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wwPDB X-ray Structure Validation Summary Report ⓘ

Apr 29, 2025 – 02:45 PM EDT

PDB ID	:	3S2W / pdb_00003s2w
Title	:	The crystal structure of a MarR transcriptional regulator from Methanosarcina mazei Go1
Authors	:	Tan, K.; Li, H.; Gu, M.; Joachimiak, A.; Midwest Center for Structural Genomics (MCSG)
Deposited on	:	2011-05-17
Resolution	:	2.45 Å(reported)

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

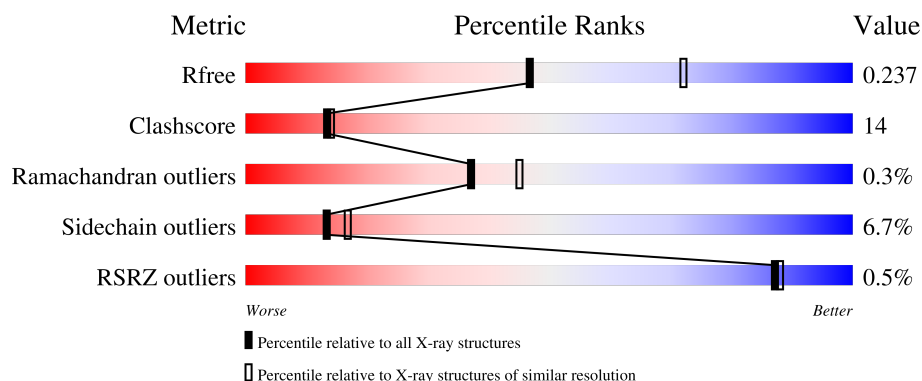|		
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

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 2.45 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	Percentile Ranks	Value
Rfree		0.237
Clashscore		14
Ramachandran outliers		0.3%
Sidechain outliers		6.7%
RSRZ outliers		0.5%

Worse — *Better*

▮ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	164625	1096 (2.46-2.46)
Clashscore	180529	1178 (2.46-2.46)
Ramachandran outliers	177936	1170 (2.46-2.46)
Sidechain outliers	177891	1170 (2.46-2.46)
RSRZ outliers	164620	1096 (2.46-2.46)

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 >=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 <=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	159	67% 22% • 8%
1	B	159	67% 17% • 14%
1	C	159	% 51% 33% • • 13%
1	D	159	65% 19% • 13%
1	E	159	% 69% 14% • 15%

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Mol	Chain	Length	Quality of chain
1	F	159	% 65%　　　　　20%　　・　11%
1	G	159	% 45%　　　　　36%　　・　16%
1	H	159	59%　　　　　23%　　6%　13%

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 9311 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 Transcriptional regulator, MarR family.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	146	Total	C	N	O	S	Se	0	0	0
			1189	761	201	222	1	4			
1	B	137	Total	C	N	O	S	Se	0	0	0
			1130	727	190	208	1	4			
1	C	138	Total	C	N	O	S	Se	0	0	0
			1139	730	191	213	1	4			
1	D	138	Total	C	N	O	S	Se	0	0	0
			1141	731	194	211	1	4			
1	E	135	Total	C	N	O	Se		0	0	0
			1110	715	185	206	4				
1	F	142	Total	C	N	O	S	Se	0	0	0
			1175	752	199	219	1	4			
1	G	134	Total	C	N	O	Se		0	0	0
			1105	712	184	205	4				
1	H	139	Total	C	N	O	Se		0	0	0
			1159	742	199	214	4				

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	expression tag	UNP Q8PVU7
A	-1	ASN	-	expression tag	UNP Q8PVU7
A	0	ALA	-	expression tag	UNP Q8PVU7
B	-2	SER	-	expression tag	UNP Q8PVU7
B	-1	ASN	-	expression tag	UNP Q8PVU7
B	0	ALA	-	expression tag	UNP Q8PVU7
C	-2	SER	-	expression tag	UNP Q8PVU7
C	-1	ASN	-	expression tag	UNP Q8PVU7
C	0	ALA	-	expression tag	UNP Q8PVU7
D	-2	SER	-	expression tag	UNP Q8PVU7
D	-1	ASN	-	expression tag	UNP Q8PVU7
D	0	ALA	-	expression tag	UNP Q8PVU7
E	-2	SER	-	expression tag	UNP Q8PVU7

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-1	ASN	-	expression tag	UNP Q8PVU7
E	0	ALA	-	expression tag	UNP Q8PVU7
F	-2	SER	-	expression tag	UNP Q8PVU7
F	-1	ASN	-	expression tag	UNP Q8PVU7
F	0	ALA	-	expression tag	UNP Q8PVU7
G	-2	SER	-	expression tag	UNP Q8PVU7
G	-1	ASN	-	expression tag	UNP Q8PVU7
G	0	ALA	-	expression tag	UNP Q8PVU7
H	-2	SER	-	expression tag	UNP Q8PVU7
H	-1	ASN	-	expression tag	UNP Q8PVU7
H	0	ALA	-	expression tag	UNP Q8PVU7

- Molecule 2 is SULFATE ION (CCD ID: SO4) (formula: O_4S).

