



# wwPDB EM Validation Summary Report ⓘ

Mar 23, 2026 – 03:12 AM UTC

PDB ID : 9B2V / pdb\_00009b2v  
EMDB ID : EMD-44116  
Title : SARS CoV-2 Spike protein Ectodomain with internal tag, 1RBD-up conformation  
Authors : Singh, S.; Hasan, S.S.  
Deposited on : 2024-03-17  
Resolution : 2.55 Å(reported)  
Based on initial model : 7KRQ

This is a wwPDB EM 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/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

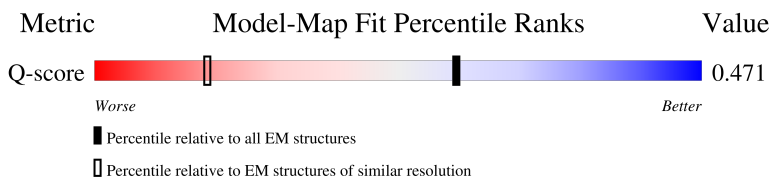
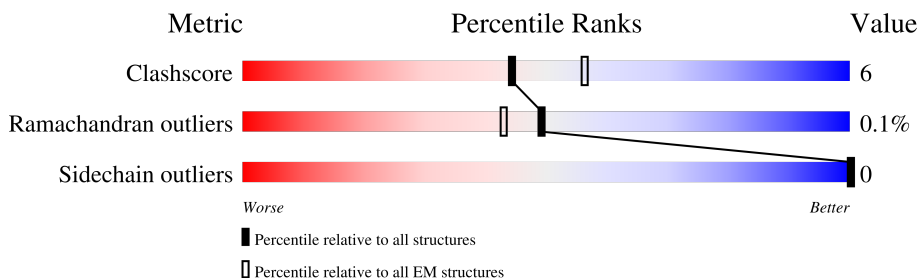
EMDB validation analysis : 0.0.1.dev132  
Mogul : 2022.3.0, CSD as543be (2022)  
MolProbity : 4-5-2 with Phenix2.0  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:  
*ELECTRON MICROSCOPY*

The reported resolution of this entry is 2.55 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.



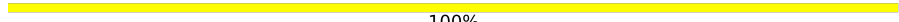

















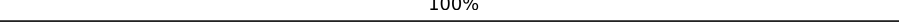



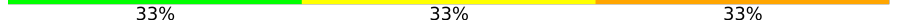

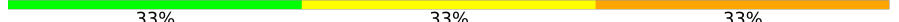
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	7475 ( 2.05 - 3.05 )

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 EM map (all-atom inclusion  $< 40\%$ ). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	1275	 71% 10% 19%
1	B	1275	 77% 8% 15%
1	C	1275	 74% 10% 15%
2	a	4	 25% 75%


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Mol	Chain	Length	Quality of chain
3	D	2	 100%
3	E	2	 100%
3	I	2	 100%
3	K	2	 100%
3	M	2	 100%
3	R	2	 100%
3	U	2	 100%
3	W	2	 50% 50%
3	b	2	 100%
3	d	2	 50% 50%
4	F	3	 33% 67%
4	H	3	 67% 33%
4	J	3	 33% 67%
4	L	3	 33% 67%
4	N	3	 33% 67%
4	O	3	 33% 67%
4	P	3	 33% 67%
4	Q	3	 100%
4	T	3	 33% 67%
4	V	3	 33% 67%
4	X	3	 33% 67%
4	Y	3	 33% 33% 33%
4	Z	3	 33% 67%
4	c	3	 33% 33% 33%
5	G	4	 100%

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Mol	Chain	Length	Quality of chain
6	S	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
3	NAG	K	1	-	X	X	-
4	NAG	Q	1	-	-	X	-
4	NAG	Q	2	-	-	X	-
4	NAG	V	2	-	-	X	-

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 50707 atoms, of which 24633 are hydrogens and 0 are deuteriums.

In the tables below, 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 Spike glycoprotein.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
1	A	1033	15839	5137	7801	1337	1528	36	0	0
1	B	1079	16531	5361	8136	1398	1598	38	0	0
1	C	1081	16620	5388	8181	1405	1608	38	0	0

There are 219 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	SER	-	insertion	UNP P0DTC2
A	-19	ALA	-	insertion	UNP P0DTC2
A	-18	TRP	-	insertion	UNP P0DTC2
A	-17	SER	-	insertion	UNP P0DTC2
A	-16	HIS	-	insertion	UNP P0DTC2
A	-15	PRO	-	insertion	UNP P0DTC2
A	-14	GLN	-	insertion	UNP P0DTC2
A	-13	PHE	-	insertion	UNP P0DTC2
A	-12	GLU	-	insertion	UNP P0DTC2
A	-11	LYS	-	insertion	UNP P0DTC2
A	-10	GLY	-	insertion	UNP P0DTC2
A	-9	GLY	-	insertion	UNP P0DTC2
A	-8	GLY	-	insertion	UNP P0DTC2
A	-7	SER	-	insertion	UNP P0DTC2
A	-6	GLY	-	insertion	UNP P0DTC2
A	-5	GLY	-	insertion	UNP P0DTC2
A	-4	GLY	-	insertion	UNP P0DTC2
A	-3	SER	-	insertion	UNP P0DTC2
A	-2	GLY	-	insertion	UNP P0DTC2
A	-1	GLY	-	insertion	UNP P0DTC2
A	0	SER	-	insertion	UNP P0DTC2
A	1	SER	-	insertion	UNP P0DTC2
A	2	ALA	-	insertion	UNP P0DTC2
A	3	TRP	-	insertion	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	4	SER	-	insertion	UNP P0DTC2
A	5	HIS	-	insertion	UNP P0DTC2
A	6	PRO	-	insertion	UNP P0DTC2
A	7	GLN	-	insertion	UNP P0DTC2
A	8	PHE	-	insertion	UNP P0DTC2
A	9	GLU	-	insertion	UNP P0DTC2
A	10	LYS	-	insertion	UNP P0DTC2
A	11	SER	-	insertion	UNP P0DTC2
A	12	ALA	-	insertion	UNP P0DTC2
A	13	LEU	-	insertion	UNP P0DTC2
A	14	VAL	-	insertion	UNP P0DTC2
A	15	PRO	-	insertion	UNP P0DTC2
A	16	ARG	-	insertion	UNP P0DTC2
A	17	GLY	-	insertion	UNP P0DTC2
A	18	SER	-	insertion	UNP P0DTC2
A	614	GLY	ASP	variant	UNP P0DTC2
A	682	GLY	ARG	engineered mutation	UNP P0DTC2
A	683	SER	ARG	engineered mutation	UNP P0DTC2
A	685	SER	ARG	engineered mutation	UNP P0DTC2
A	986	PRO	LYS	engineered mutation	UNP P0DTC2
A	987	PRO	VAL	engineered mutation	UNP P0DTC2
A	1210	GLY	-	expression tag	UNP P0DTC2
A	1211	SER	-	expression tag	UNP P0DTC2
A	1212	GLY	-	expression tag	UNP P0DTC2
A	1213	TYR	-	expression tag	UNP P0DTC2
A	1214	ILE	-	expression tag	UNP P0DTC2
A	1215	PRO	-	expression tag	UNP P0DTC2
A	1216	GLU	-	expression tag	UNP P0DTC2
A	1217	ALA	-	expression tag	UNP P0DTC2
A	1218	PRO	-	expression tag	UNP P0DTC2
A	1219	ARG	-	expression tag	UNP P0DTC2
A	1220	ASP	-	expression tag	UNP P0DTC2
A	1221	GLY	-	expression tag	UNP P0DTC2
A	1222	GLN	-	expression tag	UNP P0DTC2
A	1223	ALA	-	expression tag	UNP P0DTC2
A	1224	TYR	-	expression tag	UNP P0DTC2
A	1225	VAL	-	expression tag	UNP P0DTC2
A	1226	ARG	-	expression tag	UNP P0DTC2
A	1227	LYS	-	expression tag	UNP P0DTC2
A	1228	ASP	-	expression tag	UNP P0DTC2
A	1229	GLY	-	expression tag	UNP P0DTC2
A	1230	GLU	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	1231	TRP	-	expression tag	UNP P0DTC2
A	1232	VAL	-	expression tag	UNP P0DTC2
A	1233	LEU	-	expression tag	UNP P0DTC2
A	1234	LEU	-	expression tag	UNP P0DTC2
A	1235	SER	-	expression tag	UNP P0DTC2
A	1236	THR	-	expression tag	UNP P0DTC2
A	1237	PHE	-	expression tag	UNP P0DTC2
B	-20	SER	-	insertion	UNP P0DTC2
B	-19	ALA	-	insertion	UNP P0DTC2
B	-18	TRP	-	insertion	UNP P0DTC2
B	-17	SER	-	insertion	UNP P0DTC2
B	-16	HIS	-	insertion	UNP P0DTC2
B	-15	PRO	-	insertion	UNP P0DTC2
B	-14	GLN	-	insertion	UNP P0DTC2
B	-13	PHE	-	insertion	UNP P0DTC2
B	-12	GLU	-	insertion	UNP P0DTC2
B	-11	LYS	-	insertion	UNP P0DTC2
B	-10	GLY	-	insertion	UNP P0DTC2
B	-9	GLY	-	insertion	UNP P0DTC2
B	-8	GLY	-	insertion	UNP P0DTC2
B	-7	SER	-	insertion	UNP P0DTC2
B	-6	GLY	-	insertion	UNP P0DTC2
B	-5	GLY	-	insertion	UNP P0DTC2
B	-4	GLY	-	insertion	UNP P0DTC2
B	-3	SER	-	insertion	UNP P0DTC2
B	-2	GLY	-	insertion	UNP P0DTC2
B	-1	GLY	-	insertion	UNP P0DTC2
B	0	SER	-	insertion	UNP P0DTC2
B	1	SER	-	insertion	UNP P0DTC2
B	2	ALA	-	insertion	UNP P0DTC2
B	3	TRP	-	insertion	UNP P0DTC2
B	4	SER	-	insertion	UNP P0DTC2
B	5	HIS	-	insertion	UNP P0DTC2
B	6	PRO	-	insertion	UNP P0DTC2
B	7	GLN	-	insertion	UNP P0DTC2
B	8	PHE	-	insertion	UNP P0DTC2
B	9	GLU	-	insertion	UNP P0DTC2
B	10	LYS	-	insertion	UNP P0DTC2
B	11	SER	-	insertion	UNP P0DTC2
B	12	ALA	-	insertion	UNP P0DTC2
B	13	LEU	-	insertion	UNP P0DTC2
B	14	VAL	-	insertion	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	15	PRO	-	insertion	UNP P0DTC2
B	16	ARG	-	insertion	UNP P0DTC2
B	17	GLY	-	insertion	UNP P0DTC2
B	18	SER	-	insertion	UNP P0DTC2
B	614	GLY	ASP	variant	UNP P0DTC2
B	682	GLY	ARG	engineered mutation	UNP P0DTC2
B	683	SER	ARG	engineered mutation	UNP P0DTC2
B	685	SER	ARG	engineered mutation	UNP P0DTC2
B	986	PRO	LYS	engineered mutation	UNP P0DTC2
B	987	PRO	VAL	engineered mutation	UNP P0DTC2
B	1209	GLY	-	expression tag	UNP P0DTC2
B	1210	SER	-	expression tag	UNP P0DTC2
B	1211	GLY	-	expression tag	UNP P0DTC2
B	1212	TYR	-	expression tag	UNP P0DTC2
B	1213	ILE	-	expression tag	UNP P0DTC2
B	1214	PRO	-	expression tag	UNP P0DTC2
B	1215	GLU	-	expression tag	UNP P0DTC2
B	1216	ALA	-	expression tag	UNP P0DTC2
B	1217	PRO	-	expression tag	UNP P0DTC2
B	1218	ARG	-	expression tag	UNP P0DTC2
B	1219	ASP	-	expression tag	UNP P0DTC2
B	1220	GLY	-	expression tag	UNP P0DTC2
B	1221	GLN	-	expression tag	UNP P0DTC2
B	1222	ALA	-	expression tag	UNP P0DTC2
B	1223	TYR	-	expression tag	UNP P0DTC2
B	1224	VAL	-	expression tag	UNP P0DTC2
B	1225	ARG	-	expression tag	UNP P0DTC2
B	1226	LYS	-	expression tag	UNP P0DTC2
B	1227	ASP	-	expression tag	UNP P0DTC2
B	1228	GLY	-	expression tag	UNP P0DTC2
B	1229	GLU	-	expression tag	UNP P0DTC2
B	1230	TRP	-	expression tag	UNP P0DTC2
B	1231	VAL	-	expression tag	UNP P0DTC2
B	1232	LEU	-	expression tag	UNP P0DTC2
B	1233	LEU	-	expression tag	UNP P0DTC2
B	1234	SER	-	expression tag	UNP P0DTC2
B	1235	THR	-	expression tag	UNP P0DTC2
B	1236	PHE	-	expression tag	UNP P0DTC2
C	-20	SER	-	insertion	UNP P0DTC2
C	-19	ALA	-	insertion	UNP P0DTC2
C	-18	TRP	-	insertion	UNP P0DTC2
C	-17	SER	-	insertion	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-16	HIS	-	insertion	UNP P0DTC2
C	-15	PRO	-	insertion	UNP P0DTC2
C	-14	GLN	-	insertion	UNP P0DTC2
C	-13	PHE	-	insertion	UNP P0DTC2
C	-12	GLU	-	insertion	UNP P0DTC2
C	-11	LYS	-	insertion	UNP P0DTC2
C	-10	GLY	-	insertion	UNP P0DTC2
C	-9	GLY	-	insertion	UNP P0DTC2
C	-8	GLY	-	insertion	UNP P0DTC2
C	-7	SER	-	insertion	UNP P0DTC2
C	-6	GLY	-	insertion	UNP P0DTC2
C	-5	GLY	-	insertion	UNP P0DTC2
C	-4	GLY	-	insertion	UNP P0DTC2
C	-3	SER	-	insertion	UNP P0DTC2
C	-2	GLY	-	insertion	UNP P0DTC2
C	-1	GLY	-	insertion	UNP P0DTC2
C	0	SER	-	insertion	UNP P0DTC2
C	1	SER	-	insertion	UNP P0DTC2
C	2	ALA	-	insertion	UNP P0DTC2
C	3	TRP	-	insertion	UNP P0DTC2
C	4	SER	-	insertion	UNP P0DTC2
C	5	HIS	-	insertion	UNP P0DTC2
C	6	PRO	-	insertion	UNP P0DTC2
C	7	GLN	-	insertion	UNP P0DTC2
C	8	PHE	-	insertion	UNP P0DTC2
C	9	GLU	-	insertion	UNP P0DTC2
C	10	LYS	-	insertion	UNP P0DTC2
C	11	SER	-	insertion	UNP P0DTC2
C	12	ALA	-	insertion	UNP P0DTC2
C	13	LEU	-	insertion	UNP P0DTC2
C	14	VAL	-	insertion	UNP P0DTC2
C	15	PRO	-	insertion	UNP P0DTC2
C	16	ARG	-	insertion	UNP P0DTC2
C	17	GLY	-	insertion	UNP P0DTC2
C	18	SER	-	insertion	UNP P0DTC2
C	614	GLY	ASP	variant	UNP P0DTC2
C	682	GLY	ARG	engineered mutation	UNP P0DTC2
C	683	SER	ARG	engineered mutation	UNP P0DTC2
C	685	SER	ARG	engineered mutation	UNP P0DTC2
C	986	PRO	LYS	engineered mutation	UNP P0DTC2
C	987	PRO	VAL	engineered mutation	UNP P0DTC2
C	1209	GLY	-	expression tag	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	1210	SER	-	expression tag	UNP P0DTC2
C	1211	GLY	-	expression tag	UNP P0DTC2
C	1212	TYR	-	expression tag	UNP P0DTC2
C	1213	ILE	-	expression tag	UNP P0DTC2
C	1214	PRO	-	expression tag	UNP P0DTC2
C	1215	GLU	-	expression tag	UNP P0DTC2
C	1216	ALA	-	expression tag	UNP P0DTC2
C	1217	PRO	-	expression tag	UNP P0DTC2
C	1218	ARG	-	expression tag	UNP P0DTC2
C	1219	ASP	-	expression tag	UNP P0DTC2
C	1220	GLY	-	expression tag	UNP P0DTC2
C	1221	GLN	-	expression tag	UNP P0DTC2
C	1222	ALA	-	expression tag	UNP P0DTC2
C	1223	TYR	-	expression tag	UNP P0DTC2
C	1224	VAL	-	expression tag	UNP P0DTC2
C	1225	ARG	-	expression tag	UNP P0DTC2
C	1226	LYS	-	expression tag	UNP P0DTC2
C	1227	ASP	-	expression tag	UNP P0DTC2
C	1228	GLY	-	expression tag	UNP P0DTC2
C	1229	GLU	-	expression tag	UNP P0DTC2
C	1230	TRP	-	expression tag	UNP P0DTC2
C	1231	VAL	-	expression tag	UNP P0DTC2
C	1232	LEU	-	expression tag	UNP P0DTC2
C	1233	LEU	-	expression tag	UNP P0DTC2
C	1234	SER	-	expression tag	UNP P0DTC2
C	1235	THR	-	expression tag	UNP P0DTC2
C	1236	PHE	-	expression tag	UNP P0DTC2

- Molecule 2 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	H	N			O
2	a	4	93	28	43	2	20	0	0

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms					AltConf	Trace
3	D	2	Total	C	H	N	O	0	0
			53	16	25	2	10		
3	E	2	Total	C	H	N	O	0	0
			53	16	25	2	10		
3	I	2	Total	C	N	O		0	0
			28	16	2	10			
3	K	2	Total	C	N	O		0	0
			28	16	2	10			
3	b	2	Total	C	H	N	O	0	0
			53	16	25	2	10		
3	M	2	Total	C	H	N	O	0	0
			53	16	25	2	10		
3	R	2	Total	C	N	O		0	0
			28	16	2	10			
3	U	2	Total	C	N	O		0	0
			28	16	2	10			
3	W	2	Total	C	N	O		0	0
			28	16	2	10			
3	d	2	Total	C	N	O		0	0
			28	16	2	10			

- Molecule 4 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms					AltConf	Trace
4	F	3	Total	C	H	N	O	0	0
			73	22	34	2	15		
4	H	3	Total	C	H	N	O	0	0
			70	22	31	2	15		
4	J	3	Total	C	N	O		0	0
			39	22	2	15			
4	L	3	Total	C	N	O		0	0
			39	22	2	15			
4	N	3	Total	C	H	N	O	0	0
			73	22	34	2	15		

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Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
4	O	3	39	22	2	15	0	0
4	P	3	39	22	2	15	0	0
4	Q	3	39	22	2	15	0	0
4	c	3	73	22	34	2	15	0
4	T	3	73	22	34	2	15	0
4	V	3	39	22	2	15	0	0
4	X	3	39	22	2	15	0	0
4	Y	3	39	22	2	15	0	0
4	Z	3	39	22	2	15	0	0

- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-6)-alpha-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



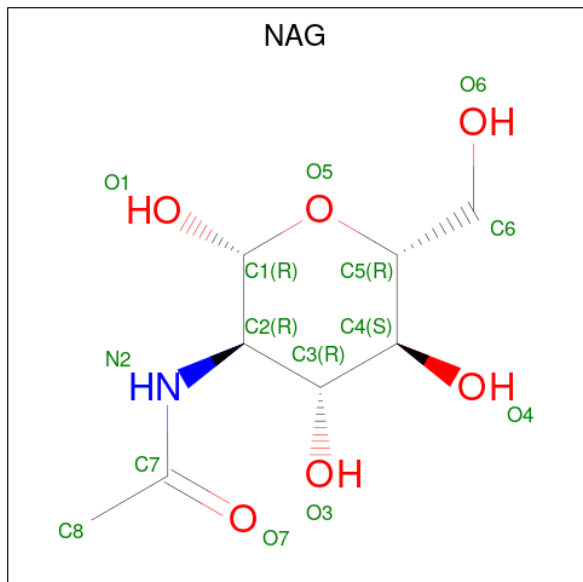
Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	H	N			O
5	G	4	93	28	43	2	20	0	0

- Molecule 6 is an oligosaccharide called alpha-L-fucopyranose-(1-6)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	H	N			O
6	S	2	45	14	21	1	9	0	0

- Molecule 7 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula:  $C_8H_{15}NO_6$ ).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	H	N	O	
7	A	1	Total	C	H	N	O	0
			27	8	13	1	5	
7	A	1	Total	C	H	N	O	0
			27	8	13	1	5	
7	A	1	Total	C	H	N	O	0
			27	8	13	1	5	
7	A	1	Total	C	H	N	O	0
			27	8	13	1	5	
7	A	1	Total	C	H	N	O	0
			25	8	11	1	5	
7	A	1	Total	C	N	O	0	
			14	8	1	5		
7	A	1	Total	C	N	O	0	
			14	8	1	5		
7	B	1	Total	C	H	N	O	0
			27	8	13	1	5	
7	B	1	Total	C	H	N	O	0
			27	8	13	1	5	
7	B	1	Total	C	H	N	O	0
			27	8	13	1	5	
7	B	1	Total	C	H	N	O	0
			27	8	13	1	5	
7	B	1	Total	C	H	N	O	0
			27	8	13	1	5	

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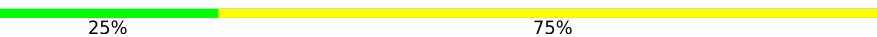
Mol	Chain	Residues	Atoms				AltConf	
			Total	C	N	O		
7	B	1	Total 14	C 8	N 1	O 5	0	
7	B	1	Total 14	C 8	N 1	O 5	0	
7	C	1	Total 27	C 8	H 13	N 1	O 5	0
7	C	1	Total 14	C 8	N 1	O 5	0	
7	C	1	Total 14	C 8	N 1	O 5	0	
7	C	1	Total 14	C 8	N 1	O 5	0	





GLY  
SER  
GLY  
TYR  
ILE  
PRO  
GLU  
ALA  
PRO  
ARG  
ASP  
GLY  
GLN  
ALA  
TYR  
VAL  
ARG  
LYS  
ASP  
GLY  
GLU  
TRP  
VAL  
LEU  
SER  
THR  
PHE

- Molecule 2: alpha-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain a:  25% 75%

