



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 20, 2026 – 09:56 AM UTC

PDB ID : 3VXR / pdb_00003vxr
Title : The complex between H27-14 TCR and HLA-A24 bound to HIV-1 Nef134-10(wt) peptide
Authors : Shimizu, A.; Fukai, S.; Yamagata, A.; Iwamoto, A.
Deposited on : 2012-09-20
Resolution : 2.40 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

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>.

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

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

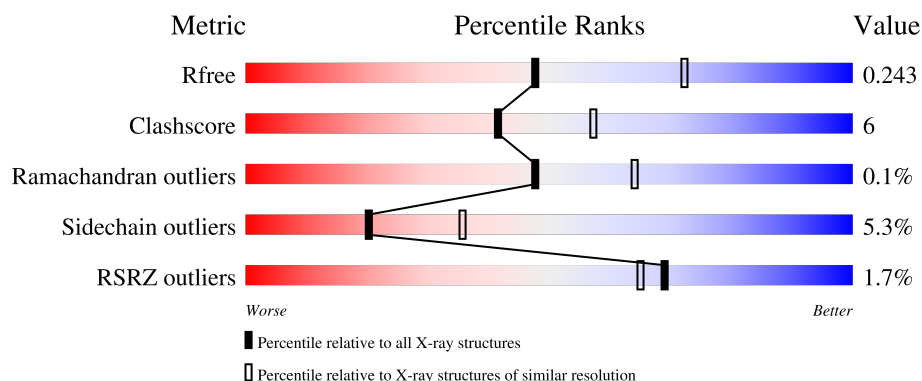
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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}	180053	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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 ≥ 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	275	82%16%.
2	B	100	81%19%
3	D	207	5% 76%16%6%
4	E	244	77%21%..
5	C	10	90%10%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 6861 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 HLA class I histocompatibility antigen, A-24 alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	274	Total	C	N	O	S	0	0	0
			2222	1382	403	427	10			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	expression tag	UNP P05534

- Molecule 2 is a protein called Beta-2-microglobulin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	100	Total	C	N	O	S	0	0	0
			836	533	141	158	4			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	0	MET	-	expression tag	UNP P61769

- Molecule 3 is a protein called H27-14 TCR alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	194	Total	C	N	O	S	0	0	0
			1493	924	256	305	8			

- Molecule 4 is a protein called H27-14 TCR beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	E	242	Total	C	N	O	S	0	0	0
			1954	1226	347	375	6			

- Molecule 5 is a protein called 10-mer peptide from Protein Nef.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	C	10	Total	C	N	O	S	0	0	0
			92	64	14	13	1			

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	79	Total	O	0	0
			79	79		
6	B	44	Total	O	0	0
			44	44		
6	D	56	Total	O	0	0
			56	56		
6	E	83	Total	O	0	0
			83	83		
6	C	2	Total	O	0	0
			2	2		

- Molecule 5: 10-mer peptide from Protein Nef

Chain C:  90% 10%



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	221.45Å 47.74Å 113.99Å 90.00° 119.91° 90.00°	Depositor
Resolution (Å)	50.00 – 2.40 50.00 – 2.40	Depositor EDS
% Data completeness (in resolution range)	91.2 (50.00-2.40) 91.6 (50.00-2.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.74 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.199 , 0.242 0.199 , 0.243	Depositor DCC
R_{free} test set	2075 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	26.4	Xtriage
Anisotropy	0.184	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 24.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.028 for -h-2*1,-k,l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	6861	wwPDB-VP
Average B, all atoms (Å ²)	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.41% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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

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	0.70	0/2282	0.80	3/3092 (0.1%)
2	B	0.65	0/859	0.75	0/1162
3	D	0.46	0/1517	0.76	1/2054 (0.0%)
4	E	0.63	0/2006	0.81	3/2724 (0.1%)
5	C	0.65	0/97	0.73	0/130
All	All	0.63	0/6761	0.79	7/9162 (0.1%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	150	TYR	CA-C-N	-9.87	109.88	119.85
4	E	150	TYR	C-N-CA	-9.87	109.88	119.85
3	D	13	VAL	N-CA-C	5.98	114.09	109.19
4	E	72	GLY	N-CA-C	-5.94	100.96	112.02
1	A	231	VAL	CB-CA-C	-5.33	105.48	111.45
1	A	192	HIS	CA-C-N	5.25	126.41	119.84
1	A	192	HIS	C-N-CA	5.25	126.41	119.84

