Full wwPDB X-ray Structure Validation Report (i)

May 17, 2026 – 03:28 PM JST

PDB ID	:	9X0N / pdb_00009x0n
Title	:	Crystal structure of a self-sufficient cytochrome P450 from Shimazuella soli.
Authors	:	Liu, Z.W.; Huang, J.-W.; Wang, T.; Chen, C.-C.; Guo, R.-T.
Deposited on	:	2025-09-30
Resolution	:	3.38 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 (i) 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 (i)) were used in the production of this report:

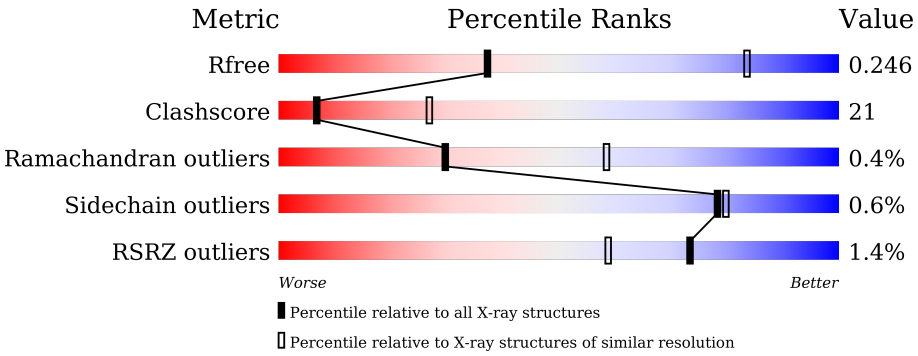
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
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 (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.38 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	1047 (3.42-3.34)
Clashscore	190562	1067 (3.42-3.34)
Ramachandran outliers	187476	1056 (3.42-3.34)
Sidechain outliers	187428	1056 (3.42-3.34)
RSRZ outliers	180081	1047 (3.42-3.34)

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 <=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	1067	57% 38% • 5%
1	B	1067	2% 54% 41% • •

2 Entry composition

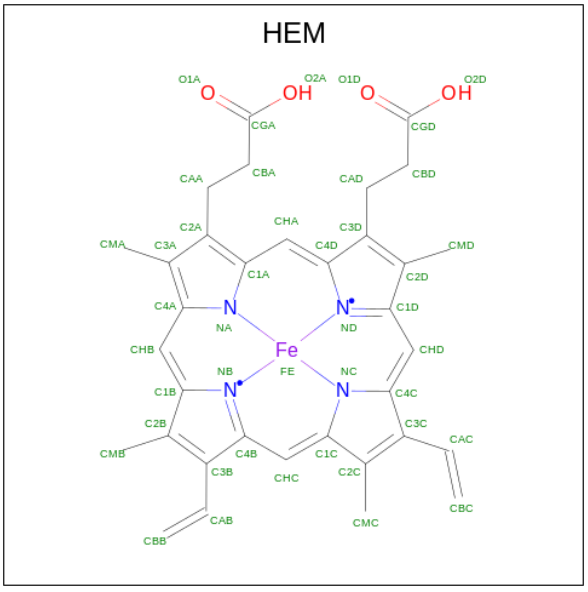
There are 5 unique types of molecules in this entry. The entry contains 16582 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 SoP450.

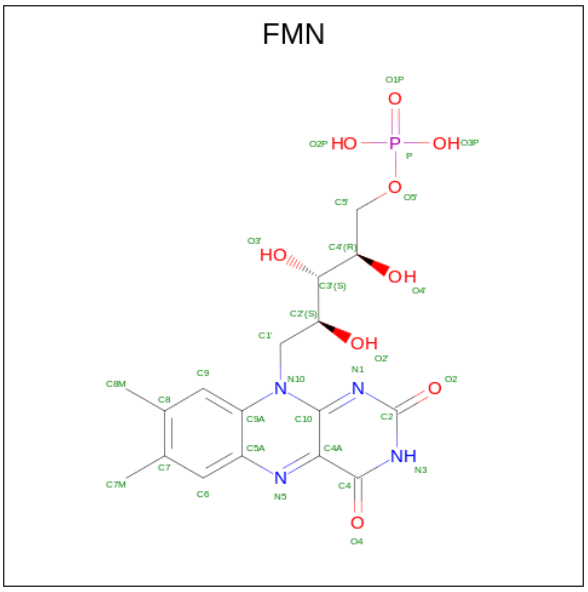
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	1017	Total	C	N	O	S	0	0	0
			8123	5152	1403	1534	34			
1	B	1020	Total	C	N	O	S	0	0	0
			8145	5164	1404	1543	34			

- Molecule 2 is PROTOPORPHYRIN IX CONTAINING FE (CCD ID: HEM) (formula: $C_{34}H_{32}FeN_4O_4$) (labeled as "Ligand of Interest" by depositor).



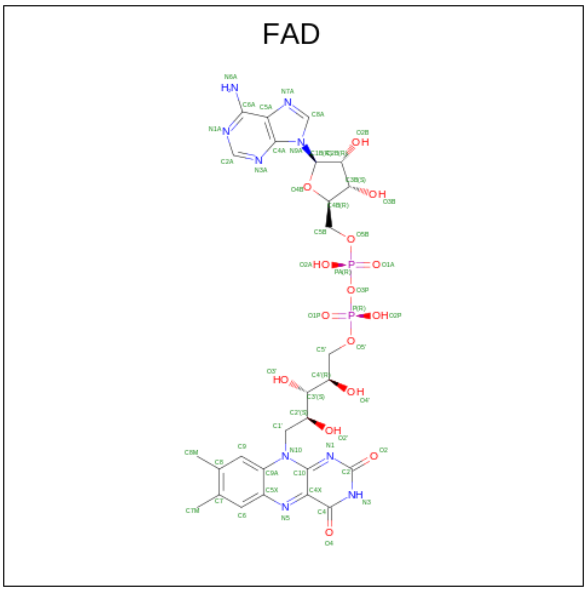
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		
2	B	1	Total	C	Fe	N	O	0	0
			43	34	1	4	4		

- Molecule 3 is FLAVIN MONONUCLEOTIDE (CCD ID: FMN) (formula: $C_{17}H_{21}N_4O_9P$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			31	17	4	9	1		
3	B	1	Total	C	N	O	P	0	0
			31	17	4	9	1		

- Molecule 4 is FLAVIN-ADENINE DINUCLEOTIDE (CCD ID: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 5 is water.

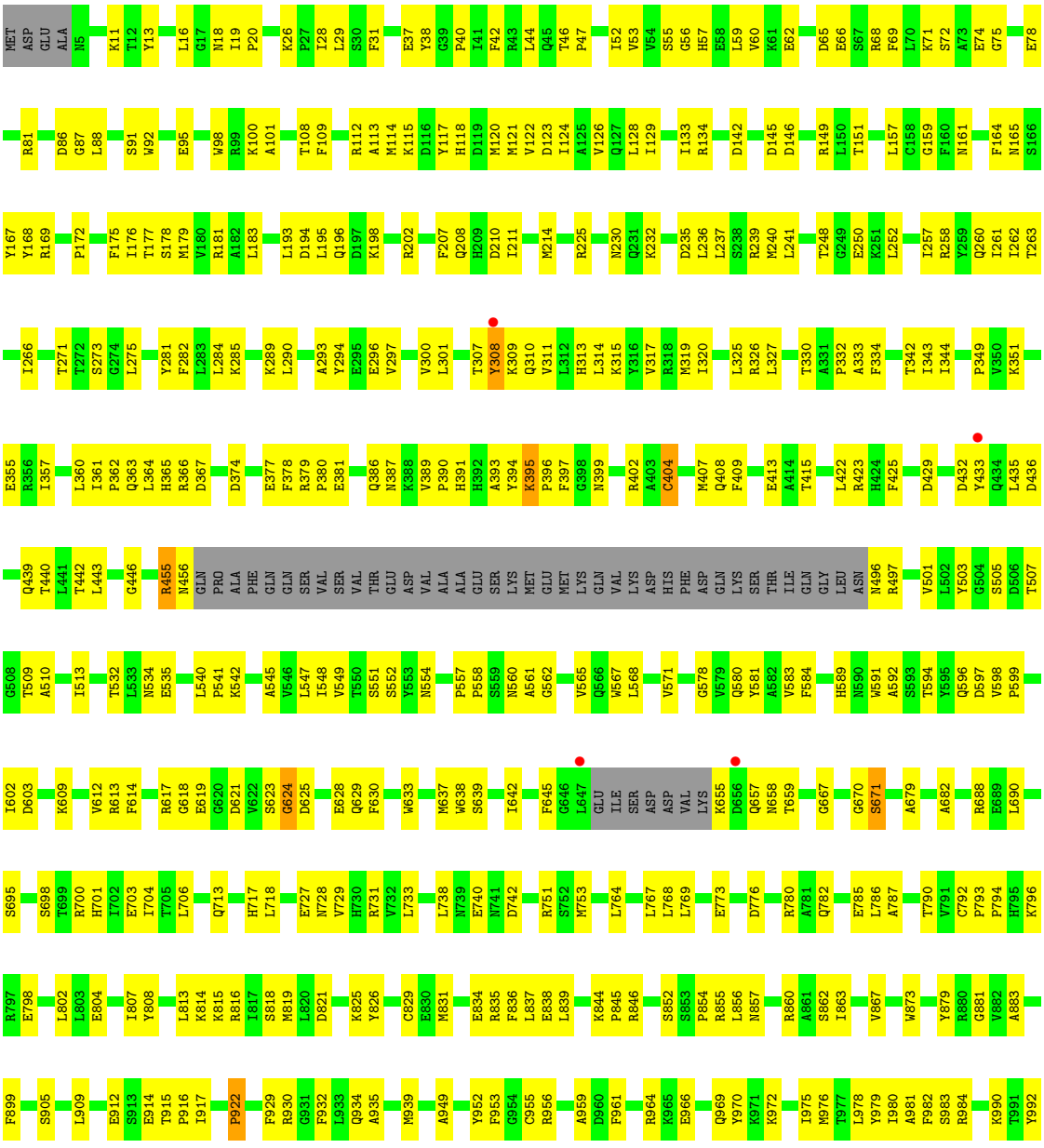
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	43	Total	O	0	0
			43	43		
5	B	17	Total	O	0	0
			17	17		

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.

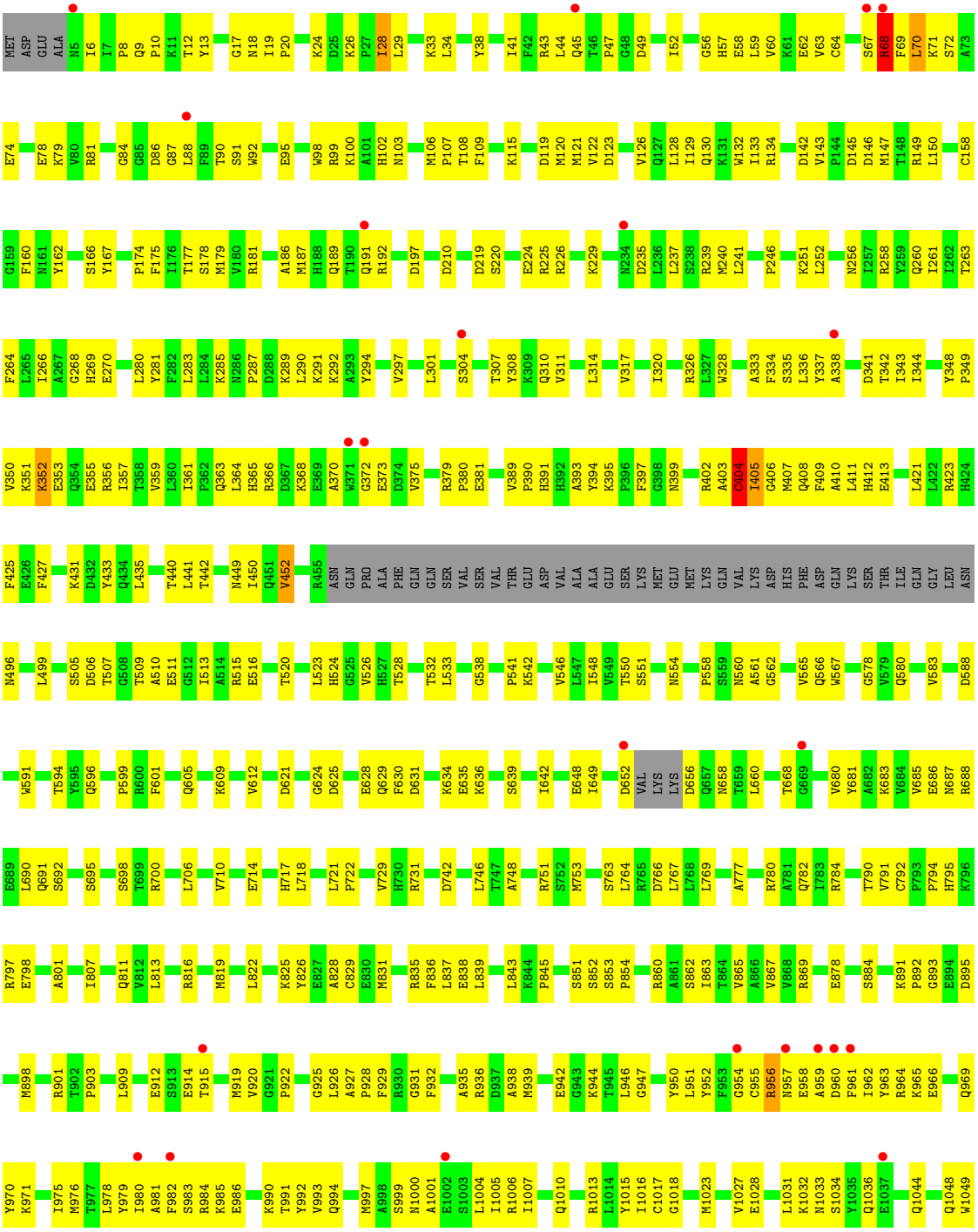
- Molecule 1: SoP450

Chain A:



- Molecule 1: SoP450

Chain B:




L1050
E1051
K1055
Q1058
Y1059
A1060
V1063
L1067

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 31	Depositor
Cell constants a, b, c, α, β, γ	205.56Å 205.56Å 83.64Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	24.69 – 3.38 24.69 – 3.38	Depositor EDS
% Data completeness (in resolution range)	90.0 (24.69-3.38) 89.8 (24.69-3.38)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.33 (at 3.38Å)	Xtriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.193 , 0.247 0.195 , 0.246	Depositor DCC
R_{free} test set	1960 reflections (3.55%)	wwPDB-VP
Wilson B-factor (Å^2)	48.4	Xtriage
Anisotropy	0.066	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , 35.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.012 for -h,-k,l 0.016 for h,-h-k,-l 0.004 for -k,-h,-l	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	16582	wwPDB-VP
Average B, all atoms (Å^2)	47.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.57% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: FAD, FMN, 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	0.52	0/8300	0.81	6/11223 (0.1%)
1	B	0.47	0/8322	0.77	2/11254 (0.0%)
All	All	0.50	0/16622	0.79	8/22477 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	3
All	All	0	4

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	667	GLY	N-CA-C	-8.88	101.73	112.48
1	A	432	ASP	N-CA-C	-6.65	103.12	110.91
1	B	404	CYS	CB-CA-C	-6.56	99.81	110.77
1	A	624	GLY	CA-C-N	-5.67	112.98	122.17
1	A	624	GLY	C-N-CA	-5.67	112.98	122.17
1	A	667	GLY	CA-C-O	-5.66	117.32	122.24
1	B	268	GLY	N-CA-C	5.22	119.45	112.77
1	A	1062	ASP	N-CA-C	-5.13	100.03	108.49

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	881	GLY	Peptide
1	B	68	ARG	Sidechain
1	B	731	ARG	Sidechain
1	B	956	ARG	Sidechain

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	8123	0	8035	333	0
1	B	8145	0	8047	377	0
2	A	43	0	30	5	0
2	B	43	0	30	10	0
3	A	31	0	19	3	0
3	B	31	0	19	3	0
4	A	53	0	31	3	0
4	B	53	0	31	0	0
5	A	43	0	0	3	0
5	B	17	0	0	0	0
All	All	16582	0	16242	700	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 21.

