



## Full wwPDB EM Validation Report ⓘ

Feb 8, 2024 – 06:41 PM EST

PDB ID : 8EUW  
EMDB ID : EMD-28619  
Title : Cryo-EM structure of HIV-1 BG505 DS-SOSIP ENV trimer bound to VRC34.01-MM28 FAB  
Authors : Pletnev, S.; Kwong, P.  
Deposited on : 2022-10-19  
Resolution : 2.70 Å(reported)

This is a Full wwPDB EM 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/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.dev70  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

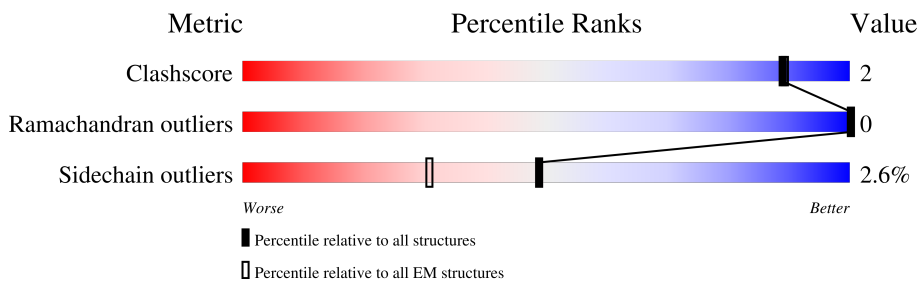
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 2.70 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.




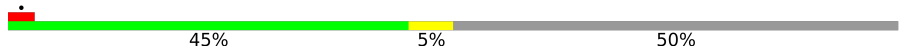
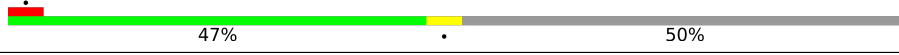

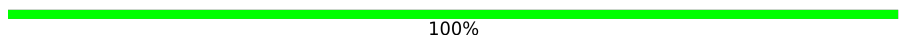

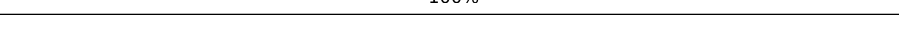
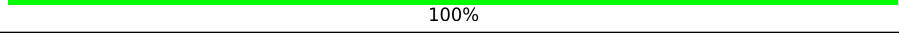
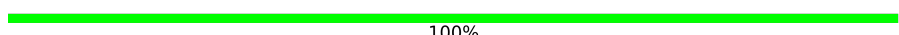

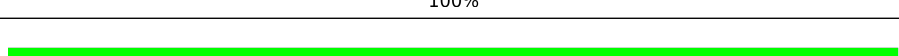
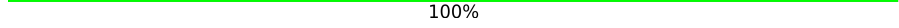


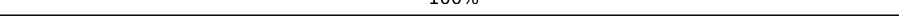
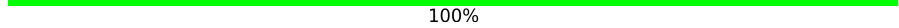


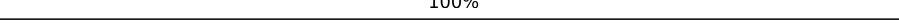
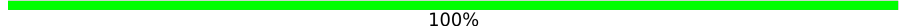


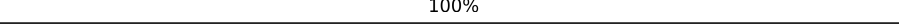


Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	481	
1	C	481	
1	E	481	
2	B	153	
2	D	153	
2	F	153	
3	G	223	
3	I	223	




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Mol	Chain	Length	Quality of chain
3	K	223	 50% 45%
4	H	212	 45% 5% 50%
4	J	212	 47% 50%
4	L	212	 47% 50%
5	M	2	 100%
5	O	2	 100%
5	Q	2	 100%
5	R	2	 100%
5	S	2	 100%
5	T	2	 100%
5	V	2	 50% 50%
5	X	2	 100%
5	Y	2	 100%
5	Z	2	 50% 50%
5	a	2	 100%
5	b	2	 100%
5	c	2	 100%
5	e	2	 100%
5	f	2	 100%
5	h	2	 100%
5	i	2	 100%
5	j	2	 100%
6	N	3	 100%
6	U	3	 100%
6	d	3	 100%

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Mol	Chain	Length	Quality of chain
7	P	5	 60% 40%
7	W	5	 60% 40%
7	g	5	 60% 40%

## 2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 20040 atoms, of which 0 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 Envelope glycoprotein gp120.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	441	3465	2173	611	651	30	0	0
1	C	441	3465	2173	611	651	30	0	0
1	E	441	3465	2173	611	651	30	0	0

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	201	CYS	ILE	conflict	UNP Q2N0S6
A	332	ASN	THR	conflict	UNP Q2N0S6
A	433	CYS	ALA	conflict	UNP Q2N0S6
A	501	CYS	ALA	conflict	UNP Q2N0S6
A	509	ARG	GLU	conflict	UNP Q2N0S6
A	510	ARG	LYS	conflict	UNP Q2N0S6
A	512	ARG	ALA	conflict	UNP Q2N0S6
A	513	ARG	VAL	conflict	UNP Q2N0S6
C	201	CYS	ILE	conflict	UNP Q2N0S6
C	332	ASN	THR	conflict	UNP Q2N0S6
C	433	CYS	ALA	conflict	UNP Q2N0S6
C	501	CYS	ALA	conflict	UNP Q2N0S6
C	509	ARG	GLU	conflict	UNP Q2N0S6
C	510	ARG	LYS	conflict	UNP Q2N0S6
C	512	ARG	ALA	conflict	UNP Q2N0S6
C	513	ARG	VAL	conflict	UNP Q2N0S6
E	201	CYS	ILE	conflict	UNP Q2N0S6
E	332	ASN	THR	conflict	UNP Q2N0S6
E	433	CYS	ALA	conflict	UNP Q2N0S6
E	501	CYS	ALA	conflict	UNP Q2N0S6
E	509	ARG	GLU	conflict	UNP Q2N0S6
E	510	ARG	LYS	conflict	UNP Q2N0S6
E	512	ARG	ALA	conflict	UNP Q2N0S6
E	513	ARG	VAL	conflict	UNP Q2N0S6

- Molecule 2 is a protein called Envelope glycoprotein gp41.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	130	Total	C	N	O	S	0	0
			1022	648	176	192	6		
2	D	130	Total	C	N	O	S	0	0
			1022	648	176	192	6		
2	F	130	Total	C	N	O	S	0	0
			1022	648	176	192	6		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	559	PRO	ILE	conflict	UNP Q2N0S6
B	605	CYS	THR	conflict	UNP Q2N0S6
D	559	PRO	ILE	conflict	UNP Q2N0S6
D	605	CYS	THR	conflict	UNP Q2N0S6
F	559	PRO	ILE	conflict	UNP Q2N0S6
F	605	CYS	THR	conflict	UNP Q2N0S6

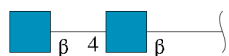
- Molecule 3 is a protein called VRC34.01-MM28 FAB variable heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	G	122	Total	C	N	O	S	0	0
			950	600	166	180	4		
3	I	122	Total	C	N	O	S	0	0
			950	600	166	180	4		
3	K	122	Total	C	N	O	S	0	0
			950	600	166	180	4		

- Molecule 4 is a protein called VRC34.01-MM28 FAB variable light chain.

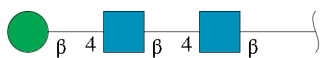
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	H	107	Total	C	N	O	S	0	0
			817	519	136	159	3		
4	J	107	Total	C	N	O	S	0	0
			817	519	136	159	3		
4	L	107	Total	C	N	O	S	0	0
			817	519	136	159	3		

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



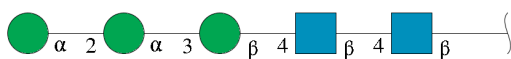
Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
5	a	2	28	16	2	10	0	0
5	M	2	28	16	2	10	0	0
5	O	2	28	16	2	10	0	0
5	Q	2	28	16	2	10	0	0
5	R	2	28	16	2	10	0	0
5	S	2	28	16	2	10	0	0
5	c	2	28	16	2	10	0	0
5	T	2	28	16	2	10	0	0
5	V	2	28	16	2	10	0	0
5	X	2	28	16	2	10	0	0
5	Y	2	28	16	2	10	0	0
5	Z	2	28	16	2	10	0	0
5	e	2	28	16	2	10	0	0
5	b	2	28	16	2	10	0	0
5	f	2	28	16	2	10	0	0
5	h	2	28	16	2	10	0	0
5	i	2	28	16	2	10	0	0
5	j	2	28	16	2	10	0	0

- Molecule 6 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
			Total	C	N	O		
6	N	3	39	22	2	15	0	0
6	U	3	39	22	2	15	0	0
6	d	3	39	22	2	15	0	0

- Molecule 7 is an oligosaccharide called alpha-D-mannopyranose-(1-2)-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.



Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
7	P	5	61	34	2	25	0	0
7	W	5	61	34	2	25	0	0
7	g	5	61	34	2	25	0	0

- Molecule 8 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula:  $C_8H_{15}NO_6$ ).





Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
8	A	1	Total 14	8	1	5	0
8	A	1	Total 14	8	1	5	0
8	A	1	Total 14	8	1	5	0
8	A	1	Total 14	8	1	5	0
8	A	1	Total 14	8	1	5	0
8	A	1	Total 14	8	1	5	0
8	A	1	Total 14	8	1	5	0
8	A	1	Total 14	8	1	5	0
8	C	1	Total 14	8	1	5	0
8	C	1	Total 14	8	1	5	0
8	C	1	Total 14	8	1	5	0
8	C	1	Total 14	8	1	5	0
8	C	1	Total 14	8	1	5	0
8	C	1	Total 14	8	1	5	0
8	C	1	Total 14	8	1	5	0

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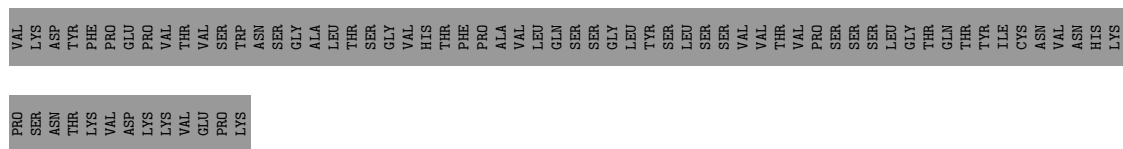
Mol	Chain	Residues	Atoms				AltConf
8	E	1	Total	C	N	O	0
			14	8	1	5	
8	E	1	Total	C	N	O	0
			14	8	1	5	
8	E	1	Total	C	N	O	0
			14	8	1	5	
8	E	1	Total	C	N	O	0
			14	8	1	5	
8	E	1	Total	C	N	O	0
			14	8	1	5	
8	E	1	Total	C	N	O	0
			14	8	1	5	

- Molecule 9 is water.

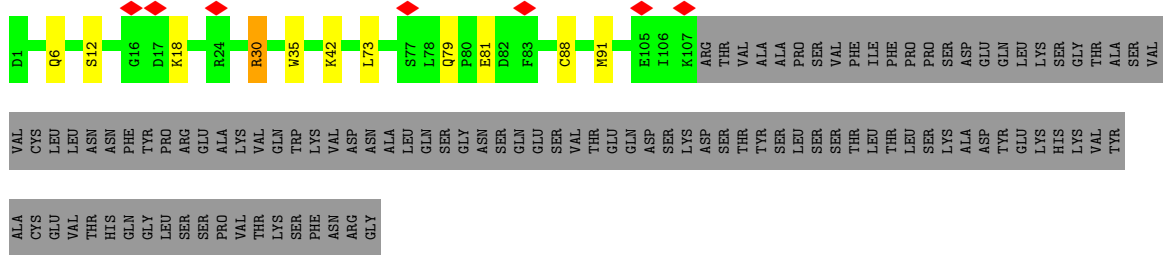
Mol	Chain	Residues	Atoms		AltConf
9	A	54	Total	O	0
			54	54	
9	B	3	Total	O	0
			3	3	
9	C	56	Total	O	0
			56	56	
9	D	3	Total	O	0
			3	3	
9	E	61	Total	O	0
			61	61	
9	F	2	Total	O	0
			2	2	
9	K	1	Total	O	0
			1	1	



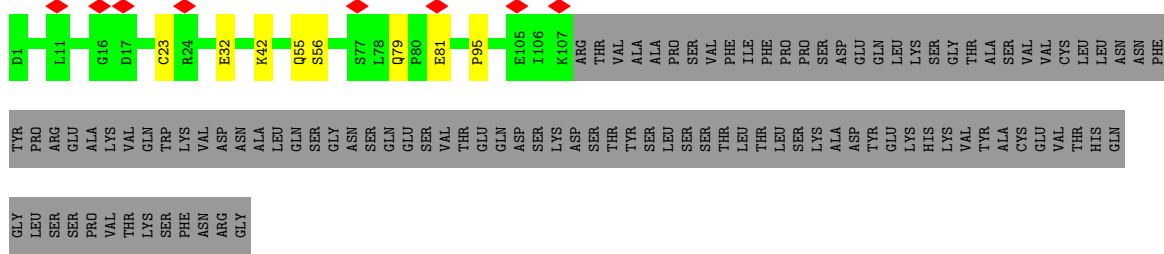




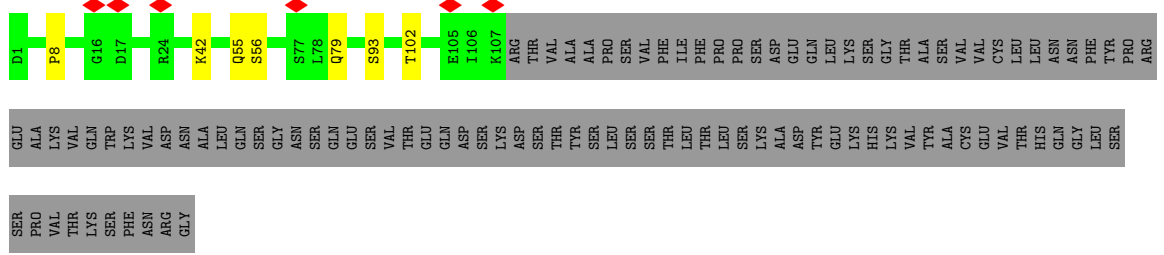
• Molecule 4: VRC34.01-MM28 FAB variable light chain



• Molecule 4: VRC34.01-MM28 FAB variable light chain



• Molecule 4: VRC34.01-MM28 FAB variable light chain



• Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



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

Chain M:  100%

MAG1  
MAG2

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

Chain O:  100%

MAG1  
MAG2

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

Chain Q:  100%

MAG1  
MAG2

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

Chain R:  100%

MAG1  
MAG2

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

Chain S:  100%

MAG1  
MAG2

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

Chain c:  100%

MAG1  
MAG2

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

Chain T:  100%

MAG1  
MAG2

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

Chain V:  50% 50%MAG1  
MAG2

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

Chain X:  100%MAG1  
MAG2

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

Chain Y:  100%MAG1  
MAG2

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

Chain Z:  50% 50%MAG1  
MAG2

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

Chain e:  100%MAG1  
MAG2

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

Chain b:  100%MAG1  
MAG2

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

Chain f:  100%

MAG1  
MAG2

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

Chain h:  100%

MAG1  
MAG2

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

Chain i:  100%

MAG1  
MAG2

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

Chain j:  100%

MAG1  
MAG2

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

Chain N:  100%

MAG1  
MAG2  
BMA3

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

Chain U:  100%

MAG1  
MAG2  
BMA3

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

Chain d:  100%



MAG1  
MAG2  
BMA3

- Molecule 7: alpha-D-mannopyranose-(1-2)-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 P:  60% 40%

MAG1  
MAG2  
BMA3  
MAN4  
MAN5

- Molecule 7: alpha-D-mannopyranose-(1-2)-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 W:  60% 40%

MAG1  
MAG2  
BMA3  
MAN4  
MAN5

- Molecule 7: alpha-D-mannopyranose-(1-2)-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 g:  60% 40%

MAG1  
MAG2  
BMA3  
MAN4  
MAN5

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C3	Depositor
Number of particles used	918637	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	43.5	Depositor
Minimum defocus (nm)	700	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	3.183	Depositor
Minimum map value	-2.081	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.038	Depositor
Recommended contour level	0.1	Depositor
Map size (Å)	365.19998, 365.19998, 365.19998	wwPDB
Map dimensions	440, 440, 440	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.83, 0.83, 0.83	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: BMA, MAN, NAG

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	0.26	0/3537	0.54	0/4802
1	C	0.25	0/3537	0.53	0/4802
1	E	0.26	0/3537	0.54	0/4802
2	B	0.25	0/1040	0.49	0/1411
2	D	0.25	0/1040	0.49	0/1411
2	F	0.25	0/1040	0.50	0/1411
3	G	0.25	0/974	0.54	0/1321
3	I	0.25	0/974	0.54	0/1321
3	K	0.25	0/974	0.54	0/1321
4	H	0.29	0/837	0.55	0/1137
4	J	1.04	5/837 (0.6%)	1.09	5/1137 (0.4%)
4	L	0.27	0/837	0.53	0/1137
All	All	0.33	5/19164 (0.0%)	0.57	5/26013 (0.0%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	J	95	PRO	CB-CG	19.90	2.49	1.50
4	J	95	PRO	CG-CD	-15.77	0.98	1.50
4	J	95	PRO	N-CA	-9.62	1.30	1.47
4	J	95	PRO	N-CD	8.77	1.60	1.47
4	J	95	PRO	CA-CB	-5.15	1.43	1.53

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	J	95	PRO	CB-CG-CD	-23.49	14.90	106.50
4	J	95	PRO	N-CA-CB	-12.94	87.77	103.30
4	J	95	PRO	CA-N-CD	-11.67	95.16	111.50
4	J	95	PRO	N-CD-CG	-7.99	91.22	103.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	J	95	PRO	CA-CB-CG	-7.54	89.67	104.00

There are no chirality outliers.

There are no planarity outliers.

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

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3465	0	3391	18	0
1	C	3465	0	3391	11	0
1	E	3465	0	3391	17	0
2	B	1022	0	1007	2	0
2	D	1022	0	1007	4	0
2	F	1022	0	1007	2	0
3	G	950	0	915	2	0
3	I	950	0	915	5	0
3	K	950	0	915	5	0
4	H	817	0	800	3	0
4	J	817	0	800	2	0
4	L	817	0	800	2	0
5	M	28	0	25	0	0
5	O	28	0	25	0	0
5	Q	28	0	25	0	0
5	R	28	0	25	0	0
5	S	28	0	25	0	0
5	T	28	0	25	0	0
5	V	28	0	25	1	0
5	X	28	0	25	0	0
5	Y	28	0	25	0	0
5	Z	28	0	25	1	0
5	a	28	0	25	0	0
5	b	28	0	25	0	0
5	c	28	0	25	0	0
5	e	28	0	25	0	0
5	f	28	0	25	0	0
5	h	28	0	25	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	i	28	0	25	0	0
5	j	28	0	25	0	0
6	N	39	0	34	0	0
6	U	39	0	34	0	0
6	d	39	0	34	0	0
7	P	61	0	52	0	0
7	W	61	0	52	0	0
7	g	61	0	52	0	0
8	A	98	0	91	0	0
8	C	98	0	91	0	0
8	E	98	0	91	0	0
9	A	54	0	0	3	0
9	B	3	0	0	0	0
9	C	56	0	0	2	0
9	D	3	0	0	0	0
9	E	61	0	0	4	0
9	F	2	0	0	0	0
9	K	1	0	0	0	0
All	All	20040	0	19320	72	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 2.

