



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 24, 2023 – 10:51 AM EDT

PDB ID : 3A6N  
Title : The nucleosome containing a testis-specific histone variant, human H3T  
Authors : Tachiwana, H.; Kagawa, W.; Osakabe, A.; Koichiro, K.; Shiga, T.; Kimura, H.; Kurumizaka, H.  
Deposited on : 2009-09-04  
Resolution : 2.70 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](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.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467  
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

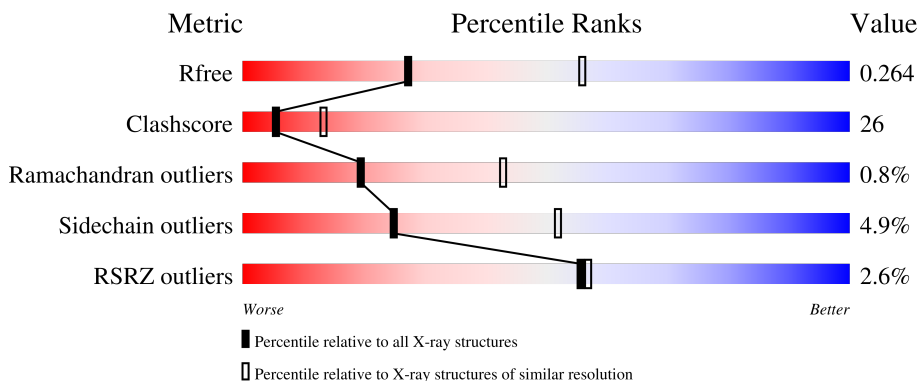
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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.



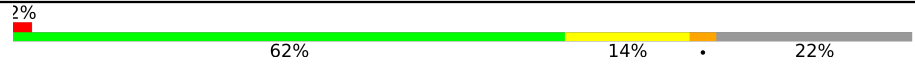

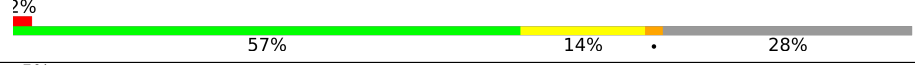
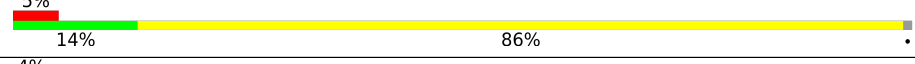
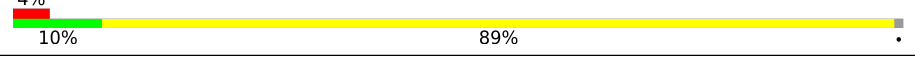
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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

Mol	Chain	Length	Quality of chain
1	A	139	
1	E	139	
2	B	106	
2	F	106	
3	C	133	

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Mol	Chain	Length	Quality of chain
3	G	133	
4	D	129	
4	H	129	
5	I	146	
5	J	146	

## 2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 12062 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 Histone H3.1t.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	97	805	507	155	138	5	0	0	0
1	E	98	811	510	156	140	5	0	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP Q16695
A	-2	SER	-	expression tag	UNP Q16695
A	-1	HIS	-	expression tag	UNP Q16695
E	-3	GLY	-	expression tag	UNP Q16695
E	-2	SER	-	expression tag	UNP Q16695
E	-1	HIS	-	expression tag	UNP Q16695

- Molecule 2 is a protein called Histone H4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	81	646	407	126	112	1	0	0	0
2	F	84	673	424	133	115	1	0	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-3	GLY	-	expression tag	UNP P62805
B	-2	SER	-	expression tag	UNP P62805
B	-1	HIS	-	expression tag	UNP P62805
F	-3	GLY	-	expression tag	UNP P62805
F	-2	SER	-	expression tag	UNP P62805
F	-1	HIS	-	expression tag	UNP P62805

- Molecule 3 is a protein called Histone H2A type 1-B/E.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	105	Total	C	N	O	0	0	0
			810	511	158	141			
3	G	104	Total	C	N	O	0	0	0
			805	508	157	140			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-3	GLY	-	expression tag	UNP P04908
C	-2	SER	-	expression tag	UNP P04908
C	-1	HIS	-	expression tag	UNP P04908
G	-3	GLY	-	expression tag	UNP P04908
G	-2	SER	-	expression tag	UNP P04908
G	-1	HIS	-	expression tag	UNP P04908

- Molecule 4 is a protein called Histone H2B type 1-J.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	94	Total	C	N	O	S	0	0	0
			736	462	134	138	2			
4	H	93	Total	C	N	O	S	0	0	0
			725	456	130	137	2			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	-3	GLY	-	expression tag	UNP P06899
D	-2	SER	-	expression tag	UNP P06899
D	-1	HIS	-	expression tag	UNP P06899
H	-3	GLY	-	expression tag	UNP P06899
H	-2	SER	-	expression tag	UNP P06899
H	-1	HIS	-	expression tag	UNP P06899

- Molecule 5 is a DNA chain called 146-MER DNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
5	I	145	Total	C	N	O	P	0	0	0
			2970	1421	538	867	144			
5	J	145	Total	C	N	O	P	0	0	0
			2969	1421	535	869	144			

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total Cl 1 1	0	0
6	C	1	Total Cl 1 1	0	0
6	E	1	Total Cl 1 1	0	0
6	G	1	Total Cl 1 1	0	0

- Molecule 7 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

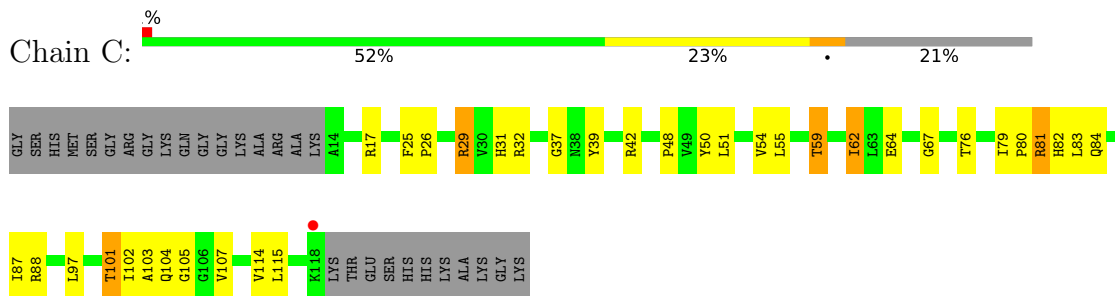
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	D	1	Total Mn 1 1	0	0
7	I	3	Total Mn 3 3	0	0
7	J	4	Total Mn 4 4	0	0

- Molecule 8 is water.

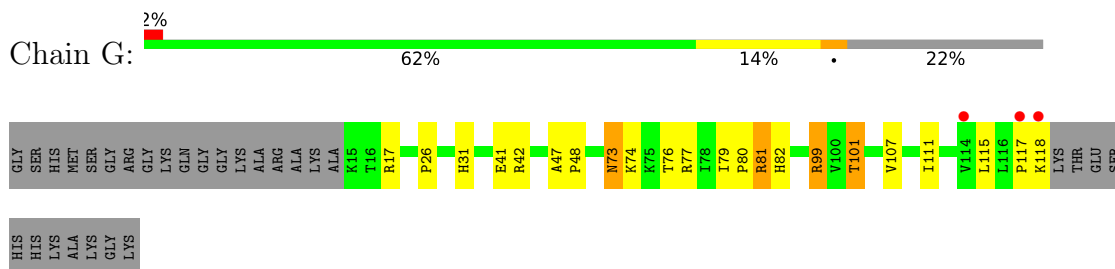
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	8	Total O 8 8	0	0
8	B	9	Total O 9 9	0	0
8	C	11	Total O 11 11	0	0
8	D	9	Total O 9 9	0	0
8	E	18	Total O 18 18	0	0
8	F	13	Total O 13 13	0	0
8	G	6	Total O 6 6	0	0
8	H	7	Total O 7 7	0	0
8	I	5	Total O 5 5	0	0
8	J	14	Total O 14 14	0	0



