



Full wwPDB X-ray Structure Validation Report ⓘ

May 21, 2020 – 08:30 pm BST

PDB ID : 5NW5
Title : Crystal structure of the Rif1 N-terminal domain (RIF1-NTD) from *Saccharomyces cerevisiae* in complex with DNA
Authors : Bunker, R.D.; Reinert, J.K.; Shi, T.; Thoma, N.H.
Deposited on : 2017-05-05
Resolution : 6.50 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 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 : 2.11
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.11

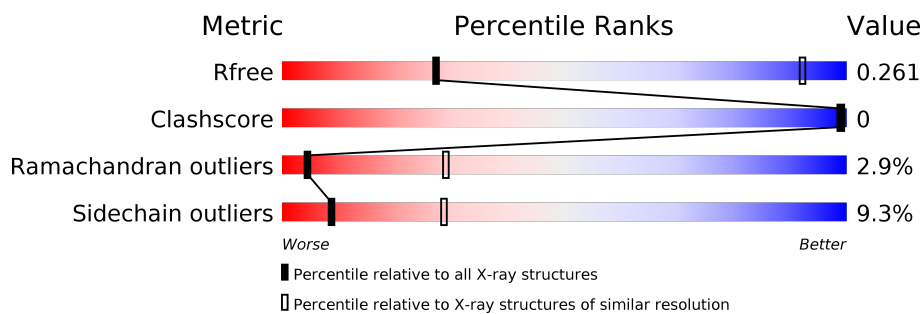
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 6.50 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1000 (9.00-3.90)
Clashscore	141614	1064 (9.00-3.90)
Ramachandran outliers	138981	1012 (9.00-3.88)
Sidechain outliers	138945	1010 (9.00-3.84)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for ≥ 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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	1226	 76% 12% • 12%
1	B	1226	 76% 11% • 12%
2	C	30	 67% 33%
3	D	30	 63% 37%

2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 37748 atoms, of which 18886 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 Telomere length regulator protein RIF1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	1085	17916	5717	9096	1455	1614	34	0	0	0
1	B	1085	17914	5717	9096	1453	1614	34	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

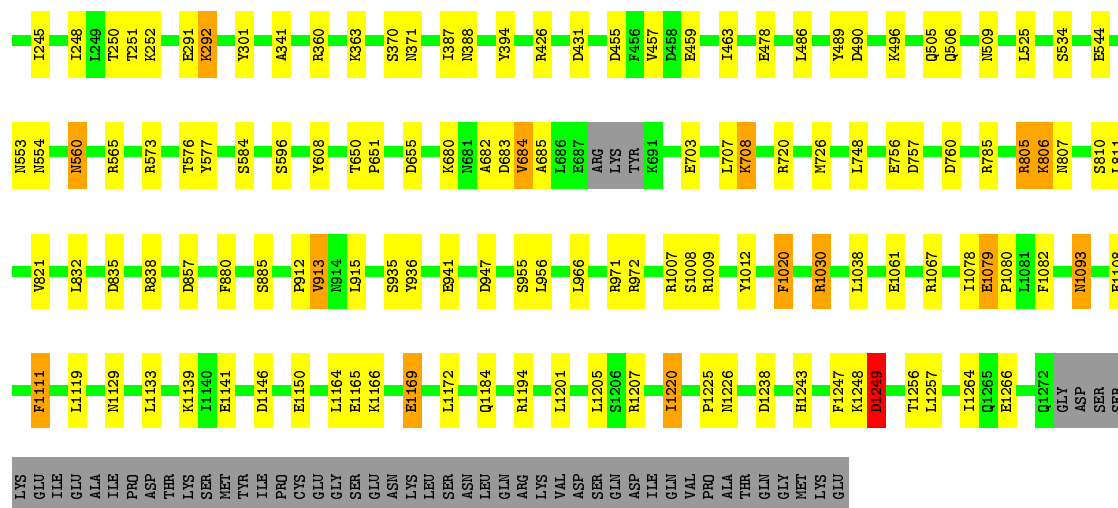
Chain	Residue	Modelled	Actual	Comment	Reference
A	96	GLY	-	expression tag	UNP P29539
A	97	GLY	-	expression tag	UNP P29539
A	98	GLY	-	expression tag	UNP P29539
A	99	ARG	-	expression tag	UNP P29539
B	96	GLY	-	expression tag	UNP P29539
B	97	GLY	-	expression tag	UNP P29539
B	98	GLY	-	expression tag	UNP P29539
B	99	ARG	-	expression tag	UNP P29539

- Molecule 2 is a DNA chain called DNA (60-MER).

