



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 12:58 AM UTC

PDB ID : 4G2C / pdb_00004g2c
Title : DyP2 from Amycolatopsis sp. ATCC 39116
Authors : Brown, M.E.; Barros, T.; Chang, M.C.Y.
Deposited on : 2012-07-11
Resolution : 2.25 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

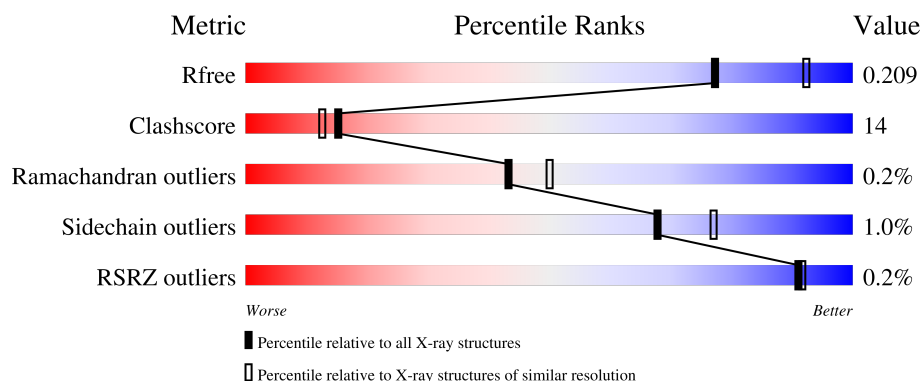
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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	1898 (2.26-2.26)
Clashscore	190562	2005 (2.26-2.26)
Ramachandran outliers	187476	1965 (2.26-2.26)
Sidechain outliers	187428	1966 (2.26-2.26)
RSRZ outliers	180081	1898 (2.26-2.26)

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	493	
1	B	493	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	ACT	A	504	-	-	X	-
4	ACT	A	505	-	-	X	-
4	ACT	A	507	-	-	X	-
4	ACT	A	509	-	-	X	-
4	ACT	A	511	-	-	X	-
4	ACT	A	517	-	-	X	-
4	ACT	A	518	-	-	X	-
4	ACT	A	521	-	-	X	-
4	ACT	A	523	-	-	X	-
4	ACT	A	525	-	-	X	-
4	ACT	B	503	-	-	X	-
4	ACT	B	506	-	-	X	-
4	ACT	B	508	-	-	X	-
4	ACT	B	513	-	-	X	-
4	ACT	B	514	-	-	X	-

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 7826 atoms, of which 114 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 DyP2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	462	Total	C	N	O	S	0	0	0
			3532	2216	631	677	8			
1	B	463	Total	C	N	O	S	0	0	0
			3539	2221	632	678	8			

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



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

- Molecule 3 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

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

- Molecule 4 is ACETATE ION (CCD ID: ACT) (formula: $C_2H_3O_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	H	O	0	0
			7	2	3	2		
4	A	1	Total	C	H	O	0	0
			7	2	3	2		
4	A	1	Total	C	H	O	0	0
			7	2	3	2		
4	A	1	Total	C	H	O	0	0
			7	2	3	2		
4	A	1	Total	C	H	O	0	0
			7	2	3	2		
4	A	1	Total	C	H	O	0	0
			7	2	3	2		
4	A	1	Total	C	H	O	0	0
			7	2	3	2		
4	A	1	Total	C	H	O	0	0
			7	2	3	2		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	A	1	Total 7	C 2	H 3	O 2	0	0
4	B	1	Total 7	C 2	H 3	O 2	0	0
4	B	1	Total 7	C 2	H 3	O 2	0	0
4	B	1	Total 7	C 2	H 3	O 2	0	0
4	B	1	Total 7	C 2	H 3	O 2	0	0
4	B	1	Total 7	C 2	H 3	O 2	0	0
4	B	1	Total 7	C 2	H 3	O 2	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	B	1	Total	C	H	O	0	0
			7	2	3	2		
4	B	1	Total	C	H	O	0	0
			7	2	3	2		
4	B	1	Total	C	H	O	0	0
			7	2	3	2		
4	B	1	Total	C	H	O	0	0
			7	2	3	2		
4	B	1	Total	C	H	O	0	0
			7	2	3	2		
4	B	1	Total	C	H	O	0	0
			7	2	3	2		

- Molecule 5 is water.

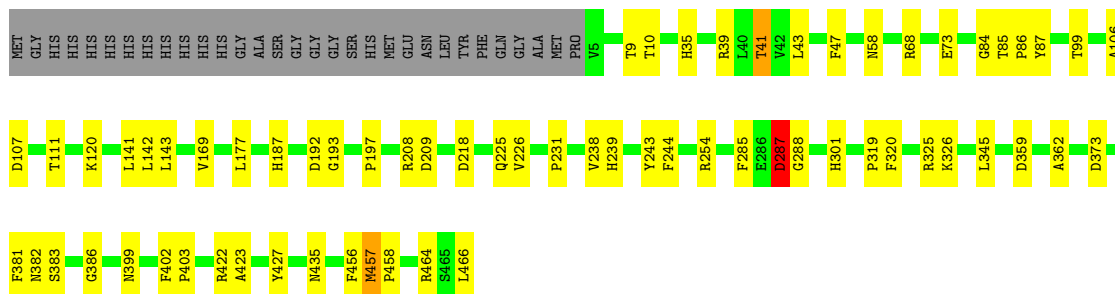
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	231	Total	O	0	0
			231	231		
5	B	170	Total	O	0	0
			170	170		

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.

