



wwPDB EM Validation Summary Report ⓘ

Oct 28, 2024 – 02:13 PM JST

PDB ID : 8X55
EMDB ID : EMD-38063
Title : BA.2.86 Spike Trimer with T356K mutation (3 RBD down)
Authors : Yue, C.; Liu, P.
Deposited on : 2023-11-16
Resolution : 3.75 Å (reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at 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>.

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

EMDB validation analysis : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

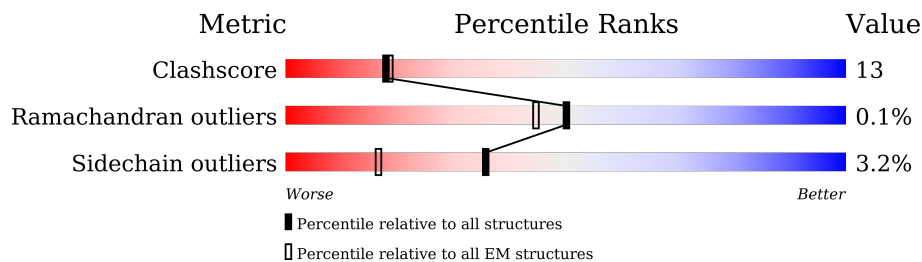
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.75 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.



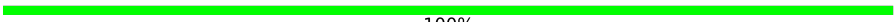
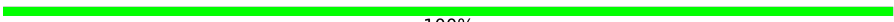
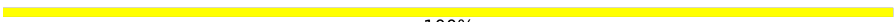
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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 ≥ 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	1206	61% 26% 12%
1	B	1206	61% 25% 12%
1	C	1206	59% 28% 12%
2	D	2	100%
2	E	2	100%
2	F	2	100%
2	G	2	100%
2	H	2	100%
2	I	2	100%

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Mol	Chain	Length	Quality of chain
2	J	2	 100%
2	K	2	 100%
2	L	2	 100%
2	M	2	 100%
2	N	2	 100%
2	O	2	 100%
2	P	2	 100%
2	Q	2	 100%
2	R	2	 100%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 25749 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 Spike glycoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1063	8318	5324	1384	1572	38	0	0
1	B	1063	8318	5324	1384	1572	38	0	0
1	C	1063	8318	5324	1384	1572	38	0	0

There are 219 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	ALA	-	expression tag	UNP P0DTC2
A	-1	THR	-	expression tag	UNP P0DTC2
A	16	MET	-	insertion	UNP P0DTC2
A	17	PRO	ASN	conflict	UNP P0DTC2
A	19	PHE	THR	conflict	UNP P0DTC2
A	20	ASN	THR	conflict	UNP P0DTC2
A	21	LEU	ARG	conflict	UNP P0DTC2
A	22	ILE	THR	conflict	UNP P0DTC2
A	23	THR	GLN	conflict	UNP P0DTC2
A	24	THR	LEU	conflict	UNP P0DTC2
A	25	THR	PRO	conflict	UNP P0DTC2
A	26	GLN	PRO	conflict	UNP P0DTC2
A	27	SER	ALA	conflict	UNP P0DTC2
A	50	LEU	SER	conflict	UNP P0DTC2
A	?	-	HIS	deletion	UNP P0DTC2
A	?	-	VAL	deletion	UNP P0DTC2
A	127	PHE	VAL	conflict	UNP P0DTC2
A	143	ASP	GLY	variant	UNP P0DTC2
A	?	-	TYR	deletion	UNP P0DTC2
A	157	SER	PHE	conflict	UNP P0DTC2
A	158	GLY	ARG	conflict	UNP P0DTC2
A	?	-	ASN	deletion	UNP P0DTC2
A	212	ILE	LEU	variant	UNP P0DTC2
A	213	GLY	VAL	variant	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	216	PHE	LEU	conflict	UNP P0DTC2
A	245	ASN	HIS	conflict	UNP P0DTC2
A	264	ASP	ALA	conflict	UNP P0DTC2
A	332	VAL	ILE	conflict	UNP P0DTC2
A	339	HIS	GLY	variant	UNP P0DTC2
A	371	PHE	SER	conflict	UNP P0DTC2
A	373	PRO	SER	variant	UNP P0DTC2
A	375	PHE	SER	variant	UNP P0DTC2
A	376	ALA	THR	variant	UNP P0DTC2
A	403	LYS	ARG	conflict	UNP P0DTC2
A	405	ASN	ASP	variant	UNP P0DTC2
A	408	SER	ARG	variant	UNP P0DTC2
A	417	ASN	LYS	variant	UNP P0DTC2
A	440	LYS	ASN	variant	UNP P0DTC2
A	445	HIS	VAL	conflict	UNP P0DTC2
A	446	SER	GLY	variant	UNP P0DTC2
A	450	ASP	ASN	conflict	UNP P0DTC2
A	452	TRP	LEU	conflict	UNP P0DTC2
A	460	LYS	ASN	variant	UNP P0DTC2
A	477	ASN	SER	variant	UNP P0DTC2
A	478	LYS	THR	variant	UNP P0DTC2
A	481	LYS	ASN	conflict	UNP P0DTC2
A	?	-	VAL	deletion	UNP P0DTC2
A	484	LYS	GLU	variant	UNP P0DTC2
A	486	PRO	PHE	variant	UNP P0DTC2
A	498	ARG	GLN	variant	UNP P0DTC2
A	501	TYR	ASN	variant	UNP P0DTC2
A	505	HIS	TYR	variant	UNP P0DTC2
A	554	LYS	GLU	conflict	UNP P0DTC2
A	570	VAL	ALA	conflict	UNP P0DTC2
A	614	GLY	ASP	variant	UNP P0DTC2
A	621	SER	PRO	conflict	UNP P0DTC2
A	655	TYR	HIS	variant	UNP P0DTC2
A	679	LYS	ASN	variant	UNP P0DTC2
A	681	ARG	PRO	variant	UNP P0DTC2
A	683	ALA	ARG	conflict	UNP P0DTC2
A	685	ALA	ARG	conflict	UNP P0DTC2
A	764	LYS	ASN	variant	UNP P0DTC2
A	796	TYR	ASP	variant	UNP P0DTC2
A	817	PRO	PHE	conflict	UNP P0DTC2
A	892	PRO	ALA	conflict	UNP P0DTC2
A	899	PRO	ALA	conflict	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	939	PHE	SER	conflict	UNP P0DTC2
A	942	PRO	ALA	conflict	UNP P0DTC2
A	954	HIS	GLN	variant	UNP P0DTC2
A	969	LYS	ASN	variant	UNP P0DTC2
A	986	PRO	LYS	variant	UNP P0DTC2
A	987	PRO	VAL	variant	UNP P0DTC2
A	1143	LEU	PRO	conflict	UNP P0DTC2
B	-2	ALA	-	expression tag	UNP P0DTC2
B	-1	THR	-	expression tag	UNP P0DTC2
B	16	MET	-	insertion	UNP P0DTC2
B	17	PRO	ASN	conflict	UNP P0DTC2
B	19	PHE	THR	conflict	UNP P0DTC2
B	20	ASN	THR	conflict	UNP P0DTC2
B	21	LEU	ARG	conflict	UNP P0DTC2
B	22	ILE	THR	conflict	UNP P0DTC2
B	23	THR	GLN	conflict	UNP P0DTC2
B	24	THR	LEU	conflict	UNP P0DTC2
B	25	THR	PRO	conflict	UNP P0DTC2
B	26	GLN	PRO	conflict	UNP P0DTC2
B	27	SER	ALA	conflict	UNP P0DTC2
B	50	LEU	SER	conflict	UNP P0DTC2
B	?	-	HIS	deletion	UNP P0DTC2
B	?	-	VAL	deletion	UNP P0DTC2
B	127	PHE	VAL	conflict	UNP P0DTC2
B	143	ASP	GLY	variant	UNP P0DTC2
B	?	-	TYR	deletion	UNP P0DTC2
B	157	SER	PHE	conflict	UNP P0DTC2
B	158	GLY	ARG	conflict	UNP P0DTC2
B	?	-	ASN	deletion	UNP P0DTC2
B	212	ILE	LEU	variant	UNP P0DTC2
B	213	GLY	VAL	variant	UNP P0DTC2
B	216	PHE	LEU	conflict	UNP P0DTC2
B	245	ASN	HIS	conflict	UNP P0DTC2
B	264	ASP	ALA	conflict	UNP P0DTC2
B	332	VAL	ILE	conflict	UNP P0DTC2
B	339	HIS	GLY	variant	UNP P0DTC2
B	371	PHE	SER	conflict	UNP P0DTC2
B	373	PRO	SER	variant	UNP P0DTC2
B	375	PHE	SER	variant	UNP P0DTC2
B	376	ALA	THR	variant	UNP P0DTC2
B	403	LYS	ARG	conflict	UNP P0DTC2
B	405	ASN	ASP	variant	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	408	SER	ARG	variant	UNP P0DTC2
B	417	ASN	LYS	variant	UNP P0DTC2
B	440	LYS	ASN	variant	UNP P0DTC2
B	445	HIS	VAL	conflict	UNP P0DTC2
B	446	SER	GLY	variant	UNP P0DTC2
B	450	ASP	ASN	conflict	UNP P0DTC2
B	452	TRP	LEU	conflict	UNP P0DTC2
B	460	LYS	ASN	variant	UNP P0DTC2
B	477	ASN	SER	variant	UNP P0DTC2
B	478	LYS	THR	variant	UNP P0DTC2
B	481	LYS	ASN	conflict	UNP P0DTC2
B	?	-	VAL	deletion	UNP P0DTC2
B	484	LYS	GLU	variant	UNP P0DTC2
B	486	PRO	PHE	variant	UNP P0DTC2
B	498	ARG	GLN	variant	UNP P0DTC2
B	501	TYR	ASN	variant	UNP P0DTC2
B	505	HIS	TYR	variant	UNP P0DTC2
B	554	LYS	GLU	conflict	UNP P0DTC2
B	570	VAL	ALA	conflict	UNP P0DTC2
B	614	GLY	ASP	variant	UNP P0DTC2
B	621	SER	PRO	conflict	UNP P0DTC2
B	655	TYR	HIS	variant	UNP P0DTC2
B	679	LYS	ASN	variant	UNP P0DTC2
B	681	ARG	PRO	variant	UNP P0DTC2
B	683	ALA	ARG	conflict	UNP P0DTC2
B	685	ALA	ARG	conflict	UNP P0DTC2
B	764	LYS	ASN	variant	UNP P0DTC2
B	796	TYR	ASP	variant	UNP P0DTC2
B	817	PRO	PHE	conflict	UNP P0DTC2
B	892	PRO	ALA	conflict	UNP P0DTC2
B	899	PRO	ALA	conflict	UNP P0DTC2
B	939	PHE	SER	conflict	UNP P0DTC2
B	942	PRO	ALA	conflict	UNP P0DTC2
B	954	HIS	GLN	variant	UNP P0DTC2
B	969	LYS	ASN	variant	UNP P0DTC2
B	986	PRO	LYS	variant	UNP P0DTC2
B	987	PRO	VAL	variant	UNP P0DTC2
B	1143	LEU	PRO	conflict	UNP P0DTC2
C	-2	ALA	-	expression tag	UNP P0DTC2
C	-1	THR	-	expression tag	UNP P0DTC2
C	16	MET	-	insertion	UNP P0DTC2
C	17	PRO	ASN	conflict	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	19	PHE	THR	conflict	UNP P0DTC2
C	20	ASN	THR	conflict	UNP P0DTC2
C	21	LEU	ARG	conflict	UNP P0DTC2
C	22	ILE	THR	conflict	UNP P0DTC2
C	23	THR	GLN	conflict	UNP P0DTC2
C	24	THR	LEU	conflict	UNP P0DTC2
C	25	THR	PRO	conflict	UNP P0DTC2
C	26	GLN	PRO	conflict	UNP P0DTC2
C	27	SER	ALA	conflict	UNP P0DTC2
C	50	LEU	SER	conflict	UNP P0DTC2
C	?	-	HIS	deletion	UNP P0DTC2
C	?	-	VAL	deletion	UNP P0DTC2
C	127	PHE	VAL	conflict	UNP P0DTC2
C	143	ASP	GLY	variant	UNP P0DTC2
C	?	-	TYR	deletion	UNP P0DTC2
C	157	SER	PHE	conflict	UNP P0DTC2
C	158	GLY	ARG	conflict	UNP P0DTC2
C	?	-	ASN	deletion	UNP P0DTC2
C	212	ILE	LEU	variant	UNP P0DTC2
C	213	GLY	VAL	variant	UNP P0DTC2
C	216	PHE	LEU	conflict	UNP P0DTC2
C	245	ASN	HIS	conflict	UNP P0DTC2
C	264	ASP	ALA	conflict	UNP P0DTC2
C	332	VAL	ILE	conflict	UNP P0DTC2
C	339	HIS	GLY	variant	UNP P0DTC2
C	371	PHE	SER	conflict	UNP P0DTC2
C	373	PRO	SER	variant	UNP P0DTC2
C	375	PHE	SER	variant	UNP P0DTC2
C	376	ALA	THR	variant	UNP P0DTC2
C	403	LYS	ARG	conflict	UNP P0DTC2
C	405	ASN	ASP	variant	UNP P0DTC2
C	408	SER	ARG	variant	UNP P0DTC2
C	417	ASN	LYS	variant	UNP P0DTC2
C	440	LYS	ASN	variant	UNP P0DTC2
C	445	HIS	VAL	conflict	UNP P0DTC2
C	446	SER	GLY	variant	UNP P0DTC2
C	450	ASP	ASN	conflict	UNP P0DTC2
C	452	TRP	LEU	conflict	UNP P0DTC2
C	460	LYS	ASN	variant	UNP P0DTC2
C	477	ASN	SER	variant	UNP P0DTC2
C	478	LYS	THR	variant	UNP P0DTC2
C	481	LYS	ASN	conflict	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	?	-	VAL	deletion	UNP P0DTC2
C	484	LYS	GLU	variant	UNP P0DTC2
C	486	PRO	PHE	variant	UNP P0DTC2
C	498	ARG	GLN	variant	UNP P0DTC2
C	501	TYR	ASN	variant	UNP P0DTC2
C	505	HIS	TYR	variant	UNP P0DTC2
C	554	LYS	GLU	conflict	UNP P0DTC2
C	570	VAL	ALA	conflict	UNP P0DTC2
C	614	GLY	ASP	variant	UNP P0DTC2
C	621	SER	PRO	conflict	UNP P0DTC2
C	655	TYR	HIS	variant	UNP P0DTC2
C	679	LYS	ASN	variant	UNP P0DTC2
C	681	ARG	PRO	variant	UNP P0DTC2
C	683	ALA	ARG	conflict	UNP P0DTC2
C	685	ALA	ARG	conflict	UNP P0DTC2
C	764	LYS	ASN	variant	UNP P0DTC2
C	796	TYR	ASP	variant	UNP P0DTC2
C	817	PRO	PHE	conflict	UNP P0DTC2
C	892	PRO	ALA	conflict	UNP P0DTC2
C	899	PRO	ALA	conflict	UNP P0DTC2
C	939	PHE	SER	conflict	UNP P0DTC2
C	942	PRO	ALA	conflict	UNP P0DTC2
C	954	HIS	GLN	variant	UNP P0DTC2
C	969	LYS	ASN	variant	UNP P0DTC2
C	986	PRO	LYS	variant	UNP P0DTC2
C	987	PRO	VAL	variant	UNP P0DTC2
C	1143	LEU	PRO	conflict	UNP P0DTC2

