



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 21, 2023 – 07:12 pm BST

PDB ID : 8BJZ  
Title : crystal structure of antibody Fab with SiaLac-amidine-Lys  
Authors : Moynie, L.; Naismith, J.H.  
Deposited on : 2022-11-08  
Resolution : 1.89 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>.

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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 : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.35.1  
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) : 2.35.1

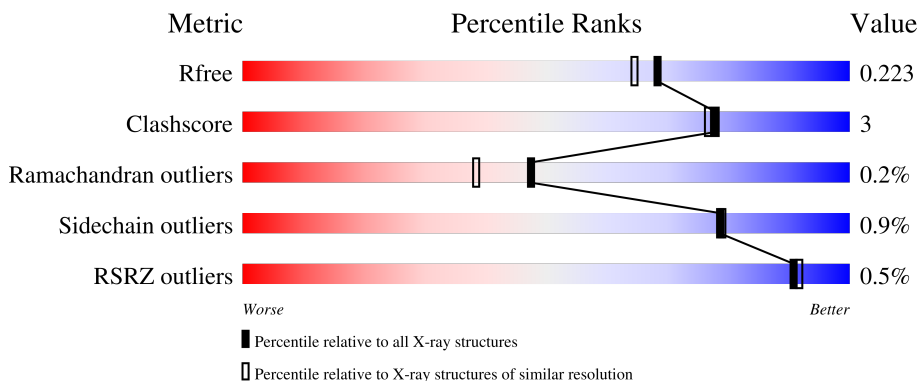
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.89 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	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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	227	 88% 6% 5%
1	H	227	 89% 7%
2	B	219	 89% 6%
2	L	219	 86% 11%
3	C	3	 67% 33%

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Mol	Chain	Length	Quality of chain
3	D	3	 33% 67%

## 2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 7047 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 BAR-1 Fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	H	218	Total 1639	C 1039	N 270	O 321	S 9	0	4	0
1	A	215	Total 1620	C 1029	N 266	O 315	S 10	0	4	0

- Molecule 2 is a protein called BAR-1 Fab light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	L	213	Total 1663	C 1037	N 277	O 340	S 9	0	2	0
2	B	211	Total 1644	C 1027	N 274	O 335	S 8	0	1	0

- Molecule 3 is an oligosaccharide called N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	3	Total 42	C 23	N 1	O 18	0	0	0
3	D	3	Total 42	C 23	N 1	O 18	0	0	0

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	H	1	Total 1	Zn 1	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	L	2	Total	Zn	0	0
			2	2		
4	A	1	Total	Zn	0	0
			1	1		
4	B	2	Total	Zn	0	0
			2	2		

- Molecule 5 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C<sub>6</sub>H<sub>13</sub>NO<sub>4</sub>S).



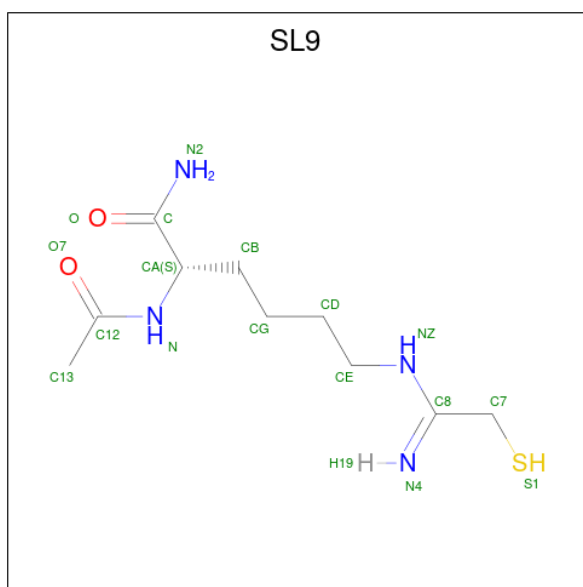
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
5	H	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
5	A	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



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

- Molecule 7 is (2 {S})-2-acetamido-6-(2-sulfanylethanimidoylamino)hexanamide (three-letter code: SL9) (formula: C<sub>10</sub>H<sub>20</sub>N<sub>4</sub>O<sub>2</sub>S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	L	1	Total	C	N	O	S	0	0
			17	10	4	2	1		
7	B	1	Total	C	N	O	S	0	0
			17	10	4	2	1		

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	H	77	Total	O	0	0
			77	77		
8	L	87	Total	O	0	0
			87	87		
8	A	79	Total	O	0	0
			79	79		
8	B	60	Total	O	0	0
			60	60		

### 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.

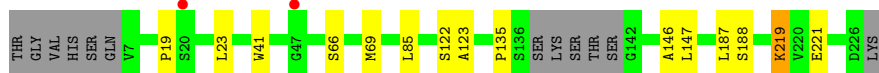
- Molecule 1: BAR-1 Fab heavy chain

Chain H: 




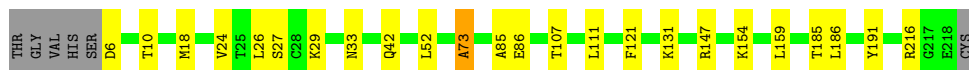
- Molecule 1: BAR-1 Fab heavy chain

Chain A: 



- Molecule 2: BAR-1 Fab light chain

Chain L: 



- Molecule 2: BAR-1 Fab light chain

Chain B: 



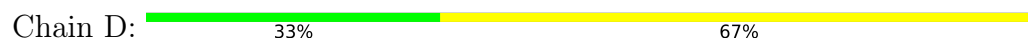
- Molecule 3: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-beta-D-glucopyranose

Chain C: 



- Molecule 3: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-beta-D-glucopyranose





8BJZ  
GAL2  
SIA3

## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	115.91Å 130.68Å 76.91Å 90.00° 123.66° 90.00°	Depositor
Resolution (Å)	48.24 – 1.89 48.24 – 1.72	Depositor EDS
% Data completeness (in resolution range)	99.6 (48.24-1.89) 99.7 (48.24-1.72)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.23 (at 1.72Å)	Xtrriage
Refinement program	PHENIX 1.14_3260	Depositor
R, $R_{free}$	0.186 , 0.223 0.186 , 0.223	Depositor DCC
$R_{free}$ test set	4858 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	24.5	Xtrriage
Anisotropy	0.331	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 52.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	7047	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	29.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.55% 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: MES, SL9, GAL, BGC, ZN, SIA, GOL

