Full wwPDB X-ray Structure Validation Report (i)

Dec 15, 2024 – 12:28 AM EST

PDB ID	:	1N7Q
Title	:	Streptococcus pneumoniae Hyaluronate Lyase W291A/W292A Double Mutant complex with hyaluronan hexasacchride
Authors	:	Nukui, M.; Taylor, K.B.; McPherson, D.T.; Shigenaga, M.; Jedrzejas, M.J.
Deposited on	:	2002-11-16
Resolution	:	2.30 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 (i) 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 (i)) were used in the production of this report:

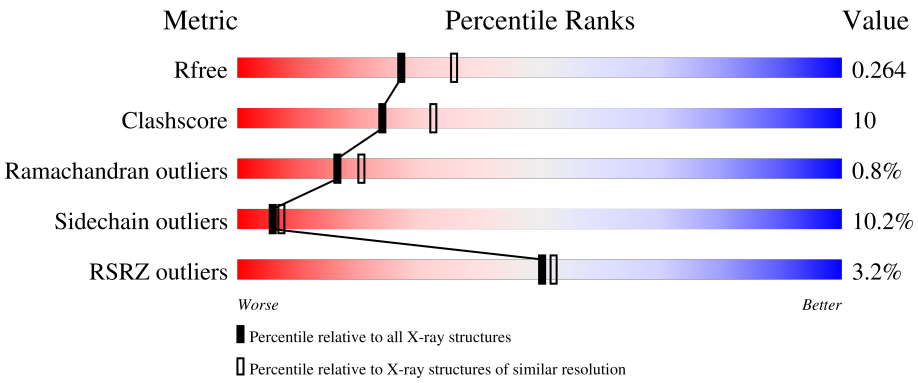
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

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 2.30 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}	164625	5963 (2.30-2.30)
Clashscore	180529	6698 (2.30-2.30)
Ramachandran outliers	177936	6640 (2.30-2.30)
Sidechain outliers	177891	6640 (2.30-2.30)
RSRZ outliers	164620	5963 (2.30-2.30)

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	721	3%, 70%, 23%, 6%
2	B	6	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
2	NAG	B	5	-	-	X	-

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 6325 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.

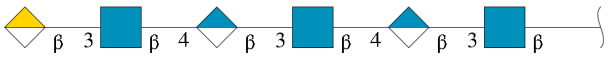
- Molecule 1 is a protein called HYALURONIDASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	721	5766	3622	966	1156	22	0	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	291	ALA	TRP	engineered mutation	GB 437705
A	292	ALA	TRP	engineered mutation	GB 437705
A	731	VAL	GLY	SEE REMARK 999	GB 437705

- Molecule 2 is an oligosaccharide called beta-D-galactopyranuronic acid-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-beta-D-glucopyranuronic acid-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-beta-D-glucopyranuronic acid-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	B	6	79	42	3	34	0	0	0

- Molecule 3 is water.

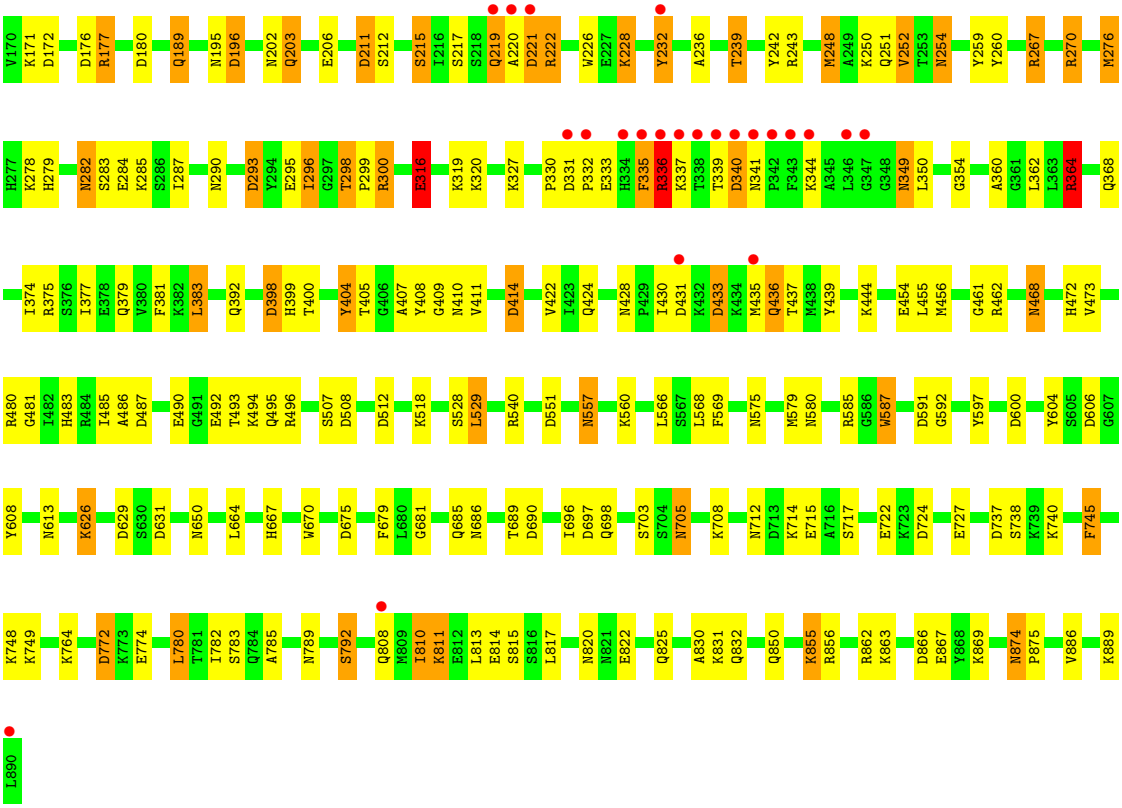
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	480	480	480	0	0

