



# Full wwPDB X-ray Structure Validation Report ⓘ

Apr 28, 2019 – 09:53 AM EDT

PDB ID : 2Y5Z  
Title : Mixed-function P450 MycG in complex with mycinamicin III in C2221 space group  
Authors : Li, S.; Kells, P.M.; Sherman, D.H.; Podust, L.M.  
Deposited on : 2011-01-19  
Resolution : 2.06 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 : 1.8.0 (224370), CSD as540be (2019)  
Xtriage (Phenix) : 1.13  
EDS : rb-20031633  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Refmac : 5.8.0158  
CCP4 : 7.0 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : rb-20031633

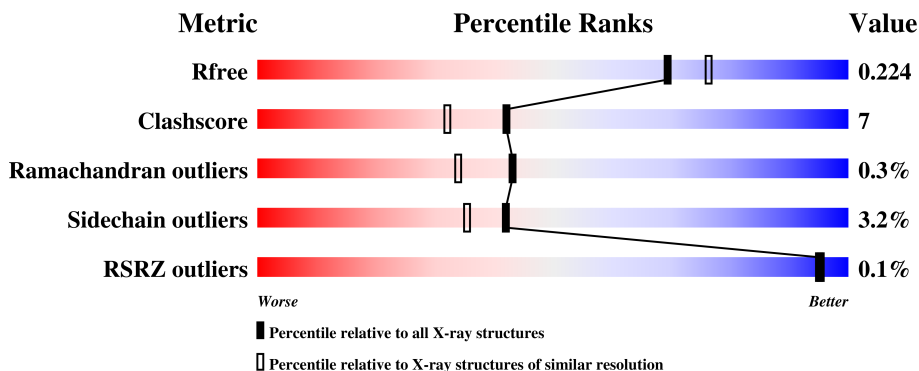
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.06 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))
$R_{free}$	111664	2250 (2.08-2.04)
Clashscore	122126	2358 (2.08-2.04)
Ramachandran outliers	120053	2339 (2.08-2.04)
Sidechain outliers	120020	2339 (2.08-2.04)
RSRZ outliers	108989	2211 (2.08-2.04)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	417	 81% 11% • 6%
1	B	417	 81% 12% • 6%
1	C	417	 80% 13% • 6%

## 2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 10503 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 P-450-LIKE PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	393	Total 3119	C 1957	N 568	O 582	S 12	0	5	0
1	B	394	Total 3148	C 1970	N 581	O 586	S 11	0	7	0
1	C	394	Total 3118	C 1953	N 572	O 582	S 11	0	3	0

There are 60 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP Q59523
A	-18	GLY	-	expression tag	UNP Q59523
A	-17	SER	-	expression tag	UNP Q59523
A	-16	SER	-	expression tag	UNP Q59523
A	-15	HIS	-	expression tag	UNP Q59523
A	-14	HIS	-	expression tag	UNP Q59523
A	-13	HIS	-	expression tag	UNP Q59523
A	-12	HIS	-	expression tag	UNP Q59523
A	-11	HIS	-	expression tag	UNP Q59523
A	-10	HIS	-	expression tag	UNP Q59523
A	-9	SER	-	expression tag	UNP Q59523
A	-8	SER	-	expression tag	UNP Q59523
A	-7	GLY	-	expression tag	UNP Q59523
A	-6	LEU	-	expression tag	UNP Q59523
A	-5	VAL	-	expression tag	UNP Q59523
A	-4	PRO	-	expression tag	UNP Q59523
A	-3	ARG	-	expression tag	UNP Q59523
A	-2	GLY	-	expression tag	UNP Q59523
A	-1	SER	-	expression tag	UNP Q59523
A	0	HIS	-	expression tag	UNP Q59523
B	-19	MET	-	expression tag	UNP Q59523
B	-18	GLY	-	expression tag	UNP Q59523
B	-17	SER	-	expression tag	UNP Q59523

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-16	SER	-	expression tag	UNP Q59523
B	-15	HIS	-	expression tag	UNP Q59523
B	-14	HIS	-	expression tag	UNP Q59523
B	-13	HIS	-	expression tag	UNP Q59523
B	-12	HIS	-	expression tag	UNP Q59523
B	-11	HIS	-	expression tag	UNP Q59523
B	-10	HIS	-	expression tag	UNP Q59523
B	-9	SER	-	expression tag	UNP Q59523
B	-8	SER	-	expression tag	UNP Q59523
B	-7	GLY	-	expression tag	UNP Q59523
B	-6	LEU	-	expression tag	UNP Q59523
B	-5	VAL	-	expression tag	UNP Q59523
B	-4	PRO	-	expression tag	UNP Q59523
B	-3	ARG	-	expression tag	UNP Q59523
B	-2	GLY	-	expression tag	UNP Q59523
B	-1	SER	-	expression tag	UNP Q59523
B	0	HIS	-	expression tag	UNP Q59523
C	-19	MET	-	expression tag	UNP Q59523
C	-18	GLY	-	expression tag	UNP Q59523
C	-17	SER	-	expression tag	UNP Q59523
C	-16	SER	-	expression tag	UNP Q59523
C	-15	HIS	-	expression tag	UNP Q59523
C	-14	HIS	-	expression tag	UNP Q59523
C	-13	HIS	-	expression tag	UNP Q59523
C	-12	HIS	-	expression tag	UNP Q59523
C	-11	HIS	-	expression tag	UNP Q59523
C	-10	HIS	-	expression tag	UNP Q59523
C	-9	SER	-	expression tag	UNP Q59523
C	-8	SER	-	expression tag	UNP Q59523
C	-7	GLY	-	expression tag	UNP Q59523
C	-6	LEU	-	expression tag	UNP Q59523
C	-5	VAL	-	expression tag	UNP Q59523
C	-4	PRO	-	expression tag	UNP Q59523
C	-3	ARG	-	expression tag	UNP Q59523
C	-2	GLY	-	expression tag	UNP Q59523
C	-1	SER	-	expression tag	UNP Q59523
C	0	HIS	-	expression tag	UNP Q59523

