



# wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 6, 2020 – 03:36 PM BST

PDB ID : 5XC2  
Title : Crystal structure of GH family 81 beta-1,3-glucanase from *Rhizomucor miehei* complexed with laminarihexaose  
Authors : Qin, Z.; Yang, S.; Peng, Z.; Yan, Q.; Jiang, Z.  
Deposited on : 2017-03-22  
Resolution : 2.70 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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
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

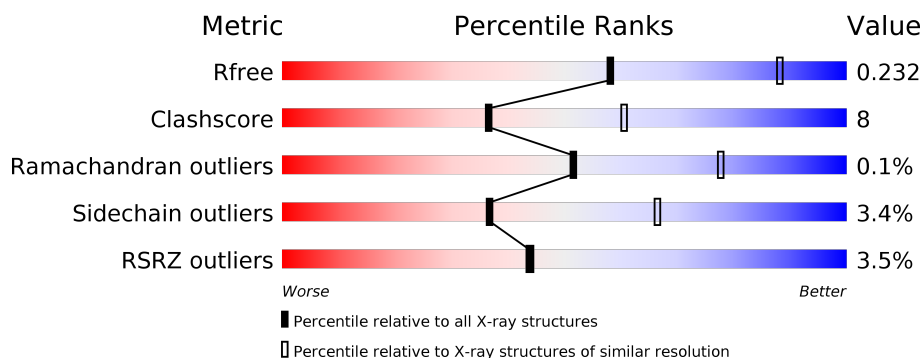
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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.





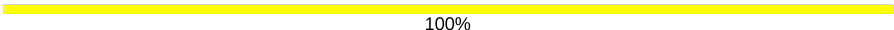
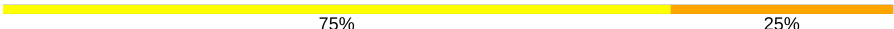


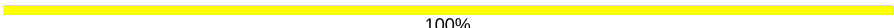
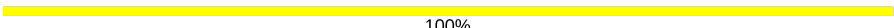

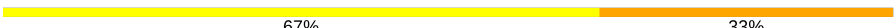


Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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	796	<div> <div>2%</div> <div> <div></div> <div>77%</div> <div>12%</div> <div>•</div> <div>10%</div> </div> </div>
1	B	796	<div> <div>%</div> <div> <div></div> <div>74%</div> <div>15%</div> <div>•</div> <div>10%</div> </div> </div>
1	C	796	<div> <div>4%</div> <div> <div></div> <div>67%</div> <div>20%</div> <div>•</div> <div>11%</div> </div> </div>
1	D	796	<div> <div>5%</div> <div> <div></div> <div>66%</div> <div>15%</div> <div>•</div> <div>19%</div> </div> </div>
2	E	6	<div> <div></div> <div> <div>50%</div> <div>50%</div> </div> </div>
3	F	5	<div> <div></div> <div> <div>80%</div> <div>20%</div> </div> </div>

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Mol	Chain	Length	Quality of chain
3	M	5	
4	G	4	
4	L	4	
4	O	4	
4	P	4	
4	Q	4	
5	H	3	
5	I	3	
5	N	3	
5	R	3	
6	J	2	
6	K	2	

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
6	BGC	J	1	-	X	-	-
6	BGC	J	2	-	X	-	-

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 23075 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 Endo-beta-1,3-glucanase.

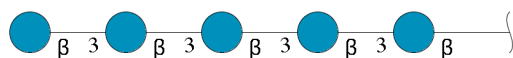
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	717	Total	C	N	O	S	0	0	0
			5661	3624	947	1077	13			
1	B	720	Total	C	N	O	S	0	1	0
			5687	3638	951	1085	13			
1	C	705	Total	C	N	O	S	0	1	0
			5545	3553	923	1056	13			
1	D	648	Total	C	N	O	S	0	1	0
			5120	3298	851	959	12			

- Molecule 2 is an oligosaccharide called beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
2	E	6	Total	C	O	0	0	0
			67	36	31			

- Molecule 3 is an oligosaccharide called beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
3	F	5	Total	C	O	0	0	0
			56	30	26			

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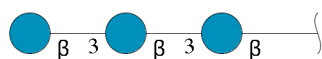
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
3	M	5	Total	C	O	0	0	0
			56	30	26			

- Molecule 4 is an oligosaccharide called beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose.



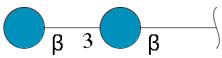
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
4	G	4	Total	C	O	0	0	0
			45	24	21			
4	L	4	Total	C	O	0	0	0
			45	24	21			
4	O	4	Total	C	O	0	0	0
			45	24	21			
4	P	4	Total	C	O	0	0	0
			45	24	21			
4	Q	4	Total	C	O	0	0	0
			45	24	21			

- Molecule 5 is an oligosaccharide called beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
5	H	3	Total	C	O	0	0	0
			33	18	15			
5	I	3	Total	C	O	0	0	0
			34	18	16			
5	N	3	Total	C	O	0	0	0
			34	18	16			
5	R	3	Total	C	O	0	0	0
			34	18	16			

- Molecule 6 is an oligosaccharide called beta-D-glucopyranose-(1-3)-beta-D-glucopyranose.



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

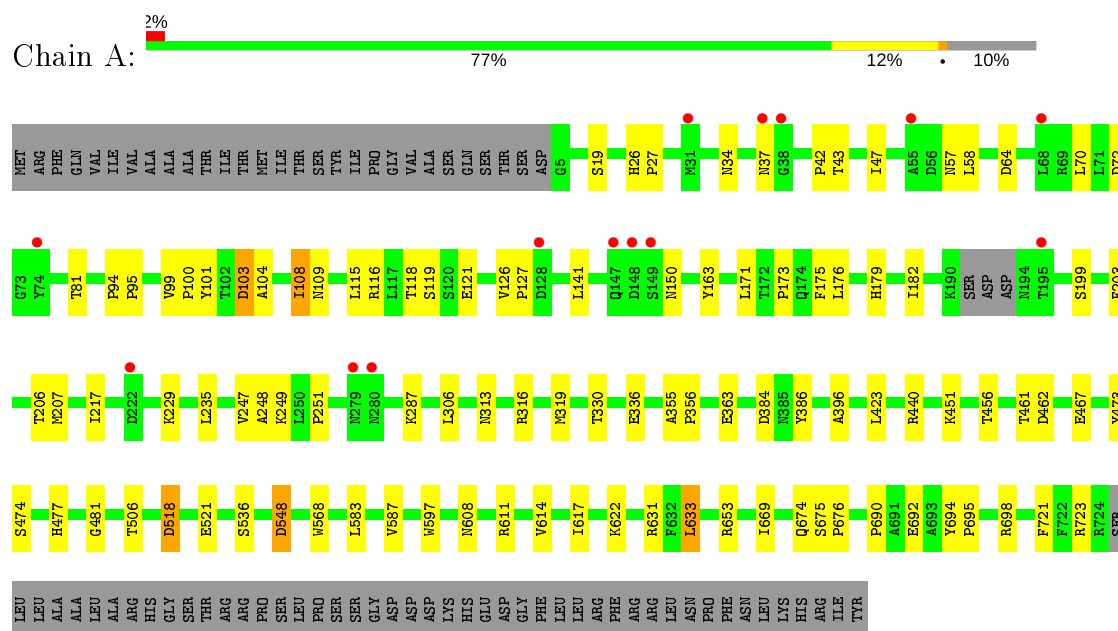
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	185	Total	O	0	0
			185	185		
7	B	143	Total	O	0	0
			143	143		
7	C	57	Total	O	0	0
			57	57		
7	D	94	Total	O	0	0
			94	94		

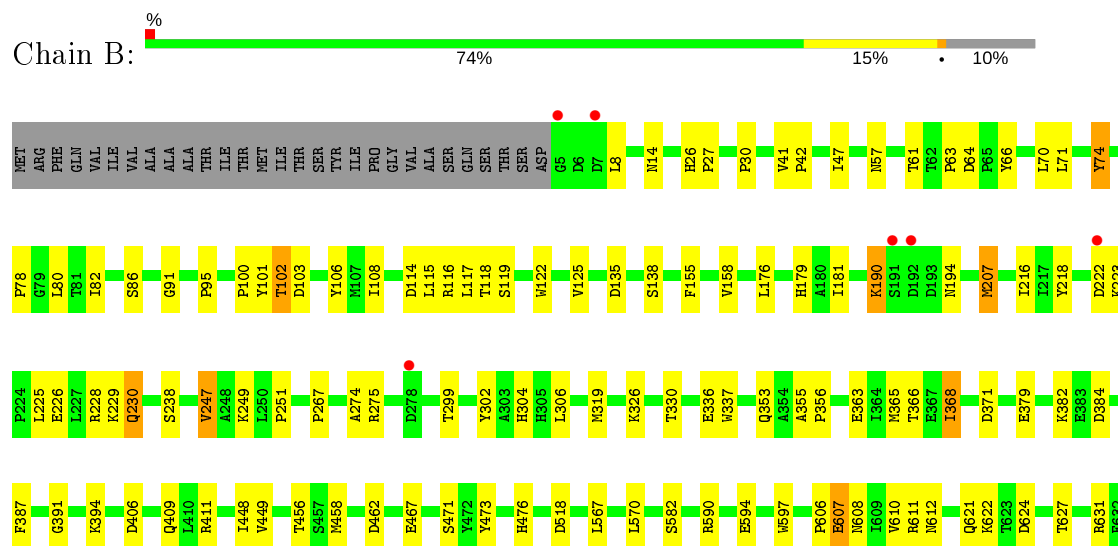
### 3 Residue-property plots [i](#)

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: Endo-beta-1,3-glucanase

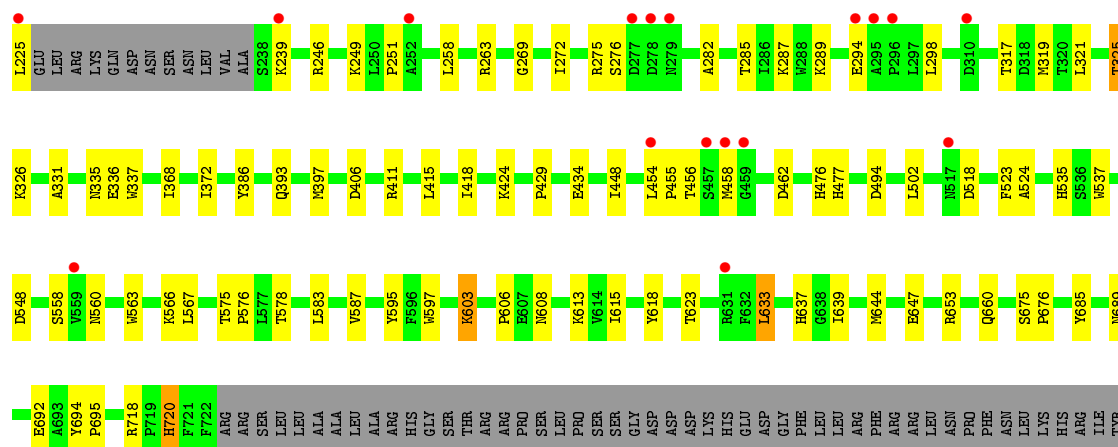


#### • Molecule 1: Endo-beta-1,3-glucanase









- Molecule 2: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain E: 50% 50%



- Molecule 3: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain F: 80% 20%



- Molecule 3: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain M: 40% 60%



- Molecule 4: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain G: 75% 25%




- Molecule 4: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain L: 100%

BGC1  
BGC2  
BGC3  
BGC4

- Molecule 4: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain O:  75% 25%

