



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jan 31, 2016 – 08:24 PM GMT

PDB ID : 1K1E  
Title : Structure Of the cobalt-bound form of the deoxy-D-mannose-octulosonate 8-phosphate phosphatase (YrbI) From Haemophilus Influenzae (HI1679)  
Authors : Lim, K.; Herzberg, O.; Structure 2 Function Project (S2F)  
Deposited on : 2001-09-25  
Resolution : 1.67 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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  
<http://wwpdb.org/validation/2016/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 : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

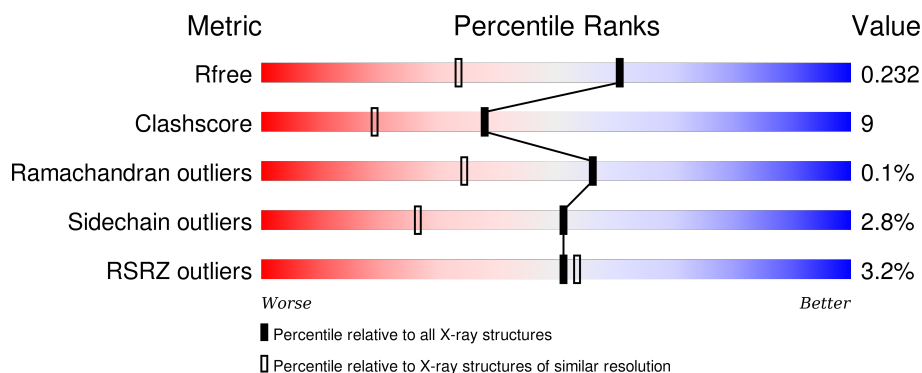
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.67 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))
$R_{free}$	91344	4802 (1.70-1.66)
Clashscore	102246	5317 (1.70-1.66)
Ramachandran outliers	100387	5225 (1.70-1.66)
Sidechain outliers	100360	5224 (1.70-1.66)
RSRZ outliers	91569	4813 (1.70-1.66)

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	180	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 0%, red 1%, green 1%, green 79%, yellow 79%, yellow 96%, orange 96%, orange 97%, grey 97%, grey 100%);"></div> <div style="display: flex; justify-content: space-between; width: 90%; margin: 0 auto;"> <span>79%</span> <span>17%</span> </div> </div>
1	B	180	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 0%, red 6%, green 6%, green 82%, yellow 82%, yellow 96%, orange 96%, orange 97%, grey 97%, grey 100%);"></div> <div style="display: flex; justify-content: space-between; width: 90%; margin: 0 auto;"> <span>82%</span> <span>14%</span> </div> </div>
1	C	180	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 0%, red 3%, green 3%, green 80%, yellow 80%, yellow 96%, orange 96%, orange 97%, grey 97%, grey 100%);"></div> <div style="display: flex; justify-content: space-between; width: 90%; margin: 0 auto;"> <span>80%</span> <span>16%</span> </div> </div>
1	D	180	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 0%, red 3%, green 3%, green 82%, yellow 82%, yellow 93%, orange 93%, orange 97%, grey 97%, grey 100%);"></div> <div style="display: flex; justify-content: space-between; width: 90%; margin: 0 auto;"> <span>82%</span> <span>11%</span> <span>6%</span> </div> </div>
1	E	180	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 0%, red 4%, green 4%, green 80%, yellow 80%, yellow 98%, orange 98%, orange 99%, grey 99%, grey 100%);"></div> <div style="display: flex; justify-content: space-between; width: 90%; margin: 0 auto;"> <span>80%</span> <span>18%</span> </div> </div>

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Mol	Chain	Length	Quality of chain
1	F	180	
1	G	180	
1	H	180	
1	I	180	
1	J	180	
1	K	180	
1	L	180	

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	SO4	B	2402	-	-	X	-
5	MES	C	2601	-	-	-	X
5	MES	H	2602	-	-	-	X
5	MES	J	2603	-	-	-	X
6	GOL	G	2504	-	-	-	X

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 17393 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 deoxy-D-mannose-octulosonate 8-phosphate phosphatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	177	Total	C	N	O	S	7	0	0
			1336	844	227	257	8			
1	B	177	Total	C	N	O	S	12	0	0
			1336	844	227	257	8			
1	C	174	Total	C	N	O	S	5	0	0
			1317	833	224	253	7			
1	D	170	Total	C	N	O	S	6	0	0
			1283	812	217	247	7			
1	E	177	Total	C	N	O	S	10	0	0
			1336	844	227	257	8			
1	F	177	Total	C	N	O	S	7	0	0
			1336	844	227	257	8			
1	G	170	Total	C	N	O	S	6	0	0
			1286	815	218	246	7			
1	H	171	Total	C	N	O	S	6	0	0
			1295	820	220	248	7			
1	I	177	Total	C	N	O	S	12	0	0
			1336	844	227	257	8			
1	J	177	Total	C	N	O	S	0	0	0
			1336	844	227	257	8			
1	K	173	Total	C	N	O	S	15	0	0
			1310	828	223	252	7			
1	L	170	Total	C	N	O	S	9	0	0
			1286	815	218	246	7			

