Full wwPDB X-ray Structure Validation Report ⓘ

Mar 18, 2024 – 05:11 PM JST

PDB ID	:	7BPG
Title	:	Structure of serinol nucleic acid - RNA complex
Authors	:	Kamiya, Y.; Satoh, T.; Kodama, A.; Suzuki, T.; Uchiyama, S.; Kato, K.; Asanuma, H.
Deposited on	:	2020-03-22
Resolution	:	1.70 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:

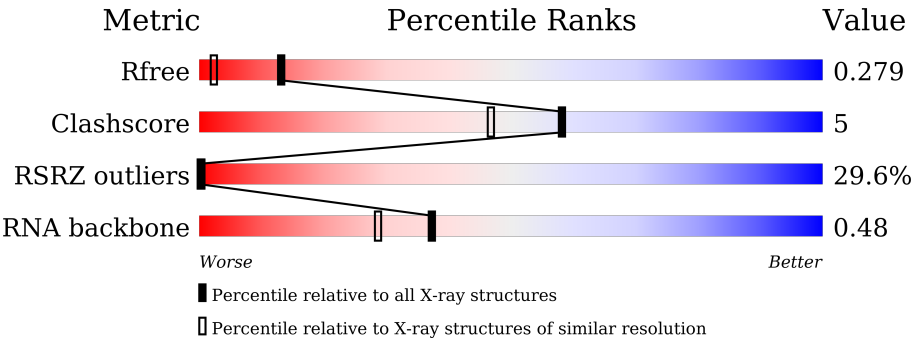
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)
RNA backbone	3102	1007 (2.38-1.02)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	8	38% 25% 62% 12%
1	C	8	12% 50% 38% 12%
1	E	8	38% 38% 50% 12%
1	G	8	12% 75% 12% 12%
2	B	8	12% 62% 25%
2	D	8	12% 75% 12%

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Mol	Chain	Length	Quality of chain
2	F	8	100%
2	H	8	12% 88%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 1395 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 RNA chain called RNA (5'-R(*GP*CP*UP*GP*CP*(5BU)P*GP*C)-3').

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	8	Total	Br	C	N	O	P	0	0	0
			167	1	75	28	56	7			
1	C	8	Total	Br	C	N	O	P	0	0	0
			167	1	75	28	56	7			
1	E	8	Total	Br	C	N	O	P	0	0	0
			167	1	75	28	56	7			
1	G	7	Total	Br	C	N	O	P	0	0	0
			147	1	66	25	49	6			

- Molecule 2 is a DNA chain called SNA (S-(F7R)(F7X)(F7O)(F7R)(F7X)(F7O)(F7R)(F7U)-R).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	8	Total	C	N	O	P	0	0	0
			170	77	42	44	7			
2	D	8	Total	C	N	O	P	0	0	0
			170	77	42	44	7			
2	F	8	Total	C	N	O	P	0	0	0
			170	77	42	44	7			
2	H	8	Total	C	N	O	P	0	0	0
			170	77	42	44	7			

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	1	Total	Ca	0	0
			1	1		

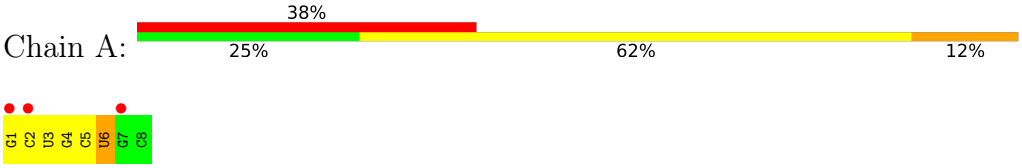
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	8	Total O 8 8	0	0
4	C	5	Total O 5 5	0	0
4	E	5	Total O 5 5	0	0
4	G	8	Total O 8 8	0	0
4	B	14	Total O 14 14	0	0
4	D	8	Total O 8 8	0	0
4	F	11	Total O 11 11	0	0
4	H	7	Total O 7 7	0	0

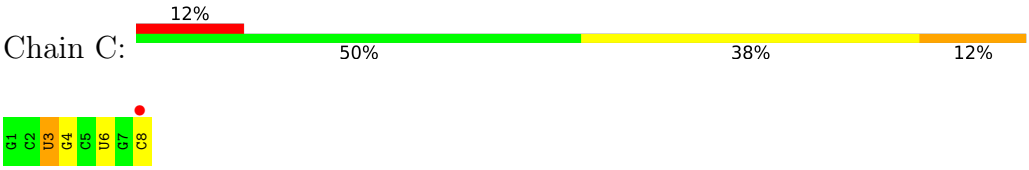
3 Residue-property plots (i)

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.

