



Full wwPDB X-ray Structure Validation Report ⓘ

May 29, 2020 – 07:03 am BST

PDB ID : 5H9V
Title : Crystal structure of Regnase PIN domain, form I
Authors : Yokogawa, M.; Tsushima, T.; Adachi, W.; Noda, N.N.; Inagaki, F.
Deposited on : 2015-12-29
Resolution : 2.75 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
Mogul : 1.8.5 (274361), CSD as541be (2020)
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

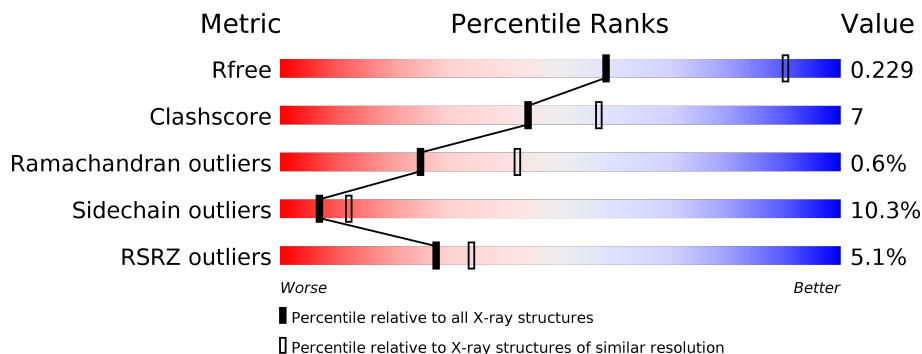
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION





The reported resolution of this entry is 2.75 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	1235 (2.78-2.74)
Clashscore	141614	1277 (2.78-2.74)
Ramachandran outliers	138981	1257 (2.78-2.74)
Sidechain outliers	138945	1257 (2.78-2.74)
RSRZ outliers	127900	1207 (2.78-2.74)

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 $\leq 5\%$. 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	210	
1	B	210	
1	C	210	
1	D	210	

2 Entry composition i

There are 2 unique types of molecules in this entry. The entry contains 5289 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Ribonuclease ZC3H12A.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	161	1317	838	238	236	2	3	0	0	0
1	B	158	1304	833	233	233	2	3	0	0	0
1	C	162	1334	850	242	237	2	3	0	0	0
1	D	162	1330	847	241	237	2	3	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	130	GLY	-	expression tag	UNP Q5D1E7
A	131	PRO	-	expression tag	UNP Q5D1E7
A	132	HIS	-	expression tag	UNP Q5D1E7
A	133	MSE	-	expression tag	UNP Q5D1E7
B	130	GLY	-	expression tag	UNP Q5D1E7
B	131	PRO	-	expression tag	UNP Q5D1E7
B	132	HIS	-	expression tag	UNP Q5D1E7
B	133	MSE	-	expression tag	UNP Q5D1E7
C	130	GLY	-	expression tag	UNP Q5D1E7
C	131	PRO	-	expression tag	UNP Q5D1E7
C	132	HIS	-	expression tag	UNP Q5D1E7
C	133	MSE	-	expression tag	UNP Q5D1E7
D	130	GLY	-	expression tag	UNP Q5D1E7
D	131	PRO	-	expression tag	UNP Q5D1E7
D	132	HIS	-	expression tag	UNP Q5D1E7
D	133	MSE	-	expression tag	UNP Q5D1E7

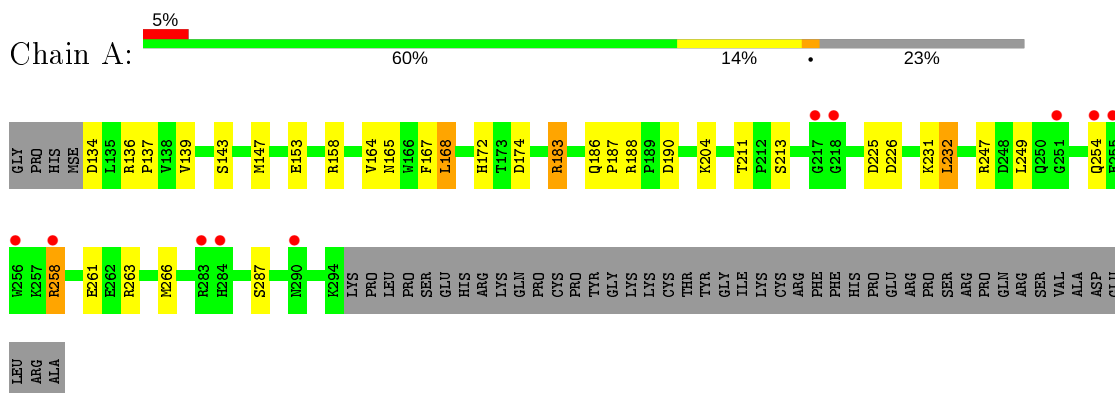
- Molecule 2 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total 1	Na 1	0	0
2	A	1	Total 1	Na 1	0	0
2	D	1	Total 1	Na 1	0	0
2	C	1	Total 1	Na 1	0	0

