



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 3, 2021 – 03:10 AM EDT

PDB ID : 3IR7  
Title : Crystal structure of NarGHI mutant NarG-R94S  
Authors : Bertero, M.G.; Rothery, R.A.; Weiner, J.H.; Strynadka, N.C.J.  
Deposited on : 2009-08-21  
Resolution : 2.50 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](mailto: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.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.23.2  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.23.2

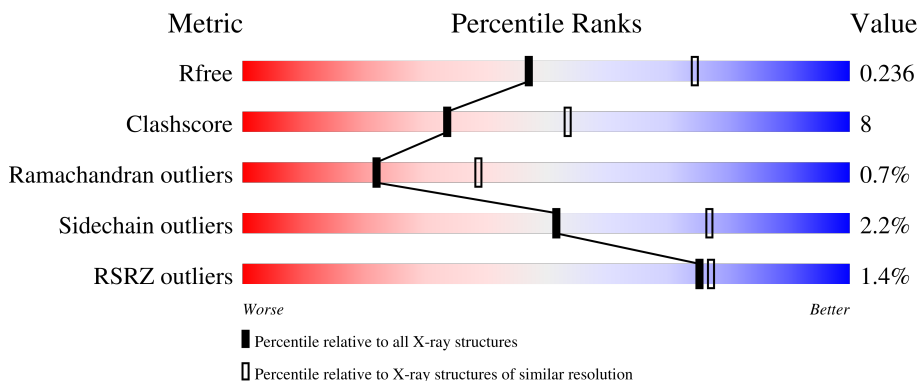
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.50 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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  $\geq 3$ , 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	1247	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 75%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 19%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 2%; height: 10px; background-color: grey; margin-right: 2px;"></div> </div> <p style="margin-left: 40px;">79%      19%      .</p>
2	B	512	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 79%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 15%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 2%; height: 10px; background-color: grey; margin-right: 2px;"></div> </div> <p style="margin-left: 40px;">83%      15%      ..</p>
3	C	225	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 2px;"></div> <div style="width: 73%; height: 10px; background-color: green; margin-right: 2px;"></div> <div style="width: 22%; height: 10px; background-color: yellow; margin-right: 2px;"></div> <div style="width: 1%; height: 10px; background-color: grey; margin-right: 2px;"></div> </div> <p style="margin-left: 40px;">77%      22%      .</p>

## 2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 16102 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 Respiratory nitrate reductase 1 alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	1242	9840	6214	1723	1855	48	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	94	SER	ARG	engineered mutation	UNP P09152

- Molecule 2 is a protein called Respiratory nitrate reductase 1 beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	509	4050	2562	701	755	32	0	0	0

- Molecule 3 is a protein called Respiratory nitrate reductase 1 gamma chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	225	1791	1188	303	286	14	0	0	0

- Molecule 4 is PHOSPHORIC ACID 4-(2-AMINO-4-OXO-3,4,5,6,-TETRAHYDRO-PTE RIDIN-6-YL)-2-HYDROXY-3,4-DIMERCAPTO-BUT-3-EN-YL ESTER GUANYLATE ESTER (three-letter code: MD1) (formula: C<sub>20</sub>H<sub>26</sub>N<sub>10</sub>O<sub>13</sub>P<sub>2</sub>S<sub>2</sub>).



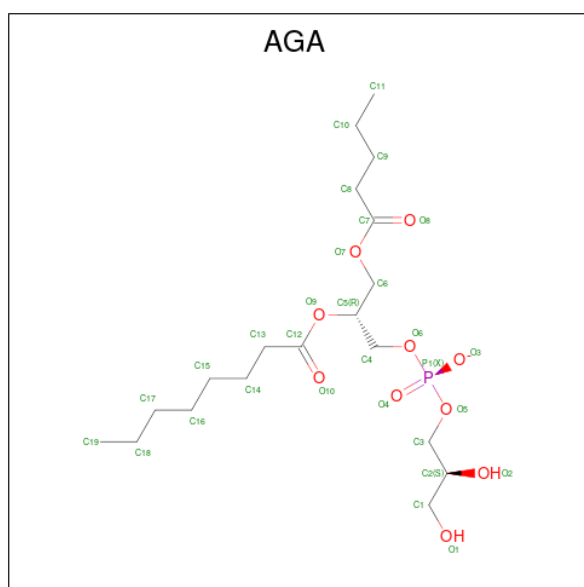
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	Fe	S	0	0
			8	4	4		
5	B	1	Total	Fe	S	0	0
			8	4	4		

- Molecule 6 is MOLYBDENUM(VI) ION (three-letter code: 6MO) (formula: Mo).

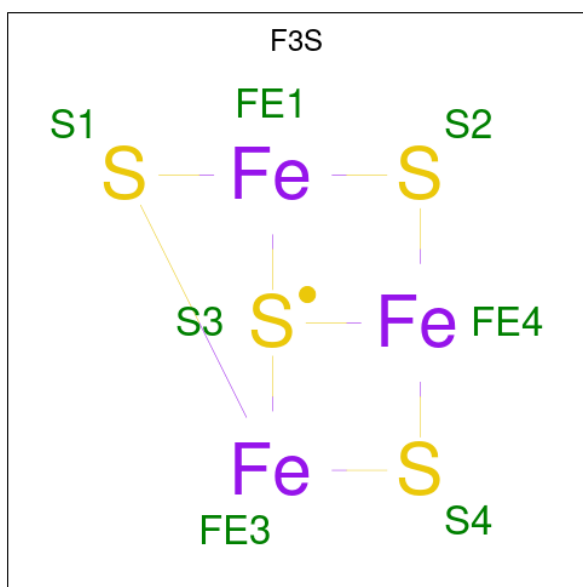
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Mo	0	0
			1	1		

- Molecule 7 is (1S)-2-[[[(2S)-2,3-DIHYDROXYPROPYL]OXY](HYDROXY)PHOSPHORYL]OXY]-1-[(PENTANOYLOXY)METHYL]ETHYL OCTANOATE (three-letter code: AGA) (formula: C<sub>19</sub>H<sub>36</sub>O<sub>10</sub>P).



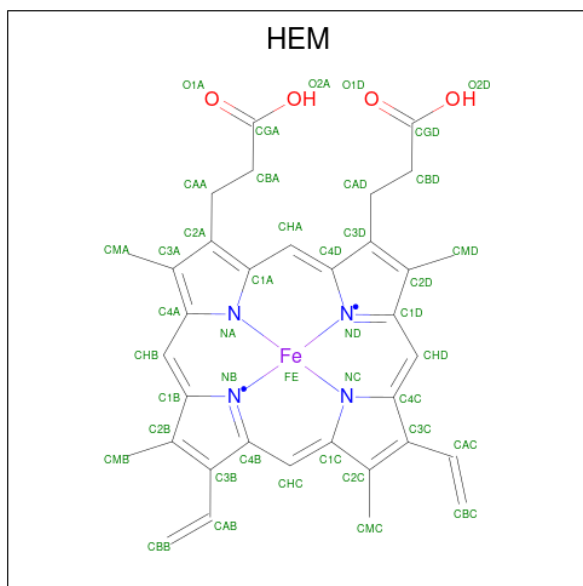
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	A	1	Total	C	O	P	0	0
			25	16	8	1		

- Molecule 8 is FE3-S4 CLUSTER (three-letter code: F3S) (formula: Fe<sub>3</sub>S<sub>4</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	B	1	Total	Fe	S			
			7	3	4	0	0	

- Molecule 9 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula:  $C_{34}H_{32}FeN_4O_4$ ).



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

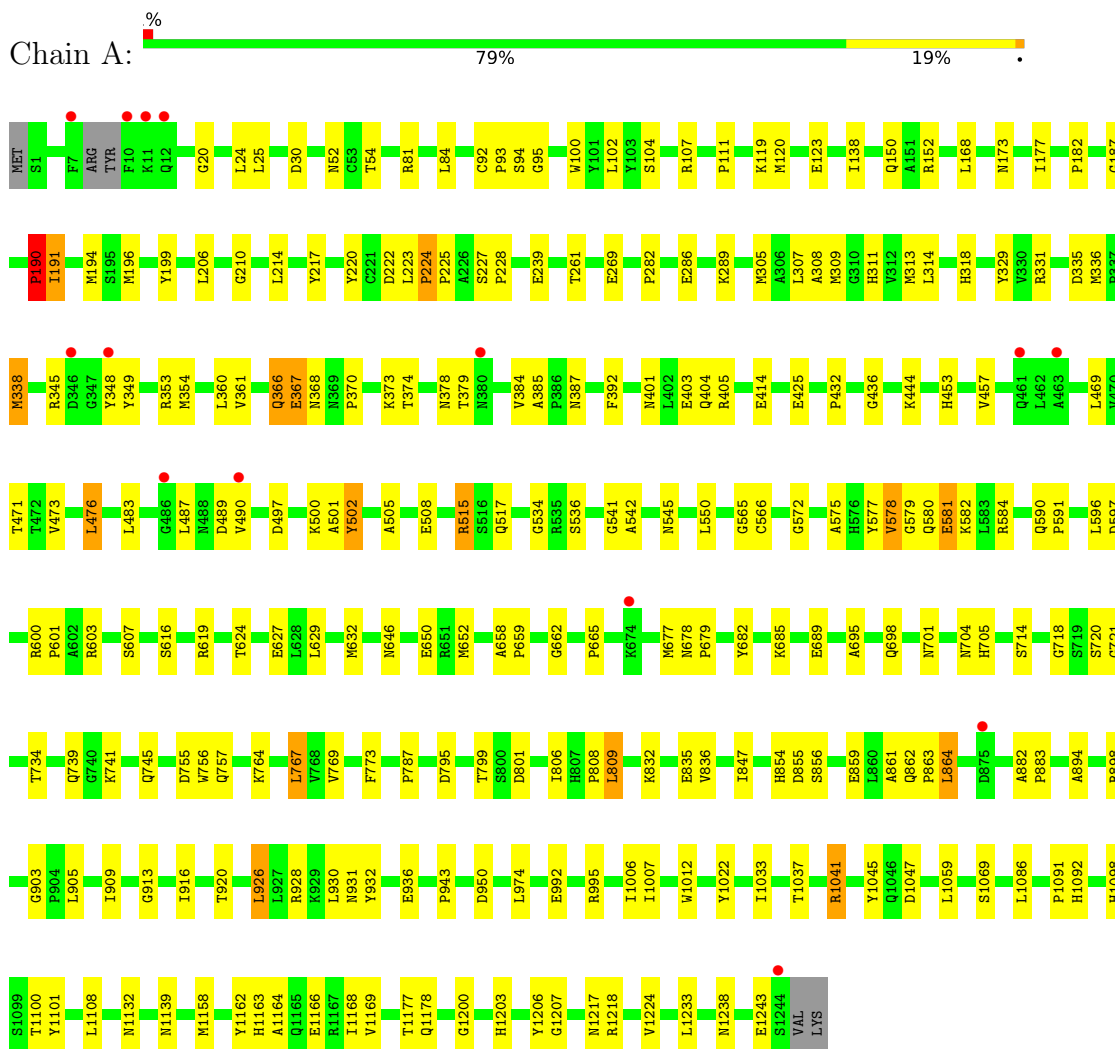
- Molecule 10 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
10	A	86	Total 86	O 86	0	0
10	B	82	Total 82	O 82	0	0
10	C	8	Total 8	O 8	0	0

