



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 27, 2014 – 01:24 PM GMT

PDB ID : 2DPE  
Title : Crystal structure of a secretory 40KDA glycoprotein from sheep at 2.0A resolution  
Authors : Srivastava, D.B.; Ethayathulla, A.S.; Kumar, J.; Singh, N.; Sharma, S.; Das, U.; Srinivasan, A.; Singh, T.P.  
Deposited on : 2006-05-11  
Resolution : 2.07 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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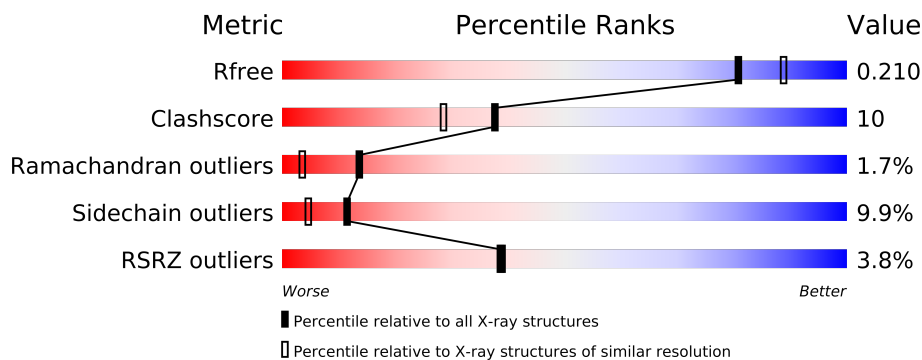
The following versions of software and data (see [references](#)) were used in the production of this report:

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 2.07 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))
$R_{free}$	66092	1224 (2.08-2.04)
Clashscore	79885	1390 (2.08-2.04)
Ramachandran outliers	78287	1381 (2.08-2.04)
Sidechain outliers	78261	1381 (2.08-2.04)
RSRZ outliers	66119	1225 (2.08-2.04)

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	361	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 3168 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 Chitinase-3-like protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	361	Total	C	N	O	S	0	0	0
			2869	1832	499	529	9			

- Molecule 2 is a polymer of unknown type called SUGAR (5-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	5	Total	C	N	O	0	0
			63	34	2	27		

- Molecule 3 is water.

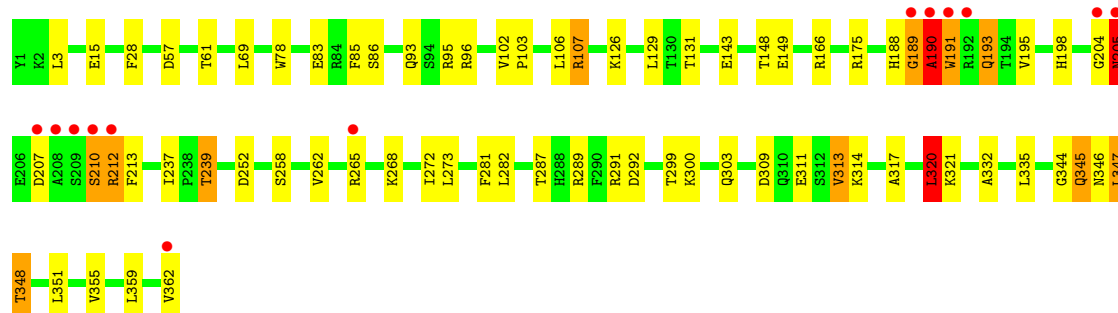
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	236	Total	O	0	0
			236	236		

### 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 ( $RSRZ > 2$ ). 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: Chitinase-3-like protein 1

Chain A: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	62.71Å 66.44Å 107.53Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.94 – 2.07 56.52 – 2.07	Depositor EDS
% Data completeness (in resolution range)	99.7 (19.94-2.07) 99.8 (56.52-2.07)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.07	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.62 (at 2.07Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.185 , 0.203 0.184 , 0.210	Depositor DCC
$R_{free}$ test set	551 reflections (2.01%)	DCC
Wilson B-factor (Å <sup>2</sup> )	34.7	Xtriage
Anisotropy	0.042	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 58.1	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 28016 reflections	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	3168	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.57% of the height of the origin peak. No significant pseudotranslation is detected.*

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

## 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: BMA, NAG, MAN

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	0.44	1/2945 (0.0%)	0.77	5/3995 (0.1%)

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
2	A	1	0
All	All	1	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	191	TRP	N-CA	7.04	1.60	1.46

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	190	ALA	O-C-N	-9.54	107.43	122.70
1	A	320	LEU	CA-CB-CG	8.51	134.88	115.30
1	A	189	GLY	N-CA-C	-8.50	91.84	113.10
1	A	190	ALA	CA-C-N	6.56	131.64	117.20
1	A	191	TRP	N-CA-C	5.75	126.52	111.00

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	366	MAN	C1

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	190	ALA	Mainchain

## 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	2869	0	2794	57	0
2	A	63	0	53	1	0
3	A	236	0	0	20	0
All	All	3168	0	2847	58	0

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 10.

