



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 25, 2020 – 02:57 PM BST

PDB ID : 4KT2  
Title : Crystal structure of d-mannonate dehydratase from chromohalobacter salexigens complexed with mg and glycerol  
Authors : Fedorov, A.A.; Fedorov, E.V.; Wichelecki, D.; Gerlt, J.A.; Almo, S.C.  
Deposited on : 2013-05-19  
Resolution : 1.80 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.13  
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) : 2.13

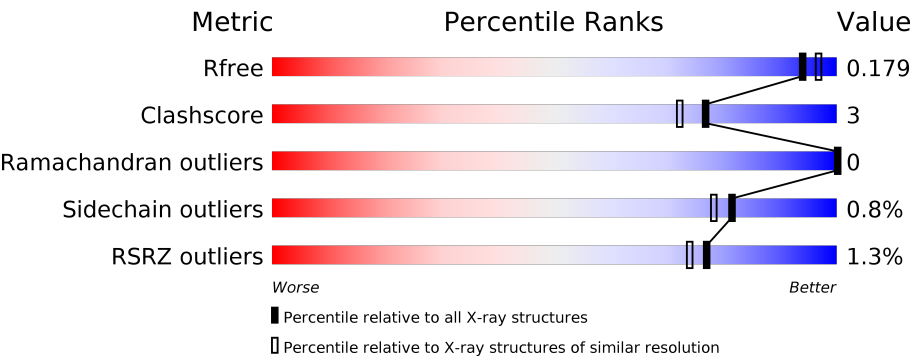
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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	5950 (1.80-1.80)
Clashscore	141614	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)
RSRZ outliers	127900	5850 (1.80-1.80)

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 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	405	<div><div>%</div><div><div></div><div>88%</div><div>6%</div><div>5%</div></div></div>
1	B	405	<div><div>%</div><div><div></div><div>90%</div><div>6%</div><div>.</div></div></div>
1	C	405	<div><div>%</div><div><div></div><div>89%</div><div>6%</div><div>5%</div></div></div>
1	D	405	<div><div>%</div><div><div></div><div>88%</div><div>6%</div><div>5%</div></div></div>
1	E	405	<div><div>2%</div><div><div></div><div>90%</div><div>7%</div><div>.</div></div></div>
1	F	405	<div><div>2%</div><div><div></div><div>88%</div><div>7%</div><div>.</div></div></div>

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Mol	Chain	Length	Quality of chain
1	G	405	<div><div>%</div><div><div></div><div>89%</div><div>6%5%</div></div></div>
1	H	405	<div><div>%</div><div><div></div><div>87%</div><div>9%•</div></div></div>

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 26989 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 D-mannonate dehydratase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	384	Total	C	N	O	S	0	3	0
			3062	1943	548	557	14			
1	B	391	Total	C	N	O	S	0	3	0
			3112	1972	552	573	15			
1	C	385	Total	C	N	O	S	0	2	0
			3065	1944	549	558	14			
1	D	385	Total	C	N	O	S	0	0	0
			3049	1932	546	557	14			
1	E	395	Total	C	N	O	S	0	3	0
			3154	1999	560	580	15			
1	F	387	Total	C	N	O	S	0	0	0
			3065	1942	548	561	14			
1	G	385	Total	C	N	O	S	0	2	0
			3064	1941	547	562	14			
1	H	388	Total	C	N	O	S	0	0	0
			3069	1944	549	562	14			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	2	SER	-	EXPRESSION TAG	UNP Q1QT89
A	3	LEU	-	EXPRESSION TAG	UNP Q1QT89
B	2	SER	-	EXPRESSION TAG	UNP Q1QT89
B	3	LEU	-	EXPRESSION TAG	UNP Q1QT89
C	2	SER	-	EXPRESSION TAG	UNP Q1QT89
C	3	LEU	-	EXPRESSION TAG	UNP Q1QT89
D	2	SER	-	EXPRESSION TAG	UNP Q1QT89
D	3	LEU	-	EXPRESSION TAG	UNP Q1QT89
E	2	SER	-	EXPRESSION TAG	UNP Q1QT89
E	3	LEU	-	EXPRESSION TAG	UNP Q1QT89
F	2	SER	-	EXPRESSION TAG	UNP Q1QT89
F	3	LEU	-	EXPRESSION TAG	UNP Q1QT89
G	2	SER	-	EXPRESSION TAG	UNP Q1QT89

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Chain	Residue	Modelled	Actual	Comment	Reference
G	3	LEU	-	EXPRESSION TAG	UNP Q1QT89
H	2	SER	-	EXPRESSION TAG	UNP Q1QT89
H	3	LEU	-	EXPRESSION TAG	UNP Q1QT89

- Molecule 2 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total Cl 1 1	0	0
2	A	1	Total Cl 1 1	0	0
2	C	1	Total Cl 1 1	0	0
2	F	1	Total Cl 1 1	0	0

