Full wwPDB X-ray Structure Validation Report (i)

Jun 16, 2024 – 05:11 PM EDT

PDB ID	:	3T7K
Title	:	Complex structure of Rtt107p and phosphorylated histone H2A
Authors	:	Li, X.; Li, F.; Wu, J.; Shi, Y.
Deposited on	:	2011-07-30
Resolution	:	2.03 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 (i) 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 (i)) were used in the production of this report:

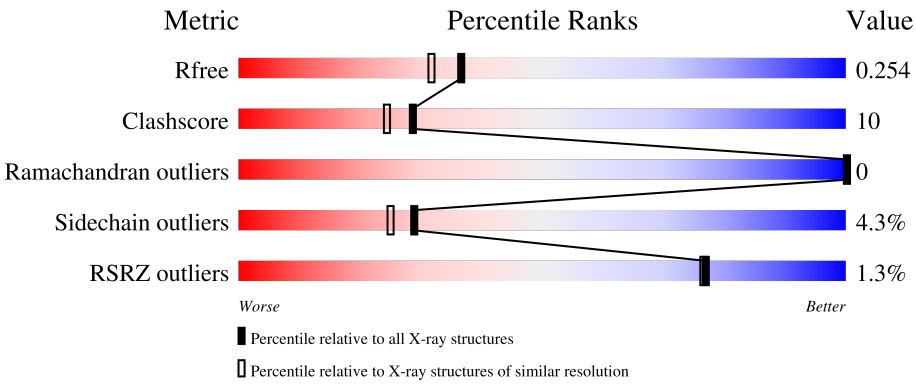
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.03 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	10434 (2.04-2.00)
Clashscore	141614	11643 (2.04-2.00)
Ramachandran outliers	138981	11493 (2.04-2.00)
Sidechain outliers	138945	11492 (2.04-2.00)
RSRZ outliers	127900	10220 (2.04-2.00)

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	256	% 73% 15% • 9%
1	B	256	2% 73% 15% • 9%
2	C	8	38% 25% 38%
2	D	8	38% 25% 38%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 3972 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 Regulator of Ty1 transposition protein 107.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	233	1895	1234	315	340	6	6	0	0
1	B	234	1902	1239	316	341	6	12	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	815	GLY	-	EXPRESSION TAG	UNP P38850
A	816	SER	-	EXPRESSION TAG	UNP P38850
A	817	PRO	-	EXPRESSION TAG	UNP P38850
A	818	HIS	-	EXPRESSION TAG	UNP P38850
A	819	MET	-	EXPRESSION TAG	UNP P38850
B	815	GLY	-	EXPRESSION TAG	UNP P38850
B	816	SER	-	EXPRESSION TAG	UNP P38850
B	817	PRO	-	EXPRESSION TAG	UNP P38850
B	818	HIS	-	EXPRESSION TAG	UNP P38850
B	819	MET	-	EXPRESSION TAG	UNP P38850

- Molecule 2 is a protein called Histone H2A.1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	C	5	37	20	5	11	1	0	0	0
2	D	5	37	20	5	11	1	0	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	48	48	48	0	0

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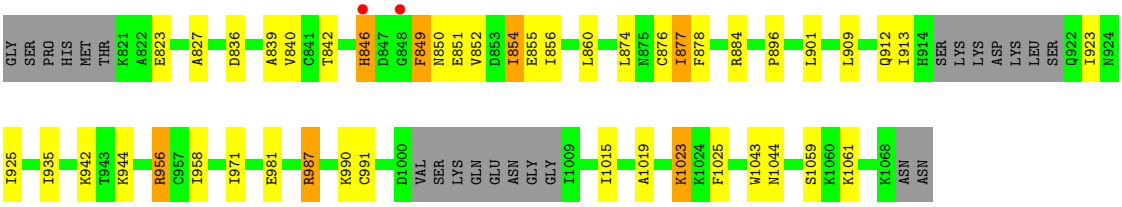
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	C	2	2	2	0	0
			Total	O		
3	B	50	50	50	0	0
			Total	O		
3	D	1	1	1	0	0

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.

