



# Full wwPDB X-ray Structure Validation Report ⓘ

Jul 3, 2026 – 01:04 AM JST

PDB ID : 9WWZ / pdb\_00009wwz  
Title : Crystal structure of CTD of Dandelion  
Authors : Yu, Y.; Chen, Q.; Tang, Y.  
Deposited on : 2025-09-24  
Resolution : 2.79 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 : 4-5-2 with Phenix2.0  
Xtrriage (Phenix) : 2.0  
EDS : 3.0  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
CCP4 : 9.0.015 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.50

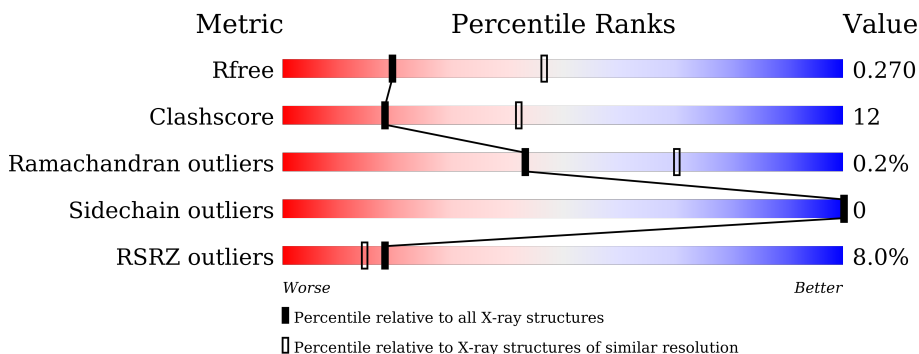
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.79 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))
$R_{free}$	180053	5248 (2.80-2.76)
Clashscore	190562	5693 (2.80-2.76)
Ramachandran outliers	187476	5590 (2.80-2.76)
Sidechain outliers	187428	5592 (2.80-2.76)
RSRZ outliers	180081	5251 (2.80-2.76)

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	304	 5% 73% 21% 6%
1	B	304	 10% 66% 28% 5%

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4778 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 Dandelion.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	287	2363	1513	396	446	8	0	0	0
1	B	288	2371	1519	397	447	8	0	0	0

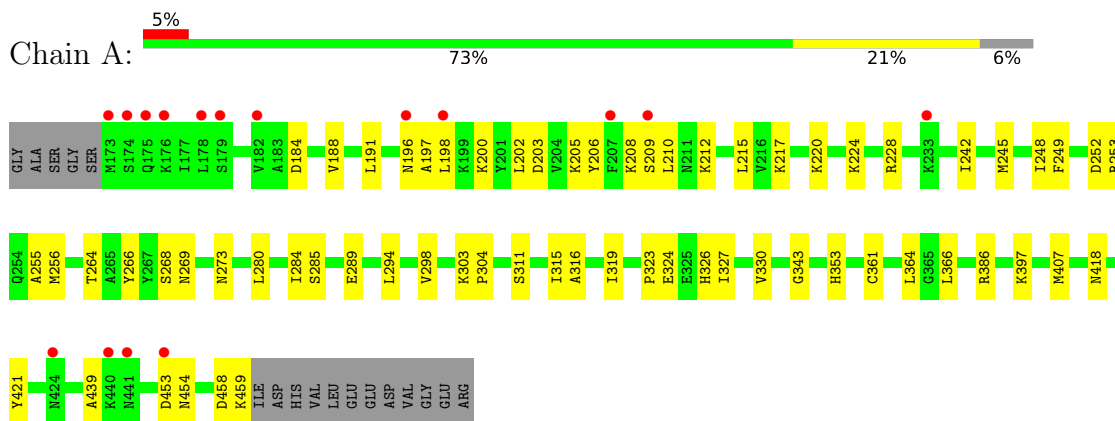
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	22	Total	O	0	0
			22	22		
2	B	22	Total	O	0	0
			22	22		