BGC1  
BGC2  
BGC3  
BGC4

- Molecule 4: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain P:  50% 50%

BGC1  
BGC2  
BGC3  
BGC4

- Molecule 4: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain Q:  25% 75%

BGC1  
BGC2  
BGC3  
BGC4

- Molecule 5: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain H:  100%

BGC1  
BGC2  
BGC3

- Molecule 5: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain I:  100%

BGC1  
BGC2  
BGC3

- Molecule 5: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain N:  33% 67%

BGC1  
BGC2  
BGC3

- Molecule 5: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain R:  67% 33%

BGC1  
BGC2  
BGC3

- Molecule 6: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain J:  50% 50%

BGC1  
BGC2

- Molecule 6: beta-D-glucopyranose-(1-3)-beta-D-glucopyranose

Chain K:  50% 50%

BGC1  
BGC2

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	108.70 Å 99.02 Å 138.43 Å 90.00° 111.35° 90.00°	Depositor
Resolution (Å)	29.73 – 2.70 29.73 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.5 (29.73-2.70) 99.6 (29.73-2.70)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.72 (at 2.68 Å)	Xtriage
Refinement program	PHENIX 1.8.2 _1309	Depositor
R, $R_{free}$	0.176 , 0.232 0.180 , 0.232	Depositor DCC
$R_{free}$ test set	2005 reflections (2.68%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	46.6	Xtriage
Anisotropy	0.284	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 45.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.46$ , $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	0.035 for h,-k,-h-l	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	23075	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 18.53% 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

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	0.53	0/5821	0.68	1/7949 (0.0%)
1	B	0.49	0/5851	0.67	0/7991
1	C	0.45	0/5704	0.67	1/7791 (0.0%)
1	D	0.44	0/5265	0.66	0/7180
All	All	0.48	0/22641	0.67	2/30911 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	316	ARG	NE-CZ-NH1	5.36	122.98	120.30
1	C	415	LEU	CA-CB-CG	5.25	127.37	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	5661	0	5451	64	0
1	B	5687	0	5470	84	0
1	C	5545	0	5311	126	0
1	D	5120	0	4938	65	0
2	E	67	0	56	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	F	56	0	48	1	0
3	M	56	0	48	2	0
4	G	45	0	39	1	0
4	L	45	0	39	0	0
4	O	45	0	39	1	0
4	P	45	0	38	2	0
4	Q	45	0	38	4	0
5	H	33	0	27	0	0
5	I	34	0	28	0	0
5	N	34	0	30	4	0
5	R	34	0	30	3	0
6	J	22	0	13	4	0
6	K	22	0	17	1	0
7	A	185	0	0	5	1
7	B	143	0	0	7	0
7	C	57	0	0	10	0
7	D	94	0	0	4	1
All	All	23075	0	21660	349	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 8.

The worst 5 of 349 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)
6:J:1:BGC:O5	6:J:1:BGC:C5	1.64	1.42
1:C:64:ASP:OD2	1:C:302:TYR:OH	1.70	1.09
1:C:644:MET:HG3	1:C:649:MET:HE3	1.40	1.02
1:C:644:MET:HG3	1:C:649:MET:CE	1.93	0.98
1:B:363:GLU:OE1	1:B:698:ARG:NH2	2.07	0.88

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)
7:A:1068:HOH:O	7:D:952:HOH:O[2_848]	2.17	0.03

## 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	713/796 (90%)	678 (95%)	34 (5%)	1 (0%)	51	78
1	B	719/796 (90%)	678 (94%)	40 (6%)	1 (0%)	51	78
1	C	698/796 (88%)	656 (94%)	41 (6%)	1 (0%)	51	78
1	D	633/796 (80%)	604 (95%)	28 (4%)	1 (0%)	47	73
All	All	2763/3184 (87%)	2616 (95%)	143 (5%)	4 (0%)	51	78

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	64	ASP
1	B	64	ASP
1	D	64	ASP
1	C	64	ASP

### 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	603/685 (88%)	589 (98%)	14 (2%)	50	78
1	B	606/685 (88%)	588 (97%)	18 (3%)	41	70
1	C	587/685 (86%)	563 (96%)	24 (4%)	30	59
1	D	539/685 (79%)	514 (95%)	25 (5%)	27	54
All	All	2335/2740 (85%)	2254 (96%)	81 (4%)	37	65

5 of 81 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	183	SER
1	C	406	ASP
1	D	558[A]	SER
1	C	205	ILE
1	C	366	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	34	ASN
1	C	14	ASN
1	C	491	HIS
1	D	608	ASN

### 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 ⓘ

52 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	E	1	2	12,12,12	0.85	0	17,17,17	2.46	4 (23%)
2	BGC	E	2	2	11,11,12	1.67	3 (27%)	15,15,17	1.33	3 (20%)
2	BGC	E	3	2	11,11,12	1.79	2 (18%)	15,15,17	2.17	6 (40%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	BGC	E	4	2	11,11,12	2.59	4 (36%)	15,15,17	2.79	6 (40%)
2	BGC	E	5	2	11,11,12	1.64	3 (27%)	15,15,17	1.49	2 (13%)
2	BGC	E	6	2	11,11,12	1.74	3 (27%)	15,15,17	1.69	3 (20%)
3	BGC	F	1	3	12,12,12	0.98	1 (8%)	17,17,17	2.38	7 (41%)
3	BGC	F	2	3	11,11,12	1.89	1 (9%)	15,15,17	3.73	4 (26%)
3	BGC	F	3	3	11,11,12	1.51	2 (18%)	15,15,17	1.25	2 (13%)
3	BGC	F	4	3	11,11,12	1.59	2 (18%)	15,15,17	1.16	1 (6%)
3	BGC	F	5	3	11,11,12	1.85	3 (27%)	15,15,17	1.41	2 (13%)
4	BGC	G	1	4	12,12,12	1.16	1 (8%)	17,17,17	0.69	0
4	BGC	G	2	4	11,11,12	1.37	2 (18%)	15,15,17	1.49	3 (20%)
4	BGC	G	3	4	11,11,12	1.68	3 (27%)	15,15,17	1.18	1 (6%)
4	BGC	G	4	4	11,11,12	1.76	2 (18%)	15,15,17	1.26	2 (13%)
5	BGC	H	1	5	11,11,12	4.09	7 (63%)	15,15,17	4.96	10 (66%)
5	BGC	H	2	5	11,11,12	1.75	3 (27%)	15,15,17	2.55	6 (40%)
5	BGC	H	3	5	11,11,12	0.80	0	15,15,17	2.93	7 (46%)
5	BGC	I	1	5	12,12,12	1.23	1 (8%)	17,17,17	1.87	5 (29%)
5	BGC	I	2	5	11,11,12	3.59	4 (36%)	15,15,17	2.57	4 (26%)
5	BGC	I	3	5	11,11,12	2.02	1 (9%)	15,15,17	4.49	10 (66%)
6	BGC	J	1	6	11,11,12	5.99	8 (72%)	15,15,17	3.60	10 (66%)
6	BGC	J	2	6	11,11,12	7.56	9 (81%)	15,15,17	5.64	10 (66%)
6	BGC	K	1	6	11,11,12	1.73	3 (27%)	15,15,17	2.32	4 (26%)
6	BGC	K	2	6	11,11,12	1.94	3 (27%)	15,15,17	3.28	5 (33%)
4	BGC	L	1	4	12,12,12	1.10	1 (8%)	17,17,17	2.36	5 (29%)
4	BGC	L	2	4	11,11,12	1.82	2 (18%)	15,15,17	2.46	6 (40%)
4	BGC	L	3	4	11,11,12	1.61	1 (9%)	15,15,17	2.29	6 (40%)
4	BGC	L	4	4	11,11,12	1.85	3 (27%)	15,15,17	1.13	1 (6%)
3	BGC	M	1	3	12,12,12	0.76	0	17,17,17	2.07	5 (29%)
3	BGC	M	2	3	11,11,12	1.73	3 (27%)	15,15,17	1.29	1 (6%)
3	BGC	M	3	3	11,11,12	1.70	3 (27%)	15,15,17	3.28	7 (46%)
3	BGC	M	4	3	11,11,12	1.91	2 (18%)	15,15,17	2.16	6 (40%)
3	BGC	M	5	3	11,11,12	1.52	2 (18%)	15,15,17	1.28	3 (20%)
5	BGC	N	1	5	12,12,12	1.35	1 (8%)	17,17,17	1.96	7 (41%)
5	BGC	N	2	5	11,11,12	2.63	2 (18%)	15,15,17	5.49	4 (26%)
5	BGC	N	3	5	11,11,12	1.99	5 (45%)	15,15,17	2.13	6 (40%)
4	BGC	O	1	4	12,12,12	1.18	1 (8%)	17,17,17	1.02	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	BGC	O	2	4	11,11,12	1.75	2 (18%)	15,15,17	1.17	1 (6%)
4	BGC	O	3	4	11,11,12	1.64	2 (18%)	15,15,17	1.31	3 (20%)
4	BGC	O	4	4	11,11,12	1.55	2 (18%)	15,15,17	1.75	4 (26%)
4	BGC	P	1	4	12,12,12	1.47	2 (16%)	17,17,17	2.14	5 (29%)
4	BGC	P	2	4	11,11,12	1.47	2 (18%)	15,15,17	3.17	6 (40%)
4	BGC	P	3	4	11,11,12	1.59	1 (9%)	15,15,17	2.60	7 (46%)
4	BGC	P	4	4	11,11,12	1.94	3 (27%)	15,15,17	1.48	4 (26%)
4	BGC	Q	1	4	12,12,12	1.08	1 (8%)	17,17,17	2.28	5 (29%)
4	BGC	Q	2	4	11,11,12	1.34	2 (18%)	15,15,17	2.27	4 (26%)
4	BGC	Q	3	4	11,11,12	1.87	6 (54%)	15,15,17	2.63	6 (40%)
4	BGC	Q	4	4	11,11,12	1.54	2 (18%)	15,15,17	3.53	6 (40%)
5	BGC	R	1	5	12,12,12	1.19	1 (8%)	17,17,17	0.78	1 (5%)
5	BGC	R	2	5	11,11,12	1.85	2 (18%)	15,15,17	3.34	8 (53%)
5	BGC	R	3	5	11,11,12	1.21	1 (9%)	15,15,17	1.88	5 (33%)