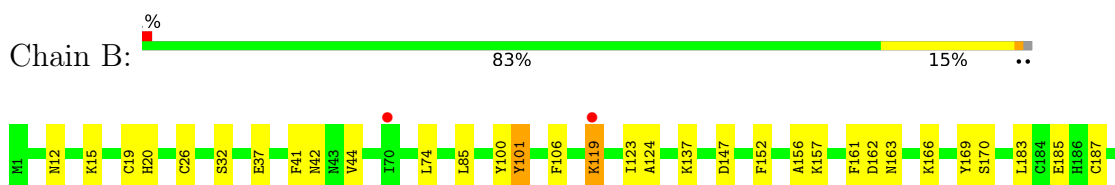
### 3 Residue-property plots i

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

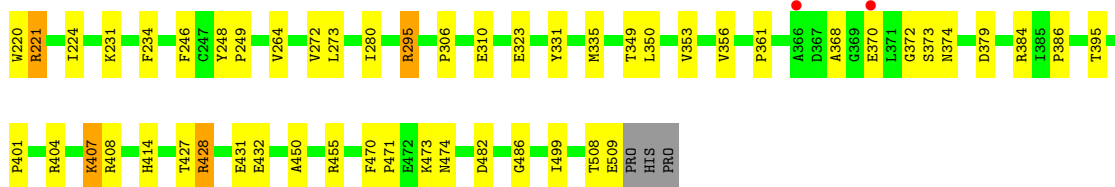
- Molecule 1: Respiratory nitrate reductase 1 alpha chain



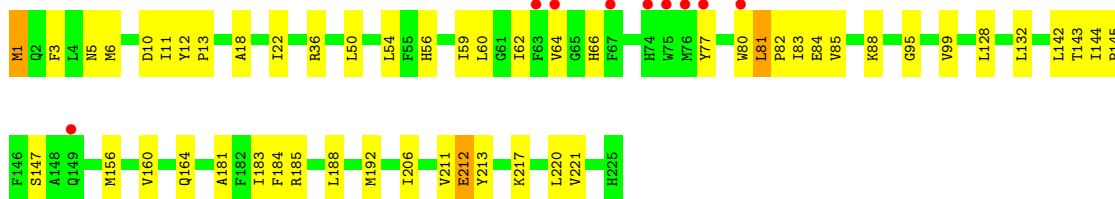
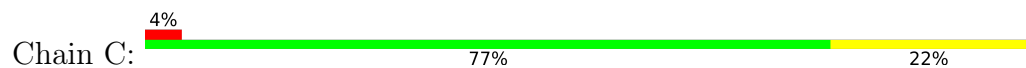
- Molecule 2: Respiratory nitrate reductase 1 beta chain







• Molecule 3: Respiratory nitrate reductase 1 gamma chain



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	153.85Å 241.15Å 139.97Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	24.96 – 2.50 24.96 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.8 (24.96-2.50) 99.9 (24.96-2.50)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.60 (at 2.50Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.202 , 0.243 0.194 , 0.236	Depositor DCC
$R_{free}$ test set	7209 reflections (8.03%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	36.5	Xtrriage
Anisotropy	0.666	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 29.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	16102	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	36.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.79% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: FME, SF4, AGA, 6MO, F3S, MD1, 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	0.35	0/10097	0.62	2/13707 (0.0%)
2	B	0.37	0/4146	0.64	1/5609 (0.0%)
3	C	0.39	0/1833	0.55	0/2481
All	All	0.36	0/16076	0.62	3/21797 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	407	LYS	CB-CA-C	5.56	121.53	110.40
1	A	809	LEU	N-CA-C	-5.37	96.52	111.00
1	A	767	LEU	CA-CB-CG	5.02	126.84	115.30

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	9840	0	9496	185	0
2	B	4050	0	3973	53	0
3	C	1791	0	1825	34	0
4	A	94	0	42	8	0
5	A	8	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	B	24	0	0	1	0
6	A	1	0	0	0	0
7	A	25	0	29	0	0
8	B	7	0	0	0	0
9	C	86	0	60	2	0
10	A	86	0	0	6	0
10	B	82	0	0	4	0
10	C	8	0	0	0	0
All	All	16102	0	15425	265	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 8.

