Full wwPDB X-ray Structure Validation Report ⓘ

Nov 13, 2023 – 08:35 PM JST

PDB ID	:	5XZO
Title	:	Crystal structure of GH10 xylanase XYL10C from Bispora. sp MEY-1
Authors	:	You, S.; Chen, C.; Tu, T.; Guo, R.T.; Luo, H.; Yao, B.
Deposited on	:	2017-07-13
Resolution	:	1.50 Å(reported)

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

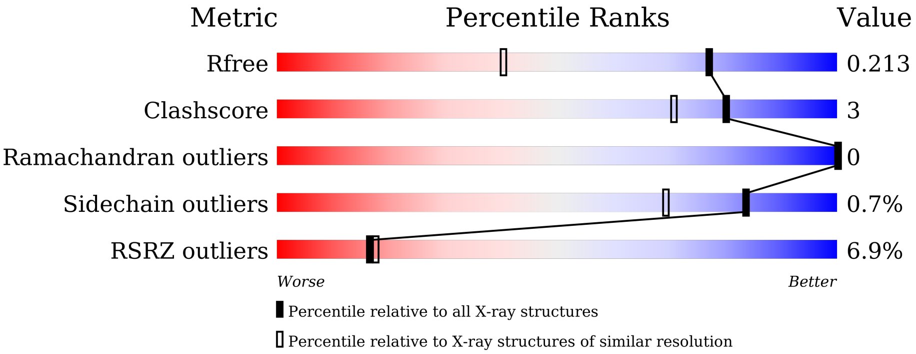
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance

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

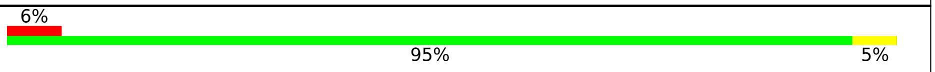
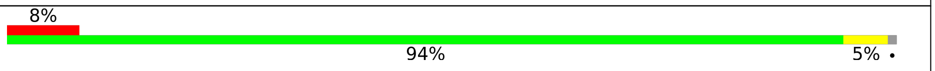
The reported resolution of this entry is 1.50 Å.

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	2936 (1.50-1.50)
Clashscore	141614	3144 (1.50-1.50)
Ramachandran outliers	138981	3066 (1.50-1.50)
Sidechain outliers	138945	3064 (1.50-1.50)
RSRZ outliers	127900	2884 (1.50-1.50)

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	335	
1	B	335	

2 Entry composition (i)

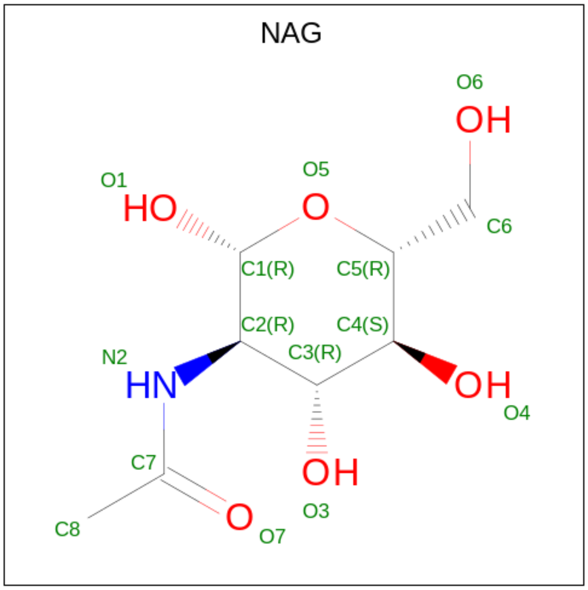
There are 3 unique types of molecules in this entry. The entry contains 6138 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Beta-xylanase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	335	2657	1695	432	520	10	0	0	0
1	B	333	2638	1684	427	517	10	0	0	0

- Molecule 2 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	14	8	1	5	0	0
2	A	1	14	8	1	5	0	0
2	A	1	14	8	1	5	0	0
2	B	1	14	8	1	5	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total C N O 14 8 1 5	0	0

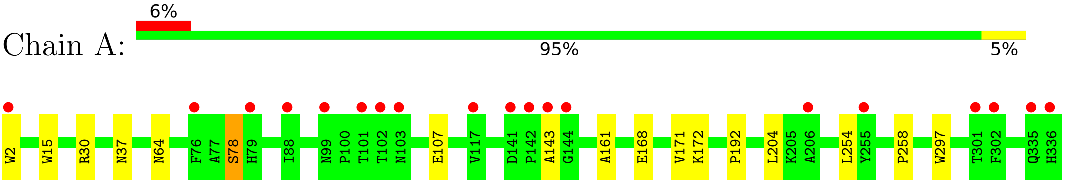
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	413	Total O 413 413	0	0
3	B	360	Total O 360 360	0	0

