



# Full wwPDB X-ray Structure Validation Report ⓘ

May 15, 2020 – 10:55 pm BST

PDB ID : 1NZ0  
Title : RNASE P PROTEIN FROM THERMOTOGA MARITIMA  
Authors : Kazantsev, A.V.; Krivenko, A.A.; Harrington, D.J.; Carter, R.J.; Holbrook, S.R.; Adams, P.D.; Pace, N.R.; Berkeley Structural Genomics Center (BSGC)  
Deposited on : 2003-02-14  
Resolution : 1.20 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 : 2.11  
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) : 2.11

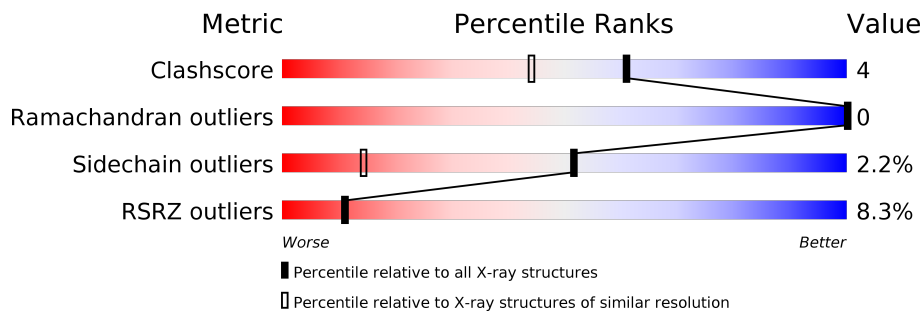
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.20 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))
Clashscore	141614	1286 (1.22-1.18)
Ramachandran outliers	138981	1240 (1.22-1.18)
Sidechain outliers	138945	1239 (1.22-1.18)
RSRZ outliers	127900	1200 (1.22-1.18)

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	118	
1	B	118	
1	C	118	
1	D	118	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4577 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 Ribonuclease P protein component.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	Se			
1	A	109	1018	673	181	162	2	0	19	0
1	C	107	981	650	175	155	1	0	18	0
1	B	110	965	633	178	152	2	0	8	0
1	D	111	1000	662	178	158	2	0	16	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	CLONING ARTIFACT	UNP Q9X1H4
A	1	SER	MET	ENGINEERED	UNP Q9X1H4
B	0	GLY	-	CLONING ARTIFACT	UNP Q9X1H4
B	1	SER	MET	ENGINEERED	UNP Q9X1H4
C	0	GLY	-	CLONING ARTIFACT	UNP Q9X1H4
C	1	SER	MET	ENGINEERED	UNP Q9X1H4
D	0	GLY	-	CLONING ARTIFACT	UNP Q9X1H4
D	1	SER	MET	ENGINEERED	UNP Q9X1H4

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

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

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	136	Total	O	0	19
			136	136		
3	C	137	Total	O	0	25
			137	137		
3	B	119	Total	O	0	24
			119	119		
3	D	141	Total	O	0	16
			141	141		

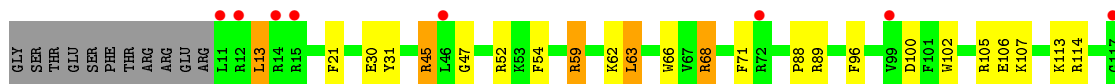
### 3 Residue-property plots [i](#)

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

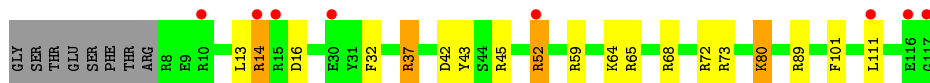
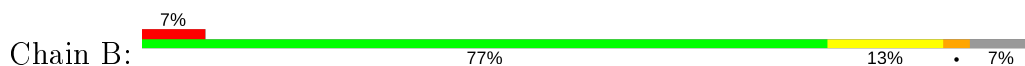
- Molecule 1: Ribonuclease P protein component



