



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 20, 2024 – 04:07 PM JST

PDB ID : 8Z4F  
Title : Pseudomurein Endoisopeptidases PeiP  
Authors : Guo, L.; Bai, L.  
Deposited on : 2024-04-17  
Resolution : 1.88 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  
Xtriage (Phenix) : 1.13  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

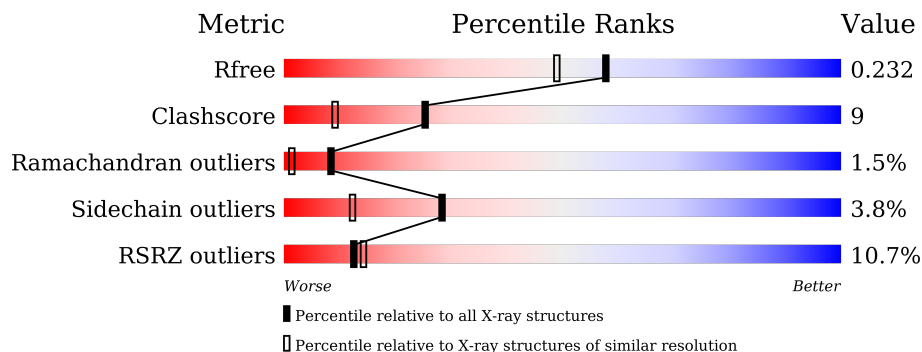
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.88 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))
$R_{free}$	164625	1090 (1.88-1.88)
Clashscore	180529	1144 (1.88-1.88)
Ramachandran outliers	177936	1135 (1.88-1.88)
Sidechain outliers	177891	1135 (1.88-1.88)
RSRZ outliers	164620	1090 (1.88-1.88)

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	303	
1	B	303	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4550 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 Pseudomurein endosiopeptidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	B	222	1814	1153	323	327	11	0	0	0
1	A	300	2476	1571	445	445	15	0	0	0

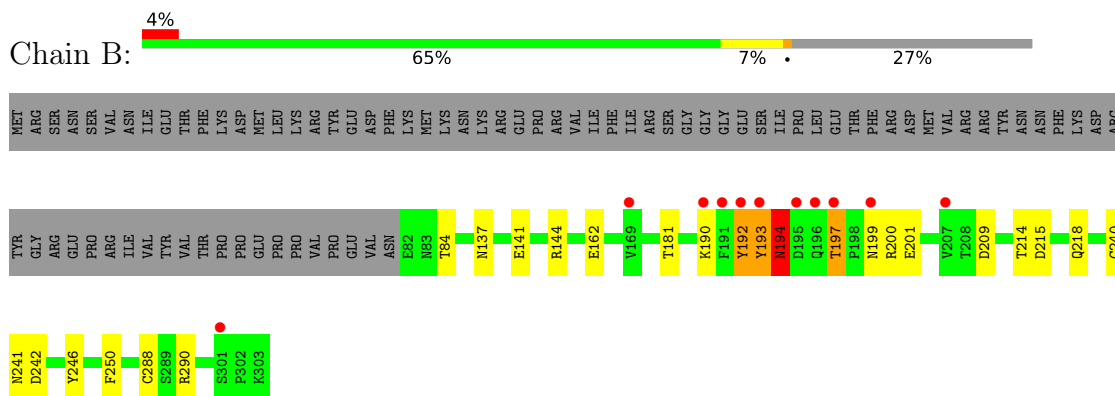
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
2	B	103	103	103	0	0
2	A	157	157	157	0	0

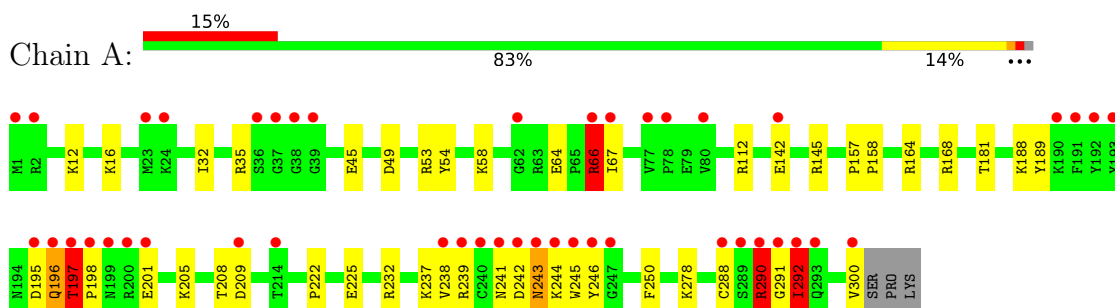
### 3 Residue-property plots [i](#)