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: HYALURONIDASE

Chain A: 3% 70% 23% 6%



• Molecule 2: beta-D-galactopyranuronic acid-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-beta-D-glucopyranuronic acid-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-beta-D-glucopyranuronic acid-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain B: 100%

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	84.26Å 102.00Å 103.12Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.30 20.00 – 2.30	Depositor EDS
% Data completeness (in resolution range)	(Not available) (20.00-2.30) 98.3 (20.00-2.30)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	0.17	Depositor
$< I/\sigma(I) >$ [1]	1.77 (at 2.30Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.174 , 0.249 0.208 , 0.264	Depositor DCC
R_{free} test set	814 reflections (2.06%)	wwPDB-VP
Wilson B-factor (Å^2)	32.5	Xtriage
Anisotropy	0.143	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 39.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.016 for -h,l,k	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	6325	wwPDB-VP
Average B, all atoms (Å^2)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.91% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: BDP, GTR, 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	1.52	42/5881 (0.7%)	1.26	53/7941 (0.7%)

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	3

All (42) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	276	MET	SD-CE	-10.52	1.19	1.77
1	A	267	ARG	CB-CG	8.54	1.75	1.52
1	A	604	TYR	CD2-CE2	-8.30	1.26	1.39
1	A	368	GLN	CG-CD	8.27	1.70	1.51
1	A	267	ARG	CG-CD	8.03	1.72	1.51
1	A	507	SER	CB-OG	7.57	1.52	1.42
1	A	260	TYR	CD2-CE2	7.13	1.50	1.39
1	A	608	TYR	CD2-CE2	7.00	1.49	1.39
1	A	189	GLN	CG-CD	6.80	1.66	1.51
1	A	811	LYS	CD-CE	6.69	1.68	1.51
1	A	259	TYR	CE2-CZ	6.67	1.47	1.38
1	A	705	ASN	CB-CG	6.49	1.66	1.51
1	A	855	LYS	CD-CE	6.41	1.67	1.51
1	A	886	VAL	CB-CG2	6.33	1.66	1.52
1	A	468	ASN	CB-CG	6.21	1.65	1.51
1	A	745	PHE	CD1-CE1	6.13	1.51	1.39
1	A	867	GLU	CG-CD	5.79	1.60	1.51
1	A	473	VAL	CB-CG1	5.76	1.65	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	316	GLU	CG-CD	5.75	1.60	1.51
1	A	232	TYR	CG-CD2	5.70	1.46	1.39
1	A	267	ARG	NE-CZ	5.67	1.40	1.33
1	A	171	LYS	CD-CE	5.65	1.65	1.51
1	A	242	TYR	CD1-CE1	-5.62	1.30	1.39
1	A	203	GLN	CG-CD	5.57	1.63	1.51
1	A	236	ALA	CA-CB	5.57	1.64	1.52
1	A	869	LYS	CD-CE	5.52	1.65	1.51
1	A	697	ASP	C-O	-5.50	1.12	1.23
1	A	368	GLN	CB-CG	5.42	1.67	1.52
1	A	267	ARG	CD-NE	5.39	1.55	1.46
1	A	319	LYS	CD-CE	5.37	1.64	1.51
1	A	808	GLN	CD-OE1	5.37	1.35	1.24
1	A	232	TYR	CB-CG	5.36	1.59	1.51
1	A	587	TRP	CG-CD1	5.30	1.44	1.36
1	A	830	ALA	CA-CB	5.30	1.63	1.52
1	A	679	PHE	CG-CD2	5.26	1.46	1.38
1	A	867	GLU	CD-OE2	5.23	1.31	1.25
1	A	626	LYS	CD-CE	5.18	1.64	1.51
1	A	740	LYS	CD-CE	5.16	1.64	1.51
1	A	221	ASP	CB-CG	5.12	1.62	1.51
1	A	228	LYS	CD-CE	5.12	1.64	1.51
1	A	785	ALA	CA-CB	5.11	1.63	1.52
1	A	714	LYS	CD-CE	5.04	1.63	1.51

