



wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 1, 2023 – 06:54 AM EDT

PDB ID : 3IEM
Title : Crystal Structure of TTHA0252 from *Thermus thermophilus* HB8 complexed with RNA analog
Authors : Ishikawa, H.; Nakagawa, N.; Kuramitsu, S.; Yokoyama, S.; Masui, R.
Deposited on : 2009-07-23
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

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 : 2.36
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) : 2.36

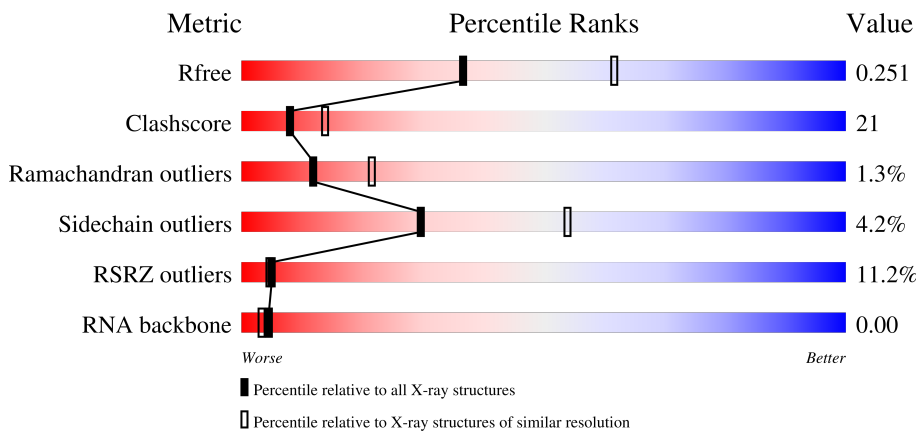
1 Overall quality at a glance

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.




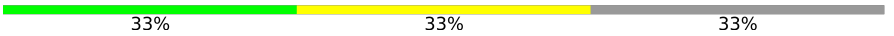



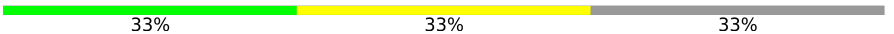




Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)
RNA backbone	3102	1008 (2.84-2.16)

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 $\leq 5\%$. 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	431	
1	B	431	
1	C	431	
1	D	431	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	G	6	 17% 83%
2	H	6	 33% 33% 33%
2	I	6	 17% 83%
2	J	6	 17% 33% 50%
2	K	6	 50% 50%
2	L	6	 33% 33% 33%
2	M	6	 33% 67%
2	N	6	 17% 33% 50%
2	O	6	 33% 67%
2	P	6	 17% 17% 67%

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	SSU	G	3	-	-	X	-
2	SSU	M	2	-	-	X	-
3	SO4	A	439	-	-	-	X
3	SO4	A	446	-	-	X	X
3	SO4	B	443	-	-	-	X
3	SO4	B	445	-	-	X	X
3	SO4	B	448	-	-	X	-
3	SO4	C	439	-	-	X	-
3	SO4	D	436	-	-	X	-
3	SO4	D	439	-	-	X	-
5	FLC	B	450	-	-	X	X

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 14354 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 TTHA0252.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	431	Total 3326	C 2127	N 597	O 594	S 8	0	0	0
1	B	431	Total 3326	C 2127	N 597	O 594	S 8	0	0	0
1	C	431	Total 3326	C 2127	N 597	O 594	S 8	0	0	0
1	D	431	Total 3326	C 2127	N 597	O 594	S 8	0	0	0

- Molecule 2 is a RNA chain called RNA (5'-R*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU))-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	N	O	P				S
2	G	6	Total 101	C 45	N 10	O 36	P 5	S 5	0	0	1
2	H	4	Total 61	C 27	N 6	O 22	P 3	S 3	0	0	1
2	I	6	Total 85	C 36	N 8	O 31	P 5	S 5	0	0	1
2	J	3	Total 41	C 18	N 4	O 15	P 2	S 2	0	0	1
2	K	3	Total 57	C 27	N 6	O 20	P 2	S 2	0	0	0
2	L	4	Total 45	C 18	N 4	O 17	P 3	S 3	0	0	1
2	M	2	Total 21	C 9	N 2	O 8	P 1	S 1	0	0	0
2	N	3	Total 41	C 18	N 4	O 15	P 2	S 2	0	0	1
2	O	2	Total 37	C 18	N 4	O 13	P 1	S 1	0	0	0
2	P	2	Total 21	C 9	N 2	O 8	P 1	S 1	0	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

Continued on next page...

Continued from previous page...

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

Continued on next page...

Continued from previous page...

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

Continued on next page...

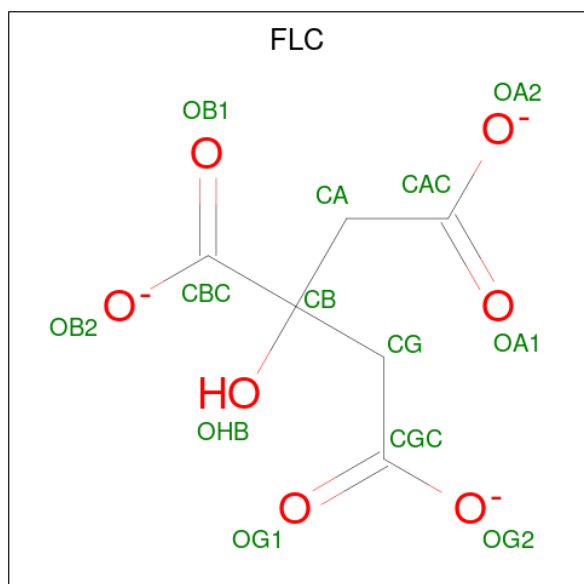
Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	D	1	Total	O	S	0	0
			5	4	1		
3	D	1	Total	O	S	0	0
			5	4	1		
3	J	1	Total	O	S	0	0
			5	4	1		
3	K	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	2	Total	Zn	0	0
			2	2		
4	B	2	Total	Zn	0	0
			2	2		
4	C	2	Total	Zn	0	0
			2	2		
4	D	2	Total	Zn	0	0
			2	2		