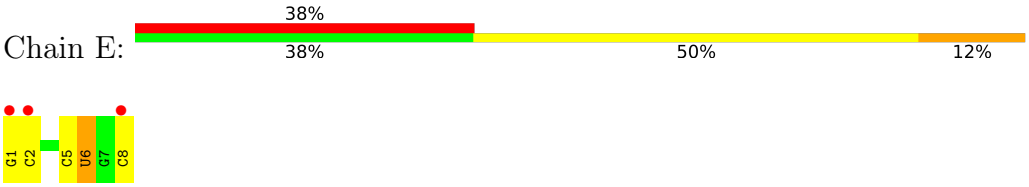
• Molecule 1: RNA (5'-R(*GP*CP*UP*GP*CP*(5BU)P*GP*C)-3')



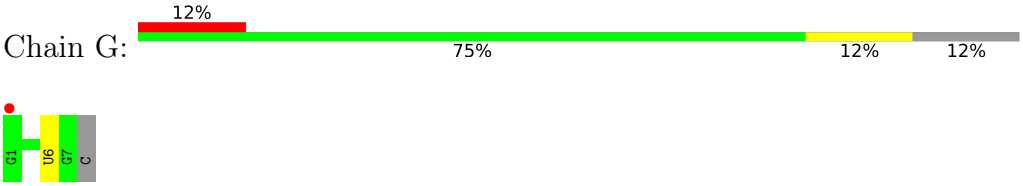
• Molecule 1: RNA (5'-R(*GP*CP*UP*GP*CP*(5BU)P*GP*C)-3')



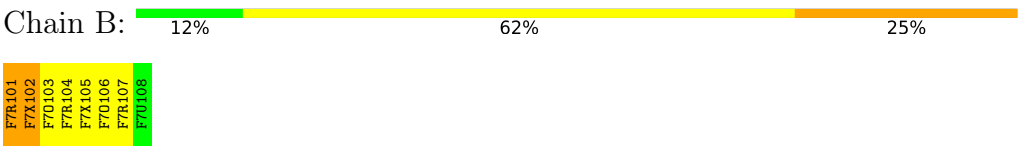
• Molecule 1: RNA (5'-R(*GP*CP*UP*GP*CP*(5BU)P*GP*C)-3')



• Molecule 1: RNA (5'-R(*GP*CP*UP*GP*CP*(5BU)P*GP*C)-3')

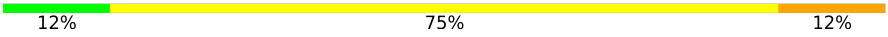


• Molecule 2: SNA (S-(F7R)(F7X)(F7O)(F7R)(F7X)(F7O)(F7R)(F7U)-R)



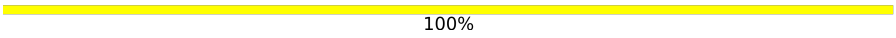
• Molecule 2: SNA (S-(F7R)(F7X)(F7O)(F7R)(F7X)(F7O)(F7R)(F7U)-R)

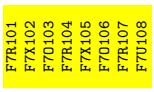
Chain D:



• Molecule 2: SNA (S-(F7R)(F7X)(F7O)(F7R)(F7X)(F7O)(F7R)(F7U)-R)

Chain F:





• Molecule 2: SNA (S-(F7R)(F7X)(F7O)(F7R)(F7X)(F7O)(F7R)(F7U)-R)

Chain H:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	40.36Å 46.92Å 47.54Å 90.00° 114.54° 90.00°	Depositor
Resolution (Å)	20.00 – 1.70 19.77 – 1.70	Depositor EDS
% Data completeness (in resolution range)	99.8 (20.00-1.70) 99.9 (19.77-1.70)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.87 (at 1.70Å)	Xtriage
Refinement program	REFMAC 5.8.0266	Depositor
R, R_{free}	0.232 , 0.271 0.236 , 0.279	Depositor DCC
R_{free} test set	894 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	37.5	Xtriage
Anisotropy	0.217	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 57.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.019 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	1395	wwPDB-VP
Average B, all atoms (Å^2)	60.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 14.73% 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: F7O, CA, F7R, 5BU, F7X, F7U

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	0/162	0.68	0/251
1	C	0.83	1/162 (0.6%)	0.85	0/251
1	E	0.26	0/162	0.66	0/251
1	G	0.34	0/140	0.68	0/217
All	All	0.51	1/626 (0.2%)	0.72	0/970

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	3	U	N1-C6	7.09	1.44	1.38

There are no bond angle outliers.