MAG1  
MAG2  
MAN3  
MAN4

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D:  100%

MAG1  
MAG2

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain E:  100%

MAG1  
MAG2

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain I:  100%

MAG1  
MAG2

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain K:  100%

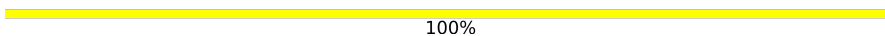
MAG1  
MAG2

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain b:  100%

MAG1  
MAG2

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain M:  100%

MAG1  
MAG2

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain R:  100%

MAG1  
MAG2

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain U:  100%

MAG1  
MAG2

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain W:  50% 50%

MAG1  
MAG2

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain d:  50% 50%

MAG1  
MAG2

- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:  33% 67%

MAG1  
MAG2  
BWA3

- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain H:  67% 33%



- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain J: 33% 67%



- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain L: 33% 67%



- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain N: 33% 67%



- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain O: 33% 67%



- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain P: 33% 67%

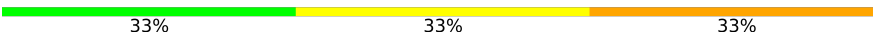


- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain Q: 100%

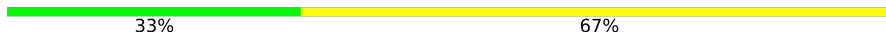


- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain c:  33% 33% 33%



- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain T:  33% 67%



- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain V:  33% 67%



- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain X:  33% 67%



- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain Y:  33% 33% 33%



- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain Z:  33% 67%



- Molecule 5: alpha-D-mannopyranose-(1-6)-alpha-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G:  100%

MAG1  
MAG2  
MAN3  
MAN4

- Molecule 6: alpha-L-fucopyranose-(1-6)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain S:  50% 50%

MAG1  
FUC2

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	82364	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	43.97	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	191780	Depositor
Image detector	TFS FALCON 4i (4k x 4k)	Depositor
Maximum map value	1.081	Depositor
Minimum map value	-0.452	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.021	Depositor
Recommended contour level	0.065	Depositor
Map size (Å)	377.0018, 377.0018, 377.0018	wwPDB
Map dimensions	380, 380, 380	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.99211, 0.99211, 0.99211	Depositor

## 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: NAG, MAN, BMA, FUC

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	0.15	2/8219 (0.0%)	0.33	4/11182 (0.0%)
1	B	0.12	0/8587	0.27	0/11684
1	C	0.12	0/8634	0.28	1/11744 (0.0%)
All	All	0.13	2/25440 (0.0%)	0.29	5/34610 (0.0%)

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	2
1	C	0	3
All	All	0	5

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1074	ASN	CB-CG	5.75	1.66	1.52
1	A	1074	ASN	CA-CB	5.04	1.60	1.53

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1073	LYS	CA-C-N	11.94	139.03	121.72
1	A	1073	LYS	C-N-CA	11.94	139.03	121.72
1	A	1074	ASN	N-CA-CB	-7.27	98.02	109.87
1	C	604	THR	OG1-CB-CG2	5.43	120.15	109.30
1	A	1074	ASN	OD1-CG-ND2	-5.10	117.50	122.60

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1074	ASN	Sidechain
1	A	617	CYS	Peptide
1	C	233	ILE	Peptide
1	C	234	ASN	Peptide
1	C	603	ASN	Peptide

## 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	8038	7801	7821	102	0
1	B	8395	8136	8157	77	0
1	C	8439	8181	8208	103	0
2	a	50	43	43	0	0
3	D	28	25	25	0	0
3	E	28	25	25	2	0
3	I	28	0	25	8	0
3	K	28	0	25	19	0
3	M	28	25	25	0	0
3	R	28	0	25	6	0
3	U	28	0	25	0	0
3	W	28	0	25	1	0
3	b	28	25	25	0	0
3	d	28	0	25	5	0
4	F	39	34	34	0	0
4	H	39	31	34	1	0
4	J	39	0	34	6	0
4	L	39	0	34	6	0
4	N	39	34	34	0	0
4	O	39	0	34	0	0
4	P	39	0	34	0	0
4	Q	39	0	34	11	0
4	T	39	34	34	0	0
4	V	39	0	34	7	0
4	X	39	0	34	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	Y	39	0	34	2	0
4	Z	39	0	34	3	0
4	c	39	34	34	1	0
5	G	50	43	43	0	0
6	S	24	21	22	2	0
7	A	98	63	91	8	0
7	B	98	65	91	1	0
7	C	56	13	52	5	0
All	All	26074	24633	25254	327	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 6.

The worst 5 of 327 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:C:1074:ASN:HB2	6:S:1:NAG:H2	1.42	1.02
4:L:1:NAG:H3	4:L:2:NAG:H2	1.49	0.94
1:A:1074:ASN:HD21	3:K:1:NAG:H4	1.33	0.94
3:K:1:NAG:H82	3:K:1:NAG:H5	1.53	0.90
1:C:603:ASN:OD1	7:C:1303:NAG:N2	2.06	0.89

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 PDB entries followed by that with respect to all EM entries.

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	1015/1275 (80%)	960 (95%)	52 (5%)	3 (0%)	36	45
1	B	1065/1275 (84%)	1008 (95%)	57 (5%)	0	100	100
1	C	1069/1275 (84%)	1018 (95%)	51 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	3149/3825 (82%)	2986 (95%)	160 (5%)	3 (0%)	49 61

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	829	ALA
1	A	851	CYS
1	A	164	ASN

### 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 PDB entries followed by that with respect to all EM entries.

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	891/1101 (81%)	891 (100%)	0	100 100
1	B	929/1101 (84%)	929 (100%)	0	100 100
1	C	938/1101 (85%)	938 (100%)	0	100 100
All	All	2758/3303 (84%)	2758 (100%)	0	100 100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 23 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	183	GLN
1	C	762	GLN
1	C	658	ASN
1	C	856	ASN
1	B	49	HIS

### 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](#)

72 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	NAG	D	1	3,1	14,14,15	2.05	4 (28%)	17,19,21	1.11	1 (5%)
3	NAG	D	2	3	14,14,15	1.97	4 (28%)	17,19,21	1.06	1 (5%)
3	NAG	E	1	3,1	14,14,15	2.00	5 (35%)	17,19,21	1.48	5 (29%)
3	NAG	E	2	3	14,14,15	2.38	5 (35%)	17,19,21	2.42	7 (41%)
4	NAG	F	1	4,1	14,14,15	1.97	4 (28%)	17,19,21	1.04	1 (5%)
4	NAG	F	2	4	14,14,15	2.02	4 (28%)	17,19,21	1.07	2 (11%)
4	BMA	F	3	4	11,11,12	0.50	0	15,15,17	0.72	0
5	NAG	G	1	5,1	14,14,15	1.99	4 (28%)	17,19,21	1.02	1 (5%)
5	NAG	G	2	5	14,14,15	1.96	4 (28%)	17,19,21	1.19	2 (11%)
5	MAN	G	3	5	11,11,12	0.76	0	15,15,17	1.10	2 (13%)
5	MAN	G	4	5	11,11,12	0.62	0	15,15,17	0.88	1 (6%)
4	NAG	H	1	4,1	14,14,15	1.93	3 (21%)	17,19,21	1.09	1 (5%)
4	NAG	H	2	4	14,14,15	2.00	4 (28%)	17,19,21	1.08	2 (11%)
4	BMA	H	3	4	11,11,12	0.68	0	15,15,17	0.75	0
3	NAG	I	1	3,1	14,14,15	1.94	4 (28%)	17,19,21	1.33	2 (11%)
3	NAG	I	2	3	14,14,15	2.02	4 (28%)	17,19,21	1.18	1 (5%)
4	NAG	J	1	4,1	14,14,15	1.99	3 (21%)	17,19,21	2.28	7 (41%)
4	NAG	J	2	4	14,14,15	1.89	3 (21%)	17,19,21	2.19	5 (29%)
4	BMA	J	3	4	11,11,12	0.51	0	15,15,17	0.78	0
3	NAG	K	1	3,1	14,14,15	3.40	5 (35%)	17,19,21	6.47	15 (88%)
3	NAG	K	2	3	14,14,15	1.95	3 (21%)	17,19,21	1.49	5 (29%)
4	NAG	L	1	4,1	14,14,15	1.78	3 (21%)	17,19,21	2.82	6 (35%)
4	NAG	L	2	4	14,14,15	1.98	4 (28%)	17,19,21	1.80	4 (23%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	BMA	L	3	4	11,11,12	0.79	1 (9%)	15,15,17	1.15	1 (6%)
3	NAG	M	1	3,1	14,14,15	1.93	4 (28%)	17,19,21	1.26	2 (11%)
3	NAG	M	2	3	14,14,15	1.98	4 (28%)	17,19,21	1.14	2 (11%)
4	NAG	N	1	4,1	14,14,15	1.96	3 (21%)	17,19,21	1.04	2 (11%)
4	NAG	N	2	4	14,14,15	2.00	4 (28%)	17,19,21	1.12	2 (11%)
4	BMA	N	3	4	11,11,12	0.57	0	15,15,17	0.68	0
4	NAG	O	1	4,1	14,14,15	1.94	4 (28%)	17,19,21	1.26	2 (11%)
4	NAG	O	2	4	14,14,15	1.97	4 (28%)	17,19,21	1.14	2 (11%)
4	BMA	O	3	4	11,11,12	0.56	0	15,15,17	0.67	0
4	NAG	P	1	4,1	14,14,15	2.11	5 (35%)	17,19,21	1.45	3 (17%)
4	NAG	P	2	4	14,14,15	1.98	4 (28%)	17,19,21	1.28	1 (5%)
4	BMA	P	3	4	11,11,12	0.55	0	15,15,17	0.69	0
4	NAG	Q	1	4,1	14,14,15	1.93	4 (28%)	17,19,21	1.11	1 (5%)
4	NAG	Q	2	4	14,14,15	2.16	4 (28%)	17,19,21	1.22	2 (11%)
4	BMA	Q	3	4	11,11,12	0.83	0	15,15,17	0.86	1 (6%)
3	NAG	R	1	3,1	14,14,15	2.05	4 (28%)	17,19,21	1.28	2 (11%)
3	NAG	R	2	3	14,14,15	2.04	4 (28%)	17,19,21	1.24	2 (11%)
6	NAG	S	1	6,1	14,14,15	1.95	3 (21%)	17,19,21	1.83	4 (23%)
6	FUC	S	2	6	10,10,11	0.78	1 (10%)	14,14,16	0.87	0
4	NAG	T	1	4,1	14,14,15	1.98	4 (28%)	17,19,21	1.07	2 (11%)
4	NAG	T	2	4	14,14,15	1.95	4 (28%)	17,19,21	1.20	1 (5%)
4	BMA	T	3	4	11,11,12	0.59	0	15,15,17	0.68	0
3	NAG	U	1	3,1	14,14,15	1.97	4 (28%)	17,19,21	1.11	1 (5%)
3	NAG	U	2	3	14,14,15	1.97	4 (28%)	17,19,21	1.14	2 (11%)
4	NAG	V	1	4,1	14,14,15	2.03	4 (28%)	17,19,21	1.13	2 (11%)
4	NAG	V	2	4	14,14,15	2.02	4 (28%)	17,19,21	1.37	4 (23%)
4	BMA	V	3	4	11,11,12	0.56	0	15,15,17	0.70	0
3	NAG	W	1	3,1	14,14,15	2.09	4 (28%)	17,19,21	2.55	7 (41%)
3	NAG	W	2	3	14,14,15	1.90	3 (21%)	17,19,21	1.21	1 (5%)
4	NAG	X	1	4,1	14,14,15	1.96	4 (28%)	17,19,21	1.03	1 (5%)
4	NAG	X	2	4	14,14,15	1.97	4 (28%)	17,19,21	1.11	1 (5%)
4	BMA	X	3	4	11,11,12	0.53	0	15,15,17	0.69	0
4	NAG	Y	1	4,1	14,14,15	2.07	4 (28%)	17,19,21	1.69	4 (23%)
4	NAG	Y	2	4	14,14,15	2.11	4 (28%)	17,19,21	1.08	1 (5%)
4	BMA	Y	3	4	11,11,12	0.73	0	15,15,17	0.73	0
4	NAG	Z	1	4,1	14,14,15	2.12	4 (28%)	17,19,21	1.51	3 (17%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	NAG	Z	2	4	14,14,15	2.06	4 (28%)	17,19,21	1.05	0
4	BMA	Z	3	4	11,11,12	0.51	0	15,15,17	0.70	0
2	NAG	a	1	2,1	14,14,15	2.03	3 (21%)	17,19,21	2.72	7 (41%)
2	NAG	a	2	2	14,14,15	1.99	4 (28%)	17,19,21	1.00	1 (5%)
2	BMA	a	3	2	11,11,12	0.50	0	15,15,17	0.65	0
2	MAN	a	4	2	11,11,12	0.57	0	15,15,17	1.03	2 (13%)
3	NAG	b	1	3,1	14,14,15	2.00	4 (28%)	17,19,21	1.28	2 (11%)
3	NAG	b	2	3	14,14,15	1.95	4 (28%)	17,19,21	1.03	1 (5%)
4	NAG	c	1	4,1	14,14,15	2.07	4 (28%)	17,19,21	1.82	5 (29%)
4	NAG	c	2	4	14,14,15	2.06	4 (28%)	17,19,21	1.45	4 (23%)
4	BMA	c	3	4	11,11,12	0.62	0	15,15,17	0.65	0
3	NAG	d	1	3,1	14,14,15	1.97	4 (28%)	17,19,21	1.89	2 (11%)
3	NAG	d	2	3	14,14,15	1.98	4 (28%)	17,19,21	1.07	1 (5%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	D	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	D	2	3	-	1/6/23/26	0/1/1/1
3	NAG	E	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	E	2	3	-	6/6/23/26	0/1/1/1
4	NAG	F	1	4,1	-	1/6/23/26	0/1/1/1
4	NAG	F	2	4	-	2/6/23/26	0/1/1/1
4	BMA	F	3	4	-	1/2/19/22	0/1/1/1
5	NAG	G	1	5,1	-	2/6/23/26	0/1/1/1
5	NAG	G	2	5	-	0/6/23/26	0/1/1/1
5	MAN	G	3	5	-	2/2/19/22	1/1/1/1
5	MAN	G	4	5	-	2/2/19/22	0/1/1/1
4	NAG	H	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	H	2	4	-	0/6/23/26	0/1/1/1
4	BMA	H	3	4	-	1/2/19/22	0/1/1/1
3	NAG	I	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	I	2	3	-	3/6/23/26	0/1/1/1
4	NAG	J	1	4,1	-	4/6/23/26	0/1/1/1
4	NAG	J	2	4	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	BMA	J	3	4	-	2/2/19/22	0/1/1/1
3	NAG	K	1	3,1	-	4/6/23/26	0/1/1/1
3	NAG	K	2	3	-	4/6/23/26	0/1/1/1
4	NAG	L	1	4,1	-	5/6/23/26	0/1/1/1
4	NAG	L	2	4	-	3/6/23/26	0/1/1/1
4	BMA	L	3	4	-	2/2/19/22	0/1/1/1
3	NAG	M	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	M	2	3	-	0/6/23/26	0/1/1/1
4	NAG	N	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	N	2	4	-	0/6/23/26	0/1/1/1
4	BMA	N	3	4	-	0/2/19/22	0/1/1/1
4	NAG	O	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	O	2	4	-	2/6/23/26	0/1/1/1
4	BMA	O	3	4	-	0/2/19/22	0/1/1/1
4	NAG	P	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	P	2	4	-	2/6/23/26	0/1/1/1
4	BMA	P	3	4	-	0/2/19/22	0/1/1/1
4	NAG	Q	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	Q	2	4	-	2/6/23/26	0/1/1/1
4	BMA	Q	3	4	-	0/2/19/22	0/1/1/1
3	NAG	R	1	3,1	-	3/6/23/26	0/1/1/1
3	NAG	R	2	3	-	3/6/23/26	0/1/1/1
6	NAG	S	1	6,1	-	2/6/23/26	0/1/1/1
6	FUC	S	2	6	-	-	0/1/1/1
4	NAG	T	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	T	2	4	-	2/6/23/26	0/1/1/1
4	BMA	T	3	4	-	1/2/19/22	0/1/1/1
3	NAG	U	1	3,1	-	4/6/23/26	0/1/1/1
3	NAG	U	2	3	-	1/6/23/26	0/1/1/1
4	NAG	V	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	V	2	4	-	2/6/23/26	0/1/1/1
4	BMA	V	3	4	-	0/2/19/22	0/1/1/1
3	NAG	W	1	3,1	-	4/6/23/26	0/1/1/1
3	NAG	W	2	3	-	2/6/23/26	0/1/1/1
4	NAG	X	1	4,1	-	4/6/23/26	0/1/1/1
4	NAG	X	2	4	-	2/6/23/26	0/1/1/1
4	BMA	X	3	4	-	0/2/19/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	Y	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	Y	2	4	-	2/6/23/26	0/1/1/1
4	BMA	Y	3	4	-	0/2/19/22	0/1/1/1
4	NAG	Z	1	4,1	-	3/6/23/26	0/1/1/1
4	NAG	Z	2	4	-	3/6/23/26	0/1/1/1
4	BMA	Z	3	4	-	0/2/19/22	0/1/1/1
2	NAG	a	1	2,1	-	4/6/23/26	0/1/1/1
2	NAG	a	2	2	-	2/6/23/26	0/1/1/1
2	BMA	a	3	2	-	1/2/19/22	0/1/1/1
2	MAN	a	4	2	-	0/2/19/22	0/1/1/1
3	NAG	b	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	b	2	3	-	4/6/23/26	0/1/1/1
4	NAG	c	1	4,1	-	6/6/23/26	0/1/1/1
4	NAG	c	2	4	-	0/6/23/26	0/1/1/1
4	BMA	c	3	4	-	0/2/19/22	0/1/1/1
3	NAG	d	1	3,1	-	4/6/23/26	0/1/1/1
3	NAG	d	2	3	-	0/6/23/26	0/1/1/1

The worst 5 of 209 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	K	1	NAG	O5-C1	8.83	1.58	1.43
3	E	2	NAG	O5-C1	5.37	1.52	1.43
4	Q	2	NAG	O5-C1	5.03	1.52	1.43
3	K	1	NAG	O5-C5	4.95	1.53	1.43
3	K	1	NAG	C7-N2	4.78	1.49	1.34

The worst 5 of 155 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	K	1	NAG	O5-C1-C2	-12.97	91.22	111.29
3	K	1	NAG	C1-O5-C5	11.52	127.63	112.19
3	K	1	NAG	O5-C5-C6	9.37	125.90	107.66
3	K	1	NAG	C4-C3-C2	8.09	122.88	111.02
3	K	1	NAG	C8-C7-N2	7.48	128.52	116.12

There are no chirality outliers.

5 of 126 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	K	1	NAG	C3-C2-N2-C7
3	b	2	NAG	C1-C2-N2-C7
3	U	1	NAG	C1-C2-N2-C7
4	P	2	NAG	C1-C2-N2-C7
4	Z	1	NAG	C1-C2-N2-C7

All (1) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	G	3	MAN	C1-C2-C3-C4-C5-O5

30 monomers are involved in 83 short contacts:

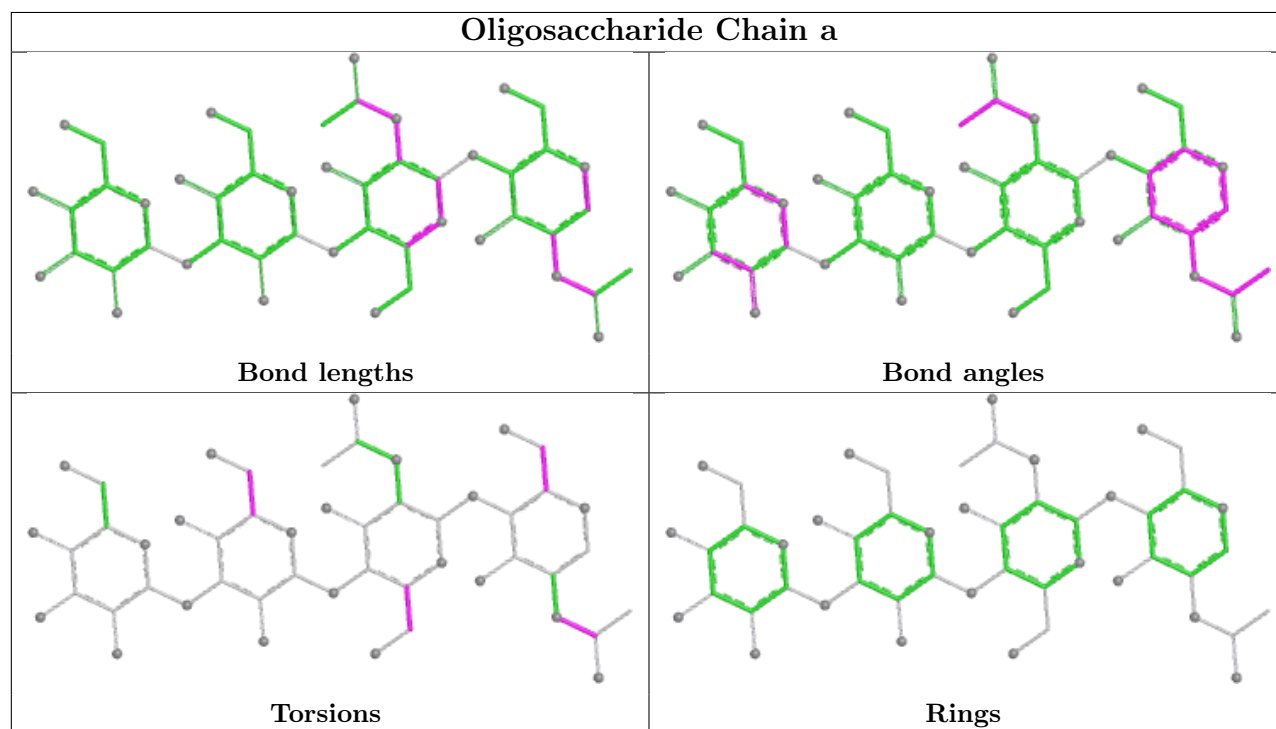
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	Q	1	NAG	8	0
3	E	2	NAG	2	0
4	Z	1	NAG	2	0
4	Q	3	BMA	3	0
4	H	3	BMA	1	0
4	V	2	NAG	7	0
4	V	3	BMA	4	0
4	J	2	NAG	4	0
4	L	1	NAG	6	0
3	W	1	NAG	1	0
3	K	1	NAG	16	0
6	S	1	NAG	2	0
3	I	2	NAG	6	0
4	Y	1	NAG	2	0
3	R	2	NAG	4	0
3	R	1	NAG	4	0
4	X	1	NAG	2	0
3	E	1	NAG	1	0
3	d	1	NAG	5	0
4	J	1	NAG	6	0
4	Z	3	BMA	1	0
4	X	2	NAG	3	0
4	Q	2	NAG	9	0
4	c	1	NAG	1	0
3	I	1	NAG	6	0
4	H	2	NAG	1	0
4	Z	2	NAG	2	0
4	V	1	NAG	3	0
4	L	2	NAG	4	0