All (700) 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:404:CYS:SG	2:B:1101:HEM:FE	1.23	1.28
1:B:404:CYS:SG	2:B:1101:HEM:NC	2.54	0.81
1:B:404:CYS:SG	2:B:1101:HEM:NB	2.53	0.81
1:A:161:ASN:HA	1:A:232:LYS:HZ2	1.45	0.80
1:B:751:ARG:HB3	1:B:753:MET:HE3	1.61	0.80
1:B:408:GLN:O	1:B:412:HIS:N	2.16	0.78
1:A:271:THR:HA	1:A:330:THR:HG21	1.63	0.78
1:B:108:THR:CG2	1:B:239:ARG:HD3	2.14	0.77
1:A:976:MET:HE3	1:A:978:LEU:HB2	1.67	0.77
1:A:1024:ALA:O	1:A:1028:GLU:HG3	1.85	0.77

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1007:ILE:HA	1:B:1010:GLN:HG2	1.67	0.76
1:B:397:PHE:HD2	1:B:404:CYS:HB2	1.50	0.76
1:B:955:CYS:HB2	1:B:960:ASP:HB2	1.67	0.75
1:B:852:SER:HB3	1:B:862:SER:HB3	1.69	0.75
1:B:635:GLU:HG3	1:B:636:LYS:N	2.02	0.74
1:A:59:LEU:HD12	1:A:59:LEU:H	1.52	0.74
1:A:19:ILE:HG22	1:A:20:PRO:HD3	1.67	0.74
1:B:364:LEU:HD11	1:B:393:ALA:HA	1.69	0.74
1:B:992:TYR:HB3	1:B:994:GLN:HE22	1.51	0.74
1:B:307:THR:HG22	1:B:310:GLN:HG3	1.69	0.73
1:A:819:MET:HE2	1:A:836:PHE:HD1	1.54	0.73
1:B:174:PRO:HA	1:B:177:THR:HG22	1.70	0.73
1:B:928:PRO:HG2	1:B:1017:CYS:SG	2.29	0.73
1:A:161:ASN:HA	1:A:232:LYS:NZ	2.04	0.72
1:A:786:LEU:HD12	1:A:831:MET:HE1	1.71	0.72
1:A:301:LEU:HA	1:A:310:GLN:HG2	1.72	0.72
1:A:362:PRO:O	1:A:366:ARG:HG2	1.90	0.72
1:B:134:ARG:HH12	1:B:496:ASN:HB2	1.51	0.72
1:A:146:ASP:HA	1:A:149:ARG:HD2	1.71	0.72
1:A:970:TYR:HB3	1:A:975:ILE:HD11	1.72	0.72
1:B:92:TRP:HB2	1:B:95:GLU:HG3	1.72	0.72
1:A:275:LEU:HD13	1:A:325:LEU:HG	1.71	0.71
1:B:925:GLY:O	1:B:928:PRO:HD2	1.90	0.71
1:A:307:THR:OG1	1:A:310:GLN:OE1	2.05	0.71
1:A:819:MET:HE2	1:A:836:PHE:CD1	2.25	0.71
1:A:542:LYS:HD2	1:A:578:GLY:H	1.55	0.71
1:A:637:MET:HG3	1:A:638:TRP:N	2.04	0.70
1:B:792:CYS:HB3	1:B:795:HIS:HB2	1.73	0.70
1:B:121:MET:HE2	1:B:413:GLU:HB2	1.72	0.70
1:A:532:THR:HG23	1:A:560:ASN:HB3	1.74	0.70
1:B:71:LYS:HB2	1:B:402:ARG:HG3	1.74	0.70
1:B:507:THR:HB	3:B:1103:FMN:O3P	1.92	0.70
1:B:742:ASP:HB2	1:B:764:LEU:HD12	1.73	0.70
1:B:938:ALA:O	1:B:942:GLU:HG2	1.92	0.70
1:B:960:ASP:O	1:B:962:ILE:N	2.25	0.70
1:A:88:LEU:HD21	1:A:101:ALA:HB3	1.73	0.69
1:B:225:ARG:NH2	1:B:235:ASP:OD2	2.25	0.69
1:A:883:ALA:N	4:A:1103:FAD:O1P	2.24	0.69
1:B:368:LYS:HD2	1:B:373:GLU:HA	1.73	0.69
1:B:777:ALA:HB2	1:B:816:ARG:HA	1.73	0.69
1:A:455:ARG:HG3	1:A:456:ASN:H	1.58	0.69

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:683:LYS:NZ	1:B:893:GLY:O	2.25	0.69
1:B:1004:LEU:HA	1:B:1007:ILE:HD12	1.75	0.69
1:B:88:LEU:HD12	1:B:260:GLN:OE1	1.92	0.69
1:B:706:LEU:HD13	1:B:710:VAL:HG12	1.75	0.69
2:A:1101:HEM:HMB1	2:A:1101:HEM:HBB2	1.74	0.68
1:B:978:LEU:HD13	1:B:980:ILE:HD11	1.76	0.68
1:A:790:THR:HA	1:A:829:CYS:HA	1.75	0.68
1:A:855:ARG:HD2	1:A:935:ALA:HA	1.75	0.68
1:B:912:GLU:HB2	1:B:915:THR:HG23	1.76	0.67
1:A:361:ILE:HG22	1:A:365:HIS:CE1	2.30	0.67
1:B:18:ASN:OD1	1:B:44:LEU:HA	1.94	0.67
1:A:62:GLU:HG3	1:A:68:ARG:HH12	1.60	0.67
1:B:851:SER:HB3	1:B:927:ALA:HB1	1.75	0.67
1:B:119:ASP:O	1:B:122:VAL:HG12	1.94	0.66
1:A:993:VAL:O	1:A:997:MET:HG3	1.95	0.66
1:B:225:ARG:HG3	1:B:237:LEU:HD21	1.77	0.66
1:B:992:TYR:HB3	1:B:994:GLN:NE2	2.10	0.66
1:A:326:ARG:HB2	1:A:394:TYR:HE1	1.59	0.66
1:A:281:TYR:CZ	1:A:435:LEU:HB2	2.31	0.65
1:B:122:VAL:O	1:B:126:VAL:HG13	1.96	0.65
1:B:533:LEU:HD21	1:B:548:ILE:HG23	1.78	0.65
1:B:970:TYR:HB3	1:B:975:ILE:HD11	1.77	0.65
1:A:225:ARG:NH1	1:A:235:ASP:OD2	2.29	0.65
1:A:659:THR:HG22	1:B:838:GLU:OE1	1.96	0.65
1:B:404:CYS:SG	2:B:1101:HEM:NA	2.69	0.65
1:A:510:ALA:HB1	1:A:549:VAL:HG12	1.79	0.65
1:B:652:ASP:OD2	1:B:656:ASP:N	2.29	0.65
1:A:117:TYR:O	1:A:121:MET:HG3	1.96	0.65
1:B:1013:ARG:HG2	1:B:1015:TYR:CE1	2.32	0.64
1:A:360:LEU:HB3	1:A:363:GLN:HB2	1.79	0.64
1:A:548:ILE:HB	1:A:583:VAL:HG22	1.79	0.64
1:A:1007:ILE:HA	1:A:1010:GLN:HG2	1.79	0.64
1:A:981:ALA:HB2	1:A:996:VAL:HG21	1.78	0.64
1:B:1018:GLY:HA3	1:B:1023:MET:HE3	1.80	0.64
1:B:120:MET:CE	1:B:158:CYS:HA	2.28	0.64
1:A:780:ARG:NH2	1:B:625:ASP:OD2	2.31	0.63
1:A:596:GLN:C	1:A:599:PRO:HD2	2.24	0.63
1:A:751:ARG:HG2	1:A:753:MET:HE2	1.81	0.63
1:B:187:MET:CE	1:B:440:THR:HA	2.28	0.63
1:A:311:VAL:HA	1:A:314:LEU:HD12	1.80	0.63
1:B:99:ARG:HG3	1:B:103:ASN:HD21	1.63	0.63

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:499:LEU:HD23	1:B:528:THR:HG22	1.80	0.62
1:B:311:VAL:HG21	1:B:412:HIS:CE1	2.34	0.62
1:A:194:ASP:O	1:A:198:LYS:HG2	2.00	0.62
1:B:84:GLY:HA3	1:B:90:THR:HG21	1.82	0.62
1:B:853:SER:OG	1:B:931:GLY:O	2.18	0.62
1:B:961:PHE:CE2	1:B:964:ARG:HG2	2.35	0.62
1:A:332:PRO:HB3	1:A:443:LEU:HD11	1.82	0.62
1:B:178:SER:HB3	1:B:210:ASP:HB3	1.82	0.61
1:A:181:ARG:NH1	1:A:210:ASP:OD1	2.32	0.61
1:B:914:GLU:O	1:B:947:GLY:HA3	2.00	0.61
1:A:317:VAL:HA	1:A:320:ILE:HD12	1.81	0.61
1:A:307:THR:O	1:A:309:LYS:N	2.34	0.61
1:B:10:PRO:HA	1:B:38:TYR:CZ	2.35	0.61
1:A:581:TYR:CZ	1:A:613:ARG:HB3	2.36	0.61
1:B:19:ILE:HG12	1:B:20:PRO:HD3	1.81	0.61
1:A:390:PRO:HB2	1:A:393:ALA:HB3	1.83	0.60
1:B:57:HIS:HA	1:B:60:VAL:HB	1.83	0.60
1:B:718:LEU:HD11	1:B:898:MET:HB2	1.83	0.60
1:A:284:LEU:HD11	1:A:429:ASP:HB2	1.82	0.60
1:A:364:LEU:HD11	1:A:393:ALA:HA	1.82	0.60
1:B:98:TRP:NE1	1:B:402:ARG:HH12	1.99	0.60
1:B:767:LEU:HD21	1:B:837:LEU:HD21	1.82	0.60
1:A:1022:ARG:O	1:A:1025:PRO:HD2	2.02	0.60
1:B:109:PHE:HB3	1:B:405:ILE:O	2.01	0.60
1:A:496:ASN:N	5:A:1201:HOH:O	2.34	0.60
1:B:219:ASP:OD1	1:B:258:ARG:HD3	2.02	0.60
1:B:550:THR:HG22	1:B:551:SER:O	2.00	0.60
1:B:961:PHE:HD2	1:B:964:ARG:CB	2.15	0.60
1:A:532:THR:HB	1:A:535:GLU:HG3	1.84	0.59
1:B:692:SER:OG	1:B:958:GLU:HG3	2.01	0.59
1:B:407:MET:O	1:B:411:LEU:HG	2.02	0.59
1:A:718:LEU:HD22	1:A:863:ILE:HG21	1.83	0.59
1:A:713:GLN:HA	1:A:854:PRO:HG2	1.83	0.59
1:B:954:GLY:HA2	1:B:981:ALA:HB3	1.85	0.59
1:A:87:GLY:HA2	1:A:260:GLN:NE2	2.17	0.59
1:A:767:LEU:HD21	1:A:837:LEU:HD11	1.83	0.59
1:B:729:VAL:HG21	1:B:769:LEU:HD23	1.84	0.59
1:B:1028:GLU:O	1:B:1032:LYS:HG3	2.03	0.59
1:A:133:ILE:HG13	1:A:134:ARG:N	2.16	0.59
1:B:348:TYR:O	1:B:350:VAL:HG23	2.02	0.59
1:A:289:LYS:NZ	1:A:381:GLU:OE1	2.36	0.58

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1036:GLN:HG2	1:A:1043:GLU:H	1.68	0.58
1:B:404:CYS:SG	2:B:1101:HEM:ND	2.76	0.58
1:A:71:LYS:HE3	2:A:1101:HEM:O2A	2.03	0.58
1:B:831:MET:HE3	1:B:836:PHE:HA	1.85	0.58
1:A:123:ASP:O	1:A:126:VAL:HG22	2.03	0.58
1:B:252:LEU:HD22	1:B:256:ASN:ND2	2.19	0.58
1:A:142:ASP:OD2	1:A:145:ASP:HB2	2.04	0.58
1:A:365:HIS:CE1	1:A:396:PRO:HG3	2.38	0.58
1:A:625:ASP:OD1	1:A:628:GLU:HB3	2.04	0.58
1:B:790:THR:HA	1:B:829:CYS:HA	1.86	0.58
1:A:26:LYS:HB3	1:A:29:LEU:HD23	1.85	0.58
1:A:916:PRO:HB2	1:A:1007:ILE:HG23	1.86	0.57
1:B:425:PHE:HB2	1:B:427:PHE:HE1	1.68	0.57
1:A:690:LEU:HD21	1:A:701:HIS:HB2	1.86	0.57
1:A:929:PHE:O	1:A:932:PHE:HB2	2.03	0.57
1:B:794:PRO:HA	1:B:797:ARG:HH21	1.68	0.57
1:B:270:GLU:HB3	1:B:442:THR:OG1	2.03	0.57
1:A:52:ILE:HB	1:A:357:ILE:HD13	1.85	0.57
1:B:505:SER:HB3	1:B:510:ALA:HB3	1.85	0.57
1:B:1016:ILE:HD12	1:B:1059:TYR:OH	2.03	0.57
1:B:121:MET:HE3	1:B:409:PHE:CE1	2.39	0.57
1:B:9:GLN:HE22	1:B:45:GLN:HG2	1.68	0.57
1:B:431:LYS:HE2	1:B:433:TYR:HB2	1.86	0.57
1:A:109:PHE:O	1:A:408:GLN:NE2	2.36	0.57
1:A:386:GLN:O	1:A:389:VAL:HG22	2.04	0.57
1:A:505:SER:HB2	1:A:510:ALA:HB3	1.86	0.56
1:B:507:THR:HG22	1:B:507:THR:O	2.04	0.56
1:B:751:ARG:HB3	1:B:753:MET:CE	2.34	0.56
1:B:187:MET:HE2	1:B:440:THR:HA	1.86	0.56
1:A:16:LEU:HD23	1:A:20:PRO:HG3	1.87	0.56
1:A:68:ARG:HE	1:A:342:THR:HG21	1.71	0.56
1:A:128:LEU:HB2	1:A:167:TYR:OH	2.06	0.56
1:B:791:VAL:HG22	1:B:828:ALA:O	2.05	0.56
1:A:28:ILE:HG12	1:A:439:GLN:CD	2.31	0.56
1:B:964:ARG:HD2	1:B:965:LYS:HE2	1.87	0.56
1:A:912:GLU:HB2	1:A:915:THR:HG23	1.87	0.56
1:A:961:PHE:CE2	1:A:980:ILE:HD13	2.40	0.56
1:B:511:GLU:OE2	1:B:515:ARG:NH1	2.38	0.56
1:B:580:GLN:HA	1:B:612:VAL:O	2.04	0.56
1:B:961:PHE:CD2	1:B:964:ARG:HG2	2.40	0.56
1:B:123:ASP:O	1:B:126:VAL:HG22	2.05	0.56