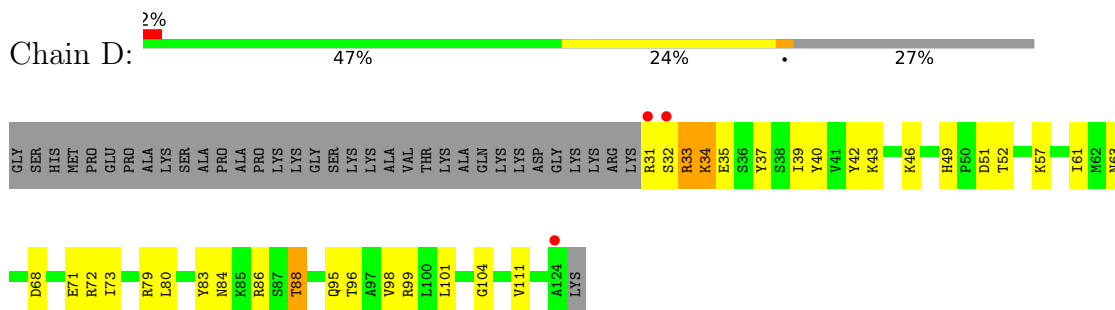
• Molecule 3: Histone H2A type 1-B/E



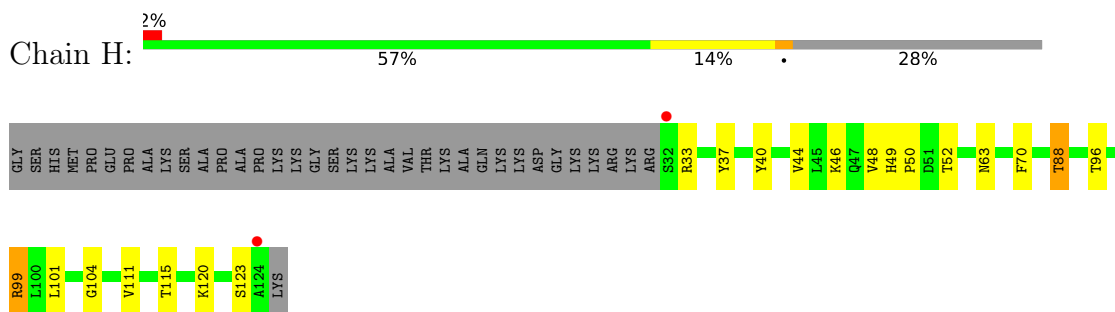
• Molecule 3: Histone H2A type 1-B/E



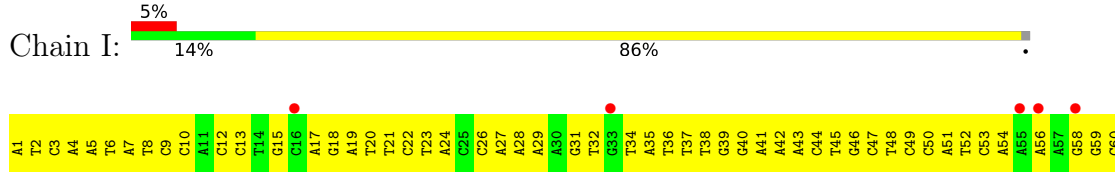
• Molecule 4: Histone H2B type 1-J



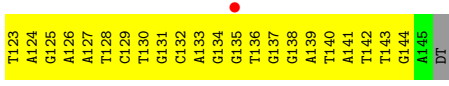
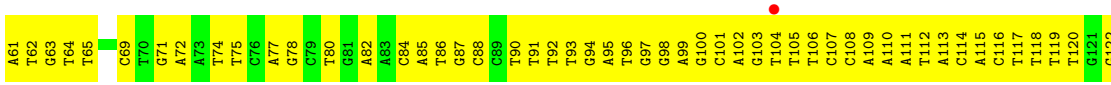
• Molecule 4: Histone H2B type 1-J



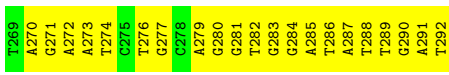
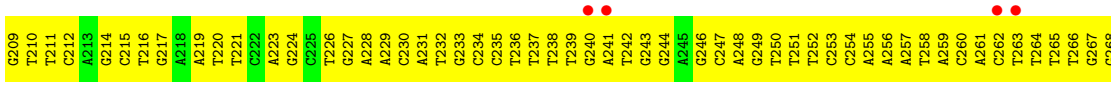
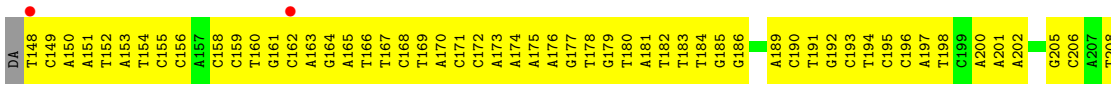
• Molecule 5: 146-MER DNA







● Molecule 5: 146-MER DNA



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	105.48Å 109.52Å 181.05Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.70 38.88 – 2.67	Depositor EDS
% Data completeness (in resolution range)	(Not available) (50.00-2.70) 98.5 (38.88-2.67)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.56 (at 2.69Å)	Xtrriage
Refinement program	CNS 1.2	Depositor
R, $R_{free}$	0.228 , 0.264 0.228 , 0.264	Depositor DCC
$R_{free}$ test set	2921 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	50.2	Xtrriage
Anisotropy	0.323	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 53.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.023 for k,h,-l	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	12062	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	69.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.47% 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

### 5.1 Standard geometry

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

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.42	0/817	0.64	0/1094
1	E	0.54	1/823 (0.1%)	0.67	0/1101
2	B	0.42	0/653	0.66	0/873
2	F	0.49	0/680	0.70	0/908
3	C	0.43	0/820	0.64	0/1107
3	G	0.38	0/815	0.61	0/1100
4	D	0.44	0/747	0.61	0/1004
4	H	0.41	0/736	0.59	0/990
5	I	0.40	0/3332	0.79	0/5141
5	J	0.39	0/3330	0.80	0/5138
All	All	0.42	1/12753 (0.0%)	0.73	0/18456

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
5	J	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	110	CYS	CB-SG	-5.49	1.72	1.81

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
5	J	214	DG	Sidechain

## 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	805	0	843	44	0
1	E	811	0	848	45	0
2	B	646	0	687	28	0
2	F	673	0	722	34	0
3	C	810	0	866	38	0
3	G	805	0	861	25	0
4	D	736	0	758	41	0
4	H	725	0	745	20	0
5	I	2970	0	1640	174	0
5	J	2969	0	1641	190	0
6	A	1	0	0	1	0
6	C	1	0	0	0	0
6	E	1	0	0	1	0
6	G	1	0	0	0	0
7	D	1	0	0	0	0
7	I	3	0	0	0	0
7	J	4	0	0	0	0
8	A	8	0	0	0	0
8	B	9	0	0	1	0
8	C	11	0	0	0	0
8	D	9	0	0	4	0
8	E	18	0	0	1	0
8	F	13	0	0	1	0
8	G	6	0	0	1	0
8	H	7	0	0	0	0
8	I	5	0	0	1	0
8	J	14	0	0	1	0
All	All	12062	0	9611	560	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 26.

All (560) 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)
5:J:242:DT:H2''	5:J:243:DG:H5''	1.31	1.09
5:J:152:DT:H2''	5:J:153:DA:H5''	1.30	1.08
5:I:36:DT:H2''	5:I:37:DT:H5''	1.32	1.06
5:I:101:DC:H2''	5:I:102:DA:H5'	1.36	1.04
5:I:47:DC:H2''	5:I:48:DT:H5''	1.41	1.03
5:I:131:DG:H2''	5:I:132:DC:C5	1.96	1.01
4:D:37:TYR:H	4:D:63:ASN:HD21	1.10	0.99
5:J:248:DA:H2''	5:J:249:DG:H5'	1.41	0.98
5:I:128:DT:H2''	5:I:129:DC:H5'	1.42	0.98
3:C:84:GLN:HE22	3:C:88:ARG:HE	1.01	0.97
5:J:152:DT:C2'	5:J:153:DA:H5''	1.94	0.97
5:I:40:DG:H2''	5:I:41:DA:H5'	1.44	0.97
5:J:264:DT:H2''	5:J:265:DT:H5'	1.45	0.94
5:I:36:DT:C2'	5:I:37:DT:H5''	1.96	0.94
5:J:183:DT:H2''	5:J:184:DT:H5''	1.48	0.94
5:I:17:DA:H1'	5:I:18:DG:H5'	1.49	0.94
5:I:43:DA:H1'	5:I:44:DC:H5''	1.51	0.91
5:I:50:DC:H2''	5:I:51:DA:H5'	1.50	0.91
5:J:184:DT:H2''	5:J:185:DG:C8	2.06	0.91
5:J:241:DA:H2''	5:J:242:DT:H5'	1.55	0.89
5:I:104:DT:H2''	5:I:105:DT:H5'	1.53	0.88
5:J:163:DA:H2''	5:J:164:DG:OP2	1.73	0.88
5:J:242:DT:C2'	5:J:243:DG:H5''	2.04	0.88
5:J:179:DG:H1'	5:J:180:DT:H5''	1.54	0.87
1:E:63:ARG:HH11	1:E:63:ARG:HB2	1.40	0.87
1:E:111:VAL:HG21	1:E:119:ILE:HG22	1.54	0.86
5:J:184:DT:H2''	5:J:185:DG:N7	1.92	0.85
5:J:181:DA:H1'	5:J:182:DT:H5''	1.60	0.84
5:I:47:DC:C2'	5:I:48:DT:H5''	2.06	0.83
3:G:17:ARG:HH12	3:G:31:HIS:HD2	1.27	0.83
5:I:5:DA:H2''	5:I:6:DT:H5''	1.61	0.83
5:I:53:DC:H2''	5:I:54:DA:H5'	1.62	0.82
5:J:219:DA:H2''	5:J:220:DT:H5'	1.62	0.82
5:J:192:DG:H2''	5:J:193:DC:H5'	1.62	0.82
5:I:19:DA:H2''	5:I:20:DT:H5'	1.61	0.82
5:J:205:DG:H1'	5:J:206:DC:H5''	1.63	0.81
3:C:87:ILE:HD12	3:C:97:LEU:HD12	1.63	0.80
5:I:45:DT:H2''	5:I:46:DG:C8	2.16	0.79
3:C:62:ILE:HD11	3:C:83:LEU:HD22	1.65	0.79
5:I:106:DT:H1'	5:I:107:DC:H5''	1.64	0.78
3:C:84:GLN:HE22	3:C:88:ARG:NE	1.81	0.77
5:I:64:DT:H2''	5:I:65:DT:H5'	1.66	0.77

