Full wwPDB X-ray Structure Validation Report ⓘ

Feb 27, 2023 – 06:23 pm GMT

PDB ID	:	6XUK
Title	:	AbLIFT design 15 of Ab 1116NS19.9
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Deposited on	:	2020-01-20
Resolution	:	1.42 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

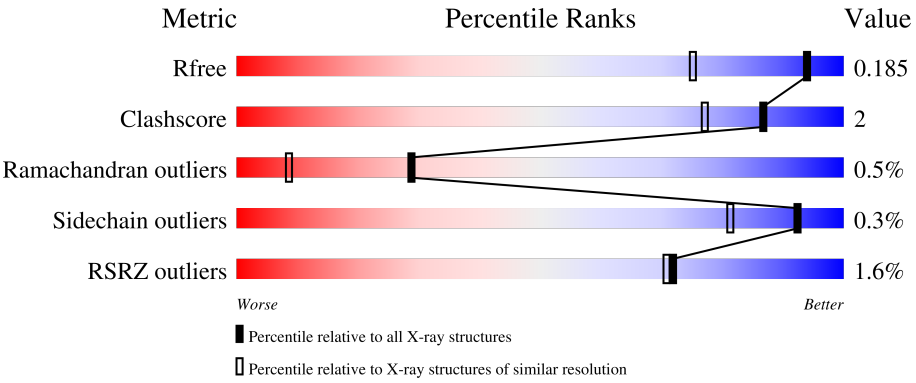
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.32.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.32.1

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 1.42 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	2579 (1.44-1.40)
Clashscore	141614	2696 (1.44-1.40)
Ramachandran outliers	138981	2632 (1.44-1.40)
Sidechain outliers	138945	2631 (1.44-1.40)
RSRZ outliers	127900	2528 (1.44-1.40)

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 >=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	H	222	3%, 92%
2	L	214	94%, 6%
3	A	4	25%, 50%, 25%

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
4	GOL	L	302	-	X	-	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 7324 atoms, of which 3283 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.

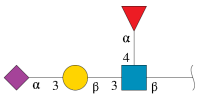
- Molecule 1 is a protein called Heavy chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	H	216	3212	1027	1581	275	320	9	0	3	0

- Molecule 2 is a protein called Light chain.

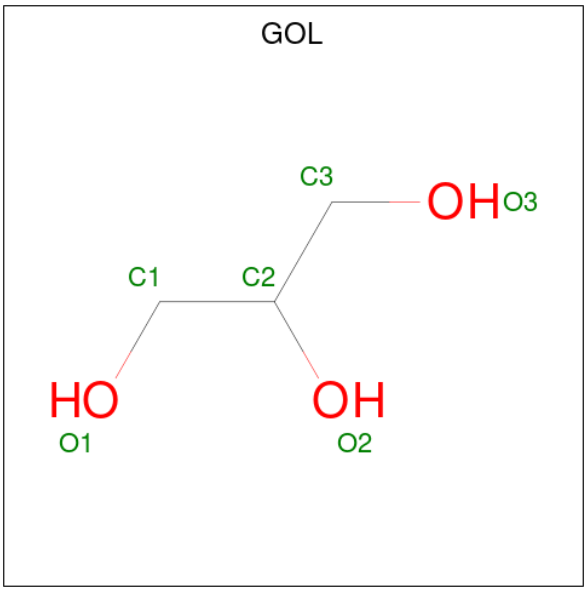
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
2	L	214	3317	1057	1636	280	336	8	0	3	0

- Molecule 3 is an oligosaccharide called N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galacto pyranose-(1-3)-[alpha-L-fucopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	H	N	O			
3	A	4	106	31	50	2	23	0	0	0

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	L	1	Total C H O 14 3 8 3	0	0
4	L	1	Total C H O 14 3 8 3	0	0

- Molecule 5 is water.

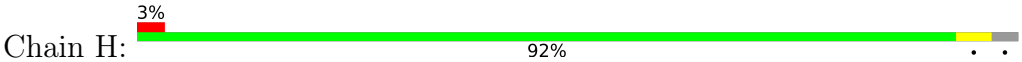
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	H	325	Total O 325 325	0	0
5	L	336	Total O 336 336	0	0

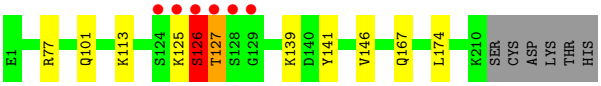
3 Residue-property plots (i)

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: Heavy chain

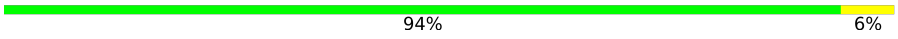
Chain H:





