



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 20, 2023 – 03:55 AM EDT

PDB ID : 5IMW  
Title : Trapped Toxin  
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Deposited on : 2016-03-07  
Resolution : 2.89 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 : 2.35.1  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.35.1

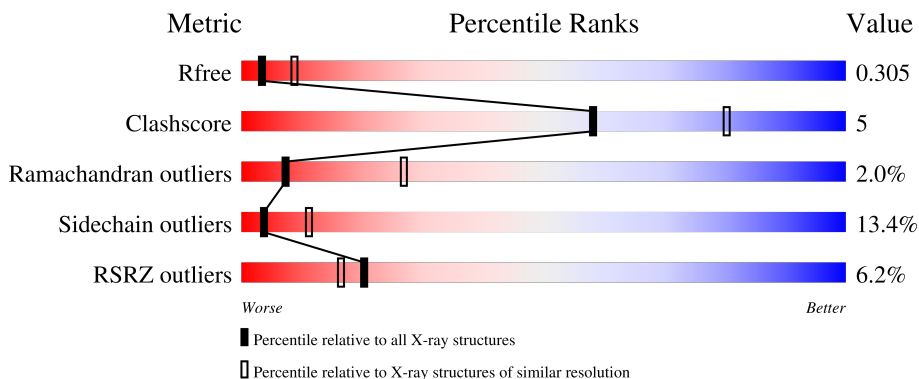
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.89 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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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	471	
1	B	471	

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 14175 atoms, of which 7062 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 Intermedilysin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O				S
1	A	456	7047	2229	3513	620	680	5	0	0	0
1	B	462	7128	2257	3549	627	690	5	0	0	0

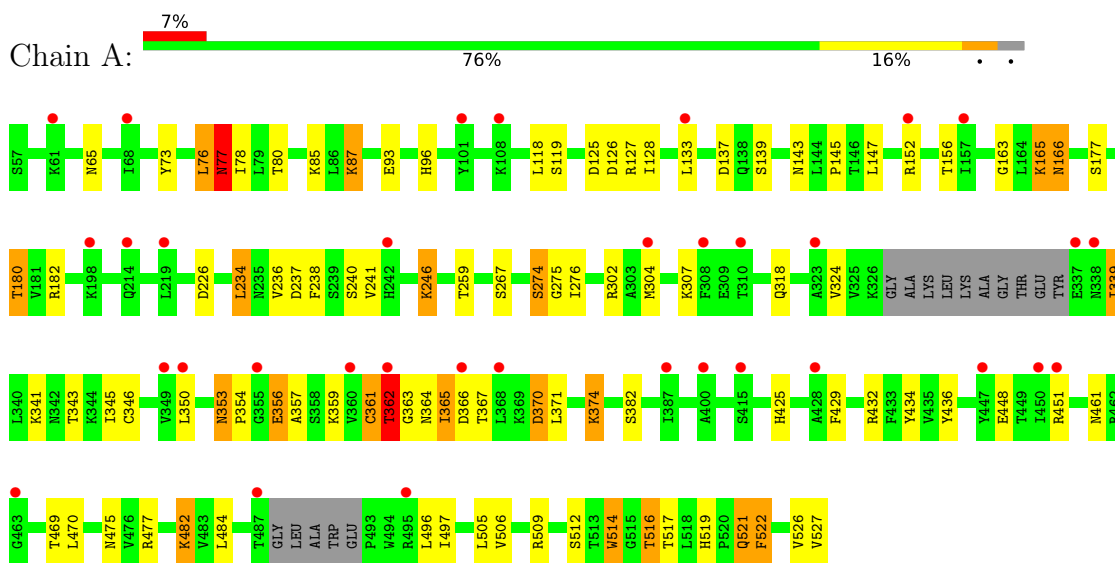
There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	195	LYS	ASN	conflict	UNP Q9LCB8
A	346	CYS	THR	conflict	UNP Q9LCB8
A	361	CYS	ILE	conflict	UNP Q9LCB8
B	195	LYS	ASN	conflict	UNP Q9LCB8
B	346	CYS	THR	conflict	UNP Q9LCB8
B	361	CYS	ILE	conflict	UNP Q9LCB8

