



# Full wwPDB X-ray Structure Validation Report ⓘ

Dec 16, 2023 – 11:39 PM EST

PDB ID : 3FBX  
Title : Crystal structure of the lysosomal 66.3 kDa protein from mouse solved by S-SAD  
Authors : Lakomek, K.; Dickmanns, A.; Mueller, U.; Ficner, R.  
Deposited on : 2008-11-20  
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](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  
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

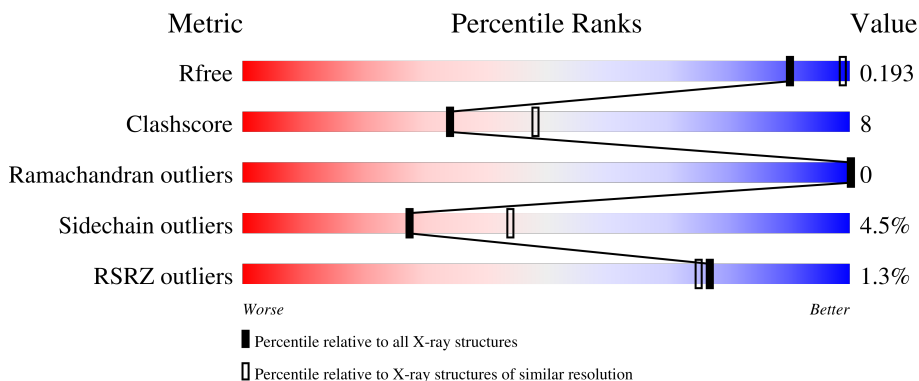
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

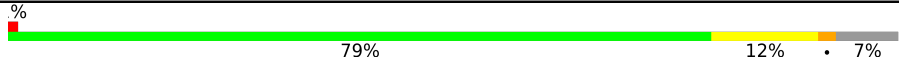
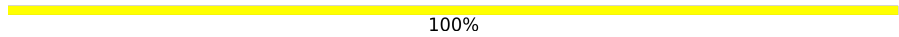
The reported resolution of this entry is 2.40 Å.

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))
$R_{free}$	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (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  $\geq 3$ , 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	559	 79% 12% 7%
2	B	2	 100%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	XE	A	607	-	-	X	-
8	PGE	A	22	-	-	X	-

## 2 Entry composition i

There are 10 unique types of molecules in this entry. The entry contains 4616 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 Putative phospholipase B-like 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	520	4192	2694	702	774	22	0	5	0

There are 11 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	595	GLY	-	expression tag	UNP Q3TCN2
A	596	ARG	-	expression tag	UNP Q3TCN2
A	597	GLY	-	expression tag	UNP Q3TCN2
A	598	SER	-	expression tag	UNP Q3TCN2
A	599	HIS	-	expression tag	UNP Q3TCN2
A	600	HIS	-	expression tag	UNP Q3TCN2
A	601	HIS	-	expression tag	UNP Q3TCN2
A	602	HIS	-	expression tag	UNP Q3TCN2
A	603	HIS	-	expression tag	UNP Q3TCN2
A	604	HIS	-	expression tag	UNP Q3TCN2
A	605	GLY	-	expression tag	UNP Q3TCN2

- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



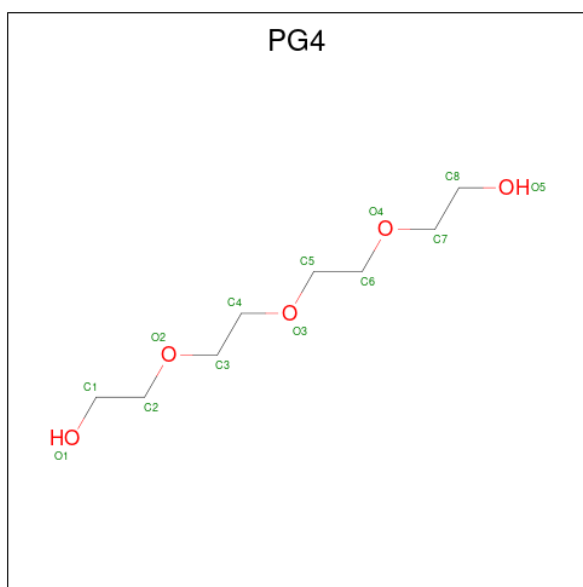
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	B	2	28	16	2	10	0	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