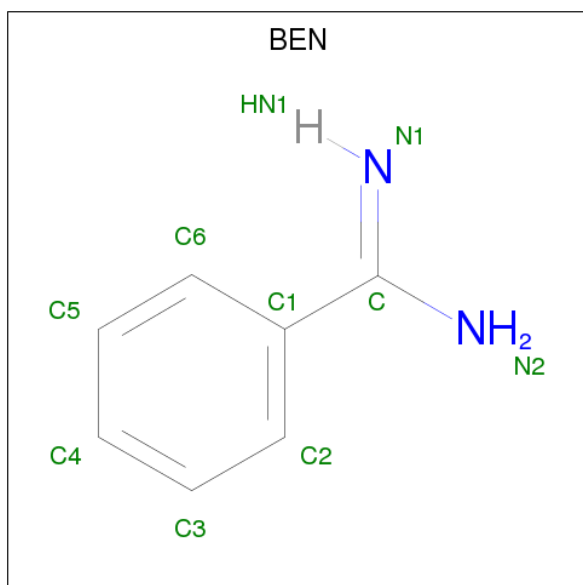
- Molecule 2 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: C<sub>34</sub>H<sub>32</sub>FeN<sub>4</sub>O<sub>4</sub>).



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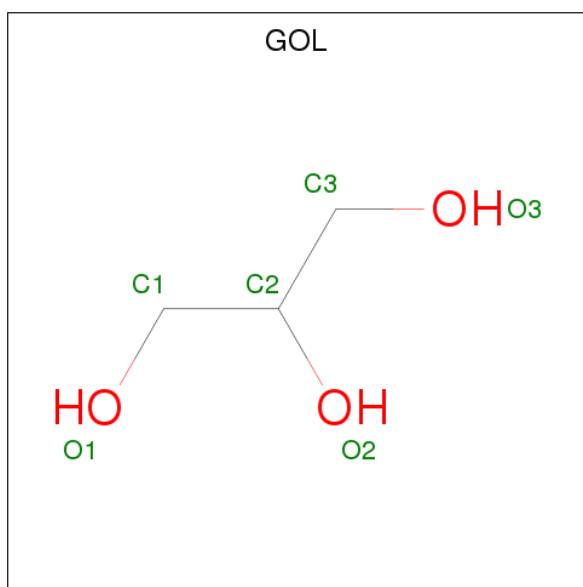
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	B	1	37	29	1	7	0	0
3	C	1	37	29	1	7	0	0

- Molecule 4 is BENZAMIDINE (three-letter code: BEN) (formula: C<sub>7</sub>H<sub>8</sub>N<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	N		
4	A	1	9	7	2	0	0
4	B	1	9	7	2	0	0
4	C	1	9	7	2	0	0

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



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

- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	265	Total O 265 265	0	0
6	B	266	Total O 266 266	0	0

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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
6	C	260	Total 260	O 260	0	0

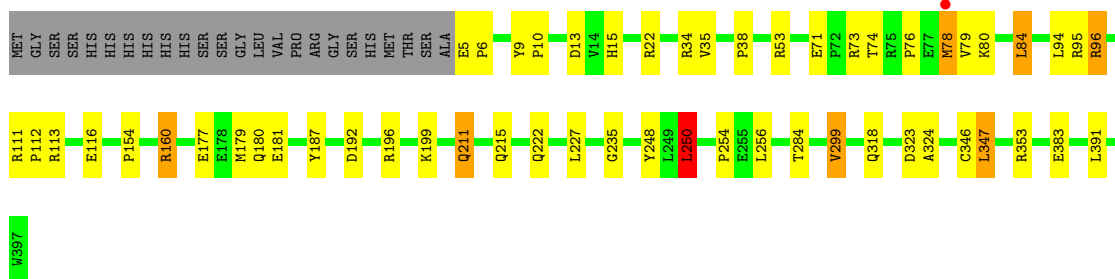


### 3 Residue-property plots [i](#)


These plots are drawn for all protein, RNA and DNA 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.