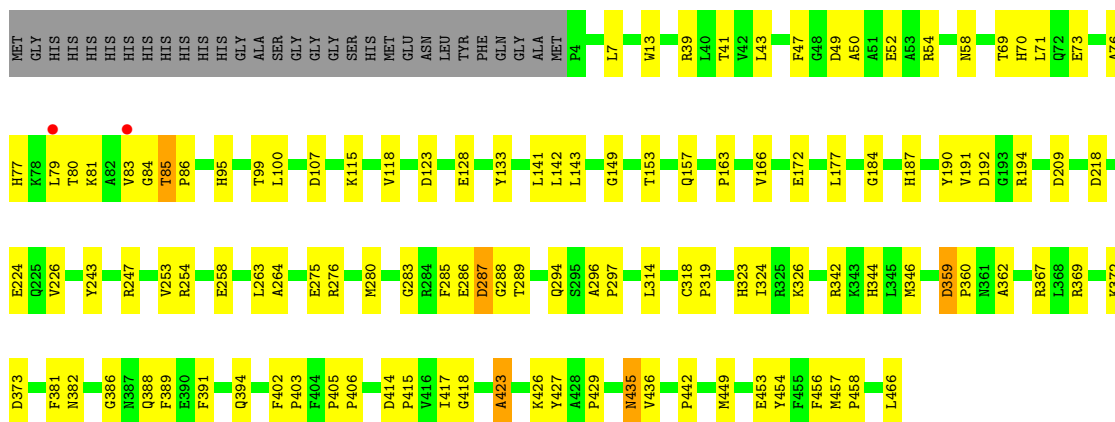
• Molecule 1: DyP2

Chain A: 



• Molecule 1: DyP2

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	48.13Å 77.95Å 252.35Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.04 – 2.25 49.04 – 2.25	Depositor EDS
% Data completeness (in resolution range)	98.7 (49.04-2.25) 98.7 (49.04-2.25)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.20 (at 2.24Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.3_928)	Depositor
R, R_{free}	0.184 , 0.243 (Not available) , 0.209	Depositor DCC
R_{free} test set	2336 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	33.9	Xtriage
Anisotropy	0.268	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 34.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7826	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.37% 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: ACT, MN, 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	0.51	0/3622	0.82	1/4928 (0.0%)
1	B	0.45	0/3630	0.87	11/4939 (0.2%)
All	All	0.48	0/7252	0.84	12/9867 (0.1%)

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

There are no bond length outliers.

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	B	287	ASP	N-CA-C	8.54	123.70	113.28
1	A	287	ASP	N-CA-C	7.89	122.95	113.16
1	B	423	ALA	CA-C-N	-5.84	113.95	119.85
1	B	423	ALA	C-N-CA	-5.84	113.95	119.85
1	B	85	THR	CA-C-N	5.62	125.60	120.21
1	B	85	THR	C-N-CA	5.62	125.60	120.21
1	B	149	GLY	CA-C-N	5.60	125.44	119.28
1	B	149	GLY	C-N-CA	5.60	125.44	119.28
1	B	359	ASP	CA-C-N	5.20	124.92	119.82
1	B	359	ASP	C-N-CA	5.20	124.92	119.82
1	B	318	CYS	CA-C-N	5.17	125.11	119.78
1	B	318	CYS	C-N-CA	5.17	125.11	119.78

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	287	ASP	Peptide

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	3532	0	3407	82	0
1	B	3539	0	3415	102	0
2	A	43	0	30	6	0
2	B	43	0	30	8	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	100	75	75	42	0
4	B	52	39	39	24	0
5	A	231	0	0	7	0
5	B	170	0	0	3	0
All	All	7712	114	6996	194	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 14.

All (194) 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:95:HIS:HB2	4:B:513:ACT:H2	1.31	1.11
1:B:79:LEU:CD1	1:B:80:THR:HG23	1.83	1.07
1:A:319:PRO:HB3	4:A:507:ACT:H1	1.32	1.06
1:B:285:PHE:CD2	4:B:514:ACT:H1	1.93	1.04
1:B:319:PRO:HB3	4:B:506:ACT:H1	1.33	1.04
1:B:285:PHE:HD2	4:B:514:ACT:H1	1.23	1.00
1:B:39:ARG:HH11	4:B:508:ACT:H1	1.23	0.99
1:A:422:ARG:HB3	4:A:523:ACT:H2	1.43	0.99
1:A:73:GLU:HB3	4:A:517:ACT:CH3	1.93	0.97
1:A:422:ARG:HB3	4:A:523:ACT:CH3	1.94	0.97
1:B:95:HIS:HB2	4:B:513:ACT:CH3	1.94	0.97

