



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 13, 2024 – 02:06 pm GMT

PDB ID : 6SV2  
Title : Human prion protein (PrP) fragment 119-231 (G127V M129 variant) complexed to ICSM 18 (anti-Prp therapeutic antibody) Fab fragment  
Authors : Conners, R.  
Deposited on : 2019-09-17  
Resolution : 2.30 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 : 1.8.4, CSD as541be (2020)  
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

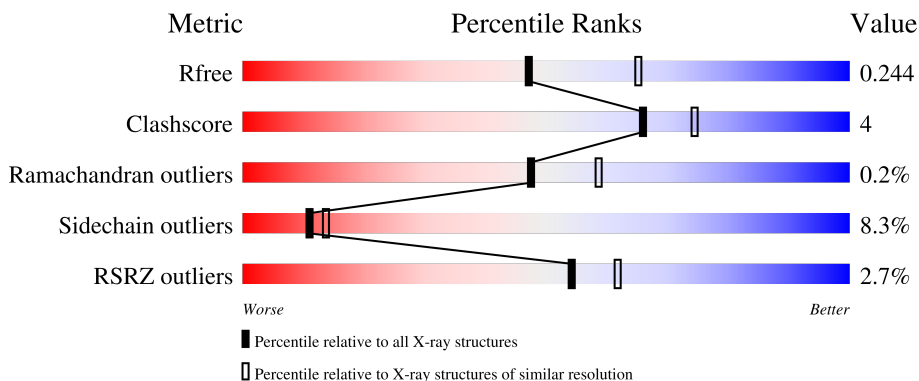
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

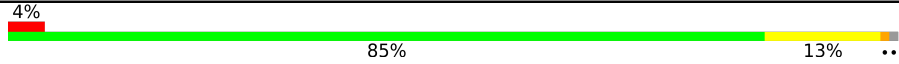
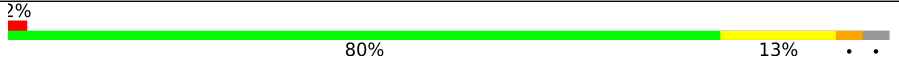

The reported resolution of this entry is 2.30 Å.

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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

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	L	212	
2	H	215	
3	A	113	

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 4127 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 ICSM 18-ANTI-PRP THERAPEUTIC FAB LIGHT CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	L	210	1626	1013	275	329	9	64	2	0

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

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	H	208	1585	1007	256	317	5	50	3	0

- Molecule 3 is a protein called Major prion protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	A	101	848	527	146	166	9	21	0	0

There is a discrepancy between the modelled and reference sequences:

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

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



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

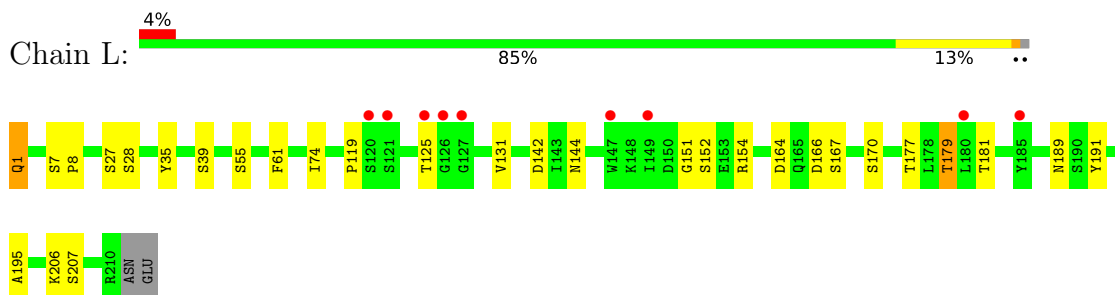
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	L	25	Total	O	0	0
			25	25		
5	H	20	Total	O	0	0
			20	20		
5	A	18	Total	O	0	0
			18	18		

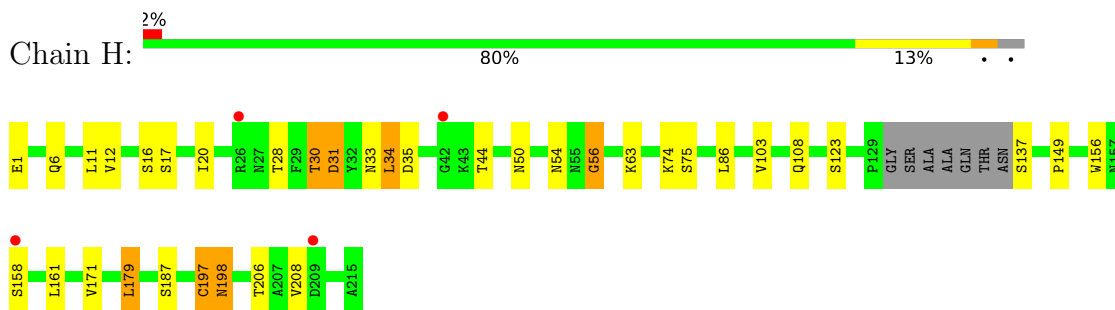
### 3 Residue-property plots [i](#)

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.