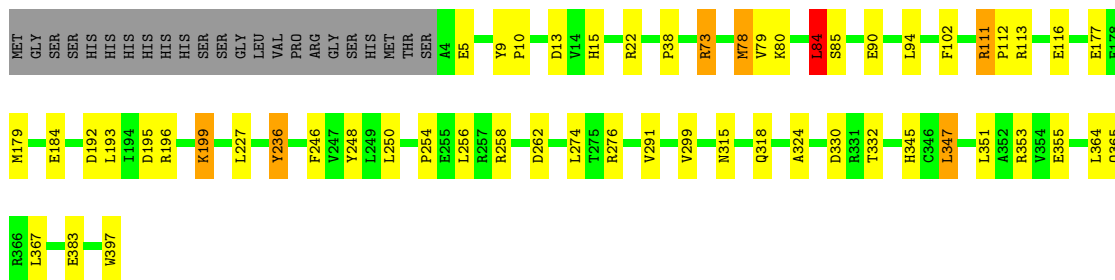
- Molecule 1: P-450-LIKE PROTEIN

Chain A: 




- Molecule 1: P-450-LIKE PROTEIN

Chain B: 



- Molecule 1: P-450-LIKE PROTEIN

Chain C: 



## 4 Data and refinement statistics i

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	58.30Å 100.88Å 439.37Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	219.68 – 2.06 54.92 – 2.06	Depositor EDS
% Data completeness (in resolution range)	86.3 (219.68-2.06) 86.1 (54.92-2.06)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.49 (at 2.07Å)	Xtrriage
Refinement program	REFMAC 5.5.0109	Depositor
R, $R_{free}$	0.150 , 0.221 0.151 , 0.224	Depositor DCC
$R_{free}$ test set	3501 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	26.9	Xtrriage
Anisotropy	0.057	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 31.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	0.478 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.478 for 1/2*h+1/2*k,3/2*h-1/2*k,-l	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	10503	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	28.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.93% 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: GOL, BEN, HEM, ZM3

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	0.97	2/3184 (0.1%)	0.91	7/4332 (0.2%)
1	B	0.95	2/3212 (0.1%)	0.90	5/4368 (0.1%)
1	C	0.95	0/3182	0.90	5/4328 (0.1%)
All	All	0.95	4/9578 (0.0%)	0.90	17/13028 (0.1%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	248	TYR	CD1-CE1	6.09	1.48	1.39
1	B	248	TYR	CD1-CE1	5.57	1.47	1.39
1	A	299	VAL	CB-CG1	-5.47	1.41	1.52
1	B	90	GLU	CG-CD	5.17	1.59	1.51

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	95	ARG	NE-CZ-NH1	-6.54	117.03	120.30
1	B	347	LEU	CB-CG-CD2	-6.21	100.45	111.00
1	A	347	LEU	CA-CB-CG	6.09	129.31	115.30
1	B	73	ARG	NE-CZ-NH1	5.91	123.25	120.30
1	A	13	ASP	CB-CG-OD1	5.67	123.41	118.30
1	A	250	LEU	CA-CB-CG	5.61	128.21	115.30
1	B	84	LEU	CB-CG-CD1	5.40	120.17	111.00
1	A	391	LEU	CB-CG-CD1	-5.39	101.83	111.00
1	C	84	LEU	CB-CG-CD1	5.35	120.09	111.00
1	B	13	ASP	CB-CG-OD2	-5.33	113.50	118.30
1	A	34	ARG	NE-CZ-NH1	5.26	122.93	120.30
1	C	13	ASP	CB-CG-OD1	5.26	123.03	118.30
1	C	73	ARG	NE-CZ-NH1	5.24	122.92	120.30
1	C	96	ARG	NE-CZ-NH1	5.24	122.92	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	160	ARG	NE-CZ-NH1	5.20	122.90	120.30
1	C	95	ARG	NE-CZ-NH1	-5.14	117.73	120.30
1	B	111	ARG	NE-CZ-NH2	-5.12	117.74	120.30

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3119	0	3087	46	0
1	B	3148	0	3125	38	0
1	C	3118	0	3102	53	0
2	A	43	0	30	3	0
2	B	43	0	30	4	0
2	C	43	0	30	3	0
3	A	37	0	46	5	0
3	B	37	0	46	3	0
3	C	37	0	46	3	0
4	A	9	0	7	0	0
4	B	9	0	7	0	0
4	C	9	0	7	0	0
5	A	24	0	32	5	0
5	B	24	0	32	3	0
5	C	12	0	16	0	0
6	A	265	0	0	5	0
6	B	266	0	0	9	0
6	C	260	0	0	2	0
All	All	10503	0	9643	145	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 7.

