



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 19, 2016 – 06:45 PM GMT

PDB ID : 3X0U
Title : Crystal structure of PirB
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Deposited on : 2014-10-22
Resolution : 1.70 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
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
Mogul : unknown
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026982
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
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) : rb-20026982

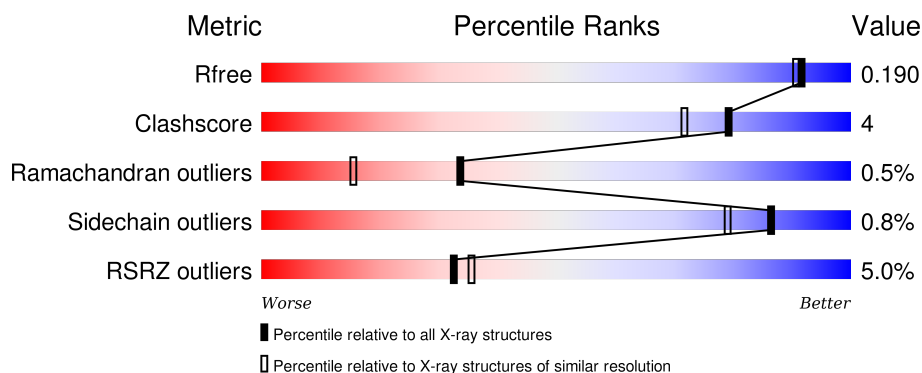
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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}	91344	3190 (1.70-1.70)
Clashscore	102246	3585 (1.70-1.70)
Ramachandran outliers	100387	3527 (1.70-1.70)
Sidechain outliers	100360	3527 (1.70-1.70)
RSRZ outliers	91569	3200 (1.70-1.70)

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	A	446	<div> <div>3%</div> <div>89%</div> <div>6% • 5%</div> </div>
1	B	446	<div> <div>6%</div> <div>84%</div> <div>10% 6%</div> </div>

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 7849 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 Uncharacterized protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	425	Total	C	N	O	S	0	0	0
			3440	2198	563	670	9			
1	B	421	Total	C	N	O	S	0	0	0
			3414	2182	559	664	9			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	439	LEU	-	EXPRESSION TAG	UNP X7RH70
A	440	GLU	-	EXPRESSION TAG	UNP X7RH70
A	441	HIS	-	EXPRESSION TAG	UNP X7RH70
A	442	HIS	-	EXPRESSION TAG	UNP X7RH70
A	443	HIS	-	EXPRESSION TAG	UNP X7RH70
A	444	HIS	-	EXPRESSION TAG	UNP X7RH70
A	445	HIS	-	EXPRESSION TAG	UNP X7RH70
A	446	HIS	-	EXPRESSION TAG	UNP X7RH70
B	439	LEU	-	EXPRESSION TAG	UNP X7RH70
B	440	GLU	-	EXPRESSION TAG	UNP X7RH70
B	441	HIS	-	EXPRESSION TAG	UNP X7RH70
B	442	HIS	-	EXPRESSION TAG	UNP X7RH70
B	443	HIS	-	EXPRESSION TAG	UNP X7RH70
B	444	HIS	-	EXPRESSION TAG	UNP X7RH70
B	445	HIS	-	EXPRESSION TAG	UNP X7RH70
B	446	HIS	-	EXPRESSION TAG	UNP X7RH70

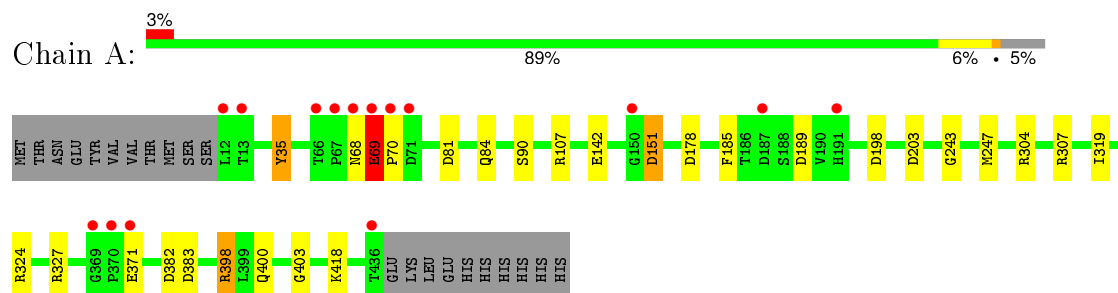
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	516	Total	O	0	0
			516	516		
2	B	479	Total	O	0	0
			479	479		