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:22:LEU:O	2:B:23:ARG:HB3	1.81	0.77
3:C:84:GLN:NE2	3:C:88:ARG:HE	1.82	0.77
1:E:63:ARG:HH11	1:E:63:ARG:CB	1.98	0.76
5:J:158:DC:H2''	5:J:159:DC:H5''	1.68	0.75
5:J:183:DT:C2''	5:J:184:DT:H5''	2.15	0.75
5:J:250:DT:H2''	5:J:251:DT:H5''	1.66	0.75
5:J:255:DA:H2''	5:J:256:DA:OP2	1.86	0.75
4:D:88:THR:HG23	5:I:39:DG:OP1	1.85	0.75
1:E:133:GLU:O	1:E:134:ARG:HG3	1.86	0.74
5:J:165:DA:H2''	5:J:166:DT:H5''	1.68	0.74
4:D:46:LYS:HA	4:D:46:LYS:HE2	1.69	0.74
2:B:59:LYS:O	2:B:63:GLU:HG3	1.87	0.74
5:I:108:DC:H2''	5:I:109:DA:C8	2.23	0.74
5:J:261:DA:H1''	5:J:262:DC:H5''	1.70	0.73
1:E:63:ARG:H	1:E:63:ARG:NH1	1.87	0.72
5:I:135:DG:H2''	5:I:136:DT:O5''	1.88	0.72
5:I:141:DA:H1''	5:I:142:DT:H5''	1.72	0.72
5:I:137:DG:H2''	5:I:138:DG:OP2	1.88	0.72
3:C:55:LEU:O	3:C:59:THR:HG23	1.90	0.71
5:I:77:DA:H1''	5:I:78:DG:H5''	1.71	0.71
3:C:51:LEU:HD13	4:D:73:ILE:HG21	1.73	0.71
5:I:134:DG:H2''	5:I:135:DG:OP2	1.91	0.70
5:I:4:DA:H2''	5:I:5:DA:H5''	1.72	0.70
1:E:60:LEU:HD12	1:E:64:LYS:HE3	1.73	0.70
1:E:71:MET:HE3	1:E:89:VAL:HA	1.74	0.70
1:E:122:LYS:HB2	6:E:201:CL:CL	2.28	0.70
3:G:101:THR:HG22	8:G:302:HOH:O	1.90	0.70
5:I:19:DA:H2''	5:I:20:DT:C5''	2.21	0.70
1:A:63:ARG:HH11	5:I:60:DC:H5''	1.57	0.70
2:F:92:ARG:NH1	2:F:92:ARG:HB3	2.06	0.70
5:I:115:DA:H2''	5:I:116:DC:H5''	1.73	0.70
5:J:233:DG:H2''	5:J:234:DC:OP2	1.90	0.69
5:J:152:DT:H2''	5:J:153:DA:C5''	2.16	0.69
1:A:68:GLN:NE2	1:A:72:ARG:HH21	1.90	0.69
1:A:63:ARG:HH12	2:B:30:THR:HG21	1.58	0.69
5:J:158:DC:C2''	5:J:159:DC:H5''	2.23	0.69
5:I:36:DT:C3''	5:I:37:DT:H5''	2.24	0.68
5:J:152:DT:C3''	5:J:153:DA:H5''	2.23	0.68
5:J:209:DG:H1''	5:J:210:DT:H5''	1.76	0.68
5:I:115:DA:C2''	5:I:116:DC:H5''	2.23	0.68
3:G:42:ARG:NH1	5:I:111:DA:H4''	2.08	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:J:266:DT:H2''	5:J:267:DG:C8	2.29	0.67
5:I:20:DT:H2''	5:I:21:DT:H5'	1.76	0.67
5:I:99:DA:H1'	5:I:100:DG:H5'	1.76	0.67
1:E:71:MET:CE	1:E:92:LEU:HD12	2.25	0.67
5:I:5:DA:C2'	5:I:6:DT:H5''	2.24	0.67
1:E:63:ARG:NH2	2:F:30:THR:HG23	2.09	0.66
5:I:101:DC:C2'	5:I:102:DA:H5'	2.18	0.66
5:I:106:DT:H2''	5:I:107:DC:H5'	1.77	0.66
5:I:50:DC:H2''	5:I:51:DA:C5'	2.25	0.66
5:I:115:DA:H1'	5:I:116:DC:H5''	1.78	0.66
5:J:242:DT:H2''	5:J:243:DG:C5'	2.18	0.66
3:G:77:ARG:HB3	5:I:131:DG:OP1	1.96	0.66
1:E:119:ILE:HG13	2:F:50:ILE:HG13	1.77	0.65
5:J:276:DT:H2''	5:J:277:DG:N7	2.11	0.65
1:A:51:ILE:O	1:A:55:GLN:HG3	1.97	0.65
2:F:62:LEU:O	2:F:66:ILE:HG12	1.97	0.65
5:I:51:DA:H2''	5:I:52:DT:H5'	1.79	0.65
1:A:63:ARG:NH1	5:I:60:DC:H5''	2.11	0.65
1:A:71:MET:CE	1:A:89:VAL:HG13	2.26	0.65
1:E:65:LEU:HB3	1:E:66:PRO:HD3	1.77	0.65
1:E:79:LYS:HD3	1:E:80:THR:N	2.12	0.65
5:I:133:DA:H2''	5:I:134:DG:OP2	1.96	0.65
5:J:148:DT:H2''	5:J:149:DC:C6	2.31	0.65
5:J:172:DC:H2''	5:J:173:DA:C8	2.32	0.64
5:J:230:DC:H2''	5:J:231:DA:C8	2.33	0.64
1:E:121:PRO:HB3	2:F:53:GLU:HG3	1.77	0.64
5:J:170:DA:H1'	5:J:171:DC:H5''	1.78	0.64
2:F:20:LYS:HG2	2:F:21:VAL:N	2.12	0.64
5:I:43:DA:C1'	5:I:44:DC:H5''	2.26	0.64
5:I:52:DT:H1'	5:I:53:DC:H5''	1.81	0.63
5:I:129:DC:H2''	5:I:130:DT:H71	1.80	0.63
4:D:37:TYR:H	4:D:63:ASN:ND2	1.91	0.63
5:J:270:DA:H2''	5:J:271:DG:O5'	1.98	0.63
3:C:84:GLN:HG3	3:C:105:GLY:HA3	1.81	0.63
5:I:42:DA:H2''	5:I:43:DA:H5'	1.81	0.63
5:I:113:DA:H2''	5:I:114:DC:O5'	1.99	0.63
5:I:47:DC:C3'	5:I:48:DT:H5''	2.29	0.62
5:J:246:DG:H1'	5:J:247:DC:H5'	1.80	0.62
2:F:19:ARG:HA	2:F:19:ARG:NE	2.14	0.62
3:C:83:LEU:O	3:C:87:ILE:HG12	1.99	0.62
5:J:195:DC:H2''	5:J:196:DC:OP2	2.00	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:I:36:DT:H2''	5:I:37:DT:C5'	2.19	0.62
5:J:181:DA:C2'	5:J:182:DT:H5''	2.30	0.62
1:A:76:GLN:HA	1:A:76:GLN:HE21	1.64	0.61
5:I:63:DG:H2''	5:I:64:DT:OP2	1.99	0.61
3:C:101:THR:HG21	8:F:202:HOH:O	2.00	0.61
5:I:110:DA:H2''	5:I:111:DA:OP2	2.00	0.61
5:I:59:DG:H2''	5:I:60:DC:OP2	2.00	0.61
5:J:181:DA:C1'	5:J:182:DT:H5''	2.29	0.61
5:I:117:DT:H1'	5:I:118:DT:H5''	1.82	0.61
5:I:34:DT:H2''	5:I:35:DA:C8	2.35	0.61
5:I:53:DC:C2'	5:I:54:DA:H5'	2.30	0.61
5:I:102:DA:H2''	5:I:103:DG:OP2	1.98	0.61
5:I:8:DT:H1'	5:I:9:DC:H5'	1.83	0.61
5:J:175:DA:H2''	5:J:176:DA:C8	2.35	0.61
1:E:110:CYS:SG	1:E:126:LEU:HD23	2.41	0.61
4:D:31:ARG:HA	4:D:31:ARG:CZ	2.31	0.60
5:J:246:DG:H1'	5:J:247:DC:C5'	2.31	0.60
5:I:104:DT:H2'	5:I:105:DT:H71	1.82	0.60
5:I:136:DT:H2'	5:I:137:DG:C8	2.37	0.60
1:A:49:ARG:HD2	5:J:155:DC:P	2.41	0.60
5:J:284:DG:H2''	5:J:285:DA:C8	2.35	0.60
5:J:155:DC:H2''	5:J:156:DC:H5'	1.82	0.60
1:A:111:VAL:HG21	1:A:119:ILE:HA	1.84	0.60
4:D:80:LEU:HD21	4:D:96:THR:CG2	2.32	0.60
5:I:131:DG:H2''	5:I:132:DC:C6	2.36	0.60
5:I:18:DG:H2''	5:I:19:DA:OP2	2.02	0.59
5:I:84:DC:H2''	5:I:85:DA:C8	2.37	0.59
3:C:32:ARG:NH1	5:I:29:DA:OP1	2.35	0.59
5:J:287:DA:H2'	5:J:288:DT:H72	1.82	0.59
5:I:3:DC:H2''	5:I:4:DA:C8	2.36	0.59
5:J:264:DT:H2'	5:J:265:DT:H72	1.85	0.59
1:A:71:MET:HE3	1:A:89:VAL:HG13	1.85	0.59
1:A:68:GLN:HE21	1:A:72:ARG:HH21	1.50	0.59
1:A:108:ASN:O	1:A:112:ILE:HD13	2.03	0.59
5:I:106:DT:H1'	5:I:107:DC:C5'	2.31	0.58
3:C:26:PRO:HD3	4:D:40:TYR:CD1	2.38	0.58
2:B:92:ARG:HH21	4:D:101:LEU:HD13	1.68	0.58
4:D:31:ARG:HA	4:D:31:ARG:NE	2.18	0.58
5:J:229:DA:H2''	5:J:230:DC:H5'	1.84	0.58
1:A:109:LEU:HD13	1:E:129:ARG:HG2	1.84	0.58
5:J:279:DA:H2''	5:J:280:DG:H5'	1.85	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:G:17:ARG:HH12	3:G:31:HIS:CD2	2.15	0.58
5:I:119:DT:H2''	5:I:120:DT:OP2	2.03	0.58
5:I:143:DT:H2''	5:I:144:DG:OP2	2.03	0.58
5:J:159:DC:H2'	5:J:160:DT:H71	1.85	0.58
5:J:165:DA:H2'	5:J:166:DT:H72	1.86	0.58
5:I:116:DC:H2'	5:I:117:DT:H72	1.86	0.58
4:H:37:TYR:H	4:H:63:ASN:ND2	2.01	0.57