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

- Molecule 4 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: C<sub>8</sub>H<sub>18</sub>O<sub>5</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
4	A	1	Total	C	O	0	0
			13	8	5		

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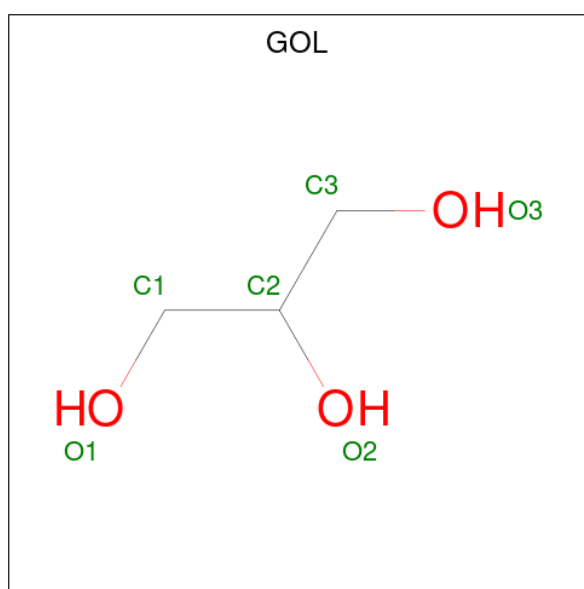
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			13	8	5		

- Molecule 5 is XENON (three-letter code: XE) (formula: Xe).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Xe	0	0
			1	1		

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



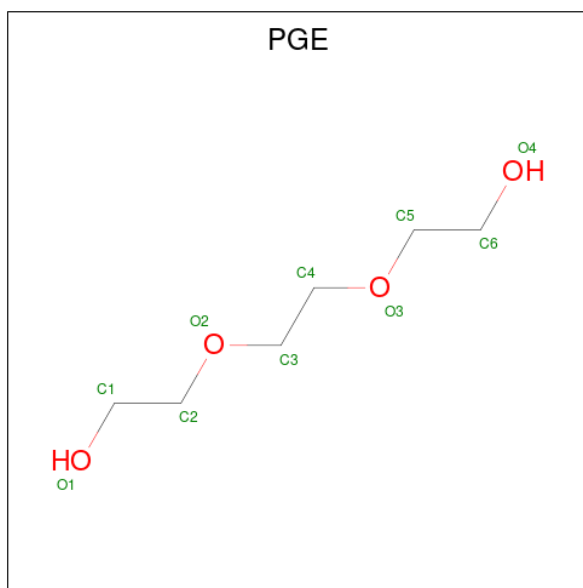
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		
6	A	1	Total	C	O	0	0
			6	3	3		

- Molecule 7 is ACETATE ION (three-letter code: ACT) (formula: C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			4	2	2		

- Molecule 8 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>4</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	C	O	0	0
			10	6	4		

- Molecule 9 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	1	Total 1	Na 1	0	0

- Molecule 10 is water.

