



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 9, 2020 – 01:33 PM BST

PDB ID : 6SE9  
Title : Cold-adapted beta-D-galactosidase from *Arthrobacter* sp. 32cB mutant E441Q  
in complex with lactose bound in shallow mode  
Authors : Rutkiewicz, M.; Bujacz, A.; Bujacz, G.  
Deposited on : 2019-07-29  
Resolution : 1.97 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.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.13.1  
buster-report : 1.1.7 (2018)  
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) : 2.13.1

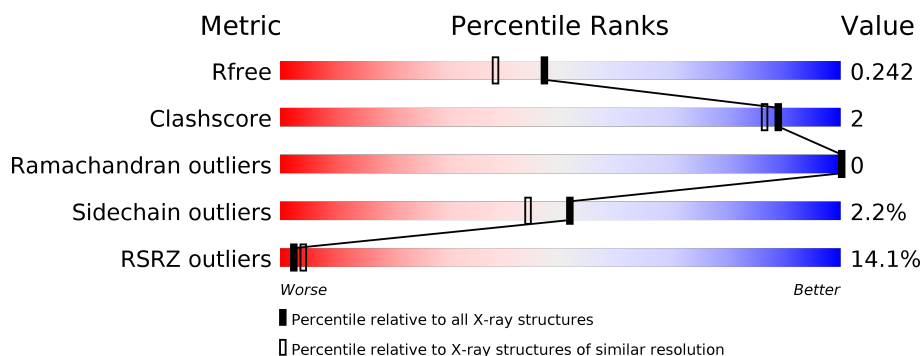
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.97 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	2580 (1.96-1.96)
Clashscore	141614	2705 (1.96-1.96)
Ramachandran outliers	138981	2678 (1.96-1.96)
Sidechain outliers	138945	2678 (1.96-1.96)
RSRZ outliers	127900	2539 (1.96-1.96)

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 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	1010	<div> <div>14%</div> <div>93%</div> <div>5%</div> </div>
2	B	2	<div> <div>100%</div> </div>

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	ACT	A	1105	-	-	-	X
7	FRU	A	1109	-	-	-	X

## 2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 8098 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 Beta-galactosidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	989	7619	4794	1363	1443	19	0	2	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	441	GLN	GLU	engineered mutation	UNP A0A023UGN9

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

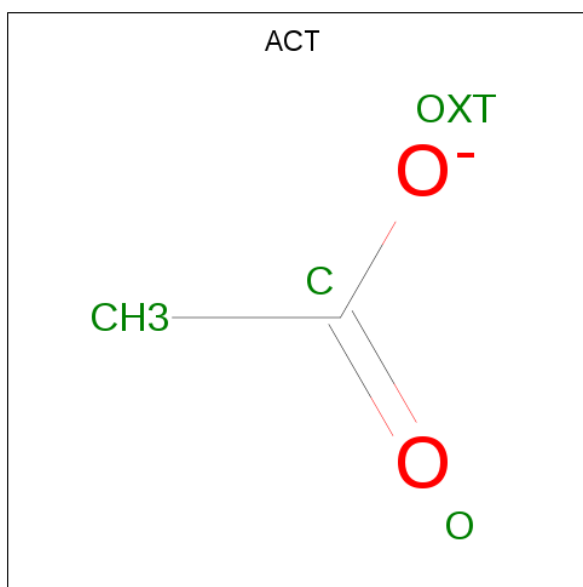


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
			Total	C	O			
2	B	2	23	12	11	0	0	0

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

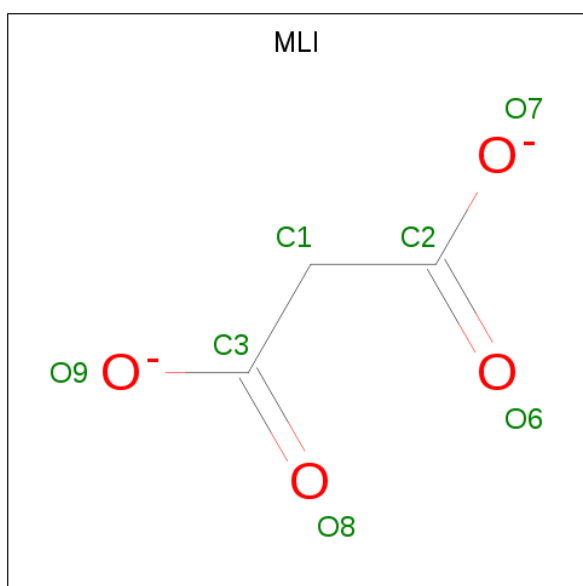
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	Na	0	0
			2	2		

- Molecule 4 is ACETATE ION (three-letter code: ACT) (formula: C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>).



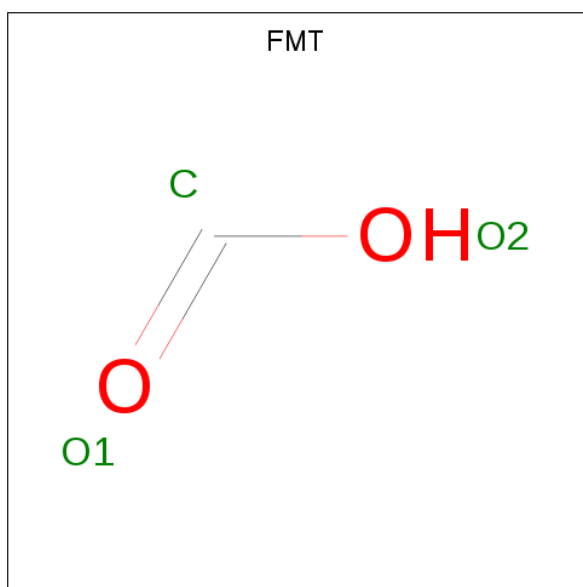
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		

- Molecule 5 is MALONATE ION (three-letter code: MLI) (formula:  $C_3H_2O_4$ ).



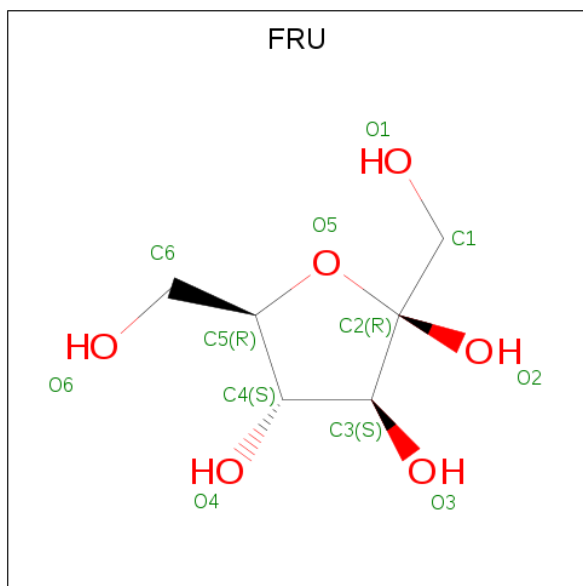
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			7	3	4		

- Molecule 6 is FORMIC ACID (three-letter code: FMT) (formula:  $CH_2O_2$ ).