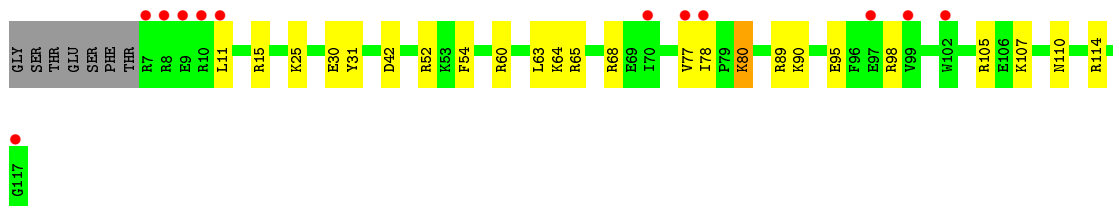
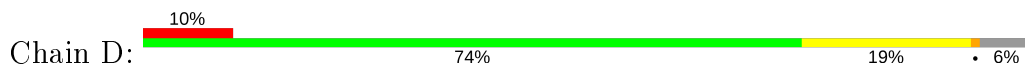
- Molecule 1: Ribonuclease P protein component



- Molecule 1: Ribonuclease P protein component



- Molecule 1: Ribonuclease P protein component



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	56.23Å 64.14Å 68.33Å 90.00° 102.02° 90.00°	Depositor
Resolution (Å)	30.00 – 1.20 11.89 – 1.20	Depositor EDS
% Data completeness (in resolution range)	79.6 (30.00-1.20) 79.1 (11.89-1.20)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	0.06	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.14 (at 1.20Å)	Xtrriage
Refinement program	SHELXL-97	Depositor
R, $R_{free}$	0.163 , 0.217 0.167 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	16.3	Xtrriage
Anisotropy	0.190	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 61.2	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	0.97	EDS
Total number of atoms	4577	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.51% 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: 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	0.76	1/1107 (0.1%)	1.83	25/1468 (1.7%)
1	B	0.70	0/1012	1.98	36/1343 (2.7%)
1	C	0.74	0/1068	1.75	22/1414 (1.6%)
1	D	0.62	0/1071	1.41	9/1421 (0.6%)
All	All	0.71	1/4258 (0.0%)	1.75	92/5646 (1.6%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	114	ARG	CD-NE	-5.40	1.37	1.46