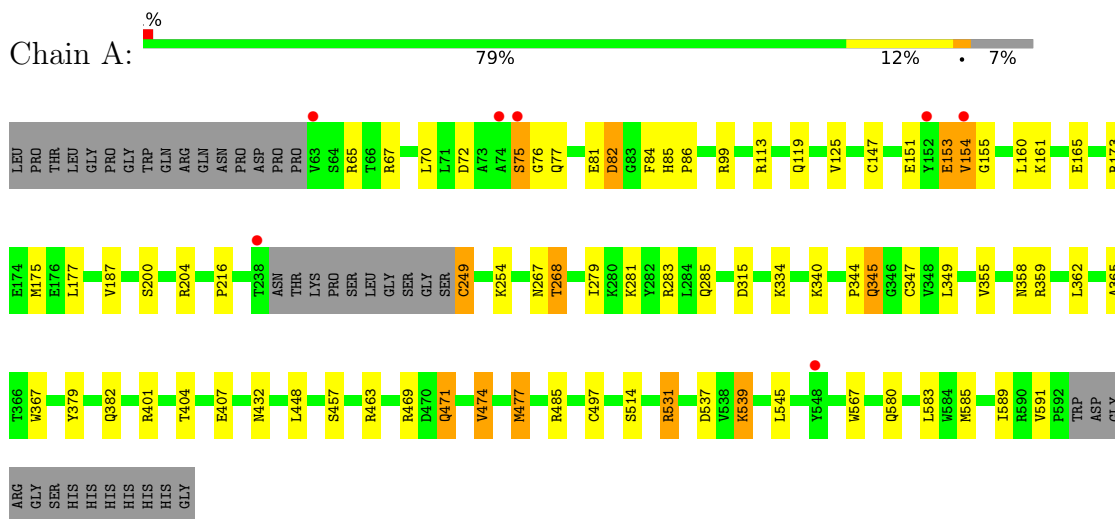
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	294	Total 294	O 294	0	0



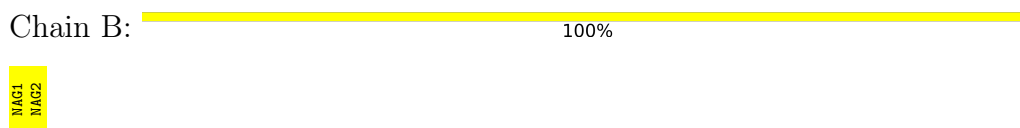
### 3 Residue-property plots [i](#)

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: Putative phospholipase B-like 2



- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	148.80Å 89.67Å 64.95Å 90.00° 98.67° 90.00°	Depositor
Resolution (Å)	32.11 – 2.40 32.11 – 2.40	Depositor EDS
% Data completeness (in resolution range)	98.1 (32.11-2.40) 98.1 (32.11-2.40)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	7.93 (at 2.39Å)	Xtrriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.156 , 0.198 0.155 , 0.193	Depositor DCC
$R_{free}$ test set	1620 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	25.8	Xtrriage
Anisotropy	0.289	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 44.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	4616	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	25.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.21% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: PG4, NAG, OCS, XE, ACT, NA, GOL, PGE

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	0.62	0/4317	0.68	0/5880

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	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	153	GLU	Peptide
1	A	154	VAL	Peptide

### 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	4192	0	4064	70	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	28	0	25	0	0
3	A	42	0	39	1	0
4	A	26	0	36	7	0
5	A	1	0	0	5	0
6	A	18	0	24	0	0
7	A	4	0	3	0	0
8	A	10	0	14	10	0
9	A	1	0	0	0	0
10	A	294	0	0	6	0
All	All	4616	0	4205	72	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 8.