All (72) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:164:GLU:OE2	1:A:308:ARG:NH1	2.22	0.73
1:A:37:THR:HG1	1:A:499:THR:HG1	1.33	0.71
1:E:56:SER:OG	1:E:71:THR:OG1	2.12	0.67
1:A:258:GLN:NE2	1:A:371:VAL:O	2.29	0.66
1:C:56:SER:OG	1:C:71:THR:OG1	2.12	0.66
1:C:258:GLN:NE2	1:C:371:VAL:O	2.29	0.65
1:E:293:GLN:O	9:E:701:HOH:O	2.15	0.65
1:A:56:SER:OG	1:A:71:THR:OG1	2.14	0.64
1:E:258:GLN:NE2	1:E:371:VAL:O	2.30	0.64
3:K:32:ASN:ND2	3:K:95:ASP:O	2.30	0.64
1:C:37:THR:OG1	1:C:499:THR:OG1	2.09	0.62
3:G:23:ARG:NH1	3:G:75:ILE:O	2.33	0.61
1:C:164:GLU:OE2	1:C:308:ARG:NH1	2.33	0.61
1:A:119:CYS:SG	1:A:205:CYS:N	2.73	0.60
1:E:350:ARG:NH1	1:E:357:THR:O	2.35	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:350:ARG:NH1	1:C:357:THR:O	2.34	0.59
1:A:350:ARG:NH1	1:A:357:THR:O	2.35	0.59
4:H:6:GLN:NE2	4:H:88:CYS:SG	2.74	0.59
1:C:298:ARG:NH1	1:C:300:ASN:O	2.36	0.59
1:E:164:GLU:OE2	1:E:308:ARG:NH1	2.36	0.59
1:E:298:ARG:NH1	1:E:300:ASN:O	2.36	0.58
1:E:421:LYS:O	9:E:703:HOH:O	2.17	0.57
1:A:298:ARG:NH1	1:A:300:ASN:O	2.37	0.57
3:K:23:ARG:NH1	3:K:75:ILE:O	2.39	0.55
3:G:32:ASN:ND2	3:G:95:ASP:O	2.39	0.55
4:L:55:GLN:OE1	4:L:56:SER:N	2.40	0.54
3:I:23:ARG:NH1	3:I:75:ILE:O	2.40	0.53
1:C:502:LYS:NZ	2:D:607:ASN:OD1	2.41	0.53
3:I:32:ASN:ND2	3:I:95:ASP:O	2.42	0.52
2:D:577:GLN:N	2:D:577:GLN:OE1	2.43	0.51
1:A:247:CYS:O	9:A:701:HOH:O	2.19	0.51
4:J:55:GLN:OE1	4:J:56:SER:N	2.44	0.51
1:E:247:CYS:O	9:E:704:HOH:O	2.19	0.51
1:E:218:CYS:HA	1:E:247:CYS:HB3	1.92	0.50
1:A:139:THR:OG1	1:A:141:ASP:OD1	2.30	0.50
1:A:218:CYS:HA	1:A:247:CYS:HB3	1.93	0.50
1:A:37:THR:OG1	1:A:499:THR:OG1	2.07	0.49
3:I:61:GLN:N	3:I:61:GLN:OE1	2.45	0.49
1:A:305:LYS:NZ	9:A:708:HOH:O	2.44	0.48
3:K:61:GLN:N	3:K:61:GLN:OE1	2.46	0.48
1:C:305:LYS:NZ	9:C:708:HOH:O	2.46	0.48
2:B:606:THR:HG21	2:B:646:LEU:HD22	1.95	0.48
5:V:2:NAG:O7	5:Z:1:NAG:O6	2.32	0.47
1:E:305:LYS:NZ	9:E:709:HOH:O	2.47	0.47
1:A:51:THR:O	1:A:51:THR:OG1	2.33	0.46
2:D:606:THR:HG21	2:D:646:LEU:HD22	1.97	0.46
4:H:30:ARG:HD3	4:H:30:ARG:H	1.80	0.46
1:C:247:CYS:O	9:C:701:HOH:O	2.20	0.45
4:J:32:GLU:OE1	4:J:32:GLU:N	2.50	0.44
3:I:101:ASP:OD1	3:I:101:ASP:N	2.48	0.44
3:I:35:HIS:NE2	3:I:95:ASP:OD2	2.38	0.44
1:E:50:THR:O	1:E:103:GLN:NE2	2.51	0.43
1:E:299:PRO:HA	1:E:442:VAL:HG13	1.99	0.43
1:C:299:PRO:HA	1:C:442:VAL:HG13	2.00	0.43
1:A:299:PRO:HA	1:A:442:VAL:HG13	2.00	0.43
1:E:37:THR:OG1	1:E:499:THR:OG1	2.15	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:H:35:TRP:CE3	4:H:73:LEU:HD22	2.55	0.42
4:L:8:PRO:O	4:L:102:THR:HG23	2.20	0.42
2:F:606:THR:HG21	2:F:646:LEU:HD22	2.00	0.42
1:C:496:VAL:O	2:D:631:TRP:NE1	2.45	0.42
1:E:51:THR:O	1:E:51:THR:OG1	2.35	0.42
1:A:421:LYS:O	9:A:702:HOH:O	2.21	0.42
1:A:178:ARG:O	1:A:178:ARG:NH1	2.52	0.41
1:A:369:LEU:O	1:A:373:THR:OG1	2.36	0.41
2:F:522:PHE:O	2:F:540:GLN:NE2	2.50	0.41
3:K:101:ASP:OD1	3:K:101:ASP:N	2.52	0.41
1:A:54:CYS:SG	1:A:55:ALA:N	2.93	0.41
3:K:93:ALA:HB1	3:K:100(E):MET:HB3	2.03	0.41
1:E:289:ASN:OD1	1:E:289:ASN:N	2.53	0.41
1:E:280:ASN:ND2	1:E:458:GLY:O	2.53	0.41
1:E:136:ASN:OD1	1:E:136:ASN:O	2.39	0.40
2:B:530:MET:O	2:B:534:SER:OG	2.31	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 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	433/481 (90%)	426 (98%)	7 (2%)	0	100	100
1	C	433/481 (90%)	425 (98%)	8 (2%)	0	100	100
1	E	433/481 (90%)	425 (98%)	8 (2%)	0	100	100
2	B	126/153 (82%)	124 (98%)	2 (2%)	0	100	100
2	D	126/153 (82%)	125 (99%)	1 (1%)	0	100	100
2	F	126/153 (82%)	126 (100%)	0	0	100	100
3	G	120/223 (54%)	118 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	I	120/223 (54%)	118 (98%)	2 (2%)	0	100	100
3	K	120/223 (54%)	118 (98%)	2 (2%)	0	100	100
4	H	105/212 (50%)	103 (98%)	2 (2%)	0	100	100
4	J	105/212 (50%)	103 (98%)	2 (2%)	0	100	100
4	L	105/212 (50%)	103 (98%)	2 (2%)	0	100	100
All	All	2352/3207 (73%)	2314 (98%)	38 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	395/429 (92%)	389 (98%)	6 (2%)	65	86
1	C	395/429 (92%)	383 (97%)	12 (3%)	41	70
1	E	395/429 (92%)	386 (98%)	9 (2%)	50	78
2	B	109/129 (84%)	105 (96%)	4 (4%)	34	63
2	D	109/129 (84%)	108 (99%)	1 (1%)	78	92
2	F	109/129 (84%)	107 (98%)	2 (2%)	59	83
3	G	101/188 (54%)	99 (98%)	2 (2%)	55	81
3	I	101/188 (54%)	99 (98%)	2 (2%)	55	81
3	K	101/188 (54%)	99 (98%)	2 (2%)	55	81
4	H	91/185 (49%)	84 (92%)	7 (8%)	13	30
4	J	91/185 (49%)	87 (96%)	4 (4%)	28	56
4	L	91/185 (49%)	88 (97%)	3 (3%)	38	67
All	All	2088/2793 (75%)	2034 (97%)	54 (3%)	49	75

All (54) residues with a non-rotameric sidechain are listed below:



Mol	Chain	Res	Type
1	A	46	LYS
1	A	57	ASP
1	A	66	HIS
1	A	91	GLU
1	A	140	ASP
1	A	247	CYS
2	B	542	ARG
2	B	543	ASN
2	B	637	ASN
2	B	638	TYR
1	C	46	LYS
1	C	57	ASP
1	C	66	HIS
1	C	92	GLU
1	C	140	ASP
1	C	178	ARG
1	C	201	CYS
1	C	247	CYS
1	C	325	ASP
1	C	440	GLN
1	C	444	ARG
1	C	501	CYS
2	D	638	TYR
1	E	46	LYS
1	E	57	ASP
1	E	66	HIS
1	E	92	GLU
1	E	140	ASP
1	E	247	CYS
1	E	347	LYS
1	E	456	ARG
1	E	501	CYS
2	F	542	ARG
2	F	638	TYR
3	G	50	TRP
3	G	71	ARG
4	H	12	SER
4	H	18	LYS
4	H	30	ARG
4	H	42	LYS
4	H	79	GLN
4	H	81	GLU
4	H	91	MET

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Mol	Chain	Res	Type
3	I	50	TRP
3	I	71	ARG
4	J	23	CYS
4	J	42	LYS
4	J	79	GLN
4	J	81	GLU
3	K	50	TRP
3	K	71	ARG
4	L	42	LYS
4	L	79	GLN
4	L	93	SER

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

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

60 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	$\# Z  > 2$
5	NAG	M	1	1,5	14,14,15	0.31	0	17,19,21	0.52	0
5	NAG	M	2	5	14,14,15	0.23	0	17,19,21	0.42	0
6	NAG	N	1	1,6	14,14,15	0.27	0	17,19,21	0.46	0
6	NAG	N	2	6	14,14,15	0.24	0	17,19,21	0.45	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
6	BMA	N	3	6	11,11,12	0.56	0	15,15,17	0.72	0
5	NAG	O	1	1,5	14,14,15	0.27	0	17,19,21	0.56	0
5	NAG	O	2	5	14,14,15	0.22	0	17,19,21	0.40	0
7	NAG	P	1	1,7	14,14,15	0.24	0	17,19,21	0.45	0
7	NAG	P	2	7	14,14,15	0.19	0	17,19,21	0.43	0
7	BMA	P	3	7	11,11,12	0.65	0	15,15,17	0.78	0
7	MAN	P	4	7	11,11,12	0.65	0	15,15,17	0.97	2 (13%)
7	MAN	P	5	7	11,11,12	0.67	0	15,15,17	0.93	2 (13%)
5	NAG	Q	1	1,5	14,14,15	0.21	0	17,19,21	0.41	0
5	NAG	Q	2	5	14,14,15	0.20	0	17,19,21	0.42	0
5	NAG	R	1	1,5	14,14,15	0.22	0	17,19,21	0.47	0
5	NAG	R	2	5	14,14,15	0.21	0	17,19,21	0.40	0
5	NAG	S	1	1,5	14,14,15	0.39	0	17,19,21	0.60	0
5	NAG	S	2	5	14,14,15	0.26	0	17,19,21	0.42	0
5	NAG	T	1	1,5	14,14,15	0.29	0	17,19,21	0.52	0
5	NAG	T	2	5	14,14,15	0.23	0	17,19,21	0.42	0
6	NAG	U	1	1,6	14,14,15	0.21	0	17,19,21	0.43	0
6	NAG	U	2	6	14,14,15	0.25	0	17,19,21	0.45	0
6	BMA	U	3	6	11,11,12	0.57	0	15,15,17	0.73	0
5	NAG	V	1	1,5	14,14,15	0.28	0	17,19,21	0.56	0
5	NAG	V	2	5	14,14,15	0.23	0	17,19,21	0.40	0
7	NAG	W	1	1,7	14,14,15	0.26	0	17,19,21	0.47	0
7	NAG	W	2	7	14,14,15	0.23	0	17,19,21	0.41	0
7	BMA	W	3	7	11,11,12	0.59	0	15,15,17	0.73	0
7	MAN	W	4	7	11,11,12	0.61	0	15,15,17	0.96	2 (13%)
7	MAN	W	5	7	11,11,12	0.63	0	15,15,17	0.95	2 (13%)
5	NAG	X	1	1,5	14,14,15	0.22	0	17,19,21	0.44	0
5	NAG	X	2	5	14,14,15	0.22	0	17,19,21	0.42	0
5	NAG	Y	1	1,5	14,14,15	0.24	0	17,19,21	0.48	0
5	NAG	Y	2	5	14,14,15	0.22	0	17,19,21	0.40	0
5	NAG	Z	1	1,5	14,14,15	0.38	0	17,19,21	0.54	0
5	NAG	Z	2	5	14,14,15	0.27	0	17,19,21	0.41	0
5	NAG	a	1	1,5	14,14,15	0.26	0	17,19,21	0.59	0
5	NAG	a	2	5	14,14,15	0.25	0	17,19,21	0.40	0
5	NAG	b	1	1,5	14,14,15	0.31	0	17,19,21	0.51	0
5	NAG	b	2	5	14,14,15	0.24	0	17,19,21	0.40	0
5	NAG	c	1	1,5	14,14,15	0.27	0	17,19,21	0.58	0
5	NAG	c	2	5	14,14,15	0.25	0	17,19,21	0.41	0
6	NAG	d	1	1,6	14,14,15	0.20	0	17,19,21	0.43	0
6	NAG	d	2	6	14,14,15	0.17	0	17,19,21	0.44	0
6	BMA	d	3	6	11,11,12	0.62	0	15,15,17	0.70	0
5	NAG	e	1	1,5	14,14,15	0.25	0	17,19,21	0.59	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	NAG	e	2	5	14,14,15	0.25	0	17,19,21	0.41	0
5	NAG	f	1	1,5	14,14,15	0.28	0	17,19,21	0.56	0
5	NAG	f	2	5	14,14,15	0.23	0	17,19,21	0.41	0
7	NAG	g	1	1,7	14,14,15	0.25	0	17,19,21	0.48	0
7	NAG	g	2	7	14,14,15	0.22	0	17,19,21	0.40	0
7	BMA	g	3	7	11,11,12	0.63	0	15,15,17	0.75	0
7	MAN	g	4	7	11,11,12	0.62	0	15,15,17	0.97	2 (13%)
7	MAN	g	5	7	11,11,12	0.63	0	15,15,17	0.94	2 (13%)
5	NAG	h	1	1,5	14,14,15	0.21	0	17,19,21	0.42	0
5	NAG	h	2	5	14,14,15	0.22	0	17,19,21	0.41	0
5	NAG	i	1	1,5	14,14,15	0.24	0	17,19,21	0.50	0
5	NAG	i	2	5	14,14,15	0.21	0	17,19,21	0.40	0
5	NAG	j	1	1,5	14,14,15	0.38	0	17,19,21	0.58	0
5	NAG	j	2	5	14,14,15	0.25	0	17,19,21	0.42	0

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
5	NAG	M	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	M	2	5	-	0/6/23/26	0/1/1/1
6	NAG	N	1	1,6	-	2/6/23/26	0/1/1/1
6	NAG	N	2	6	-	2/6/23/26	0/1/1/1
6	BMA	N	3	6	-	0/2/19/22	0/1/1/1
5	NAG	O	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	O	2	5	-	2/6/23/26	0/1/1/1
7	NAG	P	1	1,7	-	0/6/23/26	0/1/1/1
7	NAG	P	2	7	-	1/6/23/26	0/1/1/1
7	BMA	P	3	7	-	0/2/19/22	0/1/1/1
7	MAN	P	4	7	-	0/2/19/22	0/1/1/1
7	MAN	P	5	7	-	0/2/19/22	0/1/1/1
5	NAG	Q	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	Q	2	5	-	2/6/23/26	0/1/1/1
5	NAG	R	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	R	2	5	-	2/6/23/26	0/1/1/1
5	NAG	S	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	S	2	5	-	0/6/23/26	0/1/1/1
5	NAG	T	1	1,5	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	T	2	5	-	0/6/23/26	0/1/1/1
6	NAG	U	1	1,6	-	1/6/23/26	0/1/1/1
6	NAG	U	2	6	-	2/6/23/26	0/1/1/1
6	BMA	U	3	6	-	0/2/19/22	0/1/1/1
5	NAG	V	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	V	2	5	-	2/6/23/26	0/1/1/1
7	NAG	W	1	1,7	-	0/6/23/26	0/1/1/1
7	NAG	W	2	7	-	2/6/23/26	0/1/1/1
7	BMA	W	3	7	-	0/2/19/22	0/1/1/1
7	MAN	W	4	7	-	1/2/19/22	0/1/1/1
7	MAN	W	5	7	-	0/2/19/22	0/1/1/1
5	NAG	X	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	X	2	5	-	2/6/23/26	0/1/1/1
5	NAG	Y	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	Y	2	5	-	2/6/23/26	0/1/1/1
5	NAG	Z	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	Z	2	5	-	0/6/23/26	0/1/1/1
5	NAG	a	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	a	2	5	-	2/6/23/26	0/1/1/1
5	NAG	b	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	b	2	5	-	2/6/23/26	0/1/1/1
5	NAG	c	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	c	2	5	-	2/6/23/26	0/1/1/1
6	NAG	d	1	1,6	-	2/6/23/26	0/1/1/1
6	NAG	d	2	6	-	2/6/23/26	0/1/1/1
6	BMA	d	3	6	-	1/2/19/22	0/1/1/1
5	NAG	e	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	e	2	5	-	2/6/23/26	0/1/1/1
5	NAG	f	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	f	2	5	-	2/6/23/26	0/1/1/1
7	NAG	g	1	1,7	-	0/6/23/26	0/1/1/1
7	NAG	g	2	7	-	2/6/23/26	0/1/1/1
7	BMA	g	3	7	-	0/2/19/22	0/1/1/1
7	MAN	g	4	7	-	0/2/19/22	0/1/1/1
7	MAN	g	5	7	-	0/2/19/22	0/1/1/1
5	NAG	h	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	h	2	5	-	2/6/23/26	0/1/1/1
5	NAG	i	1	1,5	-	1/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	i	2	5	-	2/6/23/26	0/1/1/1
5	NAG	j	1	1,5	-	2/6/23/26	0/1/1/1
5	NAG	j	2	5	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	P	4	MAN	O2-C2-C3	-2.39	105.34	110.14
7	W	4	MAN	O2-C2-C3	-2.34	105.45	110.14
7	g	4	MAN	O2-C2-C3	-2.33	105.46	110.14
7	g	4	MAN	C1-O5-C5	2.30	115.31	112.19
7	W	4	MAN	C1-O5-C5	2.29	115.30	112.19
7	P	4	MAN	C1-O5-C5	2.28	115.28	112.19
7	W	5	MAN	C1-O5-C5	2.21	115.19	112.19
7	g	5	MAN	O2-C2-C3	-2.19	105.74	110.14
7	W	5	MAN	O2-C2-C3	-2.19	105.74	110.14
7	P	5	MAN	O2-C2-C3	-2.18	105.78	110.14
7	g	5	MAN	C1-O5-C5	2.15	115.11	112.19
7	P	5	MAN	C1-O5-C5	2.11	115.05	112.19

There are no chirality outliers.

All (61) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	d	2	NAG	O5-C5-C6-O6
5	Y	2	NAG	O5-C5-C6-O6
5	i	2	NAG	O5-C5-C6-O6
5	R	2	NAG	O5-C5-C6-O6
5	V	2	NAG	O5-C5-C6-O6
5	O	2	NAG	O5-C5-C6-O6
5	Q	1	NAG	O5-C5-C6-O6
5	S	1	NAG	O5-C5-C6-O6
5	X	1	NAG	O5-C5-C6-O6
5	f	2	NAG	O5-C5-C6-O6
5	j	1	NAG	O5-C5-C6-O6
6	N	2	NAG	O5-C5-C6-O6
6	d	1	NAG	O5-C5-C6-O6
5	O	2	NAG	C4-C5-C6-O6
5	h	1	NAG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
5	f	2	NAG	C4-C5-C6-O6
6	d	2	NAG	C4-C5-C6-O6
6	U	2	NAG	O5-C5-C6-O6
5	S	1	NAG	C4-C5-C6-O6
5	V	2	NAG	C4-C5-C6-O6
5	a	2	NAG	O5-C5-C6-O6
6	N	1	NAG	O5-C5-C6-O6
5	R	2	NAG	C4-C5-C6-O6
5	j	1	NAG	C4-C5-C6-O6
6	N	2	NAG	C4-C5-C6-O6
6	d	1	NAG	C4-C5-C6-O6
5	c	2	NAG	O5-C5-C6-O6
5	e	2	NAG	O5-C5-C6-O6
5	Y	2	NAG	C4-C5-C6-O6
5	i	2	NAG	C4-C5-C6-O6
6	N	1	NAG	C4-C5-C6-O6
6	U	2	NAG	C4-C5-C6-O6
5	X	1	NAG	C4-C5-C6-O6
5	e	2	NAG	C4-C5-C6-O6
5	a	2	NAG	C4-C5-C6-O6
5	Q	1	NAG	C4-C5-C6-O6
5	h	1	NAG	C4-C5-C6-O6
5	Y	1	NAG	O5-C5-C6-O6
5	c	2	NAG	C4-C5-C6-O6
7	W	2	NAG	O5-C5-C6-O6
7	g	2	NAG	O5-C5-C6-O6
5	h	2	NAG	O5-C5-C6-O6
5	j	2	NAG	O5-C5-C6-O6
7	g	2	NAG	C4-C5-C6-O6
7	W	2	NAG	C4-C5-C6-O6
5	h	2	NAG	C4-C5-C6-O6
5	j	2	NAG	C4-C5-C6-O6
5	Y	1	NAG	C4-C5-C6-O6
5	Q	2	NAG	C4-C5-C6-O6
6	d	3	BMA	O5-C5-C6-O6
7	W	4	MAN	O5-C5-C6-O6
5	X	2	NAG	C4-C5-C6-O6
5	Q	2	NAG	O5-C5-C6-O6
5	b	2	NAG	C4-C5-C6-O6
5	i	1	NAG	O5-C5-C6-O6
5	b	2	NAG	O5-C5-C6-O6
6	U	1	NAG	O5-C5-C6-O6

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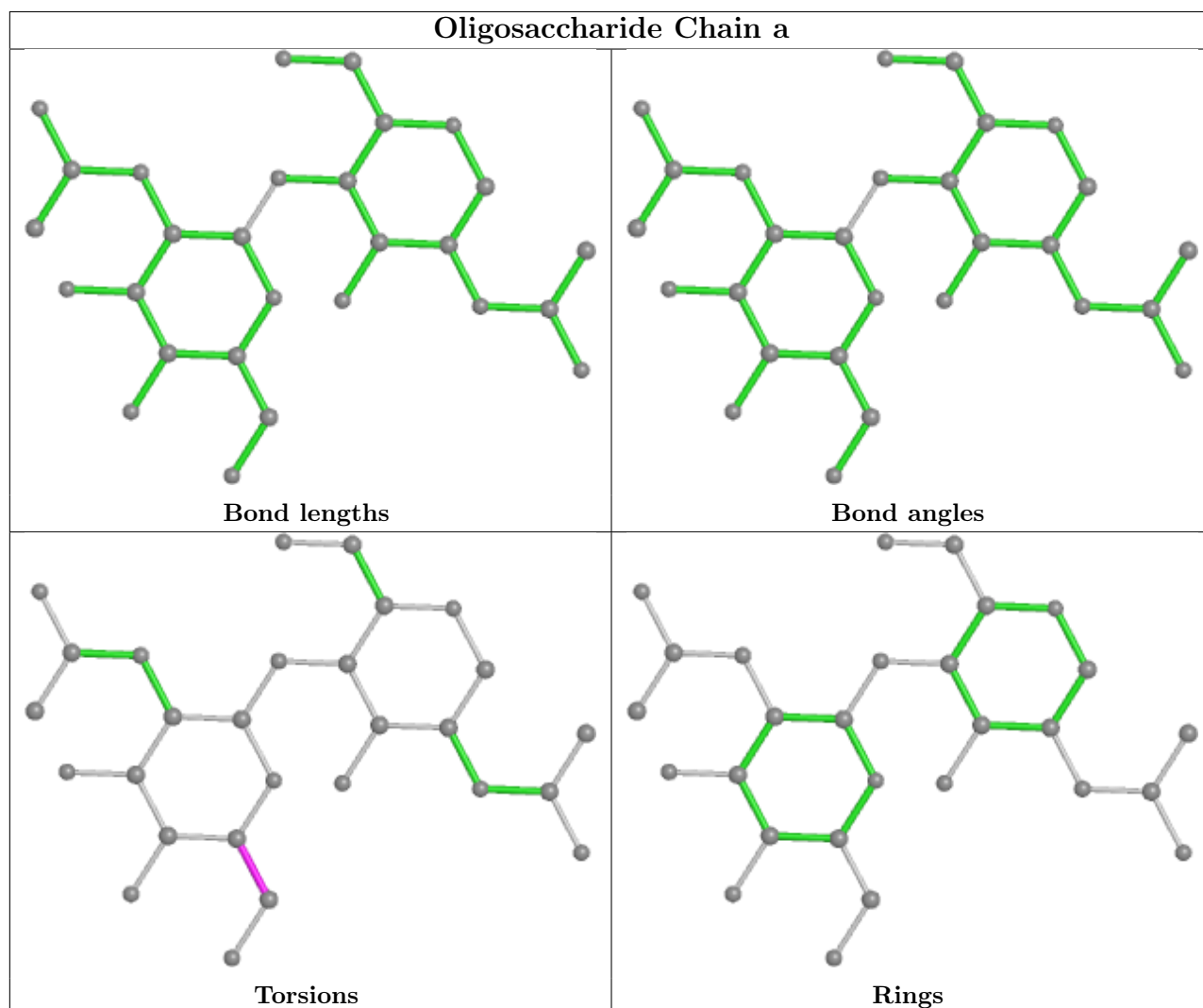
Mol	Chain	Res	Type	Atoms
5	T	1	NAG	C4-C5-C6-O6
5	T	1	NAG	O5-C5-C6-O6
5	X	2	NAG	O5-C5-C6-O6
7	P	2	NAG	C4-C5-C6-O6

There are no ring outliers.