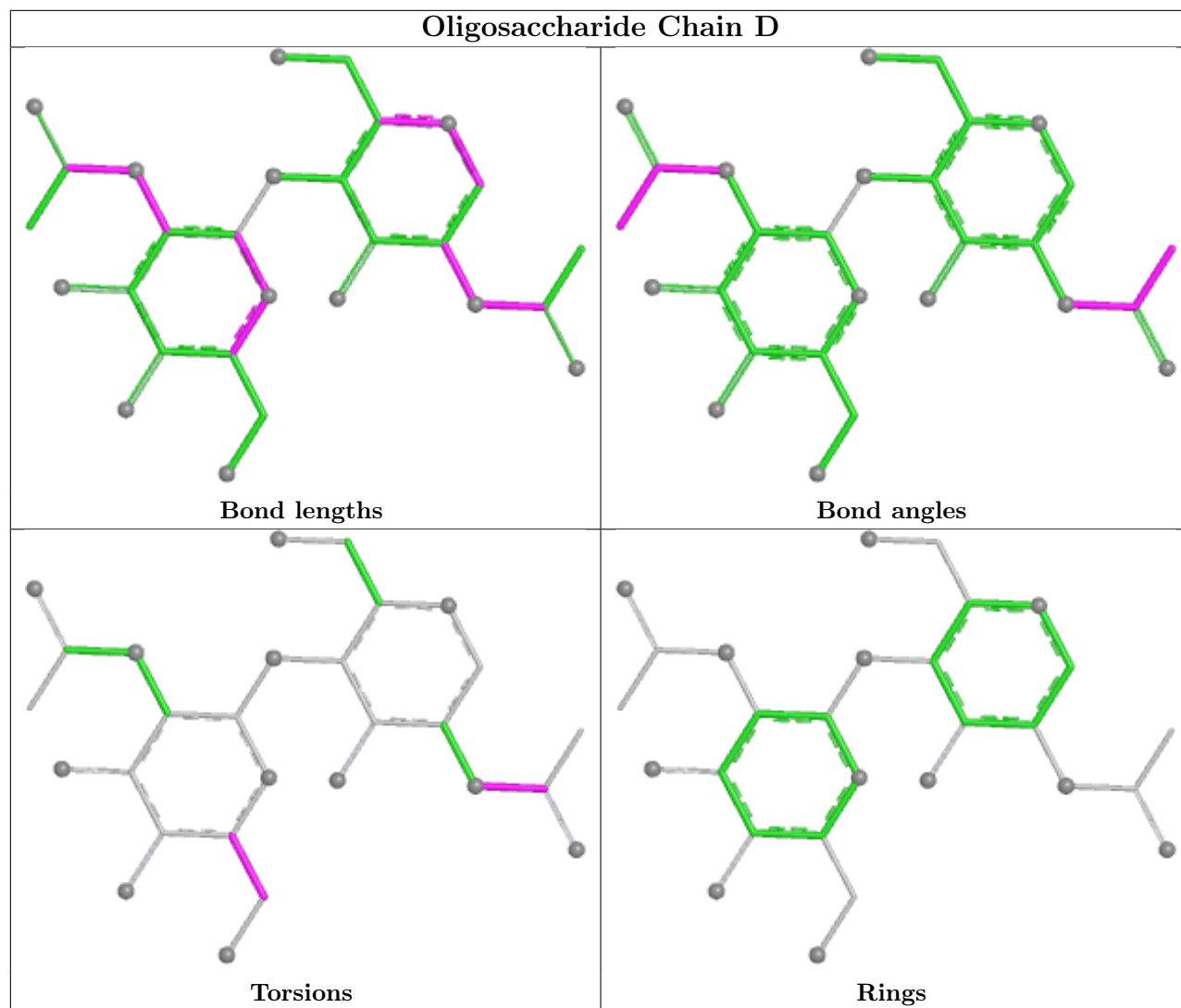
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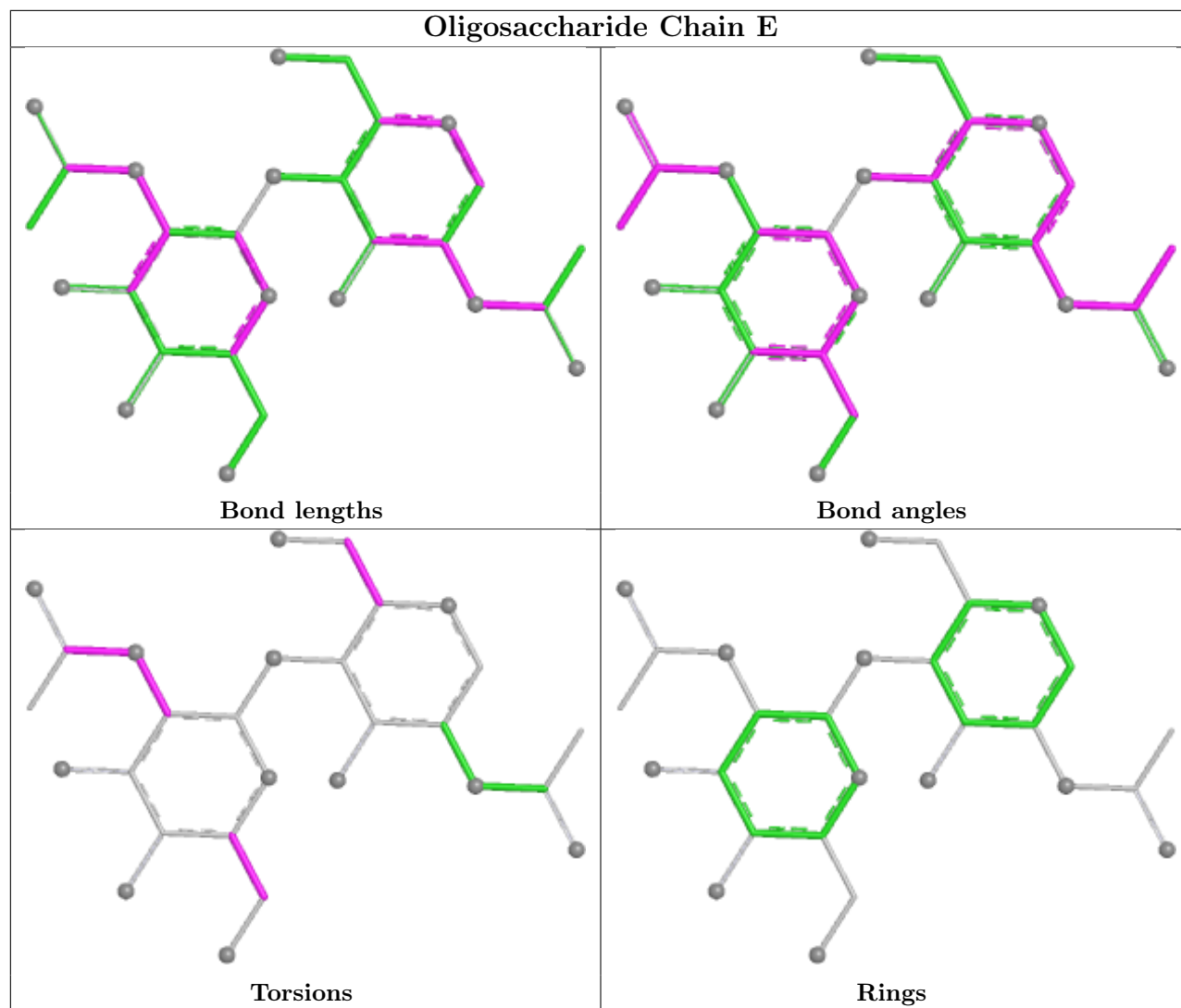
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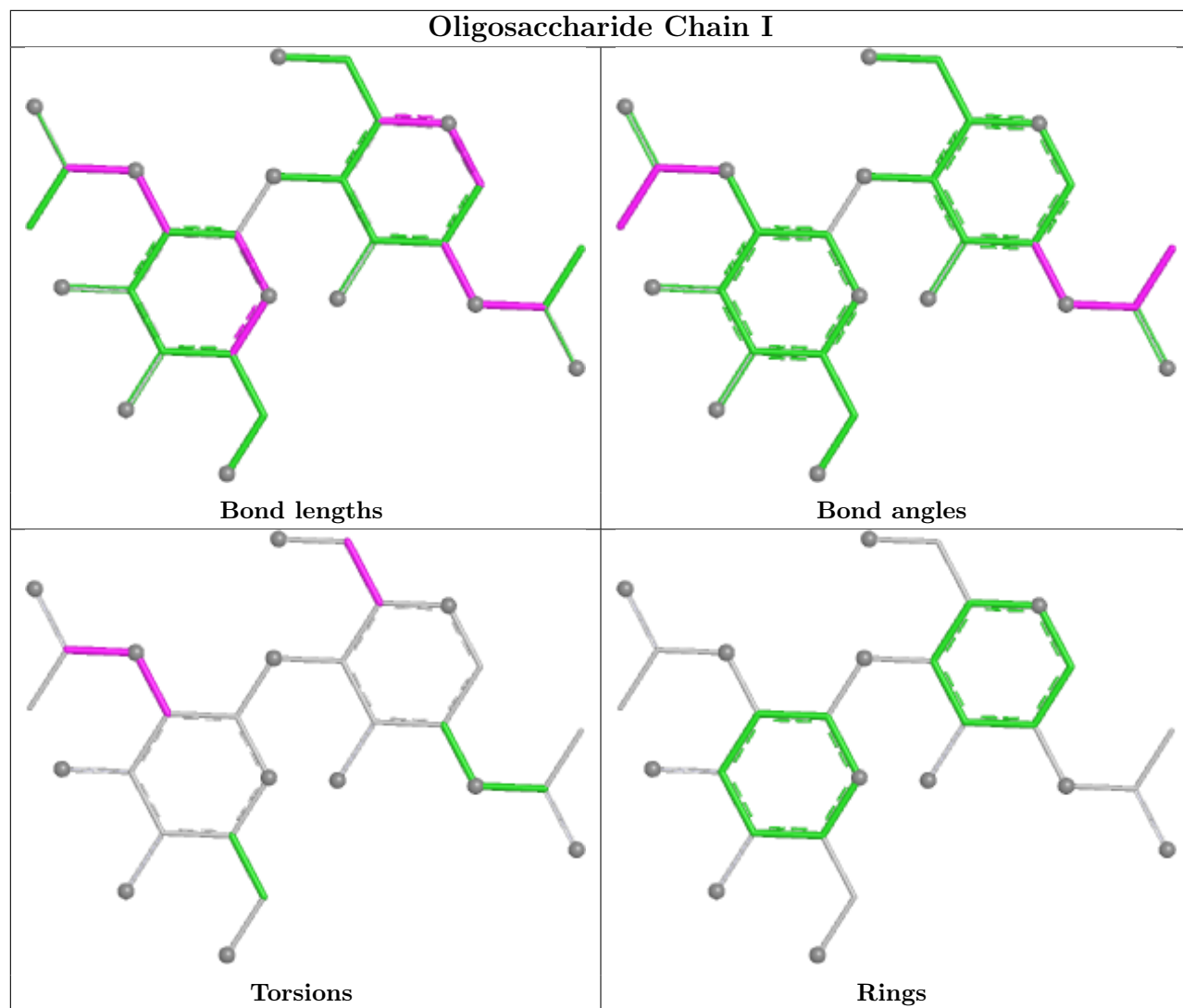
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	K	2	NAG	3	0

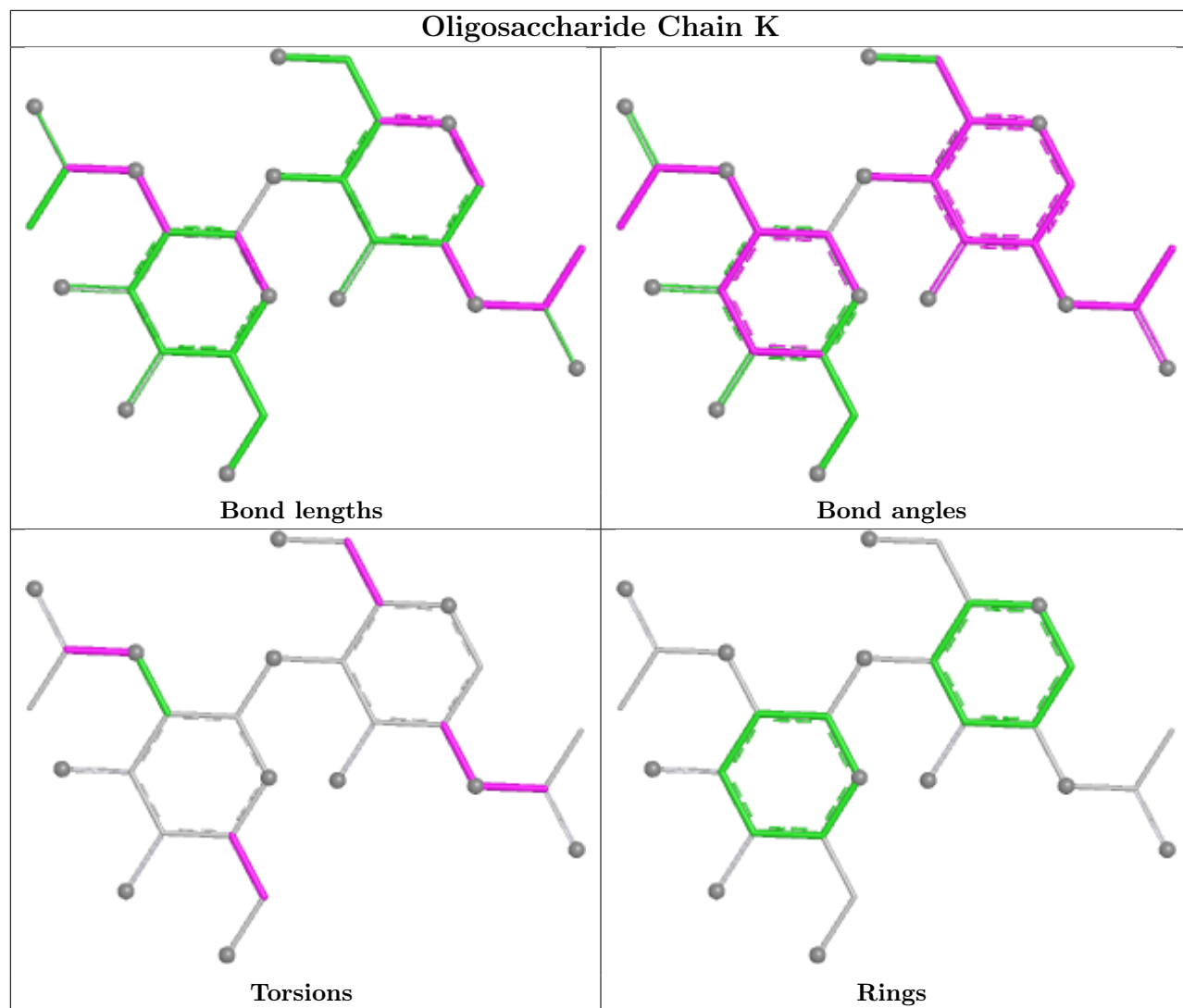
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