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



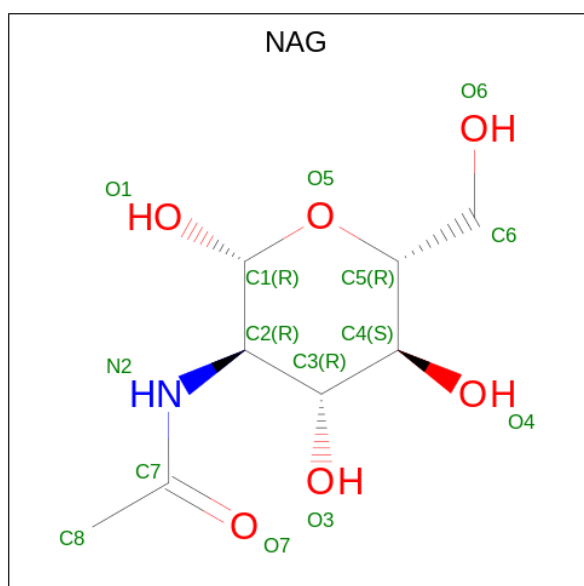
Mol	Chain	Residues	Atoms				AltConf	Trace
2	D	2	Total	C	N	O	0	0
			25	14	1	10		
2	E	2	Total	C	N	O	0	0
			25	14	1	10		
2	F	2	Total	C	N	O	0	0
			25	14	1	10		

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Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
2	G	2	Total 25	14	1	10	0	0
2	H	2	Total 25	14	1	10	0	0
2	I	2	Total 25	14	1	10	0	0
2	J	2	Total 25	14	1	10	0	0
2	K	2	Total 25	14	1	10	0	0
2	L	2	Total 25	14	1	10	0	0
2	M	2	Total 25	14	1	10	0	0
2	N	2	Total 25	14	1	10	0	0
2	O	2	Total 25	14	1	10	0	0
2	P	2	Total 25	14	1	10	0	0
2	Q	2	Total 25	14	1	10	0	0
2	R	2	Total 25	14	1	10	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



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

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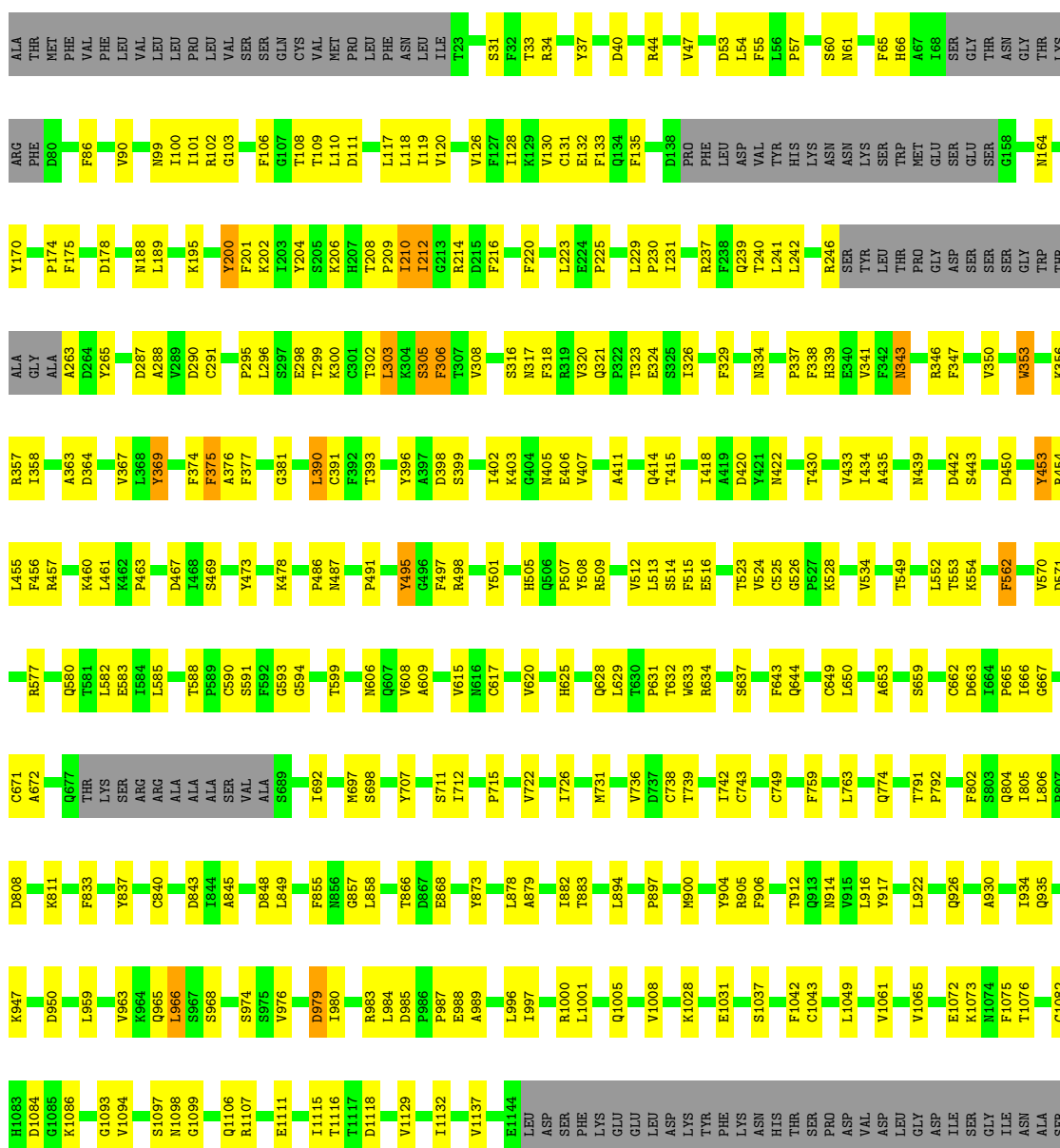
Mol	Chain	Residues	Atoms				AltConf
3	C	1	Total	C	N	O	0
			14	8	1	5	
3	C	1	Total	C	N	O	0
			14	8	1	5	
3	C	1	Total	C	N	O	0
			14	8	1	5	
3	C	1	Total	C	N	O	0
			14	8	1	5	
3	C	1	Total	C	N	O	0
			14	8	1	5	
3	C	1	Total	C	N	O	0
			14	8	1	5	
3	C	1	Total	C	N	O	0
			14	8	1	5	

3 Residue-property plots [i](#)

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

- Molecule 1: Spike glycoprotein

Chain A: 61% 26% 12%



VAL
VAL
ASN
PHE
ILE
GLN
LYS
GLU
ILE
ASP
LEU
ARG
LEU
PRO
ASN
GLU
VAL
VAL
ALA
LYS
ASN
VAL
LEU
LEU
ASP
GLN
GLU
GLN

● Molecule 1: Spike glycoprotein

Chain B:  61% 25% 12%

ALA
THR
MET
PHE
VAL
PHE
LEU
VAL
LEU
LEU
LEU
LEU
PRO
LEU
VAL
SER
SER
ALA
GLN
CYS
VAL
MET
PRO
LEU
LEU
ILE
T23
T24
T25
T33
R34
Y37
Y38
P39
D40
K41
V42
F43
R44
V47
T51
Q52
D53
L54
F55
L56
P57
S60
M61
F65
H66
A67
L68
SER
HIS
GLY

THR
ASN
GLY
THR
ARG
MET
PHE
D80
L84
P85
F86
M87
Y90
Y91
E96
M99
I100
I101
R102
G103
T108
T109
L110
D111
Q115
S116
L117
L118
I119
V120
T124
R125
F127
I128
K129
V130
C131
E132
F133
F134
Q135
C136
M137
D138
PRO
PHE
LEU
ASP
VAL
TYR
HIS
LYS

ASN
ASN
LYS
SER
TRP
MET
SER
GLU
SER
GLU
GLU
G158
M164
M165
C166
F168
E174
F175
M176
M178
M188
E191
Y200
K206
H207
I212
F216
P217
Q218
G219
P220
L223
L229
P230
I231
G232
I233
R237
F238
Q239
T240
L241
L242
R246
SER
TYR
LEU

THR
PRO
ASP
GLY
SER
SER
GLY
TRP
ALA
ALA
A263
D264
Y265
Y266
V267
G283
D287
A288
P295
L296
T299
Y303
K304
S305
F306
T307
V308
E309
Y313
Q314
T315
S316
N317
F318
Q321
P322
T323
E324
S325
I326
P337
F338
H339
N343
F347
Y350
Y350

R357
I358
N360
A372
F373
F374
F377
K378
C379
Y380
L390
C391
F392
T393
D398
S399
I402
K403
E406
V407
I410
A411
Q414
N417
I418
A419
D420
Y421
N422
Y423
D427
D428
C432
V433
W436
M437
S438
D442
S443
G447
M448
D450
D450

Y453
R454
L455
F456
R457
D467
I468
S469
Y473
P486
M487
P491
Y495
G496
F497
R498
Y501
H505
Q506
P507
Y508
R509
V510
V511
L512
S514
E515
E516
A520
C525
V534
T549
K554
L560
D568
I569
D570
T572
R577
L582
E583
E583

T588
P589
C590
S591
F592
G593
I598
T599
T602
V608
A609
Q613
G614
V615
M616
C617
V620
I624
L629
T630
P631
T632
M633
R634
S637
M641
Q644
T645
R646
C649
L650
I651
G652
A653
C662
D663
I664
P665
I666
I670
C671
A672
Q677
THR
LYS
L582
E583

SER
ARG
ALA
ALA
ALA
SER
VAL
ALA
S689
I692
Y707
S708
M709
M710
S711
I712
P715
F718
V722
I726
M731
D737
T738
T739
I742
C743
C749
L752
F759
I770
E773
Q774
Q779
A783
K786
Q787
I788
P792
Q804
I805
S689
I692
Y707
S708
M709
M710
S711
I712
P715
F718
V722
I726
M731
D737
T738
T739
I742
C743
C749
L752
F759
I770
E773
Q774
Q779
A783
K786
Q787
I788
P792
Q804
I805

K811
R815
E819
Y837
G838
D839
D843
A845
A846
R847
D848
L849
L864
L865
T866
M869
Y873
A876
L877
L878
I882
T883
L884
M900
R905
T912
Q913
N914
Y917
E918
N919
I923
Q935
K947
N955
L959
V963
K811
R815
E819
Y837
G838
D839
D843
A845
A846
R847
D848
L849
L864
L865
T866
M869
Y873
A876
L877
L878
I882
T883
L884
M900
R905
T912
Q913
N914
Y917
E918
N919
I923
Q935
K947
N955
L959
V963

