



wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 14, 2017 – 09:10 pm GMT

PDB ID : 4YG7
Title : Structure of FL autorepression promoter complex
Authors : Schumacher, M.A.
Deposited on : 2015-02-25
Resolution : 3.77 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<http://wwpdb.org/validation/2016/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)	:	1.9-1692
EDS	:	trunk28620
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	recalc28949

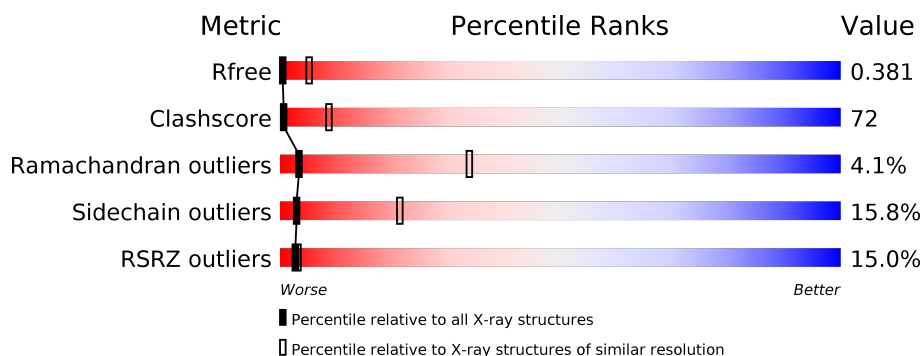
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.77 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.



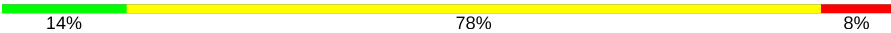
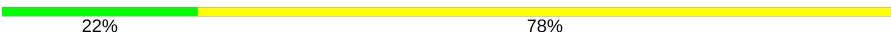
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	100719	1011 (4.04-3.52)
Clashscore	112137	1017 (4.00-3.56)
Ramachandran outliers	110173	1006 (4.02-3.54)
Sidechain outliers	110143	1000 (4.02-3.54)
RSRZ outliers	101464	1024 (4.04-3.52)

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. 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	B	71	<div> <div>10%</div> <div>18% 55% 24% .</div> </div>
1	C	71	<div> <div>18%</div> <div>18% 69% 13%</div> </div>
1	E	71	<div> <div>10%</div> <div>23% 61% 14% .</div> </div>
1	G	71	<div> <div>17%</div> <div>24% 61% 15%</div> </div>
2	D	436	<div> <div>20%</div> <div>26% 59% 9% . 5%</div> </div>
2	K	436	<div> <div>13%</div> <div>20% 59% 16% 6%</div> </div>

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Mol	Chain	Length	Quality of chain
3	R	50	 14% 78% 8%
4	T	50	 22% 78%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 10806 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 Antitoxin HipB.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	69	Total	C	N	O	S	0	0	0
			550	349	92	106	3			
1	E	69	Total	C	N	O	S	0	0	0
			550	349	92	106	3			
1	C	71	Total	C	N	O	S	0	0	0
			565	358	95	109	3			
1	G	71	Total	C	N	O	S	0	0	0
			565	358	95	109	3			

- Molecule 2 is a protein called Serine/threonine-protein kinase HipA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	414	Total	C	N	O	S	0	0	0
			3275	2100	570	593	12			
2	K	412	Total	C	N	O	S	0	0	0
			3256	2087	568	589	12			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	309	GLN	ASP	conflict	UNP P23874
K	309	GLN	ASP	conflict	UNP P23874

- Molecule 3 is a DNA chain called DNA (50-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	R	50	Total	C	N	O	P	0	0	0
			1022	491	184	298	49			

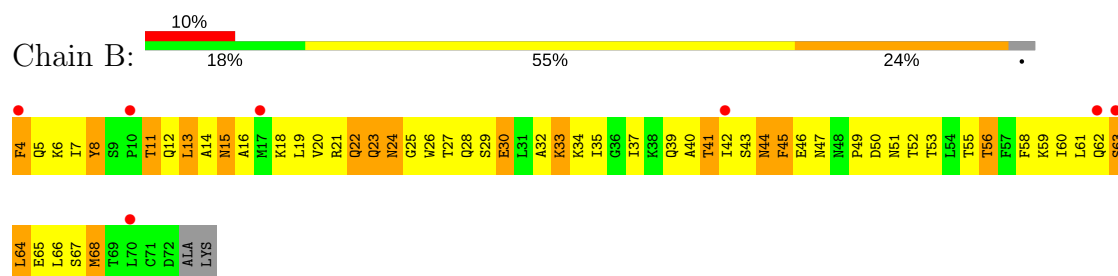
- Molecule 4 is a DNA chain called DNA (50-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	T	50	Total	C	N	O	P	0	0	0
			1023	491	184	299	49			