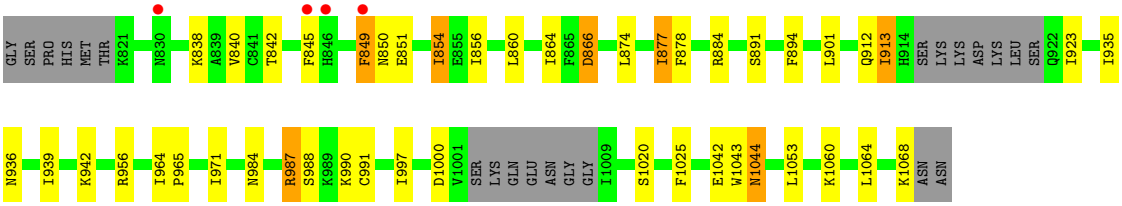
• Molecule 1: Regulator of Ty1 transposition protein 107

Chain A:



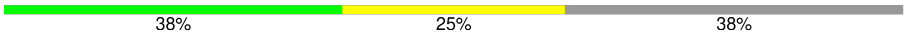
• Molecule 1: Regulator of Ty1 transposition protein 107

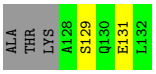
Chain B:



• Molecule 2: Histone H2A.1

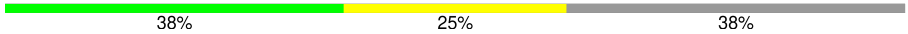
Chain C:

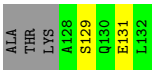




• Molecule 2: Histone H2A.1

Chain D:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	34.52Å 59.26Å 85.89Å 78.36° 89.68° 73.17°	Depositor
Resolution (Å)	30.55 – 2.03 30.55 – 2.03	Depositor EDS
% Data completeness (in resolution range)	90.0 (30.55-2.03) 88.6 (30.55-2.03)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.29 (at 2.03Å)	Xtriage
Refinement program	PHENIX 1.6.1_357	Depositor
R, R_{free}	0.218 , 0.258 0.213 , 0.254	Depositor DCC
R_{free} test set	2007 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å^2)	33.8	Xtriage
Anisotropy	0.619	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 41.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.438 for h,h-k,-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	3972	wwPDB-VP
Average B, all atoms (Å^2)	44.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.17% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: SEP

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	0.39	0/1927	0.55	0/2594
1	B	0.40	0/1934	0.56	0/2604
2	C	0.30	0/25	0.31	0/31
2	D	0.38	0/25	0.43	0/31
All	All	0.39	0/3911	0.56	0/5260

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	A	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	846	HIS	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	1895	0	1975	33	0
1	B	1902	0	1984	43	0
2	C	37	0	27	0	0
2	D	37	0	27	2	0
3	A	48	0	0	1	0
3	B	50	0	0	0	0
3	C	2	0	0	0	0
3	D	1	0	0	0	0
All	All	3972	0	4013	76	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 10.