All (72) 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:382:GLN:NE2	1:A:407:GLU:OE2	2.03	0.90
1:A:432:ASN:HD22	1:A:463:ARG:HH22	1.17	0.90
1:A:334:LYS:HD3	1:A:448:LEU:HD11	1.63	0.80
1:A:84:PHE:CZ	1:A:86:PRO:HG3	2.18	0.79
1:A:279:ILE:HG21	1:A:591:VAL:HG11	1.67	0.77
1:A:254:LYS:HG2	1:A:474:VAL:HG22	1.67	0.77
1:A:358:ASN:HB2	8:A:22:PGE:H12	1.67	0.76
1:A:72:ASP:O	1:A:76:GLY:HA2	1.86	0.76
1:A:355:VAL:HG13	8:A:22:PGE:H2	1.67	0.75
1:A:362:LEU:HD13	10:A:762:HOH:O	1.84	0.75
1:A:359:ARG:HG2	8:A:22:PGE:H42	1.70	0.74
1:A:75:SER:HB3	1:A:77:GLN:H	1.52	0.73
1:A:349:LEU:HD23	5:A:607:XE:XE	2.67	0.73
1:A:359:ARG:CG	8:A:22:PGE:H42	2.19	0.72
1:A:349:LEU:CD2	5:A:607:XE:XE	3.15	0.71
1:A:254:LYS:NZ	1:A:471:GLN:HE22	1.88	0.70
1:A:65:ARG:NH1	10:A:791:HOH:O	2.27	0.69
1:A:477:MET:HE1	1:A:545:LEU:HD12	1.75	0.68
1:A:334:LYS:HD3	1:A:448:LEU:CD1	2.25	0.67
1:A:358:ASN:CB	8:A:22:PGE:H12	2.24	0.66
1:A:358:ASN:ND2	1:A:367:TRP:HE1	1.93	0.66
8:A:22:PGE:H52	8:A:22:PGE:H22	1.77	0.66
1:A:279:ILE:HD13	1:A:591:VAL:HG21	1.80	0.63
1:A:344:PRO:HD3	4:A:606:PG4:H41	1.81	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:75:SER:HB3	1:A:77:GLN:N	2.16	0.61
1:A:365:ALA:O	4:A:23:PG4:H71	2.01	0.61
1:A:249:OCS:N	1:A:249:OCS:OD1	2.32	0.60
1:A:567:TRP:HE1	1:A:580:GLN:NE2	1.98	0.60
1:A:254:LYS:HZ3	1:A:471:GLN:HE22	1.50	0.59
1:A:358:ASN:HD22	1:A:367:TRP:HE1	1.49	0.59
1:A:268:THR:HG23	1:A:537:ASP:OD2	2.04	0.58
3:A:21:NAG:H82	4:A:606:PG4:H52	1.85	0.58
1:A:268:THR:HG22	1:A:539:LYS:NZ	2.18	0.57
1:A:477:MET:CE	1:A:545:LEU:HD12	2.35	0.56
1:A:268:THR:HG21	1:A:315:ASP:CG	2.27	0.55
1:A:70:LEU:HD13	1:A:81:GLU:HG3	1.91	0.53
1:A:165:GLU:HG3	1:A:216:PRO:HG3	1.92	0.51
1:A:154:VAL:N	1:A:155:GLY:HA3	2.25	0.51
1:A:432:ASN:HD22	1:A:463:ARG:NH2	1.98	0.51
1:A:151:GLU:HG2	10:A:650:HOH:O	2.12	0.50
1:A:583:LEU:HD21	1:A:585:MET:HE3	1.93	0.49
1:A:359:ARG:CG	8:A:22:PGE:C4	2.89	0.49
1:A:432:ASN:ND2	1:A:463:ARG:HH22	1.99	0.49
1:A:401:ARG:HG2	4:A:23:PG4:H12	1.93	0.49
1:A:589:ILE:HD12	1:A:591:VAL:HG23	1.94	0.48
1:A:153:GLU:HG2	10:A:771:HOH:O	2.14	0.48
1:A:175:MET:CE	1:A:187:VAL:HG12	2.44	0.48
1:A:471:GLN:O	1:A:474:VAL:HG13	2.14	0.48
1:A:349:LEU:HD21	5:A:607:XE:XE	2.92	0.47
1:A:281:LYS:HD3	1:A:283:ARG:NH2	2.30	0.47
1:A:347:CYS:HB3	5:A:607:XE:XE	2.93	0.47
1:A:340:LYS:HA	4:A:606:PG4:H72	1.97	0.46
1:A:539:LYS:HB2	1:A:539:LYS:HE2	1.70	0.46
1:A:147:CYS:HA	1:A:151:GLU:HG3	1.98	0.46
1:A:268:THR:HG22	1:A:539:LYS:HZ2	1.81	0.44
1:A:173:ARG:NH1	1:A:177:LEU:HD21	2.32	0.44
1:A:358:ASN:CB	8:A:22:PGE:C1	2.95	0.44
1:A:125:VAL:HA	1:A:200:SER:HB2	2.00	0.43
1:A:119:GLN:HE22	1:A:285:GLN:HB2	1.83	0.43
1:A:345:GLN:HE21	1:A:345:GLN:HB2	1.69	0.43
1:A:268:THR:HG23	1:A:537:ASP:CG	2.39	0.43
1:A:285:GLN:NE2	10:A:646:HOH:O	2.51	0.43
1:A:401:ARG:HA	4:A:23:PG4:H21	2.01	0.42
1:A:254:LYS:HZ2	1:A:471:GLN:HE22	1.65	0.41
1:A:359:ARG:HG3	8:A:22:PGE:C4	2.50	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:404:THR:HG23	4:A:23:PG4:H31	2.02	0.41
1:A:485:ARG:NH1	10:A:751:HOH:O	2.20	0.41
1:A:514:SER:HB3	1:A:531:ARG:HG3	2.03	0.41
1:A:477:MET:CE	1:A:545:LEU:CD1	2.99	0.41
1:A:347:CYS:CB	5:A:607:XE:XE	3.47	0.40
1:A:82:ASP:O	1:A:85:HIS:HE1	2.04	0.40
1:A:358:ASN:OD1	8:A:22:PGE:H12	2.22	0.40