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: Pseudomurein endosiopeptidase



- Molecule 1: Pseudomurein endosiopeptidase



## 4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	105.34Å 113.10Å 120.92Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.64 – 1.88 37.64 – 1.88	Depositor EDS
% Data completeness (in resolution range)	92.8 (37.64-1.88) 92.8 (37.64-1.88)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.65 (at 1.88Å)	Xtrriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, $R_{free}$	0.196 , 0.231 0.199 , 0.232	Depositor DCC
$R_{free}$ test set	56898 reflections (3.64%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	30.5	Xtrriage
Anisotropy	0.417	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 41.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	4550	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	40.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.64% 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](#)

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	0.53	1/2539 (0.0%)	0.73	3/3430 (0.1%)
1	B	0.53	0/1861	0.73	1/2518 (0.0%)
All	All	0.53	1/4400 (0.0%)	0.73	4/5948 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	225	GLU	CD-OE1	-6.35	1.18	1.25

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	290	ARG	C-N-CA	6.32	135.57	122.30
1	A	66	ARG	CB-CG-CD	5.94	127.05	111.60
1	A	196	GLN	C-N-CA	5.25	134.84	121.70
1	B	194	ASN	CB-CA-C	5.03	120.46	110.40

There are no chirality outliers.

There are no planarity outliers.

### 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	2476	0	2463	66	1
1	B	1814	0	1798	19	1
2	A	157	0	0	6	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	103	0	0	4	1
All	All	4550	0	4261	81	2

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 9.