- Molecule 5 is CITRATE ANION (three-letter code: FLC) (formula: C₆H₅O₇).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	0	0
			13	6	7		

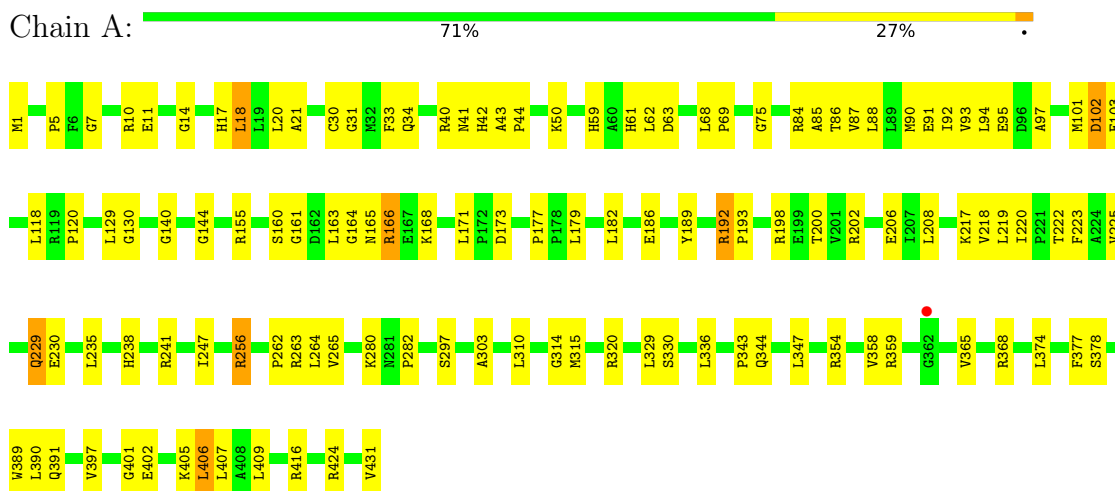
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	84	Total O 84 84	0	0
6	B	71	Total O 71 71	0	0
6	C	22	Total O 22 22	0	0
6	D	37	Total O 37 37	0	0
6	G	1	Total O 1 1	0	0
6	J	2	Total O 2 2	0	0
6	K	2	Total O 2 2	0	0
6	L	2	Total O 2 2	0	0
6	M	1	Total O 1 1	0	0
6	O	2	Total O 2 2	0	0

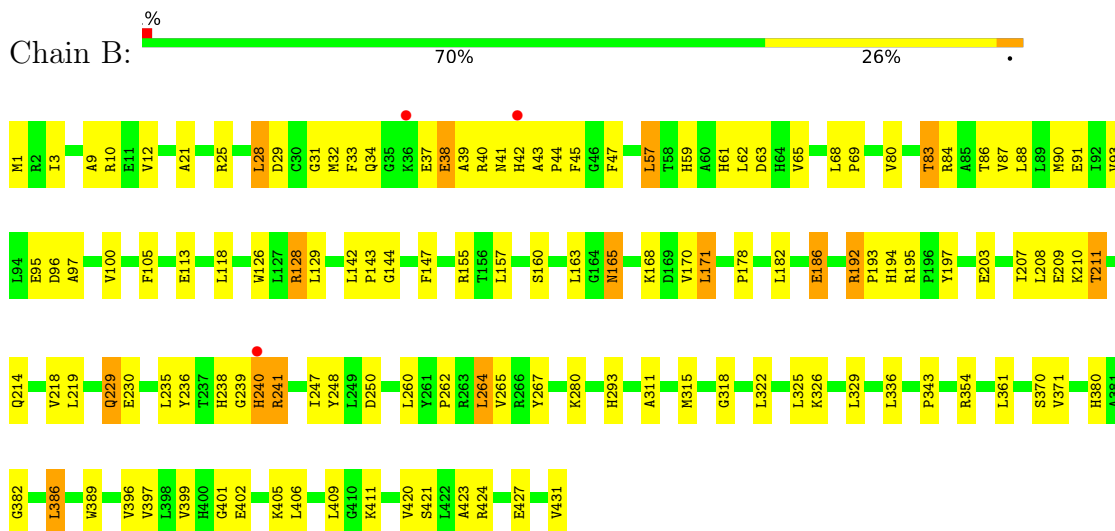
3 Residue-property plots [i](#)

