



# Full wwPDB X-ray Structure Validation Report ⓘ

Apr 18, 2023 – 10:38 AM EDT

PDB ID : 7USN  
Title : Crystal structure of ferritin 1 from *Caenorhabditis elegans*, FTN-1  
Authors : Malcolm, T.R.; Maher, M.J.; Mubarak, S.S.M.  
Deposited on : 2022-04-25  
Resolution : 1.79 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.

The types of validation reports are described at

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

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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 : 2.32.2  
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) : 2.32.2

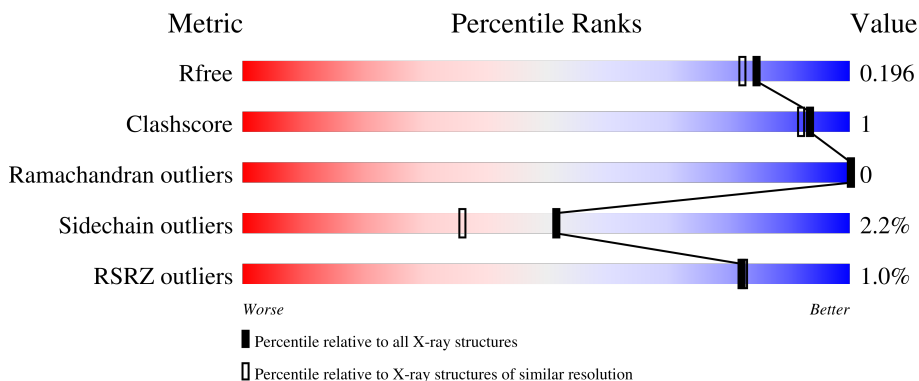
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.79 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	9185 (1.80-1.76)
Clashscore	141614	10184 (1.80-1.76)
Ramachandran outliers	138981	10051 (1.80-1.76)
Sidechain outliers	138945	10050 (1.80-1.76)
RSRZ outliers	127900	9032 (1.80-1.76)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	168	97%
1	B	168	95% 5%
1	C	168	94% 6%
1	D	168	2% 95% 5%
1	E	168	96% ..

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Mol	Chain	Length	Quality of chain
1	F	168	 95% 5%
1	G	168	 98% 2%
1	H	168	 97%
1	I	168	 98%
1	J	168	 97%
1	K	168	 96%
1	L	168	 95% 5%
1	M	168	 98%
1	N	168	 95% 5%
1	O	168	 97%
1	P	168	 94% 6%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	GOL	D	202	-	-	X	-

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 24606 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 Ferritin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	168	1368	856	244	265	3	0	1	0
1	B	168	1362	853	243	263	3	0	0	0
1	C	168	1383	865	250	265	3	0	2	0
1	D	168	1371	858	244	266	3	0	1	0
1	E	168	1362	853	243	263	3	0	0	0
1	F	168	1373	859	247	264	3	0	1	0
1	G	168	1394	871	254	266	3	0	3	0
1	O	168	1373	859	247	264	3	0	1	0
1	H	168	1362	853	243	263	3	0	0	0
1	I	168	1373	859	247	264	3	0	1	0
1	J	168	1373	859	247	264	3	0	1	0
1	K	168	1373	859	247	264	3	0	1	0
1	L	168	1382	864	249	266	3	0	2	0
1	M	168	1373	859	247	264	3	0	1	0
1	N	168	1362	853	243	263	3	0	0	0
1	P	168	1384	865	251	265	3	0	2	0

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



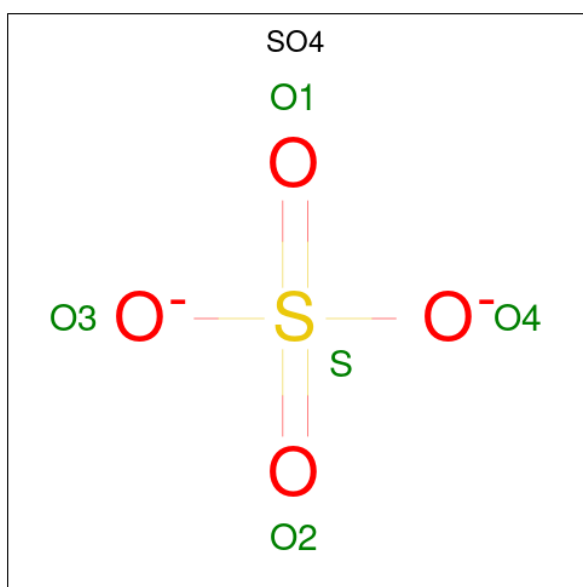
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 6 3 3	0	0
2	A	1	Total C O 6 3 3	0	0
2	A	1	Total C O 6 3 3	0	0
2	B	1	Total C O 6 3 3	0	0
2	B	1	Total C O 6 3 3	0	0
2	C	1	Total C O 6 3 3	0	0
2	C	1	Total C O 6 3 3	0	0
2	D	1	Total C O 6 3 3	0	0
2	D	1	Total C O 6 3 3	0	0
2	E	1	Total C O 6 3 3	0	0
2	F	1	Total C O 6 3 3	0	0
2	F	1	Total C O 6 3 3	0	0
2	G	1	Total C O 6 3 3	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	G	1	Total	C	O	0	0
			6	3	3		
2	O	1	Total	C	O	0	0
			6	3	3		
2	J	1	Total	C	O	0	0
			6	3	3		
2	J	1	Total	C	O	0	0
			6	3	3		
2	K	1	Total	C	O	0	0
			6	3	3		
2	L	1	Total	C	O	0	0
			6	3	3		
2	L	1	Total	C	O	0	0
			6	3	3		
2	N	1	Total	C	O	0	0
			6	3	3		
2	N	1	Total	C	O	0	0
			6	3	3		
2	P	1	Total	C	O	0	0
			6	3	3		
2	P	1	Total	C	O	0	0
			6	3	3		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	D	1	Total O S 5 4 1	0	0
3	E	1	Total O S 5 4 1	0	0
3	F	1	Total O S 5 4 1	0	0
3	G	1	Total O S 5 4 1	0	0
3	O	1	Total O S 5 4 1	0	0
3	H	1	Total O S 5 4 1	0	0
3	I	1	Total O S 5 4 1	0	0
3	J	1	Total O S 5 4 1	0	0
3	K	1	Total O S 5 4 1	0	0
3	L	1	Total O S 5 4 1	0	0
3	P	1	Total O S 5 4 1	0	0