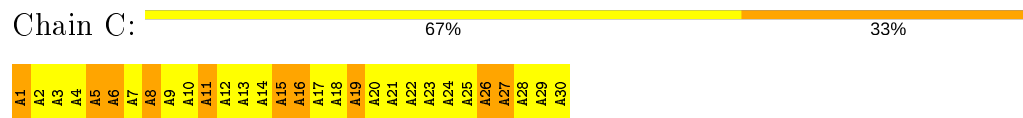
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	P			
2	C	30	959	300	332	150	148	29	0	0	0

- Molecule 3 is a DNA chain called DNA (30-MER).

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	P			
3	D	30	959	300	362	60	208	29	0	0	0



- Molecule 2: DNA (60-MER)



- Molecule 3: DNA (30-MER)



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	92.14Å 169.80Å 390.16Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.23 – 6.50 43.23 – 6.50	Depositor EDS
% Data completeness (in resolution range)	70.2 (43.23-6.50) 70.2 (43.23-6.50)	Depositor EDS
R_{merge}	0.34	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.59 (at 6.66Å)	Xtrriage
Refinement program	PHENIX (dev_2205: AMBER)	Depositor
R, R_{free}	0.253 , 0.277 0.254 , 0.261	Depositor DCC
R_{free} test set	622 reflections (7.01%)	wwPDB-VP
Wilson B-factor (Å ²)	388.4	Xtrriage
Anisotropy	0.395	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 268.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.36$, $\langle L^2 \rangle = 0.19$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.82	EDS
Total number of atoms	37748	wwPDB-VP
Average B, all atoms (Å ²)	327.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.43% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality i

5.1 Standard geometry i

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	0.74	0/8995	1.05	21/12178 (0.2%)
1	B	0.74	0/8993	1.05	23/12175 (0.2%)
2	C	1.68	1/716 (0.1%)	3.04	114/1102 (10.3%)
3	D	1.94	5/656 (0.8%)	2.54	48/1012 (4.7%)
All	All	0.86	6/19360 (0.0%)	1.28	206/26467 (0.8%)

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	8
1	B	0	6
2	C	0	10
3	D	0	11
All	All	0	35

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	26	DA	N7-C5	5.64	1.42	1.39
3	D	28	DT	C5-C7	5.30	1.53	1.50
3	D	12	DT	C5-C7	5.15	1.53	1.50
3	D	14	DT	C5-C7	5.14	1.53	1.50
3	D	20	DT	C5-C7	5.02	1.53	1.50
3	D	9	DT	C4'-O4'	-5.01	1.40	1.45