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	G	1	Total Mg 1 1	0	0
3	D	1	Total Mg 1 1	0	0
3	E	1	Total Mg 1 1	0	0
3	H	1	Total Mg 1 1	0	0
3	B	1	Total Mg 1 1	0	0
3	C	1	Total Mg 1 1	0	0
3	A	1	Total Mg 1 1	0	0
3	F	1	Total Mg 1 1	0	0

- Molecule 4 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
4	A	1	Total	C	O	0	0
			6	3	3		
4	B	1	Total	C	O	0	0
			6	3	3		
4	C	1	Total	C	O	0	0
			6	3	3		
4	D	1	Total	C	O	0	0
			6	3	3		
4	E	1	Total	C	O	0	0
			6	3	3		
4	F	1	Total	C	O	0	0
			6	3	3		
4	F	1	Total	C	O	0	0
			6	3	3		
4	G	1	Total	C	O	0	0
			6	3	3		
4	H	1	Total	C	O	0	0
			6	3	3		

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

- Molecule 6 is water.

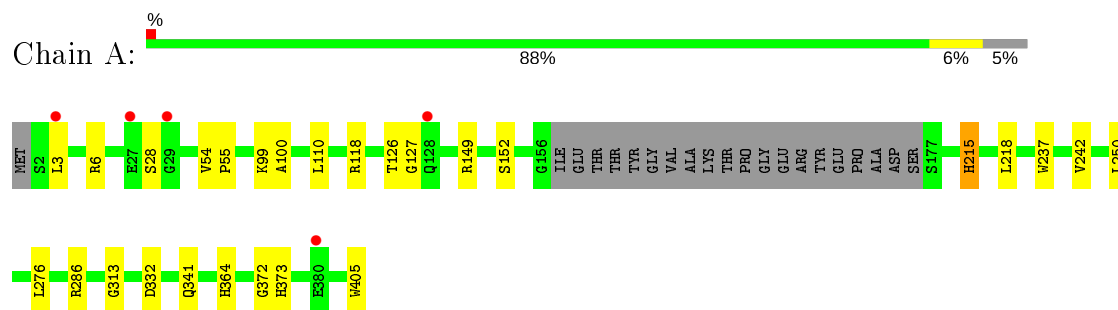
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	275	Total 275	O 275	0	0
6	B	273	Total 275	O 275	0	2
6	C	264	Total 264	O 264	0	0
6	D	263	Total 264	O 264	0	1
6	E	281	Total 281	O 281	0	0
6	F	282	Total 282	O 282	0	0
6	G	293	Total 294	O 294	0	1
6	H	278	Total 278	O 278	0	0



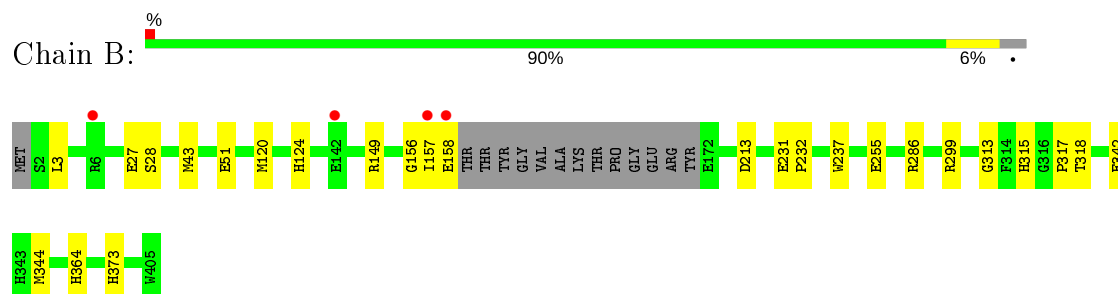
### 3 Residue-property plots [i](#)

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.