All (265) 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:A:508:GLU:OE1	1:A:515:ARG:HD2	1.75	0.86
1:A:863:PRO:HG2	1:A:864:LEU:HD22	1.62	0.81
1:A:584:ARG:HD3	1:A:1006:ILE:HD13	1.62	0.80
1:A:227:SER:HB3	1:A:228:PRO:HD3	1.67	0.77
1:A:1218:ARG:HD2	10:A:1319:HOH:O	1.88	0.71
2:B:407:LYS:NZ	2:B:432:GLU:HG2	2.07	0.70
1:A:578:VAL:HG23	1:A:579:GLY:H	1.56	0.69
2:B:395:THR:HG21	2:B:401:PRO:HG2	1.74	0.69
1:A:261:THR:HG22	2:B:264:VAL:HG11	1.75	0.69
3:C:6:MET:O	3:C:10:ASP:HB2	1.94	0.68
1:A:1098:HIS:CE1	4:A:1251:MD1:S13	2.88	0.66
1:A:677:MET:HG3	1:A:682:TYR:HB2	1.77	0.66
1:A:1098:HIS:HE1	4:A:1251:MD1:S13	2.18	0.66
2:B:361:PRO:HD2	2:B:384:ARG:HD3	1.78	0.65
1:A:335:ASP:O	1:A:338:MET:HB2	1.96	0.65
1:A:387:ASN:ND2	1:A:405:ARG:HB2	2.11	0.65
1:A:225:PRO:O	1:A:228:PRO:HD2	1.97	0.65
3:C:95:GLY:O	3:C:99:VAL:HG23	1.96	0.64
1:A:366:GLN:HG2	1:A:373:LYS:HD2	1.79	0.63
1:A:705:HIS:CD2	1:A:764:LYS:HB3	2.35	0.62
1:A:517:GLN:HE21	1:A:517:GLN:HA	1.64	0.62
1:A:168:LEU:HD23	1:A:168:LEU:O	2.00	0.62
3:C:82:PRO:HG2	3:C:85:VAL:HG23	1.82	0.62
1:A:336:MET:HA	1:A:473:VAL:HB	1.81	0.61
1:A:928:ARG:HG2	1:A:943:PRO:HG3	1.80	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:187:CYS:HB3	2:B:349:THR:O	2.01	0.60
3:C:143:THR:HG22	3:C:183:ILE:HG13	1.84	0.59
1:A:517:GLN:HA	1:A:517:GLN:NE2	2.18	0.59
1:A:616:SER:HB3	1:A:619:ARG:HD3	1.83	0.59
1:A:1098:HIS:CE1	4:A:1247:MD1:S12	2.96	0.59
3:C:206:ILE:HD11	9:C:806:HEM:HBC2	1.85	0.59
2:B:373:SER:HB3	2:B:428:ARG:NH1	2.19	0.58
2:B:508:THR:O	2:B:509:GLU:HB3	2.03	0.58
1:A:191:ILE:O	1:A:194:MET:HG2	2.04	0.57
1:A:345:ARG:HB2	1:A:348:TYR:O	2.04	0.57
1:A:1092:HIS:HA	1:A:1163:HIS:HB3	1.85	0.57
3:C:84:GLU:O	3:C:88:LYS:HG2	2.04	0.57
1:A:487:LEU:HD12	1:A:487:LEU:N	2.20	0.57
3:C:12:TYR:N	3:C:13:PRO:HD2	2.19	0.57
1:A:119:LYS:O	1:A:123:GLU:HG3	2.04	0.57
1:A:360:LEU:N	1:A:360:LEU:HD22	2.20	0.57
1:A:578:VAL:HG23	1:A:579:GLY:N	2.20	0.56
2:B:152:PHE:CD2	2:B:170:SER:HB3	2.40	0.56
1:A:338:MET:HG3	1:A:374:THR:HB	1.87	0.56
1:A:214:LEU:HB3	1:A:607:SER:OG	2.05	0.56
2:B:407:LYS:HZ1	2:B:432:GLU:HG2	1.71	0.56
3:C:50:LEU:HD13	3:C:54:LEU:HD12	1.88	0.56
1:A:1206:TYR:CG	1:A:1207:GLY:N	2.74	0.56
1:A:353:ARG:HA	1:A:1047:ASP:HB2	1.88	0.56
1:A:931:ASN:O	1:A:932:TYR:HB2	2.05	0.55
1:A:741:LYS:HB3	1:A:745:GLN:HB2	1.88	0.55
1:A:338:MET:HB3	1:A:354:MET:HE2	1.88	0.55
1:A:678:ASN:HB2	1:A:679:PRO:HD2	1.88	0.55
1:A:1037:THR:HA	1:A:1203:HIS:HB3	1.87	0.55
4:A:1247:MD1:H7	4:A:1247:MD1:C11	2.37	0.55
1:A:882:ALA:HB1	1:A:883:PRO:HD2	1.88	0.55
2:B:372:GLY:HA3	2:B:379:ASP:OD1	2.07	0.55
1:A:217:TYR:CE2	1:A:223:LEU:HA	2.42	0.55
1:A:575:ALA:HB1	1:A:577:TYR:CE2	2.42	0.55
3:C:1:FME:O1	3:C:3:PHE:HB3	2.07	0.55
1:A:329:TYR:CE1	1:A:565:GLY:HA2	2.42	0.55
1:A:220:TYR:CE1	1:A:720:SER:HB2	2.42	0.55
1:A:92:CYS:HB2	1:A:93:PRO:HD2	1.88	0.54
1:A:220:TYR:CE2	4:A:1247:MD1:H101	2.43	0.54
1:A:309:MET:O	1:A:313:MET:HG3	2.06	0.54
1:A:401:ASN:OD1	1:A:403:GLU:HG3	2.07	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:128:LEU:O	3:C:132:LEU:HG	2.08	0.54
1:A:581:GLU:OE2	1:A:801:ASP:OD2	2.25	0.54
1:A:662:GLY:HA2	1:A:704:ASN:OD1	2.07	0.54
1:A:1132:ASN:ND2	2:B:137:LYS:HE3	2.22	0.54
3:C:83:ILE:HD11	3:C:156:MET:HG2	1.89	0.54
2:B:370:GLU:OE2	2:B:370:GLU:HA	2.07	0.53
1:A:1086:LEU:HD12	1:A:1224:VAL:HG21	1.90	0.53
1:A:1098:HIS:C	1:A:1164:ALA:HB3	2.28	0.53
1:A:1006:ILE:CD1	10:A:1323:HOH:O	2.57	0.53
2:B:450:ALA:HB1	2:B:455:ARG:HD3	1.91	0.53
1:A:795:ASP:HA	1:A:809:LEU:O	2.10	0.52
1:A:223:LEU:O	1:A:225:PRO:HD3	2.09	0.52
1:A:453:HIS:HA	1:A:489:ASP:OD1	2.10	0.52
3:C:181:ALA:HB3	3:C:184:PHE:CD2	2.45	0.52
1:A:582:LYS:HB2	1:A:801:ASP:CG	2.30	0.51
1:A:1069:SER:O	1:A:1139:ASN:HB2	2.10	0.51
1:A:282:PRO:HB2	1:A:1158:MET:HE3	1.92	0.51
1:A:311:HIS:CE1	1:A:483:LEU:HD13	2.46	0.51
1:A:767:LEU:HD13	1:A:769:VAL:HG23	1.93	0.51
1:A:679:PRO:HB2	1:A:847:ILE:HD11	1.93	0.51
1:A:517:GLN:HE21	1:A:517:GLN:CA	2.22	0.51
1:A:920:THR:O	1:A:920:THR:HG23	2.12	0.50
1:A:52:ASN:CG	1:A:191:ILE:HG13	2.32	0.50
1:A:490:VAL:O	1:A:500:LYS:HE2	2.11	0.50
1:A:856:SER:O	1:A:859:GLU:HG2	2.11	0.50
3:C:81:LEU:N	3:C:81:LEU:HD23	2.27	0.50
1:A:652:MET:CE	1:A:862:GLN:HE22	2.25	0.50
1:A:739:GLN:NE2	1:A:1177:THR:HG22	2.27	0.50
1:A:1091:PRO:HG2	1:A:1162:TYR:CE1	2.47	0.50
2:B:137:LYS:HA	10:B:585:HOH:O	2.11	0.50
2:B:119:LYS:HD2	2:B:119:LYS:N	2.26	0.50
1:A:269:GLU:HG3	2:B:15:LYS:HE3	1.94	0.50
1:A:473:VAL:HG13	1:A:1045:TYR:HB2	1.93	0.50
1:A:624:THR:O	1:A:627:GLU:HG2	2.12	0.50
2:B:185:GLU:OE1	2:B:353:VAL:HB	2.12	0.49
1:A:1218:ARG:HG3	10:A:1319:HOH:O	2.11	0.49
1:A:366:GLN:CG	1:A:373:LYS:HD2	2.43	0.49
1:A:373:LYS:HD3	1:A:392:PHE:CZ	2.47	0.49
1:A:835:GLU:HG3	1:A:836:VAL:N	2.27	0.49
3:C:160:VAL:O	3:C:164:GLN:HG3	2.12	0.49
1:A:331:ARG:HG3	1:A:331:ARG:HH11	1.78	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:306:PRO:O	2:B:310:GLU:HG3	2.13	0.49
2:B:407:LYS:HZ3	2:B:432:GLU:HG2	1.77	0.49
1:A:368:ASN:O	1:A:373:LYS:HE3	2.13	0.49
2:B:137:LYS:HE2	10:B:591:HOH:O	2.12	0.49
3:C:18:ALA:O	3:C:22:ILE:HG22	2.13	0.49
1:A:107:ARG:HD2	1:A:773:PHE:O	2.12	0.49
1:A:378:ASN:HA	1:A:414:GLU:O	2.13	0.49
1:A:102:LEU:HD12	1:A:102:LEU:H	1.78	0.48
1:A:404:GLN:HE22	1:A:1041:ARG:HH12	1.61	0.48
1:A:695:ALA:HB1	1:A:704:ASN:HB3	1.95	0.48
2:B:220:TRP:C	2:B:221:ARG:HG3	2.33	0.48
3:C:50:LEU:CD1	3:C:54:LEU:HD12	2.43	0.48
1:A:534:GLY:O	1:A:572:GLY:HA3	2.12	0.48
1:A:974:LEU:HD21	1:A:1033:ILE:HD13	1.94	0.48
2:B:427:THR:O	2:B:431:GLU:HG3	2.13	0.48
3:C:56:HIS:HA	3:C:59:ILE:HG22	1.94	0.48
1:A:497:ASP:HA	1:A:505:ALA:HB2	1.96	0.48
1:A:225:PRO:C	1:A:228:PRO:HD2	2.34	0.48
3:C:80:TRP:C	3:C:81:LEU:HD23	2.34	0.48
1:A:152:ARG:HB2	1:A:734:THR:CG2	2.43	0.48
3:C:83:ILE:HG23	3:C:84:GLU:N	2.28	0.48
1:A:926:LEU:HD22	1:A:930:LEU:CD1	2.44	0.48
1:A:436:GLY:O	1:A:444:LYS:HD3	2.13	0.48
1:A:1168:ILE:HG13	1:A:1169:VAL:HG23	1.96	0.48
4:A:1247:MD1:H7	4:A:1247:MD1:H11	1.94	0.47
1:A:864:LEU:HD22	1:A:864:LEU:N	2.29	0.47
2:B:404:ARG:O	2:B:408:ARG:HG3	2.14	0.47
1:A:387:ASN:HD22	1:A:405:ARG:HB2	1.77	0.47
2:B:331:TYR:CE2	2:B:335:MET:HG3	2.49	0.47
1:A:894:ALA:O	1:A:898:ARG:HG3	2.14	0.47
2:B:152:PHE:CE2	2:B:170:SER:HB3	2.49	0.47
1:A:217:TYR:CE1	1:A:222:ASP:HB3	2.50	0.47
1:A:373:LYS:HD3	1:A:392:PHE:CE1	2.49	0.47
1:A:366:GLN:HG3	1:A:373:LYS:NZ	2.29	0.47
1:A:1100:THR:O	1:A:1101:TYR:HB2	2.14	0.47
1:A:187:GLY:HA3	1:A:206:LEU:HD11	1.96	0.46
1:A:582:LYS:NZ	1:A:584:ARG:NH1	2.63	0.46
1:A:597:ASP:O	1:A:903:GLY:HA3	2.15	0.46
2:B:19:CYS:O	2:B:20:HIS:HB2	2.16	0.46
1:A:384:VAL:HG22	1:A:385:ALA:N	2.29	0.46
1:A:210:GLY:O	1:A:603:ARG:HD2	2.16	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:20:GLY:O	3:C:217:LYS:HD2	2.14	0.46
1:A:54:THR:HA	1:A:580:GLN:HG3	1.96	0.46
2:B:473:LYS:HE3	2:B:474:ASN:OD1	2.16	0.46
1:A:24:LEU:HD12	3:C:221:VAL:O	2.16	0.46
1:A:95:GLY:HA3	5:A:1248:SF4:S4	2.55	0.46
1:A:338:MET:HB3	1:A:354:MET:CE	2.45	0.46
1:A:366:GLN:O	1:A:370:PRO:HB3	2.16	0.46
1:A:100:TRP:O	1:A:104:SER:HB3	2.15	0.46
1:A:220:TYR:CE1	1:A:720:SER:CB	2.99	0.46
2:B:224:ILE:HD11	2:B:234:PHE:HB2	1.98	0.46
1:A:289:LYS:O	1:A:289:LYS:HD3	2.16	0.45
1:A:1108:LEU:HD13	2:B:106:PHE:CE2	2.51	0.45
1:A:30:ASP:HB2	2:B:486:GLY:HA2	1.98	0.45
1:A:102:LEU:HD12	1:A:102:LEU:N	2.31	0.45
1:A:308:ALA:O	1:A:311:HIS:HB3	2.16	0.45
3:C:211:VAL:HG23	3:C:212:GLU:N	2.30	0.45
1:A:832:LYS:O	1:A:836:VAL:HG23	2.17	0.45
2:B:162:ASP:O	2:B:163:ASN:HB2	2.16	0.45
1:A:584:ARG:HD3	1:A:1006:ILE:CD1	2.39	0.45
2:B:26:CYS:SG	2:B:41:PHE:HB2	2.56	0.45
1:A:366:GLN:HG3	1:A:373:LYS:HZ2	1.82	0.45
2:B:470:PHE:HB3	2:B:471:PRO:CD	2.46	0.45
2:B:123:ILE:HG13	2:B:124:ALA:H	1.82	0.45
2:B:12:ASN:HA	2:B:356:VAL:HB	1.99	0.45
2:B:295:ARG:HE	2:B:295:ARG:HA	1.82	0.45
1:A:120:MET:O	1:A:138:ILE:HD11	2.17	0.44
1:A:191:ILE:HG23	1:A:580:GLN:O	2.17	0.44
1:A:239:GLU:HG2	1:A:1022:TYR:HB3	1.98	0.44
2:B:20:HIS:CE1	2:B:44:VAL:HB	2.52	0.44
1:A:81:ARG:CZ	1:A:84:LEU:HD11	2.47	0.44
1:A:349:TYR:CZ	1:A:469:LEU:HD12	2.52	0.44
1:A:471:THR:HG21	1:A:476:LEU:HD13	1.99	0.44
2:B:156:ALA:HB1	2:B:166:LYS:HD2	1.99	0.44
2:B:482:ASP:OD1	2:B:499:ILE:HG13	2.17	0.44
1:A:1059:LEU:N	1:A:1059:LEU:HD23	2.33	0.44
1:A:578:VAL:CG2	1:A:579:GLY:H	2.21	0.44
1:A:1218:ARG:CD	10:A:1319:HOH:O	2.57	0.44
3:C:11:ILE:C	3:C:13:PRO:HD2	2.38	0.44
1:A:905:LEU:HD22	1:A:909:ILE:HD12	1.99	0.44
3:C:62:ILE:HG23	3:C:66:HIS:CE1	2.53	0.44
1:A:1012:TRP:HB3	1:A:1022:TYR:OH	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:658:ALA:HA	1:A:659:PRO:C	2.38	0.43
1:A:94:SER:HB3	1:A:1101:TYR:CD1	2.53	0.43
1:A:425:GLU:O	1:A:457:VAL:HG22	2.18	0.43
1:A:582:LYS:HB2	1:A:801:ASP:OD2	2.19	0.43
1:A:913:GLY:O	1:A:916:ILE:HG12	2.19	0.43
1:A:168:LEU:HD23	1:A:168:LEU:C	2.39	0.43
1:A:1218:ARG:CG	10:A:1319:HOH:O	2.66	0.43
2:B:100:TYR:O	2:B:101:TYR:HB3	2.18	0.43
2:B:231:LYS:HD3	2:B:231:LYS:HA	1.82	0.43
2:B:123:ILE:HG13	2:B:124:ALA:N	2.34	0.43
1:A:854:HIS:O	1:A:855:ASP:HB2	2.18	0.43
1:A:926:LEU:HD22	1:A:930:LEU:HD11	2.00	0.42
1:A:314:LEU:O	1:A:318:HIS:HB2	2.19	0.42
2:B:169:TYR:OH	2:B:386:PRO:HB3	2.19	0.42
1:A:190:PRO:HD3	1:A:714:SER:HB2	2.01	0.42
1:A:545:ASN:OD1	1:A:550:LEU:HD12	2.18	0.42
1:A:487:LEU:N	1:A:487:LEU:CD1	2.82	0.42
1:A:541:GLY:HA3	4:A:1251:MD1:O1B	2.20	0.42
1:A:305:MET:O	1:A:309:MET:HG3	2.19	0.42
2:B:374:ASN:HA	2:B:414:HIS:CD2	2.55	0.42
1:A:432:PRO:HD3	1:A:632:MET:CE	2.50	0.42
1:A:931:ASN:ND2	1:A:950:ASP:HB3	2.34	0.42
2:B:508:THR:O	2:B:509:GLU:CB	2.67	0.42
1:A:367:GLU:HG3	1:A:368:ASN:N	2.35	0.42
3:C:212:GLU:HG3	3:C:213:TYR:N	2.35	0.42
1:A:196:MET:CE	1:A:799:THR:HG23	2.50	0.42
1:A:199:TYR:CD1	1:A:199:TYR:C	2.93	0.42
1:A:861:ALA:HB3	1:A:1200:GLY:O	2.19	0.42
1:A:1177:THR:O	1:A:1178:GLN:HB2	2.19	0.42
1:A:54:THR:HA	1:A:580:GLN:CG	2.50	0.41
1:A:862:GLN:HA	1:A:863:PRO:HD2	1.93	0.41
2:B:137:LYS:CE	10:B:591:HOH:O	2.66	0.41
3:C:13:PRO:HB3	3:C:192:MET:SD	2.60	0.41
1:A:701:ASN:ND2	1:A:704:ASN:ND2	2.68	0.41
3:C:188:LEU:HD22	9:C:807:HEM:HMB3	2.02	0.41
1:A:360:LEU:HD22	1:A:360:LEU:H	1.84	0.41
1:A:685:LYS:O	1:A:689:GLU:HG3	2.20	0.41
1:A:767:LEU:CD1	1:A:769:VAL:HG23	2.50	0.41
2:B:248:TYR:CG	2:B:249:PRO:HD3	2.55	0.41
1:A:992:GLU:HG2	1:A:1007:ILE:HD11	2.02	0.41
1:A:182:PRO:HD2	1:A:665:PRO:HG2	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1059:LEU:HD23	1:A:1059:LEU:H	1.85	0.41
2:B:280:ILE:HG23	2:B:350:LEU:HD12	2.03	0.41
3:C:144:ILE:N	3:C:145:PRO:HD2	2.35	0.41
1:A:542:ALA:HB3	4:A:1251:MD1:O3B	2.21	0.41
1:A:806:ILE:O	1:A:806:ILE:HG23	2.21	0.41
1:A:329:TYR:CD1	1:A:565:GLY:HA2	2.55	0.41
1:A:764:LYS:CE	10:A:1328:HOH:O	2.67	0.41
2:B:246:PHE:HA	5:B:803:SF4:S4	2.60	0.41
2:B:272:VAL:CG1	2:B:273:LEU:N	2.83	0.41
3:C:184:PHE:O	3:C:188:LEU:HG	2.21	0.41
1:A:286:GLU:OE1	2:B:147:ASP:OD1	2.39	0.41
1:A:289:LYS:HD3	1:A:289:LYS:C	2.41	0.41
1:A:756:TRP:CG	1:A:757:GLN:N	2.89	0.41
2:B:157:LYS:HE2	2:B:157:LYS:HB3	1.78	0.41
3:C:77:TYR:CB	3:C:81:LEU:HD21	2.51	0.41
1:A:403:GLU:O	1:A:405:ARG:N	2.54	0.41
1:A:590:GLN:N	1:A:591:PRO:HD2	2.36	0.41
1:A:591:PRO:HA	1:A:596:LEU:HB2	2.01	0.41
3:C:60:LEU:O	3:C:64:VAL:HG23	2.21	0.41
1:A:227:SER:HB3	1:A:228:PRO:CD	2.46	0.41
1:A:536:SER:HB2	1:A:566:CYS:SG	2.61	0.41
1:A:111:PRO:HA	1:A:787:PRO:HD3	2.03	0.40
1:A:992:GLU:CG	1:A:1007:ILE:HD11	2.50	0.40
1:A:222:ASP:O	1:A:224:PRO:HD3	2.21	0.40
1:A:307:LEU:HD13	1:A:502:TYR:CD2	2.56	0.40
1:A:379:THR:HG21	1:A:414:GLU:OE2	2.21	0.40
1:A:698:GLN:HG2	1:A:755:ASP:OD1	2.21	0.40
2:B:32:SER:HB2	10:B:556:HOH:O	2.22	0.40
3:C:5:ASN:OD1	3:C:185:ARG:NH1	2.54	0.40
3:C:50:LEU:CD1	3:C:54:LEU:CD1	3.00	0.40
1:A:25:LEU:HD11	3:C:220:LEU:HD22	2.04	0.40
1:A:173:ASN:O	1:A:177:ILE:HG13	2.21	0.40
1:A:307:LEU:HD13	1:A:502:TYR:CE2	2.56	0.40
1:A:646:ASN:O	1:A:650:GLU:HG3	2.22	0.40
1:A:1091:PRO:HG2	1:A:1162:TYR:CD1	2.56	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	1238/1247 (99%)	1149 (93%)	78 (6%)	11 (1%)	17	31
2	B	507/512 (99%)	486 (96%)	19 (4%)	2 (0%)	34	54
3	C	223/225 (99%)	210 (94%)	13 (6%)	0	100	100
All	All	1968/1984 (99%)	1845 (94%)	110 (6%)	13 (1%)	22	39