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: Ribonuclease TTHA0252

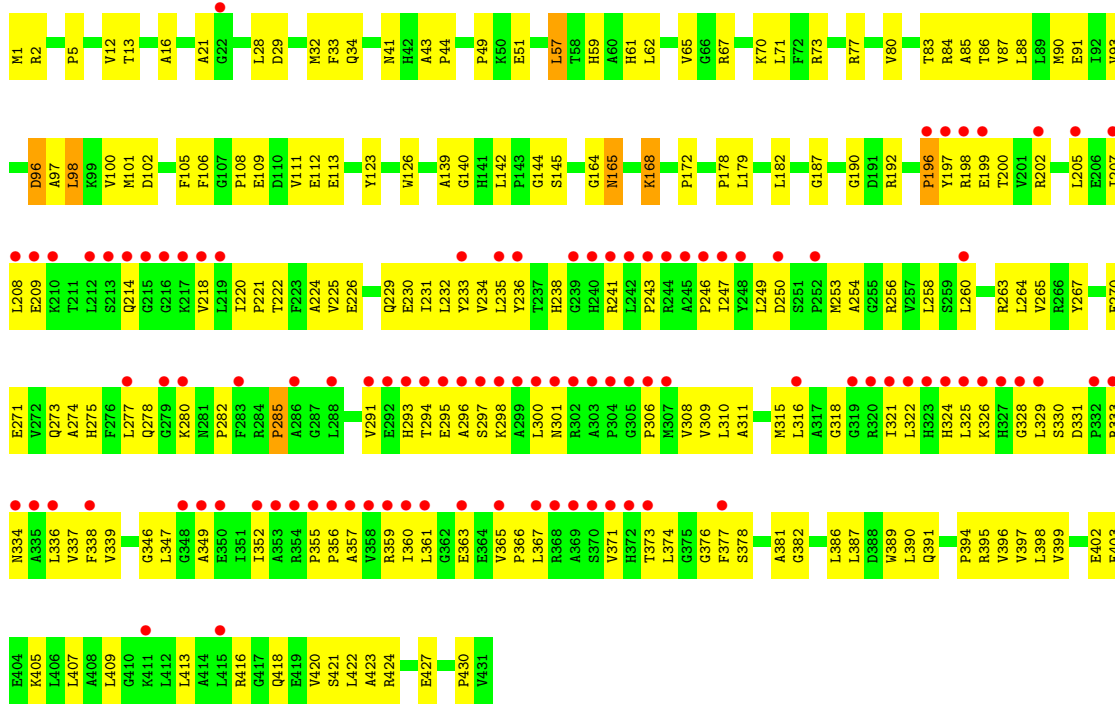


• Molecule 1: Ribonuclease TTHA0252

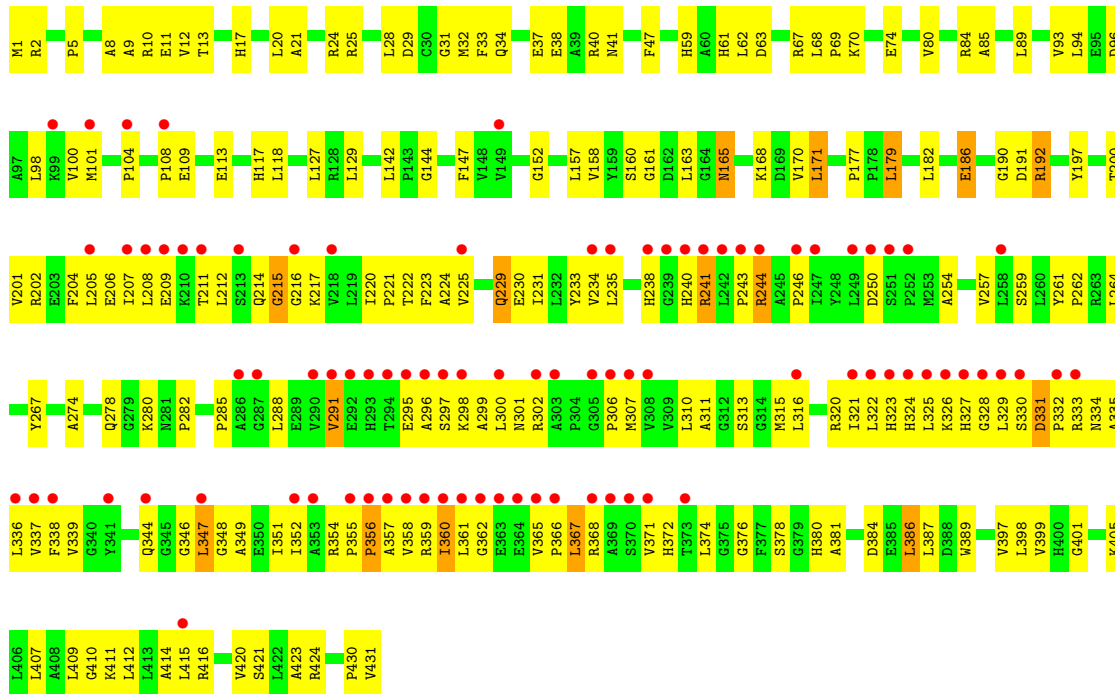


• Molecule 1: Ribonuclease TTHA0252

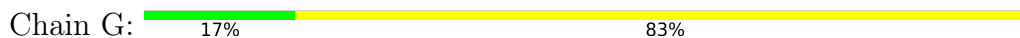


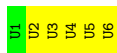


● Molecule 1: Ribonuclease TTHA0252

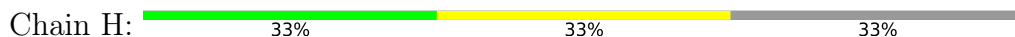


● Molecule 2: RNA (5'-R*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)-3')

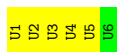
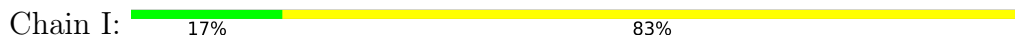




