



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 26, 2024 – 01:38 AM EDT

PDB ID : 6SUZ  
Title : Human prion protein (PrP) fragment 119-231 (G127V V129 variant) complexed to ICSM 18 (anti-Prp therapeutic antibody) Fab fragment  
Authors : Conners, R.  
Deposited on : 2019-09-17  
Resolution : 2.50 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
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
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)	:	2.37.1

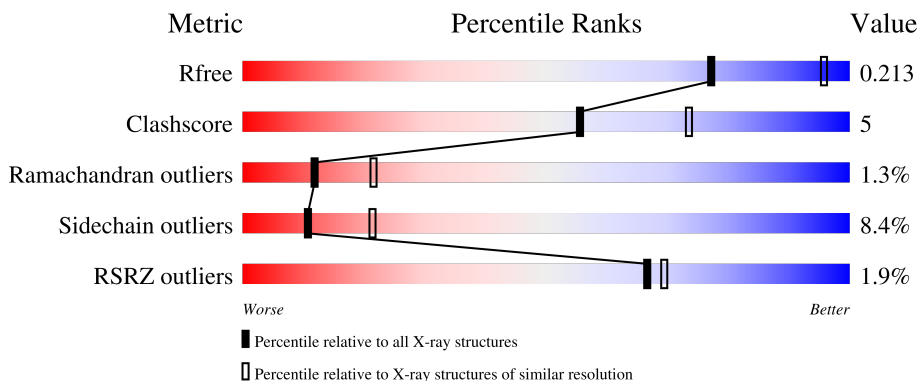
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.50 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))
$R_{free}$	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (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 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	99	<div> <div style="width: 92%;"></div> <div style="width: 7%;"></div> <div style="width: 1%;"></div> </div>
2	H	215	<div> <div style="width: 4%;"></div> <div style="width: 81%;"></div> <div style="width: 15%;"></div> <div style="width: 1%;"></div> </div>
3	L	211	<div> <div style="width: 81%;"></div> <div style="width: 17%;"></div> <div style="width: 2%;"></div> </div>

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 4166 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 Major prion protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	99	Total	C	N	O	S	0	1	0
			836	518	145	165	8			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	127	VAL	GLY	engineered mutation	UNP P04156
A	129	VAL	MET	engineered mutation	UNP P04156

- Molecule 2 is a protein called ICSM 18-ANTI-PRP THERAPEUTIC FAB HEAVY CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	215	Total	C	N	O	S	0	0	0
			1623	1028	264	326	5			

- Molecule 3 is a protein called ICSM 18-ANTI-PRP THERAPEUTIC FAB LIGHT CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	L	211	Total	C	N	O	S	0	3	0
			1636	1018	276	333	9			

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	15	Total	O	0	0
			15	15		
5	H	22	Total	O	0	0
			22	22		
5	L	29	Total	O	0	0
			29	29		

### 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.

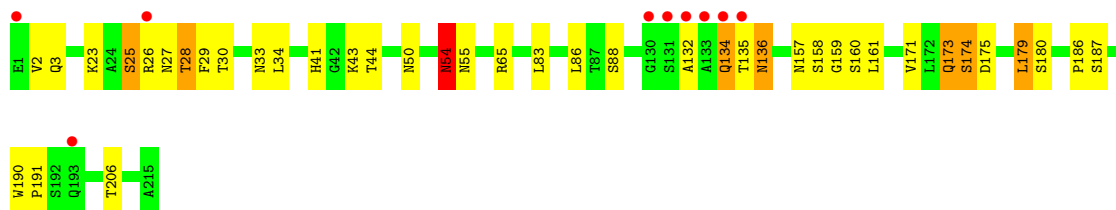
- Molecule 1: Major prion protein

Chain A: 




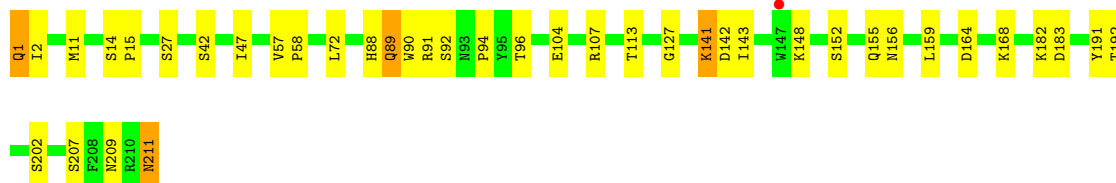
- Molecule 2: ICSM 18-ANTI-PRP THERAPEUTIC FAB HEAVY CHAIN