S968
S974
I980
R983
L984
D985
P986
P987
I993
I997
R1000
L1001
Q1005
L1012
R1019
K1028
M1029
S1030
D1041
F1042
L1049
P1053
Q1054
V1061
V1065
E1071
E1072
K1073
H1074
F1075
T1076
C1082
H1083
E1092
G1093
V1094
S1097
M1098
G1099
Q1106
S968
S974
I980
R983
L984
D985
P986
P987
I993
I997
R1000
L1001
Q1005
L1012
R1019
K1028
M1029
S1030
D1041
F1042
L1049
P1053
Q1054
V1061
V1065
E1071
E1072
K1073
H1074
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T1076
C1082
H1083
E1092
G1093
V1094
S1097
M1098
G1099
Q1106

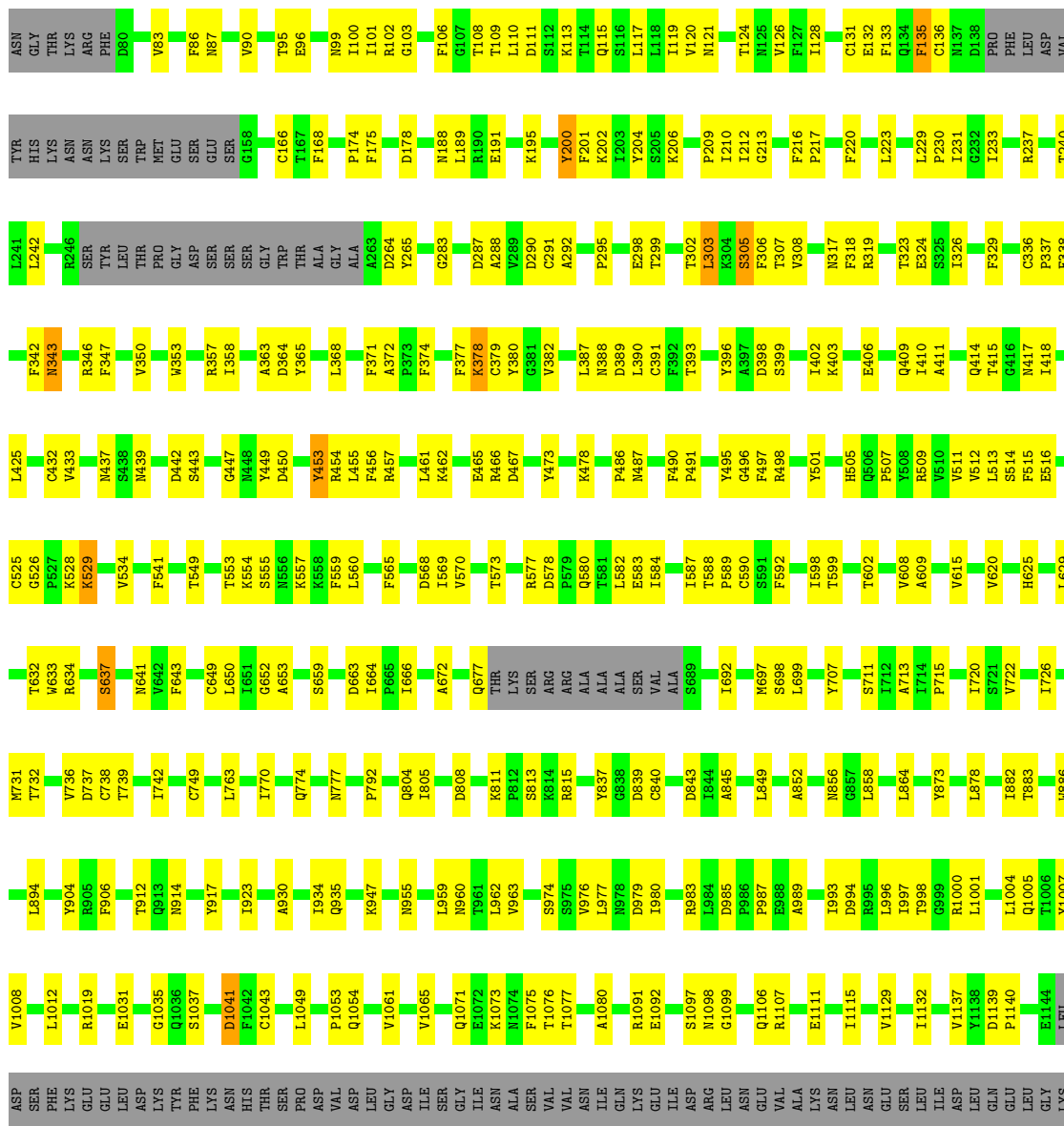
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V1129
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LYS
GLU
GLU
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VAL
SER
SER
PHE
GLN
CYS
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MET
PRO
LEU
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PHE
ASN
ASN
HIS
THR
SER
PRO
ASP
VAL
ASP
LEU
LEU
GLY
ASP
P39
D40
R44
V47
T51
D52
D53
L54
F55
L56
P57
F58
F59
S60
N61
F65
A68
SER
GLY
THR
LEU
LEU
THR
I805

ASN
GLU
SER
LEU
ILE
ASP
LEU
GLN
LEU
GLY
LYS
TYR
GLU
GLN

● Molecule 1: Spike glycoprotein

Chain C:  59% 28% 12%

ALA
THR
MET
PHE
VAL
PHE
LEU
VAL
LEU
LEU
LEU
PRO
PRO
VAL
VAL
SER
SER
GLN
CYS
VAL
MET
PRO
LEU
LEU
PHE
ASN
ASN
ILE
T23
N30
S31
F32
T33
R34
Y37
Y38
P39
D40
R44
V47
T51
D52
D53
L54
F55
L56
P57
F58
F59
S60
N61
F65
A68
SER
GLY
THR



Tyr
Glu
Gln

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



WAG1
BHA2

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



WAG1
BHA2

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

Chain F:  100%



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

Chain G:  100%



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

Chain H:  100%



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

Chain I:  100%



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

Chain J:  100%



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

Chain K:  100%



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

Chain L:  100%



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

Chain M:  100%

MAG1
BMA2

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

Chain N:  100%MAG1
BMA2

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

Chain O:  100%MAG1
BMA2


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

Chain P:  100%MAG1
BMA2

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

Chain Q:  100%MAG1
BMA2

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

Chain R:  100%MAG1
BMA2

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	96376	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING ONLY	Depositor
Microscope	FEI TITAN	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	60	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	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, BMA

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	0.30	1/8518 (0.0%)	0.55	6/11592 (0.1%)
1	B	0.28	0/8518	0.52	0/11592
1	C	0.28	0/8518	0.52	2/11592 (0.0%)
All	All	0.29	1/25554 (0.0%)	0.53	8/34776 (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	B	0	1
All	All	0	3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	209	PRO	CG-CD	-8.68	1.22	1.50

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	209	PRO	CA-N-CD	-12.61	93.85	111.50
1	A	209	PRO	N-CD-CG	-9.90	88.35	103.20
1	C	303	LEU	CA-CB-CG	6.63	130.55	115.30
1	C	1041	ASP	CB-CG-OD1	5.77	123.49	118.30
1	A	209	PRO	CA-CB-CG	-5.14	94.23	104.00

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	210	ILE	Peptide
1	A	303	LEU	Peptide
1	B	303	LEU	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	8318	0	8109	225	0
1	B	8318	0	8109	230	0
1	C	8318	0	8109	256	0
2	D	25	0	22	0	0
2	E	25	0	22	0	0
2	F	25	0	22	0	0
2	G	25	0	22	0	0
2	H	25	0	22	0	0
2	I	25	0	22	0	0
2	J	25	0	22	0	0
2	K	25	0	22	0	0
2	L	25	0	22	0	0
2	M	25	0	22	0	0
2	N	25	0	22	0	0
2	O	25	0	22	0	0
2	P	25	0	22	0	0
2	Q	25	0	22	0	0
2	R	25	0	22	0	0
3	A	140	0	130	1	0
3	B	140	0	130	2	0
3	C	140	0	130	2	0
All	All	25749	0	25047	665	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 13.

The worst 5 of 665 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:391:CYS:HA	1:A:525:CYS:HB3	1.42	1.02
1:B:391:CYS:HA	1:B:525:CYS:HB3	1.43	1.01
1:C:731:MET:HB2	1:C:955:ASN:HD21	1.35	0.89
1:B:96:GLU:OE1	1:B:100:ILE:N	2.18	0.77
1:C:804:GLN:NE2	1:C:935:GLN:OE1	2.17	0.77

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	1053/1206 (87%)	972 (92%)	80 (8%)	1 (0%)	48	79
1	B	1053/1206 (87%)	975 (93%)	76 (7%)	2 (0%)	44	73
1	C	1053/1206 (87%)	975 (93%)	77 (7%)	1 (0%)	48	79
All	All	3159/3618 (87%)	2922 (92%)	233 (7%)	4 (0%)	50	79

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	212	ILE
1	C	212	ILE
1	B	212	ILE
1	B	216	PHE

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	925/1054 (88%)	893 (96%)	32 (4%)	31	56
1	B	925/1054 (88%)	892 (96%)	33 (4%)	30	55
1	C	925/1054 (88%)	900 (97%)	25 (3%)	40	61
All	All	2775/3162 (88%)	2685 (97%)	90 (3%)	36	58

5 of 90 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	711	SER
1	C	343	ASN
1	B	774	GLN
1	C	40	ASP
1	C	378	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	613	GLN
1	B	957	GLN
1	C	955	ASN
1	A	644	GLN
1	A	487	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

30 monosaccharides are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the

expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
2	NAG	D	1	1,2	14,14,15	0.25	0	17,19,21	0.40	0
2	BMA	D	2	2	11,11,12	0.63	0	15,15,17	0.72	0
2	NAG	E	1	1,2	14,14,15	0.20	0	17,19,21	0.43	0
2	BMA	E	2	2	11,11,12	0.64	0	15,15,17	0.77	0
2	NAG	F	1	1,2	14,14,15	0.26	0	17,19,21	0.45	0
2	BMA	F	2	2	11,11,12	0.60	0	15,15,17	0.81	0
2	NAG	G	1	1,2	14,14,15	0.23	0	17,19,21	0.41	0
2	BMA	G	2	2	11,11,12	0.59	0	15,15,17	0.68	0
2	NAG	H	1	1,2	14,14,15	1.17	1 (7%)	17,19,21	1.06	1 (5%)
2	BMA	H	2	2	11,11,12	0.57	0	15,15,17	1.23	2 (13%)
2	NAG	I	1	1,2	14,14,15	0.25	0	17,19,21	0.40	0
2	BMA	I	2	2	11,11,12	0.61	0	15,15,17	0.71	0
2	NAG	J	1	1,2	14,14,15	0.21	0	17,19,21	0.43	0
2	BMA	J	2	2	11,11,12	0.64	0	15,15,17	0.78	0
2	NAG	K	1	1,2	14,14,15	0.26	0	17,19,21	0.45	0
2	BMA	K	2	2	11,11,12	0.61	0	15,15,17	0.82	0
2	NAG	L	1	1,2	14,14,15	0.20	0	17,19,21	0.40	0
2	BMA	L	2	2	11,11,12	0.58	0	15,15,17	0.68	0
2	NAG	M	1	1,2	14,14,15	1.16	1 (7%)	17,19,21	1.07	1 (5%)
2	BMA	M	2	2	11,11,12	0.57	0	15,15,17	1.21	1 (6%)
2	NAG	N	1	1,2	14,14,15	0.24	0	17,19,21	0.41	0
2	BMA	N	2	2	11,11,12	0.61	0	15,15,17	0.71	0
2	NAG	O	1	1,2	14,14,15	0.20	0	17,19,21	0.42	0
2	BMA	O	2	2	11,11,12	0.63	0	15,15,17	0.78	0
2	NAG	P	1	1,2	14,14,15	0.27	0	17,19,21	0.45	0
2	BMA	P	2	2	11,11,12	0.60	0	15,15,17	0.81	0
2	NAG	Q	1	1,2	14,14,15	0.21	0	17,19,21	0.40	0
2	BMA	Q	2	2	11,11,12	0.58	0	15,15,17	0.67	0
2	NAG	R	1	1,2	14,14,15	1.21	1 (7%)	17,19,21	1.11	1 (5%)
2	BMA	R	2	2	11,11,12	0.59	0	15,15,17	1.25	3 (20%)