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:867:VAL:HA	1:B:884:SER:HB2	1.88	0.56
1:A:834:GLU:O	1:A:838:GLU:HG3	2.06	0.56
1:B:542:LYS:HD2	1:B:578:GLY:HA3	1.88	0.56
1:B:976:MET:HE1	1:B:978:LEU:HB3	1.88	0.56
1:B:541:PRO:HG2	1:B:546:VAL:HG22	1.88	0.56
1:B:565:VAL:HG13	1:B:601:PHE:CE2	2.41	0.56
1:B:68:ARG:HH11	1:B:342:THR:HG21	1.70	0.56
1:B:294:TYR:O	1:B:297:VAL:HG22	2.05	0.56
1:A:327:LEU:O	1:A:366:ARG:NH1	2.39	0.55
1:A:815:LYS:NZ	1:A:873:TRP:HB3	2.21	0.55
1:B:524:HIS:ND1	1:B:649:ILE:HG23	2.20	0.55
1:B:588:ASP:HB3	1:B:591:TRP:CE3	2.41	0.55
1:A:922:PRO:CG	1:A:1023:MET:HE2	2.35	0.55
1:A:983:SER:HB3	1:A:992:TYR:HE1	1.71	0.55
1:B:128:LEU:HB2	1:B:167:TYR:OH	2.05	0.55
1:B:269:HIS:CE1	1:B:270:GLU:HG3	2.42	0.55
1:A:72:SER:HA	1:A:92:TRP:CZ3	2.41	0.55
1:B:107:PRO:HG2	1:B:239:ARG:NH2	2.21	0.55
1:A:86:ASP:HA	1:A:91:SER:HB3	1.88	0.55
1:B:175:PHE:CE2	1:B:179:MET:HE3	2.41	0.55
1:B:363:GLN:HA	1:B:366:ARG:HB2	1.87	0.55
1:A:115:LYS:HD3	1:A:308:TYR:CD1	2.42	0.55
1:B:69:PHE:HA	1:B:338:ALA:HA	1.88	0.55
1:B:129:ILE:O	1:B:133:ILE:HG23	2.07	0.55
1:B:440:THR:O	1:B:441:LEU:C	2.46	0.55
1:B:1013:ARG:HG3	1:B:1058:GLN:O	2.07	0.55
1:A:558:PRO:HD2	1:A:561:ALA:HB3	1.89	0.55
1:A:164:PHE:CE2	1:A:176:ILE:HD11	2.42	0.55
1:A:207:PHE:CE2	1:A:211:ILE:HD11	2.42	0.55
1:B:984:ARG:HA	1:B:990:LYS:HZ2	1.73	0.54
1:A:658:ASN:HB3	1:B:835:ARG:CZ	2.37	0.54
1:A:551:SER:OG	3:A:1102:FMN:H4'	2.08	0.54
1:B:379:ARG:HG2	1:B:381:GLU:HG2	1.90	0.54
1:A:374:ASP:HB2	1:A:377:GLU:HB3	1.88	0.54
1:B:956:ARG:HB2	1:B:959:ALA:HB3	1.90	0.54
1:A:1001:ALA:HB1	1:A:1034:SER:OG	2.08	0.54
1:A:596:GLN:HE21	1:A:619:GLU:HB3	1.73	0.54
1:A:682:ALA:HB1	1:A:704:ILE:HG23	1.90	0.54
1:B:920:VAL:HG13	1:B:993:VAL:HG11	1.90	0.54
1:B:605:GLN:HE21	1:B:609:LYS:HE3	1.73	0.54
1:B:869:ARG:HH12	1:B:878:GLU:HB2	1.72	0.54

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:926:LEU:HB3	1:B:962:ILE:HD11	1.89	0.54
1:B:1007:ILE:O	1:B:1010:GLN:HB2	2.07	0.54
1:A:62:GLU:OE2	1:A:344:ILE:HA	2.08	0.53
1:B:351:LYS:HG3	1:B:352:LYS:N	2.23	0.53
1:A:55:SER:HB2	1:A:363:GLN:HB3	1.90	0.53
1:B:370:ALA:O	1:B:390:PRO:HG3	2.09	0.53
1:B:225:ARG:HG3	1:B:237:LEU:CD2	2.37	0.53
1:A:165:ASN:HB3	1:A:168:TYR:HD2	1.74	0.53
1:B:984:ARG:HA	1:B:990:LYS:NZ	2.23	0.53
1:B:1001:ALA:HB1	1:B:1034:SER:OG	2.08	0.53
2:B:1101:HEM:HMC2	2:B:1101:HEM:HBC2	1.90	0.53
1:B:56:GLY:O	1:B:57:HIS:ND1	2.41	0.53
1:B:43:ARG:O	1:B:44:LEU:HD23	2.09	0.53
1:B:292:LYS:NZ	1:B:381:GLU:OE2	2.33	0.53
1:B:160:PHE:CD2	1:B:162:TYR:HB3	2.44	0.53
1:A:11:LYS:HG2	1:A:13:TYR:CE1	2.44	0.52
1:A:567:TRP:O	1:A:571:VAL:HG23	2.09	0.52
1:A:42:PHE:CZ	1:A:53:VAL:HG21	2.44	0.52
1:A:262:ILE:O	1:A:266:ILE:HG13	2.09	0.52
1:B:763:SER:HB2	1:B:766:ASP:HB2	1.90	0.52
1:B:939:MET:HA	1:B:942:GLU:CG	2.38	0.52
1:B:961:PHE:CD2	1:B:964:ARG:CG	2.92	0.52
1:A:28:ILE:HG12	1:A:439:GLN:NE2	2.24	0.52
1:B:341:ASP:HB2	1:B:352:LYS:HZ2	1.73	0.52
1:B:425:PHE:HB2	1:B:427:PHE:CE1	2.44	0.52
1:B:1006:ARG:O	1:B:1010:GLN:NE2	2.42	0.52
1:A:976:MET:CE	1:A:978:LEU:HB2	2.37	0.52
1:A:271:THR:HA	1:A:330:THR:CG2	2.38	0.52
1:A:639:SER:O	1:A:642:ILE:HG13	2.09	0.52
1:A:727:GLU:O	1:A:731:ARG:HG3	2.08	0.52
1:B:283:LEU:HB3	1:B:290:LEU:HD13	1.90	0.52
1:B:935:ALA:O	1:B:939:MET:HG3	2.09	0.52
1:A:75:GLY:O	1:A:78:GLU:HG2	2.10	0.52
1:A:248:THR:HG22	1:A:250:GLU:HB2	1.92	0.52
1:B:952:TYR:HB3	1:B:993:VAL:HG13	1.91	0.52
1:B:57:HIS:CD2	1:B:370:ALA:HB2	2.45	0.52
1:B:308:TYR:CE1	1:B:412:HIS:HE1	2.28	0.52
1:B:1033:ASN:HA	1:B:1036:GLN:HG3	1.91	0.52
1:B:964:ARG:HD2	1:B:965:LYS:CE	2.40	0.52
1:B:963:TYR:HB3	1:B:966:GLU:HB2	1.91	0.51
1:A:655:LYS:HG2	1:A:657:GLN:H	1.75	0.51

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:31:PHE:HB3	1:A:360:LEU:HD21	1.93	0.51
1:B:13:TYR:HB2	1:B:20:PRO:HG2	1.92	0.51
1:B:108:THR:HG23	1:B:239:ARG:HD3	1.90	0.51
1:B:404:CYS:HB3	1:B:407:MET:H	1.74	0.51
1:A:159:GLY:HA2	1:A:236:LEU:HB2	1.93	0.51
1:B:337:TYR:CD2	1:B:353:GLU:HG3	2.46	0.51
1:B:410:ALA:HB2	2:B:1101:HEM:HHC	1.91	0.51
1:A:313:HIS:HA	1:A:315:LYS:HE2	1.93	0.51
1:A:319:MET:HE3	1:A:380:PRO:O	2.10	0.51
1:B:10:PRO:HD2	1:B:43:ARG:O	2.11	0.51
1:B:160:PHE:CD1	1:B:261:ILE:HD12	2.45	0.51
1:A:729:VAL:HG21	1:A:769:LEU:HD23	1.93	0.51
1:B:71:LYS:HG2	1:B:402:ARG:HE	1.76	0.51
1:B:240:MET:HE1	1:B:264:PHE:HE2	1.76	0.51
1:A:112:ARG:HG3	1:A:113:ALA:N	2.24	0.51
1:A:71:LYS:HE3	2:A:1101:HEM:CGA	2.41	0.51
1:A:202:ARG:NH2	1:A:679:ALA:O	2.44	0.51
1:A:961:PHE:HE2	1:A:980:ILE:HD13	1.76	0.51
1:B:431:LYS:HZ2	1:B:449:ASN:HB2	1.76	0.51
1:A:66:GLU:HA	1:A:69:PHE:O	2.10	0.51
1:B:187:MET:HB2	1:B:441:LEU:HD21	1.92	0.51
1:A:301:LEU:HD11	1:A:423:ARG:HD3	1.92	0.51
1:A:983:SER:HB3	1:A:992:TYR:CE1	2.46	0.51
1:B:926:LEU:HD22	1:B:962:ILE:HG13	1.93	0.51
1:B:28:ILE:HG13	1:B:29:LEU:HD12	1.92	0.50
1:A:793:PRO:N	1:A:794:PRO:HD2	2.26	0.50
1:A:905:SER:HB3	1:B:554:ASN:OD1	2.12	0.50
1:B:1006:ARG:C	1:B:1010:GLN:HE21	2.19	0.50
1:A:542:LYS:HG3	1:A:578:GLY:HA3	1.92	0.50
1:A:88:LEU:HD21	1:A:101:ALA:CB	2.39	0.50
1:A:193:LEU:HD12	1:A:196:GLN:HE21	1.77	0.50
1:B:301:LEU:HD21	1:B:314:LEU:HD11	1.94	0.50
1:A:975:ILE:HD12	1:A:976:MET:HG2	1.93	0.50
1:B:997:MET:HE1	1:B:1027:VAL:HG13	1.94	0.50
1:B:108:THR:HG21	1:B:239:ARG:HD3	1.92	0.50
1:B:143:VAL:HG13	1:B:147:MET:HE2	1.94	0.50
1:B:782:GLN:NE2	1:B:839:LEU:O	2.45	0.50
1:B:43:ARG:NH2	1:B:355:GLU:OE1	2.45	0.50
1:A:342:THR:O	1:A:343:ILE:HD12	2.12	0.49
1:A:562:GLY:O	1:A:565:VAL:HG22	2.12	0.49
1:B:69:PHE:CZ	1:B:344:ILE:HD12	2.47	0.49

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:846:ARG:HG3	1:A:883:ALA:CB	2.42	0.49
1:B:698:SER:OG	1:B:700:ARG:HD2	2.11	0.49
1:A:57:HIS:ND1	1:A:367:ASP:OD2	2.38	0.49
1:A:930:ARG:NH1	1:A:966:GLU:OE2	2.45	0.49
1:B:24:LYS:HE2	1:B:191:GLN:NE2	2.27	0.49
1:B:146:ASP:HA	1:B:149:ARG:HD2	1.94	0.49
1:B:336:LEU:O	1:B:357:ILE:HB	2.12	0.49
1:A:397:PHE:CD2	1:A:407:MET:HE3	2.48	0.49
1:B:81:ARG:HD2	1:B:90:THR:O	2.13	0.49
1:B:718:LEU:HD13	1:B:898:MET:HE2	1.95	0.49
1:B:149:ARG:NH1	1:B:166:SER:O	2.46	0.49
1:B:307:THR:HG22	1:B:310:GLN:CG	2.40	0.49
1:B:985:LYS:HD2	1:B:986:GLU:H	1.77	0.49
1:A:589:HIS:HD1	1:A:623:SER:HB2	1.76	0.49
1:A:952:TYR:OH	1:A:1004:LEU:HD21	2.13	0.49
1:B:174:PRO:HA	1:B:177:THR:CG2	2.41	0.49
1:B:971:LYS:HE2	1:B:978:LEU:HG	1.94	0.49
1:B:1005:ILE:HG13	1:B:1034:SER:O	2.13	0.49
1:A:236:LEU:HD12	1:A:236:LEU:H	1.78	0.49
1:A:326:ARG:HB2	1:A:394:TYR:CE1	2.45	0.49
1:A:695:SER:HB3	1:A:959:ALA:HB1	1.95	0.49
1:A:953:PHE:HD2	1:A:980:ILE:HG23	1.77	0.49
1:B:551:SER:O	1:B:558:PRO:HD3	2.13	0.49
1:B:630:PHE:CE2	1:B:634:LYS:HD3	2.48	0.49
1:B:687:ASN:O	1:B:700:ARG:NH2	2.45	0.49
1:B:819:MET:HA	1:B:822:LEU:HD12	1.95	0.49
1:A:782:GLN:HA	1:A:839:LEU:HD13	1.95	0.48
1:B:28:ILE:HD11	1:B:328:TRP:HZ3	1.78	0.48
1:B:304:SER:HA	1:B:423:ARG:NH1	2.27	0.48
1:A:846:ARG:HG3	1:A:883:ALA:HB2	1.94	0.48
1:B:289:LYS:HZ3	1:B:380:PRO:HD3	1.78	0.48
1:B:509:THR:O	1:B:513:ILE:HD12	2.13	0.48
1:B:825:LYS:HD2	1:B:826:TYR:CE1	2.48	0.48
1:A:172:PRO:HB2	1:A:177:THR:HG23	1.95	0.48
1:A:844:LYS:O	1:A:846:ARG:NH1	2.46	0.48
1:B:187:MET:HE1	1:B:440:THR:HA	1.95	0.48
1:B:226:ARG:HH22	1:B:251:LYS:NZ	2.11	0.48
1:B:395:LYS:HE2	1:B:399:ASN:HB3	1.94	0.48
1:A:503:TYR:HA	1:A:549:VAL:O	2.13	0.48
1:B:929:PHE:HD1	1:B:932:PHE:CD2	2.32	0.48
1:A:545:ALA:HB2	1:A:645:PHE:CZ	2.49	0.48

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:670:GLY:O	1:A:671:SER:C	2.56	0.48
1:A:922:PRO:HG3	1:A:1023:MET:HE2	1.94	0.48
1:B:1001:ALA:O	1:B:1005:ILE:HG12	2.14	0.48
1:A:698:SER:HB3	1:A:867:VAL:HB	1.96	0.48
1:B:961:PHE:HD2	1:B:964:ARG:HB2	1.78	0.48
1:A:534:ASN:CG	1:A:560:ASN:O	2.56	0.48
1:A:856:LEU:HD12	1:A:857:ASN:N	2.29	0.48
1:B:126:VAL:O	1:B:130:GLN:HG3	2.14	0.48
1:A:208:GLN:HG3	5:A:1228:HOH:O	2.13	0.48
1:B:19:ILE:CG1	1:B:20:PRO:HD3	2.44	0.48
1:B:981:ALA:O	1:B:991:THR:HB	2.13	0.48
1:A:979:TYR:HB3	1:A:996:VAL:HG11	1.95	0.47
1:B:919:MET:HE3	1:B:951:LEU:HB2	1.95	0.47
1:A:835:ARG:NE	1:B:658:ASN:OD1	2.46	0.47
1:A:929:PHE:HD1	1:A:932:PHE:HD2	1.62	0.47
1:B:1006:ARG:HG3	1:B:1007:ILE:N	2.29	0.47
1:A:193:LEU:HB2	1:A:196:GLN:HG2	1.96	0.47
1:B:59:LEU:HA	1:B:59:LEU:HD12	1.60	0.47
1:B:405:ILE:H	1:B:405:ILE:HG12	1.45	0.47
1:A:121:MET:SD	1:A:413:GLU:HB2	2.55	0.47
1:A:343:ILE:HG13	1:A:349:PRO:HA	1.96	0.47
1:B:310:GLN:O	1:B:314:LEU:HD12	2.14	0.47
1:B:562:GLY:O	1:B:566:GLN:HG3	2.13	0.47
1:B:957:ASN:CB	1:B:985:LYS:HD3	2.44	0.47
1:B:625:ASP:O	1:B:629:GLN:HG3	2.14	0.47
1:B:751:ARG:HD2	1:B:753:MET:HE1	1.96	0.47
1:A:40:PRO:HB2	1:A:59:LEU:HD13	1.97	0.47
1:A:118:HIS:O	1:A:122:VAL:HG23	2.15	0.47
1:A:225:ARG:HG3	1:A:230:ASN:O	2.15	0.47
1:A:240:MET:HB3	1:A:257:ILE:HG12	1.95	0.47
1:A:625:ASP:O	1:A:629:GLN:HG3	2.15	0.47
1:A:929:PHE:HD1	1:A:932:PHE:CD2	2.32	0.47
1:B:62:GLU:HG2	1:B:68:ARG:HH22	1.78	0.47
1:B:74:GLU:HB3	1:B:356:ARG:HD2	1.95	0.47
1:B:863:ILE:HD12	1:B:865:VAL:CG2	2.44	0.47
1:B:999:SER:OG	1:B:1000:ASN:OD1	2.32	0.47
1:B:1044:GLN:O	1:B:1048:GLN:NE2	2.47	0.47
1:A:360:LEU:O	1:A:363:GLN:N	2.42	0.47
1:B:142:ASP:OD2	1:B:145:ASP:HB3	2.14	0.47
1:A:16:LEU:O	1:A:47:PRO:HD3	2.15	0.47
1:A:342:THR:C	1:A:343:ILE:HD12	2.39	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:786:LEU:HD12	1:A:831:MET:CE	2.44	0.47
1:B:87:GLY:HA2	1:B:260:GLN:NE2	2.30	0.47
1:B:317:VAL:HA	1:B:320:ILE:HD12	1.97	0.47
1:A:334:PHE:HB3	2:A:1101:HEM:HBA2	1.96	0.47
1:A:983:SER:O	1:A:990:LYS:HD3	2.15	0.47
1:B:440:THR:C	1:B:442:THR:N	2.73	0.47
1:B:538:GLY:HA2	1:B:567:TRP:CZ2	2.50	0.47
1:B:1050:LEU:HD23	1:B:1050:LEU:HA	1.68	0.47
1:A:713:GLN:HA	1:A:854:PRO:CG	2.45	0.46
1:B:150:LEU:HB2	1:B:167:TYR:OH	2.15	0.46
1:B:835:ARG:HD3	1:B:838:GLU:OE2	2.14	0.46
1:B:160:PHE:HD1	1:B:261:ILE:HD12	1.80	0.46
1:B:891:LYS:HA	1:B:891:LYS:HD3	1.56	0.46
1:A:129:ILE:O	1:A:133:ILE:HG23	2.15	0.46
1:A:258:ARG:O	1:A:262:ILE:HG13	2.16	0.46
1:A:703:GLU:HB3	1:A:860:ARG:HD2	1.97	0.46
1:A:922:PRO:HG3	1:A:1023:MET:HG3	1.96	0.46
1:B:970:TYR:O	1:B:975:ILE:HG13	2.16	0.46
1:A:88:LEU:N	1:A:88:LEU:HD23	2.30	0.46
1:A:956:ARG:HD3	1:A:984:ARG:HE	1.80	0.46
1:B:60:VAL:O	1:B:63:VAL:HG22	2.15	0.46
1:B:192:ARG:HD2	1:B:197:ASP:HB2	1.98	0.46
1:B:280:LEU:HD11	1:B:421:LEU:HD23	1.96	0.46
1:B:287:PRO:O	1:B:291:LYS:HD3	2.16	0.46
1:A:617:ARG:HG2	1:A:618:GLY:N	2.29	0.46
1:A:1050:LEU:HD12	1:A:1050:LEU:HA	1.50	0.46
1:B:29:LEU:O	1:B:33:LYS:HG2	2.16	0.46
1:A:571:VAL:HA	1:B:13:TYR:HE2	1.80	0.46
1:A:792:CYS:HA	1:A:793:PRO:HD3	1.84	0.46
1:A:816:ARG:NH2	1:A:879:TYR:OH	2.49	0.46
1:B:8:PRO:HG2	1:B:41:ILE:O	2.15	0.46
1:A:818:SER:HB3	1:A:821:ASP:CG	2.40	0.46
1:B:625:ASP:OD2	1:B:628:GLU:HG2	2.16	0.46
1:B:379:ARG:HD2	1:B:381:GLU:HB2	1.98	0.46
1:B:402:ARG:N	1:B:402:ARG:HD2	2.30	0.46
1:B:944:LYS:HB3	1:B:944:LYS:HE3	1.65	0.46
1:A:596:GLN:NE2	1:A:619:GLU:HB3	2.30	0.46
1:A:785:GLU:HG2	1:A:839:LEU:HD11	1.98	0.46
1:B:86:ASP:HA	1:B:91:SER:HB3	1.96	0.46
1:B:263:THR:HA	1:B:266:ILE:HG12	1.98	0.46
1:B:963:TYR:O	1:B:964:ARG:C	2.57	0.46