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:79:LEU:HD13	1:B:80:THR:HG23	1.44	0.96
1:A:197:PRO:HB3	4:A:521:ACT:H2	1.46	0.93
1:B:39:ARG:NH1	4:B:508:ACT:H1	1.84	0.92
1:A:427:TYR:HA	4:A:507:ACT:H3	1.54	0.88
1:B:79:LEU:HD12	1:B:80:THR:HG23	1.57	0.87
1:A:423:ALA:O	4:A:523:ACT:H3	1.77	0.84
1:B:54:ARG:NH1	1:B:100:LEU:O	2.11	0.84
1:A:456:PHE:C	1:A:457:MET:HE2	2.04	0.83
1:B:247:ARG:NH1	1:B:449:MET:HE2	1.94	0.82
1:B:285:PHE:HA	4:B:514:ACT:H2	1.61	0.81
1:B:319:PRO:CB	4:B:506:ACT:H1	2.10	0.81
1:B:254:ARG:HD3	1:B:367:ARG:HA	1.63	0.80
1:B:319:PRO:HB3	4:B:506:ACT:CH3	2.09	0.80
1:A:225:GLN:NE2	4:A:521:ACT:H1	1.96	0.79
4:A:504:ACT:H1	5:A:633:HOH:O	1.82	0.79
1:A:73:GLU:HB3	4:A:517:ACT:H2	1.66	0.77
1:B:372:LYS:NZ	1:B:373:ASP:OD2	2.17	0.77
1:A:208:ARG:HG2	4:B:503:ACT:H1	1.69	0.75
1:B:254:ARG:O	1:B:258:GLU:HG3	1.87	0.75
1:A:457:MET:HE2	1:A:457:MET:N	2.01	0.75
1:B:286:GLU:HG3	4:B:514:ACT:O	1.86	0.75
1:A:386:GLY:O	4:A:511:ACT:H3	1.89	0.72
1:A:383:SER:OG	4:A:503:ACT:CH3	2.38	0.72
1:A:107:ASP:O	1:A:111:THR:HG23	1.90	0.71
1:B:95:HIS:CB	4:B:513:ACT:H2	2.17	0.71
2:B:501:HEM:HBB2	2:B:501:HEM:CMB	2.21	0.70
1:A:73:GLU:CB	4:A:517:ACT:CH3	2.68	0.69
4:A:509:ACT:CH3	1:B:209:ASP:OD1	2.40	0.69
1:A:10:THR:OG1	4:A:527:ACT:H3	1.92	0.69
1:A:85:THR:HB	1:A:86:PRO:CD	2.23	0.69
1:A:84:GLY:HA3	4:A:517:ACT:H3	1.76	0.67
1:A:192:ASP:HA	2:A:501:HEM:HBA2	1.75	0.67
1:A:422:ARG:HB3	4:A:523:ACT:H1	1.77	0.67
1:B:163:PRO:HG2	1:B:166:VAL:HG23	1.78	0.66
1:B:275:GLU:O	4:B:514:ACT:H3	1.94	0.66
1:B:192:ASP:HA	2:B:501:HEM:HBA2	1.77	0.66
1:A:85:THR:HB	1:A:86:PRO:HD2	1.79	0.65
1:A:73:GLU:HB3	4:A:517:ACT:H3	1.78	0.65
1:B:118:VAL:HG13	1:B:123:ASP:HB2	1.79	0.64
1:B:402:PHE:CD1	1:B:403:PRO:HA	2.32	0.64
1:B:287:ASP:O	5:B:678:HOH:O	2.15	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:49:ASP:OD2	1:B:52:GLU:HG3	1.98	0.63
1:B:285:PHE:CD2	4:B:514:ACT:CH3	2.78	0.63
1:A:285:PHE:O	1:A:288:GLY:HA2	1.98	0.63
1:A:381:PHE:HE1	1:A:457:MET:CG	2.11	0.62
1:B:153:THR:HG22	1:B:157:GLN:NE2	2.14	0.62
1:B:85:THR:HB	1:B:86:PRO:CD	2.30	0.62
1:A:423:ALA:H	4:A:523:ACT:H3	1.65	0.62
1:B:177:LEU:HD11	1:B:187:HIS:CE1	2.35	0.61
2:B:501:HEM:HBB2	2:B:501:HEM:HMB2	1.81	0.61
1:B:85:THR:HB	1:B:86:PRO:HD2	1.82	0.61
1:A:319:PRO:CB	4:A:507:ACT:H1	2.19	0.60
1:B:83:VAL:HG23	1:B:84:GLY:N	2.17	0.60
1:B:286:GLU:CG	4:B:514:ACT:O	2.49	0.59
1:B:346:MET:HE1	1:B:389:PHE:HA	1.84	0.59
1:B:47:PHE:HB2	1:B:99:THR:HG21	1.86	0.57
1:B:402:PHE:CG	1:B:403:PRO:HA	2.40	0.57
1:A:73:GLU:CB	4:A:517:ACT:H2	2.30	0.57
1:B:286:GLU:H	4:B:514:ACT:C	2.17	0.57
1:B:381:PHE:C	1:B:382:ASN:HD22	2.12	0.57
1:B:79:LEU:HD13	1:B:80:THR:CG2	2.30	0.56
1:B:39:ARG:HH11	4:B:508:ACT:CH3	2.08	0.56
1:B:194:ARG:N	2:B:501:HEM:O2A	2.39	0.56
1:A:345:LEU:HB2	4:A:521:ACT:H3	1.88	0.55
1:B:107:ASP:HB2	1:B:243:TYR:CZ	2.41	0.55
1:A:381:PHE:HE1	1:A:457:MET:HG2	1.72	0.55
1:B:285:PHE:O	1:B:288:GLY:HA2	2.05	0.55
1:A:209:ASP:OD1	4:B:503:ACT:H2	2.05	0.55
1:B:381:PHE:HE1	1:B:457:MET:CG	2.20	0.55
1:B:403:PRO:O	1:B:405:PRO:HD3	2.07	0.54
1:B:69:THR:O	1:B:73:GLU:HG3	2.07	0.54
1:A:359:ASP:HB3	1:A:362:ALA:HB2	1.90	0.54
1:B:276:ARG:O	1:B:280:MET:HG3	2.08	0.54
1:A:244:PHE:HB2	1:A:457:MET:HE3	1.90	0.54
1:A:197:PRO:HB3	4:A:521:ACT:CH3	2.29	0.54
1:A:244:PHE:CB	1:A:457:MET:HE3	2.36	0.53
1:B:285:PHE:CD2	1:B:297:PRO:HD3	2.43	0.53
1:B:153:THR:HG22	1:B:157:GLN:HE21	1.73	0.53
1:B:50:ALA:O	1:B:54:ARG:HG3	2.09	0.53
1:A:68:ARG:HD3	5:A:797:HOH:O	2.09	0.52
1:A:218:ASP:OD1	4:A:505:ACT:H1	2.09	0.52
1:B:426:LYS:O	4:B:506:ACT:H3	2.10	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:79:LEU:HD12	1:B:80:THR:N	2.24	0.52
4:A:509:ACT:H2	1:B:209:ASP:OD1	2.09	0.52
1:B:115:LYS:NZ	1:B:133:TYR:O	2.42	0.52
2:B:501:HEM:CMC	2:B:501:HEM:HBC2	2.39	0.52
1:A:457:MET:N	1:A:457:MET:CE	2.73	0.52
1:B:326:LYS:NZ	1:B:402:PHE:O	2.34	0.51
1:B:381:PHE:HE1	1:B:457:MET:HG2	1.75	0.51
1:B:323:HIS:HE1	1:B:417:ILE:HD13	1.76	0.50
1:A:423:ALA:H	4:A:523:ACT:CH3	2.24	0.50
1:B:76:ALA:HA	1:B:79:LEU:HG	1.94	0.50
1:B:362:ALA:O	1:B:369:ARG:NH2	2.45	0.50