- Molecule 2 is COBALT (II) ION (three-letter code: CO) (formula: Co).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	G	1	Total	Co	0	0
			1	1		
2	J	1	Total	Co	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	D	1	Total 1	Co 1	0	0
2	K	1	Total 1	Co 1	0	0
2	E	1	Total 1	Co 1	0	0
2	H	1	Total 1	Co 1	0	0
2	B	1	Total 1	Co 1	0	0
2	I	1	Total 1	Co 1	0	0
2	C	1	Total 1	Co 1	0	0
2	A	1	Total 1	Co 1	0	0
2	L	1	Total 1	Co 1	0	0
2	F	1	Total 1	Co 1	0	0

- Molecule 3 is MERCURY (II) ION (three-letter code: HG) (formula: Hg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	G	1	Total 1	Hg 1	0	0
3	J	1	Total 1	Hg 1	0	0
3	D	1	Total 1	Hg 1	0	0
3	K	1	Total 1	Hg 1	0	0
3	E	1	Total 1	Hg 1	0	0
3	H	1	Total 1	Hg 1	0	0
3	B	1	Total 1	Hg 1	0	0
3	I	1	Total 1	Hg 1	0	0
3	C	1	Total 1	Hg 1	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Hg	0	0
			1	1		
3	L	1	Total	Hg	0	0
			1	1		
3	F	1	Total	Hg	0	0
			1	1		

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



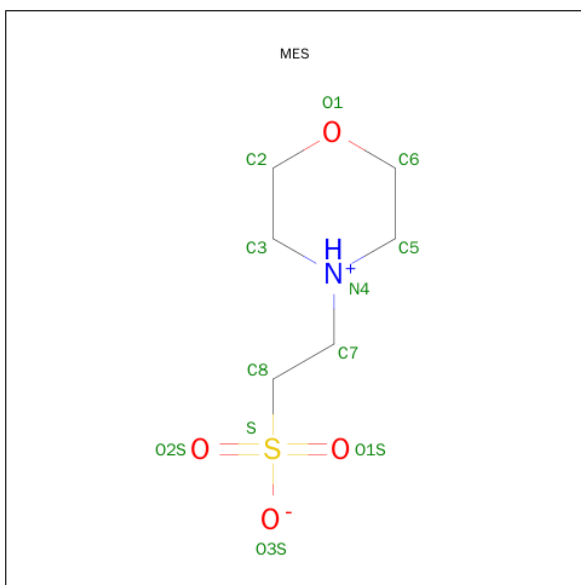
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	C	1	Total	O	S	0	0
			5	4	1		
4	D	1	Total	O	S	0	0
			5	4	1		
4	E	1	Total	O	S	0	0
			5	4	1		
4	F	1	Total	O	S	0	0
			5	4	1		
4	G	1	Total	O	S	0	0
			5	4	1		
4	H	1	Total	O	S	0	0
			5	4	1		

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

- Molecule 5 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C<sub>6</sub>H<sub>13</sub>NO<sub>4</sub>S).



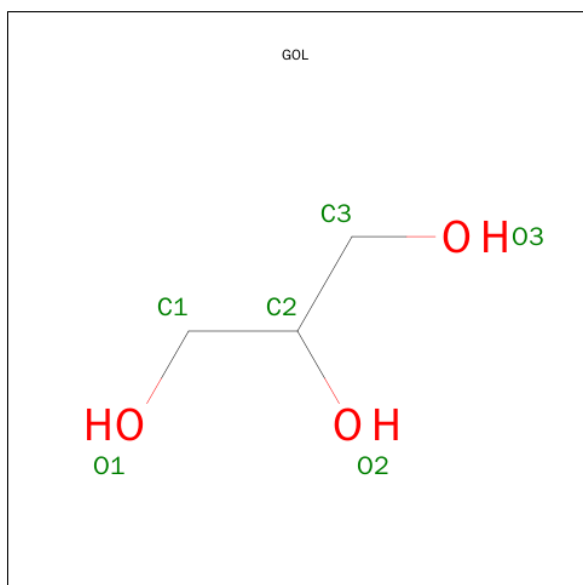
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	C	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	H	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
5	J	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	I	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		
6	C	1	Total	C	O	0	0
			6	3	3		
6	G	1	Total	C	O	0	0
			6	3	3		
6	K	1	Total	C	O	0	0
			6	3	3		
6	K	1	Total	C	O	0	0
			6	3	3		