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	E	1	2	-	2/2/22/22	0/1/1/1
2	BGC	E	2	2	-	0/2/19/22	0/1/1/1
2	BGC	E	3	2	-	2/2/19/22	0/1/1/1
2	BGC	E	4	2	-	2/2/19/22	0/1/1/1
2	BGC	E	5	2	-	1/2/19/22	0/1/1/1
2	BGC	E	6	2	-	0/2/19/22	0/1/1/1
3	BGC	F	1	3	-	0/2/22/22	0/1/1/1
3	BGC	F	2	3	-	2/2/19/22	0/1/1/1
3	BGC	F	3	3	-	2/2/19/22	0/1/1/1
3	BGC	F	4	3	-	2/2/19/22	0/1/1/1
3	BGC	F	5	3	-	2/2/19/22	0/1/1/1
4	BGC	G	1	4	-	2/2/22/22	0/1/1/1
4	BGC	G	2	4	-	2/2/19/22	0/1/1/1
4	BGC	G	3	4	-	0/2/19/22	0/1/1/1
4	BGC	G	4	4	-	2/2/19/22	0/1/1/1
5	BGC	H	1	5	-	1/2/19/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	BGC	H	2	5	-	2/2/19/22	0/1/1/1
5	BGC	H	3	5	-	1/2/19/22	0/1/1/1
5	BGC	I	1	5	-	0/2/22/22	0/1/1/1
5	BGC	I	2	5	-	0/2/19/22	0/1/1/1
5	BGC	I	3	5	-	2/2/19/22	0/1/1/1
6	BGC	J	1	6	-	2/2/19/22	0/1/1/1
6	BGC	J	2	6	-	2/2/19/22	0/1/1/1
6	BGC	K	1	6	-	0/2/19/22	0/1/1/1
6	BGC	K	2	6	-	2/2/19/22	0/1/1/1
4	BGC	L	1	4	-	0/2/22/22	0/1/1/1
4	BGC	L	2	4	-	0/2/19/22	0/1/1/1
4	BGC	L	3	4	-	0/2/19/22	0/1/1/1
4	BGC	L	4	4	-	0/2/19/22	0/1/1/1
3	BGC	M	1	3	-	2/2/22/22	0/1/1/1
3	BGC	M	2	3	-	0/2/19/22	0/1/1/1
3	BGC	M	3	3	-	1/2/19/22	0/1/1/1
3	BGC	M	4	3	-	2/2/19/22	0/1/1/1
3	BGC	M	5	3	-	2/2/19/22	0/1/1/1
5	BGC	N	1	5	-	0/2/22/22	0/1/1/1
5	BGC	N	2	5	-	0/2/19/22	0/1/1/1
5	BGC	N	3	5	-	2/2/19/22	0/1/1/1
4	BGC	O	1	4	-	0/2/22/22	0/1/1/1
4	BGC	O	2	4	-	2/2/19/22	0/1/1/1
4	BGC	O	3	4	-	0/2/19/22	0/1/1/1
4	BGC	O	4	4	-	0/2/19/22	0/1/1/1
4	BGC	P	1	4	-	2/2/22/22	0/1/1/1
4	BGC	P	2	4	-	1/2/19/22	0/1/1/1
4	BGC	P	3	4	-	1/2/19/22	0/1/1/1
4	BGC	P	4	4	-	2/2/19/22	0/1/1/1
4	BGC	Q	1	4	-	2/2/22/22	0/1/1/1
4	BGC	Q	2	4	-	2/2/19/22	0/1/1/1
4	BGC	Q	3	4	-	2/2/19/22	0/1/1/1
4	BGC	Q	4	4	-	2/2/19/22	0/1/1/1
5	BGC	R	1	5	-	2/2/22/22	0/1/1/1
5	BGC	R	2	5	-	2/2/19/22	0/1/1/1
5	BGC	R	3	5	-	0/2/19/22	0/1/1/1

The worst 5 of 126 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	J	2	BGC	O2-C2	-17.75	1.05	1.43
6	J	1	BGC	O3-C3	-12.78	1.12	1.43
6	J	1	BGC	O5-C5	10.53	1.64	1.43
5	I	2	BGC	O3-C3	-9.73	1.20	1.43
6	J	2	BGC	O5-C1	8.84	1.57	1.43

The worst 5 of 240 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	N	2	BGC	O5-C5-C6	-16.52	81.30	107.20
5	H	1	BGC	O5-C5-C6	-16.32	81.62	107.20
3	F	2	BGC	O5-C1-C2	-13.40	90.08	110.77
6	J	2	BGC	O5-C5-C6	-13.09	86.69	107.20
6	J	2	BGC	C1-C2-C3	10.95	123.12	109.67

There are no chirality outliers.

5 of 62 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	P	4	BGC	O5-C5-C6-O6
4	O	2	BGC	C4-C5-C6-O6
4	Q	1	BGC	O5-C5-C6-O6
4	P	1	BGC	O5-C5-C6-O6
5	I	3	BGC	O5-C5-C6-O6

There are no ring outliers.

19 monomers are involved in 24 short contacts:

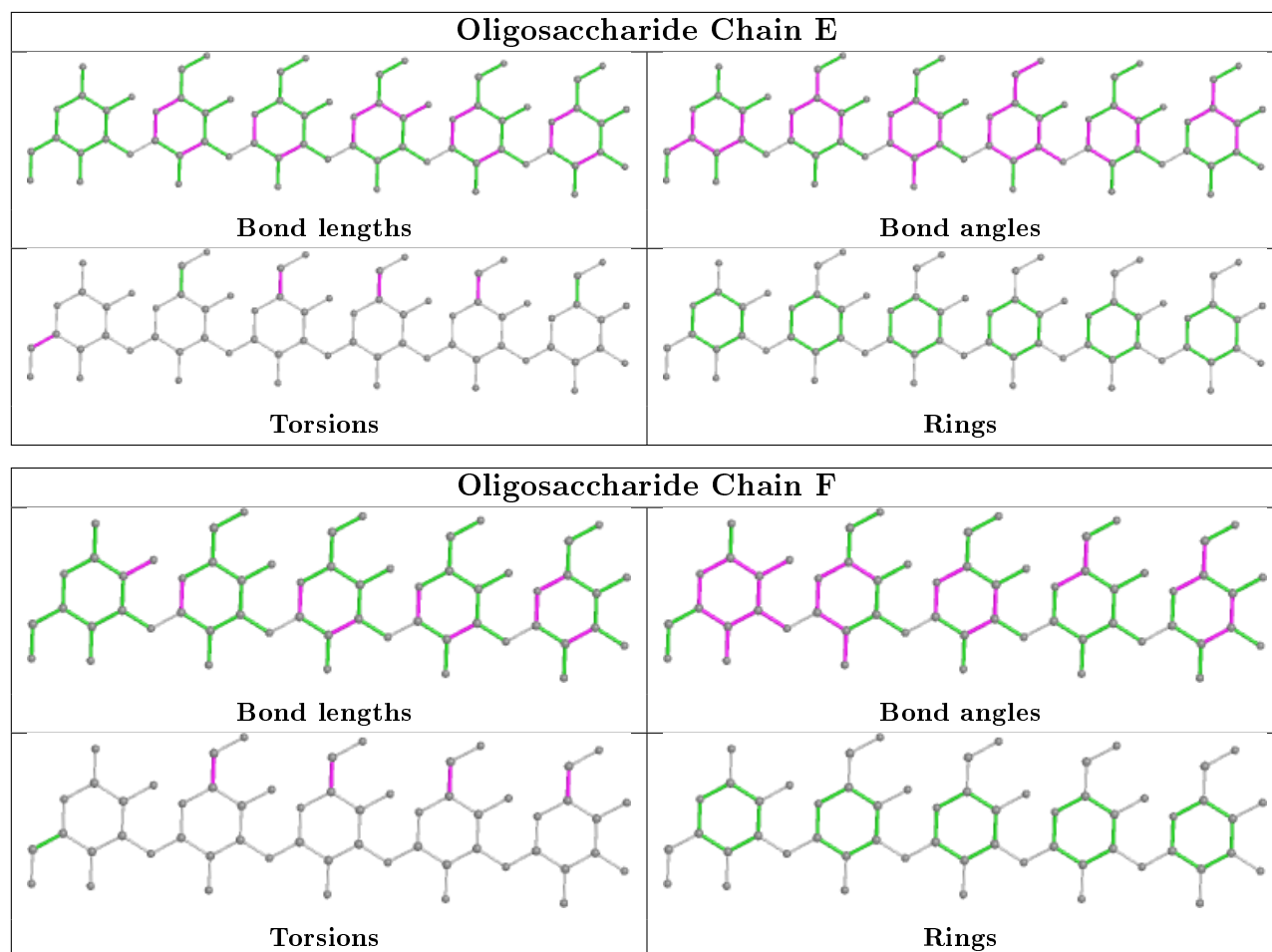
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	P	3	BGC	1	0
2	E	6	BGC	1	0
3	F	3	BGC	1	0
4	Q	1	BGC	1	0
5	N	1	BGC	1	0
4	O	1	BGC	1	0
5	N	3	BGC	3	0
4	Q	3	BGC	1	0
5	R	2	BGC	3	0
2	E	3	BGC	2	0
4	Q	2	BGC	2	0
4	G	1	BGC	1	0
2	E	2	BGC	1	0