All (145) 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:78:MET:HE1	1:A:80:LYS:NZ	1.30	1.44
1:C:78:MET:HE1	1:C:80:LYS:NZ	1.27	1.43
1:A:78:MET:HE1	1:A:80:LYS:CE	1.78	1.12
1:C:78:MET:HE1	1:C:80:LYS:CE	1.82	1.09
1:C:78:MET:CE	1:C:80:LYS:NZ	2.15	1.08
1:A:78:MET:CE	1:A:80:LYS:CE	2.32	1.06
1:C:78:MET:CE	1:C:80:LYS:HZ1	1.68	1.06
1:A:78:MET:CE	1:A:80:LYS:HE3	1.86	1.05
1:C:78:MET:CE	1:C:80:LYS:CE	2.35	1.05
1:A:78:MET:CE	1:A:80:LYS:NZ	2.21	1.03
1:A:179[B]:MET:HE1	3:A:460:ZM3:H13	1.40	1.03
1:C:5:GLU:HB2	1:C:6:PRO:HA	1.36	1.02
1:C:5:GLU:HG3	1:C:34:ARG:HB2	1.42	1.02
1:A:78:MET:HE2	1:A:80:LYS:HE3	1.44	0.98
1:C:5:GLU:HB2	1:C:6:PRO:CA	1.90	0.98
1:C:78:MET:CE	1:C:80:LYS:HE3	1.92	0.97
1:C:78:MET:HE2	1:C:80:LYS:HE3	1.50	0.92
1:B:330:ASP:OD1	6:B:2217:HOH:O	1.96	0.82
1:C:5:GLU:CB	1:C:6:PRO:HA	2.09	0.82
1:A:78:MET:HE2	1:A:80:LYS:CE	2.09	0.77
1:C:78:MET:HE2	1:C:80:LYS:CE	2.11	0.76
1:A:78:MET:CE	1:A:80:LYS:HZ1	1.87	0.76
1:A:160:ARG:HD3	1:B:177[B]:GLU:HG2	1.67	0.76
1:C:5:GLU:OE2	1:C:30:GLU:OE2	2.05	0.75
1:A:78:MET:HE1	1:A:80:LYS:HZ1	0.93	0.74
1:B:9:TYR:OH	6:B:2005:HOH:O	2.06	0.74
1:C:4:ALA:C	1:C:5:GLU:HG2	2.09	0.72
5:A:1399:GOL:H12	6:A:2263:HOH:O	1.92	0.69
1:B:250:LEU:HD23	1:B:256:LEU:HG	1.75	0.69
1:B:15:HIS:HE1	1:B:383:GLU:OE2	1.74	0.69
1:B:192[B]:ASP:OD1	1:B:196[B]:ARG:NE	2.24	0.69
1:C:215:GLN:O	1:C:216:GLN:HB2	1.92	0.68
1:A:5:GLU:N	1:A:6:PRO:HD2	2.09	0.67
1:C:5:GLU:CB	1:C:6:PRO:CA	2.71	0.64
3:A:460:ZM3:C24	3:A:460:ZM3:C2	2.76	0.64
5:B:1400:GOL:H12	6:B:2139:HOH:O	1.96	0.64
1:A:160:ARG:CD	1:B:177[B]:GLU:HG2	2.28	0.63
1:B:291:VAL:HA	5:B:1402:GOL:H2	1.81	0.62
1:A:84:LEU:HD21	2:A:450:HEM:HBA1	1.80	0.62
1:B:113:ARG:HD2	1:B:116:GLU:OE1	2.01	0.61
1:A:74:THR:N	5:A:1401:GOL:H32	2.16	0.61
1:A:15:HIS:HE1	1:A:383:GLU:OE2	1.84	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:78:MET:HE1	1:C:80:LYS:HZ1	0.75	0.60
1:C:5:GLU:OE1	1:C:33:SER:HB2	2.01	0.60
1:A:74:THR:H	5:A:1401:GOL:H32	1.66	0.59
1:C:258:ARG:NH1	1:C:262:ASP:OD2	2.36	0.59
1:C:5:GLU:CD	1:C:34:ARG:H	2.06	0.58
1:B:318:GLN:NE2	1:B:324:ALA:H	2.01	0.58
1:A:94:LEU:HD22	1:A:227:LEU:HD11	1.85	0.58
1:A:74:THR:HG23	5:A:1401:GOL:H32	1.86	0.57
3:C:460:ZM3:C2	3:C:460:ZM3:C24	2.82	0.57
1:A:187[B]:TYR:OH	1:A:222:GLN:NE2	2.33	0.56
1:B:345:HIS:HE1	6:B:2240:HOH:O	1.89	0.56
1:A:96:ARG:HD3	6:A:2103:HOH:O	2.06	0.56
1:A:196:ARG:HA	1:A:199:LYS:HE3	1.88	0.55
3:B:460:ZM3:C24	3:B:460:ZM3:C2	2.84	0.55
1:A:250:LEU:HD22	1:A:256:LEU:HG	1.86	0.55
1:B:9:TYR:CG	1:B:10:PRO:HA	2.42	0.55
1:A:318:GLN:NE2	1:A:324:ALA:H	2.06	0.54
1:A:78:MET:HE1	1:A:80:LYS:HZ3	1.59	0.54
1:B:84:LEU:HD21	2:B:450:HEM:HBA1	1.89	0.53
1:A:53:ARG:HD3	6:A:2065:HOH:O	2.07	0.53
1:B:258:ARG:NH1	1:B:262:ASP:OD2	2.42	0.53
1:C:5:GLU:CG	1:C:6:PRO:HA	2.39	0.53
1:A:113:ARG:HD2	1:A:116:GLU:OE1	2.09	0.53
1:B:79:VAL:HG21	3:B:460:ZM3:H22	1.91	0.53
1:C:5:GLU:HG3	1:C:6:PRO:HA	1.90	0.53
1:C:9:TYR:CG	1:C:10:PRO:HA	2.44	0.53
1:B:192[B]:ASP:O	1:B:196[B]:ARG:HG2	2.09	0.52
1:C:318:GLN:NE2	1:C:324:ALA:H	2.06	0.52
2:B:450:HEM:HBC2	2:B:450:HEM:HMC2	1.91	0.52
1:B:38:PRO:HD2	1:B:73:ARG:O	2.11	0.50
1:A:353:ARG:HD2	6:A:2234:HOH:O	2.10	0.50
1:A:22:ARG:HH22	1:C:335:GLN:NE2	2.10	0.50
1:B:318:GLN:HE22	1:B:324:ALA:H	1.59	0.50
1:A:346:CYS:HA	2:A:450:HEM:CHA	2.42	0.49