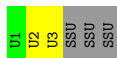
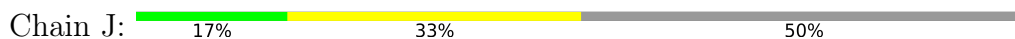
- Molecule 2: RNA (5'-R*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU))-3')



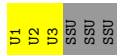
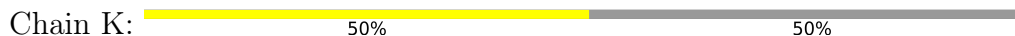
- Molecule 2: RNA (5'-R*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU))-3')



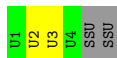
- Molecule 2: RNA (5'-R*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU))-3')



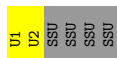
- Molecule 2: RNA (5'-R*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU))-3')



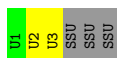
- Molecule 2: RNA (5'-R*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU))-3')



- Molecule 2: RNA (5'-R*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU))-3')



- Molecule 2: RNA (5'-R*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU))-3')



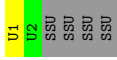
- Molecule 2: RNA (5'-R*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU))-3')





- Molecule 2: RNA (5'-R*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU)P*(SSU))-3')

Chain P:  17% 17% 67%



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	144.69Å 146.44Å 119.97Å 90.00° 110.37° 90.00°	Depositor
Resolution (Å)	50.00 – 2.50 45.93 – 2.50	Depositor EDS
% Data completeness (in resolution range)	93.8 (50.00-2.50) 94.0 (45.93-2.50)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.41 (at 2.51Å)	Xtrriage
Refinement program	CNS	Depositor
R, R_{free}	0.213 , 0.257 0.207 , 0.251	Depositor DCC
R_{free} test set	8060 reflections (10.03%)	wwPDB-VP
Wilson B-factor (Å ²)	37.9	Xtrriage
Anisotropy	0.071	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 53.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	14354	wwPDB-VP
Average B, all atoms (Å ²)	51.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.40% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: FLC, SSU, ZN, 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	0.37	0/3407	0.66	2/4621 (0.0%)
1	B	0.38	0/3407	0.66	1/4621 (0.0%)
1	C	0.31	0/3407	0.59	0/4621
1	D	0.31	0/3407	0.59	1/4621 (0.0%)
All	All	0.35	0/13628	0.62	4/18484 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	161	GLY	N-CA-C	-5.81	98.58	113.10
1	B	386	LEU	CA-CB-CG	5.22	127.30	115.30
1	A	225	VAL	CA-C-N	5.17	128.58	117.20
1	D	161	GLY	N-CA-C	-5.08	100.41	113.10

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	3326	0	3351	90	0
1	B	3326	0	3351	117	0
1	C	3326	0	3351	171	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	3326	0	3351	196	0
2	G	101	0	51	20	0
2	H	61	0	31	4	0
2	I	85	0	40	14	0
2	J	41	0	21	1	0
2	K	57	0	31	7	0
2	L	45	0	20	1	0
2	M	21	0	10	7	0
2	N	41	0	21	2	0
2	O	37	0	21	5	0
2	P	21	0	10	2	0
3	A	80	0	0	5	0
3	B	90	0	0	4	0
3	C	60	0	0	2	0
3	D	55	0	0	5	0
3	J	5	0	0	0	0
3	K	5	0	0	1	0
4	A	2	0	0	0	0
4	B	2	0	0	0	0
4	C	2	0	0	0	0
4	D	2	0	0	0	0
5	B	13	0	5	4	0
6	A	84	0	0	6	0
6	B	71	0	0	1	0
6	C	22	0	0	0	0
6	D	37	0	0	0	0
6	G	1	0	0	0	0
6	J	2	0	0	0	0
6	K	2	0	0	0	0
6	L	2	0	0	0	0
6	M	1	0	0	0	0
6	O	2	0	0	1	0
All	All	14354	0	13665	596	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 21.

The worst 5 of 596 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)
2:M:1:SSU:H1'	2:M:2:SSU:S1P	1.56	1.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:331:ASP:H	1:D:368:ARG:HB2	1.21	1.03
1:D:47:PHE:HA	2:M:2:SSU:S1P	1.99	1.03
2:M:1:SSU:C1'	2:M:2:SSU:S1P	2.47	1.03
1:C:98:LEU:HD11	1:C:108:PRO:HA	1.39	1.01

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	429/431 (100%)	410 (96%)	17 (4%)	2 (0%)	29	48
1	B	429/431 (100%)	405 (94%)	21 (5%)	3 (1%)	22	39
1	C	429/431 (100%)	369 (86%)	50 (12%)	10 (2%)	6	10
1	D	429/431 (100%)	377 (88%)	44 (10%)	8 (2%)	8	13
All	All	1716/1724 (100%)	1561 (91%)	132 (8%)	23 (1%)	12	21

5 of 23 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	241	ARG
1	A	102	ASP
1	B	240	HIS
1	B	241	ARG
1	C	168	LYS

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	342/342 (100%)	324 (95%)	18 (5%)	22	43
1	B	342/342 (100%)	325 (95%)	17 (5%)	24	46
1	C	342/342 (100%)	335 (98%)	7 (2%)	55	79
1	D	342/342 (100%)	327 (96%)	15 (4%)	28	52
All	All	1368/1368 (100%)	1311 (96%)	57 (4%)	30	54

5 of 57 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	219	LEU
1	D	398	LEU
1	C	28	LEU
1	D	386	LEU
1	D	229	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 30 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	41	ASN
1	D	214	GLN
1	C	229	GLN
1	D	301	ASN
1	D	151	GLN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	G	0/6	-	-
2	H	0/6	-	-
2	I	0/6	-	-
2	J	0/6	-	-
2	K	0/6	-	-
2	L	0/6	-	-
2	M	0/6	-	-
2	N	0/6	-	-
2	O	0/6	-	-
2	P	0/6	-	-

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
All	All	0/60	-	-

There are no RNA backbone outliers to report.

