WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report (i)

Oct 30, 2023 – 02:43 PM JST

PDB ID	:	5B71
Title	:	Crystal structure of complement C5 in complex with SKY59
Authors	:	Irie, M.; Shimizu, Y.; Sampei, Z.; Fukuzawa, T.
Deposited on	:	2016-06-03
Resolution	:	2.11 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
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

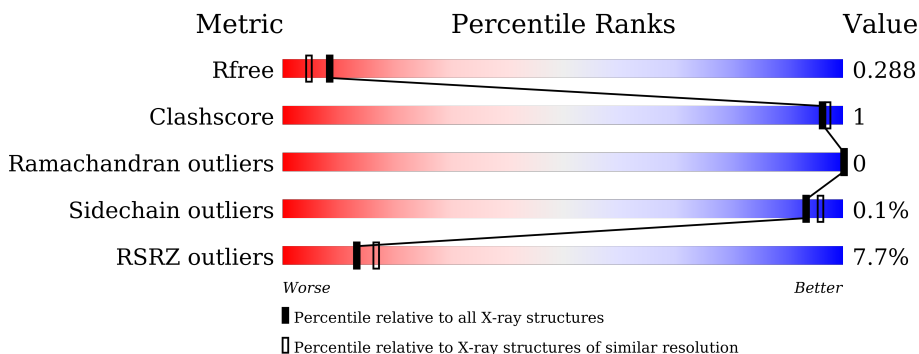|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.11 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	Percentile Ranks	Value
Rfree		0.288
Clashscore		1
Ramachandran outliers		0
Sidechain outliers		0.1%
RSRZ outliers		7.7%

Worse   *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	6241 (2.14-2.10)
Clashscore	141614	6778 (2.14-2.10)
Ramachandran outliers	138981	6705 (2.14-2.10)
Sidechain outliers	138945	6706 (2.14-2.10)
RSRZ outliers	127900	6112 (2.14-2.10)

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 >=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 <=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	217	3% / 97%
1	C	217	6% / 96%
2	B	228	7% / 91% / 6%
2	D	228	12% / 94%
3	E	110	4% / 83% / 15%
3	F	110	12% / 82% / 16%

2   Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 8217 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 SKY59 Fab light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	217	Total 1623	C 1009	N 270	O 338	S 6	0	0	0
1	C	214	Total 1580	C 979	N 264	O 332	S 5	0	0	0

- Molecule 2 is a protein called SKY59 Fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	222	Total 1646	C 1041	N 276	O 320	S 9	0	0	0
2	D	219	Total 1614	C 1021	N 266	O 318	S 9	0	0	0

- Molecule 3 is a protein called Complement C5 beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	93	Total 739	C 480	N 119	O 139	S 1	0	0	0
3	F	92	Total 693	C 447	N 112	O 133	S 1	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	15	GLY	-	expression tag	UNP P01031
E	16	SER	-	expression tag	UNP P01031
E	17	PRO	-	expression tag	UNP P01031
E	18	GLU	-	expression tag	UNP P01031
E	19	PHE	-	expression tag	UNP P01031
F	15	GLY	-	expression tag	UNP P01031
F	16	SER	-	expression tag	UNP P01031
F	17	PRO	-	expression tag	UNP P01031

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Chain	Residue	Modelled	Actual	Comment	Reference
F	18	GLU	-	expression tag	UNP P01031
F	19	PHE	-	expression tag	UNP P01031

• Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	84	Total 84	O 84	0	0
4	B	62	Total 62	O 62	0	0
4	C	70	Total 70	O 70	0	0
4	D	60	Total 60	O 60	0	0
4	E	35	Total 35	O 35	0	0
4	F	11	Total 11	O 11	0	0