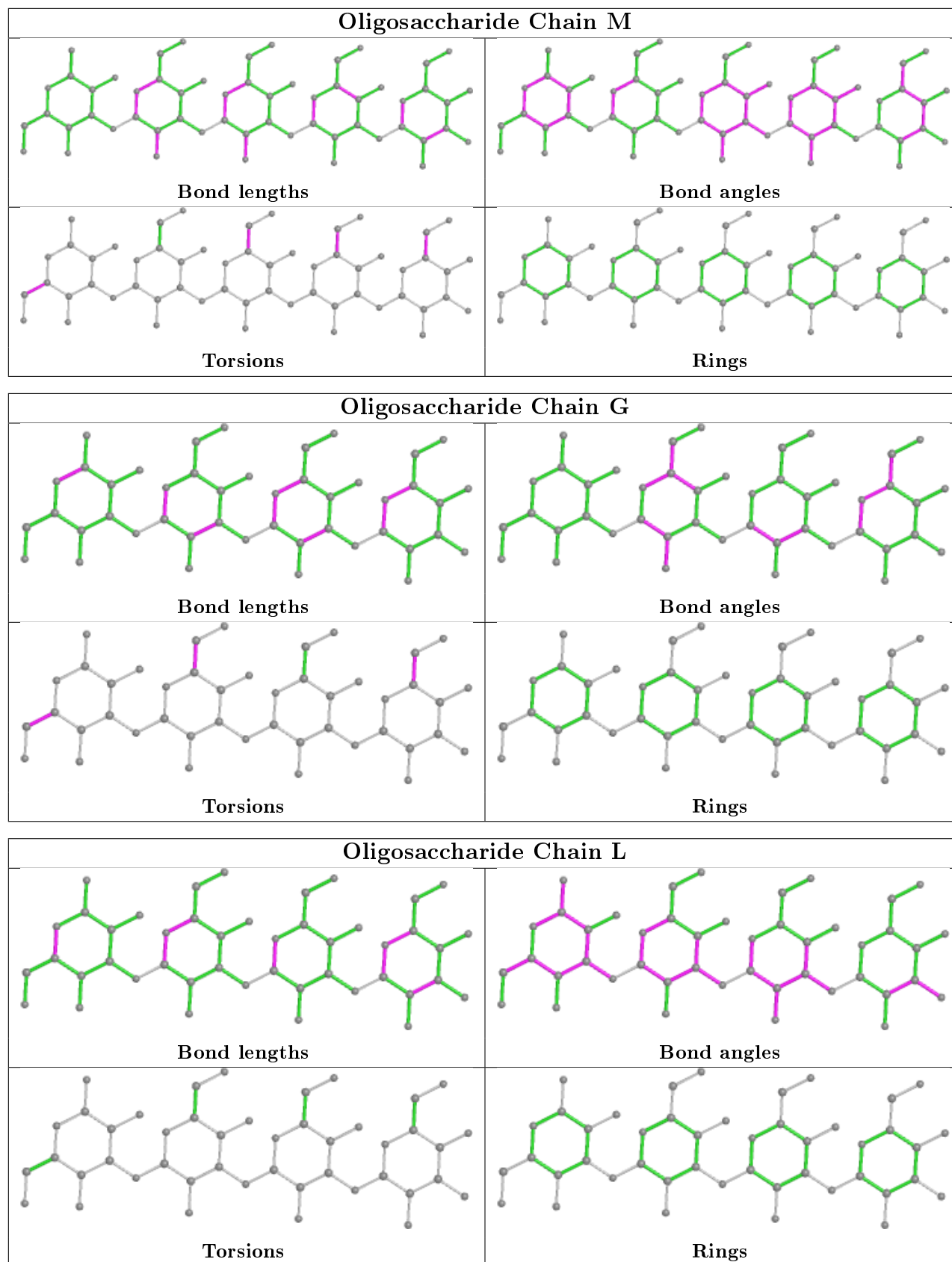
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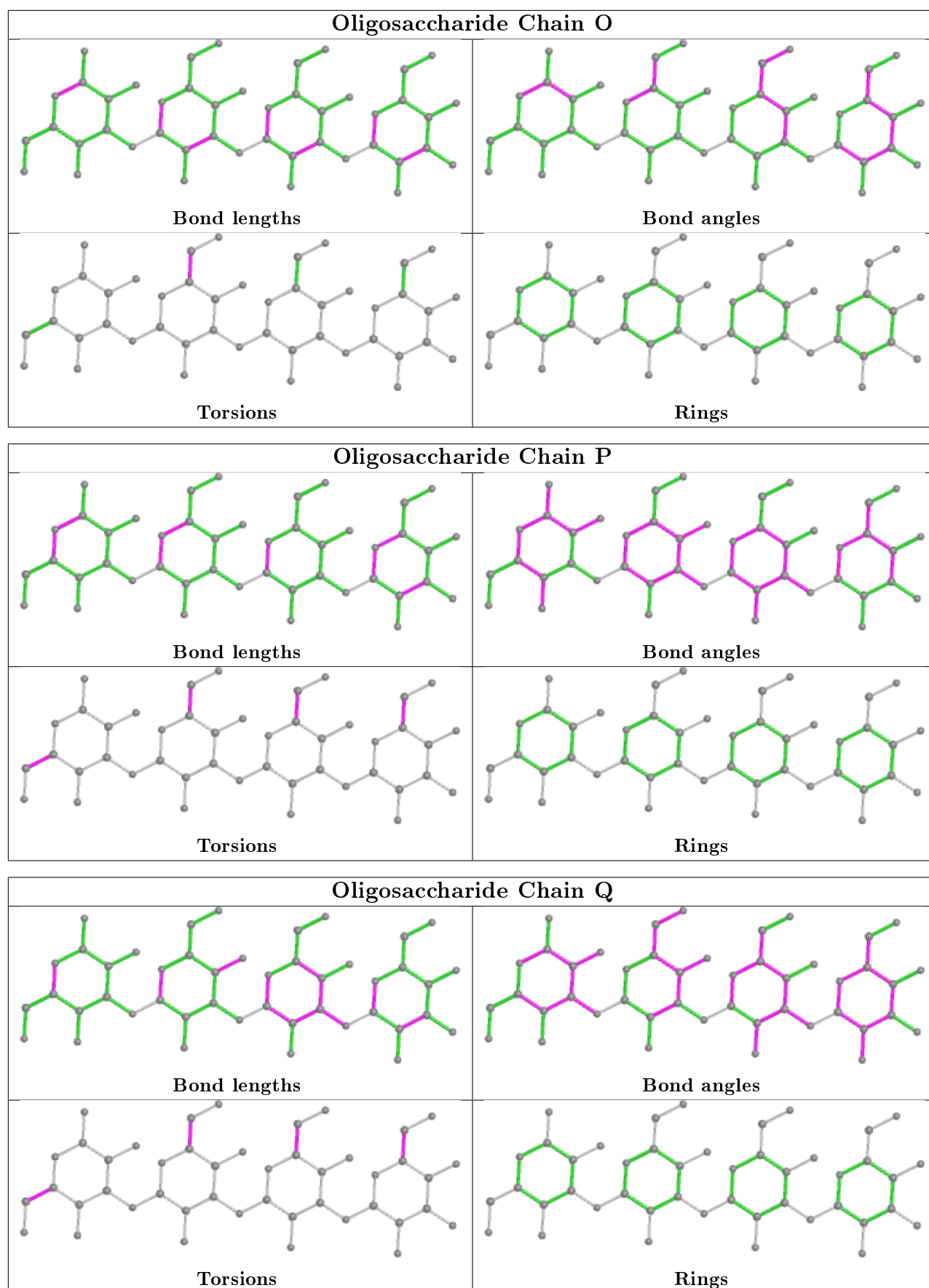
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	M	3	BGC	1	0
4	P	2	BGC	1	0
3	M	2	BGC	1	0
6	K	2	BGC	1	0
3	M	4	BGC	1	0
6	J	1	BGC	4	0

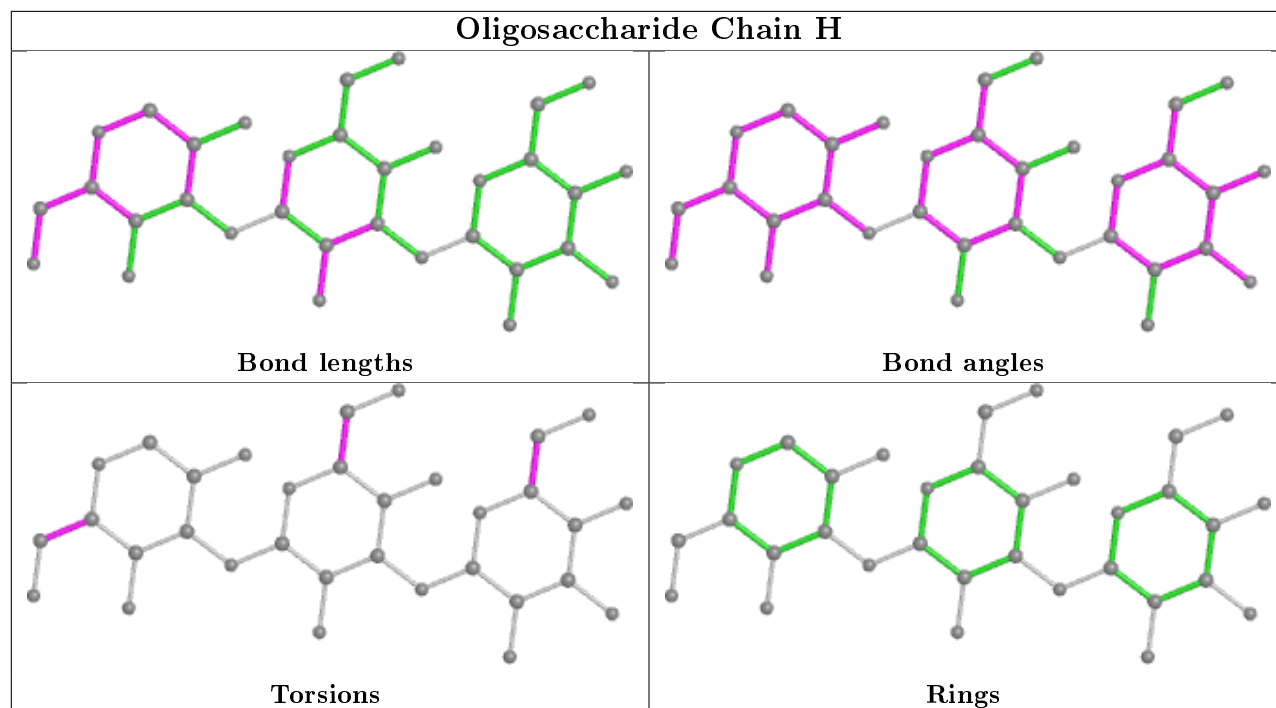
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



