



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 5, 2024 – 11:32 AM EDT

PDB ID : 5TA5  
Title : Crystal structure of BuGH86wt in complex with neoagarooctase  
Authors : Pluvinage, B.; Boraston, A.B.  
Deposited on : 2016-09-09  
Resolution : 1.65 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>.

---

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

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.20.1  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

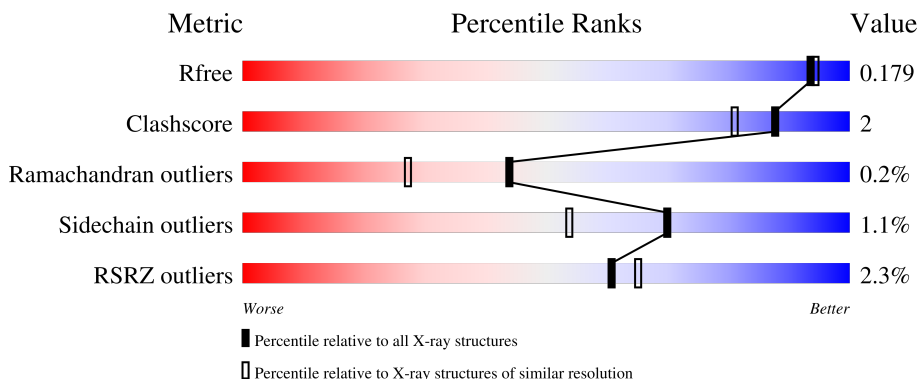
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.65 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	2328 (1.66-1.66)
Clashscore	180529	2515 (1.66-1.66)
Ramachandran outliers	177936	2475 (1.66-1.66)
Sidechain outliers	177891	2475 (1.66-1.66)
RSRZ outliers	164620	2328 (1.66-1.66)

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	649	 92%
1	B	649	 89% 5% 6%
2	C	2	 100%
3	D	2	 100%

## 2 Entry composition [i](#)

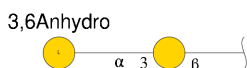
There are 7 unique types of molecules in this entry. The entry contains 11778 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Glycoside Hydrolase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	624	5262	3352	886	991	33	11	24	0
1	B	613	5148	3278	869	968	33	24	24	0

- Molecule 2 is an oligosaccharide called 3,6-anhydro-alpha-L-galactopyranose-(1-3)-beta-D-galactopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
			Total	C	O			
2	C	2	22	12	10	0	0	0

- Molecule 3 is an oligosaccharide called beta-D-galactopyranose-(1-4)-3,6-anhydro-alpha-L-galactopyranose.



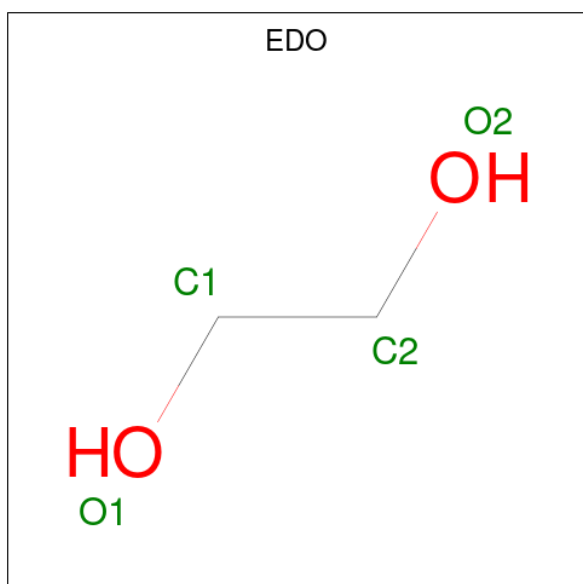
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
			Total	C	O			
3	D	2	22	12	10	0	0	0

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total O S 5 4 1	0	0
4	B	1	Total O S 5 4 1	0	0
4	B	1	Total O S 5 4 1	0	0
4	B	1	Total O S 5 4 1	0	0
4	B	1	Total O S 5 4 1	0	0

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



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

*Continued on next page...*



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	3	Total Ca 3 3	0	0
6	B	3	Total Ca 3 3	0	0

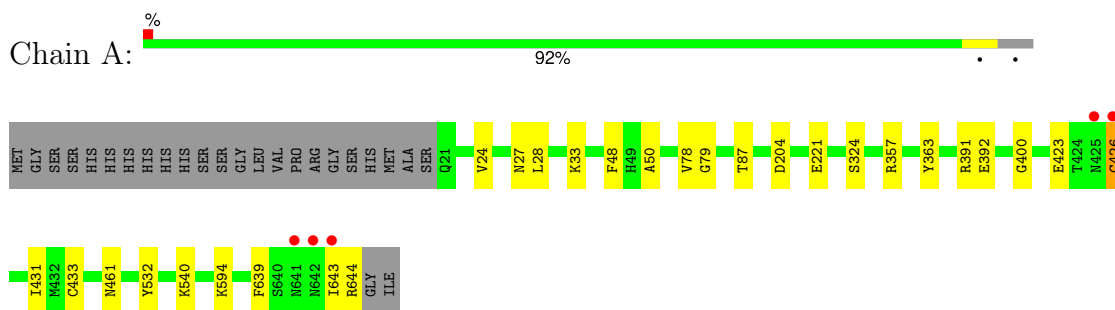
- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	589	Total O 589 589	0	0
7	B	536	Total O 536 536	0	1