There are no symmetry-related clashes.

### 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	521/559 (93%)	507 (97%)	14 (3%)	0	<b>100</b> <b>100</b>

There are no Ramachandran outliers to report.

#### 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	450/477 (94%)	430 (96%)	20 (4%)	28 45

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	67	ARG
1	A	75	SER
1	A	82	ASP
1	A	99	ARG
1	A	113	ARG
1	A	160	LEU
1	A	161	LYS
1	A	204	ARG
1	A	267	ASN
1	A	268	THR
1	A	345	GLN
1	A	379	TYR
1	A	457	SER
1	A	469	ARG
1	A	471	GLN
1	A	474	VAL
1	A	477	MET
1	A	497	CYS
1	A	531	ARG
1	A	539	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	85	HIS
1	A	119	GLN
1	A	260	HIS
1	A	285	GLN
1	A	333	ASN
1	A	343	GLN
1	A	345	GLN
1	A	354	ASN
1	A	358	ASN
1	A	432	ASN
1	A	446	GLN
1	A	451	GLN
1	A	471	GLN
1	A	491	HIS
1	A	580	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

1 non-standard protein/DNA/RNA residue is 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
1	OCS	A	249	9,1	7,8,9	0.80	0	6,11,13	1.63	1 (16%)

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
1	OCS	A	249	9,1	-	4/4/7/9	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	249	OCS	OD1-SG-CB	2.45	109.85	106.94

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	249	OCS	N-CA-CB-SG
1	A	249	OCS	CA-CB-SG-OD1
1	A	249	OCS	CA-CB-SG-OD2
1	A	249	OCS	CA-CB-SG-OD3



There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	249	OCS	1	0

## 5.5 Carbohydrates

2 monosaccharides 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	B	1	2,1	14,14,15	0.55	0	17,19,21	1.31	2 (11%)
2	NAG	B	2	2	14,14,15	0.53	0	17,19,21	1.11	1 (5%)

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	B	1	2,1	-	1/6/23/26	0/1/1/1
2	NAG	B	2	2	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1	NAG	C1-O5-C5	3.45	116.87	112.19
2	B	1	NAG	C2-N2-C7	2.50	126.46	122.90
2	B	2	NAG	O5-C5-C6	2.46	111.06	107.20

There are no chirality outliers.

