



# Full wwPDB X-ray Structure Validation Report

Feb 28, 2014 – 06:52 AM GMT

PDB ID : 1A8A  
Title : RAT ANNEXIN V COMPLEXED WITH GLYCEROPHOSPHOSERINE  
Authors : Swairjo, M.A.; Concha, N.O.; Kaetzel, M.A.; Dedman, J.R.; Seaton, B.A.  
Deposited on : 1998-03-23  
Resolution : 1.90 Å(reported)

This is a full wwPDB 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 <http://wwpdb.org/ValidationPDFNotes.html>

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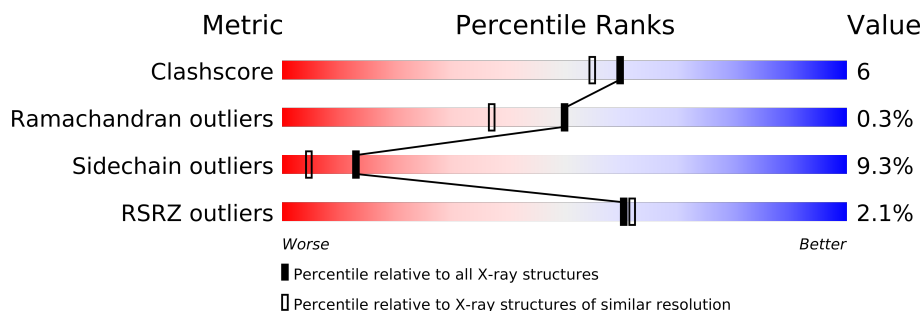
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : dev-1323  
EDS : stable22639  
Percentile statistics : 21963  
Refmac : 5.8.0049  
CCP4 : 6.3.0 (Settle)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : stable22683

# 1 Overall quality at a glance

The reported resolution of this entry is 1.90 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	79885	4465 (1.90-1.90)
Ramachandran outliers	78287	4413 (1.90-1.90)
Sidechain outliers	78261	4414 (1.90-1.90)
RSRZ outliers	66119	3686 (1.90-1.90)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	319	

The following table lists non-polymeric compounds that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Geometry	Electron density
2	CA	A	403	-	X
2	CA	A	405	-	X
3	GSE	A	997	-	X

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 2645 atoms, of which 0 are hydrogen and 0 are deuterium.

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.

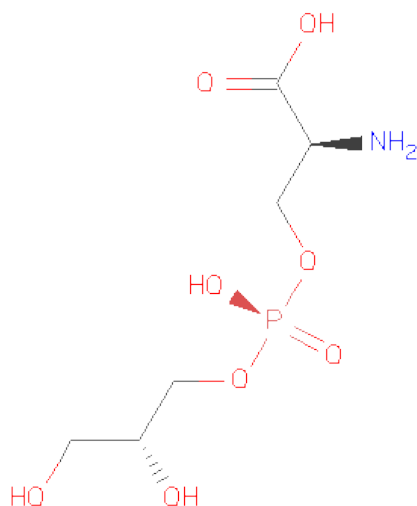
- Molecule 1 is a protein called ANNEXIN V.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	318	2503	1572	425	498	8	0	0	0

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

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	10	Total	Ca	0	0
			10	10		

- Molecule 3 is L-ALPHA-GLYCEROPHOSPHORYLSERINE (three-letter code: GSE) (formula: C<sub>6</sub>H<sub>14</sub>NO<sub>8</sub>P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	A	1	16	6	1	8	1	0	0

