



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 6, 2020 – 07:20 PM BST

PDB ID : 1OFL  
Title : CRYSTAL STRUCTURE OF CHONDROITINASE B COMPLEXED TO  
DERMATAN SULFATE HEXASACCHARIDE  
Authors : Michel, G.; Cygler, M.  
Deposited on : 2003-04-15  
Resolution : 1.70 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.13.1  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.13.1

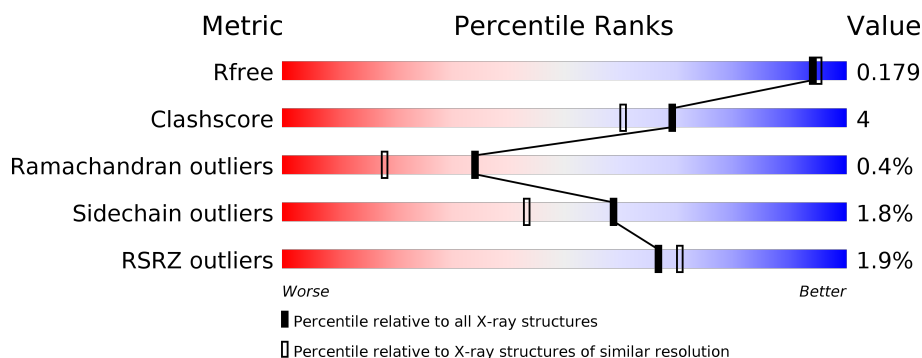
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.70 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	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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	481	<div> <div>2%</div> <div> <div></div> <div>89%</div> <div>10%</div> </div> </div>
2	B	7	<div> <div>71%</div> <div>29%</div> </div>
3	C	2	<div> <div>50%</div> <div>50%</div> </div>
3	D	2	<div> <div>100%</div> </div>
3	E	2	<div> <div>50%</div> <div>50%</div> </div>
4	F	2	<div> <div>100%</div> </div>

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 4742 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 CHONDROITINASE B.

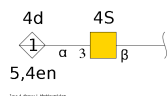
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	481	Total	C	N	O	S	7	1	0
			3789	2413	663	696	17			

- Molecule 2 is an oligosaccharide called alpha-D-galactopyranose-(1-3)-[beta-D-glucopyranose-(1-4)]2-O-methyl-alpha-L-fucopyranose-(1-4)-beta-D-xylopyranose-(1-4)-alpha-D-glucopyranuronic acid-(1-2)-[alpha-L-rhamnopyranose-(1-4)]alpha-D-mannopyranose.



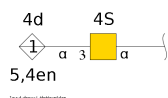
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
2	B	7	Total	C	O	0	0	0
			75	42	33			

- Molecule 3 is an oligosaccharide called 4-deoxy-alpha-L-threo-hex-4-enopyranuronic acid-(1-3)-2-acetamido-2-deoxy-4-O-sulfo-beta-D-galactopyranose.



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	2	Total	C	N	O	S	0	0	0
			30	14	1	14	1			
3	D	2	Total	C	N	O	S	0	0	0
			30	14	1	14	1			
3	E	2	Total	C	N	O	S	0	0	0
			30	14	1	14	1			

- Molecule 4 is an oligosaccharide called 4-deoxy-alpha-L-threo-hex-4-enopyranuronic acid-(1-3)-2-acetamido-2-deoxy-4-O-sulfo-alpha-D-galactopyranose.



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	2	Total	C	N	O	S	0	0	0
			30	14	1	14	1			

- Molecule 5 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Ca	0	0
			1	1		

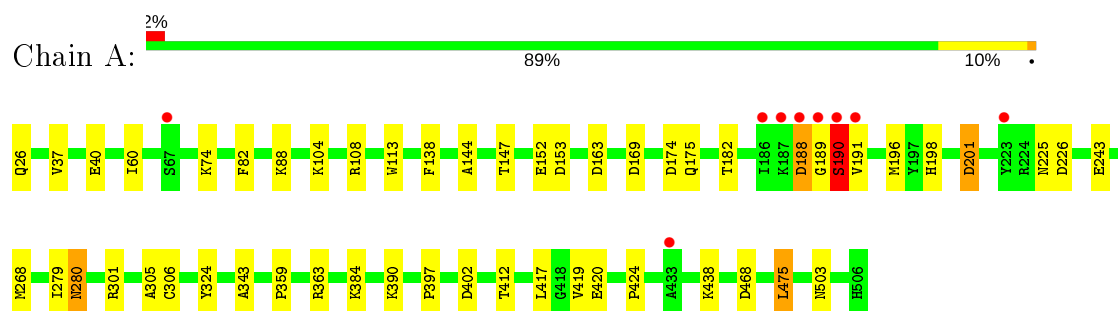
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	757	Total	O	0	0
			757	757		

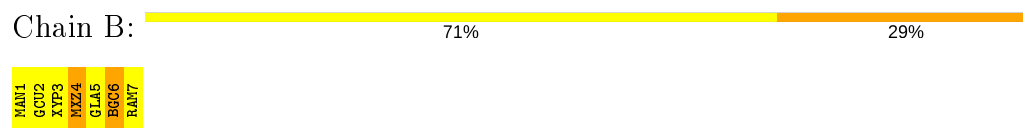
### 3 Residue-property plots

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: CHONDROITINASE B



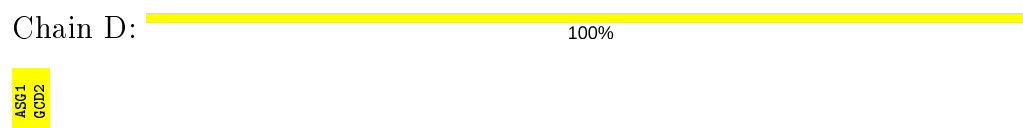
- Molecule 2: alpha-D-galactopyranose-(1-3)-[beta-D-glucopyranose-(1-4)]2-O-methyl-alpha-L-fucopyranose-(1-4)-beta-D-xylopyranose-(1-4)-alpha-D-glucopyranuronic acid-(1-2)-[alpha-L-rhamnopyranose-(1-4)]alpha-D-mannopyranose



- Molecule 3: 4-deoxy-alpha-L-threo-hex-4-enopyranuronic acid-(1-3)-2-acetamido-2-deoxy-4-O-sulfo-beta-D-galactopyranose



- Molecule 3: 4-deoxy-alpha-L-threo-hex-4-enopyranuronic acid-(1-3)-2-acetamido-2-deoxy-4-O-sulfo-beta-D-galactopyranose




- Molecule 3: 4-deoxy-alpha-L-threo-hex-4-enopyranuronic acid-(1-3)-2-acetamido-2-deoxy-4-O-sulfo-beta-D-galactopyranose

Chain E:  50% 50%

ASG1  
GCD2

- Molecule 4: 4-deoxy-alpha-L-threo-hex-4-enopyranuronic acid-(1-3)-2-acetamido-2-deoxy-4-O-sulfo-alpha-D-galactopyranose

