



wwPDB EM Validation Summary Report ⓘ

Oct 22, 2024 – 12:32 AM JST

PDB ID : 8X5R
EMDB ID : EMD-38073
Title : SARS-CoV-2 BA.2.75 Spike with K356T mutation (1 RBD up)
Authors : Yue, C.; Liu, P.
Deposited on : 2023-11-17
Resolution : 3.72 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

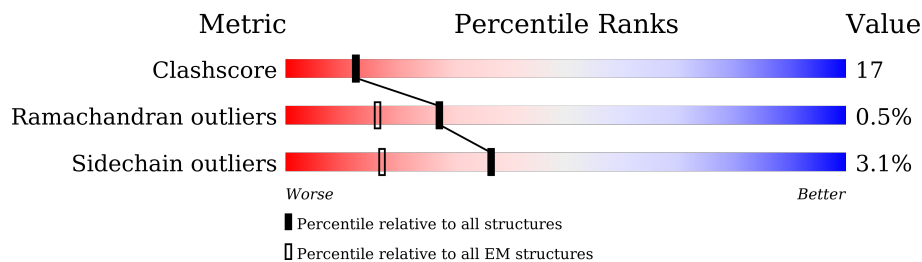
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.72 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	1270	54% 30% 14%
1	B	1270	54% 30% 14%
1	C	1270	56% 27% 14%
2	D	2	100%
2	E	2	50% 50%
2	F	2	100%
2	G	2	50% 50%
2	H	2	50% 50%
2	I	2	100%

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Mol	Chain	Length	Quality of chain
2	J	2	 50% 50%
2	K	2	 100%
2	L	2	 100%
2	M	2	 100%
2	N	2	 100%
2	O	2	 50% 50%
2	P	2	 100%
2	Q	2	 50% 50%
2	R	2	 50% 50%
2	S	2	 100%
2	T	2	 100%
2	U	2	 100%
2	V	2	 50% 50%
2	W	2	 100%
2	X	2	 50% 50%

2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 26208 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	C	1086	8442	5395	1405	1605	37	0	0
1	A	1086	8442	5395	1405	1605	37	0	0
1	B	1086	8442	5395	1405	1605	37	0	0

There are 135 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	22	ILE	THR	variant	UNP P0DTC2
C	?	-	LEU	deletion	UNP P0DTC2
C	?	-	PRO	deletion	UNP P0DTC2
C	?	-	PRO	deletion	UNP P0DTC2
C	27	SER	ALA	variant	UNP P0DTC2
C	142	ASP	GLY	variant	UNP P0DTC2
C	147	GLU	LYS	variant	UNP P0DTC2
C	152	ARG	TRP	variant	UNP P0DTC2
C	157	LEU	PHE	variant	UNP P0DTC2
C	210	VAL	ILE	variant	UNP P0DTC2
C	213	GLY	VAL	variant	UNP P0DTC2
C	257	SER	GLY	variant	UNP P0DTC2
C	339	HIS	GLY	variant	UNP P0DTC2
C	356	THR	LYS	engineered mutation	UNP P0DTC2
C	371	PHE	SER	variant	UNP P0DTC2
C	373	PRO	SER	variant	UNP P0DTC2
C	375	PHE	SER	variant	UNP P0DTC2
C	376	ALA	THR	variant	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	446	SER	GLY	variant	UNP P0DTC2
C	460	LYS	ASN	variant	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	477	ASN	SER	variant	UNP P0DTC2
C	478	LYS	THR	variant	UNP P0DTC2
C	484	ALA	GLU	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	655	TYR	HIS	variant	UNP P0DTC2
C	679	LYS	ASN	variant	UNP P0DTC2
C	681	HIS	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	942	PRO	ALA	conflict	UNP P0DTC2
C	954	HIS	GLN	variant	UNP P0DTC2
C	969	LYS	ASN	variant	UNP P0DTC2
C	986	PRO	LYS	conflict	UNP P0DTC2
C	987	PRO	VAL	conflict	UNP P0DTC2
A	22	ILE	THR	variant	UNP P0DTC2
A	?	-	LEU	deletion	UNP P0DTC2
A	?	-	PRO	deletion	UNP P0DTC2
A	?	-	PRO	deletion	UNP P0DTC2
A	27	SER	ALA	variant	UNP P0DTC2
A	142	ASP	GLY	variant	UNP P0DTC2
A	147	GLU	LYS	variant	UNP P0DTC2
A	152	ARG	TRP	variant	UNP P0DTC2
A	157	LEU	PHE	variant	UNP P0DTC2
A	210	VAL	ILE	variant	UNP P0DTC2
A	213	GLY	VAL	variant	UNP P0DTC2
A	257	SER	GLY	variant	UNP P0DTC2
A	339	HIS	GLY	variant	UNP P0DTC2
A	356	THR	LYS	engineered mutation	UNP P0DTC2
A	371	PHE	SER	variant	UNP P0DTC2
A	373	PRO	SER	variant	UNP P0DTC2
A	375	PHE	SER	variant	UNP P0DTC2
A	376	ALA	THR	variant	UNP P0DTC2
A	405	ASN	ASP	variant	UNP P0DTC2
A	408	SER	ARG	variant	UNP P0DTC2
A	417	ASN	LYS	variant	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	440	LYS	ASN	variant	UNP P0DTC2
A	446	SER	GLY	variant	UNP P0DTC2
A	460	LYS	ASN	variant	UNP P0DTC2
A	477	ASN	SER	variant	UNP P0DTC2
A	478	LYS	THR	variant	UNP P0DTC2
A	484	ALA	GLU	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	655	TYR	HIS	variant	UNP P0DTC2
A	679	LYS	ASN	variant	UNP P0DTC2
A	681	HIS	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
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	conflict	UNP P0DTC2
A	987	PRO	VAL	conflict	UNP P0DTC2
B	22	ILE	THR	variant	UNP P0DTC2
B	?	-	LEU	deletion	UNP P0DTC2
B	?	-	PRO	deletion	UNP P0DTC2
B	?	-	PRO	deletion	UNP P0DTC2
B	27	SER	ALA	variant	UNP P0DTC2
B	142	ASP	GLY	variant	UNP P0DTC2
B	147	GLU	LYS	variant	UNP P0DTC2
B	152	ARG	TRP	variant	UNP P0DTC2
B	157	LEU	PHE	variant	UNP P0DTC2
B	210	VAL	ILE	variant	UNP P0DTC2
B	213	GLY	VAL	variant	UNP P0DTC2
B	257	SER	GLY	variant	UNP P0DTC2
B	339	HIS	GLY	variant	UNP P0DTC2
B	356	THR	LYS	engineered mutation	UNP P0DTC2
B	371	PHE	SER	variant	UNP P0DTC2
B	373	PRO	SER	variant	UNP P0DTC2
B	375	PHE	SER	variant	UNP P0DTC2
B	376	ALA	THR	variant	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	405	ASN	ASP	variant	UNP P0DTC2
B	408	SER	ARG	variant	UNP P0DTC2
B	417	ASN	LYS	variant	UNP P0DTC2
B	440	LYS	ASN	variant	UNP P0DTC2
B	446	SER	GLY	variant	UNP P0DTC2
B	460	LYS	ASN	variant	UNP P0DTC2
B	477	ASN	SER	variant	UNP P0DTC2
B	478	LYS	THR	variant	UNP P0DTC2
B	484	ALA	GLU	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	655	TYR	HIS	variant	UNP P0DTC2
B	679	LYS	ASN	variant	UNP P0DTC2
B	681	HIS	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	942	PRO	ALA	conflict	UNP P0DTC2
B	954	HIS	GLN	variant	UNP P0DTC2
B	969	LYS	ASN	variant	UNP P0DTC2
B	986	PRO	LYS	conflict	UNP P0DTC2
B	987	PRO	VAL	conflict	UNP P0DTC2

- Molecule 2 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
2	D	2	Total	C	N	O	0	0
			28	16	2	10		
2	E	2	Total	C	N	O	0	0
			28	16	2	10		
2	F	2	Total	C	N	O	0	0
			28	16	2	10		

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Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
2	G	2	28	16	2	10	0	0
2	H	2	28	16	2	10	0	0
2	I	2	28	16	2	10	0	0
2	J	2	28	16	2	10	0	0
2	K	2	28	16	2	10	0	0
2	L	2	28	16	2	10	0	0
2	M	2	28	16	2	10	0	0
2	N	2	28	16	2	10	0	0
2	O	2	28	16	2	10	0	0
2	P	2	28	16	2	10	0	0
2	Q	2	28	16	2	10	0	0
2	R	2	28	16	2	10	0	0
2	S	2	28	16	2	10	0	0
2	T	2	28	16	2	10	0	0
2	U	2	28	16	2	10	0	0
2	V	2	28	16	2	10	0	0
2	W	2	28	16	2	10	0	0
2	X	2	28	16	2	10	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
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	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	

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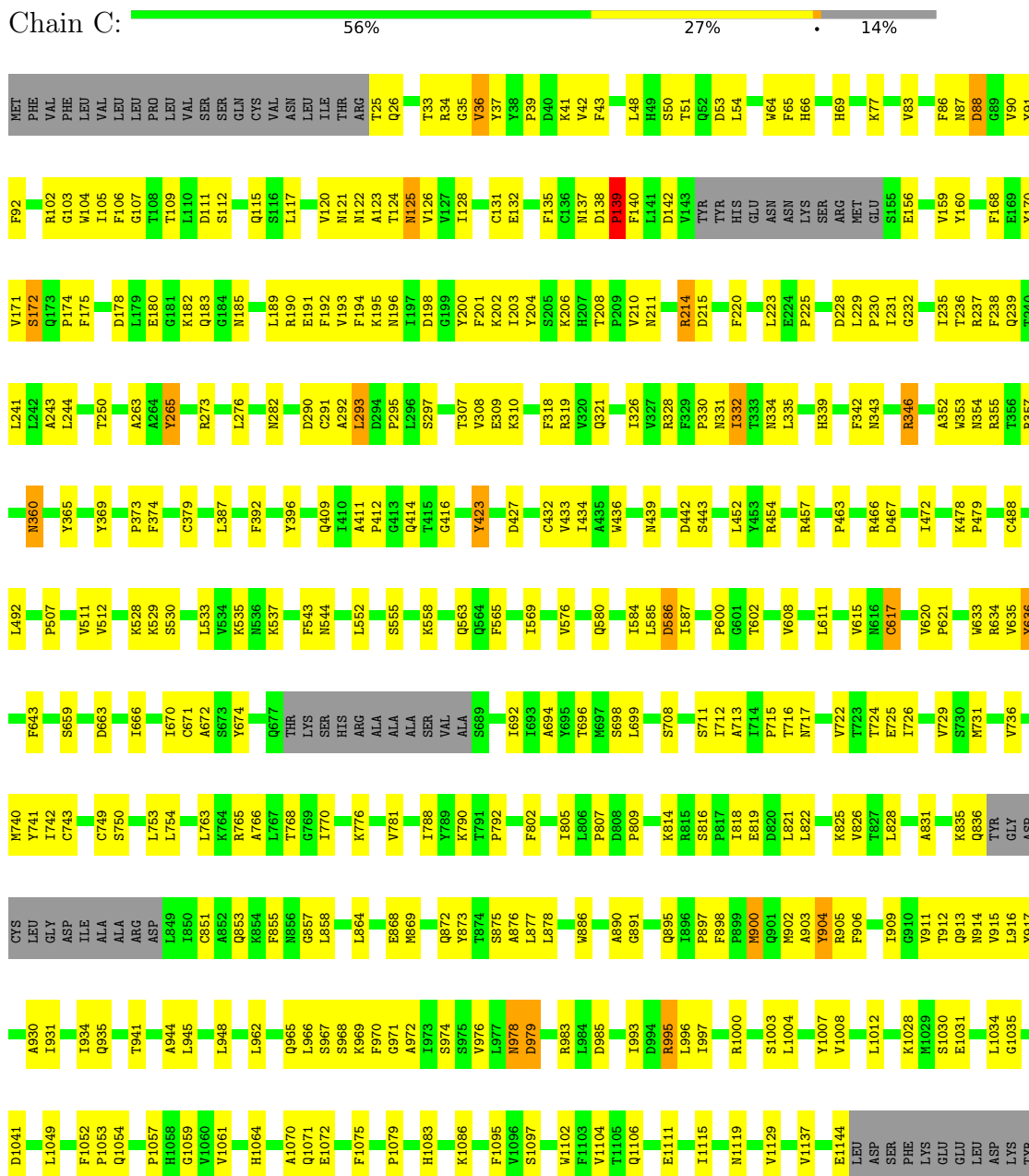
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Mol	Chain	Residues	Atoms				AltConf
3	B	1	Total	C	N	O	0
			14	8	1	5	
3	B	1	Total	C	N	O	0
			14	8	1	5	
3	B	1	Total	C	N	O	0
			14	8	1	5	
3	B	1	Total	C	N	O	0
			14	8	1	5	
3	B	1	Total	C	N	O	0
			14	8	1	5	
3	B	1	Total	C	N	O	0
			14	8	1	5	