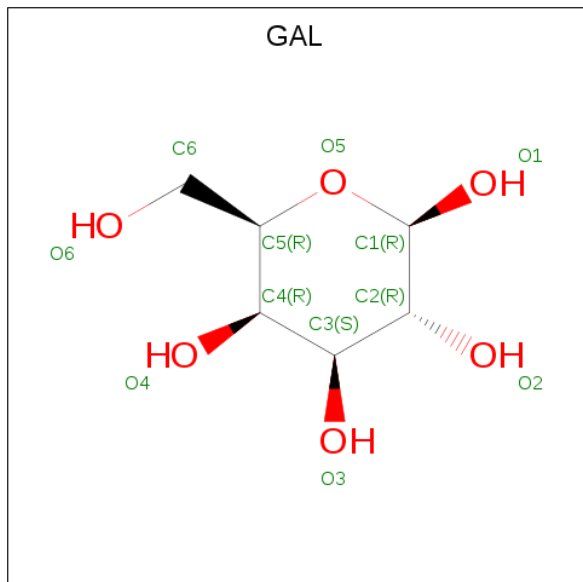
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			3	1	2		

- Molecule 7 is beta-D-fructofuranose (three-letter code: FRU) (formula: C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			12	6	6		
7	A	1	Total	C	O	0	0
			12	6	6		

- Molecule 8 is beta-D-galactopyranose (three-letter code: GAL) (formula:  $C_6H_{12}O_6$ ) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	C	O	0	0
			12	6	6		

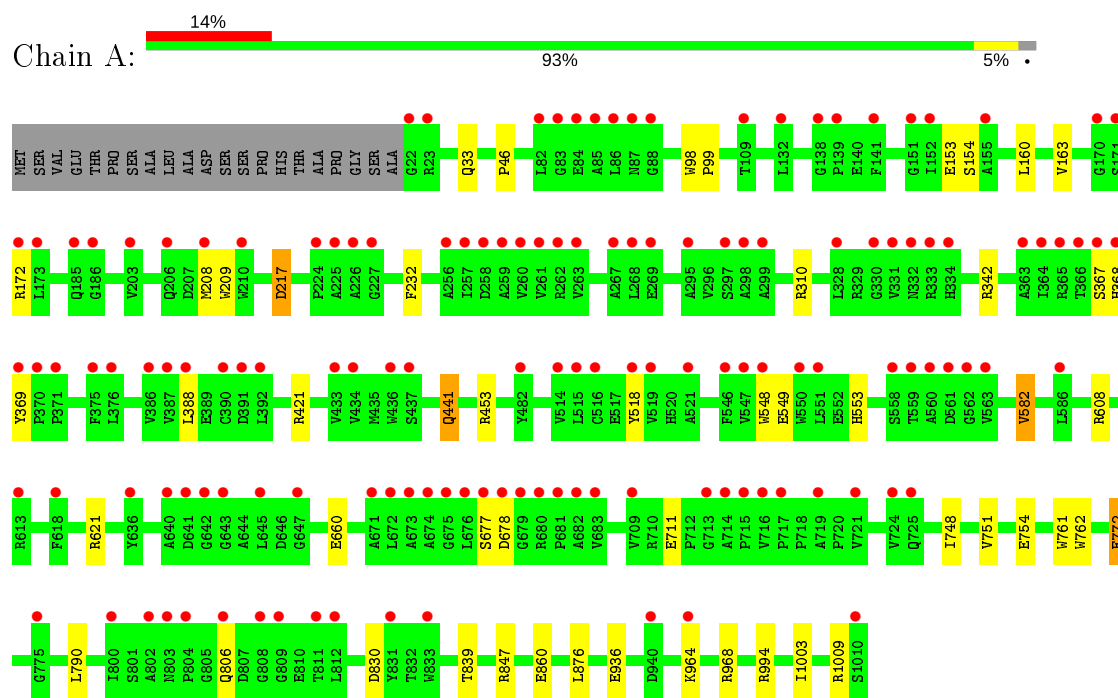
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	400	Total	O	0	0
			400	400		

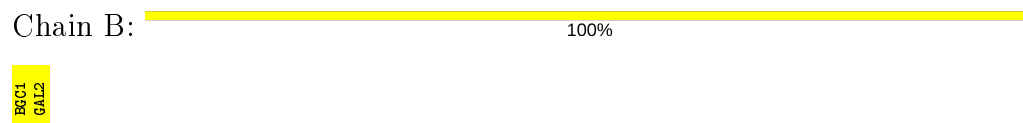
### 3 Residue-property plots [i](#)

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: Beta-galactosidase



- Molecule 2: beta-D-galactopyranose-(1-4)-beta-D-glucopyranose





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	138.90Å 138.90Å 127.88Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	47.04 – 1.97 47.04 – 1.96	Depositor EDS
% Data completeness (in resolution range)	99.0 (47.04-1.97) 99.4 (47.04-1.96)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.12 (at 1.97Å)	Xtriage
Refinement program	PHENIX 1.12_2829	Depositor
R, $R_{free}$	0.202 , 0.238 0.206 , 0.242	Depositor DCC
$R_{free}$ test set	2098 reflections (2.08%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	38.8	Xtriage
Anisotropy	0.646	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 56.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.018 for -h,-k,l	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	8098	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	70.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.82% 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: BGC, NA, FMT, MLI, GAL, FRU, ACT

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	0.26	0/7824	0.47	0/10663

There are no bond length outliers.

There are no bond angle outliers.