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	167	0	87	3	0
1	C	167	0	87	2	0
1	E	167	0	87	1	0
1	G	147	0	76	0	0
2	B	170	0	0	1	0
2	D	170	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	170	0	0	1	0
2	H	170	0	0	0	0
3	B	1	0	0	0	0
4	A	8	0	0	1	0
4	B	14	0	0	0	0
4	C	5	0	0	1	0
4	D	8	0	0	0	0
4	E	5	0	0	0	0
4	F	11	0	0	1	0
4	G	8	0	0	0	0
4	H	7	0	0	0	0
All	All	1395	0	337	8	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 5.

All (8) 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:F:108:F7U:N7	4:F:201:HOH:O	2.23	0.72
1:A:6:5BU:OP1	4:A:101:HOH:O	2.17	0.56
1:C:8:C:O3'	4:C:101:HOH:O	2.18	0.53
1:A:3:U:H2'	1:A:4:G:O4'	2.10	0.52
1:A:5:C:H2'	1:A:6:5BU:H6	2.00	0.43
2:B:101:F7R:C2	2:B:102:F7X:N2	2.82	0.43
1:E:5:C:H2'	1:E:6:5BU:H6	2.00	0.43
1:C:3:U:C2	2:D:102:F7X:N2	2.87	0.42

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

There are no protein molecules in this entry.

5.3.2 Protein sidechains (i)

There are no protein molecules in this entry.

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	8/8 (100%)	1 (12%)	1 (12%)
1	C	7/8 (87%)	1 (14%)	0
1	E	8/8 (100%)	2 (25%)	1 (12%)
1	G	6/8 (75%)	0	0
All	All	29/32 (90%)	4 (13%)	2 (6%)

All (4) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	2	C
1	C	4	G
1	E	2	C
1	E	8	C

All (2) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	1	G
1	E	1	G

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

32 non-standard protein/DNA/RNA residues 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	F7X	B	105	2	17,24,25	0.93	0	16,33,36	1.94	5 (31%)
2	F7O	B	106	2	17,23,24	2.87	3 (17%)	14,31,34	3.05	5 (35%)
2	F7X	B	102	2	17,24,25	1.16	1 (5%)	16,33,36	2.29	6 (37%)
2	F7X	H	105	2	17,24,25	0.94	0	16,33,36	1.88	3 (18%)
1	5BU	E	6	1	19,22,23	1.33	4 (21%)	28,32,35	2.08	7 (25%)
2	F7O	H	106	2	17,23,24	3.06	3 (17%)	14,31,34	3.00	4 (28%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
2	F7R	H	101	2	17,20,21	1.64	4 (23%)	19,26,29	1.07	0
2	F7R	H	107	2	17,20,21	1.03	0	19,26,29	1.61	2 (10%)
2	F7O	F	106	2	17,23,24	2.97	4 (23%)	14,31,34	2.83	3 (21%)
2	F7X	H	102	2	17,24,25	0.96	0	16,33,36	1.55	4 (25%)
2	F7R	D	101	2	17,20,21	2.51	4 (23%)	19,26,29	1.69	1 (5%)
2	F7R	B	104	2	17,20,21	1.08	1 (5%)	19,26,29	1.65	3 (15%)
2	F7O	B	103	2	17,23,24	3.13	3 (17%)	14,31,34	3.48	5 (35%)
2	F7X	F	105	2	17,24,25	1.00	0	16,33,36	2.04	4 (25%)
2	F7R	H	104	2	17,20,21	1.07	1 (5%)	19,26,29	1.77	2 (10%)
2	F7R	D	107	2	17,20,21	1.07	1 (5%)	19,26,29	1.55	3 (15%)
2	F7O	F	103	2	17,23,24	3.00	3 (17%)	14,31,34	3.61	5 (35%)
2	F7R	B	107	2	17,20,21	1.07	0	19,26,29	1.79	3 (15%)
1	5BU	G	6	1	19,22,23	1.32	4 (21%)	28,32,35	2.10	6 (21%)
1	5BU	C	6	1	19,22,23	1.29	2 (10%)	28,32,35	2.14	6 (21%)
2	F7R	B	101	2	17,20,21	1.69	6 (35%)	19,26,29	2.08	3 (15%)
2	F7R	F	107	2	17,20,21	0.96	0	19,26,29	2.18	4 (21%)
1	5BU	A	6	1	19,22,23	1.36	3 (15%)	28,32,35	2.04	9 (32%)
2	F7O	H	103	2	17,23,24	3.04	3 (17%)	14,31,34	3.27	4 (28%)
2	F7R	F	104	2	17,20,21	1.20	2 (11%)	19,26,29	1.52	3 (15%)
2	F7X	D	105	2	17,24,25	1.01	0	16,33,36	2.20	3 (18%)
2	F7R	F	101	2	17,20,21	1.71	4 (23%)	19,26,29	1.06	0
2	F7O	D	103	2	17,23,24	3.06	3 (17%)	14,31,34	3.14	4 (28%)
2	F7R	D	104	2	17,20,21	1.06	0	19,26,29	1.32	2 (10%)
2	F7O	D	106	2	17,23,24	3.00	3 (17%)	14,31,34	2.92	4 (28%)
2	F7X	F	102	2	17,24,25	0.92	0	16,33,36	1.89	4 (25%)
2	F7X	D	102	2	17,24,25	1.27	2 (11%)	16,33,36	2.82	4 (25%)

