Full wwPDB X-ray Structure Validation Report ⓘ

Jan 17, 2023 – 10:27 PM EST

PDB ID	:	1VQS
Title	:	Crystal structure of a nipsnap family protein with unknown function (atu4242) from agrobacterium tumefaciens str. c58 at 1.50 A resolution
Authors	:	Joint Center for Structural Genomics (JCSG)
Deposited on	:	2004-12-20
Resolution	:	1.50 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*
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.

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

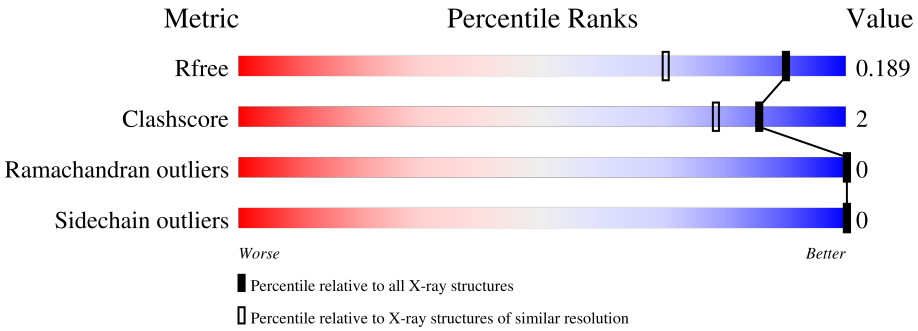
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.31.2
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.2

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 1.50 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	2936 (1.50-1.50)
Clashscore	141614	3144 (1.50-1.50)
Ramachandran outliers	138981	3066 (1.50-1.50)
Sidechain outliers	138945	3064 (1.50-1.50)

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%

Mol	Chain	Length	Quality of chain
1	A	116	91% • • 5%
1	B	116	93% • •
1	C	116	88% 7% 5%
1	D	116	93% • 5%
1	E	116	91% • 5%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 5720 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 hypothetical protein AGR_L_1239.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	110	Total	C	N	O	Se	0	6	0
			934	601	166	162	5			
1	B	111	Total	C	N	O	Se	0	5	0
			947	613	168	162	4			
1	C	110	Total	C	N	O	Se	0	7	0
			939	605	165	164	5			
1	D	110	Total	C	N	O	Se	0	7	0
			929	600	167	158	4			
1	E	110	Total	C	N	O	Se	0	7	0
			930	600	166	160	4			

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-11	MSE	-	expression tag	UNP Q8U857
A	-10	GLY	-	expression tag	UNP Q8U857
A	-9	SER	-	expression tag	UNP Q8U857
A	-8	ASP	-	expression tag	UNP Q8U857
A	-7	LYS	-	expression tag	UNP Q8U857
A	-6	ILE	-	expression tag	UNP Q8U857
A	-5	HIS	-	expression tag	UNP Q8U857
A	-4	HIS	-	expression tag	UNP Q8U857
A	-3	HIS	-	expression tag	UNP Q8U857
A	-2	HIS	-	expression tag	UNP Q8U857
A	-1	HIS	-	expression tag	UNP Q8U857
A	0	HIS	-	expression tag	UNP Q8U857
A	1	MSE	MET	modified residue	UNP Q8U857
A	71	MSE	MET	modified residue	UNP Q8U857
A	95	MSE	MET	modified residue	UNP Q8U857
A	104	MSE	MET	modified residue	UNP Q8U857
B	-11	MSE	-	expression tag	UNP Q8U857
B	-10	GLY	-	expression tag	UNP Q8U857
B	-9	SER	-	expression tag	UNP Q8U857