All (81) 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:66:ARG:H	1:A:66:ARG:HD2	1.11	1.06
1:B:181:THR:HG21	1:A:181:THR:HG22	1.45	0.95
1:A:237:LYS:C	1:A:292:ILE:HG13	1.87	0.94
1:A:197:THR:H	1:A:198:PRO:HD3	1.34	0.92
1:A:66:ARG:HH11	1:A:66:ARG:HG3	1.32	0.92
1:A:66:ARG:HD2	1:A:66:ARG:N	1.90	0.86
1:A:66:ARG:H	1:A:66:ARG:CD	1.92	0.83
1:A:197:THR:H	1:A:198:PRO:CD	1.95	0.80
1:A:239:ARG:N	1:A:292:ILE:HG12	1.99	0.78
1:A:238:VAL:CG1	1:A:288:CYS:HB2	2.14	0.77
1:B:181:THR:HG21	1:A:181:THR:CG2	2.16	0.76
1:A:239:ARG:HG2	1:A:290:ARG:HB2	1.68	0.76
1:B:144:ARG:NH2	2:B:402:HOH:O	2.18	0.75
1:A:66:ARG:HG3	1:A:66:ARG:NH1	2.02	0.73
1:A:66:ARG:HH11	1:A:66:ARG:CG	2.02	0.71
1:A:241:ASN:HB3	1:A:244:LYS:H	1.54	0.70
1:A:241:ASN:ND2	1:A:245:TRP:O	2.24	0.69
1:B:197:THR:HB	1:B:215:ASP:OD1	1.92	0.69
1:A:197:THR:N	1:A:198:PRO:HD3	2.07	0.69
1:A:238:VAL:HG11	1:A:288:CYS:HB2	1.77	0.67
1:A:237:LYS:O	1:A:292:ILE:HG13	1.94	0.67
1:A:201:GLU:OE2	1:A:205:LYS:NZ	2.27	0.66
1:A:238:VAL:N	1:A:292:ILE:HG13	2.10	0.66
1:B:162:GLU:OE1	2:B:401:HOH:O	2.12	0.66
1:A:238:VAL:HG12	1:A:288:CYS:HB2	1.78	0.64
1:A:238:VAL:C	1:A:292:ILE:HG12	2.19	0.62
1:A:54:TYR:CZ	1:A:58:LYS:HD2	2.34	0.62
1:A:245:TRP:CG	1:A:292:ILE:HD13	2.35	0.62
1:B:214:THR:O	1:B:218:GLN:HG3	2.00	0.60
1:A:164:ARG:HD3	1:A:168:ARG:HH22	1.66	0.60
1:A:245:TRP:CD1	1:A:292:ILE:HD13	2.37	0.60
1:B:190:LYS:NZ	1:B:209:ASP:HB3	2.17	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:164:ARG:HD3	1:A:168:ARG:NH2	2.17	0.59
1:A:239:ARG:HB3	1:A:290:ARG:HB2	1.85	0.57
1:B:181:THR:CG2	1:A:181:THR:HG22	2.28	0.56
1:A:157:PRO:HG2	1:A:222:PRO:HG3	1.88	0.56
1:A:245:TRP:CG	1:A:292:ILE:CD1	2.88	0.56
1:B:181:THR:CG2	1:A:181:THR:CG2	2.84	0.56
1:A:245:TRP:HB3	1:A:292:ILE:CD1	2.37	0.55
1:A:238:VAL:CA	1:A:292:ILE:CG1	2.85	0.55
1:A:35:ARG:HH11	1:A:35:ARG:HG3	1.72	0.55
1:A:241:ASN:HB2	1:A:245:TRP:N	2.23	0.54
1:A:238:VAL:CA	1:A:292:ILE:HG12	2.38	0.53
1:A:239:ARG:HG2	1:A:290:ARG:CB	2.36	0.53
1:A:238:VAL:HA	1:A:292:ILE:H	1.74	0.53
1:A:45:GLU:OE2	2:A:401:HOH:O	2.19	0.53
1:A:242:ASP:OD1	1:A:243:ASN:N	2.42	0.52
1:B:137:ASN:O	1:B:141:GLU:HG3	2.10	0.52
1:A:239:ARG:CB	1:A:290:ARG:HB2	2.39	0.52
1:A:239:ARG:CG	1:A:290:ARG:HB2	2.37	0.52
1:A:45:GLU:OE1	2:A:402:HOH:O	2.19	0.51
1:A:112:ARG:HG3	1:A:112:ARG:HH11	1.75	0.50
1:B:192:TYR:O	1:B:194:ASN:N	2.44	0.49
1:B:190:LYS:HZ2	1:B:209:ASP:HB3	1.78	0.49
1:A:245:TRP:CB	1:A:292:ILE:CD1	2.91	0.48
1:A:12:LYS:HE2	1:A:64:GLU:OE2	2.14	0.48
1:A:242:ASP:OD1	1:A:244:LYS:HD3	2.14	0.47
1:A:238:VAL:C	1:A:292:ILE:CG1	2.83	0.47
1:A:238:VAL:CA	1:A:292:ILE:HG13	2.46	0.46
1:A:290:ARG:HG3	2:A:467:HOH:O	2.16	0.46
1:A:241:ASN:CB	1:A:244:LYS:H	2.24	0.46
1:A:12:LYS:NZ	2:A:403:HOH:O	2.28	0.46
1:A:188:LYS:HE2	1:A:208:THR:O	2.16	0.45
1:B:197:THR:O	1:B:197:THR:OG1	2.29	0.45
1:B:241:ASN:HA	1:B:290:ARG:NE	2.32	0.45
1:A:158:PRO:HG2	2:A:555:HOH:O	2.16	0.45
1:A:32:ILE:N	1:A:32:ILE:HD12	2.32	0.44
1:A:164:ARG:CG	1:A:168:ARG:NH2	2.80	0.44
1:A:208:THR:OG1	1:A:209:ASP:N	2.48	0.44
1:B:240:CYS:HA	1:B:288:CYS:HB3	1.99	0.44
1:A:189:TYR:CD2	1:A:278:LYS:HD2	2.53	0.44
1:B:193:TYR:OH	2:B:403:HOH:O	2.21	0.43
1:A:164:ARG:HG2	1:A:168:ARG:CZ	2.49	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:53:ARG:HD2	2:A:407:HOH:O	2.18	0.43
1:B:199:ASN:HB3	2:B:491:HOH:O	2.19	0.42
1:B:190:LYS:HZ3	1:B:209:ASP:HB3	1.85	0.42
1:A:112:ARG:HG3	1:A:112:ARG:NH1	2.33	0.42
1:B:242:ASP:OD2	1:B:246:TYR:OH	2.26	0.41
1:A:238:VAL:HA	1:A:292:ILE:HG12	2.02	0.41
1:A:290:ARG:H	1:A:290:ARG:HG2	1.72	0.41
1:A:66:ARG:HD3	1:A:67:ILE:HG22	2.03	0.41