- Molecule 4 is FE (III) ION (three-letter code: FE) (formula: Fe).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Fe 1 1	0	0
4	B	1	Total Fe 1 1	0	0
4	C	1	Total Fe 1 1	0	0
4	D	1	Total Fe 1 1	0	0
4	E	1	Total Fe 1 1	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	F	1	Total Fe 1 1	0	0
4	G	1	Total Fe 1 1	0	0
4	O	1	Total Fe 1 1	0	0
4	H	1	Total Fe 1 1	0	0
4	I	1	Total Fe 1 1	0	0
4	J	1	Total Fe 1 1	0	0
4	K	1	Total Fe 1 1	0	0
4	L	1	Total Fe 1 1	0	0
4	M	1	Total Fe 1 1	0	0
4	N	1	Total Fe 1 1	0	0
4	P	1	Total Fe 1 1	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	170	Total O 170 170	0	0
5	B	144	Total O 144 144	0	0
5	C	152	Total O 152 152	0	0
5	D	168	Total O 168 168	0	0
5	E	155	Total O 155 155	0	0
5	F	147	Total O 147 147	0	0
5	G	158	Total O 158 158	0	0
5	O	139	Total O 139 139	0	0

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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
5	H	126	Total 126	O 126	0	0
5	I	107	Total 107	O 107	0	0
5	J	147	Total 147	O 147	0	0
5	K	149	Total 149	O 149	0	0
5	L	165	Total 165	O 165	0	0
5	M	143	Total 143	O 143	0	0
5	N	168	Total 168	O 168	0	0
5	P	165	Total 165	O 165	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.

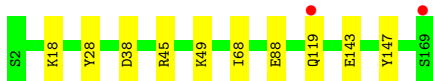
- Molecule 1: Ferritin



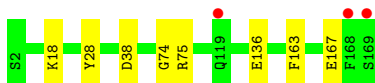
- Molecule 1: Ferritin



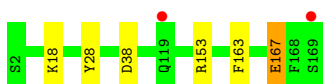
- Molecule 1: Ferritin



- Molecule 1: Ferritin



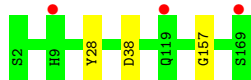
- Molecule 1: Ferritin



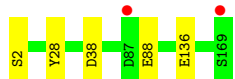
- Molecule 1: Ferritin



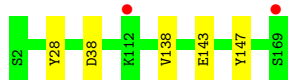
● Molecule 1: Ferritin



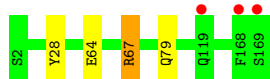
● Molecule 1: Ferritin



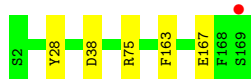
● Molecule 1: Ferritin



● Molecule 1: Ferritin



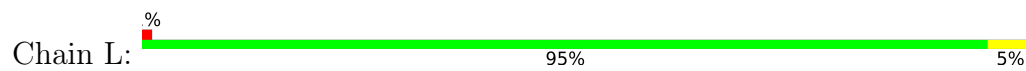
● Molecule 1: Ferritin



● Molecule 1: Ferritin



● Molecule 1: Ferritin



● Molecule 1: Ferritin



● Molecule 1: Ferritin



● Molecule 1: Ferritin



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 2 3	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	227.76Å 227.76Å 227.76Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.56 – 1.79 48.56 – 1.79	Depositor EDS
% Data completeness (in resolution range)	99.9 (48.56-1.79) 99.9 (48.56-1.79)	Depositor EDS
$R_{merge}$	0.16	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.91 (at 1.79Å)	Xtrriage
Refinement program	REFMAC 5.8.0267	Depositor
R, $R_{free}$	0.166 , 0.189 0.175 , 0.196	Depositor DCC
$R_{free}$ test set	17988 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	21.0	Xtrriage
Anisotropy	0.000	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.41 , 46.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.032 for l,-k,h	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	24606	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	27.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 59.71 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.6962e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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, SO4, FE

