



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 8, 2021 – 11:18 AM BST

PDB ID : 6H64  
Title : Crystal structure of the CRD-SAT  
Authors : Charron, C.; Kriznik, A.; Yelehe-Okouma, M.; Jouzeau, J.-Y.; Reboul, P.  
Deposited on : 2018-07-26  
Resolution : 1.80 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 : 2.20  
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) : 2.20

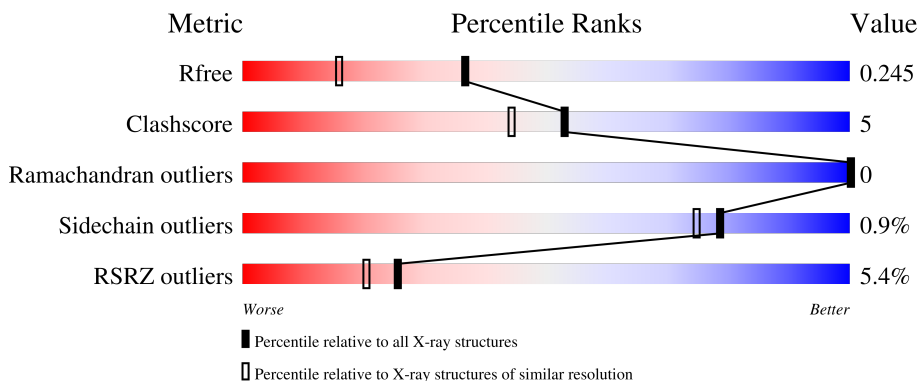
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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	5950 (1.80-1.80)
Clashscore	141614	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)
RSRZ outliers	127900	5850 (1.80-1.80)

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	170	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 70%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 8%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 19%; height: 10px; background-color: grey; margin-right: 5px;"></div> </div> <p style="text-align: center; margin: 0;">4%      70%      8%      •      19%</p>
1	B	170	<div style="display: flex; align-items: center;"> <div style="width: 5%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 68%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 11%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 19%; height: 10px; background-color: grey; margin-right: 5px;"></div> </div> <p style="text-align: center; margin: 0;">5%      68%      11%      •      19%</p>
1	C	170	<div style="display: flex; align-items: center;"> <div style="width: 5%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 63%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 16%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 19%; height: 10px; background-color: grey; margin-right: 5px;"></div> </div> <p style="text-align: center; margin: 0;">5%      63%      16%      •      19%</p>
1	D	170	<div style="display: flex; align-items: center;"> <div style="width: 5%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 65%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 15%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 19%; height: 10px; background-color: grey; margin-right: 5px;"></div> </div> <p style="text-align: center; margin: 0;">5%      65%      15%      •      19%</p>
1	E	170	<div style="display: flex; align-items: center;"> <div style="width: 4%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 66%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 12%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 19%; height: 10px; background-color: grey; margin-right: 5px;"></div> </div> <p style="text-align: center; margin: 0;">4%      66%      12%      •      19%</p>

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Mol	Chain	Length	Quality of chain
1	F	170	 3% 72% 8% 19%
2	G	2	 50% 50%
2	H	2	 100%
2	I	2	 100%
2	J	2	 100%
2	K	2	 100%
2	L	2	 100%

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 7240 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 Galectin-3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	137	1100	704	197	196	3	0	0	0
1	B	137	1100	704	197	196	3	0	0	0
1	C	137	1100	704	197	196	3	0	0	0
1	D	137	1100	704	197	196	3	0	0	0
1	E	137	1100	704	197	196	3	0	0	0
1	F	137	1100	704	197	196	3	0	0	0

There are 102 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	95	MET	-	initiating methionine	UNP P17931
A	129	LYS	ARG	engineered mutation	UNP P17931
A	245	THR	ALA	engineered mutation	UNP P17931
A	251	SER	-	expression tag	UNP P17931
A	252	SER	-	expression tag	UNP P17931
A	253	GLY	-	expression tag	UNP P17931
A	254	VAL	-	expression tag	UNP P17931
A	255	ASP	-	expression tag	UNP P17931
A	256	LEU	-	expression tag	UNP P17931
A	257	GLY	-	expression tag	UNP P17931
A	258	THR	-	expression tag	UNP P17931
A	259	GLU	-	expression tag	UNP P17931
A	260	ASN	-	expression tag	UNP P17931
A	261	LEU	-	expression tag	UNP P17931
A	262	TYR	-	expression tag	UNP P17931
A	263	PHE	-	expression tag	UNP P17931
A	264	GLN	-	expression tag	UNP P17931

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Chain	Residue	Modelled	Actual	Comment	Reference
B	95	MET	-	initiating methionine	UNP P17931
B	129	LYS	ARG	engineered mutation	UNP P17931
B	245	THR	ALA	engineered mutation	UNP P17931
B	251	SER	-	expression tag	UNP P17931
B	252	SER	-	expression tag	UNP P17931
B	253	GLY	-	expression tag	UNP P17931
B	254	VAL	-	expression tag	UNP P17931
B	255	ASP	-	expression tag	UNP P17931
B	256	LEU	-	expression tag	UNP P17931
B	257	GLY	-	expression tag	UNP P17931
B	258	THR	-	expression tag	UNP P17931
B	259	GLU	-	expression tag	UNP P17931
B	260	ASN	-	expression tag	UNP P17931
B	261	LEU	-	expression tag	UNP P17931
B	262	TYR	-	expression tag	UNP P17931
B	263	PHE	-	expression tag	UNP P17931
B	264	GLN	-	expression tag	UNP P17931
C	95	MET	-	initiating methionine	UNP P17931
C	129	LYS	ARG	engineered mutation	UNP P17931
C	245	THR	ALA	engineered mutation	UNP P17931
C	251	SER	-	expression tag	UNP P17931
C	252	SER	-	expression tag	UNP P17931
C	253	GLY	-	expression tag	UNP P17931
C	254	VAL	-	expression tag	UNP P17931
C	255	ASP	-	expression tag	UNP P17931
C	256	LEU	-	expression tag	UNP P17931
C	257	GLY	-	expression tag	UNP P17931
C	258	THR	-	expression tag	UNP P17931
C	259	GLU	-	expression tag	UNP P17931
C	260	ASN	-	expression tag	UNP P17931
C	261	LEU	-	expression tag	UNP P17931
C	262	TYR	-	expression tag	UNP P17931
C	263	PHE	-	expression tag	UNP P17931
C	264	GLN	-	expression tag	UNP P17931
D	95	MET	-	initiating methionine	UNP P17931
D	129	LYS	ARG	engineered mutation	UNP P17931
D	245	THR	ALA	engineered mutation	UNP P17931
D	251	SER	-	expression tag	UNP P17931
D	252	SER	-	expression tag	UNP P17931
D	253	GLY	-	expression tag	UNP P17931
D	254	VAL	-	expression tag	UNP P17931
D	255	ASP	-	expression tag	UNP P17931

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Chain	Residue	Modelled	Actual	Comment	Reference
D	256	LEU	-	expression tag	UNP P17931
D	257	GLY	-	expression tag	UNP P17931
D	258	THR	-	expression tag	UNP P17931
D	259	GLU	-	expression tag	UNP P17931
D	260	ASN	-	expression tag	UNP P17931
D	261	LEU	-	expression tag	UNP P17931
D	262	TYR	-	expression tag	UNP P17931
D	263	PHE	-	expression tag	UNP P17931
D	264	GLN	-	expression tag	UNP P17931
E	95	MET	-	initiating methionine	UNP P17931
E	129	LYS	ARG	engineered mutation	UNP P17931
E	245	THR	ALA	engineered mutation	UNP P17931
E	251	SER	-	expression tag	UNP P17931
E	252	SER	-	expression tag	UNP P17931
E	253	GLY	-	expression tag	UNP P17931
E	254	VAL	-	expression tag	UNP P17931
E	255	ASP	-	expression tag	UNP P17931
E	256	LEU	-	expression tag	UNP P17931
E	257	GLY	-	expression tag	UNP P17931
E	258	THR	-	expression tag	UNP P17931
E	259	GLU	-	expression tag	UNP P17931
E	260	ASN	-	expression tag	UNP P17931
E	261	LEU	-	expression tag	UNP P17931
E	262	TYR	-	expression tag	UNP P17931
E	263	PHE	-	expression tag	UNP P17931
E	264	GLN	-	expression tag	UNP P17931
F	95	MET	-	initiating methionine	UNP P17931
F	129	LYS	ARG	engineered mutation	UNP P17931
F	245	THR	ALA	engineered mutation	UNP P17931
F	251	SER	-	expression tag	UNP P17931
F	252	SER	-	expression tag	UNP P17931
F	253	GLY	-	expression tag	UNP P17931
F	254	VAL	-	expression tag	UNP P17931
F	255	ASP	-	expression tag	UNP P17931
F	256	LEU	-	expression tag	UNP P17931
F	257	GLY	-	expression tag	UNP P17931
F	258	THR	-	expression tag	UNP P17931
F	259	GLU	-	expression tag	UNP P17931
F	260	ASN	-	expression tag	UNP P17931
F	261	LEU	-	expression tag	UNP P17931
F	262	TYR	-	expression tag	UNP P17931
F	263	PHE	-	expression tag	UNP P17931