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	0.43	0/1660	0.66	2/2264 (0.1%)
1	H	0.44	0/1680	0.66	0/2291
2	B	0.43	0/1680	0.64	2/2280 (0.1%)
2	L	0.48	0/1699	0.68	3/2305 (0.1%)
All	All	0.45	0/6719	0.66	7/9140 (0.1%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	L	131	LYS	CD-CE-NZ	-7.83	93.69	111.70
2	L	86	GLU	CA-CB-CG	6.88	128.54	113.40
2	B	150	LYS	CB-CA-C	-6.86	96.68	110.40
2	L	131	LYS	CA-CB-CG	-6.62	98.85	113.40
2	B	150	LYS	CA-CB-CG	5.16	124.76	113.40
1	A	187	LEU	CA-CB-CG	5.09	127.02	115.30
1	A	23	LEU	CA-CB-CG	5.04	126.90	115.30

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	1620	0	1589	9	0
1	H	1639	0	1612	11	0
2	B	1644	0	1582	7	1
2	L	1663	0	1594	12	1
3	C	42	0	35	0	0
3	D	42	0	35	0	0
4	A	1	0	0	0	0
4	B	2	0	0	0	0
4	H	1	0	0	0	0
4	L	2	0	0	0	0
5	A	12	0	12	0	0
5	H	12	0	12	1	0
6	A	12	0	16	2	0
6	H	12	0	16	1	0
6	L	6	0	8	0	0
7	B	17	0	0	0	0
7	L	17	0	0	0	0
8	A	79	0	0	0	0
8	B	60	0	0	0	0
8	H	77	0	0	1	0
8	L	87	0	0	0	0
All	All	7047	0	6511	38	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 3.

All (38) 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)
2:B:150:LYS:HB2	2:B:202:THR:HB	1.59	0.85
2:L:18:MET:HG3	2:L:24:VAL:HG22	1.71	0.73
1:A:19:PRO:HD2	1:A:122:SER:HB3	1.73	0.71
1:A:66:SER:HA	1:A:69:MET:HG2	1.74	0.68
1:H:168:LEU:HD12	6:H:304:GOL:H32	1.83	0.60
1:A:219:LYS:HD3	1:A:221:GLU:HG3	1.83	0.59
2:L:154:LYS:HG2	2:L:159:LEU:HD23	1.87	0.57
1:H:198:LEU:O	8:H:401:HOH:O	2.18	0.56
2:B:26:LEU:HD22	2:B:107:THR:HG21	1.88	0.56
1:H:165:SER:O	1:A:123:ALA:HA	2.09	0.53
1:H:45:PRO:HB2	1:H:48:LYS:HE3	1.91	0.52
2:B:18:MET:HG3	2:B:24:VAL:HG22	1.91	0.52
1:H:10:LYS:HA	1:H:10:LYS:HE2	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:168:VAL:HG22	2:B:180:LEU:HD12	1.94	0.50
1:H:202:THR:HG23	1:H:219:LYS:HE3	1.93	0.49
6:A:304:GOL:H12	2:B:183:THR:OG1	2.13	0.49
1:A:135:PRO:HB3	1:A:146:ALA:O	2.13	0.49
2:L:6:ASP:N	2:L:6:ASP:OD1	2.47	0.48
1:H:53:LEU:HB3	1:H:72:LEU:HD21	1.95	0.48
5:H:302:MES:H32	5:H:302:MES:H81	1.70	0.47
1:H:139:SER:HA	2:L:121:PHE:CD1	2.51	0.45
2:L:42:GLN:HB2	2:L:52:LEU:HD11	1.99	0.45
2:L:85:ALA:HA	2:L:111:LEU:HD11	1.98	0.45
1:H:87:MET:HE2	1:H:87:MET:HB2	1.88	0.44
2:L:27:SER:OG	2:L:29:LYS:HE2	2.17	0.44
1:H:128:PRO:HB3	1:H:154:TYR:HB3	1.99	0.44
2:B:26:LEU:HD12	2:B:78:LEU:HD23	1.99	0.44
1:H:204:ILE:HD13	1:H:219:LYS:HA	2.00	0.43
1:A:219:LYS:CD	1:A:221:GLU:HG3	2.48	0.43
1:A:188[A]:SER:OG	6:A:304:GOL:H32	2.19	0.43
2:L:26:LEU:HD22	2:L:107:THR:HG21	2.01	0.43
2:L:185:THR:O	2:L:186:LEU:HD23	2.18	0.42
2:L:10:THR:O	2:L:29:LYS:HE3	2.20	0.42
2:B:6:ASP:O	2:B:6:ASP:CG	2.58	0.41
2:L:33:ASN:OD1	2:L:73:ALA:HA	2.21	0.41
2:L:191:TYR:CE2	2:L:216:ARG:HD2	2.56	0.41
1:A:41:TRP:CE2	1:A:85:LEU:HB2	2.56	0.41
1:A:19:PRO:CD	1:A:122:SER:HB3	2.46	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)
2:L:6:ASP:N	2:B:86:GLU:OE1[1_556]	2.02	0.18

## 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	215/227 (95%)	211 (98%)	4 (2%)	0	100	100
1	H	220/227 (97%)	215 (98%)	5 (2%)	0	100	100
2	B	210/219 (96%)	205 (98%)	4 (2%)	1 (0%)	29	18
2	L	213/219 (97%)	208 (98%)	4 (2%)	1 (0%)	29	18
All	All	858/892 (96%)	839 (98%)	17 (2%)	2 (0%)	47	38

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	L	73	ALA
2	B	73	ALA

### 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	186/193 (96%)	184 (99%)	2 (1%)	73	73
1	H	189/193 (98%)	187 (99%)	2 (1%)	73	73
2	B	189/194 (97%)	187 (99%)	2 (1%)	73	73
2	L	191/194 (98%)	190 (100%)	1 (0%)	88	89
All	All	755/774 (98%)	748 (99%)	7 (1%)	78	79

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	H	71	ARG
1	H	147	LEU
2	L	147	ARG
1	A	147	LEU
1	A	219	LYS
2	B	128	GLU

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Mol	Chain	Res	Type
2	B	161	SER

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

### 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
3	BGC	C	1	3,7	11,11,12	0.66	0	15,15,17	0.95	0
3	GAL	C	2	3	11,11,12	0.84	0	15,15,17	0.98	0
3	SIA	C	3	3	20,20,21	1.30	2 (10%)	24,28,31	1.42	3 (12%)
3	BGC	D	1	3,7	11,11,12	0.40	0	15,15,17	1.03	0
3	GAL	D	2	3	11,11,12	0.76	0	15,15,17	1.05	1 (6%)
3	SIA	D	3	3	20,20,21	1.22	1 (5%)	24,28,31	1.34	3 (12%)