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	0.68	0/1392	0.73	0/1874
1	B	0.67	0/1386	0.71	0/1866
1	C	0.65	0/1408	0.72	0/1895
1	D	0.69	0/1395	0.69	0/1878
1	E	0.67	0/1386	0.73	1/1866 (0.1%)
1	F	0.66	0/1397	0.73	0/1880
1	G	0.67	0/1419	0.70	0/1909
1	H	0.62	0/1386	0.70	0/1866
1	I	0.63	0/1397	0.69	0/1880
1	J	0.68	0/1397	0.70	0/1880
1	K	0.67	0/1397	0.71	0/1880
1	L	0.68	0/1406	0.71	0/1892
1	M	0.68	0/1397	0.72	0/1880
1	N	0.71	0/1386	0.70	0/1866
1	O	0.68	0/1397	0.72	0/1880
1	P	0.67	0/1408	0.71	0/1894
All	All	0.67	0/22354	0.71	1/30086 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	153	ARG	NE-CZ-NH2	-6.14	117.23	120.30

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	1368	0	1318	2	0
1	B	1362	0	1314	5	0
1	C	1383	0	1332	3	0
1	D	1371	0	1319	10	0
1	E	1362	0	1314	5	0
1	F	1373	0	1326	5	0
1	G	1394	0	1344	1	0
1	H	1362	0	1314	2	0
1	I	1373	0	1326	2	0
1	J	1373	0	1326	2	0
1	K	1373	0	1326	6	0
1	L	1382	0	1333	4	0
1	M	1373	0	1326	1	0
1	N	1362	0	1314	5	0
1	O	1373	0	1326	1	0
1	P	1384	0	1338	4	0
2	A	18	0	24	1	0
2	B	12	0	16	2	0
2	C	12	0	16	3	0
2	D	12	0	16	9	0
2	E	6	0	8	0	0
2	F	12	0	16	0	0
2	G	12	0	16	0	0
2	J	12	0	16	1	0
2	K	6	0	8	1	0
2	L	12	0	16	2	0
2	N	12	0	16	0	0
2	O	6	0	8	0	0
2	P	12	0	16	1	0
3	A	15	0	0	0	0
3	B	5	0	0	0	0
3	D	5	0	0	0	0
3	E	5	0	0	0	0
3	F	5	0	0	0	0
3	G	5	0	0	0	0
3	H	5	0	0	0	0
3	I	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	J	5	0	0	0	0
3	K	5	0	0	0	0
3	L	5	0	0	0	0
3	O	5	0	0	0	0
3	P	5	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
4	E	1	0	0	0	0
4	F	1	0	0	0	0
4	G	1	0	0	0	0
4	H	1	0	0	0	0
4	I	1	0	0	0	0
4	J	1	0	0	0	0
4	K	1	0	0	0	0
4	L	1	0	0	0	0
4	M	1	0	0	0	0
4	N	1	0	0	0	0
4	O	1	0	0	0	0
4	P	1	0	0	0	0
5	A	170	0	0	1	0
5	B	144	0	0	1	0
5	C	152	0	0	2	0
5	D	168	0	0	0	1
5	E	155	0	0	0	0
5	F	147	0	0	1	0
5	G	158	0	0	0	0
5	H	126	0	0	0	0
5	I	107	0	0	1	0
5	J	147	0	0	1	0
5	K	149	0	0	3	0
5	L	165	0	0	1	0
5	M	143	0	0	1	0
5	N	168	0	0	3	1
5	O	139	0	0	1	0
5	P	165	0	0	0	0
All	All	24606	0	21388	59	1

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 1.