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	137	Total	O	0	0
			137	137		

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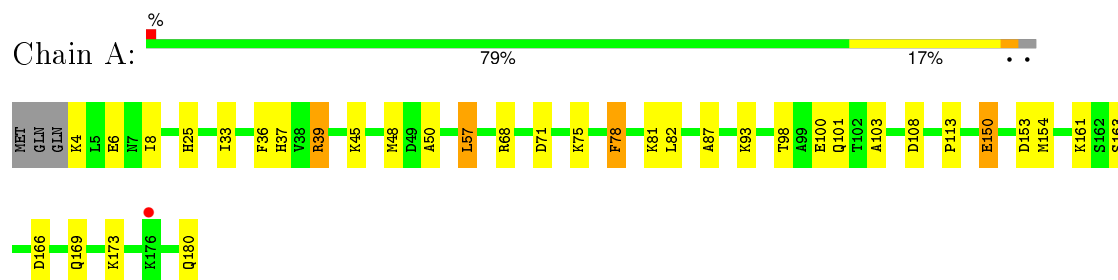
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	B	133	Total 133	O 133	0	0
7	C	133	Total 133	O 133	0	0
7	D	133	Total 133	O 133	0	0
7	E	125	Total 125	O 125	0	0
7	F	113	Total 113	O 113	0	0
7	G	124	Total 124	O 124	0	0
7	H	102	Total 102	O 102	0	0
7	I	108	Total 108	O 108	0	0
7	J	93	Total 93	O 93	0	0
7	K	115	Total 115	O 115	0	0
7	L	98	Total 98	O 98	0	0

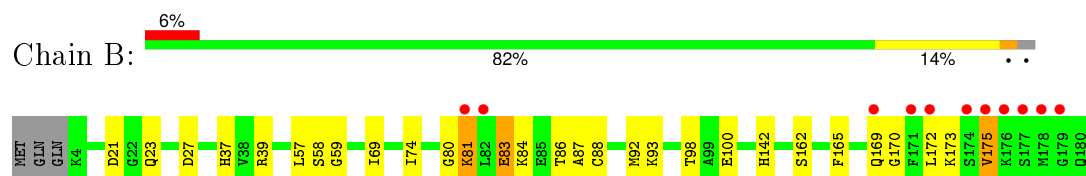
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

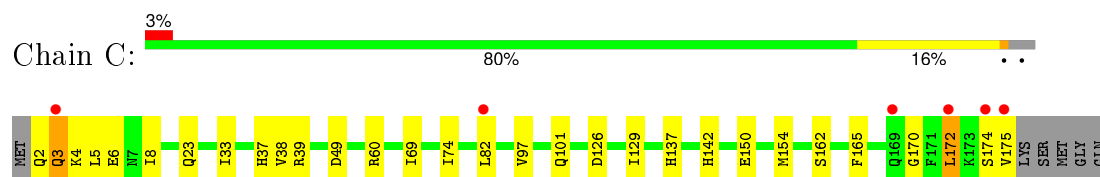
- Molecule 1: deoxy-D-mannose-octulosonate 8-phosphate phosphatase



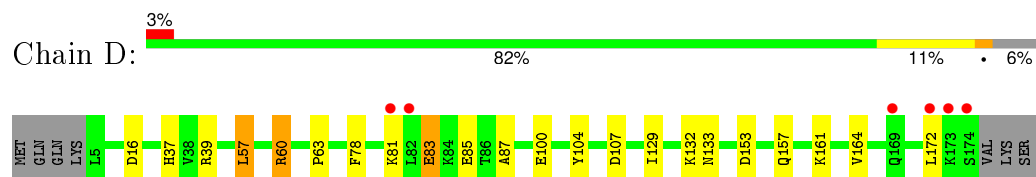
- Molecule 1: deoxy-D-mannose-octulosonate 8-phosphate phosphatase



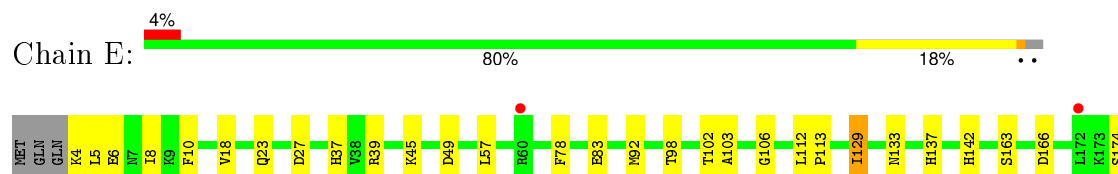
- Molecule 1: deoxy-D-mannose-octulosonate 8-phosphate phosphatase