5:J:239:DT:H4'	5:J:240:DG:OP1	2.03	0.57
5:I:34:DT:H2''	5:I:35:DA:H8	1.69	0.57
5:J:264:DT:C2'	5:J:265:DT:H5'	2.28	0.57
4:H:88:THR:HG23	5:J:186:DG:OP1	2.04	0.57
5:J:271:DG:H4'	5:J:271:DG:OP1	2.04	0.57
5:J:273:DA:H1'	5:J:274:DT:H5''	1.85	0.57
5:J:286:DT:H2''	5:J:287:DA:O5'	2.04	0.57
1:E:63:ARG:NH2	2:F:30:THR:H	2.02	0.57
5:I:128:DT:H2''	5:I:129:DC:C5'	2.25	0.57
5:J:235:DC:H2''	5:J:236:DT:C7	2.35	0.57
1:E:41:TYR:OH	5:I:7:DA:H5'	2.04	0.57
1:E:71:MET:HE3	1:E:92:LEU:HD12	1.86	0.57
3:G:47:ALA:N	3:G:48:PRO:HD2	2.20	0.57
5:J:261:DA:H1'	5:J:262:DC:C5'	2.34	0.57
3:C:54:VAL:HG21	4:D:98:VAL:HG21	1.87	0.57
1:A:68:GLN:HE22	1:A:89:VAL:HG21	1.69	0.56
5:J:168:DC:H1'	5:J:169:DT:H5''	1.86	0.56
1:A:40:ARG:NH2	5:J:229:DA:N3	2.53	0.56
1:E:63:ARG:HH21	2:F:30:THR:HG23	1.69	0.56
2:F:30:THR:OG1	2:F:32:PRO:HG2	2.06	0.56
5:J:182:DT:H2'	5:J:183:DT:H72	1.87	0.56
5:J:183:DT:C3'	5:J:184:DT:H5''	2.35	0.56
5:J:236:DT:H2''	5:J:237:DT:OP2	2.03	0.56
2:B:75:HIS:HD2	4:D:96:THR:OG1	1.89	0.56
1:A:49:ARG:HD2	5:J:155:DC:OP1	2.05	0.56
1:A:68:GLN:HE21	1:A:72:ARG:NH2	2.04	0.56
1:E:71:MET:HE2	1:E:92:LEU:HD12	1.87	0.56
1:A:70:LEU:HD13	2:B:26:ILE:HA	1.87	0.56
5:J:249:DG:H1'	5:J:250:DT:H5''	1.87	0.56
1:A:76:GLN:HA	1:A:76:GLN:NE2	2.21	0.55
5:I:9:DC:H2''	5:I:10:DC:H5'	1.88	0.55
5:I:49:DC:H2''	5:I:50:DC:OP2	2.07	0.55
1:A:68:GLN:NE2	1:A:89:VAL:HG21	2.21	0.55
5:I:26:DC:H1'	5:I:27:DA:C5	2.42	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:I:28:DA:H1'	5:I:29:DA:C8	2.41	0.55
5:J:159:DC:H2''	5:J:160:DT:O5'	2.07	0.55
4:D:33:ARG:O	4:D:33:ARG:HG3	2.06	0.55
2:F:19:ARG:HA	2:F:19:ARG:HE	1.72	0.55
5:I:111:DA:H2''	5:I:112:DT:OP2	2.07	0.55
5:J:281:DG:H2''	5:J:282:DT:H5'	1.88	0.55
3:C:87:ILE:HD12	3:C:97:LEU:CD1	2.34	0.55
5:J:246:DG:H2''	5:J:247:DC:H5'	1.88	0.55
5:J:285:DA:H1'	5:J:286:DT:H5''	1.88	0.55
3:C:64:GLU:O	4:D:49:HIS:HE1	1.90	0.55
5:I:20:DT:H1'	5:I:21:DT:H5''	1.88	0.55
5:J:158:DC:H2''	5:J:159:DC:C5'	2.36	0.55
5:I:12:DC:H1'	5:I:13:DC:H5''	1.89	0.55
2:B:92:ARG:HB3	2:B:92:ARG:CZ	2.37	0.54
5:I:85:DA:H1'	5:I:86:DT:H5''	1.90	0.54
1:E:71:MET:CE	1:E:89:VAL:HA	2.37	0.54
5:J:166:DT:H1'	5:J:167:DT:H5'	1.90	0.54
1:E:49:ARG:HG3	1:E:49:ARG:HH11	1.72	0.54
4:D:80:LEU:HD21	4:D:96:THR:HB	1.90	0.54
5:I:124:DA:H2''	5:I:125:DG:OP2	2.08	0.54
1:E:63:ARG:HH21	2:F:30:THR:CG2	2.20	0.54
2:F:20:LYS:HG2	2:F:21:VAL:H	1.71	0.54
5:J:192:DG:C2'	5:J:193:DC:H5'	2.35	0.54
1:E:71:MET:HE1	1:E:89:VAL:HG22	1.89	0.54
5:I:46:DG:N2	5:J:248:DA:C2	2.76	0.54
5:J:241:DA:C2'	5:J:242:DT:H5'	2.34	0.54
5:J:181:DA:H2''	5:J:182:DT:H5''	1.90	0.54
5:I:17:DA:H1'	5:I:18:DG:C5'	2.29	0.54
5:I:93:DT:H1'	5:I:94:DG:C5'	2.38	0.54
5:I:96:DT:H2''	5:I:97:DG:C8	2.43	0.54
5:J:285:DA:H2''	5:J:286:DT:OP2	2.08	0.54
2:B:46:ILE:O	5:J:227:DG:H3'	2.08	0.53
5:J:153:DA:H2''	5:J:154:DT:H5'	1.90	0.53
5:J:177:DG:H1'	5:J:178:DT:H5''	1.89	0.53
5:J:235:DC:H4'	5:J:236:DT:OP1	2.09	0.53
3:C:37:GLY:HA3	3:C:39:TYR:CE2	2.43	0.53
5:J:194:DT:H1'	5:J:195:DC:H5'	1.90	0.53
5:I:93:DT:H1'	5:I:94:DG:H5''	1.89	0.53
5:J:150:DA:H2''	5:J:151:DA:OP2	2.07	0.53
4:D:86:ARG:HH12	5:I:39:DG:H3'	1.72	0.53
5:I:122:DG:H1'	5:I:123:DT:H5''	1.91	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:I:129:DC:H2''	5:I:130:DT:C7	2.38	0.53
5:J:288:DT:H1'	5:J:289:DT:H5''	1.91	0.53
1:A:71:MET:HE1	1:A:89:VAL:HG13	1.91	0.53
5:I:74:DT:H2''	5:I:75:DT:H5'	1.90	0.53
5:I:58:DG:H2''	5:I:59:DG:C8	2.44	0.52
3:C:29:ARG:HD2	4:D:35:GLU:OE2	2.08	0.52
5:J:164:DG:H2''	5:J:165:DA:H5''	1.90	0.52
5:I:23:DT:H2''	5:I:24:DA:H5'	1.91	0.52
1:A:60:LEU:HD12	1:A:64:LYS:NZ	2.24	0.52
2:B:52:GLU:OE2	2:B:55:ARG:NH1	2.43	0.52
5:J:264:DT:H2''	5:J:265:DT:C5'	2.29	0.52
4:D:68:ASP:O	4:D:72:ARG:HG3	2.10	0.52
1:E:46:VAL:HG21	5:I:82:DA:H3'	1.92	0.52
3:G:42:ARG:O	4:H:88:THR:HA	2.10	0.52
5:I:37:DT:H2''	5:I:38:DT:C6	2.45	0.52
5:J:182:DT:H2''	5:J:183:DT:O5'	2.09	0.52
5:J:257:DA:H2''	5:J:258:DT:OP2	2.10	0.52
4:D:84:ASN:O	4:D:86:ARG:HG3	2.10	0.52
5:I:115:DA:C1'	5:I:116:DC:H5''	2.40	0.52
5:J:271:DG:H2''	5:J:272:DA:C8	2.45	0.52
5:J:280:DG:H1'	5:J:281:DG:C5'	2.39	0.52
1:E:69:ARG:HH22	5:I:90:DT:P	2.33	0.52
3:G:42:ARG:HB2	4:H:88:THR:HB	1.92	0.52
5:I:108:DC:H2''	5:I:109:DA:N7	2.24	0.52
5:I:134:DG:H1'	5:I:135:DG:H5'	1.91	0.51
5:I:136:DT:C2'	5:I:137:DG:C8	2.93	0.51
5:I:8:DT:H2''	5:I:9:DC:OP2	2.10	0.51
5:I:116:DC:C6	5:I:117:DT:H72	2.45	0.51
5:J:168:DC:H2''	5:J:169:DT:OP2	2.10	0.51
5:J:197:DA:H1'	5:J:198:DT:C5'	2.40	0.51
2:B:92:ARG:HB3	2:B:92:ARG:NH1	2.26	0.51
5:I:71:DG:H2''	5:I:72:DA:OP2	2.10	0.51
1:E:132:GLY:HA2	1:E:135:ALA:HB2	1.92	0.51
2:F:19:ARG:HE	2:F:19:ARG:CA	2.23	0.51
5:I:104:DT:H2''	5:I:105:DT:C5'	2.34	0.51
1:A:65:LEU:HB3	1:A:66:PRO:HD3	1.91	0.51
1:A:129:ARG:CG	1:A:129:ARG:HH11	2.24	0.51
2:F:92:ARG:HB3	2:F:92:ARG:CZ	2.40	0.51
5:J:205:DG:H2''	5:J:206:DC:C5'	2.39	0.51
5:I:103:DG:H2''	5:I:104:DT:H5''	1.92	0.51
5:I:103:DG:H2''	5:I:104:DT:C5'	2.40	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:J:285:DA:H1'	5:J:286:DT:C5'	2.40	0.51
5:J:205:DG:C1'	5:J:206:DC:H5''	2.37	0.51
2:F:19:ARG:NE	2:F:19:ARG:CA	2.74	0.51
5:J:262:DC:H1'	5:J:263:DT:H5''	1.93	0.51
5:J:284:DG:H2''	5:J:285:DA:H8	1.73	0.51
2:F:59:LYS:HG2	2:F:63:GLU:OE2	2.11	0.51
4:D:32:SER:OG	5:I:103:DG:H5''	2.11	0.50
3:G:79:ILE:HG12	3:G:82:HIS:CE1	2.46	0.50
4:H:40:TYR:O	4:H:44:VAL:HG23	2.10	0.50
5:I:5:DA:H2''	5:I:6:DT:C5'	2.36	0.50
1:A:85:GLN:HA	5:I:49:DC:OP1	2.11	0.50
3:C:17:ARG:HH22	3:C:31:HIS:CD2	2.30	0.50
3:C:67:GLY:HA3	4:D:49:HIS:CE1	2.46	0.50
2:F:35:ARG:O	2:F:39:ARG:HG2	2.12	0.50
5:J:215:DC:H2''	5:J:216:DT:H71	1.92	0.50
5:J:248:DA:H2''	5:J:249:DG:C5'	2.28	0.50
3:C:26:PRO:HD3	4:D:40:TYR:CG	2.47	0.50