SO4

O1

O

O3 O⁻ — S — O⁻ O4

S

O

O2
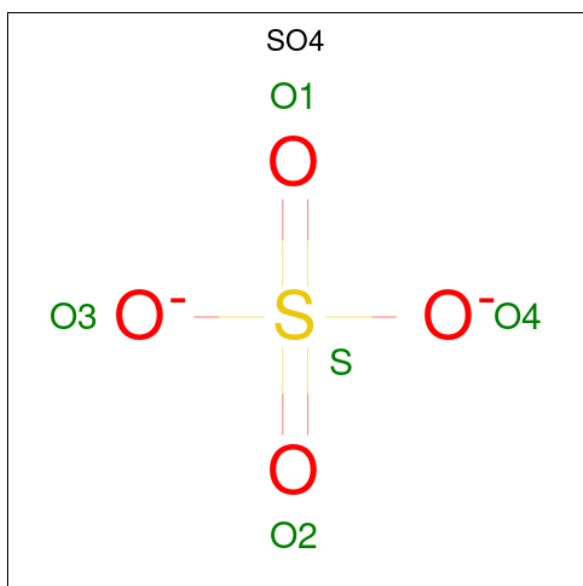
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total 5	O 4	S 1	0	0
2	A	1	Total 5	O 4	S 1	0	0
2	A	1	Total 5	O 4	S 1	0	0
2	B	1	Total 5	O 4	S 1	0	0
2	C	1	Total 5	O 4	S 1	0	0
2	C	1	Total 5	O 4	S 1	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	D	1	Total 5	O 4	S 1	0	0
2	D	1	Total 5	O 4	S 1	0	0
2	E	1	Total 5	O 4	S 1	0	0
2	F	1	Total 5	O 4	S 1	0	0
2	F	1	Total 5	O 4	S 1	0	0
2	G	1	Total 5	O 4	S 1	0	0
2	G	1	Total 5	O 4	S 1	0	0
2	G	1	Total 5	O 4	S 1	0	0

- Molecule 3 is water.

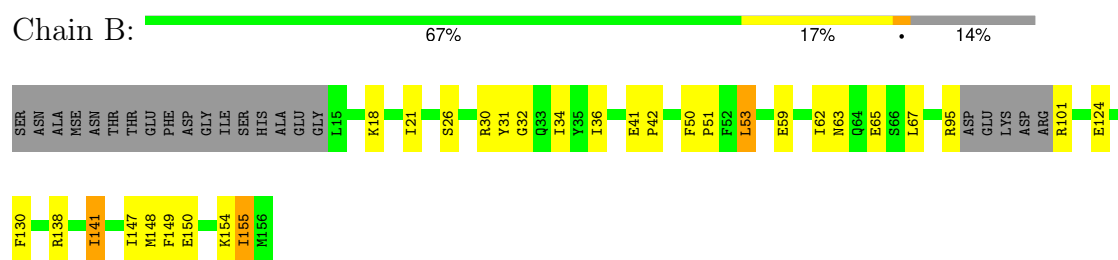| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	24	Total 24	O 24	0	0
3	B	18	Total 18	O 18	0	0
3	C	9	Total 9	O 9	0	0
3	D	6	Total 6	O 6	0	0
3	E	10	Total 10	O 10	0	0
3	F	15	Total 15	O 15	0	0
3	G	2	Total 2	O 2	0	0
3	H	9	Total 9	O 9	0	0

3 Residue-property plots ⓘ

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.