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	7619	0	7319	25	0
2	B	23	0	19	0	0
3	A	2	0	0	0	0
4	A	8	0	6	0	0
5	A	7	0	2	0	0
6	A	3	0	1	0	0
7	A	24	0	20	5	0
8	A	12	0	12	0	0
9	A	400	0	0	3	0
All	All	8098	0	7379	28	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 (28) 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)
7:A:1108:FRU:O5	7:A:1108:FRU:C2	1.64	1.21
7:A:1109:FRU:O5	7:A:1109:FRU:C2	1.64	1.11
1:A:830:ASP:OD1	1:A:847:ARG:NH1	2.20	0.74
1:A:860:GLU:OE1	1:A:994:ARG:NH1	2.21	0.73
1:A:208[A]:MET:SD	1:A:342:ARG:NH1	2.70	0.64
1:A:46:PRO:HA	7:A:1109:FRU:O2	2.00	0.62
1:A:772:GLU:OE2	1:A:994:ARG:NH2	2.32	0.62
1:A:608:ARG:NH2	1:A:660:GLU:OE2	2.36	0.59
1:A:441:GLN:NE2	9:A:1208:HOH:O	2.38	0.56
1:A:421:ARG:HD2	7:A:1109:FRU:H5	1.88	0.55
1:A:754:GLU:OE1	1:A:968:ARG:NH1	2.42	0.53
1:A:208[A]:MET:HE1	1:A:369:TYR:HE2	1.74	0.52
1:A:453:ARG:NH2	9:A:1211:HOH:O	2.41	0.50
1:A:677:SER:O	1:A:678:ASP:HB2	2.16	0.46
1:A:153:GLU:HA	1:A:154:SER:HA	1.77	0.46
1:A:553:HIS:HB2	1:A:582:VAL:HG22	1.99	0.45
7:A:1108:FRU:O1	9:A:1201:HOH:O	2.21	0.45
1:A:160:LEU:O	1:A:163:VAL:HG12	2.17	0.44
1:A:936:GLU:OE2	1:A:1009:ARG:NE	2.49	0.43
1:A:98:TRP:N	1:A:99:PRO:CD	2.82	0.43
1:A:748:ILE:O	1:A:751:VAL:HG22	2.18	0.42
1:A:217:ASP:OD1	1:A:217:ASP:N	2.52	0.42
1:A:936:GLU:OE2	1:A:1009:ARG:NH1	2.50	0.42
1:A:761:TRP:HB2	1:A:790:LEU:HB3	2.03	0.41
1:A:208[A]:MET:HG3	1:A:209:TRP:N	2.35	0.41
1:A:367:SER:HA	1:A:368:HIS:HA	1.83	0.40
1:A:548:TRP:HA	1:A:549:GLU:HA	1.86	0.40
1:A:1003:ILE:N	1:A:1003:ILE:HD12	2.37	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	989/1010 (98%)	957 (97%)	32 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 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	778/793 (98%)	761 (98%)	17 (2%)	52	44

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	33	GLN
1	A	172	ARG
1	A	217	ASP
1	A	232	PHE
1	A	310	ARG
1	A	388	LEU
1	A	441	GLN
1	A	518	TYR
1	A	582	VAL
1	A	621	ARG
1	A	711	GLU
1	A	762	TRP
1	A	772	GLU
1	A	806	GLN
1	A	839	THR
1	A	876	LEU
1	A	964	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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 ⓘ

2 monosaccharides are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z  > 2$	Counts	RMSZ	# $ Z  > 2$
2	BGC	B	1	2	12,12,12	1.26	1 (8%)	17,17,17	1.04	0
2	GAL	B	2	3,2	11,11,12	1.68	3 (27%)	15,15,17	1.19	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	BGC	B	1	2	-	2/2/22/22	0/1/1/1
2	GAL	B	2	3,2	-	1/2/19/22	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	2	GAL	O5-C1	3.70	1.49	1.43
2	B	1	BGC	O5-C1	3.05	1.50	1.42
2	B	2	GAL	C2-C3	-2.49	1.48	1.52
2	B	2	GAL	O3-C3	2.03	1.47	1.43

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	2	GAL	C1-C2-C3	2.93	113.27	109.67

There are no chirality outliers.

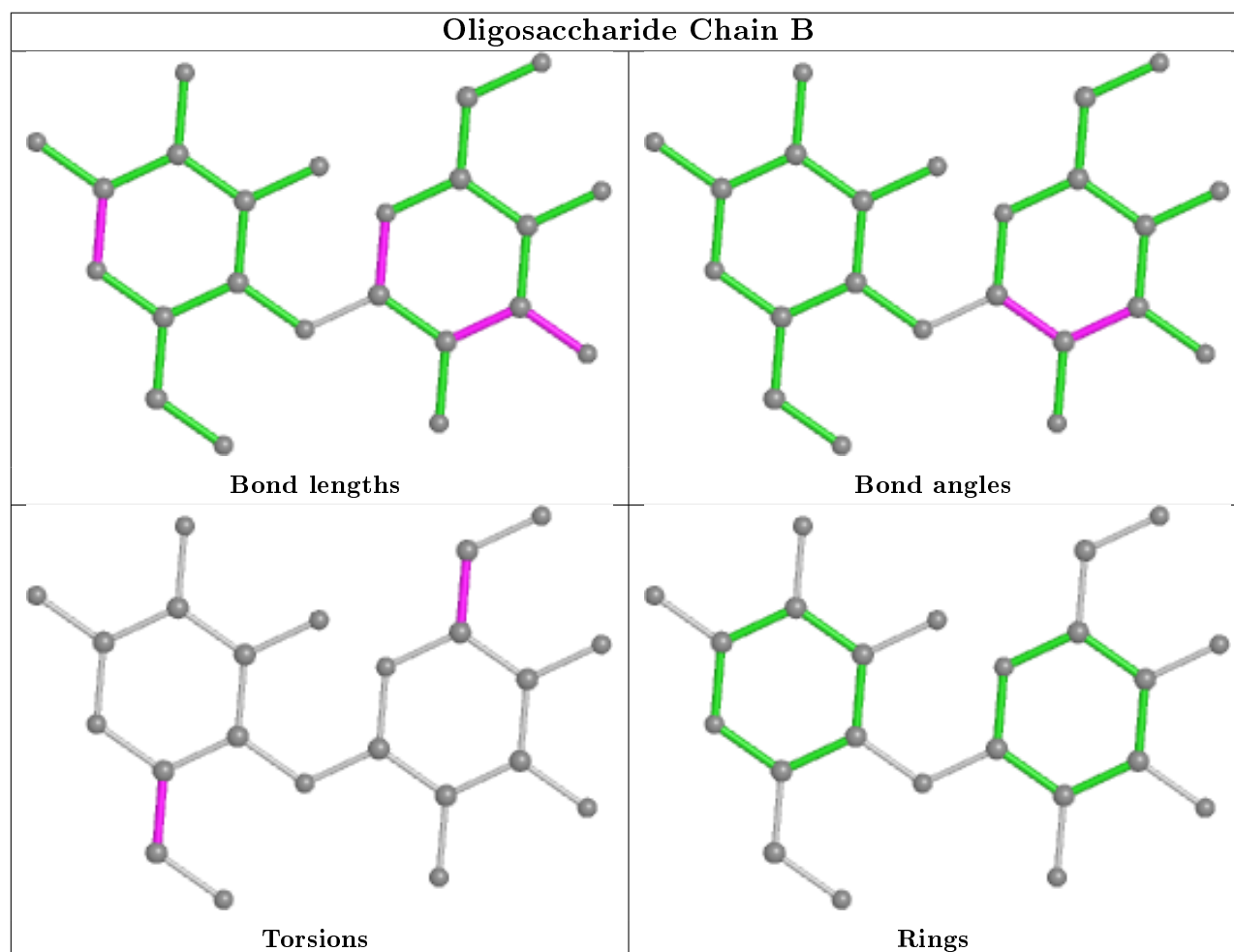
All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	1	BGC	O5-C5-C6-O6
2	B	1	BGC	C4-C5-C6-O6
2	B	2	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