2:B:501:HEM:HMB2	2:B:501:HEM:CBB	2.41	0.50
1:A:301:HIS:CG	1:B:296:ALA:HB3	2.47	0.50
2:A:501:HEM:HBC2	2:A:501:HEM:CMC	2.41	0.49
1:B:415:PRO:HB3	4:B:505:ACT:H2	1.94	0.49
1:B:247:ARG:CZ	1:B:449:MET:HE2	2.42	0.49
1:A:193:GLY:N	2:A:501:HEM:O2A	2.45	0.49
1:A:9:THR:HG22	4:A:520:ACT:H3	1.93	0.49
1:B:58:ASN:HB2	1:B:466:LEU:O	2.13	0.49
1:A:422:ARG:CB	4:A:523:ACT:H1	2.41	0.48
1:A:435:ASN:HB2	5:A:804:HOH:O	2.12	0.48
1:A:238:VAL:HG23	1:A:239:HIS:CD2	2.48	0.48
1:A:41:THR:OG1	4:A:518:ACT:H2	2.14	0.48
1:A:456:PHE:O	1:A:458:PRO:HD3	2.14	0.47
1:B:77:HIS:O	1:B:81:LYS:HA	2.13	0.47
1:B:429:PRO:HD2	1:B:435:ASN:O	2.14	0.47
1:A:197:PRO:CB	4:A:521:ACT:H2	2.33	0.47
1:B:319:PRO:CA	4:B:506:ACT:H1	2.44	0.47
1:A:254:ARG:NH2	4:A:515:ACT:O	2.47	0.47
1:B:287:ASP:N	1:B:288:GLY:HA2	2.30	0.47
1:B:13:TRP:CG	1:B:71:LEU:HD13	2.49	0.47
1:B:314:LEU:HD23	1:B:406:PRO:HG2	1.97	0.46
1:B:190:TYR:CD2	1:B:286:GLU:HA	2.50	0.46
1:A:285:PHE:O	1:A:288:GLY:CA	2.63	0.46
1:A:423:ALA:N	4:A:523:ACT:CH3	2.78	0.46
1:A:386:GLY:O	4:A:511:ACT:CH3	2.62	0.46
2:A:501:HEM:HBC2	2:A:501:HEM:HMC1	1.98	0.46
1:B:153:THR:CG2	1:B:157:GLN:HE21	2.29	0.46
1:B:423:ALA:C	1:B:442:PRO:HB3	2.41	0.46
1:A:402:PHE:CG	1:A:403:PRO:HA	2.52	0.45
2:A:501:HEM:CMB	2:A:501:HEM:HBB2	2.46	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:453:GLU:HG3	1:B:454:TYR:N	2.31	0.45
1:B:283:GLY:HA3	1:B:324:ILE:HG12	1.98	0.45
1:A:231:PRO:HG2	5:A:723:HOH:O	2.16	0.45
1:B:394:GLN:HG3	5:B:683:HOH:O	2.16	0.45
1:B:435:ASN:N	1:B:435:ASN:OD1	2.49	0.45
1:A:47:PHE:CB	1:A:99:THR:HG21	2.47	0.45
1:A:381:PHE:CE1	1:A:457:MET:HG3	2.50	0.45
1:A:47:PHE:HB2	1:A:99:THR:HG21	1.97	0.45
1:A:301:HIS:CE1	5:A:621:HOH:O	2.70	0.45
1:A:423:ALA:N	4:A:523:ACT:H3	2.30	0.45
1:A:111:THR:HG22	5:A:686:HOH:O	2.16	0.45
1:A:120:LYS:NZ	4:A:525:ACT:OXT	2.47	0.45
1:B:43:LEU:HB2	1:B:141:LEU:HB2	2.00	0.44
1:B:142:LEU:C	1:B:143:LEU:HD12	2.42	0.44
1:B:253:VAL:CG1	1:B:369:ARG:HB3	2.48	0.44
1:A:225:GLN:HE22	4:A:521:ACT:H1	1.78	0.44
1:B:7:LEU:HB3	1:B:224:GLU:HB3	1.98	0.44
1:B:247:ARG:HG2	1:B:449:MET:HE1	1.99	0.44
1:B:70:HIS:HD2	4:B:507:ACT:H2	1.82	0.44
1:B:99:THR:O	1:B:99:THR:HG22	2.18	0.44
1:B:289:THR:CG2	1:B:294:GLN:HB2	2.49	0.43
1:B:359:ASP:HA	1:B:360:PRO:HD3	1.87	0.43
1:B:382:ASN:HB3	1:B:388:GLN:OE1	2.19	0.43
1:B:344:HIS:CE1	1:B:391:PHE:CZ	3.07	0.43
1:B:133:TYR:OH	1:B:172:GLU:OE2	2.33	0.43
1:B:456:PHE:O	1:B:458:PRO:HD3	2.19	0.43
1:A:326:LYS:NZ	1:A:399:ASN:O	2.52	0.42
1:B:218:ASP:O	1:B:342:ARG:NH2	2.35	0.42
1:B:386:GLY:O	1:B:391:PHE:HB2	2.19	0.42
1:A:39:ARG:HD2	4:A:518:ACT:OXT	2.19	0.42
1:A:381:PHE:C	1:A:382:ASN:HD22	2.27	0.42
1:B:414:ASP:O	1:B:418:GLY:HA3	2.19	0.42
1:B:346:MET:N	5:B:638:HOH:O	2.46	0.42
1:B:427:TYR:HA	4:B:506:ACT:H3	2.02	0.42
1:A:373:ASP:HA	5:A:659:HOH:O	2.18	0.42
1:A:106:ALA:O	1:A:107:ASP:C	2.61	0.42
1:A:466:LEU:O	4:A:514:ACT:O	2.37	0.42
1:A:43:LEU:HB2	1:A:141:LEU:HB2	2.01	0.42
1:A:218:ASP:CG	4:A:505:ACT:H1	2.45	0.42
2:A:501:HEM:HBB2	2:A:501:HEM:HMB2	2.01	0.42
4:A:504:ACT:H3	1:B:294:GLN:NE2	2.34	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:427:TYR:O	1:B:429:PRO:HD3	2.19	0.42
1:A:423:ALA:O	4:A:523:ACT:CH3	2.58	0.42
1:A:177:LEU:HD11	1:A:187:HIS:CE1	2.55	0.42
1:A:402:PHE:CD1	1:A:403:PRO:HA	2.54	0.42
1:B:83:VAL:CG2	1:B:84:GLY:N	2.82	0.41
1:A:244:PHE:HB3	1:A:457:MET:HE3	2.02	0.41
1:A:35:HIS:CG	1:A:87:TYR:HB2	2.56	0.41
1:A:142:LEU:C	1:A:143:LEU:HD12	2.45	0.41
1:B:253:VAL:HG12	1:B:369:ARG:HB3	2.03	0.41
1:B:184:GLY:O	1:B:191:VAL:HA	2.21	0.41
2:B:501:HEM:HBC2	2:B:501:HEM:HMC1	2.02	0.41
1:A:243:TYR:O	1:A:381:PHE:HA	2.21	0.41
1:A:381:PHE:CE1	1:A:457:MET:CG	2.98	0.41
1:B:263:LEU:O	1:B:264:ALA:C	2.64	0.41
1:A:320:PHE:HA	1:A:325:ARG:HD3	2.03	0.40
1:A:58:ASN:ND2	1:A:464:ARG:O	2.54	0.40
1:A:120:LYS:HE2	4:A:525:ACT:OXT	2.21	0.40
1:A:287:ASP:N	1:A:288:GLY:HA2	2.37	0.40
2:B:501:HEM:HHA	2:B:501:HEM:CGA	2.51	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	447/493 (91%)	430 (96%)	16 (4%)	1 (0%)	43	50
1	B	461/493 (94%)	441 (96%)	19 (4%)	1 (0%)	43	50
All	All	908/986 (92%)	871 (96%)	35 (4%)	2 (0%)	43	50