Chain F:  100%

HGK1  
GCD2

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	50.57Å 73.99Å 59.06Å 90.00° 93.93° 90.00°	Depositor
Resolution (Å)	40.00 – 1.70 34.98 – 1.70	Depositor EDS
% Data completeness (in resolution range)	92.5 (40.00-1.70) 92.5 (34.98-1.70)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.99 (at 1.70Å)	Xtriage
Refinement program	REFMAC 5.1.08	Depositor
R, $R_{free}$	0.133 , 0.176 0.135 , 0.179	Depositor DCC
$R_{free}$ test set	2210 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	8.0	Xtriage
Anisotropy	0.214	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 51.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	4742	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	13.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.42% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: XYP, BGC, MXZ, GCD, GLA, CA, RAM, NGK, ASG, GCU, PCA, MAN

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	0.94	2/3877 (0.1%)	0.98	15/5245 (0.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	188	ASP	CB-CG	-14.20	1.22	1.51
1	A	152	GLU	CD-OE2	5.01	1.31	1.25

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	402	ASP	CB-CG-OD2	9.45	126.80	118.30
1	A	188	ASP	CB-CG-OD2	8.95	126.36	118.30
1	A	188	ASP	CB-CG-OD1	-8.25	110.88	118.30
1	A	301	ARG	NE-CZ-NH2	-7.30	116.65	120.30
1	A	468	ASP	CB-CG-OD2	6.21	123.89	118.30
1	A	138	PHE	CB-CG-CD1	-6.00	116.60	120.80
1	A	188	ASP	CA-CB-CG	5.95	126.49	113.40
1	A	174	ASP	CB-CG-OD2	5.78	123.50	118.30
1	A	475	LEU	CB-CG-CD2	5.63	120.57	111.00
1	A	201	ASP	CB-CG-OD2	5.59	123.33	118.30
1	A	153	ASP	CB-CG-OD2	5.50	123.25	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	363	ARG	NE-CZ-NH2	-5.40	117.60	120.30
1	A	226	ASP	CB-CG-OD2	5.28	123.05	118.30
1	A	301	ARG	NE-CZ-NH1	5.02	122.81	120.30
1	A	169	ASP	CB-CG-OD2	5.00	122.80	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	147	THR	Peptide

## 5.2 Too-close contacts

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	3789	0	3717	26	0
2	B	75	0	54	1	0
3	C	30	0	13	1	0
3	D	30	0	13	0	0
3	E	30	0	13	3	0
4	F	30	0	14	0	0
5	A	1	0	0	0	0
6	A	757	0	0	6	0
All	All	4742	0	3824	28	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (28) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:4:MXZ:C4	2:B:6:BGC:C1	2.68	0.72
1:A:503:ASN:HD21	3:E:1:ASG:C8	2.04	0.71
1:A:503:ASN:ND2	3:E:1:ASG:C8	2.64	0.60
1:A:280:ASN:HA	1:A:306:CYS:O	2.02	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:60:ILE:HD11	1:A:88:LYS:HE3	1.86	0.56
1:A:190:SER:HA	1:A:225:ASN:ND2	2.21	0.56
1:A:503:ASN:OD1	3:E:1:ASG:C8	2.57	0.53
1:A:305:ALA:HA	1:A:343:ALA:O	2.11	0.50
6:A:2738:HOH:O	3:C:2:GCD:H2	2.11	0.50
1:A:189:GLY:O	1:A:191:VAL:N	2.45	0.49
1:A:438:LYS:NZ	6:A:2600:HOH:O	2.46	0.49
1:A:40:GLU:HB2	6:A:2025:HOH:O	2.14	0.48
1:A:279:ILE:HA	1:A:305:ALA:O	2.13	0.48
1:A:144:ALA:HA	1:A:175:GLN:O	2.15	0.47
1:A:163:ASP:HA	1:A:201:ASP:O	2.14	0.47
1:A:343:ALA:HA	1:A:384:LYS:O	2.17	0.45
1:A:503:ASN:HB2	6:A:2697:HOH:O	2.15	0.45
1:A:196:MET:HB3	1:A:198:HIS:CD2	2.52	0.44
1:A:182:THR:OG1	6:A:2300:HOH:O	1.82	0.44
1:A:190:SER:HA	1:A:225:ASN:HD21	1.83	0.44
1:A:74:LYS:HE2	1:A:74:LYS:HB2	1.75	0.44
1:A:37:VAL:HG23	6:A:2015:HOH:O	2.19	0.42
1:A:397:PRO:HB3	1:A:420:GLU:HG3	2.01	0.42
1:A:82:PHE:CD1	1:A:104:LYS:HE2	2.55	0.42
1:A:390:LYS:HE3	1:A:419:VAL:HB	2.02	0.41
1:A:384:LYS:HA	1:A:412:THR:O	2.21	0.41
1:A:108:ARG:HD2	1:A:113:TRP:CE2	2.56	0.40
1:A:324:TYR:HB3	1:A:359:PRO:HG3	2.03	0.40

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	480/481 (100%)	464 (97%)	14 (3%)	2 (0%)	34 18

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	188	ASP
1	A	190	SER

### 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	398/397 (100%)	391 (98%)	7 (2%)	59 43

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

Mol	Chain	Res	Type
1	A	190	SER
1	A	243	GLU
1	A	268	MET
1	A	280	ASN
1	A	417	LEU
1	A	424	PRO
1	A	475	LEU

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	36	GLN
1	A	209	GLN
1	A	225	ASN
1	A	288	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

1 non-standard protein/DNA/RNA residue is 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	$\# Z  > 2$
1	PCA	A	26	1	7,8,9	3.35	2 (28%)	9,10,12	1.59	2 (22%)

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
1	PCA	A	26	1	-	0/0/11/13	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	26	PCA	OE-CD	7.60	1.38	1.23
1	A	26	PCA	CD-N	3.82	1.44	1.34

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	26	PCA	CB-CG-CD	-2.58	100.24	104.40
1	A	26	PCA	CB-CA-C	-2.20	109.68	112.70

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates ⓘ

15 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	MAN	B	1	1,2	11,11,12	0.83	0	15,15,17	1.51	2 (13%)
2	GCU	B	2	2	9,12,13	0.61	0	12,17,19	1.65	4 (33%)
2	XYP	B	3	2	9,9,10	1.41	1 (11%)	10,12,14	1.76	4 (40%)
2	MXZ	B	4	2	11,11,12	0.66	0	15,15,17	1.35	2 (13%)
2	GLA	B	5	2	11,11,12	0.66	0	15,15,17	1.39	3 (20%)
2	BGC	B	6	2	11,11,12	0.64	0	15,15,17	1.59	3 (20%)
2	RAM	B	7	2	10,10,11	1.12	1 (10%)	14,14,16	1.03	0
3	ASG	C	1	3	19,19,19	1.05	2 (10%)	23,28,28	1.72	5 (21%)
3	GCD	C	2	3	7,11,12	2.32	1 (14%)	8,15,17	3.28	4 (50%)
3	ASG	D	1	3	19,19,19	0.93	2 (10%)	23,28,28	1.32	2 (8%)
3	GCD	D	2	3,5	7,11,12	2.80	3 (42%)	8,15,17	4.44	3 (37%)
3	ASG	E	1	3	19,19,19	0.94	2 (10%)	23,28,28	1.62	3 (13%)
3	GCD	E	2	3	7,11,12	2.57	1 (14%)	8,15,17	2.45	1 (12%)
4	NGK	F	1	4	19,19,19	0.82	1 (5%)	23,28,28	1.17	2 (8%)
4	GCD	F	2	4	7,11,12	2.87	2 (28%)	8,15,17	2.45	3 (37%)