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: SKY59 Fab light chain
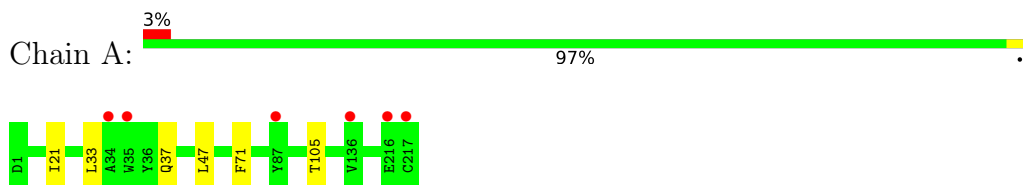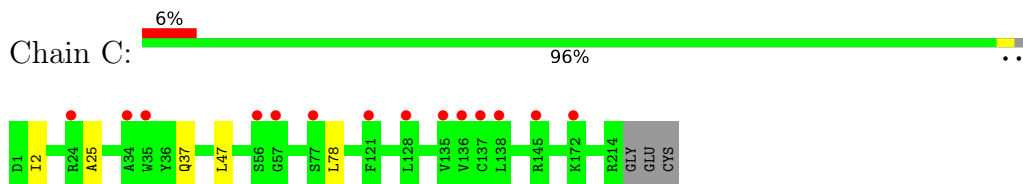
Chain A:

• Molecule 1: SKY59 Fab light chain

Chain C:

• Molecule 2: SKY59 Fab heavy chain

Chain B:

• Molecule 2: SKY59 Fab heavy chain

Chain D:

• Molecule 3: Complement C5 beta chain

Chain E:

GLY SER PRO GLU PHE E20 S26 V40 F64 I87 Q88 P89 LYS GLN LEU PRO GLY GLY GLN ASN PRO V99 Y121 ASP ASN GLY

• Molecule 3: Complement C5 beta chain

Chain F:

12%

82% 16%

GLY SER PRO GLU PHE E20 I30 V33 G34 A35 S36 Y59 P60 D61 T86 I87 Q88 P89 K90 GLN LEU PRO GLY GLY GLN ASN PRO VAL SER Y101 R116 M117 P118 I119 T120 Y121 ASP ASN GLY
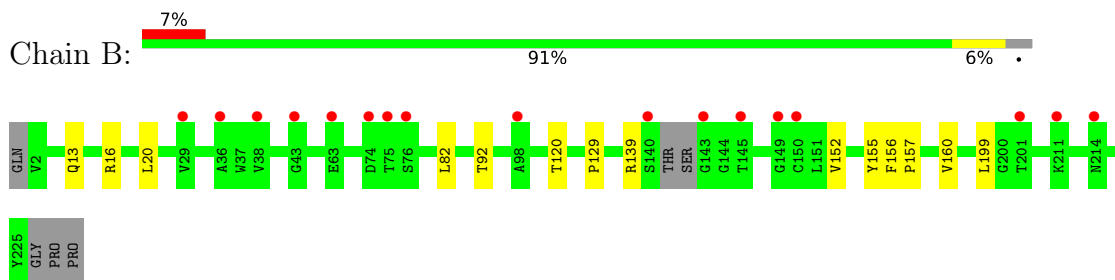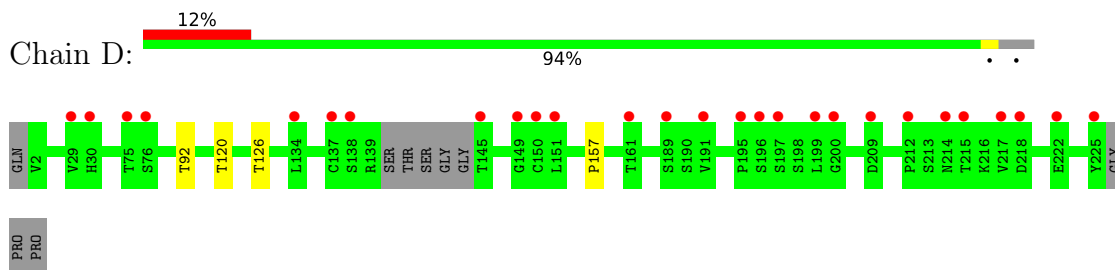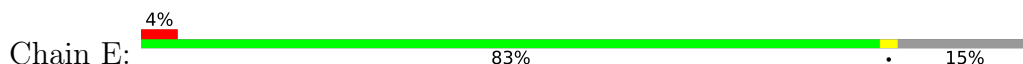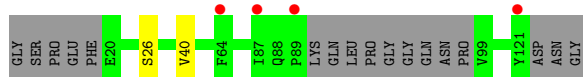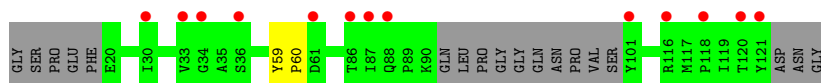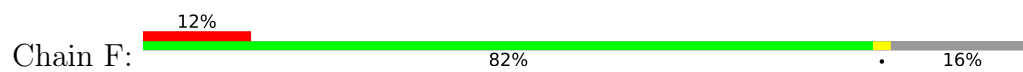
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α, β, γ	39.79Å 55.10Å 127.76Å 89.18° 86.24° 78.20°	Depositor
Resolution (Å)	25.00 – 2.11 24.84 – 2.11	Depositor EDS
% Data completeness (in resolution range)	92.0 (25.00-2.11) 92.1 (24.84-2.11)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.00 (at 2.11Å)	Xtriage
Refinement program	REFMAC 5.8.0135	Depositor
R, R_{free}	0.246 , 0.285 0.248 , 0.288	Depositor DCC
R_{free} test set	2724 reflections (4.85%)	wwPDB-VP
Wilson B-factor (Å^2)	34.2	Xtriage
Anisotropy	0.103	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 32.8	EDS
L-test for twinning[2]	$< |L| > = 0.47, < L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	8217	wwPDB-VP
Average B, all atoms (Å^2)	39.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.67% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 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	0.38	0/1655	0.55	0/2246
1	C	0.39	0/1612	0.55	0/2195
2	B	0.39	0/1688	0.57	0/2302
2	D	0.39	0/1656	0.56	0/2265
3	E	0.41	0/757	0.52	0/1025
3	F	0.40	0/709	0.52	0/965
All	All	0.39	0/8077	0.55	0/10998

