



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 17, 2024 – 04:02 AM EDT

PDB ID : 3SFU  
Title : crystal structure of murine norovirus RNA dependent RNA polymerase in complex with ribavirin  
Authors : Kim, K.H.; Alam, I.  
Deposited on : 2011-06-14  
Resolution : 2.50 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)

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.20.1  
EDS : 2.37.1  
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) : 2.37.1

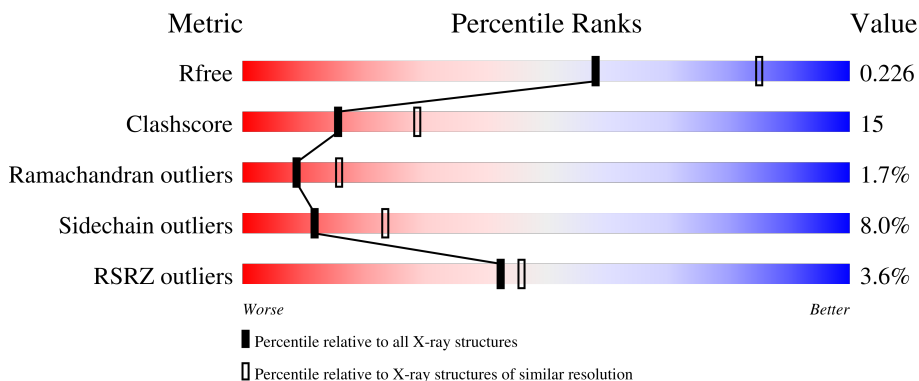
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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  $\geq 3$ , 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	517	 3% 71% 17% 5% 4%
1	B	517	 4% 69% 21% 5% 1%
1	C	517	 3% 67% 21% 5% 4%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	RBV	C	601	-	-	X	X
3	SO4	B	606	-	-	X	-
3	SO4	C	609	-	-	-	X
3	SO4	C	613	-	-	X	-
5	GOL	A	617	-	-	X	-

## 2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 12321 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 RNA polymerase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	480	Total 3828	C 2423	N 674	O 706	S 25	0	1	0
1	B	487	Total 3865	C 2444	N 680	O 716	S 25	0	0	0
1	C	478	Total 3800	C 2405	N 669	O 702	S 24	0	0	0

There are 33 discrepancies between the modelled and reference sequences:

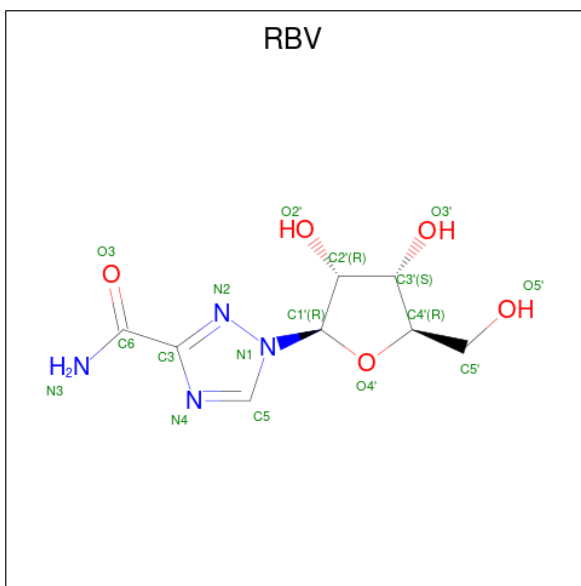
Chain	Residue	Modelled	Actual	Comment	Reference
A	510	ALA	-	EXPRESSION TAG	UNP Q80J95
A	511	ALA	-	EXPRESSION TAG	UNP Q80J95
A	512	ALA	-	EXPRESSION TAG	UNP Q80J95
A	513	LEU	-	EXPRESSION TAG	UNP Q80J95
A	514	GLU	-	EXPRESSION TAG	UNP Q80J95
A	515	HIS	-	EXPRESSION TAG	UNP Q80J95
A	516	HIS	-	EXPRESSION TAG	UNP Q80J95
A	517	HIS	-	EXPRESSION TAG	UNP Q80J95
A	518	HIS	-	EXPRESSION TAG	UNP Q80J95
A	519	HIS	-	EXPRESSION TAG	UNP Q80J95
A	520	HIS	-	EXPRESSION TAG	UNP Q80J95
B	510	ALA	-	EXPRESSION TAG	UNP Q80J95
B	511	ALA	-	EXPRESSION TAG	UNP Q80J95
B	512	ALA	-	EXPRESSION TAG	UNP Q80J95
B	513	LEU	-	EXPRESSION TAG	UNP Q80J95
B	514	GLU	-	EXPRESSION TAG	UNP Q80J95
B	515	HIS	-	EXPRESSION TAG	UNP Q80J95
B	516	HIS	-	EXPRESSION TAG	UNP Q80J95
B	517	HIS	-	EXPRESSION TAG	UNP Q80J95
B	518	HIS	-	EXPRESSION TAG	UNP Q80J95
B	519	HIS	-	EXPRESSION TAG	UNP Q80J95
B	520	HIS	-	EXPRESSION TAG	UNP Q80J95
C	510	ALA	-	EXPRESSION TAG	UNP Q80J95