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:108:THR:CG2	1:A:239:ARG:HD3	2.46	0.46
1:B:19:ILE:HD13	1:B:47:PRO:CD	2.46	0.46
1:B:335:SER:O	1:B:336:LEU:HD23	2.15	0.46
1:A:628:GLU:HB2	1:B:780:ARG:NH2	2.31	0.45
1:A:969:GLN:HA	1:A:972:LYS:HD3	1.97	0.45
1:B:558:PRO:HD2	1:B:561:ALA:HB3	1.99	0.45
1:B:763:SER:HB2	1:B:766:ASP:H	1.81	0.45
1:A:787:ALA:O	1:A:796:LYS:HG2	2.16	0.45
1:A:970:TYR:O	1:A:975:ILE:HG13	2.17	0.45
1:B:269:HIS:CG	1:B:270:GLU:N	2.84	0.45
1:B:283:LEU:HD22	1:B:290:LEU:HD13	1.98	0.45
1:B:642:ILE:HD13	1:B:648:GLU:HG3	1.97	0.45
1:A:100:LYS:HE3	1:A:252:LEU:HD23	1.98	0.45
1:A:532:THR:HB	1:A:535:GLU:CG	2.45	0.45
1:B:686:GLU:OE2	1:B:688:ARG:HD3	2.16	0.45
1:B:950:TYR:HB3	1:B:979:TYR:HE1	1.81	0.45
2:B:1101:HEM:HMB2	2:B:1101:HEM:HBB2	1.98	0.45
1:A:68:ARG:HH21	1:A:342:THR:CG2	2.30	0.45
1:A:395:LYS:N	1:A:396:PRO:HD3	2.31	0.45
1:A:961:PHE:CE2	1:A:964:ARG:HG3	2.52	0.45
1:B:6:ILE:HD12	1:B:6:ILE:O	2.16	0.45
1:B:431:LYS:NZ	1:B:449:ASN:HB2	2.31	0.45
1:B:813:LEU:HD23	1:B:813:LEU:HA	1.67	0.45
1:A:790:THR:CG2	1:A:796:LYS:HG3	2.46	0.45
1:A:845:PRO:HD2	1:B:507:THR:CG2	2.46	0.45
1:A:955:CYS:O	1:A:982:PHE:HA	2.16	0.45
1:B:88:LEU:HD22	1:B:405:ILE:HD11	1.98	0.45
1:B:596:GLN:C	1:B:599:PRO:HD2	2.41	0.45
1:B:922:PRO:HA	1:B:954:GLY:H	1.81	0.45
1:A:122:VAL:O	1:A:126:VAL:HG13	2.17	0.45
1:A:738:LEU:HD22	1:A:764:LEU:HD11	1.98	0.45
1:A:909:LEU:HG	1:A:932:PHE:CD1	2.52	0.45
1:B:718:LEU:CD1	1:B:898:MET:HE2	2.46	0.45
1:A:62:GLU:HG3	1:A:68:ARG:NH1	2.28	0.45
1:A:98:TRP:CD1	1:A:402:ARG:NH1	2.85	0.45
1:A:852:SER:HB3	1:A:862:SER:OG	2.16	0.45
1:B:34:LEU:HD23	1:B:34:LEU:HA	1.83	0.45
1:B:70:LEU:HD12	1:B:70:LEU:HA	1.71	0.45
1:B:160:PHE:HD2	1:B:162:TYR:HB3	1.82	0.45
1:B:946:LEU:CD2	1:B:975:ILE:HG22	2.47	0.45
1:A:114:MET:SD	1:A:409:PHE:HA	2.57	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:731:ARG:NH2	1:A:821:ASP:OD1	2.50	0.45
1:B:690:LEU:HB3	1:B:962:ILE:HG22	1.99	0.45
1:B:1015:TYR:HD1	1:B:1060:ALA:HB3	1.82	0.45
1:A:74:GLU:HG2	1:A:75:GLY:H	1.81	0.45
1:A:404:CYS:HB3	1:A:407:MET:HB3	1.98	0.45
1:B:12:THR:HG22	1:B:18:ASN:ND2	2.32	0.45
1:B:226:ARG:CZ	1:B:241:LEU:HG	2.47	0.45
1:B:956:ARG:HG2	1:B:984:ARG:HB3	1.98	0.45
1:A:124:ILE:HD11	1:A:157:LEU:HD22	1.99	0.44
1:A:330:THR:O	1:A:332:PRO:HD3	2.17	0.44
1:A:618:GLY:HA3	1:A:633:TRP:CD1	2.52	0.44
1:A:782:GLN:HG2	1:A:839:LEU:HB3	1.99	0.44
1:A:917:ILE:O	1:A:949:ALA:HA	2.18	0.44
1:B:588:ASP:HB3	1:B:591:TRP:CZ3	2.52	0.44
1:B:979:TYR:O	1:B:980:ILE:HD13	2.17	0.44
1:A:62:GLU:O	1:A:65:ASP:HB3	2.17	0.44
1:A:237:LEU:HD13	1:A:261:ILE:HD11	1.98	0.44
1:A:342:THR:HG22	1:A:343:ILE:N	2.31	0.44
1:A:671:SER:OG	1:B:507:THR:O	2.21	0.44
1:A:792:CYS:SG	1:A:794:PRO:HG2	2.57	0.44
1:A:796:LYS:NZ	1:B:229:LYS:NZ	2.65	0.44
1:B:62:GLU:HG2	1:B:68:ARG:HH12	1.82	0.44
1:B:516:GLU:O	1:B:520:THR:HG23	2.17	0.44
1:B:919:MET:HE3	1:B:919:MET:HB2	1.87	0.44
1:A:374:ASP:OD2	1:A:379:ARG:NE	2.44	0.44
1:A:802:LEU:O	1:A:808:TYR:HB2	2.17	0.44
1:A:835:ARG:HD2	1:A:835:ARG:N	2.32	0.44
1:A:837:LEU:HD23	1:A:837:LEU:HA	1.51	0.44
1:A:899:PHE:HA	5:A:1225:HOH:O	2.17	0.44
1:A:1024:ALA:HB3	1:A:1025:PRO:HD3	1.99	0.44
1:B:100:LYS:HD2	1:B:252:LEU:HD23	1.99	0.44
1:B:909:LEU:HD23	1:B:909:LEU:HA	1.62	0.44
1:A:1019:ASP:OD2	1:A:1067:LEU:HD13	2.17	0.44
1:B:994:GLN:HA	1:B:997:MET:HE2	1.99	0.44
1:A:178:SER:HB3	1:A:210:ASP:HB3	1.98	0.44
1:A:282:PHE:O	1:A:285:LYS:N	2.48	0.44
1:A:397:PHE:CD1	1:A:407:MET:HB2	2.53	0.44
1:A:501:VAL:HG22	1:A:547:LEU:HB2	2.00	0.44
1:A:912:GLU:HB2	1:A:915:THR:CG2	2.47	0.44
1:B:285:LYS:HD3	1:B:285:LYS:HA	1.77	0.44
1:B:591:TRP:HB3	1:B:594:THR:CG2	2.48	0.44