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 ⓘ

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	1623	0	1558	3	0
1	C	1580	0	1477	2	0
2	B	1646	0	1595	7	0
2	D	1614	0	1537	2	0
3	E	739	0	728	1	0
3	F	693	0	647	1	0
4	A	84	0	0	0	0
4	B	62	0	0	0	0
4	C	70	0	0	0	0
4	D	60	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	E	35	0	0	0	0
4	F	11	0	0	0	0
All	All	8217	0	7542	16	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 1.

All (16) 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)
2:B:152:VAL:HG11	2:B:160:VAL:HG11	1.93	0.49
1:C:37:GLN:HB2	1:C:47:LEU:HD11	1.95	0.49
1:C:2:ILE:HD11	1:C:25:ALA:HB1	1.95	0.48
2:B:129:PRO:HB3	2:B:155:TYR:HB3	1.97	0.46
3:F:59:TYR:HA	3:F:60:PRO:HA	1.70	0.46
1:A:37:GLN:HB2	1:A:47:LEU:HD11	1.97	0.45
2:B:20:LEU:HD12	2:B:82:LEU:HD23	1.99	0.45
2:B:139:ARG:HG2	2:B:199:LEU:HD23	1.98	0.45
2:B:156:PHE:HA	2:B:157:PRO:HA	1.76	0.43
2:B:92:THR:HG23	2:B:120:THR:HA	2.00	0.43
2:D:126:THR:HG22	2:D:157:PRO:HD3	2.01	0.42
1:A:21:ILE:HG12	1:A:105:THR:HG21	2.02	0.41
2:B:13:GLN:HB2	2:B:16:ARG:HG3	2.03	0.41
3:E:26:SER:HB2	3:E:40:VAL:HB	2.02	0.40
1:A:33:LEU:HD13	1:A:71:PHE:CD2	2.57	0.40
2:D:92:THR:HG23	2:D:120:THR:HA	2.02	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	215/217 (99%)	211 (98%)	4 (2%)	0	100	100
1	C	212/217 (98%)	205 (97%)	7 (3%)	0	100	100
2	B	218/228 (96%)	211 (97%)	7 (3%)	0	100	100
2	D	215/228 (94%)	210 (98%)	5 (2%)	0	100	100
3	E	89/110 (81%)	88 (99%)	1 (1%)	0	100	100
3	F	88/110 (80%)	85 (97%)	3 (3%)	0	100	100
All	All	1037/1110 (93%)	1010 (97%)	27 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	183/187 (98%)	183 (100%)	0	100	100
1	C	175/187 (94%)	174 (99%)	1 (1%)	86	90
2	B	179/187 (96%)	179 (100%)	0	100	100
2	D	175/187 (94%)	175 (100%)	0	100	100
3	E	83/98 (85%)	83 (100%)	0	100	100
3	F	72/98 (74%)	72 (100%)	0	100	100
All	All	867/944 (92%)	866 (100%)	1 (0%)	93	96