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	501	ALA
1	A	721	GLY
1	A	1166	GLU
1	A	578	VAL
2	B	101	TYR
1	A	190	PRO
1	A	224	PRO
1	A	361	VAL
1	A	502	TYR
1	A	718	GLY
1	A	1217	ASN
2	B	368	ALA
1	A	191	ILE

### 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	1037/1044 (99%)	1017 (98%)	20 (2%)	57	80
2	B	436/439 (99%)	425 (98%)	11 (2%)	47	73
3	C	184/186 (99%)	179 (97%)	5 (3%)	44	71
All	All	1657/1669 (99%)	1621 (98%)	36 (2%)	52	77

All (36) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	150	GLN
1	A	190	PRO
1	A	338	MET
1	A	366	GLN
1	A	367	GLU
1	A	476	LEU
1	A	515	ARG
1	A	581	GLU
1	A	600	ARG
1	A	601	PRO
1	A	629	LEU
1	A	808	PRO
1	A	864	LEU
1	A	926	LEU
1	A	936	GLU
1	A	995	ARG
1	A	1041	ARG
1	A	1233	LEU
1	A	1238	ASN
1	A	1243	GLU
2	B	37	GLU
2	B	42	ASN
2	B	74	LEU
2	B	85	LEU
2	B	119	LYS
2	B	161	PHE
2	B	183	LEU
2	B	221	ARG
2	B	295	ARG
2	B	323	GLU
2	B	428	ARG
3	C	36	ARG
3	C	81	LEU
3	C	142	LEU

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Mol	Chain	Res	Type
3	C	147	SER
3	C	212	GLU

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	12	GLN
1	A	37	GLN
1	A	173	ASN
1	A	234	GLN
1	A	387	ASN
1	A	461	GLN
1	A	517	GLN
1	A	559	ASN
1	A	599	GLN
1	A	704	ASN
1	A	708	ASN
1	A	759	ASN
1	A	946	ASN
1	A	1076	GLN
1	A	1082	GLN
1	A	1098	HIS
2	B	20	HIS
2	B	160	ASN
2	B	414	HIS
2	B	451	ASN
3	C	53	ASN
3	C	149	GLN
3	C	175	GLN
3	C	225	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue is 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	FME	C	1	3	8,9,10	1.45	2 (25%)	7,9,11	1.60	1 (14%)

