



# Full wwPDB X-ray Structure Validation Report ⓘ

Jul 31, 2023 – 12:01 AM EDT

PDB ID : 1LVY  
Title : PORCINE ELASTASE  
Authors : Schiltz, M.; Prange, T.  
Deposited on : 1996-07-20  
Resolution : 1.87 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 : 2.34  
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) : 2.34

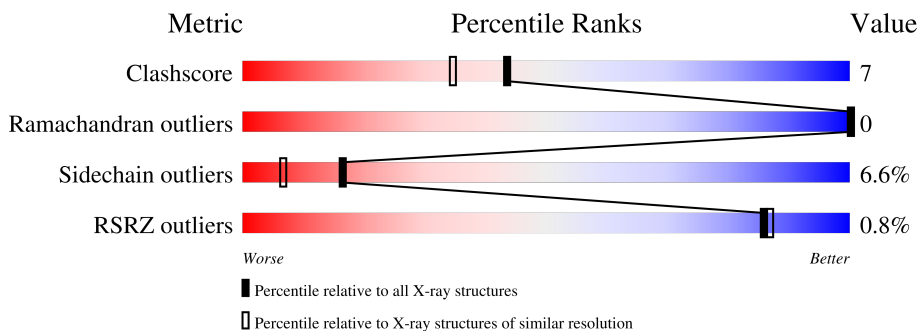
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.87 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))
Clashscore	141614	10282 (1.90-1.86)
Ramachandran outliers	138981	10152 (1.90-1.86)
Sidechain outliers	138945	10152 (1.90-1.86)
RSRZ outliers	127900	9303 (1.90-1.86)

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	240	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	SO4	A	290	-	-	X	-

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 1907 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 ELASTASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	240	1822	1135	330	347	10	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	77	ASN	ASP	conflict	UNP P00772

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Ca	0	0
			1	1		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



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

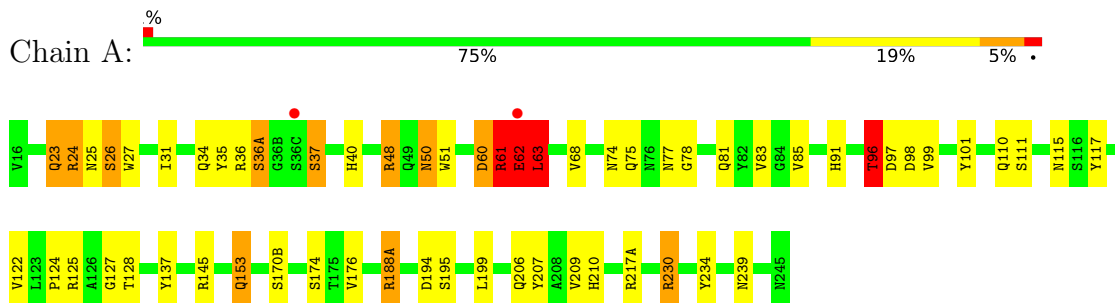
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	79	Total	O	0	0
			79	79		

### 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: ELASTASE



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	51.64Å 57.97Å 75.32Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 1.87 30.43 – 1.87	Depositor EDS
% Data completeness (in resolution range)	93.0 (10.00-1.87) 92.4 (30.43-1.87)	Depositor EDS
$R_{merge}$	0.02	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	21.66 (at 1.88Å)	Xtrriage
Refinement program	PROLSQ	Depositor
R, $R_{free}$	0.187 , 0.229 0.170 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	14.5	Xtrriage
Anisotropy	0.262	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 50.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	1907	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	15.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.37% 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, CA

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	1.03	0/1862	2.43	84/2543 (3.3%)

There are no bond length outliers.