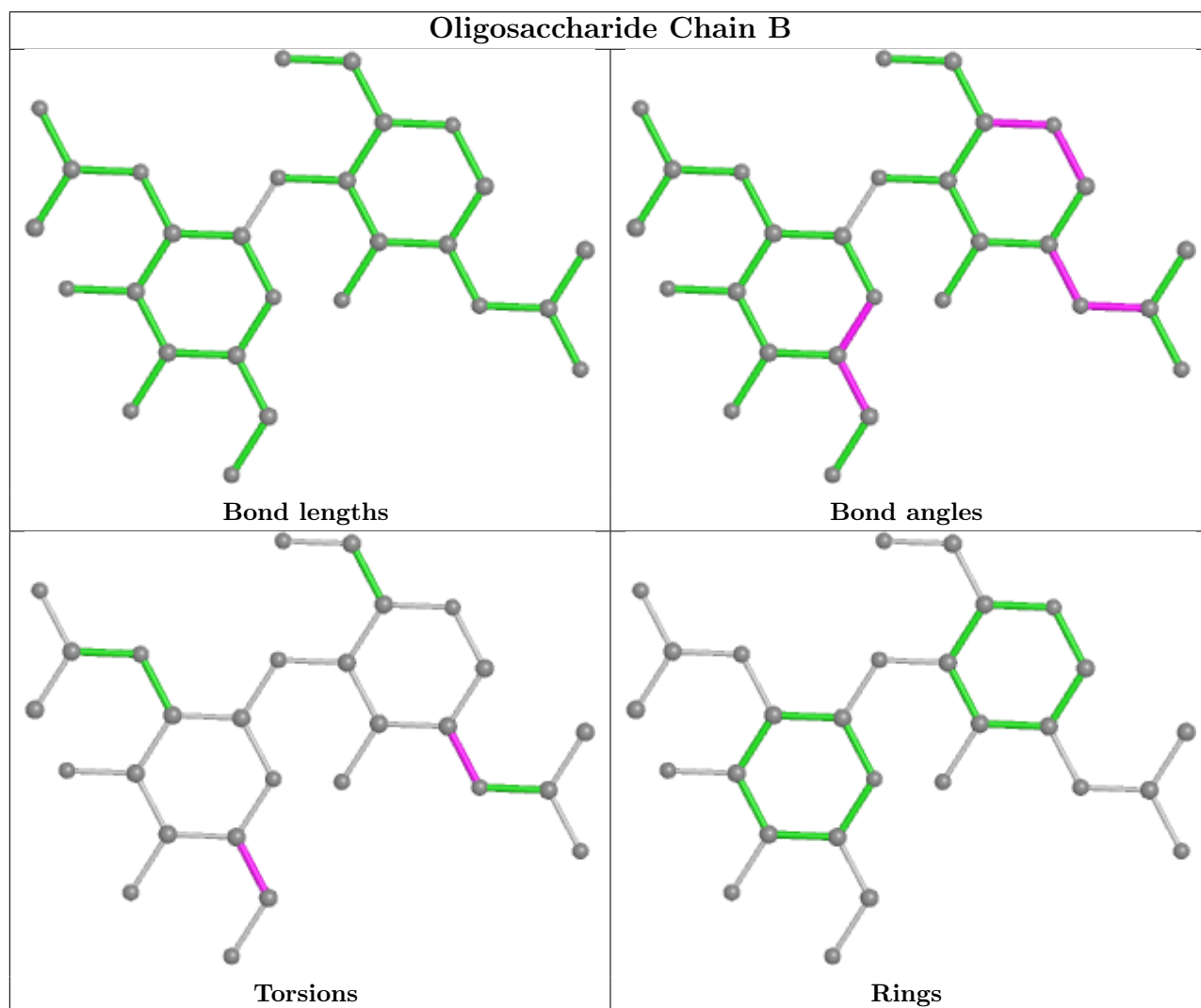
All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	2	NAG	O5-C5-C6-O6
2	B	2	NAG	C4-C5-C6-O6
2	B	1	NAG	C3-C2-N2-C7