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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



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

● Molecule 1: Spike glycoprotein



MET	PHE	VAL	PHE	LEU	VAL	Y91	F92	A93	R102	G103	W104	S105	F106	G107	T108	T109	D111	S112	K113	T114	Q115	S116	L117	L118	T119	R34	Y37	Y38	P39	D40	V42	F43	S46	T51	D52	D53	L54	P55	L56	P57	S60	V62	V63	W64	F65	H66	K77	D80	L84	P85	F86	M87	Y90	F91	F92	A93	R102	G103	W104	S105	F106	G107	T108	T109	D111	S112	K113	T114	Q115	S116	L117	L118	T119	R34	Y37	Y38	P39	D40	V42	F43	S46	T51	D52	D53	L54	P55	L56	P57	S60	V62	V63	W64	F65	H66	K77	D80	L84	F85	R101	G102	H103	L104	I105	T106	Y107	V108	Q109	I110	I111	I112	I113	I114	I115	I116	I117	I118	I119	I120	I121	I122	I123	I124	I125	I126	I127	I128	I129	I130	C131	E132	F133	D134	D135	D136	D137	D138	D139	F140	L141	D142	D143	V144	T145	H146	H147	G148	A149	A150	A151	A152	A153	A154	A155	A156	A157	A158	A159	A160	A161	A162	A163	A164	A165	A166	A167	A168	A169	A170	A171	A172	A173	A174	A175	A176	A177	A178	A179	A180	A181	A182	A183	A184	A185	A186	A187	A188	A189	A190	A191	A192	A193	A194	A195	Y200	F201	K202	L203	Y204	S205	K206	H207	T208	F209	V210	D215	L216	F217	G218	R219	F220	S221	A222	L223	D228	L229	L233	T234	L235	L236	F238	Q239	T240	L241	D253	A263	A264	L265	Q271	P272	R273	L276	L277	K278	G283	L284	L285	T286	D287	A288	V289	D290	C291	A292	P295	T299	K300	C301	T302	L303	G416	L417	L418	A419	D420	Y421	N422	Y423	K424	L425	P426	F429	T430	G431	C432	N436	L452	Y453	R454	L455	F456	L461	K462	P463	F464	E465	R466	D467	A475	K478	P479	M487	S488	P600	G601	T602	S605	N606	V610	C617	V620	P621	T630	R631	W632	W633	F643	Q644	T645	R646	A647	L650	I651	G652	A653	E654	G655	Y660	F661	C662	D663	I666	I670	C671	A672	S673	W674	Q677	THR	L752	L753	L754	Q755	L763	A771	E778	Y789	Y796	F802	S803	Q804	I805	S813	R814	S815	E819	D820	L821	L822	I834	K835	Q836	TTR	GLY	ASP	CYS	LEU	GLY	ASP	ILE	ALA	ARG	ASP	L849	G857	M869	A876	L877	L878	D881	I882	G885	W886	T887	L894	Q895	I896	P897	F898	P899	Q901	M902	A903	Y904	R905	F906	L916	Y917	L922	I923	Q926	A930	I934	Q935	T941	A944	V952	T961	L962	L966	Q965	S967	S968	K969	G971	A972	V976	L977	D979	L980	L981	P986	H983	K989	L997	R1000	D994	R995	L996	I997	I1000	S1003	T1006	Y1007	V1008	Q1011	I1012	I1013	R1019	K1028	M1029	S1030	F1031	C1032	G1035	K1038	D1041	G1046	L1049	P1053	Q1054	H1058	G1059	V1060	V1061	V1065	P1069	E1072	K1073	I1074	F1075	T1076
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- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D:  100%

MAG1
MAG2

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

Chain E:  50% 50%

MAG1
MAG2

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

Chain F:  100%

MAG1
MAG2

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

Chain G:  50% 50%

MAG1
MAG2

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

Chain H:  50% 50%

MAG1
MAG2

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

Chain I:  100%

MAG1
MAG2

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

Chain J:  50% 50%



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

Chain K:  100%



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

Chain L:  100%



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

Chain M:  100%



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

Chain N:  100%



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

Chain O:  50% 50%




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

Chain P:  100%



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

Chain Q:  50% 50%

MAG1
MAG2

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

Chain R:  50% 50%

MAG1
MAG2

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

Chain S:  100%

MAG1
MAG2

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

Chain T:  100%

MAG1
MAG2

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

Chain U:  100%

MAG1
MAG2

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

Chain V:  50% 50%

MAG1
MAG2

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

Chain W:  100%

MAG1
MAG2

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

Chain X: MAG1
MAG2

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	93276	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING ONLY	Depositor
Microscope	FEI TECNAI ARCTICA	Depositor
Voltage (kV)	200	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

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	0.32	0/8644	0.53	0/11776
1	B	0.33	0/8644	0.53	0/11776
1	C	0.33	0/8644	0.53	0/11776
All	All	0.33	0/25932	0.53	0/35328

There are no bond length outliers.

There are no bond angle outliers.

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	8442	0	8221	323	0
1	B	8442	0	8221	320	0
1	C	8442	0	8221	298	0
2	D	28	0	25	0	0
2	E	28	0	25	1	0
2	F	28	0	25	0	0
2	G	28	0	25	0	0
2	H	28	0	25	1	0
2	I	28	0	25	0	0
2	J	28	0	25	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	K	28	0	25	0	0
2	L	28	0	25	0	0
2	M	28	0	25	0	0
2	N	28	0	25	0	0
2	O	28	0	25	0	0
2	P	28	0	25	0	0
2	Q	28	0	25	1	0
2	R	28	0	25	1	0
2	S	28	0	25	1	0
2	T	28	0	25	0	0
2	U	28	0	25	0	0
2	V	28	0	25	0	0
2	W	28	0	25	1	0
2	X	28	0	25	1	0
3	A	98	0	91	0	0
3	B	98	0	91	1	0
3	C	98	0	91	3	0
All	All	26208	0	25461	860	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 17.

The worst 5 of 860 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:576:VAL:HG22	1:C:587:ILE:HD11	1.30	1.14
1:C:708:SER:HB3	1:C:711:SER:HB2	1.54	0.90
1:B:195:LYS:HB2	1:B:202:LYS:HD3	1.52	0.89
1:A:106:PHE:HB2	1:A:117:LEU:HB2	1.54	0.87
1:B:708:SER:HB3	1:B:711:SER:HB3	1.58	0.84

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	1078/1270 (85%)	972 (90%)	101 (9%)	5 (0%)	25	57
1	B	1078/1270 (85%)	970 (90%)	104 (10%)	4 (0%)	30	62
1	C	1078/1270 (85%)	977 (91%)	93 (9%)	8 (1%)	19	51
All	All	3234/3810 (85%)	2919 (90%)	298 (9%)	17 (0%)	27	57

5 of 17 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	139	PRO
1	A	123	ALA
1	A	172	SER
1	B	123	ALA
1	B	172	SER

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	940/1112 (84%)	905 (96%)	35 (4%)	29	54
1	B	940/1112 (84%)	915 (97%)	25 (3%)	40	61
1	C	940/1112 (84%)	912 (97%)	28 (3%)	36	58
All	All	2820/3336 (84%)	2732 (97%)	88 (3%)	37	58

5 of 88 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	835	LYS
1	B	354	ASN
1	A	916	LEU
1	B	158	ARG
1	B	615	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 18 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	409	GLN
1	B	1071	GLN
1	B	901	GLN
1	A	188	ASN
1	B	196	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](#)

42 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	0.39	0	17,19,21	0.49	0
2	NAG	D	2	2	14,14,15	0.26	0	17,19,21	0.49	0
2	NAG	E	1	1,2	14,14,15	0.37	0	17,19,21	0.48	0
2	NAG	E	2	2	14,14,15	0.29	0	17,19,21	0.40	0
2	NAG	F	1	1,2	14,14,15	0.32	0	17,19,21	0.55	0
2	NAG	F	2	2	14,14,15	0.33	0	17,19,21	0.34	0
2	NAG	G	1	1,2	14,14,15	0.29	0	17,19,21	0.63	0
2	NAG	G	2	2	14,14,15	0.64	1 (7%)	17,19,21	0.50	0
2	NAG	H	1	1,2	14,14,15	0.72	1 (7%)	17,19,21	0.54	0
2	NAG	H	2	2	14,14,15	0.39	0	17,19,21	0.62	0
2	NAG	I	1	1,2	14,14,15	0.40	0	17,19,21	0.35	0
2	NAG	I	2	2	14,14,15	0.23	0	17,19,21	0.41	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	J	1	1,2	14,14,15	1.17	1 (7%)	17,19,21	1.42	1 (5%)
2	NAG	J	2	2	14,14,15	0.45	0	17,19,21	0.56	0
2	NAG	K	1	1,2	14,14,15	0.35	0	17,19,21	0.43	0
2	NAG	K	2	2	14,14,15	0.25	0	17,19,21	0.43	0
2	NAG	L	1	1,2	14,14,15	0.26	0	17,19,21	0.43	0
2	NAG	L	2	2	14,14,15	0.28	0	17,19,21	0.39	0
2	NAG	M	1	1,2	14,14,15	0.24	0	17,19,21	0.51	0
2	NAG	M	2	2	14,14,15	0.41	0	17,19,21	0.35	0
2	NAG	N	1	1,2	14,14,15	0.33	0	17,19,21	0.37	0
2	NAG	N	2	2	14,14,15	0.23	0	17,19,21	0.43	0
2	NAG	O	1	1,2	14,14,15	1.09	1 (7%)	17,19,21	1.36	1 (5%)
2	NAG	O	2	2	14,14,15	0.39	0	17,19,21	0.54	0
2	NAG	P	1	1,2	14,14,15	0.28	0	17,19,21	0.56	0
2	NAG	P	2	2	14,14,15	0.58	0	17,19,21	0.50	0
2	NAG	Q	1	1,2	14,14,15	0.72	1 (7%)	17,19,21	0.52	0
2	NAG	Q	2	2	14,14,15	0.39	0	17,19,21	0.60	0
2	NAG	R	1	1,2	14,14,15	0.41	0	17,19,21	0.91	1 (5%)
2	NAG	R	2	2	14,14,15	0.25	0	17,19,21	0.40	0
2	NAG	S	1	1,2	14,14,15	0.40	0	17,19,21	0.70	0
2	NAG	S	2	2	14,14,15	0.48	0	17,19,21	0.40	0
2	NAG	T	1	1,2	14,14,15	0.30	0	17,19,21	0.58	0
2	NAG	T	2	2	14,14,15	0.35	0	17,19,21	0.34	0
2	NAG	U	1	1,2	14,14,15	0.30	0	17,19,21	0.37	0
2	NAG	U	2	2	14,14,15	0.22	0	17,19,21	0.44	0
2	NAG	V	1	1,2	14,14,15	1.19	1 (7%)	17,19,21	1.44	1 (5%)
2	NAG	V	2	2	14,14,15	0.37	0	17,19,21	0.55	0
2	NAG	W	1	1,2	14,14,15	0.33	0	17,19,21	0.58	0
2	NAG	W	2	2	14,14,15	0.49	0	17,19,21	0.48	0
2	NAG	X	1	1,2	14,14,15	0.81	1 (7%)	17,19,21	0.60	0
2	NAG	X	2	2	14,14,15	0.39	0	17,19,21	0.62	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
2	NAG	D	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	D	2	2	-	2/6/23/26	0/1/1/1
2	NAG	E	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	E	2	2	-	3/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	F	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	F	2	2	-	0/6/23/26	0/1/1/1
2	NAG	G	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	G	2	2	-	2/6/23/26	0/1/1/1
2	NAG	H	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	H	2	2	-	2/6/23/26	0/1/1/1
2	NAG	I	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	I	2	2	-	0/6/23/26	0/1/1/1
2	NAG	J	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	J	2	2	-	1/6/23/26	0/1/1/1
2	NAG	K	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	K	2	2	-	2/6/23/26	0/1/1/1
2	NAG	L	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	L	2	2	-	3/6/23/26	0/1/1/1
2	NAG	M	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	M	2	2	-	0/6/23/26	0/1/1/1
2	NAG	N	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	N	2	2	-	0/6/23/26	0/1/1/1
2	NAG	O	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	O	2	2	-	1/6/23/26	0/1/1/1
2	NAG	P	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	P	2	2	-	2/6/23/26	0/1/1/1
2	NAG	Q	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	Q	2	2	-	3/6/23/26	0/1/1/1
2	NAG	R	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	R	2	2	-	1/6/23/26	0/1/1/1
2	NAG	S	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	S	2	2	-	4/6/23/26	0/1/1/1
2	NAG	T	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	T	2	2	-	0/6/23/26	0/1/1/1
2	NAG	U	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	U	2	2	-	2/6/23/26	0/1/1/1
2	NAG	V	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	V	2	2	-	1/6/23/26	0/1/1/1
2	NAG	W	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	W	2	2	-	2/6/23/26	0/1/1/1
2	NAG	X	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	X	2	2	-	1/6/23/26	0/1/1/1