All (84) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	188(A)	ARG	NE-CZ-NH2	-33.12	103.74	120.30
1	A	48	ARG	NE-CZ-NH1	23.39	132.00	120.30
1	A	36	ARG	CD-NE-CZ	19.10	150.34	123.60
1	A	230	ARG	NE-CZ-NH1	18.69	129.65	120.30
1	A	217(A)	ARG	NE-CZ-NH2	-16.73	111.94	120.30
1	A	36	ARG	NE-CZ-NH1	15.66	128.13	120.30
1	A	36	ARG	NE-CZ-NH2	14.90	127.75	120.30
1	A	36	ARG	NH1-CZ-NH2	-13.90	104.11	119.40
1	A	145	ARG	NE-CZ-NH2	13.71	127.15	120.30
1	A	62	GLU	CB-CA-C	13.52	137.45	110.40
1	A	48	ARG	NE-CZ-NH2	-12.93	113.84	120.30
1	A	48	ARG	CD-NE-CZ	12.43	141.00	123.60
1	A	188(A)	ARG	NE-CZ-NH1	11.98	126.29	120.30
1	A	217(A)	ARG	NH1-CZ-NH2	11.47	132.02	119.40
1	A	62	GLU	O-C-N	-10.49	105.91	122.70
1	A	188(A)	ARG	NH1-CZ-NH2	9.52	129.87	119.40
1	A	35	TYR	CB-CG-CD2	-9.32	115.41	121.00
1	A	176	VAL	CG1-CB-CG2	-9.30	96.03	110.90
1	A	207	TYR	CB-CG-CD2	-9.22	115.47	121.00
1	A	194	ASP	CB-CG-OD2	9.09	126.48	118.30
1	A	24	ARG	CG-CD-NE	-9.01	92.88	111.80
1	A	97	ASP	CB-CG-OD2	-8.96	110.23	118.30
1	A	137	TYR	CB-CG-CD1	8.95	126.37	121.00
1	A	60	ASP	CB-CG-OD2	-8.57	110.59	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	217(A)	ARG	NE-CZ-NH1	-8.51	116.05	120.30
1	A	61	ARG	CD-NE-CZ	8.44	135.42	123.60
1	A	122	VAL	CA-CB-CG1	8.11	123.06	110.90
1	A	98	ASP	CB-CG-OD1	8.10	125.59	118.30
1	A	61	ARG	NE-CZ-NH1	8.03	124.31	120.30
1	A	96	THR	CA-CB-CG2	-7.92	101.31	112.40
1	A	115	ASN	O-C-N	-7.87	110.11	122.70
1	A	128	THR	CA-CB-CG2	-7.84	101.42	112.40
1	A	61	ARG	NE-CZ-NH2	-7.28	116.66	120.30
1	A	117	TYR	CB-CG-CD2	7.25	125.35	121.00
1	A	101	TYR	CB-CG-CD2	-7.19	116.69	121.00
1	A	24	ARG	NE-CZ-NH1	-7.16	116.72	120.30
1	A	78	GLY	O-C-N	-7.01	111.49	122.70
1	A	188(A)	ARG	CD-NE-CZ	6.96	133.34	123.60
1	A	63	LEU	CA-CB-CG	6.92	131.21	115.30
1	A	110	GLN	CG-CD-OE1	-6.92	107.77	121.60
1	A	117	TYR	CB-CG-CD1	-6.92	116.85	121.00
1	A	99	VAL	O-C-N	-6.92	111.63	122.70
1	A	37	SER	CB-CA-C	6.88	123.17	110.10
1	A	207	TYR	CB-CG-CD1	6.67	125.00	121.00
1	A	24	ARG	CB-CA-C	-6.57	97.27	110.40
1	A	234	TYR	CD1-CE1-CZ	-6.52	113.93	119.80
1	A	62	GLU	N-CA-CB	-6.46	98.97	110.60
1	A	137	TYR	CB-CG-CD2	-6.42	117.15	121.00
1	A	145	ARG	NE-CZ-NH1	-6.42	117.09	120.30
1	A	91	HIS	CA-CB-CG	-6.34	102.82	113.60
1	A	36(A)	SER	N-CA-CB	-6.26	101.11	110.50
1	A	110	GLN	OE1-CD-NE2	6.18	136.12	121.90
1	A	35	TYR	CB-CG-CD1	6.09	124.66	121.00
1	A	230	ARG	NE-CZ-NH2	-6.04	117.28	120.30
1	A	85	VAL	CA-CB-CG2	-5.95	101.98	110.90
1	A	24	ARG	N-CA-C	5.93	127.00	111.00
1	A	188(A)	ARG	CA-CB-CG	5.82	126.21	113.40
1	A	62	GLU	OE1-CD-OE2	-5.75	116.40	123.30
1	A	230	ARG	NH1-CZ-NH2	-5.75	113.07	119.40
1	A	230	ARG	CD-NE-CZ	5.65	131.51	123.60
1	A	195	SER	CB-CA-C	-5.59	99.49	110.10
1	A	230	ARG	CA-C-O	5.53	131.70	120.10
1	A	174	SER	N-CA-CB	-5.52	102.22	110.50
1	A	51	TRP	N-CA-CB	5.49	120.47	110.60
1	A	230	ARG	O-C-N	-5.43	114.01	122.70
1	A	99	VAL	CA-C-O	5.40	131.45	120.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	25	ASN	CB-CG-OD1	5.40	132.40	121.60
1	A	188(A)	ARG	CG-CD-NE	-5.31	100.66	111.80
1	A	199	LEU	N-CA-C	-5.29	96.72	111.00
1	A	206	GLN	N-CA-CB	-5.29	101.09	110.60
1	A	206	GLN	OE1-CD-NE2	5.25	133.98	121.90
1	A	210	HIS	C-N-CA	-5.25	111.28	122.30
1	A	23	GLN	CB-CG-CD	-5.23	98.00	111.60
1	A	115	ASN	CA-C-N	5.22	128.69	117.20
1	A	194	ASP	CB-CG-OD1	-5.19	113.63	118.30
1	A	239	ASN	CA-C-O	-5.17	109.24	120.10
1	A	98	ASP	CB-CG-OD2	-5.15	113.66	118.30
1	A	81	GLN	N-CA-CB	5.09	119.77	110.60
1	A	48	ARG	CA-C-N	5.08	128.37	117.20
1	A	234	TYR	CG-CD1-CE1	5.05	125.34	121.30
1	A	153	GLN	CB-CA-C	-5.04	100.31	110.40
1	A	24	ARG	NH1-CZ-NH2	5.03	124.93	119.40
1	A	75	GLN	CB-CA-C	-5.01	100.37	110.40
1	A	36(A)	SER	CB-CA-C	5.01	119.62	110.10

