2	2.23	0.53
1:B:217:MET:HG2	1:B:241:PHE:CE2	2.43	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:163:VAL:HG13	1:A:173:TYR:CD2	2.43	0.53
1:A:218:PHE:HB2	1:A:303:LEU:CD2	2.38	0.53
1:B:147:SER:C	1:B:148:PHE:HD2	2.16	0.53
1:B:213:THR:C	1:B:215:GLN:H	2.15	0.53
1:A:333:PHE:O	1:A:336:LEU:HB2	2.09	0.53
1:A:370:THR:HG21	1:A:430:HIS:HB3	1.91	0.53
1:B:334:GLN:O	1:B:336:LEU:N	2.41	0.53
1:A:292:ARG:HB2	1:A:297:ASP:OD2	2.09	0.53
1:B:318:ASP:HB2	6:B:1190:HOH:O	2.08	0.53
1:B:131:GLU:H	1:B:131:GLU:CD	2.12	0.52
1:B:80:ARG:NE	1:B:89:ILE:HD13	2.21	0.52
1:A:133:LEU:HD22	1:A:167:ILE:CD1	2.40	0.52
1:A:260:ARG:HA	1:A:341:TYR:CE1	2.44	0.52
1:A:178:ASP:C	6:A:916:HOH:O	2.51	0.52
1:B:340:TRP:CZ3	1:B:383:TYR:CE1	2.98	0.52
1:B:367:TYR:HD2	6:B:1169:HOH:O	1.92	0.52
1:A:77:GLN:NE2	1:A:78:TYR:N	2.56	0.52
1:A:217:MET:HG2	1:A:241:PHE:CE1	2.44	0.52
1:A:266:MET:SD	1:A:272:ARG:HD2	2.50	0.52
1:A:434:SER:HB3	1:A:468:PRO:HD2	1.92	0.52
1:A:283:LEU:O	1:A:287:LEU:HG	2.10	0.52
1:B:195:ILE:HD13	1:B:368:MET:HE1	1.91	0.52
1:B:368:MET:HE2	1:B:433:ALA:HB3	1.91	0.52
1:B:422:LYS:HG2	1:B:423:GLN:HG3	1.92	0.51
1:A:188:HIS:CD2	4:A:901:HEM:C3C	2.97	0.51
1:A:370:THR:CG2	1:A:430:HIS:HB3	2.40	0.51
4:A:901:HEM:HBC2	4:A:901:HEM:CMC	2.39	0.51
1:A:393:MET:HE3	1:A:411:GLU:HG3	1.92	0.51
1:A:349:MET:HE3	1:A:485:TYR:CE2	2.46	0.51
1:B:121:ARG:HG3	6:B:1167:HOH:O	2.11	0.51
1:B:276:ALA:HB2	6:B:1062:HOH:O	2.10	0.51
1:B:330:TYR:HB3	1:B:332:TRP:NE1	2.26	0.51
1:A:77:GLN:HG3	1:A:78:TYR:H	1.77	0.50
1:A:193:ARG:HG2	1:A:457:TRP:CG	2.46	0.50
1:A:263:GLY:HA2	1:A:272:ARG:O	2.11	0.50
1:B:217:MET:CE	1:B:305:ALA:HB2	2.42	0.50
1:A:346:VAL:HG13	1:A:363:PHE:CE1	2.46	0.50
1:A:440:HIS:O	1:A:443:ASN:HB2	2.12	0.50
1:B:304:GLN:HG3	1:B:308:GLN:O	2.12	0.50
1:A:241:PHE:HB3	1:A:242:PRO:HD2	1.92	0.50
1:A:451:CYS:O	1:A:452:PRO:C	2.52	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:281:THR:O	1:A:285:ILE:HG12	2.10	0.50
1:B:493:HIS:CG	1:B:494:ILE:N	2.80	0.50
1:A:264:TYR:CD1	1:A:264:TYR:N	2.79	0.50
1:B:214:ALA:O	1:B:313:PHE:CE2	2.64	0.50
1:B:210:ASN:O	1:B:210:ASN:OD1	2.30	0.50
1:B:285:ILE:HD12	1:B:291:PRO:CD	2.36	0.50
1:B:393:MET:HE1	1:B:411:GLU:CG	2.42	0.50
1:B:465:SER:O	1:B:471:HIS:CE1	2.64	0.50
1:A:388:GLU:O	1:A:392:ARG:HG2	2.12	0.50
1:B:133:LEU:HD11	1:B:355:GLY:O	2.11	0.50
1:B:243:GLN:HB3	1:B:358:PHE:CE2	2.46	0.49
1:B:80:ARG:HE	1:B:89:ILE:CD1	2.25	0.49
1:B:188:HIS:NE2	4:B:901:HEM:C1C	2.80	0.49
1:B:285:ILE:HD13	1:B:289:TRP:HE3	1.76	0.49
1:B:332:TRP:CE3	1:B:392:ARG:NH1	2.74	0.49
1:A:227:TYR:O	1:A:235:ARG:NH1	2.45	0.49
1:A:437:PHE:O	1:A:440:HIS:HB3	2.12	0.49
1:B:195:ILE:HG21	1:B:368:MET:HE1	1.94	0.49
1:B:316:PRO:O	1:B:319:LEU:N	2.43	0.49
1:B:303:LEU:HD13	1:B:303:LEU:N	2.27	0.49
1:B:398:HIS:HB2	6:B:1110:HOH:O	2.12	0.49
1:A:327:HIS:CG	1:A:328:PRO:CD	2.96	0.49
1:A:336:LEU:HB3	1:A:338:LEU:HD22	1.94	0.49
1:A:188:HIS:CD2	4:A:901:HEM:C4C	3.01	0.48
1:B:134:LEU:HD11	1:B:138:ILE:HD11	1.94	0.48
1:B:224:HIS:ND1	1:B:239:THR:HG22	2.20	0.48
1:B:249:HIS:HA	1:B:307:GLY:HA3	1.95	0.48
1:A:215:GLN:O	1:A:219:GLN:HG3	2.13	0.48
4:A:901:HEM:HBC2	4:A:901:HEM:HMC1	1.95	0.48
1:B:217:MET:HG2	1:B:241:PHE:CZ	2.48	0.48
1:B:320:VAL:HG12	1:B:320:VAL:O	2.13	0.48
1:B:495:TRP:O	1:B:496:GLN:C	2.57	0.48
1:A:223:ARG:NH1	6:A:974:HOH:O	2.34	0.48
1:B:148:PHE:N	1:B:148:PHE:CD2	2.82	0.48
1:B:332:TRP:HE3	1:B:392:ARG:HH11	1.58	0.48
1:B:134:LEU:CD1	1:B:138:ILE:HD11	2.43	0.48
1:B:198:ILE:HB	6:B:1162:HOH:O	2.12	0.48
1:B:422:LYS:HG3	1:B:423:GLN:HG3	1.94	0.48
1:B:78:TYR:CD1	1:B:78:TYR:C	2.92	0.47