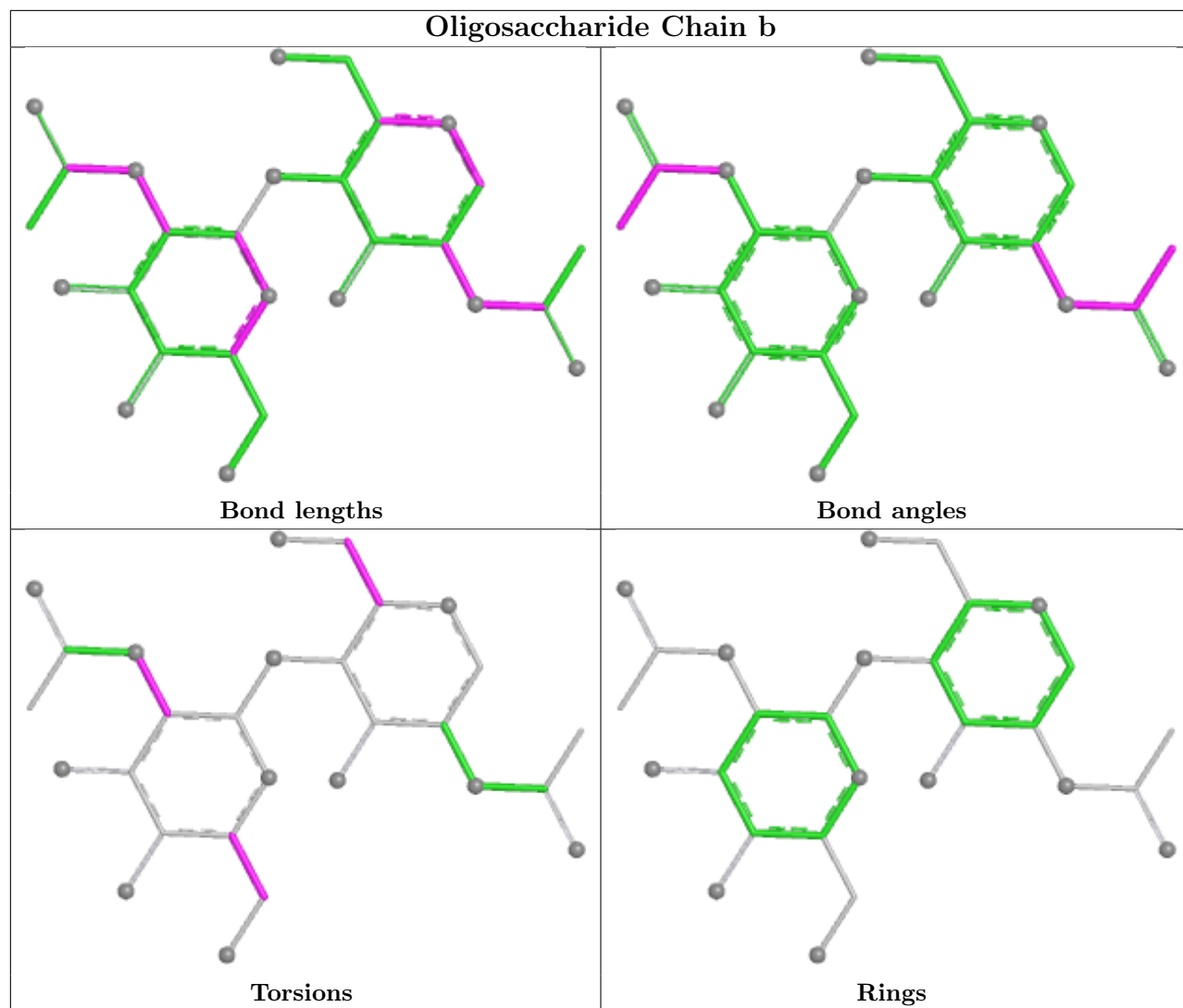


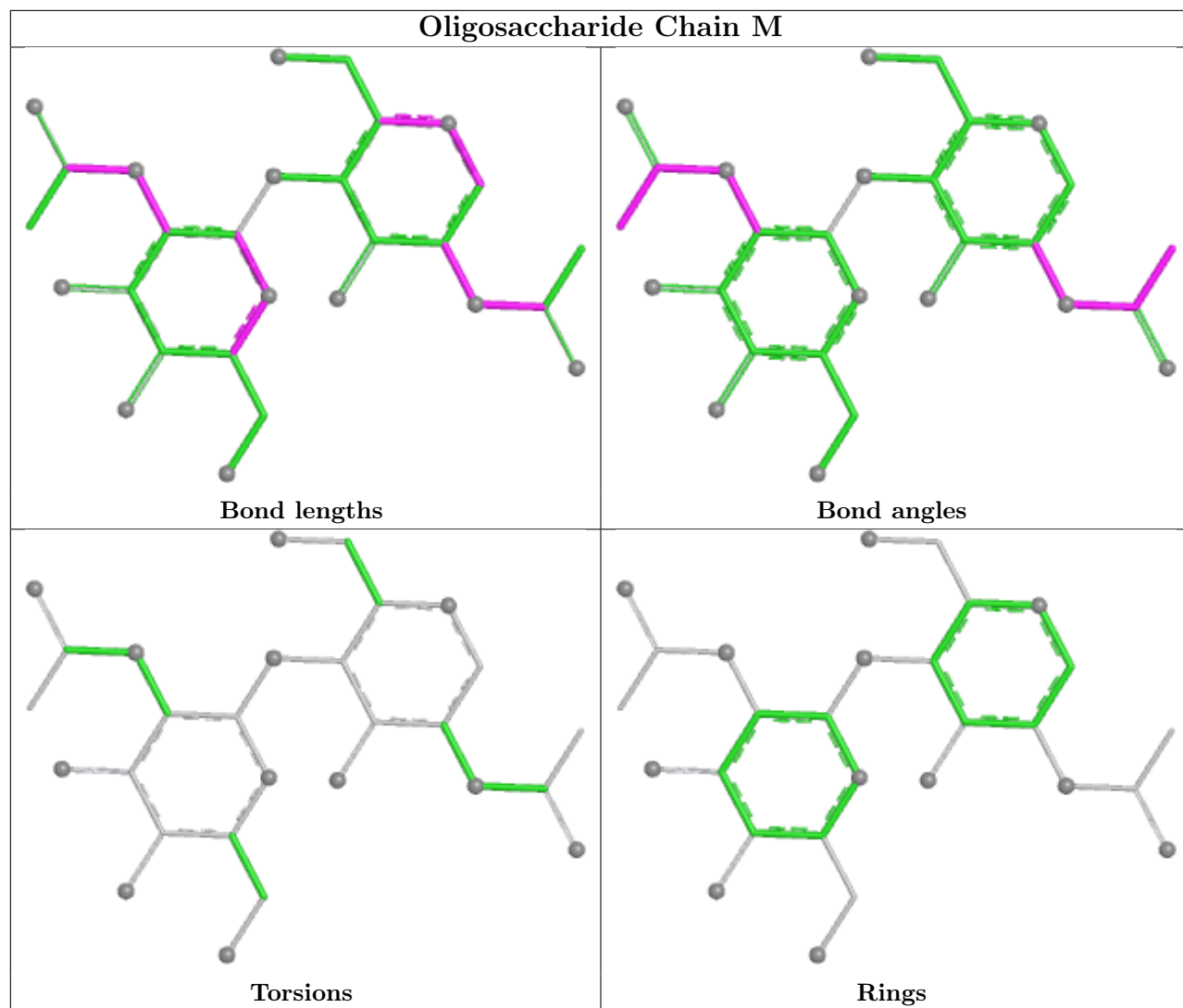


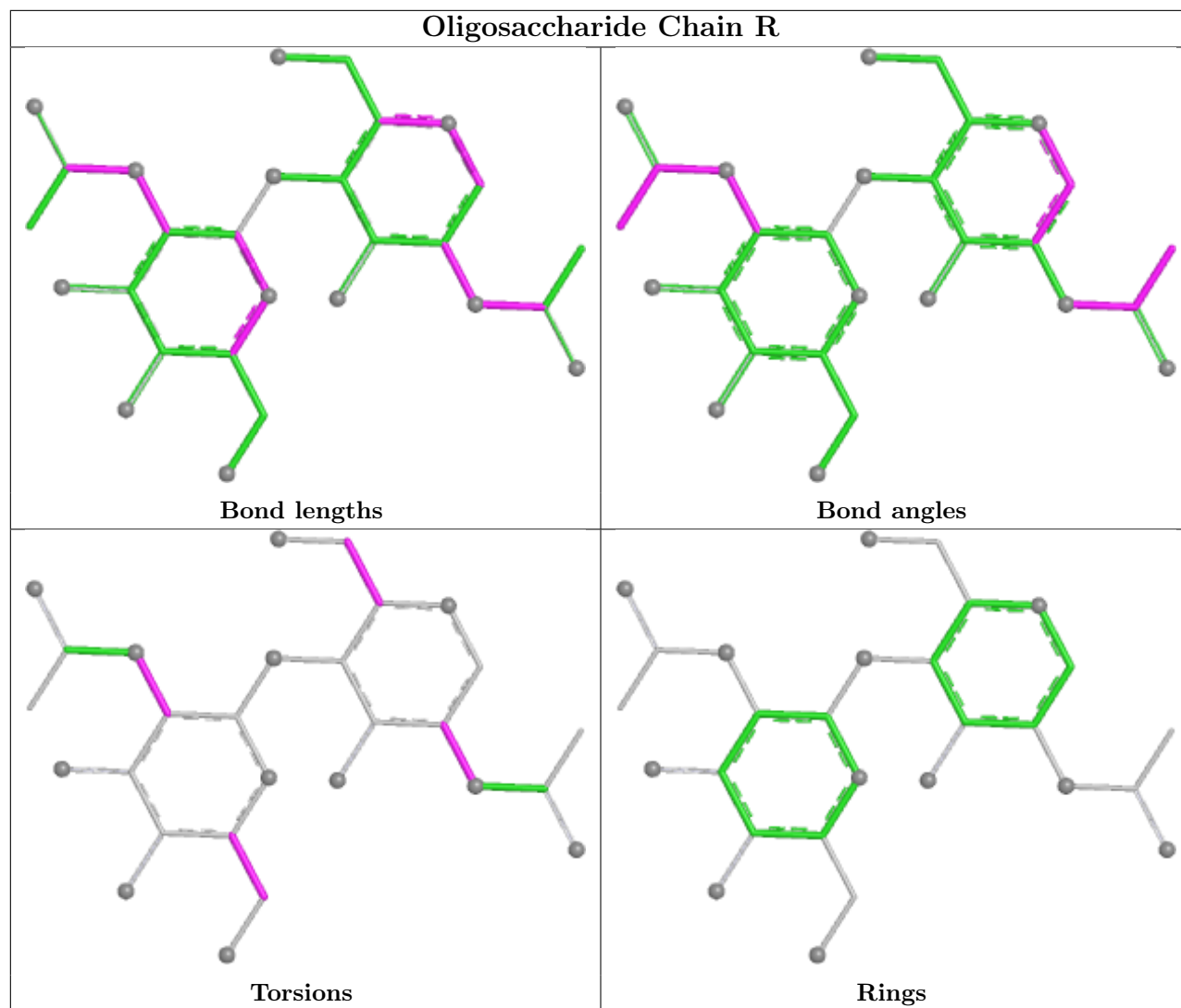


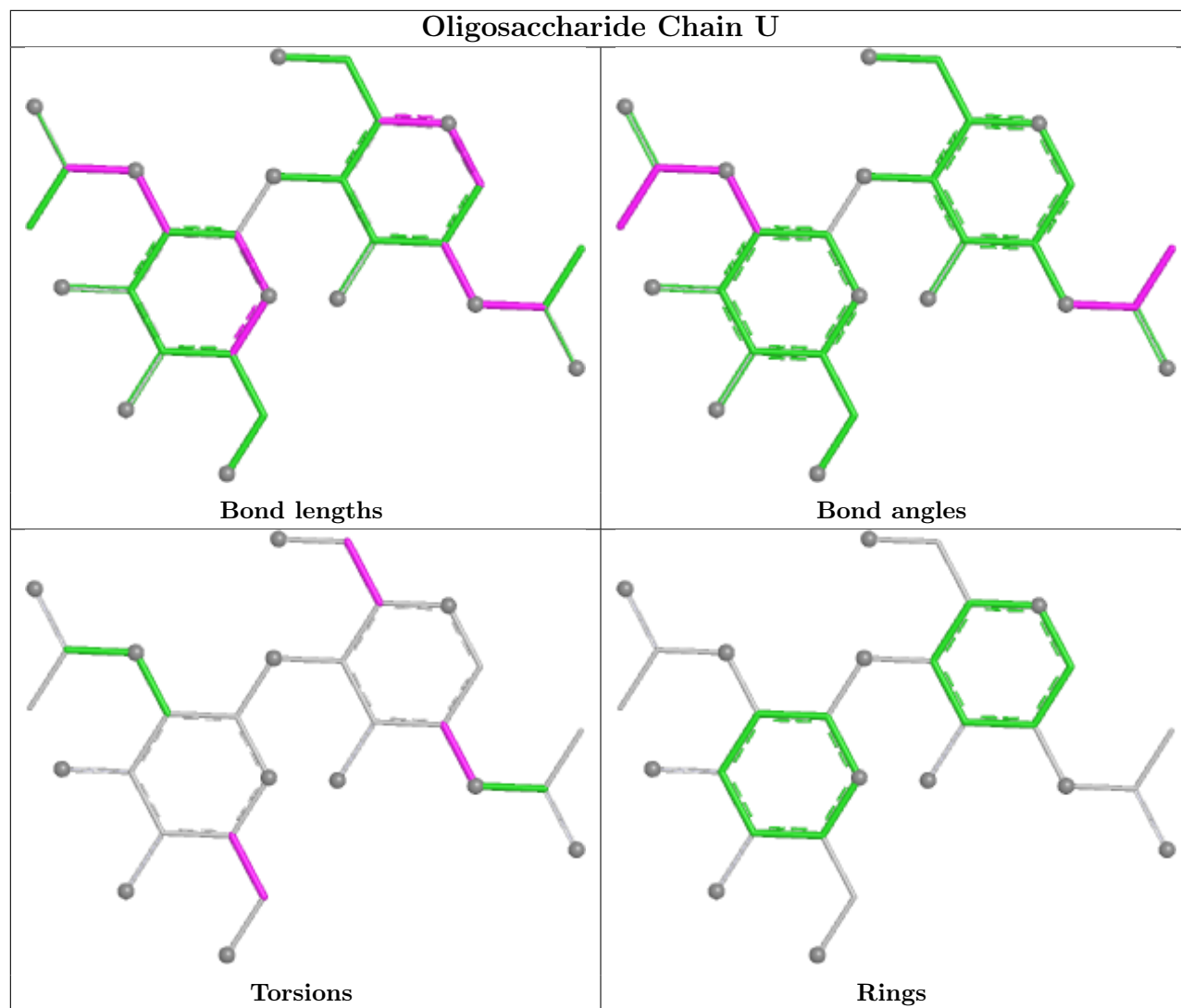


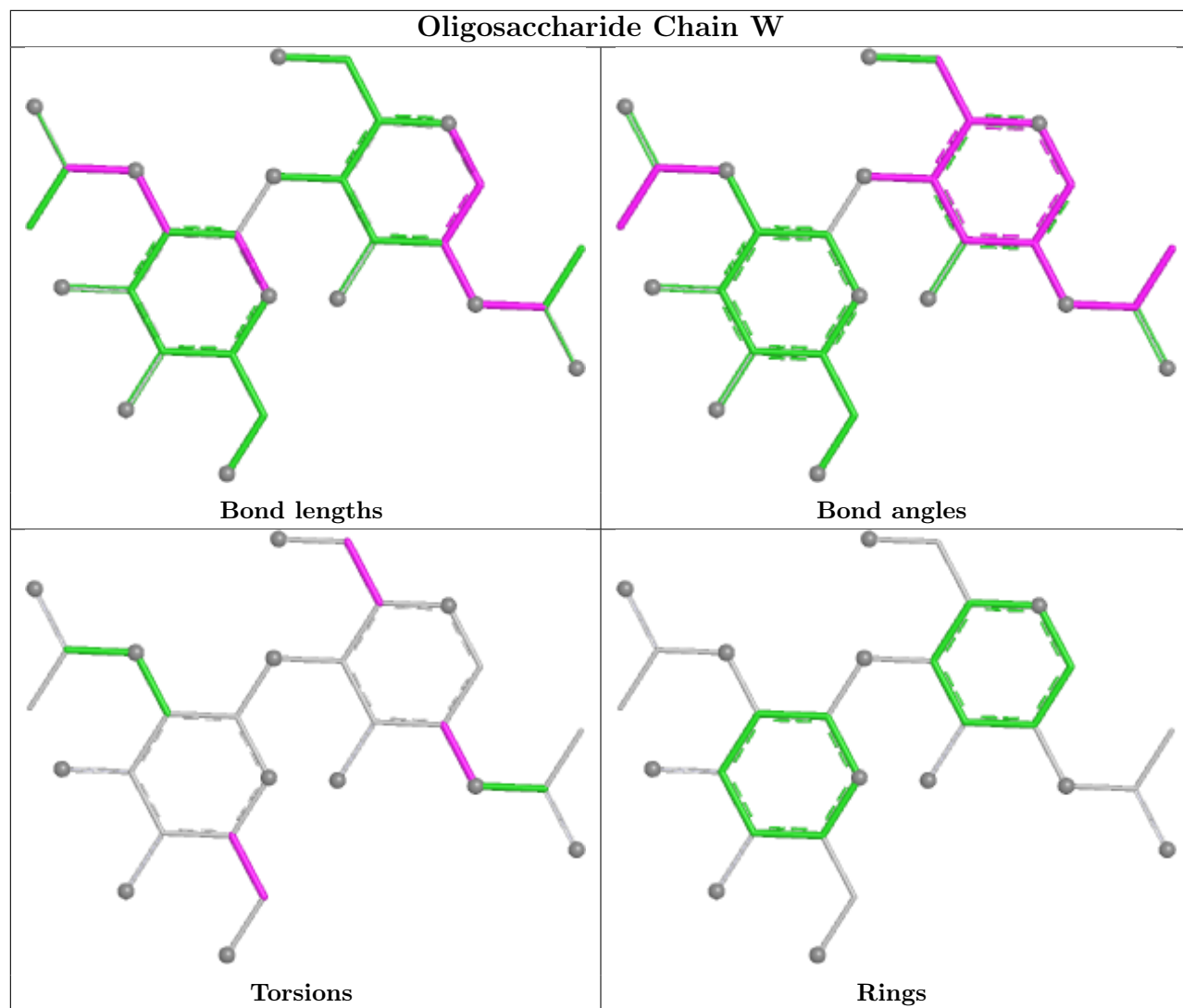


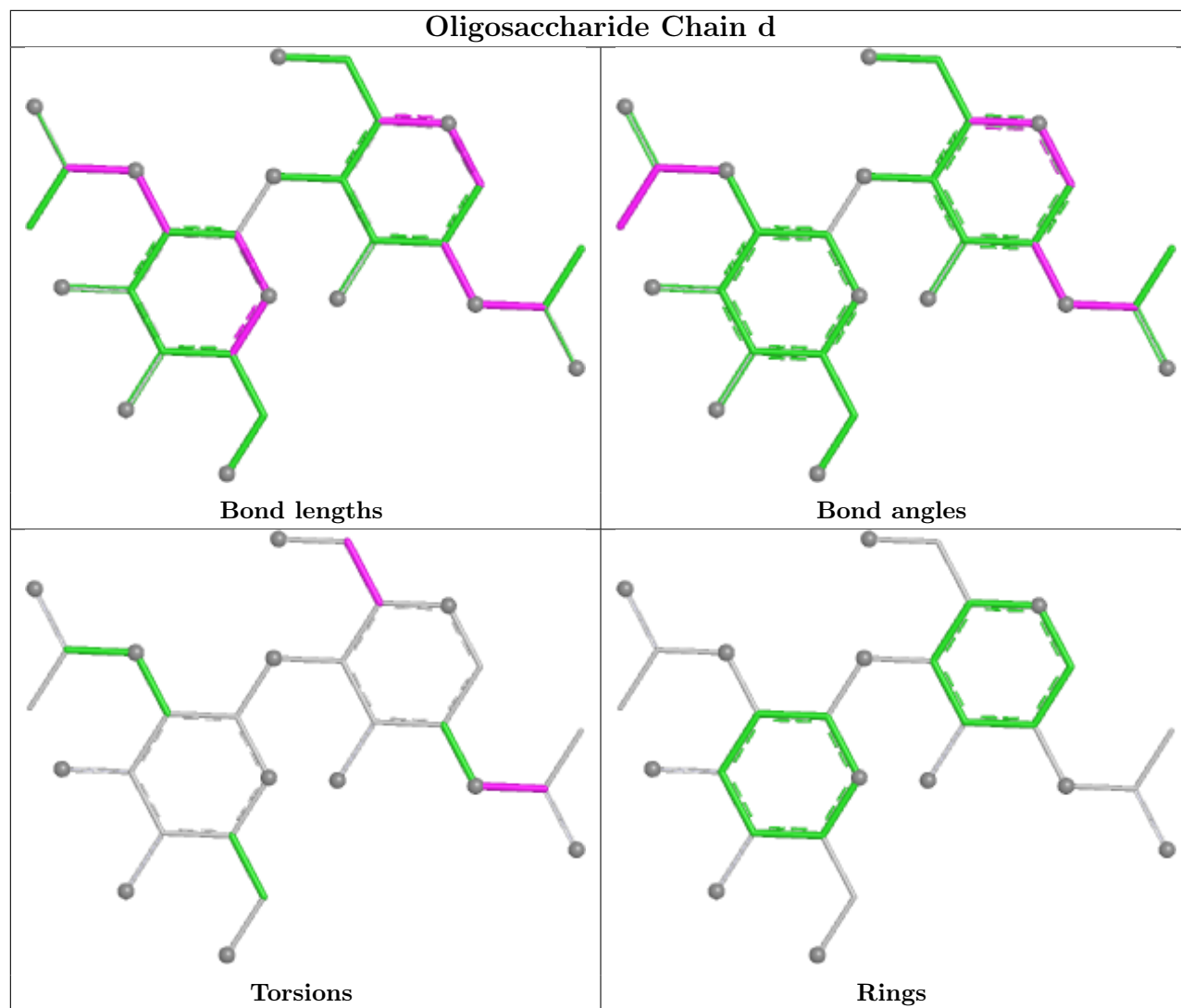


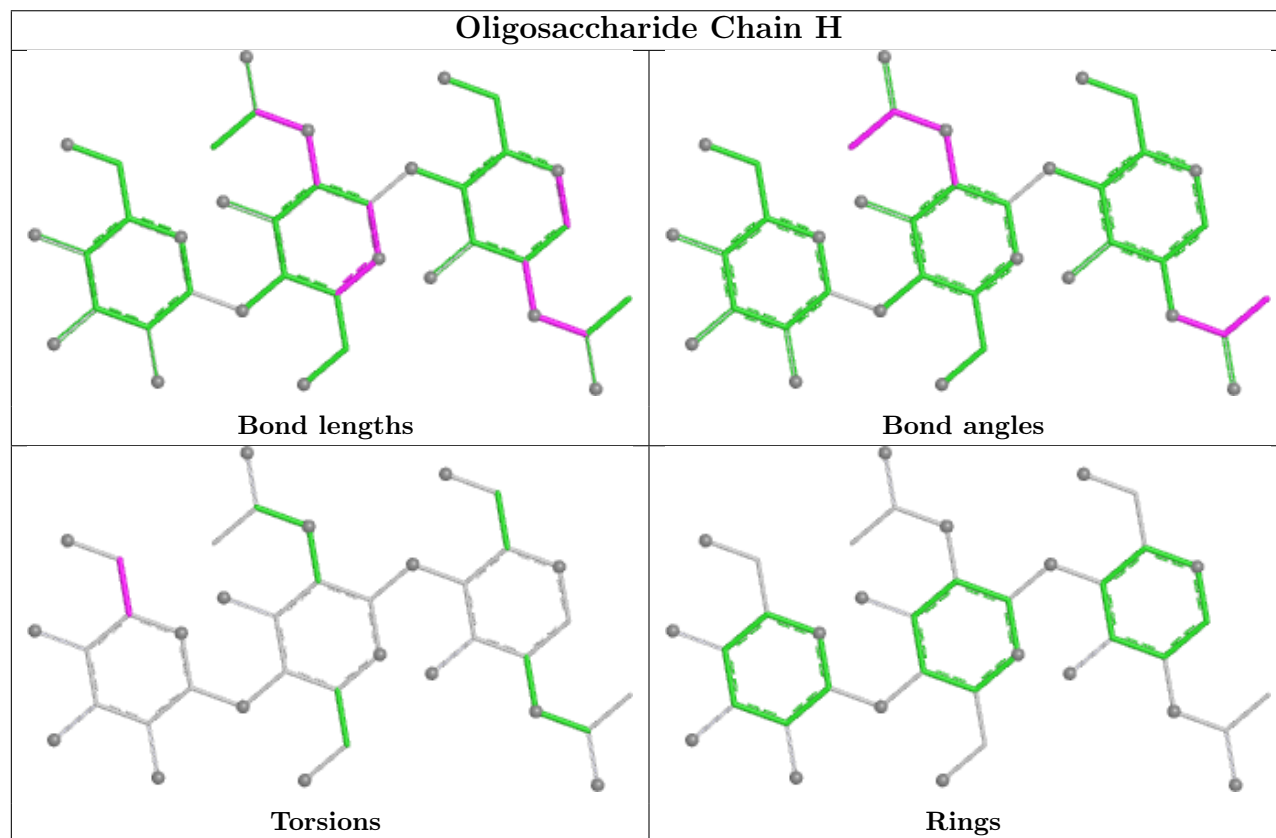
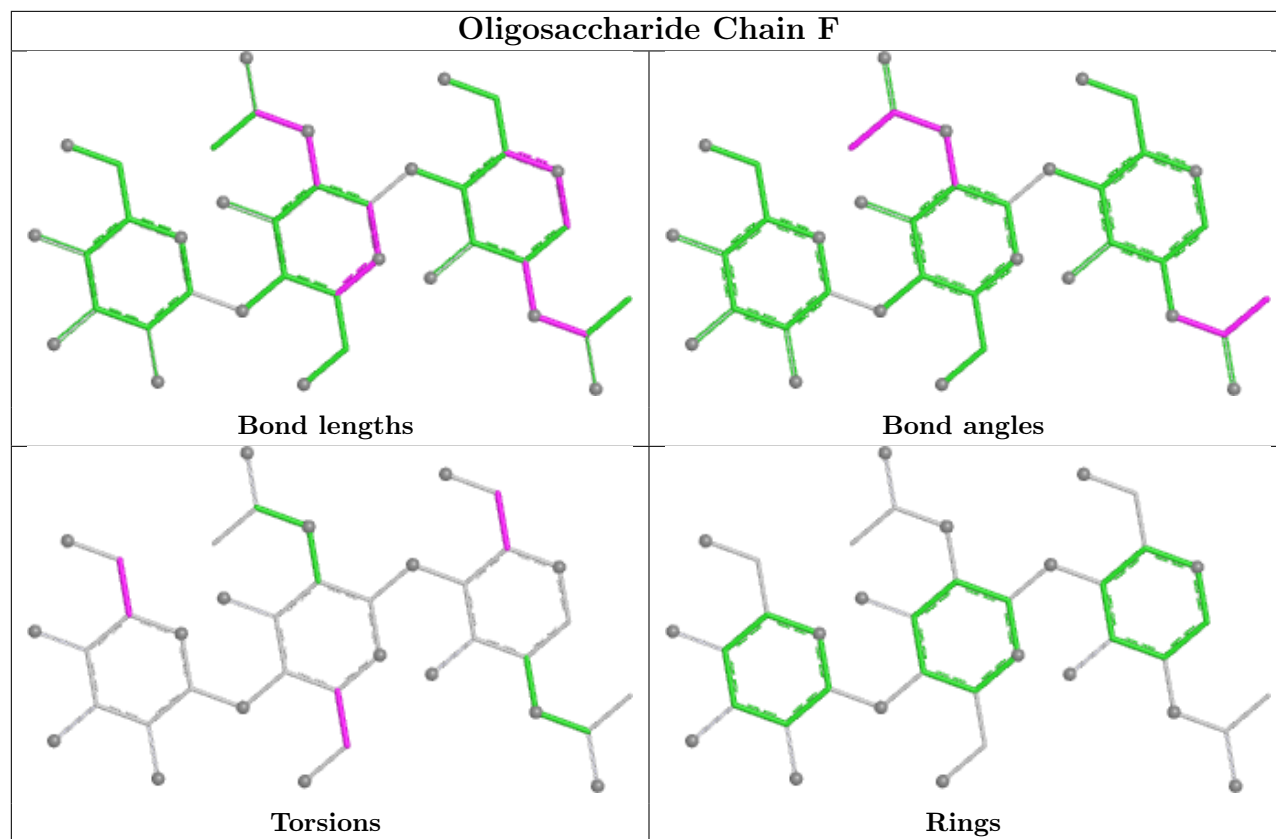