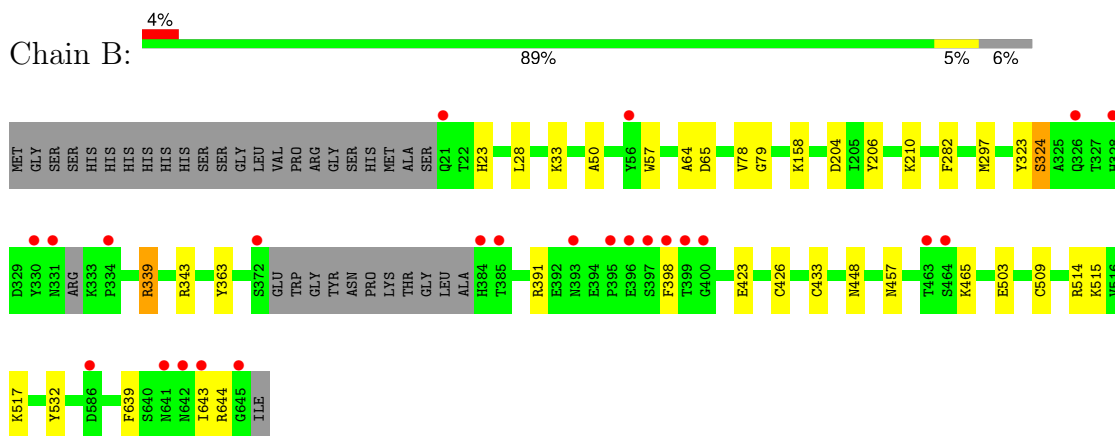
### 3 Residue-property plots [i](#)

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: Glycoside Hydrolase



- Molecule 1: Glycoside Hydrolase



- Molecule 2: 3,6-anhydro-alpha-L-galactopyranose-(1-3)-beta-D-galactopyranose



- Molecule 3: beta-D-galactopyranose-(1-4)-3,6-anhydro-alpha-L-galactopyranose





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	60.74Å 73.60Å 83.39Å 85.84° 86.19° 71.82°	Depositor
Resolution (Å)	83.08 – 1.65 83.08 – 1.65	Depositor EDS
% Data completeness (in resolution range)	97.1 (83.08-1.65) 97.1 (83.08-1.65)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	50.00 (at 1.65Å)	Xtrriage
Refinement program	REFMAC 5.8.0155	Depositor
R, $R_{free}$	0.144 , 0.169 0.157 , 0.179	Depositor DCC
$R_{free}$ test set	8112 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	10.3	Xtrriage
Anisotropy	0.017	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 41.4	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	11778	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	13.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.99% 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: SO4, GAL, AAL, EDO, CA

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	0.56	2/5390 (0.0%)	0.75	3/7280 (0.0%)
1	B	1.01	7/5268 (0.1%)	0.88	11/7110 (0.2%)
All	All	0.81	9/10658 (0.1%)	0.82	14/14390 (0.1%)

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	514	ARG	CD-NE	-38.45	0.81	1.46
1	B	517	LYS	CE-NZ	-30.80	0.72	1.49
1	B	515	LYS	CD-CE	23.05	2.08	1.51
1	B	210	LYS	CD-CE	20.66	2.02	1.51
1	B	465	LYS	CD-CE	-17.64	1.07	1.51
1	B	33	LYS	CE-NZ	10.89	1.76	1.49
1	A	594	LYS	CD-CE	-10.31	1.25	1.51
1	B	158	LYS	CD-CE	9.81	1.75	1.51
1	A	540	LYS	CD-CE	5.64	1.65	1.51

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	514	ARG	CD-NE-CZ	23.11	155.96	123.60
1	B	517	LYS	CD-CE-NZ	20.09	157.91	111.70
1	B	514	ARG	CG-CD-NE	20.05	153.90	111.80
1	B	33	LYS	CD-CE-NZ	-10.22	88.19	111.70
1	B	465	LYS	CG-CD-CE	8.66	137.89	111.90
1	B	210	LYS	CG-CD-CE	-8.37	86.79	111.90
1	B	343	ARG	NE-CZ-NH1	7.16	123.88	120.30
1	A	594	LYS	CG-CD-CE	6.93	132.68	111.90
1	B	515	LYS	CD-CE-NZ	6.54	126.75	111.70
1	B	158	LYS	CG-CD-CE	-5.95	94.07	111.90

*Continued on next page...*

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	465	LYS	CD-CE-NZ	5.63	124.65	111.70
1	B	282	PHE	CB-CG-CD1	5.53	124.67	120.80
1	A	391	ARG	NE-CZ-NH1	5.32	122.96	120.30
1	A	357	ARG	NE-CZ-NH2	-5.00	117.80	120.30

There are no chirality outliers.

There are no planarity outliers.