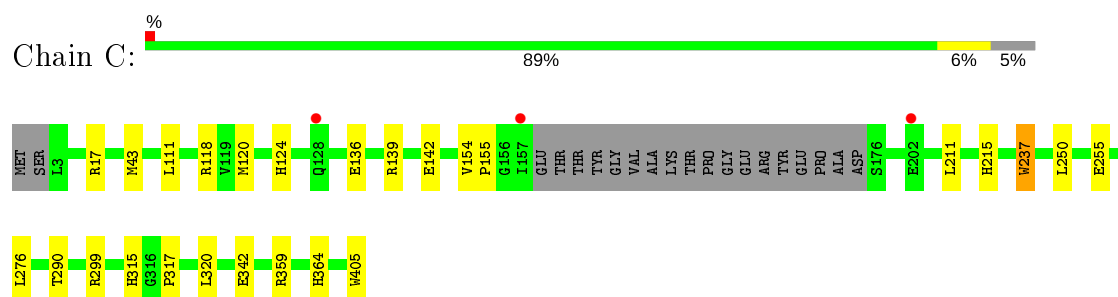
- Molecule 1: D-mannonate dehydratase



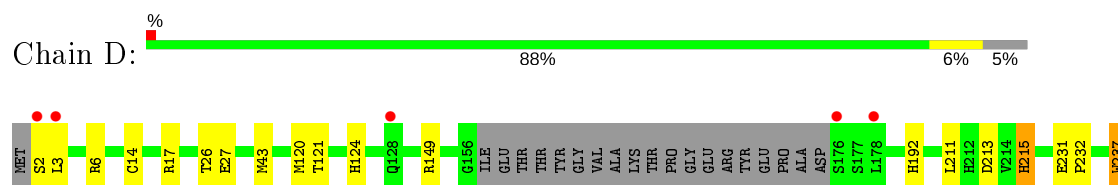
- Molecule 1: D-mannonate dehydratase



- Molecule 1: D-mannonate dehydratase

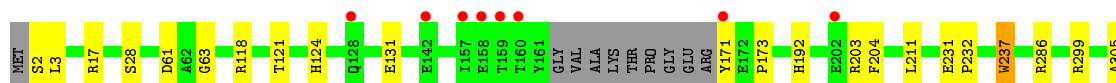
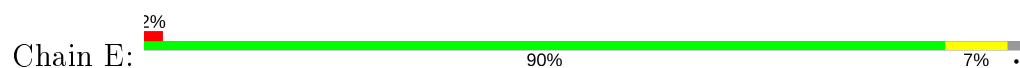


- Molecule 1: D-mannonate dehydratase

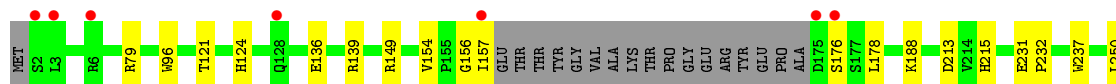
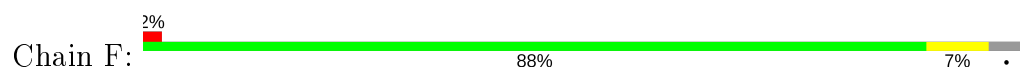




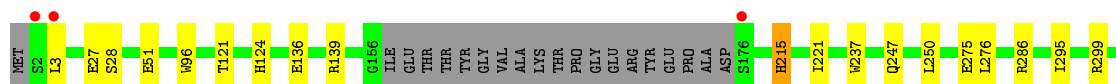
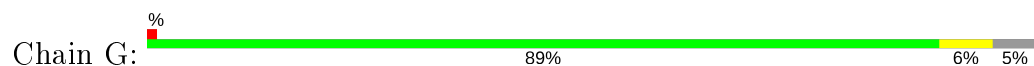
- Molecule 1: D-mannonate dehydratase



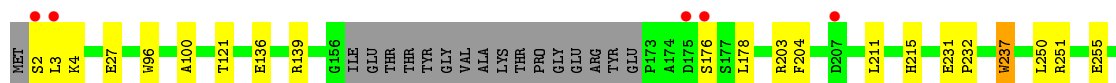
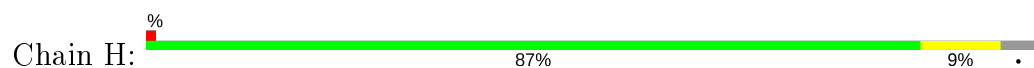
- Molecule 1: D-mannonate dehydratase



- Molecule 1: D-mannonate dehydratase



- Molecule 1: D-mannonate dehydratase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	86.58 Å 177.79 Å 109.99 Å 90.00° 102.62° 90.00°	Depositor
Resolution (Å)	35.17 – 1.80 35.17 – 1.80	Depositor EDS
% Data completeness (in resolution range)	98.5 (35.17-1.80) 98.5 (35.17-1.80)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.38 (at 1.79 Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.1_743)	Depositor
R, $R_{free}$	0.149 , 0.182 0.147 , 0.179	Depositor DCC
$R_{free}$ test set	14933 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	19.4	Xtriage
Anisotropy	0.258	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 51.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	26989	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 3.27% 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, MG, SO4, CL

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.35	0/3156	0.52	0/4296
1	B	0.35	0/3207	0.52	0/4367
1	C	0.33	0/3156	0.51	0/4296
1	D	0.34	0/3134	0.51	0/4267
1	E	0.35	0/3248	0.52	0/4424
1	F	0.36	0/3150	0.52	0/4289
1	G	0.37	0/3152	0.53	0/4291
1	H	0.35	0/3155	0.52	0/4296
All	All	0.35	0/25358	0.52	0/34526

There are no bond length outliers.

There are no bond angle outliers.