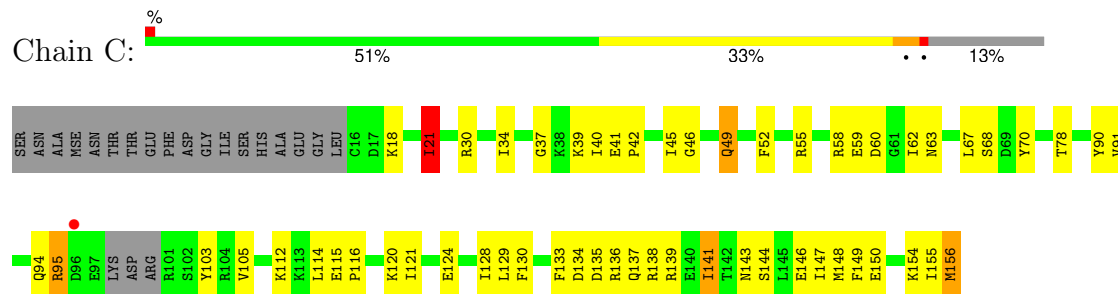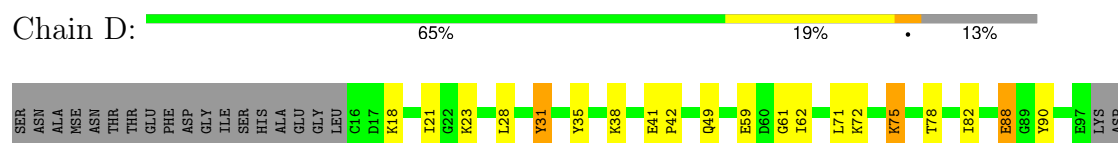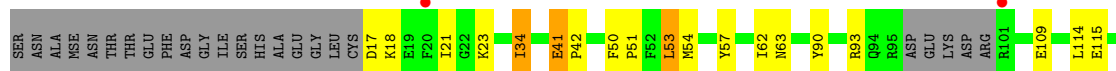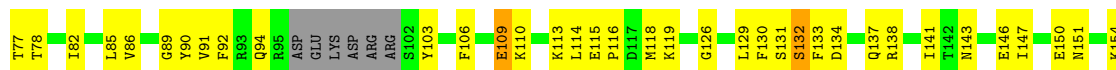• Molecule 1: Transcriptional regulator, MarR family

Chain A:

• Molecule 1: Transcriptional regulator, MarR family

Chain B:

• Molecule 1: Transcriptional regulator, MarR family

Chain C:

• Molecule 1: Transcriptional regulator, MarR family

Chain D:

ARG R101 R104 L114 E127 I128 L129 F130 S131 S132 F133 R138 N143 I147 M148 I155 M156

• Molecule 1: Transcriptional regulator, MarR family

Chain E:

69%   14%   •   15%

SER ASN ALA MSE ASN THR THR GLU PHE ASP GLY ILE SER HIS ALA GLU GLY LEU CYS D17 K18 E19 F20 I21 G22 K23 I34 E41 P42 F50 P51 F52 L53 M54 Y57 I62 N63 Y90 R93 Q94 R95 ASP GLU LYS ASP ARG R101 E109 L114 E115

K119 F130 S144 F149 G152 L153 K154 I155 M156

• Molecule 1: Transcriptional regulator, MarR family

Chain F:

65%   20%   •   11%

SER ASN ALA MSE ASN THR THR GLU PHE ASP GLY ILE SER HIS ALA GLY GLY L115 C16 D17 K18 I21 Y31 Y35 K39 R58 I62 L67 I82 V86 Y90 D96 E97 K98 R101 V105 E109 K112 K113 L114 E115 P116 K120

E124 E127 F130 S131 S132 F133 R136 Q137 R138 R139 E140 I141 L145 E146 G152 I155 M156

• Molecule 1: Transcriptional regulator, MarR family

Chain G:

45%   36%   •   16%

SER ASN ALA MSE ASN THR THR GLU PHE ASP GLY ILE SER HIS ALA GLU GLY LEU CYS D17 K18 E19 F20 I21 G22 K23 Y27 L28 Y29 R30 I34 Y35 I36 I40 E41 P42 Q49 L53 M54 R55 R58 E59 I62 N63 S66 L67 S68 D69 Y70 I73

T77 T78 I82 L85 V86 G89 Y90 V91 F92 R93 Q94 R95 ASP GLU LYS ASP ARG ARG S102 Y103 F106 E109 K110 K113 L114 E115 P116 D117 M118 K119 G126 L129 F130 S131 S132 F133 D134 Q137 R138 I141 T142 N143 E146 I147 E150 N151 K154

I155 M156

• Molecule 1: Transcriptional regulator, MarR family

Chain H:

59%   23%   6%   13%

SER ASN ALA MSE ASN THR THR GLU PHE ASP GLY ILE SER HIS ALA GLU GLY LEU CYS ASP K18 E19 F20 I21 G22 I25 S26 Y31 G32 I36 K39 I40 E41 P42 L53 L56 E59 E65 D69 Y70 L71 K72 I73 T77 K84 E88 R95

D96 E97 K98 D99 R100 R101 S102 Y103 R104 E115 P116 W125 G126 E127 I128 L129 F130 Q137 R138 S144 L145 E146 I147 M148 F149 M156

4 Data and refinement statistics   ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	42.94Å 300.08Å 55.71Å 90.00° 111.13° 90.00°	Depositor
Resolution (Å)	46.11 – 2.45 46.11 – 2.45	Depositor EDS
% Data completeness (in resolution range)	94.6 (46.11-2.45) 99.2 (46.11-2.45)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.01 (at 2.45Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.6.4_486)	Depositor
R, R_{free}	0.179 , 0.246 0.177 , 0.237	Depositor DCC
R_{free} test set	2409 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	53.8	Xtriage
Anisotropy	0.127	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 54.5	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.036 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	9311	wwPDB-VP
Average B, all atoms (Å^2)	65.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.79% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 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: SO4

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	0.61	0/1206	0.85	0/1603
1	B	0.62	0/1146	0.86	0/1522
1	C	0.56	0/1155	0.86	1/1534 (0.1%)
1	D	0.54	0/1157	0.88	1/1536 (0.1%)
1	E	0.55	0/1126	0.82	0/1496
1	F	0.65	0/1192	0.91	1/1584 (0.1%)
1	G	0.38	0/1121	0.78	0/1489
1	H	0.43	0/1176	0.79	0/1561
All	All	0.55	0/9279	0.85	3/12325 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	F	131	SER	N-CA-C	5.31	117.07	111.28
1	C	21	ILE	N-CA-C	5.22	115.44	110.42
1	D	31	TYR	N-CA-C	-5.03	105.88	111.36

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	1189	0	1182	37	0
1	B	1130	0	1136	33	0
1	C	1139	0	1135	59	0
1	D	1141	0	1142	44	0
1	E	1110	0	1109	25	0
1	F	1175	0	1177	34	0
1	G	1105	0	1107	56	0
1	H	1159	0	1168	51	0
2	A	15	0	0	0	0
2	B	5	0	0	0	0
2	C	10	0	0	1	0
2	D	10	0	0	0	0
2	E	5	0	0	0	0
2	F	10	0	0	0	0
2	G	15	0	0	1	0
3	A	24	0	0	1	0
3	B	18	0	0	0	0
3	C	9	0	0	0	0
3	D	6	0	0	0	0
3	E	10	0	0	0	0
3	F	15	0	0	0	0
3	G	2	0	0	0	0
3	H	9	0	0	1	0
All	All	9311	0	9156	266	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 14.

The worst 5 of 266 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:C:141:ILE:HG12	1:D:148:MSE:HE1	1.31	1.10
1:D:75:LYS:H	1:D:75:LYS:HD2	1.29	0.98
1:A:144:SER:HB2	1:B:141:ILE:HD11	1.51	0.90
1:B:147:ILE:HD13	1:F:109:GLU:HG3	1.53	0.88
1:A:39:LYS:HB3	1:A:121:ILE:HD12	1.62	0.82

There are no symmetry-related clashes.

5.3   Torsion angles ⓘ

5.3.1   Protein backbone ⓘ

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	142/159 (89%)	140 (99%)	2 (1%)	0	100	100
1	B	133/159 (84%)	131 (98%)	2 (2%)	0	100	100
1	C	134/159 (84%)	131 (98%)	3 (2%)	0	100	100
1	D	134/159 (84%)	131 (98%)	3 (2%)	0	100	100
1	E	131/159 (82%)	130 (99%)	1 (1%)	0	100	100
1	F	140/159 (88%)	136 (97%)	4 (3%)	0	100	100
1	G	130/159 (82%)	125 (96%)	4 (3%)	1 (1%)	16	21
1	H	137/159 (86%)	131 (96%)	4 (3%)	2 (2%)	8	8
All	All	1081/1272 (85%)	1055 (98%)	23 (2%)	3 (0%)	37	45

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	G	131	SER
1	H	98	LYS
1	H	59	GLU

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	125/134 (93%)	114 (91%)	11 (9%)	8	8
1	B	120/134 (90%)	116 (97%)	4 (3%)	33	47