1:B:217:MET:HB2	6:B:1040:HOH:O	2.14	0.47
1:B:289:TRP:CG	1:B:300:PRO:HG3	2.49	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:131:GLU:OE1	1:B:131:GLU:N	2.30	0.47
1:B:217:MET:HE2	1:B:305:ALA:HB2	1.96	0.47
1:B:289:TRP:CD1	1:B:300:PRO:HG3	2.50	0.47
1:B:295:ARG:HB3	1:B:296:PHE:CE2	2.49	0.47
1:B:399:THR:O	1:B:399:THR:HG22	2.13	0.47
1:B:213:THR:C	1:B:215:GLN:N	2.72	0.47
1:B:289:TRP:CE2	1:B:300:PRO:HD3	2.49	0.47
1:A:78:TYR:HD1	1:A:79:VAL:N	2.12	0.47
1:B:148:PHE:HD2	1:B:148:PHE:N	2.12	0.47
1:B:217:MET:HE1	1:B:304:GLN:O	2.14	0.47
1:B:254:TRP:CE2	1:B:489:PRO:HB2	2.50	0.47
1:A:218:PHE:CE2	1:A:313:PHE:HB3	2.50	0.47
1:A:251:PHE:O	1:A:252:ARG:HB3	2.14	0.47
1:B:274:ASP:OD1	1:B:274:ASP:C	2.58	0.47
1:A:77:GLN:CG	1:A:78:TYR:H	2.26	0.47
1:A:132:GLU:O	1:A:135:PRO:HD2	2.15	0.47
1:B:221:ILE:CG2	1:B:301:LEU:HD21	2.45	0.47
1:A:393:MET:CE	1:A:411:GLU:CG	2.93	0.47
1:B:368:MET:O	1:B:371:GLU:HB2	2.14	0.47
1:A:326:GLU:HB3	1:A:334:GLN:HG2	1.97	0.47
1:B:216:GLU:CB	6:B:1189:HOH:O	2.20	0.47
1:A:189:ARG:HD2	1:A:200:TRP:CZ3	2.50	0.47
1:A:216:GLU:O	1:A:220:HIS:HD2	1.97	0.47
1:A:252:ARG:HA	1:A:360:ALA:HB2	1.97	0.46
1:B:130:LEU:N	1:B:130:LEU:HD23	2.30	0.46
1:A:327:HIS:CE1	1:A:330:TYR:CD1	3.03	0.46
1:B:302:VAL:C	1:B:303:LEU:HD13	2.40	0.46
1:B:303:LEU:HD22	1:B:313:PHE:CD2	2.50	0.46
1:B:348:ASN:HD22	1:B:348:ASN:N	2.10	0.46
1:A:332:TRP:CH2	1:A:392:ARG:HB2	2.50	0.46
1:A:385:ILE:CD1	1:A:412:ILE:HD13	2.40	0.46
1:B:138:ILE:HG23	1:B:160:LEU:HD22	1.96	0.46
1:B:195:ILE:HG21	1:B:368:MET:CE	2.45	0.46
1:A:258:LEU:HD22	1:A:345:ALA:HB1	1.97	0.46
1:A:396:GLU:HA	6:A:965:HOH:O	2.14	0.46
1:B:198:ILE:HD12	1:B:440:HIS:HB2	1.98	0.46
1:B:258:LEU:HD22	1:B:345:ALA:HB1	1.98	0.46
1:B:217:MET:HE1	1:B:304:GLN:C	2.41	0.46
1:B:275:ALA:O	1:B:278:LEU:HB2	2.16	0.46
1:B:325:MET:HA	1:B:325:MET:CE	2.46	0.46
1:A:399:THR:O	1:A:402:SER:HB3	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:172:THR:HG23	1:A:173:TYR:N	2.31	0.45
1:A:421:GLN:HG2	1:A:421:GLN:H	1.42	0.45
1:A:393:MET:HE1	1:A:411:GLU:CG	2.47	0.45
1:B:206:PHE:HB2	1:B:239:THR:HB	1.99	0.45
1:B:325:MET:HA	1:B:325:MET:HE3	1.99	0.45
1:A:386:LEU:HD13	1:A:405:LYS:HG2	1.99	0.45
1:B:160:LEU:O	1:B:164:THR:OG1	2.35	0.45
1:B:351:LEU:HB3	1:B:358:PHE:HB2	1.98	0.45
1:A:144:TYR:CE2	1:A:178:ASP:O	2.70	0.45
1:A:180:LEU:HD23	1:A:180:LEU:HA	1.72	0.45
1:A:340:TRP:HZ3	1:A:383:TYR:CE1	2.35	0.45
1:A:438:MET:HG3	1:A:468:PRO:HB2	1.98	0.45
1:A:454:ASP:C	1:A:454:ASP:OD1	2.59	0.45
1:B:126:LYS:CE	6:B:1146:HOH:O	2.57	0.45
1:B:230:ASN:HB3	1:B:233:ASN:O	2.16	0.45
1:B:374:VAL:HG11	1:B:461:PRO:HB2	1.99	0.45
1:A:119:LEU:HD12	1:A:119:LEU:HA	1.67	0.45
1:A:177:LEU:C	1:A:179:GLU:H	2.25	0.45
1:A:382:ARG:CD	6:A:1003:HOH:O	2.64	0.45
1:B:211:CYS:SG	1:B:212:SER:N	2.89	0.45
1:A:296:PHE:CE1	1:A:339:LYS:O	2.69	0.44
1:B:114:MET:C	6:B:1080:HOH:O	2.58	0.44
1:B:197:ARG:C	1:B:199:GLN:N	2.74	0.44
1:A:176:THR:HG23	1:A:179:GLU:CD	2.41	0.44
1:A:133:LEU:HD22	1:A:167:ILE:HD13	1.99	0.44
1:A:217:MET:HE2	1:A:305:ALA:HB2	1.98	0.44
1:B:251:PHE:O	1:B:360:ALA:HB2	2.17	0.44
1:A:257:GLN:HG2	1:A:260:ARG:HE	1.83	0.44
1:A:480:SER:HA	1:A:481:PRO:C	2.42	0.44
1:B:80:ARG:HH21	1:B:89:ILE:HD12	1.82	0.44
1:B:81:ILE:HD13	1:B:81:ILE:HA	1.74	0.44
1:A:298:VAL:HG21	1:A:320:VAL:HG11	1.98	0.44
1:A:466:ILE:O	1:A:466:ILE:HG22	2.18	0.44
1:B:480:SER:HA	1:B:481:PRO:C	2.42	0.44
1:B:174:GLN:HA	6:B:1108:HOH:O	2.17	0.44
1:B:197:ARG:C	1:B:199:GLN:H	2.26	0.44
1:A:302:VAL:HG12	1:A:310:PRO:HB2	1.99	0.44
1:A:459:VAL:HA	1:A:460:PRO:HD3	1.85	0.44