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	3062	0	2966	15	0
1	B	3112	0	3001	20	0
1	C	3065	0	2966	18	0
1	D	3049	0	2941	20	0
1	E	3154	0	3038	20	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	3065	0	2956	16	0
1	G	3064	0	2952	16	0
1	H	3069	0	2958	24	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	F	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
4	A	6	0	8	0	0
4	B	6	0	8	0	0
4	C	6	0	8	0	0
4	D	6	0	8	0	0
4	E	6	0	8	0	0
4	F	12	0	16	0	0
4	G	6	0	8	0	0
4	H	6	0	8	0	0
5	A	10	0	0	0	0
5	B	5	0	0	0	0
5	C	10	0	0	0	0
5	D	10	0	0	1	0
5	E	5	0	0	0	0
5	F	10	0	0	0	0
5	G	10	0	0	0	0
5	H	10	0	0	0	0
6	A	275	0	0	2	0
6	B	275	0	0	2	0
6	C	264	0	0	4	0
6	D	264	0	0	2	0
6	E	281	0	0	3	0
6	F	282	0	0	3	0
6	G	294	0	0	0	0
6	H	278	0	0	2	0
All	All	26989	0	23850	144	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 3.

All (144) 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:250:LEU:HD22	1:D:276:LEU:HD22	1.50	0.94
1:G:250:LEU:HD22	1:G:276:LEU:HD22	1.50	0.93
1:B:157:ILE:HG22	1:B:158:GLU:HG2	1.51	0.90
1:A:250[A]:LEU:HD22	1:A:276:LEU:HD22	1.65	0.78
1:E:2:SER:HB3	1:E:61:ASP:OD2	1.86	0.75
1:H:3:LEU:HD23	1:H:4:LYS:H	1.52	0.75
1:H:250:LEU:HD22	1:H:276:LEU:HD22	1.69	0.74
1:A:3:LEU:HD13	1:A:28:SER:HB3	1.71	0.73
1:G:136:GLU:OE2	1:G:139:ARG:HD3	1.87	0.73
1:D:359:ARG:NH2	6:D:856:HOH:O	2.27	0.68
1:D:2:SER:O	1:D:3:LEU:HD23	1.94	0.67
1:G:3:LEU:CD1	1:G:28:SER:HB3	2.25	0.66
1:A:99:LYS:HG2	1:A:110:LEU:HD21	1.78	0.65
1:B:124:HIS:CE1	1:B:344[A]:MET:SD	2.90	0.64
1:F:384:LYS:NZ	6:F:882:HOH:O	2.31	0.64
1:B:3:LEU:HD13	1:B:28:SER:HB3	1.78	0.64
1:C:359:ARG:NH2	6:C:858:HOH:O	2.31	0.62
1:G:124:HIS:CE1	1:G:344:MET:SD	2.93	0.61
1:H:3:LEU:HD23	1:H:4:LYS:N	2.16	0.61
1:G:317:PRO:HA	1:G:344:MET:SD	2.41	0.61
1:E:203[B]:ARG:HG2	1:E:204:PHE:CE2	2.36	0.60
1:F:156:GLY:O	1:F:188:LYS:HE2	2.03	0.59
1:C:250:LEU:HD22	1:C:276:LEU:HD22	1.86	0.58
1:B:43:MET:HE3	6:B:832[A]:HOH:O	2.02	0.58
1:G:136:GLU:HA	1:G:139:ARG:HG2	1.86	0.58
1:C:215:HIS:ND1	1:C:405:TRP:OXT	2.31	0.57
1:C:43:MET:HG3	1:G:51:GLU:HG3	1.87	0.56
1:H:4:LYS:HB3	1:H:27:GLU:HG3	1.88	0.56
1:A:126:THR:OG1	1:A:149:ARG:NH1	2.38	0.56
1:C:136:GLU:OE1	1:C:139:ARG:NH1	2.37	0.56
1:H:136:GLU:OE2	1:H:139:ARG:HD3	2.07	0.54
1:F:359:ARG:NH2	6:F:860:HOH:O	2.41	0.54
1:F:176:SER:HB2	1:F:178:LEU:O	2.07	0.54
1:D:2:SER:HB3	1:D:27:GLU:OE2	2.07	0.53
1:E:192:HIS:HE1	6:E:751:HOH:O	1.91	0.53
1:D:2:SER:OG	1:D:3:LEU:N	2.36	0.53
1:D:215:HIS:ND1	1:D:405:TRP:OXT	2.34	0.53
1:D:6:ARG:NH2	6:D:860:HOH:O	2.42	0.53
1:F:250:LEU:HD22	1:F:276:LEU:HD22	1.90	0.52
1:C:111:LEU:HD22	1:C:299:ARG:HH11	1.75	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:295:ILE:O	1:G:299:ARG:HG3	2.10	0.52