1:E:118:THR:HA	2:F:45:ARG:HB3	1.94	0.50
1:E:107:THR:O	1:E:111:VAL:HG23	2.12	0.50
1:E:79:LYS:HD3	1:E:79:LYS:C	2.31	0.50
1:E:121:PRO:CB	2:F:53:GLU:HG3	2.42	0.50
2:F:92:ARG:HH21	4:H:101:LEU:HD23	1.76	0.50
5:J:153:DA:H1'	5:J:154:DT:H5''	1.94	0.50
4:H:46:LYS:O	4:H:50:PRO:HG3	2.12	0.50
5:J:231:DA:H1'	5:J:232:DT:H5''	1.94	0.50
2:B:29:ILE:HD12	2:B:58:LEU:HD12	1.94	0.50
5:I:6:DT:H2''	5:I:7:DA:C8	2.46	0.50
5:I:8:DT:H1'	5:I:9:DC:C5'	2.42	0.50
3:G:26:PRO:HD3	4:H:40:TYR:CD1	2.47	0.49
2:B:45:ARG:CZ	5:I:69:DC:H4'	2.42	0.49
5:I:93:DT:H2''	5:I:94:DG:H5'	1.93	0.49
5:I:26:DC:H1'	5:I:27:DA:N7	2.27	0.49
5:I:77:DA:C2	5:J:217:DG:N2	2.80	0.49
5:I:115:DA:H2''	5:I:116:DC:C5'	2.40	0.49
5:J:282:DT:H2''	5:J:283:DG:H5'	1.95	0.49
5:J:290:DG:H2''	5:J:291:DA:OP2	2.12	0.49
2:F:31:LYS:N	2:F:32:PRO:HD2	2.28	0.49
3:C:81:ARG:NH2	3:C:107:VAL:O	2.41	0.49
4:D:79:ARG:HG2	4:D:83:TYR:CZ	2.48	0.49
5:J:179:DG:H2''	5:J:180:DT:OP2	2.12	0.49
5:J:197:DA:H1'	5:J:198:DT:H5''	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:J:219:DA:C2'	5:J:220:DT:H5'	2.40	0.49
1:A:63:ARG:NH1	2:B:30:THR:HG21	2.26	0.49
5:J:231:DA:H2''	5:J:232:DT:OP2	2.13	0.49
5:J:190:DC:H1'	5:J:191:DT:H5'	1.95	0.48
1:A:121:PRO:HD2	6:A:201:CL:CL	2.50	0.48
4:D:51:ASP:HB3	8:D:303:HOH:O	2.13	0.48
4:H:49:HIS:HB3	4:H:52:THR:OG1	2.14	0.48
5:I:1:DA:H1'	5:I:2:DT:C6	2.48	0.48
5:I:15:DG:N2	5:J:279:DA:C2	2.82	0.48
5:I:31:DG:H1'	5:I:32:DT:H5''	1.94	0.48
5:J:173:DA:H2''	5:J:174:DA:C8	2.49	0.48
3:C:103:ALA:O	3:C:104:GLN:HB2	2.12	0.48
5:J:205:DG:H2''	5:J:206:DC:H5'	1.94	0.48
5:J:243:DG:H2''	5:J:244:DG:C8	2.49	0.48
5:J:261:DA:H2''	5:J:262:DC:OP2	2.13	0.48
5:J:291:DA:H2''	5:J:292:DT:H5'	1.94	0.48
4:H:111:VAL:O	4:H:115:THR:HG23	2.14	0.48
5:I:130:DT:H2''	5:I:131:DG:C8	2.49	0.48
1:A:90:MET:HA	1:A:90:MET:CE	2.44	0.48
3:C:79:ILE:HG12	3:C:82:HIS:CE1	2.48	0.48
2:B:22:LEU:O	2:B:23:ARG:CB	2.59	0.48
5:J:262:DC:H2''	5:J:263:DT:H5'	1.96	0.48
1:A:71:MET:HG3	1:A:92:LEU:HD12	1.95	0.47
4:H:33:ARG:HB3	5:I:123:DT:OP1	2.15	0.47
5:J:148:DT:H6	5:J:148:DT:O5'	1.97	0.47
2:B:26:ILE:O	2:B:55:ARG:HD3	2.14	0.47
5:I:52:DT:H1'	5:I:53:DC:C5'	2.43	0.47
5:J:211:DT:H1'	5:J:212:DC:H5'	1.95	0.47
4:D:80:LEU:CD2	4:D:96:THR:HB	2.45	0.47
5:I:43:DA:H1'	5:I:44:DC:C5'	2.34	0.47
5:I:87:DG:H4'	5:I:88:DC:H5'	1.97	0.47
5:J:265:DT:H2''	5:J:266:DT:O5'	2.13	0.47
2:B:23:ARG:NH2	2:B:28:GLY:HA2	2.29	0.47
5:J:258:DT:H2''	5:J:259:DA:H8	1.79	0.47
1:A:52:ARG:HG2	3:G:111:ILE:HD11	1.95	0.47
3:C:50:TYR:OH	4:D:95:GLN:HG3	2.14	0.47
5:I:103:DG:C2'	5:I:104:DT:H5''	2.44	0.47
5:J:258:DT:H2''	5:J:259:DA:C8	2.50	0.47
1:A:79:LYS:HD3	1:A:82:LEU:HD21	1.97	0.47
5:I:48:DT:H2''	5:I:49:DC:H5'	1.97	0.47
5:J:182:DT:H5'	5:J:182:DT:H6	1.79	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:J:192:DG:H1'	5:J:193:DC:H5''	1.97	0.47
5:J:201:DA:H2''	5:J:202:DA:OP2	2.15	0.47
2:F:35:ARG:HD3	8:I:302:HOH:O	2.14	0.47
4:H:37:TYR:H	4:H:63:ASN:HD21	1.63	0.47
5:I:52:DT:H2''	5:I:53:DC:H5'	1.97	0.47
5:J:160:DT:H73	8:J:1105:HOH:O	2.15	0.47
5:J:280:DG:H1'	5:J:281:DG:H5'	1.97	0.47
5:J:192:DG:H1'	5:J:193:DC:C5'	2.45	0.46
4:D:34:LYS:HG2	5:J:270:DA:OP1	2.16	0.46
2:F:20:LYS:CG	2:F:21:VAL:N	2.79	0.46
5:I:114:DC:H4'	5:I:114:DC:OP1	2.15	0.46
5:J:190:DC:H2''	5:J:191:DT:C5'	2.45	0.46
5:J:250:DT:C2'	5:J:251:DT:H5'	2.39	0.46
5:J:252:DT:H2''	5:J:253:DC:O5'	2.15	0.46
5:J:193:DC:O2	5:J:194:DT:C4	2.68	0.46
5:J:200:DA:H2''	5:J:201:DA:H5'	1.96	0.46
4:D:99:ARG:NH2	4:D:111:VAL:HG11	2.31	0.46
3:G:42:ARG:NH2	5:I:111:DA:O4'	2.48	0.46
5:I:7:DA:C2	5:J:287:DA:C2	3.04	0.46
4:D:51:ASP:HA	8:D:303:HOH:O	2.16	0.46
2:F:75:HIS:HD2	4:H:96:THR:OG1	1.99	0.46
5:I:58:DG:C2'	5:I:59:DG:C8	2.98	0.46
5:J:229:DA:H1'	5:J:230:DC:H5''	1.98	0.46
2:B:58:LEU:O	2:B:58:LEU:HD22	2.15	0.46
2:B:75:HIS:CD2	4:D:96:THR:OG1	2.69	0.46
3:G:31:HIS:CD2	3:G:48:PRO:HG3	2.51	0.46
5:I:22:DC:H2''	5:I:23:DT:H5''	1.98	0.46
5:J:226:DT:H2''	5:J:227:DG:C8	2.51	0.45
5:J:246:DG:C2'	5:J:247:DC:H5'	2.46	0.45
1:E:134:ARG:HB2	1:E:134:ARG:NH1	2.31	0.45
5:J:152:DT:H2''	5:J:153:DA:O4'	2.17	0.45
5:J:200:DA:H2''	5:J:201:DA:OP2	2.16	0.45
3:C:25:PHE:CZ	3:C:59:THR:HG21	2.52	0.45
3:C:51:LEU:O	3:C:55:LEU:HG	2.17	0.45
5:I:74:DT:H1'	5:I:75:DT:H5''	1.98	0.45
5:J:182:DT:H2'	5:J:183:DT:C7	2.45	0.45
5:J:262:DC:H1'	5:J:263:DT:C5'	2.46	0.45
2:B:26:ILE:HD11	2:B:55:ARG:O	2.16	0.45
1:E:63:ARG:HH21	2:F:30:THR:CB	2.30	0.45
5:I:128:DT:H2''	5:I:129:DC:H6	1.81	0.45
3:C:76:THR:O	4:D:52:THR:HG23	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:I:114:DC:H2''	5:I:115:DA:C8	2.52	0.45
3:C:67:GLY:HA3	4:D:49:HIS:ND1	2.32	0.45
3:G:77:ARG:CB	5:I:131:DG:OP1	2.65	0.45
3:C:17:ARG:HH22	3:C:31:HIS:CG	2.34	0.45
4:H:88:THR:CG2	5:J:186:DG:OP1	2.65	0.44
1:A:46:VAL:O	1:A:50:GLU:HG3	2.17	0.44
5:I:140:DT:H6	5:I:140:DT:H5'	1.82	0.44
5:J:190:DC:H2''	5:J:191:DT:H5'	1.98	0.44
3:C:62:ILE:CD1	3:C:87:ILE:HD11	2.47	0.44
5:I:27:DA:C6	5:I:28:DA:C6	3.05	0.44
5:I:31:DG:H2''	5:I:32:DT:H5'	1.98	0.44
5:I:84:DC:H2''	5:I:85:DA:H8	1.83	0.44
5:I:123:DT:H6	5:I:123:DT:H2'	1.70	0.44
5:I:126:DA:H2''	5:I:127:DA:OP2	2.17	0.44
5:J:184:DT:C2'	5:J:185:DG:N7	2.72	0.44
5:J:223:DA:H1'	5:J:224:DG:C8	2.52	0.44
5:I:95:DA:H1'	5:I:96:DT:H5''	1.98	0.44
1:A:69:ARG:HG2	2:B:25:ASN:OD1	2.18	0.44
5:J:161:DG:H2''	5:J:162:DC:OP2	2.17	0.44
5:J:172:DC:H2''	5:J:173:DA:N7	2.32	0.44
5:J:205:DG:C2'	5:J:206:DC:H5''	2.48	0.44
2:B:31:LYS:N	2:B:32:PRO:HD2	2.33	0.44
3:C:81:ARG:O	3:C:81:ARG:HG3	2.16	0.44
1:A:65:LEU:HG	1:A:69:ARG:NH2	2.32	0.44
5:I:136:DT:H4'	5:I:136:DT:OP1	2.17	0.44
5:J:279:DA:C2'	5:J:280:DG:H5'	2.48	0.44
1:E:57:SER:HB2	1:E:59:GLU:OE2	2.17	0.44