There are no RNA pucker outliers to report.

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

Of 35 non-standard protein/DNA/RNA residues modelled in this entry, 6 are modelled with single atom - leaving 29 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	$\# Z > 2$
2	SSU	P	1	2	18,18,22	0.22	0	26,26,33	0.37	0
2	SSU	K	1	2	18,18,22	0.31	0	26,26,33	0.39	0
2	SSU	N	3	2	18,21,22	0.30	0	26,30,33	0.30	0
2	SSU	H	4	2	18,21,22	0.29	0	26,30,33	0.30	0
2	SSU	I	4	2	18,21,22	0.31	0	26,30,33	0.36	0
2	SSU	O	1	2	18,18,22	0.27	0	26,26,33	0.30	0
2	SSU	K	2	2	18,21,22	0.35	0	26,30,33	0.27	0
2	SSU	J	3	2	18,21,22	0.30	0	26,30,33	0.38	0
2	SSU	I	5	2	18,21,22	0.33	0	26,30,33	0.42	0
2	SSU	L	3	2	18,21,22	0.34	0	26,30,33	0.35	0
2	SSU	G	6	2	18,21,22	0.28	0	26,30,33	0.38	0
2	SSU	K	3	2	18,21,22	0.29	0	26,30,33	0.29	0
2	SSU	L	4	2	0,3,22	-	-	0,3,33	-	-
2	SSU	G	5	2	18,21,22	0.30	0	26,30,33	0.33	0
2	SSU	J	2	2	18,21,22	0.34	0	26,30,33	0.34	0
2	SSU	N	2	2	18,21,22	0.27	0	26,30,33	0.36	0
2	SSU	M	2	2	0,3,22	-	-	0,3,33	-	-
2	SSU	I	2	2	18,21,22	0.22	0	26,30,33	0.34	0
2	SSU	P	2	2	0,3,22	-	-	0,3,33	-	-
2	SSU	H	3	2	18,21,22	0.27	0	26,30,33	0.28	0
2	SSU	G	4	2	18,21,22	0.35	0	26,30,33	0.31	0
2	SSU	G	2	2	18,21,22	0.26	0	26,30,33	0.39	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	SSU	G	3	2	18,21,22	0.36	0	26,30,33	0.47	0
2	SSU	I	3	2	18,21,22	0.29	0	26,30,33	0.59	0
2	SSU	I	6	2	0,3,22	-	-	0,3,33	-	-
2	SSU	H	2	2	18,21,22	0.24	0	26,30,33	0.25	0
2	SSU	L	2	2	18,21,22	0.32	0	26,30,33	0.43	0
2	SSU	O	2	2	18,21,22	0.28	0	26,30,33	0.33	0
2	SSU	M	1	2	18,18,22	0.31	0	26,26,33	0.60	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
2	SSU	P	1	2	-	2/6/22/26	0/2/2/2
2	SSU	K	1	2	-	2/6/22/26	0/2/2/2
2	SSU	N	3	2	-	1/7/25/26	0/2/2/2
2	SSU	H	4	2	-	3/7/25/26	0/2/2/2
2	SSU	I	4	2	-	6/7/25/26	0/2/2/2
2	SSU	O	1	2	-	4/6/22/26	0/2/2/2
2	SSU	K	2	2	-	2/7/25/26	0/2/2/2
2	SSU	J	3	2	-	2/7/25/26	0/2/2/2
2	SSU	I	5	2	-	4/7/25/26	0/2/2/2
2	SSU	L	3	2	-	0/7/25/26	0/2/2/2
2	SSU	G	6	2	-	2/7/25/26	0/2/2/2
2	SSU	K	3	2	-	5/7/25/26	0/2/2/2
2	SSU	G	5	2	-	0/7/25/26	0/2/2/2
2	SSU	J	2	2	-	2/7/25/26	0/2/2/2
2	SSU	N	2	2	-	2/7/25/26	0/2/2/2
2	SSU	I	2	2	-	7/7/25/26	0/2/2/2
2	SSU	H	3	2	-	2/7/25/26	0/2/2/2
2	SSU	G	4	2	-	5/7/25/26	0/2/2/2
2	SSU	G	2	2	-	4/7/25/26	0/2/2/2
2	SSU	G	3	2	-	0/7/25/26	0/2/2/2
2	SSU	I	3	2	-	3/7/25/26	0/2/2/2
2	SSU	H	2	2	-	0/7/25/26	0/2/2/2
2	SSU	L	2	2	-	0/7/25/26	0/2/2/2
2	SSU	O	2	2	-	2/7/25/26	0/2/2/2

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	SSU	M	1	2	-	2/6/22/26	0/2/2/2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 62 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	G	6	SSU	C4'-C5'-O5'-P
2	I	4	SSU	C2'-C1'-N1-C6
2	I	4	SSU	C2'-C1'-N1-C2
2	I	4	SSU	C3'-C4'-C5'-O5'
2	I	5	SSU	O4'-C1'-N1-C6

There are no ring outliers.