All (2) 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)
1:B:144:ARG:NH1	1:A:66:ARG:NH2[6_455]	1.55	0.65
2:B:476:HOH:O	2:A:544:HOH:O[7_454]	2.19	0.01

## 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	298/303 (98%)	279 (94%)	14 (5%)	5 (2%)	7	1
1	B	220/303 (73%)	212 (96%)	5 (2%)	3 (1%)	9	1
All	All	518/606 (86%)	491 (95%)	19 (4%)	8 (2%)	8	1

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	194	ASN
1	A	197	THR
1	A	243	ASN
1	A	291	GLY

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Mol	Chain	Res	Type
1	B	193	TYR
1	A	196	GLN
1	A	292	ILE
1	B	192	TYR

### 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	274/277 (99%)	261 (95%)	13 (5%)	22	8
1	B	200/277 (72%)	195 (98%)	5 (2%)	42	26
All	All	474/554 (86%)	456 (96%)	18 (4%)	28	12

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	84	THR
1	B	197	THR
1	B	200	ARG
1	B	201	GLU
1	B	250	PHE
1	A	16	LYS
1	A	49	ASP
1	A	66	ARG
1	A	142	GLU
1	A	145	ARG
1	A	195	ASP
1	A	197	THR
1	A	232	ARG
1	A	246	TYR
1	A	250	PHE
1	A	290	ARG
1	A	292	ILE
1	A	300	VAL

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

### 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 oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 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	A	300/303 (99%)	0.69	45 (15%) <b>6</b> <b>7</b>	20, 36, 86, 131	0
1	B	222/303 (73%)	0.25	11 (4%) <b>35</b> <b>36</b>	21, 32, 61, 90	0
All	All	522/606 (86%)	0.50	56 (10%) <b>12</b> <b>14</b>	20, 34, 72, 131	0

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	245	TRP	7.7
1	A	240	CYS	6.3
1	A	199	ASN	5.9
1	B	196	GLN	5.8
1	A	292	ILE	5.8
1	A	78	PRO	5.5
1	A	243	ASN	5.2
1	B	197	THR	5.1
1	A	246	TYR	5.0
1	A	193	TYR	5.0
1	A	23	MET	4.9
1	A	197	THR	4.7
1	A	191	PHE	4.5
1	A	77	VAL	4.2
1	A	36	SER	4.2
1	A	37	GLY	4.2
1	A	242	ASP	4.0
1	A	198	PRO	4.0
1	A	239	ARG	3.9
1	B	191	PHE	3.8
1	A	291	GLY	3.8
1	A	300	VAL	3.7
1	A	244	LYS	3.7
1	A	200	ARG	3.5

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Mol	Chain	Res	Type	RSRZ
1	A	241	ASN	3.5
1	A	238	VAL	3.5
1	A	293	GLN	3.2
1	A	38	GLY	3.2
1	A	209	ASP	3.1
1	B	193	TYR	3.1
1	B	195	ASP	3.1
1	A	67	ILE	2.9
1	A	192	TYR	2.9
1	B	207	VAL	2.9
1	A	39	GLY	2.9
1	A	196	GLN	2.9
1	A	2	ARG	2.7
1	A	195	ASP	2.7
1	A	1	MET	2.6
1	A	24	LYS	2.6
1	A	80	VAL	2.5
1	B	192	TYR	2.5
1	A	66	ARG	2.4
1	A	288	CYS	2.4
1	A	247	GLY	2.3
1	A	290	ARG	2.3
1	A	201	GLU	2.3
1	A	289	SER	2.2
1	B	199	ASN	2.2
1	A	62	GLY	2.2
1	A	214	THR	2.1
1	B	190	LYS	2.1
1	B	301	SER	2.1
1	A	142	GLU	2.1
1	A	190	LYS	2.1
1	B	169	VAL	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 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.