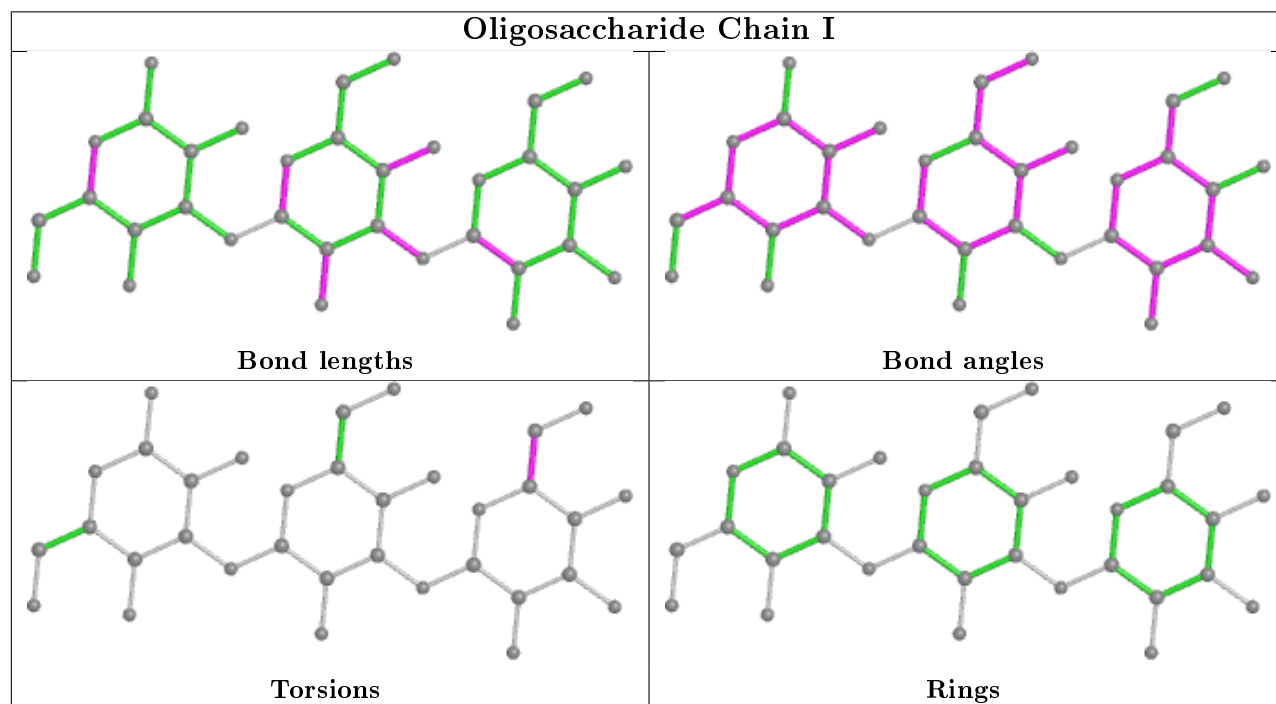




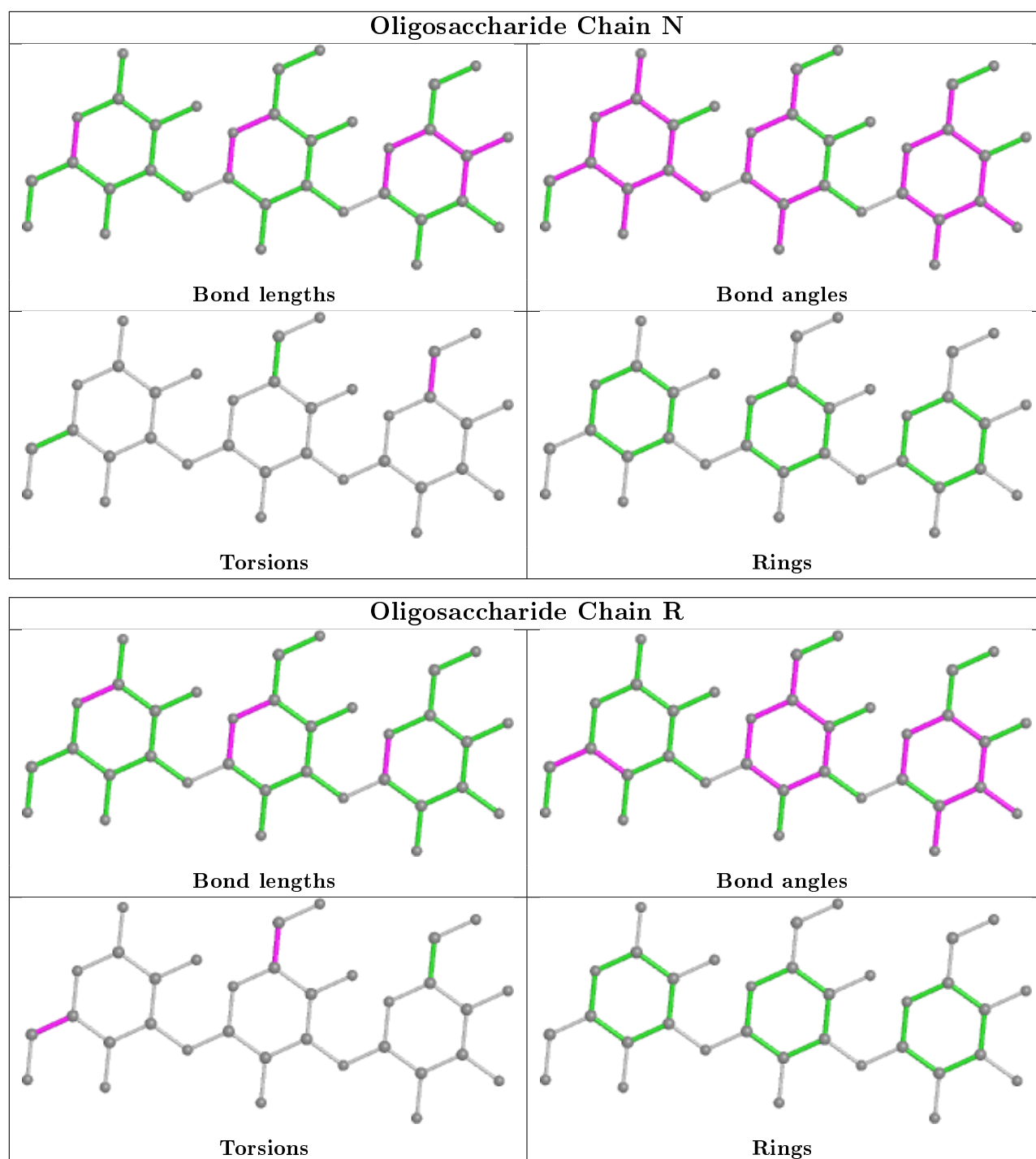
## Oligosaccharide Chain H

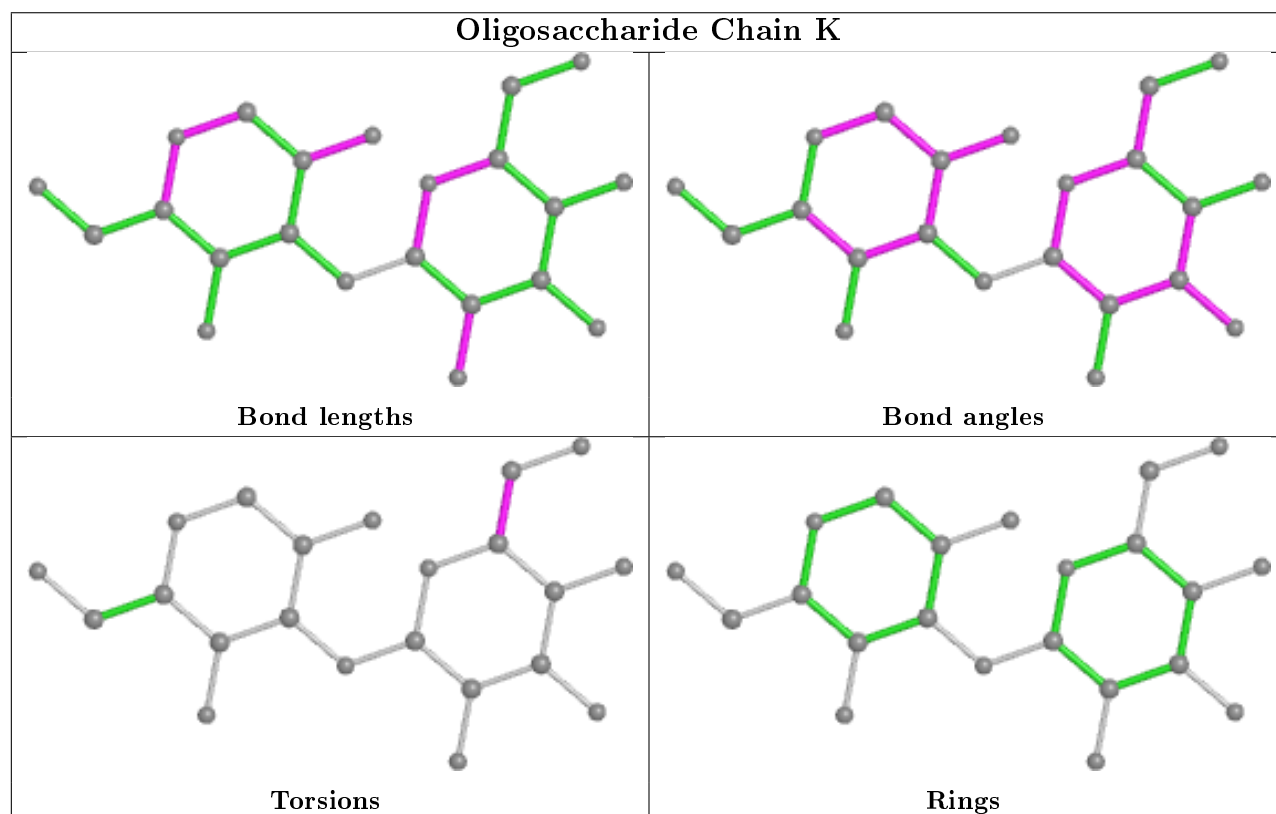
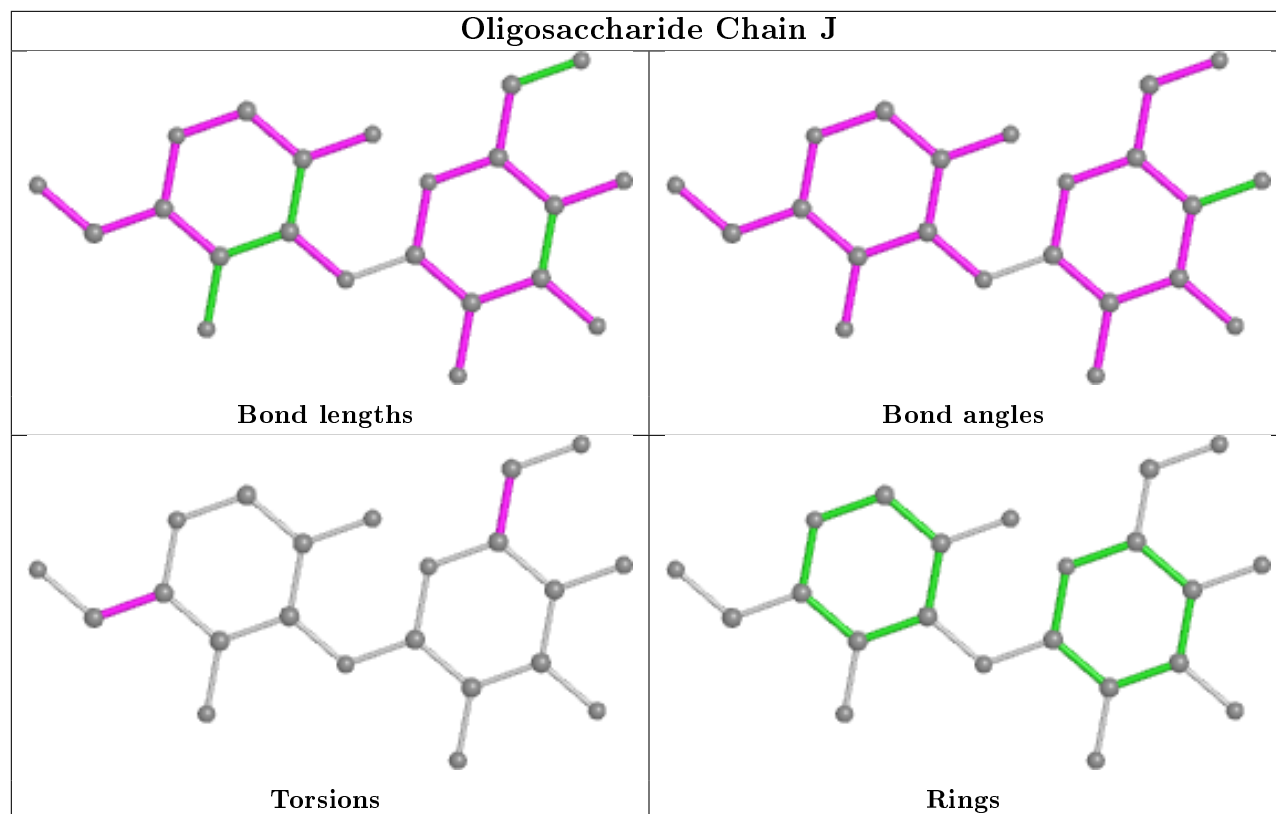