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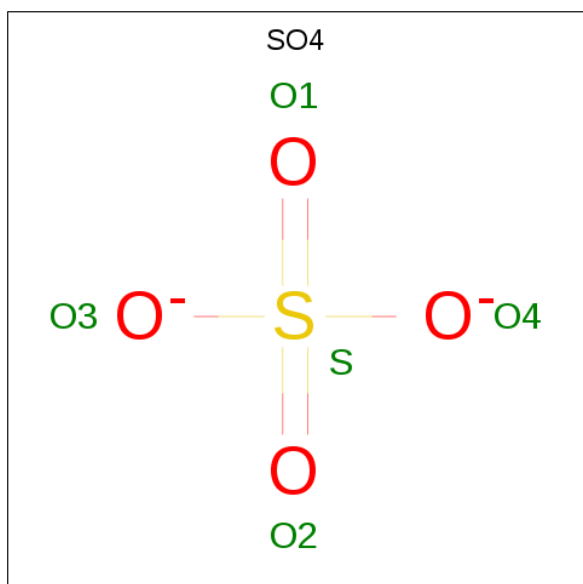
Chain	Residue	Modelled	Actual	Comment	Reference
F	264	GLN	-	expression tag	UNP P17931

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



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
			Total	C	O			
2	G	2	23	12	11	0	0	0
2	H	2	23	12	11	0	0	0
2	I	2	23	12	11	0	0	0
2	J	2	23	12	11	0	0	0
2	K	2	23	12	11	0	0	0
2	L	2	23	12	11	0	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO<sub>4</sub>) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total O S 5 4 1	0	0
3	A	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	C	1	Total O S 5 4 1	0	0
3	C	1	Total O S 5 4 1	0	0
3	D	1	Total O S 5 4 1	0	0
3	E	1	Total O S 5 4 1	0	0
3	F	1	Total O S 5 4 1	0	0

- Molecule 4 is water.

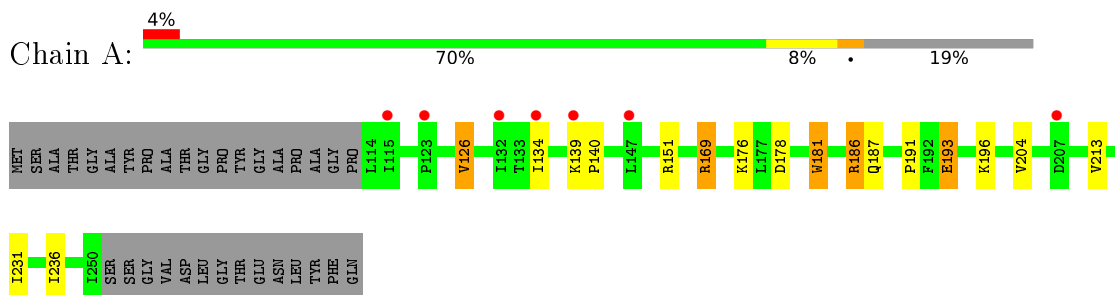
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	84	Total O 84 84	0	0
4	B	80	Total O 80 80	0	0
4	C	64	Total O 64 64	0	0
4	D	76	Total O 76 76	0	0
4	E	71	Total O 71 71	0	0
4	F	82	Total O 82 82	0	0



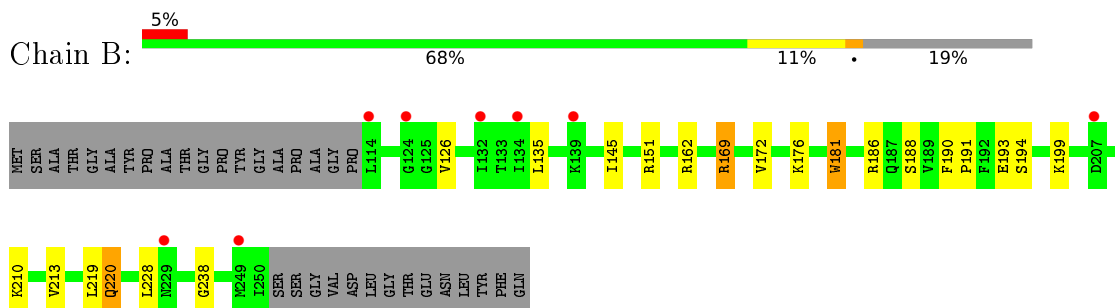
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

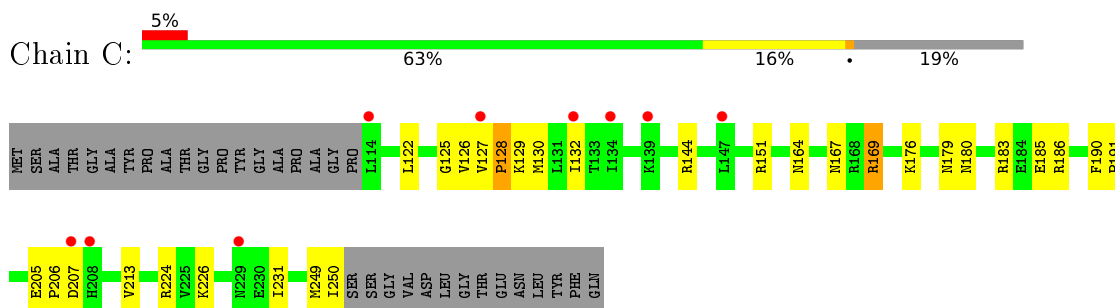
- Molecule 1: Galectin-3



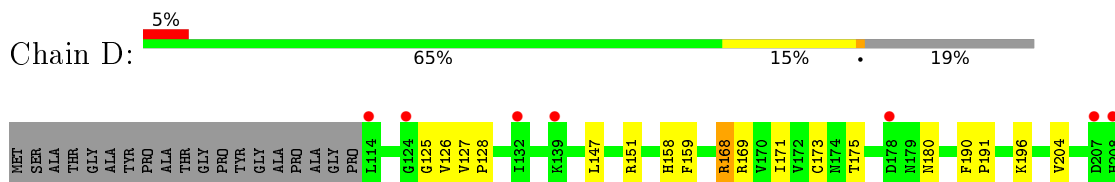
- Molecule 1: Galectin-3



- Molecule 1: Galectin-3

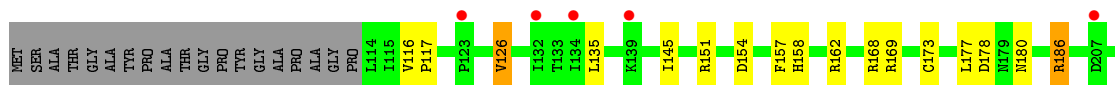


- Molecule 1: Galectin-3

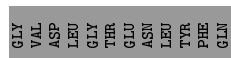
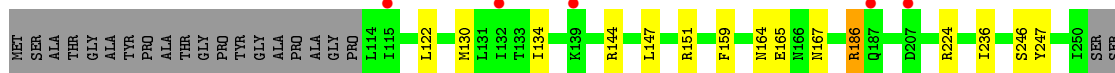




• Molecule 1: Galectin-3



• Molecule 1: Galectin-3



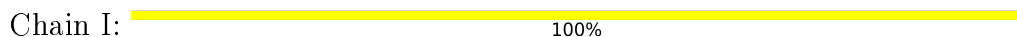
• Molecule 2: beta-D-galactopyranose-(1-4)-alpha-D-glucopyranose