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	MAN	B	1	1,2	-	0/2/19/22	0/1/1/1
2	GCU	B	2	2	-	0/0/21/24	0/1/1/1
2	XYP	B	3	2	-	-	0/1/1/1
2	MXZ	B	4	2	-	0/2/19/22	0/1/1/1
2	GLA	B	5	2	-	0/2/19/22	0/1/1/1
2	BGC	B	6	2	-	2/2/19/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	RAM	B	7	2	-	-	0/1/1/1
3	ASG	C	1	3	-	4/11/31/31	0/1/1/1
3	GCD	C	2	3	-	0/0/17/20	0/1/1/1
3	ASG	D	1	3	-	3/11/31/31	0/1/1/1
3	GCD	D	2	3,5	-	0/0/17/20	0/1/1/1
3	ASG	E	1	3	-	0/11/31/31	0/1/1/1
3	GCD	E	2	3	-	0/0/17/20	0/1/1/1
4	NGK	F	1	4	-	2/11/31/31	0/1/1/1
4	GCD	F	2	4	-	0/0/17/20	0/1/1/1

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	F	2	GCD	O5-C5	7.13	1.47	1.37
3	E	2	GCD	O5-C5	6.30	1.46	1.37
3	D	2	GCD	O5-C5	6.03	1.45	1.37
3	C	2	GCD	O5-C5	5.31	1.44	1.37
2	B	3	XYP	O5-C1	-3.79	1.35	1.42
3	D	2	GCD	C4-C5	3.40	1.36	1.32
2	B	7	RAM	C2-C3	2.89	1.56	1.52
3	C	1	ASG	OSB-S	2.66	1.56	1.45
3	E	1	ASG	OSB-S	2.45	1.55	1.45
3	E	1	ASG	O4-S	2.45	1.64	1.57
4	F	2	GCD	C4-C5	2.33	1.35	1.32
3	D	1	ASG	O4-C4	-2.30	1.41	1.46
3	D	2	GCD	C3-C4	2.28	1.53	1.50
4	F	1	NGK	O4-S	2.26	1.63	1.57
3	D	1	ASG	O4-S	2.23	1.63	1.57
3	C	1	ASG	O4-S	2.10	1.63	1.57

All (41) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	2	GCD	O5-C5-C4	-11.72	114.91	124.81
3	C	2	GCD	O5-C5-C4	-6.27	119.52	124.81
3	E	2	GCD	O5-C5-C4	-6.25	119.54	124.81
4	F	2	GCD	O5-C5-C4	-5.43	120.23	124.81
3	E	1	ASG	O5-C1-C2	-5.25	104.25	109.52
3	C	1	ASG	O5-C1-C2	4.92	114.46	109.52
3	C	2	GCD	C1-O5-C5	4.62	125.28	115.58
2	B	1	MAN	O4-C4-C5	-3.88	99.66	109.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1	ASG	C4-O4-S	3.65	125.92	118.88
2	B	6	BGC	C1-O5-C5	-3.44	107.53	112.19
2	B	4	MXZ	O4-C4-C3	-3.26	102.81	110.35
2	B	2	GCU	O3-C3-C2	-3.21	103.86	109.99
3	D	1	ASG	C3-C2-N2	-3.10	104.77	110.62
3	C	2	GCD	C1-C2-C3	3.07	113.44	109.67
3	C	1	ASG	C1-C2-N2	-2.90	107.37	110.73
2	B	6	BGC	C1-C2-C3	-2.89	106.12	109.67
2	B	5	GLA	C1-C2-C3	2.88	113.20	109.67
2	B	2	GCU	C1-O5-C5	2.86	117.21	112.17
2	B	3	XYP	C4-C3-C2	-2.78	107.62	110.92
3	E	1	ASG	O7-C7-C8	-2.73	116.99	122.06
3	C	2	GCD	C2-C3-C4	-2.72	108.60	112.32
2	B	1	MAN	O2-C2-C1	-2.72	103.60	109.15
4	F	2	GCD	C1-C2-C3	2.67	112.95	109.67
2	B	3	XYP	O3-C3-C2	-2.64	104.93	109.99
3	D	1	ASG	C2-N2-C7	-2.63	116.79	123.18
3	D	2	GCD	C1-O5-C5	2.61	121.07	115.58
4	F	1	NGK	C4-O4-S	2.61	123.92	118.88
2	B	2	GCU	O5-C1-C2	2.58	114.75	110.77
2	B	3	XYP	C1-C2-C3	2.54	112.79	109.67
2	B	3	XYP	O2-C2-C3	-2.50	105.12	110.14
4	F	1	NGK	C1-O5-C5	2.38	118.15	113.66
3	D	2	GCD	C1-C2-C3	2.33	112.53	109.67
2	B	6	BGC	O5-C5-C6	2.24	110.72	107.20
3	C	1	ASG	O3-C3-C2	-2.23	105.15	109.66
2	B	4	MXZ	CM-O2-C2	-2.22	108.05	114.03
4	F	2	GCD	O2-C2-C1	-2.22	104.61	109.15
2	B	5	GLA	O2-C2-C3	-2.19	105.75	110.14
3	C	1	ASG	C1-C2-C3	-2.17	107.59	110.54
2	B	2	GCU	O4-C4-C5	-2.13	105.98	110.05
2	B	5	GLA	O3-C3-C4	2.13	115.27	110.35
3	E	1	ASG	O1-C1-O5	-2.12	104.02	110.38

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	1	ASG	C4-O4-S-OSA
3	C	1	ASG	C4-O4-S-OSA
3	C	1	ASG	C4-O4-S-OSB
4	F	1	NGK	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
3	D	1	ASG	C4-O4-S-OSB
3	D	1	ASG	C4-O4-S-OSC
3	C	1	ASG	C4-O4-S-OSC
3	C	1	ASG	O5-C5-C6-O6
2	B	6	BGC	C4-C5-C6-O6
2	B	6	BGC	O5-C5-C6-O6
4	F	1	NGK	C4-C5-C6-O6