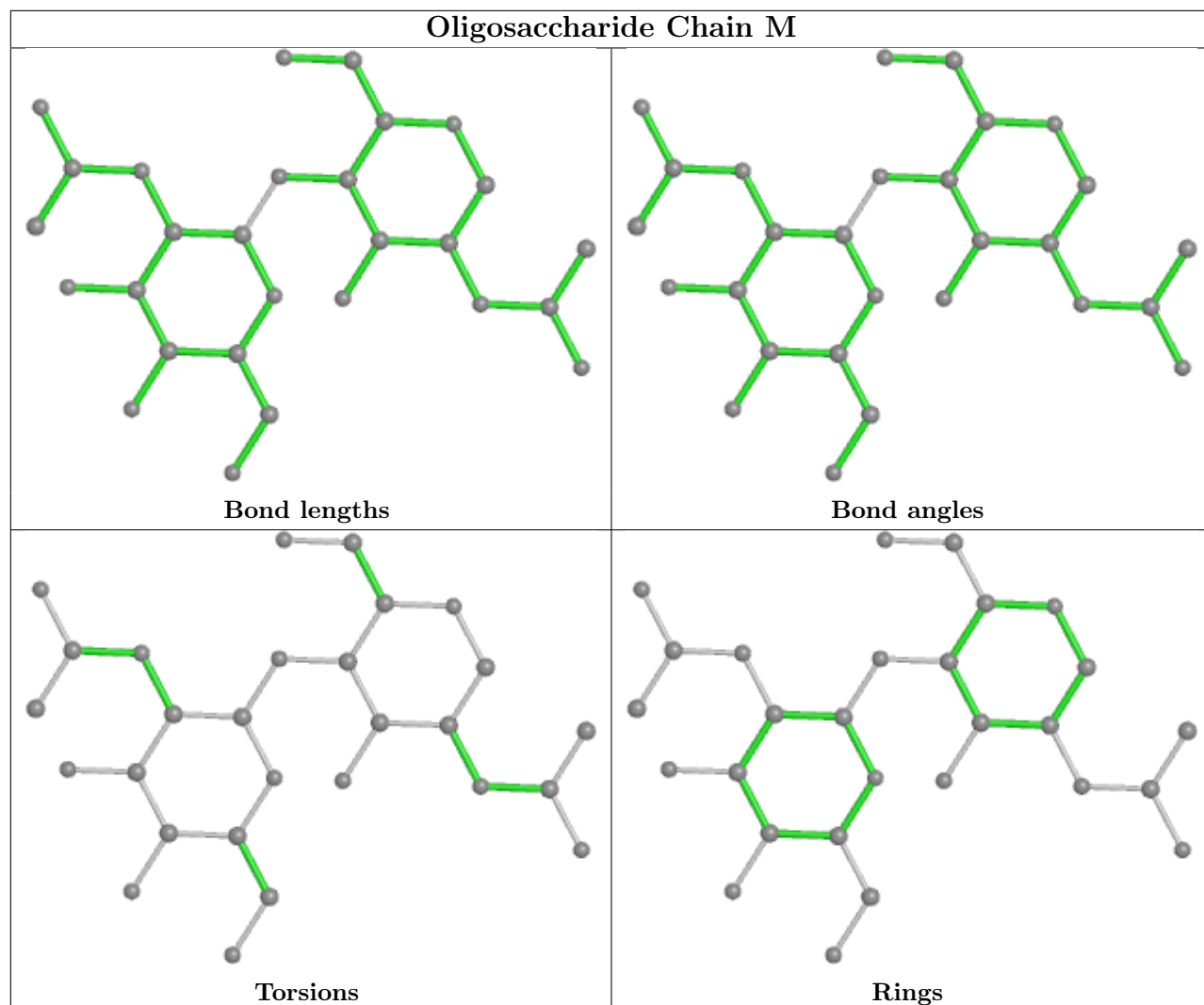
2 monomers are involved in 1 short contact:

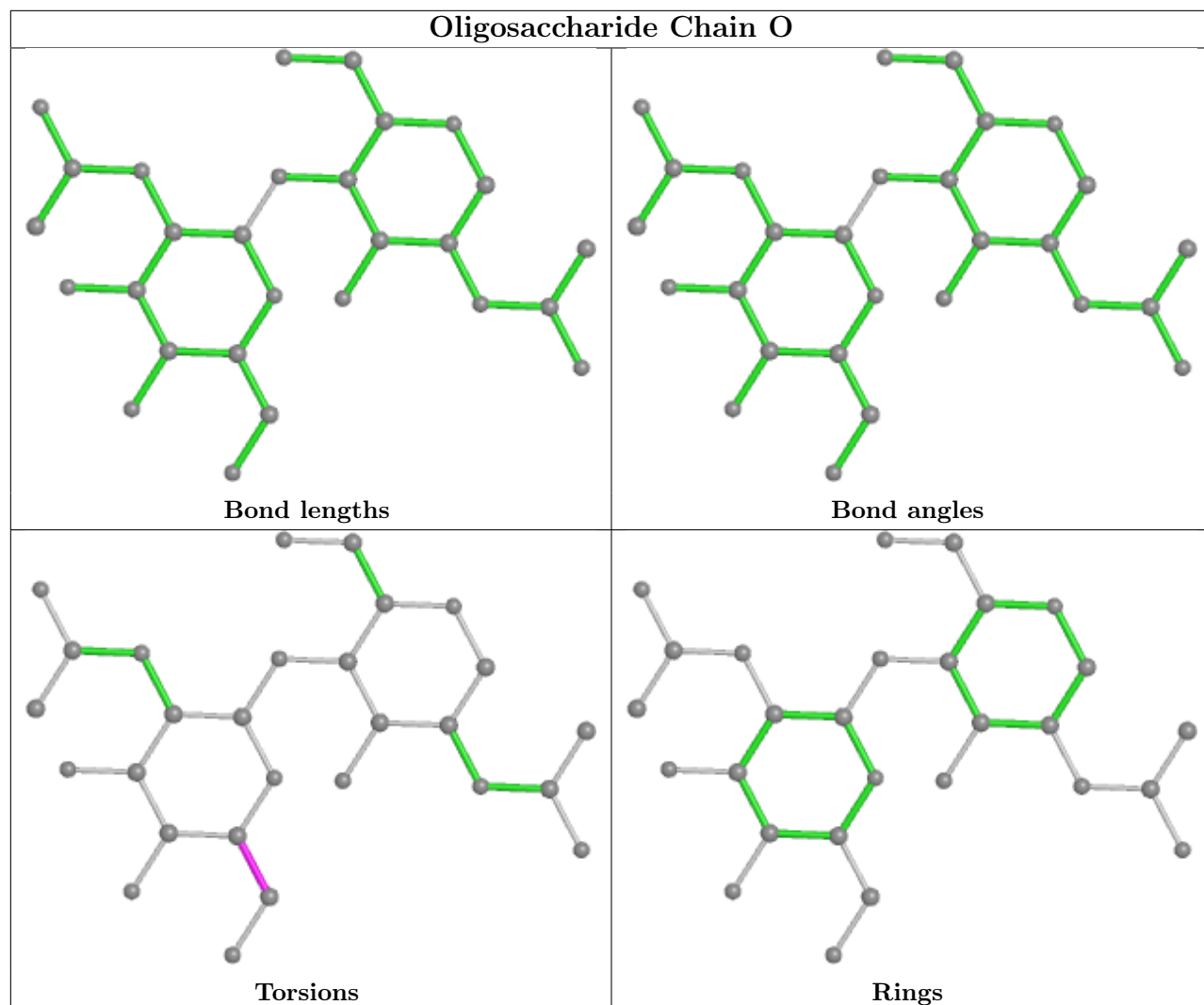
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	V	2	NAG	1	0
5	Z	1	NAG	1	0

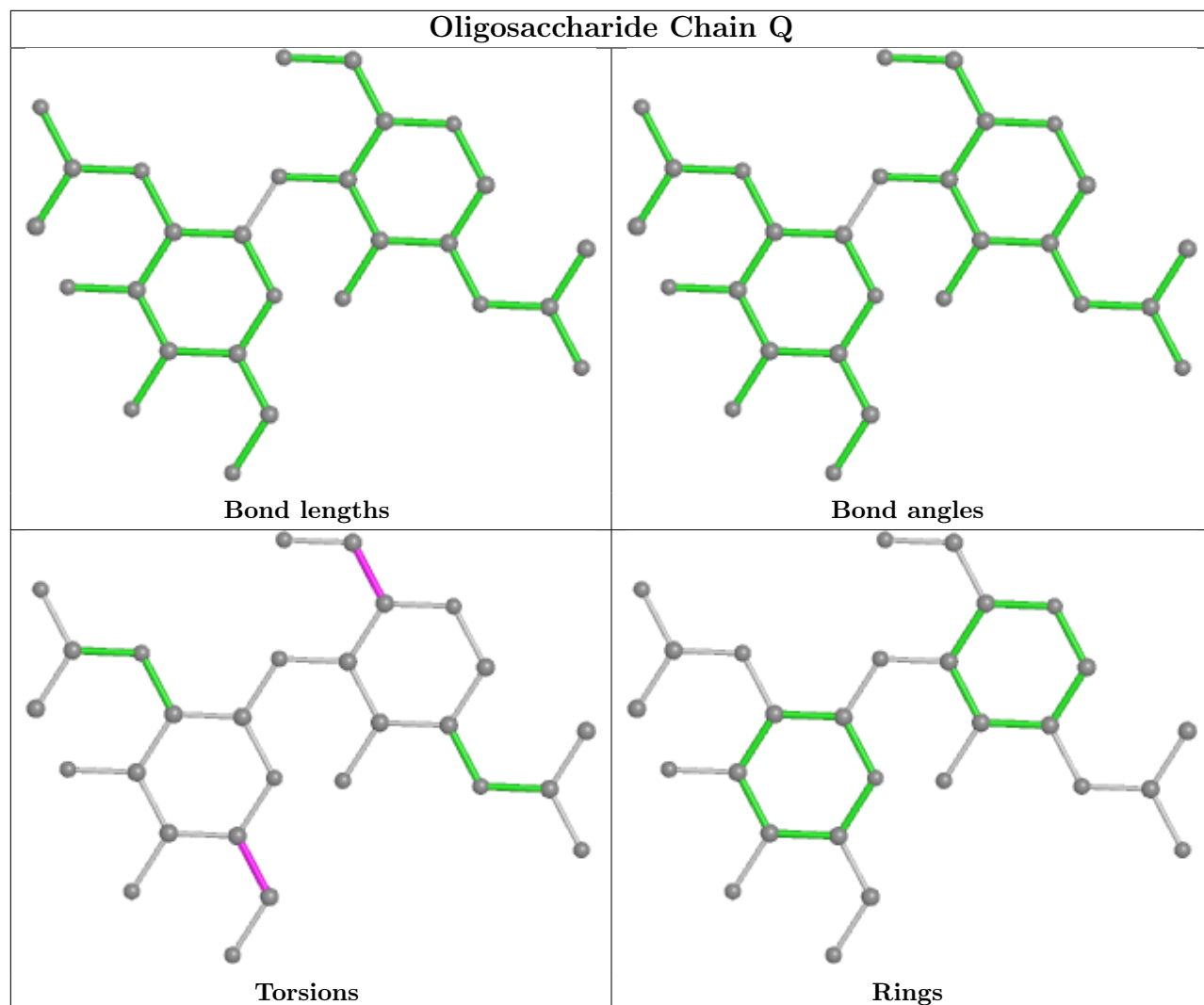
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