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:681:TYR:HB3	1:B:895:ASP:HB3	1.99	0.44
1:A:568:LEU:HD23	1:A:568:LEU:HA	1.78	0.44
1:B:691:GLN:NE2	1:B:695:SER:OG	2.37	0.44
1:B:746:LEU:HD23	1:B:746:LEU:HA	1.60	0.44
1:A:317:VAL:HG12	1:A:415:THR:HG23	2.00	0.44
1:A:790:THR:HG22	1:A:796:LYS:CG	2.48	0.44
1:B:714:GLU:OE2	1:B:854:PRO:HD2	2.18	0.44
1:B:1031:LEU:HG	1:B:1049:TRP:HH2	1.83	0.44
1:A:37:GLU:HG2	1:A:38:TYR:CD2	2.53	0.44
1:A:387:ASN:OD1	1:A:387:ASN:N	2.48	0.44
1:A:389:VAL:HG23	1:A:391:HIS:CE1	2.53	0.44
1:A:975:ILE:CD1	1:A:976:MET:HG2	2.48	0.44
1:B:43:ARG:HG2	1:B:45:GLN:NE2	2.33	0.44
1:B:81:ARG:HG3	1:B:90:THR:HB	2.00	0.44
1:B:115:LYS:HB3	1:B:115:LYS:HE2	1.76	0.44
1:B:985:LYS:HD2	1:B:986:GLU:N	2.33	0.44
1:A:614:PHE:HE1	1:A:637:MET:HE3	1.82	0.44
1:B:64:CYS:O	1:B:399:ASN:ND2	2.50	0.44
1:A:655:LYS:HG2	1:A:657:GLN:N	2.33	0.43
1:A:825:LYS:HG2	1:A:826:TYR:CD1	2.53	0.43
1:B:28:ILE:HG13	1:B:29:LEU:N	2.32	0.43
1:B:389:VAL:HG23	1:B:391:HIS:NE2	2.33	0.43
1:B:404:CYS:C	1:B:406:GLY:N	2.72	0.43
1:B:639:SER:HA	1:B:642:ILE:HG22	1.98	0.43
1:A:621:ASP:CG	1:A:624:GLY:H	2.26	0.43
1:A:1007:ILE:O	1:A:1010:GLN:HB2	2.18	0.43
1:B:635:GLU:HG3	1:B:636:LYS:H	1.77	0.43
1:A:532:THR:CG2	1:A:560:ASN:HB3	2.45	0.43
1:B:24:LYS:CE	1:B:191:GLN:HE22	2.32	0.43
1:B:251:LYS:HB2	1:B:251:LYS:HE2	1.79	0.43
1:A:509:THR:HB	3:A:1102:FMN:H5'1	2.01	0.43
1:B:72:SER:HA	1:B:92:TRP:CZ3	2.53	0.43
1:B:718:LEU:HD23	1:B:863:ILE:HG21	2.00	0.43
1:B:983:SER:HB2	1:B:992:TYR:CE1	2.53	0.43
1:A:71:LYS:HZ2	1:A:402:ARG:HH21	1.67	0.43
1:A:179:MET:HB2	1:A:214:MET:HE3	2.00	0.43
1:A:195:LEU:HD11	1:A:196:GLN:NE2	2.34	0.43
1:A:260:GLN:O	1:A:263:THR:HB	2.17	0.43
1:A:580:GLN:HA	1:A:612:VAL:O	2.18	0.43
1:B:722:PRO:HD3	1:B:845:PRO:HA	2.01	0.43
1:A:717:HIS:CE1	4:A:1103:FAD:H6	2.54	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:856:LEU:HD21	1:A:934:GLN:OE1	2.19	0.43
1:B:147:MET:HE1	1:B:421:LEU:HD21	2.00	0.43
1:B:404:CYS:O	1:B:405:ILE:C	2.60	0.43
1:A:440:THR:C	1:A:442:THR:H	2.25	0.43
1:A:742:ASP:HB2	1:A:764:LEU:HD12	2.00	0.43
1:B:12:THR:HB	1:B:17:GLY:HA2	2.01	0.43
1:B:115:LYS:HE2	1:B:308:TYR:CE2	2.53	0.43
1:A:159:GLY:HA2	1:A:236:LEU:HD13	1.99	0.43
1:A:549:VAL:HA	1:A:584:PHE:O	2.19	0.43
1:A:825:LYS:HG2	1:A:826:TYR:CE1	2.54	0.43
1:B:379:ARG:HG2	1:B:381:GLU:CG	2.47	0.43
1:B:397:PHE:O	1:B:403:ALA:HA	2.19	0.43
1:A:914:GLU:CD	1:A:914:GLU:H	2.27	0.43
1:B:71:LYS:HE2	2:B:1101:HEM:O1A	2.19	0.43
1:B:692:SER:HG	1:B:958:GLU:HG3	1.84	0.43
1:B:798:GLU:O	1:B:801:ALA:HB3	2.18	0.43
1:A:115:LYS:NZ	1:A:308:TYR:HB3	2.34	0.42
1:A:183:LEU:HD23	1:A:183:LEU:HA	1.88	0.42
1:A:532:THR:HG22	1:A:534:ASN:N	2.34	0.42
1:A:552:SER:HB3	1:A:598:VAL:H	1.84	0.42
1:A:790:THR:HG22	1:A:796:LYS:HG3	2.00	0.42
1:A:935:ALA:O	1:A:939:MET:HG3	2.19	0.42
1:B:10:PRO:HA	1:B:38:TYR:OH	2.19	0.42
1:B:685:VAL:HG11	1:B:860:ARG:HE	1.84	0.42
1:A:351:LYS:H	1:A:355:GLU:HG3	1.83	0.42
1:A:365:HIS:HE1	1:A:396:PRO:HG3	1.80	0.42
1:A:378:PHE:CZ	1:A:380:PRO:HG3	2.54	0.42
1:B:281:TYR:CZ	1:B:435:LEU:HB2	2.54	0.42
1:B:807:ILE:O	1:B:811:GLN:HB2	2.18	0.42
1:B:914:GLU:HA	1:B:947:GLY:H	1.84	0.42
1:A:571:VAL:HG12	1:A:609:LYS:HD2	2.01	0.42
1:A:813:LEU:O	1:A:814:LYS:C	2.63	0.42
1:B:24:LYS:HE2	1:B:191:GLN:HE22	1.83	0.42
1:B:961:PHE:CD2	1:B:964:ARG:HA	2.54	0.42
1:A:129:ILE:HG23	1:A:425:PHE:CZ	2.55	0.42
1:A:333:ALA:HA	1:A:361:ILE:HG13	2.01	0.42
1:A:773:GLU:HG2	1:A:776:ASP:HB2	2.02	0.42
1:A:1019:ASP:OD2	1:A:1022:ARG:HB3	2.19	0.42
1:B:939:MET:HA	1:B:942:GLU:HG3	2.01	0.42
1:A:57:HIS:HA	1:A:60:VAL:HB	2.01	0.42
1:A:161:ASN:OD1	1:A:161:ASN:N	2.53	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:296:GLU:O	1:A:300:VAL:HG22	2.20	0.42
1:A:422:LEU:HA	1:A:422:LEU:HD23	1.84	0.42
1:A:838:GLU:HG2	1:B:660:LEU:HG	2.01	0.42
1:A:594:THR:HG22	1:A:597:ASP:OD2	2.18	0.42
1:B:57:HIS:H	1:B:60:VAL:HG23	1.85	0.42
1:B:361:ILE:HG22	1:B:365:HIS:CE1	2.55	0.42
1:B:686:GLU:HA	1:B:892:PRO:HG3	2.01	0.42
2:B:1101:HEM:HBC2	2:B:1101:HEM:CMC	2.49	0.42
1:A:513:ILE:HG23	1:A:630:PHE:CZ	2.55	0.42
1:A:804:GLU:HB3	1:A:807:ILE:HD13	2.00	0.42
1:A:915:THR:HA	1:A:916:PRO:HD3	1.83	0.42
1:B:326:ARG:HB2	1:B:394:TYR:CE1	2.54	0.42
1:A:961:PHE:CD2	1:A:964:ARG:HG3	2.55	0.42
2:A:1101:HEM:HMC2	2:A:1101:HEM:HBC2	2.00	0.42
1:B:57:HIS:CG	1:B:58:GLU:N	2.88	0.42
1:A:252:LEU:HD23	1:A:252:LEU:HA	1.78	0.42
1:B:109:PHE:HB2	1:B:405:ILE:HG22	2.01	0.42
1:B:609:LYS:HA	1:B:609:LYS:HD3	1.93	0.42
1:B:690:LEU:CB	1:B:962:ILE:HG22	2.50	0.42
1:B:843:LEU:HD12	1:B:843:LEU:HA	1.85	0.42
1:A:29:LEU:HD13	1:A:29:LEU:HA	1.69	0.42
1:A:930:ARG:O	1:A:934:GLN:HG3	2.20	0.42
1:B:717:HIS:HB2	1:B:901:ARG:O	2.20	0.42
1:A:46:THR:HB	1:A:47:PRO:HD2	2.02	0.41
1:A:294:TYR:O	1:A:297:VAL:HG22	2.20	0.41
1:A:507:THR:HB	3:A:1102:FMN:O3P	2.20	0.41
1:A:547:LEU:HD22	1:A:633:TRP:HH2	1.84	0.41
1:B:307:THR:CG2	1:B:310:GLN:HG3	2.45	0.41
1:B:368:LYS:HE3	1:B:375:VAL:HG22	2.02	0.41
1:B:548:ILE:HB	1:B:583:VAL:HG22	2.02	0.41
1:A:117:TYR:OH	1:A:239:ARG:NH1	2.53	0.41
1:A:554:ASN:ND2	1:B:903:PRO:HB2	2.35	0.41
1:B:43:ARG:HG3	1:B:52:ILE:HG12	2.03	0.41
1:B:550:THR:HG22	1:B:551:SER:N	2.35	0.41
1:A:169:ARG:H	1:A:169:ARG:HG3	1.71	0.41
1:A:334:PHE:CD1	1:A:361:ILE:HD11	2.55	0.41
1:A:433:TYR:OH	1:A:436:ASP:HB3	2.20	0.41
1:A:284:LEU:HD21	1:A:429:ASP:HB2	2.01	0.41
1:A:733:LEU:CD1	1:A:740:GLU:HB3	2.50	0.41
1:A:934:GLN:HG2	1:A:970:TYR:OH	2.21	0.41
1:B:98:TRP:CZ2	1:B:402:ARG:NH1	2.86	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:332:PRO:HB3	1:A:443:LEU:CD1	2.49	0.41
1:B:132:TRP:CE3	1:B:452:VAL:HG21	2.56	0.41
1:B:344:ILE:HG22	1:B:348:TYR:HB2	2.02	0.41
1:B:505:SER:HB2	3:B:1103:FMN:O1P	2.20	0.41
1:A:395:LYS:HE3	1:A:399:ASN:OD1	2.20	0.41
1:A:557:PRO:HB3	1:A:565:VAL:HG11	2.03	0.41
1:A:598:VAL:O	1:A:602:ILE:HG13	2.20	0.41
1:A:688:ARG:O	1:A:700:ARG:HA	2.21	0.41
1:B:78:GLU:HG2	1:B:79:LYS:N	2.35	0.41
1:B:181:ARG:HG2	1:B:210:ASP:OD2	2.20	0.41
1:B:348:TYR:HA	1:B:349:PRO:HD3	1.87	0.41
1:B:955:CYS:SG	1:B:961:PHE:HD1	2.43	0.41
1:A:497:ARG:HD3	1:A:497:ARG:HA	1.90	0.41
1:A:798:GLU:O	1:A:802:LEU:HG	2.21	0.41
1:B:261:ILE:HD13	1:B:261:ILE:HA	1.94	0.41
1:B:334:PHE:CE1	1:B:359:VAL:HG21	2.55	0.41
1:B:526:VAL:O	1:B:528:THR:HG23	2.20	0.41
1:B:542:LYS:HE3	1:B:578:GLY:H	1.85	0.41
1:B:680:VAL:HG12	1:B:681:TYR:N	2.36	0.41
1:B:970:TYR:CB	1:B:975:ILE:HD11	2.47	0.41
1:B:980:ILE:CG2	1:B:982:PHE:HD1	2.33	0.41
1:A:129:ILE:HG23	1:A:425:PHE:CE2	2.56	0.41
1:A:603:ASP:OD2	1:A:617:ARG:HB2	2.21	0.41
1:B:342:THR:HG22	1:B:343:ILE:O	2.20	0.41
1:B:506:ASP:N	3:B:1103:FMN:O2P	2.52	0.41
1:B:780:ARG:O	1:B:784:ARG:HG3	2.21	0.41
1:A:87:GLY:O	1:A:88:LEU:C	2.61	0.41
1:A:175:PHE:CD1	1:A:175:PHE:C	2.98	0.41
1:A:290:LEU:O	1:A:293:ALA:HB3	2.21	0.41
1:A:301:LEU:HD11	1:A:423:ARG:CD	2.50	0.41
1:A:433:TYR:OH	1:A:446:GLY:O	2.32	0.41
1:A:659:THR:O	1:B:748:ALA:HA	2.21	0.41
1:B:115:LYS:HB3	1:B:308:TYR:CZ	2.55	0.41
1:B:220:SER:O	1:B:224:GLU:HG3	2.19	0.41
1:B:283:LEU:HD21	1:B:320:ILE:HD13	2.03	0.41
1:B:513:ILE:HG23	1:B:630:PHE:CZ	2.56	0.41
1:B:621:ASP:CG	1:B:624:GLY:H	2.29	0.41
1:B:631:ASP:HA	1:B:634:LYS:HE2	2.02	0.41
1:B:969:GLN:O	1:B:969:GLN:HG3	2.20	0.41
1:B:975:ILE:HG13	1:B:975:ILE:H	1.67	0.41
1:A:120:MET:HE2	1:A:157:LEU:HG	2.02	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:507:THR:HG22	1:A:507:THR:O	2.21	0.41
1:B:532:THR:HB	1:B:560:ASN:HB3	2.02	0.41
1:A:554:ASN:HD21	1:B:903:PRO:HB2	1.86	0.40
1:A:591:TRP:CE2	1:B:1063:VAL:HG13	2.56	0.40
1:A:728:ASN:HD22	1:A:728:ASN:HA	1.66	0.40
1:B:333:ALA:HA	1:B:361:ILE:HG12	2.03	0.40
1:B:407:MET:HB3	1:B:408:GLN:H	1.67	0.40
1:B:994:GLN:NE2	1:B:994:GLN:H	2.18	0.40
1:A:151:THR:HG21	1:A:273:SER:N	2.36	0.40
1:A:844:LYS:HE3	1:B:507:THR:HG21	2.03	0.40
1:B:186:ALA:O	1:B:189:GLN:N	2.54	0.40
1:A:237:LEU:O	1:A:241:LEU:HG	2.22	0.40
1:A:389:VAL:HA	1:A:390:PRO:HD3	1.91	0.40
1:A:706:LEU:HD23	1:A:706:LEU:HA	1.88	0.40
1:A:768:LEU:HA	1:A:768:LEU:HD23	1.82	0.40
4:A:1103:FAD:O5'	4:A:1103:FAD:O3'	2.35	0.40
1:A:18:ASN:OD1	1:A:44:LEU:HD12	2.21	0.40
1:A:56:GLY:HA3	1:A:59:LEU:HD13	2.02	0.40
1:A:164:PHE:CD2	1:A:176:ILE:HD11	2.57	0.40
1:A:557:PRO:CG	1:A:562:GLY:HA2	2.52	0.40
1:A:557:PRO:HA	1:A:598:VAL:HG21	2.03	0.40
1:B:49:ASP:OD1	1:B:49:ASP:C	2.64	0.40
1:B:102:HIS:O	1:B:106:MET:HG2	2.21	0.40
1:B:961:PHE:HD2	1:B:964:ARG:HA	1.86	0.40
1:B:983:SER:O	1:B:990:LYS:HA	2.21	0.40
1:B:999:SER:C	1:B:1001:ALA:H	2.29	0.40
1:A:81:ARG:NH2	1:A:95:GLU:OE2	2.54	0.40
1:A:540:LEU:HA	1:A:541:PRO:HD3	1.79	0.40
1:A:557:PRO:HG3	1:A:565:VAL:HG21	2.03	0.40
1:B:523:LEU:HA	1:B:523:LEU:HD12	1.71	0.40
1:B:721:LEU:HA	1:B:722:PRO:HD3	1.87	0.40
1:B:909:LEU:HG	1:B:932:PHE:CD1	2.57	0.40
1:B:936:ARG:O	1:B:946:LEU:HD21	2.22	0.40
1:B:1051:GLU:O	1:B:1055:LYS:HG2	2.21	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	1011/1067 (95%)	941 (93%)	64 (6%)	6 (1%)	21 49
1	B	1014/1067 (95%)	950 (94%)	61 (6%)	3 (0%)	36 64
All	All	2025/2134 (95%)	1891 (93%)	125 (6%)	9 (0%)	30 58

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	922	PRO
1	B	668	THR
1	A	308	TYR
1	B	372	GLY
1	A	455	ARG
1	A	592	ALA
1	A	671	SER
1	B	246	PRO
1	A	395	LYS

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	874/919 (95%)	873 (100%)	1 (0%)	88 89
1	B	877/919 (95%)	867 (99%)	10 (1%)	65 74
All	All	1751/1838 (95%)	1740 (99%)	11 (1%)	78 80

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	404	CYS
1	B	26	LYS
1	B	28	ILE
1	B	67	SER
1	B	68	ARG
1	B	70	LEU
1	B	352	LYS
1	B	404	CYS
1	B	405	ILE
1	B	450	ILE
1	B	452	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (24) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	111	GLN
1	A	196	GLN
1	A	230	ASN
1	A	363	GLN
1	A	434	GLN
1	A	524	HIS
1	A	563	GLN
1	A	728	ASN
1	A	741	ASN
1	A	775	GLN
1	A	941	GLN
1	A	1000	ASN
1	B	9	GLN
1	B	45	GLN
1	B	209	HIS
1	B	322	ASN
1	B	412	HIS
1	B	449	ASN
1	B	554	ASN
1	B	566	GLN
1	B	657	GLN
1	B	724	ASN
1	B	973	ASN
1	B	994	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)

6 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	FMN	A	1102	-	33,33,33	1.44	4 (12%)	48,50,50	2.23	19 (39%)
2	HEM	B	1101	-	50,50,50	1.68	6 (12%)	66,82,82	1.14	3 (4%)
4	FAD	A	1103	-	56,58,58	0.58	1 (1%)	81,89,89	0.74	2 (2%)
2	HEM	A	1101	1	50,50,50	1.42	4 (8%)	66,82,82	1.48	13 (19%)
3	FMN	B	1103	-	33,33,33	1.17	3 (9%)	48,50,50	1.54	9 (18%)
4	FAD	B	1102	-	56,58,58	0.54	0	81,89,89	0.70	2 (2%)

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
3	FMN	A	1102	-	-	8/18/18/18	0/3/3/3
2	HEM	B	1101	-	-	4/14/54/54	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	FAD	A	1103	-	-	16/34/50/50	0/6/6/6
2	HEM	A	1101	1	-	3/14/54/54	-
3	FMN	B	1103	-	-	4/18/18/18	0/3/3/3
4	FAD	B	1102	-	-	18/34/50/50	0/6/6/6

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1101	HEM	FE-NB	6.77	2.15	1.94
2	A	1101	HEM	FE-NB	4.75	2.09	1.94
2	B	1101	HEM	FE-NC	4.74	2.11	1.95
3	A	1102	FMN	C1'-C2'	3.80	1.58	1.52
3	A	1102	FMN	C4A-N5	3.46	1.37	1.30
4	A	1103	FAD	P-O2P	-3.45	1.39	1.55
3	B	1103	FMN	C4A-N5	3.34	1.37	1.30
2	A	1101	HEM	FE-NC	3.32	2.06	1.95
2	B	1101	HEM	FE-ND	3.15	2.04	1.94
3	A	1102	FMN	C1'-N10	2.97	1.55	1.48
2	A	1101	HEM	CAB-C3B	2.93	1.55	1.47
3	B	1103	FMN	C10-N1	2.86	1.39	1.33
2	B	1101	HEM	CAC-C3C	2.80	1.55	1.47
3	A	1102	FMN	C10-N1	2.79	1.38	1.33
2	A	1101	HEM	CAC-C3C	2.74	1.54	1.47
2	B	1101	HEM	CAB-C3B	2.60	1.54	1.47
3	B	1103	FMN	C1'-C2'	2.29	1.55	1.52
2	B	1101	HEM	CMB-C2B	2.26	1.55	1.50

All (48) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	1102	FMN	C1'-N10-C9A	6.18	130.81	120.51
3	A	1102	FMN	O2'-C2'-C1'	4.61	120.94	109.80
3	A	1102	FMN	C4A-C10-N10	4.41	122.92	116.48
3	A	1102	FMN	C4-N3-C2	-4.22	117.85	125.64
3	A	1102	FMN	C4A-C10-N1	-3.74	116.05	124.73
3	A	1102	FMN	C9A-N10-C10	-3.72	114.97	120.77
2	A	1101	HEM	CHD-C4C-NC	3.43	128.15	124.44
3	A	1102	FMN	C4A-C4-N3	3.30	121.58	113.19
3	A	1102	FMN	C6-C5A-C9A	3.18	123.43	118.94
3	B	1103	FMN	C4-N3-C2	-3.16	119.80	125.64
3	B	1103	FMN	C4-C4A-C10	3.06	121.93	116.79

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	1102	FMN	C9-C9A-C5A	-3.01	114.42	120.11
2	A	1101	HEM	CHA-C4D-ND	2.98	128.05	124.37
2	A	1101	HEM	C3D-C4D-ND	-2.94	106.89	110.17
3	A	1102	FMN	C5A-C9A-N10	2.78	120.82	117.95
4	B	1102	FAD	O3'-C3'-C4'	2.75	115.46	108.81
3	B	1103	FMN	C4A-C10-N10	2.73	120.48	116.48
3	B	1103	FMN	C4A-C10-N1	-2.73	118.40	124.73
3	B	1103	FMN	O4-C4-C4A	-2.66	119.55	126.60
2	A	1101	HEM	C4A-NA-C1A	2.65	107.95	105.35
4	A	1103	FAD	O5'-P-O1P	2.65	119.42	109.07
4	A	1103	FAD	C4'-C3'-C2'	-2.62	107.91	113.36
3	A	1102	FMN	C4-C4A-C10	2.61	121.17	116.79
2	A	1101	HEM	O1D-CGD-CBD	-2.61	114.71	123.08
4	B	1102	FAD	C5'-C4'-C3'	2.52	117.07	112.20
3	B	1103	FMN	P-O5'-C5'	2.50	125.19	118.30
2	B	1101	HEM	CHD-C4C-NC	2.48	127.12	124.44
2	A	1101	HEM	CHC-C1C-NC	2.46	127.09	124.44
3	A	1102	FMN	C10-N1-C2	2.45	121.81	116.90
3	A	1102	FMN	O4-C4-C4A	-2.37	120.32	126.60
3	A	1102	FMN	C9-C8-C7	2.36	123.05	119.67
2	A	1101	HEM	CBD-CAD-C3D	-2.32	106.19	112.63
2	A	1101	HEM	C1B-NB-C4B	2.32	107.47	105.07
3	B	1103	FMN	O4'-C4'-C5'	-2.26	104.85	109.92
2	B	1101	HEM	CBA-CAA-C2A	-2.23	106.42	112.63
2	A	1101	HEM	C4D-C3D-C2D	2.23	110.14	106.90
2	A	1101	HEM	C4D-ND-C1D	2.19	107.34	105.07
3	B	1103	FMN	C10-C4A-N5	-2.19	120.21	124.86
3	A	1102	FMN	C8M-C8-C7	-2.18	116.26	120.74
3	B	1103	FMN	C4A-C4-N3	2.17	118.71	113.19
2	A	1101	HEM	CMA-C3A-C2A	2.16	130.28	125.61
3	A	1102	FMN	O5'-P-O1P	2.16	112.52	106.47
2	B	1101	HEM	C4A-NA-C1A	2.15	107.46	105.35
3	A	1102	FMN	C9-C9A-N10	2.15	124.75	121.84
3	A	1102	FMN	C6-C5A-N5	-2.15	114.76	118.51
2	A	1101	HEM	CAC-C3C-C4C	-2.09	119.84	124.90
2	A	1101	HEM	C4C-NC-C1C	2.05	107.36	105.35
3	A	1102	FMN	C1'-C2'-C3'	2.01	115.41	109.79

There are no chirality outliers.