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	BGC	C	1	3,7	-	0/2/19/22	0/1/1/1
3	GAL	C	2	3	-	0/2/19/22	0/1/1/1
3	SIA	C	3	3	-	0/18/34/38	0/1/1/1
3	BGC	D	1	3,7	-	0/2/19/22	0/1/1/1
3	GAL	D	2	3	-	1/2/19/22	0/1/1/1
3	SIA	D	3	3	-	0/18/34/38	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	3	SIA	C2-C1	3.69	1.55	1.52
3	D	3	SIA	C2-C1	3.66	1.55	1.52
3	C	3	SIA	C3-C2	2.13	1.56	1.52

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	3	SIA	C8-C7-C6	-3.38	106.62	113.03
3	C	3	SIA	C8-C7-C6	-3.31	106.76	113.03
3	C	3	SIA	O6-C2-C1	2.73	113.04	107.70
3	D	2	GAL	O5-C5-C6	-2.65	103.05	107.20
3	D	3	SIA	O6-C2-C1	2.48	112.56	107.70
3	D	3	SIA	C3-C4-C5	-2.28	108.71	111.46
3	C	3	SIA	C4-C5-N5	2.10	114.54	110.38

There are no chirality outliers.

All (1) torsion outliers are listed below:

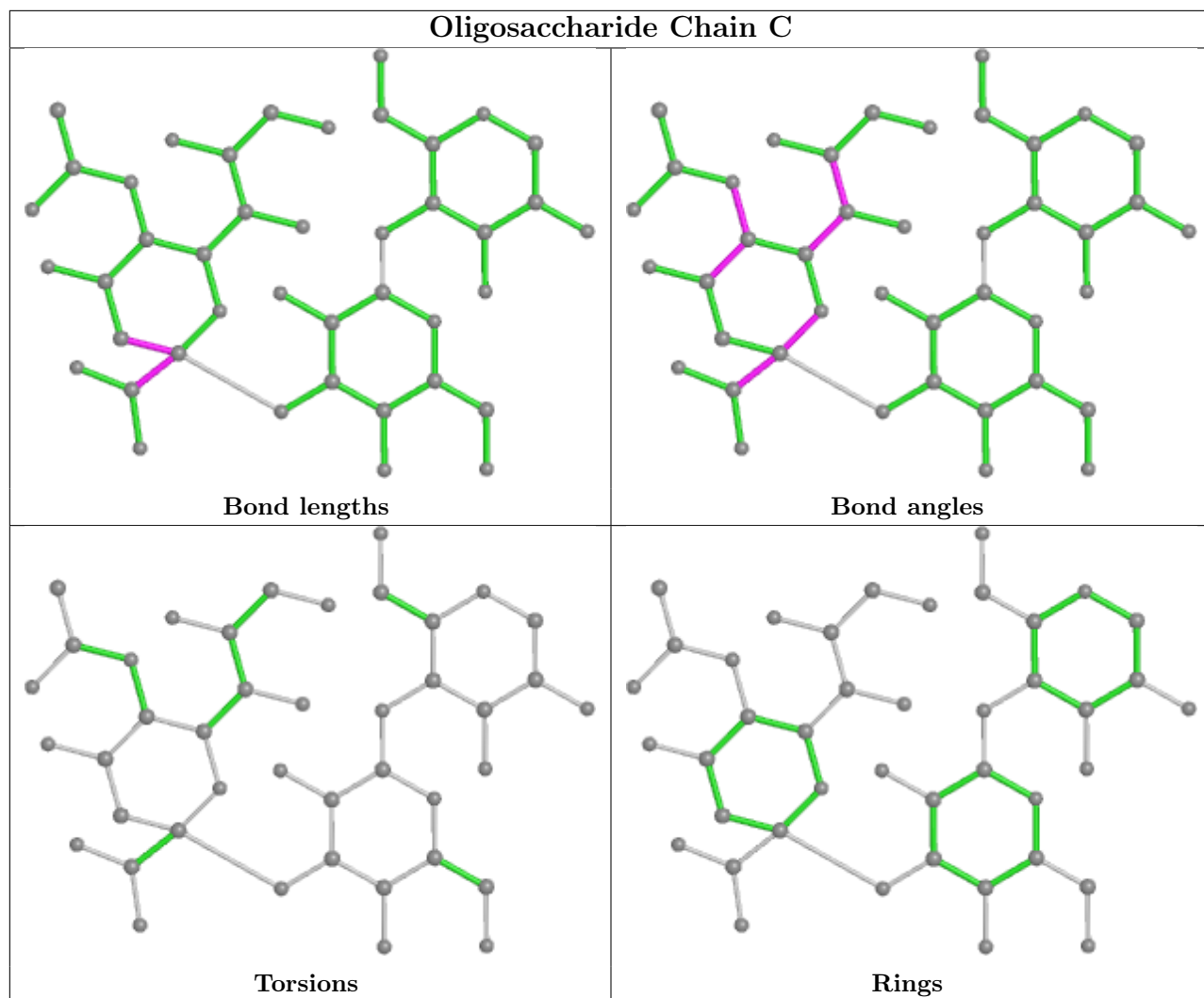
Mol	Chain	Res	Type	Atoms
3	D	2	GAL	O5-C5-C6-O6