## 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	5262	0	5096	15	0
1	B	5148	0	4988	24	0
2	C	22	0	19	0	0
3	D	22	0	19	0	0
4	A	5	0	0	0	0
4	B	20	0	0	1	0
5	A	80	0	120	1	0
5	B	88	0	132	3	0
6	A	3	0	0	0	0
6	B	3	0	0	0	0
7	A	589	0	0	1	0
7	B	536	0	0	4	0
All	All	11778	0	10374	39	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 2.

All (39) 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:B:339[A]:ARG:HH21	1:B:339[A]:ARG:HB3	1.37	0.89
1:B:65[B]:ASP:OD1	5:B:723:EDO:H21	1.74	0.86
1:B:64[A]:ALA:O	7:B:801:HOH:O	1.95	0.83
1:B:339[A]:ARG:HH21	1:B:339[A]:ARG:CB	2.04	0.71

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:426[B]:CYS:HG	1:A:433[B]:CYS:CB	2.09	0.65
1:B:423:GLU:OE2	1:B:644:ARG:NH1	2.36	0.58
1:B:323:TYR:O	1:B:324:SER:HB2	2.04	0.57
1:B:65[B]:ASP:OD1	5:B:723:EDO:C2	2.50	0.57
1:A:639[B]:PHE:CE1	1:A:643:ILE:HD11	2.41	0.55
1:B:391[B]:ARG:NH2	7:B:807:HOH:O	2.40	0.54
1:A:423:GLU:OE2	1:A:644:ARG:NH2	2.41	0.53
1:A:24[B]:VAL:HG12	1:A:426[B]:CYS:HB3	1.90	0.53
1:B:509:CYS:HB3	7:B:1272:HOH:O	2.08	0.53
1:A:426[A]:CYS:SG	1:A:431:ILE:HB	2.50	0.51
1:B:426[B]:CYS:SG	1:B:433[B]:CYS:SG	3.02	0.51
1:B:398:PHE:CB	7:B:905:HOH:O	2.58	0.51
1:B:23[B]:HIS:HD2	1:B:457[B]:ASN:O	1.94	0.50
1:A:426[B]:CYS:CB	1:A:433[B]:CYS:HG	2.26	0.49
1:A:87:THR:HA	5:A:714:EDO:H21	1.94	0.49
1:B:426[B]:CYS:HG	1:B:433[B]:CYS:CB	2.25	0.49
1:A:639[B]:PHE:CD1	1:A:643:ILE:HG12	2.48	0.48
1:A:78:VAL:HB	1:A:79:GLY:HA3	1.94	0.48
1:A:33:LYS:NZ	4:B:702:SO4:O4	2.31	0.47
1:A:423:GLU:OE2	1:A:644:ARG:NH1	2.47	0.47
1:B:426[B]:CYS:HG	1:B:433[B]:CYS:HB2	1.79	0.47
1:B:639[B]:PHE:CD1	1:B:643:ILE:HG12	2.50	0.47
1:A:392:GLU:HG2	1:A:400:GLY:HA3	1.99	0.44
1:B:57:TRP:HB3	5:B:723:EDO:H12	1.99	0.44
1:B:339[A]:ARG:CB	1:B:339[A]:ARG:NH2	2.77	0.43
1:B:297[A]:MET:HE2	1:B:297[A]:MET:HB2	1.76	0.43
1:B:50:ALA:O	1:B:79:GLY:HA3	2.18	0.43
1:B:78:VAL:HB	1:B:79:GLY:HA3	2.01	0.43
1:A:50:ALA:O	1:A:79:GLY:HA3	2.19	0.43
1:B:448:ASN:O	1:B:503:GLU:HA	2.18	0.43
1:B:423:GLU:OE2	1:B:644:ARG:NH2	2.52	0.42
1:A:27:ASN:HD22	1:A:461:ASN:HB2	1.84	0.42
1:B:639[B]:PHE:CE1	1:B:643:ILE:HD11	2.54	0.42
1:B:64[A]:ALA:O	1:B:65[A]:ASP:C	2.57	0.41
1:A:221[B]:GLU:HG3	7:A:906:HOH:O	2.20	0.41

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	647/649 (100%)	625 (97%)	21 (3%)	1 (0%)	44	27
1	B	631/649 (97%)	609 (96%)	21 (3%)	1 (0%)	44	27
All	All	1278/1298 (98%)	1234 (97%)	42 (3%)	2 (0%)	44	27

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	324	SER
1	B	324	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	A	576/575 (100%)	569 (99%)	7 (1%)	67	50
1	B	562/575 (98%)	555 (99%)	7 (1%)	67	50
All	All	1138/1150 (99%)	1124 (99%)	14 (1%)	70	50

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	28	LEU
1	A	48	PHE
1	A	204	ASP
1	A	363	TYR

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	A	426[A]	CYS
1	A	426[B]	CYS
1	A	532	TYR
1	B	28	LEU
1	B	204	ASP
1	B	206	TYR
1	B	339[A]	ARG
1	B	339[B]	ARG
1	B	363	TYR
1	B	532	TYR

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

Mol	Chain	Res	Type
1	A	27	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](#)

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
2	GAL	C	1	2	12,12,12	0.57	0	17,17,17	0.88	1 (5%)
2	AAL	C	2	2	11,11,12	0.55	0	13,16,18	1.46	2 (15%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	AAL	D	1	3	12,12,12	0.76	0	16,18,18	1.13	2 (12%)
3	GAL	D	2	3	11,11,12	0.50	0	15,15,17	0.91	1 (6%)