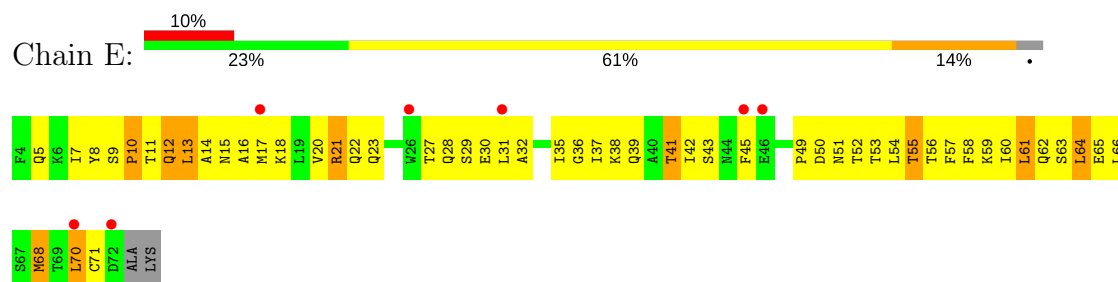
3 Residue-property plots [i](#)

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.

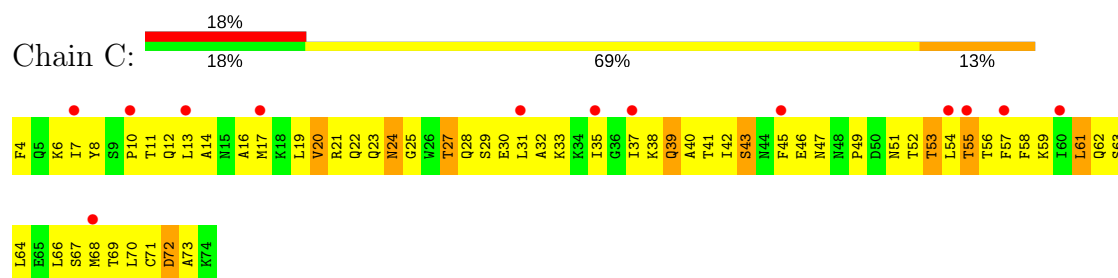
• Molecule 1: Antitoxin HipB



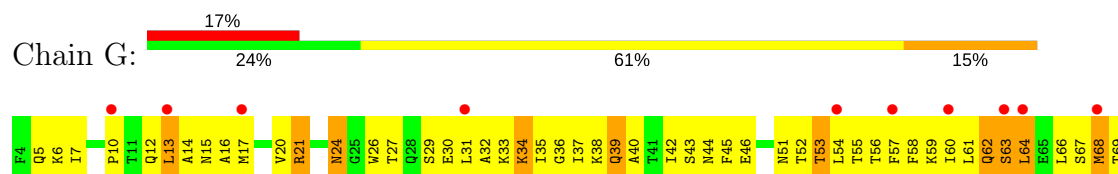
• Molecule 1: Antitoxin HipB

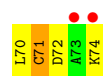


• Molecule 1: Antitoxin HipB

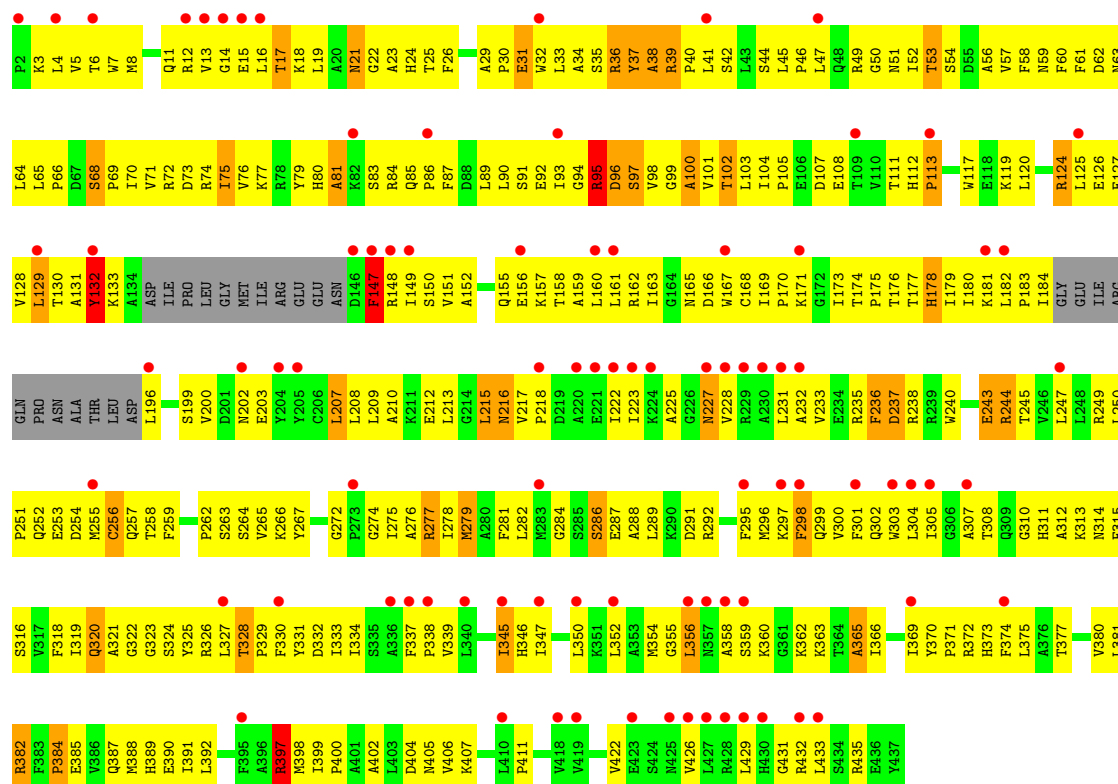


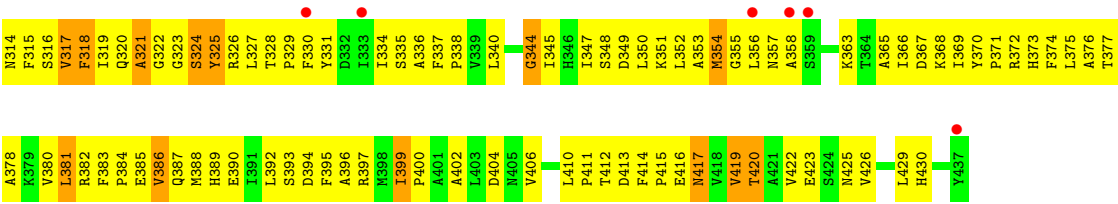
• Molecule 1: Antitoxin HipB



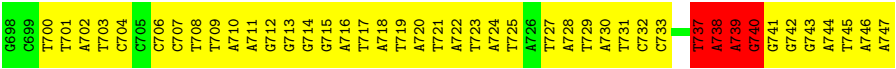


● Molecule 2: Serine/threonine-protein kinase HipA

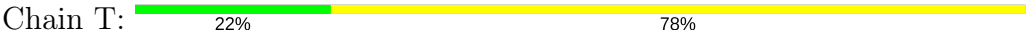




• Molecule 3: DNA (50-MER)



• Molecule 4: DNA (50-MER)



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	228.20Å 228.20Å 130.80Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	161.40 – 3.77 85.98 – 3.75	Depositor EDS
% Data completeness (in resolution range)	93.6 (161.40-3.77) 97.3 (85.98-3.75)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.64 (at 3.78Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.384 , 0.379 0.385 , 0.381	Depositor DCC