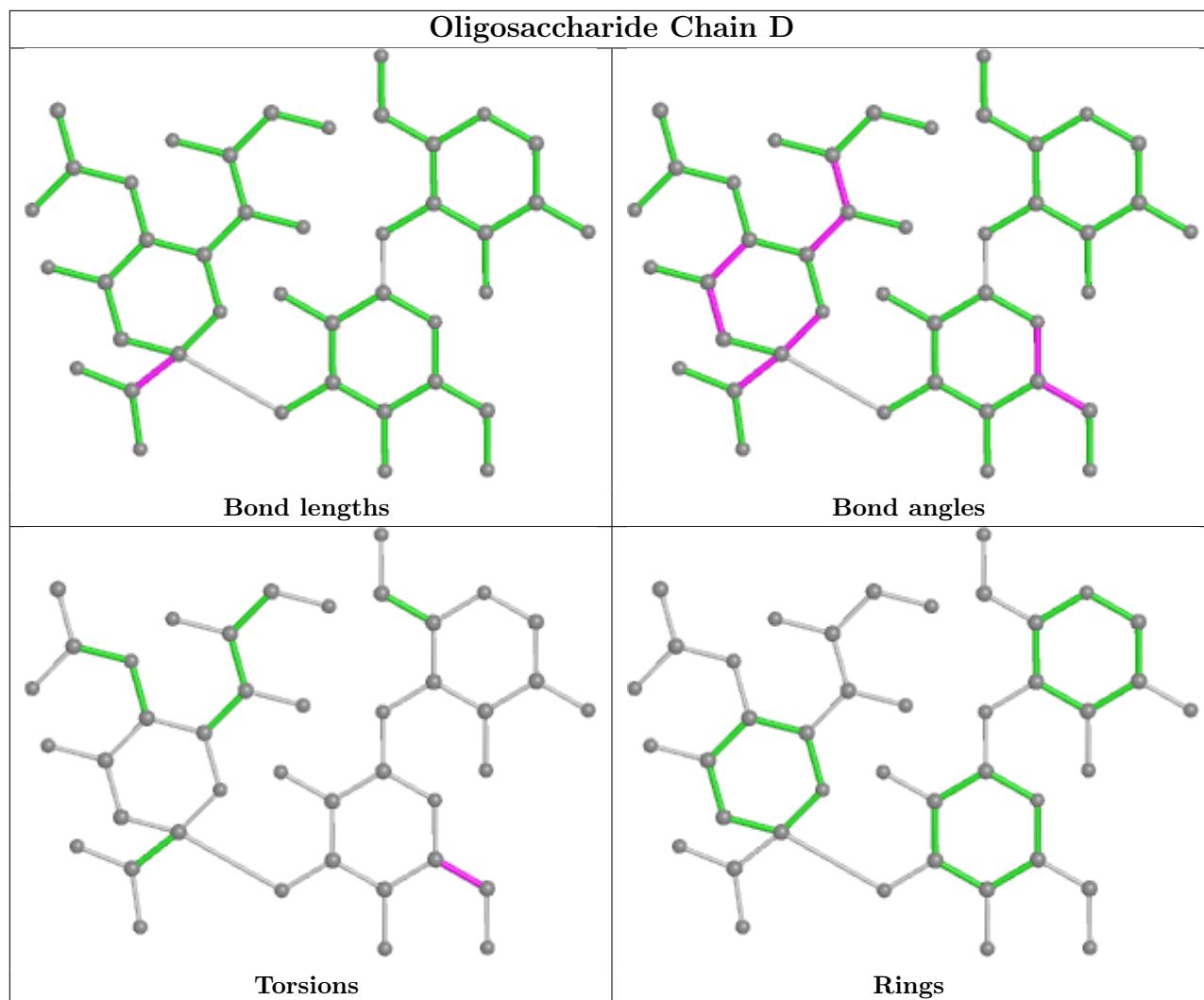
There are no ring outliers.

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 [i](#)

Of 15 ligands modelled in this entry, 6 are monoatomic - leaving 9 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	$\# Z  > 2$
6	GOL	L	301	-	5,5,5	0.93	0	5,5,5	0.86	0
6	GOL	H	303	-	5,5,5	0.84	0	5,5,5	0.91	0
7	SL9	B	303	3	13,16,16	0.93	1 (7%)	16,19,19	0.90	1 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
7	SL9	L	304	3	13,16,16	0.95	1 (7%)	16,19,19	0.81	0
6	GOL	A	303	-	5,5,5	0.99	0	5,5,5	1.11	0
6	GOL	H	304	-	5,5,5	0.95	0	5,5,5	0.98	0
5	MES	A	302	-	12,12,12	1.85	1 (8%)	14,16,16	1.65	2 (14%)
5	MES	H	302	-	12,12,12	1.87	1 (8%)	14,16,16	2.42	6 (42%)
6	GOL	A	304	-	5,5,5	0.73	0	5,5,5	1.15	1 (20%)

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
6	GOL	L	301	-	-	4/4/4/4	-
6	GOL	H	303	-	-	2/4/4/4	-
7	SL9	B	303	3	-	7/16/18/18	-
7	SL9	L	304	3	-	4/16/18/18	-
6	GOL	A	303	-	-	4/4/4/4	-
6	GOL	H	304	-	-	2/4/4/4	-
5	MES	A	302	-	-	1/6/14/14	0/1/1/1
5	MES	H	302	-	-	5/6/14/14	0/1/1/1
6	GOL	A	304	-	-	2/4/4/4	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	H	302	MES	C8-S	-6.04	1.68	1.77
5	A	302	MES	C8-S	-5.98	1.69	1.77
7	B	303	SL9	C8-N4	2.44	1.34	1.27
7	L	304	SL9	C8-N4	2.35	1.33	1.27

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	H	302	MES	O2S-S-C8	4.78	112.67	106.92
5	H	302	MES	C2-C3-N4	-4.16	103.79	110.10
5	A	302	MES	C5-N4-C3	3.81	117.41	108.83
5	H	302	MES	C7-N4-C3	3.52	120.22	111.23
5	H	302	MES	C5-N4-C3	3.33	116.33	108.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	302	MES	O3S-S-C8	3.02	110.65	105.77
7	B	303	SL9	CB-CA-N	-2.31	106.21	110.88
5	H	302	MES	C7-N4-C5	2.30	117.11	111.23
6	A	304	GOL	C3-C2-C1	-2.22	103.06	111.70
5	H	302	MES	C6-C5-N4	-2.07	106.96	110.10

There are no chirality outliers.