## Oligosaccharide Chain I









## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	717/796 (90%)	-0.27	14 (1%) 65 67	2, 10, 33, 60	0
1	B	720/796 (90%)	-0.26	6 (0%) 86 87	4, 16, 37, 69	0
1	C	705/796 (88%)	0.36	34 (4%) 30 28	11, 37, 68, 83	0
1	D	648/796 (81%)	0.19	43 (6%) 18 16	6, 29, 63, 82	0
All	All	2790/3184 (87%)	-0.00	97 (3%) 44 44	2, 21, 59, 83	0

The worst 5 of 97 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	5	GLY	5.7
1	D	175	PHE	5.7
1	C	720	HIS	4.6
1	C	6	ASP	4.1
1	C	365	MET	3.8

### 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
4	BGC	Q	4	11/12	0.81	0.24	34,41,53,63	0
3	BGC	F	1	12/12	0.81	0.31	28,40,46,52	0

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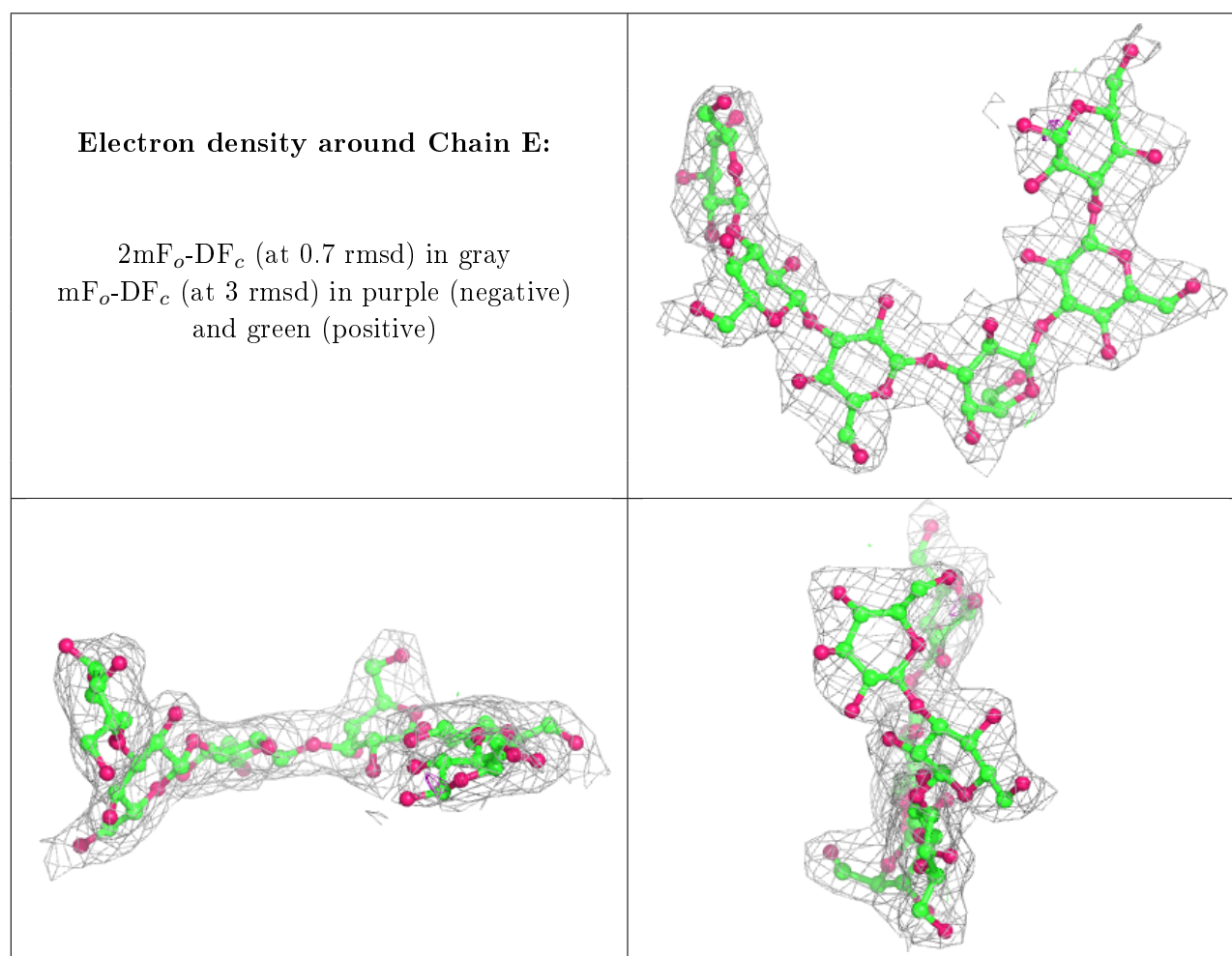
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	BGC	J	2	11/12	0.84	0.35	30,45,52,59	0
2	BGC	E	1	12/12	0.84	0.21	13,30,41,42	0
4	BGC	G	4	11/12	0.86	0.21	9,25,34,39	0
5	BGC	H	3	11/12	0.87	0.38	46,50,63,64	0
6	BGC	J	1	11/12	0.88	0.20	12,14,24,25	0
4	BGC	O	1	12/12	0.88	0.32	27,32,47,52	0
3	BGC	M	5	11/12	0.89	0.18	27,35,42,44	0
4	BGC	O	4	11/12	0.90	0.30	28,37,45,47	0
4	BGC	Q	1	12/12	0.92	0.12	26,30,43,45	0
4	BGC	L	4	11/12	0.92	0.24	21,29,37,47	0
5	BGC	H	2	11/12	0.92	0.24	17,27,46,46	0
4	BGC	G	1	12/12	0.92	0.20	18,28,42,48	0
4	BGC	Q	3	11/12	0.93	0.19	20,24,31,32	0
3	BGC	F	5	11/12	0.93	0.22	21,28,31,33	0
4	BGC	P	2	11/12	0.94	0.13	15,18,22,24	0
4	BGC	L	1	12/12	0.94	0.17	18,26,38,46	0
4	BGC	O	3	11/12	0.94	0.23	20,23,34,34	0
6	BGC	K	1	11/12	0.94	0.13	9,15,24,33	0
3	BGC	M	2	11/12	0.94	0.14	12,17,22,22	0
5	BGC	R	3	11/12	0.94	0.29	18,32,38,53	0
5	BGC	R	1	12/12	0.94	0.14	19,23,26,28	0
3	BGC	M	1	12/12	0.94	0.15	24,29,35,41	0
5	BGC	N	3	11/12	0.94	0.17	21,22,28,34	0
5	BGC	I	1	12/12	0.94	0.15	12,16,26,28	0
4	BGC	P	4	11/12	0.94	0.17	15,20,30,33	0
4	BGC	P	3	11/12	0.95	0.10	11,15,17,20	0
2	BGC	E	6	11/12	0.95	0.16	27,33,36,46	0
5	BGC	R	2	11/12	0.95	0.24	24,29,36,46	0
6	BGC	K	2	11/12	0.95	0.11	7,9,13,13	0
5	BGC	I	3	11/12	0.95	0.12	8,11,14,15	0
3	BGC	M	4	11/12	0.95	0.12	21,25,28,29	0
3	BGC	M	3	11/12	0.95	0.15	19,22,27,30	0
4	BGC	Q	2	11/12	0.95	0.12	21,23,28,29	0
5	BGC	H	1	11/12	0.95	0.14	7,12,15,18	0
4	BGC	O	2	11/12	0.95	0.16	14,20,24,25	0
5	BGC	I	2	11/12	0.96	0.12	7,9,14,15	0
2	BGC	E	5	11/12	0.96	0.15	10,15,18,19	0
4	BGC	P	1	12/12	0.96	0.10	21,28,33,36	0
2	BGC	E	4	11/12	0.96	0.12	6,8,10,12	0
3	BGC	F	3	11/12	0.96	0.13	6,11,16,17	0
4	BGC	L	3	11/12	0.96	0.13	11,15,20,23	0
3	BGC	F	2	11/12	0.96	0.14	14,19,22,23	0

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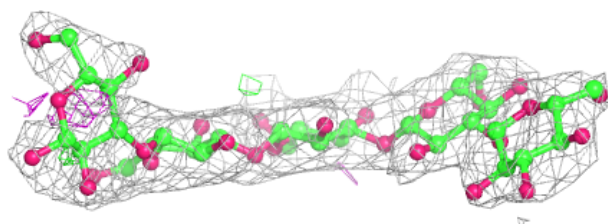
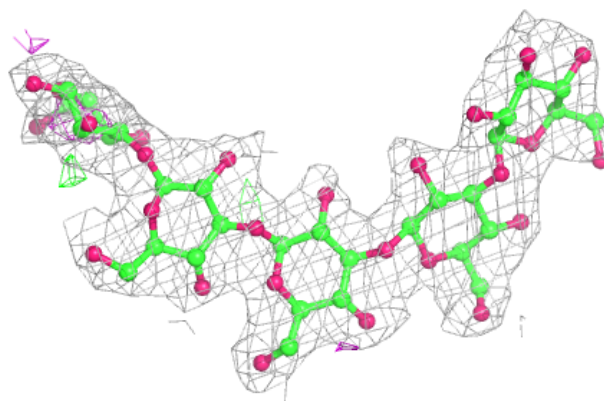
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	BGC	N	2	11/12	0.96	0.16	12,16,21,23	0
2	BGC	E	2	11/12	0.96	0.13	4,10,16,18	0
4	BGC	G	3	11/12	0.97	0.10	7,9,13,14	0
4	BGC	G	2	11/12	0.97	0.12	8,10,12,16	0
5	BGC	N	1	12/12	0.97	0.11	18,25,28,35	0
2	BGC	E	3	11/12	0.98	0.09	7,9,11,12	0
4	BGC	L	2	11/12	0.98	0.18	8,11,13,14	0
3	BGC	F	4	11/12	0.98	0.13	9,11,19,19	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.