1:A:5:GLU:N	1:A:6:PRO:CD	2.74	0.49
1:C:15:HIS:HE1	1:C:383:GLU:OE2	1.94	0.49
1:A:9:TYR:CG	1:A:10:PRO:HA	2.48	0.49
1:B:94:LEU:HD22	1:B:227:LEU:HD11	1.94	0.49
1:A:318:GLN:HE22	1:A:324:ALA:H	1.60	0.49
5:B:1400:GOL:C1	6:B:2139:HOH:O	2.56	0.49
1:B:179:MET:SD	3:B:460:ZM3:H8	2.52	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:5:GLU:CG	1:C:34:ARG:HB2	2.28	0.49
1:C:97:LEU:HD13	1:C:219:LEU:HD23	1.94	0.49
1:B:78:MET:SD	1:B:80:LYS:NZ	2.80	0.48
1:A:254:PRO:HA	6:A:2165:HOH:O	2.12	0.48
1:C:345:HIS:HD2	6:C:2230:HOH:O	1.97	0.47
1:C:113:ARG:HD2	1:C:116:GLU:OE1	2.14	0.47
1:C:5:GLU:HB2	1:C:6:PRO:C	2.34	0.47
1:A:9:TYR:CD1	1:A:10:PRO:HA	2.50	0.47
1:A:111:ARG:HB3	1:A:112:PRO:HD3	1.97	0.47
1:C:94:LEU:HD22	1:C:227:LEU:HD11	1.97	0.47
1:C:318:GLN:HE22	1:C:324:ALA:H	1.63	0.47
1:C:346:CYS:HA	2:C:450:HEM:CHA	2.45	0.46
1:B:254:PRO:HA	6:B:2162:HOH:O	2.15	0.46
1:B:85:SER:HB3	6:B:2068:HOH:O	2.15	0.46
1:C:235:GLY:HA2	2:C:450:HEM:C2C	2.51	0.46
1:A:71:GLU:HG3	1:A:78:MET:HE3	1.98	0.45
1:C:37:PRO:HG3	1:C:72:PRO:HB3	1.98	0.45
1:B:246:PHE:CE1	1:B:274:LEU:HB3	2.52	0.45
1:C:9:TYR:HB2	1:C:35:VAL:HB	1.97	0.45
1:C:9:TYR:O	1:C:38:PRO:HD3	2.17	0.45
1:C:71:GLU:HG3	1:C:78:MET:HE3	1.97	0.44
1:B:9:TYR:CD1	1:B:10:PRO:HA	2.52	0.44
1:C:134:LEU:CD2	1:C:247:VAL:HG11	2.48	0.44
3:A:460:ZM3:H16B	3:A:460:ZM3:H17	1.66	0.43
1:B:15:HIS:CE1	1:B:383:GLU:OE2	2.64	0.43
1:C:231:LEU:HD21	1:C:347:LEU:HD11	2.00	0.43
1:A:113:ARG:HD2	1:A:113:ARG:HA	1.81	0.43
1:A:323:ASP:HA	1:C:88:PRO:HB2	2.01	0.43
2:B:450:HEM:HBB2	2:B:450:HEM:CMB	2.48	0.43
1:C:263:ARG:HB2	1:C:266:LEU:HD12	1.99	0.43
1:B:250:LEU:CD2	1:B:256:LEU:HG	2.43	0.43
1:A:79:VAL:HG21	3:A:460:ZM3:H22	1.99	0.43
3:C:460:ZM3:O4	3:C:460:ZM3:H10B	2.19	0.43
3:A:460:ZM3:O6	3:A:460:ZM3:C2	2.65	0.42
1:C:348:GLY:HA3	2:C:450:HEM:C3C	2.54	0.42
1:A:9:TYR:HB2	1:A:35:VAL:HB	2.02	0.42
1:B:193:LEU:HA	1:B:196[B]:ARG:HG3	2.00	0.42
2:B:450:HEM:HBB2	2:B:450:HEM:HMB2	2.00	0.42
1:B:367:LEU:HD22	1:B:397:TRP:CD1	2.54	0.42
1:B:276:ARG:O	1:B:315:ASN:HB3	2.20	0.42
1:C:347:LEU:HD12	1:C:347:LEU:C	2.40	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:38:PRO:HD2	1:A:73:ARG:O	2.20	0.41
1:C:345:HIS:HE1	6:C:2232:HOH:O	2.02	0.41
1:B:22:ARG:HG2	1:B:22:ARG:HH11	1.85	0.41
1:A:177:GLU:O	1:A:181:GLU:HG3	2.20	0.41
1:C:384:GLY:O	1:C:385:MET:HB2	2.21	0.41
1:C:94:LEU:O	1:C:98:VAL:HG23	2.20	0.41
1:C:9:TYR:CD1	1:C:10:PRO:HA	2.55	0.41
1:B:195:ASP:O	1:B:199:LYS:HG3	2.21	0.41
5:A:1402:GOL:H32	1:C:89:PRO:HB2	2.03	0.41
1:A:192[A]:ASP:O	1:A:196:ARG:HG2	2.21	0.41
1:B:364:LEU:HA	1:B:364:LEU:HD23	1.90	0.41
1:C:113:ARG:HD2	1:C:113:ARG:HA	1.86	0.41
1:B:347:LEU:HD23	1:B:347:LEU:C	2.41	0.41
1:B:353:ARG:HD2	6:B:2239:HOH:O	2.19	0.41
1:B:351:LEU:O	1:B:355:GLU:HG3	2.21	0.41
1:A:235:GLY:HA2	2:A:450:HEM:C2C	2.56	0.41
1:B:111:ARG:HB3	1:B:112:PRO:HD3	2.03	0.41
1:C:213:ARG:HA	1:C:217:ASP:O	2.21	0.41
1:A:211:GLN:HB3	1:A:211:GLN:HE21	1.53	0.40
1:B:236:TYR:HB3	6:B:2152:HOH:O	2.22	0.40
1:C:79:VAL:HG21	3:C:460:ZM3:H22	2.03	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	396/417 (95%)	381 (96%)	14 (4%)	1 (0%)	43 34
1	B	399/417 (96%)	384 (96%)	14 (4%)	1 (0%)	43 34
1	C	395/417 (95%)	379 (96%)	15 (4%)	1 (0%)	43 34
All	All	1190/1251 (95%)	1144 (96%)	43 (4%)	3 (0%)	43 34