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Chain	Residue	Modelled	Actual	Comment	Reference
C	511	ALA	-	EXPRESSION TAG	UNP Q80J95
C	512	ALA	-	EXPRESSION TAG	UNP Q80J95
C	513	LEU	-	EXPRESSION TAG	UNP Q80J95
C	514	GLU	-	EXPRESSION TAG	UNP Q80J95
C	515	HIS	-	EXPRESSION TAG	UNP Q80J95
C	516	HIS	-	EXPRESSION TAG	UNP Q80J95
C	517	HIS	-	EXPRESSION TAG	UNP Q80J95
C	518	HIS	-	EXPRESSION TAG	UNP Q80J95
C	519	HIS	-	EXPRESSION TAG	UNP Q80J95
C	520	HIS	-	EXPRESSION TAG	UNP Q80J95

- Molecule 2 is 1-(beta-D-ribofuranosyl)-1H-1,2,4-triazole-3-carboxamide (three-letter code: RBV) (formula: C<sub>8</sub>H<sub>12</sub>N<sub>4</sub>O<sub>5</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
2	A	1	Total	C	N	O	0	0
			17	8	4	5		
2	B	1	Total	C	N	O	0	0
			17	8	4	5		
2	C	1	Total	C	N	O	0	0
			17	8	4	5		

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



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Mg	0	0
			1	1		
4	B	1	Total	Mg	0	0
			1	1		
4	C	1	Total	Mg	0	0
			1	1		

- Molecule 5 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
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	A	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0
5	B	1	Total C O 6 3 3	0	0

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

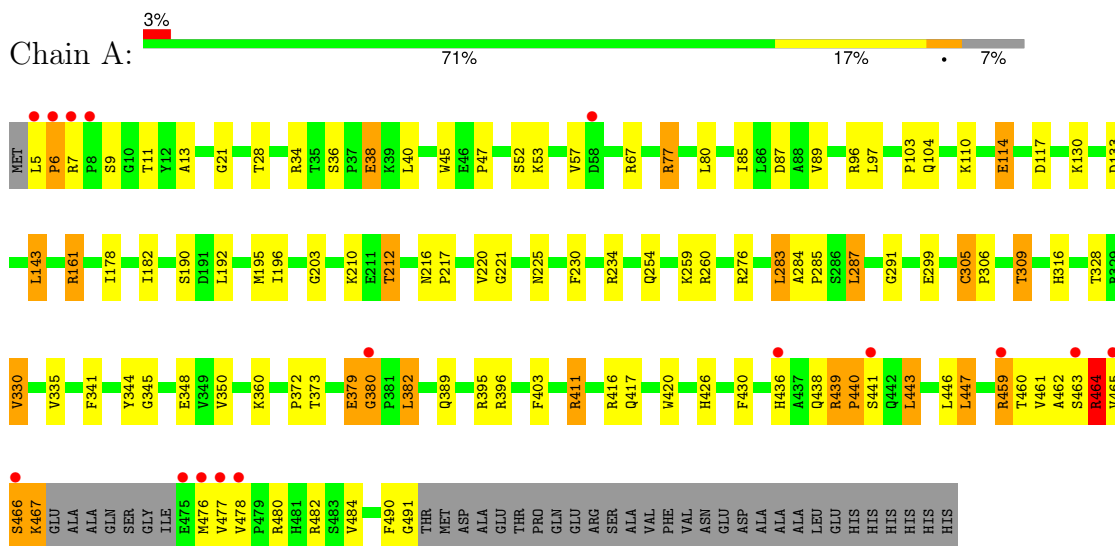
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	179	Total O 179 179	0	0
6	B	149	Total O 149 149	0	0
6	C	155	Total O 155 155	0	0

