Full wwPDB X-ray Structure Validation Report ⓘ

Nov 2, 2021 – 05:04 am GMT

PDB ID	:	7OO2
Title	:	Crystal structure of an antibody targeting the capsular polysaccharide of serogroup X Neisseria meningitidis (MenX)
Authors	:	Pietri, G.P.; de Ruyck, J.; Lenac, T.; Adamo, R.; Bouckaert, J.
Deposited on	:	2021-05-26
Resolution	:	2.16 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 following versions of software and data (see references ⓘ) were used in the production of this report:

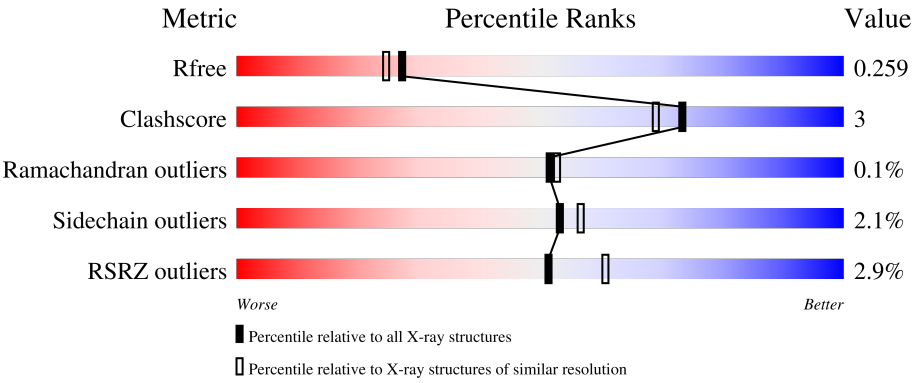
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.23.2
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0267
CCP4	:	7.1.010 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.16 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	1479 (2.16-2.16)
Clashscore	141614	1585 (2.16-2.16)
Ramachandran outliers	138981	1560 (2.16-2.16)
Sidechain outliers	138945	1559 (2.16-2.16)
RSRZ outliers	127900	1456 (2.16-2.16)

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 <=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	227	5% 86% 8%
1	C	227	5% 90% 6%
2	B	214	% 90% 9%
2	D	214	92% 7%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 13392 atoms, of which 6384 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.

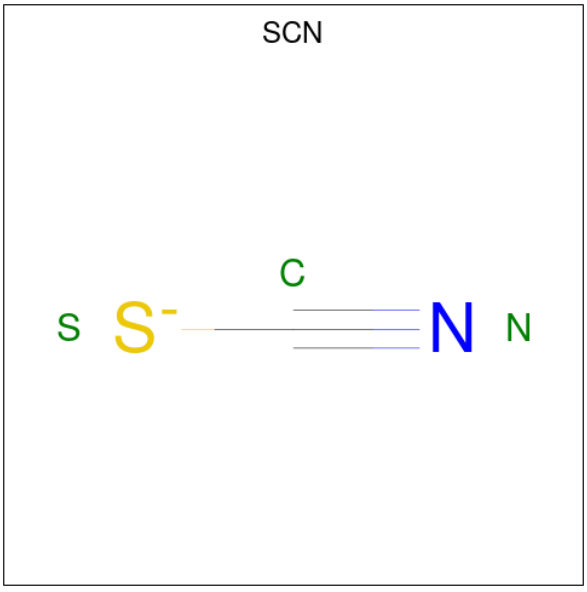
- Molecule 1 is a protein called anti-MenX Fab heavy chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	218	Total	C	H	N	O	S	0	0	0
			3245	1032	1611	274	320	8			
1	C	218	Total	C	H	N	O	S	0	0	0
			3245	1032	1611	274	320	8			

- Molecule 2 is a protein called anti-MenX Fab light chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	214	Total	C	H	N	O	S	0	1	0
			3246	1034	1583	271	350	8			
2	D	214	Total	C	H	N	O	S	0	0	0
			3236	1030	1579	271	348	8			