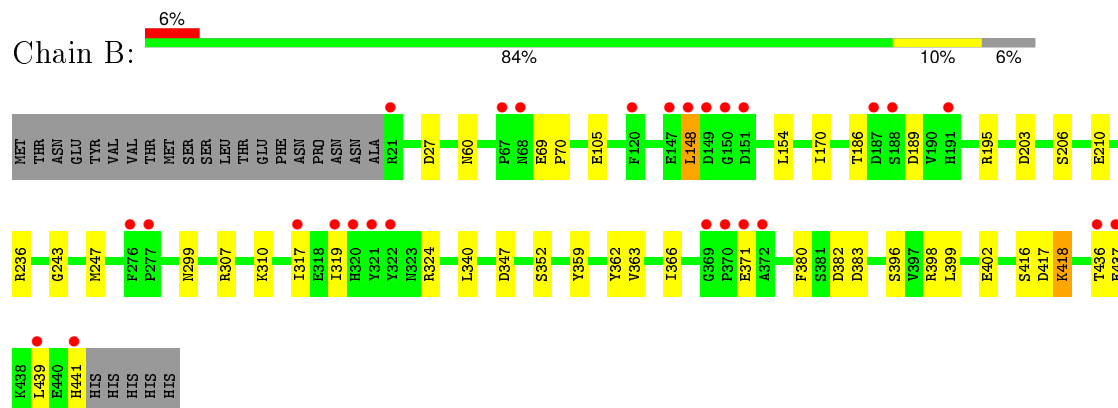
3 Residue-property plots

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 ($RSRZ > 2$). 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: Uncharacterized protein



• Molecule 1: Uncharacterized protein



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	120.90Å 128.62Å 117.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	26.25 – 1.70 26.25 – 1.70	Depositor EDS
% Data completeness (in resolution range)	99.2 (26.25-1.70) 99.3 (26.25-1.70)	Depositor EDS
R_{merge}	0.03	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.76 (at 1.70Å)	Xtriage
Refinement program	REFMAC 5.8.0049	Depositor
R, R_{free}	0.149 , 0.180 0.162 , 0.190	Depositor DCC
R_{free} test set	4891 reflections (5.19%)	DCC
Wilson B-factor (Å ²)	13.9	Xtriage
Anisotropy	0.063	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 46.8	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 99220 reflections	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7849	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.27% 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, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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	0.98	2/3527 (0.1%)	0.96	9/4791 (0.2%)
1	B	0.93	0/3500	0.93	7/4751 (0.1%)
All	All	0.96	2/7027 (0.0%)	0.94	16/9542 (0.2%)

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	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	90	SER	CB-OG	5.45	1.49	1.42
1	A	35	TYR	CB-CG	-5.35	1.43	1.51

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	307	ARG	NE-CZ-NH2	-10.94	114.83	120.30
1	A	398	ARG	NE-CZ-NH2	-10.24	115.18	120.30
1	A	307	ARG	NE-CZ-NH1	8.77	124.68	120.30
1	B	402	GLU	OE1-CD-OE2	7.65	132.48	123.30
1	B	307	ARG	NE-CZ-NH2	-7.55	116.52	120.30
1	B	236	ARG	NE-CZ-NH2	-7.07	116.77	120.30
1	B	324	ARG	NE-CZ-NH1	6.61	123.60	120.30
1	A	327	ARG	NE-CZ-NH1	6.10	123.35	120.30
1	B	347	ASP	CB-CG-OD2	-6.04	112.86	118.30
1	A	398	ARG	NE-CZ-NH1	6.03	123.32	120.30
1	B	247	MET	CG-SD-CE	-5.95	90.68	100.20
1	A	247	MET	CG-SD-CE	-5.93	90.70	100.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	198	ASP	CB-CG-OD1	5.76	123.49	118.30
1	A	178	ASP	CB-CG-OD1	-5.66	113.21	118.30
1	A	324	ARG	NE-CZ-NH1	5.17	122.89	120.30
1	B	380	PHE	CB-CG-CD1	5.12	124.38	120.80