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	121/134 (90%)	111 (92%)	10 (8%)	9	10
1	D	121/134 (90%)	116 (96%)	5 (4%)	26	39
1	E	117/134 (87%)	112 (96%)	5 (4%)	25	37
1	F	125/134 (93%)	113 (90%)	12 (10%)	7	6
1	G	117/134 (87%)	109 (93%)	8 (7%)	13	16
1	H	123/134 (92%)	113 (92%)	10 (8%)	9	11
All	All	969/1072 (90%)	904 (93%)	65 (7%)	13	17

5 of 65 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	65	GLU
1	H	73	ILE
1	C	156	MSE
1	C	141	ILE
1	H	99	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	63	ASN
1	G	143	ASN
1	E	33	GLN
1	G	151	ASN
1	F	137	GLN

5.3.3   RNA ⓘ

There are no RNA molecules in this entry.

5.4   Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5   Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

14 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
2	SO4	A	158	-	4,4,4	0.24	0	6,6,6	0.09	0
2	SO4	C	157	-	4,4,4	0.30	0	6,6,6	0.12	0
2	SO4	A	157	-	4,4,4	0.22	0	6,6,6	0.22	0
2	SO4	B	157	-	4,4,4	0.28	0	6,6,6	0.15	0
2	SO4	E	157	-	4,4,4	0.25	0	6,6,6	0.18	0
2	SO4	F	158	-	4,4,4	0.23	0	6,6,6	0.28	0
2	SO4	G	158	-	4,4,4	0.28	0	6,6,6	0.17	0
2	SO4	G	159	-	4,4,4	0.24	0	6,6,6	0.14	0
2	SO4	D	158	-	4,4,4	0.23	0	6,6,6	0.10	0
2	SO4	D	157	-	4,4,4	0.20	0	6,6,6	0.11	0
2	SO4	C	158	-	4,4,4	0.22	0	6,6,6	0.12	0
2	SO4	G	157	-	4,4,4	0.21	0	6,6,6	0.24	0
2	SO4	F	157	-	4,4,4	0.26	0	6,6,6	0.25	0
2	SO4	A	159	-	4,4,4	0.26	0	6,6,6	0.09	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	G	159	SO4	1	0
2	C	158	SO4	1	0

5.7 Other polymers (i)

There are no such residues in this entry.

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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, 95th 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^2)	Q<0.9
1	A	142/159 (89%)	-0.51	0	100	100	31, 50, 87, 109	0
1	B	133/159 (83%)	-0.53	0	100	100	34, 51, 85, 104	0
1	C	134/159 (84%)	-0.45	1 (0%)	84	85	39, 57, 97, 128	0
1	D	134/159 (84%)	-0.41	0	100	100	40, 60, 93, 113	0
1	E	131/159 (82%)	-0.49	2 (1%)	71	73	34, 57, 93, 128	0
1	F	138/159 (86%)	-0.57	1 (0%)	84	85	34, 50, 76, 100	0
1	G	130/159 (81%)	-0.05	1 (0%)	82	83	56, 89, 119, 136	0
1	H	135/159 (84%)	-0.18	0	100	100	44, 77, 125, 140	0
All	All	1077/1272 (84%)	-0.40	5 (0%)	87	88	31, 60, 110, 140	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	96	ASP	3.6
1	F	15	LEU	2.8
1	E	101	ARG	2.4
1	G	70	TYR	2.2
1	E	20	PHE	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, 95th 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($Å^2$)	Q<0.9
2	SO4	G	158	5/5	0.67	0.12	109,111,118,118	0
2	SO4	G	159	5/5	0.77	0.09	138,141,143,144	0
2	SO4	D	158	5/5	0.78	0.07	152,155,159,159	0
2	SO4	C	158	5/5	0.81	0.09	110,114,115,116	5
2	SO4	A	159	5/5	0.81	0.09	127,128,130,132	0
2	SO4	E	157	5/5	0.84	0.08	104,106,112,117	0
2	SO4	B	157	5/5	0.86	0.09	102,103,107,110	0
2	SO4	A	158	5/5	0.87	0.08	86,86,90,90	5
2	SO4	G	157	5/5	0.87	0.07	91,98,102,104	5
2	SO4	C	157	5/5	0.89	0.10	74,76,82,83	5
2	SO4	A	157	5/5	0.90	0.10	81,95,96,102	0
2	SO4	D	157	5/5	0.95	0.07	78,80,84,94	0
2	SO4	F	157	5/5	0.96	0.06	61,70,72,72	5
2	SO4	F	158	5/5	0.98	0.06	50,52,53,54	5

6.5 Other polymers ⓘ

There are no such residues in this entry.