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	226	VAL
1	A	226	VAL

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	364/387 (94%)	361 (99%)	3 (1%)	73	80
1	B	365/387 (94%)	361 (99%)	4 (1%)	65	75
All	All	729/774 (94%)	722 (99%)	7 (1%)	68	77

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	41	THR
1	A	169	VAL
1	A	457	MET
1	B	41	THR
1	B	128	GLU
1	B	435	ASN
1	B	436	VAL

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	225	GLN
1	A	394	GLN
1	A	445	GLN
1	B	77	HIS
1	B	157	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 42 ligands modelled in this entry, 2 are monoatomic - leaving 40 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	ACT	A	519	-	3,3,3	0.81	0	3,3,3	1.31	0
4	ACT	A	508	-	3,3,3	0.92	0	3,3,3	1.04	0
4	ACT	A	504	-	3,3,3	0.71	0	3,3,3	1.11	0
4	ACT	A	526	-	3,3,3	0.78	0	3,3,3	1.29	0
4	ACT	A	518	-	3,3,3	0.78	0	3,3,3	1.04	0
4	ACT	A	525	-	3,3,3	1.02	0	3,3,3	0.98	0
4	ACT	A	524	-	3,3,3	0.85	0	3,3,3	1.13	0
2	HEM	B	501	1	50,50,50	1.81	9 (18%)	67,82,82	1.40	8 (11%)
4	ACT	B	510	-	3,3,3	0.74	0	3,3,3	1.45	0
4	ACT	A	510	-	3,3,3	0.87	0	3,3,3	1.02	0
4	ACT	B	512	-	3,3,3	0.78	0	3,3,3	1.45	0
4	ACT	B	513	-	3,3,3	0.80	0	3,3,3	1.04	0
4	ACT	A	527	-	3,3,3	0.71	0	3,3,3	1.06	0
4	ACT	B	506	-	3,3,3	0.81	0	3,3,3	0.76	0
4	ACT	A	512	-	3,3,3	0.83	0	3,3,3	1.18	0
4	ACT	A	507	-	3,3,3	0.78	0	3,3,3	0.80	0
4	ACT	B	514	-	3,3,3	0.70	0	3,3,3	1.08	0
4	ACT	B	504	-	3,3,3	0.84	0	3,3,3	1.14	0
4	ACT	A	521	-	3,3,3	0.72	0	3,3,3	1.13	0
4	ACT	A	506	-	3,3,3	0.80	0	3,3,3	1.24	0
4	ACT	B	515	-	3,3,3	0.74	0	3,3,3	1.25	0
4	ACT	A	523	-	3,3,3	0.92	0	3,3,3	0.32	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	ACT	B	508	-	3,3,3	0.68	0	3,3,3	1.56	1 (33%)
4	ACT	A	517	-	3,3,3	0.83	0	3,3,3	1.02	0
4	ACT	B	503	-	3,3,3	0.70	0	3,3,3	1.25	0
4	ACT	A	509	-	3,3,3	0.76	0	3,3,3	0.78	0
4	ACT	A	514	-	3,3,3	0.81	0	3,3,3	1.35	0
2	HEM	A	501	1	50,50,50	1.90	9 (18%)	67,82,82	1.43	9 (13%)
4	ACT	A	516	-	3,3,3	0.71	0	3,3,3	1.33	0
4	ACT	A	503	-	3,3,3	0.80	0	3,3,3	0.85	0
4	ACT	B	509	-	3,3,3	0.81	0	3,3,3	1.24	0
4	ACT	A	515	-	3,3,3	0.83	0	3,3,3	1.35	0
4	ACT	B	511	-	3,3,3	0.83	0	3,3,3	1.20	0
4	ACT	A	522	-	3,3,3	0.75	0	3,3,3	1.37	0
4	ACT	A	520	-	3,3,3	0.88	0	3,3,3	1.23	0
4	ACT	A	511	-	3,3,3	0.85	0	3,3,3	0.92	0
4	ACT	B	505	-	3,3,3	0.75	0	3,3,3	1.10	0
4	ACT	A	513	-	3,3,3	0.77	0	3,3,3	1.14	0
4	ACT	B	507	-	3,3,3	0.75	0	3,3,3	1.16	0
4	ACT	A	505	-	3,3,3	0.74	0	3,3,3	1.21	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
2	HEM	B	501	1	-	5/14/54/54	-
2	HEM	A	501	1	-	4/14/54/54	-

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	HEM	C3D-C2D	7.40	1.52	1.36
2	A	501	HEM	C3D-C2D	7.31	1.52	1.36
2	A	501	HEM	FE-ND	6.35	2.14	1.94
2	B	501	HEM	FE-NC	4.23	2.09	1.95
2	A	501	HEM	FE-NC	4.07	2.08	1.95
2	B	501	HEM	FE-ND	3.71	2.06	1.94
2	B	501	HEM	FE-NA	3.41	2.06	1.95
2	A	501	HEM	CAC-C3C	2.94	1.55	1.47
2	A	501	HEM	CAB-C3B	2.83	1.54	1.47
2	B	501	HEM	CAB-C3B	2.74	1.54	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	HEM	CMC-C2C	2.55	1.56	1.50
2	B	501	HEM	CAC-C3C	2.51	1.54	1.47
2	A	501	HEM	FE-NA	2.33	2.02	1.95
2	B	501	HEM	FE-NB	2.29	2.02	1.94
2	A	501	HEM	CMB-C2B	2.27	1.55	1.50
2	A	501	HEM	FE-NB	2.18	2.01	1.94
2	B	501	HEM	CMC-C2C	2.06	1.55	1.50
2	B	501	HEM	CAA-C2A	2.05	1.56	1.51

