



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 28, 2014 – 07:01 AM GMT

PDB ID : 3A0F
Title : The crystal structure of Geotrichum sp. M128 xyloglucanase
Authors : Yaoi, K.; Kondo, H.; Hiyoshi, A.; Noro, N.; Sugimoto, H.; Tsuda, S.; Miyazaki, K.
Deposited on : 2009-03-16
Resolution : 2.50 Å(reported)

This is a full wwPDB validation 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/ValidationPDFNotes.html>

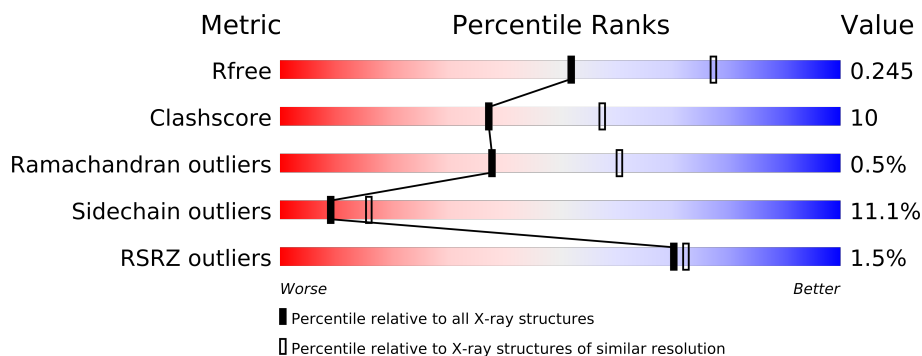
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance


The reported resolution of this entry is 2.50 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}	66092	2784 (2.50-2.50)
Clashscore	79885	3562 (2.50-2.50)
Ramachandran outliers	78287	3480 (2.50-2.50)
Sidechain outliers	78261	3482 (2.50-2.50)
RSRZ outliers	66119	2785 (2.50-2.50)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	763	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 5783 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Xyloglucanase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	753	Total	C	N	O	S	0	0	0
			5676	3589	976	1098	13			

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-6	MET	-	EXPRESSION TAG	UNP Q764N8
A	-5	HIS	-	EXPRESSION TAG	UNP Q764N8
A	-4	HIS	-	EXPRESSION TAG	UNP Q764N8
A	-3	HIS	-	EXPRESSION TAG	UNP Q764N8
A	-2	HIS	-	EXPRESSION TAG	UNP Q764N8
A	-1	HIS	-	EXPRESSION TAG	UNP Q764N8
A	0	HIS	-	EXPRESSION TAG	UNP Q764N8

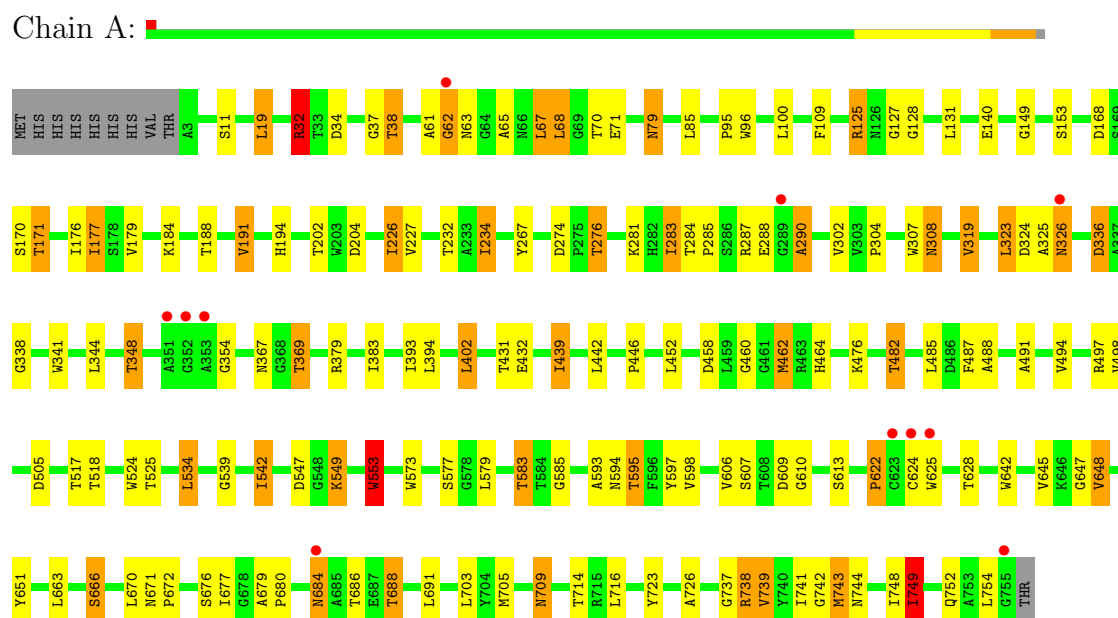
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	107	Total	O	0	0
			107	107		