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	F7X	B	105	2	-	0/13/15/16	0/2/2/2
2	F7O	B	106	2	-	0/13/15/16	0/2/2/2
2	F7X	B	102	2	-	0/13/15/16	0/2/2/2
2	F7X	H	105	2	-	0/13/15/16	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	5BU	E	6	1	-	0/7/25/26	0/2/2/2
2	F7O	H	106	2	-	0/13/15/16	0/2/2/2
2	F7R	H	101	2	-	0/13/15/16	0/1/1/1
2	F7R	H	107	2	-	0/13/15/16	0/1/1/1
2	F7O	F	106	2	-	0/13/15/16	0/2/2/2
2	F7X	H	102	2	-	0/13/15/16	0/2/2/2
2	F7R	D	101	2	-	2/13/15/16	0/1/1/1
2	F7R	B	104	2	-	1/13/15/16	0/1/1/1
2	F7O	B	103	2	-	0/13/15/16	0/2/2/2
2	F7X	F	105	2	-	0/13/15/16	0/2/2/2
2	F7R	H	104	2	-	0/13/15/16	0/1/1/1
2	F7R	D	107	2	-	0/13/15/16	0/1/1/1
2	F7O	F	103	2	-	0/13/15/16	0/2/2/2
2	F7R	B	107	2	-	0/13/15/16	0/1/1/1
1	5BU	G	6	1	-	0/7/25/26	0/2/2/2
1	5BU	C	6	1	-	1/7/25/26	0/2/2/2
2	F7R	B	101	2	-	6/13/15/16	0/1/1/1
2	F7R	F	107	2	-	0/13/15/16	0/1/1/1
1	5BU	A	6	1	-	2/7/25/26	0/2/2/2
2	F7O	H	103	2	-	0/13/15/16	0/2/2/2
2	F7R	F	104	2	-	0/13/15/16	0/1/1/1
2	F7X	D	105	2	-	0/13/15/16	0/2/2/2
2	F7R	F	101	2	-	0/13/15/16	0/1/1/1
2	F7O	D	103	2	-	0/13/15/16	0/2/2/2
2	F7R	D	104	2	-	0/13/15/16	0/1/1/1
2	F7O	D	106	2	-	0/13/15/16	0/2/2/2
2	F7X	F	102	2	-	0/13/15/16	0/2/2/2
2	F7X	D	102	2	-	0/13/15/16	0/2/2/2