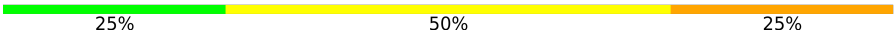
• Molecule 2: Light chain

Chain L:



• Molecule 3: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-3)-[alpha-L-fucopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose

Chain A:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	64.94Å 64.94Å 244.11Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	62.75 – 1.42 62.75 – 1.42	Depositor EDS
% Data completeness (in resolution range)	99.9 (62.75-1.42) 99.9 (62.75-1.42)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.26 (at 1.42Å)	Xtriage
Refinement program	PHENIX 1.16_3549	Depositor
R, R_{free}	0.149 , 0.185 0.149 , 0.185	Depositor DCC
R_{free} test set	5022 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	17.5	Xtriage
Anisotropy	0.084	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.40 , 42.9	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	0.98	EDS
Total number of atoms	7324	wwPDB-VP
Average B, all atoms (Å^2)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.58% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, SIA, GAL, NAG, FUC

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	H	0.61	0/1679	0.74	1/2282 (0.0%)
2	L	0.78	2/1729 (0.1%)	0.94	5/2344 (0.2%)
All	All	0.70	2/3408 (0.1%)	0.85	6/4626 (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	H	0	2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	L	81	GLU	CD-OE1	-18.58	1.05	1.25
2	L	81	GLU	CD-OE2	6.99	1.33	1.25

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	L	169	LYS	CD-CE-NZ	-17.42	71.64	111.70
2	L	108	ARG	NE-CZ-NH2	-13.91	113.34	120.30
2	L	108	ARG	NE-CZ-NH1	13.59	127.10	120.30
2	L	81	GLU	OE1-CD-OE2	5.90	130.38	123.30
1	H	77	ARG	NE-CZ-NH2	-5.45	117.57	120.30
2	L	81	GLU	CG-CD-OE1	-5.21	107.89	118.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	H	125	LYS	Peptide
1	H	126	SER	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	H	1631	1581	1595	6	0
2	L	1681	1636	1642	8	0
3	A	56	50	49	1	0
4	L	12	16	14	0	0
5	H	325	0	0	2	4
5	L	336	0	0	1	5
All	All	4041	3283	3300	14	5

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 2.

All (14) 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:H:113:LYS:NZ	5:H:401:HOH:O	1.90	1.02
1:H:101:GLN:OE1	5:H:402:HOH:O	1.94	0.85
1:H:146:VAL:CG2	1:H:174:LEU:HD13	2.32	0.58
2:L:147:GLN:HG3	2:L:154:LEU:HD11	1.87	0.57
2:L:78:LEU:HD21	2:L:106:ILE:CD1	2.38	0.54
2:L:147:GLN:HG3	2:L:154:LEU:CD1	2.39	0.53
2:L:78:LEU:HD21	2:L:106:ILE:HD12	1.94	0.49
2:L:48:ILE:HD12	2:L:73:LEU:CD1	2.46	0.46
1:H:141:TYR:CE1	1:H:146:VAL:HG13	2.52	0.45
2:L:49:TYR:CD2	3:A:3:SIA:H4	2.52	0.45
1:H:139:LYS:NZ	1:H:167:GLN:OE1	2.52	0.43
2:L:45:LYS:NZ	5:L:405:HOH:O	2.43	0.41
1:H:126:SER:OG	1:H:127:THR:N	2.54	0.41
2:L:147:GLN:CG	2:L:154:LEU:CD1	2.98	0.41

All (5) symmetry-related close contacts are listed below. The label for Atom-2 includes the sym-

metry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:L:699:HOH:O	5:L:699:HOH:O[7_555]	1.14	1.06
5:H:678:HOH:O	5:L:510:HOH:O[7_555]	1.86	0.34
5:H:548:HOH:O	5:L:594:HOH:O[7_455]	2.07	0.13
5:H:645:HOH:O	5:L:553:HOH:O[7_455]	2.08	0.12
5:H:645:HOH:O	5:L:601:HOH:O[7_455]	2.17	0.03

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	H	217/222 (98%)	212 (98%)	3 (1%)	2 (1%)	17 3
2	L	215/214 (100%)	212 (99%)	3 (1%)	0	100 100
All	All	432/436 (99%)	424 (98%)	6 (1%)	2 (0%)	29 8

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	H	127	THR
1	H	126	SER

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	H	183/186 (98%)	183 (100%)	0	100 100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
2	L	193/190 (102%)	192 (100%)	1 (0%)	88 73
All	All	376/376 (100%)	375 (100%)	1 (0%)	92 81

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	L	145	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	L	199	GLN