All (92) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	14	ARG	CD-NE-CZ	19.82	151.34	123.60
1	A	114	ARG	CD-NE-CZ	18.93	150.10	123.60
1	B	59	ARG	NE-CZ-NH1	17.08	128.84	120.30
1	A	114	ARG	NE-CZ-NH1	15.85	128.22	120.30
1	A	52	ARG	NE-CZ-NH2	15.51	128.05	120.30
1	C	45[A]	ARG	NE-CZ-NH2	-13.17	113.71	120.30
1	C	45[B]	ARG	NE-CZ-NH2	-13.17	113.71	120.30
1	A	59	ARG	NE-CZ-NH1	13.03	126.81	120.30
1	B	45	ARG	NE-CZ-NH2	12.81	126.71	120.30
1	C	68	ARG	NE-CZ-NH2	-12.38	114.11	120.30
1	B	59	ARG	NE-CZ-NH2	-12.20	114.20	120.30
1	A	52	ARG	CD-NE-CZ	11.32	139.45	123.60
1	B	65	ARG	NE-CZ-NH1	11.09	125.84	120.30
1	C	59[A]	ARG	CD-NE-CZ	10.77	138.67	123.60
1	C	59[B]	ARG	CD-NE-CZ	10.77	138.67	123.60
1	B	37[A]	ARG	NE-CZ-NH2	-10.61	115.00	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	37[B]	ARG	NE-CZ-NH2	-10.61	115.00	120.30
1	B	68[C]	ARG	NE-CZ-NH1	10.60	125.60	120.30
1	B	68[D]	ARG	NE-CZ-NH1	10.60	125.60	120.30
1	B	37[A]	ARG	NE-CZ-NH1	10.28	125.44	120.30
1	B	37[B]	ARG	NE-CZ-NH1	10.28	125.44	120.30
1	C	45[A]	ARG	NE-CZ-NH1	9.76	125.18	120.30
1	C	45[B]	ARG	NE-CZ-NH1	9.76	125.18	120.30
1	A	14	ARG	NE-CZ-NH2	-9.26	115.67	120.30
1	A	105	ARG	NE-CZ-NH2	-9.15	115.72	120.30
1	B	14	ARG	NE-CZ-NH1	-8.84	115.88	120.30
1	B	45	ARG	NE-CZ-NH1	-8.71	115.94	120.30
1	C	89	ARG	NE-CZ-NH2	-8.61	115.99	120.30
1	B	101	PHE	CB-CG-CD1	8.46	126.72	120.80
1	C	100	ASP	CB-CG-OD2	-8.12	110.99	118.30
1	B	16	ASP	CB-CG-OD1	7.97	125.47	118.30
1	A	65[A]	ARG	NE-CZ-NH2	-7.96	116.32	120.30
1	A	65[B]	ARG	NE-CZ-NH2	-7.96	116.32	120.30
1	D	52	ARG	NE-CZ-NH2	-7.93	116.33	120.30
1	B	80	LYS	CD-CE-NZ	7.81	129.66	111.70
1	C	71	PHE	CB-CG-CD1	7.68	126.18	120.80
1	B	14	ARG	NE-CZ-NH2	7.49	124.05	120.30
1	C	63[A]	LEU	CB-CG-CD2	-7.20	98.75	111.00
1	C	63[B]	LEU	CB-CG-CD2	-7.20	98.75	111.00
1	A	89	ARG	NE-CZ-NH2	-7.09	116.75	120.30
1	C	114	ARG	NE-CZ-NH2	-6.92	116.84	120.30
1	B	101	PHE	CG-CD2-CE2	6.88	128.37	120.80
1	C	71	PHE	CB-CG-CD2	-6.86	116.00	120.80
1	C	31	TYR	CB-CG-CD1	6.81	125.09	121.00
1	D	89	ARG	NE-CZ-NH2	-6.69	116.95	120.30