All (58) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:166:ARG:HA	3:A:502:HOH:O	1.50	1.11
1:A:204:GLY:HA2	1:A:292:ASP:HB3	1.48	0.95
1:A:57:ASP:O	1:A:61:THR:HG23	1.71	0.89
1:A:188:HIS:CD2	1:A:189:GLY:H	1.92	0.87
1:A:96:ARG:HB2	3:A:486:HOH:O	1.78	0.83
1:A:347:LEU:HD12	3:A:598:HOH:O	1.84	0.76
1:A:78:TRP:HH2	3:A:452:HOH:O	1.69	0.75
1:A:28:PHE:HE1	3:A:576:HOH:O	1.73	0.72
1:A:204:GLY:CA	1:A:292:ASP:HB3	2.21	0.69
1:A:281:PHE:O	1:A:300:LYS:HE3	1.93	0.69
1:A:239:THR:HG22	1:A:335:LEU:HB2	1.77	0.67
1:A:95:ARG:NH2	1:A:131:THR:HG21	2.10	0.66
1:A:239:THR:HG21	1:A:332:ALA:O	1.97	0.65
1:A:188:HIS:HD2	1:A:189:GLY:H	1.41	0.64
1:A:190:ALA:O	1:A:191:TRP:HB2	1.98	0.64
1:A:362:VAL:HG12	1:A:362:VAL:OXT	1.98	0.63
1:A:313:VAL:HG13	1:A:355:VAL:CG2	2.29	0.62
1:A:107:ARG:HD3	1:A:143:GLU:OE2	2.00	0.61
1:A:317:ALA:HA	1:A:320:LEU:HD13	1.81	0.61

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:95:ARG:CZ	1:A:131:THR:HG21	2.30	0.60
1:A:15:GLU:OE1	1:A:268:LYS:NZ	2.35	0.60
1:A:148:THR:HB	3:A:491:HOH:O	2.02	0.59
1:A:210:SER:O	1:A:213:PHE:N	2.36	0.58
1:A:210:SER:C	1:A:213:PHE:H	2.06	0.58
1:A:287:THR:HB	3:A:560:HOH:O	2.03	0.58
1:A:96:ARG:CB	3:A:486:HOH:O	2.45	0.58
1:A:188:HIS:CD2	1:A:189:GLY:N	2.68	0.58
1:A:262:VAL:H	1:A:303:GLN:HE22	1.52	0.58
1:A:96:ARG:CA	3:A:486:HOH:O	2.53	0.56
1:A:148:THR:HG23	3:A:499:HOH:O	2.06	0.56
1:A:313:VAL:HG13	1:A:355:VAL:HG22	1.86	0.56
1:A:166:ARG:CA	3:A:502:HOH:O	2.25	0.55
1:A:166:ARG:CB	3:A:502:HOH:O	2.55	0.54
1:A:239:THR:CG2	1:A:335:LEU:HB2	2.37	0.53
1:A:95:ARG:CZ	1:A:131:THR:CG2	2.88	0.52
1:A:314:LYS:HE2	3:A:596:HOH:O	2.10	0.51
1:A:126:LYS:NZ	3:A:568:HOH:O	2.45	0.50
1:A:198:HIS:CD2	1:A:198:HIS:H	2.31	0.49
1:A:291:ARG:HG3	3:A:530:HOH:O	2.12	0.49
1:A:289:ARG:NH2	1:A:309:ASP:OD2	2.44	0.48
1:A:205:ASN:HD22	1:A:205:ASN:C	2.16	0.48
1:A:78:TRP:CB	3:A:580:HOH:O	2.61	0.48
1:A:210:SER:C	1:A:213:PHE:N	2.66	0.48
1:A:362:VAL:CG1	1:A:362:VAL:OXT	2.62	0.48
1:A:78:TRP:CH2	3:A:452:HOH:O	2.55	0.48
1:A:239:THR:HG23	1:A:239:THR:O	2.15	0.46
1:A:95:ARG:NH2	1:A:131:THR:CG2	2.77	0.46
1:A:28:PHE:CE1	3:A:576:HOH:O	2.54	0.45
1:A:102:VAL:HB	1:A:103:PRO:HD3	1.97	0.45
1:A:188:HIS:HD2	1:A:189:GLY:N	2.10	0.45
1:A:262:VAL:H	1:A:303:GLN:NE2	2.14	0.44
1:A:348:THR:HG21	3:A:574:HOH:O	2.18	0.44
1:A:237:ILE:CG2	1:A:313:VAL:HG22	2.49	0.43
1:A:272:ILE:HG22	1:A:273:LEU:N	2.35	0.41
2:A:365:BMA:H61	2:A:366:MAN:H2	1.40	0.41
1:A:204:GLY:HA2	1:A:292:ASP:CB	2.35	0.41
1:A:321:LYS:NZ	3:A:602:HOH:O	2.54	0.41
1:A:344:GLY:O	1:A:345:GLN:C	2.60	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	359/361 (99%)	344 (96%)	9 (2%)	6 (2%)	14 3