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

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

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	BMA	D	2	2	-	0/2/19/22	0/1/1/1
2	NAG	E	1	1,2	-	2/6/23/26	0/1/1/1
2	BMA	E	2	2	-	0/2/19/22	0/1/1/1
2	NAG	F	1	1,2	-	2/6/23/26	0/1/1/1
2	BMA	F	2	2	-	0/2/19/22	0/1/1/1
2	NAG	G	1	1,2	-	1/6/23/26	0/1/1/1
2	BMA	G	2	2	-	0/2/19/22	0/1/1/1
2	NAG	H	1	1,2	-	2/6/23/26	0/1/1/1
2	BMA	H	2	2	-	0/2/19/22	0/1/1/1
2	NAG	I	1	1,2	-	2/6/23/26	0/1/1/1
2	BMA	I	2	2	-	0/2/19/22	0/1/1/1
2	NAG	J	1	1,2	-	2/6/23/26	0/1/1/1
2	BMA	J	2	2	-	0/2/19/22	0/1/1/1
2	NAG	K	1	1,2	-	2/6/23/26	0/1/1/1
2	BMA	K	2	2	-	0/2/19/22	0/1/1/1
2	NAG	L	1	1,2	-	1/6/23/26	0/1/1/1
2	BMA	L	2	2	-	0/2/19/22	0/1/1/1
2	NAG	M	1	1,2	-	2/6/23/26	0/1/1/1
2	BMA	M	2	2	-	0/2/19/22	0/1/1/1
2	NAG	N	1	1,2	-	2/6/23/26	0/1/1/1
2	BMA	N	2	2	-	0/2/19/22	0/1/1/1
2	NAG	O	1	1,2	-	2/6/23/26	0/1/1/1
2	BMA	O	2	2	-	0/2/19/22	0/1/1/1
2	NAG	P	1	1,2	-	2/6/23/26	0/1/1/1
2	BMA	P	2	2	-	0/2/19/22	0/1/1/1
2	NAG	Q	1	1,2	-	1/6/23/26	0/1/1/1
2	BMA	Q	2	2	-	0/2/19/22	0/1/1/1
2	NAG	R	1	1,2	-	2/6/23/26	0/1/1/1
2	BMA	R	2	2	-	1/2/19/22	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	R	1	NAG	O5-C1	-4.19	1.37	1.43
2	H	1	NAG	O5-C1	-4.04	1.37	1.43
2	M	1	NAG	O5-C1	-4.02	1.37	1.43

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

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
2	R	1	NAG	C3-C4-C5	3.13	115.81	110.24
2	H	1	NAG	C3-C4-C5	2.95	115.50	110.24
2	M	1	NAG	C3-C4-C5	2.94	115.48	110.24
2	R	2	BMA	C1-O5-C5	2.81	116.00	112.19
2	H	2	BMA	C1-O5-C5	2.73	115.89	112.19

There are no chirality outliers.

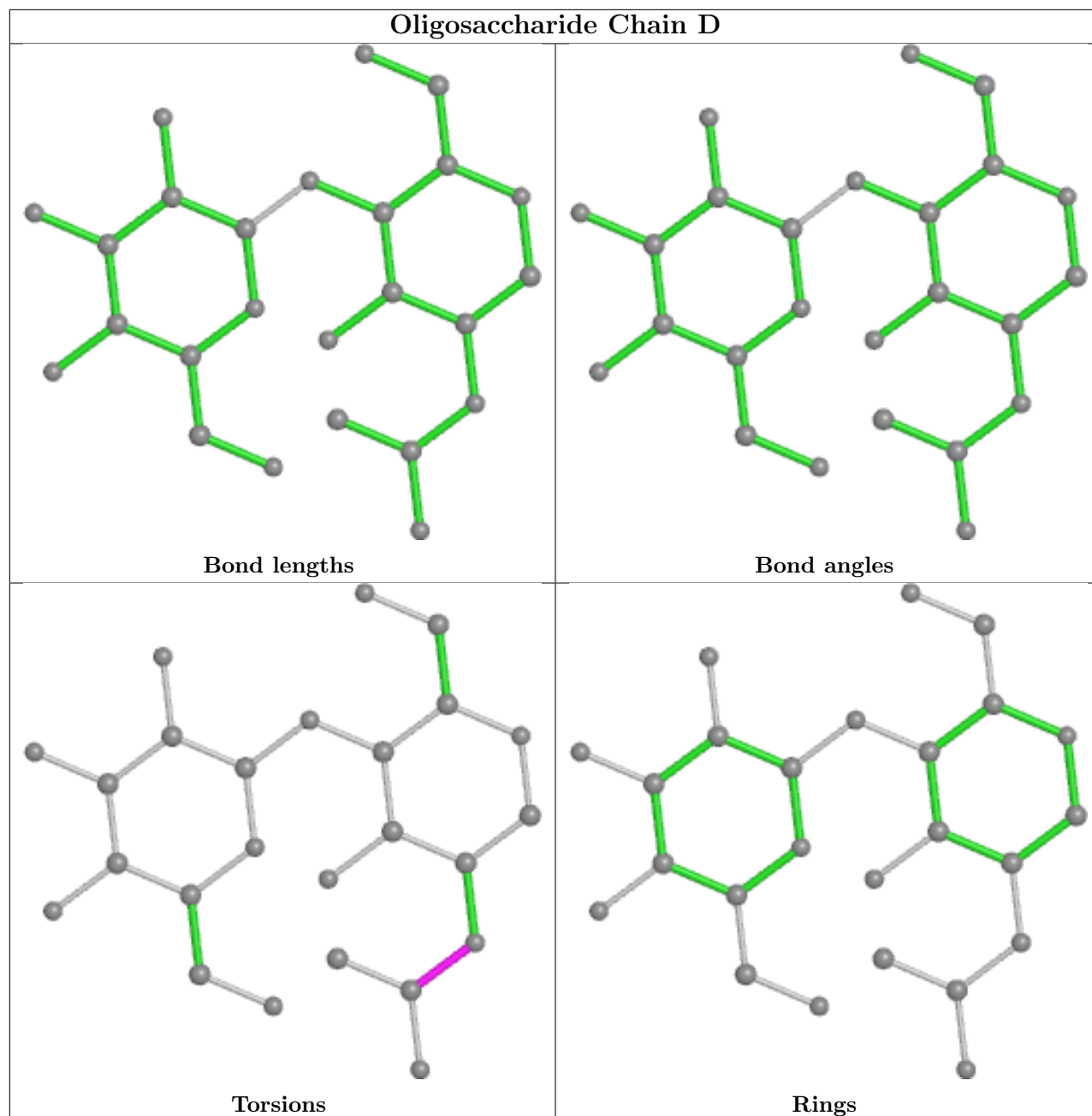
5 of 28 torsion outliers are listed below:

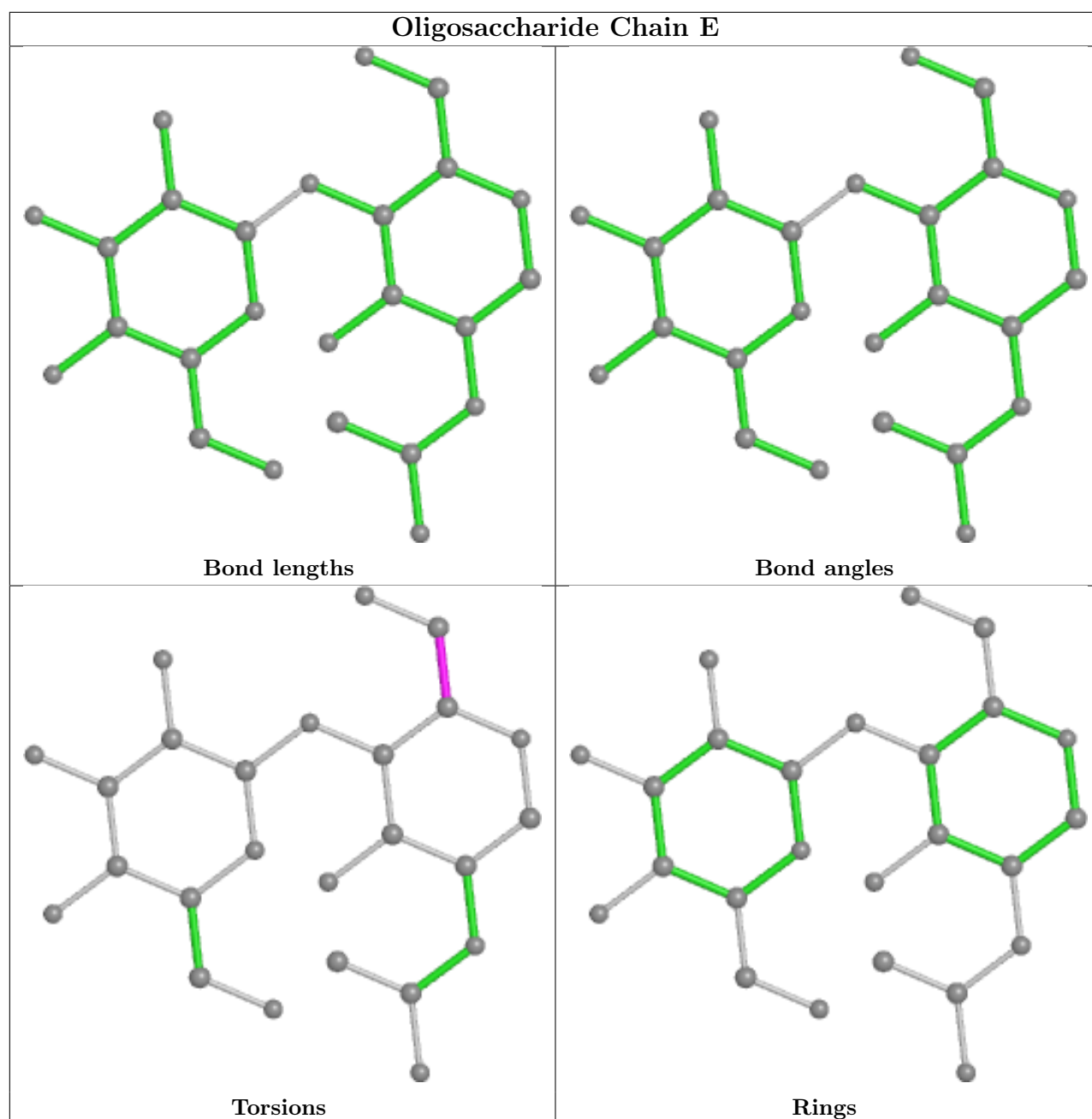
Mol	Chain	Res	Type	Atoms
2	R	1	NAG	O5-C5-C6-O6
2	H	1	NAG	O5-C5-C6-O6
2	M	1	NAG	O5-C5-C6-O6
2	F	1	NAG	O5-C5-C6-O6
2	K	1	NAG	O5-C5-C6-O6

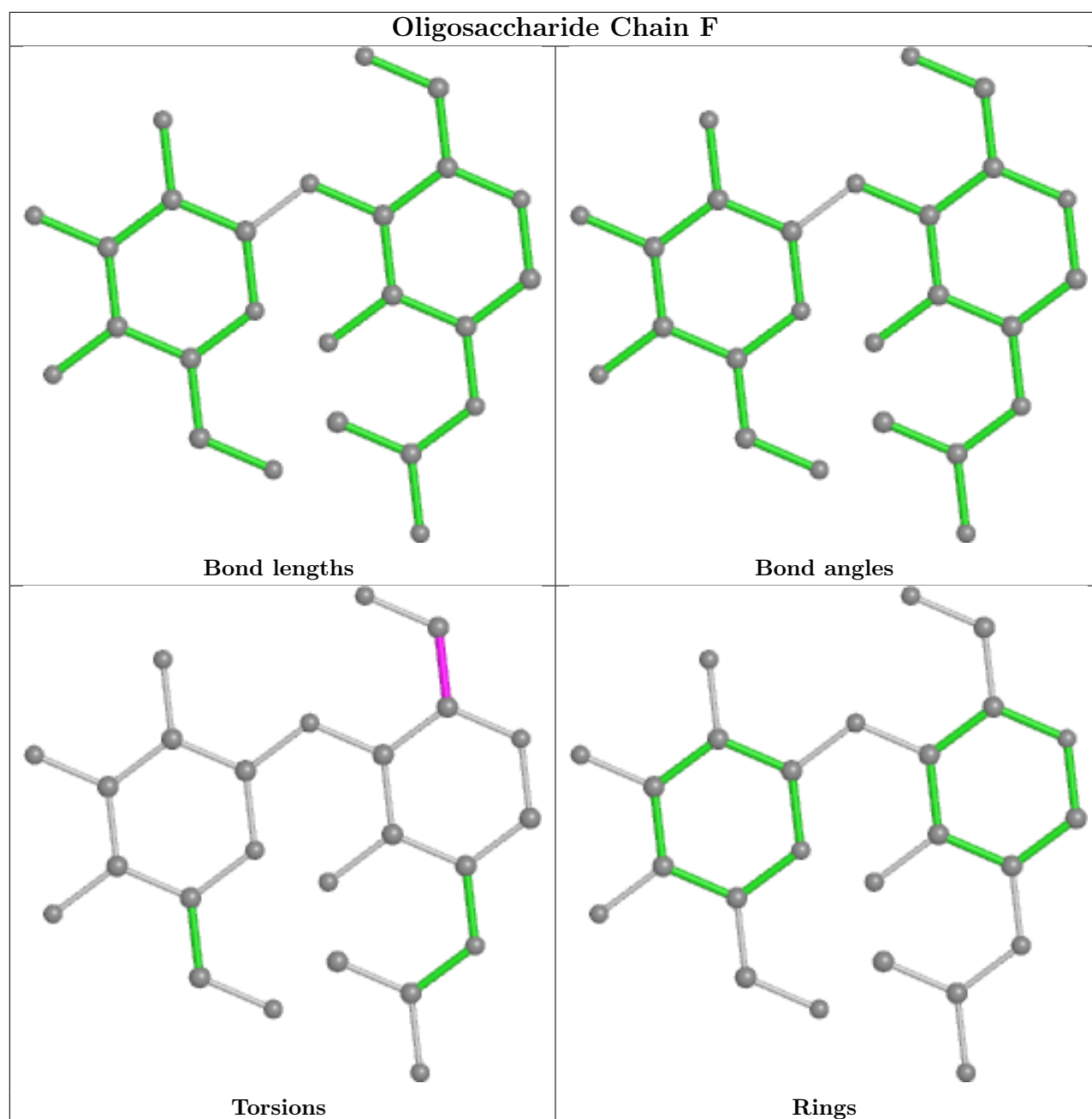
There are no ring outliers.

