



# Full wwPDB X-ray Structure Validation Report ⓘ

Jul 26, 2022 – 10:08 am BST

PDB ID : 8AHP  
Title : The crystal structure of the truncated form of Lotus japonicus kinase 1  
Authors : Solovou, T.; Leonidas, D.D.  
Deposited on : 2022-07-22  
Resolution : 2.90 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	:	2.29
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.29

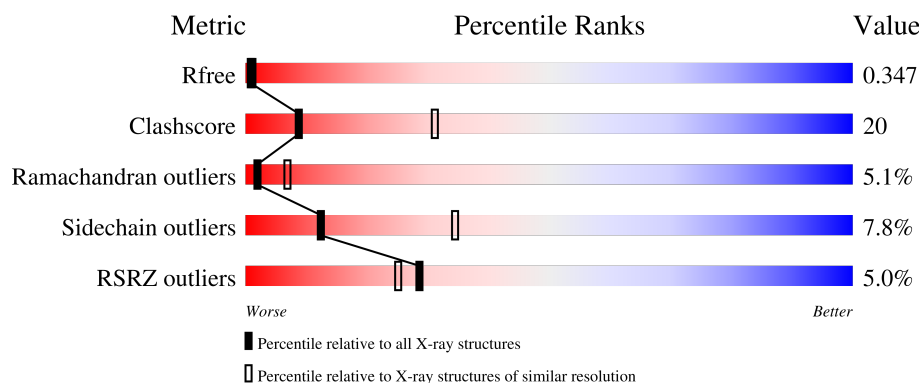
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 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	378	<div> <div>5%</div> <div>52%</div> <div>38%</div> <div>5%</div> <div>5%</div> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2881 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 Non-specific serine/threonine protein kinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	358	Total	C	N	O	S	0	0	0
			2873	1848	493	515	17			

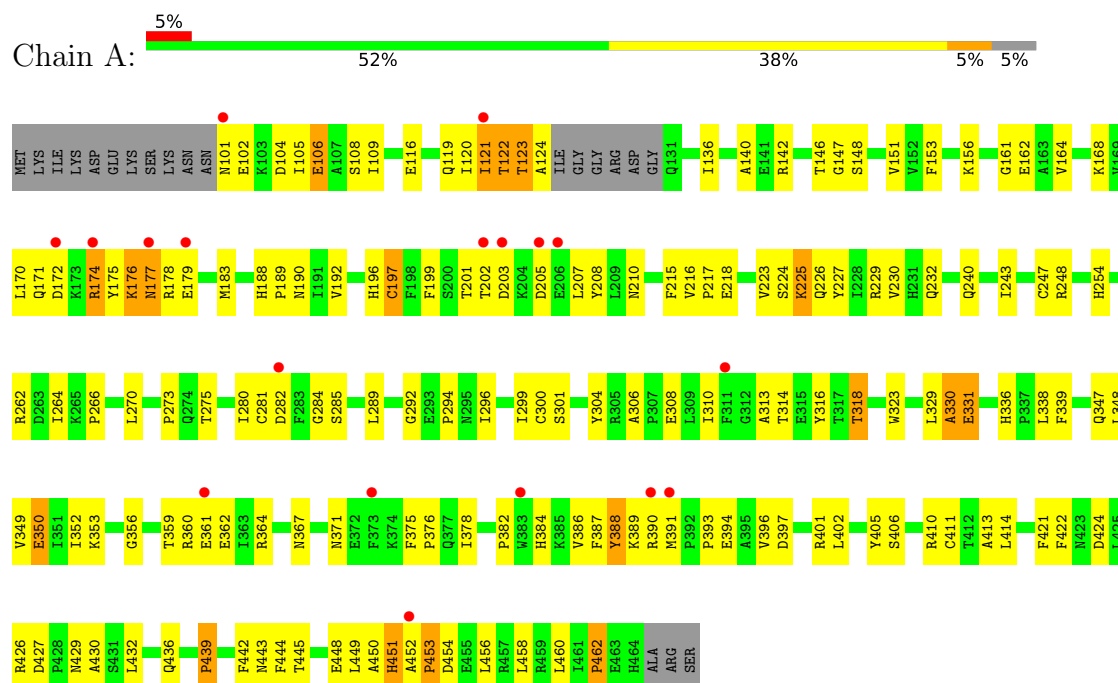
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	8	Total	O	0	0
			8	8		