5:I:84:DC:H6	5:I:84:DC:H2'	1.66	0.44
5:J:259:DA:H1'	5:J:260:DC:H5''	1.99	0.44
3:G:77:ARG:N	5:I:131:DG:OP1	2.49	0.43
5:J:179:DG:C1'	5:J:180:DT:H5''	2.37	0.43
3:C:114:VAL:HG12	3:C:114:VAL:O	2.18	0.43
3:C:115:LEU:CD2	1:E:117:VAL:HG23	2.47	0.43
4:D:80:LEU:HD21	4:D:96:THR:CB	2.47	0.43
3:G:81:ARG:NH2	3:G:107:VAL:O	2.48	0.43
5:I:36:DT:H2''	5:I:37:DT:H6	1.82	0.43
1:E:63:ARG:NH1	1:E:63:ARG:N	2.61	0.43
5:I:111:DA:C8	5:I:112:DT:H72	2.53	0.43
1:A:67:PHE:CE2	1:A:71:MET:HE2	2.54	0.43
1:A:71:MET:HB2	1:A:71:MET:HE2	1.92	0.43
3:G:99:ARG:NH1	3:G:99:ARG:HG3	2.34	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:I:98:DG:H4'	5:I:99:DA:OP1	2.18	0.43
5:J:179:DG:H1'	5:J:180:DT:C5'	2.38	0.43
5:J:280:DG:H1'	5:J:281:DG:H5''	1.99	0.43
2:B:44:LYS:CB	3:G:115:LEU:HD22	2.49	0.43
1:E:111:VAL:CG2	1:E:119:ILE:HG22	2.39	0.43
3:C:102:ILE:HG23	4:D:61:ILE:HD13	1.99	0.43
1:E:111:VAL:HG21	1:E:119:ILE:CG2	2.39	0.43
4:H:48:VAL:HG23	4:H:49:HIS:ND1	2.33	0.43
5:J:220:DT:H1'	5:J:221:DT:H5'	2.00	0.43
1:A:111:VAL:CG2	1:A:119:ILE:HA	2.48	0.43
3:C:62:ILE:HD13	3:C:87:ILE:HD11	2.00	0.43
5:I:56:DA:N6	5:J:236:DT:O4	2.52	0.43
5:I:64:DT:C2'	5:I:65:DT:H5'	2.44	0.43
5:J:208:DT:H2''	5:J:209:DG:H5'	2.00	0.42
5:I:118:DT:H6	5:I:118:DT:H5'	1.84	0.42
5:J:240:DG:H2''	5:J:241:DA:OP2	2.19	0.42
3:G:99:ARG:HG3	3:G:99:ARG:HH11	1.85	0.42
5:I:58:DG:H4'	5:I:58:DG:OP1	2.19	0.42
5:I:91:DT:H1'	5:I:92:DT:H5'	2.01	0.42
5:J:246:DG:H1'	5:J:247:DC:H5''	2.01	0.42
3:C:62:ILE:O	3:C:62:ILE:HG13	2.16	0.42
1:E:101:VAL:O	1:E:105:GLU:HG3	2.20	0.42
3:G:73:ASN:O	3:G:74:LYS:HB2	2.19	0.42
5:I:61:DA:H1'	5:I:62:DT:H5''	2.02	0.42
5:J:190:DC:H2''	5:J:191:DT:O5'	2.19	0.42
2:B:35:ARG:HH12	5:J:228:DA:P	2.43	0.42
2:B:79:LYS:HB2	5:J:248:DA:OP1	2.20	0.42
5:I:20:DT:H2''	5:I:21:DT:C5'	2.48	0.42
5:I:36:DT:H2''	5:I:37:DT:C6	2.55	0.42
5:I:43:DA:C2'	5:I:44:DC:H5''	2.50	0.42
5:I:118:DT:H1'	5:I:119:DT:H5'	2.01	0.42
1:A:129:ARG:CG	1:A:129:ARG:NH1	2.82	0.42
4:D:51:ASP:CA	8:D:303:HOH:O	2.67	0.42
2:F:20:LYS:CG	2:F:21:VAL:H	2.32	0.42
5:I:45:DT:C2'	5:I:46:DG:C8	2.97	0.42
5:J:149:DC:H2''	5:J:150:DA:OP2	2.20	0.42
5:J:155:DC:C2'	5:J:156:DC:H5'	2.47	0.42
5:J:158:DC:H1'	5:J:159:DC:H5''	2.02	0.42
5:J:251:DT:H2'	5:J:252:DT:H71	2.01	0.42
5:J:287:DA:H2'	5:J:288:DT:C7	2.47	0.42
1:A:65:LEU:HD22	5:J:238:DT:H71	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:31:LYS:HG3	2:B:51:TYR:CE1	2.55	0.42
4:H:70:PHE:CD1	4:H:70:PHE:C	2.93	0.42
5:J:254:DC:H4'	5:J:255:DA:OP1	2.20	0.42
5:J:189:DA:H2''	5:J:190:DC:O5'	2.20	0.42
5:J:253:DC:C4	5:J:254:DC:N4	2.87	0.42
4:D:32:SER:HG	5:I:103:DG:H5''	1.84	0.42
5:I:4:DA:C2'	5:I:5:DA:H5'	2.46	0.41
5:I:46:DG:H2''	5:I:47:DC:C6	2.55	0.41
5:I:128:DT:H2''	5:I:129:DC:C6	2.55	0.41
3:G:79:ILE:HB	3:G:80:PRO:HD2	2.02	0.41
4:H:37:TYR:HB2	4:H:63:ASN:ND2	2.35	0.41
5:I:20:DT:H1'	5:I:21:DT:C5'	2.50	0.41
5:I:39:DG:H1'	5:I:40:DG:C8	2.55	0.41
5:J:163:DA:C2'	5:J:164:DG:OP2	2.55	0.41
5:J:248:DA:C2'	5:J:249:DG:H5'	2.30	0.41
5:J:253:DC:H2''	5:J:254:DC:O5'	2.20	0.41
4:D:57:LYS:HB2	8:D:308:HOH:O	2.20	0.41
3:G:76:THR:O	4:H:52:THR:HG23	2.20	0.41
4:H:120:LYS:HE3	4:H:120:LYS:HB2	1.72	0.41
5:J:178:DT:H2''	5:J:179:DG:C8	2.55	0.41
1:A:129:ARG:HH11	1:A:129:ARG:HG3	1.85	0.41
3:C:31:HIS:ND1	3:C:48:PRO:HG3	2.35	0.41
5:J:280:DG:H2''	5:J:281:DG:OP2	2.20	0.41
1:A:41:TYR:O	5:J:229:DA:H4'	2.21	0.41
1:A:56:LYS:HE3	1:A:56:LYS:HB2	1.93	0.41
2:B:31:LYS:O	2:B:32:PRO:C	2.58	0.41
2:B:78:ARG:HD2	5:J:248:DA:H5'	2.02	0.41
3:C:80:PRO:HG3	4:D:61:ILE:HD12	2.02	0.41
2:F:31:LYS:HG3	2:F:51:TYR:CZ	2.56	0.41
5:I:6:DT:H2''	5:I:7:DA:H8	1.85	0.41
5:I:77:DA:H2''	5:I:78:DG:OP2	2.20	0.41
5:I:109:DA:H2''	5:I:110:DA:OP2	2.20	0.41
5:J:263:DT:H2''	5:J:264:DT:O5'	2.20	0.41
5:J:154:DT:H2''	5:J:155:DC:O5'	2.21	0.41
5:J:264:DT:H1'	5:J:265:DT:H5''	2.02	0.41
2:B:22:LEU:HD12	2:B:23:ARG:H	1.84	0.41
3:G:42:ARG:HH12	5:I:111:DA:H4'	1.82	0.41
3:G:79:ILE:HB	3:G:80:PRO:CD	2.51	0.41
5:I:51:DA:C2'	5:I:52:DT:H5'	2.49	0.41
1:A:112:ILE:HD12	1:A:112:ILE:N	2.35	0.41
4:D:37:TYR:N	4:D:63:ASN:HD21	1.95	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:45:ARG:CZ	5:I:80:DT:H4'	2.51	0.41
5:J:165:DA:H2''	5:J:166:DT:C5'	2.46	0.41
1:A:92:LEU:HD23	1:A:92:LEU:HA	1.85	0.41
4:D:39:ILE:O	4:D:43:LYS:HG3	2.20	0.41
1:E:79:LYS:HB3	1:E:82:LEU:HD11	2.02	0.41
5:I:139:DA:H2''	5:I:140:DT:H5'	2.03	0.41
5:J:246:DG:H2''	5:J:247:DC:OP2	2.20	0.41
8:B:201:HOH:O	3:G:101:THR:HG21	2.20	0.41
2:F:38:ALA:HB1	2:F:43:VAL:HB	2.03	0.41
2:F:79:LYS:HD2	5:I:100:DG:OP1	2.21	0.41
4:H:99:ARG:NE	4:H:111:VAL:HG21	2.36	0.41
1:E:43:PRO:HG2	5:J:215:DC:H5''	2.03	0.40
1:E:72:ARG:O	1:E:76:GLN:HB2	2.21	0.40
1:E:121:PRO:HB3	2:F:53:GLU:CG	2.48	0.40
2:F:45:ARG:CZ	5:J:216:DT:H4'	2.51	0.40
5:J:267:DG:H2''	5:J:268:DG:OP2	2.21	0.40
5:J:197:DA:H1'	5:J:198:DT:H5'	2.03	0.40
5:J:251:DT:H2''	5:J:252:DT:OP2	2.20	0.40
4:D:42:TYR:CE2	4:D:46:LYS:HD2	2.56	0.40
5:I:26:DC:O3'	5:I:27:DA:C8	2.75	0.40
5:J:165:DA:H2'	5:J:166:DT:C7	2.49	0.40
1:E:52:ARG:HA	8:E:307:HOH:O	2.20	0.40
5:J:259:DA:H2''	5:J:260:DC:H5'	2.04	0.40
2:F:30:THR:HG1	2:F:32:PRO:HG2	1.87	0.40
5:J:197:DA:H2''	5:J:198:DT:H5'	2.03	0.40
5:J:239:DT:H1'	5:J:240:DG:H5'	2.03	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	95/139 (68%)	93 (98%)	2 (2%)	0	100	100
1	E	96/139 (69%)	92 (96%)	3 (3%)	1 (1%)	15	37
2	B	79/106 (74%)	77 (98%)	1 (1%)	1 (1%)	12	30
2	F	82/106 (77%)	79 (96%)	3 (4%)	0	100	100
3	C	103/133 (77%)	100 (97%)	3 (3%)	0	100	100
3	G	102/133 (77%)	97 (95%)	4 (4%)	1 (1%)	15	37
4	D	92/129 (71%)	87 (95%)	4 (4%)	1 (1%)	14	34
4	H	91/129 (70%)	85 (93%)	4 (4%)	2 (2%)	6	17
All	All	740/1014 (73%)	710 (96%)	24 (3%)	6 (1%)	19	43