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	270	ARG	NE-CZ-NH2	-14.91	112.84	120.30
1	A	270	ARG	NE-CZ-NH1	12.41	126.51	120.30
1	A	540	ARG	NE-CZ-NH1	-10.47	115.06	120.30
1	A	176	ASP	CB-CG-OD2	9.01	126.41	118.30
1	A	433	ASP	CB-CG-OD2	8.90	126.31	118.30
1	A	856	ARG	NE-CZ-NH1	8.81	124.71	120.30
1	A	196	ASP	CB-CG-OD2	8.68	126.11	118.30
1	A	364	ARG	NE-CZ-NH2	-8.18	116.21	120.30
1	A	508	ASP	CB-CG-OD2	8.16	125.65	118.30
1	A	293	ASP	CB-CG-OD2	7.24	124.81	118.30
1	A	211	ASP	CB-CG-OD2	7.11	124.69	118.30
1	A	772	ASP	CB-CG-OD2	7.08	124.67	118.30
1	A	600	ASP	CB-CG-OD2	7.07	124.67	118.30
1	A	462	ARG	NE-CZ-NH2	-7.00	116.80	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	487	ASP	CB-CG-OD2	6.92	124.53	118.30
1	A	856	ARG	NE-CZ-NH2	-6.86	116.87	120.30
1	A	267	ARG	CA-CB-CG	6.81	128.38	113.40
1	A	585	ARG	NE-CZ-NH1	6.78	123.69	120.30
1	A	480	ARG	NE-CZ-NH1	6.73	123.66	120.30
1	A	724	ASP	CB-CG-OD2	6.67	124.30	118.30
1	A	462	ARG	NE-CZ-NH1	6.65	123.62	120.30
1	A	414	ASP	CB-CG-OD2	6.63	124.27	118.30
1	A	383	LEU	CB-CG-CD1	6.58	122.19	111.00
1	A	529	LEU	CB-CG-CD2	-6.51	99.93	111.00
1	A	300	ARG	NE-CZ-NH2	-6.15	117.23	120.30
1	A	248	MET	CG-SD-CE	6.06	109.90	100.20
1	A	675	ASP	CB-CG-OD1	6.01	123.71	118.30
1	A	221	ASP	CB-CG-OD1	5.88	123.59	118.30
1	A	364	ARG	NE-CZ-NH1	5.84	123.22	120.30
1	A	176	ASP	CB-CG-OD1	-5.82	113.06	118.30
1	A	737	ASP	CB-CG-OD2	5.81	123.53	118.30
1	A	606	ASP	CB-CG-OD2	5.80	123.52	118.30
1	A	512	ASP	CB-CG-OD1	5.68	123.41	118.30
1	A	398	ASP	CB-CG-OD2	5.68	123.41	118.30
1	A	270	ARG	CG-CD-NE	-5.62	100.00	111.80
1	A	270	ARG	CD-NE-CZ	5.62	131.46	123.60
1	A	792	SER	CA-CB-OG	-5.61	96.06	111.20
1	A	727	GLU	OE1-CD-OE2	-5.54	116.65	123.30
1	A	195	ASN	CB-CA-C	5.48	121.35	110.40
1	A	508	ASP	OD1-CG-OD2	-5.46	112.93	123.30
1	A	180	ASP	CB-CG-OD1	5.45	123.21	118.30
1	A	551	ASP	CB-CG-OD2	5.44	123.20	118.30
1	A	780	LEU	CA-CB-CG	5.38	127.68	115.30
1	A	431	ASP	CB-CG-OD2	5.36	123.13	118.30
1	A	862	ARG	NE-CZ-NH1	5.32	122.96	120.30
1	A	172	ASP	CB-CG-OD2	5.29	123.06	118.30
1	A	591	ASP	CB-CG-OD1	5.22	123.00	118.30
1	A	690	ASP	CB-CG-OD2	5.20	122.98	118.30
1	A	631	ASP	CB-CG-OD2	5.19	122.97	118.30
1	A	340	ASP	CB-CG-OD2	5.13	122.92	118.30
1	A	629	ASP	CB-CG-OD1	5.07	122.87	118.30
1	A	855	LYS	CD-CE-NZ	5.06	123.33	111.70
1	A	866	ASP	CB-CG-OD2	5.03	122.83	118.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	219	GLN	Peptide
1	A	220	ALA	Peptide
1	A	270	ARG	Sidechain

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	5766	0	5585	114	1
2	B	79	0	51	26	0
3	A	480	0	0	5	0
All	All	6325	0	5636	114	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 10.