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	FME	C	1	3	-	5/7/9/11	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	1	FME	CB-CA	-2.76	1.48	1.53
3	C	1	FME	CB-CG	2.31	1.60	1.51

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1	FME	CA-N-CN	3.21	127.75	122.82

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	1	FME	O1-CN-N-CA
3	C	1	FME	N-CA-CB-CG
3	C	1	FME	CB-CG-SD-CE
3	C	1	FME	C-CA-CB-CG
3	C	1	FME	CB-CA-N-CN

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	1	FME	1	0

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 11 ligands modelled in this entry, 1 is monoatomic - leaving 10 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	SF4	B	803	2	0,12,12	-	-	-		
4	MD1	A	1247	6	38,51,51	3.92	9 (23%)	35,78,78	2.11	10 (28%)
9	HEM	C	807	3	27,50,50	2.39	14 (51%)	17,82,82	1.97	6 (35%)
5	SF4	B	802	2	0,12,12	-	-	-		
9	HEM	C	806	3	27,50,50	2.31	14 (51%)	17,82,82	1.72	5 (29%)
4	MD1	A	1251	6	38,51,51	3.83	10 (26%)	35,78,78	1.90	9 (25%)
7	AGA	A	1249	-	24,24,29	0.85	1 (4%)	28,29,35	1.54	2 (7%)
5	SF4	B	804	2	0,12,12	-	-	-		
5	SF4	A	1248	1	0,12,12	-	-	-		
8	F3S	B	805	2	0,9,9	-	-	-		

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	SF4	B	803	2	-	-	0/6/5/5
9	HEM	C	807	3	-	0/6/54/54	-
4	MD1	A	1247	6	-	7/21/59/59	0/5/5/5
5	SF4	B	802	2	-	-	0/6/5/5

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
9	HEM	C	806	3	-	0/6/54/54	-
4	MD1	A	1251	6	-	1/21/59/59	0/5/5/5
7	AGA	A	1249	-	-	4/26/26/34	-
5	SF4	B	804	2	-	-	0/6/5/5
5	SF4	A	1248	1	-	-	0/6/5/5
8	F3S	B	805	2	-	-	0/3/3/3

All (48) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	1247	MD1	C7-N8	19.52	1.50	1.27
4	A	1251	MD1	C7-N8	18.46	1.49	1.27
4	A	1251	MD1	C4-N9	-7.36	1.37	1.47
4	A	1247	MD1	C4-N9	-6.76	1.38	1.47
4	A	1251	MD1	C6-N1	6.22	1.43	1.33
9	C	807	HEM	C3B-CAB	5.97	1.60	1.47
4	A	1247	MD1	C6-N1	5.52	1.42	1.33
4	A	1251	MD1	C15-N17	5.37	1.42	1.33
4	A	1247	MD1	C15-N17	5.35	1.42	1.33
9	C	806	HEM	C3B-CAB	5.28	1.58	1.47
4	A	1247	MD1	C5-C6	-5.06	1.44	1.52
9	C	806	HEM	C3C-CAC	4.57	1.57	1.47
4	A	1251	MD1	C5-C6	-4.50	1.45	1.52
9	C	807	HEM	C3C-CAC	4.35	1.56	1.47
4	A	1251	MD1	C20-N18	3.76	1.40	1.34
9	C	807	HEM	CAA-C2A	3.58	1.57	1.52
4	A	1247	MD1	C20-N18	3.52	1.39	1.34
4	A	1247	MD1	C14-C13	3.50	1.55	1.51
9	C	807	HEM	CAD-C3D	3.49	1.58	1.52
4	A	1247	MD1	C17-N17	3.41	1.41	1.35
4	A	1251	MD1	C15-C16	3.33	1.46	1.41
9	C	806	HEM	C3C-C2C	-3.29	1.35	1.40
4	A	1251	MD1	C17-N17	3.24	1.41	1.35
9	C	806	HEM	CAD-C3D	3.00	1.57	1.52
4	A	1247	MD1	C13-C12	2.91	1.43	1.34
9	C	807	HEM	C3C-C2C	-2.90	1.36	1.40
9	C	806	HEM	C4D-C3D	2.83	1.49	1.42
9	C	806	HEM	CMA-C3A	2.72	1.57	1.51
9	C	807	HEM	CMC-C2C	2.71	1.58	1.51
4	A	1251	MD1	O11-C11	2.59	1.48	1.42
9	C	806	HEM	CMC-C2C	2.58	1.57	1.51
7	A	1249	AGA	C8-C7	2.58	1.58	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	C	806	HEM	CMD-C2D	2.52	1.56	1.51
9	C	807	HEM	CMD-C2D	2.47	1.56	1.51
9	C	806	HEM	CAA-C2A	2.47	1.55	1.52
9	C	807	HEM	C1B-C2B	2.46	1.48	1.42
4	A	1251	MD1	C5-C4	-2.45	1.37	1.53
9	C	807	HEM	CMB-C2B	2.38	1.57	1.51
9	C	806	HEM	C3B-C2B	-2.37	1.37	1.40
9	C	807	HEM	C4D-C3D	2.27	1.47	1.42
9	C	807	HEM	C1D-ND	2.27	1.40	1.36
9	C	807	HEM	CMA-C3A	2.24	1.56	1.51
9	C	806	HEM	C1B-C2B	2.24	1.47	1.42
9	C	806	HEM	C1C-C2C	2.22	1.47	1.42
9	C	807	HEM	C1C-C2C	2.10	1.47	1.42
9	C	806	HEM	CMB-C2B	2.09	1.56	1.51
9	C	807	HEM	C3B-C2B	-2.08	1.37	1.40
9	C	806	HEM	C1D-ND	2.08	1.40	1.36

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1247	MD1	C4-C5-N7	6.45	111.01	102.46
4	A	1251	MD1	C4-C5-N7	6.20	110.68	102.46
4	A	1247	MD1	C15-N17-C17	5.14	124.09	115.93
7	A	1249	AGA	C9-C8-C7	5.13	132.28	113.62
7	A	1249	AGA	C14-C13-C12	4.90	131.45	113.62
4	A	1247	MD1	N17-C17-N18	-4.48	118.39	125.42
4	A	1251	MD1	C15-N17-C17	4.31	122.78	115.93
9	C	807	HEM	CAA-CBA-CGA	3.72	118.91	112.67
4	A	1251	MD1	N17-C17-N18	-3.65	119.69	125.42
4	A	1247	MD1	N16-C17-N18	3.24	122.30	117.25
9	C	807	HEM	CMA-C3A-C4A	-3.24	123.49	128.46
9	C	806	HEM	CMA-C3A-C4A	-3.03	123.81	128.46
4	A	1247	MD1	C5-C6-N1	-3.00	114.49	118.19
4	A	1247	MD1	O4'-C1'-N9	-2.97	104.63	109.04
9	C	807	HEM	CMB-C2B-C3B	2.92	130.14	124.68
9	C	806	HEM	CMB-C2B-C3B	2.92	130.14	124.68
4	A	1251	MD1	PA-O3B-PB	2.65	141.94	132.83
4	A	1251	MD1	C16-C15-N17	-2.63	116.53	124.01
9	C	806	HEM	CMA-C3A-C2A	2.61	129.87	124.94
9	C	807	HEM	CMA-C3A-C2A	2.59	129.83	124.94
4	A	1251	MD1	O4'-C1'-N9	2.53	112.81	109.04
4	A	1247	MD1	C15-C16-N15	2.50	121.22	119.12

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	1247	MD1	C16-C15-N17	-2.47	117.00	124.01
9	C	806	HEM	CAA-CBA-CGA	2.33	116.57	112.67
9	C	807	HEM	CBD-CAD-C3D	2.27	116.66	112.48
4	A	1251	MD1	N16-C17-N17	2.26	120.77	117.25
4	A	1251	MD1	C15-C16-N15	2.21	120.98	119.12
9	C	807	HEM	CMC-C2C-C3C	2.21	128.81	124.68
4	A	1247	MD1	O3A-C10-C11	-2.19	101.64	107.94
4	A	1251	MD1	N18-C20-N8	2.18	121.22	116.00
9	C	806	HEM	CMC-C2C-C3C	2.12	128.65	124.68
4	A	1247	MD1	O6-C6-C5	2.01	123.97	119.86

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1247	MD1	C5'-O5'-PA-O2A
4	A	1247	MD1	O4'-C4'-C5'-O5'
4	A	1247	MD1	C3'-C4'-C5'-O5'
7	A	1249	AGA	C7-C8-C9-C10
7	A	1249	AGA	C8-C7-O7-C6
7	A	1249	AGA	C11-C10-C9-C8
7	A	1249	AGA	O8-C7-O7-C6
4	A	1247	MD1	PA-O3B-PB-O2B
4	A	1251	MD1	PA-O3B-PB-O2B
4	A	1247	MD1	C5'-O5'-PA-O1A
4	A	1247	MD1	C5'-O5'-PA-O3B
4	A	1247	MD1	C2'-C1'-N9-C4