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	23	ARG
4	D	104	GLY
4	H	104	GLY
4	H	123	SER
3	G	117	PRO
1	E	134	ARG

### 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	87/116 (75%)	83 (95%)	4 (5%)	27	54
1	E	87/116 (75%)	82 (94%)	5 (6%)	20	44
2	B	66/81 (82%)	63 (96%)	3 (4%)	27	55
2	F	69/81 (85%)	68 (99%)	1 (1%)	67	86
3	C	83/102 (81%)	77 (93%)	6 (7%)	14	34
3	G	83/102 (81%)	77 (93%)	6 (7%)	14	34
4	D	80/107 (75%)	76 (95%)	4 (5%)	24	51

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
4	H	79/107 (74%)	77 (98%)	2 (2%)	47 76
All	All	634/812 (78%)	603 (95%)	31 (5%)	25 52

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	59	GLU
1	A	92	LEU
1	A	117	VAL
1	A	129	ARG
2	B	24	ASP
2	B	47	SER
2	B	50	ILE
3	C	29	ARG
3	C	42	ARG
3	C	59	THR
3	C	62	ILE
3	C	81	ARG
3	C	101	THR
4	D	33	ARG
4	D	34	LYS
4	D	71	GLU
4	D	88	THR
1	E	56	LYS
1	E	63	ARG
1	E	64	LYS
1	E	71	MET
1	E	122	LYS
2	F	47	SER
3	G	41	GLU
3	G	73	ASN
3	G	81	ARG
3	G	99	ARG
3	G	101	THR
3	G	118	LYS
4	H	88	THR
4	H	99	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	68	GLN
1	A	76	GLN
1	A	108	ASN
2	B	75	HIS
3	C	31	HIS
3	C	73	ASN
3	C	84	GLN
3	C	112	GLN
4	D	49	HIS
4	D	63	ASN
4	D	95	GLN
1	E	76	GLN
2	F	75	HIS
3	G	31	HIS
4	H	63	ASN
4	H	95	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 12 are 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 [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	97/139 (69%)	0.13	1 (1%) 82 83	28, 43, 61, 87	0
1	E	98/139 (70%)	-0.07	1 (1%) 82 83	24, 36, 54, 73	0
2	B	81/106 (76%)	0.03	2 (2%) 57 59	30, 40, 63, 87	0
2	F	84/106 (79%)	-0.12	1 (1%) 79 80	20, 33, 50, 64	0
3	C	105/133 (78%)	-0.09	1 (0%) 82 83	20, 39, 61, 80	0
3	G	104/133 (78%)	0.04	3 (2%) 51 52	30, 45, 74, 103	0
4	D	94/129 (72%)	0.04	3 (3%) 47 48	25, 39, 65, 102	0
4	H	93/129 (72%)	0.12	2 (2%) 62 63	28, 43, 75, 94	0
5	I	145/146 (99%)	0.35	7 (4%) 30 28	45, 95, 133, 156	0
5	J	145/146 (99%)	0.37	6 (4%) 37 36	49, 97, 135, 147	0
All	All	1046/1306 (80%)	0.11	27 (2%) 56 57	20, 46, 124, 156	0