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



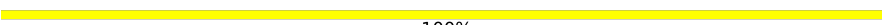
• Molecule 2: beta-D-galactopyranose-(1-4)-alpha-D-glucopyranose



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

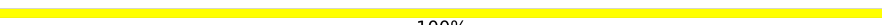


- Molecule 2: beta-D-galactopyranose-(1-4)-alpha-D-glucopyranose

Chain K:  100%

GLC1  
GAL2

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

Chain L:  100%

GLC1  
GAL2

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 62	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	118.06Å 118.06Å 137.51Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	10.00 – 1.80 10.00 – 1.80	Depositor EDS
% Data completeness (in resolution range)	99.3 (10.00-1.80) 99.8 (10.00-1.80)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.05	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.59 (at 1.80Å)	Xtrriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.201 , 0.238 0.205 , 0.245	Depositor DCC
$R_{free}$ test set	1043 reflections (1.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	20.6	Xtrriage
Anisotropy	0.011	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 51.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	0.117 for h,-h-k,-l	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	7240	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	21.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 44.72 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.4662e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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: GAL, GLC, SO4

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	1.26	3/1125 (0.3%)	1.38	7/1526 (0.5%)
1	B	1.31	4/1125 (0.4%)	1.25	4/1526 (0.3%)
1	C	1.30	4/1125 (0.4%)	1.24	6/1526 (0.4%)
1	D	1.23	2/1125 (0.2%)	1.24	5/1526 (0.3%)
1	E	1.23	2/1125 (0.2%)	1.40	10/1526 (0.7%)
1	F	1.24	1/1125 (0.1%)	1.23	6/1526 (0.4%)
All	All	1.26	16/6750 (0.2%)	1.29	38/9156 (0.4%)

The worst 5 of 16 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	246	SER	CB-OG	-6.63	1.33	1.42
1	C	185	GLU	CD-OE1	6.32	1.32	1.25
1	B	181	TRP	CE3-CZ3	6.18	1.49	1.38
1	E	169	ARG	CZ-NH2	-6.18	1.25	1.33
1	B	193	GLU	CD-OE2	-6.15	1.18	1.25

The worst 5 of 38 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	169	ARG	NE-CZ-NH1	19.99	130.29	120.30
1	A	169	ARG	NE-CZ-NH2	-19.70	110.45	120.30
1	A	169	ARG	NE-CZ-NH1	17.21	128.90	120.30
1	E	169	ARG	NE-CZ-NH2	-14.49	113.06	120.30
1	F	144	ARG	NE-CZ-NH1	-11.60	114.50	120.30

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1100	0	1114	10	0
1	B	1100	0	1114	10	0
1	C	1100	0	1114	17	0
1	D	1100	0	1114	15	0
1	E	1100	0	1114	15	0
1	F	1100	0	1114	8	0
2	G	23	0	21	0	0
2	H	23	0	21	0	0
2	I	23	0	21	0	0
2	J	23	0	21	0	0
2	K	23	0	21	0	0
2	L	23	0	21	0	0
3	A	10	0	0	0	0
3	B	10	0	0	0	0
3	C	10	0	0	0	0
3	D	5	0	0	0	0
3	E	5	0	0	1	0
3	F	5	0	0	0	0
4	A	84	0	0	1	0
4	B	80	0	0	1	0
4	C	64	0	0	2	0
4	D	76	0	0	2	0
4	E	71	0	0	3	0
4	F	82	0	0	0	0
All	All	7240	0	6810	73	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 5.

The worst 5 of 73 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:169:ARG:HD3	4:D:636:HOH:O	1.65	0.95
1:C:130:MET:CE	1:C:132:ILE:HD11	2.04	0.86
1:E:178:ASP:HB3	4:E:652:HOH:O	1.79	0.83

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:226:LYS:HE2	4:C:644:HOH:O	1.79	0.82
1:A:134:ILE:HD12	1:A:236:ILE:HD13	1.66	0.77

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	135/170 (79%)	128 (95%)	7 (5%)	0	100	100
1	B	135/170 (79%)	130 (96%)	5 (4%)	0	100	100
1	C	135/170 (79%)	128 (95%)	7 (5%)	0	100	100
1	D	135/170 (79%)	132 (98%)	3 (2%)	0	100	100
1	E	135/170 (79%)	132 (98%)	3 (2%)	0	100	100
1	F	135/170 (79%)	131 (97%)	4 (3%)	0	100	100
All	All	810/1020 (79%)	781 (96%)	29 (4%)	0	100	100

There are no Ramachandran outliers to report.

### 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	124/146 (85%)	122 (98%)	2 (2%)	62	54

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	124/146 (85%)	122 (98%)	2 (2%)	62	54
1	C	124/146 (85%)	123 (99%)	1 (1%)	81	78
1	D	124/146 (85%)	124 (100%)	0	100	100
1	E	124/146 (85%)	122 (98%)	2 (2%)	62	54
1	F	124/146 (85%)	124 (100%)	0	100	100
All	All	744/876 (85%)	737 (99%)	7 (1%)	78	75

5 of 7 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	220	GLN
1	C	128	PRO
1	E	250	ILE
1	E	126	VAL
1	B	194	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	150	GLN
1	F	187	GLN
1	C	180	ASN
1	D	166	ASN
1	D	167	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

12 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	GLC	G	1	2	12,12,12	0.86	0	17,17,17	1.21	2 (11%)
2	GAL	G	2	2	11,11,12	0.97	0	15,15,17	1.16	0
2	GLC	H	1	2	12,12,12	0.66	0	17,17,17	1.62	3 (17%)
2	GAL	H	2	2	11,11,12	1.77	3 (27%)	15,15,17	1.49	3 (20%)
2	GLC	I	1	2	12,12,12	1.03	0	17,17,17	1.59	3 (17%)
2	GAL	I	2	2	11,11,12	1.01	0	15,15,17	2.17	3 (20%)
2	GLC	J	1	2	12,12,12	0.97	0	17,17,17	1.31	1 (5%)
2	GAL	J	2	2	11,11,12	1.62	3 (27%)	15,15,17	1.36	2 (13%)
2	GLC	K	1	2	12,12,12	1.31	2 (16%)	17,17,17	1.56	4 (23%)
2	GAL	K	2	2	11,11,12	0.91	0	15,15,17	1.74	6 (40%)
2	GLC	L	1	2	12,12,12	0.86	0	17,17,17	1.03	2 (11%)
2	GAL	L	2	2	11,11,12	1.34	1 (9%)	15,15,17	2.06	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	GLC	G	1	2	-	0/2/22/22	0/1/1/1
2	GAL	G	2	2	-	0/2/19/22	0/1/1/1
2	GLC	H	1	2	-	0/2/22/22	0/1/1/1
2	GAL	H	2	2	-	0/2/19/22	0/1/1/1
2	GLC	I	1	2	-	0/2/22/22	0/1/1/1
2	GAL	I	2	2	-	0/2/19/22	0/1/1/1
2	GLC	J	1	2	-	0/2/22/22	0/1/1/1
2	GAL	J	2	2	-	0/2/19/22	0/1/1/1
2	GLC	K	1	2	-	0/2/22/22	0/1/1/1
2	GAL	K	2	2	-	0/2/19/22	0/1/1/1
2	GLC	L	1	2	-	0/2/22/22	0/1/1/1
2	GAL	L	2	2	-	0/2/19/22	0/1/1/1

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	L	2	GAL	O5-C1	-3.20	1.38	1.43
2	H	2	GAL	C2-C3	3.00	1.56	1.52
2	J	2	GAL	O5-C1	-2.95	1.39	1.43
2	H	2	GAL	O5-C1	-2.86	1.39	1.43
2	K	1	GLC	O5-C5	-2.72	1.37	1.44

The worst 5 of 34 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	I	2	GAL	O2-C2-C3	5.78	121.72	110.14
2	L	2	GAL	C1-C2-C3	5.27	116.15	109.67
2	H	1	GLC	O5-C1-C2	4.18	117.75	110.28
2	I	2	GAL	C1-C2-C3	4.02	114.60	109.67
2	I	1	GLC	C1-C2-C3	3.94	118.50	110.31