All (206) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	26	DA	N1-C6-N6	-14.64	109.82	118.60
2	C	25	DA	N1-C6-N6	-11.64	111.62	118.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	5	DA	N1-C6-N6	-11.63	111.62	118.60
2	C	7	DA	N1-C6-N6	-11.21	111.87	118.60
2	C	13	DA	N1-C6-N6	-11.04	111.98	118.60
2	C	12	DA	N1-C6-N6	-11.03	111.98	118.60
2	C	1	DA	N1-C6-N6	-10.47	112.32	118.60
2	C	21	DA	N1-C6-N6	-10.43	112.34	118.60
2	C	27	DA	N1-C6-N6	-10.35	112.39	118.60
2	C	2	DA	N1-C6-N6	-10.27	112.44	118.60
2	C	28	DA	N1-C6-N6	-10.25	112.45	118.60
2	C	30	DA	N1-C6-N6	-10.23	112.46	118.60
2	C	26	DA	C4-C5-C6	-10.21	111.89	117.00
2	C	22	DA	N1-C6-N6	-10.15	112.51	118.60
2	C	23	DA	N1-C6-N6	-9.98	112.61	118.60
2	C	24	DA	N1-C6-N6	-9.92	112.65	118.60
2	C	11	DA	N1-C6-N6	-9.82	112.70	118.60
2	C	8	DA	N1-C6-N6	-9.80	112.72	118.60
2	C	20	DA	N1-C6-N6	-9.55	112.87	118.60
2	C	3	DA	N1-C6-N6	-9.55	112.87	118.60
2	C	29	DA	N1-C6-N6	-9.39	112.97	118.60
2	C	6	DA	N1-C6-N6	-9.39	112.97	118.60
1	A	972	ARG	NE-CZ-NH1	9.38	124.99	120.30
2	C	29	DA	C5-C6-N1	8.97	122.18	117.70
2	C	17	DA	N1-C6-N6	-8.82	113.31	118.60
2	C	25	DA	C4-C5-C6	-8.79	112.61	117.00
2	C	10	DA	N1-C6-N6	-8.78	113.33	118.60
2	C	5	DA	C5-C6-N1	8.59	121.99	117.70
3	D	7	DT	C6-C5-C7	-8.57	117.76	122.90
2	C	28	DA	C5-C6-N1	8.51	121.96	117.70
2	C	16	DA	N1-C6-N6	-8.31	113.62	118.60
2	C	5	DA	C4-C5-C6	-8.28	112.86	117.00
2	C	1	DA	C4-C5-C6	-8.28	112.86	117.00
2	C	27	DA	C5-C6-N1	8.24	121.82	117.70
3	D	3	DT	C6-C5-C7	-8.20	117.98	122.90
1	B	360	ARG	NE-CZ-NH1	8.19	124.40	120.30
2	C	7	DA	C5-C6-N1	8.18	121.79	117.70
2	C	30	DA	C5-C6-N1	8.13	121.76	117.70
2	C	19	DA	N1-C6-N6	-8.12	113.73	118.60
1	B	1030	ARG	NE-CZ-NH1	8.11	124.36	120.30
3	D	9	DT	C6-C5-C7	-8.11	118.04	122.90
1	A	360	ARG	NE-CZ-NH1	8.07	124.34	120.30
2	C	11	DA	C5-C6-N1	8.05	121.72	117.70
2	C	26	DA	C5-C6-N1	8.03	121.72	117.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	6	DA	C5-C6-N1	7.92	121.66	117.70
3	D	30	DT	C6-C5-C7	-7.86	118.18	122.90
3	D	4	DT	C6-C5-C7	-7.84	118.20	122.90
3	D	5	DT	C6-C5-C7	-7.82	118.21	122.90
2	C	23	DA	C5-C6-N1	7.80	121.60	117.70
2	C	12	DA	C4-C5-C6	-7.78	113.11	117.00
2	C	22	DA	C4-C5-C6	-7.75	113.12	117.00
2	C	27	DA	C4-C5-C6	-7.68	113.16	117.00
2	C	22	DA	C5-C6-N1	7.63	121.52	117.70
2	C	15	DA	C5-C6-N1	7.62	121.51	117.70
2	C	21	DA	C4-C5-C6	-7.61	113.19	117.00
2	C	18	DA	N1-C6-N6	-7.60	114.04	118.60
3	D	20	DT	C6-C5-C7	-7.57	118.36	122.90
2	C	10	DA	C5-C6-N1	7.49	121.44	117.70
1	A	1030	ARG	NE-CZ-NH1	7.49	124.04	120.30
3	D	11	DT	C6-C5-C7	-7.47	118.42	122.90
2	C	2	DA	C4-C5-C6	-7.45	113.28	117.00
2	C	24	DA	C5-C6-N1	7.45	121.42	117.70
2	C	3	DA	C5-C6-N1	7.44	121.42	117.70
2	C	16	DA	C5-C6-N1	7.44	121.42	117.70
2	C	4	DA	C5-C6-N1	7.43	121.42	117.70
2	C	12	DA	C5-C6-N1	7.41	121.40	117.70
3	D	25	DT	C6-C5-C7	-7.39	118.47	122.90
3	D	23	DT	C6-C5-C7	-7.37	118.48	122.90