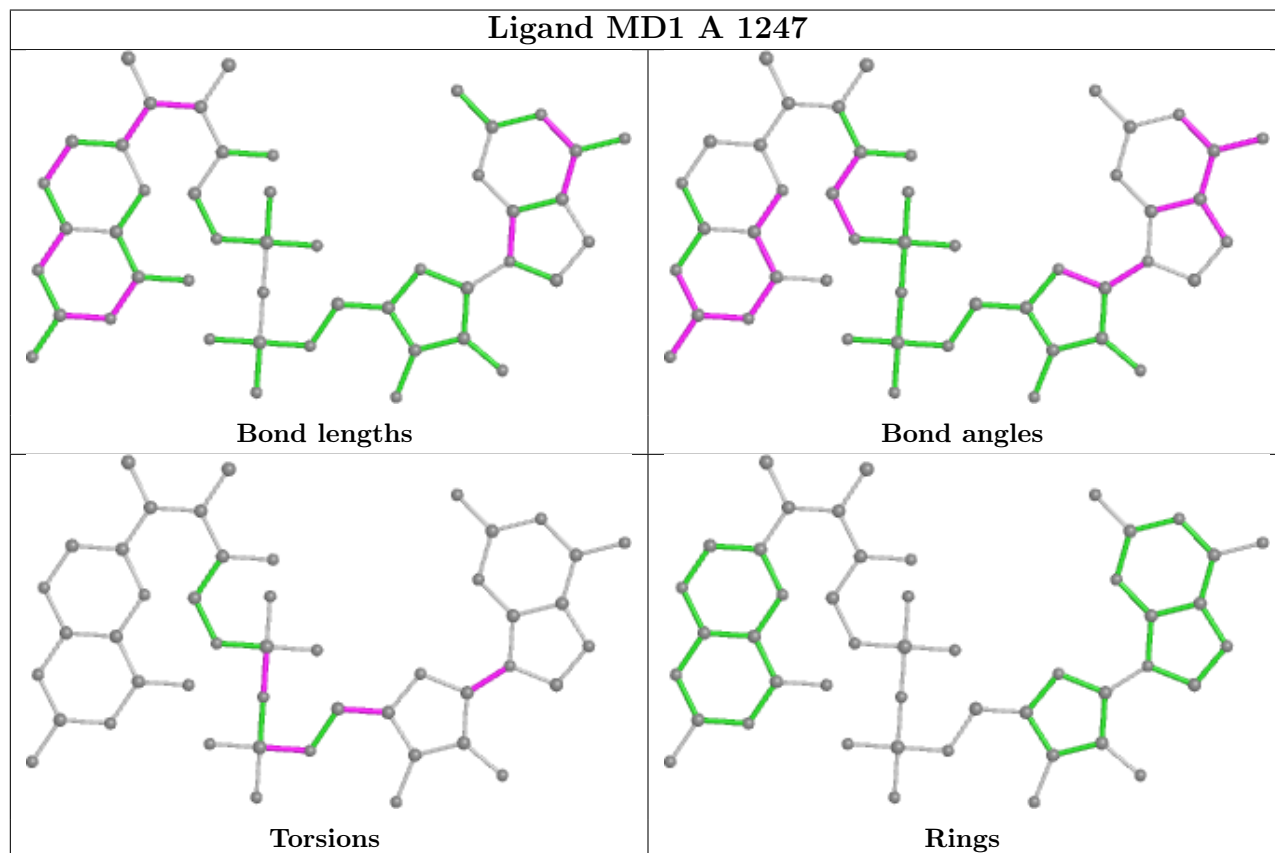
There are no ring outliers.

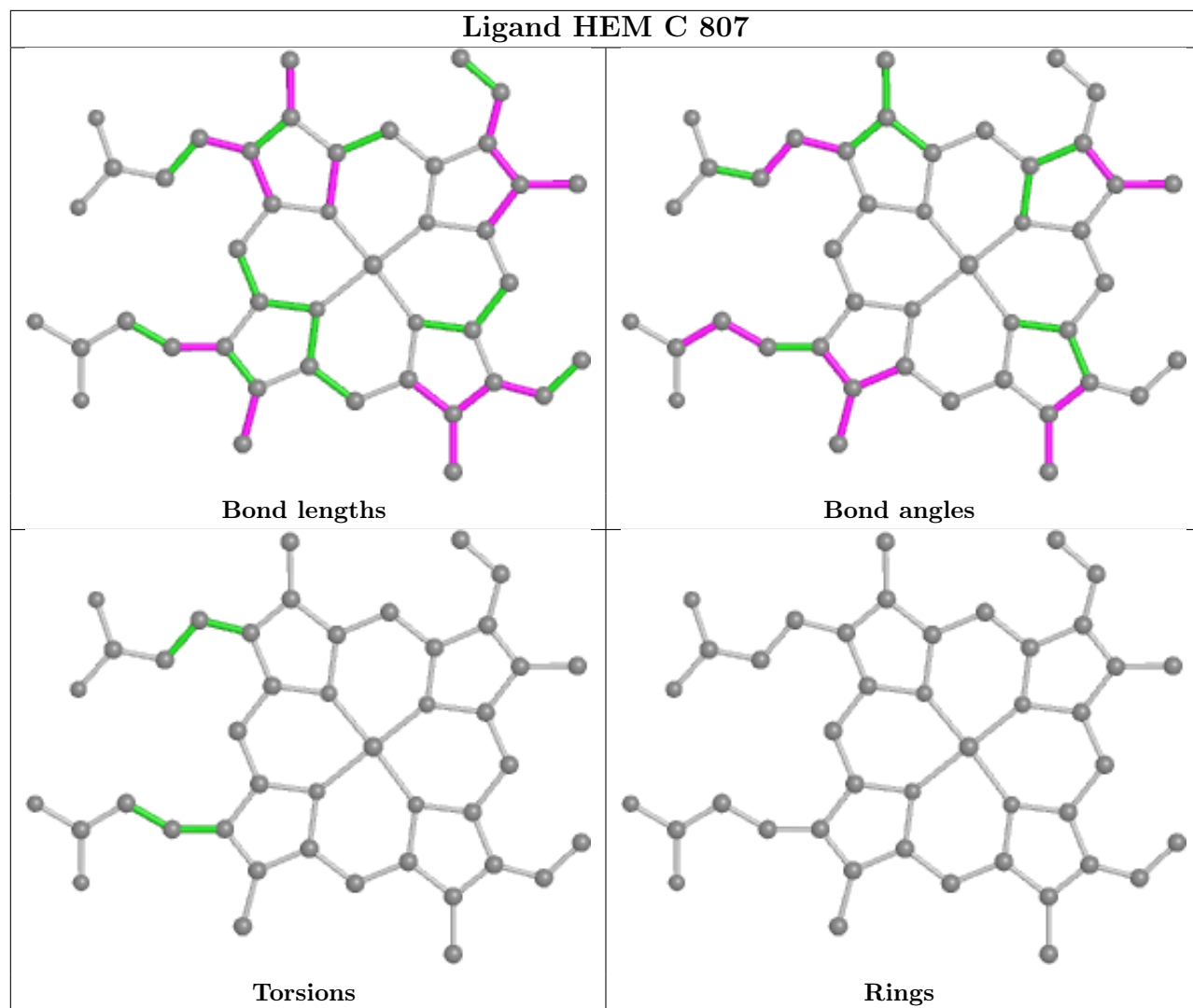
6 monomers are involved in 12 short contacts:

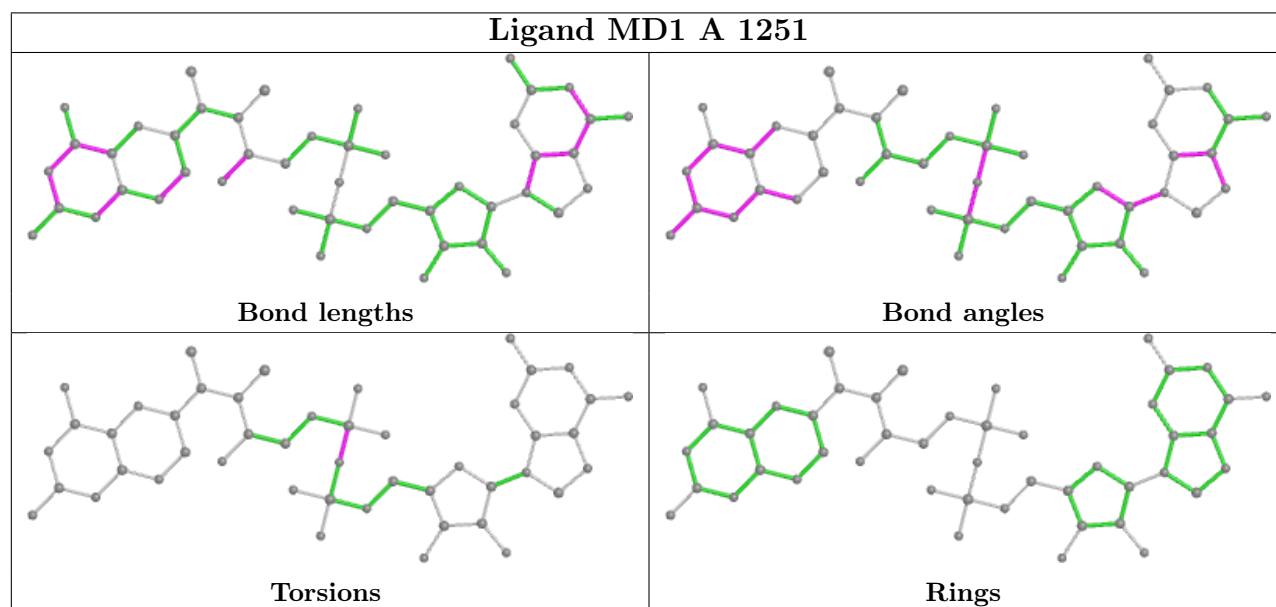
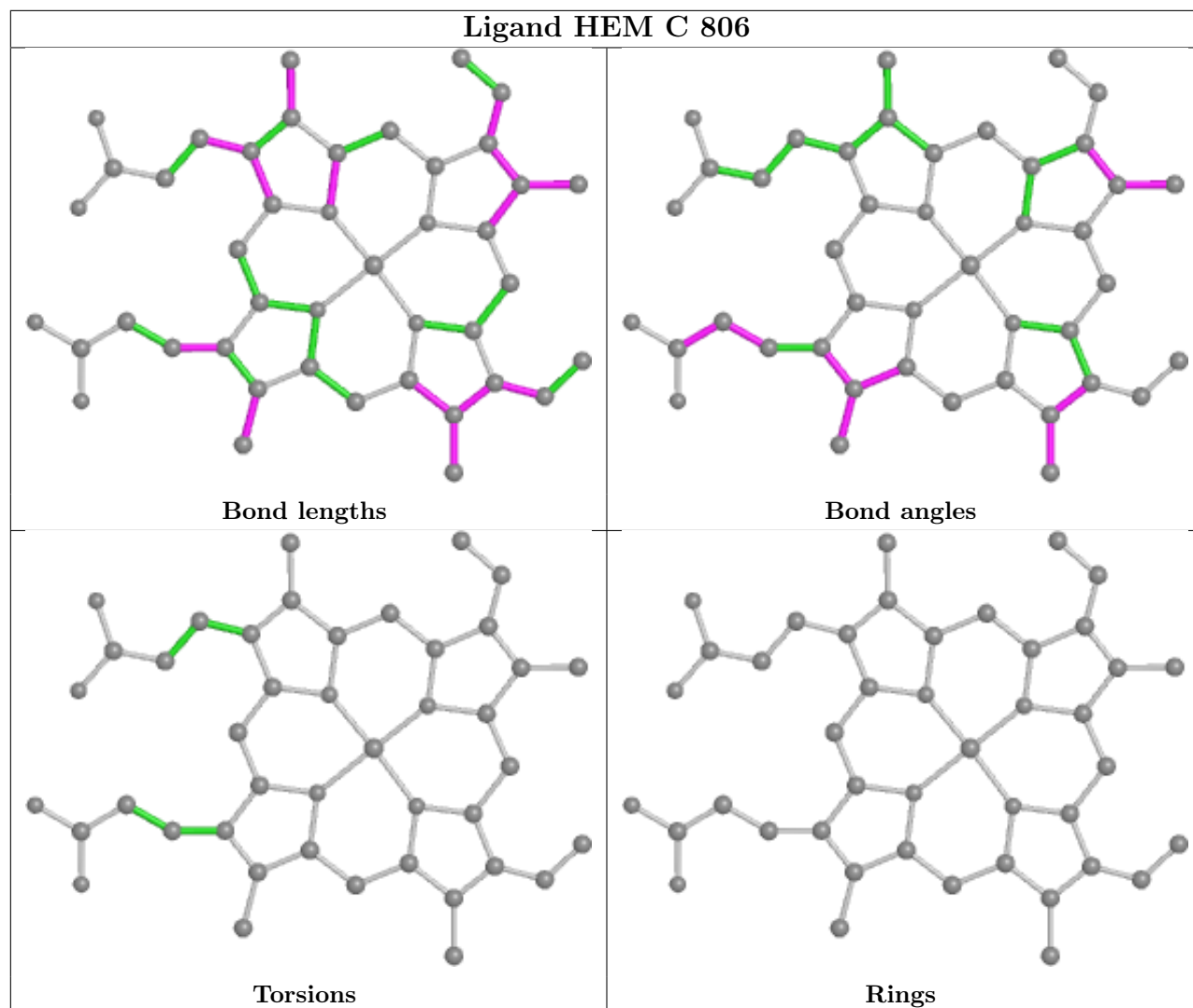
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	803	SF4	1	0
4	A	1247	MD1	4	0
9	C	807	HEM	1	0
9	C	806	HEM	1	0
4	A	1251	MD1	4	0
5	A	1248	SF4	1	0