1:B:186:MET:O	1:B:189:ARG:HB3	2.18	0.44
1:B:331:GLU:C	1:B:333:PHE:H	2.26	0.44
1:A:258:LEU:HD13	1:A:347:ALA:HB2	2.00	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:114:MET:O	1:B:115:ASN:OD1	2.36	0.44
1:B:134:LEU:O	1:B:138:ILE:HG12	2.18	0.44
1:B:172:THR:OG1	6:B:1161:HOH:O	2.21	0.44
1:B:154:GLU:H	1:B:154:GLU:HG2	1.51	0.43
1:A:253:LEU:HD12	1:A:253:LEU:N	2.33	0.43
1:A:395:LEU:HD23	1:A:404:TRP:HB2	2.00	0.43
1:A:257:GLN:HE21	1:A:260:ARG:NE	2.15	0.43
1:A:301:LEU:HB3	1:A:303:LEU:CD1	2.48	0.43
1:A:301:LEU:HB3	1:A:303:LEU:HD13	2.01	0.43
1:A:374:VAL:O	1:A:378:CYS:HB2	2.19	0.43
1:B:442:GLN:H	1:B:442:GLN:HG2	1.65	0.43
1:A:393:MET:CB	1:A:395:LEU:HD13	2.43	0.43
1:B:425:VAL:O	1:B:426:THR:C	2.61	0.43
1:A:96:HIS:CE1	6:A:992:HOH:O	2.70	0.43
1:A:182:PHE:N	6:A:916:HOH:O	2.28	0.43
1:B:215:GLN:HG3	1:B:219:GLN:HE21	1.84	0.43
1:B:267:PRO:C	1:B:269:GLY:H	2.25	0.43
1:A:273:GLY:HA2	1:A:295:ARG:HA	2.00	0.43
1:A:381:GLN:HB3	1:A:381:GLN:HE21	1.58	0.43
1:A:205:VAL:HG22	1:A:238:ILE:CG2	2.48	0.43
1:B:226:LEU:HD23	1:B:226:LEU:C	2.43	0.43
1:B:336:LEU:HA	1:B:336:LEU:HD12	1.81	0.43
1:B:457:TRP:HA	5:B:902:H4B:N1	2.34	0.43
1:A:85:GLY:CA	6:A:1046:HOH:O	2.51	0.42
1:A:154:GLU:CD	1:A:154:GLU:N	2.77	0.42
1:A:465:SER:O	1:A:471:HIS:CE1	2.67	0.42
1:B:89:ILE:HD11	6:B:1088:HOH:O	2.19	0.42
1:A:296:PHE:HB3	1:A:339:LYS:HE3	2.02	0.42
1:B:224:HIS:ND1	1:B:239:THR:CG2	2.72	0.42
1:B:386:LEU:HD23	1:B:386:LEU:HA	1.89	0.42
1:A:350:LEU:HB2	1:A:486:GLN:CD	2.45	0.42
1:B:438:MET:HG3	1:B:468:PRO:HB2	2.00	0.42
1:B:176:THR:O	1:B:179:GLU:HB2	2.20	0.42
1:B:224:HIS:NE2	1:B:364:ASN:ND2	2.68	0.42
1:B:407:ARG:NE	6:B:1185:HOH:O	1.82	0.42
1:A:349:MET:HE3	1:A:485:TYR:CD2	2.54	0.42
1:A:124:ARG:NH1	1:A:128:THR:OG1	2.53	0.41
1:A:330:TYR:HB3	1:A:332:TRP:NE1	2.35	0.41
1:B:257:GLN:NE2	1:B:260:ARG:CD	2.82	0.41
1:B:332:TRP:CZ3	1:B:392:ARG:HB2	2.55	0.41
1:B:259:ILE:HG22	1:B:341:TYR:CG	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:374:VAL:O	1:B:378:CYS:HB2	2.21	0.41
1:B:411:GLU:OE1	1:B:411:GLU:HA	2.19	0.41
1:A:78:TYR:C	1:A:78:TYR:CD1	2.99	0.41
1:A:186:MET:O	1:A:189:ARG:HB3	2.20	0.41
1:A:191:ALA:HA	1:A:192:PRO:HD2	1.91	0.41
1:A:417:LEU:HD11	6:A:980:HOH:O	2.20	0.41
1:B:215:GLN:HG3	1:B:219:GLN:NE2	2.34	0.41
1:B:488:GLU:HA	1:B:489:PRO:HD2	1.67	0.41
1:B:211:CYS:O	1:B:212:SER:HB3	2.20	0.41
1:B:332:TRP:HE3	1:B:392:ARG:HH12	1.68	0.41
1:B:258:LEU:HB2	1:B:345:ALA:HB3	2.02	0.41
1:A:297:ASP:HB3	6:A:1048:HOH:O	1.82	0.41
1:A:325:MET:CE	1:A:416:VAL:HG22	2.46	0.41
1:A:366:TRP:CZ2	4:A:901:HEM:HBB1	2.56	0.41
1:A:375:ARG:NE	6:A:1001:HOH:O	1.93	0.41
1:B:123:PRO:HG3	1:B:492:THR:HG21	2.02	0.41
1:B:188:HIS:HD2	4:B:901:HEM:C4C	2.38	0.41
1:B:348:ASN:H	1:B:348:ASN:ND2	2.18	0.41
1:A:353:VAL:HB	1:A:481:PRO:HB3	2.03	0.41
1:B:268:ASP:HB2	1:B:270:THR:HG23	2.03	0.41
1:B:393:MET:HB2	6:B:1037:HOH:O	2.21	0.41
1:B:138:ILE:HG23	1:B:160:LEU:CD2	2.51	0.41
1:B:277:THR:O	1:B:278:LEU:C	2.64	0.41
1:A:228:ALA:O	1:A:234:ILE:HA	2.21	0.40
1:A:249:HIS:HB3	1:A:306:ASP:OD1	2.20	0.40
1:A:258:LEU:HD12	1:A:258:LEU:HA	1.89	0.40
1:B:348:ASN:N	1:B:348:ASN:ND2	2.69	0.40
1:A:470:PHE:CD1	1:A:470:PHE:C	2.99	0.40
1:B:111:GLY:O	1:B:112:SER:CB	2.68	0.40
1:B:487:ILE:O	1:B:488:GLU:C	2.65	0.40
1:A:374:VAL:HG11	1:A:462:VAL:HG13	2.04	0.40
1:A:438:MET:HE1	1:A:472:GLN:CB	2.52	0.40
1:A:488:GLU:HB2	1:A:491:LYS:HD2	2.04	0.40
1:B:210:ASN:OD1	1:B:210:ASN:C	2.64	0.40
1:A:239:THR:O	1:A:361:CYS:HA	2.20	0.40
1:B:200:TRP:CG	1:B:201:SER:N	2.90	0.40
1:B:300:PRO:HB2	1:B:312:VAL:HG13	2.04	0.40