All (64) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	103	F7O	C2-N3	9.49	1.47	1.32
2	H	103	F7O	C2-N3	9.31	1.47	1.32
2	F	103	F7O	C2-N3	9.29	1.47	1.32
2	H	106	F7O	C2-N3	9.24	1.47	1.32
2	D	103	F7O	C2-N3	9.22	1.47	1.32
2	D	106	F7O	C2-N3	9.07	1.46	1.32
2	B	106	F7O	C2-N3	8.85	1.46	1.32
2	F	106	F7O	C2-N3	8.77	1.46	1.32
2	B	103	F7O	C2-N1	7.58	1.48	1.33
2	H	106	F7O	C2-N1	7.57	1.48	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	106	F7O	C2-N1	7.54	1.47	1.33
2	D	103	F7O	C2-N1	7.50	1.47	1.33
2	D	101	F7R	O3'-C3'	7.45	1.63	1.44
2	F	106	F7O	C2-N1	7.37	1.47	1.33
2	H	103	F7O	C2-N1	7.35	1.47	1.33
2	F	103	F7O	C2-N1	7.20	1.47	1.33
2	B	106	F7O	C2-N1	6.90	1.46	1.33
2	D	101	F7R	C2-N1	-4.61	1.34	1.40
2	F	101	F7R	C2-N1	-4.10	1.35	1.40
2	H	101	F7R	C2-N1	-4.04	1.35	1.40
2	B	101	F7R	C2-N1	-4.03	1.35	1.40
2	D	101	F7R	C6-N1	3.12	1.41	1.37
2	D	101	F7R	C4-N3	3.03	1.40	1.34
2	D	102	F7X	O1'-C1'	2.98	1.55	1.42
2	F	101	F7R	C4-N3	2.87	1.40	1.34
1	E	6	5BU	C4-N3	-2.80	1.33	1.38
2	F	101	F7R	C6-N1	2.78	1.41	1.37
1	A	6	5BU	C4-N3	-2.67	1.33	1.38
2	H	106	F7O	C5-C4	2.61	1.47	1.40
2	B	103	F7O	C5-C4	2.59	1.47	1.40
2	F	106	F7O	C5-C4	2.52	1.47	1.40
2	D	103	F7O	C5-C4	2.51	1.47	1.40
2	H	101	F7R	C6-N1	2.51	1.40	1.37
2	B	101	F7R	C6-N1	2.43	1.40	1.37
1	E	6	5BU	C2-N1	2.41	1.42	1.38
1	C	6	5BU	C4-N3	-2.40	1.34	1.38
1	G	6	5BU	C6-C5	2.38	1.39	1.34
2	H	101	F7R	C2-N3	2.37	1.41	1.36
2	H	101	F7R	C4-N3	2.34	1.39	1.34
1	E	6	5BU	C6-C5	2.33	1.38	1.34
2	H	103	F7O	C5-C4	2.33	1.47	1.40
1	G	6	5BU	C2-N1	2.23	1.42	1.38
2	F	103	F7O	C5-C4	2.23	1.46	1.40
2	B	101	F7R	C2-N3	2.22	1.40	1.36
2	F	101	F7R	C2-N3	2.22	1.40	1.36
1	A	6	5BU	C6-N1	-2.21	1.34	1.38
1	E	6	5BU	C6-N1	-2.18	1.34	1.38
2	F	106	F7O	O3'-C3'	2.17	1.50	1.44
1	G	6	5BU	C2-N3	-2.16	1.34	1.38
2	B	102	F7X	O3'-C3'	2.13	1.50	1.44
1	G	6	5BU	C4-N3	-2.13	1.34	1.38
2	D	102	F7X	O3'-C3'	2.13	1.50	1.44

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	106	F7O	C5-C4	2.10	1.46	1.40
2	B	101	F7R	C4-N3	2.10	1.38	1.34
2	B	106	F7O	C5-C4	2.09	1.46	1.40
2	H	104	F7R	C6-C5	2.08	1.39	1.35
2	F	104	F7R	C2B-N1	2.06	1.48	1.46
2	B	104	F7R	C2-N1	2.06	1.42	1.40
2	F	104	F7R	C6-C5	2.05	1.39	1.35
2	D	107	F7R	C6-C5	2.05	1.39	1.35
1	A	6	5BU	C2-N3	-2.03	1.34	1.38
1	C	6	5BU	C6-C5	2.02	1.38	1.34
2	B	101	F7R	C6-C5	2.02	1.39	1.35
2	B	101	F7R	O3'-C3'	2.00	1.49	1.44