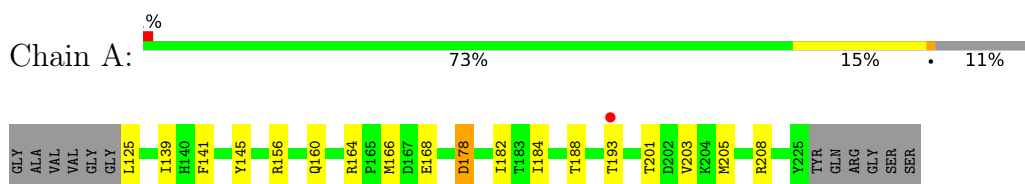
- Molecule 1: ICSM 18-ANTI-PRP THERAPEUTIC FAB LIGHT CHAIN



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



- Molecule 3: Major prion protein



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 63 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	128.08Å 128.08Å 135.64Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	57.93 – 2.30 57.86 – 2.30	Depositor EDS
% Data completeness (in resolution range)	88.5 (57.93-2.30) 88.5 (57.86-2.30)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.40 (at 2.29Å)	Xtrriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.200 , 0.251 0.196 , 0.244	Depositor DCC
$R_{free}$ test set	1362 reflections (5.17%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	37.9	Xtrriage
Anisotropy	0.100	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 47.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	4127	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	47.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.82% 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](#)

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	L	0.77	1/1673 (0.1%)	0.79	0/2270
2	H	0.76	0/1639	0.84	3/2246 (0.1%)
3	A	0.93	1/867 (0.1%)	0.96	4/1171 (0.3%)
All	All	0.80	2/4179 (0.0%)	0.85	7/5687 (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	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	L	151	GLY	C-O	7.91	1.36	1.23
3	A	145	TYR	CE1-CZ	-5.11	1.31	1.38

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	166	MET	CG-SD-CE	-6.50	89.81	100.20
2	H	56	GLY	N-CA-C	5.82	127.66	113.10
3	A	178	ASP	CB-CG-OD2	-5.63	113.23	118.30
2	H	35	ASP	CB-CG-OD1	5.36	123.12	118.30
3	A	156	ARG	NE-CZ-NH1	5.35	122.98	120.30
2	H	34	LEU	CB-CG-CD1	-5.30	101.99	111.00
3	A	156	ARG	NE-CZ-NH2	-5.19	117.71	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	H	56	GLY	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	L	1626	0	1555	10	0
2	H	1585	0	1532	15	0
3	A	848	0	788	5	0
4	H	5	0	0	0	0
5	A	18	0	0	0	0
5	H	20	0	0	0	0
5	L	25	0	0	0	0
All	All	4127	0	3875	30	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 4.