All (53) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1102	FMN	C2'-C1'-N10-C10
3	A	1102	FMN	N10-C1'-C2'-O2'
3	A	1102	FMN	N10-C1'-C2'-C3'
3	A	1102	FMN	C3'-C4'-C5'-O5'
4	A	1103	FAD	C5B-O5B-PA-O1A
4	A	1103	FAD	C5B-O5B-PA-O2A
4	A	1103	FAD	C1'-C2'-C3'-O3'
4	A	1103	FAD	C1'-C2'-C3'-C4'
4	A	1103	FAD	O2'-C2'-C3'-O3'
4	A	1103	FAD	O2'-C2'-C3'-C4'
4	A	1103	FAD	C5'-O5'-P-O3P
4	B	1102	FAD	N10-C1'-C2'-O2'
4	B	1102	FAD	N10-C1'-C2'-C3'
4	B	1102	FAD	C1'-C2'-C3'-O3'
4	B	1102	FAD	C1'-C2'-C3'-C4'
4	B	1102	FAD	C3'-C4'-C5'-O5'
4	B	1102	FAD	O4'-C4'-C5'-O5'
4	B	1102	FAD	C5'-O5'-P-O1P
4	B	1102	FAD	C5'-O5'-P-O2P
4	B	1102	FAD	C5'-O5'-P-O3P
3	B	1103	FMN	O3'-C3'-C4'-O4'
4	B	1102	FAD	O2'-C2'-C3'-O3'
4	A	1103	FAD	O4B-C4B-C5B-O5B
4	A	1103	FAD	C3B-C4B-C5B-O5B
3	B	1103	FMN	C2'-C3'-C4'-C5'
4	B	1102	FAD	O2'-C2'-C3'-C4'
4	B	1102	FAD	C2'-C3'-C4'-O4'
3	B	1103	FMN	O3'-C3'-C4'-C5'
4	B	1102	FAD	O3'-C3'-C4'-O4'
3	A	1102	FMN	O2'-C2'-C3'-C4'
3	B	1103	FMN	C2'-C3'-C4'-O4'
2	A	1101	HEM	C2A-CAA-CBA-CGA
3	A	1102	FMN	C2'-C1'-N10-C9A
4	B	1102	FAD	C2'-C3'-C4'-C5'
3	A	1102	FMN	O4'-C4'-C5'-O5'
4	B	1102	FAD	C5B-O5B-PA-O3P
4	A	1103	FAD	C5'-O5'-P-O1P
4	A	1103	FAD	C5'-O5'-P-O2P
2	B	1101	HEM	CAD-CBD-CGD-O1D
4	B	1102	FAD	C2B-C1B-N9A-C8A
3	A	1102	FMN	O2'-C2'-C3'-O3'
4	B	1102	FAD	O3'-C3'-C4'-C5'
2	A	1101	HEM	CAD-CBD-CGD-O2D

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
2	B	1101	HEM	CAD-CBD-CGD-O2D
2	A	1101	HEM	CAD-CBD-CGD-O1D
4	A	1103	FAD	PA-O3P-P-O2P
2	B	1101	HEM	CAA-CBA-CGA-O2A
2	B	1101	HEM	CAA-CBA-CGA-O1A
4	A	1103	FAD	C5B-O5B-PA-O3P
4	A	1103	FAD	PA-O3P-P-O1P
4	A	1103	FAD	C2B-C1B-N9A-C8A
4	B	1102	FAD	C5B-O5B-PA-O1A
4	A	1103	FAD	O4B-C1B-N9A-C8A

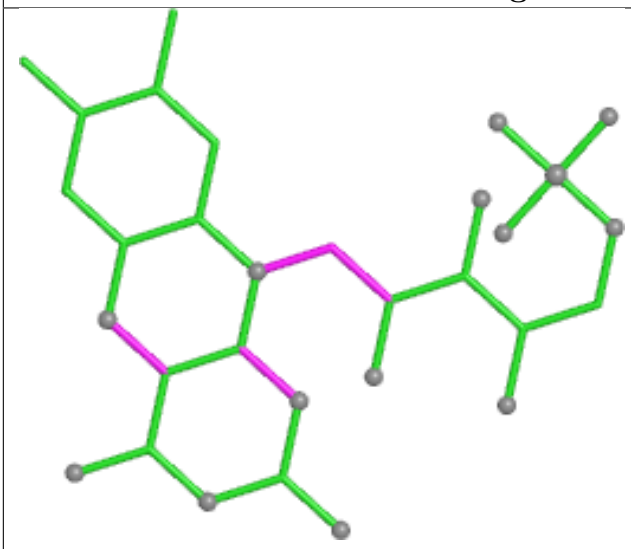
There are no ring outliers.

5 monomers are involved in 24 short contacts:

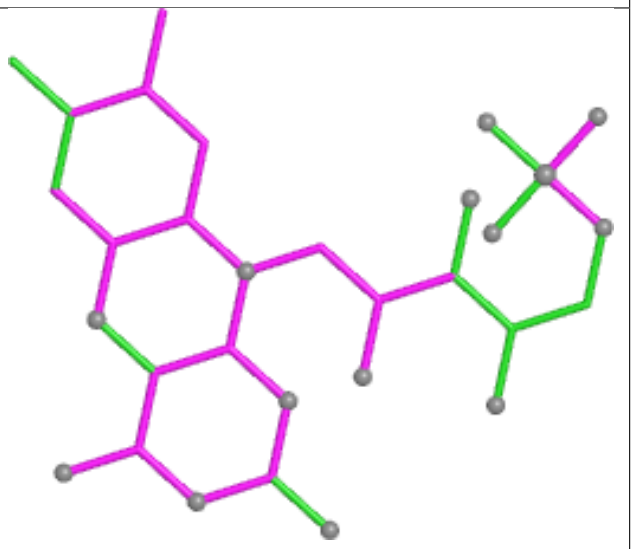
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1102	FMN	3	0
2	B	1101	HEM	10	0
4	A	1103	FAD	3	0
2	A	1101	HEM	5	0
3	B	1103	FMN	3	0

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 then 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.