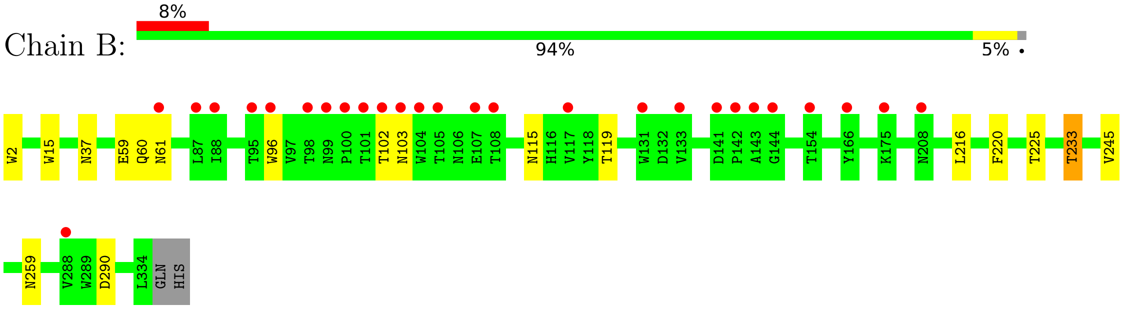
3 Residue-property plots ⓘ

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: Beta-xylanase



- Molecule 1: Beta-xylanase



4 Data and refinement statistics

Property	**Value**	**Source**
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	135.46Å 83.26Å 65.28Å 90.00° 94.49° 90.00°	Depositor
Resolution (Å)	24.85 – 1.50 24.85 – 1.50	Depositor EDS
% Data completeness (in resolution range)	98.7 (24.85-1.50) 98.6 (24.85-1.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	5.56 (at 1.50Å)	Xtriage
Refinement program	PHENIX (1.11_2567)	Depositor
R, R_{free}	0.188 , 0.213 0.187 , 0.213	Depositor DCC
R_{free} test set	5778 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å^2)	20.2	Xtriage
Anisotropy	0.070	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 44.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	6138	wwPDB-VP
Average B, all atoms (Å^2)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.75% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: NAG

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	0.38	0/2733	0.58	0/3738
1	B	0.35	0/2713	0.56	0/3711
All	All	0.37	0/5446	0.57	0/7449

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	**Chain**	**#Chirality outliers**	**#Planarity outliers**
1	A	0	1
1	B	0	1
All	All	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	**Chain**	**Res**	**Type**	**Group**
1	A	15	TRP	Peptide
1	B	15	TRP	Peptide

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	2657	0	2475	16	0
1	B	2638	0	2461	11	0
2	A	42	0	39	2	0
2	B	28	0	26	4	0
3	A	413	0	0	6	2
3	B	360	0	0	3	1
All	All	6138	0	5001	28	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 3.

All (28) 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:172:LYS:NZ	3:A:501:HOH:O	1.91	0.93
1:B:37:ASN:HD22	2:B:402:NAG:H83	1.36	0.88
1:A:37:ASN:HD22	2:A:403:NAG:H83	1.52	0.74
1:A:107:GLU:OE2	3:A:502:HOH:O	2.07	0.70
2:B:402:NAG:H81	3:B:774:HOH:O	1.96	0.65
1:B:115:ASN:O	1:B:119:THR:HG23	1.98	0.64
1:A:64:ASN:HD22	2:A:401:NAG:H83	1.64	0.62
1:A:2:TRP:N	3:A:505:HOH:O	2.33	0.60
1:B:2:TRP:N	3:B:502:HOH:O	2.34	0.60
1:A:172:LYS:NZ	1:A:172:LYS:HB3	2.23	0.54
1:A:168:GLU:O	1:A:171:VAL:HG22	2.11	0.51
1:B:60:GLN:HG2	1:B:61:ASN:ND2	2.25	0.50
1:A:30:ARG:HG3	3:A:766:HOH:O	2.12	0.49
1:A:172:LYS:HB3	1:A:172:LYS:HZ3	1.78	0.47
1:B:37:ASN:ND2	2:B:402:NAG:H83	2.17	0.47
1:A:168:GLU:HA	1:A:171:VAL:HG22	1.97	0.47
1:B:216:LEU:HD11	1:B:245:VAL:HG21	1.96	0.46
1:A:143:ALA:HB3	1:A:192:PRO:HB2	1.99	0.44
1:A:254:LEU:HD22	1:A:258:PRO:HB3	2.01	0.43
1:A:172:LYS:NZ	1:A:172:LYS:CB	2.82	0.43
1:B:220:PHE:CD2	1:B:225:THR:HG23	2.55	0.42
1:B:59:GLU:HA	1:B:96:TRP:CD1	2.55	0.42
1:A:78:SER:HB2	3:A:597:HOH:O	2.20	0.41
1:A:172:LYS:HD3	3:A:807:HOH:O	2.21	0.41
1:B:102:THR:OG1	1:B:103:ASN:N	2.54	0.41
1:A:161:ALA:HA	1:A:204:LEU:HD21	2.03	0.40
1:B:233:THR:HG22	3:B:659:HOH:O	2.20	0.40
1:B:259:ASN:ND2	2:B:401:NAG:H83	2.36	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	Interatomic distance (Å)	Clash overlap (Å)
3:A:841:HOH:O	3:B:548:HOH:O[4_555]	2.04	0.16
3:A:837:HOH:O	3:A:837:HOH:O[2_556]	2.16	0.04