All (59) 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:D:75:ARG:NE	2:D:202:GOL:O1	2.15	0.78
2:C:202:GOL:H32	5:C:334:HOH:O	1.97	0.64
1:D:163:PHE:CE1	1:D:167:GLU:HG2	2.32	0.64
2:C:202:GOL:C3	5:C:334:HOH:O	2.46	0.63
1:A:22:VAL:HA	2:A:201:GOL:H12	1.89	0.54
1:K:143:GLU:HG2	1:K:147:TYR:CE2	2.42	0.54
1:D:75:ARG:HB2	2:D:202:GOL:O1	2.08	0.54
1:D:163:PHE:O	1:D:167:GLU:HB2	2.07	0.54
1:D:75:ARG:HB2	2:D:202:GOL:HO1	1.73	0.53
1:N:143:GLU:HG2	1:N:147:TYR:CE2	2.43	0.53
1:I:64:GLU:OE2	1:I:67:ARG:NH1	2.41	0.53
1:K:160:GLU:HG3	5:K:307:HOH:O	2.07	0.53
1:G:157:GLY:HA3	2:J:201:GOL:H11	1.89	0.53
1:F:71:VAL:HG12	1:H:138:VAL:HG13	1.92	0.52
1:B:75:ARG:NH1	5:B:302:HOH:O	2.44	0.49
1:E:163:PHE:CD1	1:E:167:GLU:HG2	2.47	0.49
1:E:163:PHE:CE1	1:E:167:GLU:HG3	2.47	0.49
1:K:160:GLU:OE1	5:K:301:HOH:O	2.19	0.49
1:E:163:PHE:CE1	1:E:167:GLU:CG	2.95	0.48
1:N:75:ARG:NH1	5:N:302:HOH:O	2.46	0.48
1:P:22:VAL:HA	2:P:201:GOL:H12	1.95	0.48
1:F:75:ARG:NH1	5:F:307:HOH:O	2.47	0.47
1:B:22:VAL:HG22	2:B:201:GOL:H31	1.97	0.47
1:N:160:GLU:HG3	5:N:372:HOH:O	2.15	0.47
1:P:64:GLU:OE2	1:P:67:ARG:NH1	2.47	0.47
1:L:75:ARG:NH1	5:L:303:HOH:O	2.46	0.47
2:C:202:GOL:H11	1:F:27:SER:OG	2.15	0.47
1:L:67:ARG:NH1	2:L:202:GOL:H31	2.30	0.47
5:A:353:HOH:O	2:D:201:GOL:C1	2.62	0.46
1:C:143:GLU:HG2	1:C:147:TYR:CE2	2.50	0.46
1:B:153:ARG:NH1	1:K:160:GLU:OE1	2.48	0.46
1:L:163:PHE:CE1	1:L:167:GLU:HG2	2.52	0.45
1:N:118:GLU:HG3	5:N:442:HOH:O	2.16	0.45
1:H:143:GLU:HG2	1:H:147:TYR:CE2	2.52	0.45
1:K:75[A]:ARG:NH1	5:K:303:HOH:O	2.49	0.45
1:C:45:ARG:HG3	1:C:49:LYS:HE3	2.00	0.44
1:D:74:GLY:O	2:D:202:GOL:H11	2.18	0.43
1:D:75:ARG:CB	2:D:202:GOL:O1	2.67	0.43
1:K:160:GLU:OE2	2:K:201:GOL:O3	2.34	0.43
1:P:143:GLU:HG2	1:P:147:TYR:CE2	2.53	0.43
1:D:75:ARG:HE	2:D:202:GOL:HO1	1.61	0.42
1:E:163:PHE:CE1	1:E:167:GLU:HG2	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:J:75:ARG:NH1	5:J:307:HOH:O	2.52	0.42
1:O:2:SER:N	5:O:304:HOH:O	2.52	0.42
1:E:163:PHE:O	1:E:167:GLU:HB2	2.19	0.42
1:C:68:ILE:HD12	1:C:68:ILE:HA	1.93	0.42
1:D:75:ARG:NE	2:D:202:GOL:HO1	2.15	0.42
1:I:79:GLN:NE2	5:I:2003:HOH:O	2.47	0.42
1:B:22:VAL:HA	2:B:201:GOL:C3	2.50	0.41
1:F:143:GLU:HG2	1:F:147:TYR:CE2	2.56	0.41
1:L:67:ARG:HD2	2:L:202:GOL:O1	2.21	0.41
1:M:67[A]:ARG:HG3	5:M:2593:HOH:O	2.21	0.40
1:N:92:VAL:HG21	1:N:160:GLU:HG2	2.03	0.40
1:D:75:ARG:CD	2:D:202:GOL:O1	2.69	0.40
1:A:143:GLU:HG2	1:A:147:TYR:CE2	2.57	0.40
1:B:143:GLU:HG2	1:B:147:TYR:CE2	2.57	0.40
1:J:163:PHE:CE1	1:J:167:GLU:HG2	2.56	0.40
1:F:68:ILE:HD12	1:F:68:ILE:HA	1.98	0.40
1:P:68:ILE:HD12	1:P:68:ILE:HA	1.97	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:D:402:HOH:O	5:N:460:HOH:O[5_554]	2.09	0.11

## 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	167/168 (99%)	166 (99%)	1 (1%)	0	100	100
1	B	166/168 (99%)	165 (99%)	1 (1%)	0	100	100
1	C	168/168 (100%)	167 (99%)	1 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	167/168 (99%)	166 (99%)	1 (1%)	0	100	100
1	E	166/168 (99%)	165 (99%)	1 (1%)	0	100	100
1	F	167/168 (99%)	166 (99%)	1 (1%)	0	100	100
1	G	169/168 (101%)	168 (99%)	1 (1%)	0	100	100
1	H	166/168 (99%)	164 (99%)	2 (1%)	0	100	100
1	I	167/168 (99%)	166 (99%)	1 (1%)	0	100	100
1	J	167/168 (99%)	166 (99%)	1 (1%)	0	100	100
1	K	167/168 (99%)	166 (99%)	1 (1%)	0	100	100
1	L	168/168 (100%)	167 (99%)	1 (1%)	0	100	100
1	M	167/168 (99%)	166 (99%)	1 (1%)	0	100	100
1	N	166/168 (99%)	164 (99%)	2 (1%)	0	100	100
1	O	167/168 (99%)	166 (99%)	1 (1%)	0	100	100
1	P	168/168 (100%)	167 (99%)	1 (1%)	0	100	100
All	All	2673/2688 (99%)	2655 (99%)	18 (1%)	0	100	100

There are no Ramachandran outliers to report.