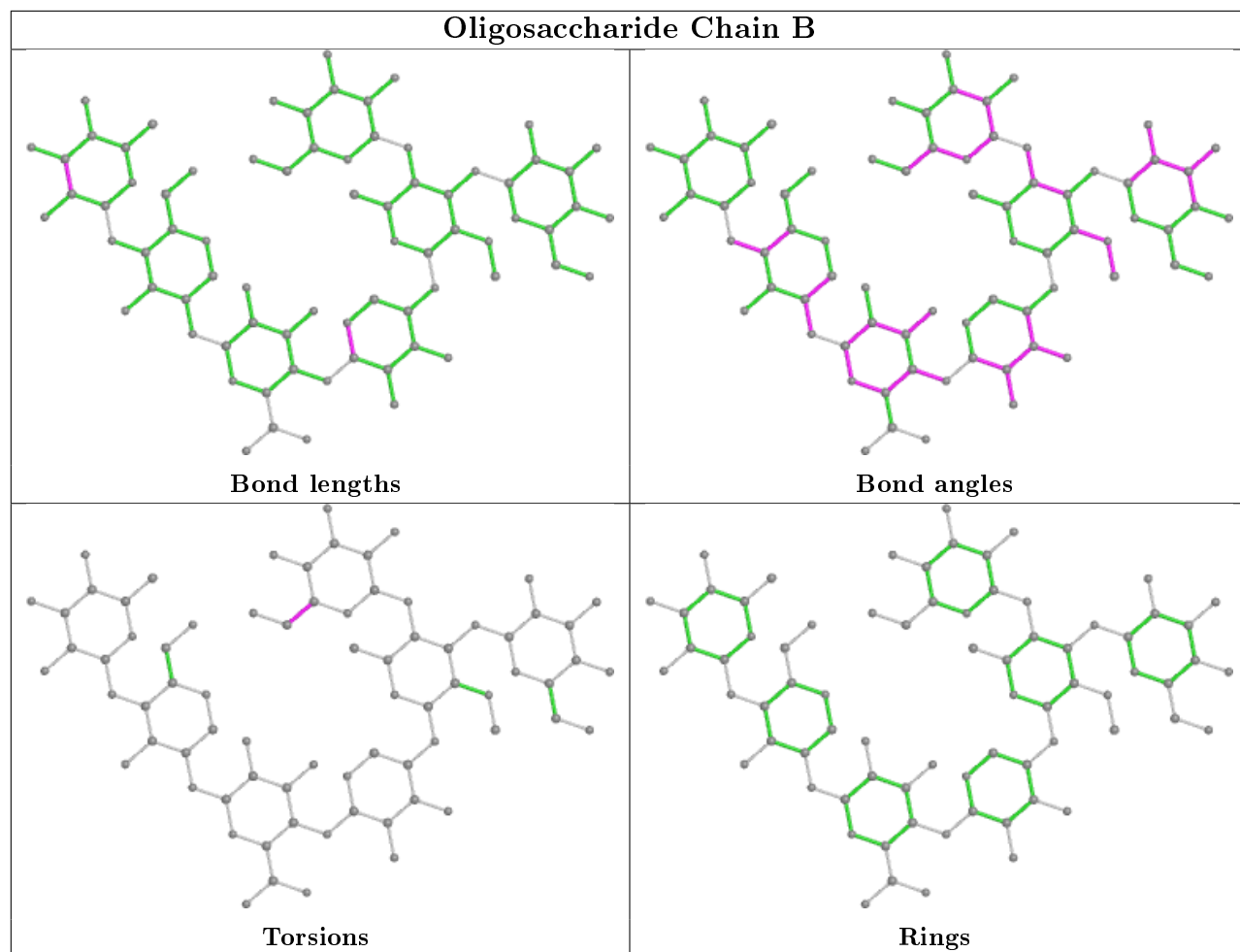
There are no ring outliers.

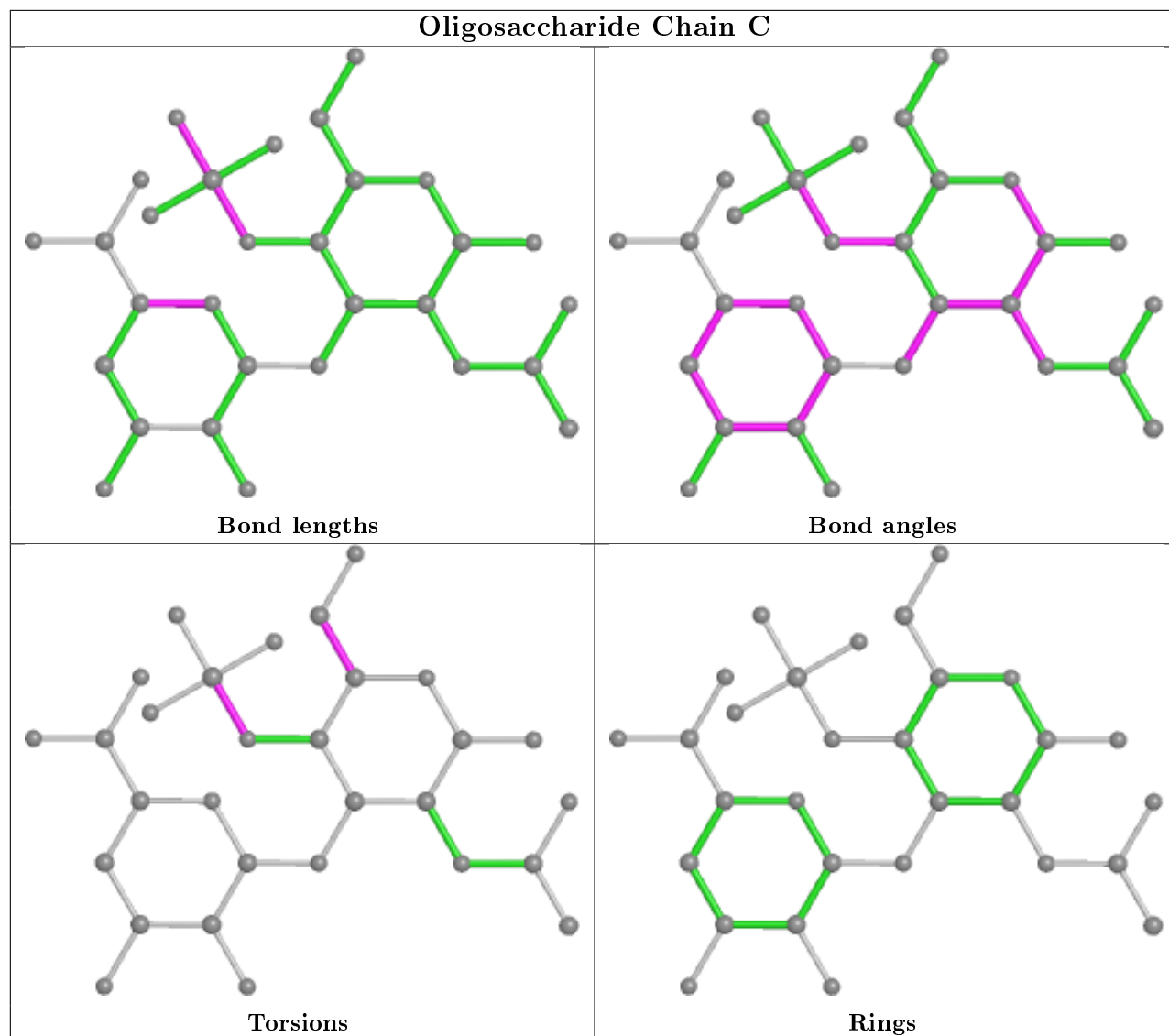
4 monomers are involved in 5 short contacts:

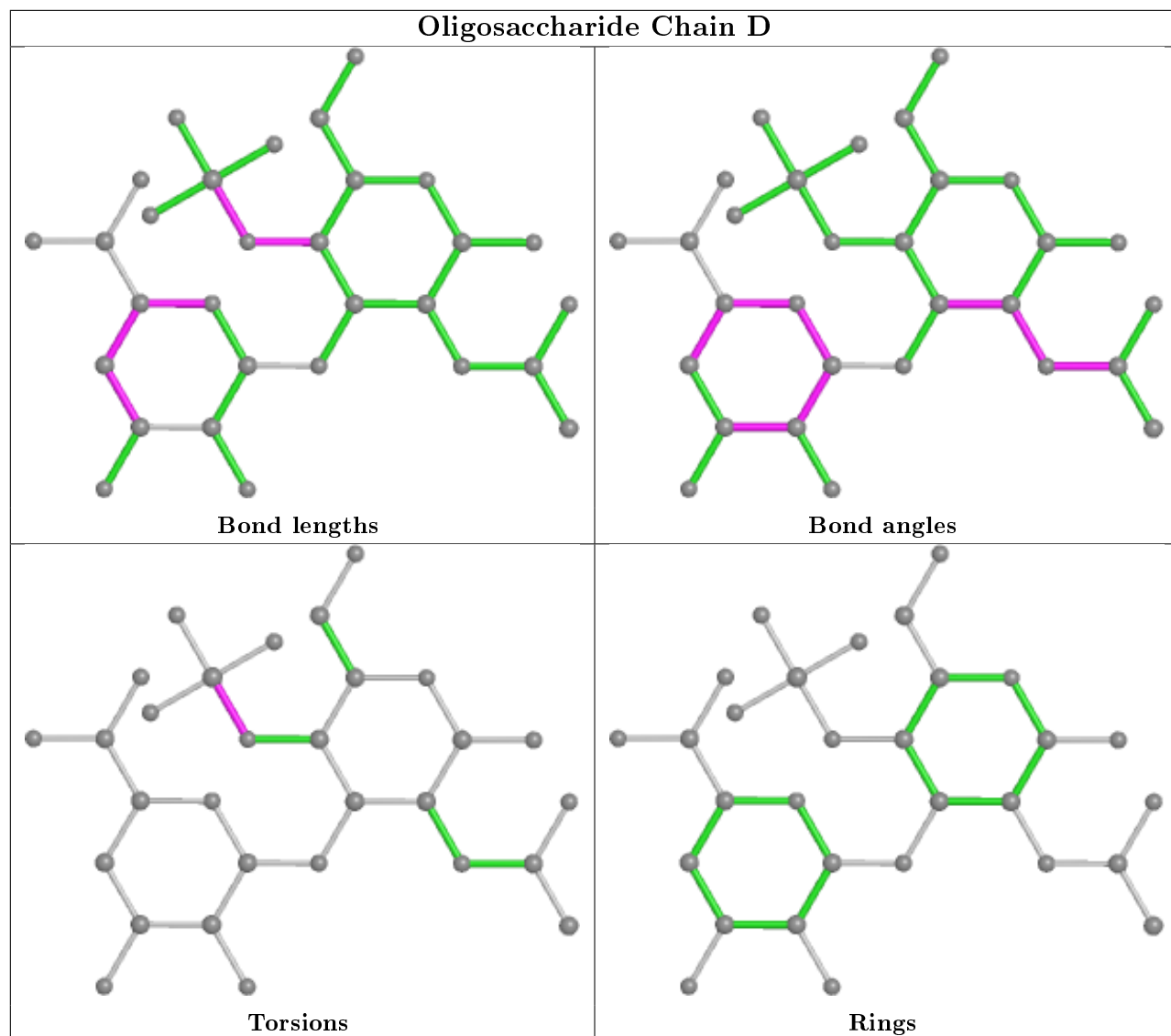
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	2	GCD	1	0
2	B	4	MXZ	1	0
3	E	1	ASG	3	0
2	B	6	BGC	1	0

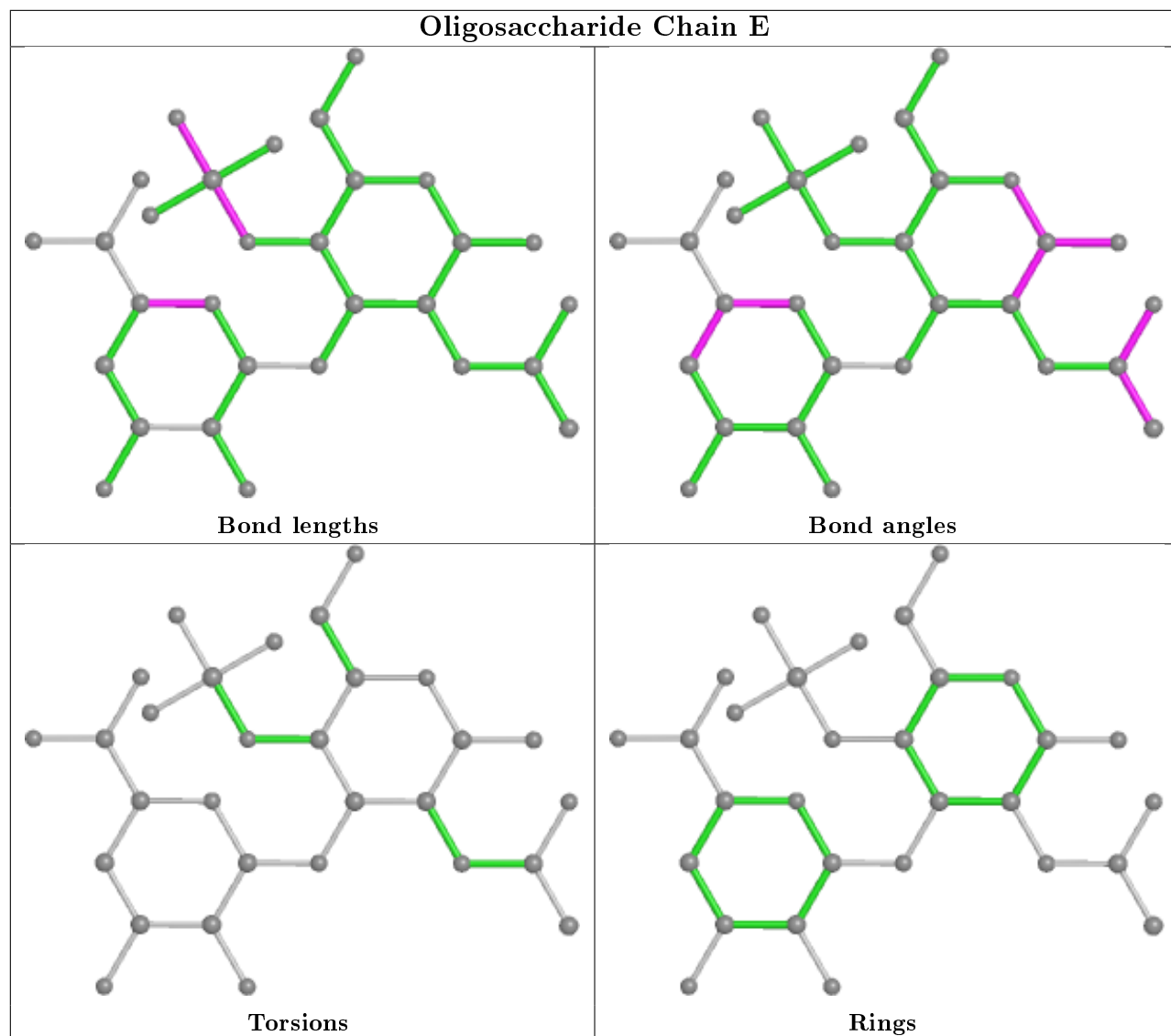
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