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-8	ASP	-	expression tag	UNP Q8U857
B	-7	LYS	-	expression tag	UNP Q8U857
B	-6	ILE	-	expression tag	UNP Q8U857
B	-5	HIS	-	expression tag	UNP Q8U857
B	-4	HIS	-	expression tag	UNP Q8U857
B	-3	HIS	-	expression tag	UNP Q8U857
B	-2	HIS	-	expression tag	UNP Q8U857
B	-1	HIS	-	expression tag	UNP Q8U857
B	0	HIS	-	expression tag	UNP Q8U857
B	1	MSE	MET	modified residue	UNP Q8U857
B	71	MSE	MET	modified residue	UNP Q8U857
B	95	MSE	MET	modified residue	UNP Q8U857
B	104	MSE	MET	modified residue	UNP Q8U857
C	-11	MSE	-	expression tag	UNP Q8U857
C	-10	GLY	-	expression tag	UNP Q8U857
C	-9	SER	-	expression tag	UNP Q8U857
C	-8	ASP	-	expression tag	UNP Q8U857
C	-7	LYS	-	expression tag	UNP Q8U857
C	-6	ILE	-	expression tag	UNP Q8U857
C	-5	HIS	-	expression tag	UNP Q8U857
C	-4	HIS	-	expression tag	UNP Q8U857
C	-3	HIS	-	expression tag	UNP Q8U857
C	-2	HIS	-	expression tag	UNP Q8U857
C	-1	HIS	-	expression tag	UNP Q8U857
C	0	HIS	-	expression tag	UNP Q8U857
C	1	MSE	MET	modified residue	UNP Q8U857
C	71	MSE	MET	modified residue	UNP Q8U857
C	95	MSE	MET	modified residue	UNP Q8U857
C	104	MSE	MET	modified residue	UNP Q8U857
D	-11	MSE	-	expression tag	UNP Q8U857
D	-10	GLY	-	expression tag	UNP Q8U857
D	-9	SER	-	expression tag	UNP Q8U857
D	-8	ASP	-	expression tag	UNP Q8U857
D	-7	LYS	-	expression tag	UNP Q8U857
D	-6	ILE	-	expression tag	UNP Q8U857
D	-5	HIS	-	expression tag	UNP Q8U857
D	-4	HIS	-	expression tag	UNP Q8U857
D	-3	HIS	-	expression tag	UNP Q8U857
D	-2	HIS	-	expression tag	UNP Q8U857
D	-1	HIS	-	expression tag	UNP Q8U857
D	0	HIS	-	expression tag	UNP Q8U857
D	1	MSE	MET	modified residue	UNP Q8U857

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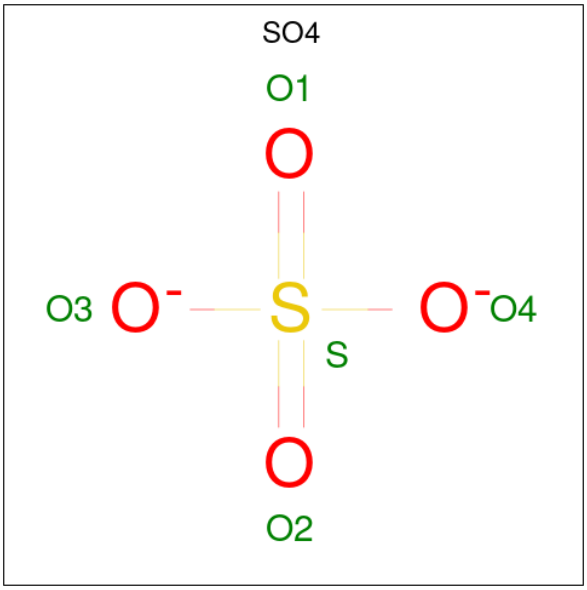
Chain	Residue	Modelled	Actual	Comment	Reference
D	71	MSE	MET	modified residue	UNP Q8U857
D	95	MSE	MET	modified residue	UNP Q8U857
D	104	MSE	MET	modified residue	UNP Q8U857
E	-11	MSE	-	expression tag	UNP Q8U857
E	-10	GLY	-	expression tag	UNP Q8U857
E	-9	SER	-	expression tag	UNP Q8U857
E	-8	ASP	-	expression tag	UNP Q8U857
E	-7	LYS	-	expression tag	UNP Q8U857
E	-6	ILE	-	expression tag	UNP Q8U857
E	-5	HIS	-	expression tag	UNP Q8U857
E	-4	HIS	-	expression tag	UNP Q8U857
E	-3	HIS	-	expression tag	UNP Q8U857
E	-2	HIS	-	expression tag	UNP Q8U857
E	-1	HIS	-	expression tag	UNP Q8U857
E	0	HIS	-	expression tag	UNP Q8U857
E	1	MSE	MET	modified residue	UNP Q8U857
E	71	MSE	MET	modified residue	UNP Q8U857
E	95	MSE	MET	modified residue	UNP Q8U857
E	104	MSE	MET	modified residue	UNP Q8U857

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total O S 9 7 2	0	1
2	B	1	Total O S 10 8 2	0	1