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	1822	0	1759	24	0
2	A	1	0	0	0	0
3	A	5	0	0	2	0
4	A	79	0	0	6	0
All	All	1907	0	1759	24	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 7.

All (24) 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:A:61:ARG:HB3	1:A:63:LEU:HD22	1.61	0.81
1:A:62:GLU:CB	4:A:473:HOH:O	2.27	0.81
1:A:50:ASN:HD22	1:A:50:ASN:H	1.30	0.80
1:A:62:GLU:HG3	4:A:473:HOH:O	1.84	0.76
1:A:61:ARG:CB	1:A:63:LEU:HD22	2.22	0.68
1:A:74:ASN:OD1	1:A:153:GLN:HG2	1.92	0.68
1:A:62:GLU:HB2	4:A:473:HOH:O	1.91	0.68
1:A:62:GLU:O	1:A:62:GLU:OE2	2.15	0.65
1:A:60:ASP:OD2	1:A:96:THR:HG23	2.03	0.59
1:A:34:GLN:HG2	1:A:40:HIS:HA	1.90	0.53
1:A:62:GLU:HG3	4:A:478:HOH:O	2.09	0.52
1:A:50:ASN:HD22	1:A:50:ASN:N	2.06	0.49
1:A:31:ILE:HG22	1:A:68:VAL:HG12	1.94	0.49
1:A:26:SER:HB3	1:A:27:TRP:CD1	2.48	0.48
1:A:24:ARG:HH12	1:A:77:ASN:ND2	2.11	0.48
1:A:230:ARG:NH1	3:A:290:SO4:O2	2.25	0.48
1:A:62:GLU:CG	4:A:473:HOH:O	2.41	0.46
1:A:23:GLN:O	1:A:26:SER:HB2	2.18	0.44
1:A:62:GLU:CG	4:A:478:HOH:O	2.65	0.43
1:A:48:ARG:HD3	1:A:48:ARG:HA	1.80	0.43
1:A:124:PRO:HD3	1:A:209:VAL:O	2.18	0.43
1:A:61:ARG:HB3	1:A:63:LEU:CD2	2.40	0.43
1:A:127:GLY:HA2	3:A:290:SO4:O2	2.22	0.40
1:A:50:ASN:H	1:A:50:ASN:ND2	2.05	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	A	238/240 (99%)	233 (98%)	5 (2%)	0	<a href="#">100</a> <a href="#">100</a>

There are no Ramachandran outliers to report.

### 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	198/198 (100%)	185 (93%)	13 (7%)	16 7

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	26	SER
1	A	36(A)	SER
1	A	37	SER
1	A	50	ASN
1	A	61	ARG
1	A	62	GLU
1	A	63	LEU
1	A	83	VAL
1	A	96	THR
1	A	111	SER
1	A	125	ARG
1	A	170(B)	SER
1	A	188(A)	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	50	ASN
1	A	178	ASN
1	A	204	ASN
1	A	239	ASN
1	A	240	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](#)

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 for Mogul analysis.

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	$\# Z  > 2$
3	SO4	A	290	-	4,4,4	0.81	0	6,6,6	0.95	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.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	290	SO4	2	0

## 5.7 Other polymers [i](#)

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	240/240 (100%)	-0.36	2 (0%) 86 87	4, 12, 31, 50	0

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	62	GLU	2.6
1	A	36(C)	SER	2.3

### 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
3	SO4	A	290	5/5	0.94	0.25	44,47,48,51	0
2	CA	A	280	1/1	0.99	0.06	16,16,16,16	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.