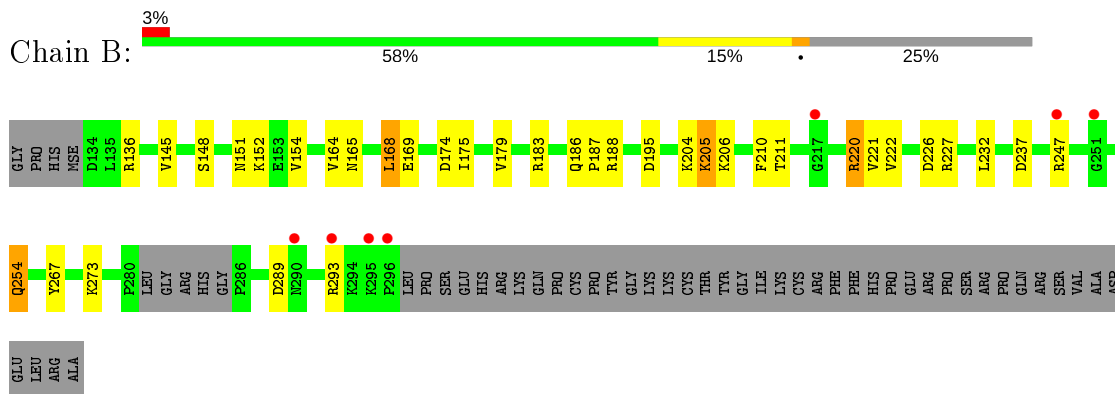
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