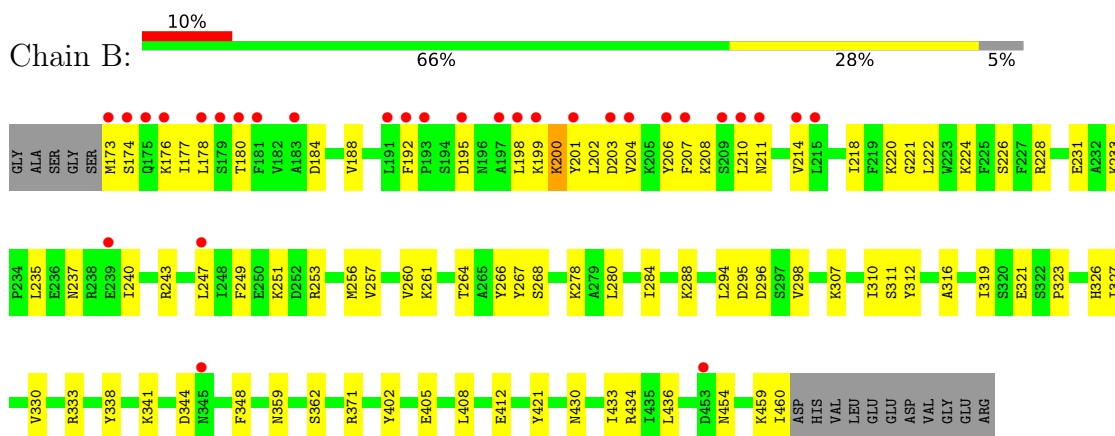
### 3 Residue-property plots [i](#)

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: Dandelion



#### • Molecule 1: Dandelion



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	50.61Å 150.88Å 51.34Å 90.00° 90.71° 90.00°	Depositor
Resolution (Å)	50.61 – 2.79 50.61 – 2.79	Depositor EDS
% Data completeness (in resolution range)	99.4 (50.61-2.79) 99.3 (50.61-2.79)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.96 (at 2.77Å)	Xtriage
Refinement program	PHENIX (1.15.2_3472: ???)	Depositor
R, $R_{free}$	0.232 , 0.271 0.232 , 0.270	Depositor DCC
$R_{free}$ test set	1009 reflections (5.24%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	35.8	Xtriage
Anisotropy	0.131	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 31.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.022 for l,k,-h 0.048 for h,-k,-l 0.036 for l,-k,h	Xtriage
$F_o, F_c$ correlation	0.89	EDS
Total number of atoms	4778	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.89% 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	0.16	0/2409	0.37	0/3233
1	B	0.18	0/2417	0.41	0/3244
All	All	0.17	0/4826	0.39	0/6477

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	2363	0	2348	49	1
1	B	2371	0	2359	65	1
2	A	22	0	0	1	0
2	B	22	0	0	0	0
All	All	4778	0	4707	114	1

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 12.

All (114) 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:173:MET:SD	1:B:174:SER:N	2.58	0.76