### 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	140/139 (101%)	138 (99%)	2 (1%)	67	56
1	B	139/139 (100%)	136 (98%)	3 (2%)	52	36
1	C	141/139 (101%)	136 (96%)	5 (4%)	36	19
1	D	140/139 (101%)	136 (97%)	4 (3%)	42	25
1	E	139/139 (100%)	135 (97%)	4 (3%)	42	25
1	F	140/139 (101%)	137 (98%)	3 (2%)	53	38
1	G	142/139 (102%)	140 (99%)	2 (1%)	67	56
1	H	139/139 (100%)	137 (99%)	2 (1%)	67	56

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	I	140/139 (101%)	138 (99%)	2 (1%)	67	56
1	J	140/139 (101%)	138 (99%)	2 (1%)	67	56
1	K	140/139 (101%)	138 (99%)	2 (1%)	67	56
1	L	141/139 (101%)	137 (97%)	4 (3%)	43	27
1	M	140/139 (101%)	138 (99%)	2 (1%)	67	56
1	N	139/139 (100%)	136 (98%)	3 (2%)	52	36
1	O	140/139 (101%)	136 (97%)	4 (3%)	42	25
1	P	141/139 (101%)	136 (96%)	5 (4%)	36	19
All	All	2241/2224 (101%)	2192 (98%)	49 (2%)	52	36

All (49) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	28	TYR
1	A	38	ASP
1	B	28	TYR
1	B	38	ASP
1	B	136	GLU
1	C	18	LYS
1	C	28	TYR
1	C	38	ASP
1	C	88	GLU
1	C	119	GLN
1	D	18	LYS
1	D	28	TYR
1	D	38	ASP
1	D	136	GLU
1	E	18	LYS
1	E	28	TYR
1	E	38	ASP
1	E	167	GLU
1	F	18	LYS
1	F	28	TYR
1	F	38	ASP
1	G	28	TYR
1	G	38	ASP
1	O	28	TYR
1	O	38	ASP
1	O	88	GLU

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Mol	Chain	Res	Type
1	O	136	GLU
1	H	28	TYR
1	H	38	ASP
1	I	28	TYR
1	I	67	ARG
1	J	28	TYR
1	J	38	ASP
1	K	28	TYR
1	K	132	LYS
1	L	18	LYS
1	L	28	TYR
1	L	38	ASP
1	L	88	GLU
1	M	28	TYR
1	M	38	ASP
1	N	18	LYS
1	N	28	TYR
1	N	38	ASP
1	P	28	TYR
1	P	38	ASP
1	P	75[A]	ARG
1	P	75[B]	ARG
1	P	136	GLU

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

Mol	Chain	Res	Type
1	A	46	ASN
1	B	46	ASN
1	B	79	GLN
1	C	46	ASN
1	C	119	GLN
1	D	46	ASN
1	E	46	ASN
1	E	79	GLN
1	F	46	ASN
1	F	79	GLN
1	G	46	ASN
1	O	46	ASN
1	H	46	ASN
1	H	79	GLN
1	I	46	ASN

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Mol	Chain	Res	Type
1	I	79	GLN
1	I	121	ASN
1	J	46	ASN
1	J	119	GLN
1	K	46	ASN
1	L	46	ASN
1	L	142	ASN
1	M	46	ASN
1	M	79	GLN
1	N	46	ASN
1	N	79	GLN
1	P	46	ASN
1	P	79	GLN
1	P	142	ASN