All (15) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:1028:HOH:O	6:A:1030:HOH:O[10_554]	0.33	1.87
1:B:407:ARG:NH1	6:B:1050:HOH:O[8_556]	0.44	1.76
6:B:1156:HOH:O	6:B:1156:HOH:O[8_556]	0.80	1.40
1:B:407:ARG:CZ	6:B:1050:HOH:O[8_556]	1.12	1.08
6:B:1136:HOH:O	6:B:1172:HOH:O[8_556]	1.24	0.96
6:B:1100:HOH:O	6:B:1159:HOH:O[10_555]	1.28	0.92
1:B:411:GLU:OE1	6:B:1183:HOH:O[8_556]	1.65	0.55
1:B:231:ASN:ND2	6:B:1166:HOH:O[10_555]	1.70	0.50
6:B:1100:HOH:O	6:B:1158:HOH:O[10_555]	1.74	0.46
6:B:1050:HOH:O	6:B:1183:HOH:O[8_556]	1.82	0.38
1:B:473:GLU:OE1	6:B:1144:HOH:O[8_556]	1.83	0.37
1:B:407:ARG:NE	6:B:1050:HOH:O[8_556]	1.93	0.27
6:B:1137:HOH:O	6:B:1137:HOH:O[8_556]	2.02	0.18
6:B:1141:HOH:O	6:B:1148:HOH:O[8_556]	2.05	0.15
1:A:462:VAL:CB	6:A:1030:HOH:O[10_554]	2.19	0.01