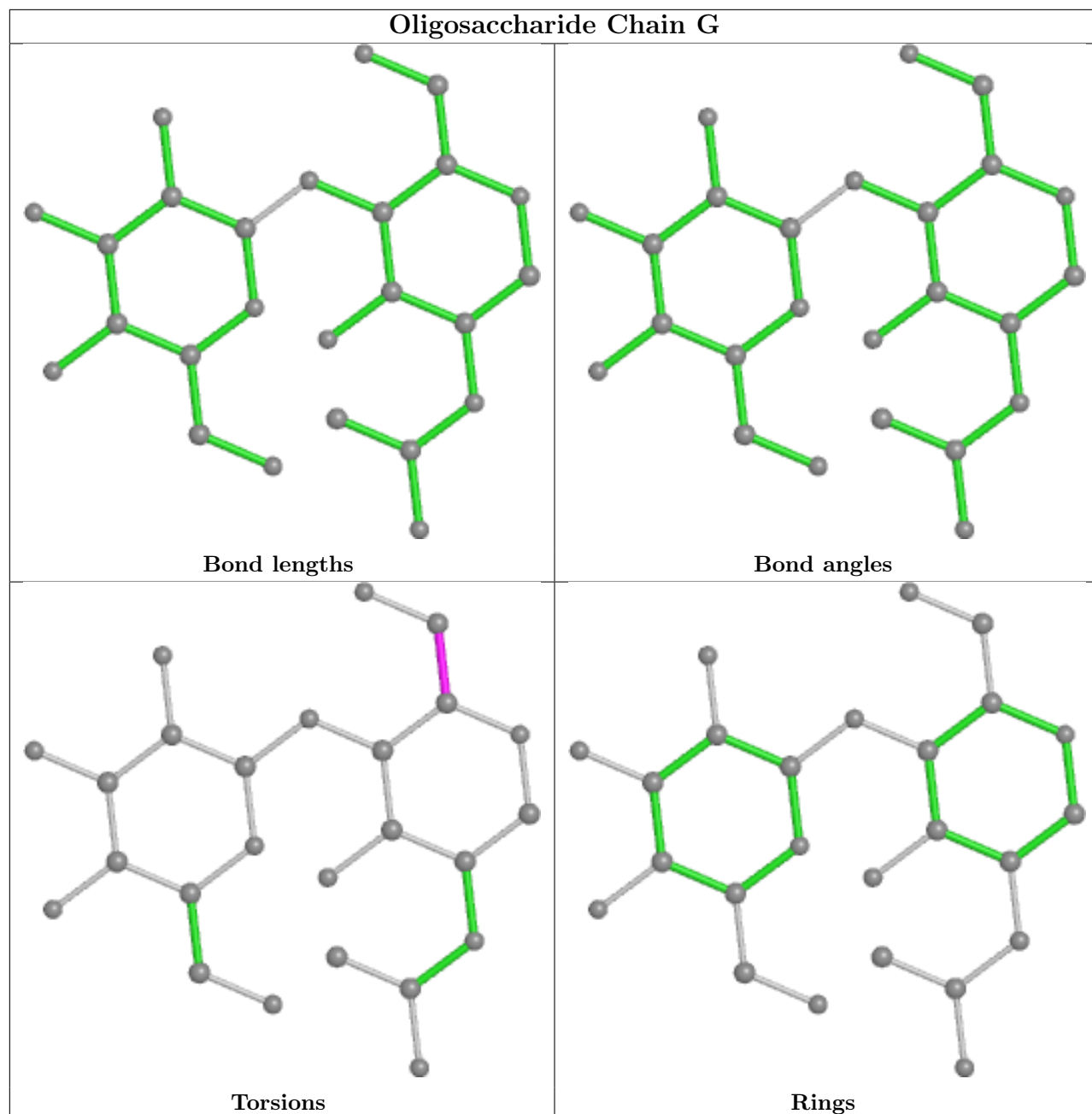
No monomer is involved in short contacts.

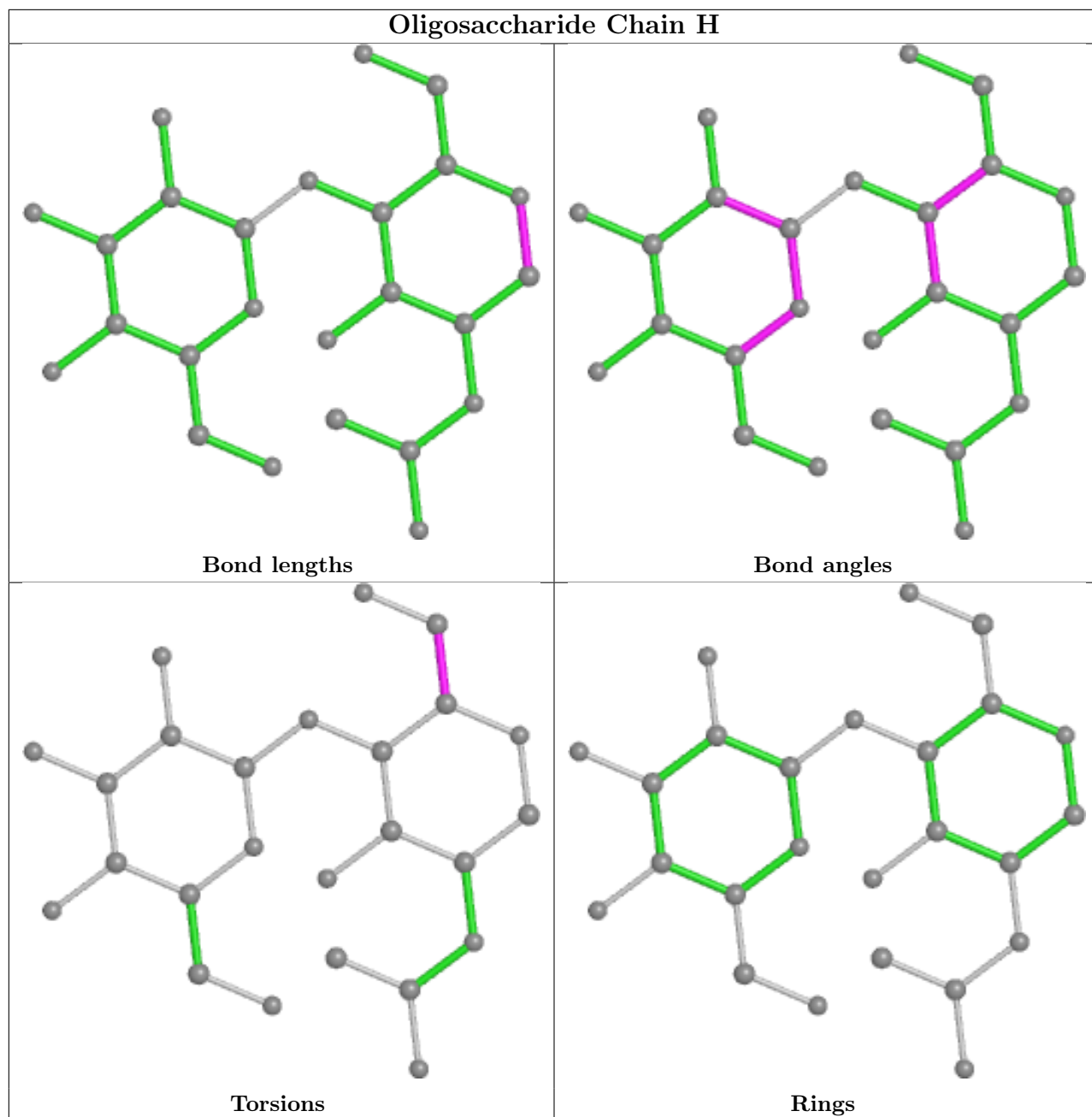
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