1	B	13	LEU	C-N-CA	6.67	138.37	121.70
1	C	100	ASP	CB-CG-OD1	6.65	124.28	118.30
1	B	89	ARG	NE-CZ-NH2	-6.61	117.00	120.30
1	B	42	ASP	CB-CG-OD2	-6.57	112.39	118.30
1	B	32	PHE	CB-CG-CD2	-6.44	116.29	120.80
1	A	114	ARG	NH1-CZ-NH2	-6.31	112.46	119.40
1	B	73	ARG	NE-CZ-NH1	-6.30	117.15	120.30
1	D	105	ARG	NE-CZ-NH2	-6.27	117.17	120.30
1	B	42	ASP	CB-CG-OD1	6.16	123.84	118.30
1	A	98	ARG	NE-CZ-NH2	-6.14	117.23	120.30
1	A	73	ARG	CD-NE-CZ	6.10	132.14	123.60
1	C	59[A]	ARG	NE-CZ-NH1	6.03	123.31	120.30
1	C	59[B]	ARG	NE-CZ-NH1	6.03	123.31	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	105	ARG	NE-CZ-NH1	6.01	123.31	120.30
1	A	59	ARG	NE-CZ-NH2	-5.93	117.33	120.30
1	A	68[A]	ARG	CD-NE-CZ	5.92	131.89	123.60
1	A	68[B]	ARG	CD-NE-CZ	5.92	131.89	123.60
1	D	65	ARG	NE-CZ-NH2	-5.81	117.40	120.30
1	C	89	ARG	NE-CZ-NH1	5.78	123.19	120.30
1	A	14	ARG	NE-CZ-NH1	5.75	123.17	120.30
1	B	68[C]	ARG	CD-NE-CZ	5.65	131.51	123.60
1	B	68[D]	ARG	CD-NE-CZ	5.65	131.51	123.60
1	B	68[C]	ARG	NE-CZ-NH2	-5.64	117.48	120.30
1	B	68[D]	ARG	NE-CZ-NH2	-5.64	117.48	120.30
1	A	52	ARG	NH1-CZ-NH2	-5.49	113.36	119.40
1	B	43	TYR	CB-CG-CD1	-5.47	117.72	121.00
1	B	65	ARG	NH1-CZ-NH2	-5.40	113.46	119.40
1	C	21	PHE	CB-CG-CD2	-5.35	117.06	120.80
1	A	116[A]	GLU	C-N-CA	5.34	133.51	122.30
1	A	116[B]	GLU	C-N-CA	5.34	133.51	122.30
1	D	15	ARG	NE-CZ-NH2	5.30	122.95	120.30
1	B	101	PHE	CZ-CE2-CD2	-5.24	113.81	120.10
1	B	111[A]	LEU	CA-CB-CG	5.24	127.34	115.30
1	B	111[B]	LEU	CA-CB-CG	5.24	127.34	115.30
1	D	31	TYR	CB-CG-CD1	5.23	124.14	121.00
1	A	54	PHE	CB-CG-CD1	-5.22	117.14	120.80
1	C	68	ARG	NE-CZ-NH1	5.20	122.90	120.30
1	D	60	ARG	NE-CZ-NH2	5.18	122.89	120.30
1	C	114	ARG	NE-CZ-NH1	5.17	122.89	120.30
1	B	72	ARG	CD-NE-CZ	5.16	130.82	123.60
1	D	52	ARG	CD-NE-CZ	5.11	130.76	123.60
1	B	52	ARG	NE-CZ-NH1	5.11	122.85	120.30
1	A	41[C]	MSE	CA-CB-CG	-5.08	104.67	113.30
1	A	41[D]	MSE	CA-CB-CG	-5.08	104.67	113.30
1	D	60	ARG	CD-NE-CZ	5.06	130.69	123.60
1	A	96	PHE	CD1-CE1-CZ	5.02	126.13	120.10
1	B	52	ARG	CD-NE-CZ	5.01	130.62	123.60