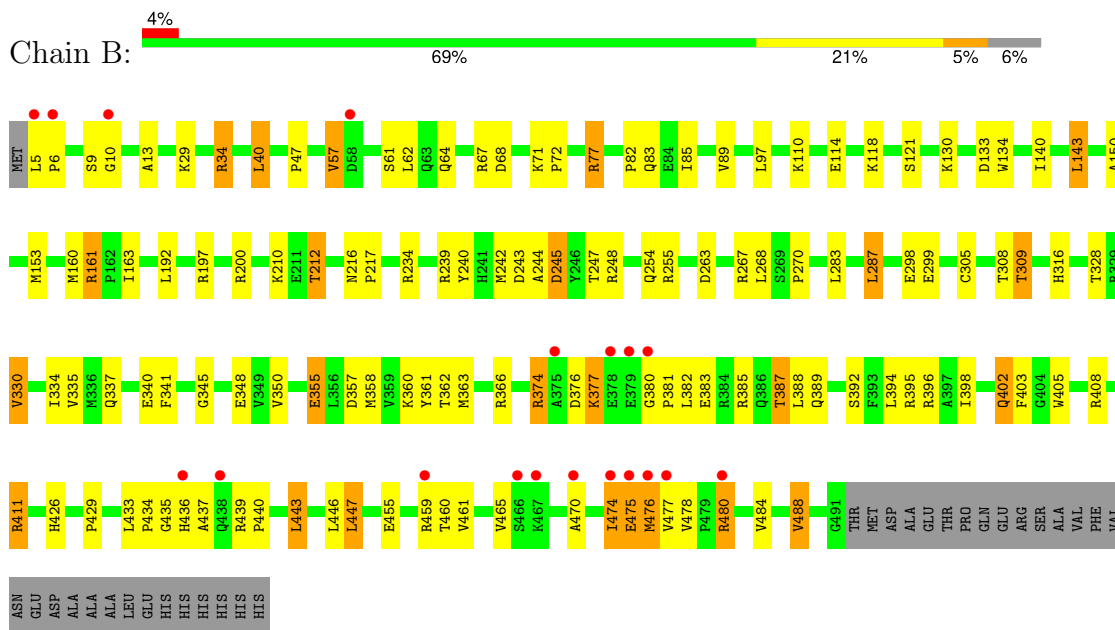
### 3 Residue-property plots [i](#)

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.