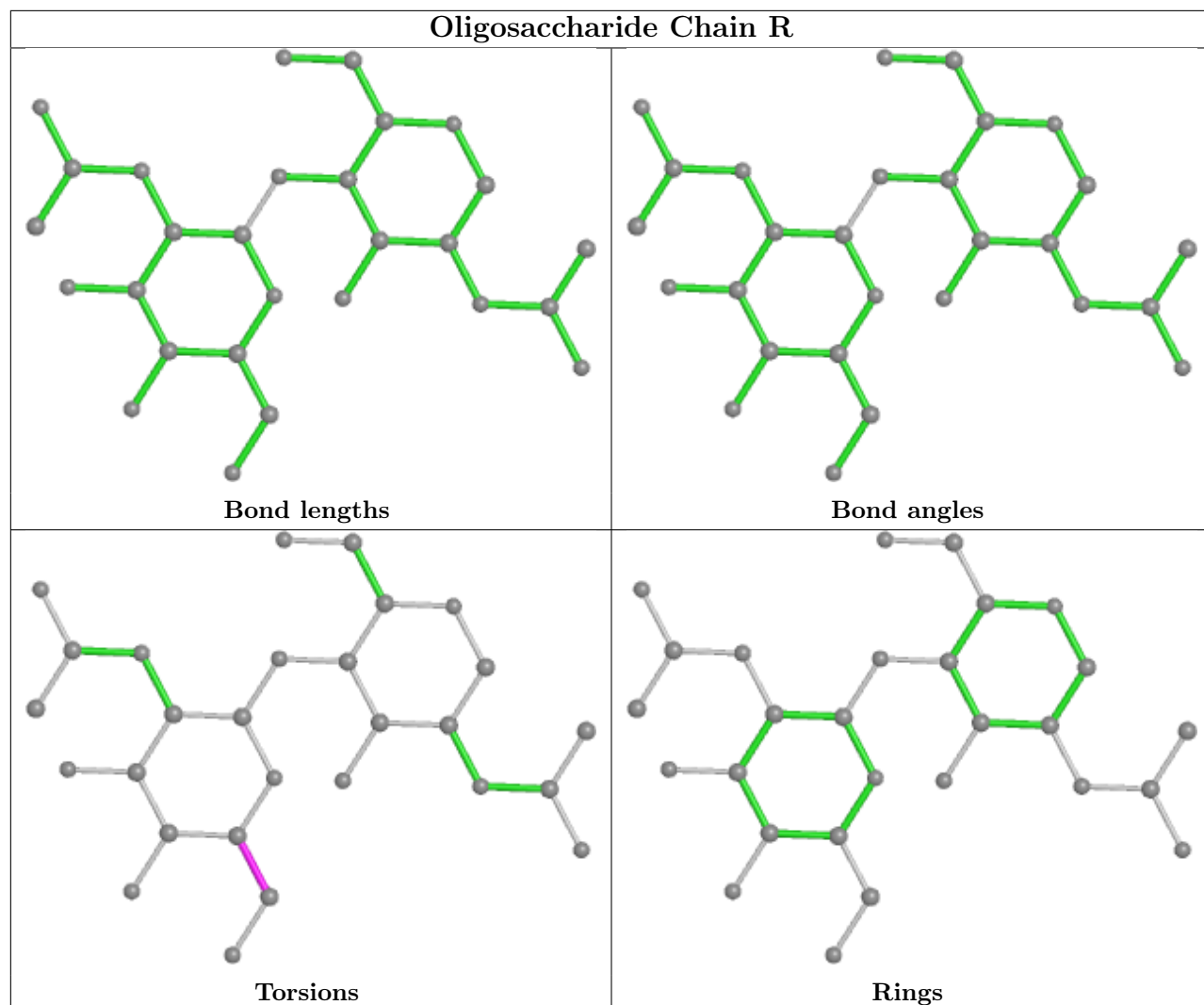


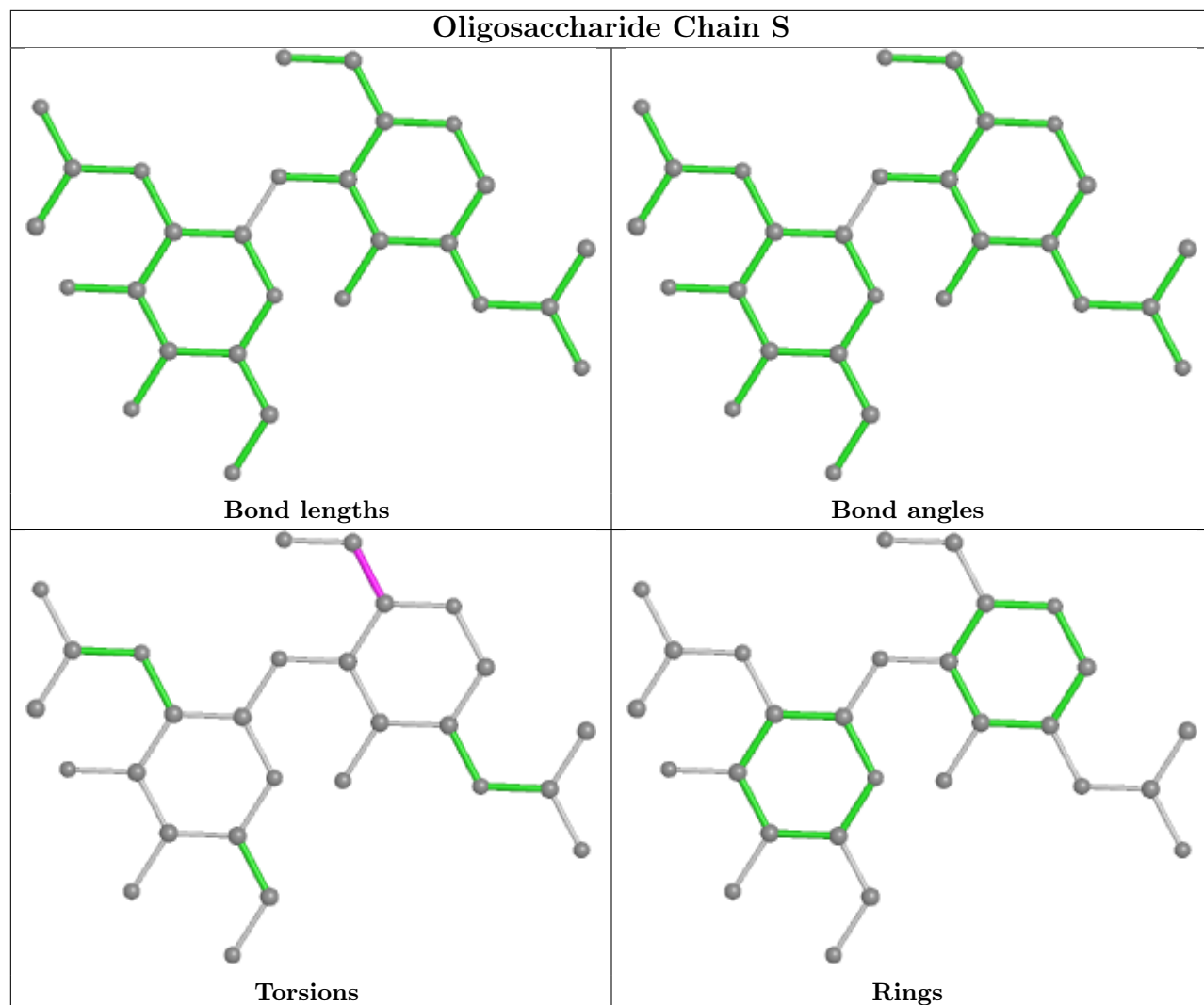


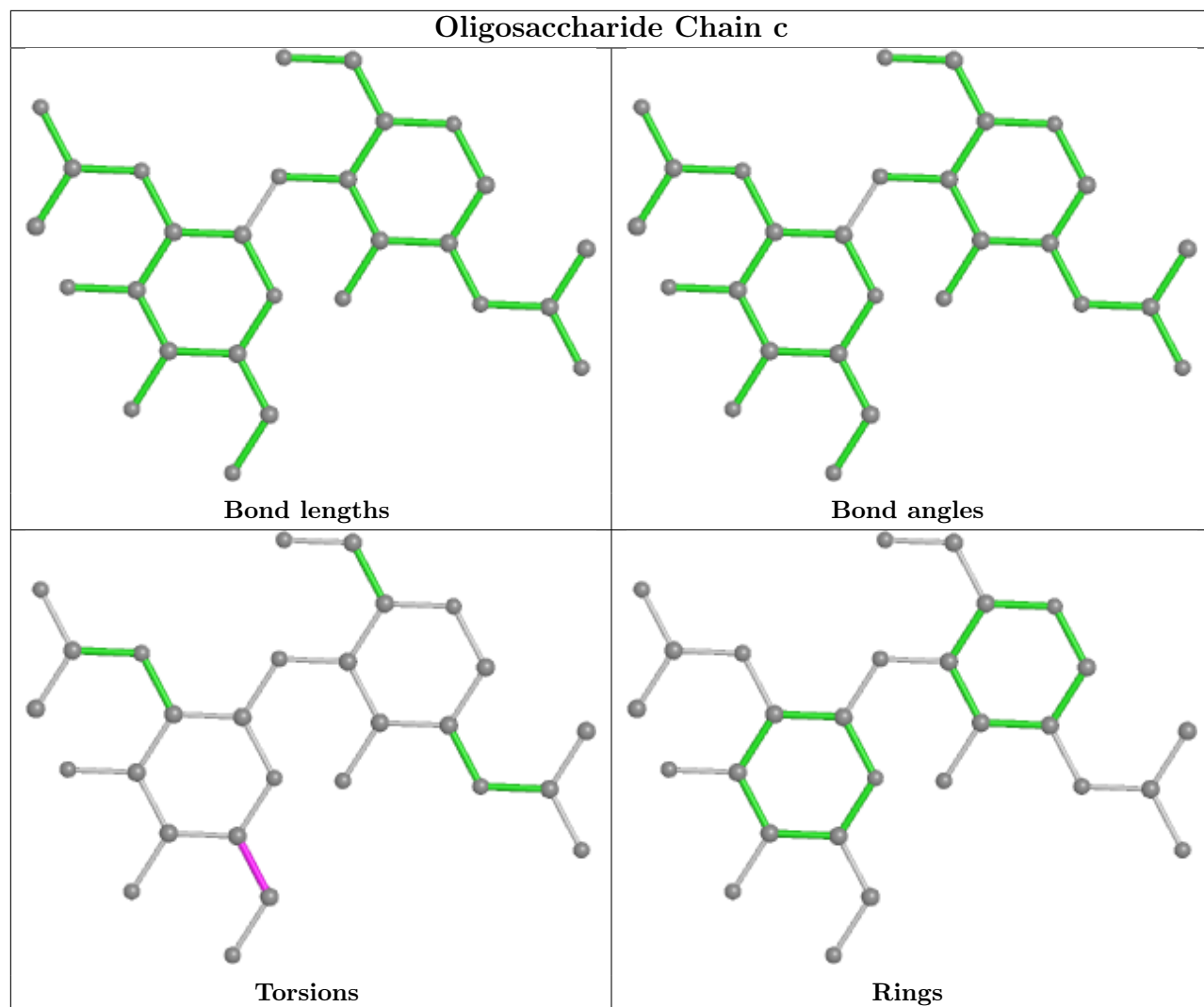


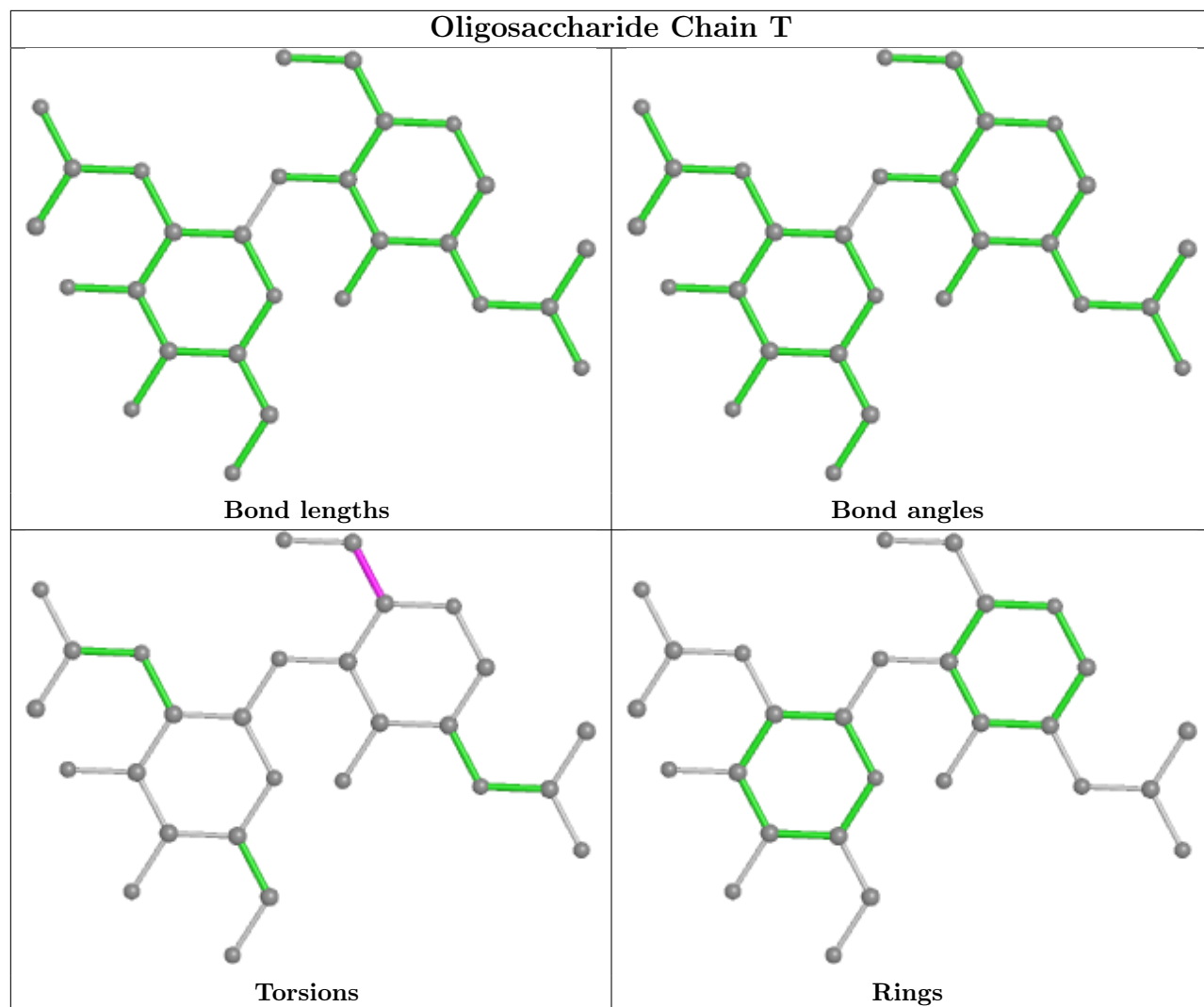


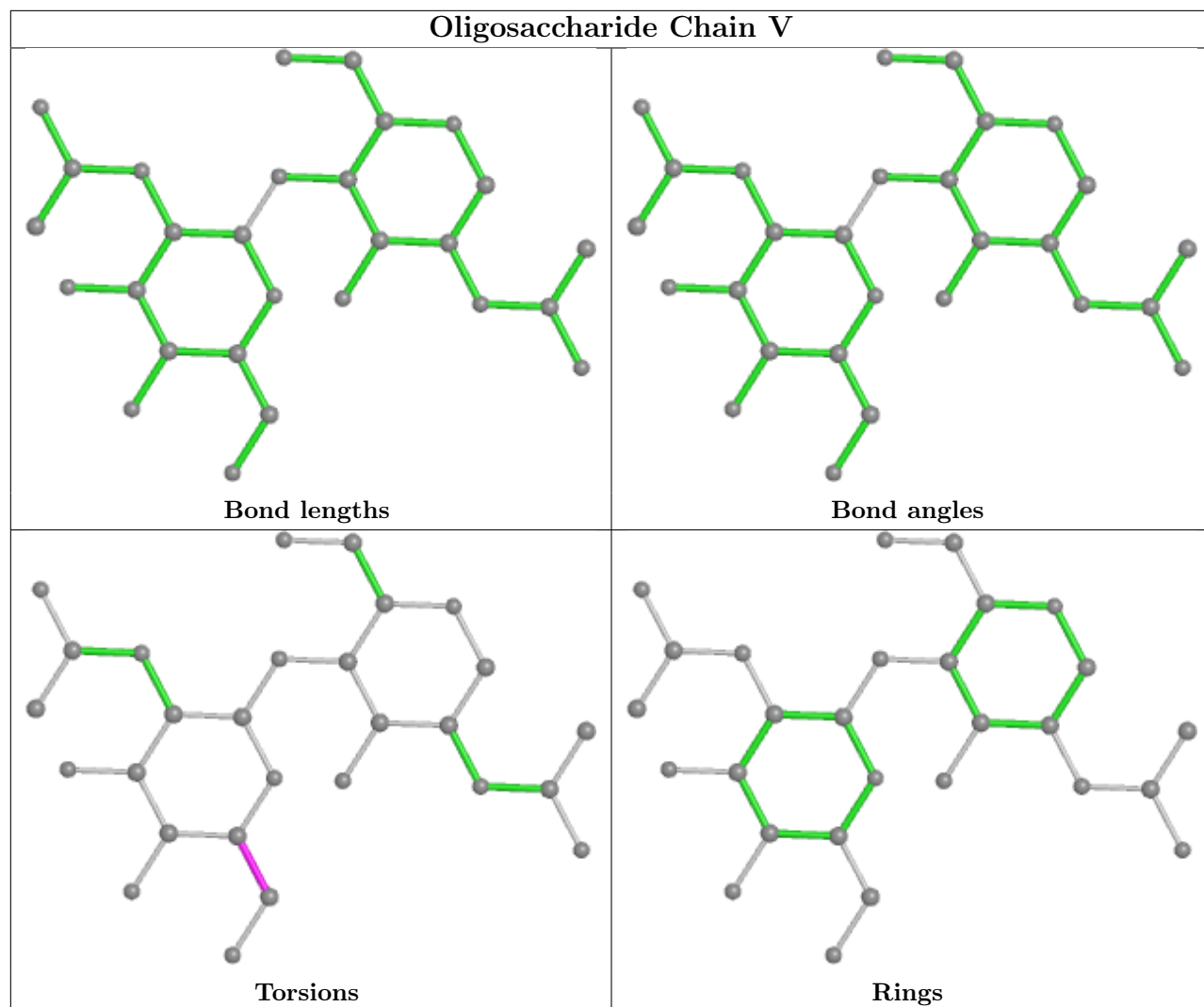




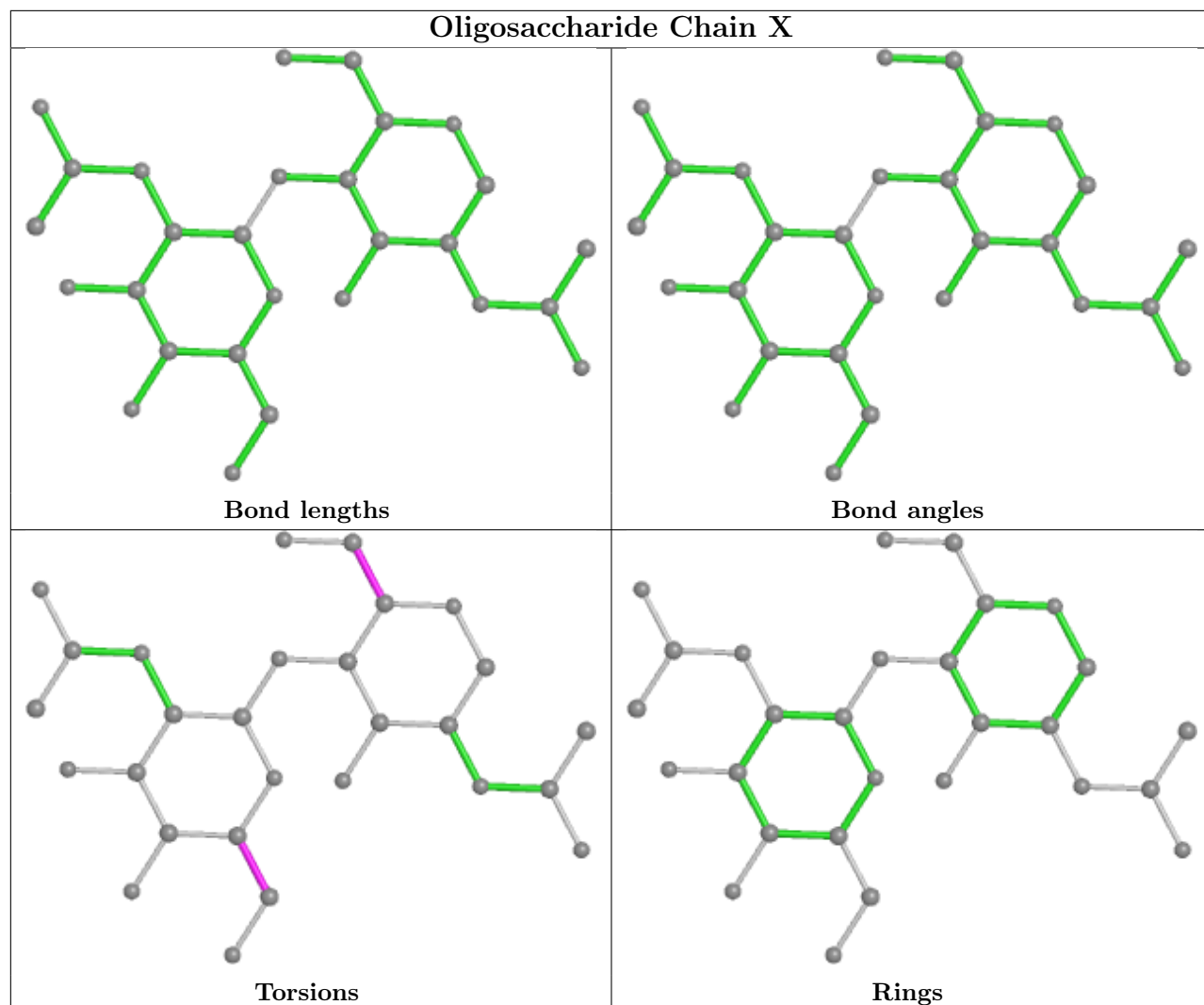


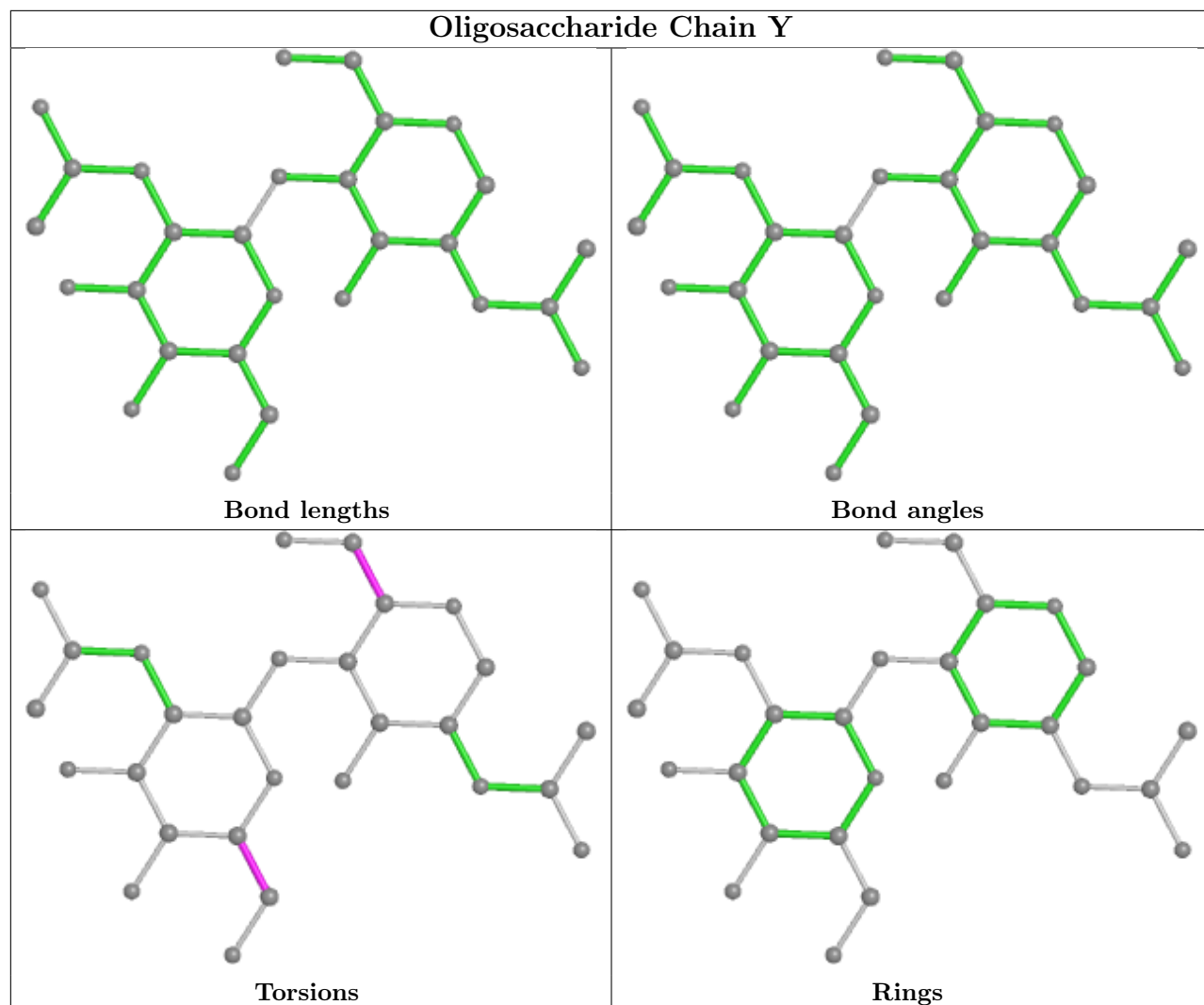


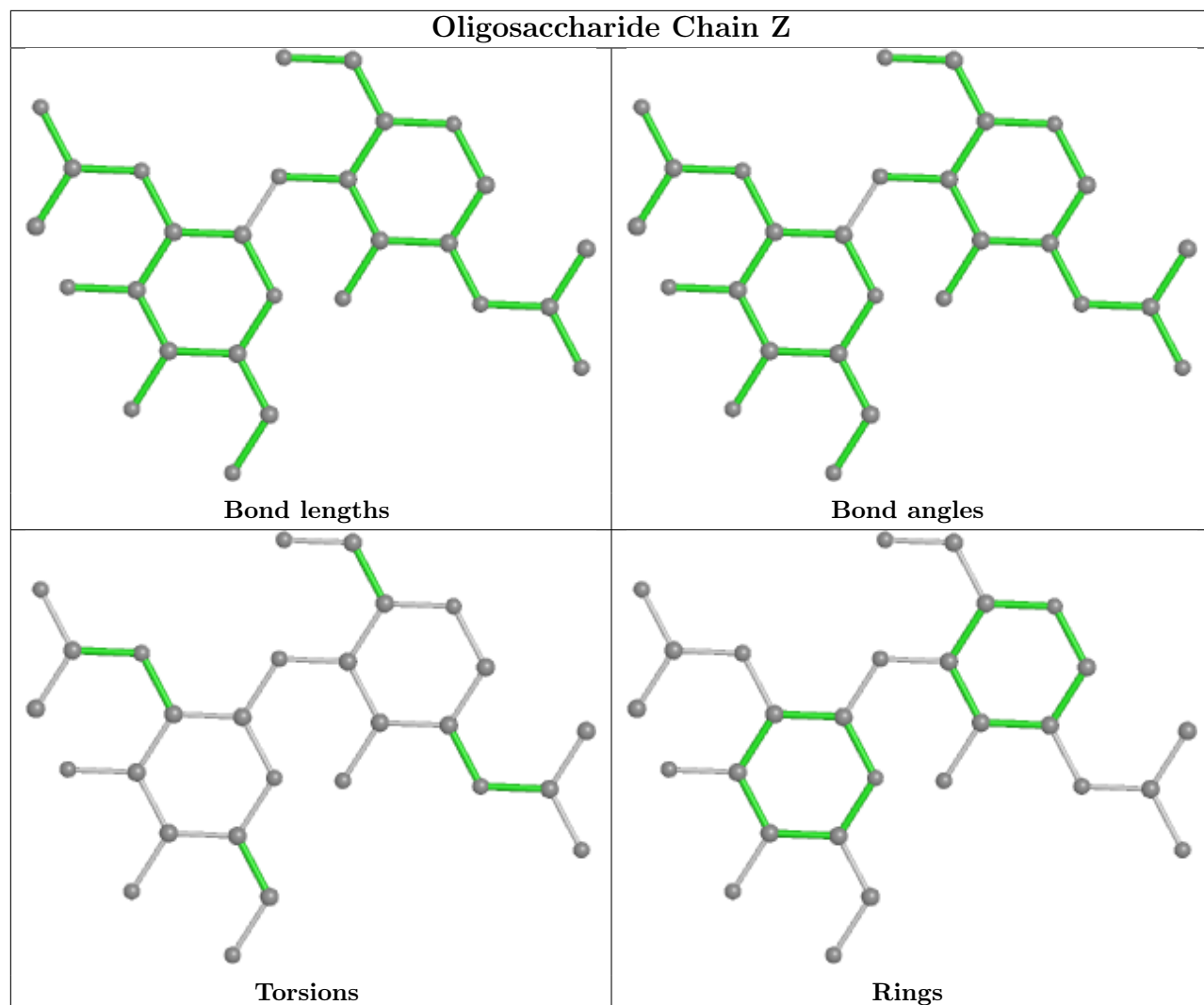


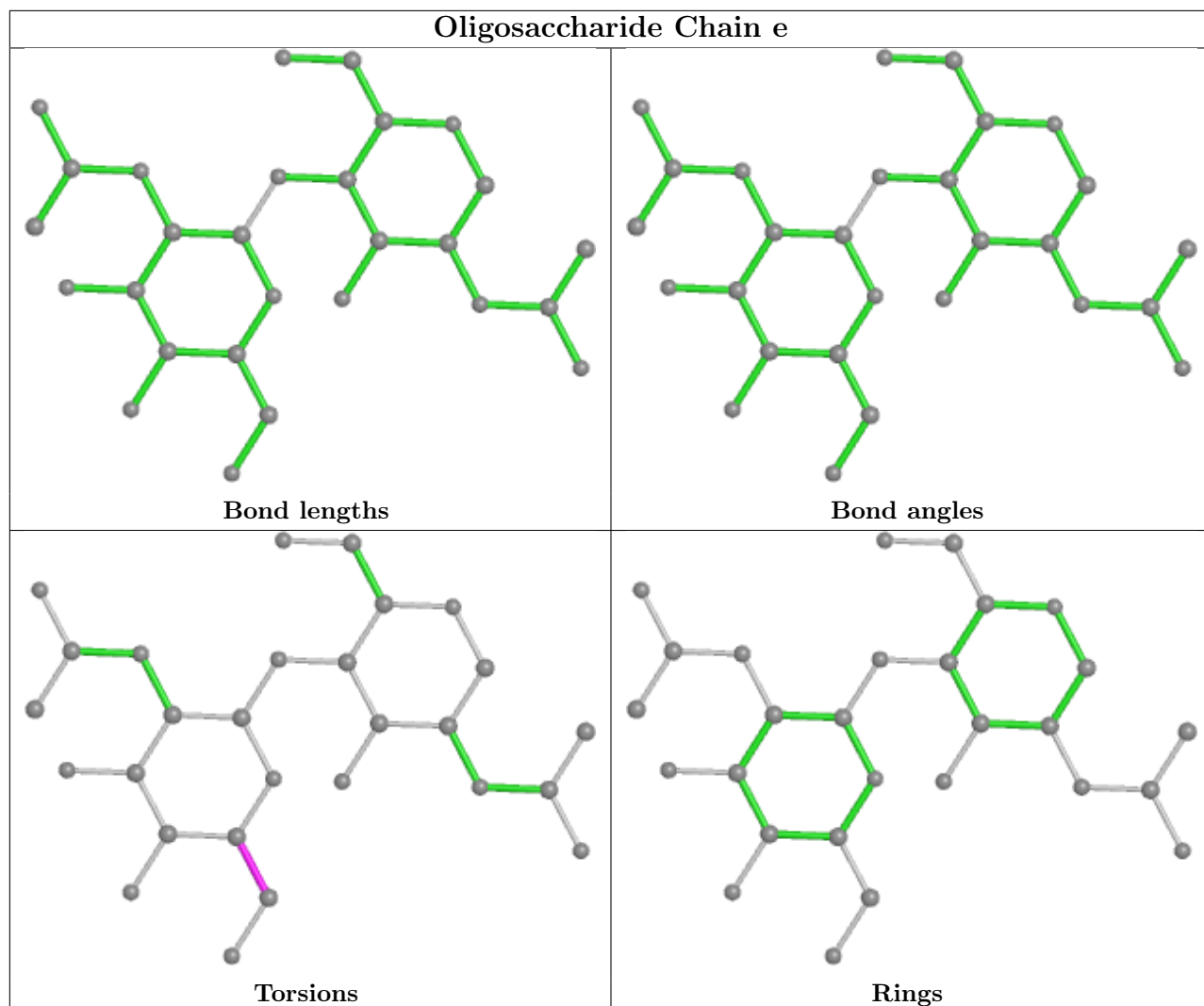


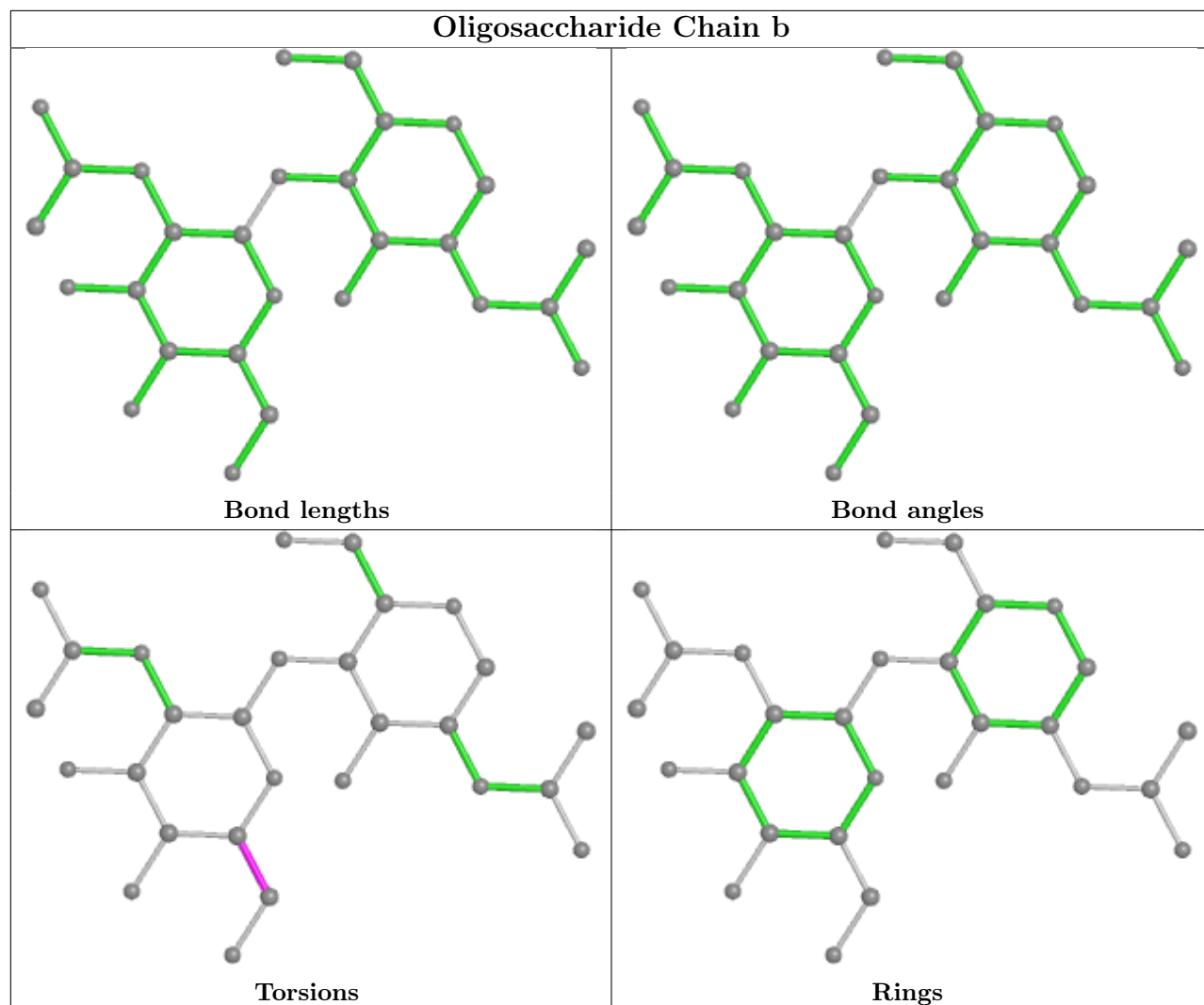


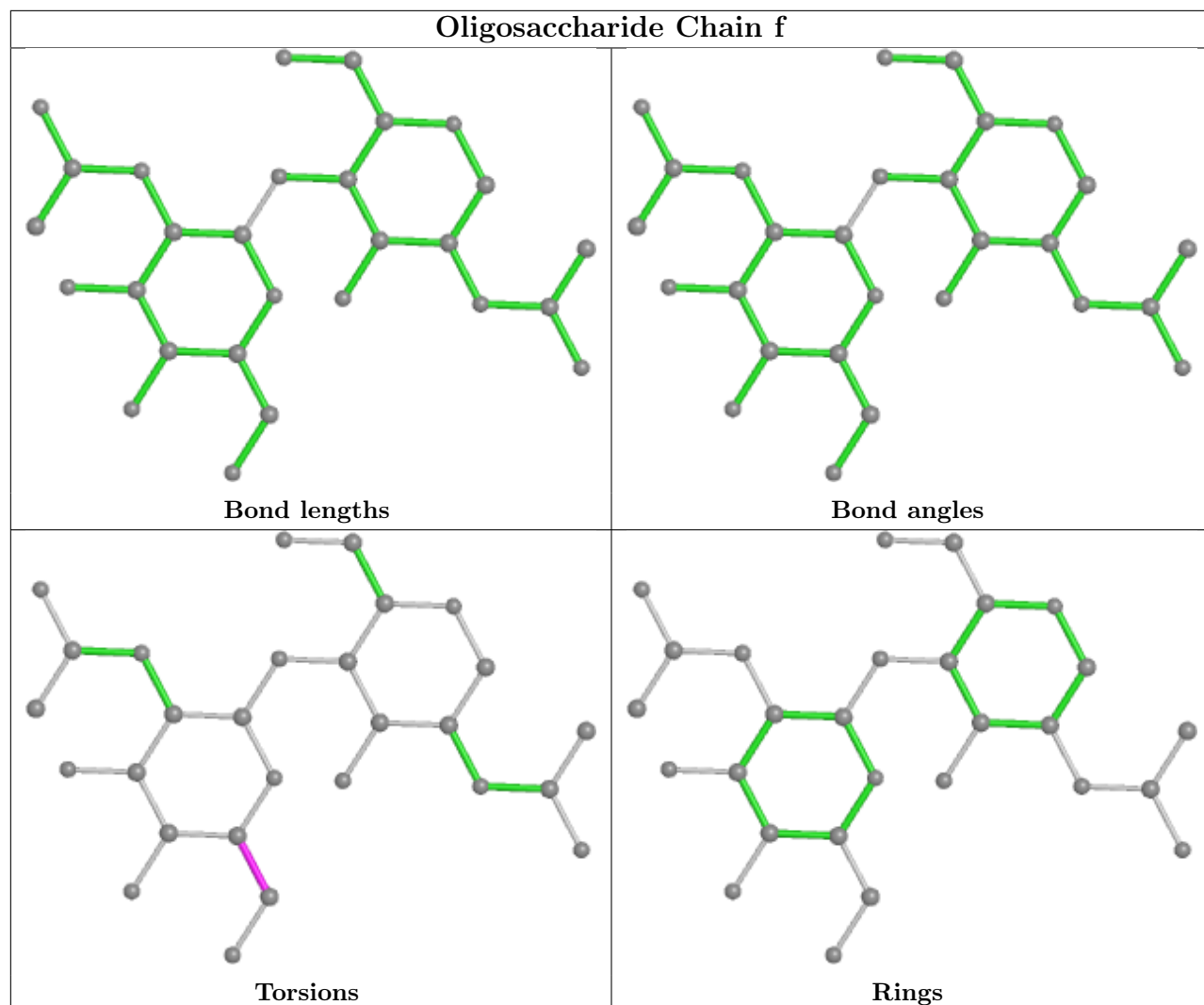


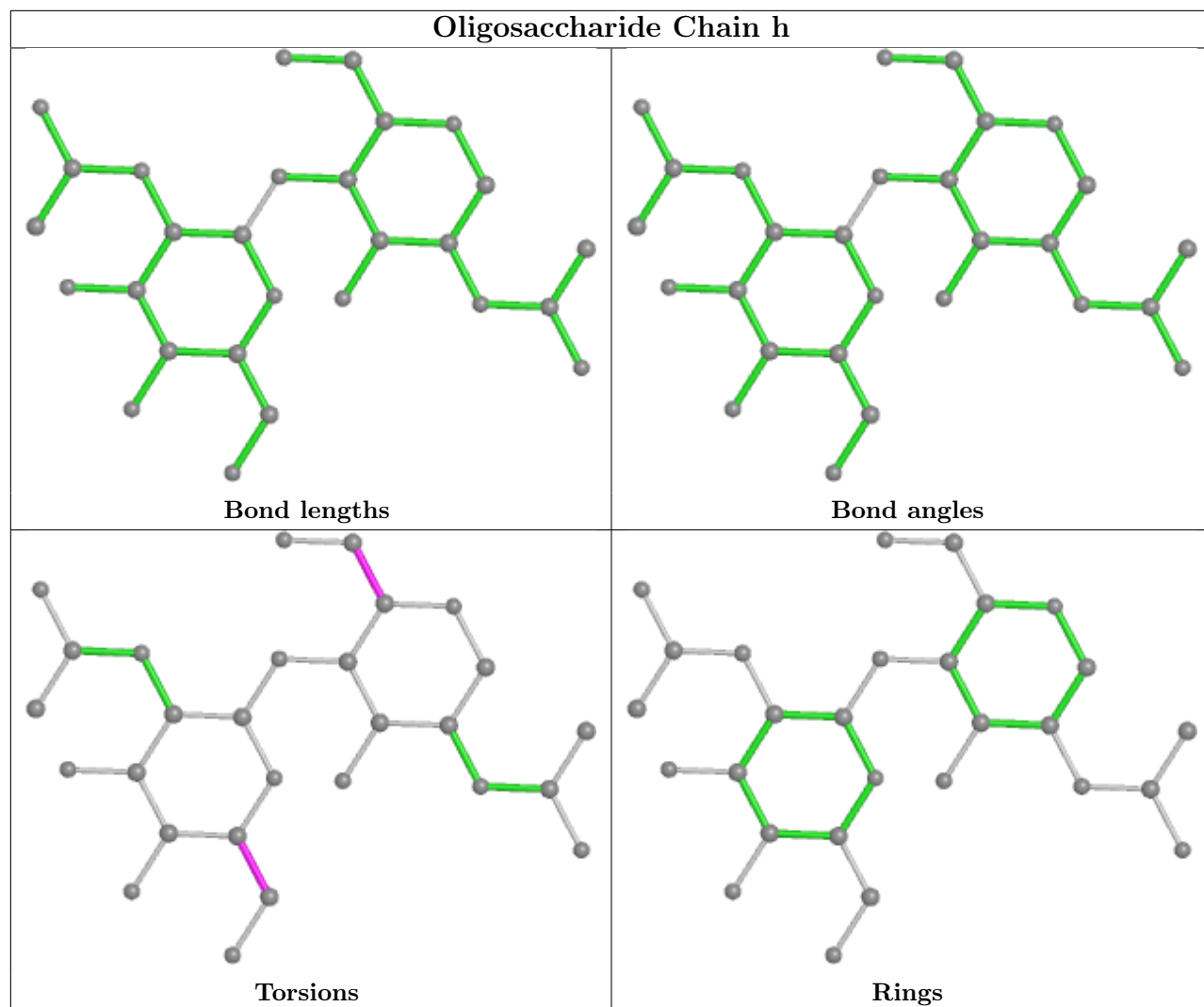


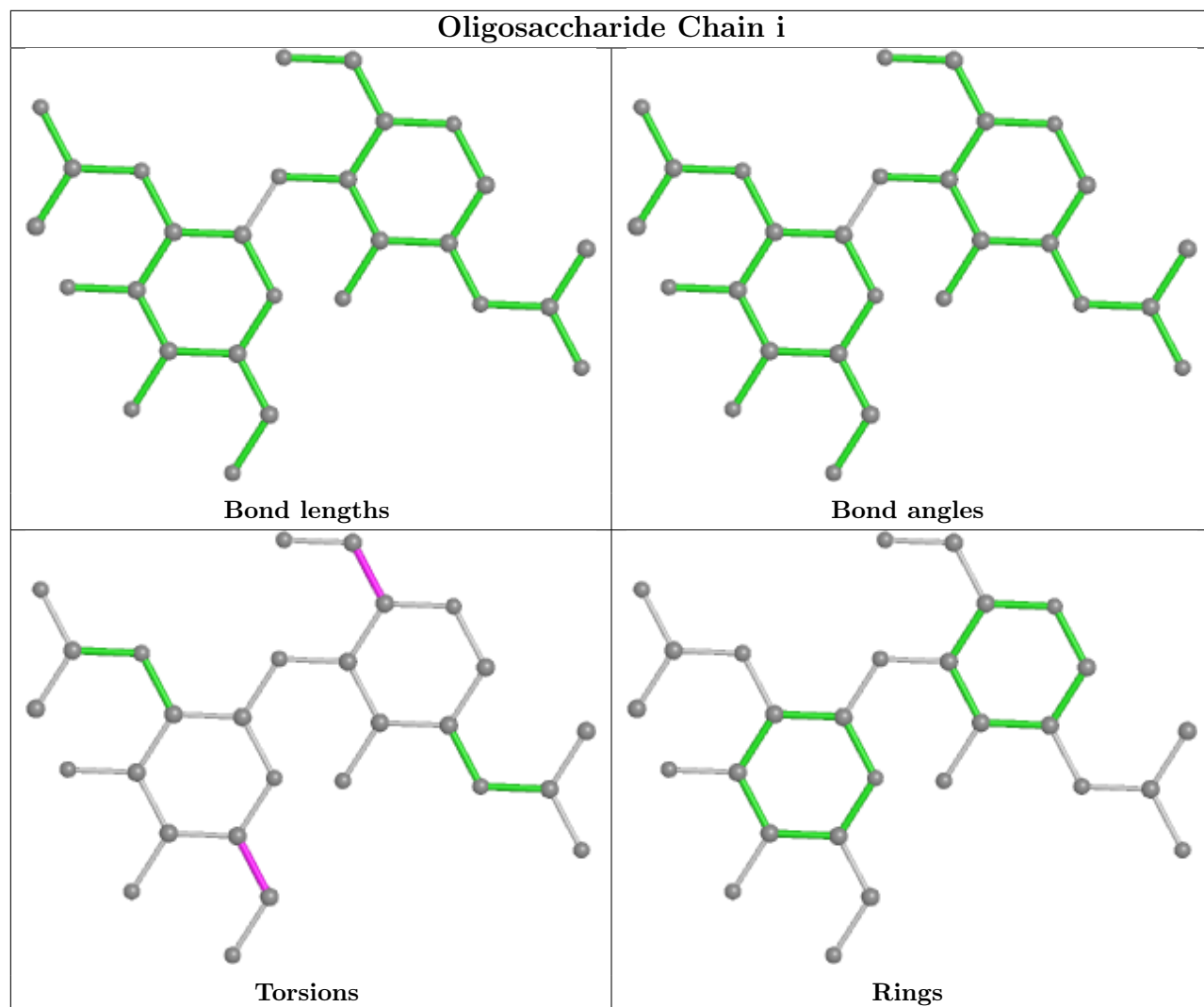




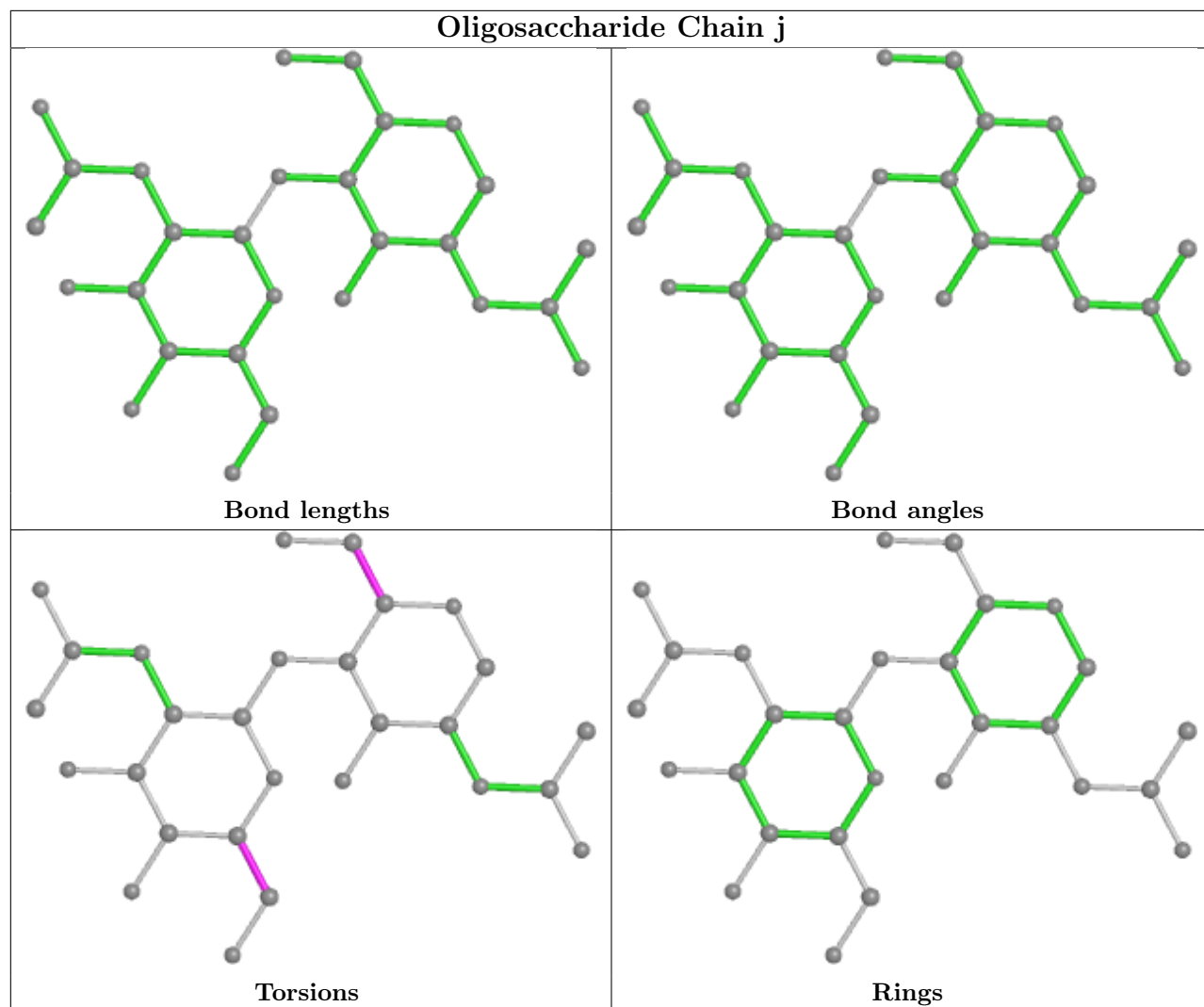


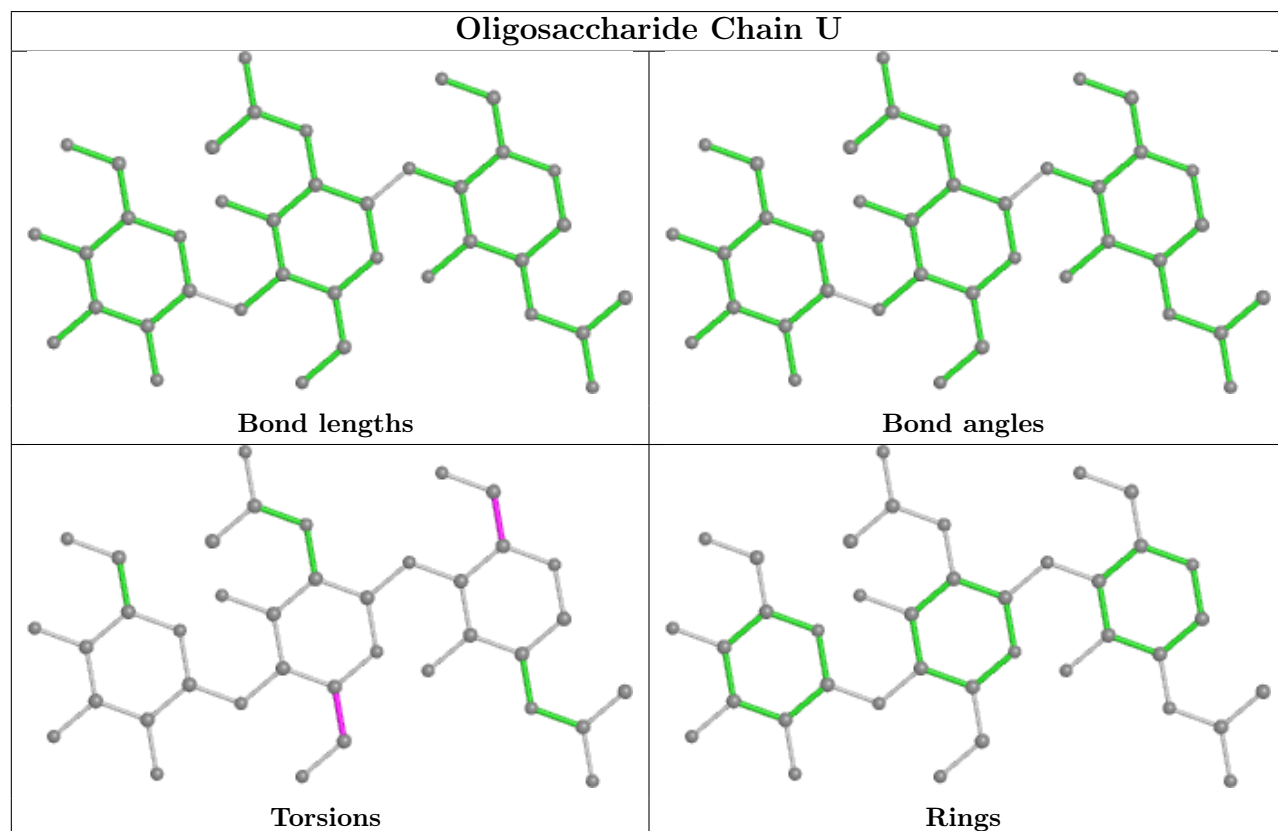
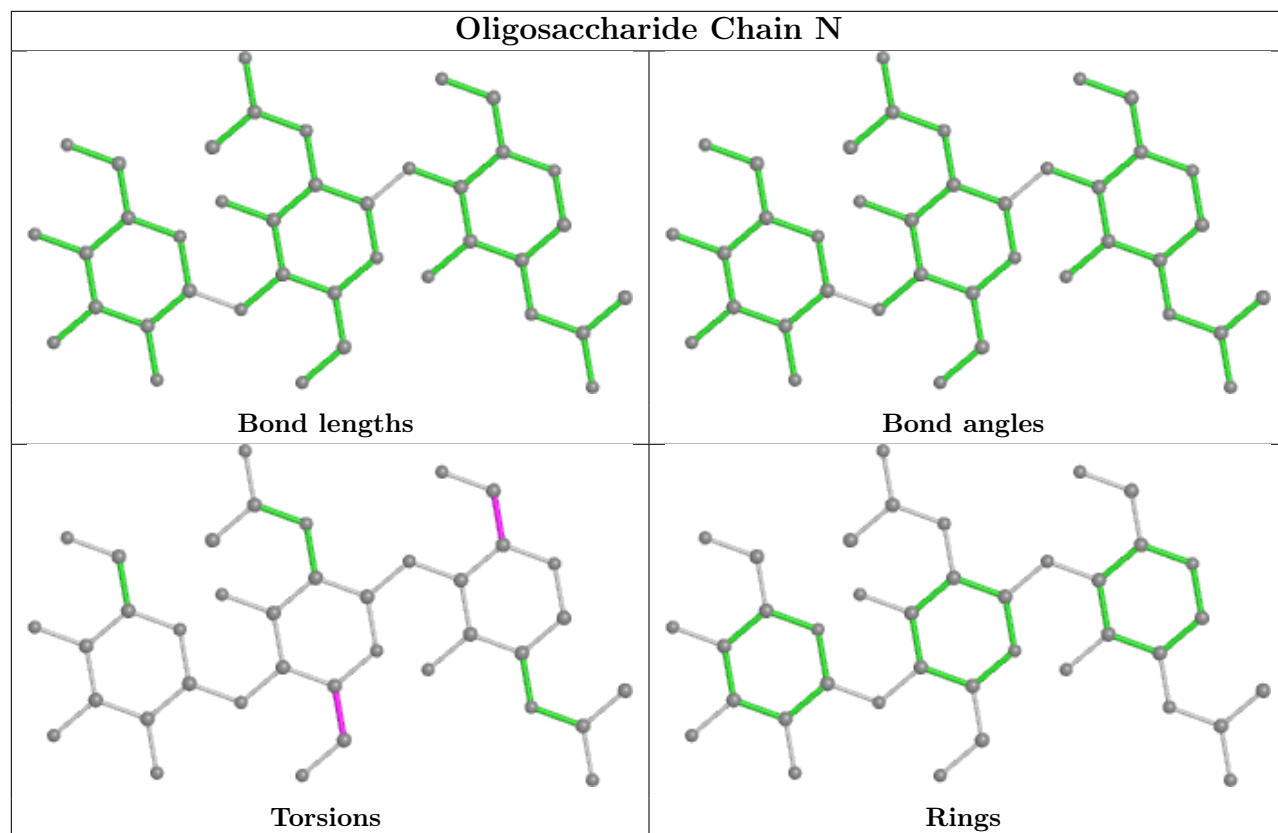


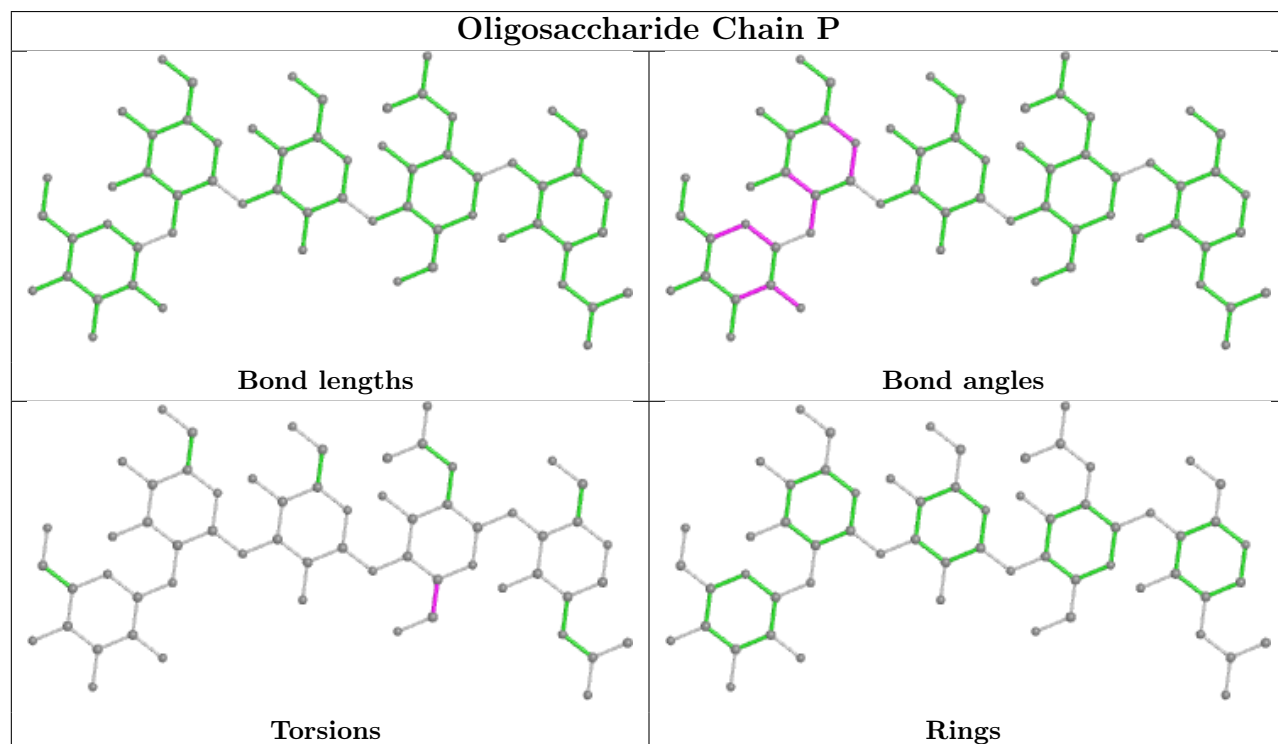
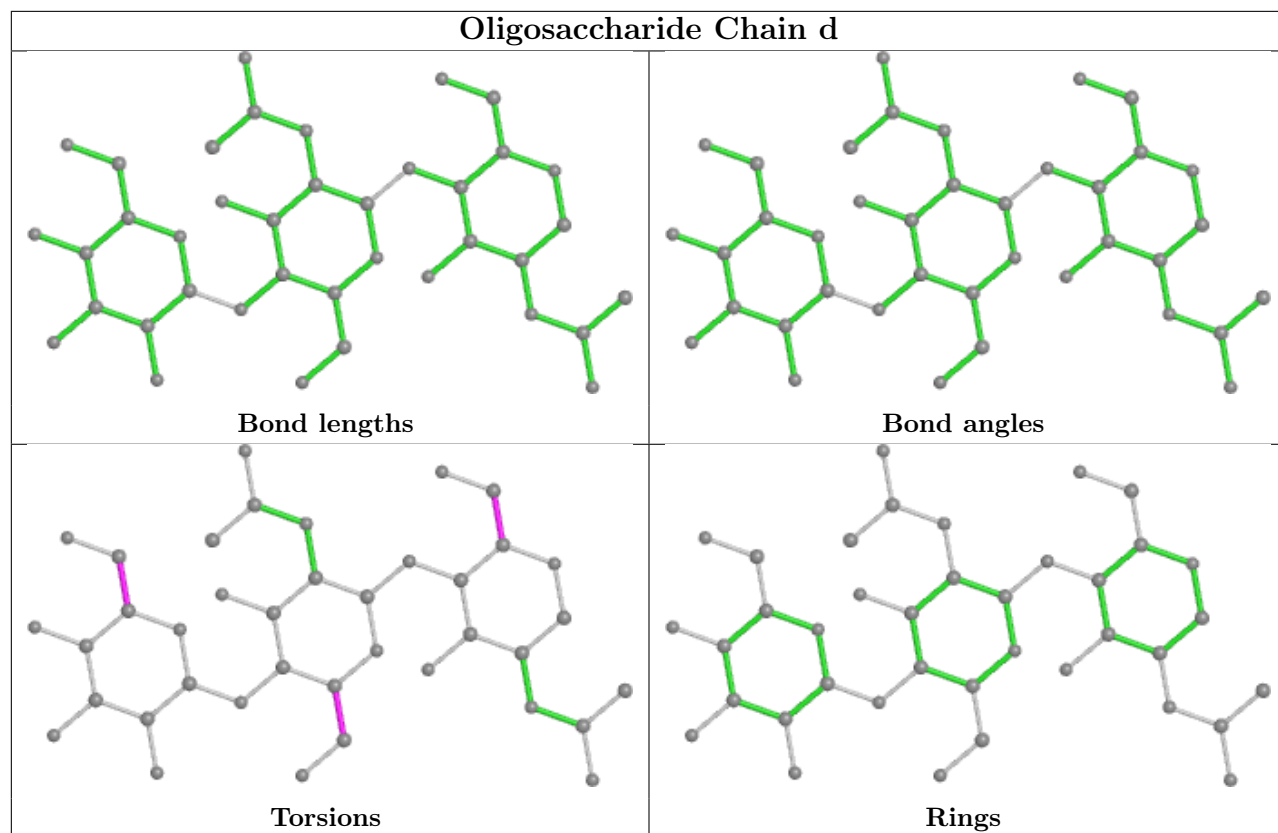


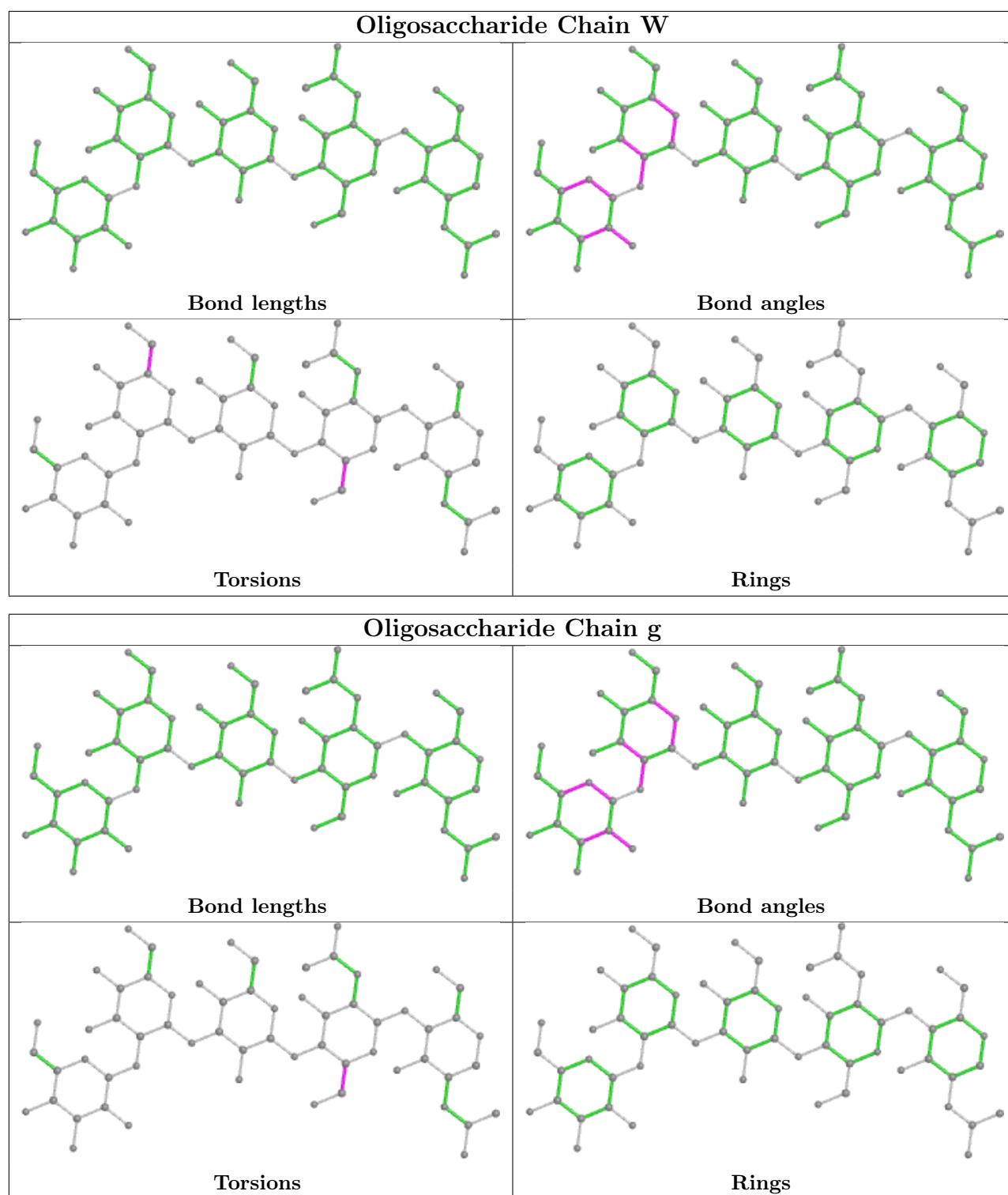












## 5.6 Ligand geometry [i](#)

21 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
8	NAG	E	606	1	14,14,15	0.22	0	17,19,21	0.44	0
8	NAG	A	607	1	14,14,15	0.23	0	17,19,21	0.69	1 (5%)
8	NAG	C	605	1	14,14,15	0.22	0	17,19,21	0.47	0
8	NAG	C	604	1	14,14,15	0.22	0	17,19,21	0.44	0
8	NAG	E	605	1	14,14,15	0.22	0	17,19,21	0.48	0
8	NAG	C	601	1	14,14,15	0.26	0	17,19,21	0.36	0
8	NAG	A	602	1	14,14,15	0.17	0	17,19,21	0.42	0