1:E:3:LEU:HD13	1:E:28:SER:HB3	1.91	0.52
1:E:131:GLU:OE2	1:E:203[A]:ARG:NH2	2.29	0.52
1:C:255:GLU:OE2	6:C:856:HOH:O	2.19	0.51
1:B:299:ARG:HD3	1:C:299:ARG:HH21	1.76	0.51
1:B:3:LEU:CD1	1:B:28:SER:HB3	2.41	0.50
1:E:2:SER:OG	1:E:63:GLY:HA3	2.11	0.50
1:F:286:ARG:HD2	1:F:313:GLY:O	2.12	0.50
1:A:286:ARG:HD2	1:A:313:GLY:O	2.11	0.49
1:E:118:ARG:NH1	6:E:742:HOH:O	2.45	0.49
1:F:136:GLU:OE2	1:F:139:ARG:HD3	2.12	0.49
1:F:136:GLU:HA	1:F:139:ARG:HG2	1.95	0.49
1:E:118:ARG:HD2	1:E:364:HIS:CD2	2.49	0.48
1:D:14:CYS:HA	1:D:17:ARG:O	2.14	0.48
1:E:3:LEU:CD1	1:E:28:SER:HB3	2.43	0.48
1:F:121:THR:HA	1:F:341:GLN:O	2.14	0.48
1:C:118:ARG:HD2	1:C:364:HIS:CG	2.49	0.48
1:E:286:ARG:HD2	1:E:313:GLY:O	2.14	0.47
1:H:286:ARG:HD2	1:H:313:GLY:O	2.13	0.47
1:G:121:THR:HA	1:G:341:GLN:O	2.14	0.47
1:C:118:ARG:NH1	6:C:838:HOH:O	2.46	0.47
1:G:286:ARG:HD2	1:G:313:GLY:O	2.14	0.47
1:H:2:SER:HB2	6:H:697:HOH:O	2.15	0.47
1:B:315:HIS:CE1	1:B:317:PRO:HG3	2.50	0.47
1:B:317:PRO:HA	1:B:344[A]:MET:SD	2.55	0.47
1:D:149:ARG:HD2	1:D:213:ASP:HB2	1.95	0.47
1:F:154:VAL:HB	1:F:157:ILE:HD11	1.98	0.46
1:E:211:LEU:HD23	1:E:237:TRP:CE2	2.50	0.46
1:E:305:ALA:HB1	1:E:310:VAL:HB	1.98	0.46
1:E:380:GLU:O	1:E:384:LYS:NZ	2.43	0.46
1:B:51[B]:GLU:HG2	1:D:43:MET:HG3	1.98	0.46
1:H:359:ARG:NH2	6:H:810:HOH:O	2.48	0.46
1:H:3:LEU:CD2	1:H:27:GLU:HB2	2.46	0.45
1:A:332:ASP:OD2	1:A:341:GLN:NE2	2.43	0.45
1:E:171:TYR:CE2	1:E:173:PRO:HG3	2.51	0.45
1:B:255:GLU:OE2	6:B:871:HOH:O	2.21	0.45
1:D:231:GLU:N	1:D:232:PRO:CD	2.80	0.45
1:H:121:THR:HA	1:H:341:GLN:O	2.16	0.45
1:G:3:LEU:HD22	1:G:27:GLU:OE1	2.16	0.45
1:H:211:LEU:HD23	1:H:237:TRP:CE2	2.52	0.45
1:H:176:SER:HB2	1:H:178:LEU:O	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:192:HIS:HE1	5:D:503:SO4:O4	2.00	0.45
1:H:3:LEU:HD22	1:H:27:GLU:HB2	1.98	0.45
1:E:393:PRO:HG2	1:E:405:TRP:CE2	2.52	0.44
1:D:3:LEU:HD22	1:D:26:THR:HG21	2.00	0.44
1:G:96:TRP:CD1	1:G:295:ILE:HB	2.53	0.44
1:E:121:THR:HA	1:E:341:GLN:O	2.17	0.44
1:B:120:MET:HA	1:B:364:HIS:CD2	2.53	0.44
1:D:250:LEU:CD2	1:D:282:ILE:CG2	2.96	0.44
1:H:315:HIS:CE1	1:H:317:PRO:HG3	2.52	0.44
1:H:332:ASP:OD2	1:H:341:GLN:NE2	2.42	0.44
1:F:251:ARG:NH1	1:F:255:GLU:OE2	2.51	0.44
1:G:305:ALA:HB1	1:G:310:VAL:HB	2.00	0.44
1:H:100:ALA:HB3	1:H:372:GLY:HA2	2.00	0.43
1:H:3:LEU:CD2	1:H:4:LYS:H	2.27	0.43
1:C:118:ARG:HD2	1:C:364:HIS:CD2	2.53	0.43
1:B:318:THR:H	1:B:344[A]:MET:HE2	1.83	0.43
1:A:118:ARG:NH1	1:A:364:HIS:NE2	2.66	0.43
1:C:120:MET:HA	1:C:364:HIS:CD2	2.53	0.43
1:E:192:HIS:CE1	6:E:751:HOH:O	2.70	0.43
1:D:121:THR:HA	1:D:341:GLN:O	2.19	0.43
1:H:96:TRP:CD1	1:H:295:ILE:HB	2.53	0.43
1:H:231:GLU:N	1:H:232:PRO:CD	2.82	0.43
1:A:118:ARG:NH1	6:A:868:HOH:O	2.48	0.42
1:C:211:LEU:HD23	1:C:237:TRP:CE2	2.53	0.42