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:211:ASN:HD21	1:B:214:VAL:HG23	1.55	0.71
1:B:174:SER:HB2	1:B:214:VAL:HG22	1.76	0.68
1:B:202:LEU:HD22	1:B:206:TYR:CD2	2.29	0.67
1:B:202:LEU:HD22	1:B:206:TYR:HD2	1.60	0.66
1:B:195:ASP:HA	1:B:198:LEU:HD12	1.80	0.64
1:B:199:LYS:HG2	1:B:207:PHE:HZ	1.63	0.64
1:B:184:ASP:OD1	1:B:201:TYR:OH	2.15	0.64
1:A:407:MET:HG2	1:A:439:ALA:HA	1.80	0.63
1:B:240:ILE:HD12	1:B:240:ILE:H	1.62	0.63
1:A:285:SER:OG	1:A:315:ILE:O	2.18	0.61
1:A:343:GLY:HA3	1:A:386:ARG:HG2	1.83	0.61
1:B:207:PHE:HB2	1:B:208:LYS:HD2	1.82	0.60
1:B:233:LYS:O	1:B:237:ASN:ND2	2.32	0.59
1:B:326:HIS:O	1:B:330:VAL:HG23	2.02	0.58
1:B:192:PHE:CE2	1:B:201:TYR:HB2	2.39	0.58
1:B:294:LEU:HD13	1:B:298:VAL:HG11	1.86	0.57
1:B:237:ASN:HA	1:B:240:ILE:HD13	1.87	0.57
1:A:205:LYS:C	1:A:208:LYS:HZ1	2.12	0.56
1:A:220:LYS:HG2	1:A:266:TYR:CZ	2.41	0.56
1:A:421:TYR:CD1	1:A:454:ASN:HB3	2.43	0.54
1:B:192:PHE:HD2	1:B:198:LEU:HD23	1.71	0.54
1:B:408:LEU:O	1:B:412:GLU:HG2	2.08	0.54
1:B:173:MET:SD	1:B:173:MET:C	2.91	0.53
1:B:220:LYS:HG2	1:B:266:TYR:CZ	2.45	0.52
1:B:257:VAL:HG12	1:B:261:LYS:HE2	1.90	0.52
1:B:177:ILE:HD11	1:B:210:LEU:HD11	1.91	0.51
1:A:215:LEU:HG	1:A:248:ILE:HG23	1.93	0.51
1:B:199:LYS:O	1:B:203:ASP:HB2	2.12	0.50
1:A:253:ARG:NH2	1:A:289:GLU:OE2	2.45	0.50
1:B:174:SER:CB	1:B:214:VAL:HG22	2.42	0.49
1:B:174:SER:O	1:B:174:SER:OG	2.28	0.49
1:A:273:ASN:ND2	2:A:505:HOH:O	2.46	0.49
1:B:214:VAL:O	1:B:218:ILE:HG13	2.13	0.48
1:B:249:PHE:CZ	1:B:253:ARG:HG3	2.48	0.48
1:A:196:ASN:O	1:A:200:LYS:HG3	2.14	0.47
1:B:307:LYS:O	1:B:333:ARG:NH2	2.46	0.47
1:B:316:ALA:O	1:B:319:ILE:HG12	2.14	0.47
1:B:177:ILE:O	1:B:180:THR:OG1	2.30	0.47
1:B:359:ASN:HA	1:B:362:SER:OG	2.15	0.47
1:A:220:LYS:HG2	1:A:266:TYR:CE2	2.50	0.46
1:A:228:ARG:HH11	1:A:269:ASN:HB3	1.80	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:421:TYR:CD1	1:B:454:ASN:HB3	2.50	0.46
1:A:198:LEU:O	1:A:202:LEU:HG	2.16	0.46
1:B:188:VAL:HG12	1:B:188:VAL:O	2.15	0.46
1:B:188:VAL:HG11	1:B:192:PHE:CE2	2.50	0.46
1:B:288:LYS:NZ	1:B:321:GLU:OE1	2.49	0.46
1:A:188:VAL:HG12	1:A:191:LEU:HD12	1.98	0.46
1:A:212:LYS:HE3	1:A:252:ASP:OD2	2.15	0.46
1:A:364:LEU:HB2	1:A:366:LEU:CD1	2.45	0.46
1:A:197:ALA:HA	1:A:200:LYS:HD3	1.96	0.46
1:A:453:ASP:OD2	1:A:453:ASP:N	2.48	0.46
1:A:228:ARG:HD3	1:A:269:ASN:O	2.16	0.46
1:B:200:LYS:O	1:B:203:ASP:HB3	2.16	0.46
1:A:294:LEU:HD13	1:A:298:VAL:HG11	1.98	0.45
1:B:178:LEU:HD13	1:B:218:ILE:HA	1.97	0.45