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	404/431 (94%)	365 (90%)	38 (9%)	1 (0%)	43	64
1	B	408/431 (95%)	366 (90%)	40 (10%)	2 (0%)	24	43
All	All	812/862 (94%)	731 (90%)	78 (10%)	3 (0%)	30	50

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	464	GLY
1	B	464	GLY
1	B	335	GLU

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	357/379 (94%)	320 (90%)	37 (10%)	7	13
1	B	357/379 (94%)	313 (88%)	44 (12%)	4	8
All	All	714/758 (94%)	633 (89%)	81 (11%)	5	11

All (81) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	77	GLN
1	A	80	ARG
1	A	81	ILE
1	A	89	ILE
1	A	97	LYS
1	A	115	ASN
1	A	119	LEU
1	A	141	ILE
1	A	169	THR
1	A	180	LEU
1	A	195	ILE
1	A	223	ARG
1	A	235	ARG
1	A	256	SER
1	A	258	LEU
1	A	260	ARG
1	A	264	TYR
1	A	268	ASP
1	A	272	ARG
1	A	290	LYS
1	A	303	LEU
1	A	338	LEU
1	A	346	VAL
1	A	348	ASN
1	A	353	VAL
1	A	370	THR
1	A	381	GLN

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Mol	Chain	Res	Type
1	A	384	ASN
1	A	386	LEU
1	A	387	GLU
1	A	391	ARG
1	A	397	THR
1	A	403	LEU
1	A	421	GLN
1	A	422	LYS
1	A	456	ILE
1	A	475	LEU
1	B	81	ILE
1	B	94	LEU
1	B	96	HIS
1	B	113	ILE
1	B	114	MET
1	B	119	LEU
1	B	121	ARG
1	B	126	LYS
1	B	130	LEU
1	B	133	LEU
1	B	164	THR
1	B	172	THR
1	B	180	LEU
1	B	203	LEU
1	B	236	SER
1	B	239	THR
1	B	258	LEU
1	B	268	ASP
1	B	301	LEU
1	B	303	LEU
1	B	308	GLN
1	B	324	THR
1	B	325	MET
1	B	334	GLN
1	B	336	LEU
1	B	338	LEU
1	B	339	LYS
1	B	348	ASN
1	B	353	VAL
1	B	381	GLN
1	B	386	LEU
1	B	388	GLU

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Mol	Chain	Res	Type
1	B	391	ARG
1	B	395	LEU
1	B	399	THR
1	B	402	SER
1	B	409	VAL
1	B	412	ILE
1	B	414	VAL
1	B	417	LEU
1	B	442	GLN
1	B	475	LEU
1	B	486	GLN
1	B	494	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	77	GLN
1	A	91	HIS
1	A	95	HIS
1	A	174	GLN
1	A	188	HIS
1	A	199	GLN
1	A	204	GLN
1	A	219	GLN
1	A	220	HIS
1	A	233	ASN
1	A	257	GLN
1	A	348	ASN
1	A	381	GLN
1	A	384	ASN
1	A	398	HIS
1	A	471	HIS
1	B	95	HIS
1	B	143	GLN
1	B	219	GLN
1	B	220	HIS
1	B	231	ASN
1	B	233	ASN
1	B	257	GLN
1	B	265	GLN
1	B	334	GLN
1	B	348	ASN

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Mol	Chain	Res	Type
1	B	364	ASN
1	B	381	GLN
1	B	471	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 2 are modelled with single atom - leaving 5 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$
4	HEM	B	901	-	50,50,50	1.98	9 (18%)	67,82,82	1.44	8 (11%)
5	H4B	B	902	-	17,18,18	3.96	7 (41%)	14,26,26	2.26	7 (50%)
5	H4B	A	902	-	17,18,18	4.11	7 (41%)	14,26,26	2.39	7 (50%)
4	HEM	A	901	1	50,50,50	1.93	9 (18%)	67,82,82	1.30	8 (11%)
2	SO4	A	1	-	4,4,4	0.23	0	6,6,6	0.16	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
4	HEM	A	901	1	-	2/14/54/54	-
4	HEM	B	901	-	-	5/14/54/54	-
5	H4B	A	902	-	-	0/8/17/17	0/2/2/2
5	H4B	B	902	-	-	0/8/17/17	0/2/2/2

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	902	H4B	O4-C4	10.05	1.42	1.23
5	A	902	H4B	O4-C4	9.97	1.42	1.23
4	B	901	HEM	FE-ND	7.92	2.19	1.94
5	A	902	H4B	C8A-N1	7.87	1.48	1.36
4	B	901	HEM	C3D-C2D	7.11	1.52	1.36
4	A	901	HEM	C3D-C2D	7.09	1.52	1.36
5	B	902	H4B	C4A-C8A	-7.02	1.26	1.38
4	A	901	HEM	FE-ND	6.75	2.15	1.94
5	A	902	H4B	C4A-C8A	-6.67	1.27	1.38
5	B	902	H4B	C8A-N1	6.58	1.46	1.36
5	A	902	H4B	C7-C6	5.83	1.57	1.52
5	B	902	H4B	C7-C6	5.03	1.57	1.52
5	B	902	H4B	C4A-N5	4.16	1.47	1.37
5	A	902	H4B	C2-N2	4.14	1.43	1.34
5	B	902	H4B	C2-N2	4.10	1.43	1.34
4	A	901	HEM	FE-NB	3.98	2.07	1.94
5	A	902	H4B	C4A-N5	3.96	1.47	1.37
4	A	901	HEM	FE-NA	3.45	2.06	1.95
4	B	901	HEM	CAB-C3B	3.13	1.55	1.47
4	A	901	HEM	CAB-C3B	3.10	1.55	1.47
4	A	901	HEM	CAC-C3C	3.07	1.55	1.47
4	B	901	HEM	FE-NA	2.89	2.04	1.95
4	B	901	HEM	FE-NB	2.60	2.02	1.94
4	B	901	HEM	CAC-C3C	2.59	1.54	1.47
5	B	902	H4B	C2-N1	2.39	1.39	1.33
5	A	902	H4B	C2-N1	2.20	1.38	1.33
4	A	901	HEM	CMB-C2B	2.10	1.55	1.50
4	B	901	HEM	CMC-C2C	2.10	1.55	1.50
4	A	901	HEM	CMD-C2D	2.05	1.55	1.50
4	B	901	HEM	CMA-C3A	2.05	1.55	1.50
4	B	901	HEM	CMB-C2B	2.04	1.55	1.50
4	A	901	HEM	CMA-C3A	2.01	1.54	1.50