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	78	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 ⓘ

There are no monosaccharides 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	217/217 (100%)	0.47	6 (2%)	53	59	25, 36, 44, 65	0
1	C	214/217 (98%)	0.63	14 (6%)	18	23	24, 39, 52, 57	0
2	B	222/228 (97%)	0.75	17 (7%)	13	17	26, 39, 56, 68	0
2	D	219/228 (96%)	0.79	27 (12%)	4	5	20, 37, 64, 69	0
3	E	93/110 (84%)	0.48	4 (4%)	35	41	28, 37, 56, 74	0
3	F	92/110 (83%)	1.10	13 (14%)	2	3	24, 45, 71, 80	0
All	All	1057/1110 (95%)	0.68	81 (7%)	13	17	20, 38, 60, 80	0

All (81) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	F	87	ILE	5.9
1	A	217	CYS	5.6
2	D	150	CYS	5.5
3	F	121	TYR	5.3
2	D	138	SER	5.0
2	D	75	THR	4.8
1	C	128	LEU	4.7
3	F	61	ASP	4.7
1	C	136	VAL	4.6
2	B	75	THR	4.4
2	D	76	SER	4.3
1	C	56	SER	4.3
2	D	225	TYR	4.1
3	E	89	PRO	4.1
3	F	120	THR	4.0
2	B	143	GLY	3.9
3	F	101	TYR	3.8
3	F	30	ILE	3.8
2	B	140	SER	3.7

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Mol	Chain	Res	Type	RSRZ
3	F	88	GLN	3.7
2	B	36	ALA	3.6
2	D	151	LEU	3.6
2	D	29	VAL	3.6
2	B	201	THR	3.5
2	B	145	THR	3.5
3	E	87	ILE	3.5
2	D	196	SER	3.4
1	C	138	LEU	3.3
1	C	57	GLY	3.2
2	D	134	LEU	3.2
2	B	76	SER	3.1
2	D	195	PRO	3.0
2	D	149	GLY	3.0
2	D	137	CYS	3.0
2	D	215	THR	3.0
1	C	172	LYS	3.0
2	D	214	ASN	3.0
1	A	34	ALA	3.0
1	A	136	VAL	3.0
2	B	43	GLY	2.9
2	D	145	THR	2.9
2	D	218	ASP	2.9
3	E	64	PHE	2.9
3	E	121	TYR	2.9
2	D	189	SER	2.9
2	D	209	ASP	2.9
3	F	33	VAL	2.9
1	C	121	PHE	2.7
1	C	34	ALA	2.7
2	D	212	PRO	2.7
2	D	197	SER	2.7
1	A	216	GLU	2.6
2	D	199	LEU	2.6
2	D	30	HIS	2.5
2	D	191	VAL	2.5
1	A	87	TYR	2.4
2	D	217	VAL	2.4
1	C	137	CYS	2.4
3	F	118	PRO	2.3
2	D	200	GLY	2.3
2	B	29	VAL	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	35	TRP	2.3
2	B	63	GLU	2.3
2	B	74	ASP	2.3
1	C	35	TRP	2.3
1	C	145	ARG	2.2
3	F	34	GLY	2.2
2	B	150	CYS	2.2
1	C	77	SER	2.2
2	B	211	LYS	2.2
2	B	38	VAL	2.2
3	F	86	THR	2.2
2	D	161	THR	2.1
2	B	149	GLY	2.1
3	F	116	ARG	2.1
2	B	214	ASN	2.1
2	D	222	GLU	2.1
3	F	36	SER	2.1
1	C	24	ARG	2.1
1	C	135	VAL	2.0
2	B	98	ALA	2.0

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 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.