- Molecule 3 is THIOCYANATE ION (three-letter code: SCN) (formula: CNS).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total C N S 3 1 1 1	0	0
3	B	1	Total C N S 3 1 1 1	0	0
3	D	1	Total C N S 3 1 1 1	0	0

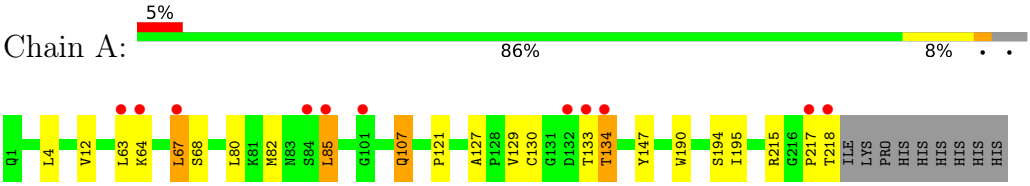
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	105	Total O 105 105	0	0
4	B	108	Total O 108 108	0	0
4	C	93	Total O 93 93	0	0
4	D	105	Total O 105 105	0	0

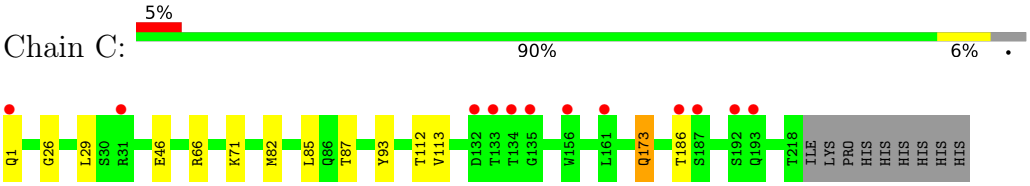
3 Residue-property plots (i)

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.

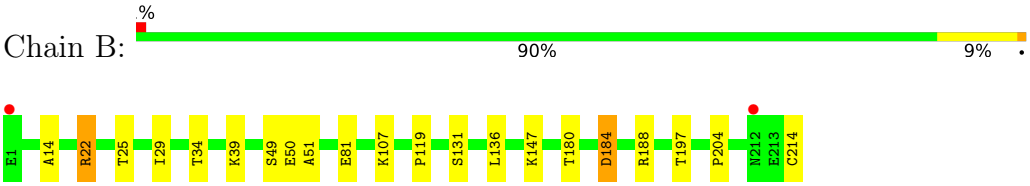
• Molecule 1: anti-MenX Fab heavy chain



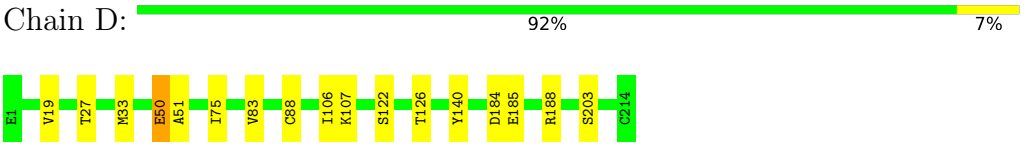
• Molecule 1: anti-MenX Fab heavy chain



• Molecule 2: anti-MenX Fab light chain



• Molecule 2: anti-MenX Fab light chain



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	83.01Å 85.35Å 123.27Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.49 – 2.16 49.49 – 2.16	Depositor EDS
% Data completeness (in resolution range)	99.8 (49.49-2.16) 95.0 (49.49-2.16)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.29 (at 2.16Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.213 , 0.262 0.210 , 0.259	Depositor DCC
R_{free} test set	1995 reflections (4.18%)	wwPDB-VP
Wilson B-factor (Å^2)	52.4	Xtriage
Anisotropy	0.046	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	(Not available) , (Not available)	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.014 for k,h,-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	13392	wwPDB-VP
Average B, all atoms (Å^2)	71.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.02% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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

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

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	0.28	0/1676	0.54	0/2289
1	C	0.30	0/1676	0.55	0/2289
2	B	0.30	0/1702	0.55	0/2317
2	D	0.29	0/1693	0.53	0/2305
All	All	0.29	0/6747	0.54	0/9200

There are no bond length outliers.