R_{free} test set	2894 reflections (8.38%)	DCC
Wilson B-factor (Å ²)	157.6	Xtriage
Anisotropy	0.648	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 167.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.38$, $\langle L^2 \rangle = 0.21$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	10806	wwPDB-VP
Average B, all atoms (Å ²)	180.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.26% 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	B	0.70	0/558	0.74	0/753
1	C	0.58	0/573	0.65	0/771
1	E	0.65	0/558	0.79	0/753
1	G	0.75	0/573	0.82	0/771
2	D	0.66	6/3348 (0.2%)	0.76	2/4535 (0.0%)
2	K	0.64	0/3328	0.76	0/4508
3	R	1.10	11/1146 (1.0%)	1.12	15/1767 (0.8%)
4	T	0.52	0/1147	0.73	0/1769
All	All	0.70	17/11231 (0.2%)	0.80	17/15627 (0.1%)

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
2	D	0	2
3	R	0	4
All	All	0	6

The worst 5 of 17 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	R	738	DA	C5-C6	-13.42	1.28	1.41
2	D	147	PHE	CE1-CZ	12.80	1.61	1.37
3	R	738	DA	N9-C4	-11.10	1.31	1.37
3	R	739	DA	C5-C6	-11.03	1.31	1.41
3	R	738	DA	N1-C2	9.38	1.42	1.34