3	D	26	DT	C6-C5-C7	-7.36	118.48	122.90
3	D	16	DT	C6-C5-C7	-7.36	118.48	122.90
2	C	14	DA	C5-C6-N1	7.35	121.38	117.70
3	D	1	DT	C6-C5-C7	-7.35	118.49	122.90
3	D	27	DT	C6-C5-C7	-7.33	118.50	122.90
2	C	6	DA	C4-C5-C6	-7.32	113.34	117.00
2	C	23	DA	C4-C5-C6	-7.31	113.35	117.00
3	D	8	DT	C6-C5-C7	-7.31	118.52	122.90
3	D	21	DT	C6-C5-C7	-7.31	118.52	122.90
2	C	9	DA	C5-C6-N1	7.30	121.35	117.70
2	C	13	DA	C4-C5-C6	-7.29	113.36	117.00
3	D	2	DT	C6-C5-C7	-7.23	118.56	122.90
3	D	13	DT	C6-C5-C7	-7.21	118.58	122.90
3	D	12	DT	C6-C5-C7	-7.19	118.59	122.90
2	C	13	DA	C5-C6-N1	7.17	121.29	117.70
2	C	30	DA	O4'-C1'-N9	7.13	112.99	108.00
2	C	17	DA	C5-C6-N1	7.11	121.25	117.70
2	C	8	DA	C4-C5-C6	-7.11	113.45	117.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	28	DT	C6-C5-C7	-7.10	118.64	122.90
2	C	11	DA	C4-C5-C6	-7.07	113.47	117.00
2	C	7	DA	C4-C5-C6	-7.05	113.47	117.00
2	C	1	DA	C5-C6-N1	7.05	121.22	117.70
2	C	14	DA	N1-C6-N6	-7.03	114.38	118.60
3	D	18	DT	C6-C5-C7	-7.03	118.69	122.90
2	C	9	DA	N1-C6-N6	-7.02	114.39	118.60
2	C	18	DA	C5-C6-N1	7.02	121.21	117.70
2	C	26	DA	C6-C5-N7	7.00	137.20	132.30
2	C	9	DA	C4-C5-C6	-6.98	113.51	117.00
2	C	4	DA	C4-C5-C6	-6.97	113.51	117.00
3	D	10	DT	C6-C5-C7	-6.93	118.74	122.90
3	D	17	DT	C6-C5-C7	-6.88	118.77	122.90
2	C	28	DA	C4-C5-C6	-6.83	113.58	117.00
2	C	30	DA	C4-C5-C6	-6.80	113.60	117.00
2	C	2	DA	C5-C6-N1	6.80	121.10	117.70
2	C	16	DA	C4-C5-C6	-6.79	113.60	117.00
1	A	401	ARG	NE-CZ-NH1	6.79	123.69	120.30
2	C	8	DA	C5-C6-N1	6.79	121.09	117.70
1	A	426	ARG	NE-CZ-NH2	6.78	123.69	120.30
3	D	6	DT	C6-C5-C7	-6.77	118.84	122.90
1	B	838	ARG	NE-CZ-NH1	6.75	123.67	120.30
3	D	19	DT	C6-C5-C7	-6.73	118.86	122.90
1	A	1251	ARG	CD-NE-CZ	6.72	133.01	123.60
1	B	235	ARG	NE-CZ-NH1	6.69	123.65	120.30
2	C	10	DA	C4-C5-C6	-6.67	113.66	117.00
1	A	720	ARG	NE-CZ-NH1	6.66	123.63	120.30
2	C	3	DA	C4-C5-C6	-6.65	113.67	117.00
3	D	24	DT	C6-C5-C7	-6.65	118.91	122.90
2	C	14	DA	C4-C5-C6	-6.65	113.68	117.00
1	B	1194	ARG	NE-CZ-NH1	6.62	123.61	120.30
1	B	785	ARG	NE-CZ-NH1	6.60	123.60	120.30
3	D	15	DT	C6-C5-C7	-6.59	118.94	122.90
3	D	29	DT	C6-C5-C7	-6.55	118.97	122.90
2	C	13	DA	O4'-C4'-C3'	6.52	109.91	106.00
2	C	21	DA	C5-C6-N1	6.52	120.96	117.70
2	C	4	DA	N1-C6-N6	-6.52	114.69	118.60
2	C	15	DA	N1-C6-N6	-6.52	114.69	118.60
2	C	9	DA	O4'-C1'-N9	6.48	112.53	108.00
2	C	20	DA	C4-C5-C6	-6.43	113.78	117.00
1	A	838	ARG	NE-CZ-NH1	6.43	123.51	120.30
2	C	25	DA	C5-C6-N1	6.40	120.90	117.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	22	DT	C6-C5-C7	-6.39	119.06	122.90
3	D	14	DT	C6-C5-C7	-6.39	119.07	122.90
1	B	426	ARG	NE-CZ-NH2	6.34	123.47	120.30
1	A	235	ARG	NE-CZ-NH1	6.33	123.47	120.30
1	B	720	ARG	NE-CZ-NH1	6.29	123.45	120.30
2	C	29	DA	C4-C5-C6	-6.24	113.88	117.00
1	B	972	ARG	NE-CZ-NH2	-6.24	117.18	120.30
3	D	29	DT	O4'-C1'-N1	6.23	112.36	108.00
2	C	25	DA	C6-C5-N7	6.21	136.65	132.30