All (31) torsion outliers are listed below:

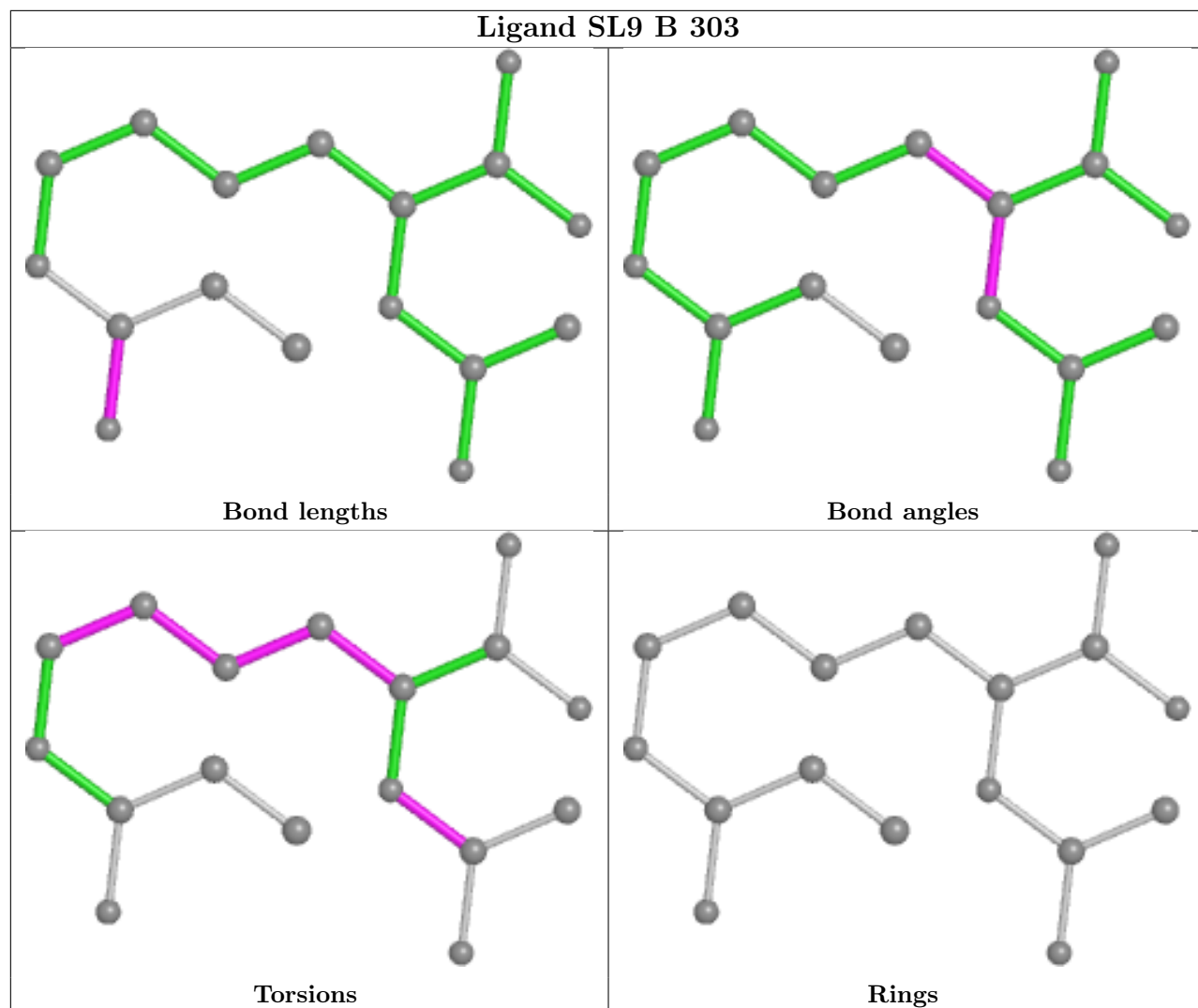
Mol	Chain	Res	Type	Atoms
5	H	302	MES	C8-C7-N4-C3
5	H	302	MES	C7-C8-S-O1S
5	H	302	MES	C7-C8-S-O2S
6	H	303	GOL	C1-C2-C3-O3
6	A	303	GOL	O1-C1-C2-O2
6	A	303	GOL	O1-C1-C2-C3
6	A	303	GOL	C1-C2-C3-O3
7	B	303	SL9	N-CA-CB-CG
7	B	303	SL9	C-CA-CB-CG
7	L	304	SL9	O7-C12-N-CA
7	L	304	SL9	C13-C12-N-CA
7	B	303	SL9	O7-C12-N-CA
7	B	303	SL9	C13-C12-N-CA
6	L	301	GOL	O2-C2-C3-O3
6	L	301	GOL	O1-C1-C2-C3
6	L	301	GOL	C1-C2-C3-O3
6	A	304	GOL	O1-C1-C2-C3
7	B	303	SL9	CA-CB-CG-CD
6	A	303	GOL	O2-C2-C3-O3
6	A	304	GOL	O1-C1-C2-O2
7	L	304	SL9	CE-CD-CG-CB
6	H	303	GOL	O2-C2-C3-O3
6	L	301	GOL	O1-C1-C2-O2
7	L	304	SL9	CG-CD-CE-NZ
5	H	302	MES	N4-C7-C8-S
6	H	304	GOL	O1-C1-C2-O2
5	H	302	MES	C7-C8-S-O3S
7	B	303	SL9	CE-CD-CG-CB
7	B	303	SL9	CG-CD-CE-NZ
6	H	304	GOL	O1-C1-C2-C3
5	A	302	MES	C8-C7-N4-C3