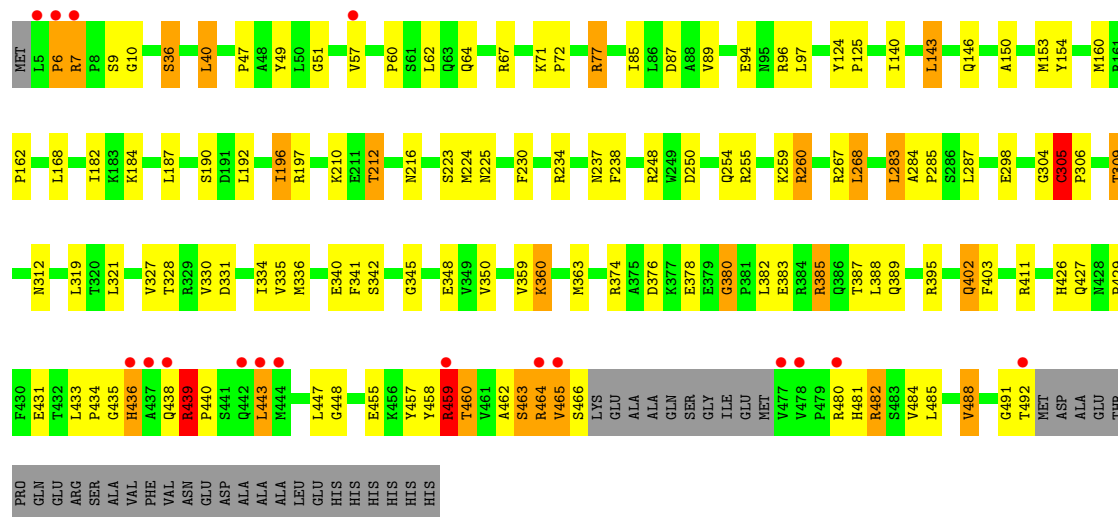
- Molecule 1: RNA polymerase



- Molecule 1: RNA polymerase



- Molecule 1: RNA polymerase



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	119.95Å 196.08Å 109.21Å 90.00° 114.12° 90.00°	Depositor
Resolution (Å)	47.85 – 2.50 49.02 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.6 (47.85-2.50) 95.6 (49.02-2.50)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	0.46	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.32 (at 2.51Å)	Xtrriage
Refinement program	REFMAC, PHENIX 1.7.1_743	Depositor
R, $R_{free}$	0.181 , 0.229 0.184 , 0.226	Depositor DCC
$R_{free}$ test set	2000 reflections (2.53%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	27.6	Xtrriage
Anisotropy	0.628	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 49.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	12321	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	34.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.46% 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: MG, GOL, RBV, 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	0.42	0/3923	0.58	0/5314
1	B	0.40	0/3961	0.57	1/5368 (0.0%)
1	C	0.41	0/3895	0.58	0/5280
All	All	0.41	0/11779	0.58	1/15962 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	57	VAL	CB-CA-C	-5.28	101.38	111.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	459	ARG	Peptide

### 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	3828	0	3790	119	1
1	B	3865	0	3822	111	0
1	C	3800	0	3757	113	0
2	A	17	0	12	4	0
2	B	17	0	12	4	0
2	C	17	0	12	10	0
3	A	40	0	0	1	0
3	B	35	0	0	4	0
3	C	60	0	0	4	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
5	A	60	0	80	13	0
5	B	54	0	72	5	0
5	C	42	0	56	8	0
6	A	179	0	0	5	0
6	B	149	0	0	4	0
6	C	155	0	0	4	0
All	All	12321	0	11613	345	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 15.

The worst 5 of 345 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:463:SER:HA	1:A:464:ARG:HB3	1.18	1.17
1:A:104:GLN:H	5:A:618:GOL:H32	1.02	1.15
1:B:436:HIS:H	1:B:437:ALA:HA	1.16	1.08
1:B:161:ARG:HG3	1:B:161:ARG:HH11	1.22	1.04
1:A:305:CYS:HB2	1:A:306:PRO:HD2	1.36	1.04

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:234:ARG:NH2	1:A:403:PHE:O[2_454]	2.02	0.18

## 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	477/517 (92%)	455 (95%)	16 (3%)	6 (1%)	12	21
1	B	485/517 (94%)	456 (94%)	22 (4%)	7 (1%)	11	20
1	C	474/517 (92%)	444 (94%)	18 (4%)	12 (2%)	5	8
All	All	1436/1551 (93%)	1355 (94%)	56 (4%)	25 (2%)	9	16

5 of 25 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	440	PRO
1	B	475	GLU
1	C	6	PRO
1	C	305	CYS
1	C	436	HIS

### 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	412/440 (94%)	377 (92%)	35 (8%)	10	21
1	B	415/440 (94%)	383 (92%)	32 (8%)	13	25
1	C	409/440 (93%)	377 (92%)	32 (8%)	12	24
All	All	1236/1320 (94%)	1137 (92%)	99 (8%)	12	23

5 of 99 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	392	SER
1	C	97	LEU
1	B	411	ARG
1	B	480	ARG
1	C	212	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	216	ASN
1	A	436	HIS
1	B	216	ASN
1	C	481	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](#)

Of 59 ligands modelled in this entry, 3 are monoatomic - leaving 56 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	$\# Z  > 2$
5	GOL	A	615	-	5,5,5	0.41	0	5,5,5	0.46	0