Of 9 ligands modelled in this entry, 2 are monoatomic - leaving 7 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
4	ACT	A	1105	-	1,3,3	2.85	1 (100%)	0,3,3	0.00	-
5	MLI	A	1106	-	0,6,6	0.00	-	0,7,7	0.00	-
6	FMT	A	1107	-	0,2,2	0.00	-	0,1,1	0.00	-
7	FRU	A	1109	-	11,12,12	4.83	6 (54%)	10,18,18	1.21	1 (10%)
7	FRU	A	1108	-	11,12,12	4.82	6 (54%)	10,18,18	0.82	0
4	ACT	A	1104	-	1,3,3	3.17	1 (100%)	0,3,3	0.00	-
8	GAL	A	1110	-	12,12,12	0.53	0	17,17,17	0.80	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	FRU	A	1108	-	-	3/5/24/24	0/1/1/1
5	MLI	A	1106	-	-	0/0/4/4	-
7	FRU	A	1109	-	-	5/5/24/24	0/1/1/1
8	GAL	A	1110	-	-	0/2/22/22	0/1/1/1

All (14) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	1109	FRU	O5-C2	13.68	1.64	1.43
7	A	1108	FRU	O5-C2	13.64	1.64	1.43
7	A	1108	FRU	O5-C5	-5.40	1.32	1.43
7	A	1109	FRU	O5-C5	-5.26	1.32	1.43
7	A	1109	FRU	O4-C4	-4.36	1.32	1.43
7	A	1108	FRU	O4-C4	-4.13	1.33	1.43
4	A	1104	ACT	CH3-C	3.17	1.52	1.48
7	A	1109	FRU	O2-C2	-3.06	1.35	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	1108	FRU	O2-C2	-2.97	1.35	1.40
4	A	1105	ACT	CH3-C	2.85	1.52	1.48
7	A	1108	FRU	C4-C5	2.61	1.59	1.53
7	A	1109	FRU	C4-C5	2.43	1.59	1.53
7	A	1109	FRU	O3-C3	2.27	1.47	1.42
7	A	1108	FRU	O3-C3	2.10	1.47	1.42

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	1109	FRU	O1-C1-C2	-2.84	105.81	111.86

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	1109	FRU	O1-C1-C2-C3
7	A	1109	FRU	O1-C1-C2-O2
7	A	1109	FRU	O1-C1-C2-O5
7	A	1109	FRU	O5-C5-C6-O6
7	A	1108	FRU	O1-C1-C2-C3
7	A	1108	FRU	O1-C1-C2-O2
7	A	1109	FRU	C4-C5-C6-O6
7	A	1108	FRU	O1-C1-C2-O5

There are no ring outliers.

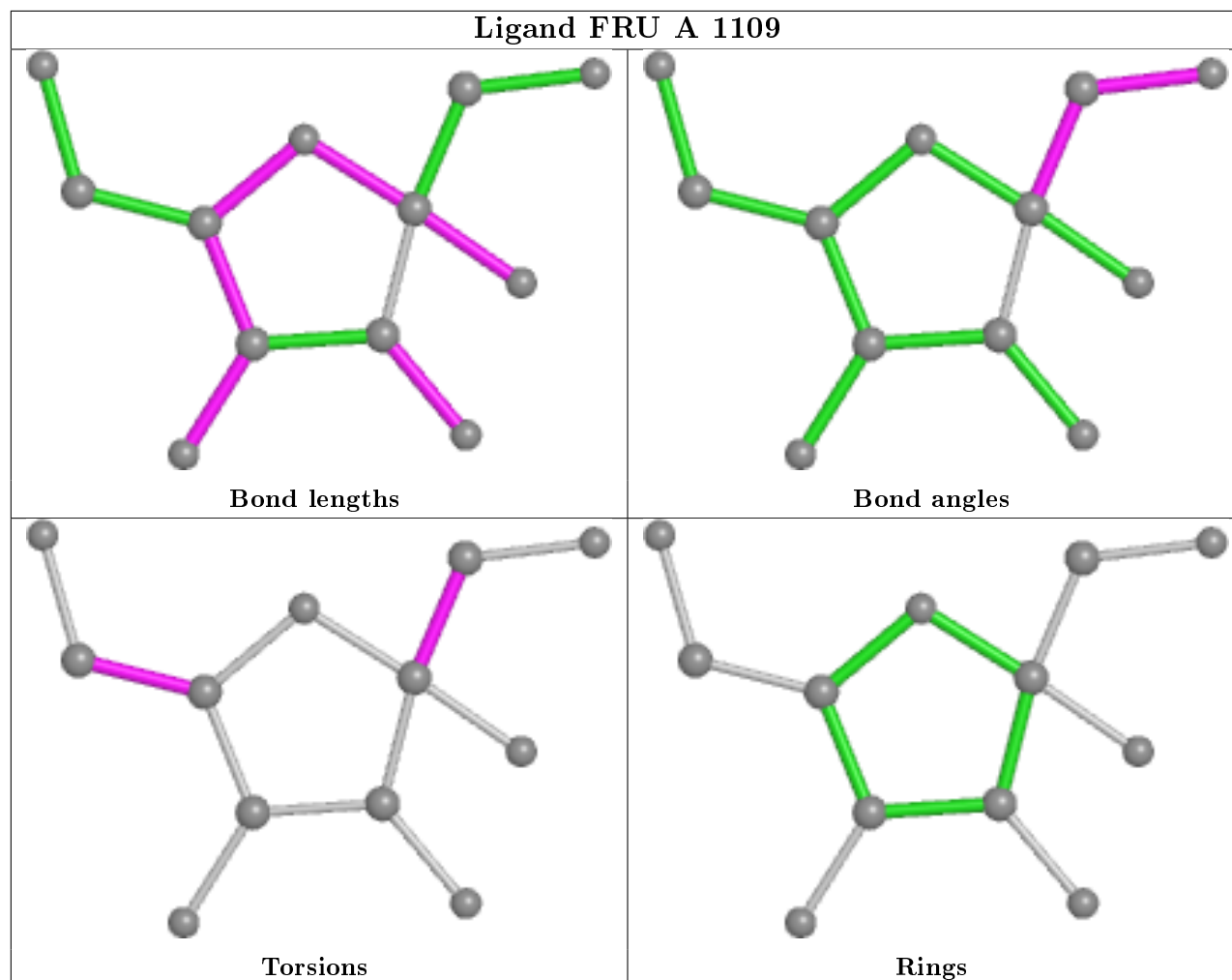
2 monomers are involved in 5 short contacts:

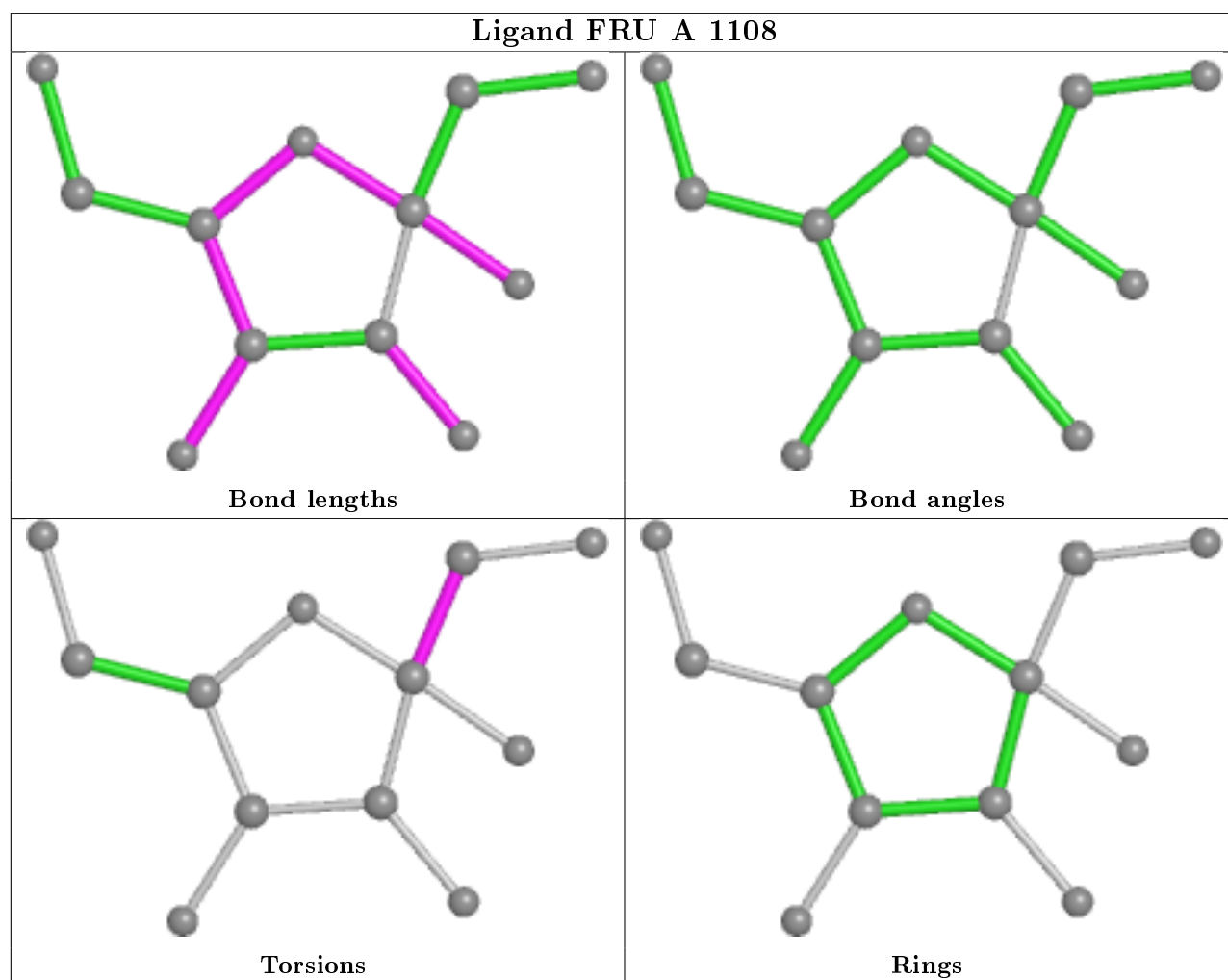
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	1109	FRU	3	0
7	A	1108	FRU	2	0

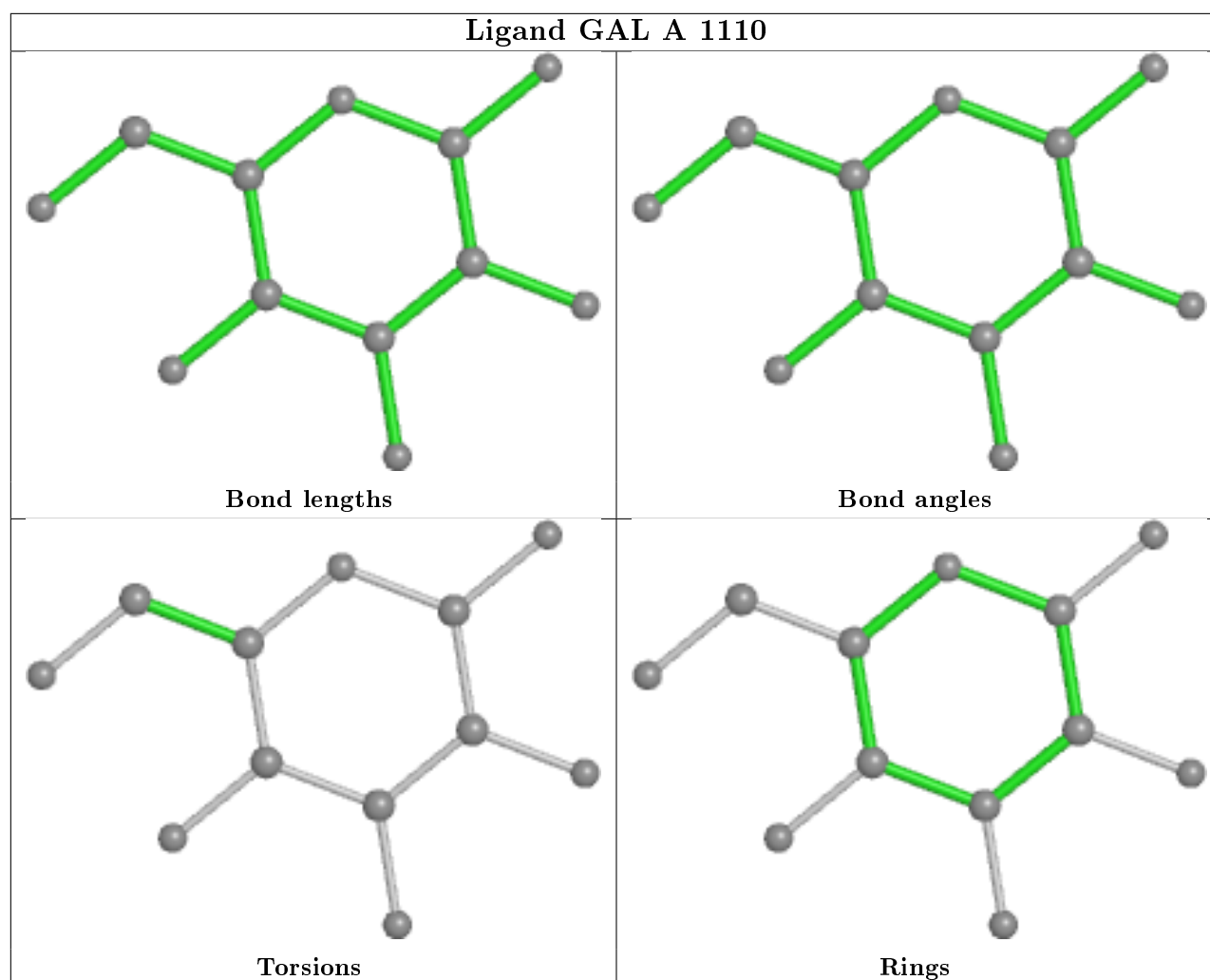
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and