25 monomers are involved in 62 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	P	1	SSU	2	0
2	K	1	SSU	2	0
2	N	3	SSU	2	0
2	H	4	SSU	2	0
2	I	4	SSU	2	0
2	O	1	SSU	3	0
2	K	2	SSU	3	0
2	J	3	SSU	1	0
2	I	5	SSU	3	0
2	L	3	SSU	1	0
2	G	6	SSU	5	0
2	K	3	SSU	3	0
2	G	5	SSU	3	0
2	J	2	SSU	1	0
2	N	2	SSU	2	0
2	M	2	SSU	7	0
2	I	2	SSU	3	0
2	H	3	SSU	2	0
2	G	4	SSU	5	0
2	G	2	SSU	3	0
2	G	3	SSU	7	0
2	I	3	SSU	6	0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	L	2	SSU	1	0
2	O	2	SSU	4	0
2	M	1	SSU	4	0

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 68 ligands modelled in this entry, 8 are monoatomic - leaving 60 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	$\# Z > 2$
3	SO4	A	441	-	4,4,4	1.00	0	6,6,6	0.65	0
3	SO4	B	440	-	4,4,4	1.01	0	6,6,6	0.66	0
3	SO4	B	442	-	4,4,4	1.00	0	6,6,6	0.67	0
3	SO4	C	440	-	4,4,4	1.02	0	6,6,6	0.66	0
3	SO4	D	441	-	4,4,4	1.02	0	6,6,6	0.65	0
3	SO4	A	446	-	4,4,4	0.99	0	6,6,6	0.67	0
3	SO4	A	432	-	4,4,4	1.01	0	6,6,6	0.64	0
3	SO4	D	432	-	4,4,4	1.01	0	6,6,6	0.66	0
3	SO4	A	444	-	4,4,4	0.99	0	6,6,6	0.68	0
3	SO4	J	40	-	4,4,4	1.00	0	6,6,6	0.65	0
3	SO4	A	434	-	4,4,4	1.01	0	6,6,6	0.67	0
3	SO4	D	439	-	4,4,4	1.02	0	6,6,6	0.65	0
3	SO4	D	434	-	4,4,4	0.99	0	6,6,6	0.66	0
3	SO4	C	434	-	4,4,4	1.00	0	6,6,6	0.67	0
3	SO4	A	442	-	4,4,4	0.99	0	6,6,6	0.66	0
3	SO4	B	432	-	4,4,4	1.06	0	6,6,6	0.63	0
3	SO4	B	438	-	4,4,4	1.03	0	6,6,6	0.63	0
3	SO4	B	437	-	4,4,4	1.01	0	6,6,6	0.64	0
3	SO4	B	448	-	4,4,4	1.03	0	6,6,6	0.65	0
3	SO4	A	435	-	4,4,4	1.04	0	6,6,6	0.65	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	SO4	A	445	-	4,4,4	1.01	0	6,6,6	0.66	0
3	SO4	C	435	-	4,4,4	1.03	0	6,6,6	0.67	0
3	SO4	A	443	-	4,4,4	0.99	0	6,6,6	0.67	0
3	SO4	B	435	-	4,4,4	1.03	0	6,6,6	0.66	0
3	SO4	B	444	-	4,4,4	1.01	0	6,6,6	0.65	0
3	SO4	B	434	-	4,4,4	1.03	0	6,6,6	0.66	0
3	SO4	D	435	-	4,4,4	1.00	0	6,6,6	0.67	0
3	SO4	A	433	-	4,4,4	1.02	0	6,6,6	0.66	0
3	SO4	D	436	-	4,4,4	1.03	0	6,6,6	0.62	0
3	SO4	B	446	-	4,4,4	1.03	0	6,6,6	0.64	0
3	SO4	C	437	-	4,4,4	1.02	0	6,6,6	0.65	0
3	SO4	A	439	-	4,4,4	1.02	0	6,6,6	0.64	0
3	SO4	C	438	-	4,4,4	1.01	0	6,6,6	0.65	0
3	SO4	B	436	-	4,4,4	0.99	0	6,6,6	0.65	0
3	SO4	D	433	-	4,4,4	1.02	0	6,6,6	0.67	0
3	SO4	A	438	-	4,4,4	1.03	0	6,6,6	0.65	0
3	SO4	D	437	-	4,4,4	1.00	0	6,6,6	0.66	0
3	SO4	A	437	-	4,4,4	0.96	0	6,6,6	0.66	0
3	SO4	D	438	-	4,4,4	1.04	0	6,6,6	0.67	0
3	SO4	B	443	-	4,4,4	1.03	0	6,6,6	0.65	0
3	SO4	C	436	-	4,4,4	1.01	0	6,6,6	0.65	0
3	SO4	C	439	-	4,4,4	1.03	0	6,6,6	0.65	0
3	SO4	C	443	-	4,4,4	1.02	0	6,6,6	0.67	0
3	SO4	A	436	-	4,4,4	1.03	0	6,6,6	0.68	0
3	SO4	A	440	-	4,4,4	1.03	0	6,6,6	0.66	0
3	SO4	B	433	-	4,4,4	1.02	0	6,6,6	0.66	0
3	SO4	C	442	-	4,4,4	0.98	0	6,6,6	0.64	0
5	FLC	B	450	-	12,12,12	1.60	4 (33%)	17,17,17	1.53	1 (5%)
3	SO4	D	440	-	4,4,4	1.01	0	6,6,6	0.66	0
3	SO4	K	36	-	4,4,4	1.02	0	6,6,6	0.65	0
3	SO4	B	445	-	4,4,4	1.05	0	6,6,6	0.62	0
3	SO4	C	441	-	4,4,4	1.04	0	6,6,6	0.65	0
3	SO4	B	441	-	4,4,4	1.02	0	6,6,6	0.65	0
3	SO4	B	447	-	4,4,4	0.94	0	6,6,6	0.71	0
3	SO4	B	449	-	4,4,4	0.94	0	6,6,6	0.71	0
3	SO4	C	432	-	4,4,4	1.00	0	6,6,6	0.67	0
3	SO4	D	442	-	4,4,4	1.02	0	6,6,6	0.66	0
3	SO4	B	439	-	4,4,4	1.02	0	6,6,6	0.64	0
3	SO4	A	447	-	4,4,4	1.00	0	6,6,6	0.65	0
3	SO4	C	433	-	4,4,4	1.01	0	6,6,6	0.66	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	FLC	B	450	-	-	0/16/16/16	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	450	FLC	OG2-CGC	-2.50	1.22	1.30
5	B	450	FLC	OA2-CAC	-2.48	1.22	1.30
5	B	450	FLC	CG-CB	2.17	1.56	1.53
5	B	450	FLC	CA-CB	2.16	1.56	1.53