### 3 Residue-property plots [i](#)

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: Non-specific serine/threonine protein kinase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	55.32Å 69.32Å 99.64Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.24 – 2.90 43.24 – 2.90	Depositor EDS
% Data completeness (in resolution range)	98.8 (43.24-2.90) 98.8 (43.24-2.90)	Depositor EDS
$R_{merge}$	0.20	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.59 (at 2.90Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, $R_{free}$	0.258 , 0.350 0.258 , 0.347	Depositor DCC
$R_{free}$ test set	882 reflections (10.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	47.5	Xtriage
Anisotropy	0.961	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	(Not available) , (Not available)	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.87	EDS
Total number of atoms	2881	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	39.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.09% 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 [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	0.54	0/2947	0.71	0/4007

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	2873	0	2885	118	0
2	A	8	0	0	0	0
All	All	2881	0	2885	118	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 20.

All (118) 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:105:ILE:HG12	1:A:121:ILE:HD12	1.47	0.96
1:A:445:THR:HG22	1:A:448:GLU:HB2	1.51	0.91
1:A:146:THR:OG1	1:A:147:GLY:N	2.05	0.88
1:A:179:GLU:HG2	1:A:284:GLY:HA2	1.64	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:202:THR:HG22	1:A:203:ASP:H	1.54	0.72
1:A:218:GLU:HG2	1:A:273:PRO:HG3	1.72	0.72
1:A:270:LEU:HD21	1:A:281:CYS:SG	2.31	0.71
1:A:360:ARG:H	1:A:360:ARG:HD2	1.56	0.71
1:A:122:THR:HA	1:A:196:HIS:CD2	2.26	0.70
1:A:164:VAL:HA	1:A:215:PHE:HB2	1.75	0.68
1:A:388:TYR:HB2	1:A:391:MET:HG2	1.73	0.68
1:A:313:ALA:HB2	1:A:367:ASN:HB2	1.76	0.67
1:A:105:ILE:HD12	1:A:106:GLU:O	1.94	0.67
1:A:414:LEU:HD11	1:A:460:LEU:HD21	1.77	0.66
1:A:105:ILE:HG12	1:A:121:ILE:CD1	2.22	0.66
1:A:387:PHE:HB3	1:A:391:MET:HG3	1.79	0.65
1:A:397:ASP:O	1:A:401:ARG:HG3	1.97	0.65
1:A:192:VAL:HG23	1:A:280:ILE:O	1.99	0.63
1:A:105:ILE:CG1	1:A:121:ILE:HD12	2.25	0.62
1:A:171:GLN:HB2	1:A:207:LEU:O	1.99	0.62
1:A:122:THR:HA	1:A:196:HIS:NE2	2.14	0.62
1:A:123:THR:HG22	1:A:124:ALA:H	1.66	0.61
1:A:323:TRP:HB2	1:A:410:ARG:NH1	2.15	0.60
1:A:262:ARG:HG2	1:A:299:ILE:HD12	1.83	0.60
1:A:177:ASN:OD1	1:A:178:ARG:N	2.35	0.60
1:A:105:ILE:HD13	1:A:121:ILE:HG23	1.85	0.59
1:A:116:GLU:HG3	1:A:140:ALA:HB3	1.83	0.59
1:A:177:ASN:O	1:A:179:GLU:HG3	2.02	0.59
1:A:174:ARG:HA	1:A:174:ARG:HH11	1.68	0.58
1:A:349:VAL:O	1:A:352:ILE:N	2.36	0.58
1:A:243:ILE:HG13	1:A:329:LEU:HD13	1.86	0.57
1:A:170:LEU:CD1	1:A:172:ASP:HB2	2.35	0.57
1:A:289:LEU:HD13	1:A:316:TYR:O	2.06	0.56
1:A:310:ILE:HG21	1:A:348:LEU:HB2	1.87	0.56
1:A:153:PHE:HE1	1:A:168:LYS:HB2	1.71	0.55
1:A:361:GLU:HA	1:A:361:GLU:OE1	2.07	0.55
1:A:146:THR:HG1	1:A:147:GLY:H	1.53	0.53
1:A:174:ARG:HA	1:A:174:ARG:NH1	2.23	0.53
1:A:105:ILE:HD11	1:A:120:ILE:HD13	1.91	0.52
1:A:456:LEU:O	1:A:460:LEU:HB2	2.10	0.52
1:A:394:GLU:H	1:A:394:GLU:CD	2.13	0.52
1:A:451:HIS:C	1:A:453:PRO:HD2	2.31	0.51