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	HEM	C4D-ND-C1D	5.46	111.67	105.21
2	B	501	HEM	C4D-ND-C1D	5.05	111.19	105.21
2	A	501	HEM	CAD-CBD-CGD	-3.49	104.41	113.67
2	B	501	HEM	CAD-CBD-CGD	-3.23	105.09	113.67
2	A	501	HEM	CBD-CAD-C3D	-3.02	104.19	112.53
2	A	501	HEM	C1B-NB-C4B	2.95	108.70	105.21
2	B	501	HEM	C3B-C4B-NB	-2.78	107.47	109.47
2	B	501	HEM	CHA-C4D-ND	2.75	127.77	124.37
2	A	501	HEM	C1D-C2D-C3D	-2.50	104.35	106.98
2	B	501	HEM	C1B-NB-C4B	2.48	108.15	105.21
2	A	501	HEM	CHA-C4D-ND	2.41	127.35	124.37
2	B	501	HEM	C3B-C2B-C1B	2.40	108.21	106.41
2	A	501	HEM	CHD-C1D-ND	2.39	127.00	124.42
2	B	501	HEM	CMD-C2D-C1D	2.32	128.65	125.03
2	A	501	HEM	C2B-C1B-NB	-2.23	107.27	109.84
4	B	508	ACT	OXT-C-CH3	2.07	123.75	115.05
2	B	501	HEM	C1D-C2D-C3D	-2.02	104.86	106.98
2	A	501	HEM	C3B-C4B-NB	-2.02	108.02	109.47

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	501	HEM	C2D-C3D-CAD-CBD
2	B	501	HEM	C4D-C3D-CAD-CBD
2	B	501	HEM	C2A-CAA-CBA-CGA
2	B	501	HEM	CAD-CBD-CGD-O2D
2	B	501	HEM	CAD-CBD-CGD-O1D
2	A	501	HEM	CAA-CBA-CGA-O2A
2	A	501	HEM	CAD-CBD-CGD-O2D

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Mol	Chain	Res	Type	Atoms
2	A	501	HEM	CAD-CBD-CGD-O1D
2	A	501	HEM	CAA-CBA-CGA-O1A

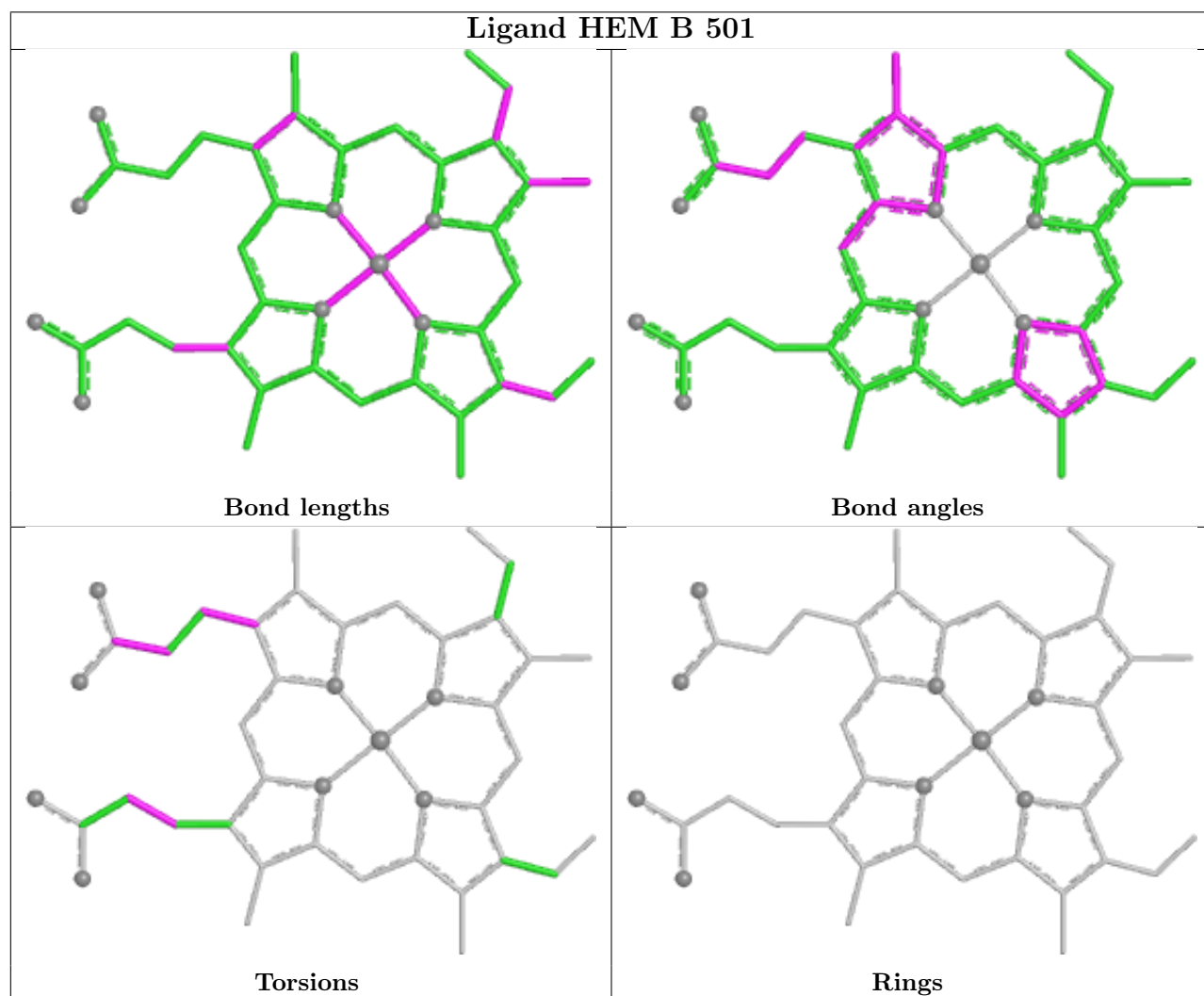
There are no ring outliers.