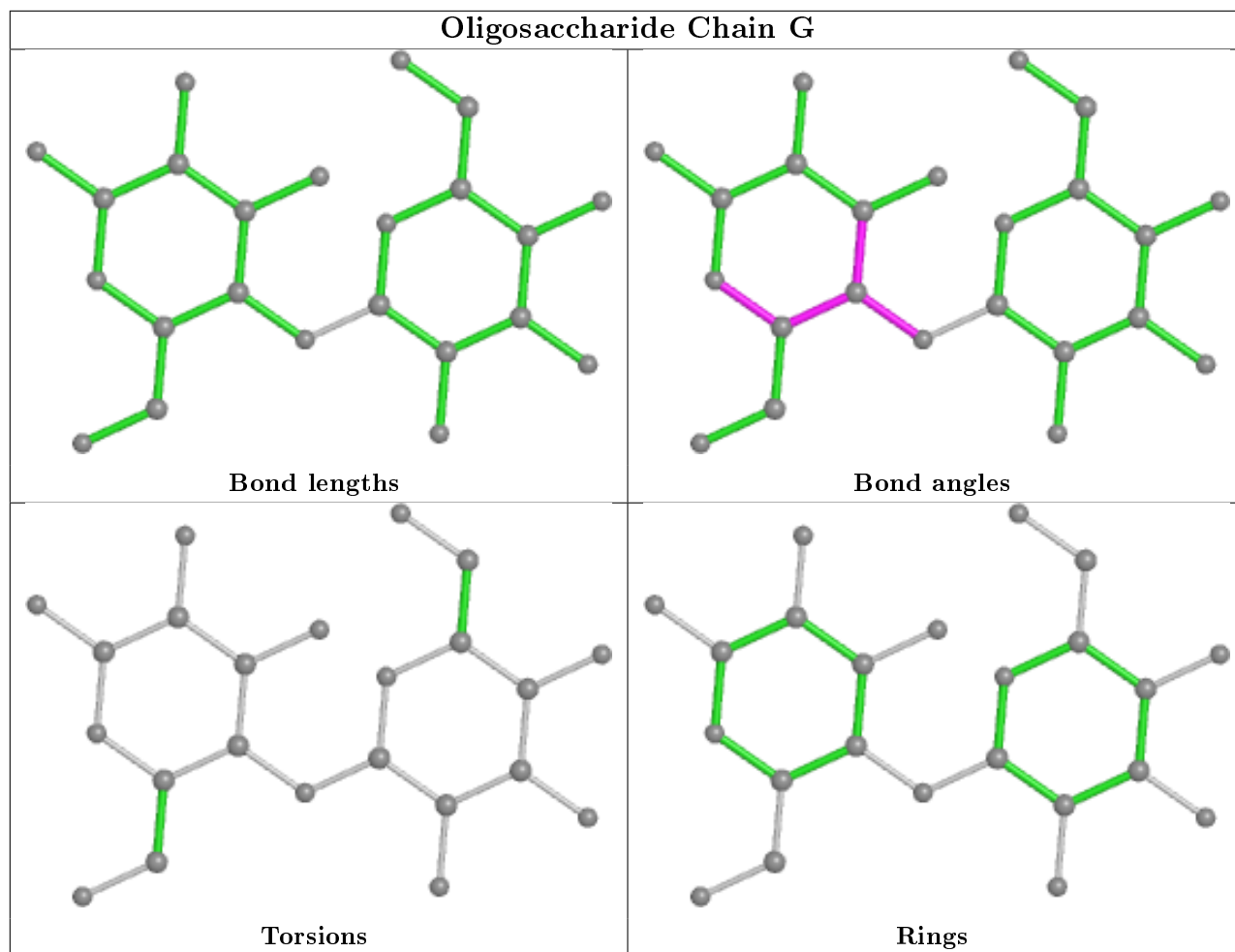
There are no chirality outliers.

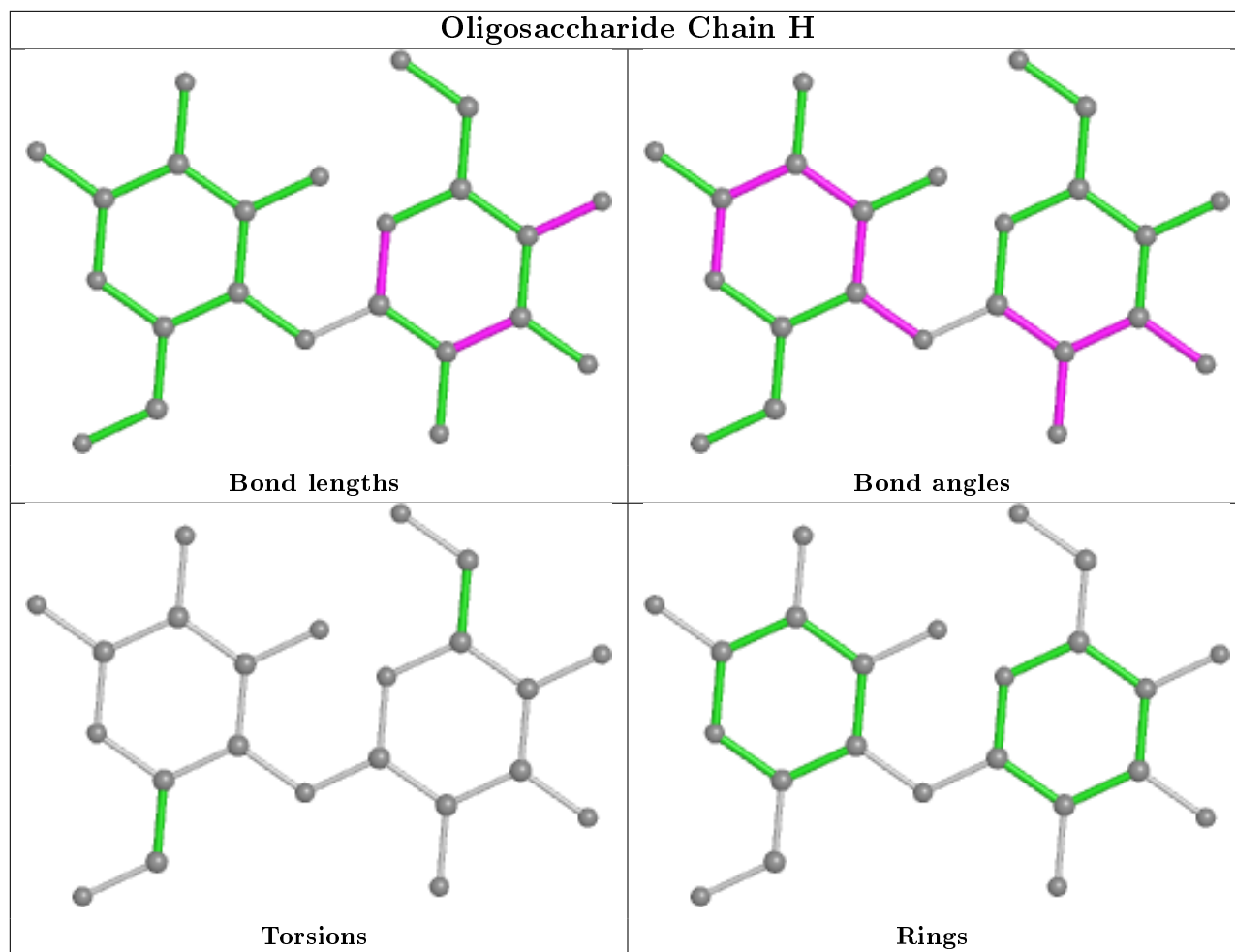
There are no torsion outliers.