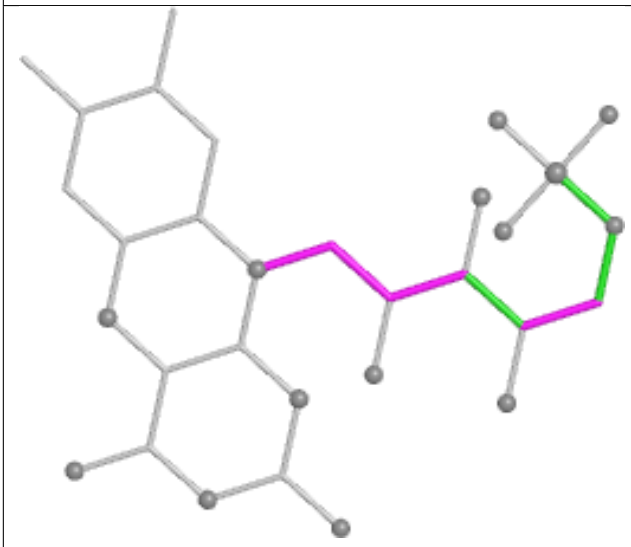
Ligand FMN A 1102



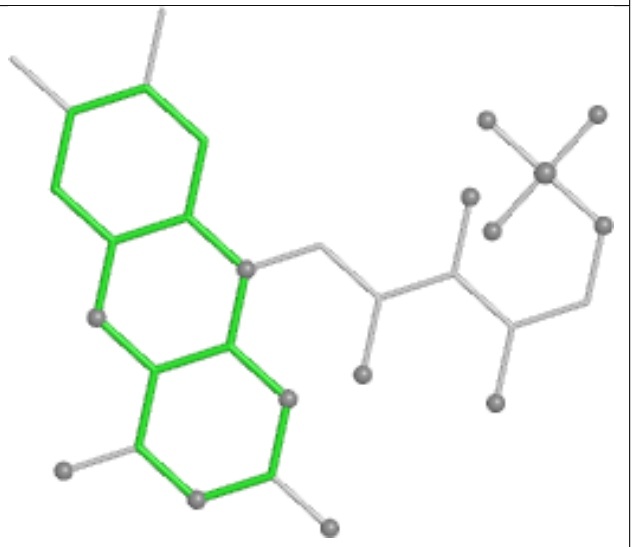
Bond lengths



Bond angles

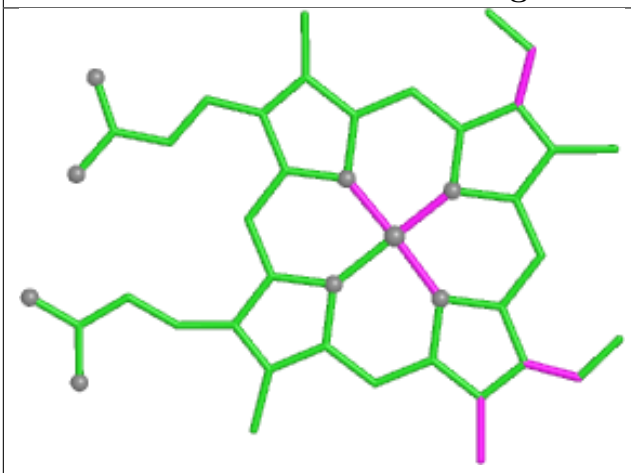


Torsions

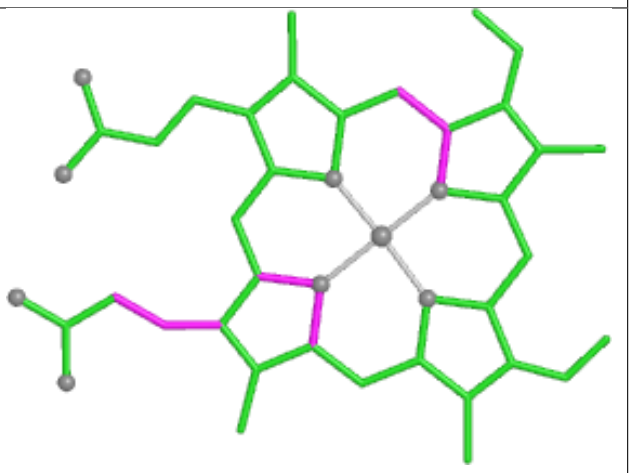


Rings

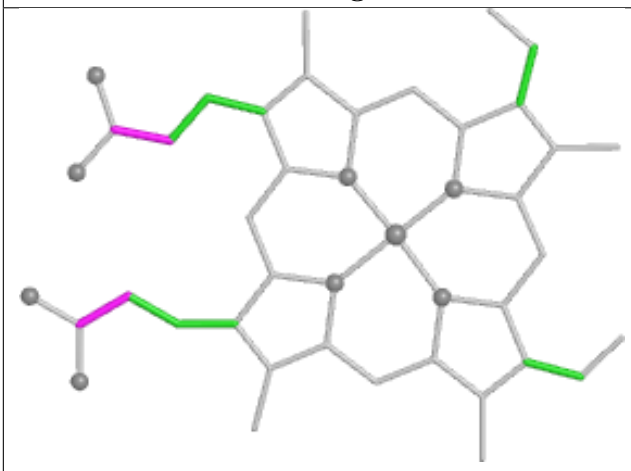
Ligand HEM B 1101



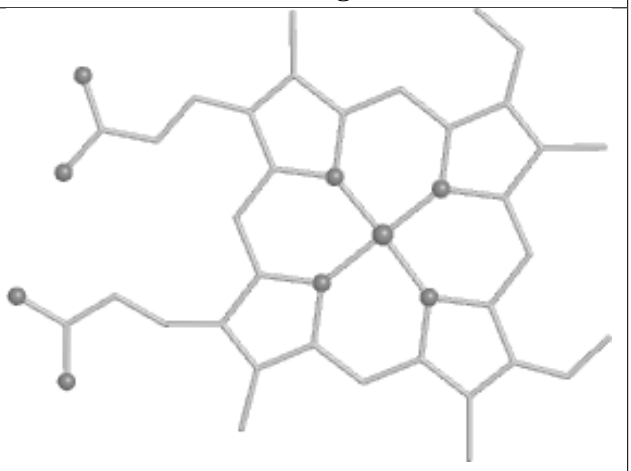
Bond lengths



Bond angles

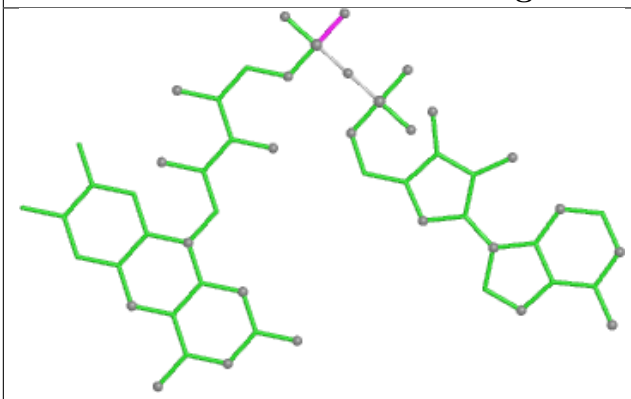


Torsions

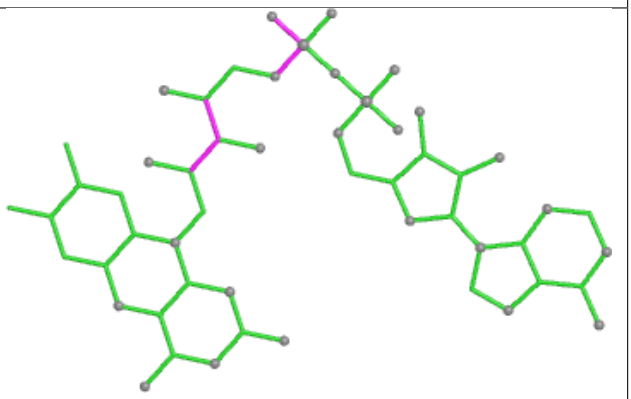


Rings

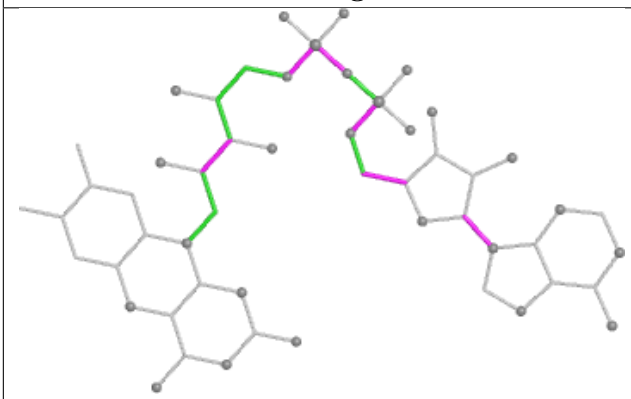
Ligand FAD A 1103



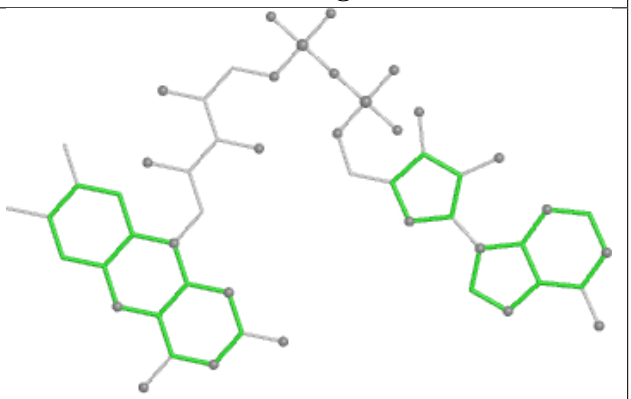
Bond lengths



Bond angles

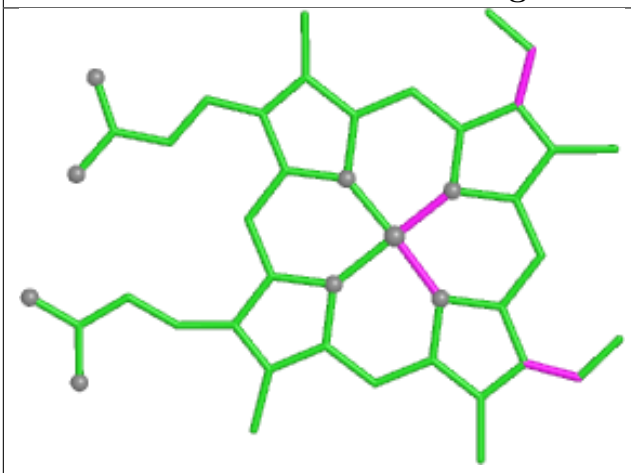


Torsions

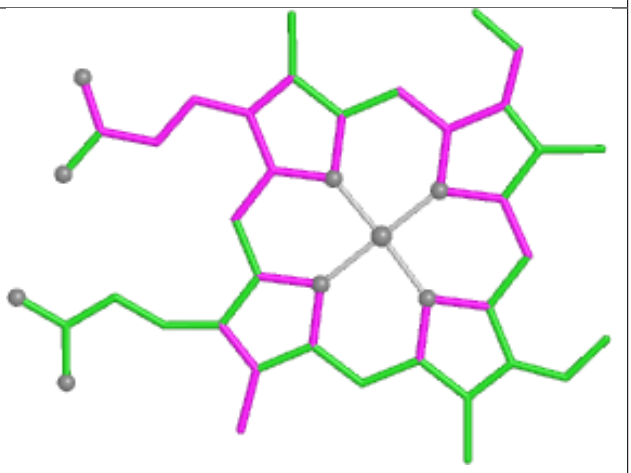


Rings

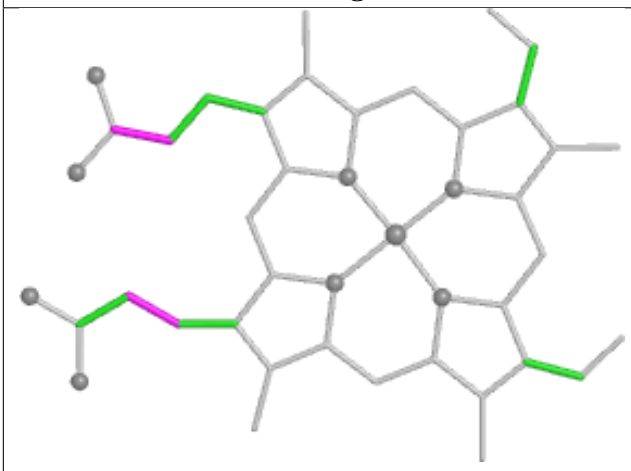
Ligand HEM A 1101



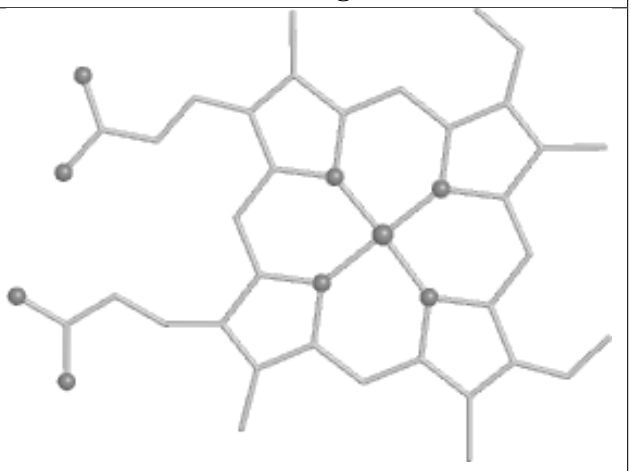
Bond lengths



Bond angles

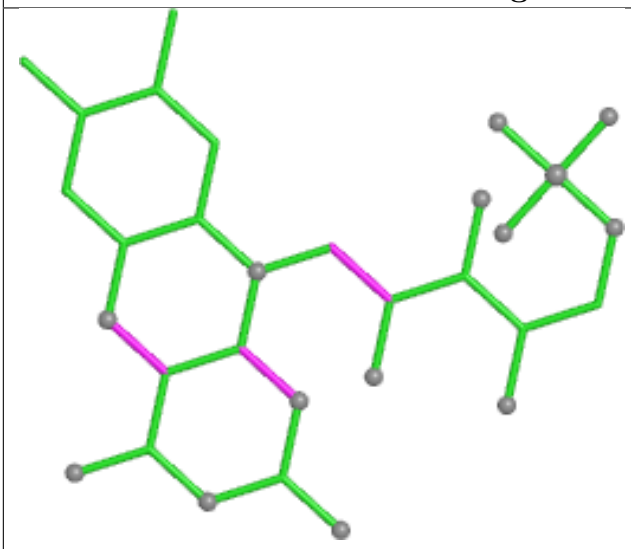


Torsions

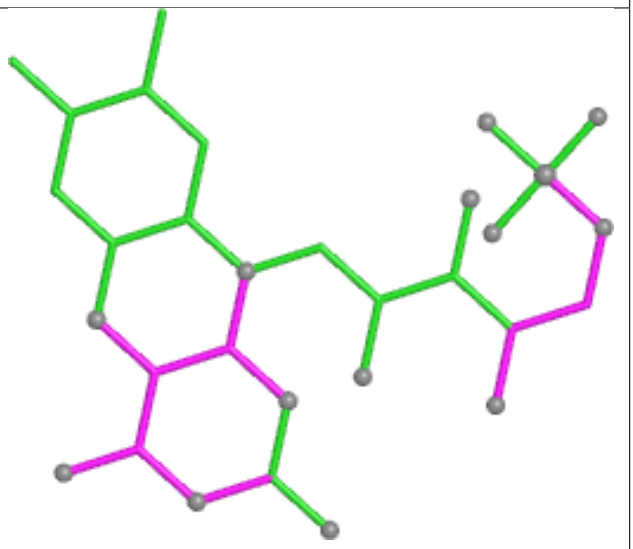


Rings

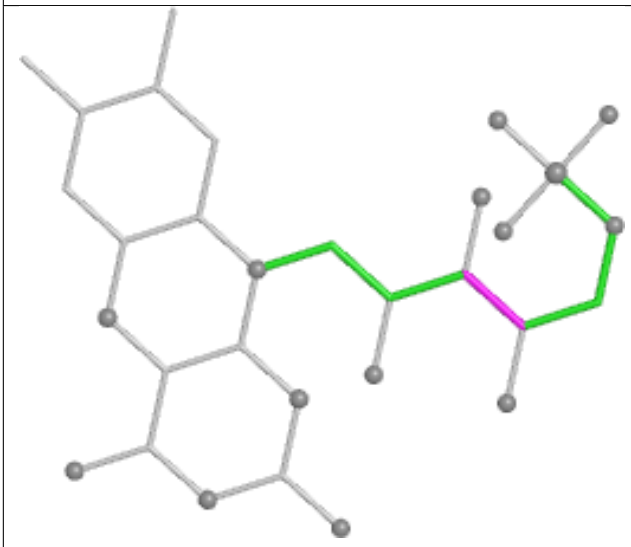
Ligand FMN B 1103



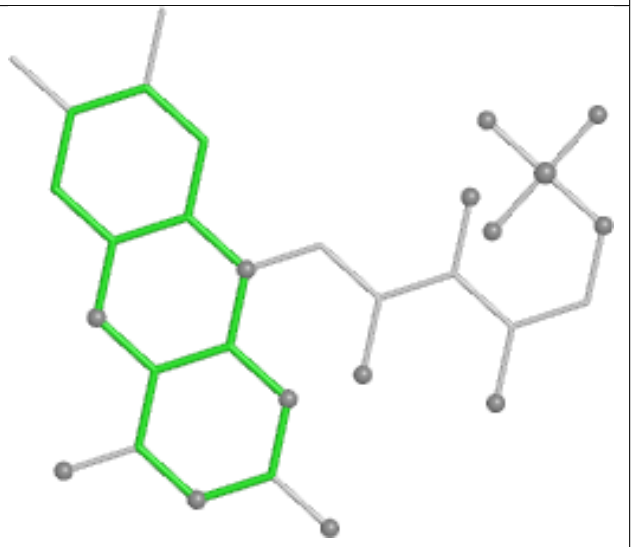
Bond lengths



Bond angles

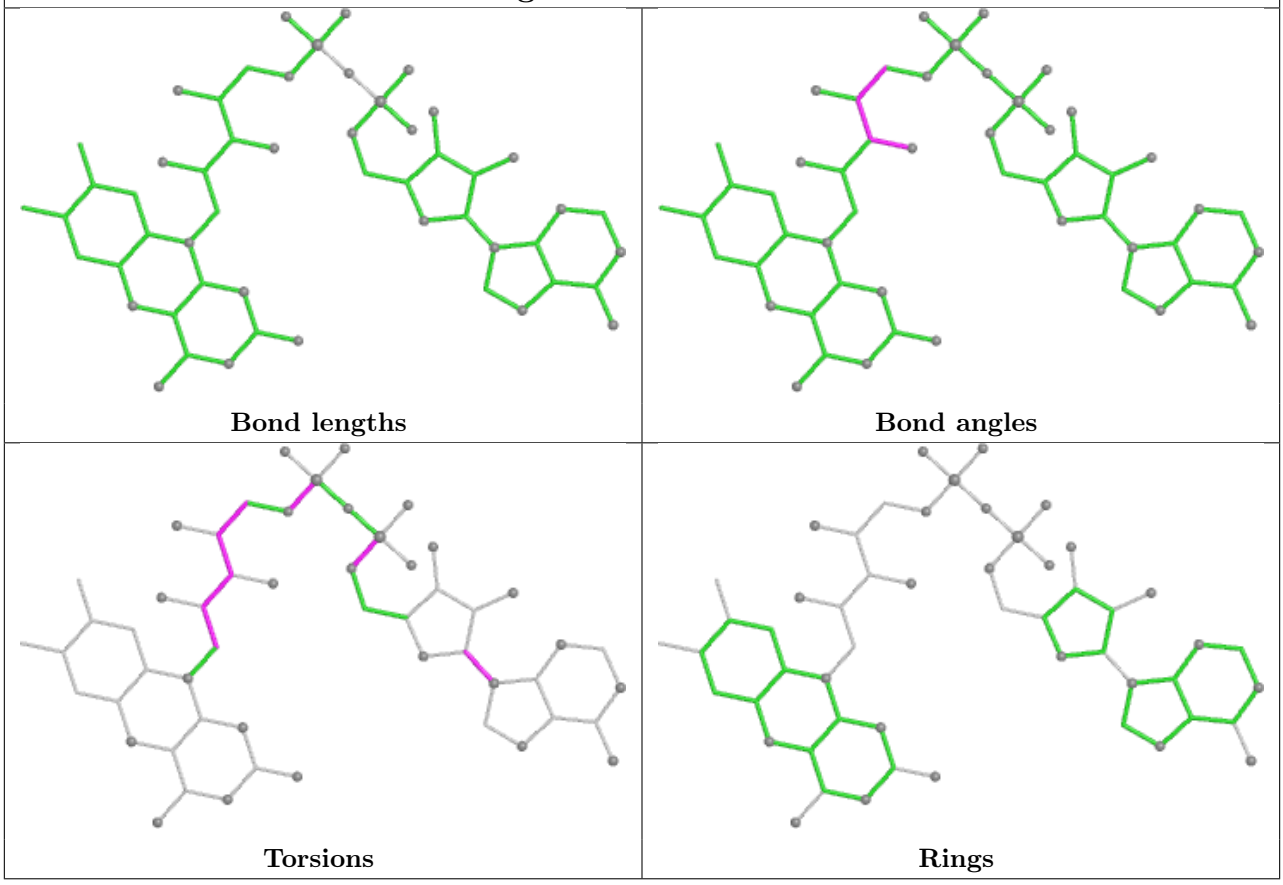


Torsions



Rings

Ligand FAD B 1102



5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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, 95^{th} 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	1017/1067 (95%)	-0.13	5 (0%)	87	77	9, 39, 70, 100	0
1	B	1020/1067 (95%)	0.19	23 (2%)	61	45	11, 53, 87, 120	0
All	All	2037/2134 (95%)	0.03	28 (1%)	73	59	9, 45, 83, 120	0

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	960	ASP	6.9
1	A	433	TYR	4.7
1	B	372	GLY	4.1
1	B	959	ALA	3.3
1	B	669	GLY	3.2
1	B	67	SER	3.1
1	B	1002	GLU	3.1
1	B	45	GLN	2.9
1	B	338	ALA	2.8
1	B	68	ARG	2.7
1	A	647	LEU	2.5
1	B	5	ASN	2.5
1	B	954	GLY	2.5
1	B	304	SER	2.4
1	B	371	TRP	2.4
1	B	961	PHE	2.3
1	A	308	TYR	2.3
1	B	234	ASN	2.3
1	B	191	GLN	2.3
1	B	652	ASP	2.3
1	A	1042	GLY	2.3
1	B	88	LEU	2.2
1	B	915	THR	2.1
1	B	980	ILE	2.1

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	656	ASP	2.1
1	B	982	PHE	2.1
1	B	957	ASN	2.0
1	B	1037	GLU	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)