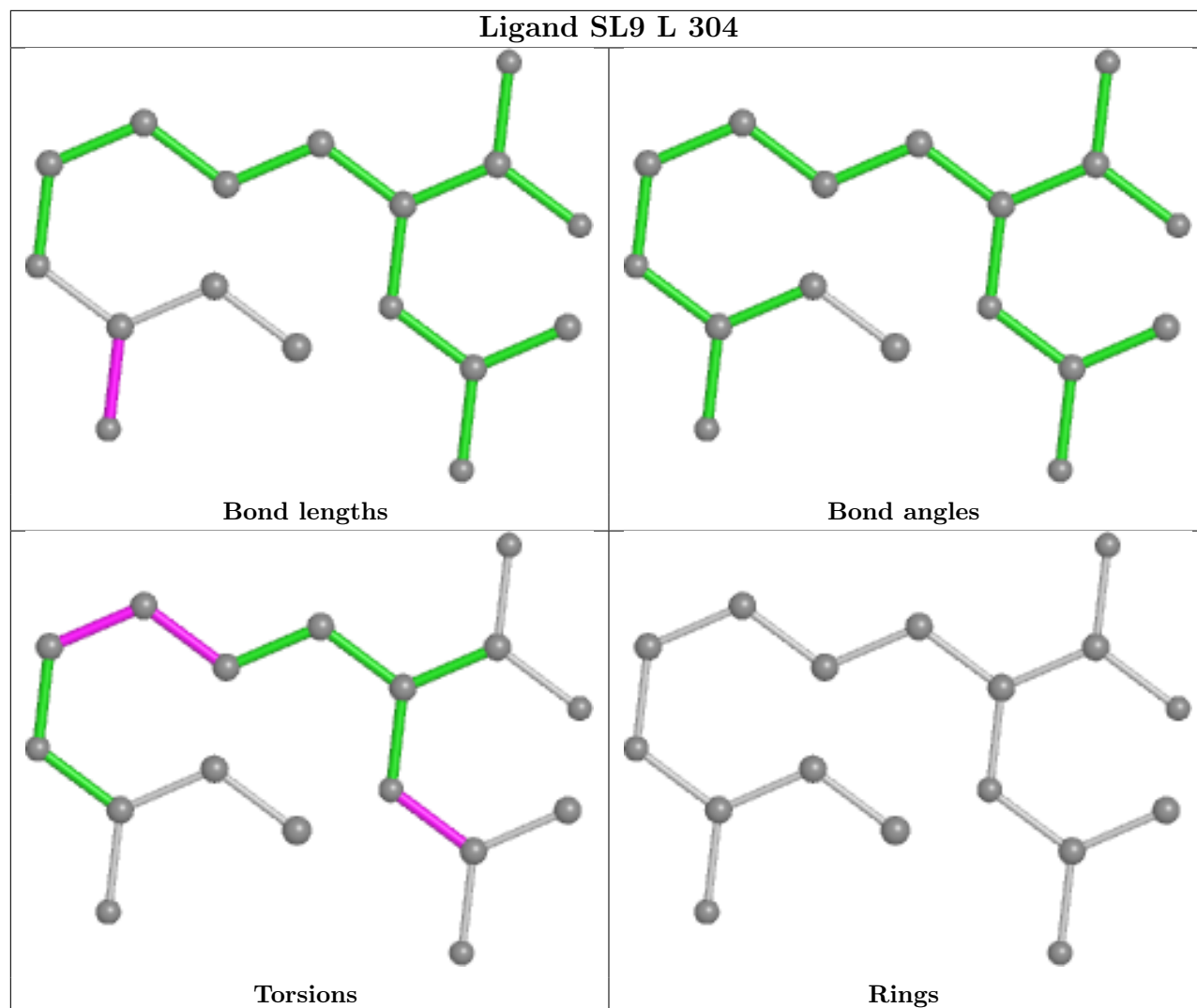
There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	H	304	GOL	1	0
5	H	302	MES	1	0
6	A	304	GOL	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 [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	215/227 (94%)	-0.51	2 (0%) 84 85	17, 27, 47, 68	0
1	H	218/227 (96%)	-0.52	1 (0%) 91 92	17, 26, 40, 70	0
2	B	211/219 (96%)	-0.37	1 (0%) 91 92	18, 31, 49, 59	0
2	L	213/219 (97%)	-0.47	0 100 100	17, 27, 40, 54	0
All	All	857/892 (96%)	-0.47	4 (0%) 91 92	17, 28, 46, 70	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	47	GLY	5.2
1	H	142	GLY	2.7
2	B	208	SER	2.1
1	A	20	SER	2.1

### 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	BGC	D	1	11/12	0.94	0.08	26,33,39,40	0
3	SIA	C	3	20/21	0.95	0.06	16,22,27,30	0
3	BGC	C	1	11/12	0.95	0.06	29,32,38,42	0