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	450	FLC	OB2-CBC-CB	4.44	120.76	113.05

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

11 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	446	SO4	3	0
3	A	444	SO4	1	0
3	D	439	SO4	2	0
3	B	448	SO4	2	0
3	A	443	SO4	1	0
3	D	436	SO4	2	0
3	D	433	SO4	1	0
3	C	439	SO4	2	0
5	B	450	FLC	4	0
3	K	36	SO4	1	0
3	B	445	SO4	2	0

5.7 Other polymers [i](#)

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, 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	431/431 (100%)	-0.11	1 (0%) 95 95	14, 29, 51, 67	0
1	B	431/431 (100%)	-0.16	3 (0%) 87 89	14, 29, 52, 69	0
1	C	431/431 (100%)	1.11	101 (23%) 0 0	21, 63, 117, 137	0
1	D	431/431 (100%)	0.96	88 (20%) 1 0	22, 51, 111, 134	0
2	G	0/6	-	-	-	-
2	H	0/6	-	-	-	-
2	I	0/6	-	-	-	-
2	J	0/6	-	-	-	-
2	K	0/6	-	-	-	-
2	L	0/6	-	-	-	-
2	M	0/6	-	-	-	-
2	N	0/6	-	-	-	-
2	O	0/6	-	-	-	-
2	P	0/6	-	-	-	-
All	All	1724/1784 (96%)	0.45	193 (11%) 5 4	14, 39, 111, 137	0

The worst 5 of 193 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	361	LEU	10.6
1	C	216	GLY	8.4
1	C	242	LEU	7.8
1	C	354	ARG	7.2
1	D	362	GLY	7.1

6.2 Non-standard residues in protein, DNA, RNA chains [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, 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	SSU	M	1	17/21	0.57	0.28	84,91,92,92	0
2	SSU	N	2	20/21	0.60	0.25	91,99,107,107	0
2	SSU	M	2	4/21	0.62	0.30	86,88,88,93	0
2	SSU	G	6	20/21	0.68	0.38	104,111,112,112	0
2	SSU	N	3	20/21	0.69	0.36	107,112,114,114	0
2	SSU	O	2	20/21	0.70	0.22	136,137,137,138	0
2	SSU	O	1	17/21	0.73	0.28	136,136,137,137	0
2	SSU	G	5	20/21	0.76	0.24	93,95,100,103	0
2	SSU	I	3	20/21	0.77	0.21	101,102,106,107	0
2	SSU	J	3	20/21	0.77	0.27	72,77,79,79	0
2	SSU	K	1	17/21	0.77	0.31	87,90,95,95	0
2	SSU	K	2	20/21	0.78	0.27	93,95,98,99	0
2	SSU	G	3	20/21	0.79	0.20	77,81,84,85	0
2	SSU	I	5	20/21	0.80	0.21	102,104,106,107	0
2	SSU	P	1	17/21	0.80	0.30	131,132,133,133	0
2	SSU	H	4	20/21	0.82	0.36	88,92,95,96	0
2	SSU	J	1	1/21	0.84	0.30	73,73,73,73	0
2	SSU	I	6	4/21	0.86	0.30	108,108,108,108	0
2	SSU	G	4	20/21	0.86	0.19	86,90,91,93	0
2	SSU	I	2	20/21	0.86	0.40	96,108,113,113	0
2	SSU	J	2	20/21	0.88	0.19	56,66,73,73	0
2	SSU	P	2	4/21	0.88	0.34	131,131,132,132	0
2	SSU	K	3	20/21	0.89	0.21	96,98,100,101	0
2	SSU	L	1	1/21	0.89	0.35	53,53,53,53	0
2	SSU	L	3	20/21	0.89	0.20	46,60,68,69	0
2	SSU	L	4	4/21	0.89	0.17	61,62,63,67	0
2	SSU	I	4	20/21	0.90	0.18	98,99,100,101	0
2	SSU	H	3	20/21	0.90	0.26	76,88,91,91	0
2	SSU	H	2	20/21	0.92	0.22	64,69,76,79	0
2	SSU	H	1	1/21	0.93	0.18	77,77,77,77	0
2	SSU	G	2	20/21	0.93	0.20	33,63,67,73	0
2	SSU	L	2	20/21	0.96	0.13	39,44,56,56	0
2	SSU	I	1	1/21	0.97	0.32	97,97,97,97	0
2	SSU	N	1	1/21	0.97	0.16	106,106,106,106	0
2	SSU	G	1	1/21	0.99	0.18	36,36,36,36	0