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	2222	0	2082	24	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	836	0	803	11	0
3	D	1493	0	1455	17	0
4	E	1954	0	1850	36	0
5	C	92	0	85	0	0
6	A	79	0	0	5	0
6	B	44	0	0	1	0
6	C	2	0	0	0	0
6	D	56	0	0	0	0
6	E	83	0	0	6	0
All	All	6861	0	6275	82	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 6.

All (82) 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)
4:E:27:SER:HB2	6:E:323:HOH:O	1.73	0.89
1:A:72:GLN:HE21	4:E:51:ASN:HD22	1.33	0.74
1:A:3:HIS:HD2	1:A:29:ASP:OD2	1.72	0.73
3:D:37:ARG:HB2	3:D:47:LEU:HD11	1.74	0.68
1:A:188:HIS:HE1	6:A:313:HOH:O	1.75	0.68
1:A:223:ASP:HB3	6:A:319:HOH:O	1.92	0.67
3:D:126:ASP:HB3	3:D:129:SER:O	1.95	0.65
2:B:42:ASN:ND2	2:B:77:GLU:H	1.96	0.63
3:D:21:LEU:CD1	3:D:106:THR:HG21	2.31	0.61
2:B:17:ASN:OD1	2:B:97:ARG:NH2	2.34	0.60
4:E:51:ASN:O	4:E:69:ARG:HD3	2.01	0.59
4:E:99:THR:HG21	6:E:342:HOH:O	2.03	0.58
1:A:234:ARG:HH11	2:B:8:GLN:NE2	2.01	0.58
4:E:224:GLN:HE22	4:E:226:ARG:HE	1.53	0.57
3:D:162:LEU:HB3	4:E:170:CYS:HB3	1.87	0.57
4:E:224:GLN:NE2	4:E:226:ARG:HE	2.02	0.57
4:E:115:ASP:OD1	4:E:117:LYS:HG2	2.06	0.56
1:A:193:PRO:O	1:A:198:GLU:O	2.26	0.54
3:D:61:ARG:NH2	3:D:84:ASP:OD1	2.36	0.53
1:A:111:ARG:HG2	6:A:314:HOH:O	2.09	0.52
4:E:96:SER:HB3	4:E:99:THR:HG22	1.90	0.52
4:E:10:HIS:HE1	4:E:155:GLU:OE2	1.93	0.52
4:E:99:THR:HG23	4:E:101:GLU:H	1.75	0.52
4:E:150:TYR:O	4:E:187:TYR:CE2	2.63	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:191:HIS:HE1	1:A:254:GLU:OE1	1.93	0.52
1:A:188:HIS:CE1	6:A:313:HOH:O	2.56	0.51
1:A:192:HIS:HB2	1:A:200:THR:HG23	1.93	0.51
1:A:193:PRO:O	1:A:199:ALA:HA	2.11	0.50
3:D:173:SER:OG	4:E:192:ARG:HD2	2.11	0.49
4:E:222:TRP:HB2	4:E:228:LYS:HG3	1.94	0.49
2:B:42:ASN:HD21	2:B:77:GLU:H	1.60	0.48
1:A:190:THR:OG1	1:A:202:ARG:HB3	2.14	0.48
4:E:52:GLU:HB2	4:E:69:ARG:O	2.14	0.47
4:E:131:GLU:HG2	6:E:368:HOH:O	2.13	0.47
3:D:92:VAL:HG23	3:D:94:MET:CE	2.44	0.47
2:B:36:GLU:HB2	2:B:83:ASN:HB3	1.97	0.46