All (114) 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:267:ARG:CB	1:A:267:ARG:CG	1.75	1.62
1:A:579:MET:SD	1:A:579:MET:CE	2.03	1.47
1:A:248:MET:SD	1:A:248:MET:CE	2.02	1.45
1:A:276:MET:CE	1:A:276:MET:SD	1.18	1.27
1:A:408:TYR:CE1	2:B:3:NAG:H82	1.75	1.19
1:A:276:MET:SD	1:A:276:MET:HE1	1.76	1.18
1:A:276:MET:SD	1:A:276:MET:HE3	1.76	1.13
1:A:276:MET:SD	1:A:276:MET:HE2	1.76	1.08
1:A:276:MET:CE	1:A:276:MET:CG	2.40	1.00
1:A:613:ASN:H	1:A:698:GLN:HE22	1.13	0.95
1:A:580:ASN:ND2	2:B:2:BDP:O3	2.01	0.92
1:A:408:TYR:CE1	2:B:3:NAG:C8	2.56	0.88
1:A:483:HIS:NE2	1:A:529:LEU:HG	1.91	0.85
1:A:250:LYS:HZ1	2:B:6:GTR:C3	1.95	0.80
1:A:414:ASP:OD2	2:B:5:NAG:O6	2.05	0.74
1:A:217:SER:HB3	1:A:222:ARG:HD2	1.67	0.74
1:A:408:TYR:CD1	2:B:3:NAG:H82	2.23	0.74
1:A:243:ARG:HH12	2:B:4:BDP:C6	2.03	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:222:ARG:HH11	1:A:222:ARG:HG2	1.56	0.70
1:A:243:ARG:HD3	2:B:5:NAG:H82	1.72	0.69
1:A:874:ASN:C	1:A:874:ASN:HD22	1.96	0.68
1:A:316:GLU:H	1:A:316:GLU:CD	1.97	0.68
1:A:354:GLY:HA3	1:A:377:ILE:HD11	1.75	0.67
1:A:820:ASN:HD22	1:A:825:GLN:HG2	1.59	0.66
1:A:202:ASN:ND2	1:A:251:GLN:HE22	1.94	0.66
1:A:243:ARG:HD3	2:B:5:NAG:C8	2.26	0.65
1:A:557:ASN:HD22	1:A:557:ASN:C	2.01	0.63
1:A:243:ARG:NH2	2:B:5:NAG:H83	2.14	0.62
1:A:296:ILE:HD11	1:A:335:PHE:CZ	2.35	0.61
1:A:414:ASP:OD2	2:B:5:NAG:C6	2.48	0.61
1:A:483:HIS:NE2	1:A:529:LEU:CG	2.63	0.61
1:A:374:ILE:HG23	1:A:430:ILE:HD11	1.82	0.61
1:A:439:TYR:CZ	3:A:1268:HOH:O	2.51	0.61
1:A:243:ARG:HH22	2:B:4:BDP:C6	2.14	0.60
1:A:587:TRP:O	3:A:901:HOH:O	2.16	0.59
1:A:276:MET:HE3	1:A:276:MET:CG	2.24	0.57
1:A:350:LEU:HD21	1:A:379:GLN:HG2	1.85	0.57
1:A:354:GLY:CA	1:A:377:ILE:HD11	2.36	0.56
1:A:850:GLN:HE21	1:A:863:LYS:HE3	1.69	0.56
1:A:243:ARG:CZ	2:B:5:NAG:HN2	2.20	0.55
1:A:300:ARG:HH22	2:B:5:NAG:H4	1.73	0.54
1:A:336:ARG:HH12	2:B:1:NAG:H4	1.73	0.54
1:A:360:ALA:O	1:A:364:ARG:HG3	2.08	0.54
1:A:481:GLY:O	1:A:485:ILE:HG12	2.08	0.54
1:A:414:ASP:OD2	2:B:5:NAG:H61	2.08	0.53
1:A:650:ASN:HD21	1:A:832:GLN:HE22	1.57	0.53
1:A:336:ARG:HH22	2:B:1:NAG:H4	1.73	0.53
1:A:337:LYS:O	1:A:337:LYS:HD3	2.09	0.53
1:A:276:MET:HE3	1:A:276:MET:HG2	1.90	0.53
1:A:243:ARG:NH2	2:B:4:BDP:O6B	2.32	0.52
1:A:407:ALA:O	1:A:411:VAL:HG23	2.10	0.52
1:A:708:LYS:HE3	1:A:715:GLU:OE2	2.09	0.52
1:A:222:ARG:HH11	1:A:222:ARG:CG	2.23	0.51
1:A:287:ILE:HD12	1:A:339:THR:CG2	2.40	0.51
1:A:349:ASN:ND2	3:A:910:HOH:O	2.44	0.51
1:A:557:ASN:ND2	1:A:560:LYS:H	2.09	0.49
1:A:296:ILE:CD1	1:A:335:PHE:CZ	2.95	0.49
1:A:569:PHE:CE2	1:A:575:ASN:HB3	2.47	0.49