any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







## 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 ⓘ

### 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	989/1010 (97%)	0.67	139 (14%) 2 4	46, 69, 105, 157	0

All (139) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	560	ALA	8.8
1	A	561	ASP	7.3
1	A	716	VAL	6.4
1	A	559	THR	6.3
1	A	563	VAL	6.2
1	A	676	LEU	5.6
1	A	562	GLY	5.5
1	A	86	LEU	5.3
1	A	714	ALA	5.2
1	A	677	SER	5.1
1	A	547	VAL	4.7
1	A	390	CYS	4.6
1	A	713	GLY	4.6
1	A	331	VAL	4.5
1	A	87	ASN	4.5
1	A	369	TYR	4.5
1	A	643	GLY	4.4
1	A	645	LEU	4.3
1	A	516	CYS	4.2
1	A	392	LEU	4.2
1	A	388	LEU	4.2
1	A	23	ARG	4.2
1	A	387	VAL	4.1
1	A	364	ILE	4.1
1	A	173	LEU	4.0
1	A	640	ALA	4.0
1	A	298	ALA	4.0

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Mol	Chain	Res	Type	RSRZ
1	A	85	ALA	4.0
1	A	673	ALA	3.8
1	A	366	THR	3.8
1	A	642	GLY	3.8
1	A	678	ASP	3.7
1	A	721	VAL	3.7
1	A	551	LEU	3.7
1	A	185	GLN	3.6
1	A	386	VAL	3.6
1	A	682	ALA	3.5
1	A	268	LEU	3.4
1	A	141	PHE	3.4
1	A	548	TRP	3.4
1	A	809	GLY	3.3
1	A	514	VAL	3.3
1	A	82	LEU	3.3
1	A	22	GLY	3.2
1	A	299	ALA	3.2
1	A	333	ARG	3.2
1	A	647	GLY	3.2
1	A	171	SER	3.2
1	A	671	ALA	3.1
1	A	365	ARG	3.1
1	A	367	SER	3.1
1	A	515	LEU	3.1
1	A	84	GLU	3.1
1	A	334	HIS	3.1
1	A	330	GLY	3.1
1	A	613	ARG	3.0
1	A	586	LEU	3.0
1	A	672	LEU	3.0
1	A	258	ASP	3.0
1	A	328	LEU	3.0
1	A	433	VAL	3.0
1	A	558	SER	3.0
1	A	518	TYR	2.9
1	A	368	HIS	2.9
1	A	152	ILE	2.9
1	A	208[A]	MET	2.9
1	A	964	LYS	2.9
1	A	675	GLY	2.8
1	A	804	PRO	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	725	GLN	2.8
1	A	806	GLN	2.8
1	A	267	ALA	2.8
1	A	370	PRO	2.8
1	A	371	PRO	2.8
1	A	546	PHE	2.8
1	A	519	VAL	2.8
1	A	802	ALA	2.7
1	A	679	GLY	2.7
1	A	683	VAL	2.7
1	A	227	GLY	2.7
1	A	641	ASP	2.7
1	A	808	GLY	2.7
1	A	224	PRO	2.7
1	A	550	TRP	2.7
1	A	724	VAL	2.7
1	A	88	GLY	2.6
1	A	391	ASP	2.6
1	A	83	GLY	2.6
1	A	151	GLY	2.6
1	A	186	GLY	2.6
1	A	803	ASN	2.5
1	A	139	PRO	2.5
1	A	482	TYR	2.5
1	A	833	TRP	2.5
1	A	363	ALA	2.5
1	A	674	ALA	2.5
1	A	680	ARG	2.5
1	A	132	LEU	2.5
1	A	259	ALA	2.5
1	A	719	ALA	2.5
1	A	434	VAL	2.4
1	A	775	GLY	2.4
1	A	436	TRP	2.4
1	A	618	PHE	2.4
1	A	172	ARG	2.4
1	A	811	THR	2.4
1	A	332	ASN	2.4
1	A	297	SER	2.4
1	A	437	SER	2.4
1	A	636	TYR	2.4
1	A	210	TRP	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	715	PRO	2.4
1	A	257	ILE	2.4
1	A	203	VAL	2.3
1	A	261	VAL	2.3
1	A	262	ARG	2.3
1	A	375	PHE	2.3
1	A	226	ALA	2.2
1	A	295	ALA	2.2
1	A	260	VAL	2.2
1	A	717	PRO	2.2
1	A	940	ASP	2.2
1	A	225	ALA	2.2
1	A	263	VAL	2.2
1	A	709	VAL	2.2
1	A	376	LEU	2.2
1	A	831	TYR	2.2
1	A	521	ALA	2.2
1	A	812	LEU	2.2
1	A	109	THR	2.1
1	A	155	ALA	2.1
1	A	170	GLY	2.1
1	A	256	ALA	2.1
1	A	138	GLY	2.1
1	A	1010	SER	2.1
1	A	800	ILE	2.1
1	A	681	PRO	2.1
1	A	206	GLN	2.0
1	A	269	GLU	2.0