All (30) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	901	HEM	CAD-C3D-C4D	5.05	133.50	124.70
4	A	901	HEM	C4D-ND-C1D	4.61	110.66	105.21
4	B	901	HEM	C4D-ND-C1D	4.50	110.53	105.21
5	A	902	H4B	O4-C4-C4A	-4.21	117.11	127.26
5	A	902	H4B	C2-N1-C8A	3.79	120.05	113.36
5	B	902	H4B	C2-N1-C8A	3.55	119.62	113.36
5	B	902	H4B	C2-N3-C4	-3.49	118.78	125.11
5	B	902	H4B	O9-C9-C10	3.40	115.61	109.14
5	B	902	H4B	O4-C4-C4A	-3.23	119.48	127.26
4	B	901	HEM	CAD-C3D-C2D	-3.17	121.93	127.87
5	A	902	H4B	C4A-C4-N3	3.13	120.72	112.13
5	A	902	H4B	O9-C9-C10	3.08	115.02	109.14
5	B	902	H4B	C4A-C4-N3	3.08	120.59	112.13
5	A	902	H4B	C2-N3-C4	-2.80	120.03	125.11
5	A	902	H4B	O10-C10-C11	2.69	117.73	109.68
5	A	902	H4B	C11-C10-C9	2.59	115.28	112.11
4	A	901	HEM	CAD-CBD-CGD	-2.57	106.84	113.67
4	A	901	HEM	CAD-C3D-C4D	2.38	128.84	124.70
4	A	901	HEM	CMD-C2D-C1D	2.37	128.73	125.03
4	B	901	HEM	CMD-C2D-C1D	2.35	128.71	125.03
5	B	902	H4B	O10-C10-C11	2.34	116.69	109.68
4	A	901	HEM	C1D-C2D-C3D	-2.32	104.55	106.98
4	A	901	HEM	C2A-C1A-NA	-2.28	107.62	110.15
4	A	901	HEM	C1B-NB-C4B	2.28	107.91	105.21
4	B	901	HEM	C2B-C1B-NB	-2.19	107.32	109.84
4	B	901	HEM	C1B-NB-C4B	2.17	107.78	105.21
4	B	901	HEM	C3B-C2B-C1B	2.12	108.01	106.41
4	A	901	HEM	CBA-CAA-C2A	-2.11	106.69	112.53
4	B	901	HEM	C4A-C3A-C2A	2.07	109.19	106.82
5	B	902	H4B	C11-C10-C9	2.03	114.60	112.11

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	901	HEM	C2D-C3D-CAD-CBD
4	B	901	HEM	C4D-C3D-CAD-CBD
4	B	901	HEM	C3D-CAD-CBD-CGD
4	B	901	HEM	CAD-CBD-CGD-O1D
4	A	901	HEM	CAA-CBA-CGA-O1A
4	B	901	HEM	CAD-CBD-CGD-O2D

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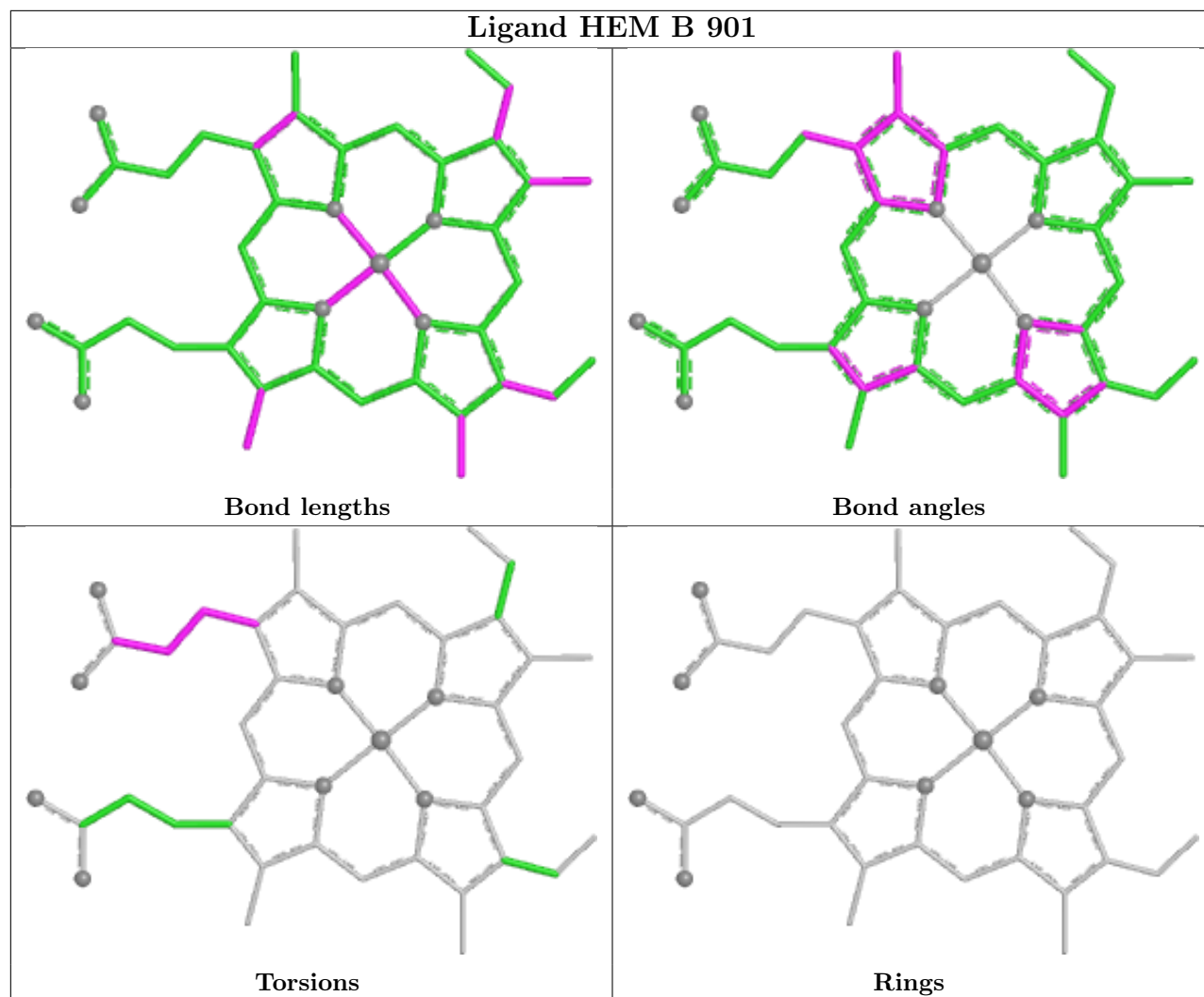
Mol	Chain	Res	Type	Atoms
4	A	901	HEM	CAA-CBA-CGA-O2A