1:A:172:ASP:OD1	1:A:174:ARG:NH2	2.43	0.51
1:A:323:TRP:HB2	1:A:410:ARG:HH11	1.74	0.51
1:A:176:LYS:HB2	1:A:178:ARG:HH11	1.75	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:422:PHE:O	1:A:426:ARG:HG3	2.10	0.51
1:A:240:GLN:NE2	1:A:421:PHE:O	2.37	0.51
1:A:445:THR:HG23	1:A:448:GLU:H	1.75	0.50
1:A:275:THR:O	1:A:439:PRO:HG3	2.11	0.50
1:A:119:GLN:O	1:A:120:ILE:HG12	2.12	0.50
1:A:339:PHE:HB3	1:A:347:GLN:OE1	2.11	0.50
1:A:402:LEU:HD23	1:A:411:CYS:HB2	1.94	0.49
1:A:350:GLU:OE2	1:A:353:LYS:NZ	2.40	0.49
1:A:119:GLN:C	1:A:120:ILE:HG12	2.33	0.49
1:A:104:ASP:HB2	1:A:199:PHE:CZ	2.48	0.48
1:A:227:TYR:O	1:A:230:VAL:HG22	2.13	0.48
1:A:427:ASP:HB3	1:A:430:ALA:HB2	1.93	0.48
1:A:330:ALA:HB1	1:A:338:LEU:HD13	1.95	0.48
1:A:156:LYS:NZ	1:A:161:GLY:HA2	2.26	0.48
1:A:361:GLU:OE2	1:A:364:ARG:HD2	2.13	0.48
1:A:179:GLU:HG2	1:A:284:GLY:CA	2.41	0.47
1:A:449:LEU:HD21	1:A:460:LEU:HD23	1.97	0.47
1:A:296:ILE:HD12	1:A:296:ILE:H	1.80	0.46
1:A:266:PRO:HD3	1:A:304:TYR:CZ	2.50	0.46
1:A:454:ASP:O	1:A:458:LEU:HG	2.16	0.46
1:A:146:THR:HA	1:A:151:VAL:HA	1.97	0.46
1:A:179:GLU:CG	1:A:284:GLY:HA2	2.40	0.46
1:A:197:CYS:HA	1:A:210:ASN:O	2.16	0.46
1:A:442:PHE:CD1	1:A:462:PRO:HD3	2.51	0.46
1:A:254:HIS:CG	1:A:318:THR:HG21	2.51	0.45
1:A:352:ILE:HG23	1:A:356:GLY:C	2.37	0.45
1:A:153:PHE:CE1	1:A:168:LYS:HB2	2.51	0.45
1:A:452:ALA:N	1:A:453:PRO:HD2	2.31	0.45
1:A:393:PRO:O	1:A:396:VAL:N	2.50	0.44
1:A:218:GLU:CG	1:A:273:PRO:HG3	2.46	0.44
1:A:414:LEU:HG	1:A:456:LEU:HD21	1.98	0.44
1:A:225:LYS:HA	1:A:225:LYS:HD2	1.76	0.43
1:A:223:VAL:O	1:A:226:GLN:HB2	2.18	0.43
1:A:190:ASN:OD1	1:A:248:ARG:HD3	2.19	0.43
1:A:216:VAL:CG1	1:A:270:LEU:HB3	2.49	0.43
1:A:164:VAL:CA	1:A:215:PHE:HB2	2.47	0.42
1:A:352:ILE:HA	1:A:356:GLY:O	2.19	0.42
1:A:442:PHE:O	1:A:444:PHE:N	2.48	0.42
1:A:449:LEU:HD23	1:A:449:LEU:HA	1.85	0.42
1:A:179:GLU:O	1:A:183:MET:HG2	2.19	0.42
1:A:361:GLU:O	1:A:364:ARG:HB3	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:229:ARG:O	1:A:229:ARG:HG3	2.19	0.42
1:A:360:ARG:H	1:A:360:ARG:CD	2.23	0.42
1:A:375:PHE:CD1	1:A:376:PRO:HD2	2.55	0.42
1:A:388:TYR:HB3	1:A:390:ARG:H	1.84	0.42
1:A:108:SER:O	1:A:109:ILE:HD12	2.19	0.42
1:A:120:ILE:HG22	1:A:121:ILE:N	2.34	0.42
1:A:177:ASN:O	1:A:179:GLU:N	2.52	0.42
1:A:331:GLU:HA	1:A:336:HIS:O	2.19	0.42
1:A:382:PRO:O	1:A:386:VAL:HG23	2.19	0.42
1:A:356:GLY:O	1:A:405:TYR:OH	2.32	0.41
1:A:120:ILE:HG22	1:A:121:ILE:H	1.86	0.41
1:A:188:HIS:CE1	1:A:189:PRO:HD2	2.55	0.41
1:A:367:ASN:OD1	1:A:367:ASN:C	2.59	0.41
1:A:119:GLN:OE1	1:A:119:GLN:N	2.54	0.41
1:A:264:ILE:HD13	1:A:264:ILE:HA	1.92	0.41
1:A:292:GLY:O	1:A:294:PRO:HD3	2.20	0.41
1:A:375:PHE:CG	1:A:376:PRO:HD2	2.55	0.41
1:A:104:ASP:OD2	1:A:104:ASP:N	2.54	0.41
1:A:199:PHE:HA	1:A:208:TYR:O	2.21	0.41
1:A:247:CYS:O	1:A:413:ALA:HB1	2.21	0.41
1:A:388:TYR:HB3	1:A:390:ARG:N	2.36	0.41
1:A:120:ILE:CG2	1:A:121:ILE:H	2.34	0.40
1:A:188:HIS:ND1	1:A:189:PRO:HD2	2.36	0.40
1:A:199:PHE:HB3	1:A:207:LEU:HD11	2.03	0.40
1:A:306:ALA:HB1	1:A:308:GLU:OE1	2.22	0.40
1:A:359:THR:HB	1:A:362:GLU:HG3	2.03	0.40
1:A:378:ILE:HD12	1:A:378:ILE:N	2.36	0.40
1:A:196:HIS:HD1	1:A:197:CYS:N	2.20	0.40
1:A:339:PHE:O	1:A:347:GLN:NE2	2.33	0.40
1:A:432:LEU:N	1:A:436:GLN:O	2.43	0.40
1:A:105:ILE:CD1	1:A:121:ILE:HD12	2.52	0.40
1:A:196:HIS:ND1	1:A:197:CYS:N	2.69	0.40