1	A	785	ARG	NE-CZ-NH1	6.19	123.39	120.30
1	B	225	ARG	NE-CZ-NH2	6.19	123.40	120.30
3	D	26	DT	N3-C2-O2	-6.17	118.60	122.30
3	D	29	DT	P-O3'-C3'	6.13	127.05	119.70
2	C	17	DA	C4-C5-C6	-6.13	113.94	117.00
2	C	20	DA	C5-C6-N1	6.07	120.74	117.70
2	C	23	DA	O4'-C4'-C3'	6.02	109.61	106.00
2	C	19	DA	C5-C6-N1	5.97	120.69	117.70
1	B	1194	ARG	NE-CZ-NH2	-5.97	117.32	120.30
3	D	19	DT	O4'-C4'-C3'	5.92	109.55	106.00
2	C	26	DA	C5-C6-N6	5.91	128.43	123.70
3	D	21	DT	O4'-C1'-C2'	-5.88	101.20	105.90
1	B	1207	ARG	NE-CZ-NH1	5.88	123.24	120.30
1	B	972	ARG	NE-CZ-NH1	5.87	123.23	120.30
1	A	225	ARG	NE-CZ-NH2	5.83	123.21	120.30
1	A	1194	ARG	NE-CZ-NH1	5.82	123.21	120.30
2	C	18	DA	C4-C5-C6	-5.80	114.10	117.00
1	A	1194	ARG	NE-CZ-NH2	-5.78	117.41	120.30
2	C	15	DA	C4-C5-C6	-5.73	114.14	117.00
2	C	17	DA	O4'-C4'-C3'	5.71	109.42	106.00
1	B	565	ARG	NE-CZ-NH1	5.67	123.14	120.30
2	C	19	DA	C4-C5-C6	-5.65	114.18	117.00
2	C	3	DA	O4'-C4'-C3'	5.64	109.38	106.00
1	B	971	ARG	NE-CZ-NH1	5.63	123.12	120.30
1	A	573	ARG	NE-CZ-NH1	5.62	123.11	120.30
2	C	24	DA	C4-C5-C6	-5.62	114.19	117.00
2	C	1	DA	C6-C5-N7	5.60	136.22	132.30
1	B	234	ARG	NE-CZ-NH1	5.57	123.08	120.30
2	C	25	DA	O4'-C1'-N9	5.55	111.89	108.00
3	D	5	DT	N3-C2-O2	-5.50	119.00	122.30
2	C	20	DA	O4'-C4'-C3'	5.46	109.27	106.00
1	B	805	ARG	NE-CZ-NH1	5.44	123.02	120.30
3	D	22	DT	O4'-C1'-C2'	-5.42	101.56	105.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	324	ARG	NE-CZ-NH2	5.42	123.01	120.30
2	C	24	DA	O4'-C4'-C3'	5.41	109.24	106.00
1	B	577	TYR	CB-CG-CD2	-5.36	117.78	121.00
3	D	11	DT	O4'-C4'-C3'	5.36	109.22	106.00
1	B	573	ARG	NE-CZ-NH1	5.34	122.97	120.30
1	B	913	VAL	CA-CB-CG2	5.34	118.90	110.90
1	B	1067	ARG	CD-NE-CZ	5.33	131.07	123.60
1	A	234	ARG	NE-CZ-NH1	5.31	122.96	120.30
2	C	16	DA	O4'-C4'-C3'	5.31	109.19	106.00
1	A	1194	ARG	CD-NE-CZ	5.29	131.01	123.60
1	A	608	TYR	CB-CG-CD2	-5.28	117.83	121.00
1	A	401	ARG	CD-NE-CZ	5.28	130.99	123.60
2	C	10	DA	O4'-C4'-C3'	5.28	109.17	106.00
3	D	9	DT	O4'-C4'-C3'	5.25	109.15	106.00
3	D	23	DT	O4'-C1'-N1	5.24	111.67	108.00
3	D	6	DT	N3-C2-O2	-5.23	119.16	122.30
3	D	7	DT	C4-C5-C7	5.22	122.13	119.00
2	C	7	DA	O4'-C4'-C3'	5.22	109.13	106.00
3	D	22	DT	C1'-O4'-C4'	-5.18	104.92	110.10
2	C	26	DA	C5-N7-C8	-5.18	101.31	103.90
3	D	5	DT	O4'-C4'-C3'	5.17	109.10	106.00
1	A	577	TYR	CB-CG-CD2	-5.16	117.90	121.00
3	D	26	DT	N1-C2-N3	5.16	117.70	114.60
1	B	608	TYR	CB-CG-CD2	-5.16	117.90	121.00
2	C	5	DA	C6-C5-N7	5.16	135.91	132.30
3	D	13	DT	O4'-C1'-C2'	-5.16	101.77	105.90
2	C	13	DA	C6-C5-N7	5.15	135.90	132.30
2	C	22	DA	C6-C5-N7	5.14	135.90	132.30
1	B	191	ARG	NE-CZ-NH1	5.09	122.84	120.30
3	D	11	DT	N3-C2-O2	-5.08	119.25	122.30
1	A	1207	ARG	NE-CZ-NH1	5.07	122.83	120.30
2	C	3	DA	P-O3'-C3'	5.06	125.77	119.70
2	C	2	DA	C6-C5-N7	5.03	135.82	132.30
2	C	21	DA	C6-C5-N7	5.02	135.81	132.30
2	C	26	DA	N1-C2-N3	-5.02	126.79	129.30
3	D	28	DT	O4'-C1'-N1	5.00	111.50	108.00