1:A:254:ASN:C	1:A:254:ASN:HD22	2.15	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:580:ASN:HD21	2:B:2:BDP:C3	2.21	0.48
1:A:211:ASP:O	1:A:215:SER:HB2	2.13	0.48
1:A:874:ASN:C	1:A:874:ASN:ND2	2.66	0.48
1:A:337:LYS:O	1:A:337:LYS:CD	2.62	0.48
1:A:408:TYR:CD1	2:B:3:NAG:C8	2.92	0.47
1:A:298:THR:HB	1:A:299:PRO:HD3	1.97	0.47
1:A:316:GLU:CD	1:A:316:GLU:N	2.68	0.46
1:A:177:ARG:HG3	1:A:422:VAL:HG13	1.97	0.46
1:A:486:ALA:O	1:A:494:LYS:HG3	2.15	0.46
1:A:745:PHE:HB2	1:A:810:ILE:HG22	1.96	0.46
1:A:566:LEU:HD11	1:A:670:TRP:CE2	2.51	0.46
1:A:283:SER:O	1:A:327:LYS:NZ	2.41	0.45
1:A:202:ASN:O	1:A:206:GLU:HG2	2.17	0.45
1:A:579:MET:CE	1:A:579:MET:CG	2.91	0.45
1:A:686:ASN:H	1:A:789:ASN:ND2	2.14	0.45
1:A:202:ASN:HD21	1:A:251:GLN:HE22	1.62	0.44
1:A:430:ILE:CG2	1:A:435:MET:CE	2.95	0.44
1:A:439:TYR:CE1	3:A:1268:HOH:O	2.69	0.44
1:A:667:HIS:O	1:A:681:GLY:HA2	2.17	0.44
1:A:764:LYS:HD2	1:A:772:ASP:HB3	1.98	0.44
1:A:408:TYR:CE1	2:B:2:BDP:C6	3.00	0.44
1:A:430:ILE:HG22	1:A:435:MET:HE3	2.00	0.44
1:A:568:LEU:HD23	1:A:592:GLY:HA2	2.00	0.44
1:A:399:HIS:O	1:A:400:THR:HB	2.18	0.44
1:A:454:GLU:HB2	1:A:472:HIS:CE1	2.53	0.44
1:A:243:ARG:NH1	2:B:4:BDP:O6A	2.49	0.43
1:A:248:MET:O	1:A:252:VAL:HB	2.18	0.43
1:A:483:HIS:NE2	1:A:529:LEU:HB2	2.33	0.43
1:A:282:ASN:ND2	1:A:285:LYS:HG2	2.34	0.43
1:A:557:ASN:C	1:A:557:ASN:ND2	2.71	0.43
1:A:410:ASN:HD21	1:A:455:LEU:CD2	2.31	0.43
1:A:295:GLU:C	1:A:296:ILE:HD12	2.39	0.43
1:A:331:ASP:OD1	1:A:332:PRO:HD2	2.19	0.43
1:A:212:SER:HB3	1:A:226:TRP:CZ2	2.54	0.43
1:A:381:PHE:O	1:A:437:THR:HG21	2.19	0.43
1:A:569:PHE:CD2	1:A:575:ASN:HB3	2.53	0.42
1:A:250:LYS:NZ	2:B:6:GTR:C4	2.83	0.42
1:A:250:LYS:NZ	2:B:6:GTR:C3	2.76	0.42
1:A:405:THR:O	1:A:409:GLY:HA3	2.20	0.42
1:A:295:GLU:OE2	1:A:336:ARG:HA	2.20	0.42
1:A:239:THR:HG21	1:A:293:ASP:OD2	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:430:ILE:HG22	1:A:435:MET:CE	2.49	0.42
1:A:278:LYS:HG2	1:A:279:HIS:CD2	2.56	0.41
1:A:282:ASN:C	1:A:282:ASN:HD22	2.24	0.41
1:A:267:ARG:CB	1:A:267:ARG:CD	2.90	0.41
1:A:177:ARG:HB3	1:A:362:LEU:HD13	2.03	0.41
1:A:444:LYS:NZ	3:A:939:HOH:O	2.53	0.41
1:A:483:HIS:NE2	1:A:529:LEU:CB	2.83	0.41
1:A:664:LEU:HA	1:A:685:GLN:O	2.20	0.41
1:A:404:TYR:CE1	1:A:461:GLY:HA3	2.55	0.41
1:A:696:ILE:N	1:A:782:ILE:O	2.54	0.40
1:A:290:ASN:ND2	2:B:2:BDP:O3	2.55	0.40
1:A:456:MET:HG2	1:A:597:TYR:CE2	2.57	0.40
1:A:408:TYR:CZ	2:B:3:NAG:C8	3.04	0.40
1:A:874:ASN:HD22	1:A:875:PRO:N	2.20	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)
1:A:340:ASP:O	1:A:815:SER:OG[4_546]	2.19	0.01