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	GAL	C	1	2	-	1/2/22/22	0/1/1/1
2	AAL	C	2	2	-	-	0/3/2/2
3	AAL	D	1	3	-	-	0/3/2/2
3	GAL	D	2	3	-	0/2/19/22	0/1/1/1

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	2	AAL	C1-O5-C5	4.07	117.65	112.19
2	C	1	GAL	O3-C3-C2	-2.32	104.90	110.38
3	D	1	AAL	C3-C4-C5	-2.22	97.22	101.99
3	D	2	GAL	C1-O5-C5	2.19	115.12	112.19
2	C	2	AAL	O5-C5-C6	-2.03	110.36	113.33
3	D	1	AAL	O5-C5-C4	-2.02	106.49	109.51

There are no chirality outliers.

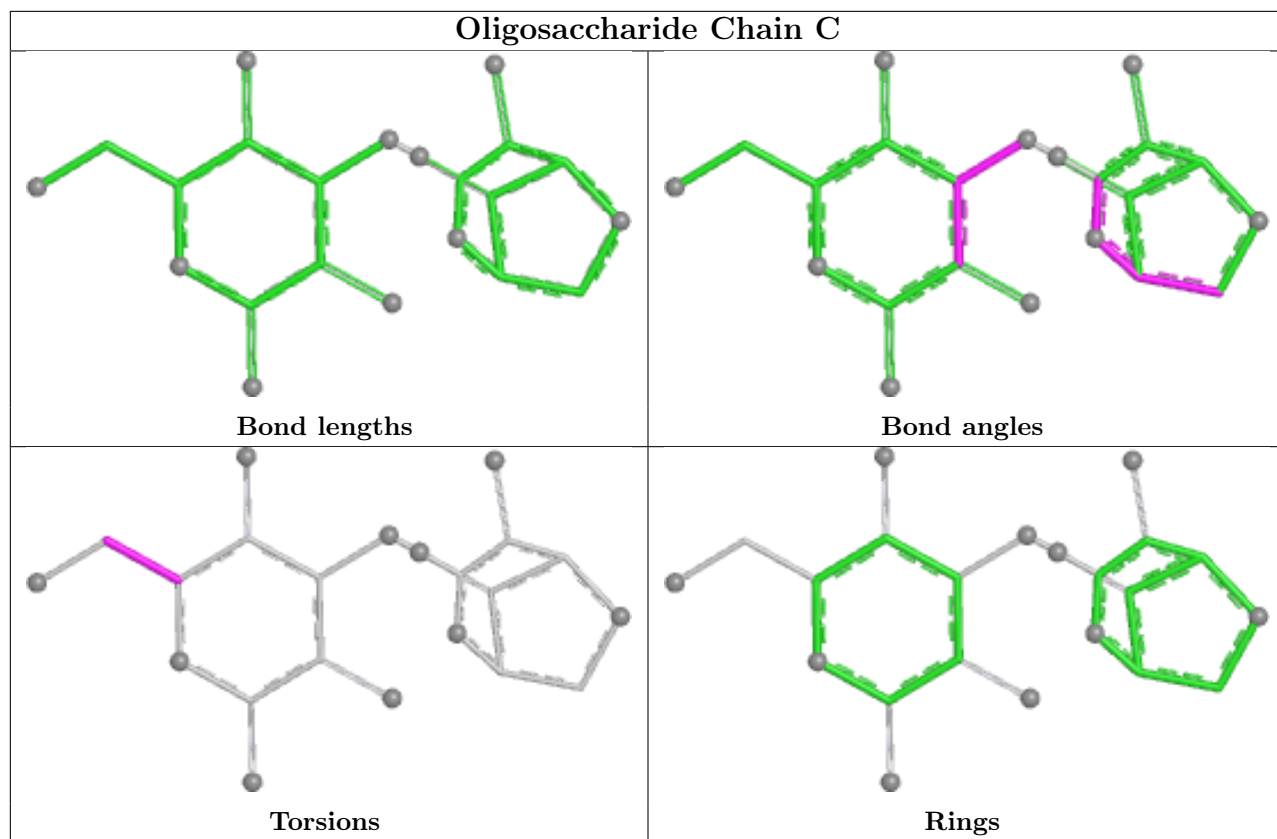
All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	1	GAL	O5-C5-C6-O6