8	NAG	E	601	1	14,14,15	0.27	0	17,19,21	0.35	0
8	NAG	E	604	1	14,14,15	0.23	0	17,19,21	0.42	0
8	NAG	C	603	1	14,14,15	0.27	0	17,19,21	0.44	0
8	NAG	E	603	1	14,14,15	0.26	0	17,19,21	0.46	0
8	NAG	A	606	1	14,14,15	0.22	0	17,19,21	0.46	0
8	NAG	C	606	1	14,14,15	0.22	0	17,19,21	0.45	0
8	NAG	A	603	1	14,14,15	0.25	0	17,19,21	0.46	0
8	NAG	A	605	1	14,14,15	0.22	0	17,19,21	0.47	0
8	NAG	E	602	1	14,14,15	0.16	0	17,19,21	0.41	0
8	NAG	A	601	1	14,14,15	0.26	0	17,19,21	0.35	0
8	NAG	C	602	1	14,14,15	0.18	0	17,19,21	0.42	0
8	NAG	C	607	1	14,14,15	0.24	0	17,19,21	0.70	1 (5%)
8	NAG	A	604	1	14,14,15	0.21	0	17,19,21	0.43	0
8	NAG	E	607	1	14,14,15	0.22	0	17,19,21	0.69	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
8	NAG	E	606	1	-	0/6/23/26	0/1/1/1
8	NAG	A	607	1	-	4/6/23/26	0/1/1/1
8	NAG	C	605	1	-	2/6/23/26	0/1/1/1
8	NAG	C	604	1	-	0/6/23/26	0/1/1/1
8	NAG	E	605	1	-	2/6/23/26	0/1/1/1
8	NAG	C	601	1	-	2/6/23/26	0/1/1/1
8	NAG	A	602	1	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	NAG	E	601	1	-	2/6/23/26	0/1/1/1
8	NAG	E	604	1	-	0/6/23/26	0/1/1/1
8	NAG	C	603	1	-	0/6/23/26	0/1/1/1
8	NAG	E	603	1	-	0/6/23/26	0/1/1/1
8	NAG	A	606	1	-	0/6/23/26	0/1/1/1
8	NAG	C	606	1	-	0/6/23/26	0/1/1/1
8	NAG	A	603	1	-	0/6/23/26	0/1/1/1
8	NAG	A	605	1	-	2/6/23/26	0/1/1/1
8	NAG	E	602	1	-	1/6/23/26	0/1/1/1