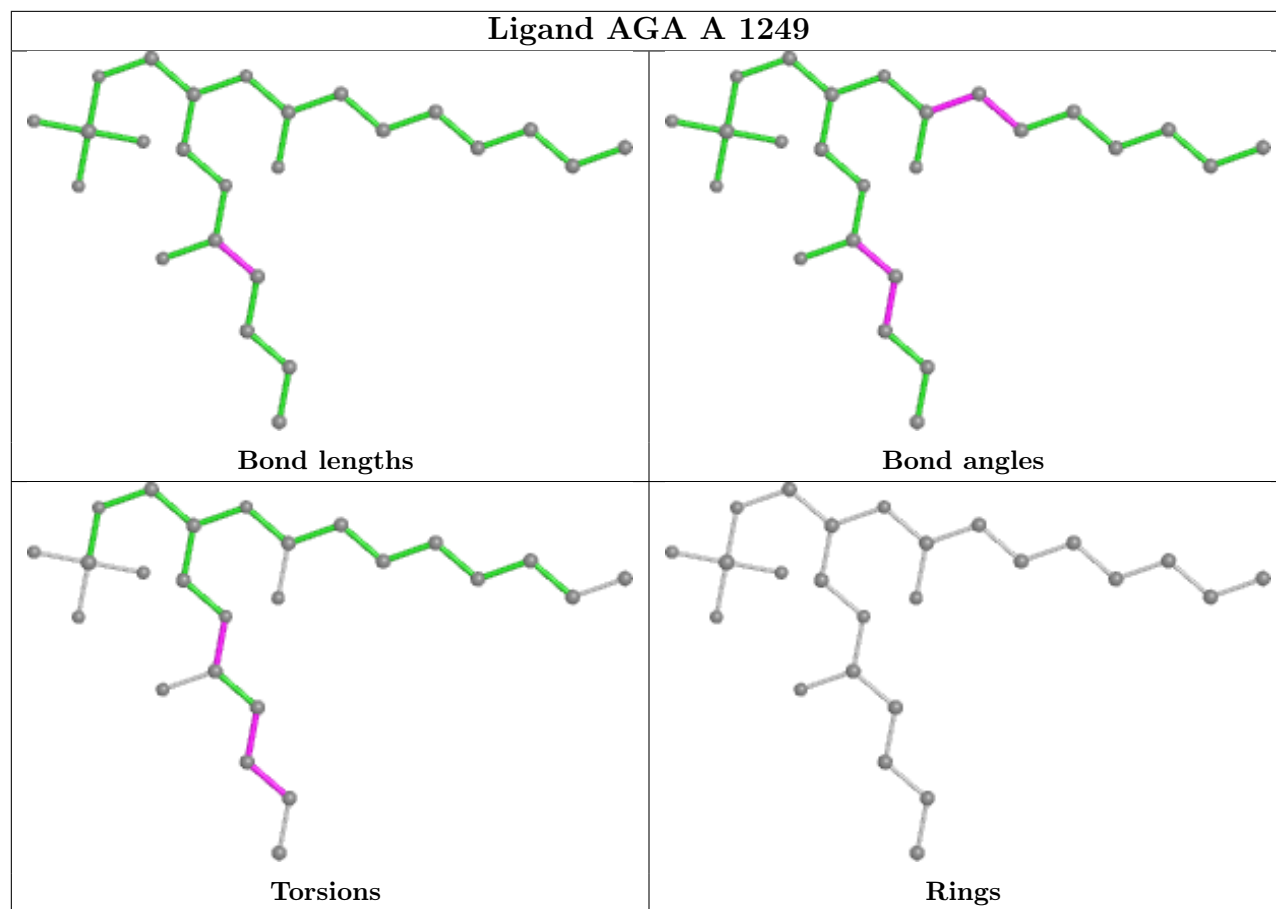
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	1242/1247 (99%)	-0.40	14 (1%) 80 82	20, 36, 56, 73	0
2	B	509/512 (99%)	-0.62	4 (0%) 86 87	18, 30, 45, 68	0
3	C	224/225 (99%)	-0.16	9 (4%) 38 41	26, 41, 67, 87	0
All	All	1975/1984 (99%)	-0.43	27 (1%) 75 77	18, 35, 57, 87	0

All (27) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	C	75	TRP	7.4
1	A	10	PHE	5.5
3	C	80	TRP	5.1
3	C	76	MET	4.9
1	A	11	LYS	3.8
3	C	77	TYR	3.7
1	A	12	GLN	3.3
3	C	67	PHE	3.1
1	A	380	ASN	3.1
1	A	490	VAL	3.0
3	C	64	VAL	3.0
3	C	149	GLN	2.9
3	C	74	HIS	2.8
2	B	370	GLU	2.7
1	A	463	ALA	2.6
2	B	119	LYS	2.6
2	B	366	ALA	2.5
2	B	70	ILE	2.5
1	A	348	TYR	2.5
1	A	7	PHE	2.5
3	C	63	PHE	2.4
1	A	346	ASP	2.4
1	A	486	GLY	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	674	LYS	2.1
1	A	1244	SER	2.1
1	A	875	ASP	2.0
1	A	461	GLN	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
3	FME	C	1	10/11	0.93	0.30	60,64,72,72	0