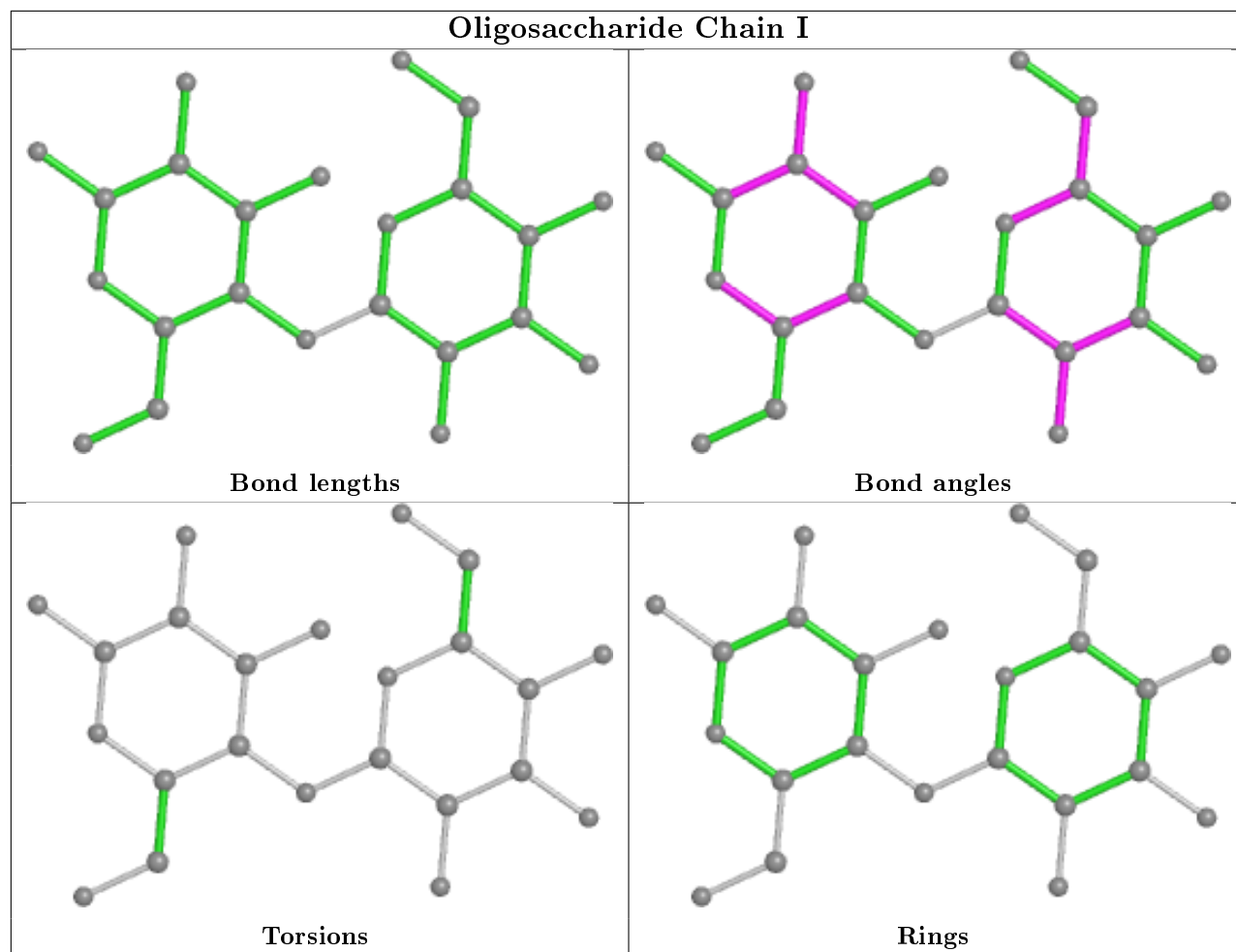
There are no ring outliers.

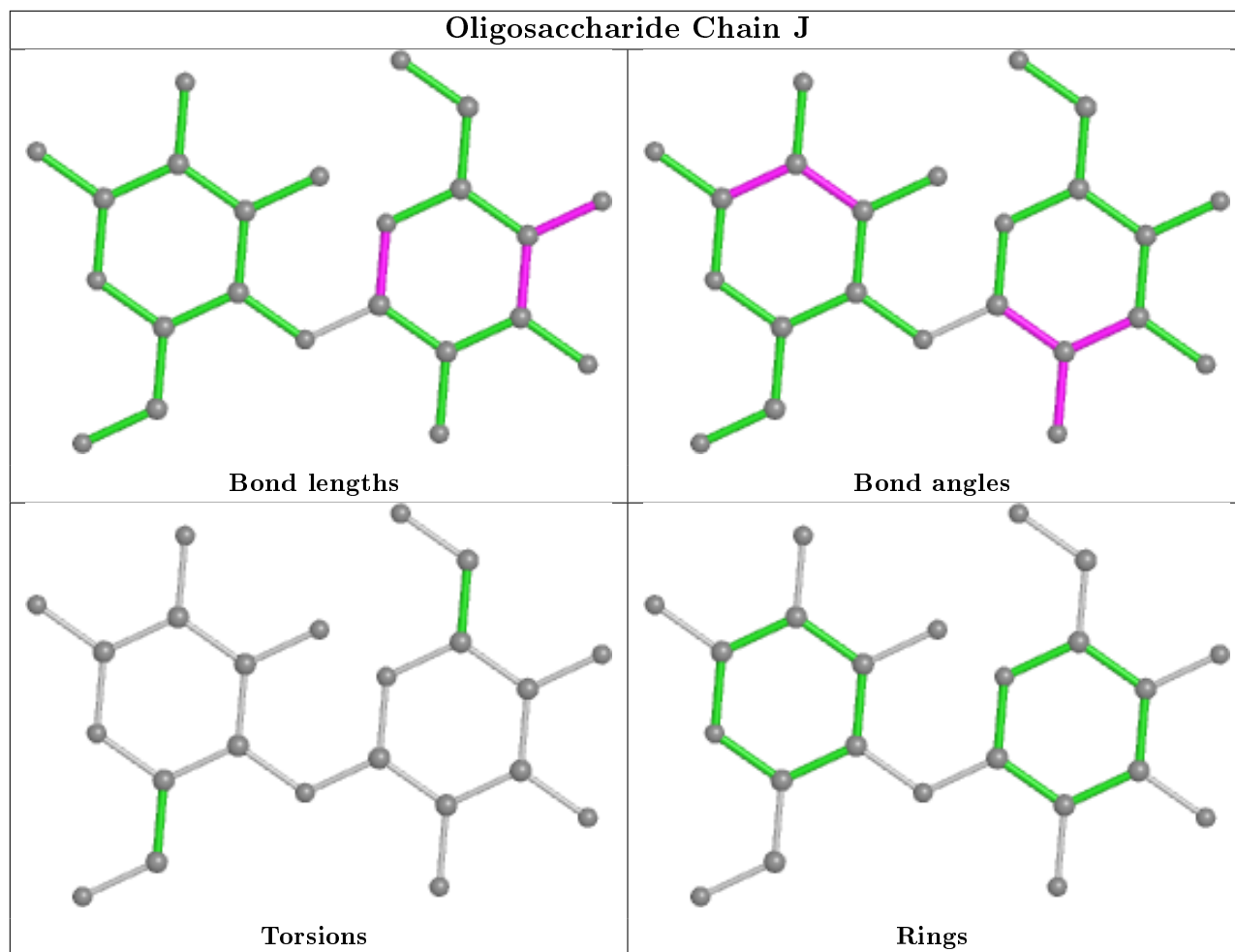
No monomer is involved in short contacts.