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

4 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	$\#\|Z\| > 2$
3	NAG	A	1	3	15,15,15	0.57	0	21,21,21	0.58	0
3	GAL	A	2	3	11,11,12	0.75	0	15,15,17	1.10	1 (6%)
3	SIA	A	3	3	20,20,21	1.74	2 (10%)	24,28,31	1.36	4 (16%)
3	FUC	A	4	3	10,10,11	0.98	0	14,14,16	1.17	1 (7%)

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	1	3	-	0/6/26/26	0/1/1/1
3	GAL	A	2	3	-	2/2/19/22	0/1/1/1
3	SIA	A	3	3	-	0/18/34/38	0/1/1/1
3	FUC	A	4	3	-	-	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	3	SIA	C2-C1	6.80	1.58	1.52
3	A	3	SIA	C4-C5	2.03	1.54	1.53

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	4	FUC	C1-C2-C3	2.46	112.69	109.67
3	A	3	SIA	O6-C2-C3	-2.43	107.11	110.46
3	A	3	SIA	C8-C7-C6	-2.40	108.48	113.03
3	A	3	SIA	O1A-C1-C2	-2.36	116.99	122.57
3	A	2	GAL	C1-C2-C3	2.09	112.24	109.67
3	A	3	SIA	O6-C2-C1	2.07	111.75	107.70

There are no chirality outliers.

All (2) torsion outliers are listed below:

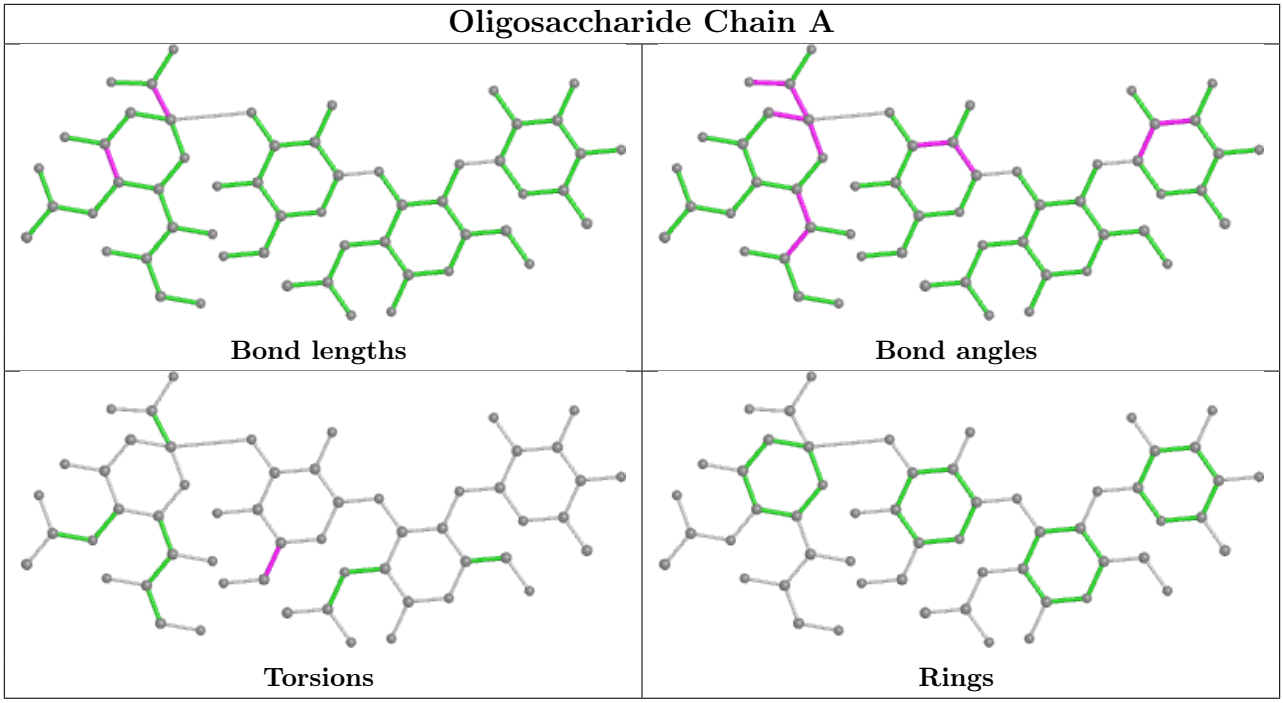
Mol	Chain	Res	Type	Atoms
3	A	2	GAL	O5-C5-C6-O6
3	A	2	GAL	C4-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	3	SIA	1	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)