All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	5	GLU
1	A	215	GLN
1	B	5	GLU

### 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	326/346 (94%)	315 (97%)	11 (3%)	40	33
1	B	329/346 (95%)	320 (97%)	9 (3%)	48	42
1	C	328/346 (95%)	317 (97%)	11 (3%)	40	33
All	All	983/1038 (95%)	952 (97%)	31 (3%)	42	35

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	76	PRO
1	A	78	MET
1	A	84	LEU
1	A	96	ARG
1	A	154	PRO
1	A	180	GLN
1	A	211	GLN
1	A	250	LEU
1	A	284	THR
1	A	299	VAL
1	A	347	LEU
1	B	78	MET
1	B	84	LEU
1	B	102	PHE
1	B	184	GLU
1	B	199	LYS
1	B	236	TYR
1	B	299	VAL

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Mol	Chain	Res	Type
1	B	332	THR
1	B	365	GLN
1	C	5	GLU
1	C	78	MET
1	C	84	LEU
1	C	173	GLU
1	C	180	GLN
1	C	199	LYS
1	C	215	GLN
1	C	250	LEU
1	C	291	VAL
1	C	299	VAL
1	C	330	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	15	HIS
1	A	130	GLN
1	A	185	GLN
1	A	211	GLN
1	A	318	GLN
1	A	320	GLN
1	B	15	HIS
1	B	130	GLN
1	B	259	GLN
1	B	318	GLN
1	B	320	GLN
1	B	345	HIS
1	B	365	GLN
1	C	15	HIS
1	C	211	GLN
1	C	215	GLN
1	C	318	GLN
1	C	320	GLN
1	C	335	GLN
1	C	345	HIS

### 5.3.3 RNA

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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

19 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
4	BEN	A	1398	-	9,9,9	1.28	1 (11%)	9,11,11	1.05	0
5	GOL	A	1399	-	5,5,5	0.63	0	5,5,5	2.34	1 (20%)
5	GOL	A	1400	-	5,5,5	0.53	0	5,5,5	0.45	0
5	GOL	A	1401	-	5,5,5	0.35	0	5,5,5	0.81	0
5	GOL	A	1402	-	5,5,5	0.46	0	5,5,5	0.40	0
2	HEM	A	450	1,6	27,50,50	2.17	8 (29%)	17,82,82	1.57	3 (17%)
3	ZM3	A	460	-	38,38,50	1.51	3 (7%)	45,52,70	1.95	13 (28%)
4	BEN	B	1398	-	9,9,9	1.28	1 (11%)	9,11,11	1.04	0
5	GOL	B	1399	-	5,5,5	0.50	0	5,5,5	0.60	0
5	GOL	B	1400	-	5,5,5	0.31	0	5,5,5	1.47	1 (20%)
5	GOL	B	1401	-	5,5,5	0.58	0	5,5,5	0.99	0
5	GOL	B	1402	-	5,5,5	0.36	0	5,5,5	0.78	0
2	HEM	B	450	1,6	27,50,50	2.00	8 (29%)	17,82,82	1.65	4 (23%)
3	ZM3	B	460	-	38,38,50	1.47	2 (5%)	45,52,70	1.91	13 (28%)
4	BEN	C	1398	-	9,9,9	1.25	1 (11%)	9,11,11	1.13	1 (11%)
5	GOL	C	1399	-	5,5,5	0.44	0	5,5,5	0.68	0
5	GOL	C	1400	-	5,5,5	0.25	0	5,5,5	1.28	1 (20%)
2	HEM	C	450	1,6	27,50,50	2.10	8 (29%)	17,82,82	1.62	4 (23%)
3	ZM3	C	460	-	38,38,50	1.51	2 (5%)	45,52,70	1.95	10 (22%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	BEN	A	1398	-	-	0/4/4/4	0/1/1/1
5	GOL	A	1399	-	-	0/4/4/4	0/0/0/0
5	GOL	A	1400	-	-	0/4/4/4	0/0/0/0
5	GOL	A	1401	-	-	0/4/4/4	0/0/0/0
5	GOL	A	1402	-	-	0/4/4/4	0/0/0/0
2	HEM	A	450	1,6	-	0/6/54/54	0/0/8/8
3	ZM3	A	460	-	-	0/48/64/89	0/1/2/3
4	BEN	B	1398	-	-	0/4/4/4	0/1/1/1
5	GOL	B	1399	-	-	0/4/4/4	0/0/0/0
5	GOL	B	1400	-	-	0/4/4/4	0/0/0/0
5	GOL	B	1401	-	-	0/4/4/4	0/0/0/0
5	GOL	B	1402	-	-	0/4/4/4	0/0/0/0
2	HEM	B	450	1,6	-	0/6/54/54	0/0/8/8
3	ZM3	B	460	-	-	0/48/64/89	0/1/2/3
4	BEN	C	1398	-	-	0/4/4/4	0/1/1/1
5	GOL	C	1399	-	-	0/4/4/4	0/0/0/0
5	GOL	C	1400	-	-	0/4/4/4	0/0/0/0
2	HEM	C	450	1,6	-	0/6/54/54	0/0/8/8
3	ZM3	C	460	-	-	0/48/64/89	0/1/2/3