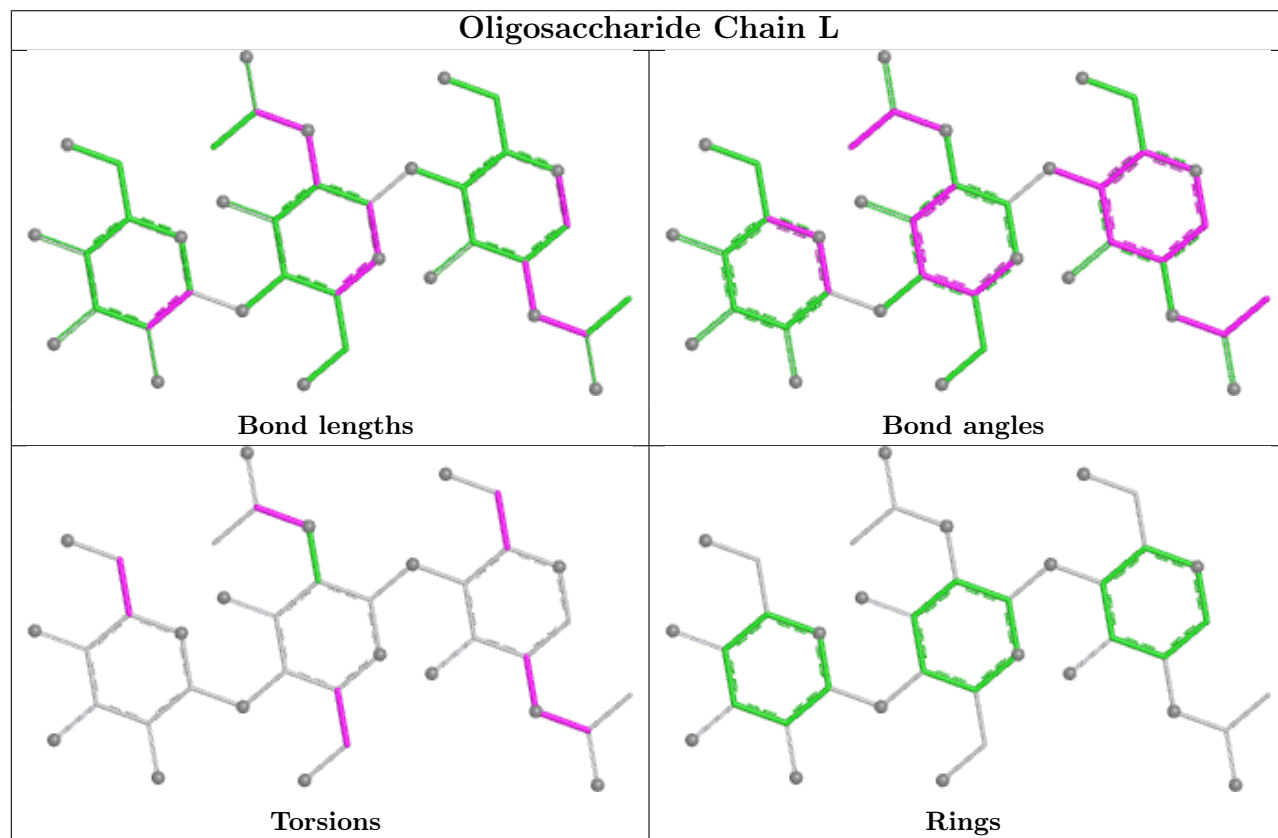
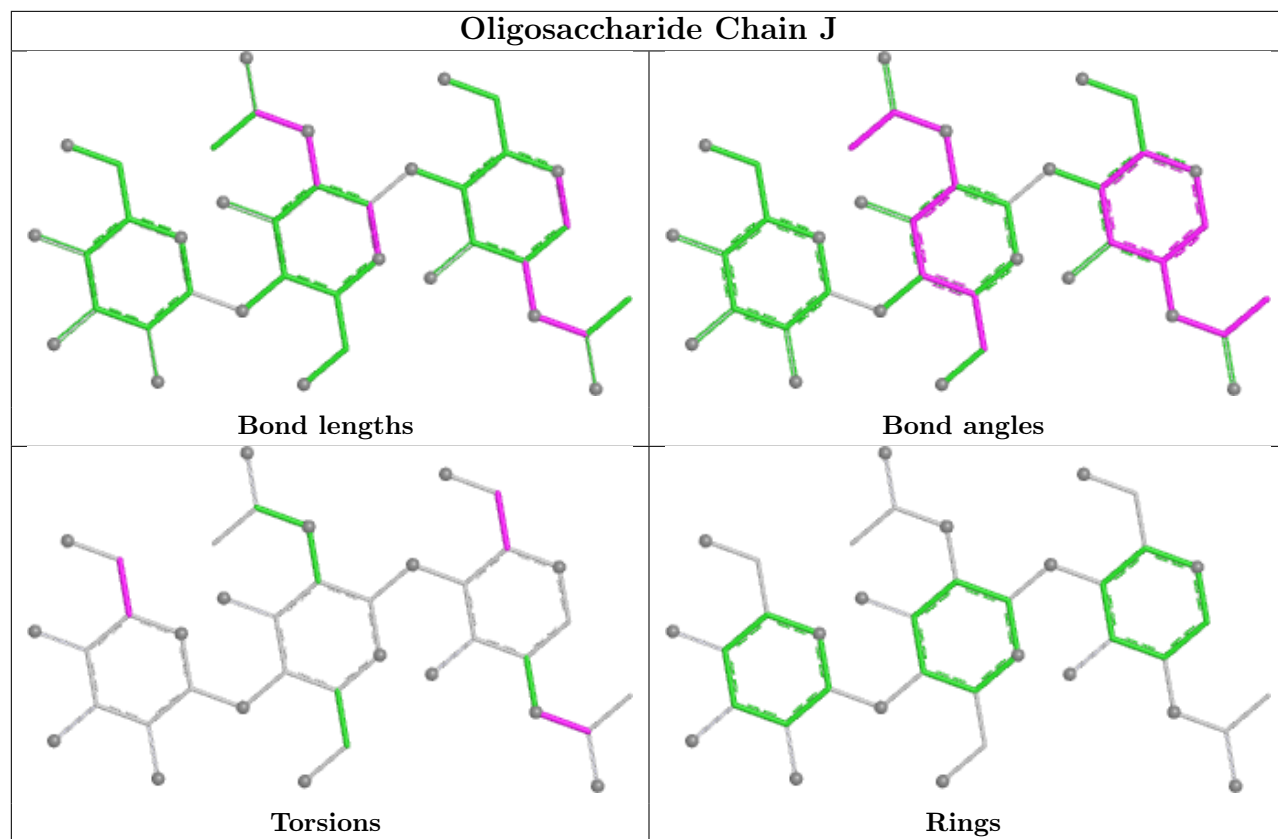


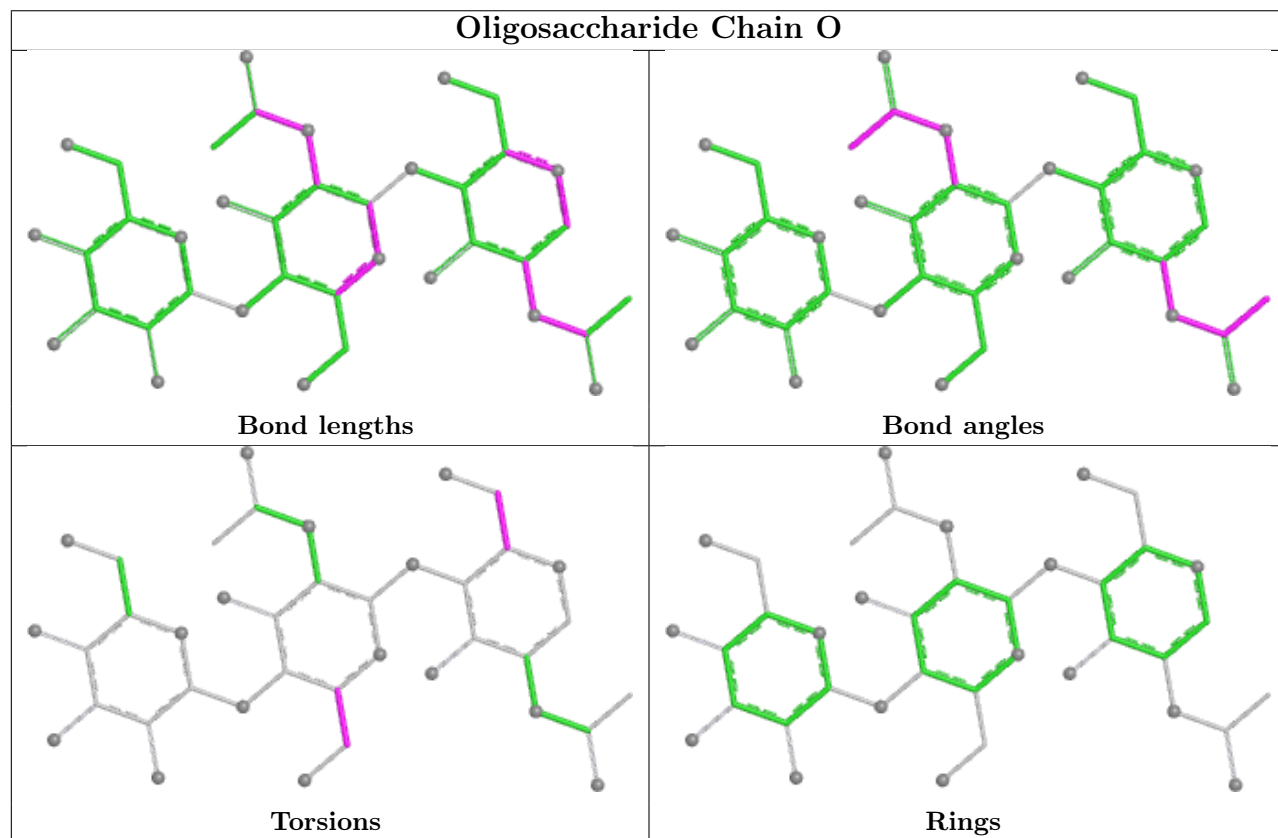
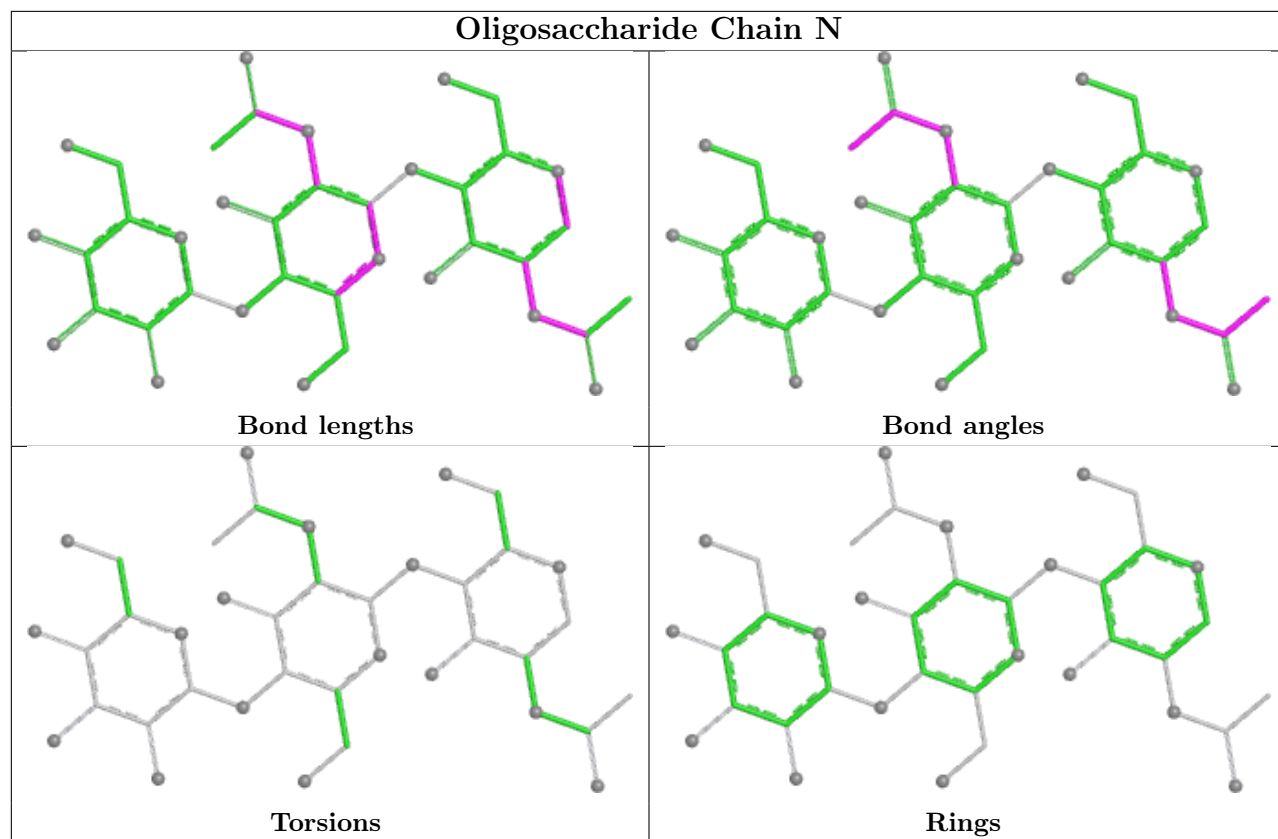


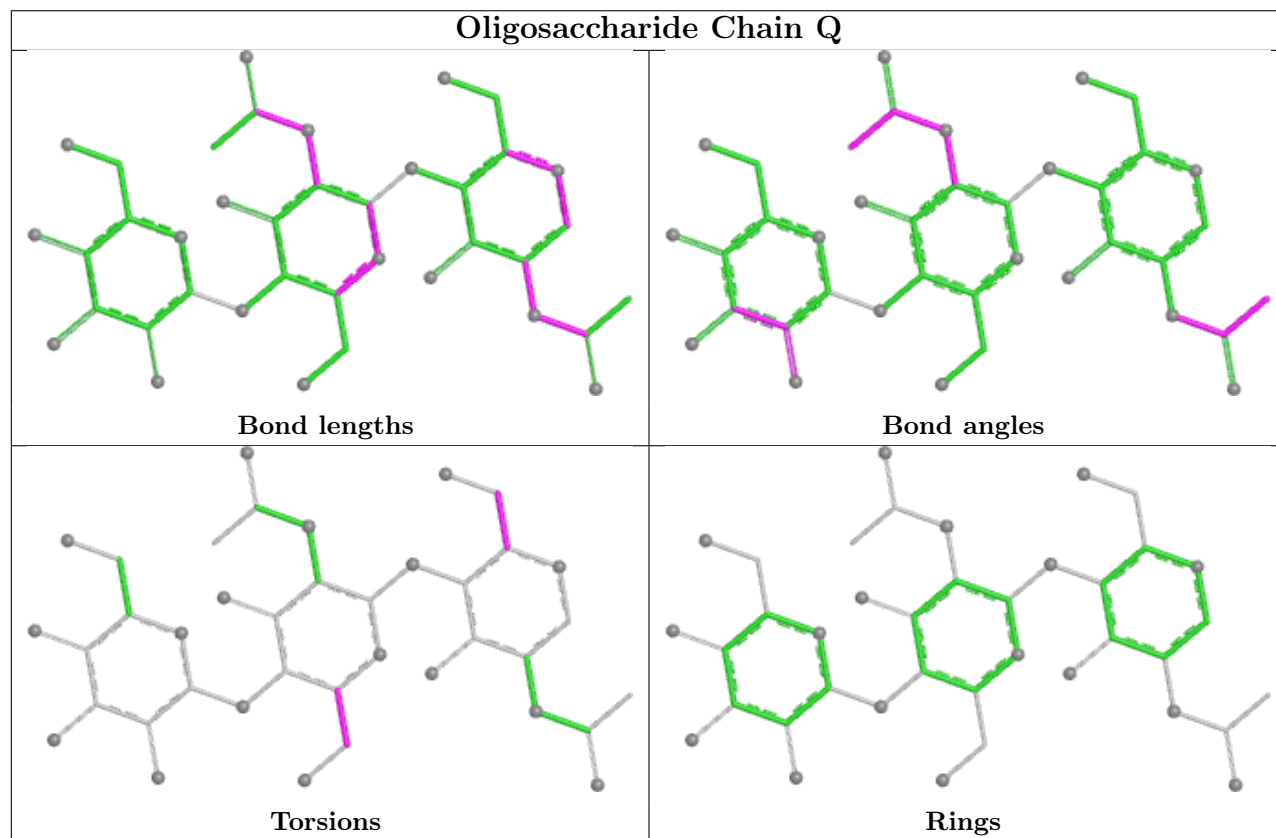
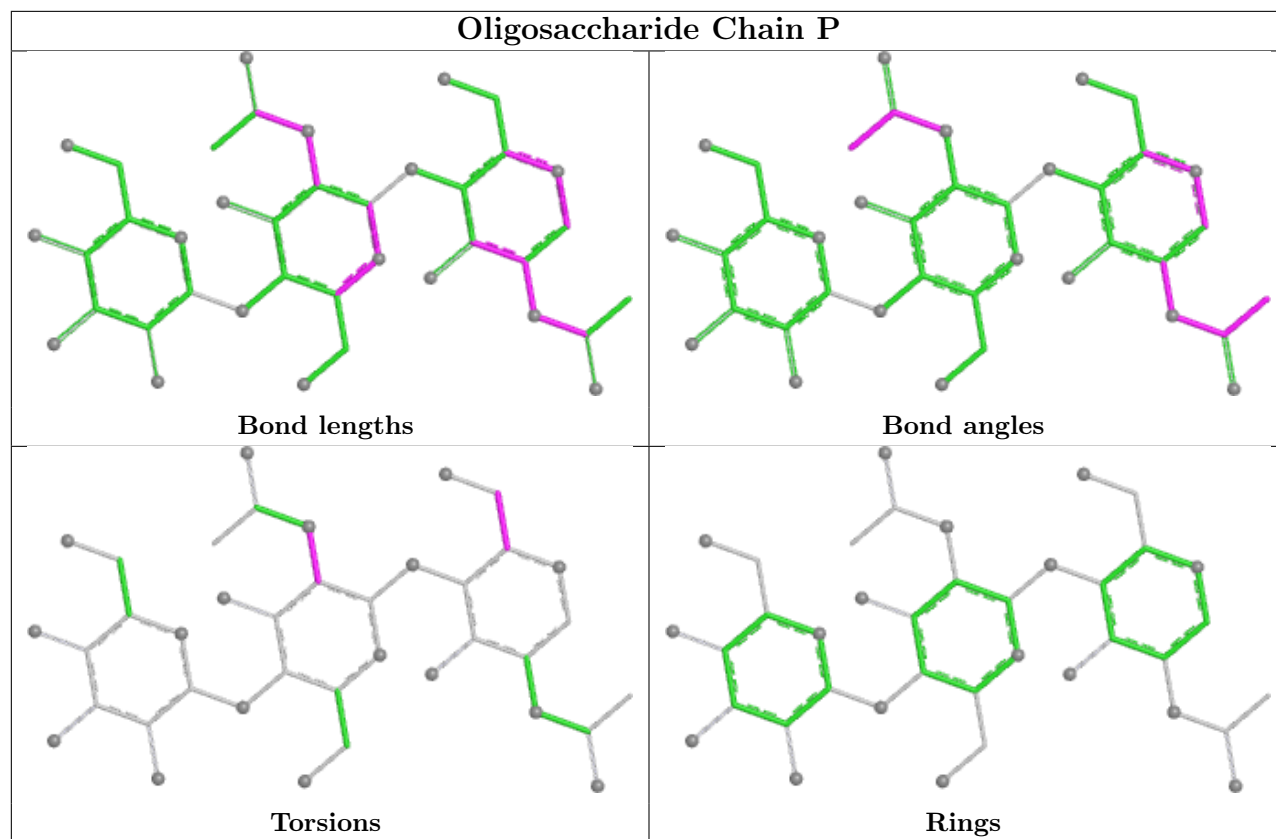