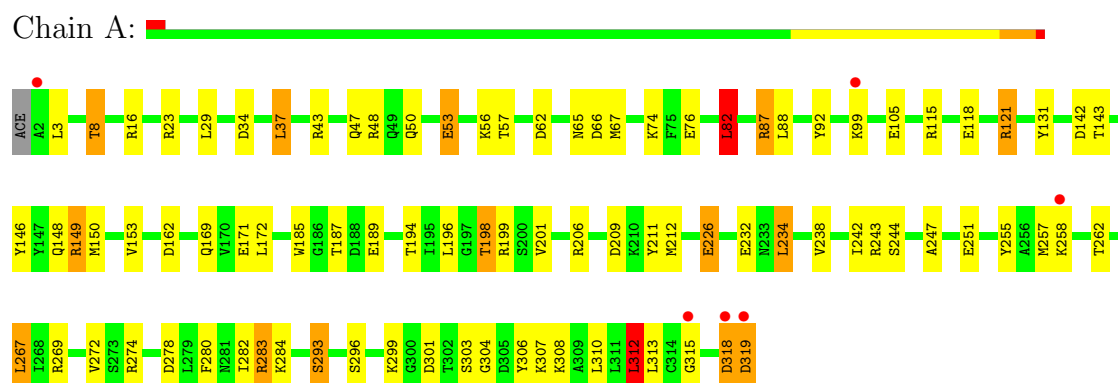
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	116	Total 116	O 116	0	0

### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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 ( $\text{RSRZ} > 2$ ). 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: ANNEXIN V



## 4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	157.27Å 157.27Å 37.45Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	10.00 – 1.90 45.40 – 1.90	Depositor EDS
% Data completeness (in resolution range)	74.0 (10.00-1.90) 74.0 (45.40-1.90)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	0.04	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.76 (at 1.89Å)	Xtriage
Refinement program	X-PLOR	Depositor
R, $R_{free}$	0.201 , (Not available) 0.201 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	DCC
Wilson B-factor (Å <sup>2</sup> )	23.3	Xtriage
Anisotropy	0.331	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 59.7	EDS
Estimated twinning fraction	0.023 for h,-h-k,-l	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 20264 reflections	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	2645	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.81% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

## 5 Model quality

### 5.1 Standard geometry

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

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	0.88	0/2535	1.66	46/3413 (1.3%)

There are no bond length outliers.

All (46) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	243	ARG	NE-CZ-NH1	12.83	126.72	120.30
1	A	199	ARG	NE-CZ-NH1	12.30	126.45	120.30
1	A	243	ARG	NE-CZ-NH2	-12.02	114.29	120.30
1	A	274	ARG	NE-CZ-NH1	11.50	126.05	120.30
1	A	274	ARG	NE-CZ-NH2	-10.99	114.81	120.30
1	A	185	TRP	CD1-CG-CD2	9.42	113.83	106.30
1	A	142	ASP	CB-CG-OD1	8.87	126.28	118.30
1	A	37	LEU	CA-CB-CG	8.57	135.00	115.30
1	A	76	GLU	OE1-CD-OE2	-8.38	113.24	123.30
1	A	206	ARG	NE-CZ-NH2	-7.86	116.37	120.30
1	A	131	TYR	CB-CG-CD1	-7.79	116.33	121.00
1	A	23	ARG	NE-CZ-NH1	7.59	124.10	120.30
1	A	185	TRP	CE2-CD2-CG	-7.44	101.35	107.30
1	A	232	GLU	OE1-CD-OE2	-6.97	114.94	123.30
1	A	48	ARG	NE-CZ-NH2	-6.95	116.83	120.30
1	A	211	TYR	CB-CG-CD1	-6.76	116.95	121.00
1	A	121	ARG	CA-CB-CG	6.71	128.16	113.40
1	A	146	TYR	CB-CG-CD1	-6.67	117.00	121.00
1	A	92	TYR	CB-CG-CD1	-6.52	117.09	121.00
1	A	312	LEU	CA-CB-CG	6.48	130.21	115.30
1	A	269	ARG	NE-CZ-NH2	-6.39	117.10	120.30
1	A	149	ARG	NE-CZ-NH2	-6.17	117.22	120.30
1	A	87	ARG	NE-CZ-NH2	-6.04	117.28	120.30
1	A	43	ARG	NE-CZ-NH1	6.04	123.32	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	87	ARG	CA-CB-CG	6.01	126.62	113.40
1	A	172	LEU	CA-CB-CG	6.00	129.10	115.30
1	A	16	ARG	NE-CZ-NH1	5.99	123.30	120.30
1	A	47	GLN	CA-CB-CG	-5.96	100.29	113.40
1	A	66	ASP	CB-CG-OD1	5.88	123.59	118.30
1	A	67	MET	CA-CB-CG	-5.86	103.34	113.30
1	A	82	LEU	CA-CB-CG	5.67	128.35	115.30
1	A	23	ARG	NE-CZ-NH2	-5.63	117.48	120.30
1	A	267	LEU	CB-CG-CD1	-5.62	101.45	111.00
1	A	87	ARG	CB-CA-C	-5.61	99.18	110.40
1	A	226	GLU	OE1-CD-OE2	-5.38	116.85	123.30
1	A	283	ARG	NE-CZ-NH1	5.33	122.97	120.30
1	A	318	ASP	N-CA-C	-5.28	96.74	111.00
1	A	105	GLU	OE1-CD-OE2	-5.24	117.01	123.30
1	A	115	ARG	NE-CZ-NH2	-5.20	117.70	120.30
1	A	185	TRP	CG-CD1-NE1	-5.19	104.91	110.10
1	A	171	GLU	CA-CB-CG	5.15	124.72	113.40
1	A	293	SER	N-CA-CB	5.13	118.19	110.50
1	A	189	GLU	OE1-CD-OE2	-5.11	117.17	123.30
1	A	315	GLY	CA-C-N	5.08	126.36	116.20
1	A	87	ARG	NE-CZ-NH1	5.06	122.83	120.30
1	A	293	SER	CB-CA-C	-5.05	100.50	110.10