1:C:315:HIS:CE1	1:C:317:PRO:HG3	2.54	0.42
1:F:124:HIS:CE1	1:F:344:MET:SD	3.12	0.42
1:B:124:HIS:NE2	1:B:342:GLU:OE2	2.46	0.42
1:C:290:THR:HB	1:C:320:LEU:HD22	2.01	0.42
1:D:124:HIS:CE1	1:D:344:MET:SD	3.12	0.42
1:F:96:TRP:CD1	1:F:295:ILE:HB	2.54	0.42
1:B:286:ARG:HD2	1:B:313:GLY:O	2.20	0.42
1:D:211:LEU:HD23	1:D:237:TRP:CE2	2.54	0.42
1:F:231:GLU:N	1:F:232:PRO:CD	2.82	0.42
1:B:231:GLU:N	1:B:232:PRO:CD	2.82	0.42
1:B:51[B]:GLU:HG2	1:D:43:MET:CG	2.50	0.42
1:A:215:HIS:ND1	1:A:405:TRP:OXT	2.35	0.42
1:A:54:VAL:HB	1:A:55:PRO:HD3	2.02	0.42
1:C:142:GLU:HG2	6:C:724:HOH:O	2.19	0.41
1:A:100:ALA:HB3	1:A:372:GLY:HA2	2.02	0.41
1:D:250:LEU:HD23	1:D:282:ILE:CG2	2.50	0.41
1:E:124:HIS:CG	1:E:344[B]:MET:SD	3.13	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:291:HIS:CE1	1:H:320:LEU:HD21	2.56	0.41
1:B:315:HIS:CD2	1:B:317:PRO:HD3	2.55	0.41
1:F:149:ARG:HD2	1:F:213:ASP:HB2	2.02	0.41
1:E:299:ARG:HH11	1:H:299:ARG:NH2	2.18	0.41
1:A:127:GLY:O	1:A:152:SER:HA	2.20	0.41
1:A:6:ARG:NH2	6:A:831:HOH:O	2.54	0.41
1:E:231:GLU:N	1:E:232:PRO:CD	2.84	0.41
1:H:211:LEU:N	1:H:211:LEU:HD12	2.35	0.41
1:G:247:GLN:OE1	1:G:275[B]:GLU:HG2	2.20	0.41
1:C:124:HIS:NE2	1:C:342:GLU:OE2	2.51	0.41
1:B:149:ARG:HD2	1:B:213:ASP:HB2	2.03	0.41
1:C:154:VAL:HA	1:C:155:PRO:HD3	1.84	0.41
1:G:221:ILE:HD12	1:G:221:ILE:HA	1.96	0.41
1:A:218:LEU:O	1:A:242:VAL:HG12	2.21	0.40
1:B:156:GLY:O	1:B:157:ILE:HD13	2.20	0.40
1:F:79:ARG:HA	6:F:754:HOH:O	2.22	0.40
1:G:215:HIS:ND1	1:G:405:TRP:OXT	2.34	0.40
1:H:251:ARG:NH1	1:H:255:GLU:OE2	2.54	0.40
1:A:126:THR:HG1	1:A:149:ARG:HH12	1.68	0.40
1:H:203:ARG:HG2	1:H:204:PHE:CE2	2.57	0.40
1:B:3:LEU:HB3	1:B:27:GLU:HG2	2.04	0.40
1:D:120:MET:HA	1:D:364:HIS:CD2	2.57	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	383/405 (95%)	374 (98%)	9 (2%)	0	100	100
1	B	390/405 (96%)	381 (98%)	9 (2%)	0	100	100
1	C	383/405 (95%)	372 (97%)	11 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	381/405 (94%)	370 (97%)	11 (3%)	0	100	100
1	E	394/405 (97%)	385 (98%)	9 (2%)	0	100	100
1	F	383/405 (95%)	369 (96%)	14 (4%)	0	100	100
1	G	383/405 (95%)	374 (98%)	9 (2%)	0	100	100
1	H	384/405 (95%)	372 (97%)	12 (3%)	0	100	100
All	All	3081/3240 (95%)	2997 (97%)	84 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 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	318/332 (96%)	315 (99%)	3 (1%)	78	75
1	B	324/332 (98%)	322 (99%)	2 (1%)	86	84
1	C	318/332 (96%)	316 (99%)	2 (1%)	86	84
1	D	316/332 (95%)	313 (99%)	3 (1%)	78	75
1	E	328/332 (99%)	326 (99%)	2 (1%)	86	84
1	F	318/332 (96%)	316 (99%)	2 (1%)	86	84
1	G	318/332 (96%)	316 (99%)	2 (1%)	86	84
1	H	318/332 (96%)	314 (99%)	4 (1%)	69	62
All	All	2558/2656 (96%)	2538 (99%)	20 (1%)	81	78