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	V	1	NAG	O5-C1	4.19	1.50	1.43
2	J	1	NAG	O5-C1	4.06	1.50	1.43
2	O	1	NAG	O5-C1	3.80	1.49	1.43
2	X	1	NAG	O5-C1	-2.41	1.39	1.43
2	H	1	NAG	O5-C1	-2.11	1.40	1.43

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	J	1	NAG	C1-O5-C5	5.62	119.81	112.19
2	V	1	NAG	C1-O5-C5	5.60	119.78	112.19
2	O	1	NAG	C1-O5-C5	5.31	119.39	112.19
2	R	1	NAG	C1-O5-C5	2.60	115.71	112.19

There are no chirality outliers.

5 of 76 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	R	1	NAG	C8-C7-N2-C2
2	R	1	NAG	O7-C7-N2-C2
2	V	1	NAG	C4-C5-C6-O6
2	J	1	NAG	C4-C5-C6-O6
2	O	1	NAG	C4-C5-C6-O6

There are no ring outliers.

13 monomers are involved in 8 short contacts:

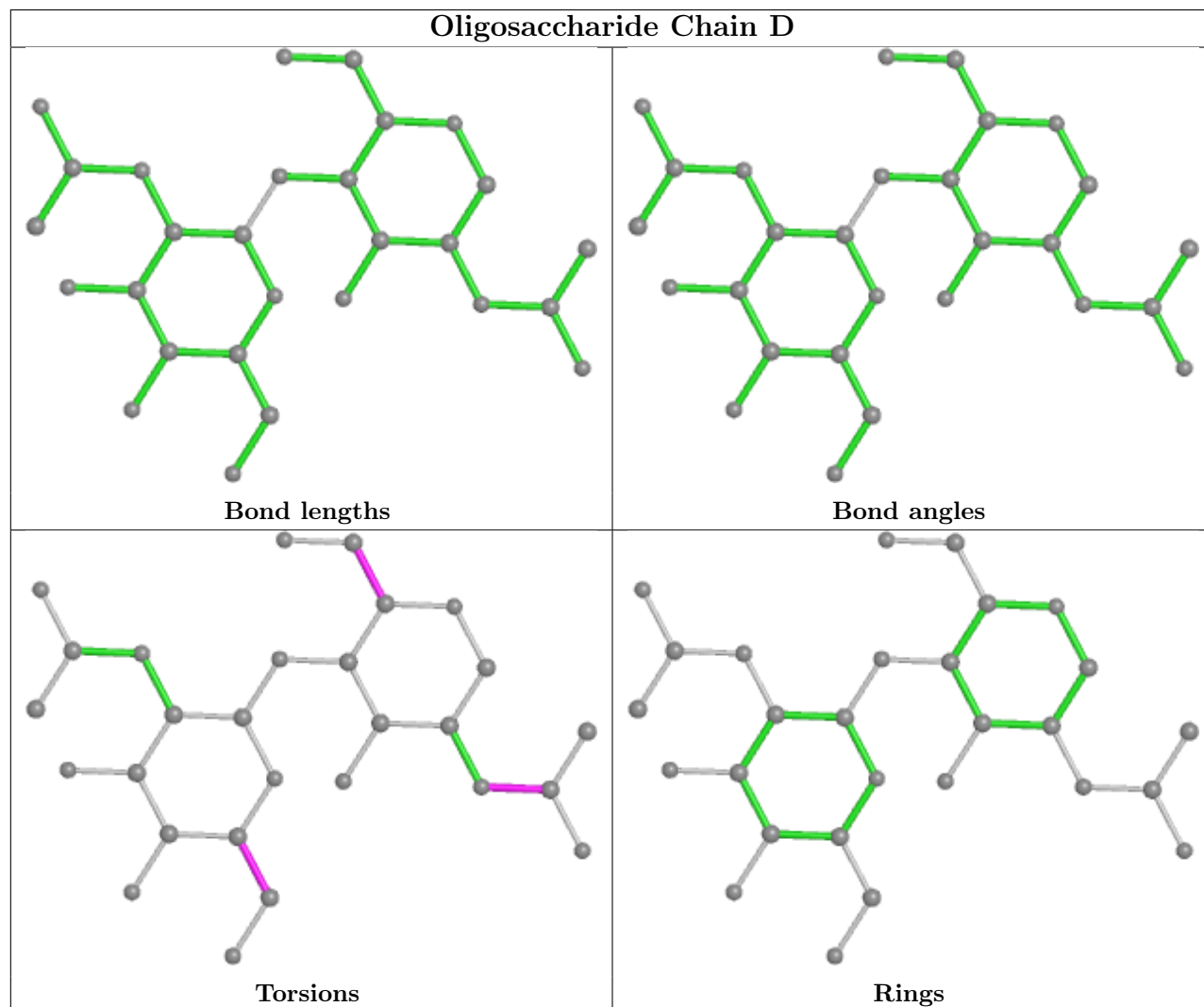
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	J	1	NAG	1	0
2	X	1	NAG	1	0
2	E	1	NAG	1	0
2	S	2	NAG	1	0
2	X	2	NAG	1	0
2	Q	1	NAG	1	0
2	S	1	NAG	1	0
2	H	1	NAG	1	0
2	R	1	NAG	1	0
2	H	2	NAG	1	0
2	W	2	NAG	1	0
2	W	1	NAG	1	0