There are no chirality outliers.

All (35) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1204	PRO	Peptide

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Mol	Chain	Res	Type	Group
1	A	196	TRP	Peptide
1	A	301	TYR	Sidechain
1	A	394	TYR	Sidechain
1	A	561	HIS	Sidechain
1	A	573	ARG	Sidechain
1	A	807	ASN	Peptide
1	A	914	ASN	Peptide
1	B	1243	HIS	Sidechain
1	B	196	TRP	Peptide
1	B	301	TYR	Sidechain
1	B	394	TYR	Sidechain
1	B	684	VAL	Peptide
1	B	807	ASN	Peptide
2	C	1	DA	Sidechain
2	C	11	DA	Sidechain
2	C	15	DA	Sidechain
2	C	16	DA	Sidechain
2	C	19	DA	Sidechain
2	C	26	DA	Sidechain
2	C	27	DA	Sidechain
2	C	5	DA	Sidechain
2	C	6	DA	Sidechain
2	C	8	DA	Sidechain
3	D	10	DT	Sidechain
3	D	12	DT	Sidechain
3	D	14	DT	Sidechain
3	D	25	DT	Sidechain
3	D	29	DT	Sidechain
3	D	30	DT	Sidechain
3	D	5	DT	Sidechain
3	D	6	DT	Sidechain
3	D	7	DT	Sidechain
3	D	8	DT	Sidechain
3	D	9	DT	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	8820	9096	9094	11	0
1	B	8818	9096	9094	5	0
2	C	627	332	332	0	0
3	D	597	362	362	0	0
All	All	18862	18886	18882	16	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 0.