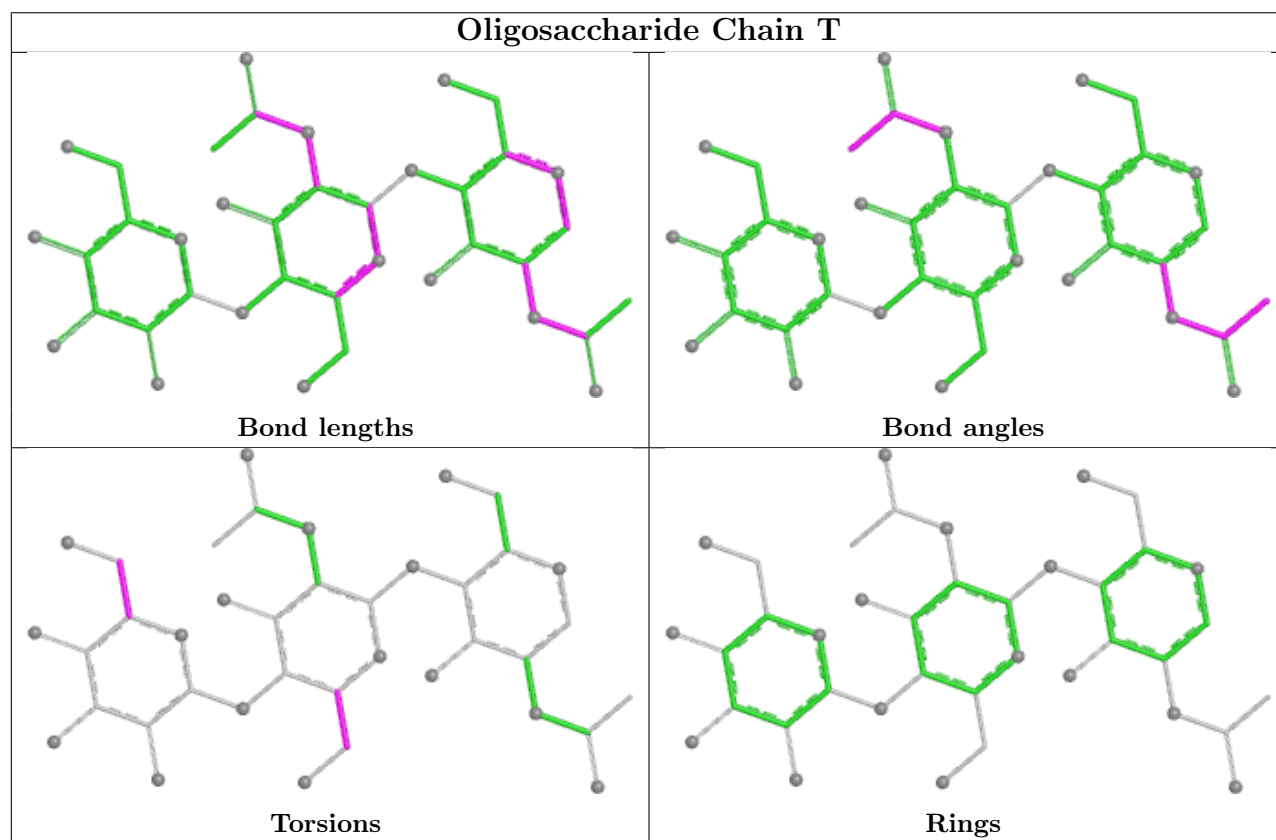
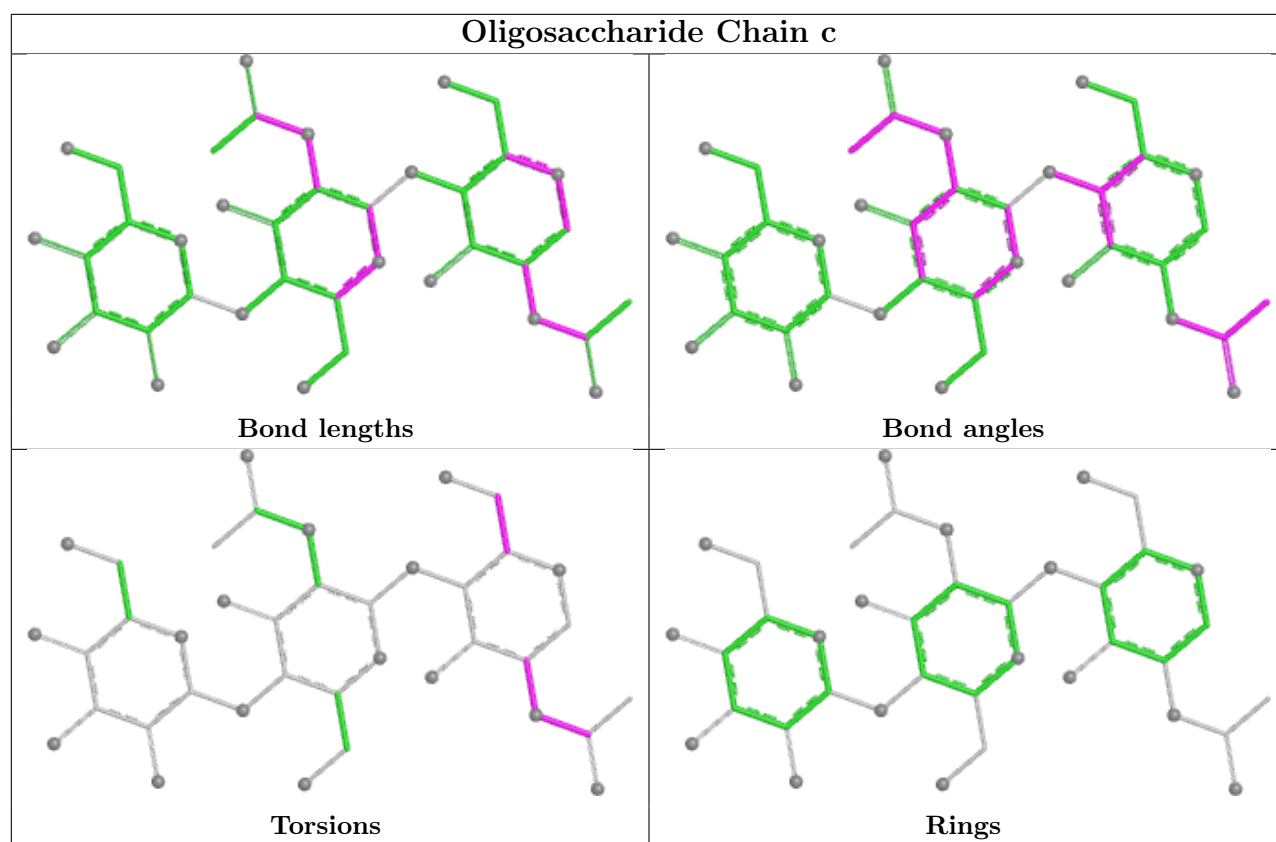


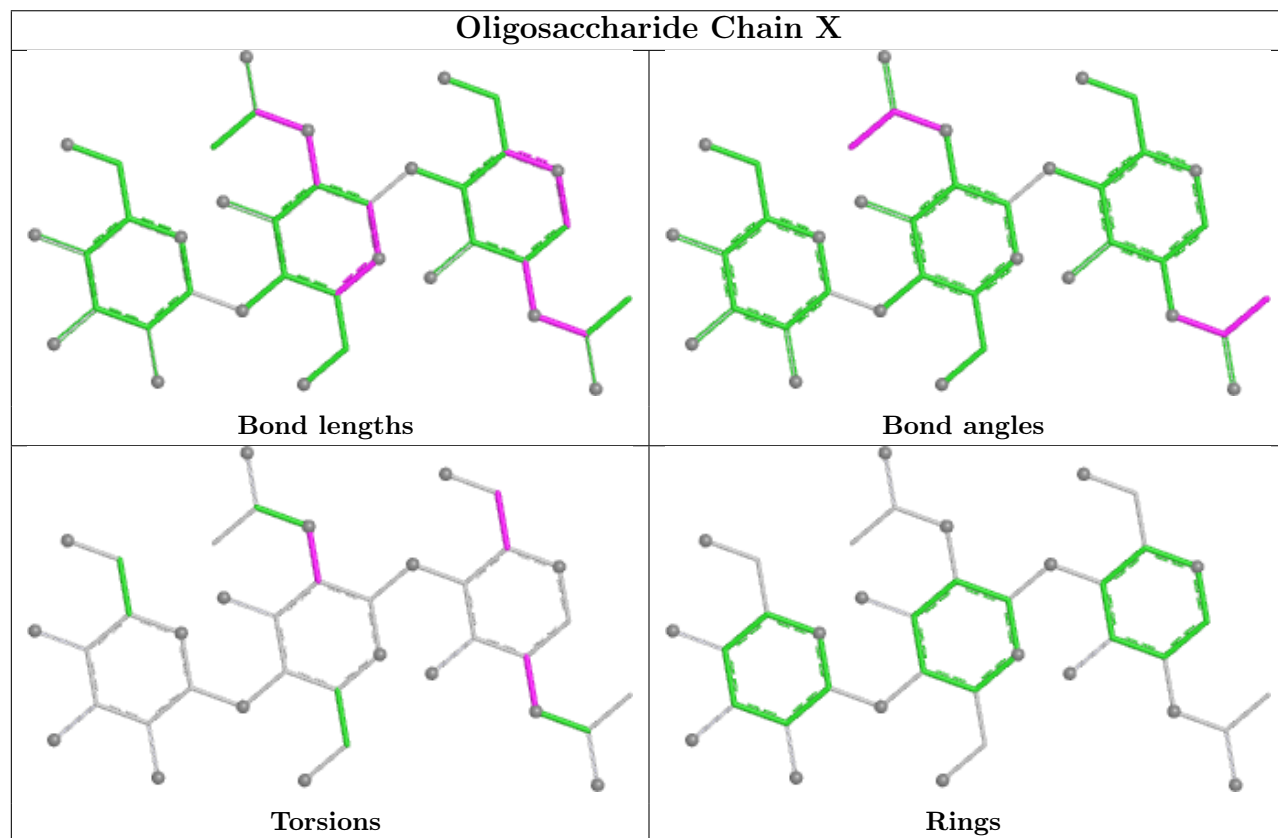
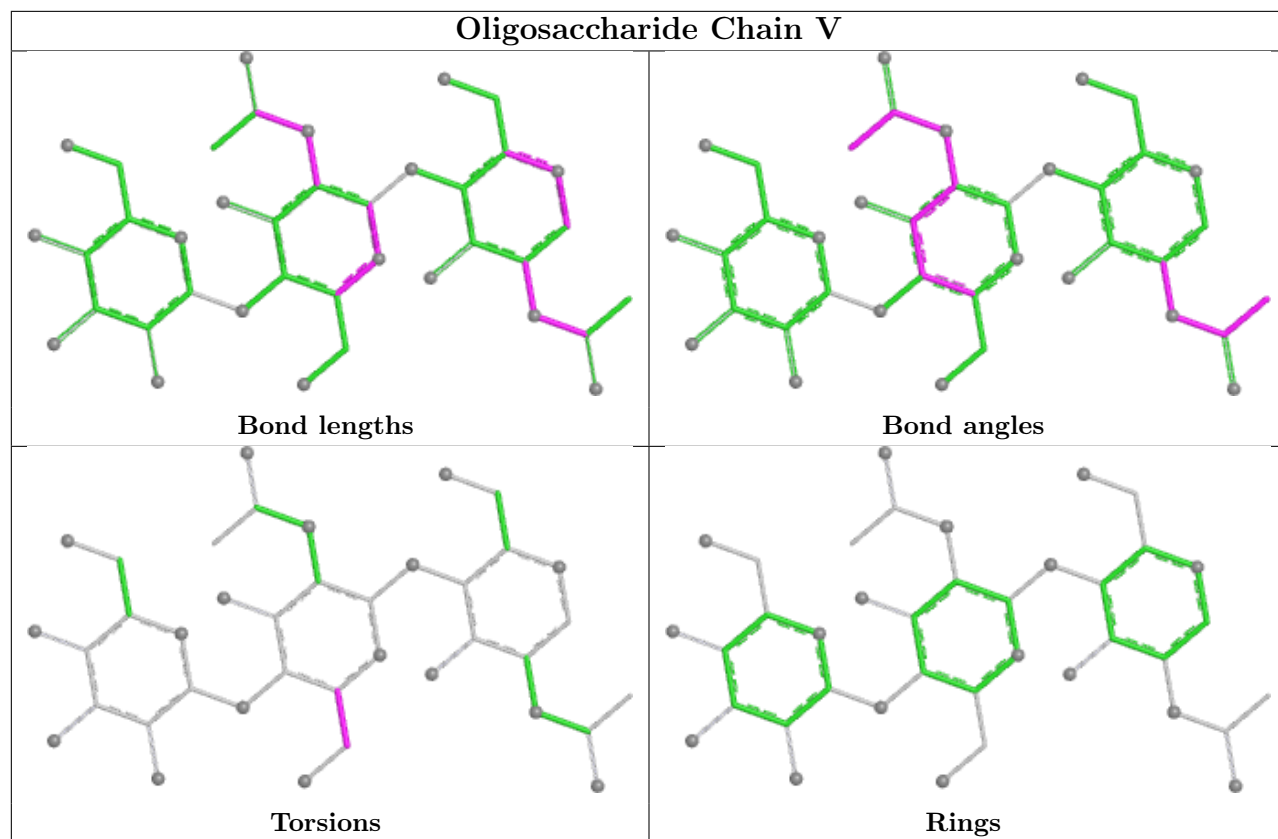


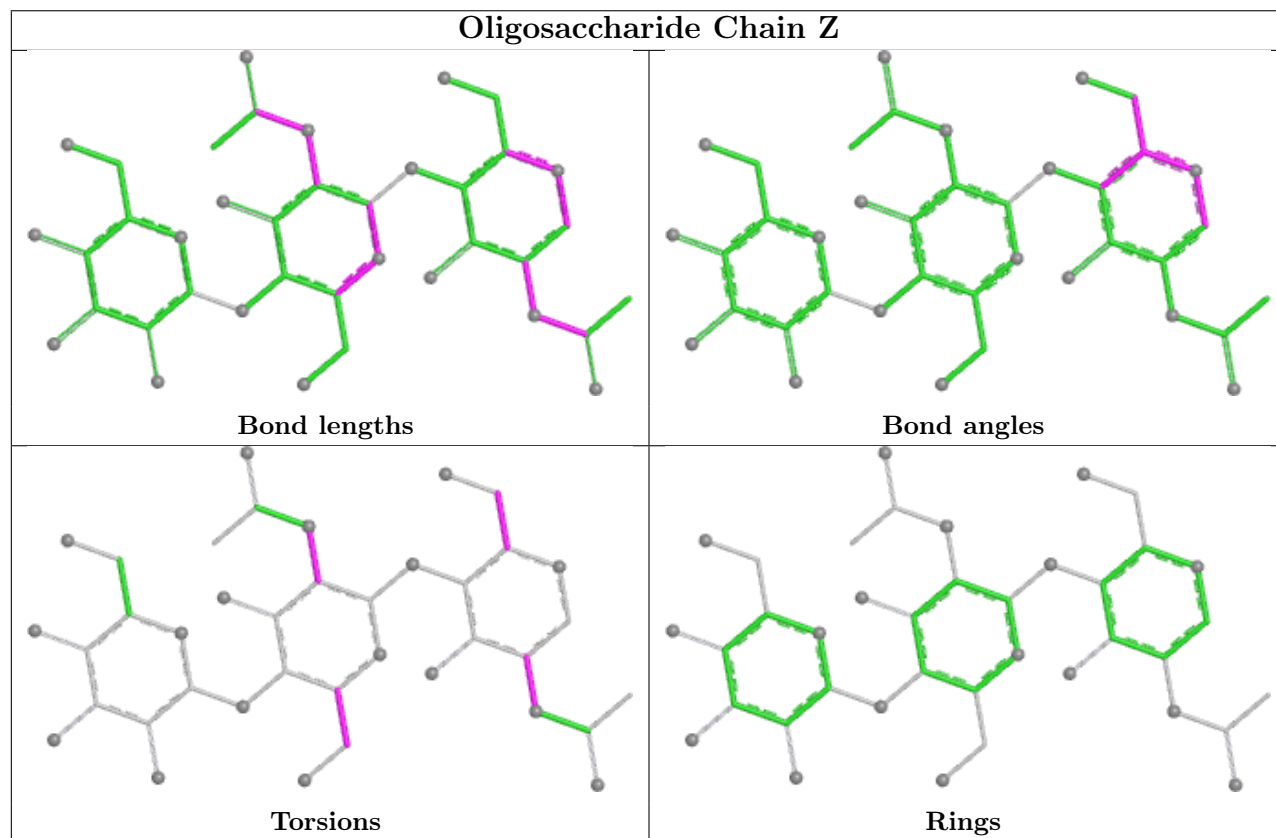
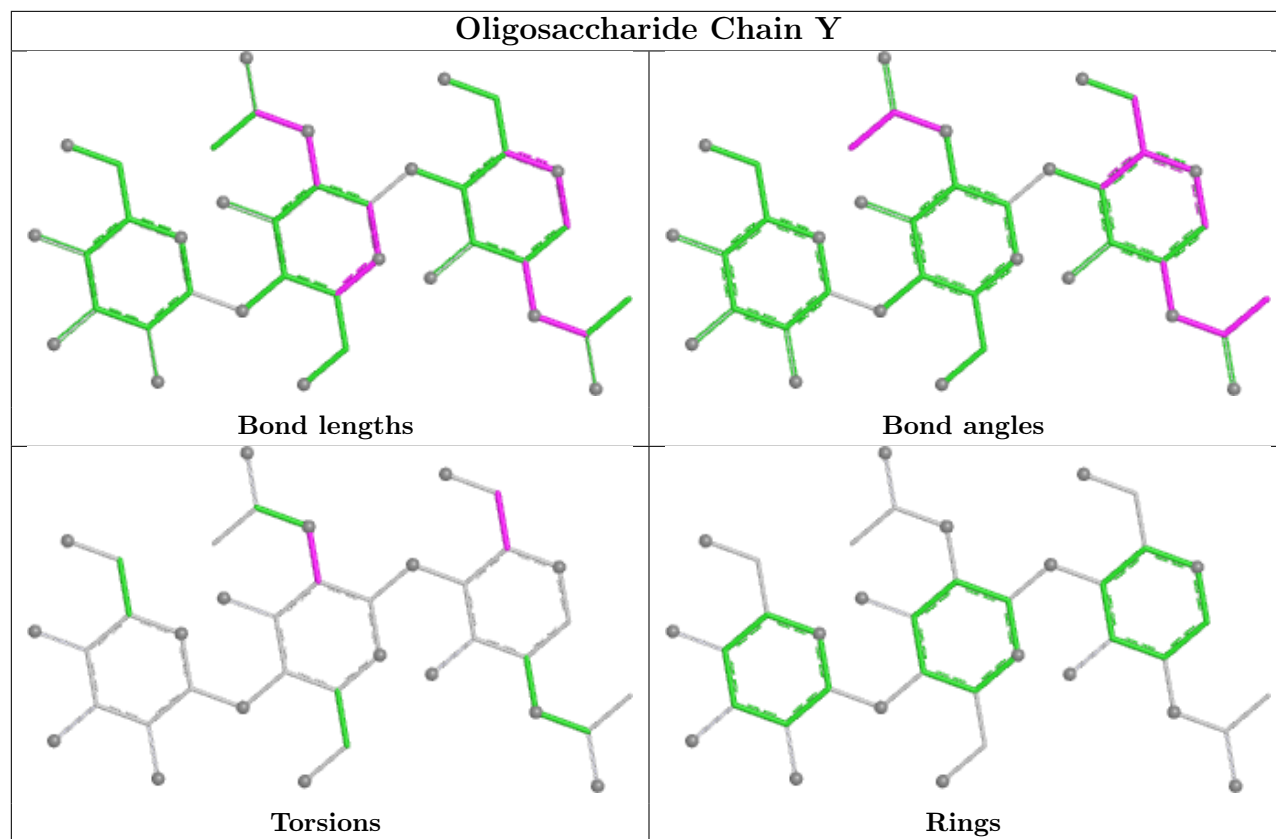


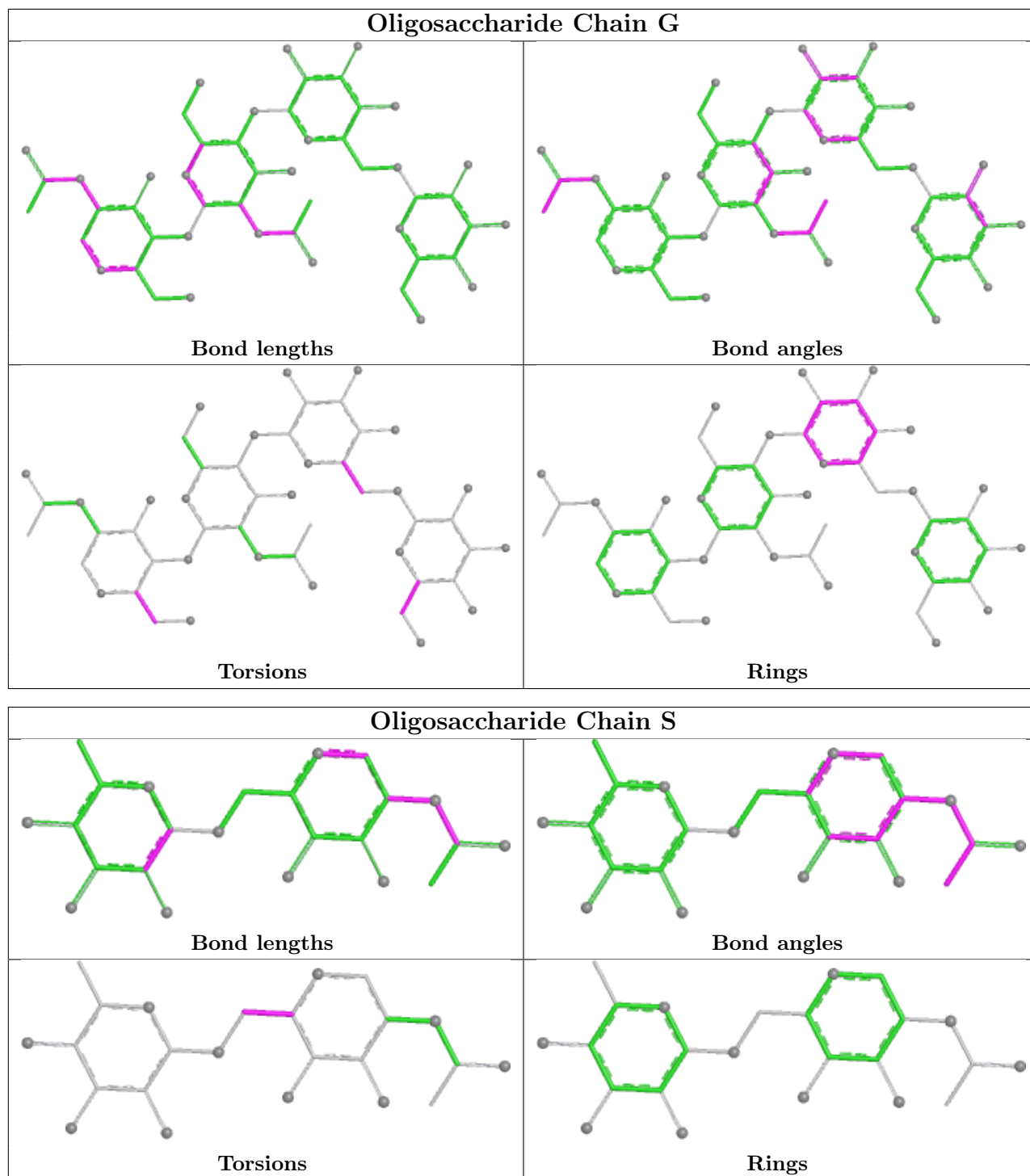












## 5.6 Ligand geometry [i](#)

18 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
7	NAG	B	1305	1	14,14,15	2.00	4 (28%)	17,19,21	1.17	2 (11%)
7	NAG	B	1306	1	14,14,15	2.07	4 (28%)	17,19,21	1.53	3 (17%)
7	NAG	A	1305	1	14,14,15	2.01	4 (28%)	17,19,21	1.21	2 (11%)
7	NAG	B	1303	1	14,14,15	2.08	4 (28%)	17,19,21	1.55	4 (23%)
7	NAG	B	1304	1	14,14,15	1.96	4 (28%)	17,19,21	1.34	3 (17%)
7	NAG	B	1307	1	14,14,15	1.95	4 (28%)	17,19,21	1.12	2 (11%)
7	NAG	C	1301	1	14,14,15	1.98	4 (28%)	17,19,21	2.61	4 (23%)
7	NAG	A	1302	1	14,14,15	2.02	4 (28%)	17,19,21	1.26	2 (11%)
7	NAG	C	1304	1	14,14,15	2.08	4 (28%)	17,19,21	1.31	1 (5%)
7	NAG	A	1307	1	14,14,15	2.01	4 (28%)	17,19,21	1.37	3 (17%)
7	NAG	A	1303	1	14,14,15	2.01	4 (28%)	17,19,21	1.24	1 (5%)
7	NAG	B	1301	1	14,14,15	2.05	4 (28%)	17,19,21	3.73	3 (17%)
7	NAG	C	1303	1	14,14,15	2.28	4 (28%)	17,19,21	2.50	9 (52%)
7	NAG	B	1302	1	14,14,15	2.05	4 (28%)	17,19,21	1.13	2 (11%)
7	NAG	C	1302	1	14,14,15	2.00	4 (28%)	17,19,21	1.11	1 (5%)
7	NAG	A	1301	1	14,14,15	2.03	3 (21%)	17,19,21	0.92	0
7	NAG	A	1304	1	14,14,15	1.98	4 (28%)	17,19,21	1.56	3 (17%)
7	NAG	A	1306	1	14,14,15	2.03	6 (42%)	17,19,21	2.42	5 (29%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	NAG	B	1305	1	-	2/6/23/26	0/1/1/1
7	NAG	B	1306	1	-	0/6/23/26	0/1/1/1
7	NAG	A	1305	1	-	0/6/23/26	0/1/1/1
7	NAG	B	1303	1	-	0/6/23/26	0/1/1/1
7	NAG	B	1304	1	-	0/6/23/26	0/1/1/1
7	NAG	B	1307	1	-	2/6/23/26	0/1/1/1
7	NAG	C	1301	1	-	3/6/23/26	0/1/1/1
7	NAG	A	1302	1	-	2/6/23/26	0/1/1/1
7	NAG	C	1304	1	-	3/6/23/26	0/1/1/1

Continued on next page...