4:E:216:LEU:HD13	4:E:229:PRO:HG2	1.96	0.46
4:E:150:TYR:CD1	4:E:150:TYR:C	2.90	0.46
1:A:220:ASP:OD2	1:A:256:ARG:HD2	2.16	0.46
1:A:72:GLN:NE2	4:E:51:ASN:HD22	2.10	0.46
1:A:202:ARG:HD3	1:A:244:TRP:CE3	2.51	0.45
4:E:10:HIS:HD2	4:E:153:HIS:ND1	2.14	0.45
3:D:2:GLN:HE21	3:D:94:MET:HE1	1.82	0.45
3:D:13:VAL:HG21	3:D:19:LEU:HD21	1.99	0.45
1:A:218:GLN:HA	1:A:223:ASP:HA	1.99	0.45
4:E:126:VAL:HG23	4:E:236:ALA:HB3	1.99	0.45
2:B:2:GLN:HB2	6:B:128:HOH:O	2.16	0.45
3:D:191:ASN:OD1	3:D:191:ASN:N	2.50	0.45
4:E:150:TYR:O	4:E:187:TYR:HE2	1.99	0.44
4:E:62:SER:HB3	4:E:65:PHE:HD1	1.83	0.44
1:A:5:MET:O	1:A:100:GLY:HA3	2.17	0.44
2:B:51:HIS:HD2	2:B:52:SER:O	2.00	0.44
4:E:26:ILE:O	4:E:29:HIS:HB2	2.18	0.43
1:A:72:GLN:HE22	1:A:75:ARG:HH11	1.65	0.43
4:E:228:LYS:HD2	4:E:230:VAL:CG1	2.49	0.43
4:E:219:ASN:HB3	6:E:332:HOH:O	2.17	0.43
3:D:94:MET:HE3	3:D:101:ILE:HD12	2.00	0.43
3:D:50:ILE:HD11	3:D:64:ALA:HB1	2.00	0.43
4:E:151:PRO:HB2	6:E:362:HOH:O	2.18	0.43
1:A:260:HIS:HB3	6:A:311:HOH:O	2.18	0.43
3:D:155:TYR:O	3:D:176:ALA:HA	2.18	0.43
4:E:31:ARG:O	4:E:94:SER:HA	2.19	0.43
2:B:25:CYS:HB2	2:B:39:LEU:HD21	2.01	0.43
4:E:62:SER:HB3	4:E:65:PHE:CD1	2.53	0.43
1:A:133:TRP:HB2	1:A:144:LYS:HG3	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:68:LYS:O	1:A:71:SER:HB3	2.19	0.42
2:B:22:PHE:CE1	2:B:69:GLU:HG3	2.55	0.42
4:E:93:ALA:HB2	4:E:104:PHE:CD2	2.54	0.42
4:E:172:ASP:HB2	4:E:189:LEU:HD12	2.01	0.42
4:E:129:PRO:HD3	4:E:142:LEU:HG	2.00	0.42
4:E:10:HIS:CE1	4:E:155:GLU:OE2	2.71	0.41
3:D:70:SER:HB3	3:D:72:ARG:HG3	2.01	0.41
1:A:111:ARG:HD3	1:A:128:GLU:HG3	2.03	0.41
4:E:71:LYS:HE2	6:E:363:HOH:O	2.19	0.41
1:A:187:THR:HB	1:A:272:LEU:HD21	2.02	0.41
2:B:23:LEU:O	2:B:67:TYR:HA	2.21	0.41
3:D:164:MET:HE2	3:D:167:MET:HE3	2.03	0.41
3:D:99:LYS:HD3	4:E:45:PHE:CD2	2.56	0.40
1:A:193:PRO:O	1:A:194:ILE:HB	2.21	0.40
2:B:21:ASN:HB3	2:B:70:PHE:CE2	2.57	0.40
3:D:18:ASN:ND2	3:D:79:ALA:H	2.18	0.40
4:E:36:ARG:HB2	4:E:46:LEU:HD11	2.03	0.40

There are no symmetry-related clashes.