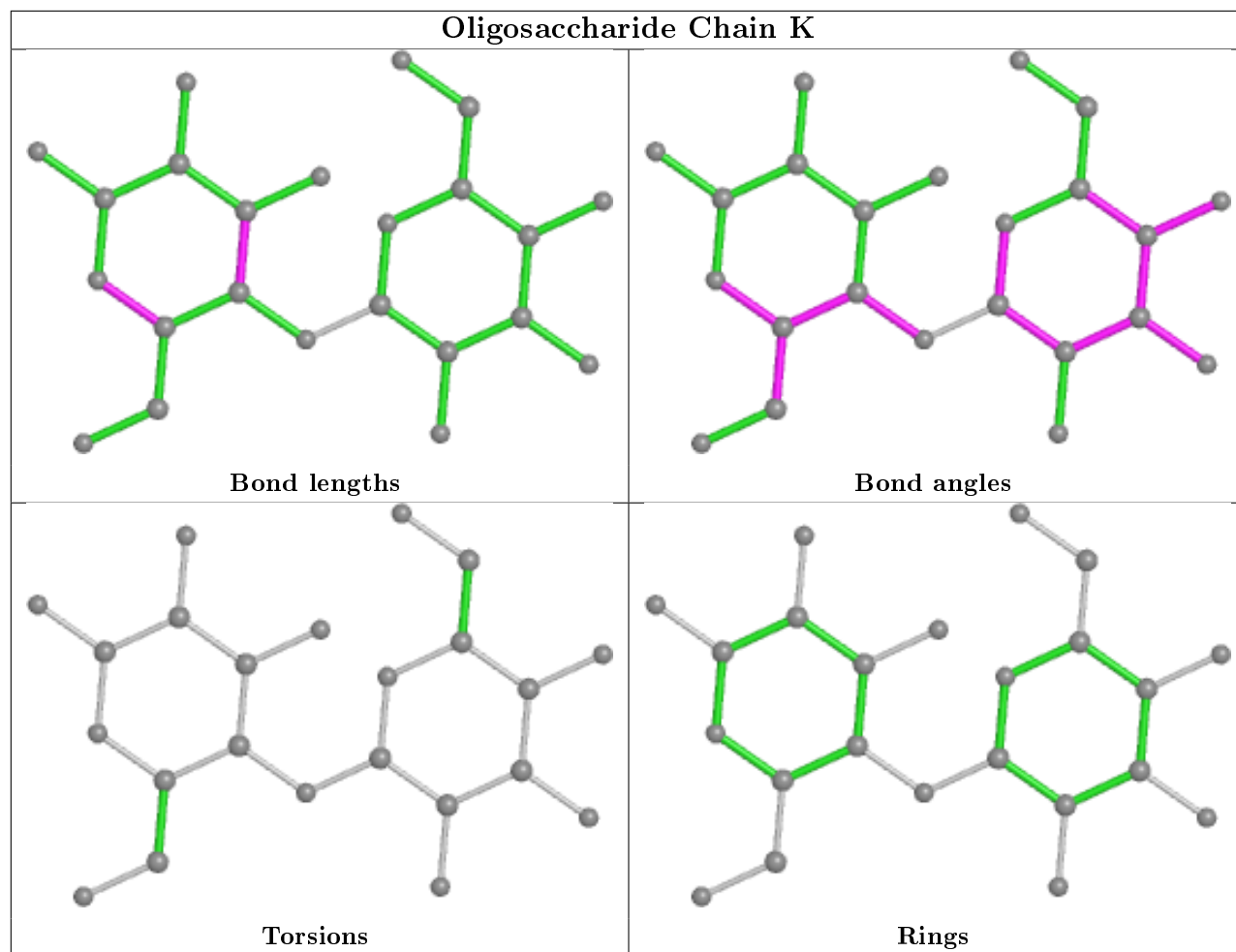
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

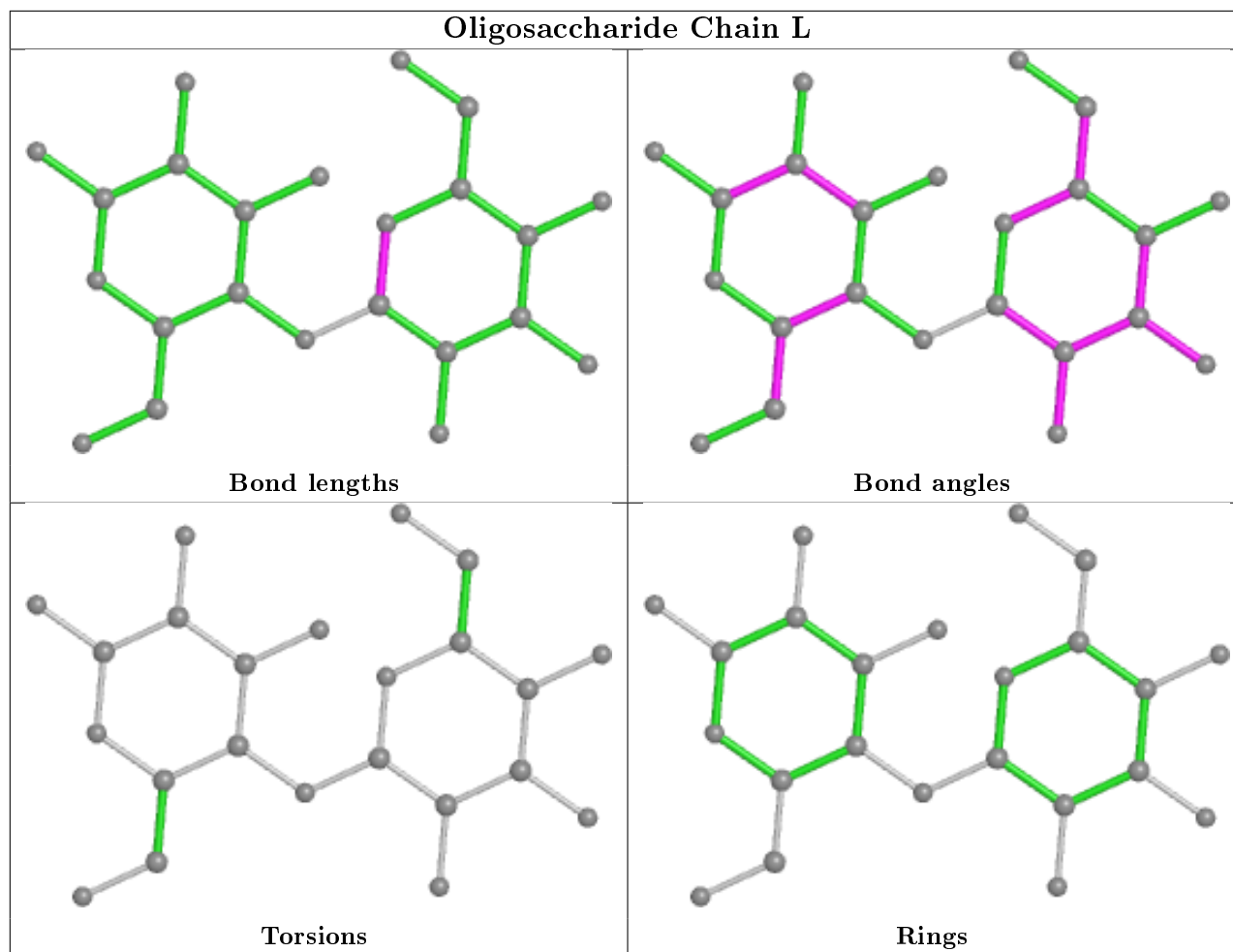












## 5.6 Ligand geometry [i](#)

9 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
3	SO4	B	503	-	4,4,4	0.75	0	6,6,6	1.43	1 (16%)
3	SO4	C	502	-	4,4,4	0.28	0	6,6,6	0.64	0
3	SO4	D	502	-	4,4,4	0.44	0	6,6,6	1.08	0
3	SO4	F	502	-	4,4,4	0.29	0	6,6,6	0.58	0
3	SO4	E	502	-	4,4,4	0.36	0	6,6,6	1.05	0
3	SO4	B	502	-	4,4,4	0.35	0	6,6,6	1.06	0



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	SO4	C	503	-	4,4,4	0.72	0	6,6,6	0.38	0
3	SO4	A	503	-	4,4,4	0.45	0	6,6,6	1.21	1 (16%)
3	SO4	A	502	-	4,4,4	0.31	0	6,6,6	1.04	0

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	503	SO4	O3-S-O2	2.48	122.25	109.31
3	A	503	SO4	O3-S-O1	-2.33	97.15	109.31

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	E	502	SO4	1	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

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

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

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ > 2	OWAB(Å <sup>2</sup> )	Q < 0.9
1	A	137/170 (80%)	-0.02	7 (5%) 28 22	12, 20, 36, 57	26 (18%)
1	B	137/170 (80%)	-0.08	8 (5%) 23 18	10, 18, 34, 52	27 (19%)
1	C	137/170 (80%)	-0.03	9 (6%) 18 14	8, 18, 35, 53	27 (19%)
1	D	137/170 (80%)	0.07	8 (5%) 23 18	7, 20, 40, 62	27 (19%)
1	E	137/170 (80%)	-0.06	7 (5%) 28 22	9, 19, 33, 51	27 (19%)
1	F	137/170 (80%)	-0.10	5 (3%) 42 37	11, 18, 33, 56	27 (19%)
All	All	822/1020 (80%)	-0.03	44 (5%) 25 20	7, 19, 35, 62	161 (19%)

The worst 5 of 44 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	124	GLY	5.4
1	F	132	ILE	3.9
1	A	132	ILE	3.8
1	A	207	ASP	3.5
1	E	132	ILE	3.4