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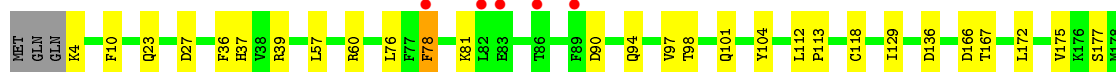
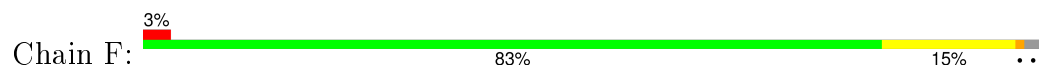


- Molecule 1: deoxy-D-mannose-octulosonate 8-phosphate phosphatase

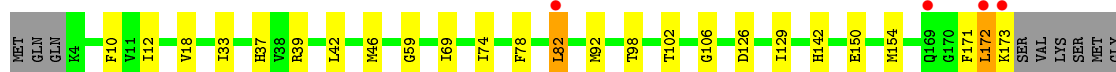
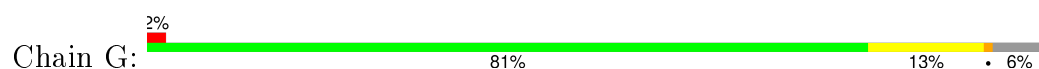




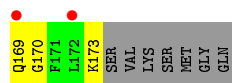
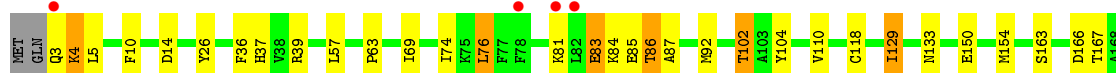
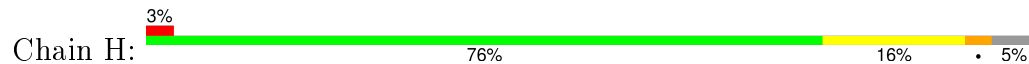
- Molecule 1: deoxy-D-mannose-octulosonate 8-phosphate phosphatase



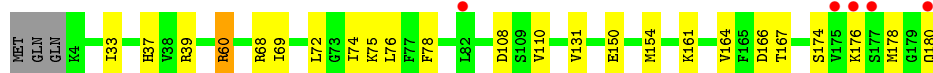
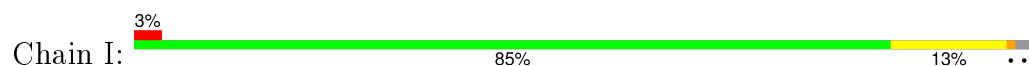
- Molecule 1: deoxy-D-mannose-octulosonate 8-phosphate phosphatase



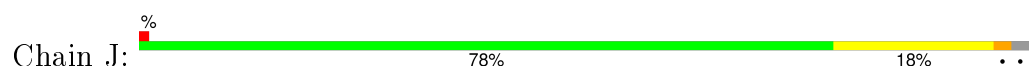
- Molecule 1: deoxy-D-mannose-octulosonate 8-phosphate phosphatase

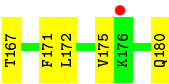


- Molecule 1: deoxy-D-mannose-octulosonate 8-phosphate phosphatase

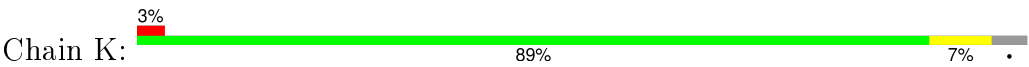


- Molecule 1: deoxy-D-mannose-octulosonate 8-phosphate phosphatase

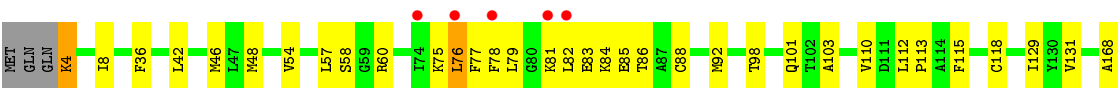
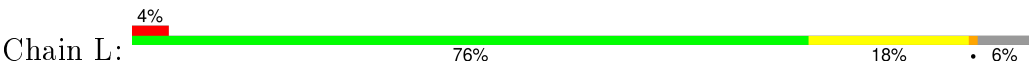




● Molecule 1: deoxy-D-mannose-octulosonate 8-phosphate phosphatase



● Molecule 1: deoxy-D-mannose-octulosonate 8-phosphate phosphatase



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	109.30Å 109.10Å 179.10Å 90.00° 107.60° 90.00°	Depositor
Resolution (Å)	20.00 – 1.67 45.97 – 1.60	Depositor EDS
% Data completeness (in resolution range)	82.5 (20.00-1.67) 77.2 (45.97-1.60)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.68 (at 1.60Å)	Xtriage
Refinement program	CNS	Depositor
R, $R_{free}$	0.178 , 0.225 0.188 , 0.232	Depositor DCC
$R_{free}$ test set	11776 reflections (6.00%)	DCC
Wilson B-factor (Å <sup>2</sup> )	16.7	Xtriage
Anisotropy	0.108	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 33.3	EDS
Estimated twinning fraction	0.155 for k,h,-1/2*h-1/2*k-l 0.155 for -k,-h,-1/2*h+1/2*k-l 0.105 for h,-k,-h-l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.42$ , $\langle L^2 \rangle = 0.24$	Xtriage
Outliers	0 of 204959 reflections	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	17393	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.34% 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, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, CO, SO4, MES, HG