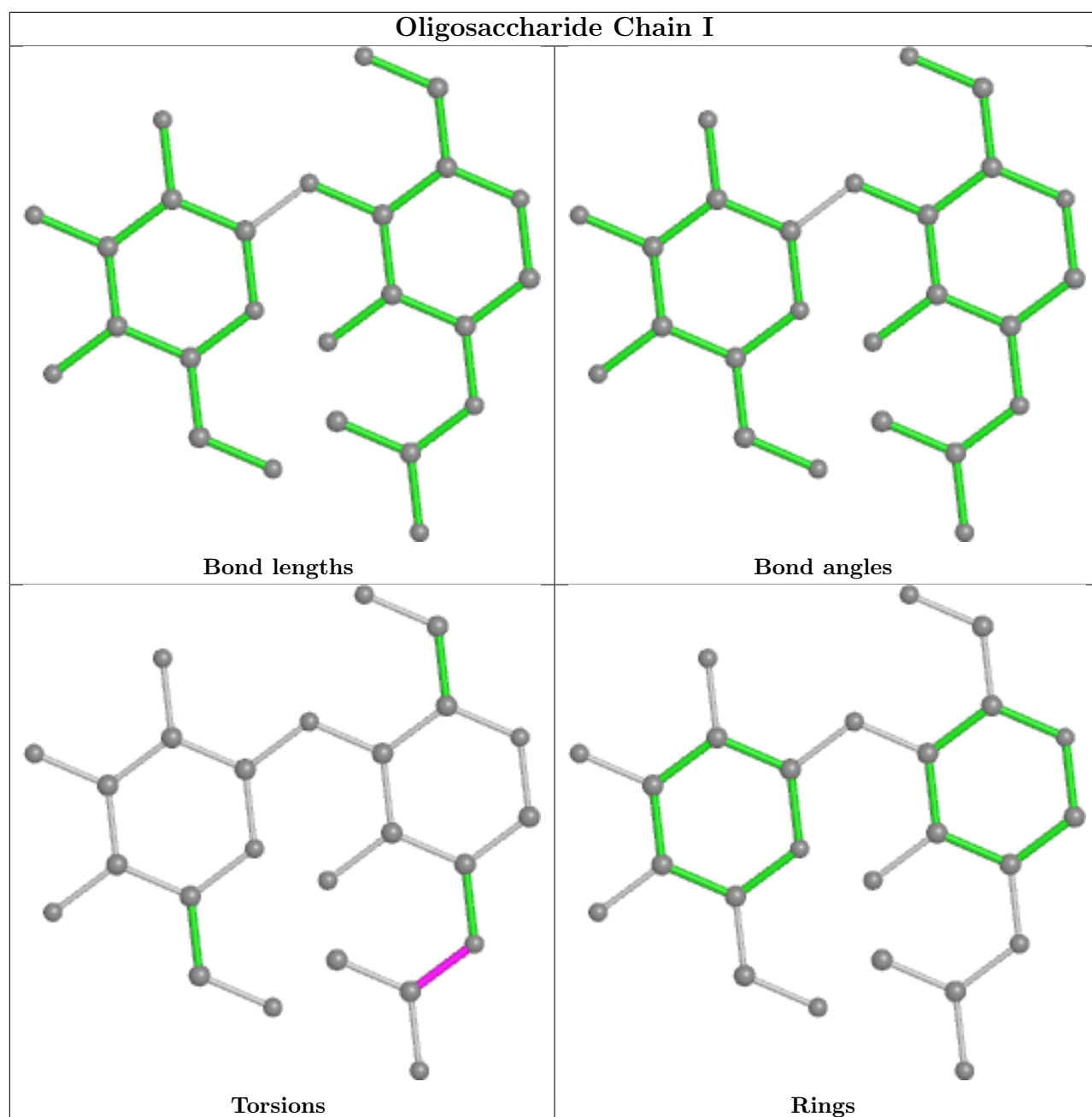


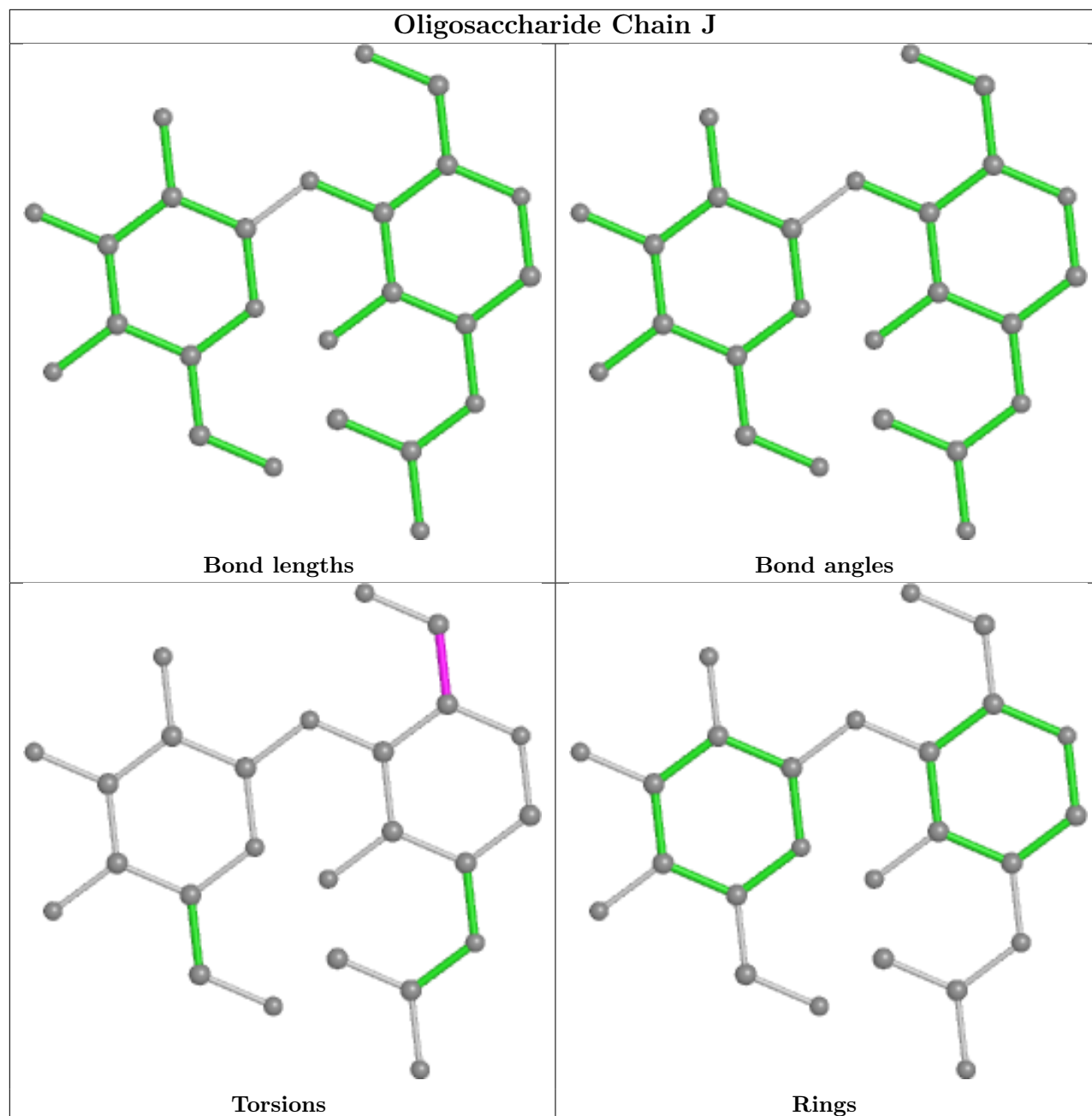


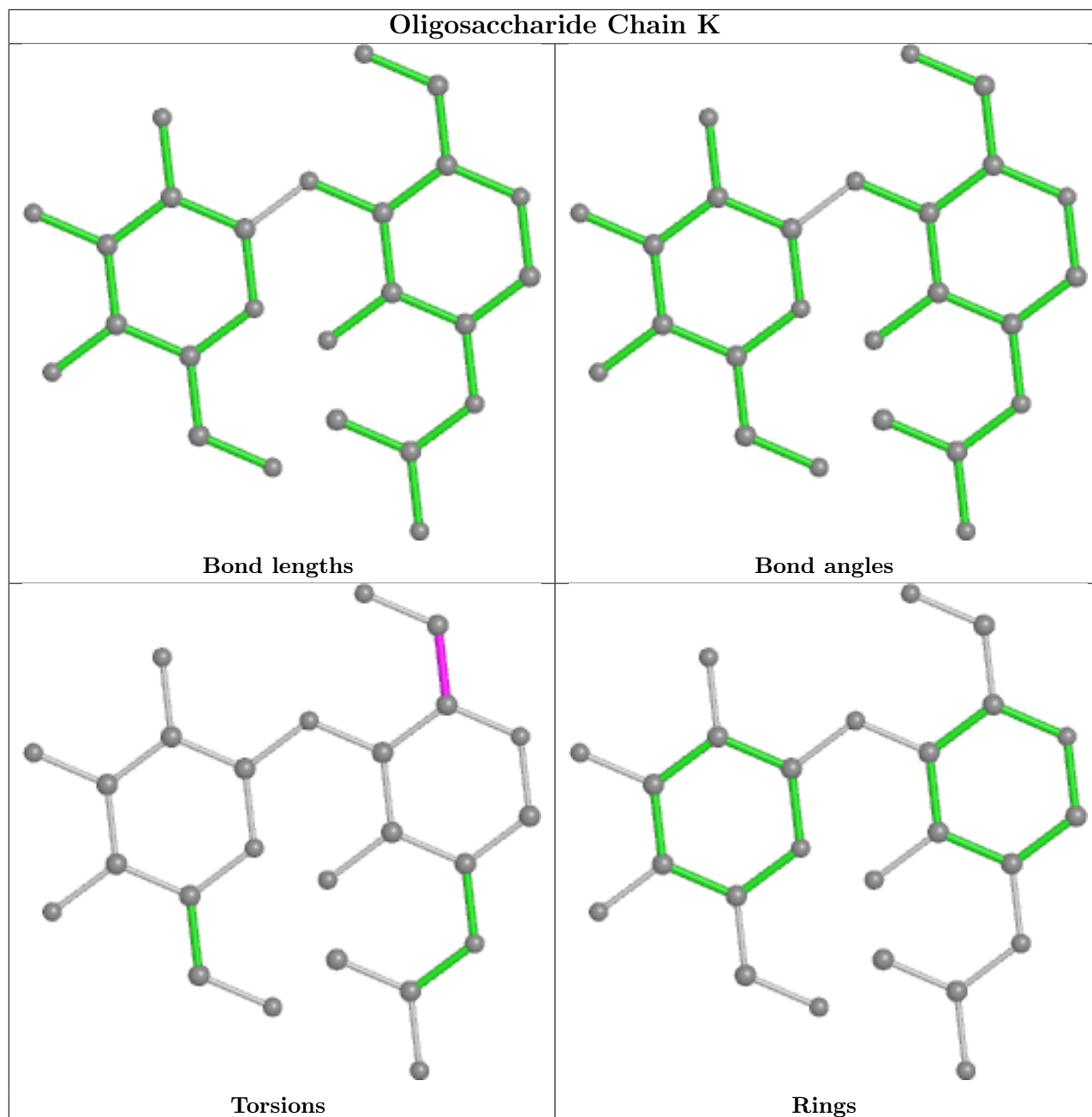


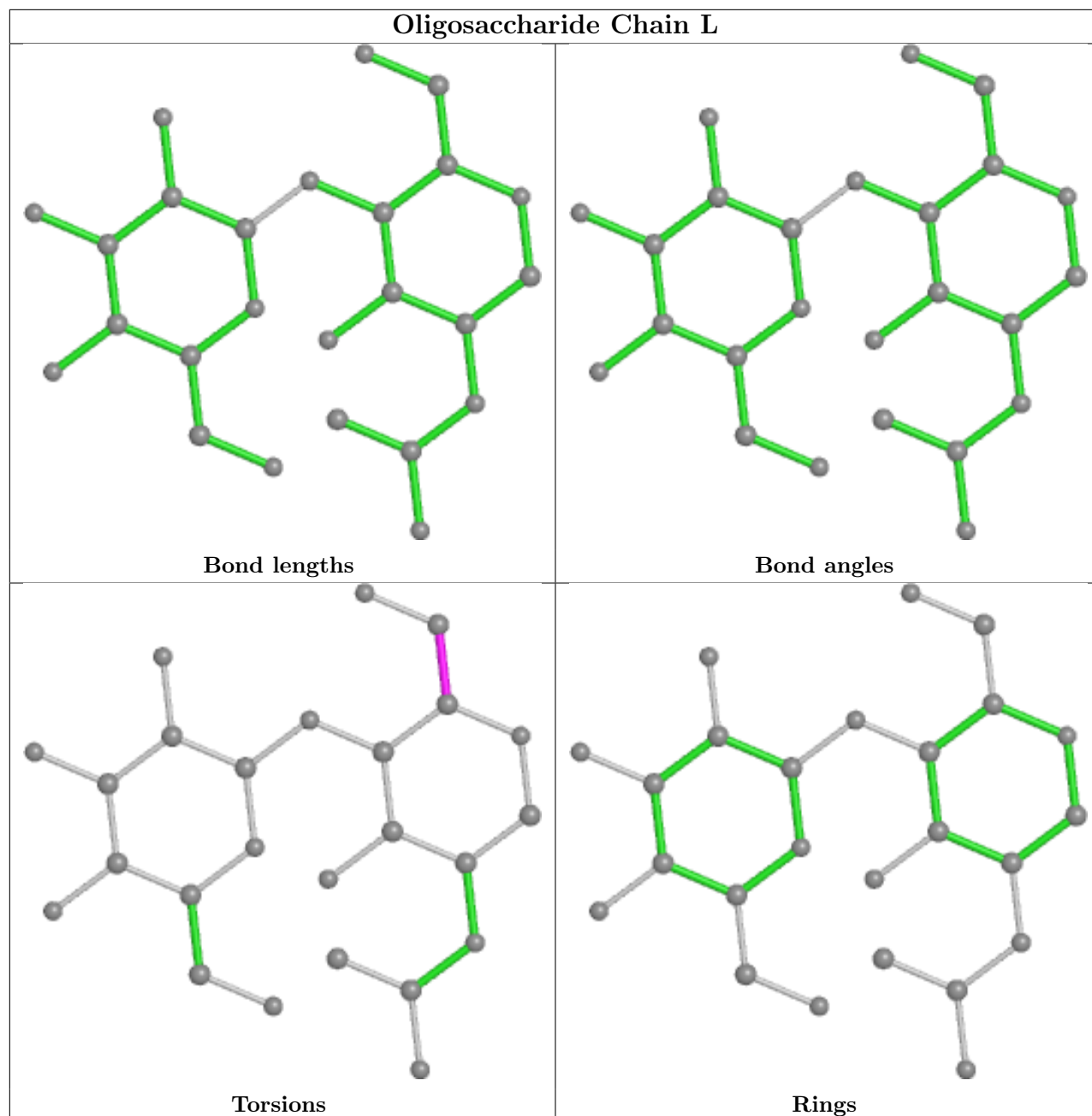


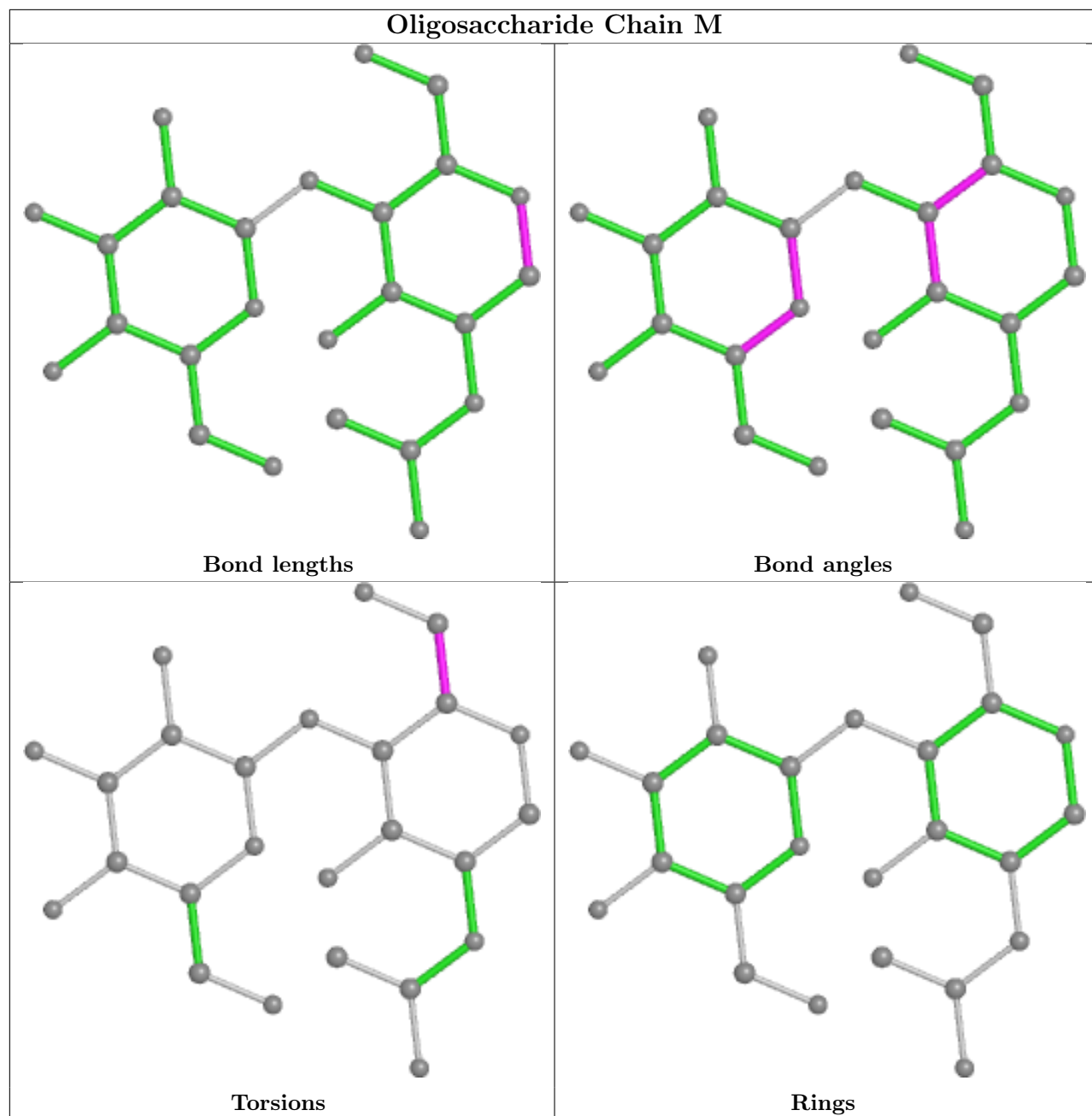


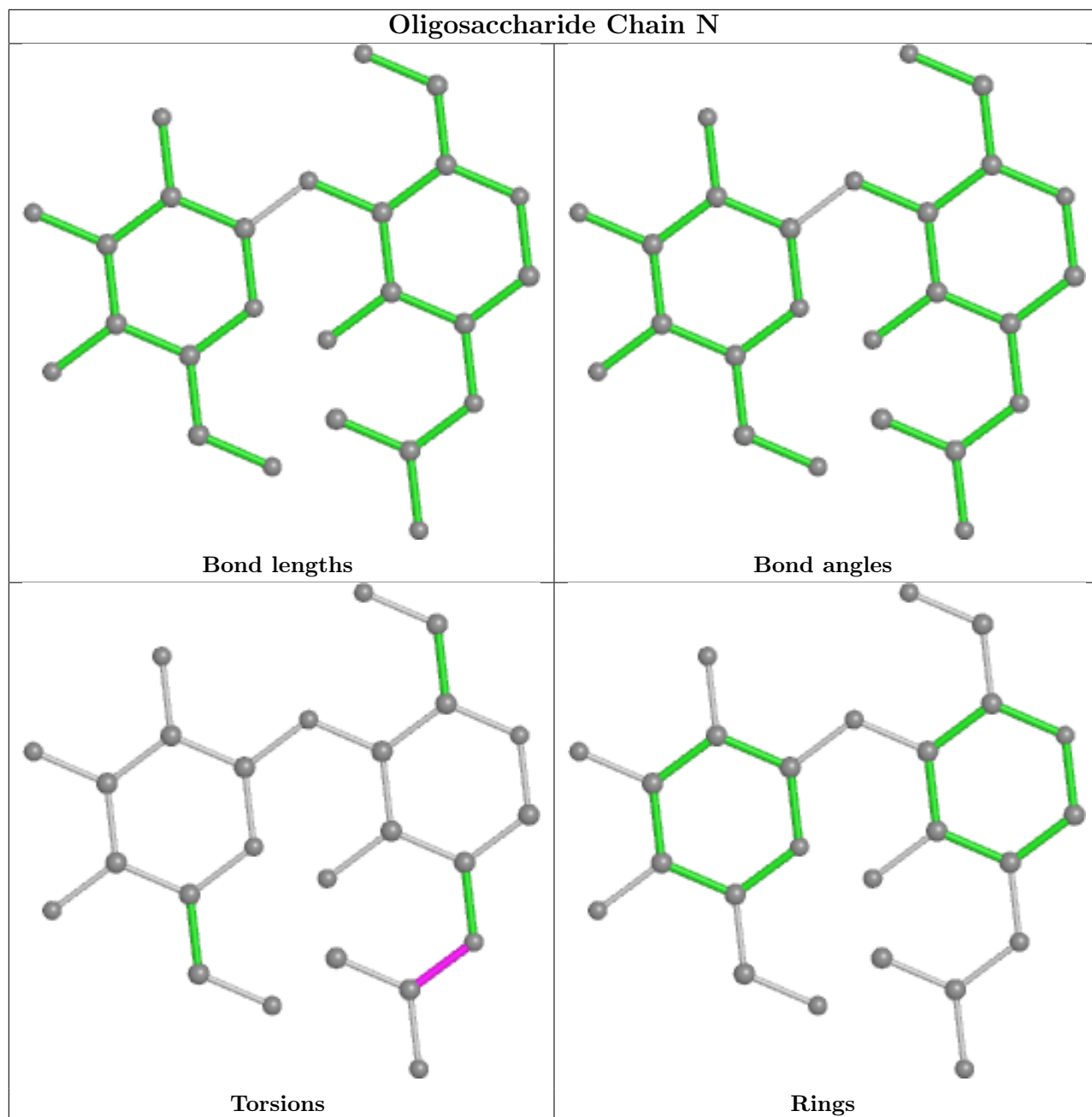


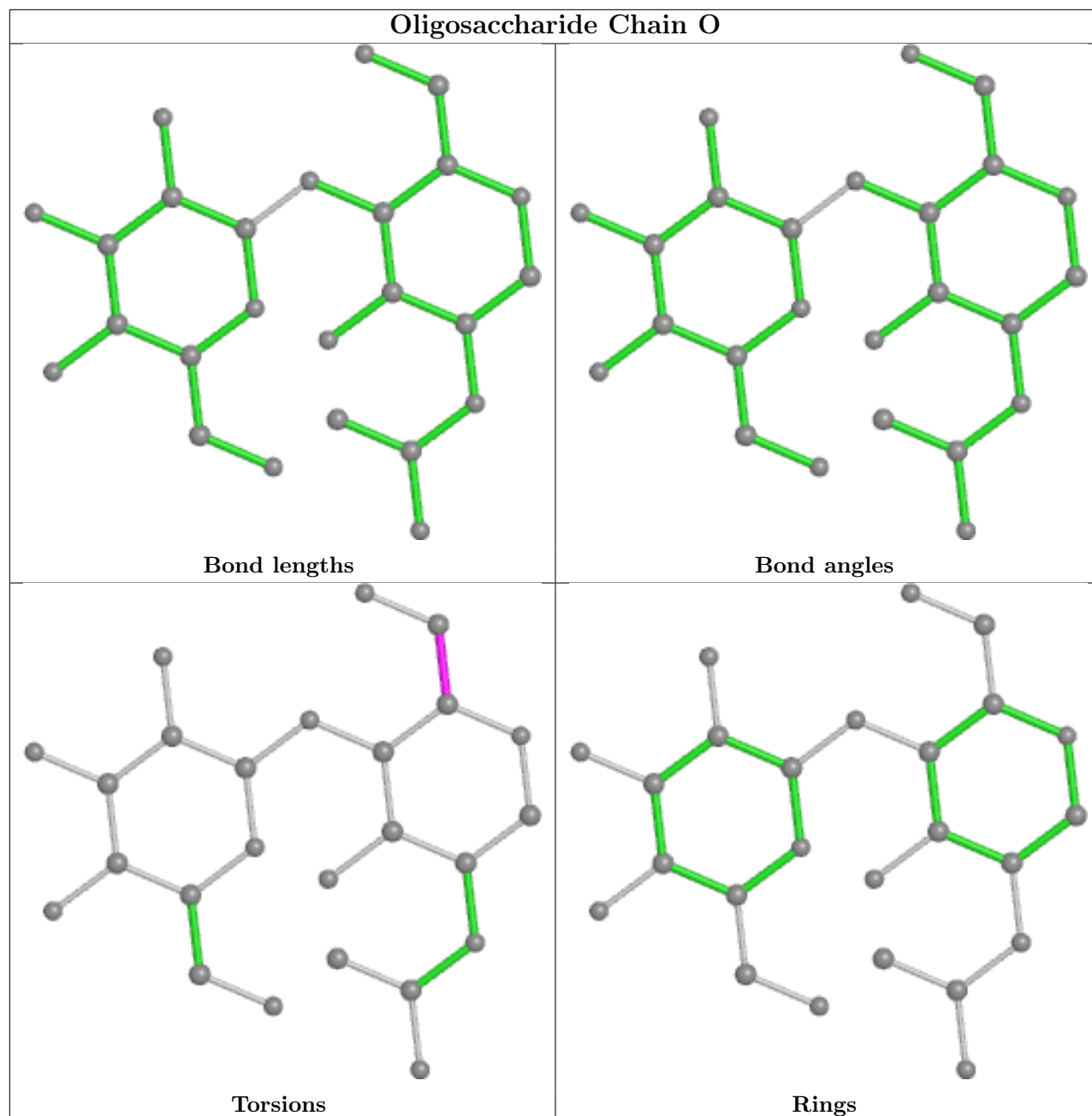


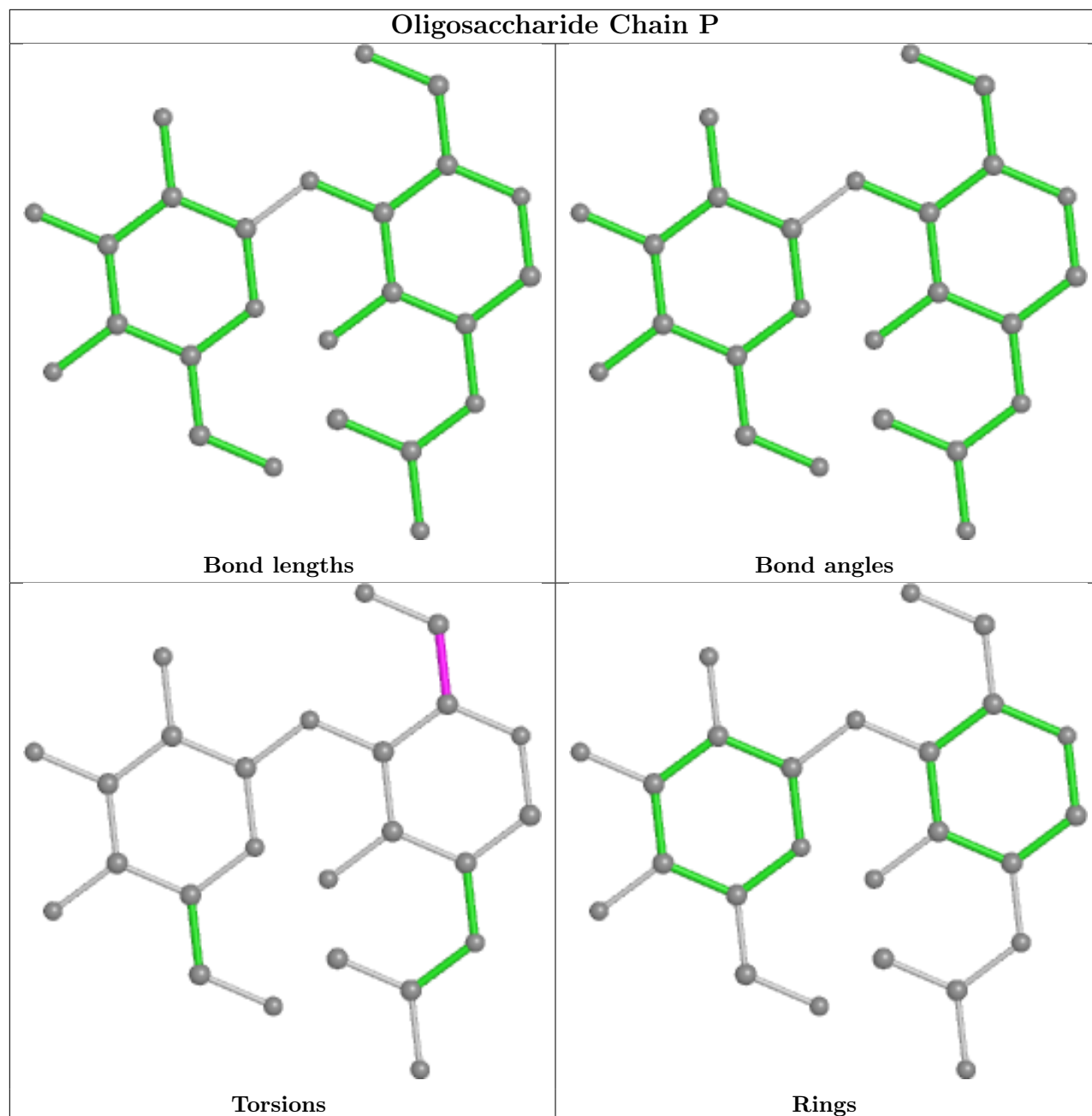


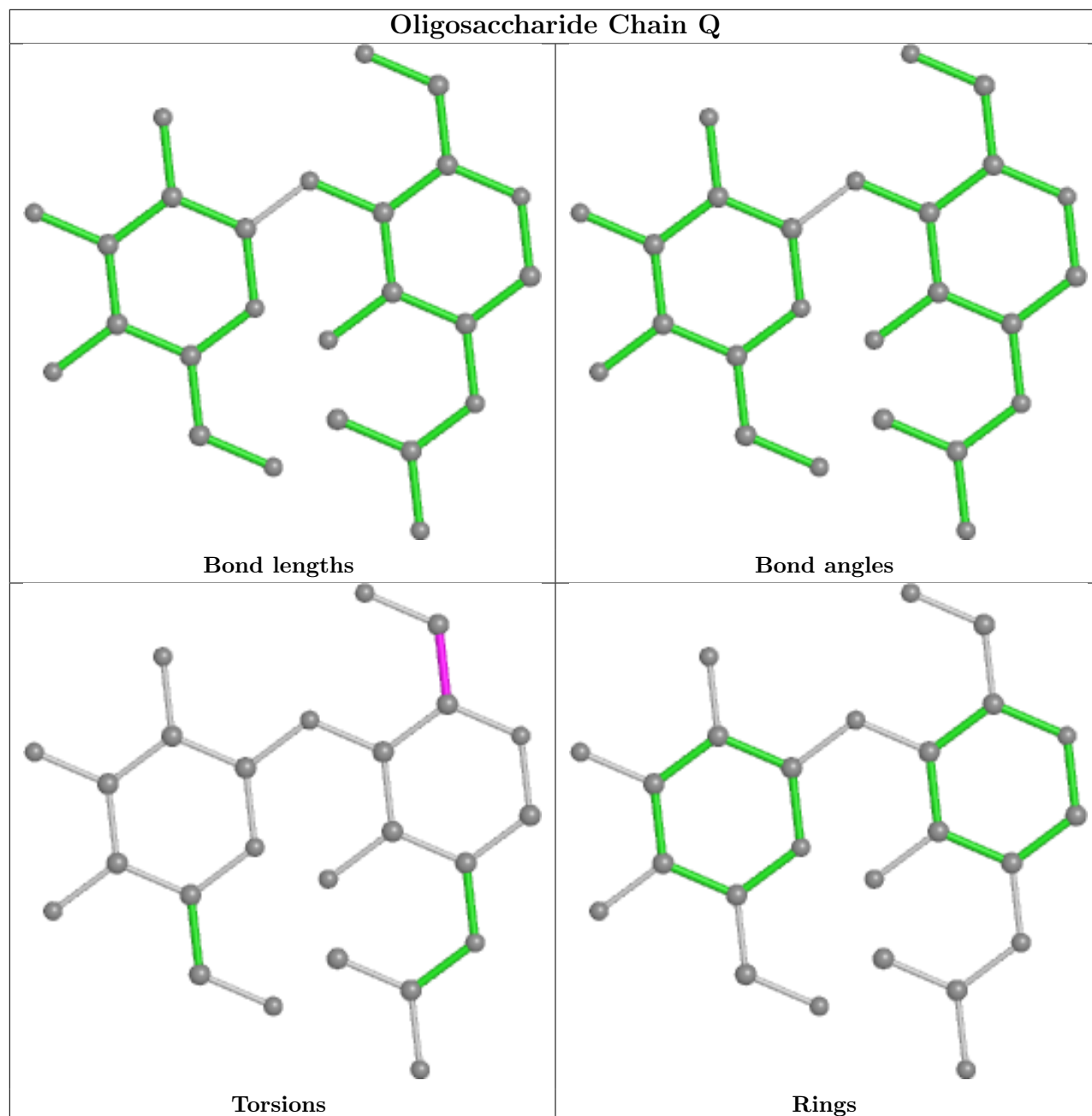


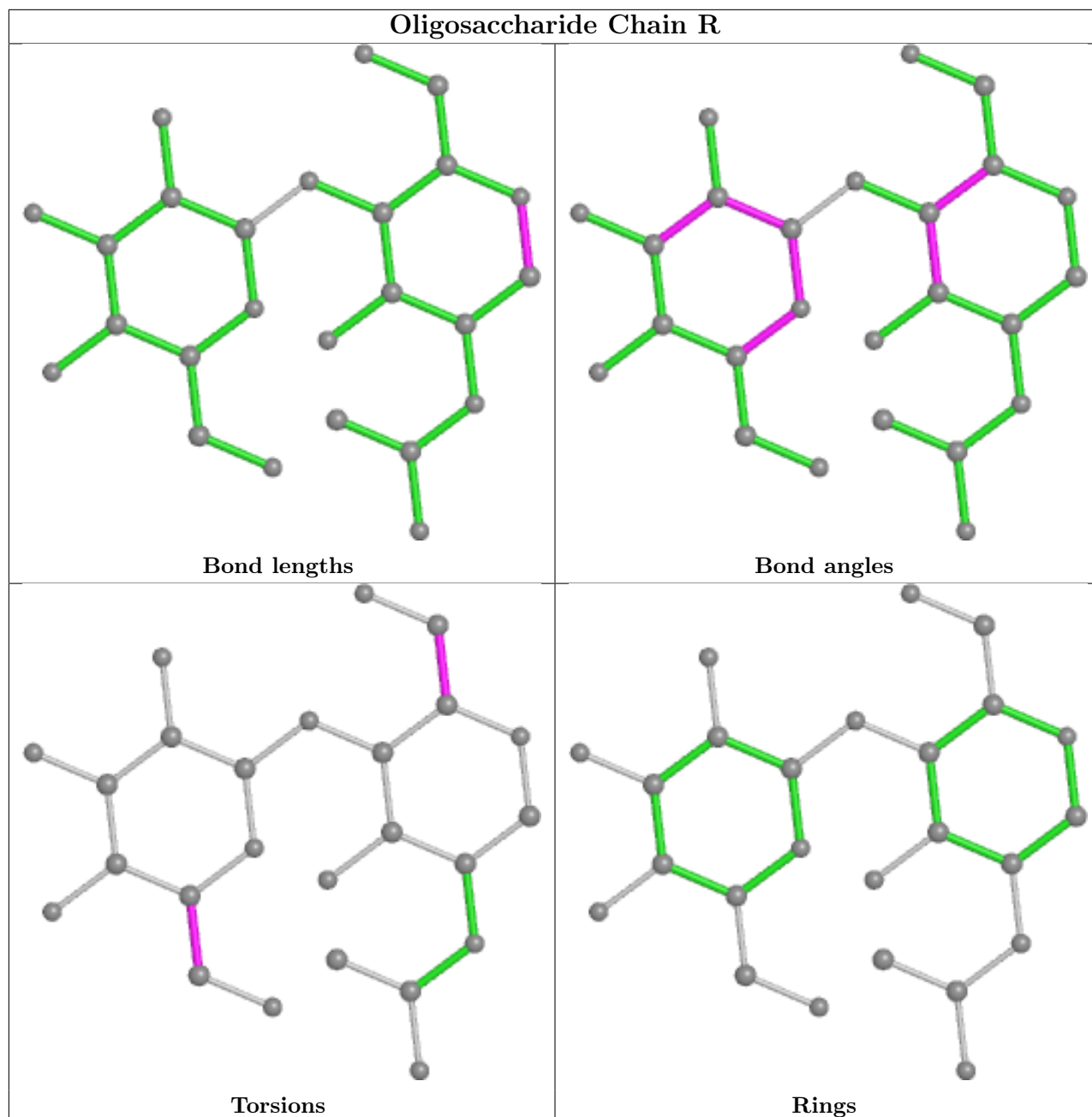












5.6 Ligand geometry [i](#)

30 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	B	1305	1	14,14,15	0.19	0	17,19,21	0.41	0
3	NAG	B	1304	1	14,14,15	0.29	0	17,19,21	0.49	0
3	NAG	B	1302	1	14,14,15	0.41	0	17,19,21	0.63	1 (5%)
3	NAG	A	1308	1	14,14,15	0.35	0	17,19,21	0.40	0
3	NAG	C	1306	1	14,14,15	0.19	0	17,19,21	0.42	0
3	NAG	A	1304	1	14,14,15	0.35	0	17,19,21	0.44	0
3	NAG	A	1309	1	14,14,15	0.18	0	17,19,21	0.42	0
3	NAG	C	1304	1	14,14,15	0.26	0	17,19,21	0.47	0
3	NAG	C	1309	1	14,14,15	0.17	0	17,19,21	0.42	0
3	NAG	C	1310	1	14,14,15	0.32	0	17,19,21	0.61	1 (5%)
3	NAG	B	1309	1	14,14,15	0.18	0	17,19,21	0.42	0
3	NAG	C	1305	1	14,14,15	0.17	0	17,19,21	0.44	0
3	NAG	C	1302	1	14,14,15	0.91	2 (14%)	17,19,21	0.90	1 (5%)
3	NAG	C	1307	1	14,14,15	0.35	0	17,19,21	1.42	1 (5%)
3	NAG	B	1301	1	14,14,15	0.19	0	17,19,21	0.54	0
3	NAG	B	1303	1	14,14,15	0.30	0	17,19,21	0.44	0
3	NAG	A	1310	1	14,14,15	0.31	0	17,19,21	0.61	1 (5%)