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	1018	0	1051	11	0
1	B	965	0	1010	2	0
1	C	981	0	1035	14	0
1	D	1000	0	1040	10	0
2	A	10	0	0	0	0
2	B	30	0	0	0	0
2	C	15	0	0	0	0
2	D	25	0	0	0	0
3	A	136	0	0	1	0
3	B	119	0	0	2	0
3	C	137	0	0	4	0
3	D	141	0	0	3	0
All	All	4577	0	4136	37	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 4.

All (37) 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:64:LYS:O	1:D:68[B]:ARG:HG3	1.86	0.75
1:A:95:GLU:O	1:A:99[A]:VAL:HG23	2.00	0.61
1:C:62:LYS:HE3	1:C:66:TRP:CH2	2.37	0.59
1:C:59[B]:ARG:HD2	1:C:96:PHE:CD2	2.38	0.58
1:C:62:LYS:HE3	1:C:66:TRP:CZ2	2.39	0.57
1:D:54:PHE:CZ	1:D:63[A]:LEU:HD22	2.40	0.57
1:D:64:LYS:HB3	1:D:68[B]:ARG:NH1	2.20	0.57
1:A:96:PHE:O	1:A:99[B]:VAL:HG22	2.06	0.56
1:B:64[B]:LYS:HE3	3:B:7357:HOH:O	2.08	0.54
1:D:42[B]:ASP:HB3	3:D:7098:HOH:O	2.09	0.53
1:D:30[A]:GLU:OE1	1:D:107[A]:LYS:HE3	2.10	0.52
1:A:54:PHE:CZ	1:A:63:LEU:HD22	2.46	0.51
1:C:68:ARG:NH2	3:C:7101:HOH:O	2.44	0.50
1:A:30[B]:GLU:HG3	1:A:31[B]:TYR:CD1	2.47	0.49
1:D:25[B]:LYS:HG3	3:D:7363:HOH:O	2.11	0.49
1:C:13:LEU:HD21	1:C:47:GLY:HA3	1.95	0.49
1:C:102:TRP:CZ3	1:C:105:ARG:HD2	2.49	0.48
1:D:11:LEU:HA	3:D:7423:HOH:O	2.13	0.47
1:C:113[A]:LYS:HE2	3:C:7482:HOH:O	2.15	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:55:GLY:O	1:A:60[B]:ARG:NE	2.47	0.46
1:B:37[A]:ARG:NH2	3:B:7216[A]:HOH:O	2.48	0.46
1:C:45[B]:ARG:NH2	3:C:7233:HOH:O	2.48	0.46
1:A:37:ARG:HG2	3:A:7516:HOH:O	2.15	0.46
1:C:105:ARG:HD3	1:C:106[B]:GLU:OE1	2.15	0.46
1:A:9:GLU:O	1:A:11:LEU:N	2.48	0.45
1:D:78:ILE:O	1:D:80[A]:LYS:HE2	2.16	0.45
1:C:52:ARG:NE	3:C:7521:HOH:O	2.49	0.44
1:C:63[A]:LEU:HD21	1:C:88:PRO:HB3	2.01	0.43
1:D:95:GLU:OE1	1:D:98:ARG:HD3	2.18	0.42
1:D:110:ASN:O	1:D:114[B]:ARG:HG3	2.20	0.42
1:A:52:ARG:NH1	1:A:60[B]:ARG:NH1	2.69	0.41
1:C:30[D]:GLU:OE2	1:C:107:LYS:NZ	2.49	0.41
1:C:54:PHE:CZ	1:C:63[A]:LEU:HD22	2.56	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	126/118 (107%)	125 (99%)	1 (1%)	0	100	100
1	B	116/118 (98%)	115 (99%)	1 (1%)	0	100	100
1	C	123/118 (104%)	123 (100%)	0	0	100	100
1	D	125/118 (106%)	125 (100%)	0	0	100	100
All	All	490/472 (104%)	488 (100%)	2 (0%)	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	111/108 (103%)	110 (99%)	1 (1%)	78	50
1	B	100/108 (93%)	97 (97%)	3 (3%)	41	7
1	C	106/108 (98%)	105 (99%)	1 (1%)	78	50
1	D	103/108 (95%)	98 (95%)	5 (5%)	25	2
All	All	420/432 (97%)	410 (98%)	10 (2%)	52	12

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	37	ARG
1	C	13	LEU
1	B	14	ARG
1	B	52	ARG
1	B	80	LYS
1	D	77[A]	VAL
1	D	77[B]	VAL
1	D	80[A]	LYS
1	D	80[B]	LYS
1	D	90	LYS

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

Mol	Chain	Res	Type
1	D	74	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

16 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	D	5007	-	4,4,4	0.34	0	6,6,6	0.23	0
2	SO4	C	5003	-	4,4,4	0.52	0	6,6,6	0.23	0
2	SO4	B	5008	-	4,4,4	0.43	0	6,6,6	0.23	0
2	SO4	D	5016	-	4,4,4	0.51	0	6,6,6	0.21	0
2	SO4	C	5005	-	4,4,4	0.36	0	6,6,6	0.21	0
2	SO4	D	5001	-	4,4,4	0.34	0	6,6,6	0.17	0
2	SO4	B	5002	-	4,4,4	0.39	0	6,6,6	0.24	0
2	SO4	B	5013[C]	-	4,4,4	0.26	0	6,6,6	0.07	0
2	SO4	B	5006	-	4,4,4	0.22	0	6,6,6	0.25	0
2	SO4	D	5014	-	4,4,4	0.46	0	6,6,6	0.14	0
2	SO4	A	5004	-	4,4,4	0.42	0	6,6,6	0.23	0
2	SO4	C	5010	-	4,4,4	0.53	0	6,6,6	0.31	0
2	SO4	B	5012[C]	-	4,4,4	0.29	0	6,6,6	0.10	0
2	SO4	B	5011	-	4,4,4	0.31	0	6,6,6	0.08	0
2	SO4	A	5009	-	4,4,4	0.34	0	6,6,6	0.39	0
2	SO4	D	5015[C]	-	4,4,4	0.38	0	6,6,6	0.19	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.