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

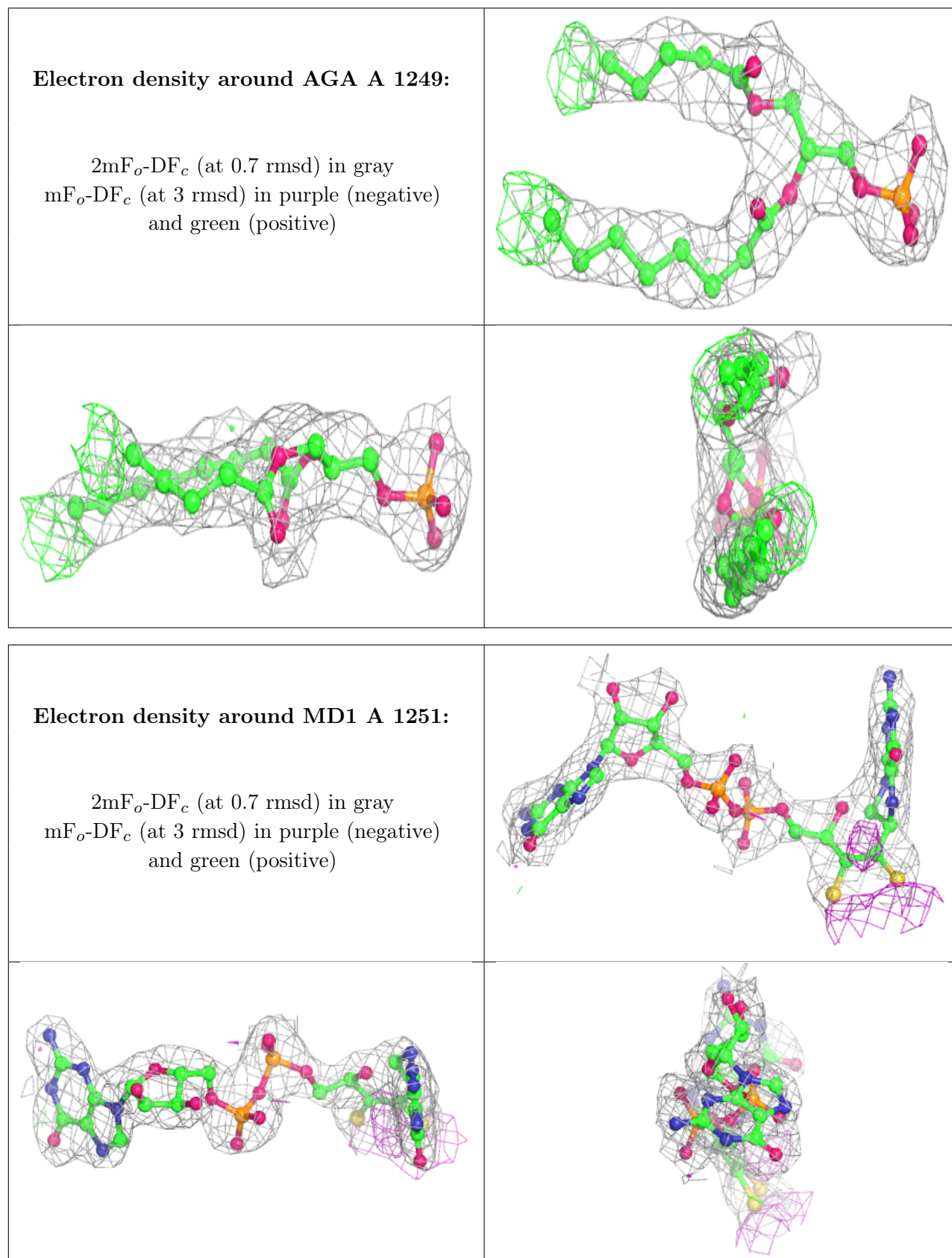
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
7	AGA	A	1249	25/30	0.94	0.14	39,42,55,56	0
4	MD1	A	1251	47/47	0.95	0.12	31,47,60,63	0
4	MD1	A	1247	47/47	0.95	0.12	33,44,62,65	0
9	HEM	C	807	43/43	0.95	0.14	49,52,61,66	0
5	SF4	B	804	8/8	0.96	0.08	30,35,36,37	0
6	6MO	A	1250	1/1	0.96	0.19	67,67,67,67	0
9	HEM	C	806	43/43	0.97	0.13	26,31,35,43	0
5	SF4	B	803	8/8	0.99	0.09	20,22,23,24	0
8	F3S	B	805	7/7	0.99	0.09	25,26,28,30	0
5	SF4	A	1248	8/8	0.99	0.05	30,31,31,34	0
5	SF4	B	802	8/8	0.99	0.07	25,26,27,27	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

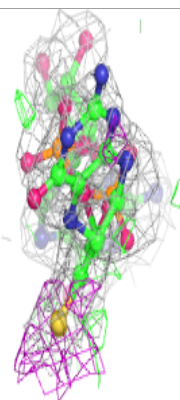
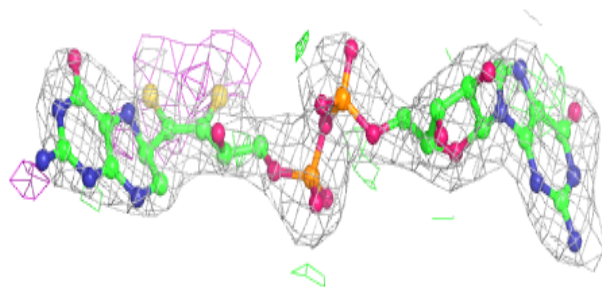
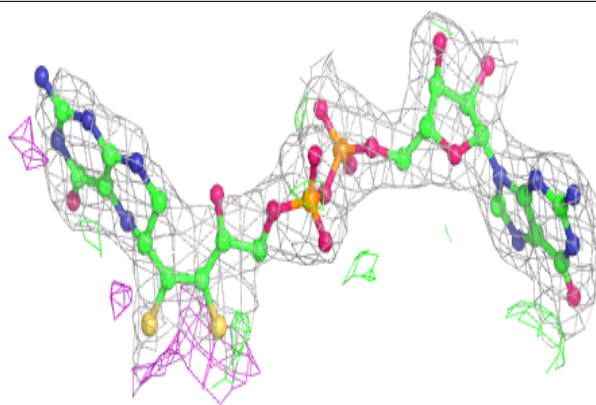


as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



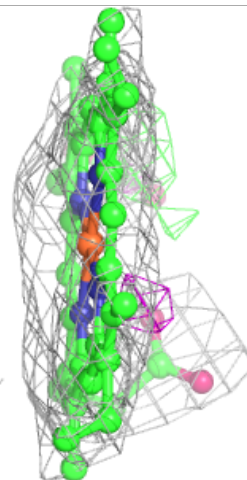
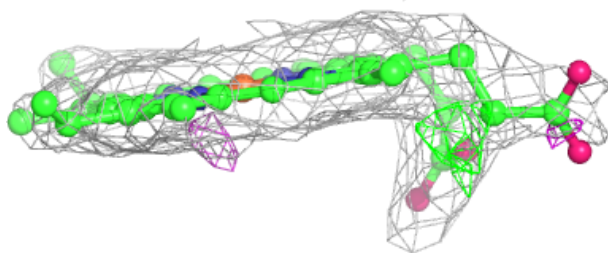
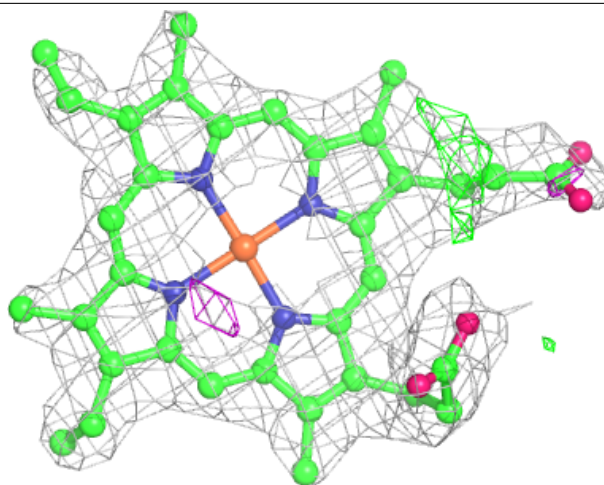
**Electron density around MD1 A 1247:**

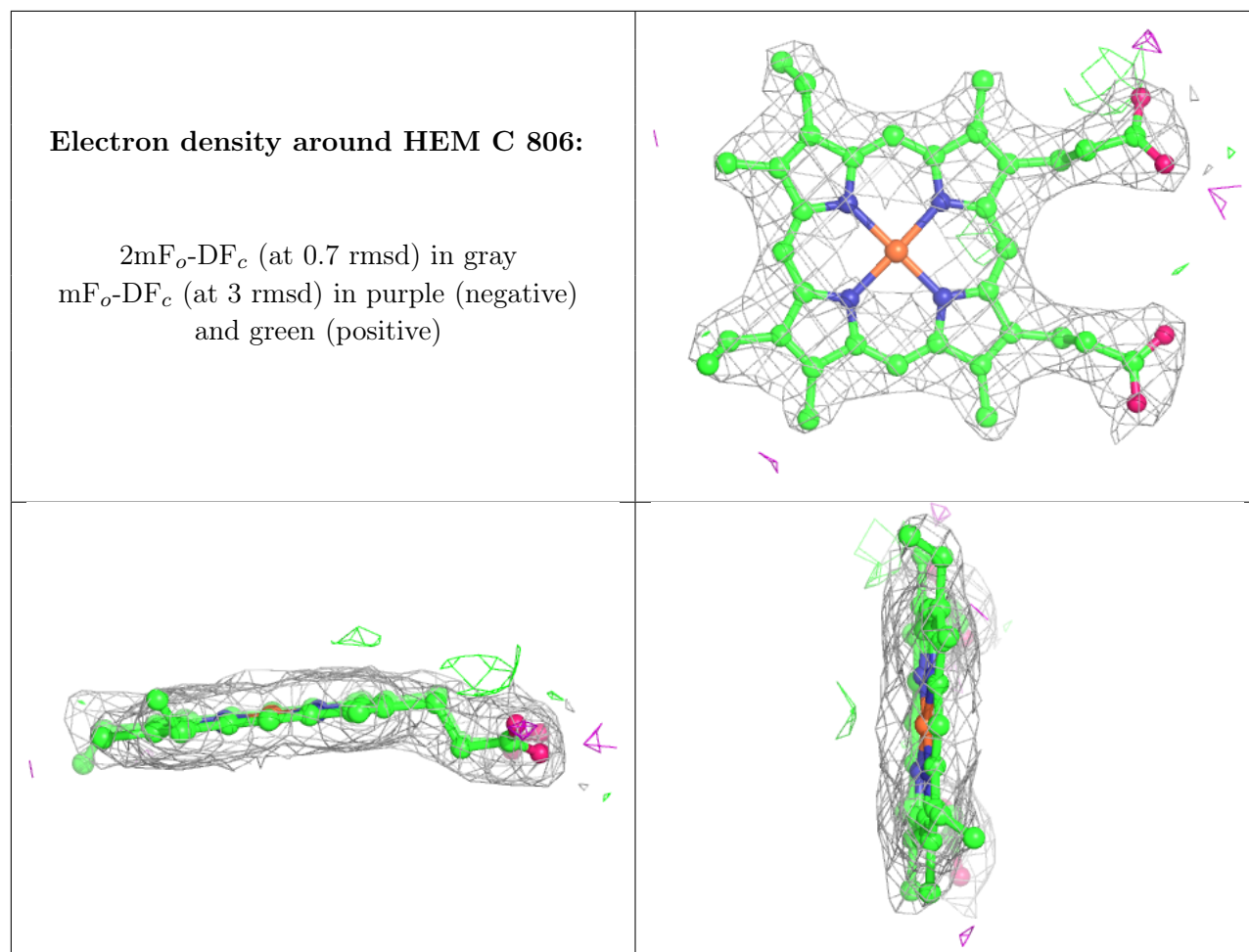
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around HEM C 807:**

$2mF_o-DF_c$  (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.