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	SO4	C	612	-	4,4,4	0.23	0	6,6,6	0.10	0
5	GOL	A	617	-	5,5,5	0.38	0	5,5,5	0.30	0
3	SO4	A	602	-	4,4,4	0.24	0	6,6,6	0.19	0
3	SO4	C	613	-	4,4,4	0.26	0	6,6,6	0.09	0
5	GOL	A	620	-	5,5,5	0.45	0	5,5,5	0.32	0
5	GOL	B	616	-	5,5,5	0.41	0	5,5,5	0.15	0
5	GOL	A	613	-	5,5,5	0.36	0	5,5,5	0.46	0
5	GOL	B	610	-	5,5,5	0.37	0	5,5,5	0.32	0
5	GOL	B	618	-	5,5,5	0.35	0	5,5,5	0.44	0
5	GOL	B	611	-	5,5,5	0.37	0	5,5,5	0.30	0
5	GOL	A	619	-	5,5,5	0.36	0	5,5,5	0.42	0
3	SO4	C	603	-	4,4,4	0.23	0	6,6,6	0.09	0
3	SO4	A	607	-	4,4,4	0.26	0	6,6,6	0.13	0
3	SO4	A	604	-	4,4,4	0.23	0	6,6,6	0.07	0
3	SO4	C	605	-	4,4,4	0.23	0	6,6,6	0.07	0
5	GOL	C	620	-	5,5,5	0.51	0	5,5,5	0.39	0
3	SO4	C	608	-	4,4,4	0.23	0	6,6,6	0.07	0
5	GOL	B	613	-	5,5,5	0.36	0	5,5,5	0.41	0
2	RBV	C	601	-	14,18,18	1.72	2 (14%)	16,26,26	3.93	2 (12%)
3	SO4	B	605	-	4,4,4	0.26	0	6,6,6	0.11	0
3	SO4	A	608	-	4,4,4	0.24	0	6,6,6	0.14	0
3	SO4	C	609	-	4,4,4	0.23	0	6,6,6	0.07	0
3	SO4	C	611	-	4,4,4	0.23	0	6,6,6	0.09	0
3	SO4	A	603	-	4,4,4	0.22	0	6,6,6	0.18	0
5	GOL	C	617	-	5,5,5	0.40	0	5,5,5	0.25	0
3	SO4	C	610	-	4,4,4	0.23	0	6,6,6	0.08	0
5	GOL	C	606	-	5,5,5	0.34	0	5,5,5	0.35	0
3	SO4	B	604	-	4,4,4	0.27	0	6,6,6	0.16	0
5	GOL	B	615	-	5,5,5	0.37	0	5,5,5	0.29	0
3	SO4	A	606	-	4,4,4	0.21	0	6,6,6	0.07	0
5	GOL	A	612	-	5,5,5	0.36	0	5,5,5	0.30	0
5	GOL	C	618	-	5,5,5	0.37	0	5,5,5	0.59	0
3	SO4	B	608	-	4,4,4	0.24	0	6,6,6	0.13	0
2	RBV	A	601	-	14,18,18	1.69	1 (7%)	16,26,26	4.78	4 (25%)
3	SO4	C	607	-	4,4,4	0.23	0	6,6,6	0.07	0
3	SO4	A	609	-	4,4,4	0.23	0	6,6,6	0.13	0
5	GOL	C	621	-	5,5,5	0.28	0	5,5,5	0.60	0
3	SO4	C	614	-	4,4,4	0.24	0	6,6,6	0.13	0
3	SO4	B	603	-	4,4,4	0.25	0	6,6,6	0.13	0
5	GOL	C	616	-	5,5,5	0.31	0	5,5,5	0.34	0
5	GOL	A	614	-	5,5,5	0.33	0	5,5,5	0.47	0
3	SO4	C	602	-	4,4,4	0.23	0	6,6,6	0.20	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	GOL	A	618	-	5,5,5	0.38	0	5,5,5	0.31	0
3	SO4	C	615	-	4,4,4	0.24	0	6,6,6	0.13	0
5	GOL	A	616	-	5,5,5	0.41	0	5,5,5	0.19	0
5	GOL	A	611	-	5,5,5	0.41	0	5,5,5	0.17	0
3	SO4	B	606	-	4,4,4	0.21	0	6,6,6	0.10	0
5	GOL	C	619	-	5,5,5	0.39	0	5,5,5	0.24	0
2	RBV	B	601	-	14,18,18	1.64	1 (7%)	16,26,26	4.61	3 (18%)
3	SO4	B	602	-	4,4,4	0.23	0	6,6,6	0.08	0
3	SO4	A	605	-	4,4,4	0.26	0	6,6,6	0.27	0
5	GOL	B	614	-	5,5,5	0.37	0	5,5,5	0.34	0
3	SO4	B	607	-	4,4,4	0.28	0	6,6,6	0.19	0
5	GOL	B	617	-	5,5,5	0.43	0	5,5,5	0.25	0
5	GOL	B	612	-	5,5,5	0.38	0	5,5,5	0.35	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
5	GOL	A	615	-	-	2/4/4/4	-
5	GOL	A	617	-	-	2/4/4/4	-
5	GOL	A	620	-	-	0/4/4/4	-
5	GOL	B	618	-	-	2/4/4/4	-
5	GOL	B	616	-	-	2/4/4/4	-
5	GOL	A	613	-	-	2/4/4/4	-
5	GOL	B	610	-	-	4/4/4/4	-
5	GOL	B	611	-	-	2/4/4/4	-
5	GOL	A	619	-	-	0/4/4/4	-
5	GOL	C	620	-	-	4/4/4/4	-
5	GOL	B	613	-	-	0/4/4/4	-
2	RBV	C	601	-	-	0/2/26/26	0/2/2/2
5	GOL	C	617	-	-	2/4/4/4	-
5	GOL	C	606	-	-	2/4/4/4	-
5	GOL	B	615	-	-	2/4/4/4	-
5	GOL	A	612	-	-	2/4/4/4	-
5	GOL	C	618	-	-	2/4/4/4	-
5	GOL	C	621	-	-	4/4/4/4	-
2	RBV	A	601	-	-	2/2/26/26	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	GOL	C	616	-	-	0/4/4/4	-
5	GOL	A	614	-	-	2/4/4/4	-
5	GOL	A	618	-	-	4/4/4/4	-
5	GOL	A	616	-	-	0/4/4/4	-
5	GOL	A	611	-	-	2/4/4/4	-
5	GOL	C	619	-	-	2/4/4/4	-
2	RBV	B	601	-	-	1/2/26/26	0/2/2/2
5	GOL	B	614	-	-	2/4/4/4	-
5	GOL	B	617	-	-	4/4/4/4	-
5	GOL	B	612	-	-	2/4/4/4	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	601	RBV	C6-N3	5.83	1.43	1.33
2	B	601	RBV	C6-N3	5.65	1.43	1.33
2	C	601	RBV	C6-N3	5.60	1.43	1.33
2	C	601	RBV	C3-C6	-2.20	1.51	1.53