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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 ($\text{RSRZ} > 2$). 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: Xyloglucanase



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	135.19Å 135.19Å 119.89Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 2.50 19.84 – 2.50	Depositor EDS
% Data completeness (in resolution range)	98.5 (20.00-2.50) 98.5 (19.84-2.50)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	6.44 (at 2.50Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.236 , 0.276 0.244 , 0.245	Depositor DCC
R_{free} test set	2192 reflections (5.32%)	DCC
Wilson B-factor (Å ²)	18.4	Xtriage
Anisotropy	0.299	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 15.2	EDS
Estimated twinning fraction	0.023 for -h,-k,l	Xtriage
L-test for twinning	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 43425 reflections	Xtriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	5783	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.18% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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	0.74	0/5843	0.80	8/7989 (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
1	A	0	3

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	32	ARG	NE-CZ-NH2	8.27	124.43	120.30
1	A	32	ARG	NE-CZ-NH1	-7.41	116.60	120.30
1	A	19	LEU	CA-CB-CG	5.72	128.45	115.30
1	A	336	ASP	CB-CG-OD2	-5.71	113.16	118.30
1	A	402	LEU	CA-CB-CG	5.54	128.05	115.30
1	A	749	ILE	CG1-CB-CG2	-5.41	99.51	111.40
1	A	739	VAL	CB-CA-C	-5.39	101.16	111.40
1	A	553	TRP	CA-CB-CG	5.11	123.41	113.70

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	127	GLY	Peptide
1	A	290	ALA	Peptide
1	A	622	PRO	Peptide

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	5676	0	5394	112	0
2	A	107	0	0	2	0
All	All	5783	0	5394	112	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 10.

All (112) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:460:GLY:O	1:A:482:THR:HG23	1.72	0.90
1:A:726:ALA:HA	1:A:743:MET:HE3	1.57	0.85
1:A:344:LEU:O	1:A:348:THR:HG23	1.80	0.82
1:A:319:VAL:HG13	1:A:393:ILE:HD12	1.62	0.82
1:A:539:GLY:O	1:A:553:TRP:CZ3	2.34	0.81
1:A:663:LEU:O	1:A:666:SER:HB2	1.86	0.76
1:A:128:GLY:HA2	2:A:758:HOH:O	1.88	0.73
1:A:171:THR:HG21	2:A:760:HOH:O	1.87	0.73
1:A:439:ILE:HD11	1:A:742:GLY:C	2.09	0.73
1:A:539:GLY:O	1:A:553:TRP:CH2	2.42	0.73
1:A:171:THR:HG23	1:A:194:HIS:HD2	1.53	0.73
1:A:61:ALA:O	1:A:62:GLY:O	2.07	0.72
1:A:553:TRP:HD1	1:A:573:TRP:CH2	2.08	0.72
1:A:705:MET:HE1	1:A:737:GLY:HA2	1.72	0.71
1:A:726:ALA:HA	1:A:743:MET:CE	2.21	0.70
1:A:609:ASP:OD2	1:A:613:SER:OG	2.12	0.67
1:A:34:ASP:OD1	1:A:125:ARG:NH1	2.27	0.67
1:A:645:VAL:HG12	1:A:648:VAL:HG13	1.77	0.66
1:A:283:ILE:HD12	1:A:338:GLY:O	1.95	0.66
1:A:38:THR:HG22	1:A:70:THR:OG1	1.96	0.66
1:A:285:PRO:HD2	1:A:307:TRP:CH2	2.30	0.66
1:A:539:GLY:O	1:A:553:TRP:HZ3	1.79	0.65
1:A:439:ILE:HG13	1:A:742:GLY:HA3	1.78	0.65
1:A:534:LEU:HD21	1:A:553:TRP:CH2	2.32	0.64
1:A:679:ALA:O	1:A:688:THR:HG23	1.97	0.63