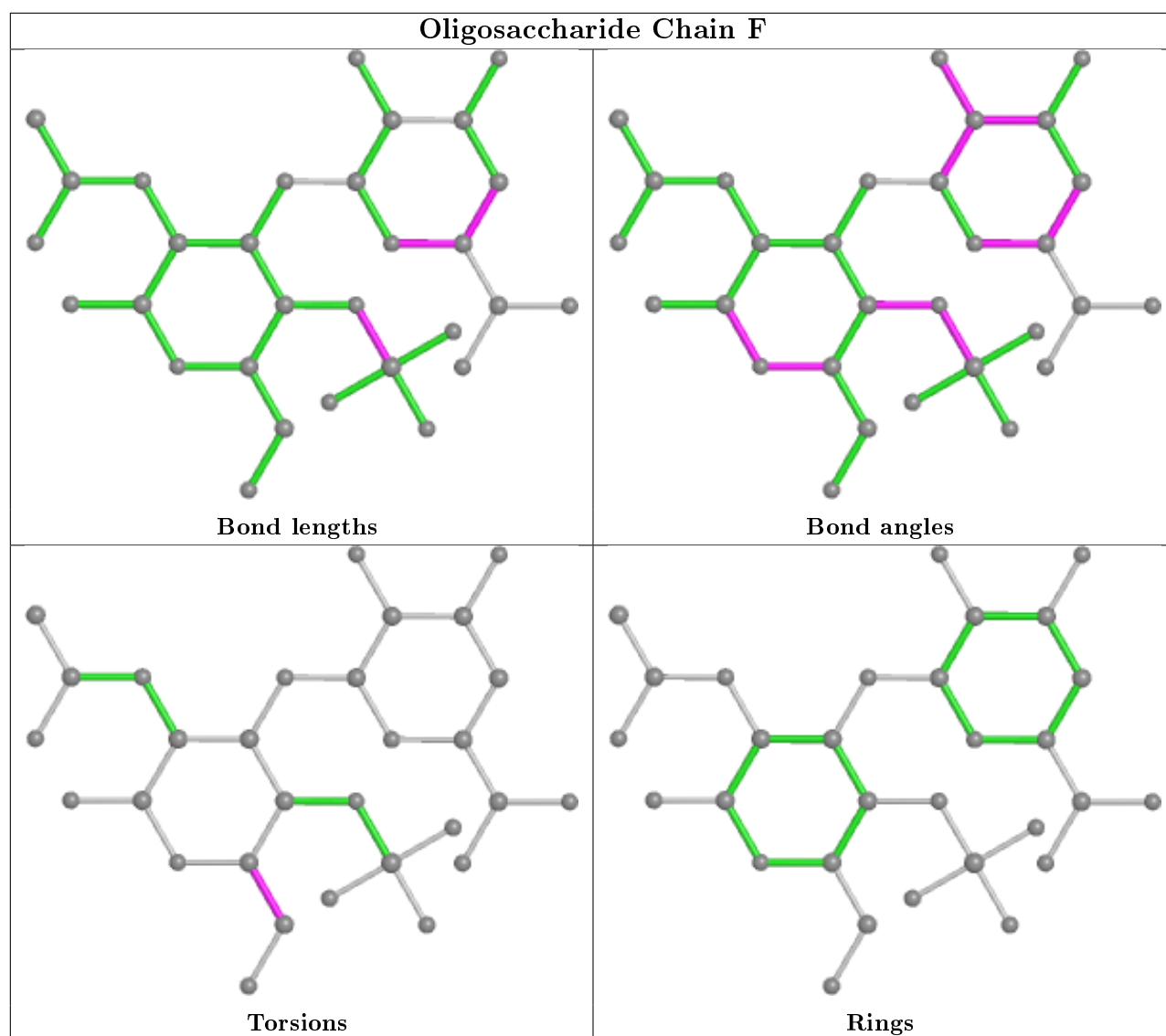












## 5.6 Ligand geometry ⓘ

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

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	480/481 (99%)	-0.36	9 (1%) 66 70	4, 8, 22, 51	7 (1%)

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	189	GLY	7.4
1	A	188	ASP	6.3
1	A	190	SER	5.0
1	A	187	LYS	4.7
1	A	186	ILE	4.4
1	A	433	ALA	3.2
1	A	67	SER	2.4
1	A	191	VAL	2.4
1	A	223	TYR	2.2