All (76) 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:B:987:ARG:HG3	1:B:990:LYS:HB3	1.59	0.83
1:A:860:LEU:HD11	1:A:913:ILE:HD11	1.61	0.82
1:A:987:ARG:HD2	1:A:987:ARG:H	1.47	0.79
1:B:884:ARG:HB2	2:D:131:GLU:HG3	1.67	0.77
1:A:987:ARG:HB2	1:A:990:LYS:HG2	1.74	0.69
1:A:842:THR:HG22	1:A:877:ILE:HD11	1.78	0.66
1:A:987:ARG:HD2	1:A:987:ARG:N	2.12	0.65
1:B:845:PHE:CD1	1:B:849:PHE:CE1	2.84	0.65
1:B:849:PHE:CZ	1:B:864:ILE:HD12	2.34	0.62
1:A:860:LEU:HD11	1:A:913:ILE:CD1	2.31	0.61
1:B:849:PHE:HZ	1:B:864:ILE:HD12	1.64	0.60
1:B:845:PHE:CD1	1:B:849:PHE:HE1	2.19	0.60
1:B:860:LEU:HD11	1:B:913:ILE:HD11	1.83	0.60
1:A:854:ILE:HG13	1:A:855:GLU:N	2.17	0.59
1:B:851:GLU:HA	1:B:854:ILE:CG2	2.33	0.59
1:B:987:ARG:NE	1:B:990:LYS:HD2	2.20	0.57
1:B:965:PRO:O	1:B:971:ILE:HD11	2.04	0.56
1:B:856:ILE:HD13	1:B:913:ILE:HG21	1.88	0.56
1:B:991:CYS:SG	1:B:1025:PHE:HE1	2.29	0.56
1:A:842:THR:CG2	1:A:877:ILE:HD11	2.36	0.55
1:B:987:ARG:HE	1:B:990:LYS:HD2	1.72	0.55
1:B:984:ASN:ND2	1:B:997:ILE:HG23	2.21	0.55
1:A:909:LEU:HA	1:A:925:ILE:HG13	1.90	0.53
1:A:856:ILE:HD13	1:A:913:ILE:HG21	1.90	0.52
1:B:942:LYS:HD3	1:B:1053:LEU:HB2	1.91	0.52
1:A:896:PRO:HB3	1:A:944:LYS:HG2	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:971:ILE:HG23	1:B:1043:TRP:CZ3	2.45	0.51
1:A:823:GLU:O	1:A:827:ALA:N	2.43	0.51
1:A:971:ILE:HG23	1:A:1043:TRP:CZ3	2.46	0.50
1:B:840:VAL:HG13	1:B:874:LEU:HD13	1.94	0.50
1:A:942:LYS:HE2	3:A:100:HOH:O	2.10	0.50
1:A:836:ASP:O	1:A:836:ASP:OD1	2.30	0.49
1:B:851:GLU:HA	1:B:854:ILE:HG22	1.94	0.49
1:A:884:ARG:NH2	1:A:1044:ASN:OD1	2.32	0.49
1:A:991:CYS:SG	1:A:1025:PHE:HE1	2.35	0.49
1:B:842:THR:HG22	1:B:877:ILE:HD11	1.95	0.48
1:A:956:ARG:HD3	1:A:981:GLU:OE1	2.14	0.48
1:B:860:LEU:HD11	1:B:913:ILE:CD1	2.43	0.47
1:A:839:ALA:HB2	1:A:876:CYS:HB3	1.97	0.47
1:B:850:ASN:O	1:B:854:ILE:HG22	2.14	0.47
1:A:878:PHE:HA	1:A:901:LEU:O	2.14	0.47
1:A:1059:SER:OG	1:A:1061:LYS:HG2	2.15	0.46
1:A:912:GLN:OE1	1:A:923:ILE:HA	2.15	0.46
1:A:855:GLU:OE1	1:A:855:GLU:HA	2.16	0.46
1:B:939:ILE:HD12	1:B:942:LYS:HD3	1.98	0.46
1:A:987:ARG:H	1:A:987:ARG:CD	2.08	0.46
1:A:840:VAL:HG23	1:A:877:ILE:HD12	1.98	0.46
1:B:912:GLN:OE1	1:B:923:ILE:HA	2.16	0.45
1:A:849:PHE:HD2	1:A:854:ILE:HG22	1.82	0.44
1:B:935:ILE:O	1:B:935:ILE:HG22	2.17	0.44
1:B:936:ASN:O	1:B:939:ILE:HG22	2.17	0.44
1:B:878:PHE:HA	1:B:901:LEU:O	2.18	0.44
1:A:846:HIS:O	1:A:846:HIS:CG	2.71	0.44
1:A:958:ILE:HD12	1:A:1015:ILE:HD12	1.99	0.44
1:A:840:VAL:HG13	1:A:874:LEU:HD13	2.00	0.43
1:B:990:LYS:HE3	1:B:990:LYS:HB2	1.73	0.43
1:A:935:ILE:O	1:A:935:ILE:HG22	2.18	0.43
1:B:891:SER:HA	1:B:894:PHE:CE1	2.53	0.43
1:B:939:ILE:HD12	1:B:942:LYS:CD	2.49	0.43
1:B:1053:LEU:HA	1:B:1053:LEU:HD23	1.78	0.42
1:B:884:ARG:NH2	1:B:1044:ASN:OD1	2.51	0.42
1:B:842:THR:CG2	1:B:877:ILE:HD11	2.50	0.42
1:B:851:GLU:O	1:B:854:ILE:HG23	2.20	0.41
1:B:854:ILE:HD13	1:B:854:ILE:C	2.40	0.41
1:B:984:ASN:HB2	1:B:997:ILE:HD13	2.01	0.41
1:B:866:ASP:N	1:B:866:ASP:OD1	2.53	0.41
1:B:964:ILE:HG23	1:B:971:ILE:HD12	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1019:ALA:O	1:A:1023:LYS:HD3	2.20	0.41
1:B:849:PHE:CD2	1:B:849:PHE:N	2.88	0.41
1:B:884:ARG:HB2	2:D:131:GLU:CG	2.43	0.41
1:B:838:LYS:HB2	1:B:838:LYS:HE3	1.93	0.41
1:A:850:ASN:O	1:A:854:ILE:HG23	2.20	0.41
1:B:1060:LYS:HD3	1:B:1060:LYS:HA	1.78	0.40
1:A:987:ARG:HB2	1:A:990:LYS:CG	2.49	0.40
1:B:956:ARG:HD2	1:B:1000:ASP:O	2.22	0.40
1:B:1042:GLU:HG2	1:B:1064:LEU:HD11	2.04	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	227/256 (89%)	221 (97%)	6 (3%)	0	100	100
1	B	228/256 (89%)	222 (97%)	6 (3%)	0	100	100
2	C	2/8 (25%)	2 (100%)	0	0	100	100
2	D	2/8 (25%)	2 (100%)	0	0	100	100
All	All	459/528 (87%)	447 (97%)	12 (3%)	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	216/237 (91%)	208 (96%)	8 (4%)	34	31
1	B	217/237 (92%)	207 (95%)	10 (5%)	27	22
2	C	2/5 (40%)	1 (50%)	1 (50%)	0	0
2	D	2/5 (40%)	2 (100%)	0	100	100
All	All	437/484 (90%)	418 (96%)	19 (4%)	29	25