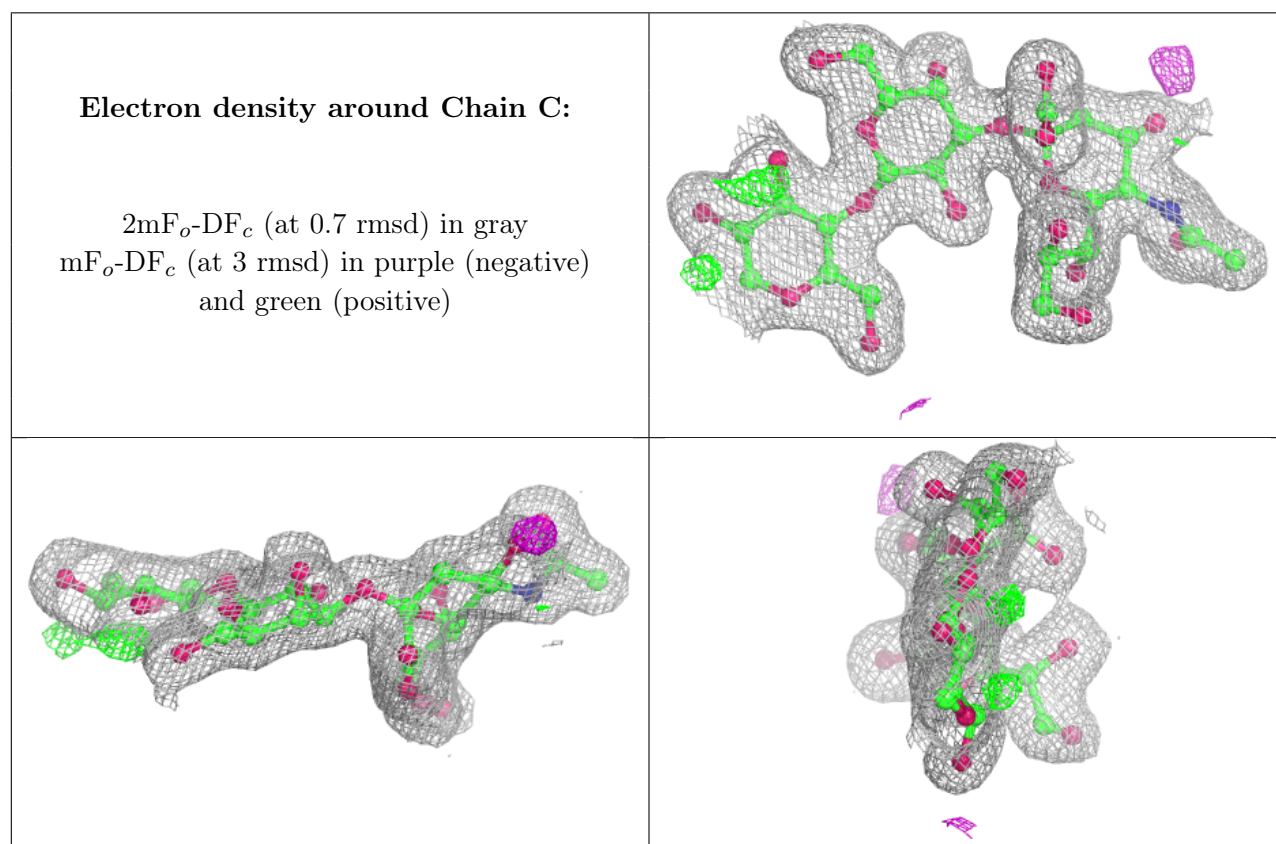
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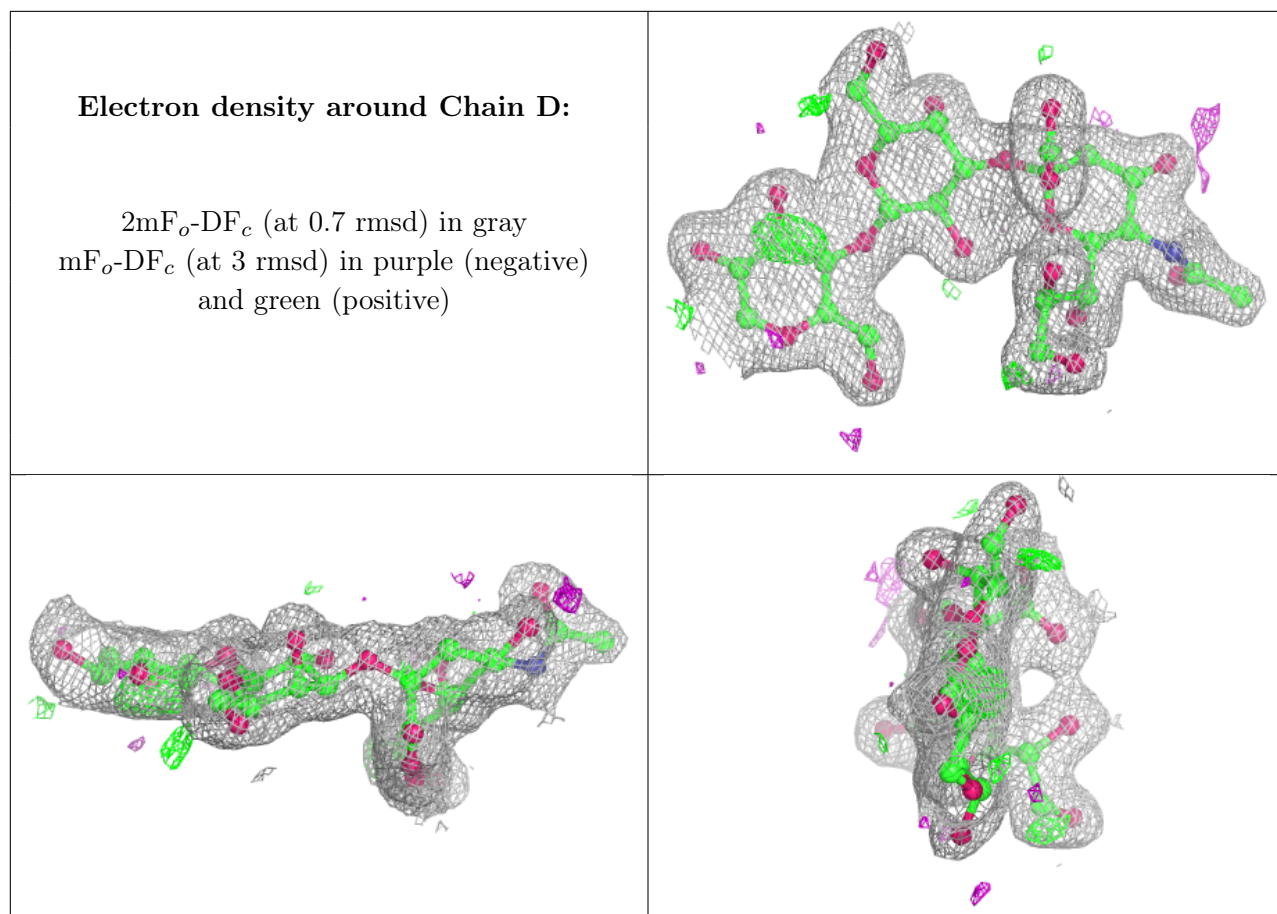


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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	GAL	D	2	11/12	0.96	0.07	22,27,28,37	0
3	SIA	D	3	20/21	0.96	0.07	19,26,31,33	0
3	GAL	C	2	11/12	0.97	0.06	21,23,26,29	0

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 [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.