All (16) 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:A:1224:ASN:H	1:A:1225:PRO:HD3	1.80	0.47
1:A:703:GLU:OE1	1:A:706:LYS:HE3	2.15	0.47
1:A:1111:PHE:CG	1:A:1139:LYS:HE3	2.50	0.46
1:A:584:SER:OG	1:A:586:LYS:HE2	2.17	0.44
1:A:650:THR:HB	1:A:651:PRO:HD3	2.00	0.44
1:B:1111:PHE:CG	1:B:1139:LYS:HE3	2.54	0.43
1:B:650:THR:HB	1:B:651:PRO:HD3	1.99	0.43
1:B:1248:LYS:HE2	1:B:1249:ASP:OD1	2.18	0.43
1:A:289:SER:O	1:A:292:LYS:HE2	2.19	0.43
1:B:1079:GLU:H	1:B:1080:PRO:CD	2.31	0.42
1:A:1079:GLU:H	1:A:1080:PRO:CD	2.32	0.42
1:B:250:THR:HB	1:B:252:LYS:HE3	2.02	0.42
1:A:1262:LYS:HE2	1:A:1266:GLU:OE2	2.20	0.42
1:A:470:SER:HA	1:A:471:PRO:HD3	1.93	0.41
1:A:632:SER:O	1:A:634:LYS:HE3	2.20	0.41
1:A:1005:LEU:HD12	1:A:1005:LEU:H	1.86	0.41

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	1081/1226 (88%)	930 (86%)	120 (11%)	31 (3%)	4	29
1	B	1081/1226 (88%)	924 (86%)	125 (12%)	32 (3%)	4	28
All	All	2162/2452 (88%)	1854 (86%)	245 (11%)	63 (3%)	4	29

All (63) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	227	GLU
1	A	391	ASN
1	A	457	VAL
1	A	806	LYS
1	A	913	VAL
1	A	1093	ASN
1	B	227	GLU
1	B	457	VAL
1	B	682	ALA
1	B	685	ALA
1	B	806	LYS
1	B	1093	ASN
1	A	205	VAL
1	A	292	LYS
1	A	388	ASN
1	A	805	ARG
1	A	946	VAL
1	A	1011	SER
1	A	1078	ILE
1	A	1181	SER
1	A	1182	ASN
1	A	1246	LYS
1	B	205	VAL
1	B	388	ASN
1	B	912	PRO
1	B	1009	ARG
1	B	1078	ILE
1	A	363	LYS
1	A	1249	ASP
1	B	292	LYS
1	B	684	VAL
1	B	708	LYS
1	B	805	ARG
1	B	1007	ARG
1	B	1020	PHE

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Mol	Chain	Res	Type
1	B	1079	GLU
1	B	1249	ASP
1	A	1007	ARG
1	A	1079	GLU
1	A	1223	PRO
1	A	1224	ASN
1	B	341	ALA
1	B	363	LYS
1	B	486	LEU
1	B	560	ASN
1	B	913	VAL
1	B	1169	GLU
1	A	189	ASN
1	A	201	ILE
1	A	341	ALA
1	A	1169	GLU
1	B	189	ASN
1	B	201	ILE
1	B	387	ILE
1	B	1008	SER
1	A	387	ILE
1	A	1128	PRO
1	B	1225	PRO
1	A	878	ILE
1	A	199	GLY
1	B	1220	ILE
1	A	1221	LEU
1	B	199	GLY

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	1020/1148 (89%)	926 (91%)	94 (9%)	9	29
1	B	1020/1148 (89%)	925 (91%)	95 (9%)	9	29
All	All	2040/2296 (89%)	1851 (91%)	189 (9%)	9	29

All (189) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	187	ARG
1	A	188	VAL
1	A	194	GLU
1	A	212	GLU
1	A	213	PHE
1	A	214	LYS
1	A	215	GLU
1	A	232	VAL
1	A	245	ILE
1	A	251	THR
1	A	256	GLU
1	A	291	GLU
1	A	292	LYS
1	A	315	PHE
1	A	319	LYS
1	A	387	ILE
1	A	405	SER
1	A	455	ASP
1	A	459	GLU
1	A	463	ILE
1	A	474	GLU
1	A	478	GLU
1	A	487	ASN
1	A	489	TYR
1	A	490	ASP
1	A	496	LYS
1	A	505	GLN
1	A	509	ASN
1	A	525	LEU
1	A	534	SER
1	A	544	GLU
1	A	553	ASN
1	A	563	LYS
1	A	576	THR
1	A	584	SER
1	A	596	SER
1	A	655	ASP
1	A	684	VAL
1	A	687	GLU
1	A	703	GLU
1	A	707	LEU
1	A	708	LYS