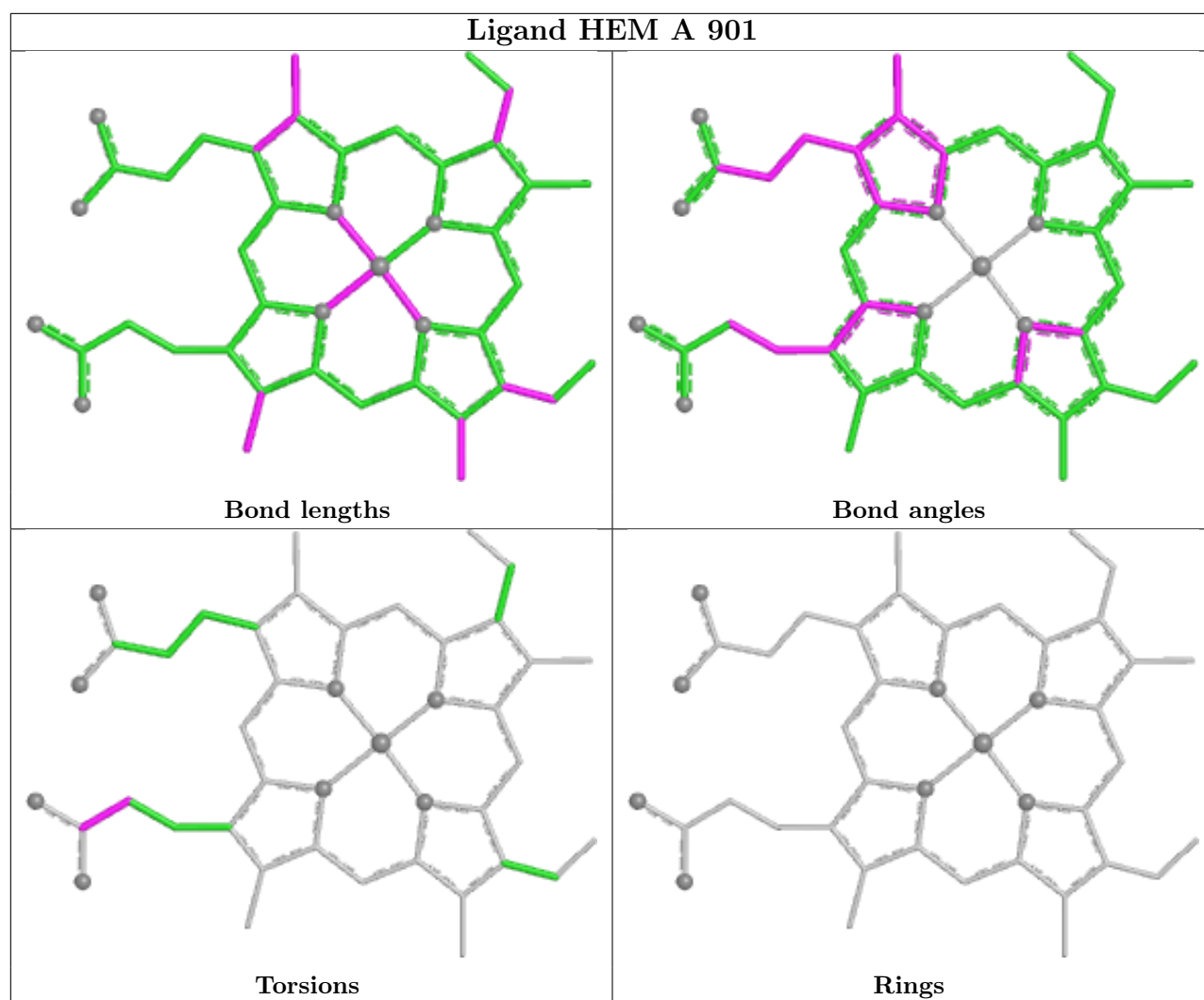
There are no ring outliers.

4 monomers are involved in 17 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	901	HEM	7	0
5	B	902	H4B	1	0
5	A	902	H4B	2	0
4	A	901	HEM	7	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	408/431 (94%)	0.24	10 (2%) 58 56	43, 69, 113, 161	0
1	B	412/431 (95%)	0.23	14 (3%) 48 46	38, 68, 110, 160	0
All	All	820/862 (95%)	0.24	24 (2%) 53 52	38, 69, 112, 161	0

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	110	LEU	3.8
1	B	214	ALA	3.5
1	B	133	LEU	3.2
1	A	495	TRP	3.0
1	B	471	HIS	3.0
1	B	109	CYS	2.8
1	B	267	PRO	2.6
1	B	213	THR	2.5
1	A	383	TYR	2.5
1	A	269	GLY	2.5
1	B	210	ASN	2.4
1	A	267	PRO	2.4
1	B	391	ARG	2.3
1	A	270	THR	2.2
1	A	271	ILE	2.2
1	B	494	ILE	2.2
1	B	100	SER	2.2
1	B	407	ARG	2.1
1	A	100	SER	2.1
1	A	329	LYS	2.1
1	B	111	GLY	2.0
1	B	112	SER	2.0
1	A	278	LEU	2.0
1	A	394	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