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	0.90	1/1355 (0.1%)	0.97	3/1821 (0.2%)
1	B	0.94	0/1355	0.96	2/1821 (0.1%)
1	C	0.97	0/1336	0.99	1/1799 (0.1%)
1	D	0.96	1/1302 (0.1%)	1.03	2/1754 (0.1%)
1	E	0.90	0/1355	0.94	2/1821 (0.1%)
1	F	0.91	0/1355	0.90	1/1821 (0.1%)
1	G	0.99	0/1305	0.98	1/1757 (0.1%)
1	H	0.86	0/1314	0.95	1/1769 (0.1%)
1	I	0.91	0/1355	0.92	0/1821
1	J	0.92	2/1355 (0.1%)	0.94	1/1821 (0.1%)
1	K	0.89	0/1329	0.94	0/1789
1	L	0.91	1/1305 (0.1%)	1.02	2/1757 (0.1%)
All	All	0.92	5/16021 (0.0%)	0.96	16/21551 (0.1%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	J	100	GLU	CG-CD	6.10	1.61	1.51
1	A	150	GLU	CD-OE1	-5.94	1.19	1.25
1	L	118	CYS	CB-SG	-5.69	1.72	1.81
1	D	104	TYR	CD2-CE2	5.43	1.47	1.39
1	J	100	GLU	CB-CG	5.24	1.62	1.52

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	L	60	ARG	NE-CZ-NH1	11.11	125.86	120.30
1	L	60	ARG	NE-CZ-NH2	-9.32	115.64	120.30
1	B	27	ASP	CB-CG-OD1	-6.10	112.81	118.30
1	E	27	ASP	CB-CG-OD2	6.04	123.73	118.30
1	E	27	ASP	CB-CG-OD1	-5.87	113.01	118.30

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	1336	0	1340	33	0
1	B	1336	0	1340	31	0
1	C	1317	0	1318	36	0
1	D	1283	0	1280	23	0
1	E	1336	0	1340	30	0
1	F	1336	0	1340	21	0
1	G	1286	0	1288	21	0
1	H	1295	0	1297	37	0
1	I	1336	0	1340	27	0
1	J	1336	0	1340	33	0
1	K	1310	0	1309	8	0
1	L	1286	0	1288	27	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
2	G	1	0	0	0	0
2	H	1	0	0	0	0
2	I	1	0	0	0	0
2	J	1	0	0	0	0
2	K	1	0	0	0	0
2	L	1	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	G	1	0	0	0	0
3	H	1	0	0	0	0
3	I	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	J	1	0	0	0	0
3	K	1	0	0	0	0
3	L	1	0	0	0	0
4	A	10	0	0	0	0
4	B	10	0	0	2	0
4	C	5	0	0	0	0
4	D	5	0	0	0	0
4	E	10	0	0	0	0
4	F	10	0	0	0	0
4	G	5	0	0	0	0
4	H	5	0	0	0	0
4	I	10	0	0	0	0
4	J	10	0	0	1	0
4	K	5	0	0	0	0
4	L	5	0	0	1	0
5	C	12	0	12	3	0
5	H	12	0	13	0	0
5	J	12	0	12	0	0
6	A	6	0	8	1	0
6	C	6	0	8	0	0
6	G	6	0	8	0	0
6	I	6	0	8	0	0
6	K	12	0	16	0	0
7	A	137	0	0	5	0
7	B	133	0	0	2	0
7	C	133	0	0	5	0
7	D	133	0	0	4	0
7	E	125	0	0	8	0
7	F	113	0	0	2	0
7	G	124	0	0	3	0
7	H	102	0	0	8	0
7	I	108	0	0	2	0
7	J	93	0	0	4	0
7	K	115	0	0	0	0
7	L	98	0	0	4	0
All	All	17393	0	15905	290	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 9.

The worst 5 of 290 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.



Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:169:GLN:HG2	1:B:173:LYS:NZ	1.65	1.09
1:L:83:GLU:OE1	1:L:86:THR:HG23	1.59	1.01
1:J:82:LEU:HD23	7:J:2652:HOH:O	1.61	1.01
1:L:76:LEU:N	1:L:76:LEU:HD12	1.79	0.98
1:I:60:ARG:NH1	1:I:60:ARG:HG2	1.82	0.93

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	175/180 (97%)	173 (99%)	2 (1%)	0	100	100
1	B	175/180 (97%)	171 (98%)	3 (2%)	1 (1%)	30	11
1	C	172/180 (96%)	167 (97%)	4 (2%)	1 (1%)	30	11
1	D	168/180 (93%)	163 (97%)	5 (3%)	0	100	100
1	E	175/180 (97%)	170 (97%)	5 (3%)	0	100	100
1	F	175/180 (97%)	169 (97%)	6 (3%)	0	100	100
1	G	168/180 (93%)	162 (96%)	5 (3%)	1 (1%)	30	11
1	H	169/180 (94%)	164 (97%)	5 (3%)	0	100	100
1	I	175/180 (97%)	171 (98%)	4 (2%)	0	100	100
1	J	175/180 (97%)	170 (97%)	5 (3%)	0	100	100
1	K	171/180 (95%)	167 (98%)	4 (2%)	0	100	100
1	L	168/180 (93%)	161 (96%)	7 (4%)	0	100	100
All	All	2066/2160 (96%)	2008 (97%)	55 (3%)	3 (0%)	56	34

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	172	LEU
1	G	172	LEU
1	B	175	VAL

### 5.3.2 Protein sidechains ⓘ

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	141/144 (98%)	138 (98%)	3 (2%)	61	39
1	B	141/144 (98%)	138 (98%)	3 (2%)	61	39
1	C	139/144 (96%)	136 (98%)	3 (2%)	60	37
1	D	135/144 (94%)	131 (97%)	4 (3%)	48	24
1	E	141/144 (98%)	134 (95%)	7 (5%)	30	9
1	F	141/144 (98%)	137 (97%)	4 (3%)	51	26
1	G	135/144 (94%)	133 (98%)	2 (2%)	72	54
1	H	136/144 (94%)	130 (96%)	6 (4%)	35	12
1	I	141/144 (98%)	138 (98%)	3 (2%)	61	39
1	J	141/144 (98%)	137 (97%)	4 (3%)	51	26
1	K	138/144 (96%)	134 (97%)	4 (3%)	50	25
1	L	135/144 (94%)	131 (97%)	4 (3%)	48	24
All	All	1664/1728 (96%)	1617 (97%)	47 (3%)	51	26

5 of 47 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	57	LEU
1	H	4	LYS
1	L	4	LYS
1	F	177	SER
1	H	76	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 28 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	169	GLN
1	E	133	ASN
1	K	37	HIS
1	E	37	HIS
1	E	94	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 51 ligands modelled in this entry, 24 are monoatomic - leaving 27 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
4	SO4	A	2401	-	4,4,4	0.48	0	6,6,6	0.47	0
4	SO4	A	2414	-	4,4,4	0.76	0	6,6,6	0.36	0
6	GOL	A	2502	-	5,5,5	0.51	0	5,5,5	0.43	0
4	SO4	B	2402	-	4,4,4	0.40	0	6,6,6	0.49	0
4	SO4	B	2413	-	4,4,4	0.72	0	6,6,6	0.43	0
4	SO4	C	2403	-	4,4,4	0.50	0	6,6,6	0.90	1 (16%)
6	GOL	C	2503	-	5,5,5	0.55	0	5,5,5	0.42	0
5	MES	C	2601	-	11,12,12	0.83	0	14,16,16	2.98	5 (35%)
4	SO4	D	2404	-	4,4,4	0.36	0	6,6,6	0.39	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	SO4	E	2405	-	4,4,4	0.42	0	6,6,6	0.62	0
4	SO4	E	2418	-	4,4,4	1.06	0	6,6,6	0.35	0
4	SO4	F	2406	-	4,4,4	0.32	0	6,6,6	0.29	0
4	SO4	F	2415	-	4,4,4	0.74	0	6,6,6	0.25	0
4	SO4	G	2407	-	4,4,4	0.76	0	6,6,6	1.04	1 (16%)
6	GOL	G	2504	-	5,5,5	0.81	0	5,5,5	0.60	0
4	SO4	H	2408	-	4,4,4	0.37	0	6,6,6	0.33	0
5	MES	H	2602	-	11,12,12	1.41	2 (18%)	14,16,16	3.24	4 (28%)
4	SO4	I	2409	-	4,4,4	0.42	0	6,6,6	0.71	0
4	SO4	I	2416	-	4,4,4	0.94	0	6,6,6	0.35	0
6	GOL	I	2501	-	5,5,5	0.41	0	5,5,5	0.53	0
4	SO4	J	2410	-	4,4,4	0.49	0	6,6,6	0.39	0
4	SO4	J	2417	-	4,4,4	0.80	0	6,6,6	0.64	0
5	MES	J	2603	-	11,12,12	0.94	0	14,16,16	3.45	8 (57%)
4	SO4	K	2411	-	4,4,4	0.70	0	6,6,6	0.34	0
6	GOL	K	2505	-	5,5,5	0.58	0	5,5,5	0.54	0
6	GOL	K	2506	-	5,5,5	0.64	0	5,5,5	0.66	0
4	SO4	L	2412	-	4,4,4	0.18	0	6,6,6	0.36	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
4	SO4	A	2401	-	-	0/0/0/0	0/0/0/0
4	SO4	A	2414	-	-	0/0/0/0	0/0/0/0
6	GOL	A	2502	-	-	0/4/4/4	0/0/0/0
4	SO4	B	2402	-	-	0/0/0/0	0/0/0/0
4	SO4	B	2413	-	-	0/0/0/0	0/0/0/0
4	SO4	C	2403	-	-	0/0/0/0	0/0/0/0
6	GOL	C	2503	-	-	0/4/4/4	0/0/0/0
5	MES	C	2601	-	-	0/6/14/14	0/1/1/1
4	SO4	D	2404	-	-	0/0/0/0	0/0/0/0
4	SO4	E	2405	-	-	0/0/0/0	0/0/0/0
4	SO4	E	2418	-	-	0/0/0/0	0/0/0/0
4	SO4	F	2406	-	-	0/0/0/0	0/0/0/0
4	SO4	F	2415	-	-	0/0/0/0	0/0/0/0
4	SO4	G	2407	-	-	0/0/0/0	0/0/0/0
6	GOL	G	2504	-	-	0/4/4/4	0/0/0/0
4	SO4	H	2408	-	-	0/0/0/0	0/0/0/0
5	MES	H	2602	-	-	0/6/14/14	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	SO4	I	2409	-	-	0/0/0/0	0/0/0/0
4	SO4	I	2416	-	-	0/0/0/0	0/0/0/0
6	GOL	I	2501	-	-	0/4/4/4	0/0/0/0
4	SO4	J	2410	-	-	0/0/0/0	0/0/0/0
4	SO4	J	2417	-	-	0/0/0/0	0/0/0/0
5	MES	J	2603	-	-	0/6/14/14	0/1/1/1
4	SO4	K	2411	-	-	0/0/0/0	0/0/0/0
6	GOL	K	2505	-	-	0/4/4/4	0/0/0/0
6	GOL	K	2506	-	-	0/4/4/4	0/0/0/0
4	SO4	L	2412	-	-	0/0/0/0	0/0/0/0