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

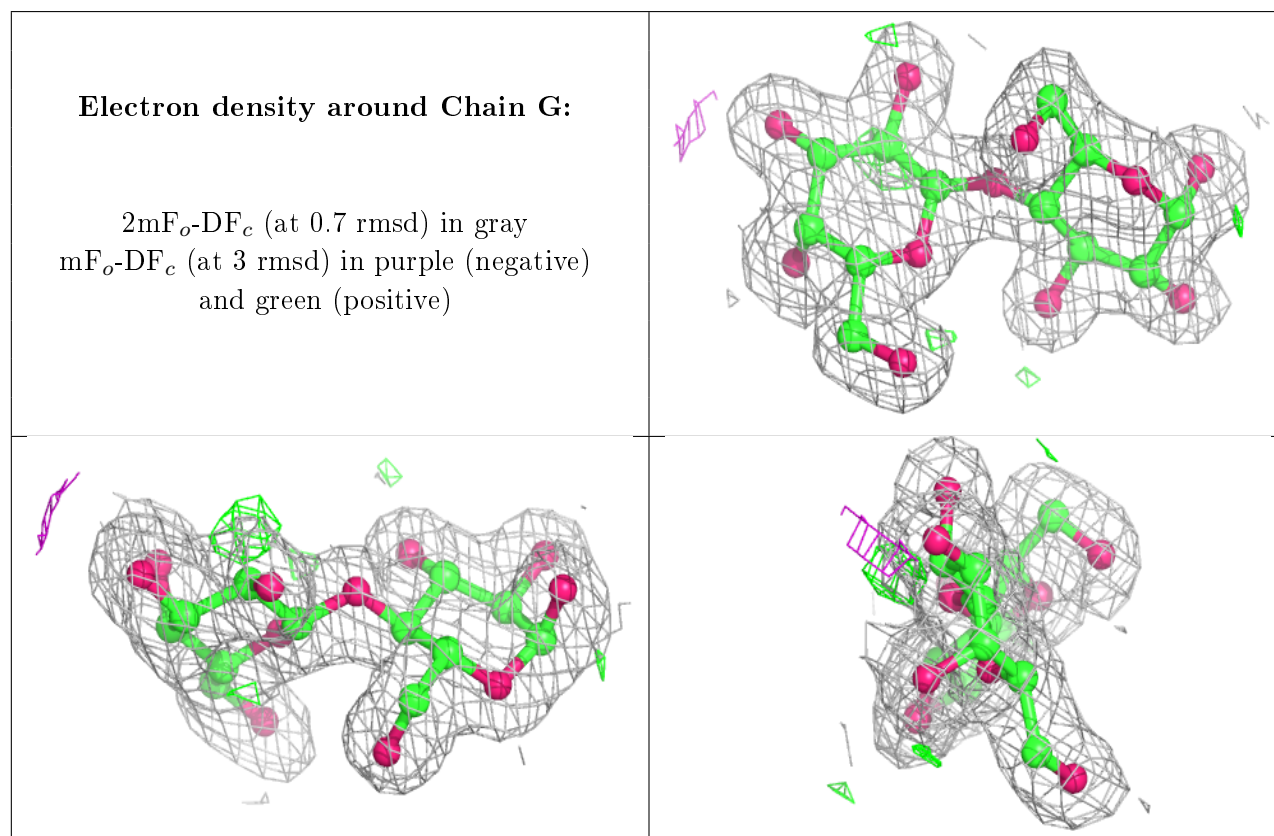
There are no non-standard protein/DNA/RNA residues in this entry.

### 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.

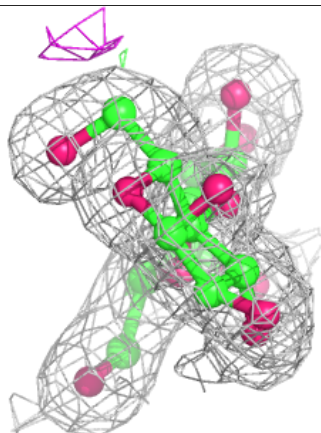
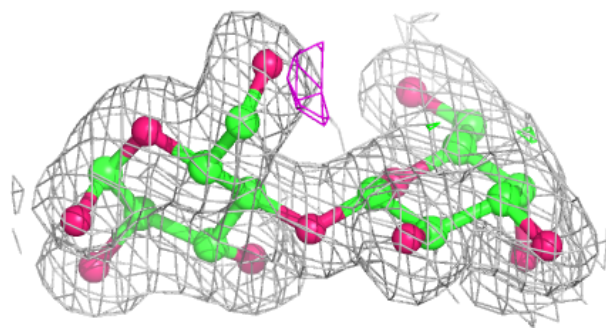
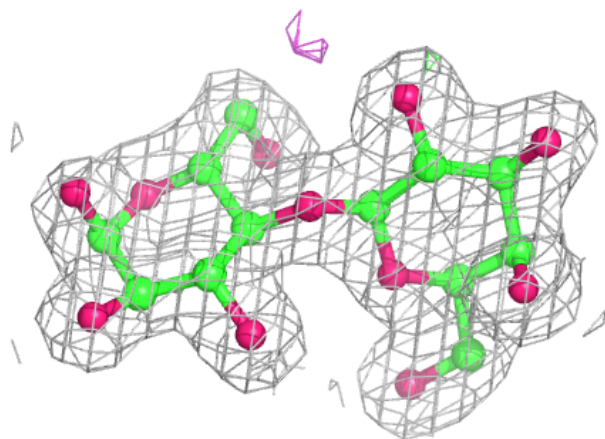
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	GAL	H	2	11/12	0.93	0.09	20,23,24,26	0
2	GAL	I	2	11/12	0.94	0.10	19,21,24,24	0
2	GLC	K	1	12/12	0.94	0.09	19,24,29,29	0
2	GAL	J	2	11/12	0.95	0.09	19,21,22,22	0
2	GLC	I	1	12/12	0.95	0.08	21,23,30,32	0
2	GLC	J	1	12/12	0.96	0.07	19,22,25,27	0
2	GLC	H	1	12/12	0.96	0.07	21,24,27,31	0
2	GAL	G	2	11/12	0.96	0.09	17,21,23,23	0
2	GLC	L	1	12/12	0.96	0.08	20,21,26,27	0
2	GAL	K	2	11/12	0.97	0.10	20,21,23,23	0
2	GLC	G	1	12/12	0.97	0.06	20,22,24,27	0
2	GAL	L	2	11/12	0.97	0.09	19,20,22,22	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.

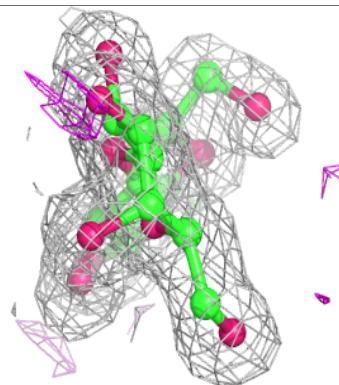
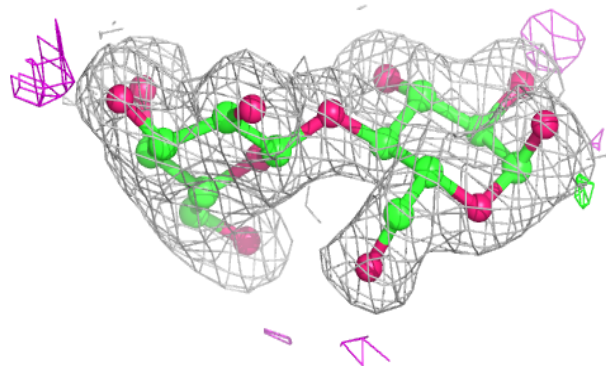
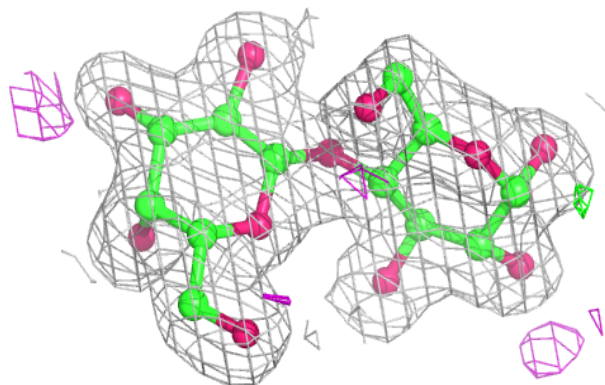