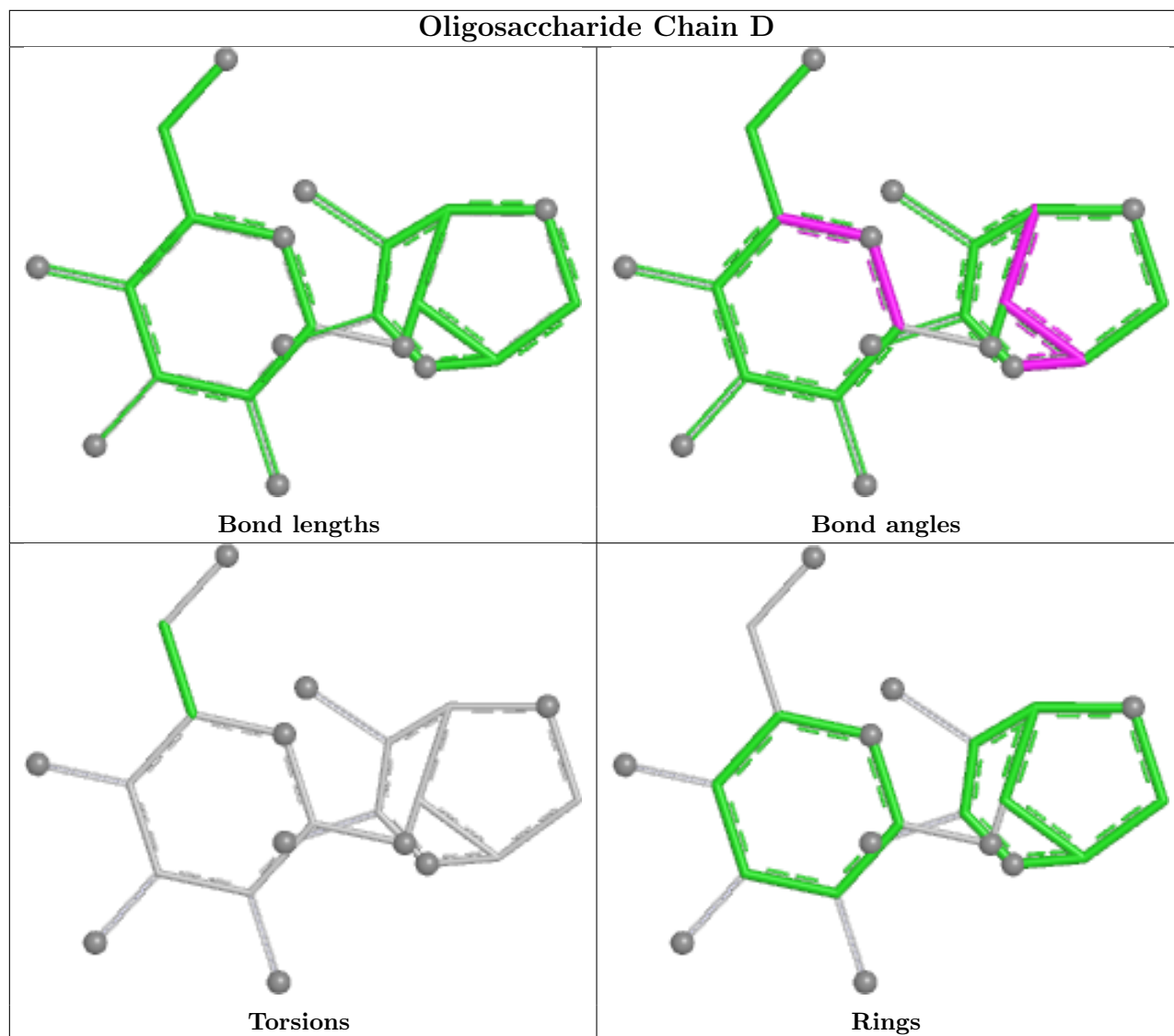
There are no ring outliers.