1:B:430:ASN:O	1:B:434:ARG:HG3	2.16	0.45
1:B:310:ILE:HB	1:B:338:TYR:CZ	2.51	0.45
1:A:316:ALA:O	1:A:319:ILE:HG12	2.17	0.45
1:B:231:GLU:O	1:B:235:LEU:HG	2.17	0.45
1:A:224:LYS:HB2	1:A:266:TYR:OH	2.17	0.45
1:B:323:PRO:O	1:B:327:ILE:HD12	2.17	0.45
1:B:341:LYS:O	1:B:344:ASP:HB2	2.17	0.45
1:A:228:ARG:NH1	1:A:269:ASN:HB3	2.32	0.44
1:A:397:LYS:HD2	1:A:397:LYS:HA	1.66	0.44
1:A:184:ASP:O	1:A:188:VAL:HG22	2.17	0.44
1:A:205:LYS:C	1:A:208:LYS:NZ	2.76	0.44
1:A:206:TYR:N	1:A:208:LYS:NZ	2.65	0.44
1:B:178:LEU:HD21	1:B:221:GLY:HA3	1.99	0.44
1:B:295:ASP:OD1	1:B:296:ASP:N	2.51	0.44
1:B:433:ILE:HD11	1:B:459:LYS:HD2	1.99	0.44
1:A:224:LYS:HG3	1:A:228:ARG:CZ	2.47	0.43
1:A:458:ASP:O	1:A:459:LYS:HB2	2.18	0.43
1:A:421:TYR:CE1	1:A:454:ASN:HB3	2.53	0.43
1:B:195:ASP:OD2	1:B:243:ARG:NH2	2.52	0.43
1:B:371:ARG:HB3	1:B:402:TYR:HE1	1.84	0.43
1:A:323:PRO:O	1:A:326:HIS:N	2.48	0.43
1:A:323:PRO:O	1:A:327:ILE:HD12	2.19	0.43
1:B:264:THR:O	1:B:268:SER:OG	2.35	0.43
1:A:242:ILE:HA	1:A:245:MET:HE2	2.00	0.43
1:A:203:ASP:O	1:A:208:LYS:HG3	2.18	0.42
1:A:326:HIS:O	1:A:330:VAL:HG23	2.19	0.42
1:A:249:PHE:CZ	1:A:253:ARG:HG3	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:327:ILE:HG12	1:A:361:CYS:SG	2.59	0.42
1:A:249:PHE:CE2	1:A:253:ARG:HG3	2.54	0.42
1:B:278:LYS:HB3	1:B:312:TYR:CZ	2.54	0.42
1:A:197:ALA:O	1:A:200:LYS:HB2	2.19	0.42
1:B:206:TYR:HD1	1:B:210:LEU:HD21	1.83	0.42
1:B:249:PHE:HA	1:B:256:MET:HG3	2.02	0.42
1:B:436:LEU:HB3	1:B:460:ILE:HD11	2.00	0.42
1:B:220:LYS:HG2	1:B:266:TYR:CE2	2.55	0.42
1:B:222:LEU:O	1:B:226:SER:OG	2.31	0.42
1:A:280:LEU:O	1:A:284:ILE:HG12	2.19	0.42
1:A:311:SER:OG	1:A:353:HIS:ND1	2.49	0.42
1:A:217:LYS:HE3	1:A:220:LYS:HD2	2.02	0.42
1:B:206:TYR:O	1:B:207:PHE:C	2.63	0.41
1:B:249:PHE:CE2	1:B:253:ARG:HG3	2.56	0.41
1:A:255:ALA:HB3	1:A:256:MET:HE2	2.02	0.41
1:B:173:MET:N	1:B:176:LYS:HZ1	2.19	0.41
1:B:247:LEU:O	1:B:251:LYS:HG2	2.19	0.41
1:A:264:THR:O	1:A:268:SER:OG	2.32	0.41
1:B:311:SER:HB2	1:B:348:PHE:O	2.21	0.41
1:B:405:GLU:OE2	1:B:405:GLU:N	2.45	0.41
1:B:200:LYS:O	1:B:204:VAL:HG23	2.21	0.41
1:B:224:LYS:HB2	1:B:266:TYR:OH	2.21	0.41
1:A:303:LYS:HB2	1:A:304:PRO:HD3	2.02	0.41
1:A:418:ASN:HA	1:A:421:TYR:CE2	2.55	0.41
1:B:421:TYR:CG	1:B:454:ASN:HB3	2.56	0.41
1:B:280:LEU:O	1:B:284:ILE:HG12	2.20	0.40
1:A:224:LYS:O	1:A:228:ARG:HB3	2.21	0.40
1:A:324:GLU:HB2	1:A:366:LEU:HD21	2.03	0.40
1:B:260:VAL:HA	1:B:267:TYR:CD2	2.56	0.40
1:A:209:SER:HB2	1:A:210:LEU:HD12	2.03	0.40
1:B:257:VAL:O	1:B:261:LYS:HG3	2.21	0.40