All (34) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	450	HEM	C3B-C2B	-4.91	1.33	1.40
2	B	450	HEM	C3B-C2B	-3.44	1.35	1.40
2	C	450	HEM	C3B-C2B	-3.21	1.35	1.40
2	C	450	HEM	C3C-C2C	-3.16	1.36	1.40
4	B	1398	BEN	C-N2	-2.95	1.26	1.33
4	A	1398	BEN	C-N2	-2.95	1.26	1.33
4	C	1398	BEN	C-N2	-2.78	1.27	1.33
2	B	450	HEM	C3C-C2C	-2.55	1.36	1.40
2	B	450	HEM	CMB-C2B	2.02	1.56	1.51
2	A	450	HEM	CMC-C2C	2.04	1.56	1.51
3	A	460	ZM3	C28-C1	2.07	1.55	1.50
2	C	450	HEM	CMA-C3A	2.15	1.56	1.51
2	A	450	HEM	CAA-C2A	2.17	1.55	1.52
2	C	450	HEM	C1D-ND	2.30	1.40	1.36
2	B	450	HEM	CMA-C3A	2.30	1.56	1.51
2	A	450	HEM	CMB-C2B	2.30	1.57	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	460	ZM3	C29-C28	2.44	1.57	1.53
2	C	450	HEM	CMD-C2D	2.48	1.56	1.51
2	B	450	HEM	CMC-C2C	2.74	1.58	1.51
3	A	460	ZM3	C29-C28	2.83	1.57	1.53
3	B	460	ZM3	C29-C28	2.92	1.57	1.53
2	A	450	HEM	C3B-CAB	3.17	1.54	1.47
2	A	450	HEM	CMA-C3A	3.23	1.58	1.51
2	B	450	HEM	C3D-C2D	3.84	1.49	1.37
2	C	450	HEM	C3B-CAB	3.85	1.55	1.47
2	B	450	HEM	C3B-CAB	4.12	1.56	1.47
2	B	450	HEM	C3C-CAC	4.13	1.56	1.47
2	C	450	HEM	C3D-C2D	4.48	1.50	1.37
2	A	450	HEM	C3C-CAC	4.51	1.57	1.47
2	A	450	HEM	C3D-C2D	4.80	1.51	1.37
2	C	450	HEM	C3C-CAC	4.86	1.57	1.47
3	B	460	ZM3	O6-C24	7.04	1.49	1.34
3	A	460	ZM3	O6-C24	7.04	1.49	1.34
3	C	460	ZM3	O6-C24	7.19	1.49	1.34