All (121) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	102	F7X	O1'-C1'-C2'	-9.29	87.93	111.95
2	F	103	F7O	N3-C2-N1	-9.14	114.39	128.68
2	H	103	F7O	N3-C2-N1	-8.97	114.66	128.68
2	B	106	F7O	N3-C2-N1	-8.87	114.81	128.68
2	D	106	F7O	N3-C2-N1	-8.80	114.92	128.68
2	H	106	F7O	N3-C2-N1	-8.72	115.05	128.68
2	D	103	F7O	N3-C2-N1	-8.59	115.25	128.68
2	F	103	F7O	O1'-C1'-C2'	-8.47	90.05	111.95
2	B	103	F7O	N3-C2-N1	-8.36	115.60	128.68
2	B	103	F7O	O1'-C1'-C2'	-8.36	90.34	111.95
2	F	106	F7O	N3-C2-N1	-8.10	116.02	128.68
2	F	107	F7R	O1'-C1'-C2'	-7.38	92.88	111.95
2	D	105	F7X	O1'-C1'-C2'	-7.24	93.24	111.95
2	B	101	F7R	C2A-C2B-N1	-6.83	102.32	111.22
2	H	103	F7O	O1'-C1'-C2'	-6.76	94.48	111.95
2	H	104	F7R	O1'-C1'-C2'	-6.61	94.86	111.95
2	D	103	F7O	O1'-C1'-C2'	-6.57	94.97	111.95
1	C	6	5BU	O4-C4-C5	-6.48	117.71	125.84
2	B	107	F7R	O1'-C1'-C2'	-6.16	96.03	111.95
2	D	101	F7R	C2A-C2B-N1	-6.10	103.27	111.22
2	F	105	F7X	O1'-C1'-C2'	-6.06	96.30	111.95
2	B	102	F7X	O1'-C1'-C2'	-5.99	96.48	111.95
1	G	6	5BU	C5-C4-N3	5.79	120.00	113.34
1	E	6	5BU	N3-C2-N1	5.40	122.06	114.89
2	H	106	F7O	O1'-C1'-C2'	-5.37	98.07	111.95
2	F	106	F7O	O1'-C1'-C2'	-5.31	98.24	111.95