There are no bond angle outliers.

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	1634	1611	1611	12	0
1	C	1634	1611	1611	9	0
2	B	1663	1583	1585	17	0
2	D	1657	1579	1579	9	0
3	B	6	0	0	0	0
3	D	3	0	0	0	0
4	A	105	0	0	2	1
4	B	108	0	0	2	0
4	C	93	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	105	0	0	2	1
All	All	7008	6384	6386	43	1

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 3.

All (43) 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)
2:B:184:ASP:OD1	1:C:87:THR:OG1	1.97	0.81
2:D:185:GLU:OE1	4:D:401:HOH:O	2.02	0.78
1:A:4:LEU:O	4:A:301:HOH:O	2.04	0.74
1:A:107:GLN:NE2	4:A:301:HOH:O	2.26	0.68
2:D:122:SER:O	2:D:126:THR:HG23	1.96	0.66
1:A:129:VAL:HG12	2:B:119:PRO:HD3	1.84	0.59
1:C:1:GLN:O	1:C:26:GLY:HA3	2.03	0.59
2:D:27:THR:OG1	4:D:402:HOH:O	2.17	0.58
1:A:67:LEU:HD13	1:A:68:SER:N	2.20	0.56
2:B:39:LYS:NZ	2:B:81:GLU:O	2.34	0.55
1:C:29:LEU:HB3	1:C:71:LYS:HD2	1.90	0.54
1:C:46:GLU:OE1	4:C:301:HOH:O	2.19	0.53
1:A:12:VAL:HG11	1:A:85:LEU:HD22	1.93	0.50
1:A:127:ALA:O	1:A:215:ARG:NH1	2.45	0.50
1:C:112:THR:OG1	4:C:302:HOH:O	2.20	0.49
2:B:180:THR:HG23	4:B:431:HOH:O	2.12	0.49
2:D:184:ASP:OD2	2:D:188:ARG:NH1	2.46	0.49
2:B:197:THR:HG22	2:B:204:PRO:HB3	1.96	0.47
2:B:25:THR:HG21	2:B:29:ILE:HD13	1.95	0.47
1:A:129:VAL:CG1	2:B:119:PRO:HD3	2.45	0.47
1:C:82:MET:HE1	1:C:93:TYR:OH	2.15	0.46
2:B:34:THR:HG22	2:B:49:SER:HA	1.97	0.45
2:B:184:ASP:OD2	1:C:87:THR:HB	2.17	0.45
2:D:50:GLU:O	2:D:51:ALA:HB3	2.16	0.45
1:A:67:LEU:HD21	1:A:80:LEU:HD11	1.97	0.45
2:B:184:ASP:OD2	2:B:188:ARG:NH2	2.51	0.44
1:A:121:PRO:HB3	1:A:147:TYR:HB3	2.00	0.44
1:A:190:TRP:CD1	1:A:195:ILE:HD12	2.52	0.44
2:B:22:ARG:CZ	2:B:22:ARG:HB2	2.47	0.44
1:A:217:PRO:O	1:A:218:THR:CB	2.67	0.43
2:B:147:LYS:HB2	2:B:147:LYS:NZ	2.34	0.43
2:D:107:LYS:HA	2:D:140:TYR:OH	2.19	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:14:ALA:HA	2:B:107:LYS:HB2	2.01	0.42
2:B:50:GLU:O	2:B:51:ALA:HB3	2.19	0.42
2:B:136:LEU:HD12	2:B:136:LEU:N	2.35	0.42
2:B:197:THR:HG23	4:B:465:HOH:O	2.19	0.41
2:D:33:MET:SD	2:D:88:CYS:HB2	2.60	0.41
2:D:83:VAL:CG1	2:D:106:ILE:HG12	2.50	0.41
1:C:85:LEU:HD23	1:C:113:VAL:HG22	2.02	0.41
2:D:19:VAL:HB	2:D:75:ILE:HB	2.03	0.41
2:B:131:SER:OG	2:B:180:THR:HG22	2.21	0.40
1:C:173:GLN:HA	1:C:173:GLN:HE21	1.86	0.40
1:A:133:THR:O	1:A:134:THR:C	2.60	0.40