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	NAG	A	1307	1	-	0/6/23/26	0/1/1/1
7	NAG	A	1303	1	-	2/6/23/26	0/1/1/1
7	NAG	B	1301	1	-	1/6/23/26	0/1/1/1
7	NAG	C	1303	1	-	6/6/23/26	0/1/1/1
7	NAG	B	1302	1	-	2/6/23/26	0/1/1/1
7	NAG	C	1302	1	-	2/6/23/26	0/1/1/1
7	NAG	A	1301	1	-	2/6/23/26	0/1/1/1
7	NAG	A	1304	1	-	1/6/23/26	0/1/1/1
7	NAG	A	1306	1	-	4/6/23/26	0/1/1/1

The worst 5 of 73 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	C	1303	NAG	O5-C1	5.38	1.52	1.43
7	B	1306	NAG	O5-C1	4.78	1.51	1.43
7	B	1303	NAG	O5-C1	4.70	1.51	1.43
7	B	1302	NAG	O5-C1	4.50	1.51	1.43
7	C	1304	NAG	O5-C1	4.48	1.51	1.43

The worst 5 of 50 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	1301	NAG	C1-O5-C5	-14.01	93.40	112.19
7	C	1301	NAG	C1-O5-C5	-7.82	101.70	112.19
7	A	1306	NAG	C2-N2-C7	-5.83	115.08	122.90
7	A	1306	NAG	C4-C3-C2	-5.05	103.61	111.02
7	B	1301	NAG	O5-C5-C6	4.83	117.06	107.66

There are no chirality outliers.

5 of 32 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	C	1303	NAG	C1-C2-N2-C7
7	C	1302	NAG	C4-C5-C6-O6
7	A	1306	NAG	C4-C5-C6-O6
7	A	1306	NAG	O5-C5-C6-O6
7	C	1303	NAG	O5-C5-C6-O6

There are no ring outliers.

9 monomers are involved in 14 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	1305	NAG	1	0
7	C	1301	NAG	1	0
7	A	1302	NAG	1	0
7	C	1304	NAG	1	0
7	A	1307	NAG	1	0
7	C	1303	NAG	3	0
7	B	1302	NAG	1	0
7	A	1304	NAG	2	0
7	A	1306	NAG	3	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.

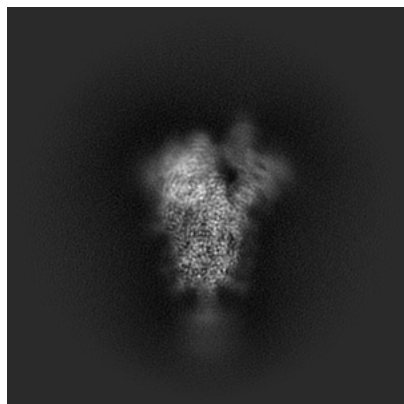
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-44116. These allow visual inspection of the internal detail of the map and identification of artifacts.

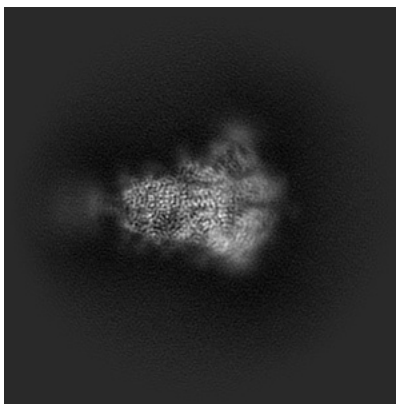
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

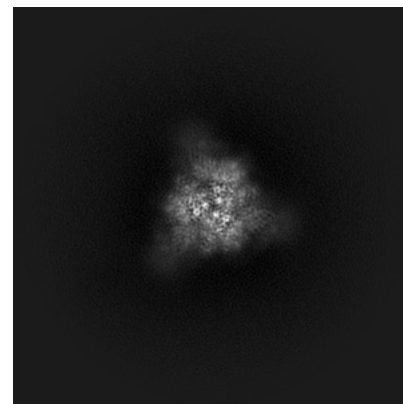
#### 6.1.1 Primary map



X

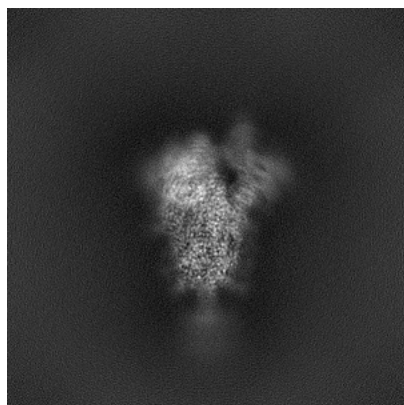


Y

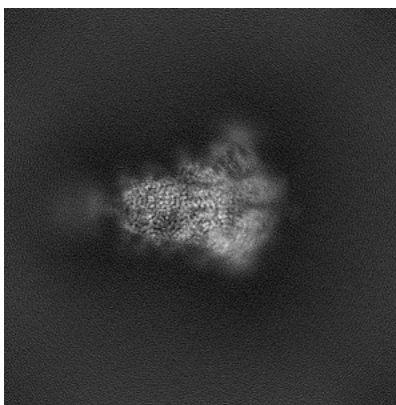


Z

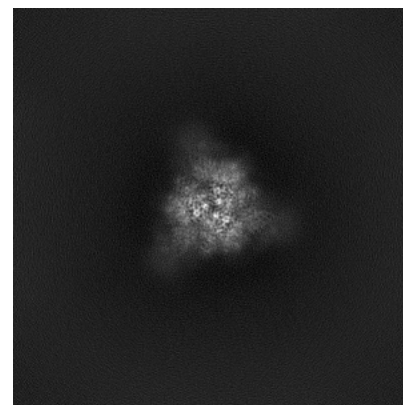
#### 6.1.2 Raw map



X



Y

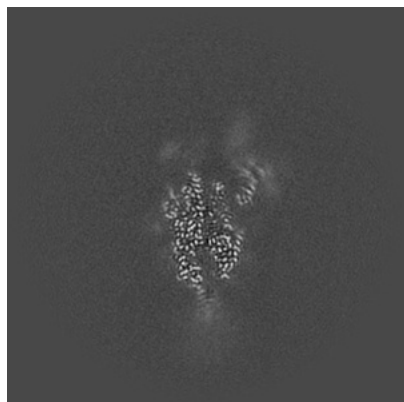


Z

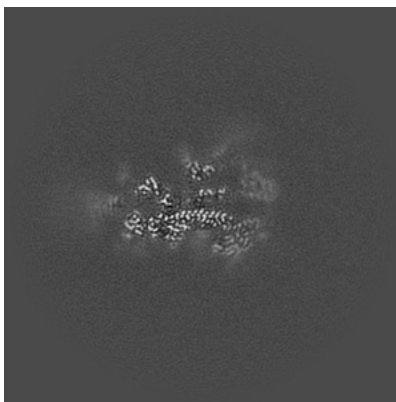
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

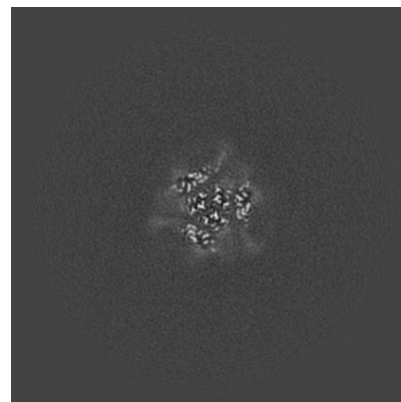
### 6.2.1 Primary map



X Index: 190

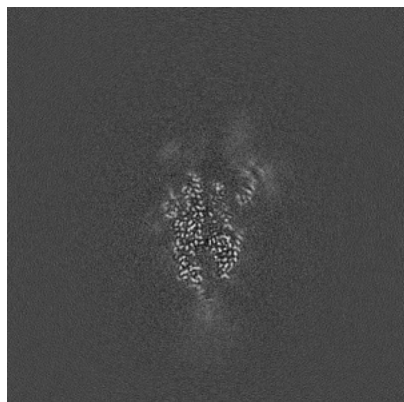


Y Index: 190

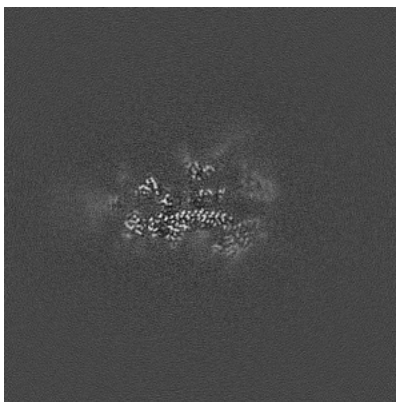


Z Index: 190

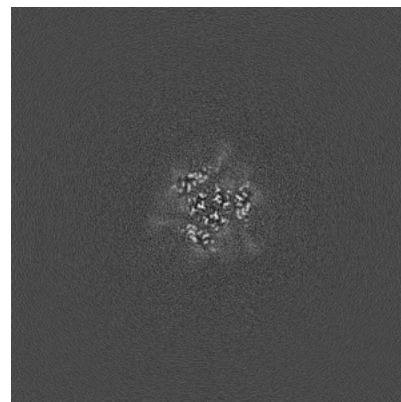
### 6.2.2 Raw map



X Index: 190



Y Index: 190

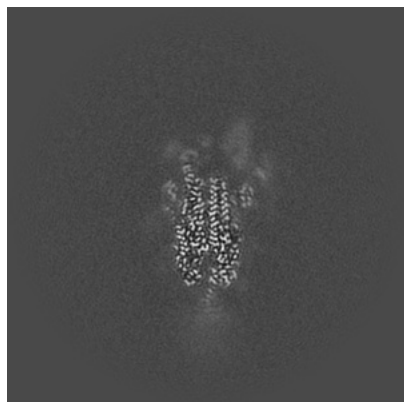


Z Index: 190

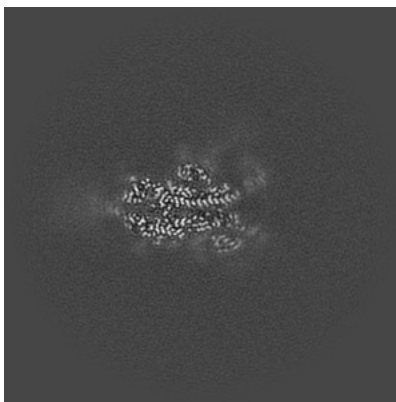
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

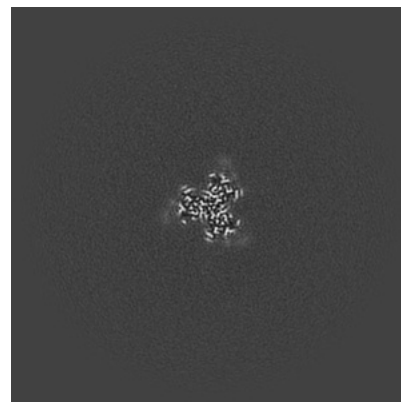
### 6.3.1 Primary map



X Index: 195



Y Index: 197



Z Index: 155

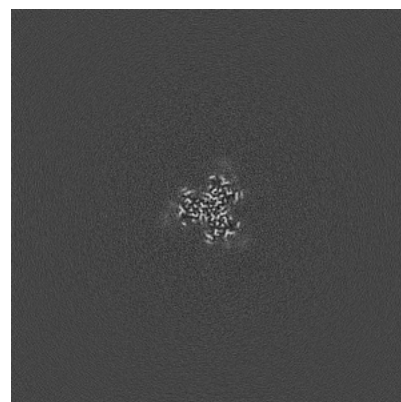
### 6.3.2 Raw map



X Index: 194



Y Index: 197

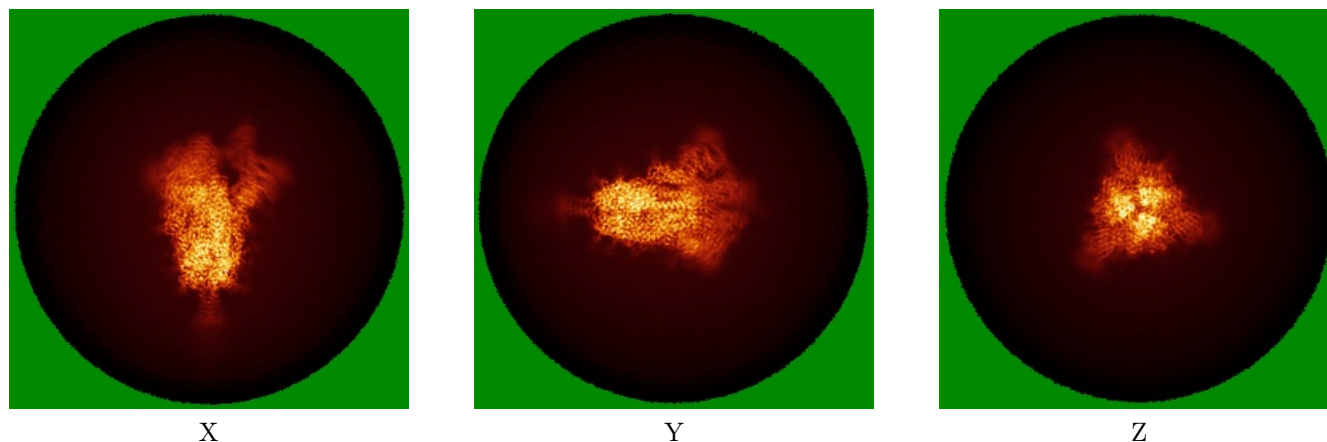


Z Index: 155

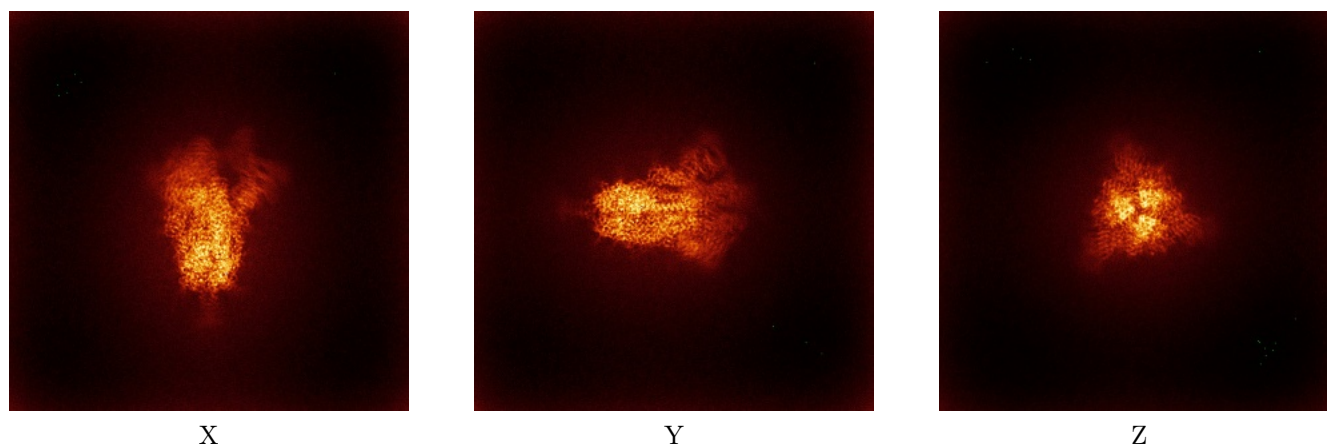
The images above show the largest variance slices of the map in three orthogonal directions.

## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

### 6.4.1 Primary map



### 6.4.2 Raw map



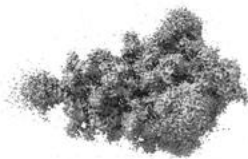
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



X



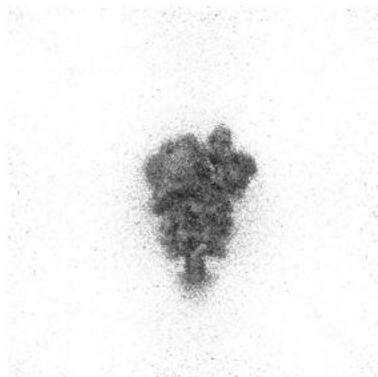
Y



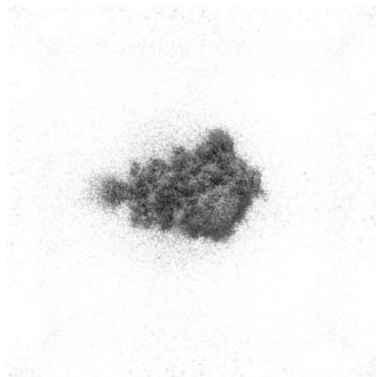
Z

The images above show the 3D surface view of the map at the recommended contour level 0.065. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

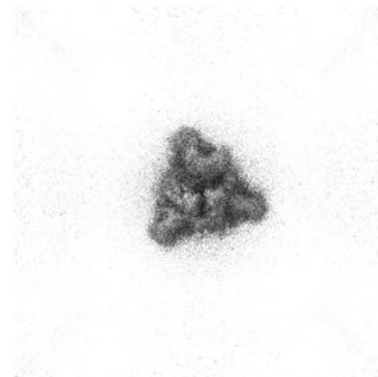
### 6.5.2 Raw map



X



Y



Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

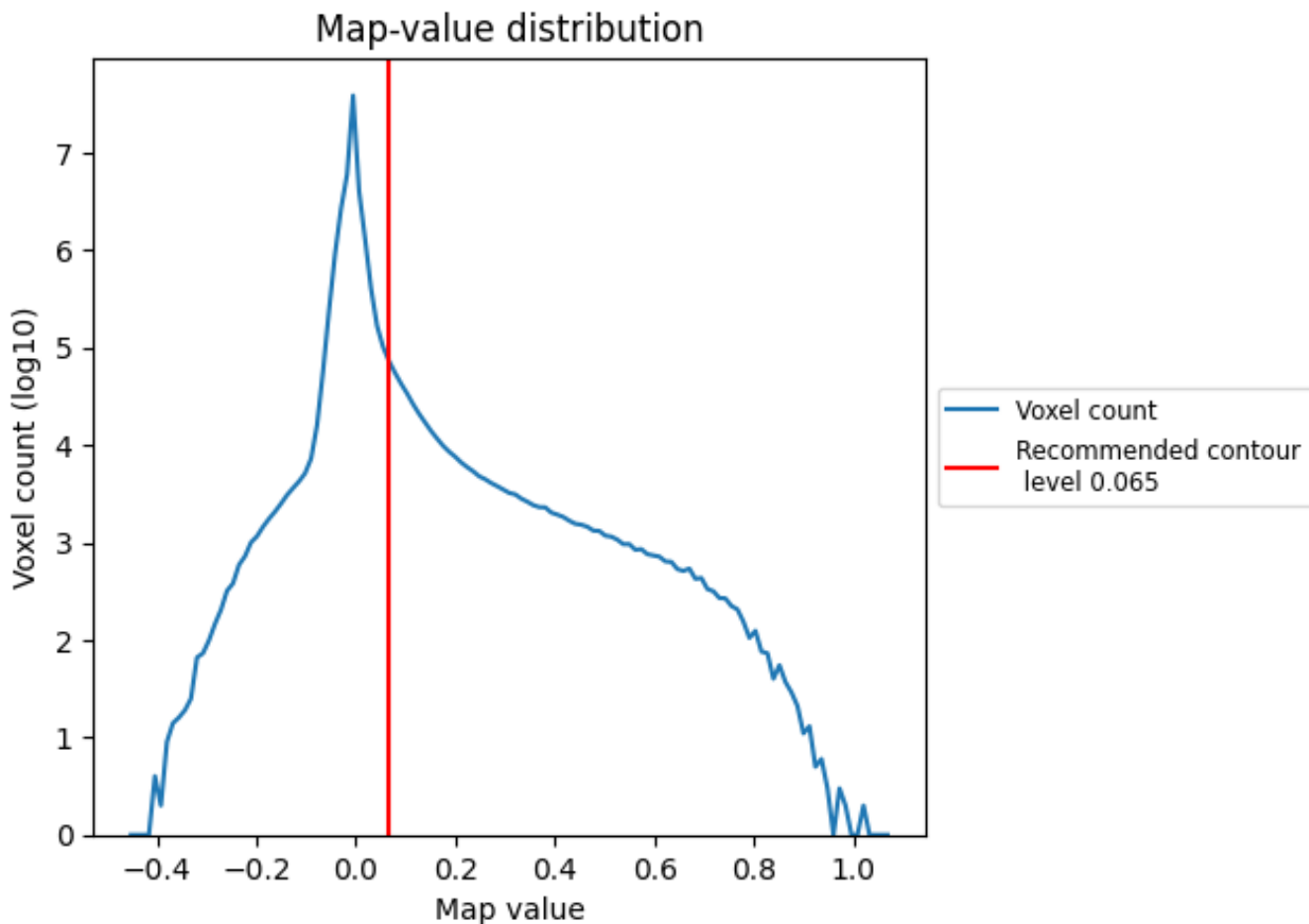
## 6.6 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