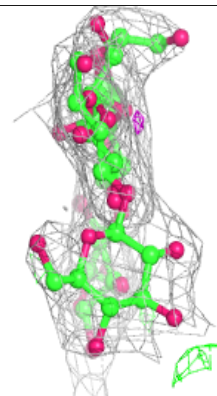
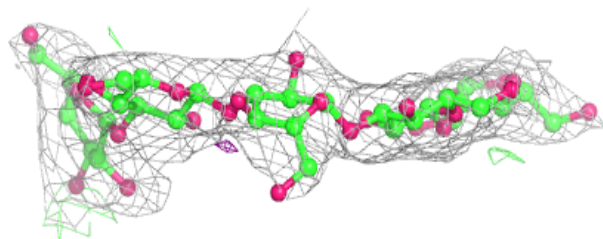
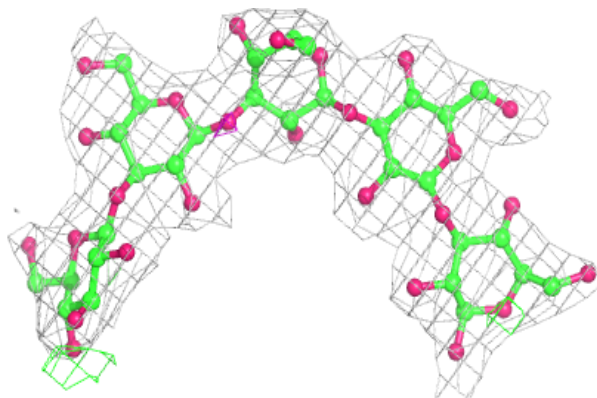


**Electron density around Chain F:**

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

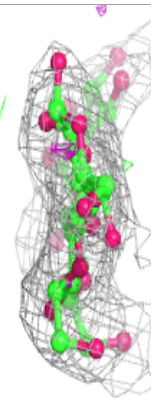
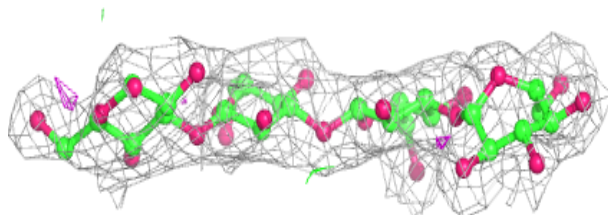
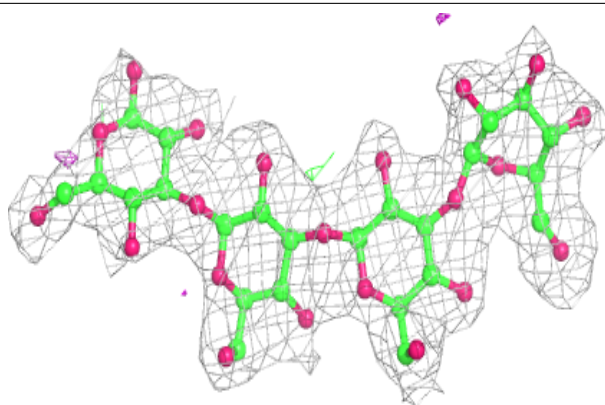
**Electron density around Chain M:**

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

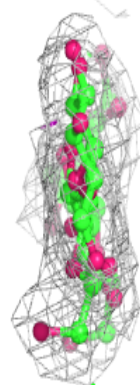
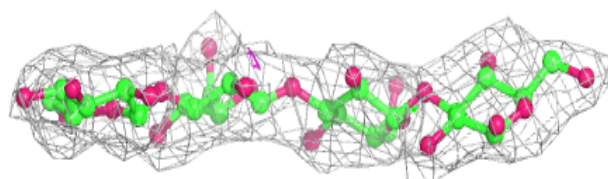
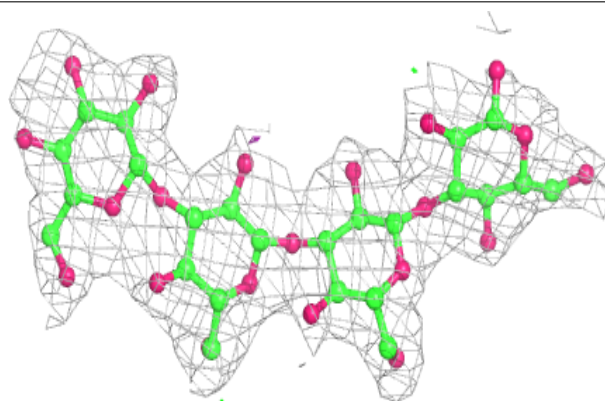


**Electron density around Chain G:**

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

**Electron density around Chain L:**

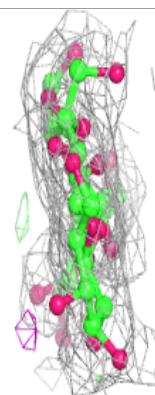
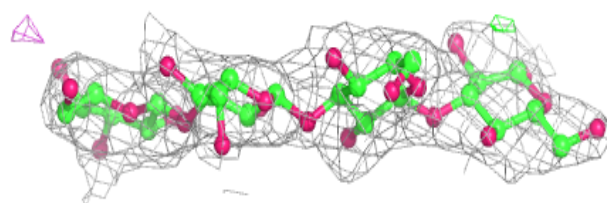
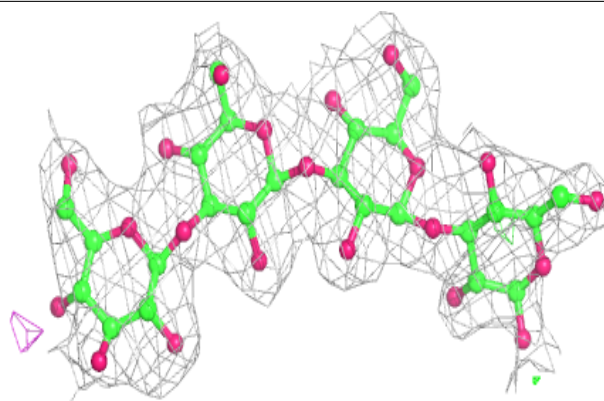
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



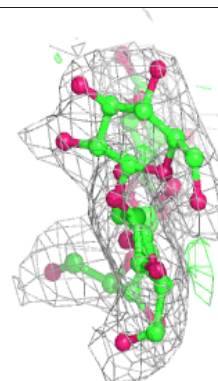
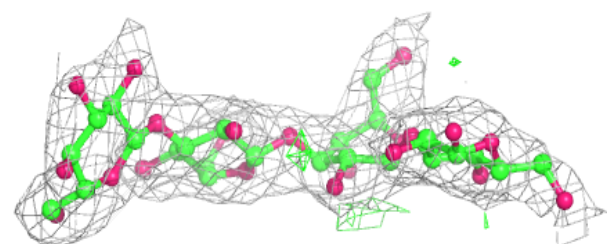
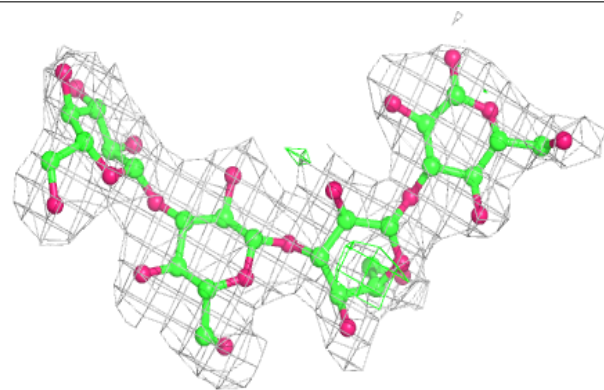


**Electron density around Chain O:**

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

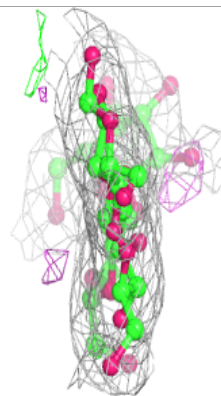
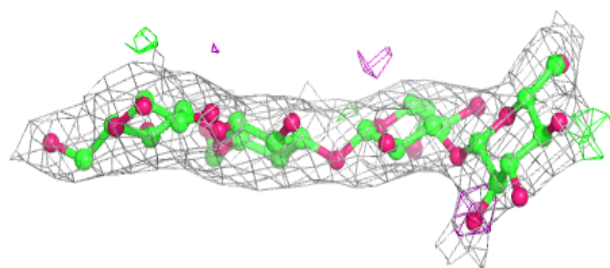
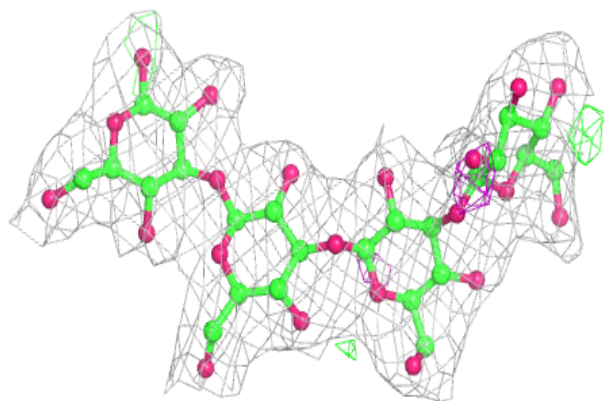
**Electron density around Chain P:**

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

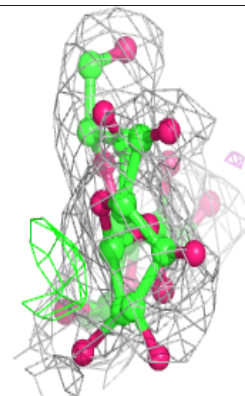
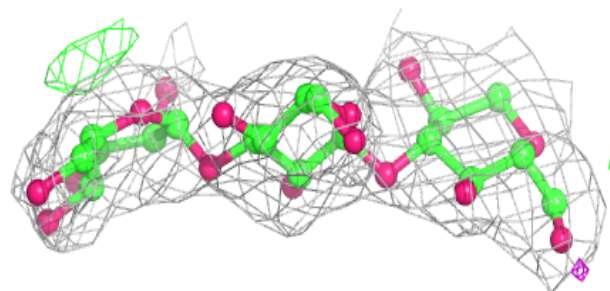
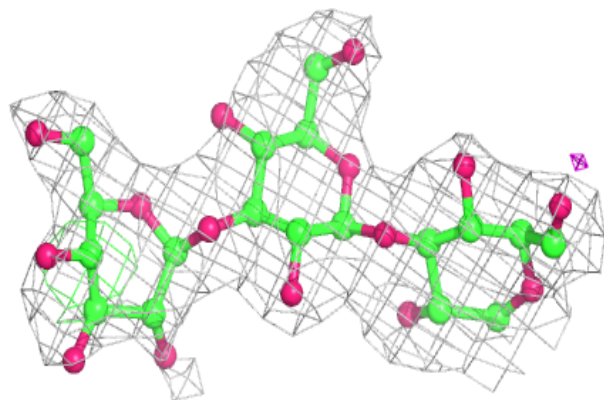