Chain H: 



- Molecule 3: ICSM 18-ANTI-PRP THERAPEUTIC FAB LIGHT CHAIN

Chain L: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 63 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	127.95Å 127.95Å 135.80Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	111.00 – 2.50 85.85 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.0 (111.00-2.50) 99.0 (85.85-2.50)	Depositor EDS
$R_{merge}$	0.14	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.55 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.8.0049	Depositor
R, $R_{free}$	0.161 , 0.212 0.168 , 0.213	Depositor DCC
$R_{free}$ test set	1161 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	46.3	Xtriage
Anisotropy	0.119	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 46.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	4166	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.32% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: SO4

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	0.97	0/857	0.95	2/1157 (0.2%)
2	H	0.97	0/1667	0.93	1/2286 (0.0%)
3	L	0.88	1/1685 (0.1%)	0.89	1/2286 (0.0%)
All	All	0.93	1/4209 (0.0%)	0.92	4/5729 (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
2	H	0	2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	L	42	SER	CB-OG	-5.23	1.35	1.42

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	164	ARG	NE-CZ-NH2	-6.59	117.00	120.30
1	A	164	ARG	NE-CZ-NH1	6.49	123.54	120.30
2	H	65	ARG	NE-CZ-NH2	-5.44	117.58	120.30
3	L	107	ARG	NE-CZ-NH1	5.15	122.88	120.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	H	134	GLN	Peptide
2	H	55	ASN	Peptide

## 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	836	0	781	3	0
2	H	1623	0	1575	17	0
3	L	1636	0	1569	23	1
4	A	5	0	0	0	0
5	A	15	0	0	0	0
5	H	22	0	0	0	0
5	L	29	0	0	1	0
All	All	4166	0	3925	41	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 5.

All (41) 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)
3:L:1[A]:GLN:HA	3:L:1[A]:GLN:OE1	1.38	1.05
3:L:1[A]:GLN:OE1	3:L:1[A]:GLN:CA	2.06	1.02
1:A:223:GLN:HE21	1:A:223:GLN:HA	1.52	0.74
3:L:1[B]:GLN:HG2	3:L:94:PRO:HD2	1.72	0.70
1:A:223:GLN:HE21	1:A:223:GLN:CA	2.06	0.68
2:H:54:ASN:OD1	2:H:54:ASN:O	2.11	0.68
3:L:47:ILE:HD12	3:L:72:LEU:HD13	1.75	0.67
3:L:211:ASN:N	3:L:211:ASN:OD1	2.31	0.64
3:L:1[B]:GLN:CG	3:L:94:PRO:HD2	2.29	0.62
2:H:33:ASN:HD21	2:H:50:ASN:HD22	1.48	0.61
3:L:1[A]:GLN:HB3	5:L:317:HOH:O	2.02	0.59
2:H:173:GLN:HG3	3:L:159:LEU:HD21	1.86	0.56
2:H:54:ASN:O	2:H:54:ASN:CG	2.43	0.56
1:A:223:GLN:HA	1:A:223:GLN:NE2	2.20	0.55
3:L:191:TYR:O	3:L:207:SER:OG	2.20	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:L:104:GLU:OE1	3:L:141:LYS:NZ	2.42	0.51
3:L:127:GLY:O	3:L:182:LYS:HB2	2.11	0.50
3:L:1[A]:GLN:HB2	3:L:94:PRO:HD2	1.94	0.49
2:H:179:LEU:HD12	2:H:180:SER:N	2.28	0.49
3:L:88:HIS:HD2	3:L:96:THR:O	1.97	0.48
2:H:174:SER:O	2:H:175:ASP:CB	2.62	0.47
2:H:83:LEU:HB3	2:H:86:LEU:HD21	1.98	0.46
2:H:179:LEU:HD12	2:H:179:LEU:C	2.37	0.45
2:H:27:ASN:OD1	2:H:28:THR:N	2.50	0.45
2:H:33:ASN:ND2	2:H:50:ASN:HD22	2.14	0.45
2:H:159:GLY:O	2:H:160:SER:C	2.54	0.44
3:L:14:SER:HB2	3:L:15:PRO:CD	2.48	0.43
2:H:135:THR:O	2:H:136:ASN:HB3	2.19	0.42
3:L:88:HIS:CE1	3:L:90:TRP:HE1	2.37	0.42
2:H:190:TRP:CG	2:H:191:PRO:HA	2.55	0.42
3:L:155:GLN:O	3:L:155:GLN:HG2	2.20	0.42
2:H:2:VAL:HG21	2:H:29:PHE:CE2	2.55	0.42
3:L:148:LYS:HB2	3:L:192:THR:HB	2.01	0.42
2:H:186:PRO:O	2:H:187:SER:C	2.58	0.42
3:L:1[A]:GLN:HB3	3:L:2:ILE:H	1.40	0.42
3:L:47:ILE:CD1	3:L:72:LEU:HD13	2.46	0.41
2:H:3:GLN:O	2:H:25:SER:HB3	2.20	0.41
3:L:57:VAL:HA	3:L:58:PRO:HD3	1.84	0.41
2:H:173:GLN:CG	3:L:159:LEU:HD21	2.51	0.41
3:L:89:GLN:HE21	3:L:91:ARG:H	1.70	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)
3:L:1[B]:GLN:OE1	3:L:92:SER:OG[12_555]	2.04	0.16