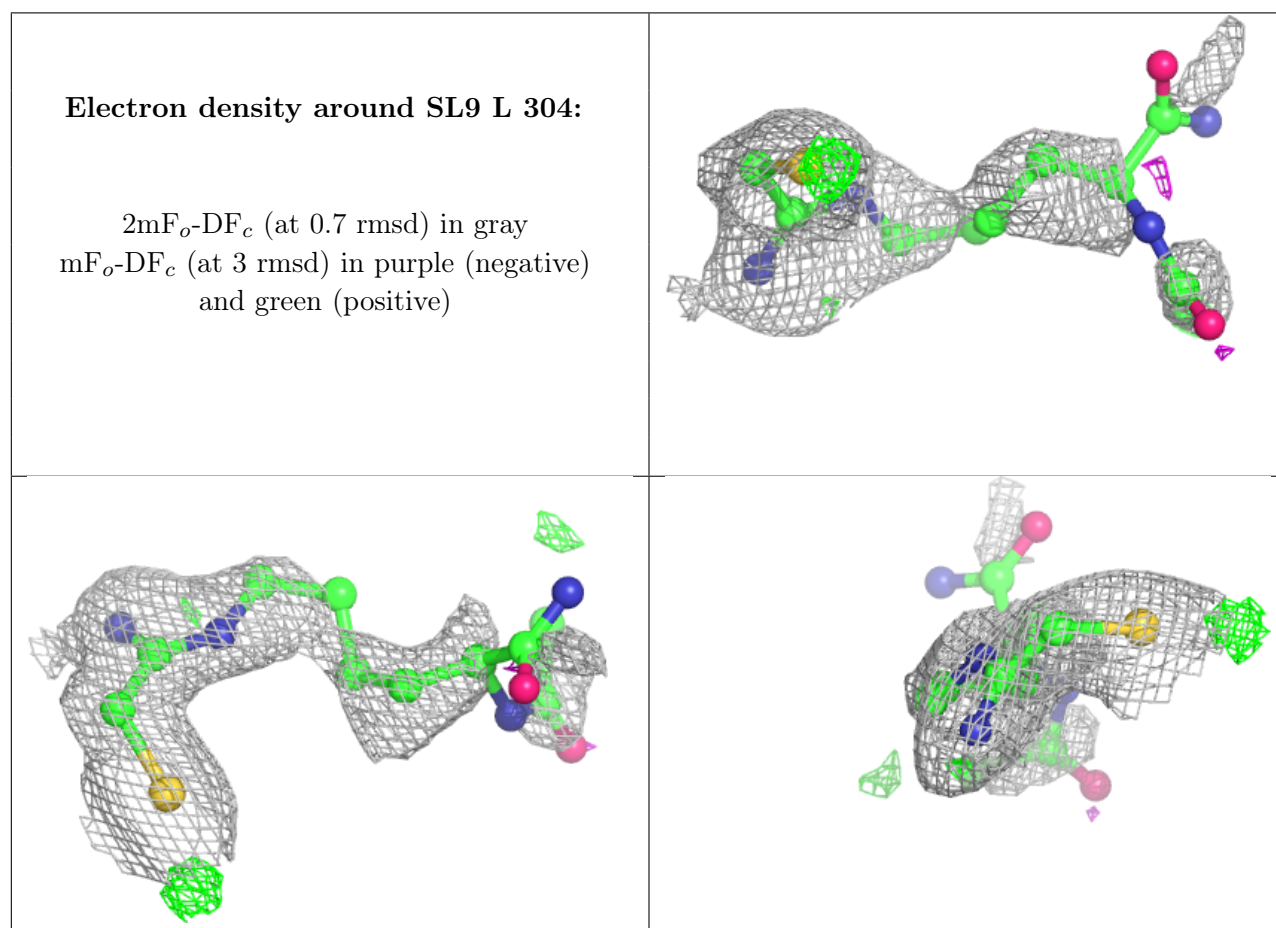
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
6	GOL	H	304	6/6	0.88	0.12	35,37,41,44	0
7	SL9	L	304	17/17	0.88	0.24	34,55,80,82	0
7	SL9	B	303	17/17	0.89	0.23	33,48,75,78	0
6	GOL	L	301	6/6	0.90	0.17	35,42,44,46	0
4	ZN	L	303	1/1	0.91	0.08	82,82,82,82	0
4	ZN	B	302	1/1	0.91	0.06	82,82,82,82	0
4	ZN	H	301	1/1	0.92	0.05	57,57,57,57	0
6	GOL	A	304	6/6	0.92	0.18	29,37,40,42	0
5	MES	H	302	12/12	0.93	0.09	27,41,42,42	0
6	GOL	A	303	6/6	0.94	0.17	30,33,40,40	0
6	GOL	H	303	6/6	0.94	0.14	36,40,41,41	0
5	MES	A	302	12/12	0.97	0.08	24,36,45,45	0

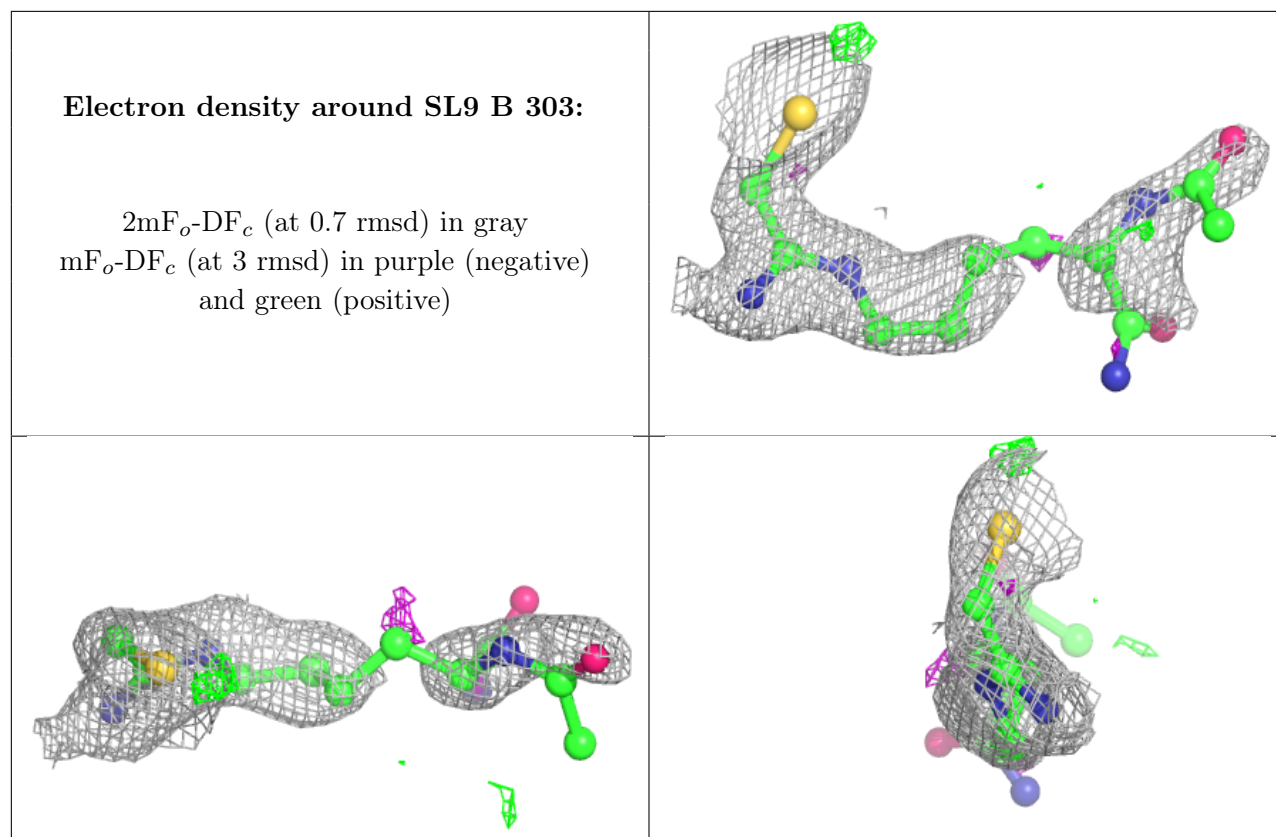
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	ZN	L	302	1/1	0.98	0.06	42,42,42,42	0
4	ZN	A	301	1/1	0.98	0.04	56,56,56,56	0
4	ZN	B	301	1/1	0.99	0.09	37,37,37,37	0

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.





## 6.5 Other polymers [i](#)

There are no such residues in this entry.