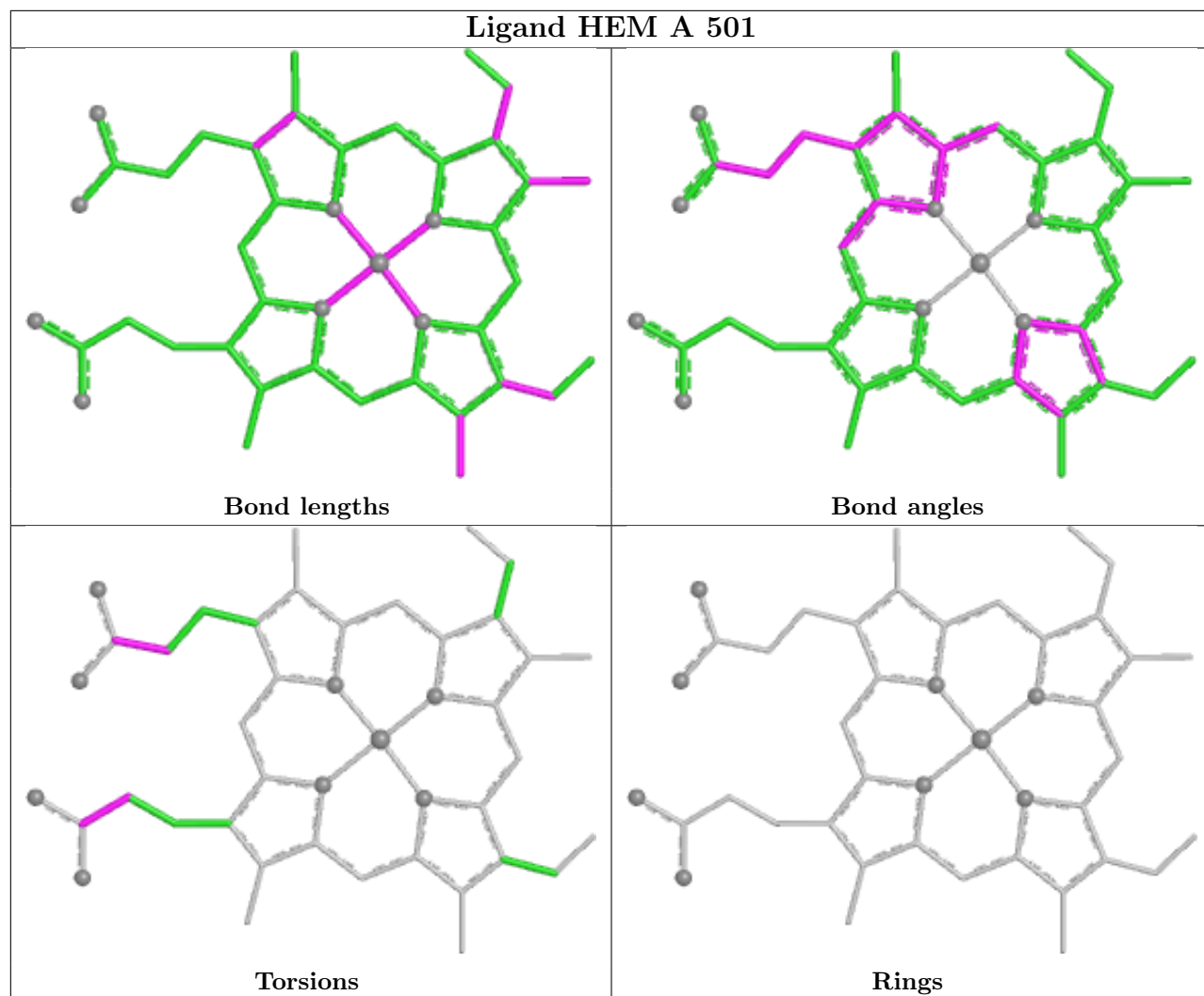
24 monomers are involved in 80 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	504	ACT	2	0
4	A	518	ACT	2	0
4	A	525	ACT	2	0
2	B	501	HEM	8	0
4	B	513	ACT	3	0
4	A	527	ACT	1	0
4	B	506	ACT	6	0
4	A	507	ACT	3	0
4	B	514	ACT	8	0
4	A	521	ACT	6	0
4	A	523	ACT	10	0
4	B	508	ACT	3	0
4	A	517	ACT	6	0
4	B	503	ACT	2	0
4	A	509	ACT	2	0
4	A	514	ACT	1	0
2	A	501	HEM	6	0
4	A	503	ACT	1	0
4	A	515	ACT	1	0
4	A	520	ACT	1	0
4	A	511	ACT	2	0
4	B	505	ACT	1	0
4	B	507	ACT	1	0
4	A	505	ACT	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2		OWAB(Å ²)	Q<0.9
1	A	462/493 (93%)	-0.60	0	100 100	19, 27, 42, 54	0
1	B	463/493 (93%)	-0.25	2 (0%)	88 89	24, 37, 51, 67	0
All	All	925/986 (93%)	-0.42	2 (0%)	91 92	19, 32, 49, 67	0

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	83	VAL	3.1
1	B	79	LEU	2.1

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	ACT	B	514	4/4	0.63	0.32	45,47,54,54	0
4	ACT	A	527	4/4	0.74	0.25	48,53,64,64	0
4	ACT	B	509	4/4	0.77	0.15	46,55,57,57	0