No monomer is involved in short contacts.

## 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 [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	108/118 (91%)	0.82	8 (7%) 14 13	11, 17, 30, 51	0
1	B	109/118 (92%)	0.74	8 (7%) 15 13	11, 18, 33, 54	0
1	C	106/118 (89%)	0.93	8 (7%) 14 13	10, 15, 30, 44	0
1	D	110/118 (93%)	0.98	12 (10%) 5 6	12, 20, 34, 54	0
All	All	433/472 (91%)	0.87	36 (8%) 11 11	10, 17, 33, 54	0

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	117	GLY	9.3
1	D	9	GLU	8.3
1	A	117	GLY	6.9
1	C	11	LEU	6.9
1	B	117	GLY	6.2
1	A	10	ARG	5.5
1	D	8	ARG	5.4
1	C	14	ARG	5.4
1	D	117	GLY	4.4
1	D	10	ARG	3.9
1	B	116	GLU	3.9
1	B	10	ARG	3.8
1	A	14	ARG	3.5
1	D	97	GLU	3.5
1	A	11	LEU	3.2
1	C	12	ARG	3.2
1	D	77[A]	VAL	3.0
1	B	14	ARG	2.9
1	B	52	ARG	2.9
1	A	99[A]	VAL	2.8
1	D	102	TRP	2.8

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Mol	Chain	Res	Type	RSRZ
1	D	78	ILE	2.7
1	A	98	ARG	2.5
1	B	15	ARG	2.5
1	D	7	ARG	2.5
1	D	99	VAL	2.5
1	C	72	ARG	2.4
1	D	11	LEU	2.3
1	C	15	ARG	2.3
1	B	30[A]	GLU	2.3
1	A	102	TRP	2.2
1	A	106[A]	GLU	2.2
1	C	99[A]	VAL	2.2
1	C	46	LEU	2.1
1	D	70	ILE	2.1
1	B	111[A]	LEU	2.0

## 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 carbohydrates 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(Å <sup>2</sup> )	Q<0.9
2	SO4	D	5016	5/5	0.82	0.35	31,39,42,45	0
2	SO4	C	5010	5/5	0.89	0.24	22,27,30,32	0
2	SO4	B	5012[C]	5/5	0.90	0.17	41,42,43,48	5
2	SO4	D	5015[C]	5/5	0.90	0.20	34,34,38,41	5
2	SO4	B	5011	5/5	0.92	0.17	33,38,40,43	0
2	SO4	D	5001	5/5	0.93	0.28	41,41,43,46	0
2	SO4	D	5007	5/5	0.94	0.22	24,27,31,34	0
2	SO4	C	5005	5/5	0.94	0.14	22,24,26,27	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	SO4	C	5003	5/5	0.94	0.17	21,23,26,30	0
2	SO4	B	5013[C]	5/5	0.94	0.12	32,32,39,41	5
2	SO4	B	5002	5/5	0.95	0.14	27,28,31,32	0
2	SO4	A	5009	5/5	0.96	0.23	30,33,43,43	0
2	SO4	B	5008	5/5	0.96	0.17	38,39,44,48	0
2	SO4	A	5004	5/5	0.97	0.16	27,28,30,38	0
2	SO4	B	5006	5/5	0.97	0.10	19,20,22,24	0
2	SO4	D	5014	5/5	0.98	0.12	23,25,30,36	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.