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	215	HIS
1	A	237	TRP
1	A	373	HIS
1	B	237	TRP
1	B	373	HIS

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Mol	Chain	Res	Type
1	C	17	ARG
1	C	237	TRP
1	D	215	HIS
1	D	237	TRP
1	D	373	HIS
1	E	17	ARG
1	E	237	TRP
1	F	215	HIS
1	F	237	TRP
1	G	215	HIS
1	G	237	TRP
1	H	215	HIS
1	H	237	TRP
1	H	263	ILE
1	H	373	HIS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	278	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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 35 ligands modelled in this entry, 12 are monoatomic - leaving 23 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	GOL	D	502	-	5,5,5	0.38	0	5,5,5	0.41	0
5	SO4	F	505	-	4,4,4	0.14	0	6,6,6	0.11	0
5	SO4	A	505	-	4,4,4	0.14	0	6,6,6	0.18	0
4	GOL	F	503	-	5,5,5	0.40	0	5,5,5	0.29	0
5	SO4	F	506	-	4,4,4	0.16	0	6,6,6	0.14	0
4	GOL	H	502	-	5,5,5	0.41	0	5,5,5	0.36	0
5	SO4	G	503	-	4,4,4	0.16	0	6,6,6	0.14	0
5	SO4	G	504	-	4,4,4	0.13	0	6,6,6	0.13	0
4	GOL	A	503	-	5,5,5	0.44	0	5,5,5	0.38	0
5	SO4	A	504	-	4,4,4	0.16	0	6,6,6	0.09	0
5	SO4	B	504	-	4,4,4	0.13	0	6,6,6	0.10	0
5	SO4	E	503	-	4,4,4	0.16	0	6,6,6	0.06	0
4	GOL	E	502	-	5,5,5	0.35	0	5,5,5	0.51	0
5	SO4	H	504	-	4,4,4	0.14	0	6,6,6	0.13	0
5	SO4	C	505	-	4,4,4	0.19	0	6,6,6	0.10	0
5	SO4	H	503	-	4,4,4	0.15	0	6,6,6	0.11	0
5	SO4	D	503	-	4,4,4	0.15	0	6,6,6	0.10	0
5	SO4	D	504	-	4,4,4	0.16	0	6,6,6	0.09	0
4	GOL	G	502	-	5,5,5	0.42	0	5,5,5	0.53	0
5	SO4	C	504	-	4,4,4	0.15	0	6,6,6	0.10	0
4	GOL	F	504	-	5,5,5	0.33	0	5,5,5	0.21	0
4	GOL	B	503	-	5,5,5	0.41	0	5,5,5	0.23	0
4	GOL	C	503	-	5,5,5	0.31	0	5,5,5	0.45	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	GOL	D	502	-	-	4/4/4/4	-
4	GOL	E	502	-	-	2/4/4/4	-
4	GOL	H	502	-	-	2/4/4/4	-
4	GOL	G	502	-	-	2/4/4/4	-
4	GOL	F	504	-	-	2/4/4/4	-
4	GOL	F	503	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	B	503	-	-	4/4/4/4	-
4	GOL	A	503	-	-	2/4/4/4	-
4	GOL	C	503	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	D	502	GOL	O1-C1-C2-C3
4	D	502	GOL	C1-C2-C3-O3
4	F	503	GOL	C1-C2-C3-O3
4	E	502	GOL	C1-C2-C3-O3
4	E	502	GOL	O2-C2-C3-O3
4	G	502	GOL	C1-C2-C3-O3
4	G	502	GOL	O2-C2-C3-O3
4	B	503	GOL	C1-C2-C3-O3
4	C	503	GOL	O1-C1-C2-O2
4	C	503	GOL	O1-C1-C2-C3
4	F	503	GOL	O2-C2-C3-O3
4	A	503	GOL	O2-C2-C3-O3
4	H	502	GOL	C1-C2-C3-O3
4	A	503	GOL	C1-C2-C3-O3
4	F	504	GOL	O1-C1-C2-C3
4	B	503	GOL	O1-C1-C2-C3
4	D	502	GOL	O2-C2-C3-O3
4	H	502	GOL	O2-C2-C3-O3
4	B	503	GOL	O2-C2-C3-O3
4	D	502	GOL	O1-C1-C2-O2
4	B	503	GOL	O1-C1-C2-O2
4	F	504	GOL	O1-C1-C2-O2

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	503	SO4	1	0

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.

## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<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	384/405 (94%)	-0.38	5 (1%) 77 74	13, 18, 33, 46	0
1	B	391/405 (96%)	-0.33	4 (1%) 82 80	12, 20, 36, 69	0
1	C	385/405 (95%)	-0.40	3 (0%) 86 84	13, 20, 37, 54	0
1	D	385/405 (95%)	-0.20	6 (1%) 72 68	14, 20, 38, 67	0
1	E	395/405 (97%)	-0.38	8 (2%) 65 61	13, 19, 36, 62	0
1	F	387/405 (95%)	-0.39	7 (1%) 68 64	12, 18, 36, 61	0
1	G	385/405 (95%)	-0.47	3 (0%) 86 84	12, 17, 33, 63	0
1	H	388/405 (95%)	-0.36	5 (1%) 77 74	13, 19, 36, 60	0
All	All	3100/3240 (95%)	-0.37	41 (1%) 77 74	12, 19, 36, 69	0

All (41) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	176	SER	7.6
1	H	2	SER	6.9
1	D	2	SER	6.4
1	B	157	ILE	5.6
1	D	176	SER	5.5
1	E	157	ILE	4.8
1	F	175	ASP	4.4
1	C	157	ILE	4.4
1	F	2	SER	4.1
1	F	157	ILE	3.9
1	E	159	THR	3.9
1	G	2	SER	3.5
1	F	3	LEU	3.4
1	D	178	LEU	3.2
1	E	142	GLU	3.2
1	D	128	GLN	3.2

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Mol	Chain	Res	Type	RSRZ
1	H	207	ASP	3.0
1	E	158	GLU	3.0
1	D	3	LEU	3.0
1	D	380	GLU	3.0
1	H	176	SER	2.9
1	G	176	SER	2.8
1	G	3	LEU	2.8
1	H	175	ASP	2.8
1	C	128	GLN	2.8
1	E	171	TYR	2.8
1	B	142	GLU	2.7
1	E	128	GLN	2.6
1	E	160	THR	2.5
1	F	128	GLN	2.5
1	C	202	GLU	2.4
1	A	128	GLN	2.4
1	B	6	ARG	2.3
1	B	158	GLU	2.3
1	H	3	LEU	2.3
1	F	6	ARG	2.2
1	A	3	LEU	2.2
1	A	380	GLU	2.1
1	A	27	GLU	2.0
1	E	202	GLU	2.0
1	A	29	GLY	2.0

## 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 monosaccharides 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. 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( $\text{\AA}^2$ )	Q<0.9
4	GOL	F	504	6/6	0.91	0.14	35,37,42,45	0
5	SO4	E	503	5/5	0.92	0.33	56,62,69,69	0
5	SO4	G	503	5/5	0.93	0.26	46,61,65,66	0
4	GOL	D	502	6/6	0.94	0.11	20,33,39,40	0
5	SO4	F	506	5/5	0.95	0.18	28,39,52,52	0
2	CL	A	501	1/1	0.95	0.07	24,24,24,24	0
5	SO4	B	504	5/5	0.95	0.22	58,61,65,68	0
5	SO4	H	504	5/5	0.95	0.15	39,43,54,58	0
2	CL	F	501	1/1	0.95	0.08	22,22,22,22	0
4	GOL	H	502	6/6	0.96	0.14	22,30,36,40	0
4	GOL	E	502	6/6	0.96	0.12	22,27,37,37	0
2	CL	C	501	1/1	0.96	0.06	24,24,24,24	0
4	GOL	A	503	6/6	0.96	0.11	20,27,34,39	0
5	SO4	H	503	5/5	0.96	0.21	42,53,59,61	0
5	SO4	D	504	5/5	0.96	0.22	41,41,52,58	0
5	SO4	C	504	5/5	0.96	0.26	49,55,62,62	0
5	SO4	G	504	5/5	0.96	0.20	28,33,50,50	0
4	GOL	B	503	6/6	0.96	0.13	22,32,33,37	0
5	SO4	C	505	5/5	0.97	0.17	34,40,51,51	0
4	GOL	G	502	6/6	0.97	0.09	21,22,30,35	0
5	SO4	A	504	5/5	0.97	0.22	50,52,60,60	0
5	SO4	F	505	5/5	0.97	0.20	38,46,51,53	0
2	CL	B	501	1/1	0.97	0.06	23,23,23,23	0
5	SO4	A	505	5/5	0.97	0.19	35,37,50,57	0
3	MG	B	502	1/1	0.98	0.08	27,27,27,27	0
5	SO4	D	503	5/5	0.98	0.29	49,54,58,60	0
3	MG	C	502	1/1	0.98	0.10	25,25,25,25	0
4	GOL	F	503	6/6	0.98	0.11	22,27,34,36	0
4	GOL	C	503	6/6	0.98	0.09	20,25,32,39	0
3	MG	E	501	1/1	0.99	0.07	30,30,30,30	0
3	MG	D	501	1/1	0.99	0.04	24,24,24,24	0
3	MG	G	501	1/1	0.99	0.05	18,18,18,18	0
3	MG	H	501	1/1	0.99	0.08	25,25,25,25	0
3	MG	A	502	1/1	0.99	0.08	24,24,24,24	0
3	MG	F	502	1/1	1.00	0.06	19,19,19,19	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.