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	207	ASP
1	A	190	ALA
1	A	205	ASN
1	A	346	ASN
1	A	193	GLN
1	A	212	ARG

### 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	302/302 (100%)	272 (90%)	30 (10%)	11 4

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	LEU
1	A	69	LEU
1	A	83	GLU
1	A	85	PHE
1	A	86	SER
1	A	93	GLN
1	A	106	LEU
1	A	107	ARG

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Mol	Chain	Res	Type
1	A	129	LEU
1	A	149	GLU
1	A	175	ARG
1	A	193	GLN
1	A	195	VAL
1	A	205	ASN
1	A	210	SER
1	A	212	ARG
1	A	239	THR
1	A	252	ASP
1	A	258	SER
1	A	265	ARG
1	A	282	LEU
1	A	299	THR
1	A	311	GLU
1	A	313	VAL
1	A	320	LEU
1	A	345	GLN
1	A	347	LEU
1	A	348	THR
1	A	351	LEU
1	A	359	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	60	ASN
1	A	109	HIS
1	A	188	HIS
1	A	193	GLN
1	A	198	HIS
1	A	205	ASN
1	A	294	GLN
1	A	303	GLN
1	A	315	ASN

### 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 ⓘ

5 carbohydrates 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	363	1,2	12,14,15	0.66	0	15,19,21	1.01	1 (6%)
2	NAG	A	364	2	12,14,15	0.64	0	15,19,21	1.85	3 (20%)
2	BMA	A	365	2	10,11,12	2.22	3 (30%)	11,15,17	4.32	5 (45%)
2	MAN	A	366	2	12,12,12	0.73	0	17,17,17	2.02	3 (17%)
2	MAN	A	367	2	12,12,12	0.96	1 (8%)	17,17,17	1.98	5 (29%)

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	363	1,2	-	0/6/23/26	0/1/1/1
2	NAG	A	364	2	-	0/6/23/26	0/1/1/1
2	BMA	A	365	2	-	0/2/19/22	0/1/1/1
2	MAN	A	366	2	1/1/5/5	0/2/22/22	0/1/1/1
2	MAN	A	367	2	-	0/2/22/22	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	365	BMA	O3-C3	-5.29	1.30	1.43
2	A	365	BMA	C4-C5	-3.91	1.44	1.53
2	A	367	MAN	O5-C5	-2.32	1.38	1.44
2	A	365	BMA	C4-C3	-2.03	1.47	1.52

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	365	BMA	C4-C3-C2	6.97	119.86	110.50
2	A	365	BMA	O5-C5-C6	6.96	114.29	106.98
2	A	365	BMA	O3-C3-C4	-6.24	96.35	110.35
2	A	365	BMA	O3-C3-C2	-6.06	98.86	109.94
2	A	366	MAN	O5-C1-C2	5.83	118.89	109.86
2	A	367	MAN	O5-C1-C2	5.82	118.88	109.86
2	A	365	BMA	C3-C4-C5	-5.19	100.94	110.20
2	A	364	NAG	C3-C4-C5	4.73	118.65	110.20
2	A	364	NAG	C3-C2-N2	-4.14	105.45	111.76
2	A	366	MAN	O1-C1-O5	-3.18	101.74	110.32
2	A	366	MAN	C4-C3-C2	-2.93	105.40	110.82
2	A	367	MAN	O1-C1-O5	-2.82	102.70	110.32
2	A	367	MAN	C1-C2-C3	2.35	114.25	110.53
2	A	364	NAG	C4-C3-C2	2.20	116.70	111.32
2	A	363	NAG	C2-N2-C7	-2.17	119.44	123.09
2	A	367	MAN	O2-C2-C1	2.08	114.31	109.89
2	A	367	MAN	C3-C4-C5	-2.01	106.61	110.20

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	366	MAN	C1

There are no torsion outliers.

There are no ring outliers.

## 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 ⓘ

### 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	361/361 (100%)	-0.00	13 (3%) 41 41	22, 35, 64, 99	0

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	191	TRP	9.7
1	A	208	ALA	8.3
1	A	209	SER	6.9
1	A	207	ASP	6.9
1	A	189	GLY	5.9
1	A	190	ALA	5.2
1	A	362	VAL	4.1
1	A	204	GLY	3.8
1	A	210	SER	3.3
1	A	192	ARG	2.8
1	A	205	ASN	2.5
1	A	212	ARG	2.2
1	A	265	ARG	2.1

### 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 ⓘ

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	NAG	A	363	14/15	0.31	6.50	35,37,39,40	14
2	MAN	A	367	12/12	0.55	-	40,41,44,45	11
2	MAN	A	366	12/12	0.38	-	40,50,62,74	11
2	NAG	A	364	14/15	0.24	-	37,40,41,41	14
2	BMA	A	365	11/12	0.34	-	36,39,41,42	11

## 6.4 Ligands

There are no ligands in this entry.

## 6.5 Other polymers

There are no such residues in this entry.