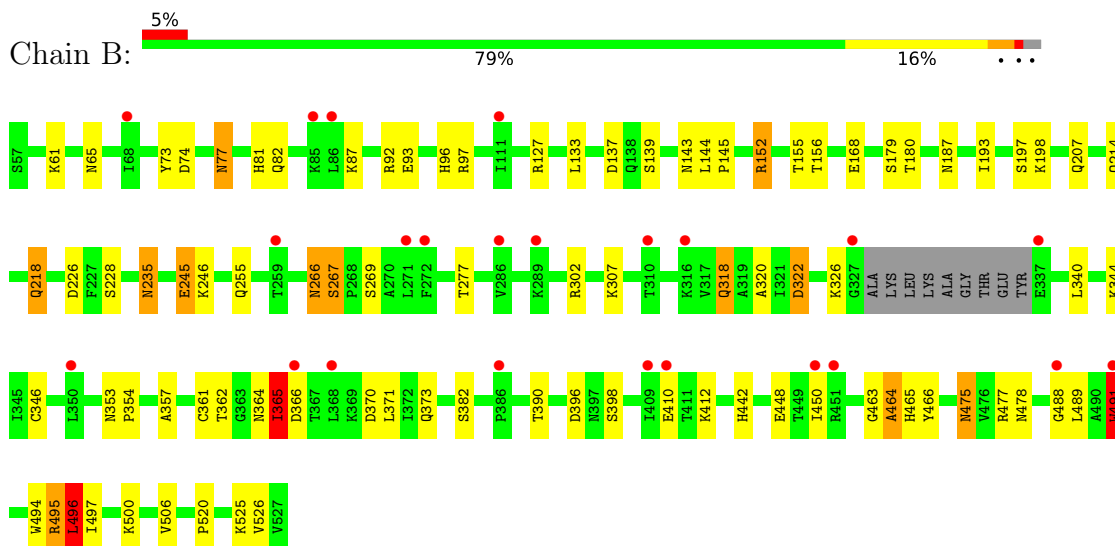
### 3 Residue-property plots

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

- Molecule 1: Intermedilysin



- Molecule 1: Intermedilysin



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	84.47Å 101.56Å 175.74Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.13 – 2.89 48.14 – 2.89	Depositor EDS
% Data completeness (in resolution range)	98.5 (48.13-2.89) 99.1 (48.14-2.89)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.49 (at 2.91Å)	Xtrriage
Refinement program	PHENIX (1.10.1_2155: ???)	Depositor
R, $R_{free}$	0.258 , 0.295 0.267 , 0.305	Depositor DCC
$R_{free}$ test set	1736 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	69.3	Xtrriage
Anisotropy	1.070	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 69.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	14175	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	105.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 45.41 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.3275e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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 [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	0.25	0/3606	0.45	0/4892
1	B	0.25	0/3654	0.45	0/4962
All	All	0.25	0/7260	0.45	0/9854

There are no bond length outliers.

There are no bond angle outliers.

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	3534	3513	3513	37	0
1	B	3579	3549	3549	33	0
All	All	7113	7062	7062	68	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 5.