**Electron density around Chain Q:**

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

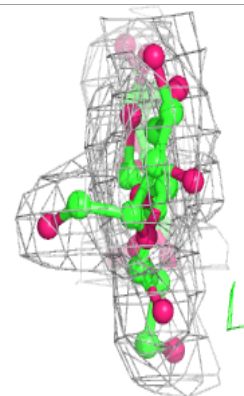
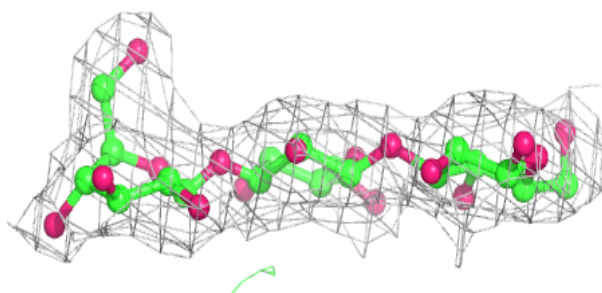
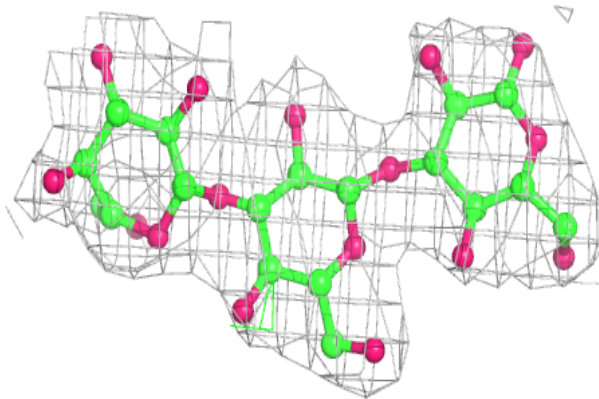
**Electron density around Chain H:**

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

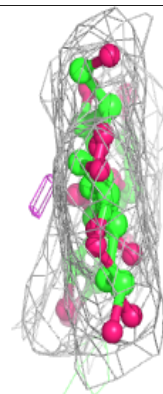
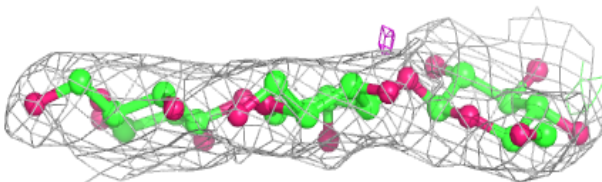
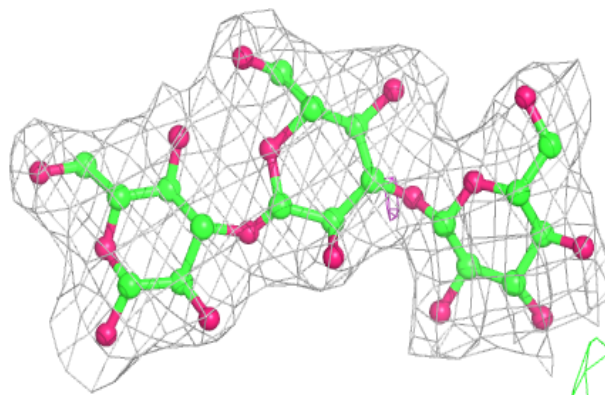


**Electron density around Chain I:**

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

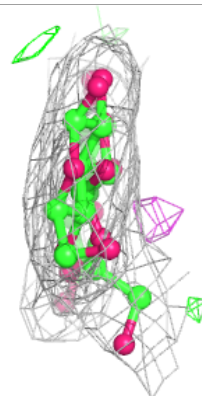
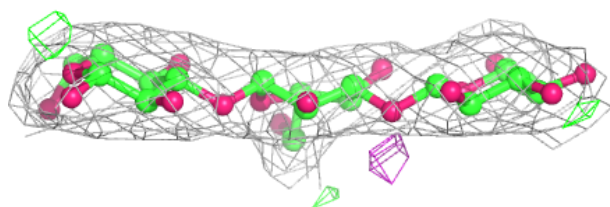
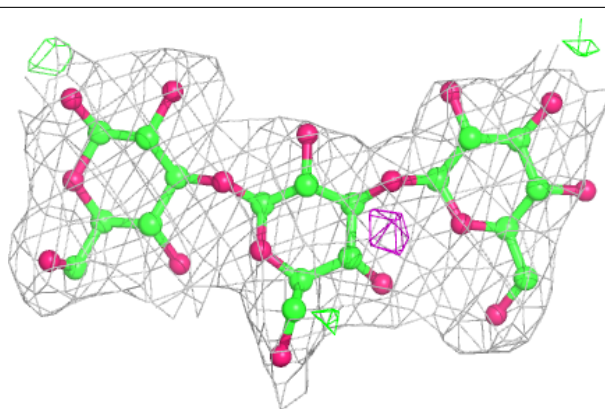
**Electron density around Chain N:**

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

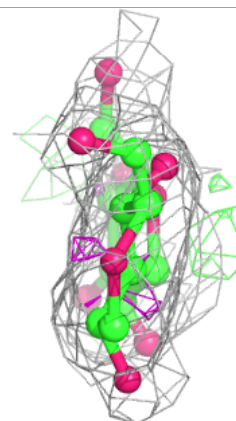
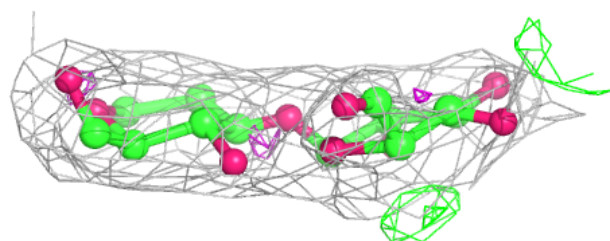
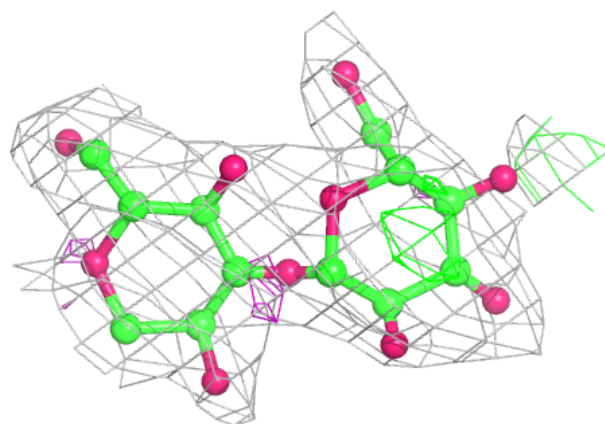


**Electron density around Chain R:**

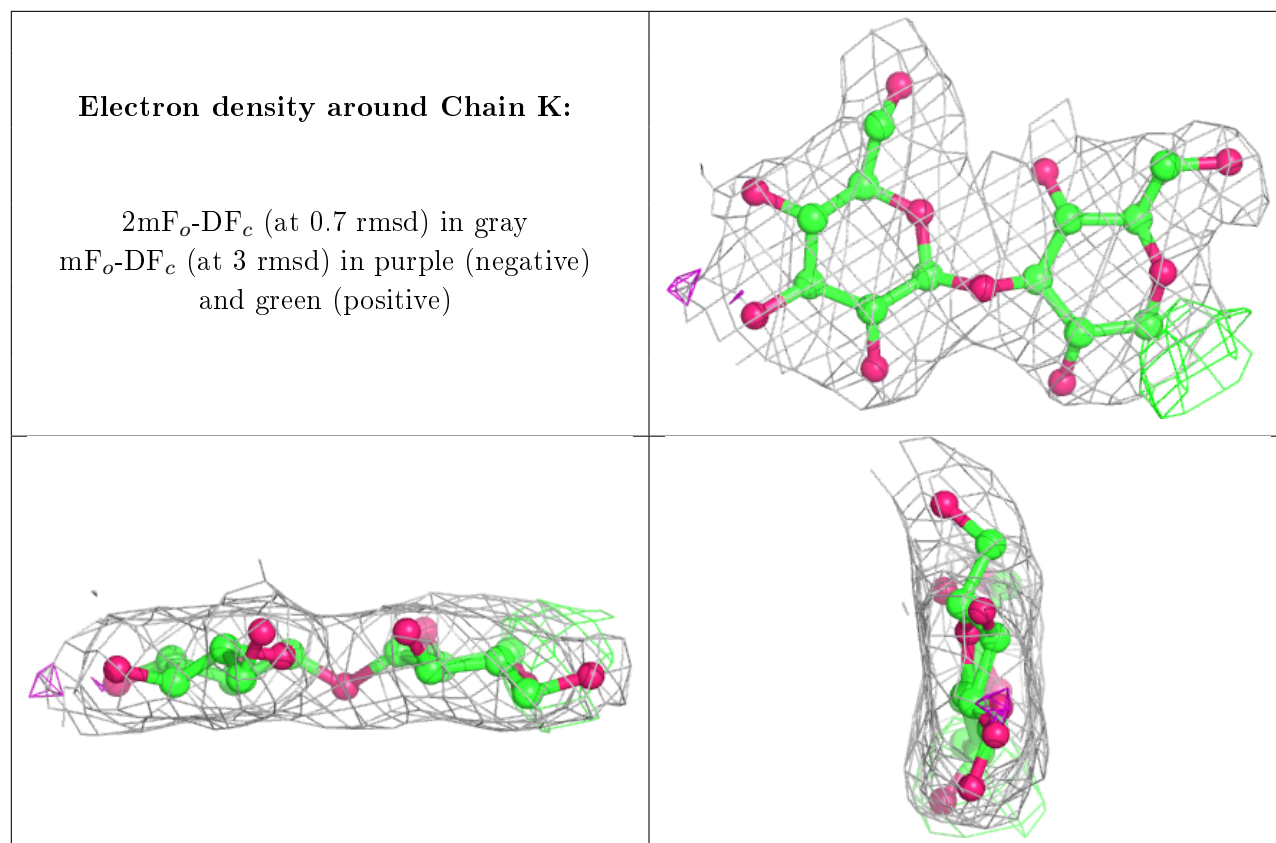
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around Chain J:**

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







## 6.4 Ligands [i](#)

There are no ligands in this entry.

## 6.5 Other polymers [i](#)

There are no such residues in this entry.