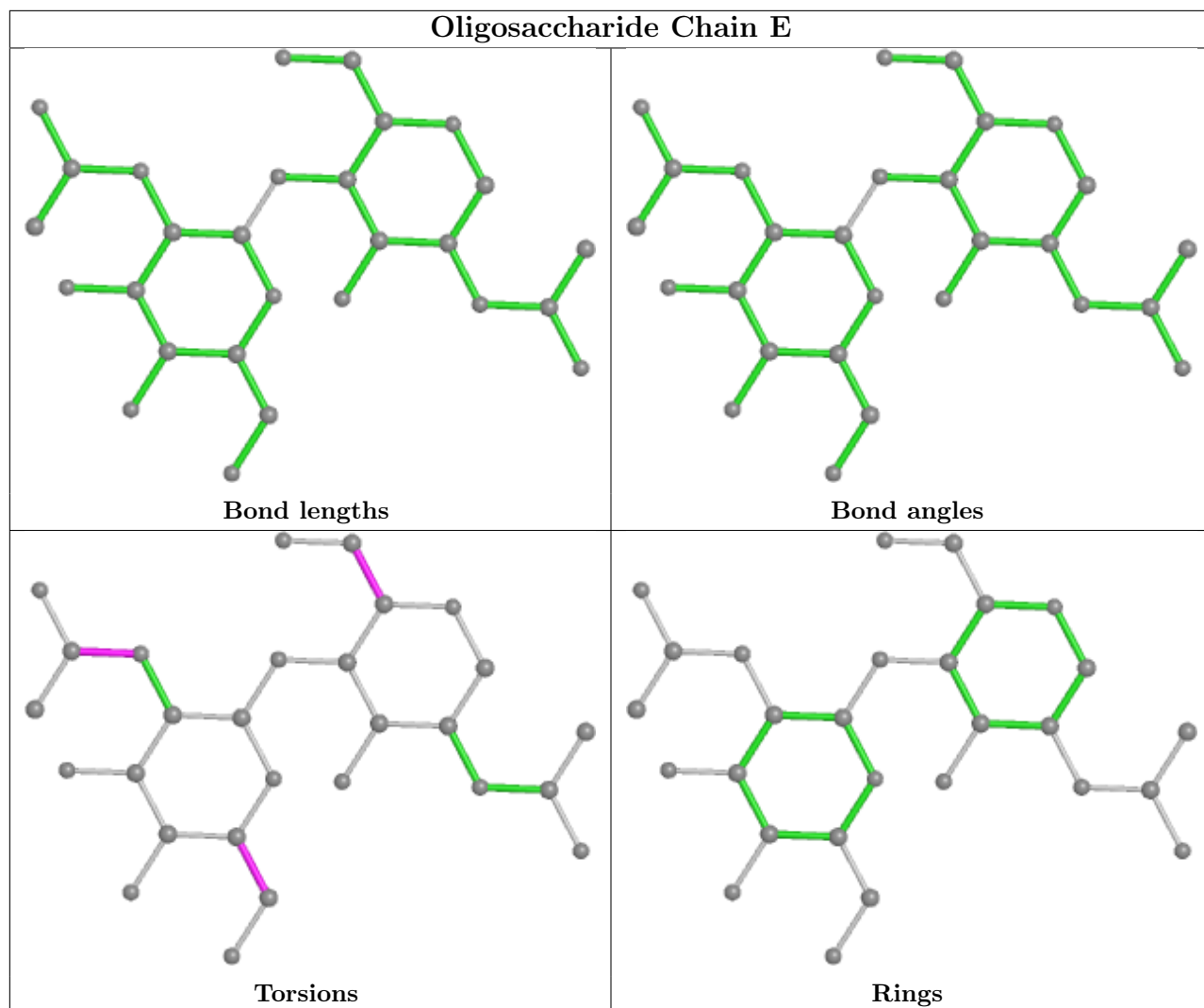
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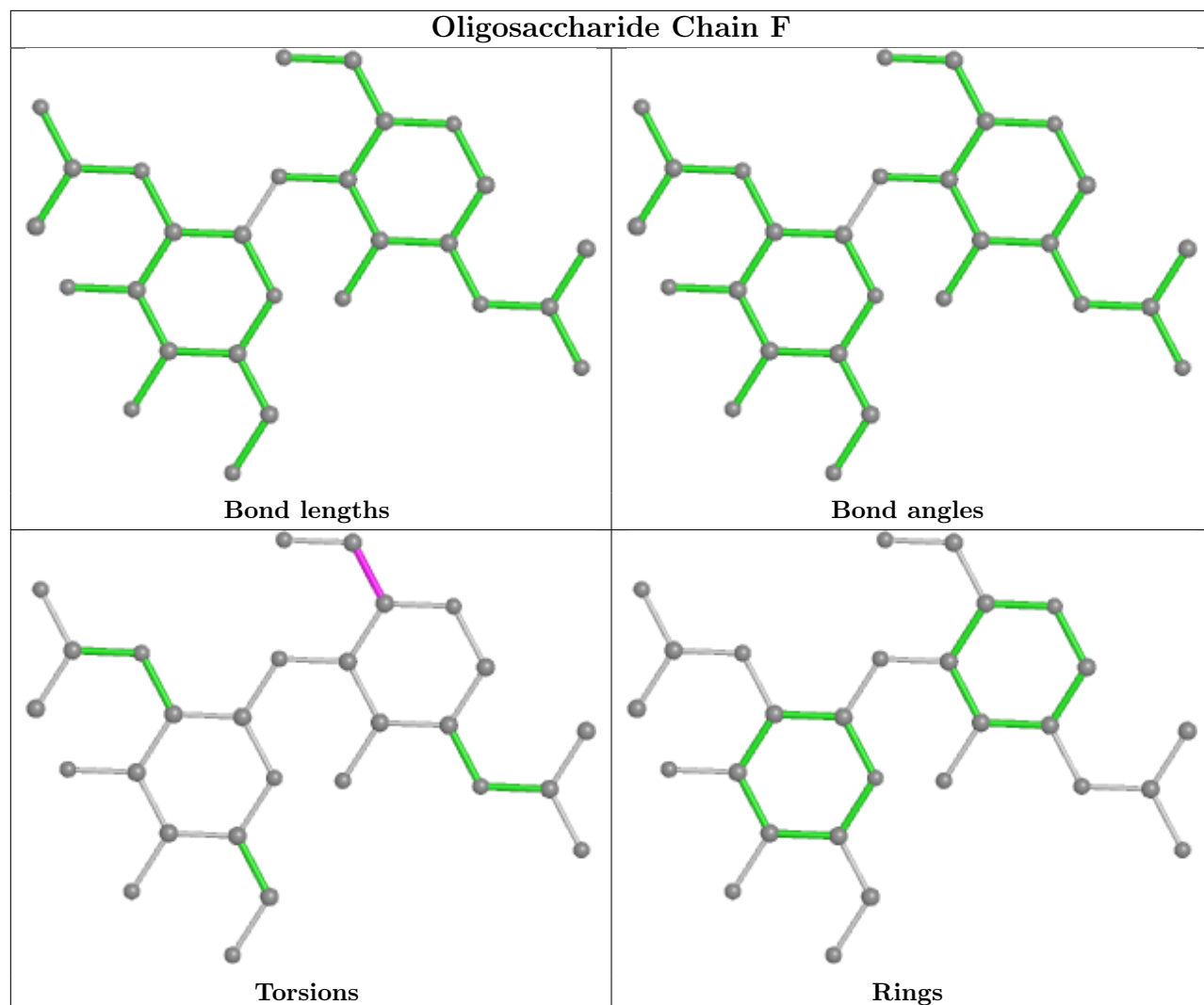
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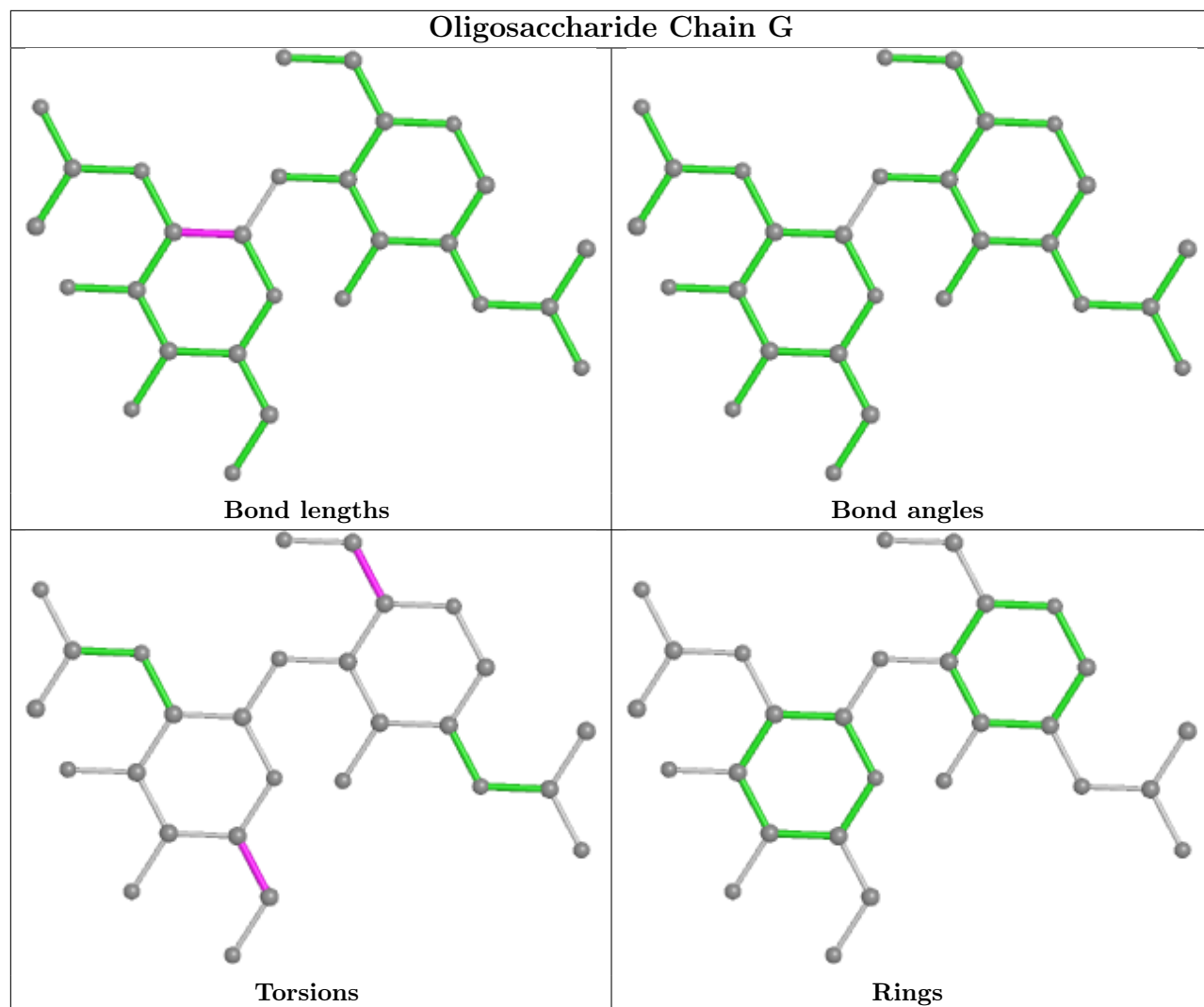
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	Q	2	NAG	1	0

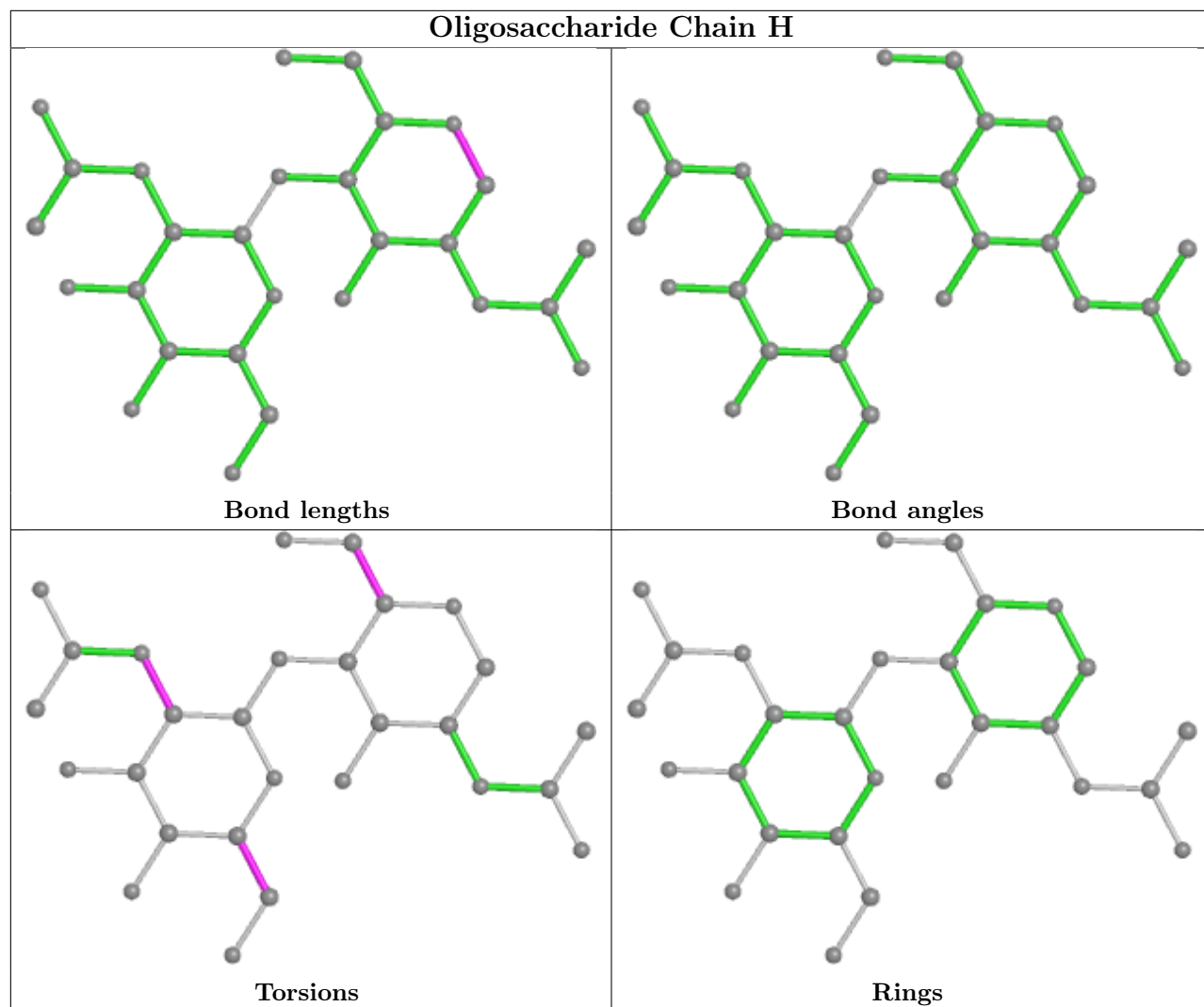
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