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



## 5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 2 are monoatomic - leaving 10 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	NAG	A	31	1	14,14,15	0.55	0	17,19,21	0.84	0
6	GOL	A	1	-	5,5,5	0.43	0	5,5,5	0.54	0
7	ACT	A	608	-	3,3,3	0.78	0	3,3,3	1.43	0
4	PG4	A	606	-	12,12,12	0.66	0	11,11,11	0.53	0
8	PGE	A	22	-	9,9,9	0.56	0	8,8,8	0.86	0
3	NAG	A	41	1	14,14,15	0.71	0	17,19,21	1.03	1 (5%)
6	GOL	A	2	-	5,5,5	0.41	0	5,5,5	0.81	0
4	PG4	A	23	-	12,12,12	0.60	0	11,11,11	0.34	0
3	NAG	A	21	1	14,14,15	0.53	0	17,19,21	1.09	1 (5%)
6	GOL	A	3	-	5,5,5	0.46	0	5,5,5	0.57	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
3	NAG	A	31	1	-	0/6/23/26	0/1/1/1
6	GOL	A	1	-	-	0/4/4/4	-
4	PG4	A	606	-	-	6/10/10/10	-
8	PGE	A	22	-	-	3/7/7/7	-
3	NAG	A	41	1	-	0/6/23/26	0/1/1/1
6	GOL	A	2	-	-	2/4/4/4	-
4	PG4	A	23	-	-	7/10/10/10	-
3	NAG	A	21	1	-	2/6/23/26	0/1/1/1
6	GOL	A	3	-	-	3/4/4/4	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	21	NAG	C1-O5-C5	3.39	116.78	112.19
3	A	41	NAG	C4-C3-C2	2.31	114.40	111.02

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	3	GOL	C1-C2-C3-O3
3	A	21	NAG	C4-C5-C6-O6
4	A	23	PG4	O2-C3-C4-O3
4	A	606	PG4	O3-C5-C6-O4
3	A	21	NAG	O5-C5-C6-O6
4	A	606	PG4	O1-C1-C2-O2
4	A	23	PG4	O4-C7-C8-O5
6	A	3	GOL	O2-C2-C3-O3
4	A	23	PG4	O1-C1-C2-O2
8	A	22	PGE	O2-C3-C4-O3
6	A	2	GOL	O2-C2-C3-O3
4	A	606	PG4	O4-C7-C8-O5
4	A	606	PG4	C3-C4-O3-C5
4	A	606	PG4	C5-C6-O4-C7
4	A	23	PG4	C1-C2-O2-C3
6	A	2	GOL	C1-C2-C3-O3
4	A	23	PG4	C3-C4-O3-C5
8	A	22	PGE	C1-C2-O2-C3
4	A	606	PG4	O2-C3-C4-O3
4	A	23	PG4	C5-C6-O4-C7
6	A	3	GOL	O1-C1-C2-O2
8	A	22	PGE	O3-C5-C6-O4
4	A	23	PG4	O3-C5-C6-O4

There are no ring outliers.

4 monomers are involved in 17 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	606	PG4	3	0
8	A	22	PGE	10	0
4	A	23	PG4	4	0
3	A	21	NAG	1	0

## 5.7 Other polymers [i](#)

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, 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	519/559 (92%)	-0.50	7 (1%) 77 75	12, 22, 41, 56	0

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	152	TYR	4.3
1	A	74	ALA	3.7
1	A	548	TYR	3.0
1	A	238	THR	2.9
1	A	154	VAL	2.4
1	A	63	VAL	2.2
1	A	75	SER	2.2

### 6.2 Non-standard residues in protein, DNA, RNA chains [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<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.