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	107	F7R	O1'-C1'-C2'	-5.24	98.42	111.95
2	F	102	F7X	O1'-C1'-C2'	-5.23	98.42	111.95
2	H	107	F7R	O1'-C1'-C2'	-5.07	98.84	111.95
2	H	105	F7X	O1'-C1'-C2'	-4.92	99.22	111.95
1	C	6	5BU	C5-C4-N3	4.91	118.99	113.34
1	G	6	5BU	C4-N3-C2	-4.77	121.17	127.35
2	B	105	F7X	O1'-C1'-C2'	-4.77	99.62	111.95
1	E	6	5BU	O4-C4-C5	-4.70	119.94	125.84
1	A	6	5BU	N3-C2-N1	4.68	121.10	114.89
2	F	104	F7R	O1'-C1'-C2'	-4.64	99.95	111.95
1	E	6	5BU	C4-N3-C2	-4.58	121.42	127.35
2	B	106	F7O	O1'-C1'-C2'	-4.54	100.21	111.95
1	A	6	5BU	O4-C4-C5	-4.53	120.16	125.84
2	D	106	F7O	O1'-C1'-C2'	-4.40	100.59	111.95
1	G	6	5BU	O4-C4-C5	-4.25	120.51	125.84
1	C	6	5BU	C4-N3-C2	-4.15	121.97	127.35
1	G	6	5BU	N3-C2-N1	4.10	120.33	114.89
1	E	6	5BU	C5-C4-N3	3.97	117.91	113.34
1	A	6	5BU	C4-N3-C2	-3.93	122.26	127.35
2	B	104	F7R	O1'-C1'-C2'	-3.92	101.82	111.95
2	B	104	F7R	C2A-C2B-N1	-3.81	106.26	111.22
1	C	6	5BU	N3-C2-N1	3.69	119.79	114.89
1	A	6	5BU	C5-C4-N3	3.68	117.57	113.34
2	D	104	F7R	O1'-C1'-C2'	-3.60	102.65	111.95
2	B	106	F7O	C2-N1-C6	3.46	124.68	118.75
1	G	6	5BU	C6-C5-C4	-3.41	117.21	120.67
2	D	102	F7X	C2'-N2'-C2A	-3.37	117.96	122.92
2	H	103	F7O	C2-N1-C6	3.32	124.43	118.75
2	F	103	F7O	C2-N1-C6	3.20	124.23	118.75
1	A	6	5BU	BR-C5-C4	3.17	121.71	118.03
2	F	107	F7R	C5-C6-N1	-3.12	119.52	122.44
2	D	106	F7O	C2-N1-C6	3.11	124.08	118.75
2	H	106	F7O	C2-N1-C6	3.02	123.92	118.75
1	G	6	5BU	BR-C5-C4	3.01	121.53	118.03
2	H	107	F7R	C5-C6-N1	-2.96	119.67	122.44
2	B	102	F7X	O2A-C2A-C2B	2.91	124.78	120.04
2	B	103	F7O	C2-N1-C6	2.91	123.73	118.75
2	B	104	F7R	C5-C6-N1	-2.89	119.73	122.44
2	D	103	F7O	C2-N1-C6	2.86	123.64	118.75
2	B	103	F7O	C2'-N2'-C2A	-2.86	118.70	122.92
2	F	106	F7O	C2-N1-C6	2.83	123.59	118.75
2	B	105	F7X	O6-C6-C5	-2.82	118.86	124.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	107	F7R	C5-C6-N1	-2.81	119.81	122.44
1	E	6	5BU	C6-N1-C2	-2.77	118.49	121.30
2	B	101	F7R	C1'-C2'-N2'	2.77	115.80	109.60
1	E	6	5BU	O2-C2-N3	-2.71	116.45	121.50
2	F	107	F7R	N1-C2-N3	2.71	121.18	118.45
2	H	102	F7X	O1'-C1'-C2'	-2.70	104.96	111.95
2	H	106	F7O	C4-C5-N7	-2.70	106.58	109.40
2	H	105	F7X	C8-N7-C5	2.69	108.11	102.99
2	B	105	F7X	O6-C6-N1	2.69	123.82	120.65
2	F	105	F7X	C5-C6-N1	2.67	118.67	113.95
2	B	106	F7O	N6-C6-N1	2.67	124.11	118.57
2	D	106	F7O	C4-C5-N7	-2.60	106.69	109.40
1	E	6	5BU	C1'-N1-C2	2.58	122.23	117.57
1	C	6	5BU	C6-C5-C4	-2.54	118.09	120.67
1	A	6	5BU	O2-C2-N1	-2.52	119.44	122.79
1	A	6	5BU	C1'-N1-C2	2.49	122.08	117.57
2	F	103	F7O	N6-C6-N1	2.47	123.70	118.57
2	F	103	F7O	C5-C6-N6	-2.45	116.62	120.35
2	D	102	F7X	C8-N7-C5	2.44	107.64	102.99
2	B	103	F7O	C4-C5-N7	-2.43	106.86	109.40
2	F	102	F7X	C8-N7-C5	2.42	107.61	102.99
2	F	104	F7R	C5-C6-N1	-2.40	120.19	122.44
2	F	102	F7X	C5-C6-N1	2.40	118.19	113.95
2	B	105	F7X	N2-C2-N1	2.32	121.66	116.71
2	B	107	F7R	C5-C6-N1	-2.31	120.28	122.44
2	F	105	F7X	C2B-N9-C8	2.31	128.39	125.66
2	F	102	F7X	O6-C6-C5	-2.31	119.86	124.37
2	H	102	F7X	O6-C6-C5	-2.31	119.87	124.37
2	B	102	F7X	C8-N7-C5	2.30	107.37	102.99
2	H	102	F7X	C8-N7-C5	2.29	107.35	102.99
2	H	102	F7X	C5-C6-N1	2.25	117.92	113.95
2	B	102	F7X	C5-C6-N1	2.22	117.87	113.95
2	H	103	F7O	C4-C5-N7	-2.21	107.09	109.40
2	B	102	F7X	O6-C6-C5	-2.20	120.08	124.37
2	D	104	F7R	C2A-C2B-N1	-2.19	108.36	111.22
2	D	105	F7X	C8-N7-C5	2.19	107.16	102.99
2	B	107	F7R	C2A-C2B-N1	2.18	114.05	111.22
2	H	104	F7R	C5-C6-N1	-2.17	120.41	122.44
2	D	103	F7O	C2'-N2'-C2A	-2.17	119.72	122.92
2	F	107	F7R	C6-C5-C4	2.16	120.99	117.50
2	F	104	F7R	N1-C2-N3	2.15	120.62	118.45
2	D	102	F7X	C5-C6-N1	2.10	117.66	113.95

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	105	F7X	C5-C6-N1	2.10	117.66	113.95
2	B	106	F7O	C5-C6-N6	-2.09	117.18	120.35
1	C	6	5BU	O2-C2-N1	-2.08	120.02	122.79
2	B	101	F7R	O2-C2-N3	-2.08	118.94	122.33
2	H	105	F7X	N2-C2-N1	2.07	121.13	116.71
2	F	105	F7X	O6-C6-C5	-2.05	120.36	124.37
2	B	105	F7X	C8-N7-C5	2.04	106.88	102.99
1	A	6	5BU	C6-C5-C4	-2.04	118.60	120.67
2	B	102	F7X	N2-C2-N1	2.02	121.01	116.71
2	D	107	F7R	N1-C2-N3	2.01	120.48	118.45
1	A	6	5BU	C6-N1-C2	-2.00	119.27	121.30

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	101	F7R	O1'-C1'-C2'-C3'
2	B	101	F7R	C1'-C2'-N2'-C2A
2	B	101	F7R	N2'-C2A-C2B-N1
2	B	101	F7R	O2A-C2A-C2B-N1
2	D	101	F7R	O1'-C1'-C2'-N2'
2	B	104	F7R	O2A-C2A-N2'-C2'
1	A	6	5BU	C2'-C1'-N1-C6
1	A	6	5BU	C2'-C1'-N1-C2
2	B	101	F7R	C2A-C2B-N1-C2
1	C	6	5BU	O4'-C4'-C5'-O5'
2	B	101	F7R	O1'-C1'-C2'-C3'
2	B	101	F7R	C2'-C3'-O3'-P

There are no ring outliers.