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 53 ligands modelled in this entry, 6 are monoatomic - leaving 47 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	$\# Z  > 2$
5	EDO	A	706	-	3,3,3	0.41	0	2,2,2	0.70	0
5	EDO	A	725	-	3,3,3	0.43	0	2,2,2	0.34	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	EDO	B	726	-	3,3,3	0.34	0	2,2,2	0.45	0
4	SO4	B	703	-	4,4,4	0.53	0	6,6,6	0.27	0
5	EDO	A	716	-	3,3,3	0.42	0	2,2,2	0.29	0
5	EDO	A	719	-	3,3,3	0.42	0	2,2,2	0.25	0
5	EDO	A	714	-	3,3,3	0.41	0	2,2,2	0.46	0
4	SO4	B	702	-	4,4,4	0.32	0	6,6,6	0.22	0
5	EDO	A	709	-	3,3,3	0.22	0	2,2,2	0.67	0
5	EDO	A	711	-	3,3,3	0.37	0	2,2,2	0.47	0
5	EDO	A	717	-	3,3,3	0.28	0	2,2,2	0.83	0
5	EDO	B	725	-	3,3,3	0.28	0	2,2,2	0.52	0
5	EDO	A	713	-	3,3,3	0.57	0	2,2,2	0.27	0
5	EDO	B	717	-	3,3,3	0.53	0	2,2,2	0.33	0
5	EDO	B	712	-	3,3,3	0.34	0	2,2,2	0.62	0
5	EDO	A	723	-	3,3,3	0.36	0	2,2,2	0.57	0
5	EDO	B	711	-	3,3,3	0.43	0	2,2,2	0.20	0
5	EDO	B	723	-	3,3,3	0.26	0	2,2,2	0.74	0
5	EDO	B	722	-	3,3,3	0.43	0	2,2,2	0.52	0
5	EDO	A	720	-	3,3,3	0.42	0	2,2,2	0.21	0
5	EDO	B	718	-	3,3,3	0.23	0	2,2,2	0.35	0
5	EDO	A	715	-	3,3,3	0.59	0	2,2,2	0.35	0
5	EDO	B	715	-	3,3,3	0.48	0	2,2,2	0.37	0
5	EDO	A	721	-	3,3,3	0.42	0	2,2,2	0.58	0
5	EDO	B	706	-	3,3,3	0.63	0	2,2,2	0.55	0
4	SO4	B	704	-	4,4,4	0.42	0	6,6,6	0.19	0
5	EDO	B	713	-	3,3,3	0.50	0	2,2,2	0.58	0
5	EDO	B	720	-	3,3,3	0.44	0	2,2,2	0.21	0
5	EDO	A	722	-	3,3,3	0.32	0	2,2,2	0.78	0
4	SO4	B	701	-	4,4,4	0.37	0	6,6,6	0.42	0
4	SO4	A	705	-	4,4,4	0.50	0	6,6,6	0.26	0
5	EDO	A	710	-	3,3,3	0.48	0	2,2,2	0.34	0
5	EDO	A	707	-	3,3,3	0.32	0	2,2,2	0.36	0
5	EDO	B	714	-	3,3,3	0.37	0	2,2,2	0.48	0
5	EDO	B	708	-	3,3,3	0.52	0	2,2,2	0.19	0
5	EDO	B	721	-	3,3,3	0.46	0	2,2,2	0.29	0
5	EDO	B	707	-	3,3,3	0.29	0	2,2,2	0.32	0
5	EDO	A	708	-	3,3,3	0.30	0	2,2,2	0.55	0
5	EDO	A	712	-	3,3,3	0.30	0	2,2,2	0.28	0
5	EDO	B	719	-	3,3,3	0.44	0	2,2,2	0.42	0
5	EDO	B	705	-	3,3,3	0.43	0	2,2,2	0.28	0
5	EDO	B	709	-	3,3,3	0.44	0	2,2,2	0.41	0
5	EDO	A	718	-	3,3,3	0.36	0	2,2,2	0.57	0
5	EDO	B	716	-	3,3,3	0.42	0	2,2,2	0.29	0
5	EDO	A	724	-	3,3,3	0.30	0	2,2,2	0.33	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	EDO	B	724	-	3,3,3	0.45	0	2,2,2	0.42	0
5	EDO	B	710	-	3,3,3	0.42	0	2,2,2	0.62	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	A	706	-	-	1/1/1/1	-
5	EDO	A	725	-	-	1/1/1/1	-
5	EDO	B	726	-	-	0/1/1/1	-
5	EDO	A	716	-	-	1/1/1/1	-
5	EDO	A	719	-	-	0/1/1/1	-
5	EDO	A	714	-	-	0/1/1/1	-
5	EDO	A	709	-	-	0/1/1/1	-
5	EDO	B	725	-	-	1/1/1/1	-
5	EDO	A	711	-	-	0/1/1/1	-
5	EDO	A	717	-	-	0/1/1/1	-
5	EDO	A	713	-	-	0/1/1/1	-
5	EDO	B	717	-	-	1/1/1/1	-
5	EDO	B	712	-	-	0/1/1/1	-
5	EDO	A	723	-	-	0/1/1/1	-
5	EDO	B	711	-	-	1/1/1/1	-
5	EDO	B	723	-	-	1/1/1/1	-
5	EDO	B	722	-	-	0/1/1/1	-
5	EDO	A	720	-	-	1/1/1/1	-
5	EDO	B	718	-	-	1/1/1/1	-
5	EDO	A	715	-	-	0/1/1/1	-
5	EDO	B	715	-	-	1/1/1/1	-
5	EDO	A	721	-	-	1/1/1/1	-
5	EDO	B	706	-	-	0/1/1/1	-
5	EDO	B	713	-	-	0/1/1/1	-
5	EDO	B	720	-	-	0/1/1/1	-
5	EDO	A	722	-	-	0/1/1/1	-
5	EDO	A	707	-	-	0/1/1/1	-
5	EDO	A	710	-	-	0/1/1/1	-
5	EDO	B	714	-	-	0/1/1/1	-
5	EDO	B	708	-	-	0/1/1/1	-
5	EDO	B	721	-	-	1/1/1/1	-
5	EDO	B	707	-	-	0/1/1/1	-
5	EDO	A	708	-	-	1/1/1/1	-
5	EDO	A	712	-	-	1/1/1/1	-

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	B	719	-	-	0/1/1/1	-
5	EDO	B	705	-	-	0/1/1/1	-
5	EDO	B	709	-	-	1/1/1/1	-
5	EDO	A	718	-	-	1/1/1/1	-
5	EDO	B	716	-	-	0/1/1/1	-
5	EDO	A	724	-	-	1/1/1/1	-
5	EDO	B	724	-	-	1/1/1/1	-
5	EDO	B	710	-	-	0/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	712	EDO	O1-C1-C2-O2
5	B	718	EDO	O1-C1-C2-O2
5	A	721	EDO	O1-C1-C2-O2
5	A	725	EDO	O1-C1-C2-O2
5	B	709	EDO	O1-C1-C2-O2
5	A	708	EDO	O1-C1-C2-O2
5	B	717	EDO	O1-C1-C2-O2
5	A	706	EDO	O1-C1-C2-O2
5	A	718	EDO	O1-C1-C2-O2
5	A	720	EDO	O1-C1-C2-O2
5	B	711	EDO	O1-C1-C2-O2
5	B	723	EDO	O1-C1-C2-O2
5	B	725	EDO	O1-C1-C2-O2
5	A	724	EDO	O1-C1-C2-O2
5	B	715	EDO	O1-C1-C2-O2
5	B	721	EDO	O1-C1-C2-O2
5	B	724	EDO	O1-C1-C2-O2
5	A	716	EDO	O1-C1-C2-O2