8	NAG	A	601	1	-	2/6/23/26	0/1/1/1
8	NAG	C	602	1	-	2/6/23/26	0/1/1/1
8	NAG	C	607	1	-	4/6/23/26	0/1/1/1
8	NAG	A	604	1	-	0/6/23/26	0/1/1/1
8	NAG	E	607	1	-	4/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	C	607	NAG	C2-N2-C7	2.22	126.06	122.90
8	E	607	NAG	C2-N2-C7	2.21	126.05	122.90
8	A	607	NAG	C2-N2-C7	2.18	126.01	122.90

There are no chirality outliers.

All (29) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	A	605	NAG	O5-C5-C6-O6
8	E	605	NAG	O5-C5-C6-O6
8	C	602	NAG	O5-C5-C6-O6
8	C	602	NAG	C4-C5-C6-O6
8	A	605	NAG	C4-C5-C6-O6
8	E	605	NAG	C4-C5-C6-O6
8	C	605	NAG	O5-C5-C6-O6
8	C	605	NAG	C4-C5-C6-O6
8	A	607	NAG	O5-C5-C6-O6
8	A	607	NAG	C8-C7-N2-C2
8	A	607	NAG	O7-C7-N2-C2
8	C	607	NAG	C8-C7-N2-C2
8	C	607	NAG	O7-C7-N2-C2

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Mol	Chain	Res	Type	Atoms
8	E	607	NAG	C8-C7-N2-C2
8	E	607	NAG	O7-C7-N2-C2
8	A	602	NAG	C4-C5-C6-O6
8	A	607	NAG	C4-C5-C6-O6
8	E	601	NAG	O5-C5-C6-O6
8	C	607	NAG	O5-C5-C6-O6
8	C	607	NAG	C4-C5-C6-O6
8	E	607	NAG	O5-C5-C6-O6
8	A	601	NAG	O5-C5-C6-O6
8	E	607	NAG	C4-C5-C6-O6
8	A	602	NAG	O5-C5-C6-O6
8	C	601	NAG	O5-C5-C6-O6
8	E	602	NAG	C4-C5-C6-O6
8	A	601	NAG	C1-C2-N2-C7
8	C	601	NAG	C1-C2-N2-C7
8	E	601	NAG	C1-C2-N2-C7

There are no ring outliers.

No monomer is involved in short contacts.