5 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	102	F7X	1	0
1	E	6	5BU	1	0
2	B	101	F7R	1	0
1	A	6	5BU	2	0
2	D	102	F7X	1	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

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 (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

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^{th} 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	7/8 (87%)	1.57	3 (42%)	0	0	40, 60, 101, 105	0
1	C	7/8 (87%)	1.44	1 (14%)	2	2	45, 63, 83, 95	0
1	E	7/8 (87%)	1.36	3 (42%)	0	0	50, 65, 91, 106	0
1	G	6/8 (75%)	0.74	1 (16%)	1	1	48, 50, 66, 84	0
2	B	0/8	-	-			-	-
2	D	0/8	-	-			-	-
2	F	0/8	-	-			-	-
2	H	0/8	-	-			-	-
All	All	27/64 (42%)	1.30	8 (29%)	0	0	40, 65, 101, 106	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	1	G	3.1
1	A	7	G	2.6
1	E	1	G	2.6
1	A	1	G	2.6
1	E	2	C	2.5
1	A	2	C	2.3
1	E	8	C	2.3
1	C	8	C	2.3

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

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^{th} 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	F7O	B	103	22/23	0.71	0.19	52,60,65,66	0
2	F7R	B	104	20/21	0.71	0.20	50,54,57,58	0
2	F7X	B	105	23/24	0.74	0.21	38,44,55,61	0
2	F7X	H	102	23/24	0.77	0.15	56,58,66,67	0
2	F7X	B	102	23/24	0.78	0.22	54,64,69,74	0
2	F7O	H	103	22/23	0.81	0.16	48,53,64,67	0
2	F7R	F	101	20/21	0.81	0.21	61,67,77,78	0
2	F7R	D	101	20/21	0.81	0.18	58,71,85,87	0
2	F7X	F	105	23/24	0.83	0.14	41,50,62,67	0
2	F7O	D	103	22/23	0.85	0.17	46,57,72,73	0
2	F7O	D	106	22/23	0.85	0.18	40,46,55,57	0
2	F7R	D	107	20/21	0.85	0.17	38,42,61,72	0
2	F7R	H	104	20/21	0.86	0.17	42,55,64,64	0
2	F7O	F	106	22/23	0.86	0.18	38,44,49,54	0
2	F7O	H	106	22/23	0.86	0.14	45,52,64,66	0
2	F7O	B	106	22/23	0.86	0.22	35,43,55,58	0
2	F7R	H	107	20/21	0.86	0.14	39,53,67,74	0
2	F7R	F	107	20/21	0.87	0.24	36,40,48,49	0
2	F7X	D	102	23/24	0.87	0.15	56,64,71,75	0
2	F7R	B	101	20/21	0.88	0.19	59,76,95,105	0
2	F7R	F	104	20/21	0.88	0.16	45,53,63,63	0
2	F7R	H	101	20/21	0.88	0.14	66,73,80,83	0
1	5BU	C	6	21/22	0.89	0.14	41,51,54,55	0
1	5BU	G	6	21/22	0.89	0.12	42,48,52,56	0
2	F7O	F	103	22/23	0.90	0.16	48,52,59,62	0
2	F7X	D	105	23/24	0.90	0.15	42,48,61,62	0
1	5BU	A	6	21/22	0.91	0.21	36,41,44,47	0
2	F7X	H	105	23/24	0.91	0.11	42,50,59,64	0
2	F7X	F	102	23/24	0.91	0.13	49,57,69,71	0
2	F7R	D	104	20/21	0.92	0.17	45,51,62,69	0
1	5BU	E	6	21/22	0.92	0.12	48,57,63,65	0
2	F7R	B	107	20/21	0.93	0.21	37,45,54,63	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	CA	B	201	1/1	0.91	0.15	53,53,53,53	0

6.5 Other polymers (i)

There are no such residues in this entry.