There are no symmetry-related clashes.

## 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	A	354/378 (94%)	294 (83%)	42 (12%)	18 (5%)	2 7

All (18) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	142	ARG
1	A	451	HIS
1	A	217	PRO
1	A	331	GLU
1	A	450	ALA
1	A	174	ARG
1	A	282	ASP
1	A	330	ALA
1	A	350	GLU
1	A	371	ASN
1	A	443	ASN
1	A	122	THR
1	A	177	ASN
1	A	462	PRO
1	A	102	GLU
1	A	300	CYS
1	A	453	PRO
1	A	439	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	A	320/336 (95%)	295 (92%)	25 (8%)	12 34

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	101	ASN
1	A	106	GLU
1	A	121	ILE
1	A	123	THR
1	A	136	ILE
1	A	148	SER
1	A	162	GLU
1	A	175	TYR
1	A	176	LYS
1	A	197	CYS
1	A	201	THR
1	A	205	ASP
1	A	224	SER
1	A	225	LYS
1	A	232	GLN
1	A	285	SER
1	A	301	SER
1	A	314	THR
1	A	318	THR
1	A	384	HIS
1	A	388	TYR
1	A	389	LYS
1	A	406	SER
1	A	424	ASP
1	A	429	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	101	ASN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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 [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	358/378 (94%)	0.37	18 (5%)	28 25	39, 39, 39, 39	0

All (18) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	101	ASN	3.7
1	A	452	ALA	3.6
1	A	390	ARG	3.1
1	A	203	ASP	2.9
1	A	205	ASP	2.8
1	A	361	GLU	2.7
1	A	311	PHE	2.5
1	A	383	TRP	2.5
1	A	373	PHE	2.4
1	A	202	THR	2.3
1	A	172	ASP	2.3
1	A	179	GLU	2.2
1	A	177	ASN	2.2
1	A	174	ARG	2.1
1	A	391	MET	2.1
1	A	206	GLU	2.1
1	A	282	ASP	2.0
1	A	121	ILE	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](#)

There are no ligands in this entry.

### 6.5 Other polymers [i](#)

There are no such residues in this entry.