3	NAG	B	1308	1	14,14,15	0.33	0	17,19,21	0.40	0
3	NAG	B	1307	1	14,14,15	0.32	0	17,19,21	1.39	1 (5%)
3	NAG	A	1301	1	14,14,15	0.23	0	17,19,21	0.54	0
3	NAG	A	1302	1	14,14,15	0.32	0	17,19,21	0.50	0
3	NAG	A	1305	1	14,14,15	0.19	0	17,19,21	0.45	0
3	NAG	A	1307	1	14,14,15	0.35	0	17,19,21	1.40	1 (5%)
3	NAG	C	1301	1	14,14,15	0.21	0	17,19,21	0.55	0
3	NAG	C	1303	1	14,14,15	0.30	0	17,19,21	0.44	0
3	NAG	C	1308	1	14,14,15	0.34	0	17,19,21	0.40	0
3	NAG	B	1310	1	14,14,15	0.32	0	17,19,21	0.61	1 (5%)
3	NAG	A	1303	1	14,14,15	0.28	0	17,19,21	0.44	0
3	NAG	B	1306	1	14,14,15	0.19	0	17,19,21	0.43	0
3	NAG	A	1306	1	14,14,15	0.20	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	B	1305	1	-	0/6/23/26	0/1/1/1
3	NAG	B	1304	1	-	4/6/23/26	0/1/1/1
3	NAG	B	1302	1	-	1/6/23/26	0/1/1/1
3	NAG	A	1308	1	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	C	1306	1	-	0/6/23/26	0/1/1/1
3	NAG	A	1304	1	-	4/6/23/26	0/1/1/1
3	NAG	A	1309	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1304	1	-	4/6/23/26	0/1/1/1
3	NAG	C	1309	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1310	1	-	4/6/23/26	0/1/1/1
3	NAG	B	1309	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1305	1	-	0/6/23/26	0/1/1/1
3	NAG	C	1302	1	-	1/6/23/26	0/1/1/1
3	NAG	C	1307	1	-	1/6/23/26	0/1/1/1
3	NAG	B	1301	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1303	1	-	0/6/23/26	0/1/1/1
3	NAG	A	1310	1	-	4/6/23/26	0/1/1/1