All (1) 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)
4:A:387:HOH:O	4:D:487:HOH:O[4_544]	2.13	0.07

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	216/227 (95%)	205 (95%)	10 (5%)	1 (0%)	29 22
1	C	216/227 (95%)	210 (97%)	6 (3%)	0	100 100
2	B	213/214 (100%)	206 (97%)	7 (3%)	0	100 100
2	D	212/214 (99%)	200 (94%)	12 (6%)	0	100 100
All	All	857/882 (97%)	821 (96%)	35 (4%)	1 (0%)	51 53

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	134	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	A	187/196 (95%)	179 (96%)	8 (4%)	29	27
1	C	187/196 (95%)	184 (98%)	3 (2%)	62	67
2	B	193/192 (100%)	190 (98%)	3 (2%)	62	67
2	D	192/192 (100%)	190 (99%)	2 (1%)	76	81
All	All	759/776 (98%)	743 (98%)	16 (2%)	53	57

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	63	LEU
1	A	64	LYS
1	A	67	LEU
1	A	82	MET
1	A	85	LEU
1	A	107	GLN
1	A	130	CYS
1	A	194	SER
2	B	22	ARG
2	B	184	ASP
2	B	214	CYS
1	C	66	ARG
1	C	173	GLN
1	C	186	THR
2	D	50	GLU
2	D	203	SER

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

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 monosaccharides in this entry.

5.6 Ligand geometry

3 ligands are 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	$\#\|Z\| > 2$
3	SCN	D	301	-	1,2,2	0.96	0	0,1,1	-	-
3	SCN	B	302	-	1,2,2	0.94	0	0,1,1	-	-
3	SCN	B	301	-	1,2,2	0.92	0	0,1,1	-	-

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.

No monomer is involved in short contacts.

5.7 Other polymers

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^{th} 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	218/227 (96%)	0.53	11 (5%) 28 37	43, 69, 100, 157	0
1	C	218/227 (96%)	0.51	12 (5%) 25 34	42, 64, 93, 121	0
2	B	214/214 (100%)	0.23	2 (0%) 84 88	40, 59, 88, 102	0
2	D	214/214 (100%)	0.12	0 100 100	38, 55, 81, 106	0
All	All	864/882 (97%)	0.35	25 (2%) 51 61	38, 62, 91, 157	0

All (25) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	133	THR	7.3
1	A	218	THR	5.7
1	C	132	ASP	5.2
1	C	1	GLN	4.8
1	C	133	THR	4.6
1	A	132	ASP	4.0
1	C	193	GLN	3.9
1	C	192	SER	3.8
1	A	63	LEU	3.7
1	C	187	SER	3.6
1	A	217	PRO	3.5
1	C	135	GLY	3.3
1	A	101	GLY	3.1
1	A	85	LEU	3.1
1	A	84	SER	3.1
1	C	31	ARG	3.0
1	A	134	THR	3.0
1	A	64	LYS	2.9
1	A	67	LEU	2.9
1	C	161	LEU	2.8
2	B	212	ASN	2.6

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Mol	Chain	Res	Type	RSRZ
1	C	156	TRP	2.4
2	B	1	GLU	2.2
1	C	186	THR	2.2
1	C	134	THR	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 (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^{th} 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^2)	Q<0.9
3	SCN	B	301	3/3	0.82	0.25	89,89,99,99	0
3	SCN	B	302	3/3	0.83	0.18	78,78,87,96	0
3	SCN	D	301	3/3	0.87	0.25	74,74,74,78	0

6.5 Other polymers (i)

There are no such residues in this entry.