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

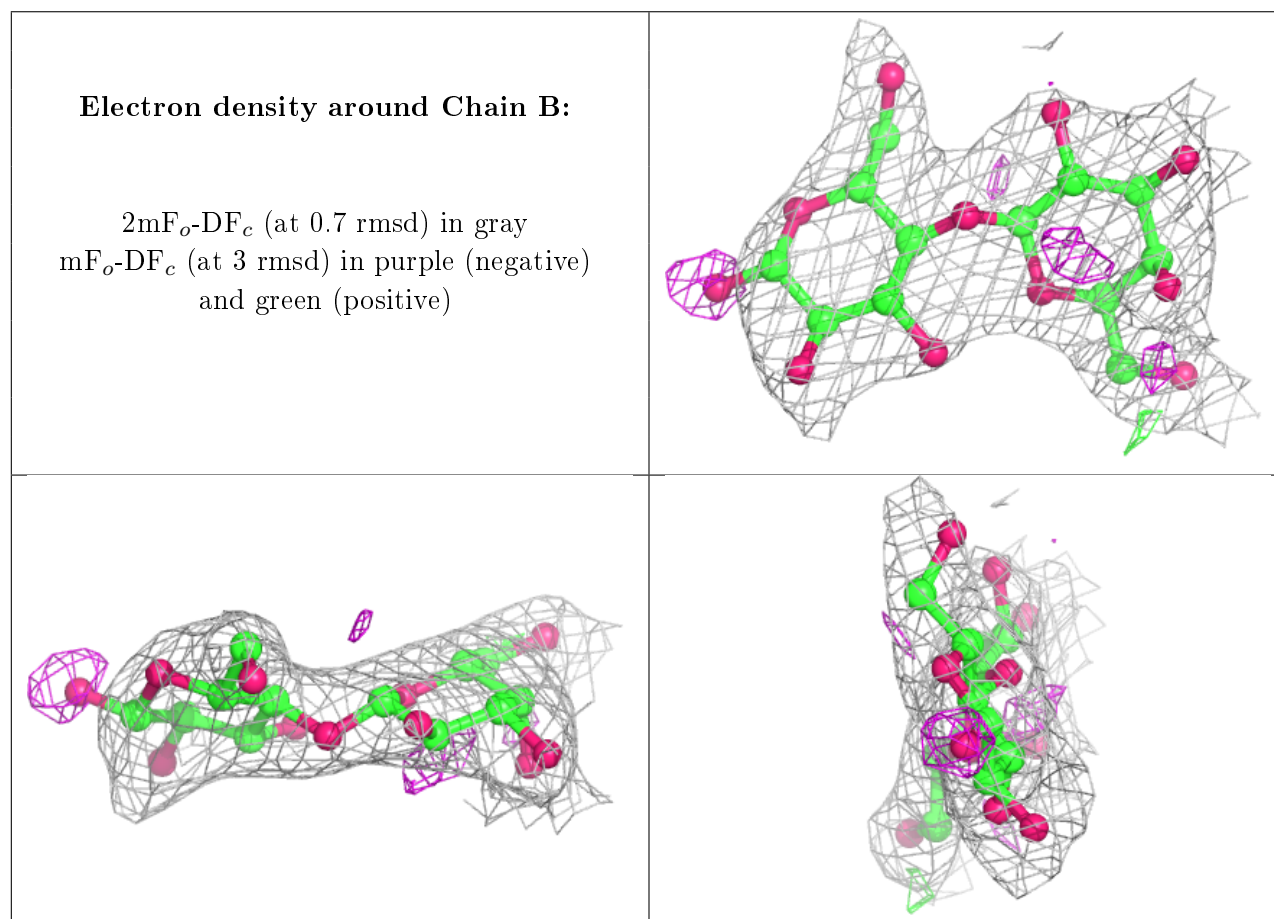
There are no non-standard protein/DNA/RNA residues in this entry.

## 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( $\text{\AA}^2$ )	Q<0.9
2	BGC	B	1	12/12	0.83	0.22	92,99,100,102	0
2	GAL	B	2	11/12	0.88	0.20	77,82,85,87	0

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



## 6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
8	GAL	A	1110	12/12	0.49	0.35	168,170,170,171	0
5	MLI	A	1106	7/7	0.63	0.29	100,101,102,102	0
4	ACT	A	1105	4/4	0.68	0.64	129,130,130,130	0
7	FRU	A	1109	12/12	0.69	0.45	54,61,64,65	12
6	FMT	A	1107	3/3	0.75	0.38	83,83,84,84	0