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	69	GLU	Peptide

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	A	3440	0	3266	14	0
1	B	3414	0	3246	33	0
2	A	516	0	0	10	2
2	B	479	0	0	14	6
All	All	7849	0	6512	47	7

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 4.

All (47) 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:203:ASP:HB3	2:B:764:HOH:O	1.34	1.26
1:B:195:ARG:HB2	2:B:867:HOH:O	1.39	1.19
2:A:793:HOH:O	1:B:210:GLU:HG3	1.51	1.10
1:A:203:ASP:HB3	2:A:844:HOH:O	1.61	1.00
1:A:35:TYR:OH	2:A:858:HOH:O	1.98	0.79
1:B:105:GLU:OE2	2:B:832:HOH:O	2.00	0.79
1:A:142:GLU:HG3	2:A:828:HOH:O	1.83	0.76
1:B:417:ASP:OD1	2:B:845:HOH:O	2.04	0.76

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:27:ASP:CG	2:B:729:HOH:O	2.25	0.74
1:B:441:HIS:C	2:B:638:HOH:O	2.25	0.74
1:A:203:ASP:OD1	2:A:845:HOH:O	2.06	0.73
2:A:793:HOH:O	1:B:210:GLU:CG	2.24	0.67
1:B:60:ASN:ND2	2:B:841:HOH:O	2.29	0.65
1:B:27:ASP:HB3	2:B:728:HOH:O	1.97	0.63
1:B:148:LEU:HG	1:B:210:GLU:OE1	2.01	0.60
1:B:416:SER:OG	1:B:418:LYS:HD3	2.04	0.57
1:B:366:ILE:HD13	1:B:396:SER:HA	1.84	0.57
1:A:107:ARG:NH1	2:A:700:HOH:O	2.36	0.57
1:B:27:ASP:HB3	2:B:729:HOH:O	2.05	0.55
1:B:27:ASP:CB	2:B:729:HOH:O	2.55	0.54
2:A:793:HOH:O	1:B:210:GLU:CD	2.45	0.54
1:B:371:GLU:O	1:B:371:GLU:HG2	2.09	0.53
1:B:436:THR:O	1:B:437:GLU:HG2	2.09	0.52
1:A:371:GLU:OE1	2:A:735:HOH:O	2.17	0.49
1:A:319:ILE:CD1	1:A:418:LYS:HD3	2.44	0.47
1:A:69:GLU:CB	1:A:70:PRO:CD	2.93	0.47
1:B:69:GLU:HB3	1:B:70:PRO:CD	2.44	0.47
1:B:299:ASN:ND2	2:B:647:HOH:O	2.49	0.46
1:A:81:ASP:O	1:A:84:GLN:HG2	2.15	0.46
1:B:362:TYR:CE1	1:B:398:ARG:CZ	2.98	0.46
1:B:398:ARG:NH1	2:B:604:HOH:O	2.39	0.45
1:B:186:THR:O	1:B:189:ASP:HB2	2.16	0.45
1:A:151:ASP:C	2:A:885:HOH:O	2.55	0.45
1:B:359:TYR:OH	1:B:437:GLU:OE1	2.29	0.44
1:B:69:GLU:HB3	1:B:70:PRO:HD2	1.99	0.44
1:B:27:ASP:CB	2:B:728:HOH:O	2.60	0.44
1:B:439:LEU:HD12	2:B:943:HOH:O	2.17	0.43
1:B:317:ILE:HG23	1:B:319:ILE:HD11	2.00	0.43
1:B:382:ASP:O	1:B:383:ASP:HB2	2.18	0.43
1:A:35:TYR:HB2	1:A:403:GLY:HA3	2.02	0.42
1:B:154:LEU:HD23	1:B:154:LEU:HA	1.95	0.41
1:B:340:LEU:HD12	1:B:340:LEU:N	2.36	0.41
1:A:382:ASP:O	1:A:383:ASP:HB2	2.20	0.41
1:B:363:VAL:HG22	1:B:399:LEU:HB2	2.03	0.40
1:A:398:ARG:HD3	1:A:400:GLN:OE1	2.21	0.40
1:A:185:PHE:HB3	1:A:189:ASP:HB2	2.03	0.40
1:B:310:LYS:HE3	1:B:352:SER:OG	2.22	0.40