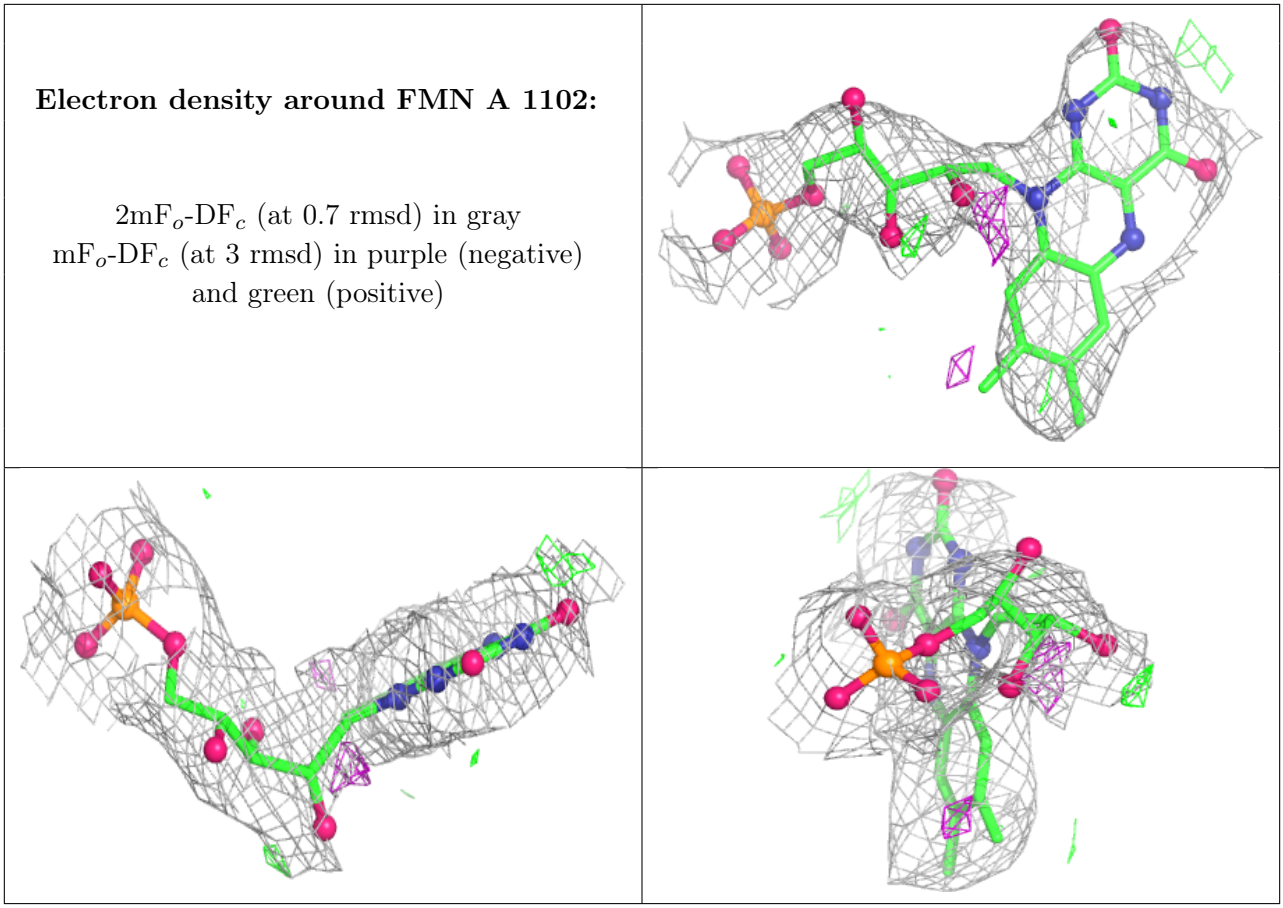
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
3	FMN	A	1102	31/31	0.95	0.10	25,40,46,48	0
4	FAD	A	1103	53/53	0.96	0.09	15,24,56,62	0
4	FAD	B	1102	53/53	0.96	0.09	25,36,54,60	0
2	HEM	B	1101	43/43	0.97	0.09	31,43,61,64	0
2	HEM	A	1101	43/43	0.98	0.07	10,18,25,28	0
3	FMN	B	1103	31/31	0.99	0.06	19,25,28,31	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.

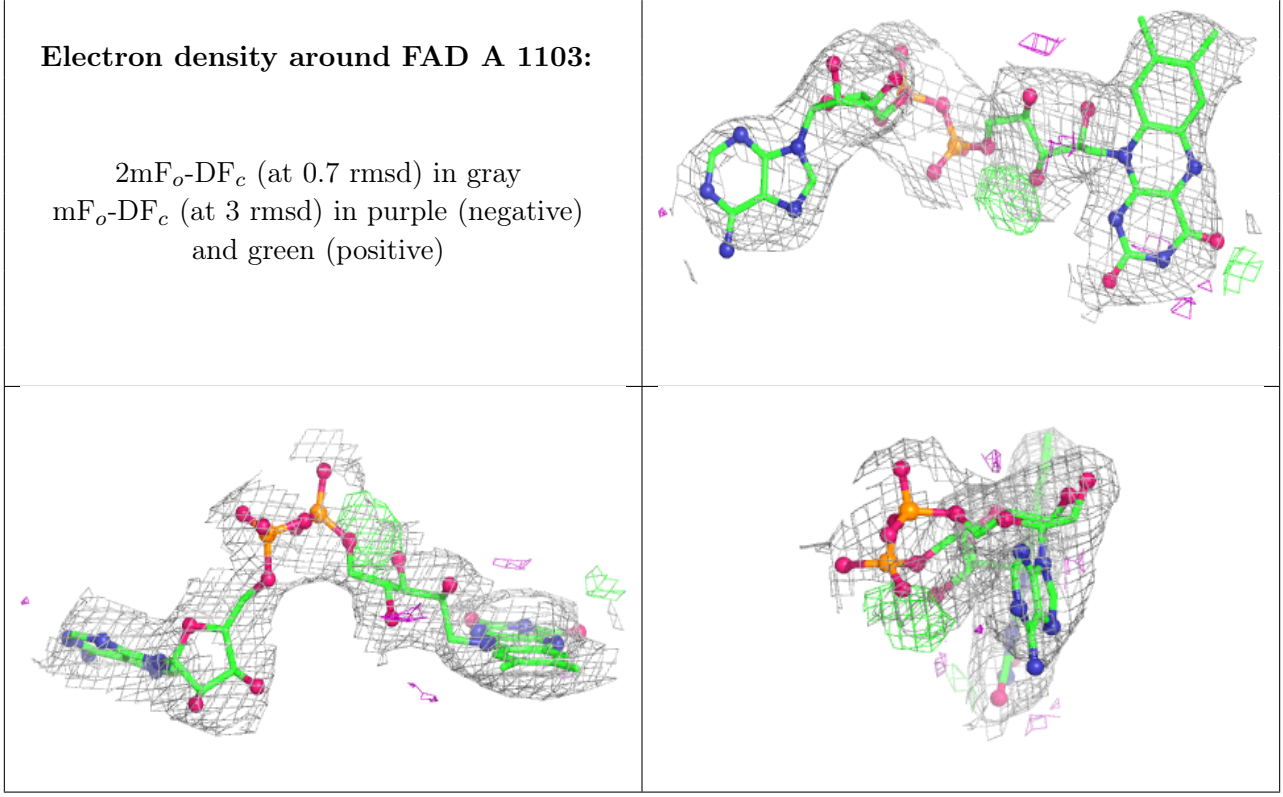
Electron density around FMN A 1102:

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



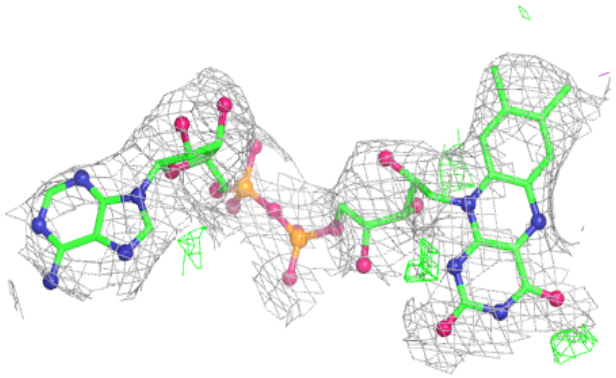
Electron density around FAD A 1103:

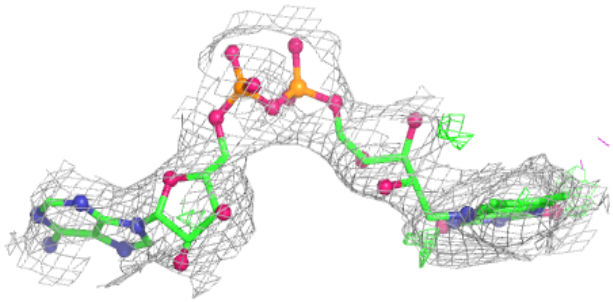
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

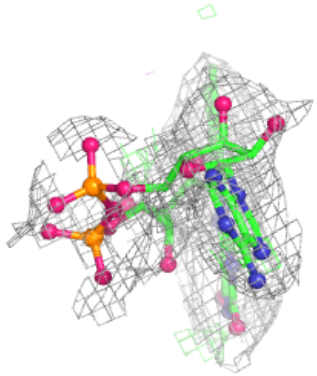


Electron density around FAD B 1102:

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

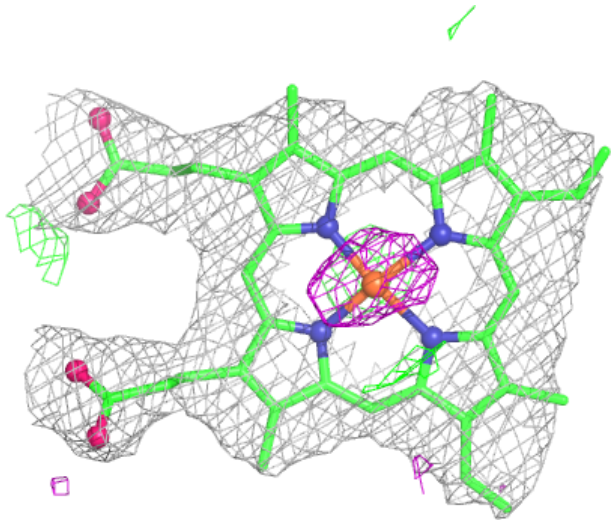


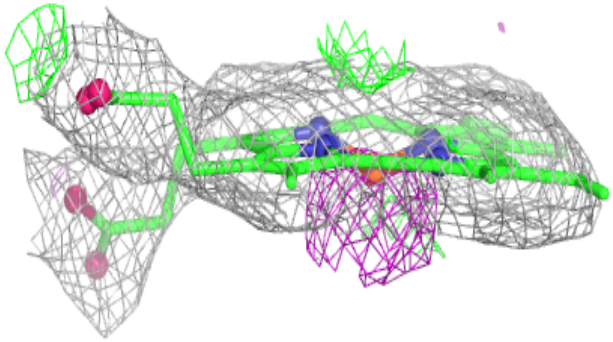


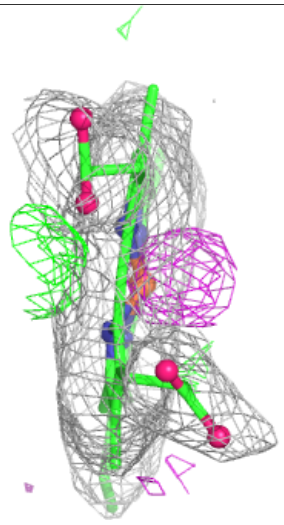


Electron density around HEM B 1101:

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

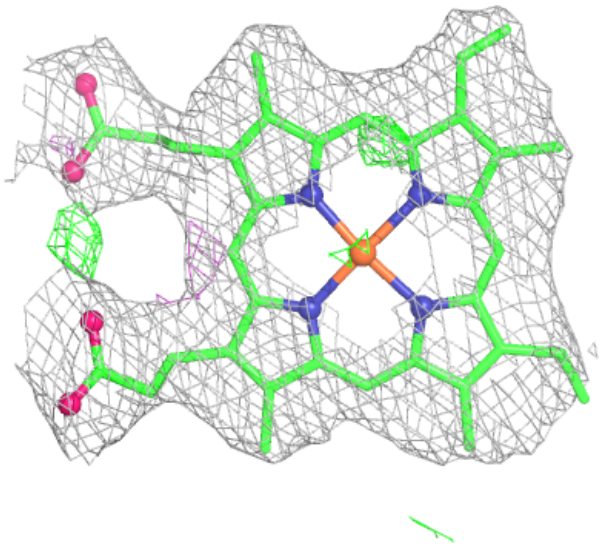


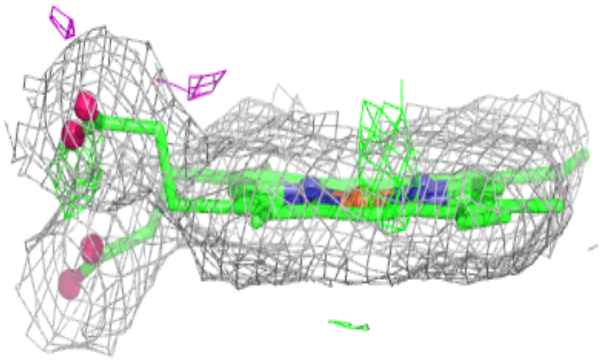


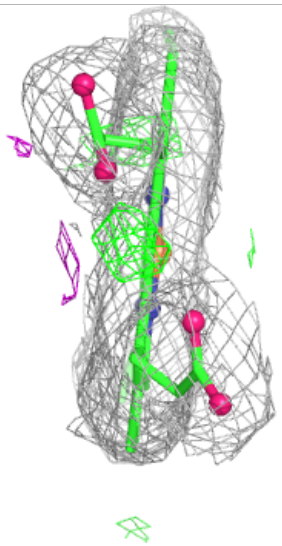


Electron density around HEM A 1101:

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

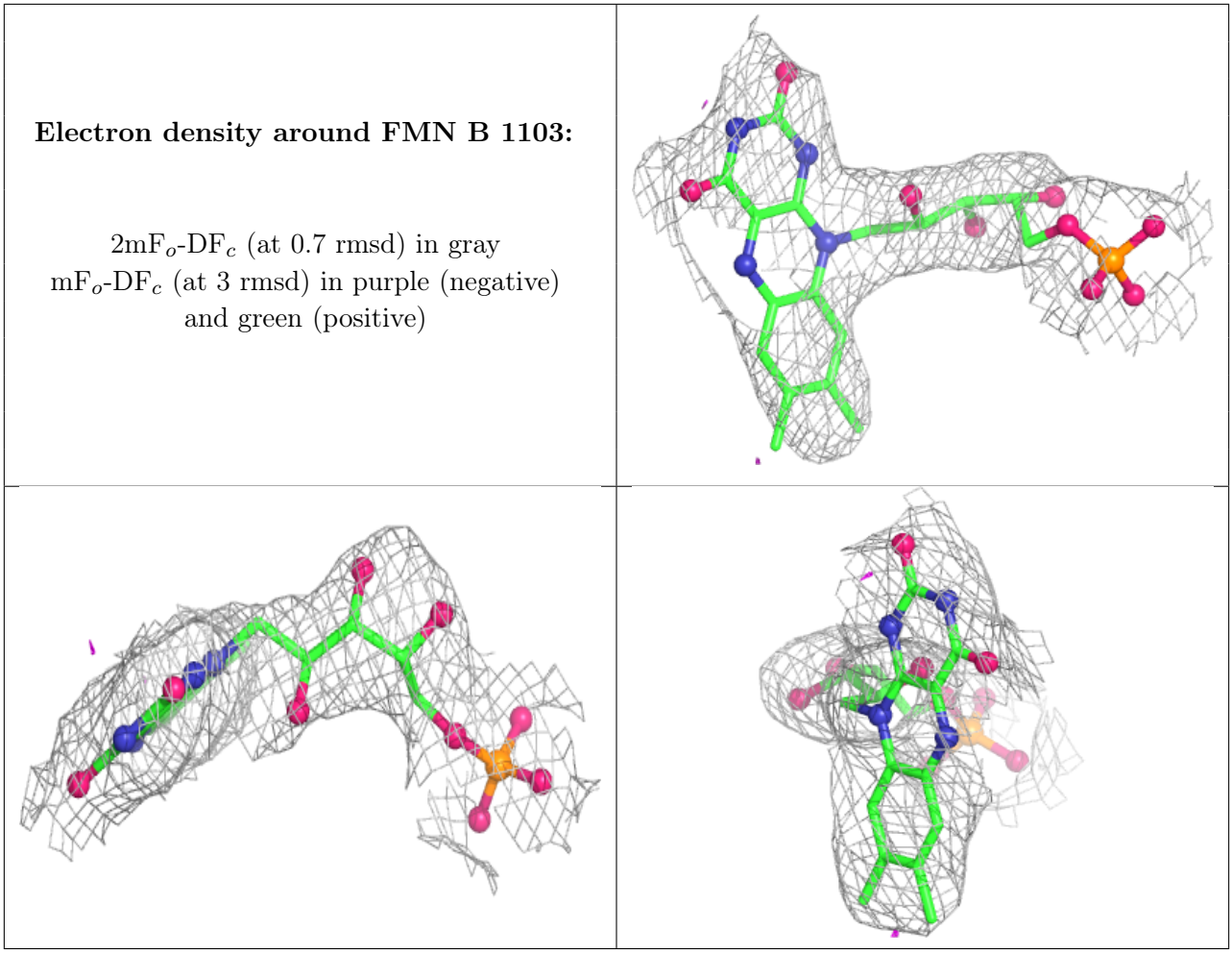






Electron density around FMN B 1103:

$2mF_o$-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

There are no such residues in this entry.