All (68) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:364:ASN:O	1:B:366:ASP:N	2.14	0.80
1:A:234:LEU:O	1:A:307:LYS:NZ	2.14	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:364:ASN:O	1:A:366:ASP:N	2.16	0.78
1:A:177:SER:OG	1:A:180:THR:OG1	2.02	0.77
1:B:96:HIS:NE2	1:B:475:ASN:OD1	2.22	0.73
1:A:127:ARG:NH1	1:A:145:PRO:O	2.20	0.72
1:B:302:ARG:NH2	1:B:371:LEU:O	2.23	0.72
1:B:74:ASP:OD2	1:B:77:ASN:ND2	2.26	0.69
1:B:214:GLN:N	1:B:218:GLN:OE1	2.26	0.69
1:A:76:LEU:O	1:A:77:ASN:ND2	2.27	0.67
1:B:477:ARG:NE	1:B:478:ASN:OD1	2.27	0.66
1:B:143:ASN:ND2	1:B:226:ASP:OD2	2.31	0.63
1:A:274:SER:O	1:A:276:ILE:N	2.33	0.61
1:B:318:GLN:O	1:B:320:ALA:N	2.33	0.61
1:A:519:HIS:O	1:A:519:HIS:ND1	2.34	0.60
1:A:356:GLU:N	1:A:356:GLU:OE2	2.35	0.60
1:A:143:ASN:ND2	1:A:226:ASP:OD2	2.36	0.59
1:A:137:ASP:OD1	1:A:139:SER:OG	2.19	0.58
1:B:267:SER:OG	1:B:269:SER:OG	2.21	0.58
1:A:241:VAL:HG23	1:A:246:LYS:HZ3	1.68	0.58
1:B:61:LYS:O	1:B:65:ASN:ND2	2.39	0.55
1:A:370:ASP:O	1:A:374:LYS:N	2.34	0.55
1:A:65:ASN:ND2	1:A:267:SER:OG	2.40	0.54
1:A:166:ASN:N	1:A:166:ASN:OD1	2.41	0.54
1:B:127:ARG:NH1	1:B:145:PRO:O	2.39	0.53
1:B:92:ARG:NE	1:B:448:GLU:OE1	2.42	0.53
1:A:125:ASP:OD1	1:A:182:ARG:NH1	2.41	0.52
1:A:434:TYR:HB2	1:A:482:LYS:HB3	1.92	0.51
1:A:85:LYS:O	1:B:450:ILE:N	2.40	0.51
1:B:353:ASN:HB3	1:B:354:PRO:HD2	1.93	0.51
1:B:506:VAL:HG11	1:B:526:VAL:HG13	1.92	0.50
1:B:464:ALA:O	1:B:466:TYR:N	2.44	0.50
1:B:495:ARG:O	1:B:496:LEU:HB2	2.11	0.50
1:A:237:ASP:O	1:A:246:LYS:NZ	2.30	0.49
1:B:137:ASP:OD1	1:B:139:SER:OG	2.29	0.49
1:A:73:TYR:HB2	1:A:78:ILE:HD11	1.94	0.48
1:A:429:PHE:CZ	1:A:516:THR:HA	2.49	0.47
1:B:266:ASN:OD1	1:B:266:ASN:N	2.38	0.47
1:A:125:ASP:O	1:A:182:ARG:NH2	2.48	0.47
1:A:361:CYS:O	1:A:362:THR:HG22	2.14	0.46
1:B:365:ILE:HG23	1:B:366:ASP:N	2.31	0.46
1:A:365:ILE:HG23	1:A:366:ASP:N	2.31	0.45
1:B:361:CYS:O	1:B:362:THR:OG1	2.32	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:396:ASP:OD2	1:B:398:SER:OG	2.19	0.45
1:B:396:ASP:N	1:B:396:ASP:OD1	2.50	0.45
1:A:128:ILE:O	1:A:182:ARG:NH2	2.46	0.44
1:B:235:ASN:O	1:B:307:LYS:NZ	2.50	0.44
1:B:235:ASN:N	1:B:235:ASN:OD1	2.50	0.44
1:A:87:LYS:HG2	1:B:450:ILE:HD11	2.00	0.44
1:B:193:ILE:HA	1:B:197:SER:HB3	1.99	0.44
1:A:506:VAL:HG11	1:A:526:VAL:HG13	2.00	0.43
1:A:514:TRP:CD1	1:A:521:GLN:HB3	2.52	0.43
1:B:491:TRP:CD1	1:B:491:TRP:N	2.86	0.43
1:A:522:PHE:CD1	1:A:522:PHE:N	2.86	0.43
1:B:245:GLU:N	1:B:245:GLU:OE1	2.51	0.43
1:A:126:ASP:OD1	1:A:126:ASP:N	2.52	0.43
1:A:522:PHE:N	1:A:522:PHE:HD1	2.17	0.42
1:A:302:ARG:HH12	1:A:374:LYS:HG3	1.83	0.42
1:A:353:ASN:OD1	1:A:374:LYS:NZ	2.41	0.42
1:B:322:ASP:N	1:B:322:ASP:OD1	2.53	0.42
1:A:324:VAL:HG21	1:A:365:ILE:HD11	2.02	0.41
1:A:163:GLY:O	1:A:165:LYS:HD3	2.20	0.41
1:B:133:LEU:H	1:B:152:ARG:HH21	1.67	0.41
1:A:362:THR:HG23	1:A:363:GLY:N	2.35	0.41
1:A:374:LYS:O	1:A:374:LYS:HD2	2.21	0.41
1:B:488:GLY:O	1:B:489:LEU:HD22	2.21	0.40
1:B:497:ILE:HG21	1:B:520:PRO:HB2	2.02	0.40
1:A:370:ASP:OD1	1:A:371:LEU:N	2.55	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	450/471 (96%)	412 (92%)	29 (6%)	9 (2%)	<b>7</b> <b>27</b>

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	458/471 (97%)	419 (92%)	30 (7%)	9 (2%)	7	27
All	All	908/942 (96%)	831 (92%)	59 (6%)	18 (2%)	7	27

All (18) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	365	ILE
1	B	365	ILE
1	B	491	TRP
1	B	496	LEU
1	A	236	VAL
1	A	275	GLY
1	A	339	ILE
1	B	357	ALA
1	A	77	ASN
1	A	274	SER
1	A	357	ALA
1	B	326	LYS
1	B	465	HIS
1	A	362	THR
1	B	464	ALA
1	B	495	ARG
1	A	354	PRO
1	B	463	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	390/403 (97%)	330 (85%)	60 (15%)	2	8
1	B	394/403 (98%)	349 (89%)	45 (11%)	5	17
All	All	784/806 (97%)	679 (87%)	105 (13%)	4	11