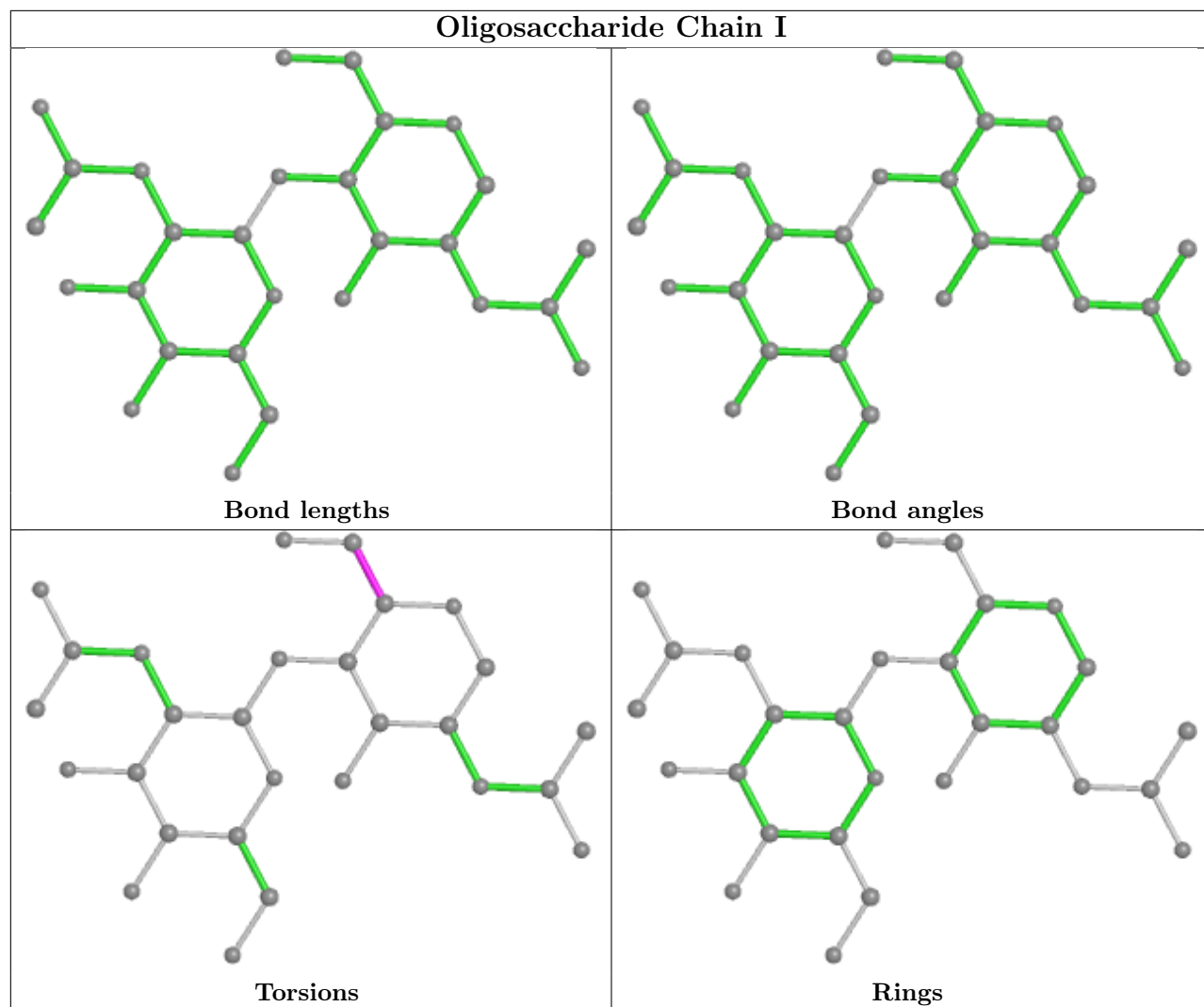


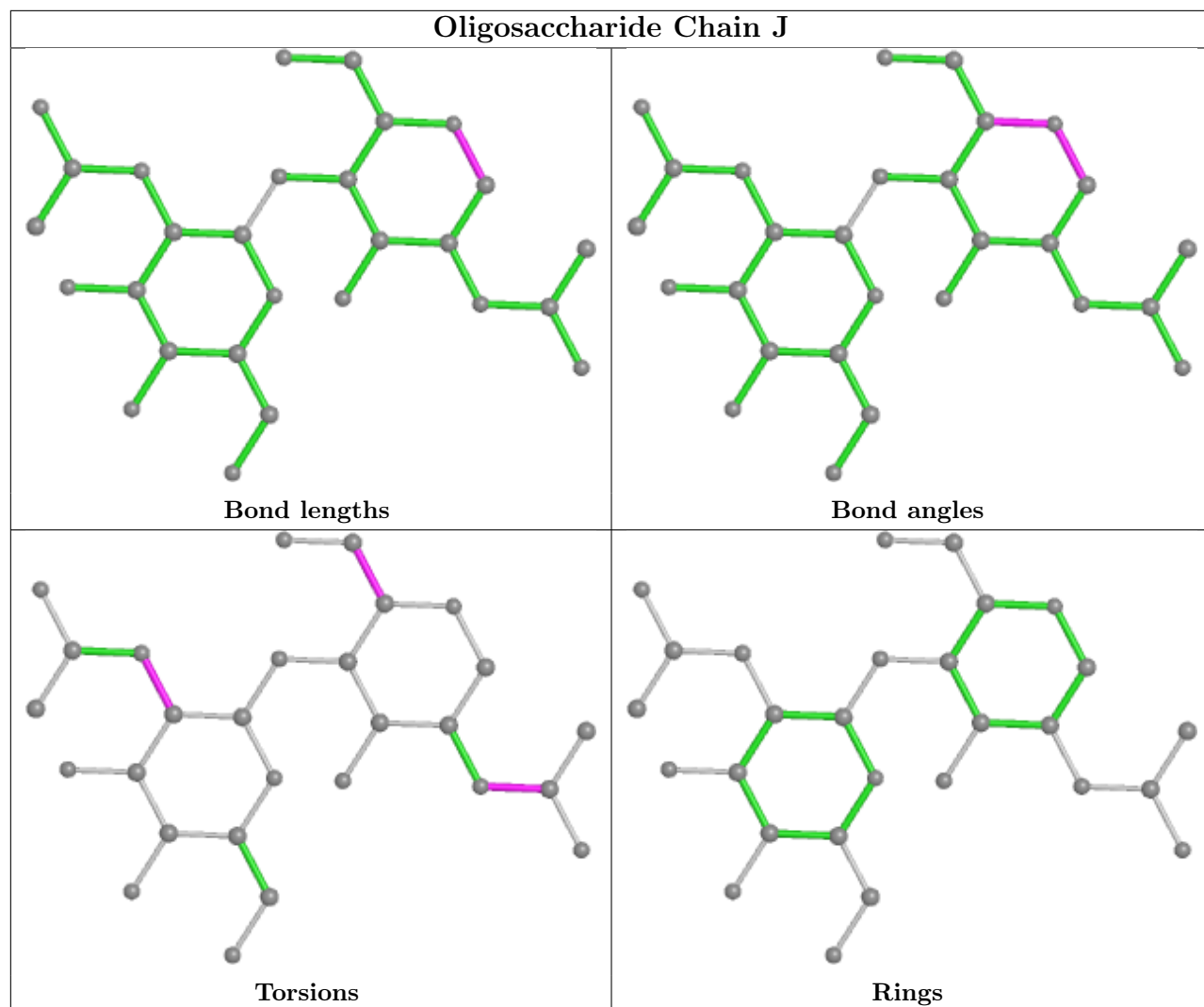


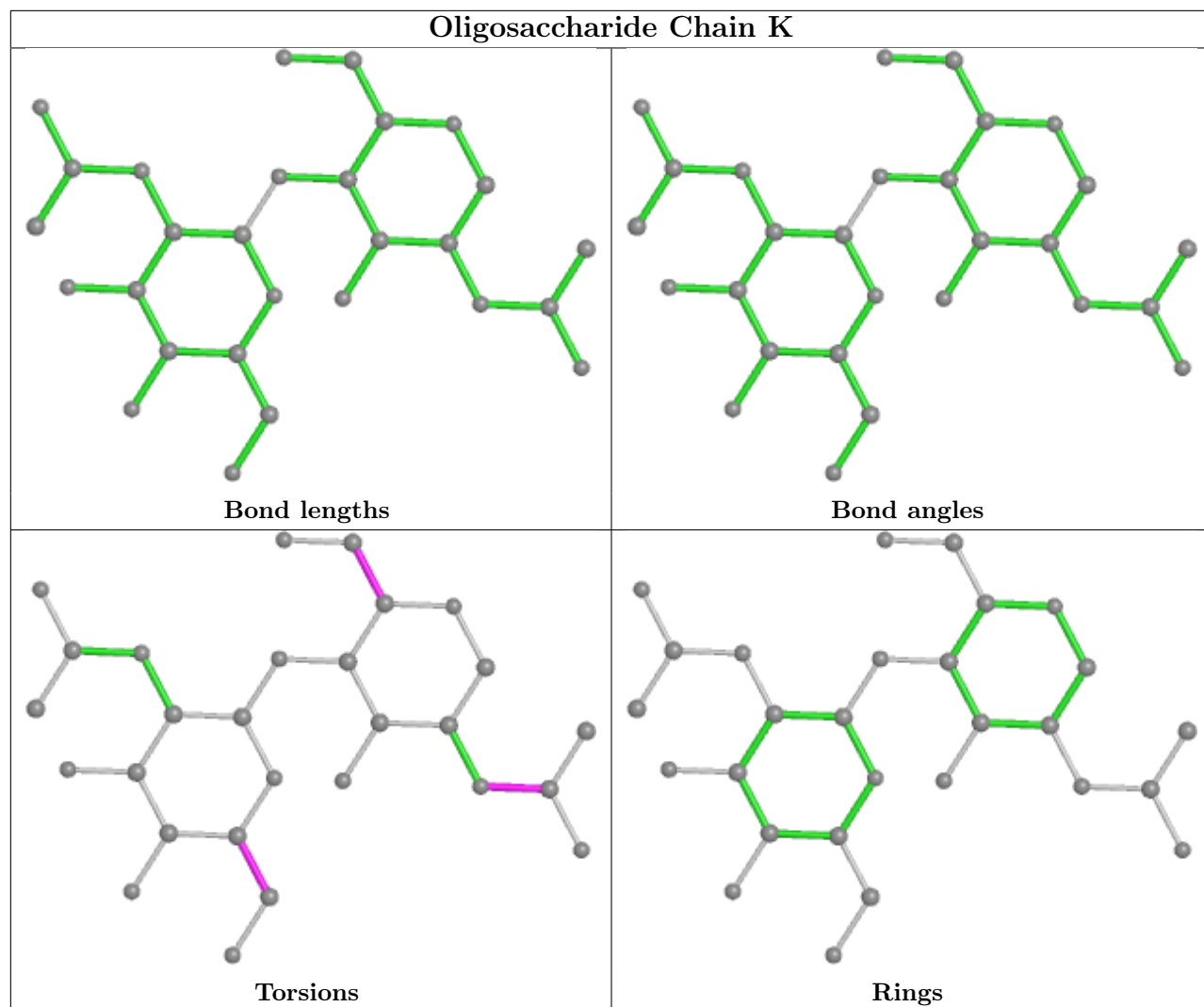