All (30) 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:L:1:GLN:N	1:L:1:GLN:OE1	1.72	1.21
2:H:33:ASN:HD21	2:H:50:ASN:HD22	1.31	0.78
2:H:158:SER:H	2:H:198:ASN:HD21	1.40	0.69
2:H:33:ASN:ND2	2:H:50:ASN:HD22	1.97	0.59
2:H:137:SER:N	2:H:187:SER:HG	2.00	0.59
2:H:179:LEU:C	2:H:179:LEU:HD12	2.26	0.57
1:L:1:GLN:N	1:L:1:GLN:CD	2.55	0.56
2:H:16:SER:O	2:H:86:LEU:HD12	2.06	0.55
3:A:178:ASP:O	3:A:182:ILE:HD12	2.07	0.54
2:H:17:SER:HA	2:H:86:LEU:CD1	2.38	0.54
2:H:30:THR:O	2:H:54:ASN:ND2	2.40	0.54
2:H:6:GLN:H	2:H:108:GLN:HE22	1.55	0.53
2:H:158:SER:H	2:H:198:ASN:ND2	2.05	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:31:ASP:N	2:H:31:ASP:OD1	2.45	0.50
3:A:139:ILE:HG22	3:A:141:PHE:CE2	2.48	0.49
3:A:201:THR:O	3:A:205:MET:HG3	2.14	0.48
1:L:144:ASN:O	1:L:195:ALA:HA	2.14	0.48
1:L:119:PRO:HD3	1:L:131:VAL:HG22	1.95	0.48
3:A:164:ARG:HD3	3:A:168:GLU:OE1	2.15	0.47
2:H:17:SER:HA	2:H:86:LEU:HD12	1.98	0.45
1:L:166:ASP:O	1:L:170:SER:HA	2.16	0.44
1:L:61:PHE:CE2	1:L:74:ILE:HG12	2.53	0.43
2:H:156:TRP:CZ3	2:H:197:CYS:HB3	2.53	0.43
1:L:191:TYR:O	1:L:207:SER:HA	2.19	0.43
1:L:7:SER:HA	1:L:8:PRO:C	2.38	0.42
1:L:177:THR:HG22	1:L:179:THR:HG22	2.01	0.42
2:H:20:ILE:HD13	2:H:20:ILE:HG21	1.68	0.42
2:H:11:LEU:HB2	2:H:149:PRO:HG3	2.03	0.41
1:L:35:TYR:N	1:L:35:TYR:CD1	2.90	0.40
3:A:184:ILE:O	3:A:188:THR:HG23	2.21	0.40

There are no symmetry-related clashes.

## 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	L	210/212 (99%)	201 (96%)	9 (4%)	0	100	100
2	H	207/215 (96%)	193 (93%)	13 (6%)	1 (0%)	29	35
3	A	99/113 (88%)	99 (100%)	0	0	100	100
All	All	516/540 (96%)	493 (96%)	22 (4%)	1 (0%)	47	58

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	30	THR

### 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	L	185/185 (100%)	170 (92%)	15 (8%)	11	15
2	H	184/186 (99%)	165 (90%)	19 (10%)	7	8
3	A	95/102 (93%)	90 (95%)	5 (5%)	22	31
All	All	464/473 (98%)	425 (92%)	39 (8%)	11	13

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	L	1	GLN
1	L	27	SER
1	L	28	SER
1	L	39	SER
1	L	55	SER
1	L	125	THR
1	L	142	ASP
1	L	152	SER
1	L	154	ARG
1	L	164	ASP
1	L	167	SER
1	L	179	THR
1	L	181	THR
1	L	189	ASN
1	L	206	LYS
2	H	1	GLU
2	H	12	VAL
2	H	28	THR
2	H	31	ASP
2	H	34	LEU
2	H	44	THR
2	H	63	LYS

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Mol	Chain	Res	Type
2	H	74	LYS
2	H	75[A]	SER
2	H	75[B]	SER
2	H	103	VAL
2	H	123	SER
2	H	161	LEU
2	H	171	VAL
2	H	179	LEU
2	H	197	CYS
2	H	198	ASN
2	H	206	THR
2	H	208	VAL
3	A	125	LEU
3	A	160	GLN
3	A	193	THR
3	A	203	VAL
3	A	208	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	L	188	HIS
1	L	189	ASN
2	H	33	ASN
2	H	198	ASN
3	A	171	ASN
3	A	174	ASN
3	A	181	ASN
3	A	212	GLN

### 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	H	301	-	4,4,4	0.20	0	6,6,6	1.24	1 (16%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
4	H	301	SO4	O4-S-O3	2.56	119.97	109.06

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 [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	L	210/212 (99%)	-0.16	9 (4%) 35 42	18, 48, 95, 103	21 (10%)
2	H	208/215 (96%)	-0.06	4 (1%) 66 73	18, 48, 87, 111	16 (7%)
3	A	101/113 (89%)	-0.36	1 (0%) 82 86	23, 33, 73, 94	6 (5%)
All	All	519/540 (96%)	-0.16	14 (2%) 54 62	18, 43, 89, 111	43 (8%)

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	L	127	GLY	4.6
1	L	185	TYR	4.1
1	L	125	THR	3.3
2	H	26	ARG	3.2
2	H	158	SER	3.1
1	L	126	GLY	2.6
1	L	121	SER	2.5
3	A	193	THR	2.5
2	H	209	ASP	2.3
2	H	42	GLY	2.3
1	L	180	LEU	2.3
1	L	147	TRP	2.1
1	L	120	SER	2.1
1	L	149	ILE	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 [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	H	301	5/5	0.97	0.22	22,23,25,27	5

### 6.5 Other polymers [i](#)

There are no such residues in this entry.