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	719/721 (100%)	675 (94%)	38 (5%)	6 (1%)	16 20

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	219	GLN
1	A	336	ARG

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Mol	Chain	Res	Type
1	A	436	GLN
1	A	712	ASN
1	A	330	PRO
1	A	428	ASN

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	636/638 (100%)	571 (90%)	65 (10%)	6 7

All (65) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	177	ARG
1	A	189	GLN
1	A	196	ASP
1	A	203	GLN
1	A	215	SER
1	A	221	ASP
1	A	222	ARG
1	A	228	LYS
1	A	232	TYR
1	A	239	THR
1	A	252	VAL
1	A	254	ASN
1	A	282	ASN
1	A	284	GLU
1	A	296	ILE
1	A	298	THR
1	A	316	GLU
1	A	320	LYS
1	A	333	GLU
1	A	335	PHE
1	A	336	ARG
1	A	341	ASN

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Mol	Chain	Res	Type
1	A	344	LYS
1	A	349	ASN
1	A	364	ARG
1	A	375	ARG
1	A	383	LEU
1	A	392	GLN
1	A	398	ASP
1	A	404	TYR
1	A	424	GLN
1	A	433	ASP
1	A	436	GLN
1	A	468	ASN
1	A	490	GLU
1	A	492	GLU
1	A	493	THR
1	A	495	GLN
1	A	496	ARG
1	A	518	LYS
1	A	528	SER
1	A	557	ASN
1	A	626	LYS
1	A	689	THR
1	A	703	SER
1	A	705	ASN
1	A	717	SER
1	A	722	GLU
1	A	738	SER
1	A	748	LYS
1	A	749	LYS
1	A	774	GLU
1	A	780	LEU
1	A	783	SER
1	A	792	SER
1	A	810	ILE
1	A	811	LYS
1	A	813	LEU
1	A	814	GLU
1	A	817	LEU
1	A	822	GLU
1	A	831	LYS
1	A	855	LYS
1	A	874	ASN

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Mol	Chain	Res	Type
1	A	889	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	202	ASN
1	A	254	ASN
1	A	282	ASN
1	A	341	ASN
1	A	349	ASN
1	A	436	GLN
1	A	468	ASN
1	A	557	ASN
1	A	580	ASN
1	A	662	GLN
1	A	698	GLN
1	A	705	ASN
1	A	759	GLN
1	A	789	ASN
1	A	820	ASN
1	A	825	GLN
1	A	832	GLN
1	A	850	GLN
1	A	874	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates (i)

6 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	15,15,15	2.12	5 (33%)	21,21,21	1.16	2 (9%)
2	BDP	B	2	2	12,12,13	3.64	5 (41%)	14,17,19	1.74	4 (28%)
2	NAG	B	3	2	14,14,15	2.38	6 (42%)	17,19,21	1.10	2 (11%)
2	BDP	B	4	2	12,12,13	3.76	5 (41%)	14,17,19	2.12	4 (28%)
2	NAG	B	5	2	14,14,15	2.50	7 (50%)	17,19,21	1.23	2 (11%)
2	GTR	B	6	2	12,12,13	5.55	4 (33%)	14,17,19	4.29	7 (50%)

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	-	2/6/26/26	0/1/1/1
2	BDP	B	2	2	-	2/4/21/24	0/1/1/1
2	NAG	B	3	2	-	0/6/23/26	0/1/1/1
2	BDP	B	4	2	-	2/4/21/24	0/1/1/1
2	NAG	B	5	2	-	4/6/23/26	0/1/1/1
2	GTR	B	6	2	-	0/4/21/24	0/1/1/1