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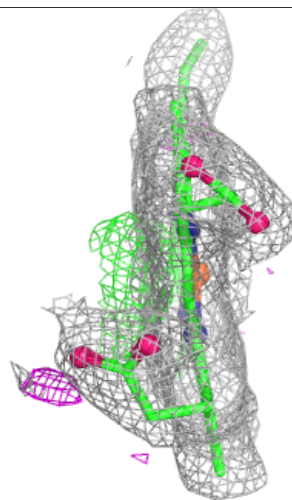
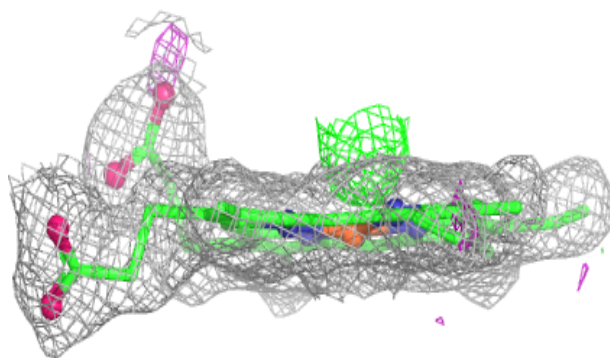
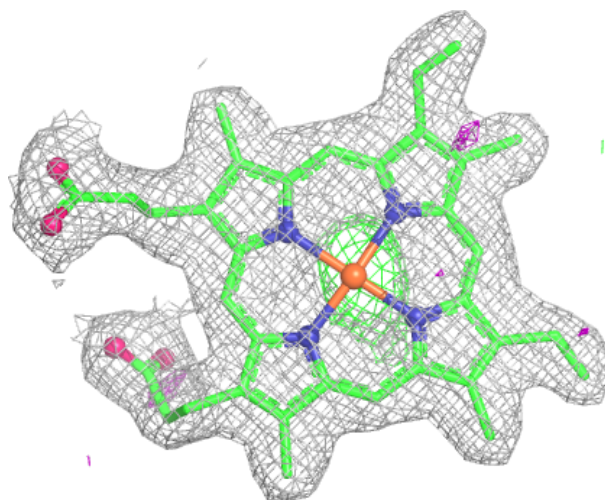
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	ACT	A	525	4/4	0.77	0.24	29,35,43,43	0
4	ACT	B	515	4/4	0.77	0.24	47,55,73,73	0
4	ACT	B	505	4/4	0.78	0.21	39,43,47,47	0
4	ACT	B	513	4/4	0.78	0.23	45,51,66,66	0
4	ACT	A	521	4/4	0.81	0.26	32,39,50,50	0
4	ACT	B	507	4/4	0.81	0.19	42,49,51,51	0
4	ACT	A	507	4/4	0.82	0.19	30,41,49,49	0
4	ACT	A	505	4/4	0.82	0.16	36,44,48,49	0
4	ACT	B	503	4/4	0.82	0.17	34,39,46,46	0
4	ACT	A	526	4/4	0.83	0.15	46,50,55,55	0
4	ACT	A	503	4/4	0.83	0.15	31,36,37,37	0
4	ACT	A	515	4/4	0.83	0.13	50,53,62,62	0
4	ACT	A	514	4/4	0.84	0.11	38,45,53,53	0
4	ACT	A	504	4/4	0.85	0.17	32,38,44,44	0
4	ACT	A	523	4/4	0.85	0.16	31,32,38,38	0
4	ACT	B	506	4/4	0.86	0.16	34,42,51,51	0
4	ACT	A	516	4/4	0.86	0.12	38,45,46,59	0
4	ACT	A	517	4/4	0.86	0.15	33,42,47,47	0
3	MN	A	502	1/1	0.86	0.13	68,68,68,68	0
4	ACT	A	511	4/4	0.86	0.11	28,33,40,49	0
4	ACT	A	524	4/4	0.86	0.14	43,45,54,54	0
4	ACT	A	519	4/4	0.88	0.13	36,42,50,50	0
4	ACT	A	510	4/4	0.88	0.12	35,47,52,52	0
4	ACT	A	522	4/4	0.88	0.11	35,37,44,44	0
4	ACT	B	510	4/4	0.88	0.13	41,43,56,56	0
3	MN	B	502	1/1	0.88	0.11	66,66,66,66	0
4	ACT	B	504	4/4	0.88	0.12	45,48,54,54	0
4	ACT	A	518	4/4	0.88	0.13	38,45,46,47	0
4	ACT	B	508	4/4	0.89	0.10	41,50,51,52	0
4	ACT	A	513	4/4	0.89	0.11	35,37,45,45	0
4	ACT	B	512	4/4	0.90	0.19	39,43,65,65	0
4	ACT	A	509	4/4	0.90	0.12	26,37,47,47	0
4	ACT	A	506	4/4	0.91	0.09	39,50,54,54	0
4	ACT	A	512	4/4	0.91	0.14	39,47,62,62	0
4	ACT	A	520	4/4	0.92	0.10	32,41,50,50	0
4	ACT	A	508	4/4	0.92	0.14	36,42,50,50	0
4	ACT	B	511	4/4	0.95	0.06	39,45,53,53	0
2	HEM	A	501	43/43	0.98	0.06	16,21,24,28	0
2	HEM	B	501	43/43	0.98	0.06	21,29,32,36	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.

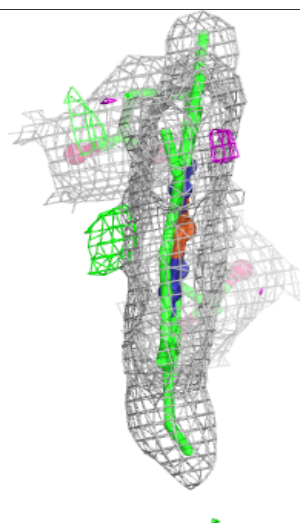
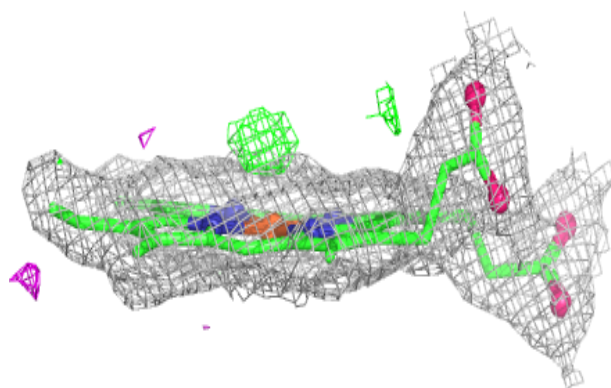
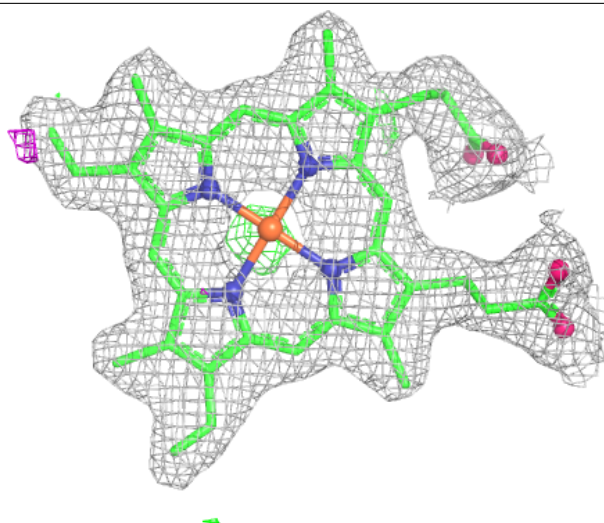
Electron density around HEM A 501:

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



Electron density around HEM B 501:

$2mF_o-DF_c$ (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.