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	601	RBV	C5-N4-C3	16.77	107.78	101.63
2	B	601	RBV	C5-N4-C3	16.13	107.55	101.63
2	C	601	RBV	C5-N4-C3	13.93	106.74	101.63
2	A	601	RBV	N2-C3-N4	-8.56	107.63	114.72
2	B	601	RBV	N2-C3-N4	-8.38	107.78	114.72

There are no chirality outliers.

5 of 55 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	611	GOL	O1-C1-C2-C3
5	A	613	GOL	O1-C1-C2-C3
5	A	615	GOL	C1-C2-C3-O3
5	A	617	GOL	C1-C2-C3-O3
5	A	618	GOL	C1-C2-C3-O3

There are no ring outliers.

23 monomers are involved in 53 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	615	GOL	1	0
5	A	617	GOL	5	0
3	C	613	SO4	2	0
5	A	620	GOL	1	0
5	B	618	GOL	1	0
5	A	619	GOL	2	0
5	C	620	GOL	3	0
2	C	601	RBV	10	0
3	A	608	SO4	1	0
3	C	609	SO4	1	0
5	C	618	GOL	3	0
3	B	608	SO4	1	0
2	A	601	RBV	4	0
5	C	621	GOL	1	0
5	C	616	GOL	1	0
5	A	614	GOL	1	0
5	A	618	GOL	3	0
3	C	615	SO4	1	0
3	B	606	SO4	2	0
2	B	601	RBV	4	0
5	B	614	GOL	3	0
3	B	607	SO4	1	0
5	B	612	GOL	1	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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	480/517 (92%)	-0.19	16 (3%) 46 50	13, 25, 72, 161	0
1	B	487/517 (94%)	-0.12	19 (3%) 39 42	15, 29, 77, 149	0
1	C	478/517 (92%)	-0.08	17 (3%) 42 46	14, 28, 75, 137	0
All	All	1445/1551 (93%)	-0.13	52 (3%) 42 46	13, 28, 74, 161	0

The worst 5 of 52 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	476	MET	8.4
1	C	5	LEU	8.3
1	B	474	ILE	6.9
1	B	5	LEU	6.9
1	C	437	ALA	6.6