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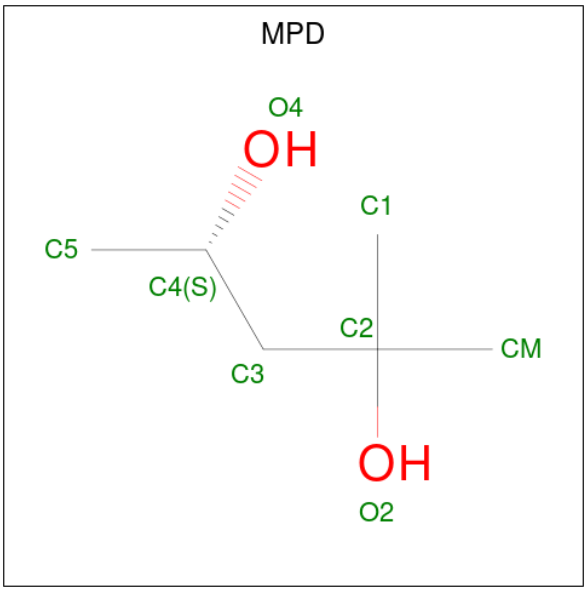
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	C	1	Total O S 10 8 2	0	1
2	D	1	Total O S 10 8 2	0	1
2	E	1	Total O S 10 8 2	0	1

- Molecule 3 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: $C_6H_{14}O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total C O 8 6 2	0	0
3	C	1	Total C O 8 6 2	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	186	Total O 189 189	0	4
4	B	219	Total O 224 224	0	4
4	C	184	Total O 188 188	0	4
4	D	183	Total O 190 190	0	5

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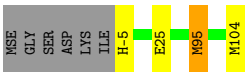
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	E	181	Total	O	0	4
			185	185		

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. 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. 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.

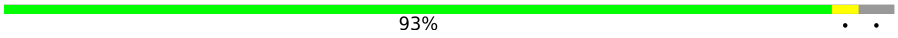
- Molecule 1: hypothetical protein AGR_L_1239

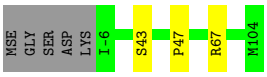
Chain A:



- Molecule 1: hypothetical protein AGR_L_1239

Chain B:



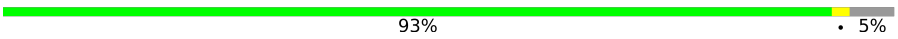


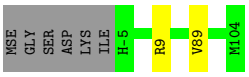
- Molecule 1: hypothetical protein AGR_L_1239

Chain C:

- Molecule 1: hypothetical protein AGR_L_1239

Chain D:





- Molecule 1: hypothetical protein AGR_L_1239

Chain E:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 4 2 2	Depositor
Cell constants a, b, c, α, β, γ	94.79Å 94.79Å 303.13Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.97 – 1.50 29.98 – 1.50	Depositor EDS
% Data completeness (in resolution range)	100.0 (29.97-1.50) 100.0 (29.98-1.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.09	Depositor
$< I/\sigma(I) >$ [1]	1.77 (at 1.50Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.151 , 0.177 0.165 , 0.189	Depositor DCC
R_{free} test set	5508 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	14.9	Xtriage
Anisotropy	0.131	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 43.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	5720	wwPDB-VP
Average B, all atoms (Å^2)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.34% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: MPD, 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	0.70	2/974 (0.2%)	0.72	0/1301
1	B	0.63	0/988	0.74	1/1325 (0.1%)
1	C	0.60	1/980 (0.1%)	0.74	1/1310 (0.1%)
1	D	0.57	0/984	0.72	0/1318
1	E	0.56	0/986	0.75	1/1320 (0.1%)
All	All	0.61	3/4912 (0.1%)	0.73	3/6574 (0.0%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	95	MSE	CB-CG	8.63	1.78	1.52
1	A	95	MSE	CG-SE	-7.18	1.71	1.95
1	C	91	GLU	CD-OE2	5.21	1.31	1.25

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	67	ARG	NE-CZ-NH1	6.44	123.52	120.30
1	C	67	ARG	NE-CZ-NH1	5.91	123.25	120.30
1	E	69	ARG	NE-CZ-NH1	5.08	122.84	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	934	0	924	5	0
1	B	947	0	946	3	0
1	C	939	0	926	5	0
1	D	929	0	921	2	0
1	E	930	0	921	2	0
2	A	9	0	0	0	0
2	B	10	0	0	0	0
2	C	10	0	0	0	0
2	D	10	0	0	0	0
2	E	10	0	0	0	0
3	B	8	0	14	2	0
3	C	8	0	14	2	0
4	A	189	0	0	2	0
4	B	224	0	0	5	0
4	C	188	0	0	3	0
4	D	190	0	0	0	0
4	E	185	0	0	0	0
All	All	5720	0	4666	21	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 2.