2 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	$\#\|Z\| > 2$
4	GOL	L	301	-	5,5,5	0.96	0	5,5,5	1.27	1 (20%)
4	GOL	L	302	-	5,5,5	2.78	2 (40%)	5,5,5	1.65	2 (40%)

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
4	GOL	L	301	-	-	4/4/4/4	-
4	GOL	L	302	-	-	4/4/4/4	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	L	302	GOL	O2-C2	-5.41	1.27	1.43
4	L	302	GOL	C3-C2	2.03	1.60	1.51

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	L	302	GOL	O2-C2-C1	2.39	119.66	109.12
4	L	301	GOL	C3-C2-C1	-2.11	103.51	111.70
4	L	302	GOL	O3-C3-C2	-2.02	100.52	110.20

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	L	301	GOL	C1-C2-C3-O3
4	L	301	GOL	O2-C2-C3-O3
4	L	302	GOL	C1-C2-C3-O3
4	L	302	GOL	O2-C2-C3-O3
4	L	302	GOL	O1-C1-C2-O2
4	L	301	GOL	O1-C1-C2-O2
4	L	301	GOL	O1-C1-C2-C3
4	L	302	GOL	O1-C1-C2-C3

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	H	216/222 (97%)	-0.14	6 (2%)	53	52	13, 19, 39, 108	0
2	L	214/214 (100%)	-0.34	1 (0%)	91	90	12, 17, 29, 71	0
All	All	430/436 (98%)	-0.24	7 (1%)	72	71	12, 18, 35, 108	0

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	127	THR	14.8
1	H	128	SER	7.6
1	H	126	SER	7.4
1	H	129	GLY	7.0
2	L	214	CYS	5.4
1	H	125	LYS	4.7
1	H	124	SER	4.1

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. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	FUC	A	4	10/11	0.95	0.06	24,30,35,39	0
3	GAL	A	2	11/12	0.97	0.06	17,21,28,28	0

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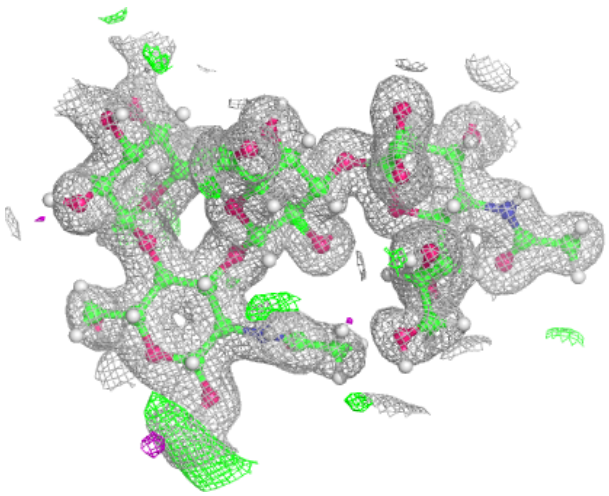
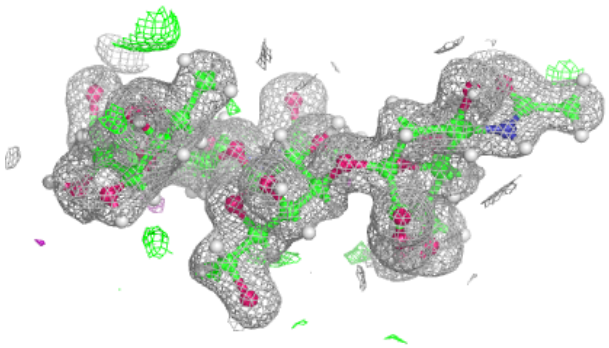
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	NAG	A	1	15/15	0.97	0.07	20,24,32,34	0
3	SIA	A	3	20/21	0.98	0.07	15,19,27,33	0

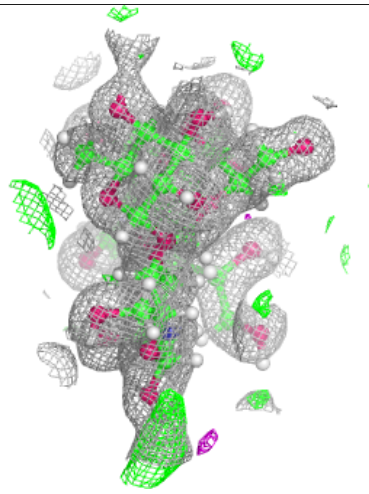
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain A:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)







6.4 Ligands

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
4	GOL	L	301	6/6	0.82	0.19	44,53,58,58	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	GOL	L	302	6/6	0.91	0.12	15,25,30,31	0

6.5 Other polymers (i)

There are no such residues in this entry.