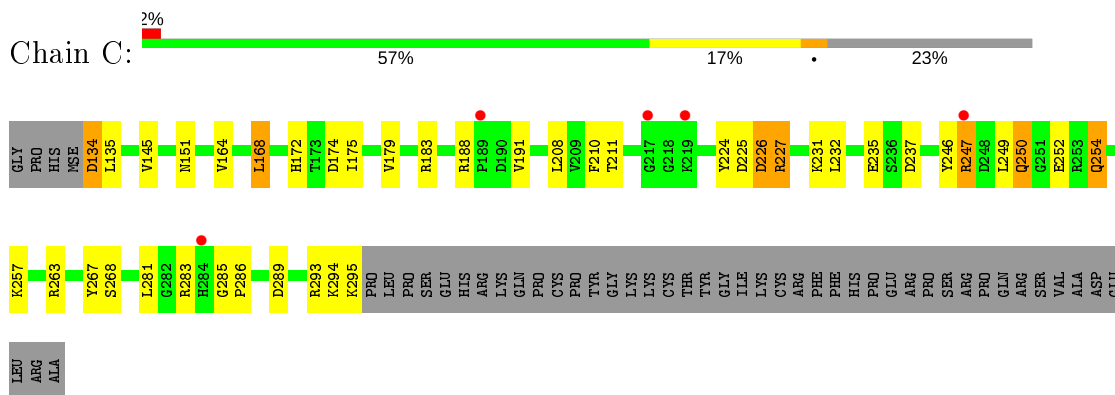
- Molecule 1: Ribonuclease ZC3H12A



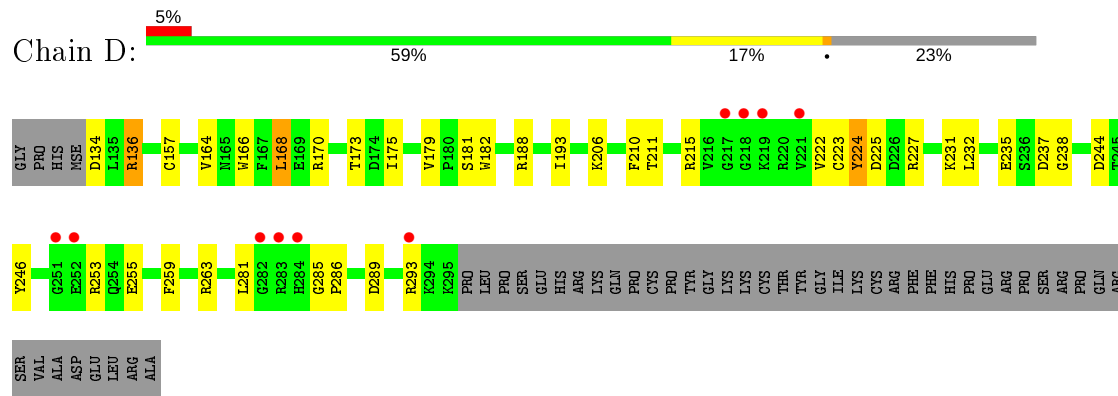
- Molecule 1: Ribonuclease ZC3H12A



- Molecule 1: Ribonuclease ZC3H12A



- Molecule 1: Ribonuclease ZC3H12A



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	113.37Å 113.37Å 187.44Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	47.49 – 2.75 47.49 – 2.75	Depositor EDS
% Data completeness (in resolution range)	90.3 (47.49-2.75) 90.4 (47.49-2.75)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.59 (at 2.77Å)	Xtrriage
Refinement program	REFMAC 5.7.0032	Depositor
R, R_{free}	0.189 , 0.226 0.196 , 0.229	Depositor DCC
R_{free} test set	1656 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å ²)	60.2	Xtrriage
Anisotropy	0.782	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 57.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.029 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	5289	wwPDB-VP
Average B, all atoms (Å ²)	92.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.10% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² 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 [i](#)

5.1 Standard geometry [i](#)

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

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	0.69	0/1346	0.90	3/1816 (0.2%)
1	B	0.77	0/1332	0.87	1/1793 (0.1%)
1	C	0.77	0/1363	0.92	0/1835
1	D	0.71	1/1359 (0.1%)	0.85	0/1831
All	All	0.74	1/5400 (0.0%)	0.89	4/7275 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	182	TRP	CB-CG	-5.08	1.41	1.50

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	183	ARG	NE-CZ-NH1	6.92	123.76	120.30
1	B	195	ASP	CB-CG-OD1	-5.58	113.28	118.30
1	A	266	MSE	CA-CB-CG	-5.13	104.57	113.30
1	A	183	ARG	NE-CZ-NH2	-5.03	117.79	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1317	0	1301	10	0
1	B	1304	0	1306	16	0
1	C	1334	0	1336	29	0
1	D	1330	0	1325	15	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
All	All	5289	0	5268	70	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 7.