All (51) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1399	GOL	C3-C2-C1	-5.13	91.77	111.75
3	C	460	ZM3	C21-C20-C11	-4.48	102.71	111.10
3	B	460	ZM3	C21-C20-C11	-4.47	102.72	111.10
3	A	460	ZM3	O1-C5-C6	-4.31	113.24	121.25
3	C	460	ZM3	O1-C5-C6	-3.78	114.22	121.25
3	A	460	ZM3	C21-C20-C11	-3.41	104.70	111.10
2	C	450	HEM	CMA-C3A-C4A	-3.21	123.53	128.46
5	B	1400	GOL	C3-C2-C1	-3.17	99.41	111.75
3	B	460	ZM3	O2-C11-C20	-2.72	105.28	110.90
2	C	450	HEM	CBD-CAD-C3D	-2.62	107.48	112.47
3	A	460	ZM3	O6-C24-O5	-2.56	119.06	123.34
3	B	460	ZM3	C21-C20-C22	-2.54	103.72	110.01
5	C	1400	GOL	C3-C2-C1	-2.50	102.00	111.75
3	A	460	ZM3	C20-C22-C23	-2.48	119.46	126.45
2	B	450	HEM	CBD-CAD-C3D	-2.47	107.75	112.47
3	A	460	ZM3	C17-C14-N	-2.42	108.83	115.67
2	A	450	HEM	C1D-C2D-C3D	-2.42	105.31	107.00
3	B	460	ZM3	C20-C22-C23	-2.32	119.93	126.45
3	B	460	ZM3	O1-C5-C6	-2.23	117.10	121.25
3	C	460	ZM3	O6-C24-O5	-2.23	119.61	123.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	450	HEM	CAA-CBA-CGA	-2.22	108.86	112.66
2	A	450	HEM	CBD-CAD-C3D	-2.19	108.30	112.47
3	C	460	ZM3	C20-C22-C23	-2.18	120.32	126.45
3	B	460	ZM3	O4-C18-C19	-2.18	102.31	106.86
3	A	460	ZM3	C13-C14-N	-2.18	104.55	110.83
3	A	460	ZM3	O3-C13-C12	2.06	115.08	110.06
3	B	460	ZM3	C18-C17-C14	2.08	114.10	110.46
4	C	1398	BEN	C6-C1-C2	2.25	121.81	118.59
2	B	450	HEM	CMB-C2B-C3B	2.45	129.40	124.80
2	C	450	HEM	CMB-C2B-C3B	2.56	129.59	124.80
3	A	460	ZM3	C12-O4-C18	2.66	117.15	112.92
2	B	450	HEM	C4C-C3C-C2C	2.76	108.83	106.90
3	A	460	ZM3	C18-C17-C14	2.87	115.48	110.46
3	C	460	ZM3	C10-C9-C8	2.96	115.18	110.70
3	B	460	ZM3	O6-C25-C26	3.04	111.85	106.90
2	B	450	HEM	CMC-C2C-C3C	3.05	130.52	124.80
3	B	460	ZM3	C6-C5-C4	3.10	126.08	118.29
3	A	460	ZM3	O4-C18-C17	3.11	113.93	109.15
3	A	460	ZM3	O7-C29-C28	3.12	119.64	110.42
3	C	460	ZM3	C6-C5-C4	3.27	126.49	118.29
3	C	460	ZM3	O3-C13-C14	3.27	115.64	109.78
3	C	460	ZM3	C12-O4-C18	3.29	118.14	112.92
2	A	450	HEM	CMC-C2C-C3C	3.44	131.24	124.80
3	B	460	ZM3	C12-O4-C18	3.67	118.75	112.92
3	B	460	ZM3	O7-C29-C28	3.71	121.39	110.42
3	A	460	ZM3	C6-C5-C4	3.79	127.81	118.29
3	B	460	ZM3	O4-C18-C17	3.94	115.20	109.15
3	C	460	ZM3	O7-C29-C28	3.99	122.23	110.42
3	B	460	ZM3	O6-C24-C23	4.04	120.80	111.36
3	A	460	ZM3	O6-C24-C23	5.13	123.34	111.36
3	C	460	ZM3	O6-C24-C23	5.17	123.42	111.36

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

11 monomers are involved in 29 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	1399	GOL	1	0
5	A	1401	GOL	3	0
5	A	1402	GOL	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	450	HEM	3	0
3	A	460	ZM3	5	0
5	B	1400	GOL	2	0
5	B	1402	GOL	1	0
2	B	450	HEM	4	0
3	B	460	ZM3	3	0
2	C	450	HEM	3	0
3	C	460	ZM3	3	0

## 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	393/417 (94%)	-0.76	1 (0%) 93   94	13, 26, 43, 50	0
1	B	394/417 (94%)	-0.72	0 100   100	14, 26, 43, 49	0
1	C	394/417 (94%)	-0.76	0 100   100	13, 26, 43, 54	0
All	All	1181/1251 (94%)	-0.75	1 (0%) 95   95	13, 26, 43, 54	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	78	MET	2.1

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

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

### 6.3 Carbohydrates [i](#)

There are no carbohydrates 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
3	ZM3	A	460	37/48	0.81	0.21	34,38,41,43	0
3	ZM3	B	460	37/48	0.83	0.19	35,38,41,43	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	ZM3	C	460	37/48	0.84	0.20	35,38,41,43	0
5	GOL	B	1401	6/6	0.88	0.20	38,39,40,43	0
5	GOL	B	1402	6/6	0.90	0.13	38,39,41,42	0
5	GOL	A	1401	6/6	0.93	0.20	42,43,43,46	0
4	BEN	C	1398	9/9	0.95	0.07	34,35,38,38	9
5	GOL	A	1399	6/6	0.96	0.10	24,29,29,31	0
5	GOL	C	1400	6/6	0.96	0.09	27,31,31,33	0
5	GOL	A	1402	6/6	0.96	0.17	35,37,40,41	0
4	BEN	B	1398	9/9	0.97	0.10	38,39,39,39	9
5	GOL	B	1400	6/6	0.97	0.09	24,31,32,32	0
4	BEN	A	1398	9/9	0.97	0.10	38,39,39,39	9
5	GOL	A	1400	6/6	0.98	0.04	18,21,22,22	0
5	GOL	B	1399	6/6	0.98	0.06	22,24,25,26	0
5	GOL	C	1399	6/6	0.98	0.07	17,21,23,24	0
2	HEM	A	450	43/43	0.99	0.08	12,15,19,20	0
2	HEM	B	450	43/43	0.99	0.08	13,15,18,21	0
2	HEM	C	450	43/43	0.99	0.07	13,16,18,19	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.