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	6	GTR	O4-C4	-14.64	1.06	1.43
2	B	6	GTR	C4-C5	-10.45	1.36	1.53
2	B	4	BDP	C5-C6	-8.29	1.35	1.53
2	B	2	BDP	C5-C6	-7.63	1.37	1.53
2	B	2	BDP	C4-C5	7.18	1.65	1.53
2	B	4	BDP	C4-C5	6.87	1.64	1.53
2	B	2	BDP	O5-C5	5.39	1.54	1.43
2	B	3	NAG	O5-C1	5.35	1.52	1.43
2	B	6	GTR	O5-C5	5.21	1.53	1.43
2	B	5	NAG	O5-C1	4.91	1.51	1.43
2	B	4	BDP	O5-C5	4.87	1.53	1.43
2	B	1	NAG	C2-N2	4.29	1.52	1.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	5	NAG	C2-N2	3.64	1.52	1.46
2	B	1	NAG	O5-C1	3.59	1.51	1.42
2	B	3	NAG	C1-C2	3.44	1.57	1.52
2	B	6	GTR	C5-C6	-3.32	1.46	1.53
2	B	5	NAG	C4-C5	3.20	1.59	1.53
2	B	3	NAG	O5-C5	3.20	1.49	1.43
2	B	5	NAG	O5-C5	3.14	1.49	1.43
2	B	1	NAG	C4-C5	3.08	1.59	1.53
2	B	5	NAG	C7-N2	3.02	1.44	1.34
2	B	4	BDP	C2-C3	2.99	1.57	1.52
2	B	5	NAG	C1-C2	2.96	1.56	1.52
2	B	1	NAG	C1-C2	2.94	1.56	1.52
2	B	3	NAG	C2-N2	2.88	1.51	1.46
2	B	3	NAG	C4-C5	2.75	1.58	1.53
2	B	2	BDP	C2-C3	2.16	1.55	1.52
2	B	2	BDP	O4-C4	2.16	1.48	1.43
2	B	5	NAG	C4-C3	2.09	1.57	1.52
2	B	4	BDP	O4-C4	2.08	1.48	1.43
2	B	1	NAG	O5-C5	2.07	1.49	1.44
2	B	3	NAG	C7-N2	2.04	1.40	1.34

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	6	GTR	C2-C3-C4	11.97	131.91	110.86
2	B	6	GTR	O4-C4-C3	7.33	127.65	110.38
2	B	4	BDP	O4-C4-C5	-4.26	100.03	109.76
2	B	6	GTR	O4-C4-C5	4.00	118.90	109.76
2	B	6	GTR	C1-C2-C3	-4.00	103.82	109.64
2	B	4	BDP	O4-C4-C3	3.71	119.12	110.38
2	B	2	BDP	O4-C4-C5	-3.32	102.17	109.76
2	B	4	BDP	C3-C4-C5	3.19	114.78	109.30
2	B	1	NAG	C8-C7-N2	-2.81	111.47	116.12
2	B	2	BDP	C3-C4-C5	2.80	114.12	109.30
2	B	6	GTR	O5-C1-C2	-2.79	104.14	110.79
2	B	5	NAG	O7-C7-N2	2.70	126.75	121.98
2	B	6	GTR	O6B-C6-O6A	2.67	130.14	124.08
2	B	4	BDP	O6B-C6-O6A	2.63	130.06	124.08
2	B	5	NAG	C8-C7-N2	-2.55	111.89	116.12
2	B	6	GTR	O3-C3-C2	-2.43	105.10	110.05
2	B	2	BDP	O6B-C6-O6A	2.43	129.58	124.08
2	B	3	NAG	C2-N2-C7	-2.35	119.74	122.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	1	NAG	O7-C7-N2	2.32	126.08	121.98
2	B	2	BDP	O4-C4-C3	2.27	115.72	110.38
2	B	3	NAG	C8-C7-N2	-2.26	112.37	116.12

There are no chirality outliers.

All (10) torsion outliers are listed below:

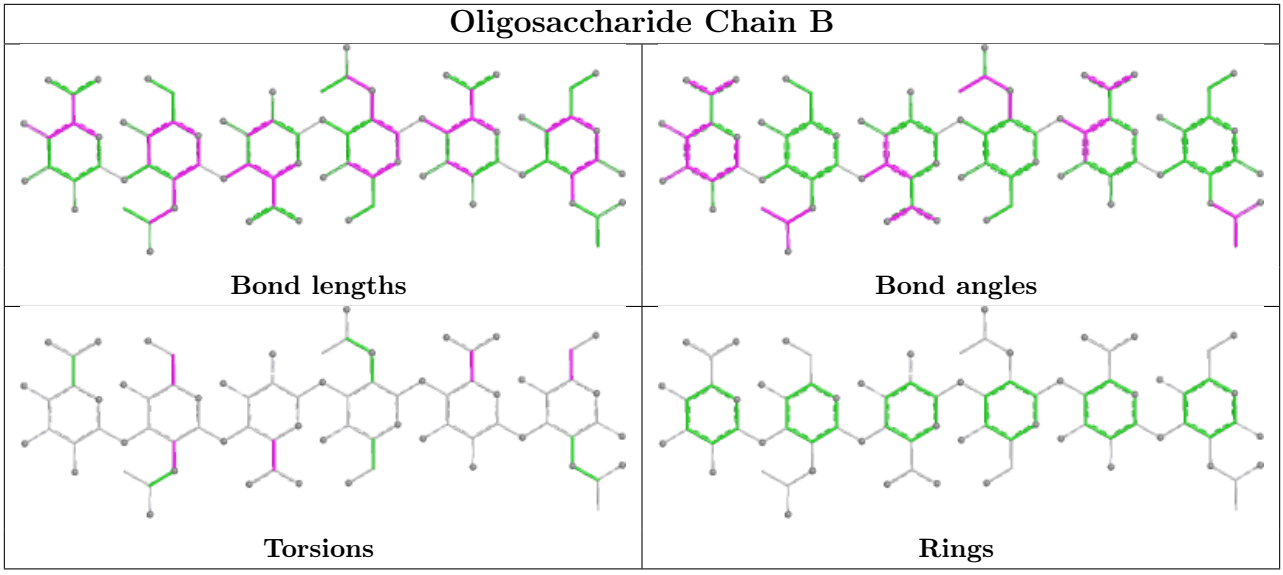
Mol	Chain	Res	Type	Atoms
2	B	2	BDP	C4-C5-C6-O6A
2	B	2	BDP	C4-C5-C6-O6B
2	B	5	NAG	C4-C5-C6-O6
2	B	5	NAG	O5-C5-C6-O6
2	B	1	NAG	O5-C5-C6-O6
2	B	5	NAG	C3-C2-N2-C7
2	B	1	NAG	C4-C5-C6-O6
2	B	5	NAG	C1-C2-N2-C7
2	B	4	BDP	O5-C5-C6-O6A
2	B	4	BDP	O5-C5-C6-O6B