## 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	98/99 (99%)	98 (100%)	0	0	100	100
2	H	213/215 (99%)	192 (90%)	14 (7%)	7 (3%)	4	5
3	L	211/211 (100%)	200 (95%)	11 (5%)	0	100	100
All	All	522/525 (99%)	490 (94%)	25 (5%)	7 (1%)	12	21

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	54	ASN
2	H	134	GLN
2	H	158	SER
2	H	157	ASN
2	H	132	ALA
2	H	136	ASN
2	H	30	THR

### 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	95/94 (101%)	88 (93%)	7 (7%)	13	27
2	H	186/186 (100%)	170 (91%)	16 (9%)	10	20
3	L	187/184 (102%)	169 (90%)	18 (10%)	8	16
All	All	468/464 (101%)	427 (91%)	41 (9%)	11	19

All (41) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	125	LEU
1	A	191	THR
1	A	196	GLU

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Mol	Chain	Res	Type
1	A	204	LYS
1	A	208	ARG
1	A	222	SER
1	A	223	GLN
2	H	23	LYS
2	H	25	SER
2	H	26	ARG
2	H	28	THR
2	H	34	LEU
2	H	41	HIS
2	H	43	LYS
2	H	44	THR
2	H	54	ASN
2	H	88	SER
2	H	161	LEU
2	H	171	VAL
2	H	173	GLN
2	H	174	SER
2	H	179	LEU
2	H	206	THR
3	L	1[A]	GLN
3	L	1[B]	GLN
3	L	11	MET
3	L	27[A]	SER
3	L	27[B]	SER
3	L	89	GLN
3	L	113	THR
3	L	141	LYS
3	L	142	ASP
3	L	143	ILE
3	L	152	SER
3	L	156	ASN
3	L	164	ASP
3	L	168	LYS
3	L	183	ASP
3	L	202	SER
3	L	209	ASN
3	L	211	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	160	GLN
1	A	174	ASN
1	A	223	GLN
2	H	33	ASN
2	H	41	HIS
3	L	88	HIS
3	L	89	GLN
3	L	155	GLN
3	L	156	ASN
3	L	160	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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
4	SO4	A	301	-	4,4,4	0.20	0	6,6,6	0.69	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 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 [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	99/99 (100%)	-0.47	0 <span>100</span> <span>100</span>	28, 40, 91, 116	0
2	H	215/215 (100%)	-0.04	9 (4%) <span>36</span> <span>39</span>	25, 55, 117, 153	0
3	L	211/211 (100%)	-0.17	1 (0%) <span>91</span> <span>91</span>	26, 54, 105, 124	0
All	All	525/525 (100%)	-0.17	10 (1%) <span>66</span> <span>69</span>	25, 51, 106, 153	0

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	H	131	SER	5.8
2	H	132	ALA	5.5
2	H	133	ALA	5.1
2	H	134	GLN	4.3
2	H	130	GLY	3.7
2	H	135	THR	3.0
2	H	1	GLU	2.9
3	L	147	TRP	2.9
2	H	193	GLN	2.5
2	H	26	ARG	2.1

### 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](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	SO4	A	301	5/5	0.93	0.31	28,37,38,38	5

## 6.5 Other polymers [i](#)

There are no such residues in this entry.