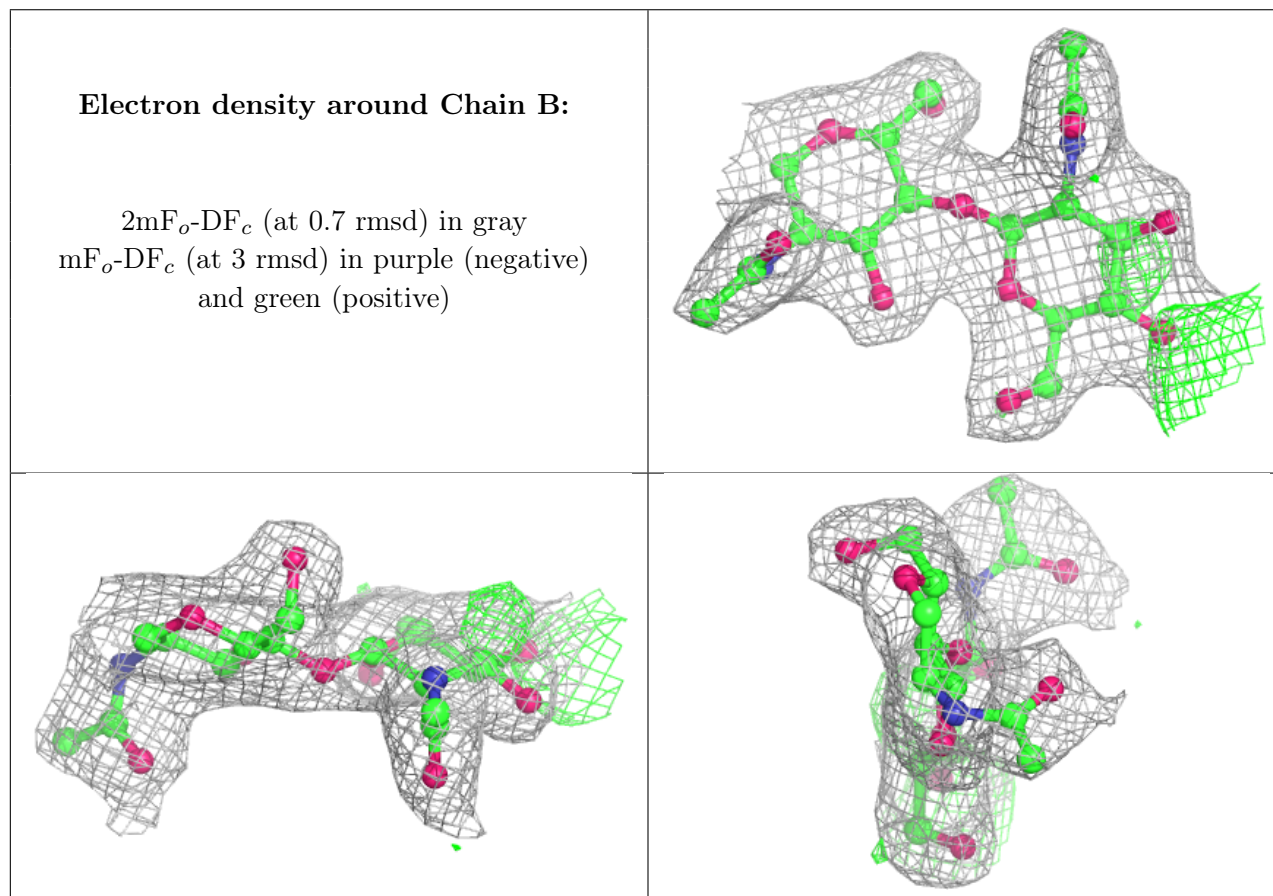
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
1	OCS	A	249	9/10	0.97	0.18	20,24,29,29	3

### 6.3 Carbohydrates [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<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	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	NAG	B	2	14/15	0.93	0.13	38,41,43,44	0
2	NAG	B	1	14/15	0.98	0.10	22,25,27,31	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.



## 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<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	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	GOL	A	3	6/6	0.70	0.31	53,54,54,54	0
4	PG4	A	606	13/13	0.79	0.29	40,55,59,59	0
3	NAG	A	41	14/15	0.79	0.39	66,72,74,74	0
4	PG4	A	23	13/13	0.83	0.41	42,53,56,56	0
6	GOL	A	2	6/6	0.86	0.23	47,50,52,54	0
3	NAG	A	21	14/15	0.89	0.27	61,65,67,68	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	GOL	A	1	6/6	0.89	0.21	53,55,55,55	0
7	ACT	A	608	4/4	0.90	0.17	73,74,74,74	0
8	PGE	A	22	10/10	0.91	0.26	30,37,44,44	0
5	XE	A	607	1/1	0.93	0.27	25,25,25,25	1
9	NA	A	609	1/1	0.93	0.27	32,32,32,32	0
3	NAG	A	31	14/15	0.95	0.17	38,41,43,44	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.