All (7) 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:B:653:HOH:O	2:B:653:HOH:O[3_655]	1.59	0.61
2:B:945:HOH:O	2:B:945:HOH:O[3_655]	1.74	0.46
2:A:905:HOH:O	2:A:905:HOH:O[4_556]	1.91	0.29
2:A:822:HOH:O	2:B:803:HOH:O[7_545]	2.05	0.15
2:B:626:HOH:O	2:B:638:HOH:O[3_655]	2.07	0.13
2:B:626:HOH:O	2:B:626:HOH:O[3_655]	2.17	0.03
2:B:654:HOH:O	2:B:655:HOH:O[3_655]	2.18	0.02

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	423/446 (95%)	412 (97%)	8 (2%)	3 (1%)	26	9
1	B	419/446 (94%)	409 (98%)	9 (2%)	1 (0%)	52	32
All	All	842/892 (94%)	821 (98%)	17 (2%)	4 (0%)	34	15

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	69	GLU
1	A	68	ASN
1	A	243	GLY
1	B	243	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	371/392 (95%)	369 (100%)	2 (0%)	92	88
1	B	368/392 (94%)	364 (99%)	4 (1%)	80	69
All	All	739/784 (94%)	733 (99%)	6 (1%)	86	79

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	151	ASP
1	A	304	ARG
1	B	148	LEU
1	B	170	ILE
1	B	206	SER
1	B	418	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	28	ASN
1	A	135	HIS
1	A	217	ASN
1	B	47	ASN
1	B	299	ASN
1	B	323	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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

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	425/446 (95%)	-0.16	15 (3%) 48 52	6, 13, 35, 96	0
1	B	421/446 (94%)	0.05	27 (6%) 23 25	8, 16, 41, 87	0
All	All	846/892 (94%)	-0.05	42 (4%) 32 35	6, 15, 39, 96	0

All (42) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	12	LEU	11.0
1	B	317	ILE	9.1
1	B	321	TYR	9.0
1	B	439	LEU	7.2
1	A	68	ASN	5.9
1	A	67	PRO	5.6
1	B	148	LEU	5.3
1	A	13	THR	5.2
1	B	369	GLY	5.1
1	A	436	THR	5.0
1	B	441	HIS	4.7
1	B	320	HIS	4.3
1	B	436	THR	4.2
1	B	370	PRO	4.2
1	B	67	PRO	4.0
1	A	69	GLU	4.0
1	B	21	ARG	3.8
1	A	70	PRO	3.8
1	B	371	GLU	3.5
1	B	277	PRO	3.5
1	B	68	ASN	3.5
1	B	322	TYR	3.4
1	B	319	ILE	3.4
1	B	187	ASP	3.3

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Mol	Chain	Res	Type	RSRZ
1	B	150	GLY	3.0
1	A	150	GLY	2.9
1	B	191	HIS	2.8
1	B	276	PHE	2.8
1	A	187	ASP	2.7
1	A	66	THR	2.6
1	A	71	ASP	2.6
1	A	371	GLU	2.6
1	A	370	PRO	2.5
1	B	437	GLU	2.5
1	B	188	SER	2.3
1	A	191	HIS	2.3
1	B	151	ASP	2.3
1	B	149	ASP	2.2
1	B	147	GLU	2.1
1	A	369	GLY	2.1
1	B	120	PHE	2.1
1	B	372	ALA	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 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.