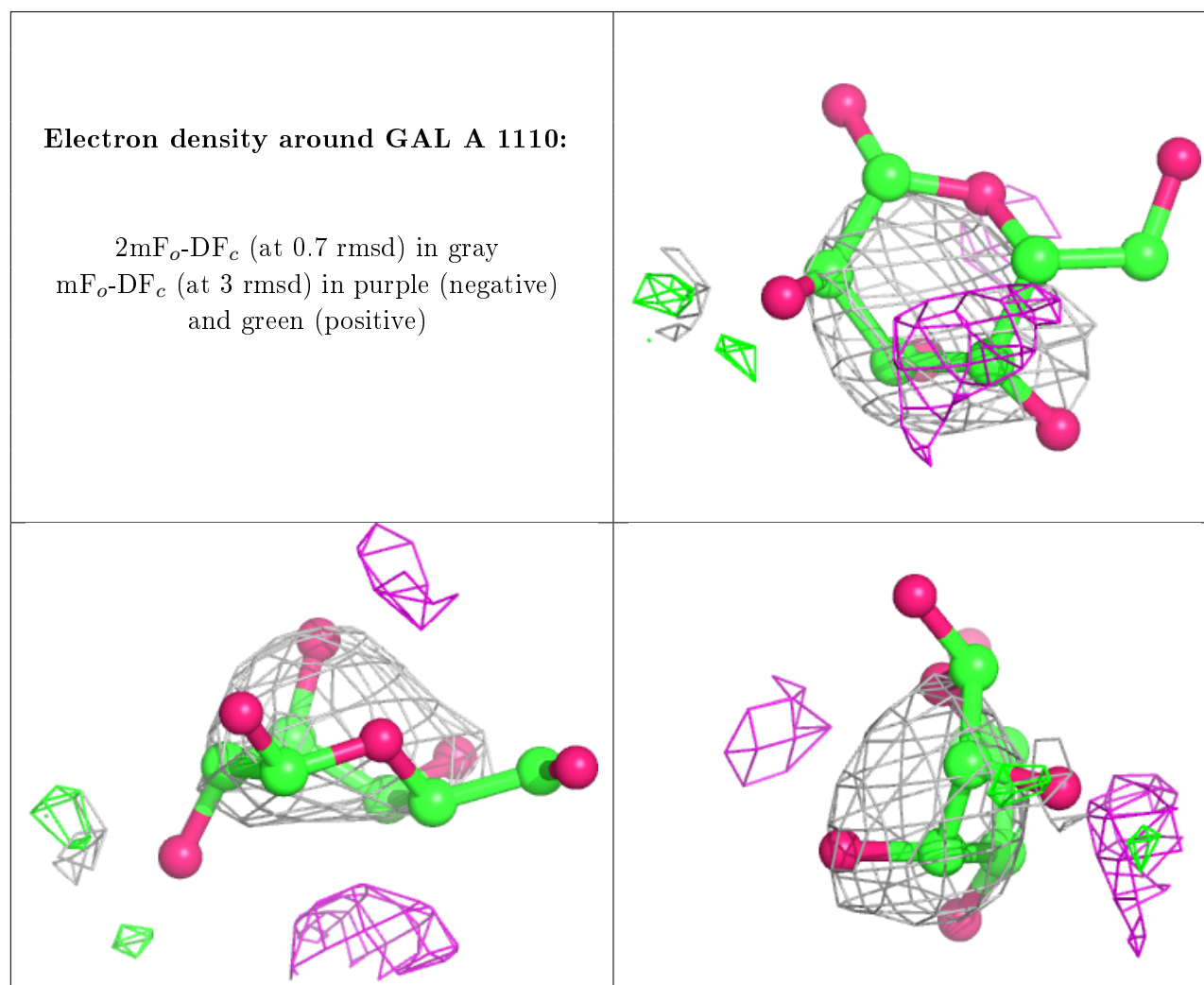
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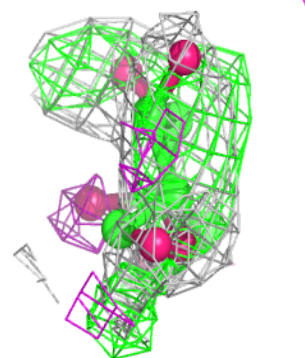
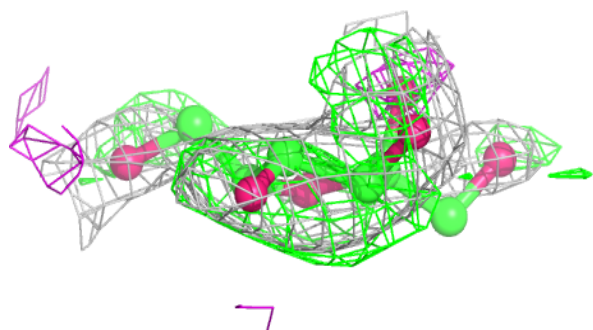
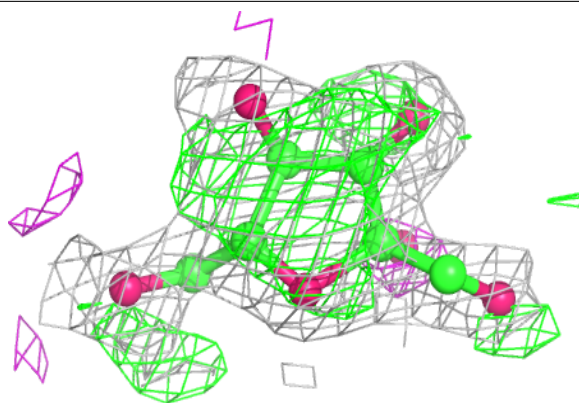
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	ACT	A	1104	4/4	0.80	0.20	94,94,94,94	0
7	FRU	A	1108	12/12	0.84	0.18	86,90,91,92	0
3	NA	A	1101	1/1	0.94	0.13	59,59,59,59	0
3	NA	A	1102	1/1	0.94	0.12	62,62,62,62	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



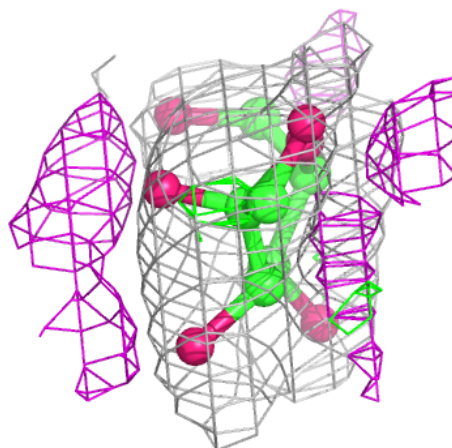
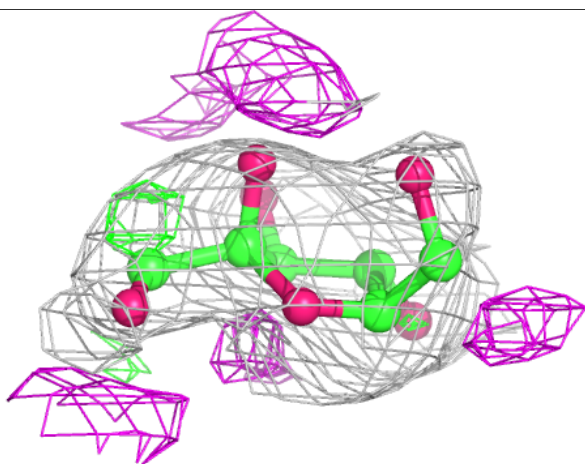
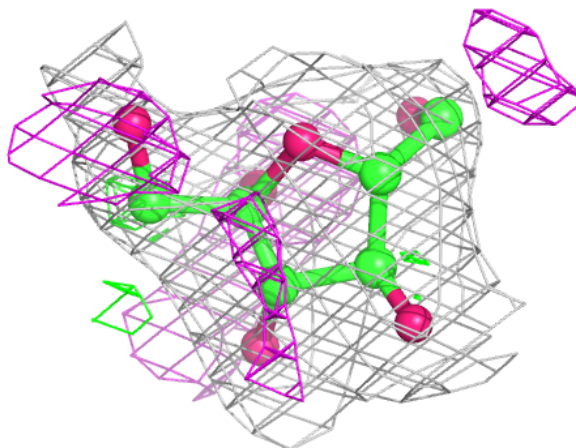
**Electron density around FRU A 1109:**

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



**Electron density around FRU A 1108:**

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



## 6.5 Other polymers [i](#)

There are no such residues in this entry.