There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	714	EDO	1	0
4	B	702	SO4	1	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	723	EDO	3	0

## 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, 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	624/649 (96%)	-0.42	5 (0%) 82 86	3, 10, 20, 34	32 (5%)
1	B	613/649 (94%)	-0.25	24 (3%) 44 46	3, 10, 28, 53	36 (5%)
All	All	1237/1298 (95%)	-0.34	29 (2%) 61 65	3, 10, 23, 53	68 (5%)

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	398	PHE	4.9
1	B	384	HIS	3.7
1	A	426[A]	CYS	3.6
1	B	643	ILE	3.6
1	B	331	ASN	3.4
1	A	643	ILE	3.3
1	B	56	TYR	3.3
1	B	464	SER	3.2
1	B	385	THR	3.1
1	B	397	SER	3.0
1	B	586	ASP	2.9
1	B	395	PRO	2.8
1	B	396	GLU	2.8
1	B	641	ASN	2.7
1	B	328	HIS	2.7
1	B	330	TYR	2.7
1	B	21	GLN	2.5
1	A	641	ASN	2.5
1	B	372	SER	2.5
1	B	399	THR	2.4
1	B	393	ASN	2.4
1	A	425	ASN	2.3
1	B	463	THR	2.3
1	B	334	PRO	2.2

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	B	400	GLY	2.2
1	A	642	ASN	2.1
1	B	326	GLN	2.1
1	B	645	GLY	2.1
1	B	642	ASN	2.0

## 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 [\(i\)](#)

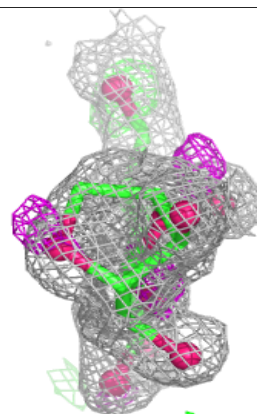
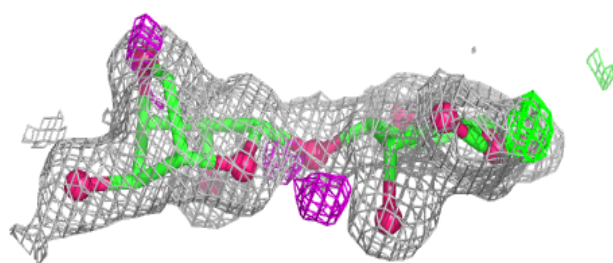
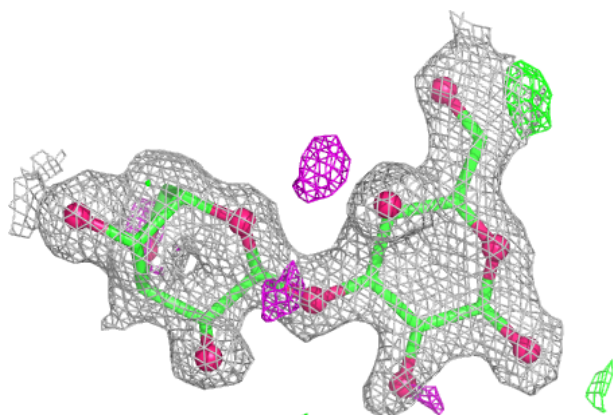
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
3	AAL	D	1	11/11	0.74	0.17	24,28,34,35	0
3	GAL	D	2	11/12	0.84	0.14	24,26,29,34	0
2	GAL	C	1	12/12	0.87	0.10	22,27,30,31	0
2	AAL	C	2	10/11	0.91	0.09	21,22,23,23	0

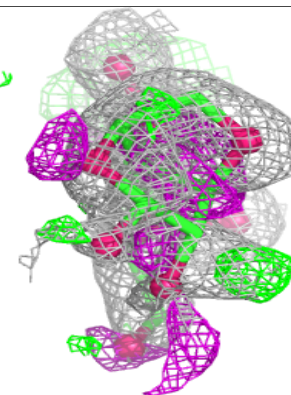
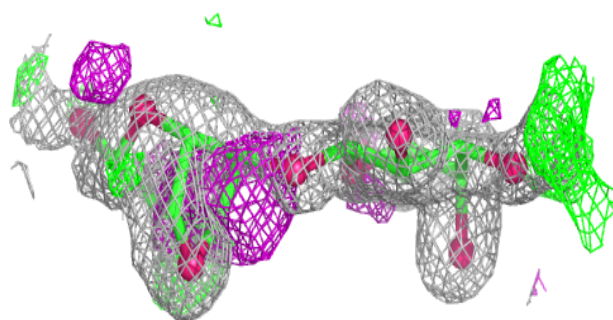
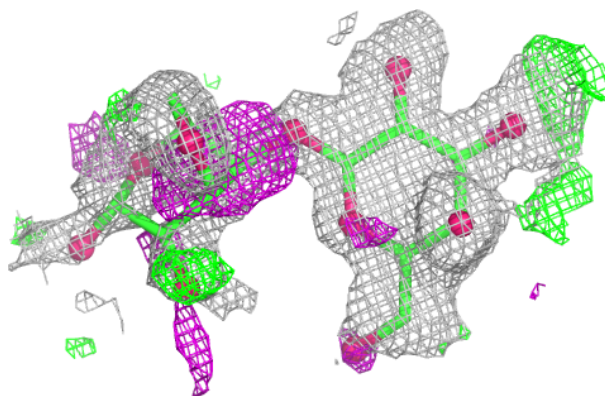
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around Chain C:**