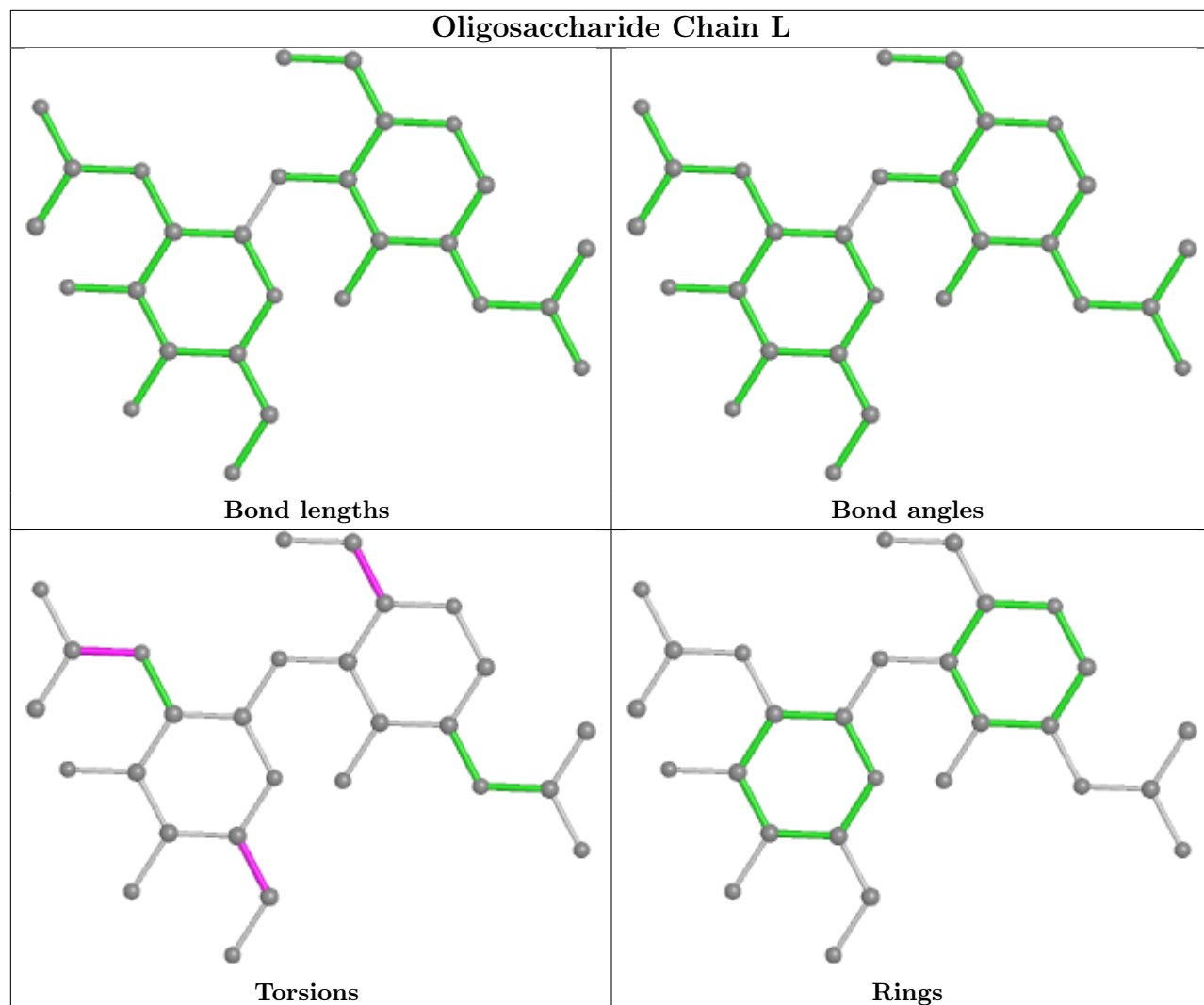


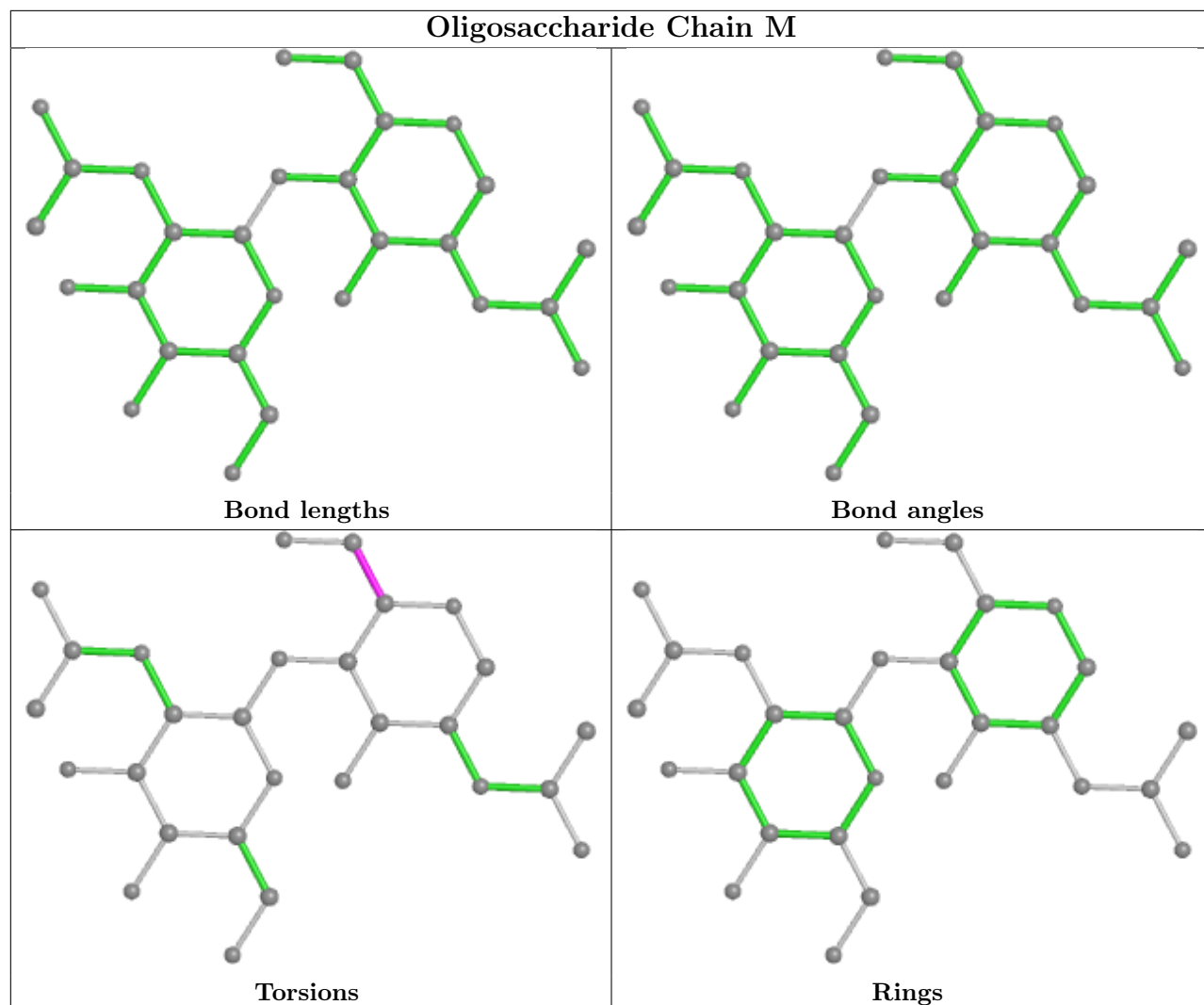


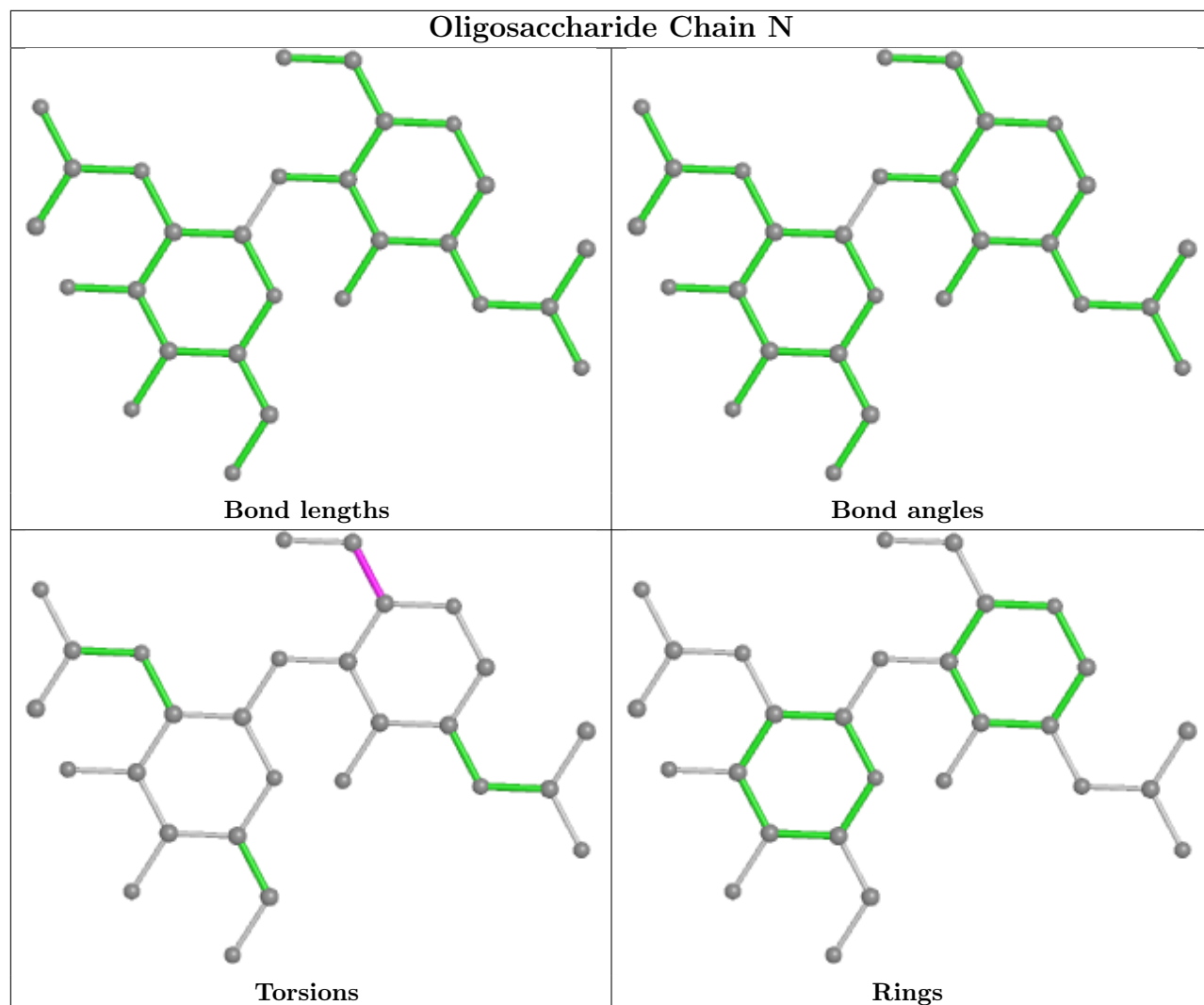


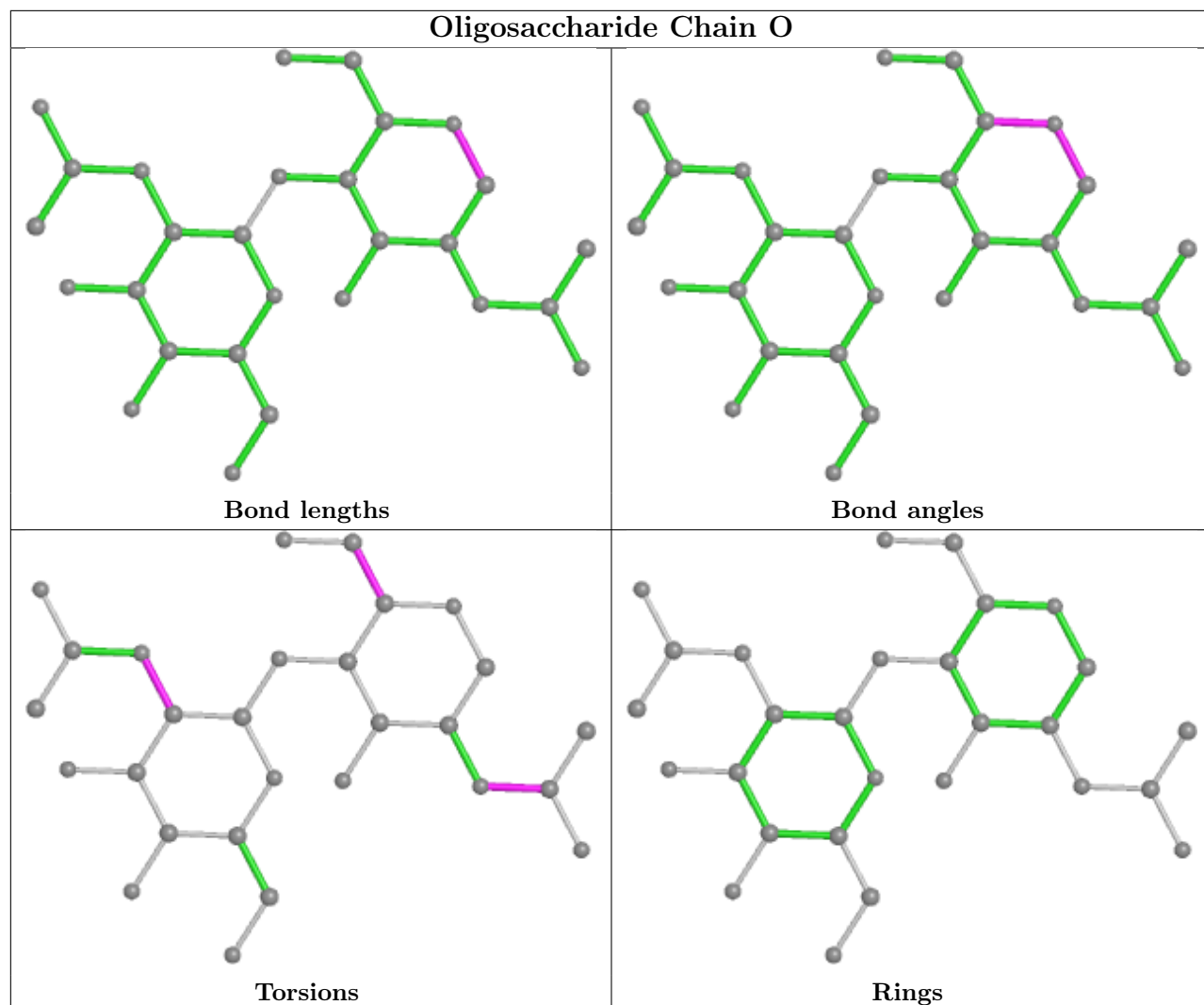