## 7 Map analysis [i](#)

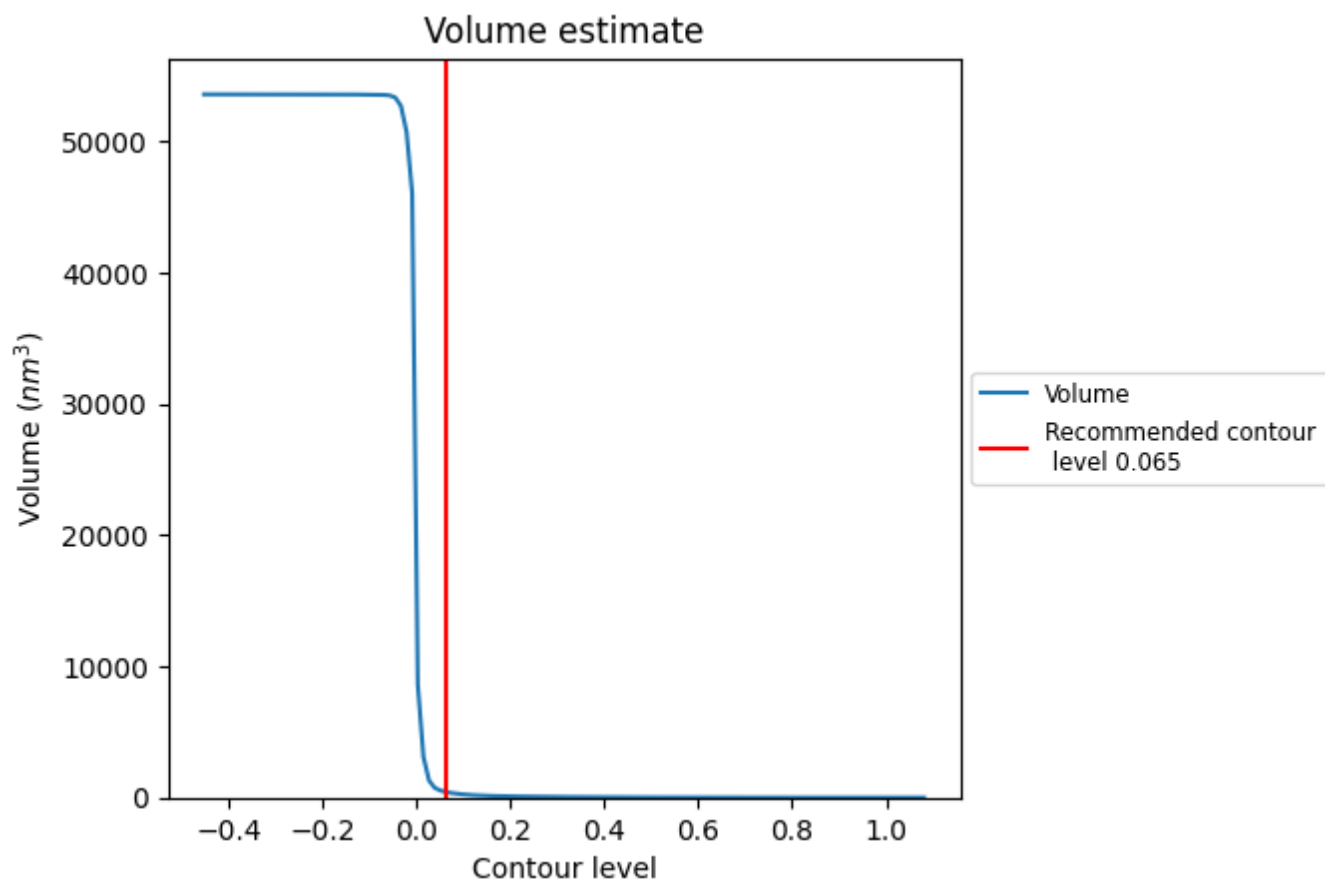
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

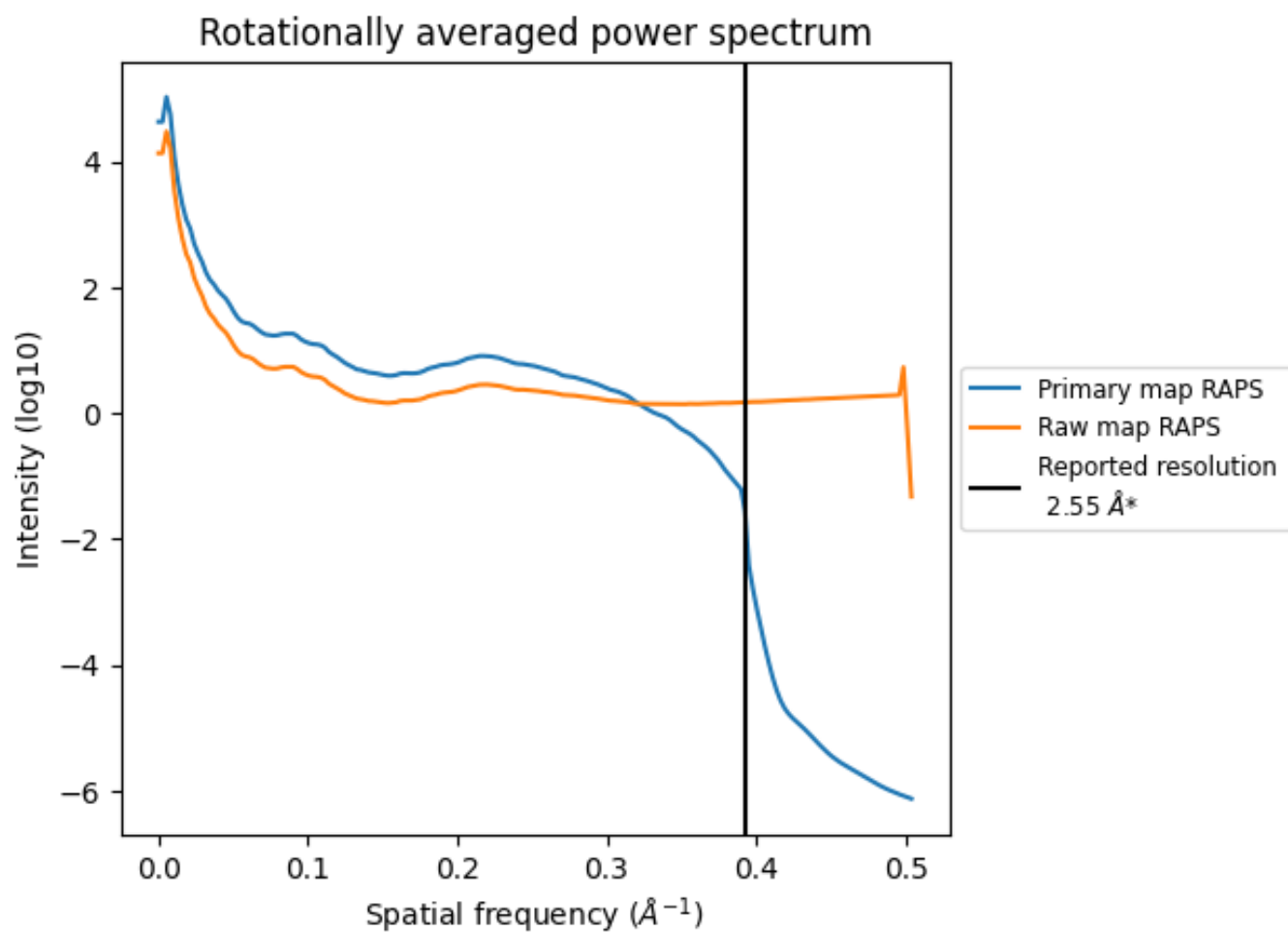
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 411  $\text{nm}^3$ ; this corresponds to an approximate mass of 371 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

### 7.3 Rotationally averaged power spectrum i

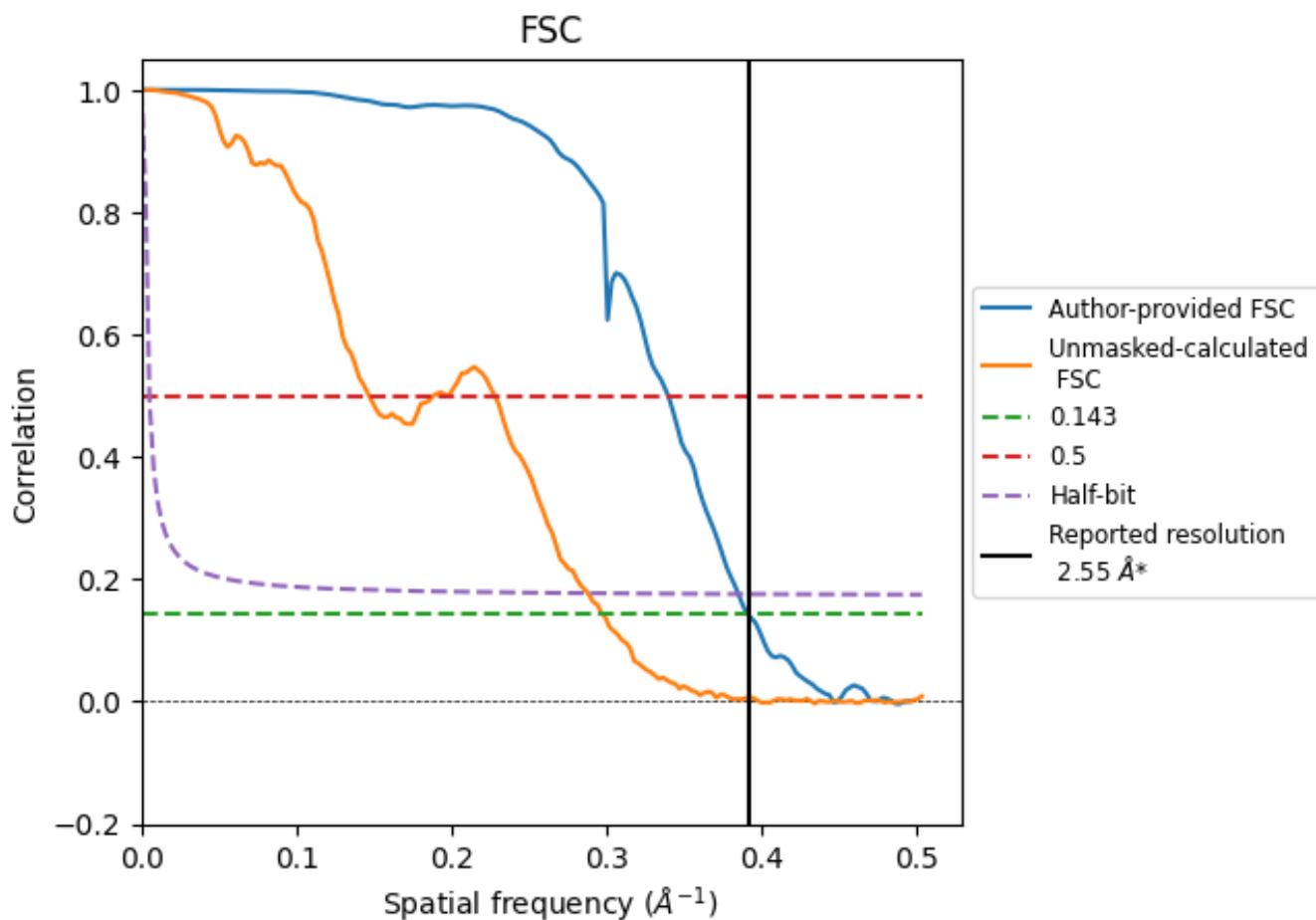


\*Reported resolution corresponds to spatial frequency of  $0.392 \text{ \AA}^{-1}$

## 8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.392 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

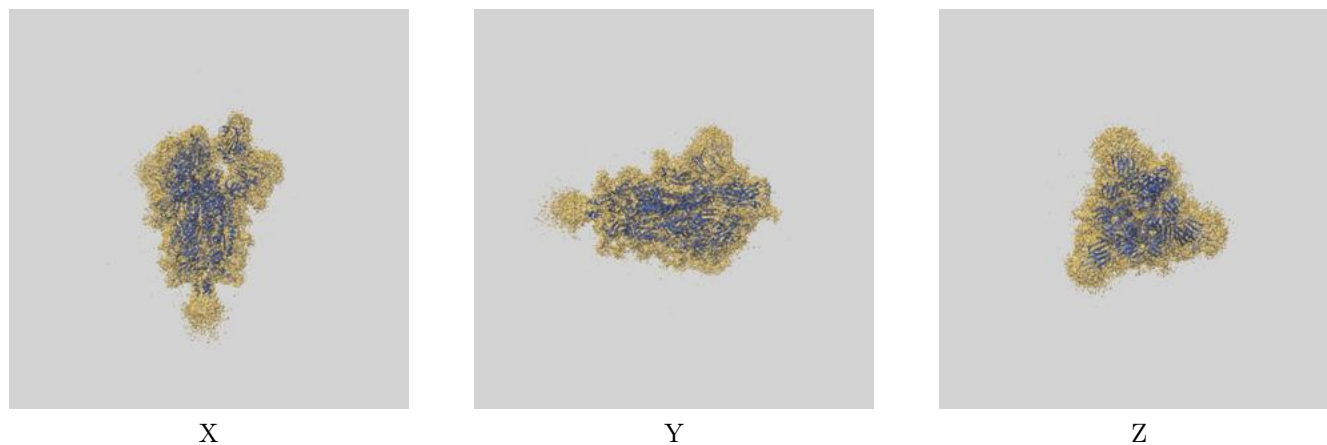
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.55	-	-
Author-provided FSC curve	2.55	2.94	2.59
Unmasked-calculated*	3.36	6.79	3.47

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.36 differs from the reported value 2.55 by more than 10 %

## 9 Map-model fit [i](#)

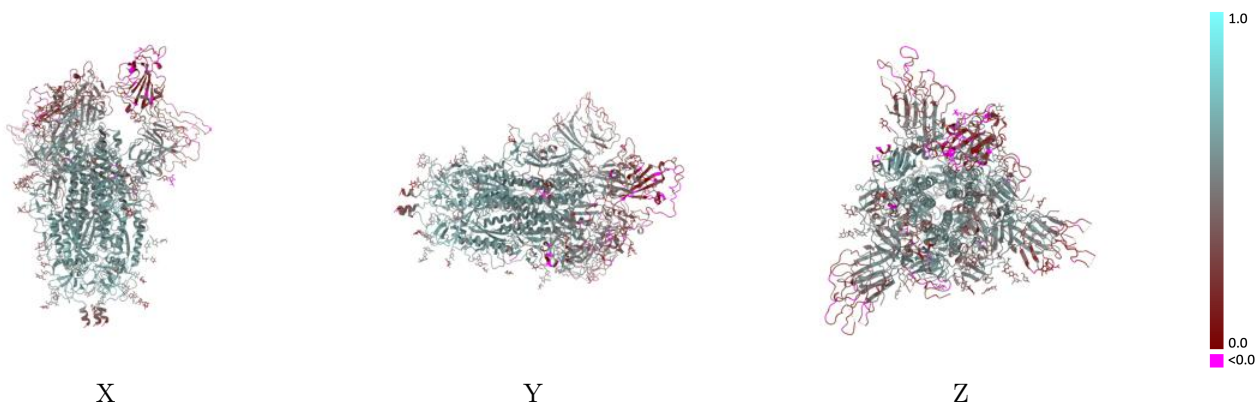
This section contains information regarding the fit between EMDB map EMD-44116 and PDB model 9B2V. Per-residue inclusion information can be found in section 3 on page 15.

### 9.1 Map-model overlay [i](#)



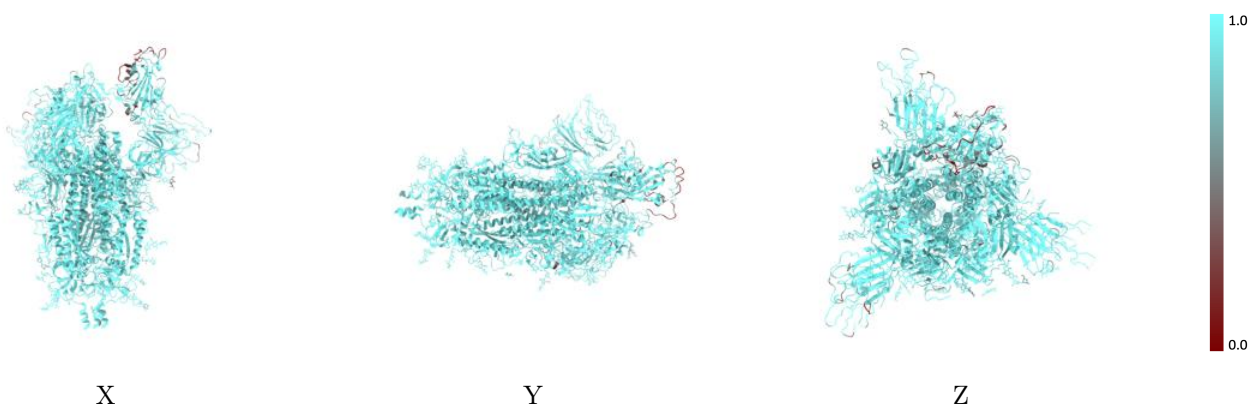
The images above show the 3D surface view of the map at the recommended contour level 0.065 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Q-score mapped to coordinate model [\(i\)](#)



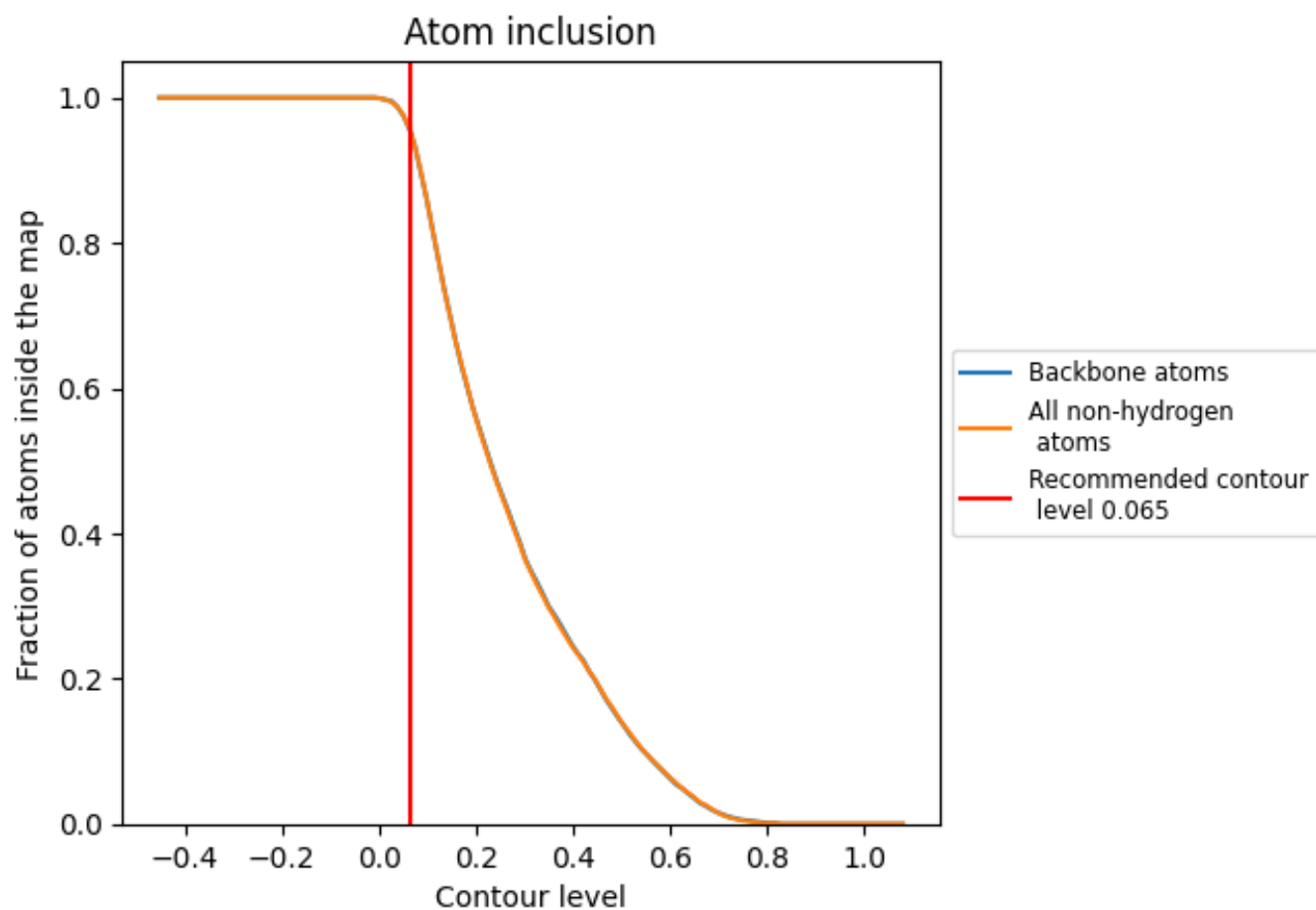
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

## 9.3 Atom inclusion mapped to coordinate model [\(i\)](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.065).































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 95% of all backbone atoms, 96% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.065) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9550	 0.4710
A	 0.9400	 0.4590
B	 0.9660	 0.4780
C	 0.9660	 0.4910
D	 0.7860	 0.1780
E	 0.9290	 0.3890
F	 1.0000	 0.5020
G	 0.9200	 0.4090
H	 0.9740	 0.3950
I	 0.8930	 0.3590
J	 0.9490	 0.3460
K	 0.9290	 0.3670
L	 0.8720	 0.2900
M	 0.9640	 0.3490
N	 0.9740	 0.4370
O	 1.0000	 0.4450
P	 0.9490	 0.4200
Q	 0.9490	 0.3240
R	 0.7140	 0.1020
S	 0.7920	 0.2400
T	 0.9740	 0.4580
U	 0.9290	 0.4210
V	 0.8720	 0.2350
W	 0.9640	 0.3760
X	 0.9230	 0.3770
Y	 0.9740	 0.4270
Z	 0.9490	 0.3150
a	 0.8600	 0.3070
b	 0.6790	 0.1350
c	 0.9490	 0.3880
d	 0.9290	 0.2390