### 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 monosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 55 ligands modelled in this entry, 16 are monoatomic - leaving 39 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
3	SO4	A	204	-	4,4,4	0.42	0	6,6,6	0.08	0
2	GOL	C	201	-	5,5,5	0.09	0	5,5,5	0.29	0
2	GOL	A	203	-	5,5,5	0.15	0	5,5,5	0.39	0
2	GOL	J	202	-	5,5,5	0.12	0	5,5,5	0.26	0
2	GOL	L	201	-	5,5,5	0.06	0	5,5,5	0.28	0
3	SO4	A	206	-	4,4,4	0.38	0	6,6,6	0.06	0
2	GOL	D	202	-	5,5,5	0.13	0	5,5,5	0.18	0
3	SO4	H	201	-	4,4,4	0.44	0	6,6,6	0.06	0
2	GOL	L	202	-	5,5,5	0.12	0	5,5,5	0.31	0
2	GOL	C	202	-	5,5,5	0.11	0	5,5,5	0.22	0
2	GOL	N	201	-	5,5,5	0.09	0	5,5,5	0.41	0
2	GOL	O	201	-	5,5,5	0.19	0	5,5,5	0.50	0
2	GOL	F	202	-	5,5,5	0.08	0	5,5,5	0.28	0
3	SO4	D	203	-	4,4,4	0.41	0	6,6,6	0.07	0
3	SO4	J	203	-	4,4,4	0.43	0	6,6,6	0.06	0
3	SO4	K	202	-	4,4,4	0.42	0	6,6,6	0.08	0
2	GOL	F	201	-	5,5,5	0.11	0	5,5,5	0.34	0
2	GOL	P	202	-	5,5,5	0.16	0	5,5,5	0.50	0
2	GOL	G	201	-	5,5,5	0.12	0	5,5,5	0.36	0
3	SO4	I	201	-	4,4,4	0.41	0	6,6,6	0.08	0
2	GOL	B	201	-	5,5,5	0.05	0	5,5,5	0.37	0
3	SO4	B	203	-	4,4,4	0.43	0	6,6,6	0.07	0
2	GOL	N	202	-	5,5,5	0.13	0	5,5,5	0.36	0
2	GOL	E	201	-	5,5,5	0.09	0	5,5,5	0.33	0
2	GOL	A	202	-	5,5,5	0.10	0	5,5,5	0.30	0
2	GOL	G	202	-	5,5,5	0.10	0	5,5,5	0.31	0
3	SO4	F	203	-	4,4,4	0.40	0	6,6,6	0.06	0
3	SO4	O	202	-	4,4,4	0.43	0	6,6,6	0.07	0
3	SO4	P	203	-	4,4,4	0.44	0	6,6,6	0.11	0
3	SO4	L	203	-	4,4,4	0.43	0	6,6,6	0.08	0
2	GOL	B	202	-	5,5,5	0.12	0	5,5,5	0.34	0
3	SO4	A	205	-	4,4,4	0.37	0	6,6,6	0.06	0
2	GOL	D	201	-	5,5,5	0.09	0	5,5,5	0.29	0
3	SO4	E	202	-	4,4,4	0.44	0	6,6,6	0.11	0
2	GOL	K	201	-	5,5,5	0.08	0	5,5,5	0.23	0
2	GOL	A	201	-	5,5,5	0.07	0	5,5,5	0.25	0
3	SO4	G	203	-	4,4,4	0.44	0	6,6,6	0.09	0
2	GOL	P	201	-	5,5,5	0.08	0	5,5,5	0.34	0
2	GOL	J	201	-	5,5,5	0.04	0	5,5,5	0.28	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns.

'-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GOL	C	201	-	-	2/4/4/4	-
2	GOL	A	203	-	-	2/4/4/4	-
2	GOL	J	202	-	-	3/4/4/4	-
2	GOL	L	201	-	-	2/4/4/4	-
2	GOL	D	202	-	-	4/4/4/4	-
2	GOL	L	202	-	-	2/4/4/4	-
2	GOL	C	202	-	-	2/4/4/4	-
2	GOL	N	201	-	-	2/4/4/4	-
2	GOL	O	201	-	-	4/4/4/4	-
2	GOL	F	202	-	-	4/4/4/4	-
2	GOL	F	201	-	-	2/4/4/4	-
2	GOL	P	202	-	-	2/4/4/4	-
2	GOL	G	201	-	-	0/4/4/4	-
2	GOL	B	201	-	-	4/4/4/4	-
2	GOL	N	202	-	-	0/4/4/4	-
2	GOL	E	201	-	-	2/4/4/4	-
2	GOL	A	202	-	-	4/4/4/4	-
2	GOL	G	202	-	-	4/4/4/4	-
2	GOL	B	202	-	-	4/4/4/4	-
2	GOL	D	201	-	-	4/4/4/4	-
2	GOL	K	201	-	-	2/4/4/4	-
2	GOL	A	201	-	-	2/4/4/4	-
2	GOL	P	201	-	-	2/4/4/4	-
2	GOL	J	201	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (61) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	201	GOL	O1-C1-C2-O2
2	A	201	GOL	O1-C1-C2-C3
2	B	201	GOL	O1-C1-C2-C3
2	B	201	GOL	C1-C2-C3-O3