**Electron density around Chain H:**

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

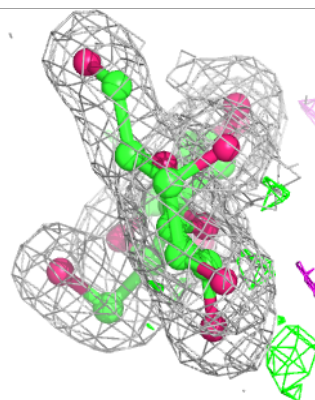
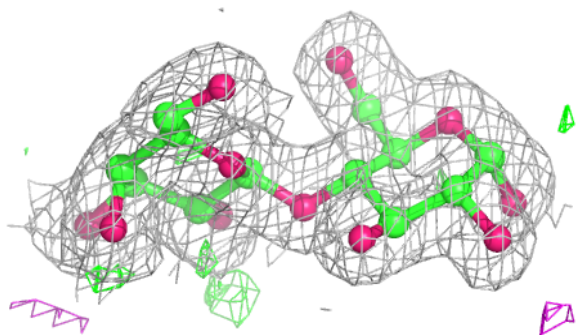
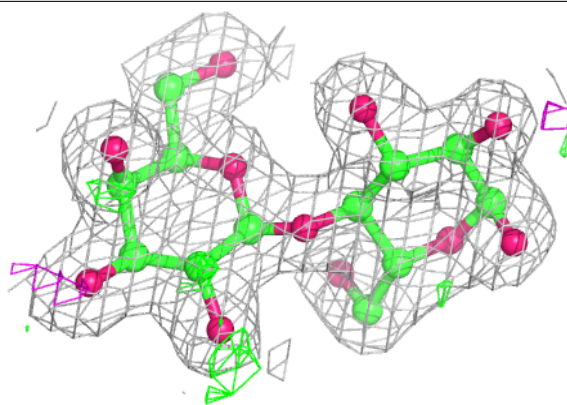
**Electron density around Chain I:**

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

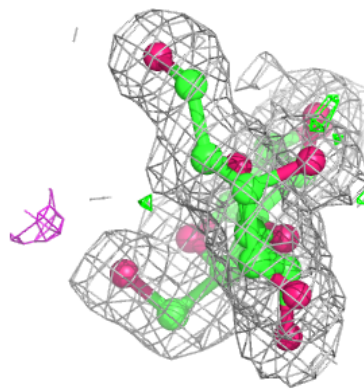
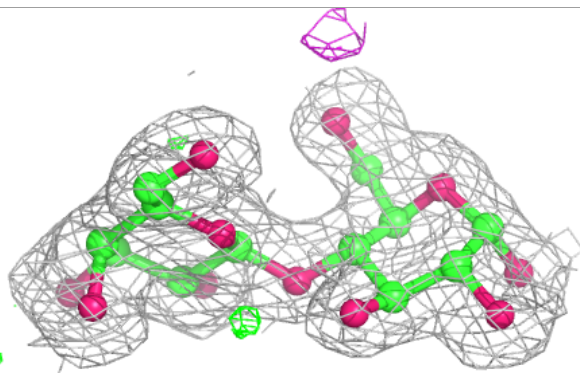
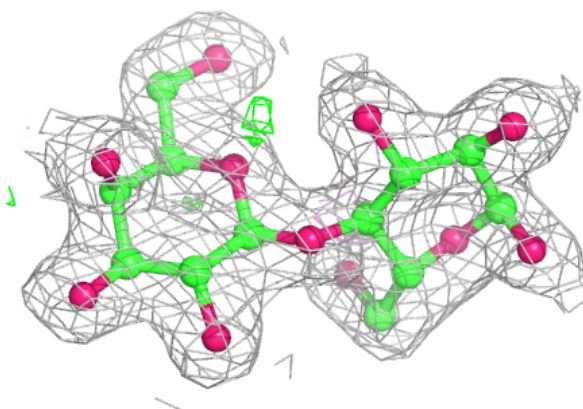


**Electron density around Chain J:**

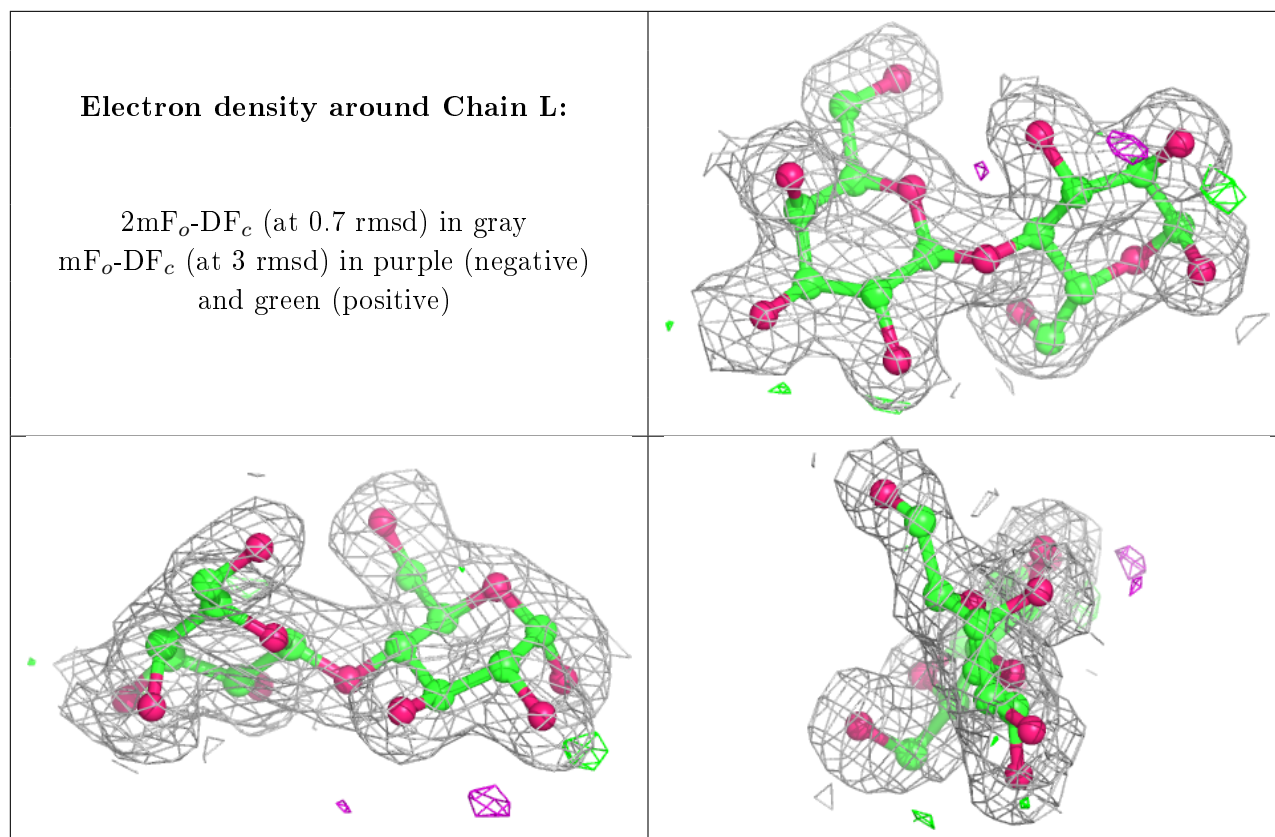
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around Chain K:**

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







## 6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	SO4	B	503	5/5	0.97	0.09	28,28,39,46	0
3	SO4	A	503	5/5	0.98	0.09	28,29,45,48	0
3	SO4	B	502	5/5	0.98	0.07	32,34,37,38	0
3	SO4	A	502	5/5	0.98	0.09	32,33,34,46	0
3	SO4	C	502	5/5	0.98	0.07	28,28,31,37	0
3	SO4	C	503	5/5	0.98	0.09	29,30,42,42	0
3	SO4	E	502	5/5	0.98	0.10	31,41,43,45	0
3	SO4	D	502	5/5	0.99	0.07	34,35,38,39	0
3	SO4	F	502	5/5	0.99	0.06	34,34,36,36	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.