There are no chirality outliers.

There are no planarity outliers.

## 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2503	0	2503	30	1
2	A	10	0	0	0	0
3	A	16	0	11	2	0
4	A	116	0	0	3	2
All	All	2645	0	2514	30	2



Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 6.

All (30) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:283:ARG:HB3	1:A:319:ASP:HB2	1.65	0.78
1:A:308:LYS:O	1:A:312:LEU:HD22	1.92	0.69
1:A:187:THR:OG1	3:A:997:GSE:N	2.35	0.60
1:A:169:GLN:HG2	4:A:587:HOH:O	2.02	0.58
1:A:299:LYS:HD2	1:A:307:LYS:HE3	1.85	0.57
1:A:194:THR:O	1:A:198:THR:HB	2.07	0.54
1:A:257:MET:HG2	1:A:262:THR:HG23	1.90	0.53
1:A:226:GLU:O	3:A:997:GSE:N	2.42	0.53
1:A:280:PHE:CE2	1:A:284:LYS:HD2	2.44	0.53
1:A:82:LEU:HD13	1:A:272:VAL:HG22	1.89	0.52
1:A:198:THR:HG23	4:A:606:HOH:O	2.08	0.52
1:A:8:THR:O	4:A:670:HOH:O	2.19	0.49
1:A:201:VAL:HG22	1:A:242:ILE:HD12	1.94	0.49
1:A:209:ASP:O	1:A:212:MET:HB3	2.13	0.49
1:A:251:GLU:O	1:A:255:TYR:HD1	1.97	0.48
1:A:238:VAL:O	1:A:242:ILE:HG12	2.14	0.47
1:A:244:SER:HB3	1:A:247:ALA:HB3	1.97	0.46
1:A:74:LYS:HA	1:A:74:LYS:HD3	1.76	0.46
1:A:278:ASP:O	1:A:282:ILE:HG13	2.16	0.46
1:A:53:GLU:O	1:A:57:THR:HG23	2.16	0.46
1:A:306:TYR:O	1:A:310:LEU:HB2	2.18	0.43
1:A:293:SER:HB3	1:A:319:ASP:O	2.19	0.43
1:A:304:GLY:O	1:A:308:LYS:HG3	2.19	0.42
1:A:234:LEU:O	1:A:238:VAL:HG23	2.19	0.42
1:A:3:LEU:HG	1:A:278:ASP:HB3	2.01	0.42
1:A:62:ASP:HB3	1:A:65:ASN:HB2	2.01	0.42
1:A:143:THR:OG1	1:A:148:GLN:HG3	2.21	0.41
1:A:201:VAL:HG13	1:A:242:ILE:HG23	2.02	0.41
1:A:87:ARG:HH21	1:A:88:LEU:HD21	1.86	0.41
1:A:299:LYS:HD2	1:A:307:LYS:CE	2.49	0.40