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	333/335 (99%)	327 (98%)	6 (2%)	0	100	100
1	B	331/335 (99%)	324 (98%)	7 (2%)	0	100	100
All	All	664/670 (99%)	651 (98%)	13 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	281/281 (100%)	279 (99%)	2 (1%)	84	69
1	B	279/281 (99%)	277 (99%)	2 (1%)	84	69
All	All	560/562 (100%)	556 (99%)	4 (1%)	84	69

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	78	SER
1	A	297	TRP
1	B	233	THR
1	B	290	ASP

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

Mol	Chain	Res	Type
1	A	99	ASN
1	B	61	ASN
1	B	115	ASN

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 ⓘ

5 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	$\#\|Z\| > 2$
2	NAG	A	403	1	14,14,15	0.33	0	17,19,21	0.52	0
2	NAG	A	402	1	14,14,15	0.26	0	17,19,21	0.34	0
2	NAG	A	401	1	14,14,15	0.31	0	17,19,21	0.36	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
2	NAG	B	402	1	14,14,15	0.47	0	17,19,21	0.75	0
2	NAG	B	401	1	14,14,15	0.47	0	17,19,21	0.37	0

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
2	NAG	A	403	1	-	2/6/23/26	0/1/1/1
2	NAG	A	402	1	-	2/6/23/26	0/1/1/1
2	NAG	A	401	1	-	4/6/23/26	0/1/1/1
2	NAG	B	402	1	-	2/6/23/26	0/1/1/1
2	NAG	B	401	1	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	NAG	O5-C5-C6-O6
2	A	401	NAG	C4-C5-C6-O6
2	A	401	NAG	C8-C7-N2-C2
2	A	401	NAG	O7-C7-N2-C2
2	A	402	NAG	C8-C7-N2-C2
2	A	402	NAG	O7-C7-N2-C2
2	A	403	NAG	C8-C7-N2-C2
2	A	403	NAG	O7-C7-N2-C2
2	B	401	NAG	C8-C7-N2-C2
2	B	401	NAG	O7-C7-N2-C2
2	B	402	NAG	C8-C7-N2-C2
2	B	402	NAG	O7-C7-N2-C2

There are no ring outliers.

4 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	403	NAG	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	401	NAG	1	0
2	B	402	NAG	3	0
2	B	401	NAG	1	0

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, 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	335/335 (100%)	0.13	19 (5%)	23	25	14, 20, 33, 50	0
1	B	333/335 (99%)	0.39	27 (8%)	12	12	15, 24, 43, 58	0
All	All	668/670 (99%)	0.26	46 (6%)	16	17	14, 22, 41, 58	0

All (46) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	101	THR	7.7
1	B	99	ASN	5.1
1	B	103	ASN	4.7
1	A	101	THR	4.6
1	B	102	THR	4.6
1	B	108	THR	4.5
1	B	143	ALA	4.5
1	B	104	TRP	4.3
1	A	99	ASN	4.0
1	A	141	ASP	4.0
1	B	141	ASP	4.0
1	B	142	PRO	3.5
1	B	208	ASN	3.4
1	B	95	THR	3.4
1	A	143	ALA	3.4
1	B	144	GLY	3.3
1	A	302	PHE	3.2
1	A	102	THR	3.1
1	A	301	THR	3.1
1	B	288	VAL	2.9
1	A	103	ASN	2.9
1	A	142	PRO	2.8
1	B	61	ASN	2.8
1	B	105	THR	2.7

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Mol	Chain	Res	Type	RSRZ
1	B	96	TRP	2.6
1	B	154	THR	2.6
1	A	335	GLN	2.6
1	A	79	HIS	2.6
1	B	133	VAL	2.6
1	B	98	THR	2.5
1	B	87	LEU	2.4
1	B	166	TYR	2.4
1	A	117	VAL	2.4
1	A	2	TRP	2.4
1	A	88	ILE	2.4
1	A	336	HIS	2.3
1	B	117	VAL	2.3
1	A	76	PHE	2.3
1	B	175	LYS	2.3
1	B	88	ILE	2.2
1	A	144	GLY	2.2
1	A	255	TYR	2.2
1	B	131	TRP	2.1
1	B	107	GLU	2.0
1	A	206	ALA	2.0
1	B	100	PRO	2.0

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 monosaccharides 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. The B-factors column lists the minimum, median, 95th 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
2	NAG	A	401	14/15	0.79	0.23	38,42,49,53	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\AA^2$)	Q<0.9
2	NAG	A	403	14/15	0.81	0.17	29,33,36,37	0
2	NAG	A	402	14/15	0.82	0.22	35,42,47,48	0
2	NAG	B	401	14/15	0.84	0.20	30,34,37,38	0
2	NAG	B	402	14/15	0.93	0.08	17,24,28,28	0

6.5 Other polymers ⓘ

There are no such residues in this entry.