The worst 5 of 17 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	R	738	DA	N1-C6-N6	11.69	125.61	118.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	R	739	DA	C5-C6-N6	-11.54	114.47	123.70
3	R	738	DA	C5-C6-N6	-9.85	115.82	123.70
3	R	739	DA	N1-C6-N6	8.52	123.71	118.60
3	R	739	DA	C5-C6-N1	8.10	121.75	117.70

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	D	132	TYR	Sidechain
2	D	147	PHE	Sidechain
3	R	737	DT	Sidechain
3	R	738	DA	Sidechain
3	R	739	DA	Sidechain

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	550	0	559	124	0
1	C	565	0	577	102	0
1	E	550	0	559	114	0
1	G	565	0	577	130	0
2	D	3275	0	3317	461	0
2	K	3256	0	3304	547	2
3	R	1022	0	568	86	0
4	T	1023	0	568	75	0
All	All	10806	0	10029	1505	2

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 72.

The worst 5 of 1505 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:8:MET:HB3	2:K:32:TRP:CH2	1.71	1.26

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:242:ALA:HB3	2:K:243:GLU:OE2	1.37	1.22
2:D:263:SER:O	2:D:266:LYS:HG2	1.45	1.16
1:E:21:ARG:HH22	1:E:27:THR:C	1.50	1.13
2:D:274:GLY:O	2:D:278:ILE:HG12	1.48	1.12

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:111:THR:OG1	2:K:111:THR:OG1[7_555]	1.71	0.49
2:K:36:ARG:NH2	2:K:163:ILE:O[7_555]	1.82	0.38

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	B	67/71 (94%)	46 (69%)	19 (28%)	2 (3%)	5	41
1	C	69/71 (97%)	60 (87%)	9 (13%)	0	100	100
1	E	67/71 (94%)	52 (78%)	12 (18%)	3 (4%)	3	31
1	G	69/71 (97%)	49 (71%)	20 (29%)	0	100	100
2	D	408/436 (94%)	310 (76%)	83 (20%)	15 (4%)	4	36
2	K	406/436 (93%)	285 (70%)	96 (24%)	25 (6%)	2	25
All	All	1086/1156 (94%)	802 (74%)	239 (22%)	45 (4%)	3	34

5 of 45 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	38	ALA
2	D	81	ALA
2	D	95	ARG

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Mol	Chain	Res	Type
2	D	100	ALA
2	D	105	PRO

5.3.2 Protein sidechains ⓘ

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	B	63/64 (98%)	45 (71%)	18 (29%)	0	3
1	C	64/64 (100%)	52 (81%)	12 (19%)	2	13
1	E	63/64 (98%)	54 (86%)	9 (14%)	4	25
1	G	64/64 (100%)	52 (81%)	12 (19%)	2	13
2	D	352/371 (95%)	311 (88%)	41 (12%)	6	34
2	K	350/371 (94%)	291 (83%)	59 (17%)	2	18
All	All	956/998 (96%)	805 (84%)	151 (16%)	3	21

5 of 151 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	4	PHE
1	G	39	GLN
2	K	317	VAL
1	C	24	ASN
1	C	55	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 49 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	22	GLN
1	C	28	GLN
2	K	346	HIS
1	E	39	GLN
1	C	39	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](#)

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 ⓘ

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	B	69/71 (97%)	0.65	7 (10%) 8 7	103, 167, 204, 211	0
1	C	71/71 (100%)	0.81	13 (18%) 1 2	132, 163, 195, 201	0
1	E	69/71 (97%)	0.62	7 (10%) 8 7	126, 151, 195, 206	0
1	G	71/71 (100%)	0.73	12 (16%) 2 2	60, 150, 183, 239	0
2	D	414/436 (94%)	0.89	87 (21%) 1 1	102, 194, 238, 254	0
2	K	412/436 (94%)	0.73	55 (13%) 4 4	103, 164, 230, 243	0
3	R	50/50 (100%)	-0.67	0 100 100	50, 198, 255, 261	0
4	T	50/50 (100%)	-0.79	0 100 100	128, 213, 260, 262	0
All	All	1206/1256 (96%)	0.66	181 (15%) 3 3	50, 174, 236, 262	0

The worst 5 of 181 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	K	89	LEU	10.4
2	K	90	LEU	10.2
2	K	154	ALA	9.6
2	D	224	LYS	9.4
2	K	156	GLU	8.7

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

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

6.3 Carbohydrates ⓘ

There are no carbohydrates 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.