All (1) 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)
1:A:453:ASP:OD1	1:B:228:ARG:NH1[2_546]	2.10	0.10

## 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	285/304 (94%)	270 (95%)	15 (5%)	0	100	100
1	B	286/304 (94%)	266 (93%)	19 (7%)	1 (0%)	36	63
All	All	571/608 (94%)	536 (94%)	34 (6%)	1 (0%)	43	70

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	200	LYS

### 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	259/272 (95%)	259 (100%)	0	100	100
1	B	260/272 (96%)	260 (100%)	0	100	100
All	All	519/544 (95%)	519 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	196	ASN
1	B	254	GLN
1	B	352	GLN

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Mol	Chain	Res	Type
1	B	428	ASN

### 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 oligosaccharides 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	287/304 (94%)	0.52	16 (5%) 30 25	21, 37, 66, 119	0
1	B	288/304 (94%)	0.56	30 (10%) 11 9	20, 34, 95, 116	0
All	All	575/608 (94%)	0.54	46 (8%) 18 14	20, 36, 87, 119	0

All (46) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	173	MET	6.5
1	A	175	GLN	4.8
1	A	173	MET	4.8
1	B	174	SER	4.7
1	B	204	VAL	3.9
1	A	176	LYS	3.8
1	B	209	SER	3.7
1	A	174	SER	3.3
1	B	201	TYR	3.2
1	B	197	ALA	3.1
1	B	211	ASN	3.0
1	B	247	LEU	2.9
1	B	176	LYS	2.9
1	B	239	GLU	2.9
1	B	345	ASN	2.9
1	B	192	PHE	2.8
1	A	198	LEU	2.8
1	B	214	VAL	2.8
1	B	198	LEU	2.7
1	A	179	SER	2.7
1	B	210	LEU	2.7
1	A	233	LYS	2.6
1	B	191	LEU	2.6
1	B	180	THR	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	207	PHE	2.5
1	A	178	LEU	2.5
1	B	215	LEU	2.4
1	A	453	ASP	2.4
1	B	178	LEU	2.3
1	A	182	VAL	2.3
1	A	440	LYS	2.3
1	A	207	PHE	2.3
1	B	193	PRO	2.3
1	B	195	ASP	2.3
1	B	203	ASP	2.3
1	A	196	ASN	2.2
1	B	179	SER	2.2
1	A	424	ASN	2.2
1	B	206	TYR	2.2
1	B	181	PHE	2.1
1	B	183	ALA	2.1
1	B	175	GLN	2.1
1	A	441	ASN	2.1
1	B	453	ASP	2.0
1	B	199	LYS	2.0
1	A	209	SER	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 oligosaccharides 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.