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	272/275 (99%)	260 (96%)	11 (4%)	1 (0%)	30	43
2	B	98/100 (98%)	95 (97%)	3 (3%)	0	100	100
3	D	192/207 (93%)	187 (97%)	5 (3%)	0	100	100
4	E	240/244 (98%)	234 (98%)	6 (2%)	0	100	100
5	C	8/10 (80%)	8 (100%)	0	0	100	100
All	All	810/836 (97%)	784 (97%)	25 (3%)	1 (0%)	48	64

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	193	PRO

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	230/231 (100%)	213 (93%)	17 (7%)	13	22
2	B	95/95 (100%)	94 (99%)	1 (1%)	65	82
3	D	172/185 (93%)	163 (95%)	9 (5%)	21	36
4	E	213/215 (99%)	203 (95%)	10 (5%)	23	41
5	C	9/9 (100%)	8 (89%)	1 (11%)	6	9
All	All	719/735 (98%)	681 (95%)	38 (5%)	20	36

All (38) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	76	GLU
1	A	79	ARG
1	A	111	ARG
1	A	115	GLN
1	A	138	MET
1	A	152	VAL
1	A	154	GLU
1	A	160	LEU
1	A	169	ARG
1	A	177	GLU
1	A	181	ARG
1	A	182	THR
1	A	183	ASP
1	A	200	THR
1	A	226	GLN
1	A	247	VAL
1	A	268	LYS

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Mol	Chain	Res	Type
2	B	65	LEU
3	D	1	LYS
3	D	28	SER
3	D	42	LYS
3	D	49	LEU
3	D	51	GLN
3	D	52	SER
3	D	100	LEU
3	D	187	ASN
3	D	191	ASN
4	E	9	ARG
4	E	17	GLN
4	E	39	LEU
4	E	48	TYR
4	E	59	ARG
4	E	76	THR
4	E	109	ARG
4	E	120	PHE
4	E	170	CYS
4	E	223	THR
5	C	1	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (32) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	3	HIS
1	A	72	GLN
1	A	93	HIS
1	A	114	HIS
1	A	115	GLN
1	A	151	HIS
1	A	180	GLN
1	A	188	HIS
1	A	191	HIS
1	A	197	HIS
1	A	218	GLN
1	A	224	GLN
1	A	226	GLN
2	B	2	GLN
2	B	8	GLN
2	B	24	ASN
2	B	42	ASN

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Mol	Chain	Res	Type
2	B	51	HIS
3	D	18	ASN
3	D	51	GLN
3	D	145	ASN
3	D	190	ASN
4	E	10	HIS
4	E	17	GLN
4	E	41	GLN
4	E	50	GLN
4	E	51	ASN
4	E	118	ASN
4	E	138	GLN
4	E	174	GLN
4	E	206	HIS
4	E	224	GLN

5.3.3 RNA ⓘ

There are no RNA molecules 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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

There are no ligands in this entry.

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, 95th 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 ²)	Q<0.9
1	A	274/275 (99%)	-0.31	2 (0%) 84 81	17, 26, 40, 50	0
2	B	100/100 (100%)	-0.34	0 100 100	17, 23, 42, 56	0
3	D	194/207 (93%)	0.03	10 (5%) 33 29	18, 29, 65, 87	0
4	E	242/244 (99%)	-0.25	2 (0%) 82 80	18, 27, 39, 65	0
5	C	10/10 (100%)	-0.56	0 100 100	16, 20, 26, 26	0
All	All	820/836 (98%)	-0.22	14 (1%) 69 65	16, 27, 47, 87	0

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	D	193	ILE	8.1
3	D	194	ILE	4.6
3	D	183	PHE	4.0
3	D	186	ALA	3.4
4	E	2	THR	2.8
4	E	150	TYR	2.6
3	D	40	PRO	2.5
3	D	192	SER	2.5
3	D	130	SER	2.3
1	A	193	PRO	2.3
3	D	129	SER	2.3
3	D	182	ASP	2.3
3	D	184	ALA	2.2
1	A	194	ILE	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.