There are no ring outliers.

6 monomers are involved in 26 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	5	NAG	8	0
2	B	1	NAG	2	0
2	B	2	BDP	4	0
2	B	3	NAG	5	0
2	B	6	GTR	3	0
2	B	4	BDP	4	0

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)

There are no ligands in this entry.

5.7 Other polymers (i)

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 (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	721/721 (100%)	-0.07	23 (3%) 50 52	24, 36, 62, 129	0

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	334	HIS	4.5
1	A	338	THR	4.3
1	A	342	PRO	4.3
1	A	343	PHE	4.0
1	A	219	GLN	3.7
1	A	232	TYR	3.7
1	A	435	MET	3.7
1	A	347	GLY	3.3
1	A	335	PHE	3.1
1	A	341	ASN	2.9
1	A	340	ASP	2.8
1	A	344	LYS	2.8
1	A	336	ARG	2.8
1	A	890	LEU	2.8
1	A	337	LYS	2.7
1	A	332	PRO	2.7
1	A	221	ASP	2.7
1	A	808	GLN	2.7
1	A	346	LEU	2.6
1	A	339	THR	2.6
1	A	220	ALA	2.3
1	A	331	ASP	2.2
1	A	431	ASP	2.2

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)

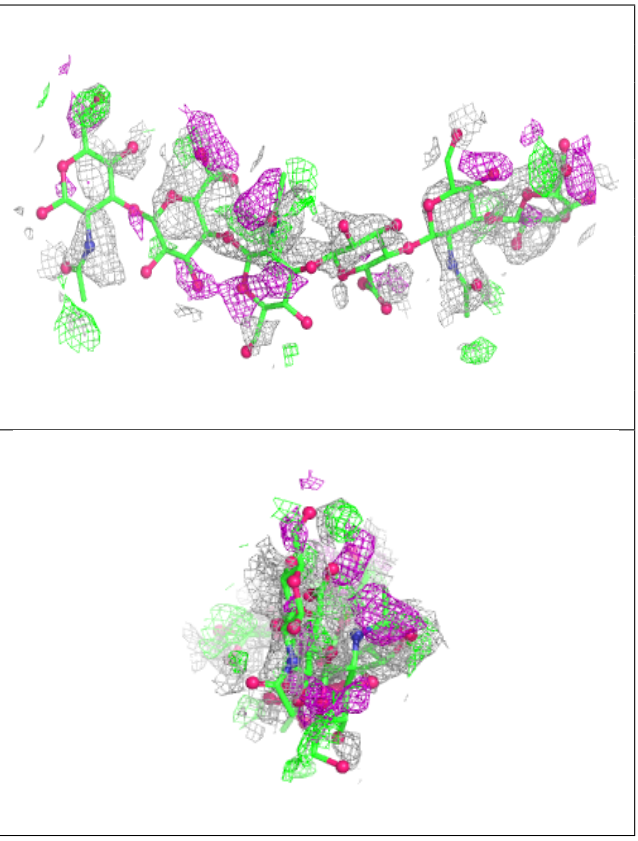
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	B	3	14/15	0.35	0.34	96,105,107,109	0
2	NAG	B	1	15/15	0.46	0.24	115,118,119,119	0
2	NAG	B	5	14/15	0.49	0.26	115,117,118,119	0
2	BDP	B	2	12/13	0.50	0.28	103,108,112,113	0
2	BDP	B	4	12/13	0.59	0.22	110,111,113,115	0
2	GTR	B	6	12/13	0.64	0.27	115,119,120,120	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.

Electron density around Chain B:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative) and green (positive)



6.4 Ligands (i)

There are no ligands in this entry.

6.5 Other polymers (i)

There are no such residues in this entry.