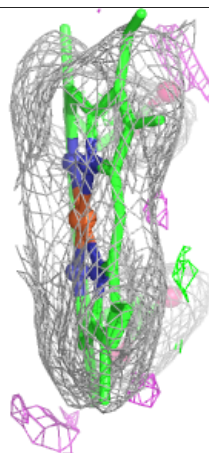
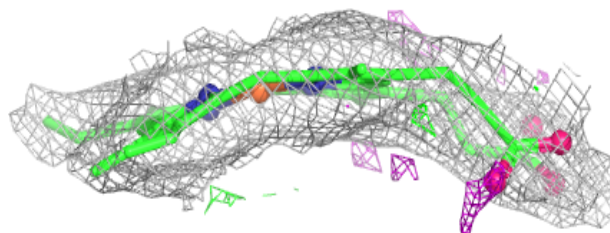
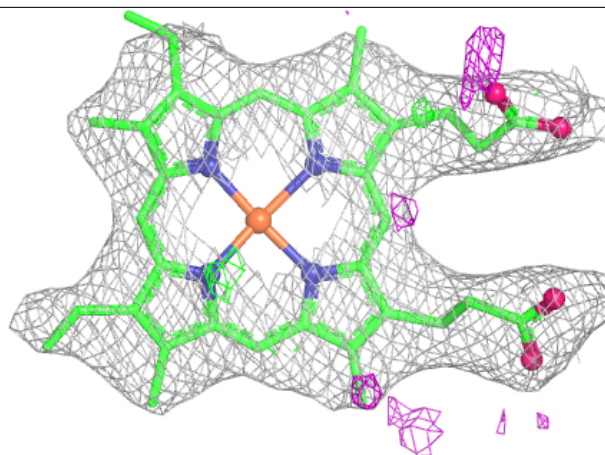
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

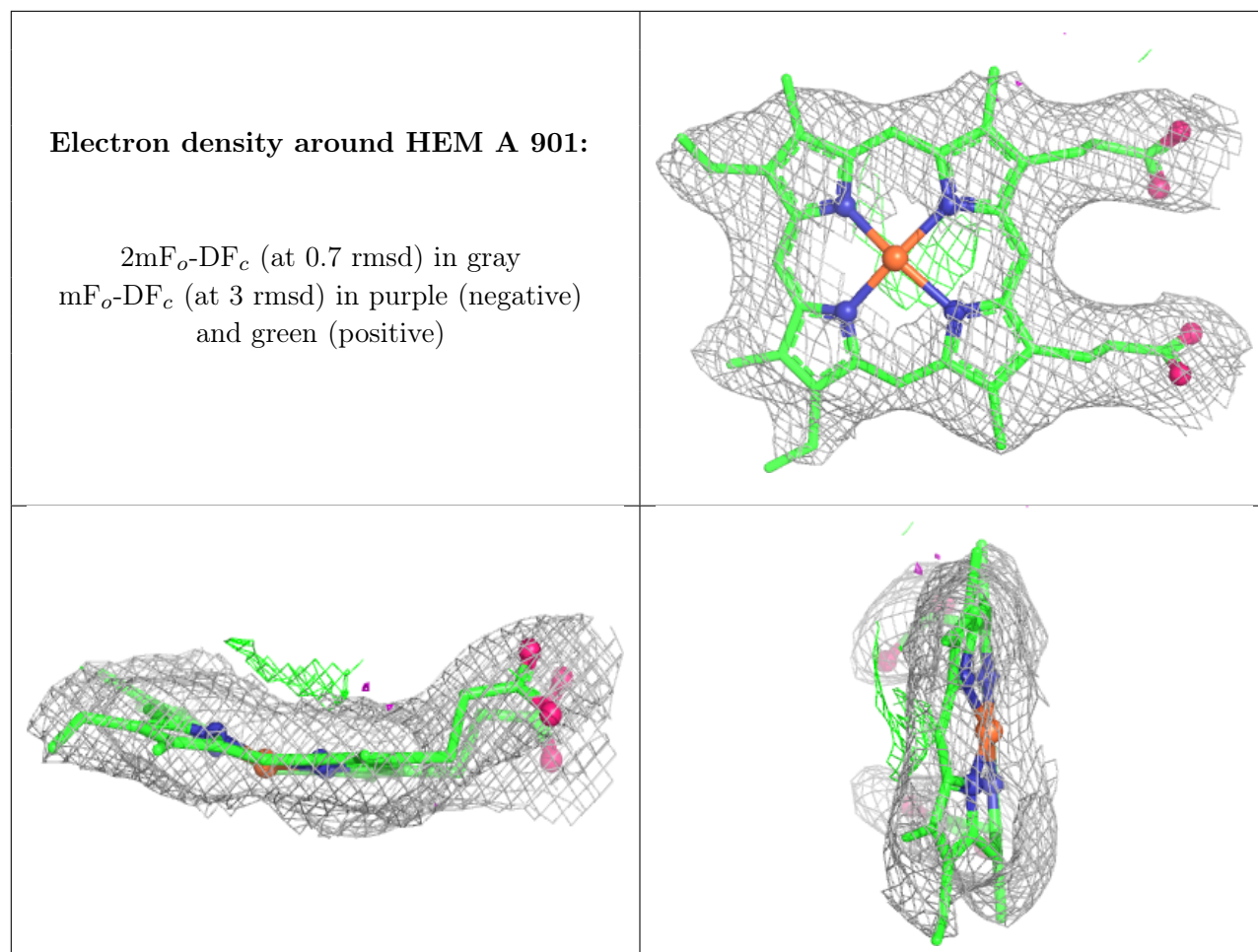
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	NH4	A	497	1/1	0.83	0.41	43,43,43,43	0
3	NH4	B	1	1/1	0.88	0.47	57,57,57,57	0
2	SO4	A	1	5/5	0.89	0.11	103,120,127,128	0
5	H4B	A	902	17/17	0.96	0.07	26,36,45,46	0
4	HEM	B	901	43/43	0.97	0.10	33,51,68,75	0
4	HEM	A	901	43/43	0.97	0.09	28,54,64,68	0
5	H4B	B	902	17/17	0.97	0.07	20,30,49,56	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 901:

$2mF_o - DF_c$ (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.