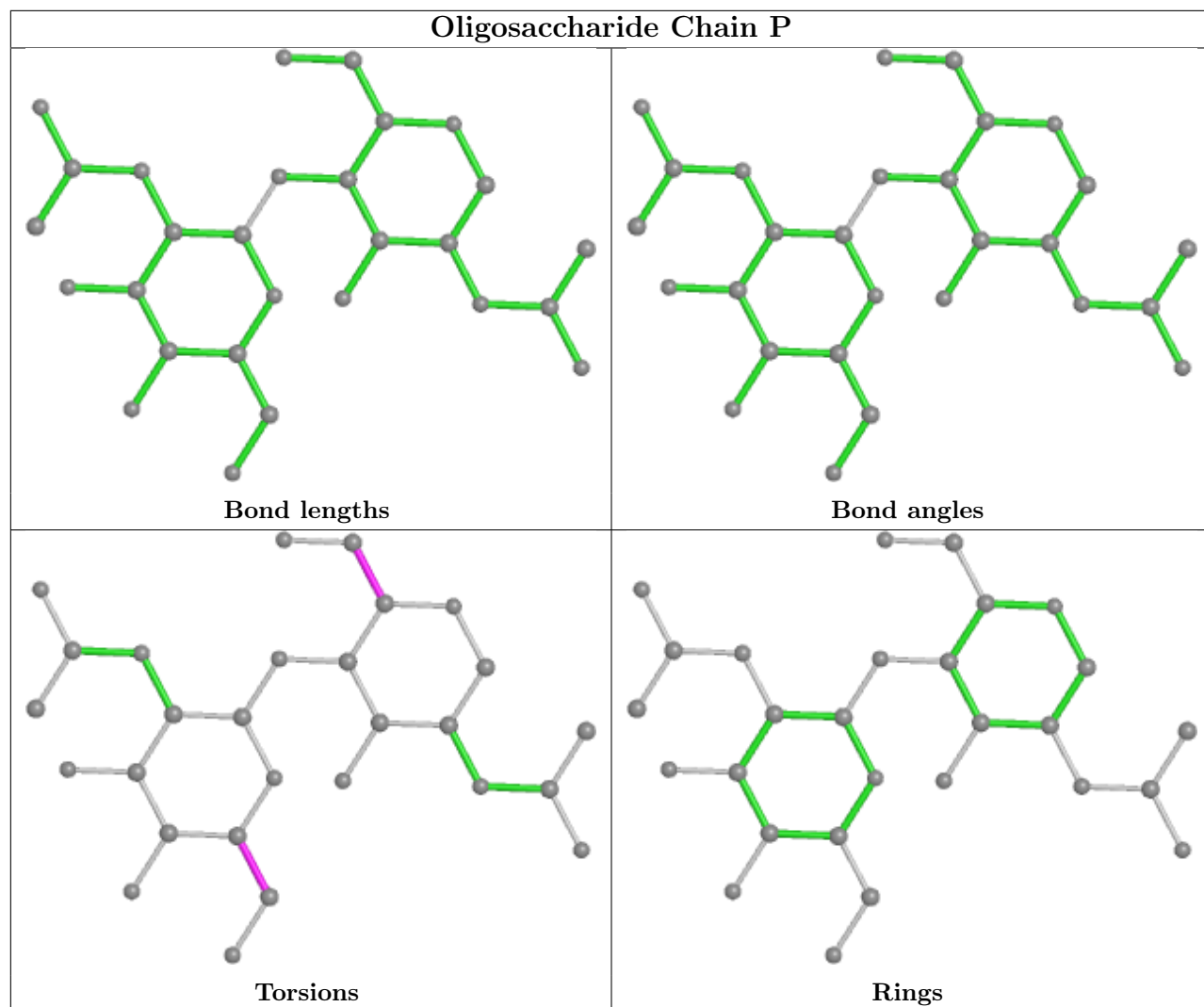


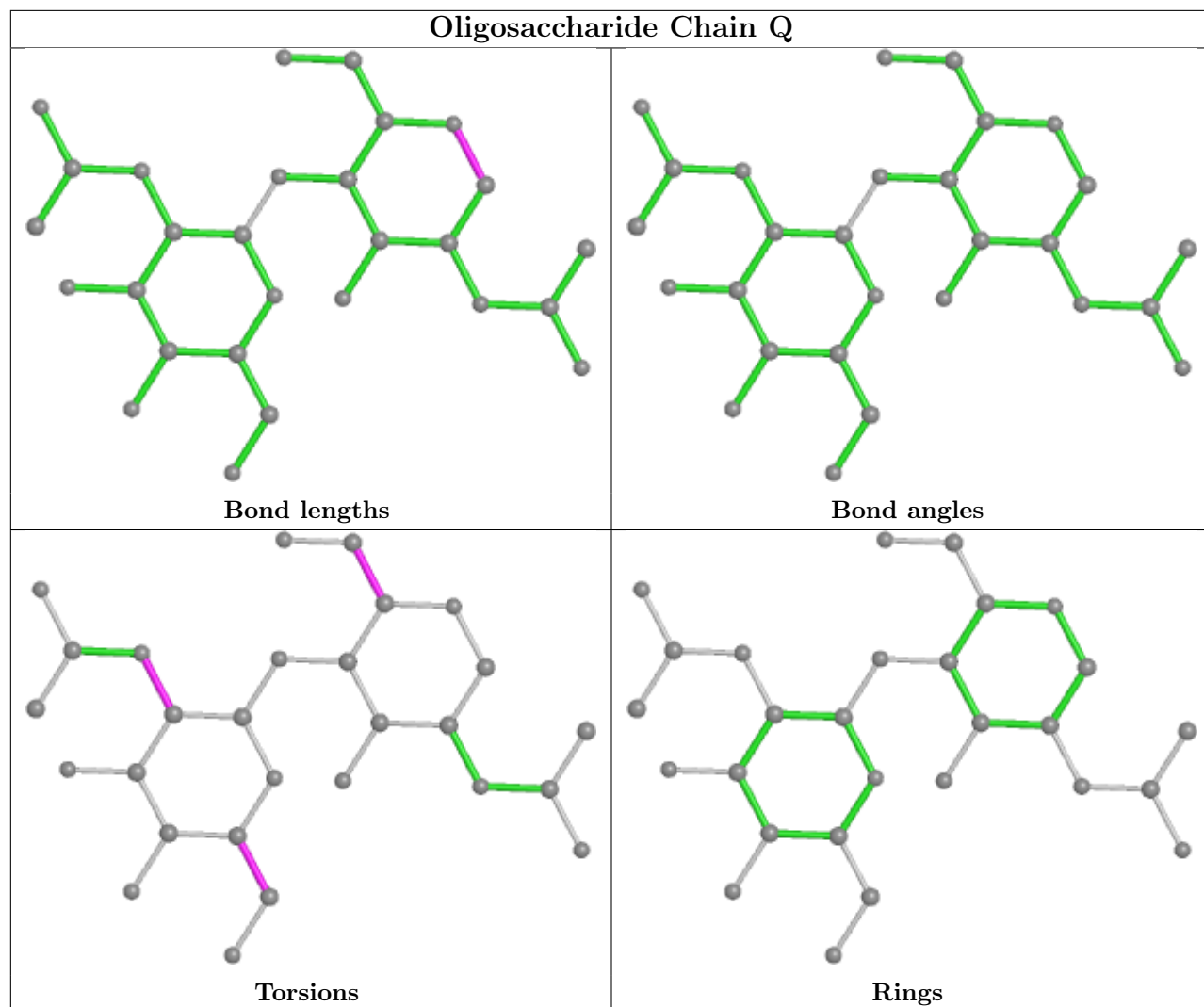


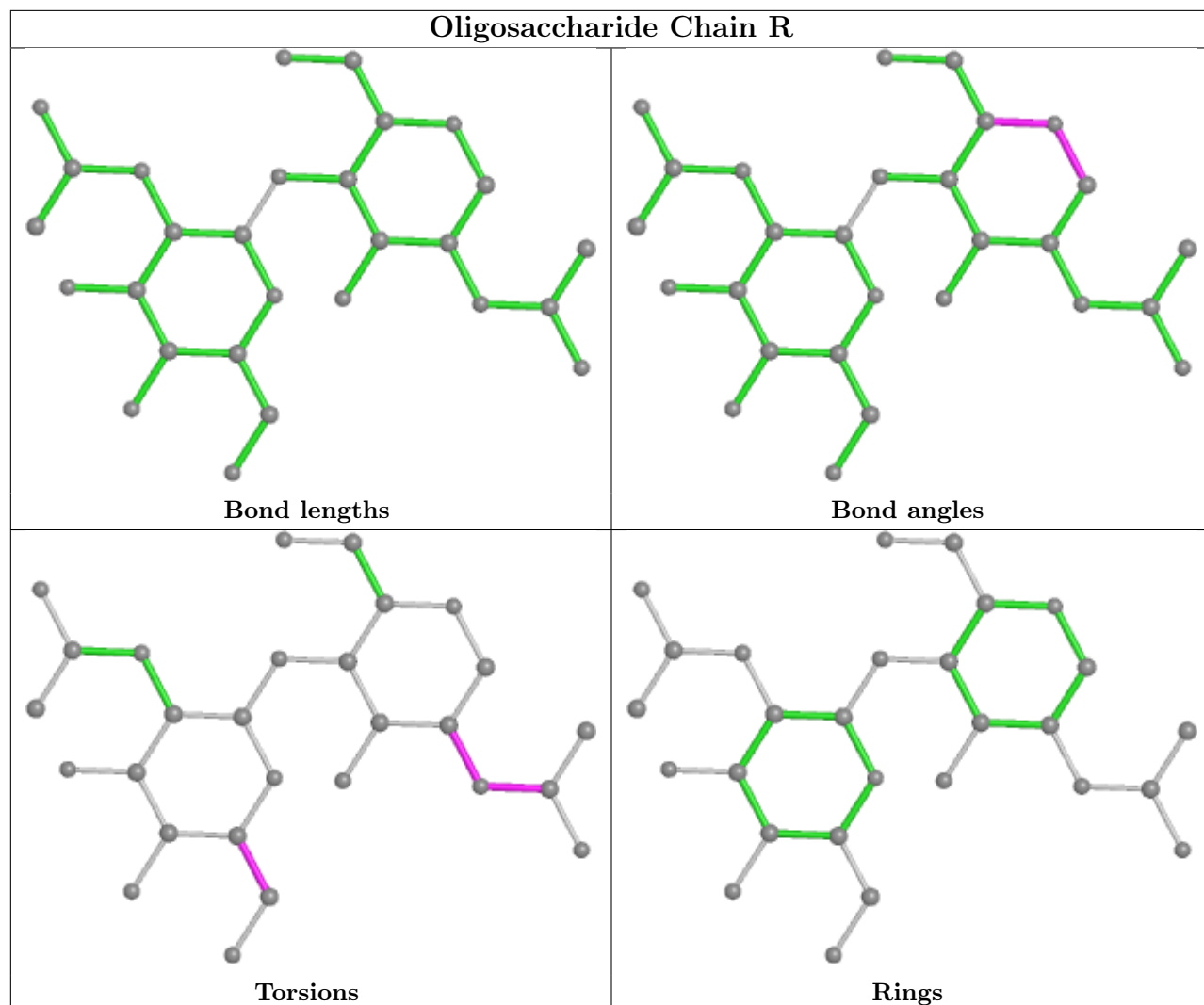