All (70) 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:C:246:TYR:O	1:C:250:GLN:NE2	1.90	1.03
1:C:250:GLN:NE2	1:C:250:GLN:H	1.77	0.81
1:C:231:LYS:O	1:C:235:GLU:HG3	1.89	0.73
1:C:247:ARG:HA	1:C:250:GLN:NE2	2.06	0.70
1:B:136:ARG:NH1	1:B:293:ARG:O	2.25	0.69
1:C:281:LEU:HD12	1:C:286:PRO:HD2	1.76	0.68
1:B:186:GLN:HG3	1:B:187:PRO:HD2	1.78	0.66
1:C:250:GLN:HE21	1:C:250:GLN:H	1.41	0.65
1:C:289:ASP:O	1:C:293:ARG:HG3	1.97	0.64
1:D:237:ASP:OD1	1:D:263:ARG:NH2	2.31	0.63
1:D:259:PHE:CE1	1:D:263:ARG:HG3	2.37	0.60
1:C:237:ASP:OD1	1:C:263:ARG:NH2	2.36	0.59
1:B:289:ASP:O	1:B:293:ARG:HG3	2.03	0.58
1:A:139:VAL:HG22	1:A:232:LEU:HD13	1.86	0.58
1:B:254:GLN:HA	1:B:254:GLN:HE21	1.69	0.57
1:C:247:ARG:HA	1:C:250:GLN:CD	2.24	0.57
1:C:226:ASP:HB2	1:C:249:LEU:HD11	1.87	0.57
1:C:281:LEU:HB2	1:C:285:GLY:HA3	1.88	0.55
1:B:220:ARG:HG2	1:B:221:VAL:N	2.23	0.54
1:D:231:LYS:O	1:D:235:GLU:HG3	2.08	0.52
1:C:247:ARG:CA	1:C:250:GLN:NE2	2.73	0.51
1:B:168:LEU:HD13	1:B:175:ILE:CD1	2.41	0.51
1:A:164:VAL:HG12	1:A:168:LEU:HD22	1.92	0.51
1:C:227:ARG:NH2	1:C:252:GLU:OE2	2.44	0.51
1:C:134:ASP:OD1	1:C:134:ASP:N	2.43	0.51
1:C:250:GLN:HB2	1:C:257:LYS:HG3	1.92	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:166:TRP:CH2	1:D:170:ARG:HD2	2.47	0.50
1:A:137:PRO:HB3	1:A:174:ASP:OD2	2.12	0.49
1:B:168:LEU:HD13	1:B:175:ILE:HD12	1.93	0.49
1:B:179:VAL:O	1:B:210:PHE:HA	2.13	0.49
1:C:208:LEU:HD23	1:C:208:LEU:C	2.33	0.49
1:C:250:GLN:HE21	1:C:250:GLN:N	2.10	0.48
1:B:164:VAL:HG12	1:B:168:LEU:HD22	1.96	0.48
1:C:168:LEU:HD13	1:C:175:ILE:HD12	1.97	0.47
1:C:164:VAL:HG12	1:C:168:LEU:HD22	1.96	0.47
1:D:164:VAL:HG12	1:D:168:LEU:HD22	1.96	0.47
1:A:136:ARG:NH2	1:A:263:ARG:CZ	2.79	0.46
1:C:174:ASP:OD1	1:C:174:ASP:C	2.52	0.46
1:D:244:ASP:OD1	1:D:246:TYR:N	2.47	0.45
1:D:281:LEU:HB2	1:D:285:GLY:HA3	1.97	0.45
1:B:148:SER:O	1:B:152:LYS:NZ	2.44	0.45
1:B:174:ASP:OD1	1:B:174:ASP:C	2.55	0.45
1:C:145:VAL:HA	1:C:267:TYR:OH	2.16	0.45
1:D:289:ASP:O	1:D:293:ARG:HG3	2.17	0.45
1:A:143:SER:O	1:A:147:MSE:HG2	2.17	0.44
1:B:151:ASN:HB3	1:B:154:VAL:HB	1.99	0.44
1:C:254:GLN:CA	1:C:254:GLN:HE21	2.31	0.43
1:D:179:VAL:O	1:D:210:PHE:HA	2.18	0.43
1:C:168:LEU:HD13	1:C:175:ILE:CD1	2.48	0.43
1:B:168:LEU:CD1	1:B:175:ILE:HD12	2.49	0.43
1:D:157:CYS:SG	1:D:193:ILE:HD11	2.58	0.43
1:D:136:ARG:HG2	1:D:238:GLY:HA2	2.01	0.43
1:C:247:ARG:C	1:C:250:GLN:NE2	2.72	0.43
1:C:281:LEU:HD12	1:C:286:PRO:CD	2.45	0.42
1:A:165:ASN:HA	1:A:168:LEU:HB2	2.00	0.42
1:C:226:ASP:CB	1:C:249:LEU:HD11	2.48	0.42
1:C:179:VAL:O	1:C:210:PHE:HA	2.19	0.42
1:A:186:GLN:HA	1:A:187:PRO:HA	1.57	0.42
1:A:167:PHE:O	1:A:172:HIS:HB2	2.19	0.42
1:B:145:VAL:HA	1:B:267:TYR:OH	2.20	0.42
1:B:205:LYS:O	1:B:206:LYS:HB2	2.20	0.42
1:B:165:ASN:HA	1:B:168:LEU:HB2	2.01	0.41
1:A:258:ARG:NH2	1:A:261:GLU:OE1	2.53	0.41
1:C:294:LYS:O	1:C:295:LYS:HG2	2.20	0.41
1:D:168:LEU:HD13	1:D:175:ILE:CD1	2.50	0.41
1:D:223:CYS:O	1:D:224:TYR:C	2.59	0.41
1:D:281:LEU:HD12	1:D:286:PRO:CD	2.51	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:181:SER:HA	1:D:210:PHE:CD1	2.56	0.40
1:C:135:LEU:HD13	1:C:172:HIS:CE1	2.57	0.40
1:A:226:ASP:HB3	1:A:249:LEU:HD11	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	159/210 (76%)	149 (94%)	10 (6%)	0	100	100
1	B	154/210 (73%)	149 (97%)	4 (3%)	1 (1%)	25	42
1	C	160/210 (76%)	150 (94%)	8 (5%)	2 (1%)	12	21
1	D	160/210 (76%)	150 (94%)	9 (6%)	1 (1%)	25	42
All	All	633/840 (75%)	598 (94%)	31 (5%)	4 (1%)	25	42