3	NAG	B	1308	1	-	0/6/23/26	0/1/1/1
3	NAG	B	1307	1	-	0/6/23/26	0/1/1/1
3	NAG	A	1301	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1302	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1305	1	-	0/6/23/26	0/1/1/1
3	NAG	A	1307	1	-	0/6/23/26	0/1/1/1
3	NAG	C	1301	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1303	1	-	0/6/23/26	0/1/1/1
3	NAG	C	1308	1	-	0/6/23/26	0/1/1/1
3	NAG	B	1310	1	-	4/6/23/26	0/1/1/1
3	NAG	A	1303	1	-	0/6/23/26	0/1/1/1
3	NAG	B	1306	1	-	0/6/23/26	0/1/1/1
3	NAG	A	1306	1	-	0/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	1302	NAG	O5-C1	2.39	1.47	1.43
3	C	1302	NAG	C1-C2	2.28	1.55	1.52

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1307	NAG	C1-O5-C5	5.20	119.24	112.19
3	A	1307	NAG	C1-O5-C5	5.13	119.15	112.19
3	B	1307	NAG	C1-O5-C5	5.07	119.06	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1302	NAG	C1-O5-C5	2.86	116.07	112.19
3	B	1302	NAG	C1-O5-C5	2.25	115.24	112.19

There are no chirality outliers.

5 of 41 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1310	NAG	C4-C5-C6-O6
3	B	1310	NAG	C4-C5-C6-O6
3	C	1310	NAG	C4-C5-C6-O6
3	A	1310	NAG	O5-C5-C6-O6
3	B	1310	NAG	O5-C5-C6-O6

There are no ring outliers.

5 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1304	NAG	1	0
3	A	1304	NAG	1	0
3	C	1302	NAG	1	0
3	B	1301	NAG	1	0
3	C	1301	NAG	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.