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

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

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q < 0.9’ lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	RBV	C	601	17/17	0.71	0.47	49,72,82,83	17
3	SO4	C	609	5/5	0.72	0.41	8,23,26,26	4
2	RBV	B	601	17/17	0.79	0.32	40,53,63,70	17
5	GOL	A	618	6/6	0.80	0.33	31,34,40,40	4
5	GOL	C	606	6/6	0.80	0.24	58,61,68,70	1
5	GOL	A	617	6/6	0.81	0.31	19,24,29,31	4
5	GOL	B	611	6/6	0.82	0.24	51,52,61,66	2
5	GOL	B	615	6/6	0.82	0.20	68,75,75,81	0
3	SO4	C	607	5/5	0.82	0.21	62,64,74,81	2
2	RBV	A	601	17/17	0.83	0.29	24,39,45,45	17
5	GOL	C	620	6/6	0.84	0.29	26,28,31,41	4
5	GOL	C	617	6/6	0.85	0.21	49,50,55,55	1
5	GOL	B	616	6/6	0.85	0.21	57,63,66,69	1
5	GOL	B	617	6/6	0.86	0.32	41,45,49,54	4
5	GOL	B	614	6/6	0.86	0.19	54,56,60,61	1
5	GOL	C	619	6/6	0.87	0.22	49,54,60,65	0
3	SO4	C	614	5/5	0.88	0.28	75,77,93,100	2
5	GOL	B	612	6/6	0.88	0.20	49,51,55,58	2
5	GOL	A	619	6/6	0.89	0.18	46,49,54,56	2
5	GOL	C	618	6/6	0.89	0.18	38,39,44,47	2
5	GOL	A	620	6/6	0.90	0.21	31,37,41,55	2
5	GOL	A	615	6/6	0.90	0.23	28,37,39,44	4
5	GOL	A	612	6/6	0.90	0.21	53,55,63,65	1
3	SO4	B	606	5/5	0.91	0.18	53,58,64,68	3
5	GOL	C	616	6/6	0.91	0.15	43,47,48,54	1
3	SO4	A	605	5/5	0.91	0.19	52,52,55,58	1
3	SO4	B	603	5/5	0.91	0.19	59,67,81,87	2
5	GOL	B	610	6/6	0.91	0.19	46,52,56,57	0
3	SO4	C	611	5/5	0.91	0.23	86,91,106,109	1
3	SO4	C	610	5/5	0.92	0.25	42,44,46,55	2
3	SO4	C	605	5/5	0.92	0.22	60,65,80,81	3
3	SO4	A	606	5/5	0.93	0.18	68,69,84,95	1
5	GOL	B	618	6/6	0.93	0.26	47,48,57,59	1
5	GOL	A	611	6/6	0.93	0.12	35,37,40,44	2
3	SO4	A	608	5/5	0.93	0.18	44,47,60,65	4
3	SO4	C	608	5/5	0.93	0.17	52,65,73,74	3
3	SO4	A	609	5/5	0.93	0.17	72,76,88,92	2
3	SO4	A	604	5/5	0.93	0.27	41,48,54,57	3
3	SO4	A	603	5/5	0.93	0.21	49,50,55,57	3
5	GOL	C	621	6/6	0.93	0.24	35,39,41,46	4
3	SO4	C	612	5/5	0.94	0.28	74,75,87,102	4
5	GOL	A	614	6/6	0.94	0.15	48,55,58,59	0
3	SO4	C	613	5/5	0.94	0.37	59,64,66,72	4

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	SO4	B	605	5/5	0.94	0.18	61,65,77,80	2
3	SO4	A	607	5/5	0.94	0.17	58,58,73,74	2
5	GOL	B	613	6/6	0.94	0.17	41,44,46,47	2
5	GOL	A	613	6/6	0.95	0.18	58,62,64,66	0
3	SO4	A	602	5/5	0.95	0.17	45,47,53,59	4
3	SO4	C	615	5/5	0.95	0.19	66,71,73,74	3
5	GOL	A	616	6/6	0.95	0.17	33,35,36,37	1
4	MG	C	604	1/1	0.96	0.11	40,40,40,40	0
3	SO4	B	602	5/5	0.96	0.17	40,47,51,54	3
3	SO4	C	603	5/5	0.96	0.16	52,60,80,81	2
3	SO4	B	608	5/5	0.97	0.11	59,69,74,79	2
3	SO4	C	602	5/5	0.97	0.20	29,34,43,43	3
3	SO4	B	604	5/5	0.97	0.16	43,46,55,60	3
3	SO4	B	607	5/5	0.97	0.31	34,35,37,38	4
4	MG	B	609	1/1	0.98	0.11	45,45,45,45	0
4	MG	A	610	1/1	0.98	0.09	29,29,29,29	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.