## 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.

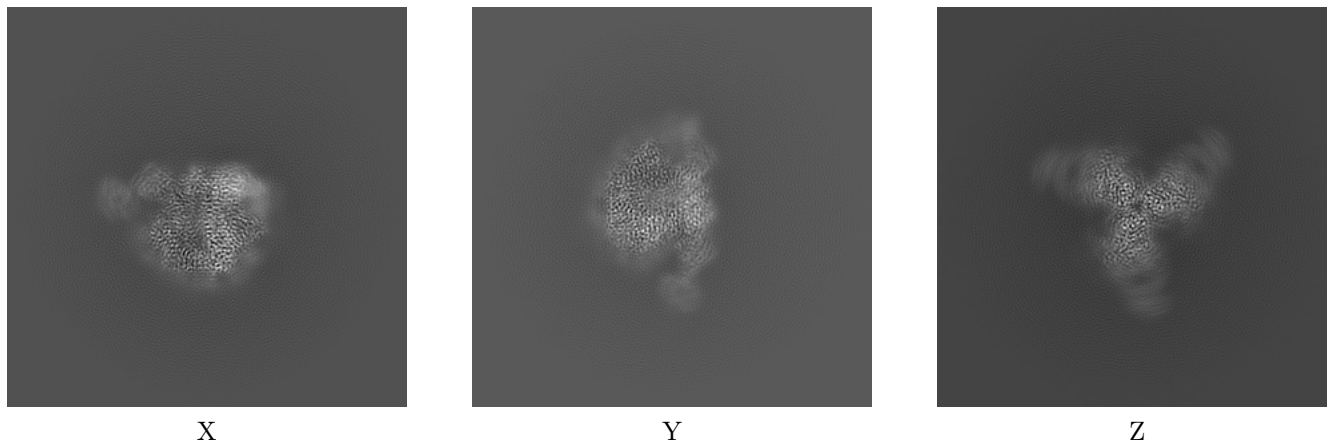
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-28619. These allow visual inspection of the internal detail of the map and identification of artifacts.

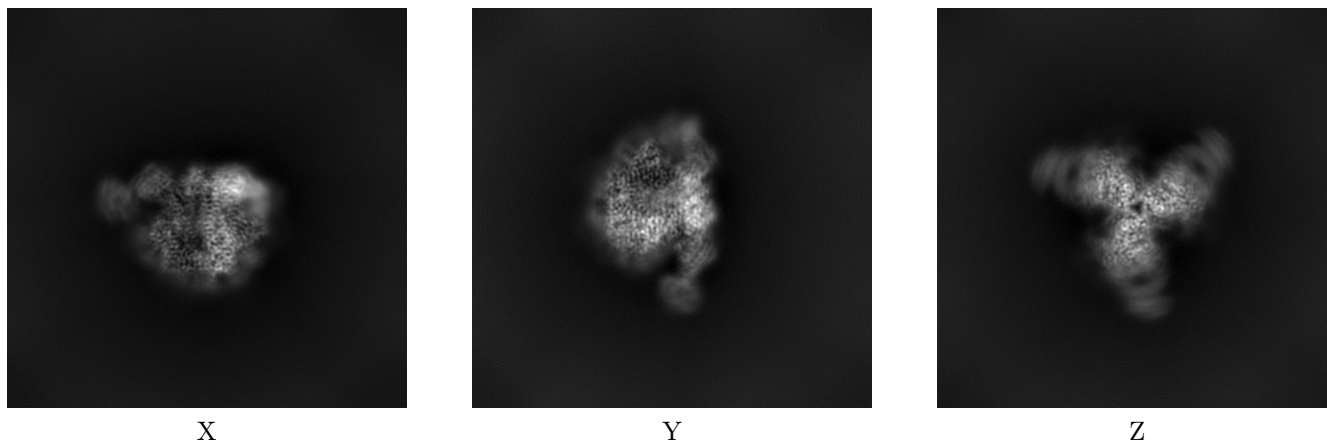
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

#### 6.1.1 Primary map



#### 6.1.2 Raw map

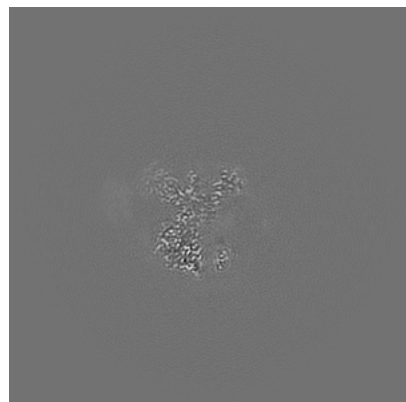


The images above show the map projected in three orthogonal directions.

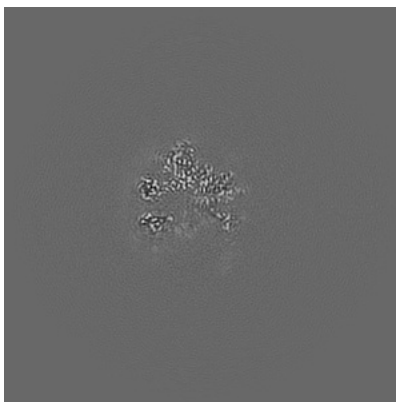


## 6.2 Central slices [i](#)

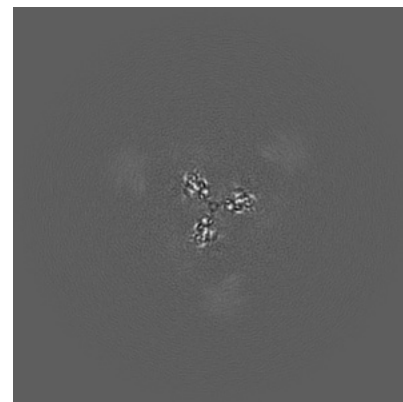
### 6.2.1 Primary map



X Index: 220

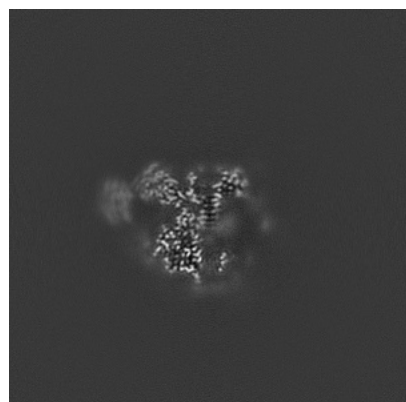


Y Index: 220

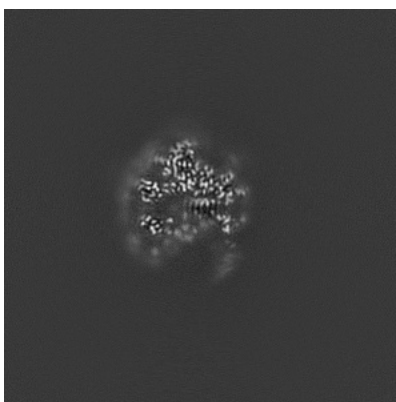


Z Index: 220

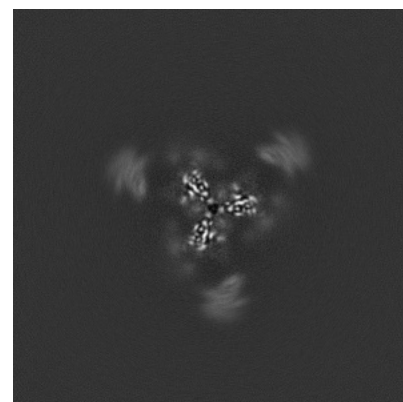
### 6.2.2 Raw map



X Index: 220



Y Index: 220

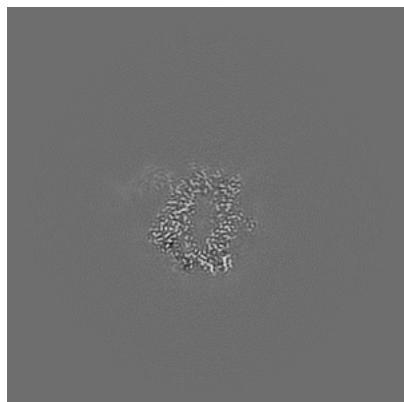


Z Index: 220

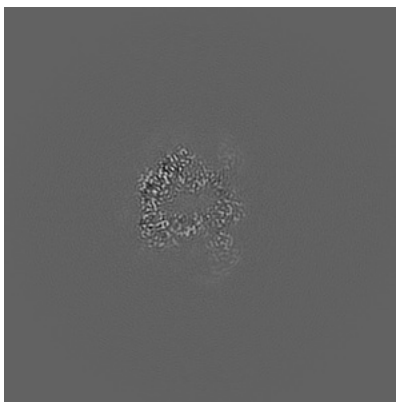
The images above show central slices of the map in three orthogonal directions.

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

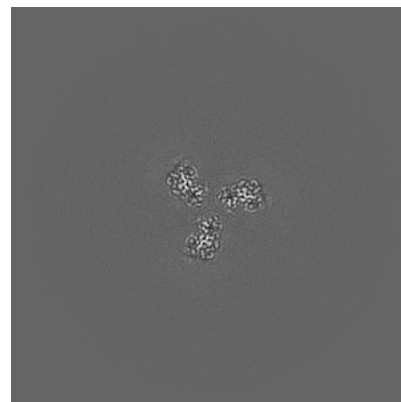
### 6.3.1 Primary map



X Index: 207

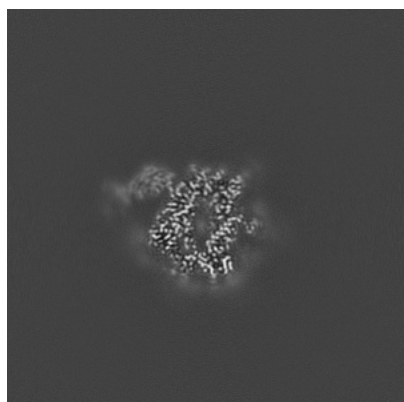


Y Index: 233

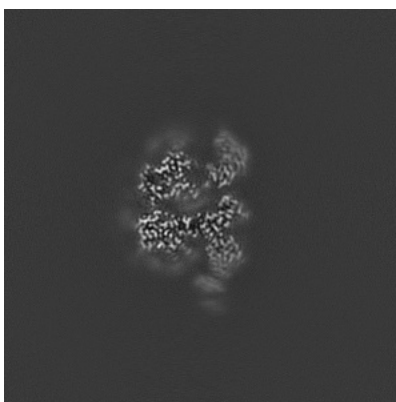


Z Index: 177

### 6.3.2 Raw map



X Index: 207



Y Index: 240

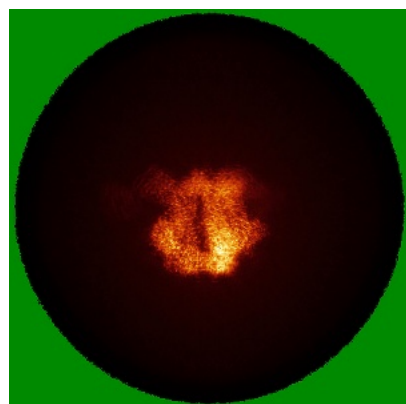


Z Index: 238

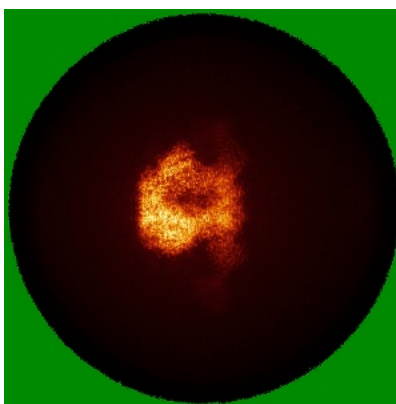
The images above show the largest variance slices of the map in three orthogonal directions.

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

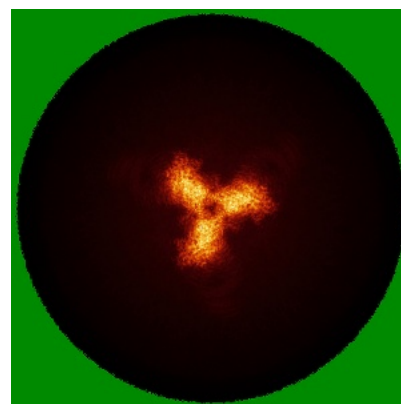
### 6.4.1 Primary map



X

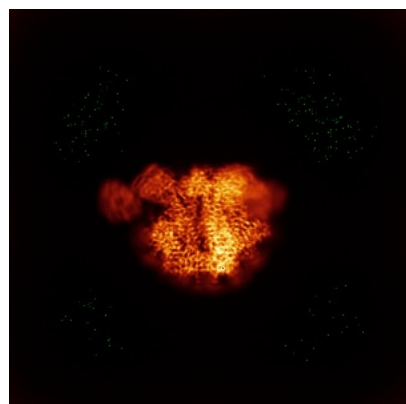


Y

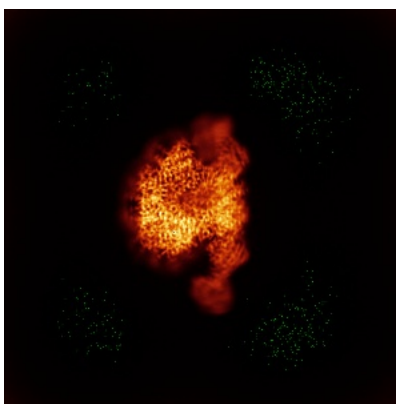


Z

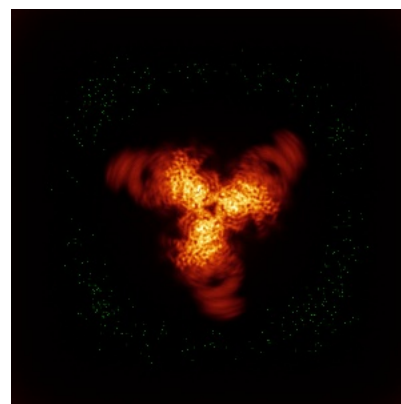
### 6.4.2 Raw map



X



Y

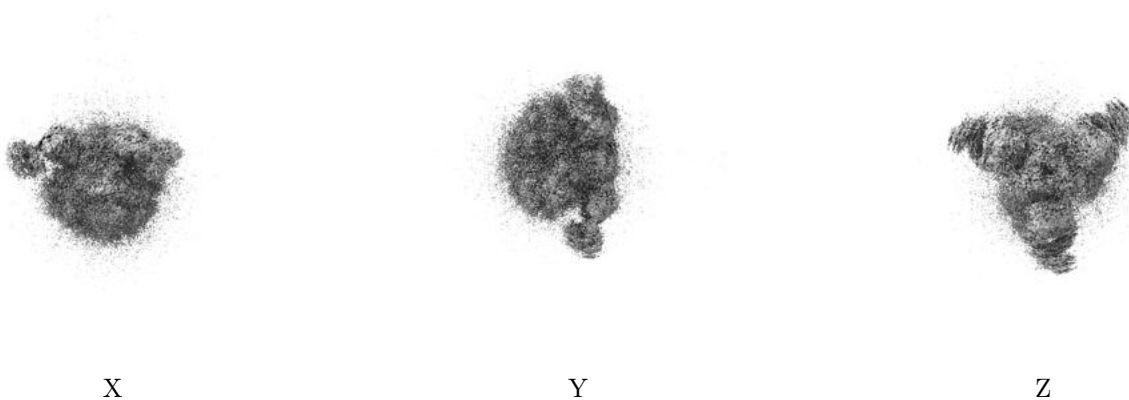


Z

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.

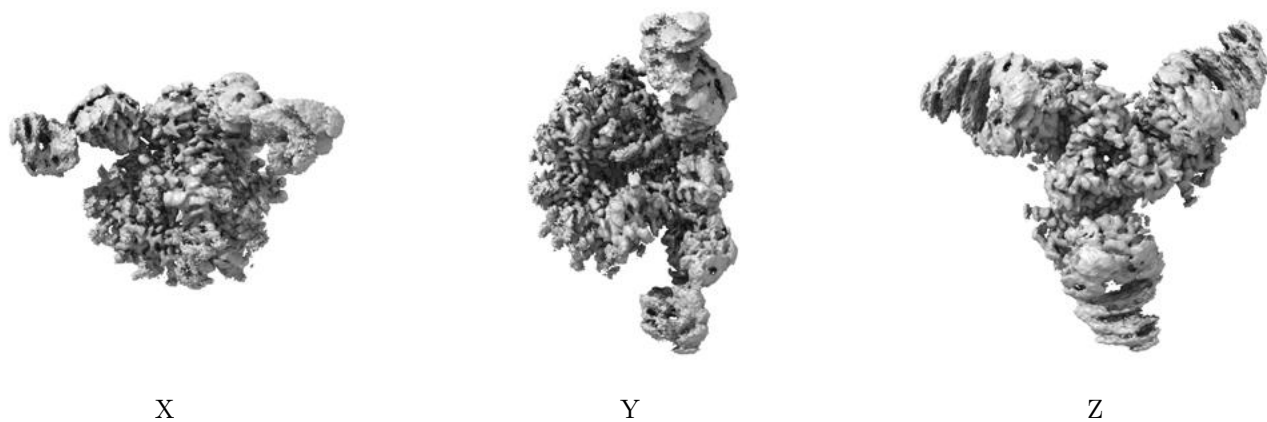
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.1. 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



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.

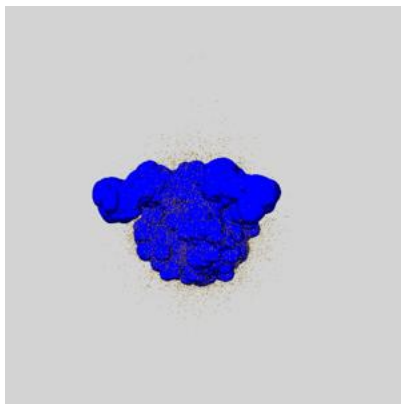
## 6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

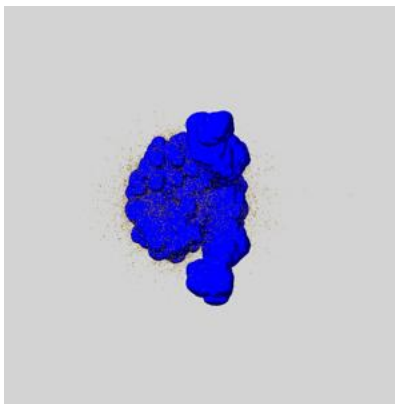
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

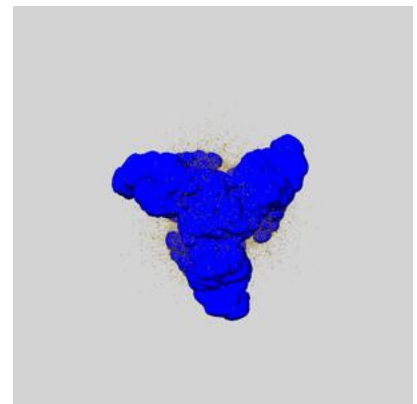
### 6.6.1 emd\_28619\_msk\_1.map [i](#)