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:553:TRP:HD1	1:A:573:TRP:CZ2	2.15	0.63
1:A:344:LEU:O	1:A:348:THR:CG2	2.46	0.63
1:A:642:TRP:HE1	1:A:709:ASN:HD21	1.46	0.62
1:A:647:GLY:HA2	1:A:671:ASN:OD1	2.00	0.61
1:A:176:ILE:HG23	1:A:191:VAL:HG13	1.82	0.61
1:A:462:MET:HG2	1:A:464:HIS:CE1	2.36	0.60
1:A:622:PRO:HD3	1:A:651:TYR:CZ	2.38	0.59
1:A:439:ILE:CG1	1:A:742:GLY:HA3	2.33	0.59
1:A:61:ALA:O	1:A:62:GLY:C	2.41	0.58
1:A:485:LEU:HA	1:A:542:ILE:HD11	1.85	0.58
1:A:176:ILE:CG2	1:A:191:VAL:HG13	2.34	0.57
1:A:593:ALA:O	1:A:595:THR:HG22	2.05	0.57
1:A:283:ILE:HG23	1:A:341:TRP:HZ2	1.69	0.56
1:A:476:LYS:HA	1:A:505:ASP:OD2	2.05	0.56
1:A:679:ALA:O	1:A:688:THR:CG2	2.54	0.56
1:A:287:ARG:NH2	1:A:290:ALA:HB3	2.22	0.55
1:A:741:ILE:HD12	1:A:743:MET:HE1	1.89	0.55
1:A:226:ILE:HD11	1:A:304:PRO:HD3	1.89	0.54
1:A:439:ILE:HD11	1:A:743:MET:N	2.23	0.53
1:A:583:THR:HB	1:A:585:GLY:H	1.73	0.53
1:A:498:VAL:HG22	1:A:553:TRP:CZ2	2.43	0.52
1:A:553:TRP:CD1	1:A:573:TRP:CH2	2.94	0.52
1:A:439:ILE:CD1	1:A:743:MET:N	2.73	0.52
1:A:281:LYS:HD2	1:A:283:ILE:HD11	1.92	0.52
1:A:140:GLU:HA	1:A:153:SER:O	2.11	0.51
1:A:100:LEU:HB3	1:A:109:PHE:CD2	2.46	0.50
1:A:595:THR:HA	1:A:607:SER:O	2.12	0.50
1:A:547:ASP:HB3	1:A:549:LYS:H	1.77	0.50
1:A:680:PRO:HA	1:A:688:THR:HG22	1.94	0.50
1:A:642:TRP:HE1	1:A:709:ASN:ND2	2.10	0.50
1:A:726:ALA:CA	1:A:743:MET:CE	2.90	0.50
1:A:34:ASP:HB3	1:A:125:ARG:HD2	1.94	0.49
1:A:439:ILE:H	1:A:439:ILE:CD1	2.25	0.49
1:A:705:MET:HE2	1:A:716:LEU:HD11	1.94	0.49
1:A:38:THR:HG21	1:A:85:LEU:HD22	1.94	0.49
1:A:367:ASN:OD1	1:A:369:THR:HG23	2.13	0.48
1:A:442:LEU:HD22	1:A:452:LEU:HD11	1.96	0.48
1:A:439:ILE:HD12	1:A:743:MET:O	2.14	0.48
1:A:171:THR:CG2	1:A:194:HIS:HD2	2.25	0.48
1:A:494:VAL:HA	1:A:517:THR:O	2.14	0.47
1:A:738:ARG:HD3	1:A:752:GLN:OE1	2.14	0.47
1:A:594:ASN:HD22	1:A:610:GLY:CA	2.27	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:539:GLY:O	1:A:553:TRP:HH2	1.95	0.47
1:A:439:ILE:HG21	1:A:748:ILE:HG13	1.97	0.47
1:A:672:PRO:HB3	1:A:691:LEU:HD11	1.97	0.47
1:A:645:VAL:HG12	1:A:648:VAL:CG1	2.45	0.47
1:A:594:ASN:HD22	1:A:610:GLY:HA3	1.79	0.47
1:A:498:VAL:HG13	1:A:539:GLY:O	2.15	0.46
1:A:149:GLY:HA2	1:A:176:ILE:CD1	2.45	0.46
1:A:726:ALA:CA	1:A:743:MET:HE3	2.38	0.46
1:A:597:TYR:HD2	1:A:606:VAL:HG22	1.79	0.46
1:A:488:ALA:HB3	1:A:491:ALA:O	2.15	0.45
1:A:645:VAL:CG1	1:A:648:VAL:HG13	2.46	0.45
1:A:579:LEU:HD21	1:A:598:VAL:HG11	1.98	0.45
1:A:498:VAL:HG13	1:A:539:GLY:C	2.38	0.45
1:A:79:ASN:HD22	1:A:79:ASN:C	2.20	0.45
1:A:38:THR:HG22	1:A:70:THR:CB	2.47	0.44
1:A:439:ILE:CD1	1:A:439:ILE:N	2.81	0.44
1:A:274:ASP:OD1	1:A:276:THR:HB	2.18	0.44
1:A:439:ILE:O	1:A:439:ILE:HD13	2.18	0.43
1:A:726:ALA:HB2	1:A:743:MET:HE1	2.00	0.43
1:A:439:ILE:N	1:A:439:ILE:HD13	2.33	0.43
1:A:324:ASP:C	1:A:326:ASN:H	2.21	0.43
1:A:439:ILE:HD11	1:A:742:GLY:CA	2.48	0.43
1:A:226:ILE:HG13	1:A:267:TYR:HE2	1.82	0.43
1:A:446:PRO:HD3	1:A:487:PHE:CE2	2.53	0.43
1:A:284:THR:HA	1:A:285:PRO:HD3	1.92	0.43
1:A:497:ARG:HG3	1:A:524:TRP:CH2	2.54	0.43
1:A:179:VAL:HG22	1:A:191:VAL:HG22	2.01	0.43
1:A:37:GLY:HA2	1:A:68:LEU:O	2.18	0.42
1:A:65:ALA:HB2	1:A:95:PRO:HD2	2.00	0.42
1:A:188:THR:HA	1:A:202:THR:O	2.20	0.42
1:A:494:VAL:HG22	1:A:518:THR:HG22	2.02	0.42
1:A:67:LEU:HD21	1:A:96:TRP:CH2	2.55	0.42
1:A:553:TRP:HB2	1:A:573:TRP:CZ3	2.55	0.42
1:A:168:ASP:OD2	1:A:170:SER:OG	2.23	0.42
1:A:498:VAL:HG22	1:A:553:TRP:CH2	2.55	0.41
1:A:553:TRP:CD1	1:A:573:TRP:CZ2	3.04	0.41
1:A:308:ASN:HB2	1:A:323:LEU:HG	2.02	0.41
1:A:234:ILE:HG13	1:A:234:ILE:H	1.65	0.41
1:A:723:TYR:CZ	1:A:749:ILE:HG12	2.55	0.41
1:A:32:ARG:NH1	1:A:125:ARG:O	2.53	0.41
1:A:38:THR:CG2	1:A:70:THR:OG1	2.67	0.41
1:A:325:ALA:O	1:A:326:ASN:C	2.58	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:684:ASN:C	1:A:684:ASN:ND2	2.75	0.41
1:A:431:THR:O	1:A:432:GLU:C	2.60	0.40
1:A:177:ILE:HG13	1:A:177:ILE:H	1.43	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	751/763 (98%)	707 (94%)	40 (5%)	4 (0%)	38 60