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Mol	Chain	Res	Type	Atoms
2	B	202	GOL	O1-C1-C2-C3
2	B	202	GOL	C1-C2-C3-O3
2	C	201	GOL	O1-C1-C2-C3
2	C	202	GOL	O1-C1-C2-C3
2	D	201	GOL	O1-C1-C2-C3
2	D	201	GOL	C1-C2-C3-O3
2	D	202	GOL	O1-C1-C2-C3
2	D	202	GOL	C1-C2-C3-O3
2	F	201	GOL	O2-C2-C3-O3
2	F	202	GOL	C1-C2-C3-O3
2	G	202	GOL	O1-C1-C2-C3
2	G	202	GOL	C1-C2-C3-O3
2	O	201	GOL	O1-C1-C2-C3
2	O	201	GOL	C1-C2-C3-O3
2	J	201	GOL	C1-C2-C3-O3
2	J	202	GOL	O1-C1-C2-C3
2	K	201	GOL	O1-C1-C2-O2
2	K	201	GOL	O1-C1-C2-C3
2	L	201	GOL	C1-C2-C3-O3
2	L	201	GOL	O2-C2-C3-O3
2	N	201	GOL	O1-C1-C2-O2
2	N	201	GOL	O1-C1-C2-C3
2	P	201	GOL	O1-C1-C2-O2
2	P	201	GOL	O1-C1-C2-C3
2	P	202	GOL	C1-C2-C3-O3
2	A	203	GOL	O2-C2-C3-O3
2	B	201	GOL	O2-C2-C3-O3
2	B	202	GOL	O2-C2-C3-O3
2	D	201	GOL	O1-C1-C2-O2
2	D	202	GOL	O1-C1-C2-O2
2	F	202	GOL	O1-C1-C2-O2
2	O	201	GOL	O2-C2-C3-O3
2	L	202	GOL	O2-C2-C3-O3
2	P	202	GOL	O2-C2-C3-O3
2	A	202	GOL	O1-C1-C2-C3
2	A	202	GOL	C1-C2-C3-O3
2	A	203	GOL	C1-C2-C3-O3
2	E	201	GOL	O1-C1-C2-C3
2	F	201	GOL	C1-C2-C3-O3
2	F	202	GOL	O1-C1-C2-C3
2	L	202	GOL	C1-C2-C3-O3
2	B	202	GOL	O1-C1-C2-O2

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Mol	Chain	Res	Type	Atoms
2	C	201	GOL	O1-C1-C2-O2
2	C	202	GOL	O1-C1-C2-O2
2	D	201	GOL	O2-C2-C3-O3
2	G	202	GOL	O1-C1-C2-O2
2	G	202	GOL	O2-C2-C3-O3
2	J	201	GOL	O2-C2-C3-O3
2	J	202	GOL	O1-C1-C2-O2
2	F	202	GOL	O2-C2-C3-O3
2	O	201	GOL	O1-C1-C2-O2
2	D	202	GOL	O2-C2-C3-O3
2	A	202	GOL	O2-C2-C3-O3
2	B	201	GOL	O1-C1-C2-O2
2	E	201	GOL	O1-C1-C2-O2
2	A	202	GOL	O1-C1-C2-O2
2	J	202	GOL	C1-C2-C3-O3

There are no ring outliers.

9 monomers are involved in 20 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	202	GOL	8	0
2	L	202	GOL	2	0
2	C	202	GOL	3	0
2	B	201	GOL	2	0
2	D	201	GOL	1	0
2	K	201	GOL	1	0
2	A	201	GOL	1	0
2	P	201	GOL	1	0
2	J	201	GOL	1	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

### 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<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	168/168 (100%)	-0.17	1 (0%) 89 89	19, 22, 32, 54	0
1	B	168/168 (100%)	-0.16	1 (0%) 89 89	21, 25, 37, 64	0
1	C	168/168 (100%)	-0.12	2 (1%) 79 79	21, 25, 36, 58	0
1	D	168/168 (100%)	-0.10	3 (1%) 68 68	19, 23, 33, 63	0
1	E	168/168 (100%)	-0.12	2 (1%) 79 79	20, 23, 34, 61	0
1	F	168/168 (100%)	-0.07	1 (0%) 89 89	21, 26, 36, 59	0
1	G	168/168 (100%)	-0.14	3 (1%) 68 68	19, 23, 33, 62	0
1	H	168/168 (100%)	0.01	2 (1%) 79 79	25, 31, 42, 65	0
1	I	168/168 (100%)	0.10	3 (1%) 68 68	28, 33, 44, 68	0
1	J	168/168 (100%)	-0.05	1 (0%) 89 89	22, 27, 38, 57	0
1	K	168/168 (100%)	-0.15	1 (0%) 89 89	20, 24, 34, 56	0
1	L	168/168 (100%)	-0.16	1 (0%) 89 89	19, 22, 33, 60	0
1	M	168/168 (100%)	-0.20	1 (0%) 89 89	20, 23, 36, 62	0
1	N	168/168 (100%)	-0.08	1 (0%) 89 89	18, 23, 33, 56	0
1	O	168/168 (100%)	-0.10	2 (1%) 79 79	21, 24, 34, 60	0
1	P	168/168 (100%)	-0.19	1 (0%) 89 89	19, 23, 34, 62	0
All	All	2688/2688 (100%)	-0.11	26 (0%) 82 82	18, 24, 37, 68	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	O	169	SER	8.7
1	G	169	SER	8.5
1	L	169	SER	8.2
1	M	169	SER	8.1
1	P	169	SER	7.5