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	849	PHE
1	A	851	GLU
1	A	852	VAL
1	A	854	ILE
1	A	877	ILE
1	A	956	ARG
1	A	987	ARG
1	A	1023	LYS
2	C	131	GLU
1	B	849	PHE
1	B	854	ILE
1	B	866	ASP
1	B	877	ILE
1	B	913	ILE
1	B	987	ARG
1	B	988	SER
1	B	1020	SER
1	B	1044	ASN
1	B	1068	LYS

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

Mol	Chain	Res	Type
1	A	1030	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)

2 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	SEP	C	129	2	8,9,10	1.58	2 (25%)	7,12,14	0.63	0
2	SEP	D	129	2	8,9,10	1.56	1 (12%)	7,12,14	1.00	1 (14%)

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	SEP	C	129	2	-	5/6/8/10	-
2	SEP	D	129	2	-	0/6/8/10	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	129	SEP	P-O1P	3.31	1.60	1.50
2	C	129	SEP	P-O1P	3.19	1.60	1.50
2	C	129	SEP	P-O3P	2.02	1.62	1.54

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	129	SEP	OG-CB-CA	2.36	110.44	108.14

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	129	SEP	N-CA-CB-OG

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Mol	Chain	Res	Type	Atoms
2	C	129	SEP	C-CA-CB-OG
2	C	129	SEP	CB-OG-P-O2P
2	C	129	SEP	CB-OG-P-O3P
2	C	129	SEP	CB-OG-P-O1P

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

There are no ligands in this entry.

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, 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	233/256 (91%)	-0.04	2 (0%)	84	83	29, 44, 62, 69	34 (14%)
1	B	234/256 (91%)	0.01	4 (1%)	70	69	29, 42, 60, 68	37 (15%)
2	C	4/8 (50%)	0.18	0	100	100	53, 53, 54, 57	0
2	D	4/8 (50%)	0.36	0	100	100	52, 53, 54, 55	0
All	All	475/528 (89%)	-0.01	6 (1%)	77	76	29, 43, 60, 69	71 (14%)

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	846	HIS	3.5
1	A	848	GLY	3.4
1	B	845	PHE	2.5
1	B	830	ASN	2.4
1	B	849	PHE	2.1
1	B	846	HIS	2.1

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	SEP	C	129	10/11	0.85	0.11	43,50,57,59	0
2	SEP	D	129	10/11	0.94	0.10	45,47,52,56	0

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

There are no ligands in this entry.

6.5 Other polymers (i)

There are no such residues in this entry.