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	62	GLY
1	A	458	ASP
1	A	11	SER
1	A	354	GLY

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	586/596 (98%)	521 (89%)	65 (11%)	9 16

All (65) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	19	LEU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	32	ARG
1	A	38	THR
1	A	63	ASN
1	A	67	LEU
1	A	68	LEU
1	A	71	GLU
1	A	79	ASN
1	A	125	ARG
1	A	131	LEU
1	A	171	THR
1	A	177	ILE
1	A	184	LYS
1	A	191	VAL
1	A	204	ASP
1	A	226	ILE
1	A	227	VAL
1	A	232	THR
1	A	234	ILE
1	A	276	THR
1	A	283	ILE
1	A	288	GLU
1	A	302	VAL
1	A	308	ASN
1	A	319	VAL
1	A	323	LEU
1	A	326	ASN
1	A	336	ASP
1	A	348	THR
1	A	369	THR
1	A	379	ARG
1	A	383	ILE
1	A	394	LEU
1	A	402	LEU
1	A	439	ILE
1	A	462	MET
1	A	482	THR
1	A	525	THR
1	A	534	LEU
1	A	542	ILE
1	A	549	LYS
1	A	553	TRP
1	A	577	SER

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	583	THR
1	A	595	THR
1	A	624	CYS
1	A	625	TRP
1	A	628	THR
1	A	648	VAL
1	A	666	SER
1	A	670	LEU
1	A	676	SER
1	A	677	ILE
1	A	684	ASN
1	A	686	THR
1	A	688	THR
1	A	703	LEU
1	A	709	ASN
1	A	714	THR
1	A	738	ARG
1	A	739	VAL
1	A	743	MET
1	A	744	ASN
1	A	749	ILE
1	A	754	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	79	ASN
1	A	326	ASN
1	A	594	ASN
1	A	658	ASN
1	A	699	GLN
1	A	709	ASN
1	A	744	ASN

5.3.3 RNA ⓘ

There are no RNA chains 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 ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues

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	753/763 (98%)	-0.36	11 (1%) 70 72	22, 31, 43, 61	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	623	CYS	4.7
1	A	755	GLY	4.5
1	A	352	GLY	4.2
1	A	684	ASN	4.1
1	A	625	TRP	4.0
1	A	624	CYS	3.5
1	A	353	ALA	3.1
1	A	289	GLY	2.6
1	A	351	ALA	2.4
1	A	62	GLY	2.3
1	A	326	ASN	2.2

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 ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.