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, 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
3	SO4	A	433	5/5	0.57	0.25	134,134,135,135	0
3	SO4	A	445	5/5	0.67	0.27	150,150,150,150	0
3	SO4	D	432	5/5	0.67	0.23	138,138,138,138	0
3	SO4	C	441	5/5	0.69	0.26	122,122,123,123	0
3	SO4	B	439	5/5	0.70	0.37	113,113,114,114	0
3	SO4	A	443	5/5	0.71	0.31	126,126,126,127	0
3	SO4	A	439	5/5	0.75	0.42	173,173,173,173	0
3	SO4	C	436	5/5	0.75	0.21	114,114,115,115	0
3	SO4	A	446	5/5	0.75	0.42	115,115,115,116	0
3	SO4	B	437	5/5	0.75	0.34	168,168,169,169	0
3	SO4	B	443	5/5	0.76	0.55	131,131,131,132	0
3	SO4	D	433	5/5	0.76	0.22	103,103,103,104	0
5	FLC	B	450	13/13	0.77	0.46	86,91,93,93	0
3	SO4	B	445	5/5	0.78	0.42	121,121,122,122	0
3	SO4	A	441	5/5	0.78	0.36	144,144,144,144	0
3	SO4	A	440	5/5	0.79	0.27	106,106,107,107	0
3	SO4	A	447	5/5	0.80	0.21	133,133,133,134	0
3	SO4	C	438	5/5	0.80	0.19	112,112,113,113	0
3	SO4	B	446	5/5	0.80	0.32	122,122,122,122	0
3	SO4	D	437	5/5	0.81	0.18	126,126,127,127	0
3	SO4	D	439	5/5	0.81	0.14	135,136,136,136	0
3	SO4	B	434	5/5	0.81	0.17	117,117,118,118	0
3	SO4	A	432	5/5	0.82	0.16	123,123,123,123	0
3	SO4	B	432	5/5	0.82	0.18	99,99,100,100	0
3	SO4	D	441	5/5	0.83	0.22	136,136,136,136	0
3	SO4	A	435	5/5	0.83	0.20	100,100,101,101	0
3	SO4	C	433	5/5	0.84	0.32	130,131,131,131	0
3	SO4	B	433	5/5	0.84	0.21	122,122,122,122	0
3	SO4	B	444	5/5	0.85	0.35	122,122,122,122	0
3	SO4	D	442	5/5	0.85	0.30	100,101,101,101	0
3	SO4	K	36	5/5	0.85	0.25	112,112,112,113	0
3	SO4	D	440	5/5	0.85	0.15	121,121,122,122	0
3	SO4	D	434	5/5	0.86	0.21	117,117,117,117	0
3	SO4	B	441	5/5	0.86	0.30	134,134,134,134	0
3	SO4	C	435	5/5	0.88	0.16	92,93,94,94	0
3	SO4	C	437	5/5	0.88	0.14	118,118,118,119	0
3	SO4	D	436	5/5	0.89	0.24	105,105,105,106	0

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	SO4	J	40	5/5	0.89	0.29	133,133,133,134	0
3	SO4	B	447	5/5	0.90	0.48	162,162,162,162	5
3	SO4	C	439	5/5	0.90	0.15	99,99,100,100	0
3	SO4	C	432	5/5	0.90	0.33	121,121,121,122	0
3	SO4	C	440	5/5	0.91	0.12	120,120,120,121	0
3	SO4	C	442	5/5	0.91	0.19	75,77,77,78	0
3	SO4	B	435	5/5	0.92	0.15	111,111,111,111	0
3	SO4	B	448	5/5	0.92	0.34	111,111,111,111	0
3	SO4	A	444	5/5	0.92	0.24	85,85,85,86	0
4	ZN	A	449	1/1	0.93	0.06	73,73,73,73	0
3	SO4	C	443	5/5	0.94	0.11	87,87,88,88	0
3	SO4	A	436	5/5	0.94	0.27	84,84,85,85	0
3	SO4	B	442	5/5	0.94	0.17	61,62,63,64	0
3	SO4	B	440	5/5	0.94	0.20	99,99,100,100	0
3	SO4	D	435	5/5	0.94	0.12	76,76,76,77	0
3	SO4	C	434	5/5	0.95	0.13	77,77,78,78	0
4	ZN	B	452	1/1	0.95	0.05	64,64,64,64	0
3	SO4	A	438	5/5	0.95	0.11	73,74,74,75	0
3	SO4	A	437	5/5	0.96	0.15	49,50,51,52	0
3	SO4	B	438	5/5	0.96	0.11	73,73,73,74	0
3	SO4	D	438	5/5	0.96	0.13	60,61,62,63	0
4	ZN	C	444	1/1	0.97	0.09	75,75,75,75	0
4	ZN	C	445	1/1	0.97	0.12	81,81,81,81	0
3	SO4	B	449	5/5	0.97	0.18	43,43,45,45	0
3	SO4	A	434	5/5	0.98	0.08	83,83,83,83	0
4	ZN	B	451	1/1	0.98	0.04	56,56,56,56	0
3	SO4	A	442	5/5	0.99	0.14	32,33,33,35	0
3	SO4	B	436	5/5	0.99	0.15	35,35,37,37	0
4	ZN	D	443	1/1	0.99	0.13	70,70,70,70	0
4	ZN	D	444	1/1	0.99	0.08	69,69,69,69	0
4	ZN	A	448	1/1	0.99	0.04	56,56,56,56	0

6.5 Other polymers [\(i\)](#)

There are no such residues in this entry.