### 6.2 Non-standard residues in protein, DNA, RNA chains [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.

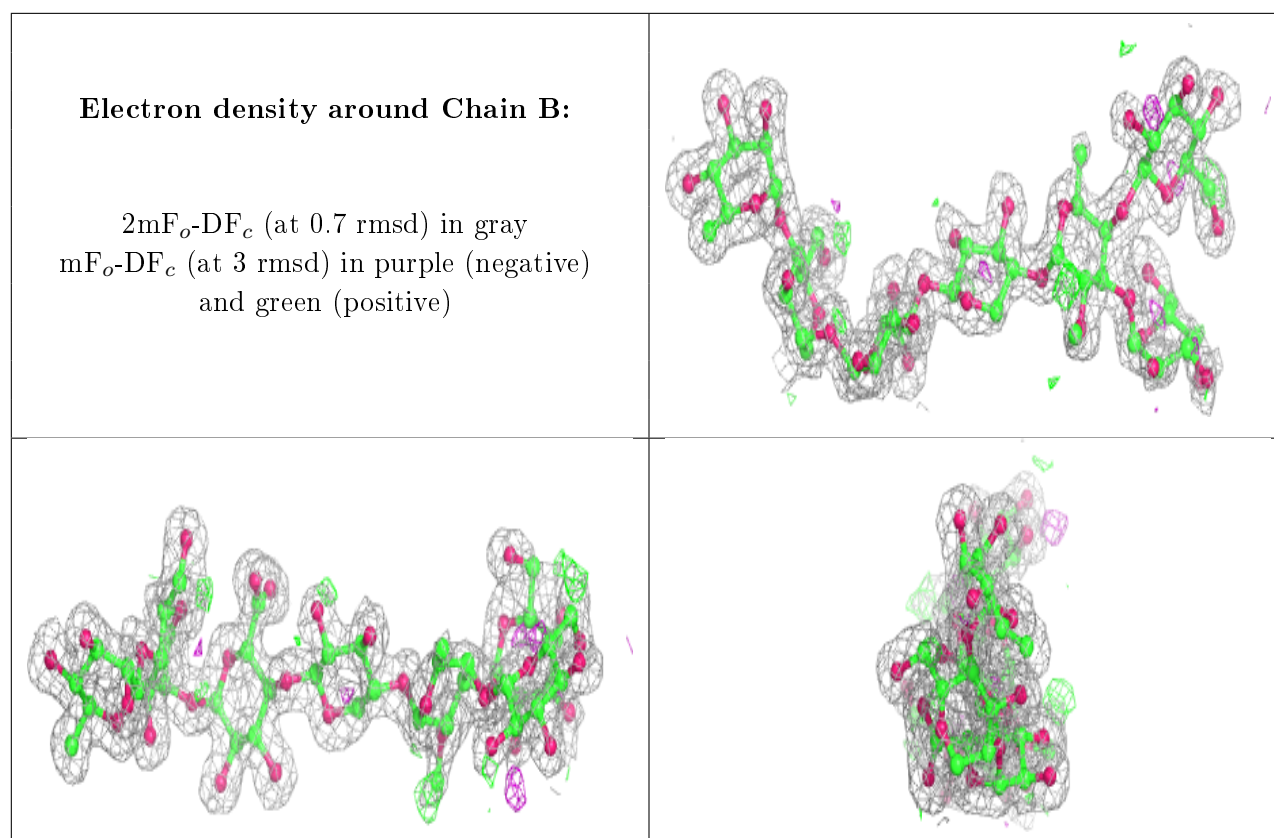
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
1	PCA	A	26	8/9	0.97	0.07	7,10,12,15	0

### 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
4	GCD	F	2	11/12	0.73	0.25	37,41,47,48	0
2	GLA	B	5	11/12	0.74	0.22	33,40,40,41	0
3	GCD	C	2	11/12	0.78	0.19	33,40,46,47	0
2	BGC	B	6	11/12	0.81	0.19	26,28,30,30	0
4	NGK	F	1	19/19	0.90	0.14	17,22,30,30	0
3	GCD	D	2	11/12	0.91	0.18	14,21,24,24	0
3	GCD	E	2	11/12	0.91	0.15	25,27,31,34	0
2	MXZ	B	4	11/12	0.91	0.16	22,25,29,31	0
2	XYP	B	3	9/10	0.93	0.16	13,19,21,21	0
3	ASG	E	1	19/19	0.94	0.17	18,21,29,31	0
3	ASG	C	1	19/19	0.96	0.10	10,13,23,23	0
3	ASG	D	1	19/19	0.97	0.14	12,19,28,29	0
2	GCU	B	2	12/13	0.97	0.08	6,7,12,16	0
2	MAN	B	1	11/12	0.98	0.07	3,5,9,9	0
2	RAM	B	7	10/11	0.98	0.06	3,6,7,7	0

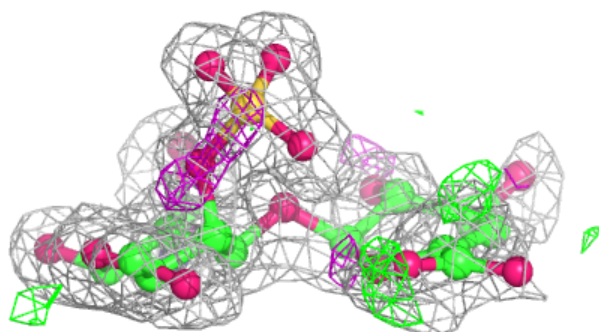
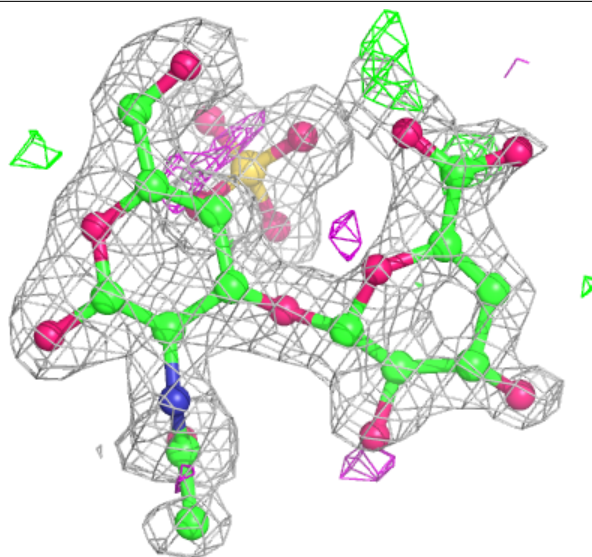
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.





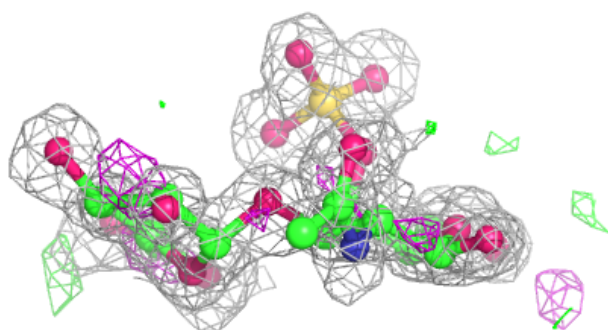
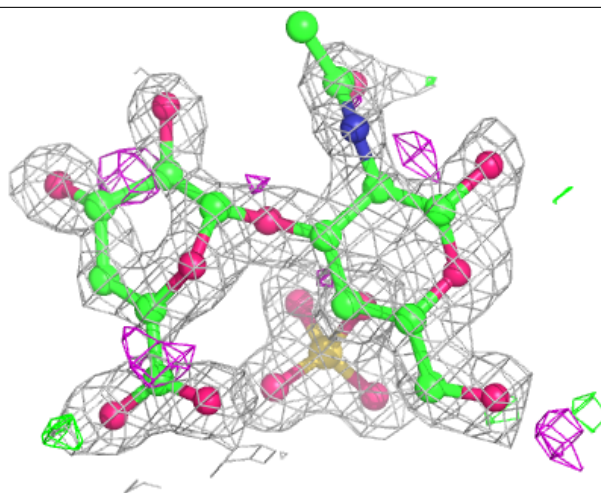
**Electron density around Chain C:**