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Mol	Chain	Res	Type
1	A	711	SER
1	A	726	MET
1	A	748	LEU
1	A	756	GLU
1	A	757	ASP
1	A	760	ASP
1	A	806	LYS
1	A	810	SER
1	A	811	LEU
1	A	821	VAL
1	A	832	LEU
1	A	857	ASP
1	A	880	PHE
1	A	925	SER
1	A	926	ASN
1	A	945	ASN
1	A	947	ASP
1	A	950	THR
1	A	973	ASN
1	A	998	SER
1	A	1038	LEU
1	A	1061	GLU
1	A	1074	MET
1	A	1082	PHE
1	A	1093	ASN
1	A	1098	LEU
1	A	1111	PHE
1	A	1119	LEU
1	A	1129	ASN
1	A	1133	LEU
1	A	1141	GLU
1	A	1150	GLU
1	A	1164	LEU
1	A	1165	GLU
1	A	1166	LYS
1	A	1168	LYS
1	A	1169	GLU
1	A	1177	ASN
1	A	1184	GLN
1	A	1187	LYS
1	A	1201	LEU
1	A	1220	ILE

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Mol	Chain	Res	Type
1	A	1221	LEU
1	A	1227	TYR
1	A	1228	GLN
1	A	1229	THR
1	A	1238	ASP
1	A	1244	ASN
1	A	1248	LYS
1	A	1249	ASP
1	A	1253	TYR
1	A	1266	GLU
1	B	187	ARG
1	B	188	VAL
1	B	194	GLU
1	B	212	GLU
1	B	213	PHE
1	B	214	LYS
1	B	215	GLU
1	B	232	VAL
1	B	245	ILE
1	B	248	ILE
1	B	251	THR
1	B	291	GLU
1	B	292	LYS
1	B	370	SER
1	B	371	ASN
1	B	431	ASP
1	B	455	ASP
1	B	459	GLU
1	B	463	ILE
1	B	478	GLU
1	B	489	TYR
1	B	490	ASP
1	B	496	LYS
1	B	505	GLN
1	B	506	GLN
1	B	509	ASN
1	B	525	LEU
1	B	534	SER
1	B	544	GLU
1	B	553	ASN
1	B	554	ASN
1	B	560	ASN

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Mol	Chain	Res	Type
1	B	576	THR
1	B	584	SER
1	B	596	SER
1	B	655	ASP
1	B	680	LYS
1	B	683	ASP
1	B	703	GLU
1	B	707	LEU
1	B	708	LYS
1	B	726	MET
1	B	748	LEU
1	B	756	GLU
1	B	757	ASP
1	B	760	ASP
1	B	806	LYS
1	B	810	SER
1	B	811	LEU
1	B	821	VAL
1	B	832	LEU
1	B	835	ASP
1	B	857	ASP
1	B	880	PHE
1	B	885	SER
1	B	915	LEU
1	B	935	SER
1	B	936	TYR
1	B	941	GLU
1	B	947	ASP
1	B	955	SER
1	B	956	LEU
1	B	966	LEU
1	B	1012	TYR
1	B	1020	PHE
1	B	1030	ARG
1	B	1038	LEU
1	B	1061	GLU
1	B	1082	PHE
1	B	1093	ASN
1	B	1108	GLU
1	B	1111	PHE
1	B	1119	LEU
1	B	1129	ASN

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Mol	Chain	Res	Type
1	B	1133	LEU
1	B	1141	GLU
1	B	1146	ASP
1	B	1150	GLU
1	B	1164	LEU
1	B	1165	GLU
1	B	1166	LYS
1	B	1169	GLU
1	B	1172	LEU
1	B	1184	GLN
1	B	1201	LEU
1	B	1205	LEU
1	B	1220	ILE
1	B	1226	ASN
1	B	1238	ASP
1	B	1247	PHE
1	B	1249	ASP
1	B	1256	THR
1	B	1257	LEU
1	B	1264	ILE
1	B	1266	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

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

6.1 Protein, DNA and RNA chains

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.