All (105) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	76	LEU
1	A	77	ASN
1	A	80	THR
1	A	87	LYS
1	A	93	GLU
1	A	96	HIS
1	A	118	LEU
1	A	119	SER
1	A	133	LEU
1	A	147	LEU
1	A	152	ARG
1	A	156	THR
1	A	165	LYS
1	A	166	ASN
1	A	180	THR
1	A	234	LEU
1	A	238	PHE
1	A	240	SER
1	A	246	LYS
1	A	259	THR
1	A	304	MET
1	A	318	GLN
1	A	339	ILE
1	A	341	LYS
1	A	343	THR
1	A	345	ILE
1	A	346	CYS
1	A	350	LEU
1	A	353	ASN
1	A	356	GLU
1	A	359	LYS
1	A	361	CYS
1	A	362	THR
1	A	367	THR
1	A	370	ASP
1	A	374	LYS
1	A	382	SER
1	A	425	HIS
1	A	432	ARG
1	A	436	TYR
1	A	448	GLU
1	A	451	ARG
1	A	461	ASN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	469	THR
1	A	470	LEU
1	A	475	ASN
1	A	477	ARG
1	A	482	LYS
1	A	484	LEU
1	A	496	LEU
1	A	497	ILE
1	A	505	LEU
1	A	509	ARG
1	A	512	SER
1	A	514	TRP
1	A	516	THR
1	A	517	THR
1	A	521	GLN
1	A	522	PHE
1	A	527	VAL
1	B	73	TYR
1	B	77	ASN
1	B	81	HIS
1	B	82	GLN
1	B	87	LYS
1	B	93	GLU
1	B	97	ARG
1	B	144	LEU
1	B	152	ARG
1	B	155	THR
1	B	156	THR
1	B	168	GLU
1	B	179	SER
1	B	180	THR
1	B	187	ASN
1	B	198	LYS
1	B	207	GLN
1	B	218	GLN
1	B	228	SER
1	B	235	ASN
1	B	245	GLU
1	B	246	LYS
1	B	255	GLN
1	B	266	ASN
1	B	267	SER

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Mol	Chain	Res	Type
1	B	277	THR
1	B	318	GLN
1	B	322	ASP
1	B	340	LEU
1	B	344	LYS
1	B	346	CYS
1	B	365	ILE
1	B	370	ASP
1	B	373	GLN
1	B	382	SER
1	B	390	THR
1	B	410	GLU
1	B	412	LYS
1	B	442	HIS
1	B	475	ASN
1	B	491	TRP
1	B	494	TRP
1	B	496	LEU
1	B	500	LYS
1	B	525	LYS

Sometimes 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 monosaccharides in this entry.

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

There are no ligands in this entry.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 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, 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	456/471 (96%)	0.65	34 (7%) 14 11	68, 94, 134, 152	0
1	B	462/471 (98%)	0.65	23 (4%) 28 25	68, 91, 126, 146	0
All	All	918/942 (97%)	0.65	57 (6%) 20 16	68, 92, 132, 152	0

All (57) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	337	GLU	5.1
1	A	310	THR	4.2
1	B	86	LEU	3.8
1	A	368	LEU	3.8
1	A	338	ASN	3.6
1	B	368	LEU	3.5
1	B	366	ASP	3.4
1	A	323	ALA	3.1
1	A	68	ILE	3.1
1	A	360	VAL	3.0
1	A	214	GLN	3.0
1	A	428	ALA	2.9
1	A	495	ARG	2.8
1	A	152	ARG	2.8
1	B	316	LYS	2.8
1	B	451	ARG	2.8
1	A	355	GLY	2.8
1	A	487	THR	2.8
1	B	286	VAL	2.8
1	A	337	GLU	2.7
1	B	409	ILE	2.6
1	A	157	ILE	2.6
1	A	101	TYR	2.6
1	B	289	LYS	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	415	SER	2.6
1	A	450	ILE	2.6
1	B	259	THR	2.5
1	A	350	LEU	2.5
1	A	366	ASP	2.5
1	A	61	LYS	2.4
1	B	327	GLY	2.4
1	A	304	MET	2.3
1	A	219	LEU	2.3
1	A	447	TYR	2.3
1	B	410	GLU	2.3
1	A	451	ARG	2.3
1	B	488	GLY	2.3
1	B	272	PHE	2.2
1	A	242	HIS	2.2
1	B	386	PRO	2.2
1	A	463	GLY	2.2
1	A	108	LYS	2.2
1	B	68	ILE	2.1
1	A	349	VAL	2.1
1	A	198	LYS	2.1
1	B	310	THR	2.1
1	A	133	LEU	2.1
1	B	85	LYS	2.1
1	A	362	THR	2.1
1	A	308	PHE	2.1
1	B	111	ILE	2.0
1	B	450	ILE	2.0
1	B	271	LEU	2.0
1	B	350	LEU	2.0
1	A	387	ILE	2.0
1	A	400	ALA	2.0
1	B	491	TRP	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

There are no ligands in this entry.

## 6.5 Other polymers

There are no such residues in this entry.