All (21) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:95:MSE:CB	1:A:95:MSE:CG	1.78	1.55
1:A:95:MSE:CB	1:A:95:MSE:SE	2.71	0.87
1:A:104[A]:MSE:HE1	4:A:149:HOH:O	1.82	0.79
1:C:104[B]:MSE:HE1	4:C:257:HOH:O	1.90	0.71
1:A:25:GLU:HG3	4:A:273:HOH:O	1.91	0.69
1:B:43[A]:SER:HB2	4:B:148:HOH:O	1.95	0.65
1:D:9:ARG:HB3	1:D:89[A]:VAL:HG12	1.83	0.60
1:B:43[A]:SER:HB3	4:B:172:HOH:O	2.03	0.59
3:C:106:MPD:H12	4:C:121:HOH:O	2.03	0.57
3:C:106:MPD:H11	3:C:106:MPD:O4	2.09	0.52
1:C:10:LEU:HD12	1:C:15[A]:ILE:HD13	1.91	0.52
1:C:65:GLU:HG3	1:C:69:ARG:NH1	2.25	0.52
3:B:106:MPD:H11	3:B:106:MPD:O4	2.10	0.50
3:B:106:MPD:H12	4:B:112:HOH:O	2.13	0.48
1:E:25:GLU:OE1	1:E:82[B]:LYS:NZ	2.34	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:9:ARG:HB3	1:D:89[A]:VAL:CG1	2.43	0.47
1:A:-5:HIS:HB3	4:B:151:HOH:O	2.19	0.43
1:E:15[A]:ILE:HD13	1:E:51:ILE:HD11	1.99	0.43
1:C:35[A]:GLY:O	4:C:289:HOH:O	2.22	0.43
1:B:47:PRO:HD2	4:B:172:HOH:O	2.19	0.43
1:C:10:LEU:CD1	1:C:15[A]:ILE:HD13	2.51	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	113/116 (97%)	108 (96%)	5 (4%)	0	100	100
1	B	114/116 (98%)	111 (97%)	3 (3%)	0	100	100
1	C	114/116 (98%)	110 (96%)	4 (4%)	0	100	100
1	D	115/116 (99%)	111 (96%)	4 (4%)	0	100	100
1	E	115/116 (99%)	110 (96%)	5 (4%)	0	100	100
All	All	571/580 (98%)	550 (96%)	21 (4%)	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	100/97 (103%)	100 (100%)	0	100	100
1	B	103/97 (106%)	103 (100%)	0	100	100
1	C	101/97 (104%)	101 (100%)	0	100	100
1	D	101/97 (104%)	101 (100%)	0	100	100
1	E	101/97 (104%)	101 (100%)	0	100	100
All	All	506/485 (104%)	506 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	-5	HIS
1	C	-3	HIS

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)

12 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	C	105[A]	-	4,4,4	0.17	0	6,6,6	0.18	0
2	SO4	B	105[A]	-	4,4,4	0.14	0	6,6,6	0.16	0
2	SO4	A	105[A]	-	4,4,4	0.16	0	6,6,6	0.18	0
3	MPD	C	106	-	7,7,7	0.40	0	9,10,10	0.47	0
2	SO4	D	105[A]	-	4,4,4	0.18	0	6,6,6	0.11	0
2	SO4	C	105[B]	-	4,4,4	0.17	0	6,6,6	0.18	0
2	SO4	B	105[B]	-	4,4,4	0.14	0	6,6,6	0.16	0
2	SO4	A	105[B]	-	0,3,4	-	-	0,3,6	-	-
2	SO4	E	105[A]	-	4,4,4	0.17	0	6,6,6	0.19	0
3	MPD	B	106	-	7,7,7	0.52	0	9,10,10	0.20	0
2	SO4	D	105[B]	-	4,4,4	0.19	0	6,6,6	0.12	0
2	SO4	E	105[B]	-	4,4,4	0.17	0	6,6,6	0.18	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
3	MPD	B	106	-	-	0/5/5/5	-
3	MPD	C	106	-	-	0/5/5/5	-

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 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	106	MPD	2	0
3	B	106	MPD	2	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

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.