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Mol	Chain	Res	Type	RSRZ
1	F	169	SER	7.3
1	H	169	SER	7.0
1	D	169	SER	6.9
1	K	169	SER	6.5
1	I	169	SER	6.3
1	B	169	SER	5.9
1	C	169	SER	5.8
1	N	169	SER	5.7
1	E	169	SER	5.1
1	A	169	SER	4.9
1	J	169	SER	4.9
1	I	119	GLN	3.0
1	C	119	GLN	2.6
1	G	119	GLN	2.2
1	D	119	GLN	2.2
1	D	168	PHE	2.2
1	I	168	PHE	2.2
1	O	87	ASP	2.2
1	E	119	GLN	2.1
1	H	112	LYS	2.1
1	G	9[A]	HIS	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 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
2	GOL	O	201	6/6	0.45	0.25	52,56,56,57	0
2	GOL	K	201	6/6	0.58	0.29	46,58,62,68	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	GOL	L	202	6/6	0.70	0.19	49,52,54,55	0
2	GOL	N	202	6/6	0.70	0.25	36,46,50,58	0
2	GOL	G	201	6/6	0.73	0.22	49,51,53,53	0
2	GOL	P	202	6/6	0.74	0.22	40,44,47,48	0
2	GOL	D	201	6/6	0.75	0.18	46,49,51,52	0
2	GOL	J	202	6/6	0.76	0.20	34,41,43,43	0
2	GOL	B	202	6/6	0.78	0.21	47,53,54,54	0
2	GOL	G	202	6/6	0.78	0.18	36,44,47,48	0
3	SO4	A	206	5/5	0.78	0.32	94,95,98,100	0
2	GOL	E	201	6/6	0.79	0.25	38,48,54,58	0
2	GOL	J	201	6/6	0.80	0.27	36,46,49,58	0
2	GOL	N	201	6/6	0.82	0.17	42,44,46,47	0
3	SO4	A	205	5/5	0.83	0.36	95,95,98,98	0
2	GOL	D	202	6/6	0.84	0.18	38,43,47,49	0
2	GOL	F	201	6/6	0.84	0.21	39,52,56,56	0
2	GOL	A	202	6/6	0.85	0.29	51,62,63,66	0
2	GOL	C	202	6/6	0.85	0.18	34,42,43,43	0
2	GOL	F	202	6/6	0.86	0.24	47,59,63,67	0
2	GOL	L	201	6/6	0.87	0.32	35,45,47,50	0
2	GOL	A	203	6/6	0.89	0.18	31,46,50,56	0
2	GOL	C	201	6/6	0.90	0.13	51,54,56,60	0
2	GOL	B	201	6/6	0.90	0.31	43,46,50,52	0
2	GOL	P	201	6/6	0.91	0.26	38,46,47,56	0
2	GOL	A	201	6/6	0.91	0.30	34,42,44,48	0
3	SO4	I	201	5/5	0.92	0.13	63,65,65,67	0
3	SO4	F	203	5/5	0.94	0.18	63,66,66,66	0
3	SO4	H	201	5/5	0.95	0.16	61,62,64,68	0
3	SO4	B	203	5/5	0.95	0.14	57,58,63,64	0
3	SO4	O	202	5/5	0.96	0.15	51,60,61,61	0
3	SO4	A	204	5/5	0.96	0.08	53,55,57,59	0
3	SO4	G	203	5/5	0.96	0.19	49,51,53,56	0
3	SO4	J	203	5/5	0.96	0.14	57,59,60,63	0
3	SO4	P	203	5/5	0.96	0.12	54,57,58,59	0
3	SO4	E	202	5/5	0.97	0.15	51,52,55,57	0
3	SO4	D	203	5/5	0.97	0.17	53,54,56,57	0
4	FE	L	204	1/1	0.97	0.10	22,22,22,22	1
3	SO4	K	202	5/5	0.98	0.17	53,57,59,60	0
4	FE	G	204	1/1	0.98	0.09	21,21,21,21	1
4	FE	H	202	1/1	0.98	0.05	30,30,30,30	1
4	FE	I	202	1/1	0.98	0.06	32,32,32,32	1
3	SO4	L	203	5/5	0.98	0.16	52,52,54,56	0
4	FE	F	204	1/1	0.99	0.07	24,24,24,24	1

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	FE	A	207	1/1	0.99	0.10	19,19,19,19	1
4	FE	O	203	1/1	0.99	0.07	22,22,22,22	1
4	FE	B	204	1/1	0.99	0.06	22,22,22,22	1
4	FE	C	203	1/1	0.99	0.07	23,23,23,23	1
4	FE	J	204	1/1	0.99	0.08	25,25,25,25	1
4	FE	K	203	1/1	0.99	0.08	23,23,23,23	1
4	FE	D	204	1/1	0.99	0.08	23,23,23,23	1
4	FE	M	201	1/1	0.99	0.08	23,23,23,23	1
4	FE	N	203	1/1	0.99	0.09	21,21,21,21	1
4	FE	P	204	1/1	0.99	0.07	21,21,21,21	1
4	FE	E	203	1/1	1.00	0.05	21,21,21,21	1

## 6.5 Other polymers [\(i\)](#)

There are no such residues in this entry.