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

**Electron density around Chain D:**

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





## 6.4 Ligands i

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
5	EDO	B	723	4/4	0.67	0.26	38,41,43,46	0
5	EDO	A	722	4/4	0.69	0.28	45,46,48,50	0
5	EDO	A	723	4/4	0.75	0.22	38,39,40,41	0
5	EDO	A	718	4/4	0.77	0.23	37,38,38,42	0
5	EDO	B	717	4/4	0.78	0.19	30,32,32,32	0
5	EDO	B	709	4/4	0.78	0.21	29,30,32,35	0
5	EDO	A	721	4/4	0.80	0.31	41,45,46,47	0
5	EDO	B	724	4/4	0.80	0.21	41,43,45,46	0
5	EDO	B	726	4/4	0.80	0.21	35,39,39,41	0
5	EDO	B	712	4/4	0.81	0.21	44,45,46,48	0
5	EDO	B	714	4/4	0.81	0.17	34,36,37,40	0
5	EDO	A	725	4/4	0.81	0.17	40,41,41,42	0
5	EDO	B	710	4/4	0.83	0.15	29,30,31,32	0
5	EDO	B	716	4/4	0.83	0.15	33,33,34,35	0
5	EDO	B	721	4/4	0.84	0.18	30,31,32,33	0
5	EDO	B	715	4/4	0.84	0.15	30,30,30,34	0
5	EDO	A	720	4/4	0.84	0.14	27,31,32,33	0
5	EDO	B	706	4/4	0.84	0.14	18,19,19,20	0
5	EDO	A	715	4/4	0.86	0.18	27,27,28,29	0
5	EDO	B	722	4/4	0.86	0.17	22,22,24,24	0
5	EDO	A	710	4/4	0.86	0.14	27,27,29,29	0
5	EDO	A	714	4/4	0.86	0.16	22,25,27,30	0
5	EDO	B	725	4/4	0.86	0.17	32,35,36,37	0
5	EDO	B	719	4/4	0.86	0.13	22,23,23,26	0
5	EDO	A	708	4/4	0.87	0.15	20,24,26,32	0
5	EDO	A	724	4/4	0.87	0.16	23,27,30,32	0
5	EDO	B	713	4/4	0.88	0.12	21,21,22,24	0
5	EDO	A	706	4/4	0.88	0.15	18,20,21,22	0
5	EDO	A	719	4/4	0.88	0.13	25,28,29,30	0
5	EDO	A	712	4/4	0.88	0.16	26,28,30,33	0
5	EDO	B	718	4/4	0.89	0.16	25,25,28,30	0
5	EDO	A	717	4/4	0.89	0.11	18,21,21,23	0
4	SO4	B	703	5/5	0.89	0.11	11,12,13,13	5
5	EDO	A	709	4/4	0.89	0.15	26,28,30,34	0
4	SO4	A	705	5/5	0.90	0.17	31,31,31,31	0
5	EDO	B	720	4/4	0.90	0.12	19,22,25,29	0
5	EDO	A	711	4/4	0.91	0.11	22,22,23,24	0

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	EDO	B	711	4/4	0.92	0.12	15,19,22,25	0
5	EDO	A	716	4/4	0.92	0.11	26,27,28,28	0
5	EDO	A	713	4/4	0.93	0.11	19,19,19,20	0
4	SO4	B	704	5/5	0.93	0.09	38,38,44,44	0
5	EDO	B	708	4/4	0.93	0.11	19,19,19,20	0
5	EDO	B	707	4/4	0.94	0.08	17,19,19,21	0
5	EDO	A	707	4/4	0.95	0.07	17,18,19,20	0
5	EDO	B	705	4/4	0.97	0.06	12,12,12,12	0
4	SO4	B	702	5/5	0.97	0.08	27,30,32,32	0
4	SO4	B	701	5/5	0.98	0.08	18,20,21,22	0
6	CA	A	726	1/1	0.99	0.08	17,17,17,17	0
6	CA	B	728	1/1	0.99	0.10	18,18,18,18	0
6	CA	A	728	1/1	1.00	0.03	8,8,8,8	0
6	CA	B	727	1/1	1.00	0.05	10,10,10,10	0
6	CA	A	727	1/1	1.00	0.03	9,9,9,9	0
6	CA	B	729	1/1	1.00	0.03	10,10,10,10	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.