X



Y

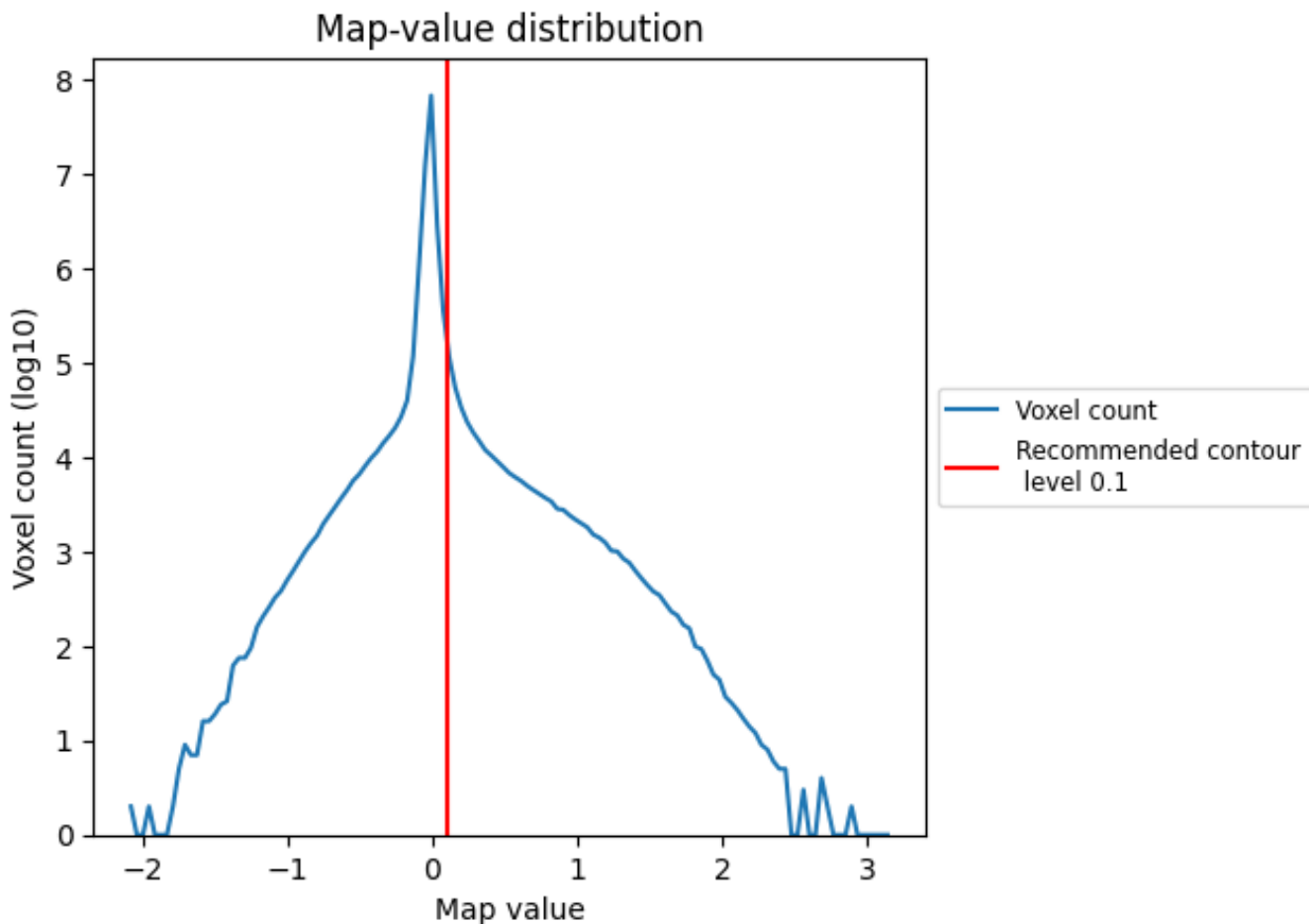


Z

## 7 Map analysis [i](#)

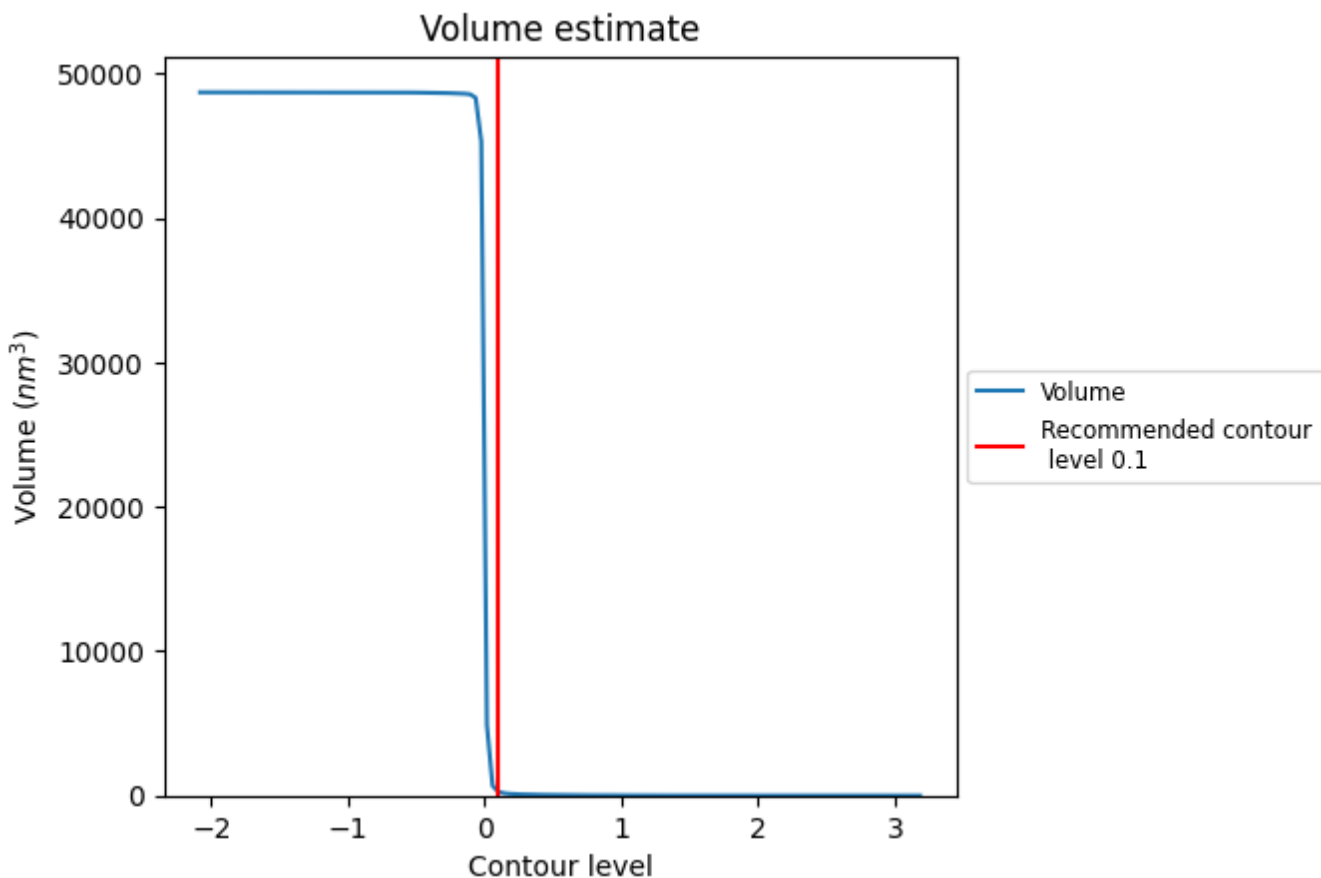
This section contains the results of statistical analysis of the map.

### 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.

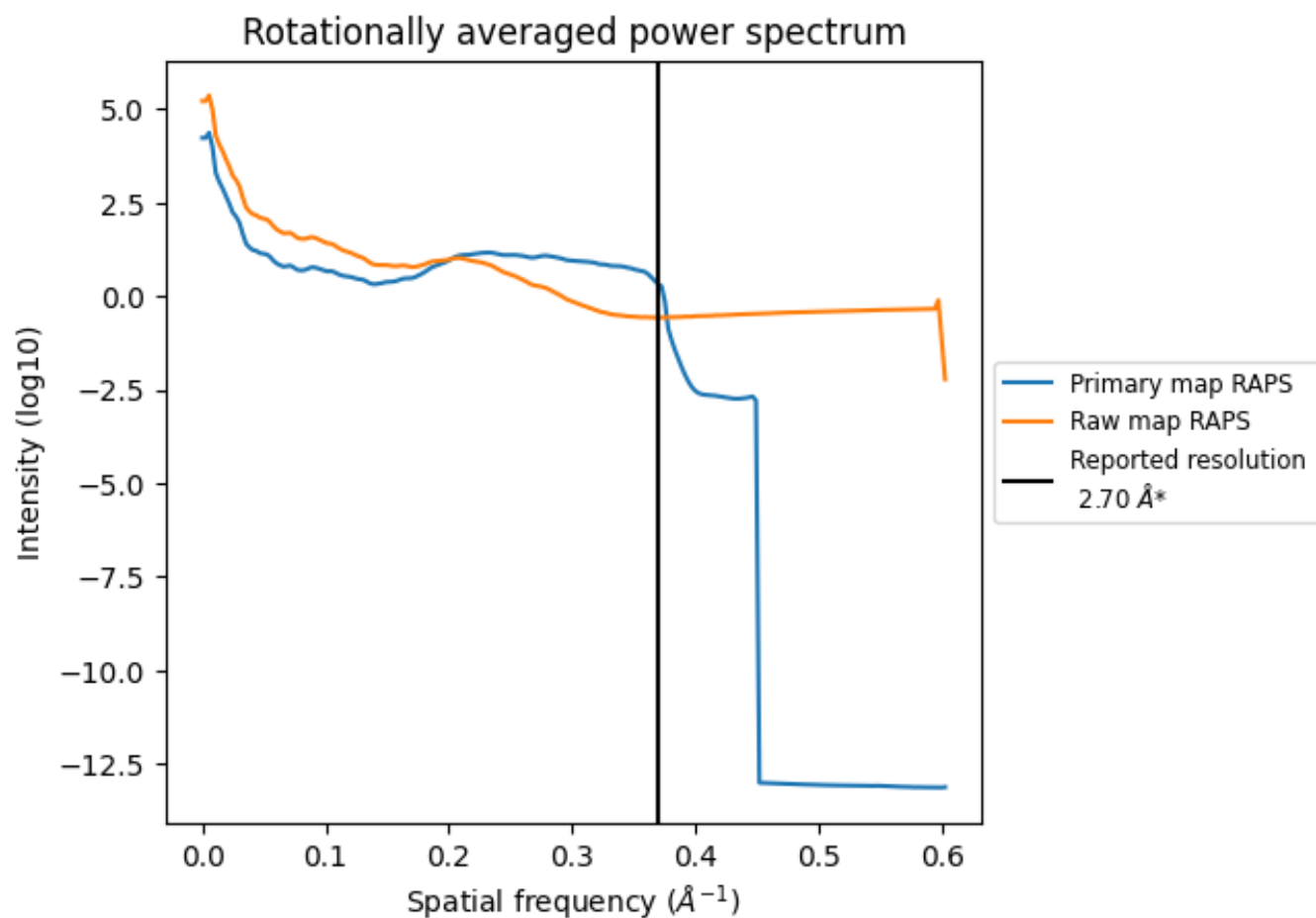
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 259 nm<sup>3</sup>; this corresponds to an approximate mass of 234 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](#)



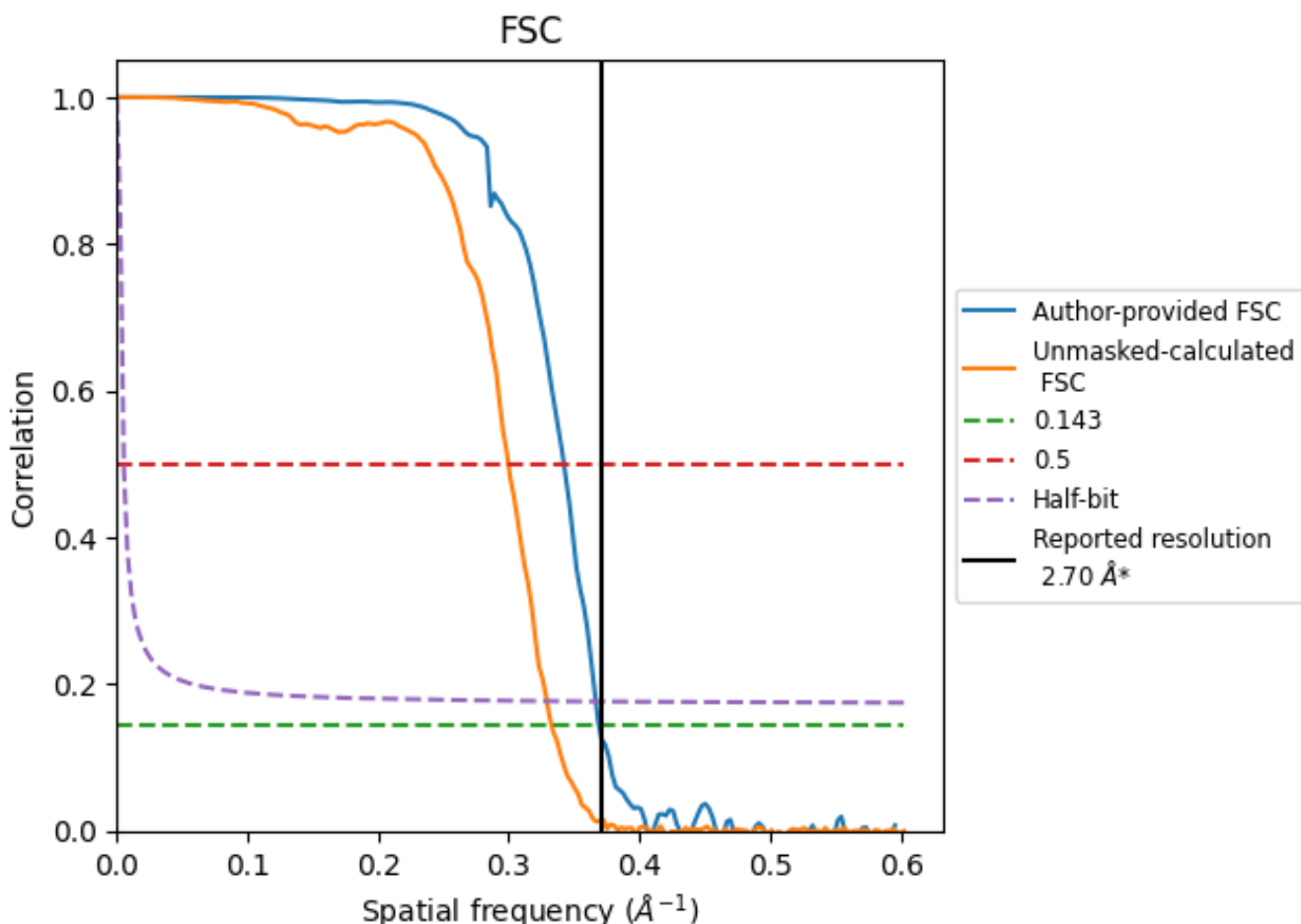
\*Reported resolution corresponds to spatial frequency of  $0.370 \text{ \AA}^{-1}$



## 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 0.370 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

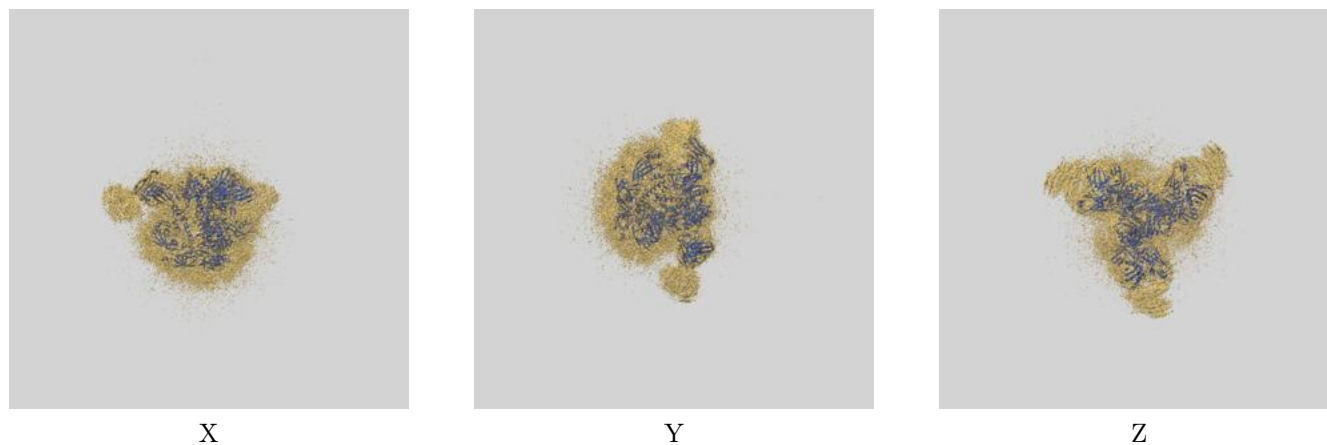
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.70	-	-
Author-provided FSC curve	2.71	2.92	2.73
Unmasked-calculated*	3.00	3.34	3.04

\*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 3.00 differs from the reported value 2.7 by more than 10 %

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

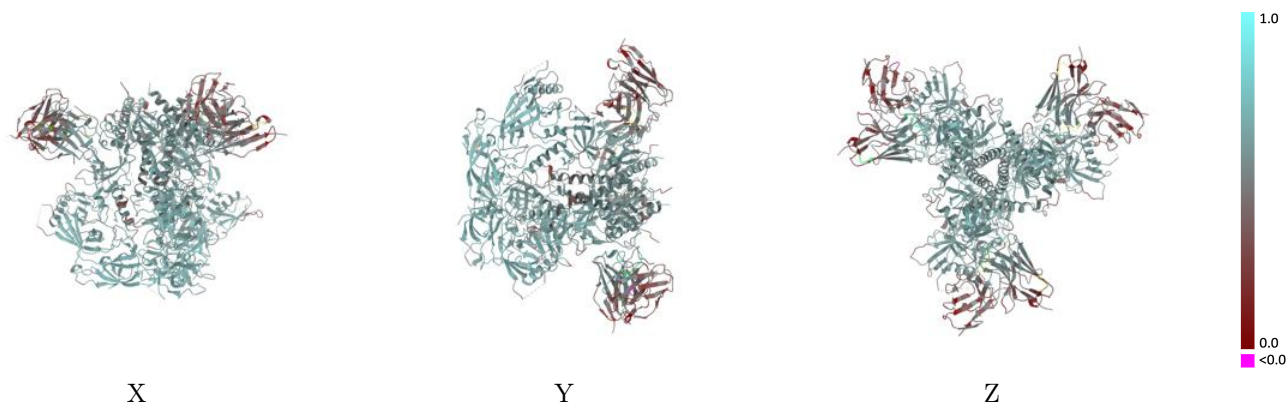
This section contains information regarding the fit between EMDB map EMD-28619 and PDB model 8EUW. Per-residue inclusion information can be found in section [3](#) on page [11](#).

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



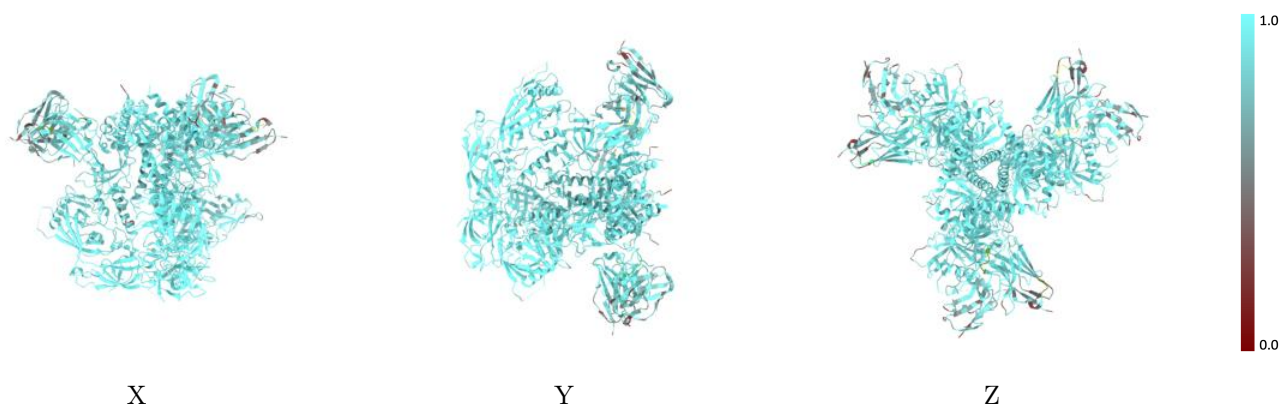
The images above show the 3D surface view of the map at the recommended contour level 0.1 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



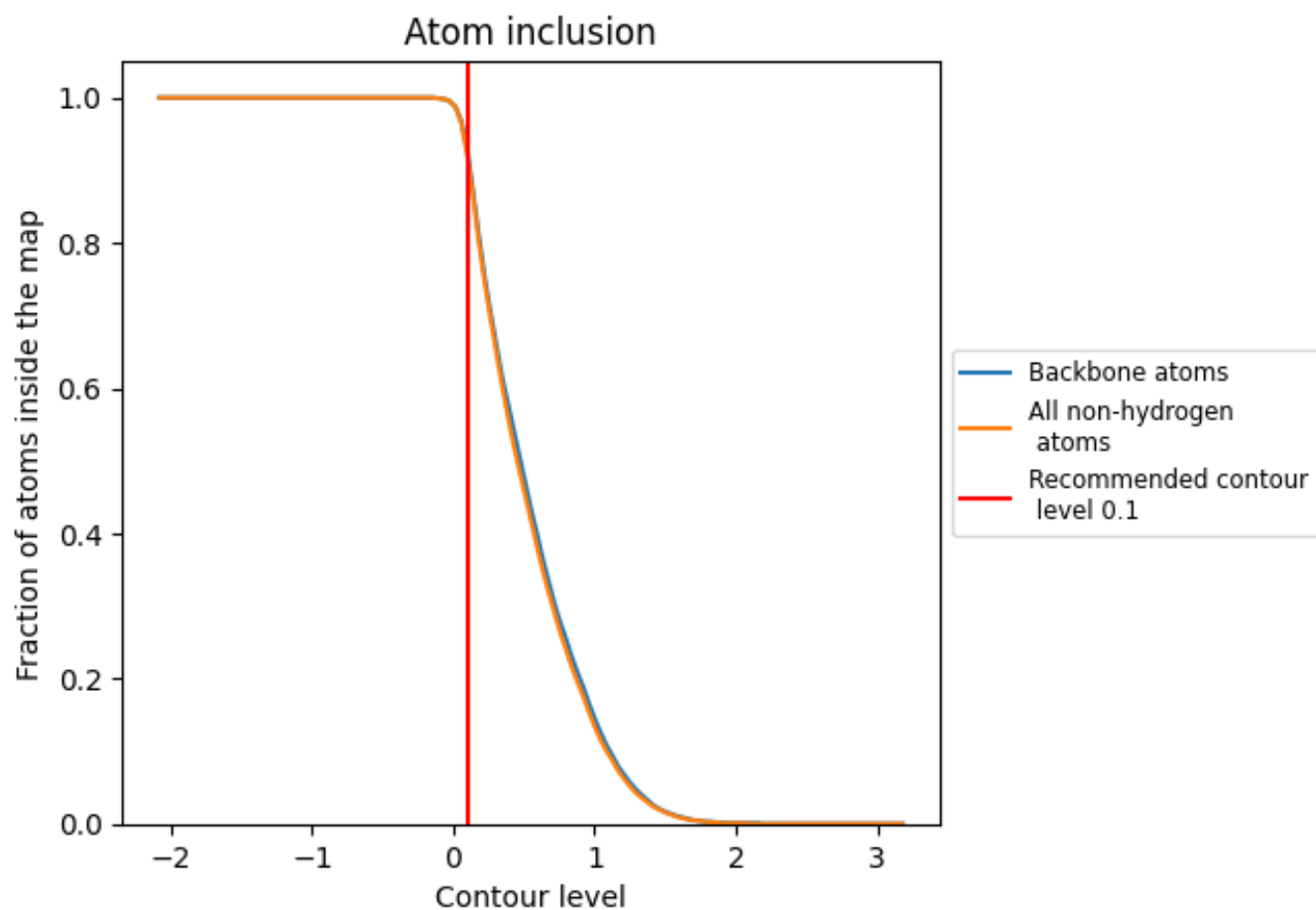
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.1).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 92% 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 (0.1) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9190	 0.5530
A	 0.9640	 0.6070
B	 0.9520	 0.5690
C	 0.9640	 0.6080
D	 0.9570	 0.5690
E	 0.9660	 0.6110
F	 0.9560	 0.5610
G	 0.8490	 0.4790
H	 0.7760	 0.4030
I	 0.8440	 0.4810
J	 0.7530	 0.3790
K	 0.8520	 0.4810
L	 0.7810	 0.4030
M	 0.8210	 0.4890
N	 0.9490	 0.5240
O	 0.8570	 0.4740
P	 0.9180	 0.5240
Q	 0.9290	 0.5200
R	 0.8570	 0.5220
S	 0.9290	 0.4990
T	 0.8570	 0.4680
U	 0.9490	 0.5440
V	 0.8570	 0.4680
W	 0.9340	 0.5320
X	 0.9290	 0.5350
Y	 0.8570	 0.5120
Z	 0.9290	 0.4390
a	 0.8210	 0.4510
b	 0.8930	 0.5050
c	 0.8210	 0.4610
d	 0.9740	 0.5250
e	 0.8210	 0.4460
f	 0.8570	 0.4740
g	 0.9180	 0.5270
h	 0.9290	 0.5140



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Chain	Atom inclusion	Q-score
i	 0.8570	 0.5210
j	 0.8930	 0.4930