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



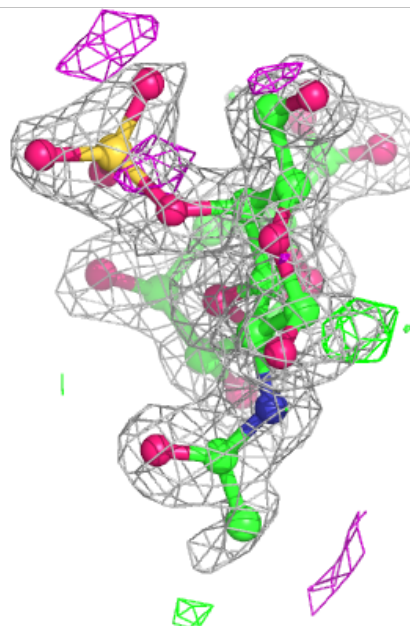
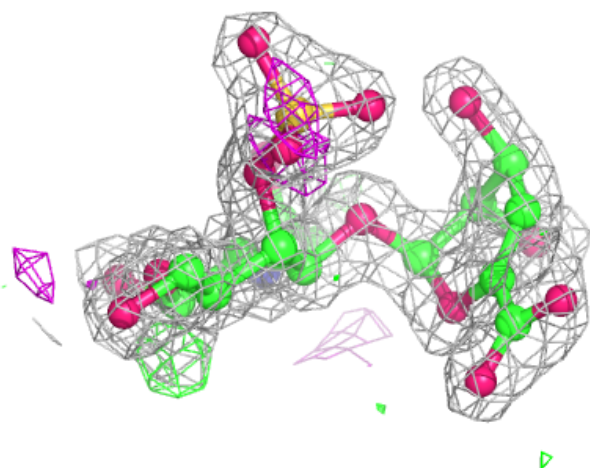
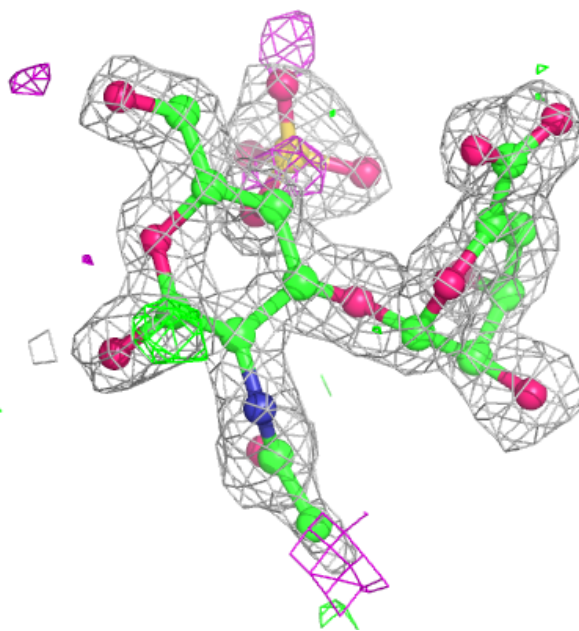
**Electron density around Chain D:**

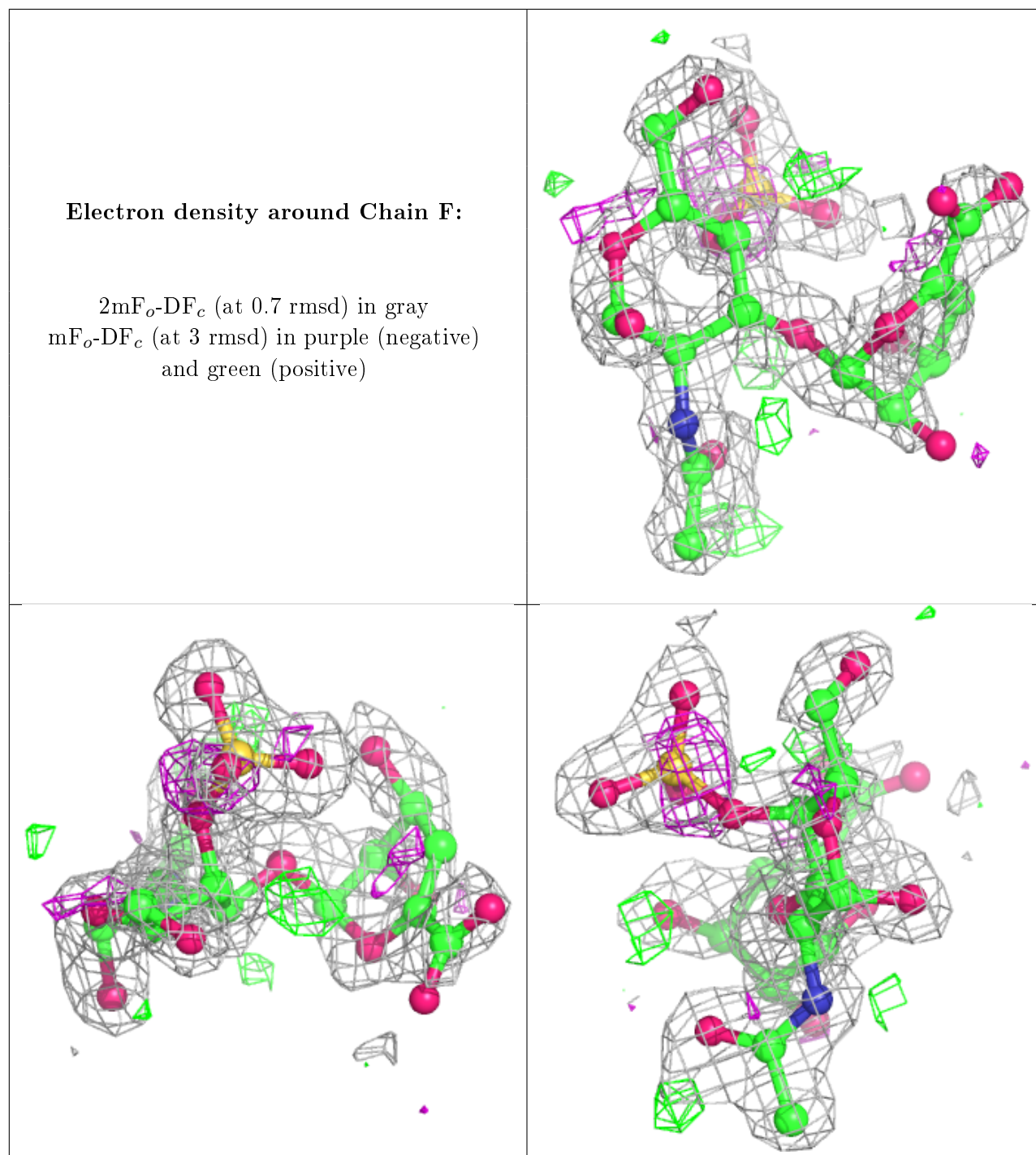
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around Chain E:**

$2mF_o-DF_c$  (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( $\text{\AA}^2$ )	Q<0.9
5	CA	A	528	1/1	1.00	0.03	8,8,8,8	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.