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	H	2602	MES	O2S-S	-2.39	1.37	1.45
5	H	2602	MES	C3-C2	2.24	1.59	1.50

The worst 5 of 19 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	H	2602	MES	O3S-S-O2S	-3.22	104.12	111.61
5	C	2601	MES	O1-C2-C3	-3.07	104.81	111.84
5	J	2603	MES	C2-C3-N4	-2.58	106.22	110.12
5	J	2603	MES	C7-N4-C5	-2.53	104.78	111.27
5	C	2601	MES	O1-C6-C5	-2.17	106.85	111.84

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

5 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	2502	GOL	1	0
4	B	2402	SO4	2	0
5	C	2601	MES	3	0
4	J	2410	SO4	1	0
4	L	2412	SO4	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	177/180 (98%)	-0.16	1 (0%) 90 92	10, 17, 31, 35	2 (1%)
1	B	177/180 (98%)	0.06	11 (6%) 24 24	12, 17, 34, 38	4 (2%)
1	C	174/180 (96%)	-0.04	6 (3%) 49 51	10, 16, 32, 41	2 (1%)
1	D	170/180 (94%)	-0.10	6 (3%) 48 50	11, 17, 32, 41	2 (1%)
1	E	177/180 (98%)	0.01	7 (3%) 42 44	10, 18, 31, 37	3 (1%)
1	F	177/180 (98%)	-0.05	6 (3%) 49 51	12, 19, 32, 38	2 (1%)
1	G	170/180 (94%)	-0.05	4 (2%) 62 65	11, 18, 32, 38	2 (1%)
1	H	171/180 (95%)	0.06	6 (3%) 48 50	13, 21, 34, 39	2 (1%)
1	I	177/180 (98%)	-0.26	5 (2%) 56 59	12, 19, 32, 38	4 (2%)
1	J	177/180 (98%)	-0.08	2 (1%) 82 85	13, 21, 33, 38	0
1	K	173/180 (96%)	-0.19	6 (3%) 48 50	13, 18, 33, 41	4 (2%)
1	L	170/180 (94%)	-0.01	7 (4%) 41 42	13, 21, 34, 39	3 (1%)
All	All	2090/2160 (96%)	-0.07	67 (3%) 51 53	10, 18, 33, 41	30 (1%)

The worst 5 of 67 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	L	82	LEU	9.0
1	H	82	LEU	8.6
1	C	175	VAL	7.7
1	E	175	VAL	7.6
1	B	172	LEU	7.3