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	Distance(Å)	Clash(Å)
4:A:668:HOH:O	4:A:669:HOH:O[2_665]	0.03	2.17
1:A:153:VAL:CG2	4:A:673:HOH:O[2_665]	1.69	0.51

## 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	316/319 (99%)	302 (96%)	13 (4%)	1 (0%)	50 37

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	318	ASP

### 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	268/268 (100%)	243 (91%)	25 (9%)	13 5

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	8	THR
1	A	29	LEU
1	A	34	ASP
1	A	37	LEU
1	A	50	GLN
1	A	53	GLU
1	A	56	LYS
1	A	82	LEU
1	A	99	LYS
1	A	118	GLU
1	A	121	ARG
1	A	149	ARG
1	A	150	MET

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Mol	Chain	Res	Type
1	A	162	ASP
1	A	196	LEU
1	A	198	THR
1	A	234	LEU
1	A	258	LYS
1	A	267	LEU
1	A	296	SER
1	A	301	ASP
1	A	303	SER
1	A	312	LEU
1	A	313	LEU
1	A	319	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	148	GLN
1	A	158	ASN
1	A	218	GLN

### 5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates in this entry.

### 5.6 Ligand geometry ⓘ

Of 11 ligands modelled in this entry, 10 are 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	GSE	A	997	2	15,15,15	1.09	0	20,20,20	3.91	6 (30%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GSE	A	997	2	-	0/18/18/18	0/0/0/0

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	997	GSE	C13-C12-N	12.07	129.34	109.36
3	A	997	GSE	O12-C11-C12	7.38	117.61	108.65
3	A	997	GSE	O16-C13-O15	-6.06	110.37	124.07
3	A	997	GSE	O16-C13-C12	5.03	128.16	116.88
3	A	997	GSE	C11-C12-C13	3.91	119.62	110.03
3	A	997	GSE	C11-C12-N	-3.84	93.69	109.78

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

## 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, 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	318/319 (99%)	-0.21	6 (1%) 64 65	11, 25, 56, 91	0

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	99	LYS	3.8
1	A	318	ASP	3.8
1	A	319	ASP	3.2
1	A	2	ALA	2.7
1	A	258	LYS	2.5
1	A	315	GLY	2.4

### 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 carbohydrates in this entry.

### 6.4 Ligands ⓘ

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
2	CA	A	405	1/1	0.24	10.33	25,25,25,25	1
2	CA	A	403	1/1	0.14	3.70	21,21,21,21	1
3	GSE	A	997	16/16	0.15	2.84	14,18,29,29	16
2	CA	A	408	1/1	0.09	0.36	19,19,19,19	1
2	CA	A	404	1/1	0.06	-0.91	12,12,12,12	1
2	CA	A	410	1/1	0.07	-1.29	25,25,25,25	1
2	CA	A	401	1/1	0.03	-2.01	20,20,20,20	1
2	CA	A	406	1/1	0.06	-2.45	21,21,21,21	1
2	CA	A	402	1/1	0.06	-5.35	21,21,21,21	1
2	CA	A	407	1/1	0.04	-6.66	10,10,10,10	0
2	CA	A	409	1/1	0.04	-26.34	20,20,20,20	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.