All (27) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	H	32	SER	9.1
3	G	118	LYS	5.1
3	C	118	LYS	4.0
4	D	31	ARG	3.8
5	I	55	DA	3.6
5	J	262	DC	3.5
5	I	56	DA	3.4
2	F	102	GLY	3.4
1	A	39	HIS	3.3
5	J	263	DT	3.0
2	B	23	ARG	2.9
3	G	117	PRO	2.8
5	J	241	DA	2.8

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Mol	Chain	Res	Type	RSRZ
5	I	33	DG	2.6
5	J	240	DG	2.5
1	E	135	ALA	2.5
4	D	32	SER	2.4
3	G	114	VAL	2.4
5	J	162	DC	2.3
5	I	104	DT	2.3
5	I	58	DG	2.2
5	I	135	DG	2.2
4	H	124	ALA	2.1
2	B	24	ASP	2.1
5	J	148	DT	2.1
4	D	124	ALA	2.1
5	I	16	DC	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 monosaccharides in this entry.

## 6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
7	MN	J	1001	1/1	0.70	0.08	112,112,112,112	0
7	MN	I	202	1/1	0.77	0.09	121,121,121,121	0
7	MN	I	201	1/1	0.81	0.15	127,127,127,127	0
7	MN	I	203	1/1	0.83	0.26	85,85,85,85	0
7	MN	J	1002	1/1	0.90	0.09	85,85,85,85	0
6	CL	A	201	1/1	0.93	0.08	64,64,64,64	0
7	MN	J	1004	1/1	0.93	0.19	72,72,72,72	0
7	MN	J	1003	1/1	0.97	0.09	85,85,85,85	0
6	CL	E	201	1/1	0.98	0.06	57,57,57,57	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	CL	G	201	1/1	0.98	0.16	45,45,45,45	0
6	CL	C	2001	1/1	0.98	0.10	48,48,48,48	0
7	MN	D	201	1/1	0.99	0.27	35,35,35,35	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.