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	220	ARG
1	C	224	TYR
1	D	224	TYR
1	C	225	ASP

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	146/188 (78%)	129 (88%)	17 (12%)	5	8
1	B	147/188 (78%)	132 (90%)	15 (10%)	7	12
1	C	149/188 (79%)	134 (90%)	15 (10%)	7	12
1	D	148/188 (79%)	134 (90%)	14 (10%)	8	15
All	All	590/752 (78%)	529 (90%)	61 (10%)	7	12

All (61) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	134	ASP
1	A	153	GLU
1	A	158	ARG
1	A	168	LEU
1	A	183	ARG
1	A	188	ARG
1	A	190	ASP
1	A	204	LYS
1	A	211	THR
1	A	213	SER
1	A	225	ASP
1	A	231	LYS
1	A	232	LEU
1	A	247	ARG
1	A	254	GLN
1	A	258	ARG
1	A	287	SER
1	B	168	LEU
1	B	169	GLU
1	B	183	ARG
1	B	188	ARG
1	B	204	LYS
1	B	205	LYS
1	B	211	THR
1	B	222	VAL
1	B	226	ASP
1	B	227	ARG
1	B	232	LEU
1	B	237	ASP
1	B	247	ARG
1	B	254	GLN

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Mol	Chain	Res	Type
1	B	273	LYS
1	C	134	ASP
1	C	151	ASN
1	C	168	LEU
1	C	183	ARG
1	C	188	ARG
1	C	191	VAL
1	C	211	THR
1	C	226	ASP
1	C	227	ARG
1	C	232	LEU
1	C	247	ARG
1	C	250	GLN
1	C	254	GLN
1	C	268	SER
1	C	283	ARG
1	D	134	ASP
1	D	136	ARG
1	D	168	LEU
1	D	173	THR
1	D	188	ARG
1	D	206	LYS
1	D	211	THR
1	D	215	ARG
1	D	222	VAL
1	D	225	ASP
1	D	227	ARG
1	D	232	LEU
1	D	253	ARG
1	D	255	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	196	GLN
1	B	254	GLN
1	C	250	GLN
1	C	254	GLN
1	C	271	ASN
1	D	196	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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 4 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

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, 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	158/210 (75%)	0.38	10 (6%) 20 24	51, 86, 151, 179	0
1	B	155/210 (73%)	0.32	7 (4%) 33 39	48, 80, 151, 163	0
1	C	159/210 (75%)	0.21	5 (3%) 49 58	56, 80, 140, 173	0
1	D	159/210 (75%)	0.32	10 (6%) 20 24	58, 89, 151, 176	0
All	All	631/840 (75%)	0.31	32 (5%) 28 34	48, 84, 151, 179	0

All (32) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	283	ARG	4.1
1	D	284	HIS	4.0
1	D	217	GLY	3.9
1	D	251	GLY	3.6
1	B	296	PRO	3.4
1	A	218	GLY	3.3
1	B	295	LYS	3.1
1	B	247	ARG	3.1
1	D	293	ARG	3.1
1	D	283	ARG	3.1
1	C	217	GLY	2.9
1	A	284	HIS	2.9
1	C	247	ARG	2.9
1	C	189	PRO	2.7
1	A	256	TRP	2.7
1	D	219	LYS	2.7
1	C	284	HIS	2.5
1	D	282	GLY	2.5
1	A	254	GLN	2.5
1	B	251	GLY	2.4
1	C	219	LYS	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	251	GLY	2.4
1	D	221	VAL	2.3
1	A	258	ARG	2.3
1	D	218	GLY	2.2
1	D	252	GLU	2.2
1	B	217	GLY	2.2
1	A	255	GLU	2.2
1	A	217	GLY	2.2
1	A	290	ASN	2.1
1	B	293	ARG	2.1
1	B	290	ASN	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 carbohydrates 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
2	NA	B	401	1/1	0.93	0.08	79,79,79,79	0
2	NA	A	401	1/1	0.93	0.17	73,73,73,73	0
2	NA	C	401	1/1	0.93	0.10	85,85,85,85	0
2	NA	D	401	1/1	0.97	0.12	88,88,88,88	0

6.5 Other polymers [i](#)

There are no such residues in this entry.