### 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 6.4 Ligands ⓘ

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
5	MES	J	2603	12/12	0.90	0.17	5.93	27,33,40,40	0
5	MES	H	2602	12/12	0.92	0.16	4.91	29,31,42,43	0
5	MES	C	2601	12/12	0.92	0.13	2.49	26,34,42,43	0
6	GOL	G	2504	6/6	0.84	0.13	2.35	19,25,26,31	0
6	GOL	I	2501	6/6	0.88	0.12	1.98	17,22,28,30	0
6	GOL	C	2503	6/6	0.90	0.11	0.64	14,19,23,29	0
6	GOL	A	2502	6/6	0.94	0.10	0.51	18,25,30,36	0
6	GOL	K	2506	6/6	0.93	0.10	0.46	19,27,28,32	0
4	SO4	K	2411	5/5	0.99	0.07	-0.16	17,20,21,23	0
4	SO4	G	2407	5/5	0.97	0.10	-0.19	16,20,28,29	0
6	GOL	K	2505	6/6	0.95	0.08	-0.19	20,22,28,31	0
4	SO4	B	2402	5/5	0.98	0.10	-0.20	26,34,36,38	0
4	SO4	C	2403	5/5	0.98	0.09	-0.20	12,16,18,21	0
4	SO4	A	2401	5/5	0.98	0.09	-0.36	21,22,25,32	0
4	SO4	L	2412	5/5	0.98	0.08	-0.44	26,29,34,39	0
4	SO4	J	2410	5/5	0.98	0.09	-0.47	19,26,30,32	0
4	SO4	H	2408	5/5	0.98	0.09	-0.47	22,27,33,39	0
4	SO4	I	2409	5/5	0.98	0.07	-0.55	18,20,23,23	0
4	SO4	F	2406	5/5	0.98	0.08	-0.58	20,21,31,34	0
4	SO4	D	2404	5/5	0.98	0.08	-0.70	17,20,28,37	0
4	SO4	E	2405	5/5	0.98	0.07	-0.84	16,16,22,23	0
3	HG	E	305	1/1	0.97	0.04	-2.21	18,18,18,18	0
2	CO	G	207	1/1	0.99	0.05	-2.61	12,12,12,12	0
2	CO	E	205	1/1	0.99	0.04	-2.78	8,8,8,8	0
3	HG	G	307	1/1	0.98	0.05	-2.81	19,19,19,19	0
2	CO	F	206	1/1	0.98	0.05	-3.10	12,12,12,12	0
2	CO	A	201	1/1	0.99	0.04	-3.46	12,12,12,12	0
2	CO	B	202	1/1	0.99	0.05	-3.59	12,12,12,12	0
2	CO	H	208	1/1	0.99	0.04	-3.60	12,12,12,12	0
2	CO	J	210	1/1	1.00	0.02	-3.72	12,12,12,12	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
3	HG	D	304	1/1	0.99	0.02	-4.02	19,19,19,19	0
2	CO	I	209	1/1	1.00	0.01	-4.21	12,12,12,12	0
2	CO	C	203	1/1	0.99	0.04	-4.23	9,9,9,9	0
3	HG	J	310	1/1	0.99	0.02	-4.52	24,24,24,24	0
3	HG	H	308	1/1	0.98	0.04	-4.84	25,25,25,25	0
3	HG	K	311	1/1	1.00	0.02	-5.09	22,22,22,22	0
3	HG	C	303	1/1	0.98	0.04	-5.30	17,17,17,17	0
3	HG	B	302	1/1	1.00	0.02	-5.83	18,18,18,18	0
2	CO	D	204	1/1	0.99	0.03	-5.84	10,10,10,10	0
2	CO	K	211	1/1	1.00	0.04	-5.99	13,13,13,13	0
3	HG	I	309	1/1	1.00	0.02	-7.13	19,19,19,19	0
3	HG	L	312	1/1	0.99	0.02	-7.57	25,25,25,25	0
2	CO	L	212	1/1	1.00	0.02	-8.03	13,13,13,13	0
3	HG	A	301	1/1	0.99	0.02	-9.13	19,19,19,19	0
3	HG	F	306	1/1	0.98	0.03	-9.80	22,22,22,22	0
4	SO4	J	2417	5/5	0.90	0.21	-	33,34,39,43	0
4	SO4	A	2414	5/5	0.90	0.23	-	32,34,43,49	0
4	SO4	I	2416	5/5	0.94	0.18	-	32,39,40,48	0
4	SO4	F	2415	5/5	0.94	0.20	-	22,35,39,44	0
4	SO4	B	2413	5/5	0.94	0.24	-	35,39,41,46	0
4	SO4	E	2418	5/5	0.86	0.25	-	33,39,40,42	0

## 6.5 Other polymers

There are no such residues in this entry.