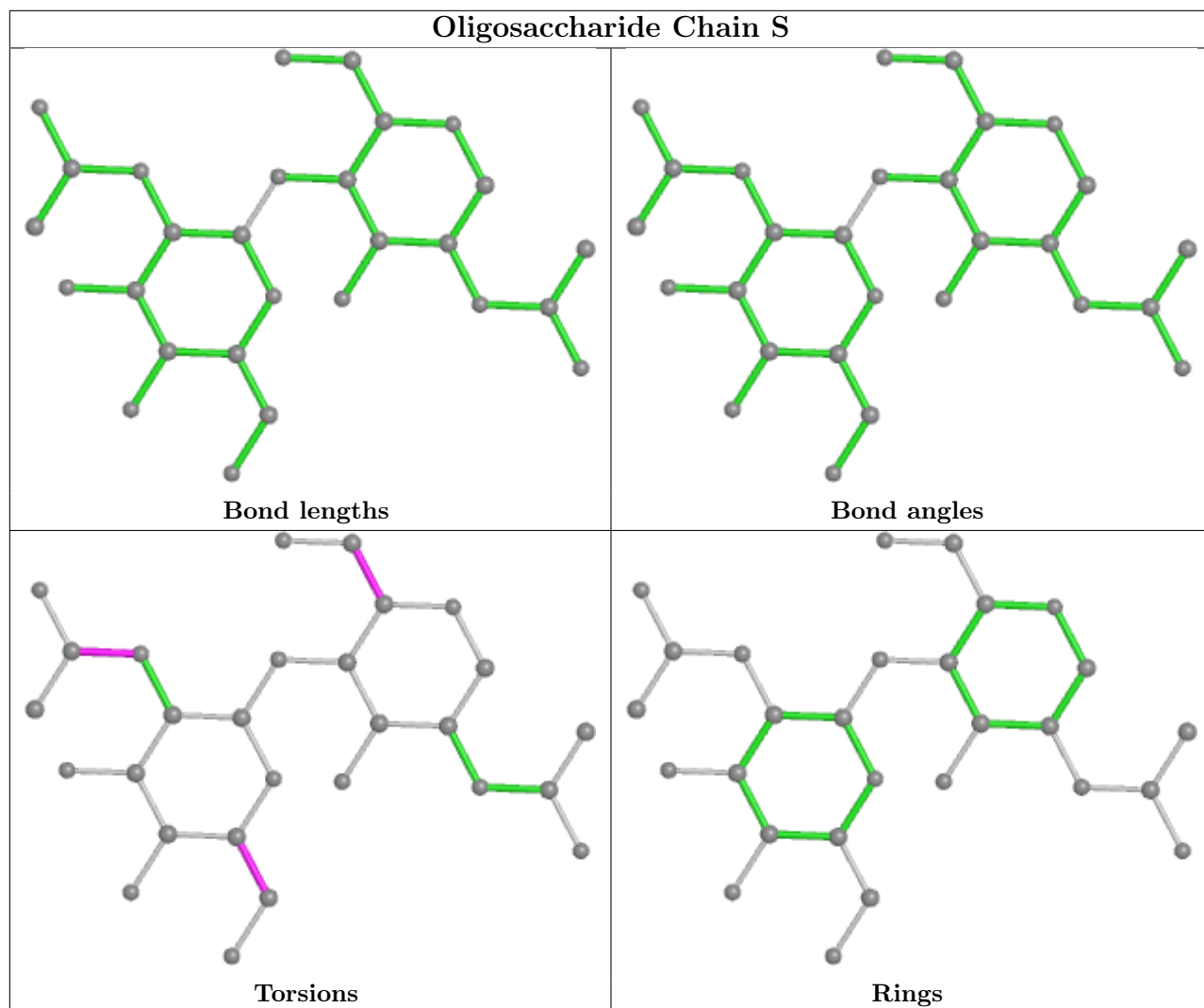


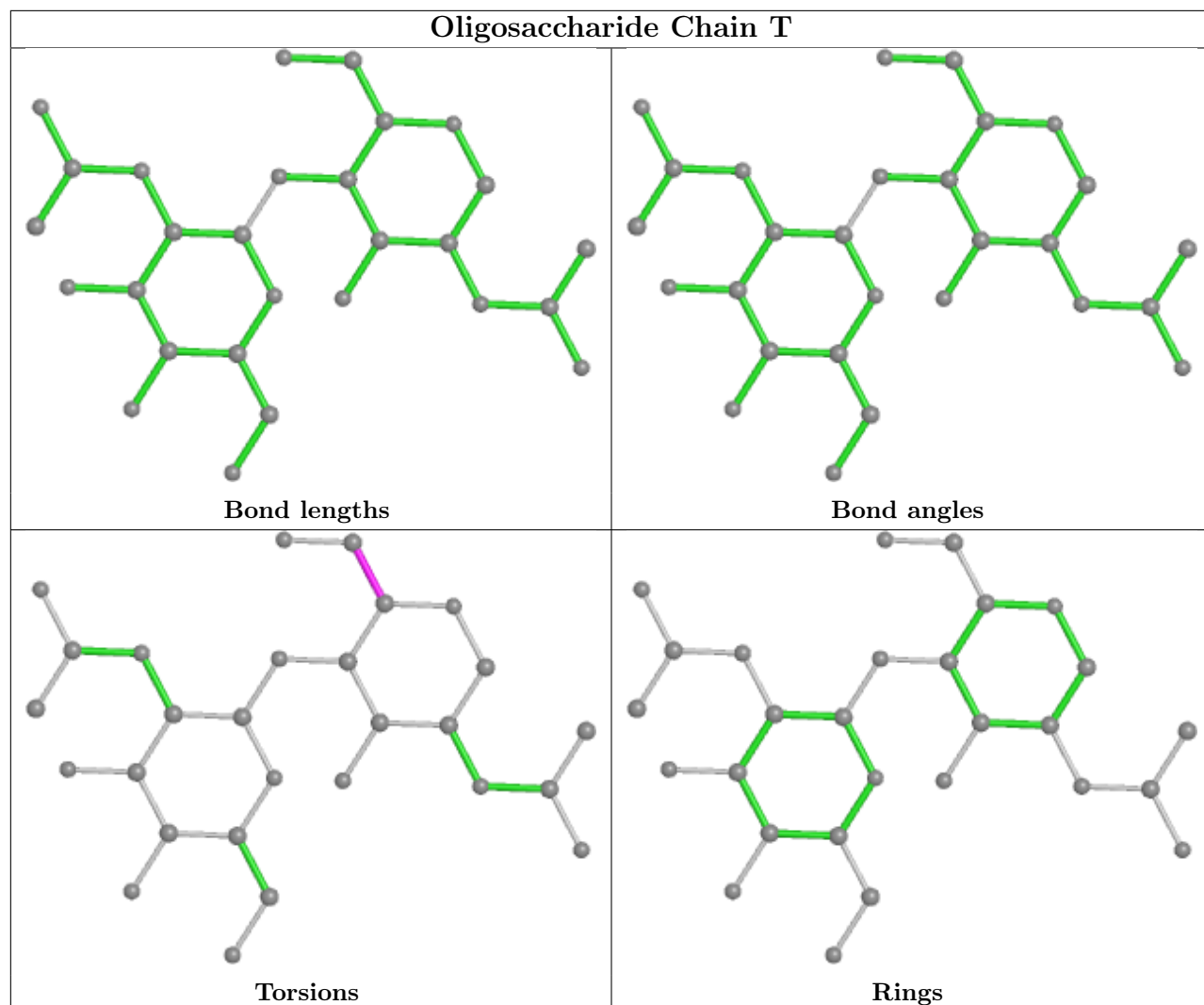


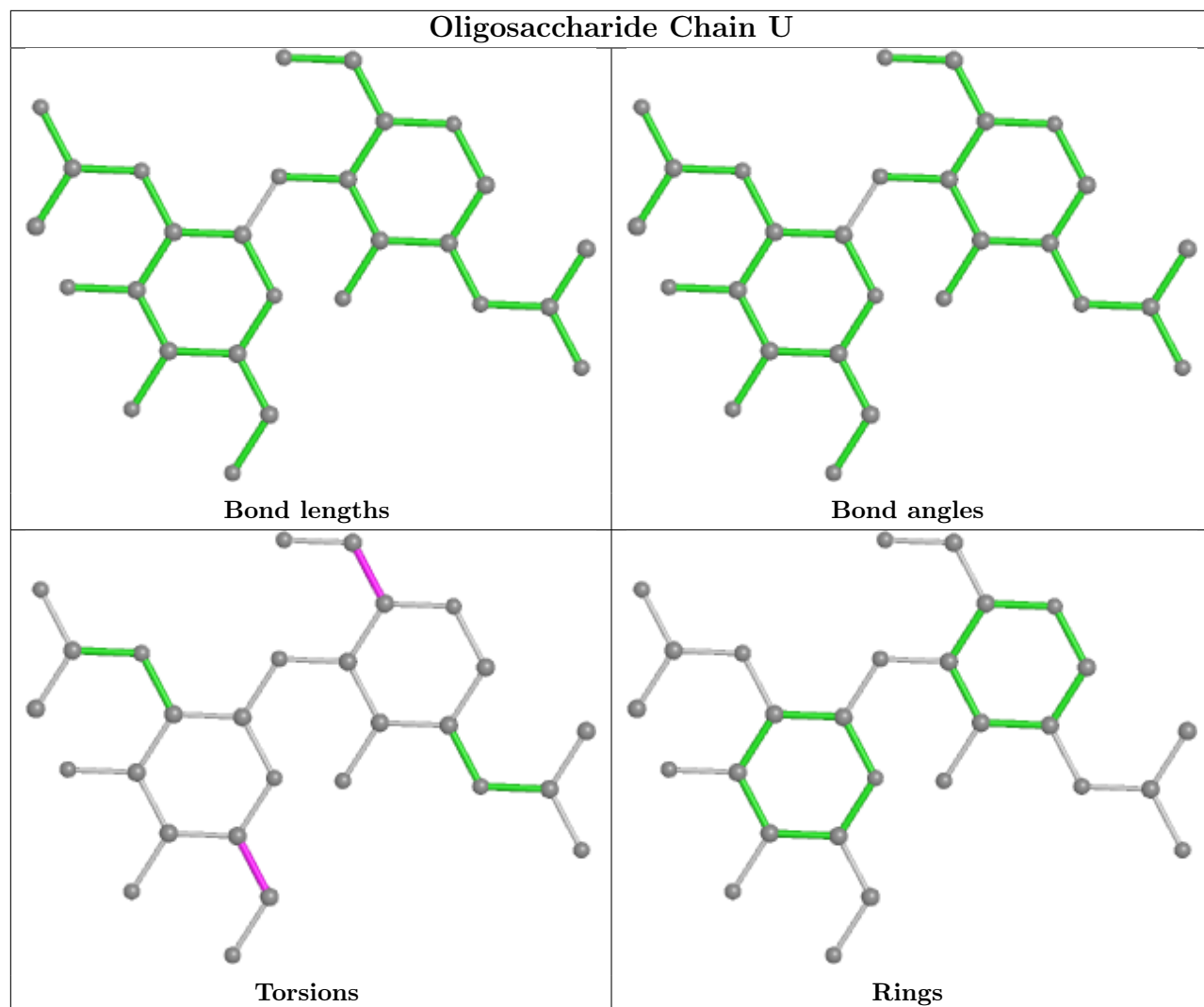


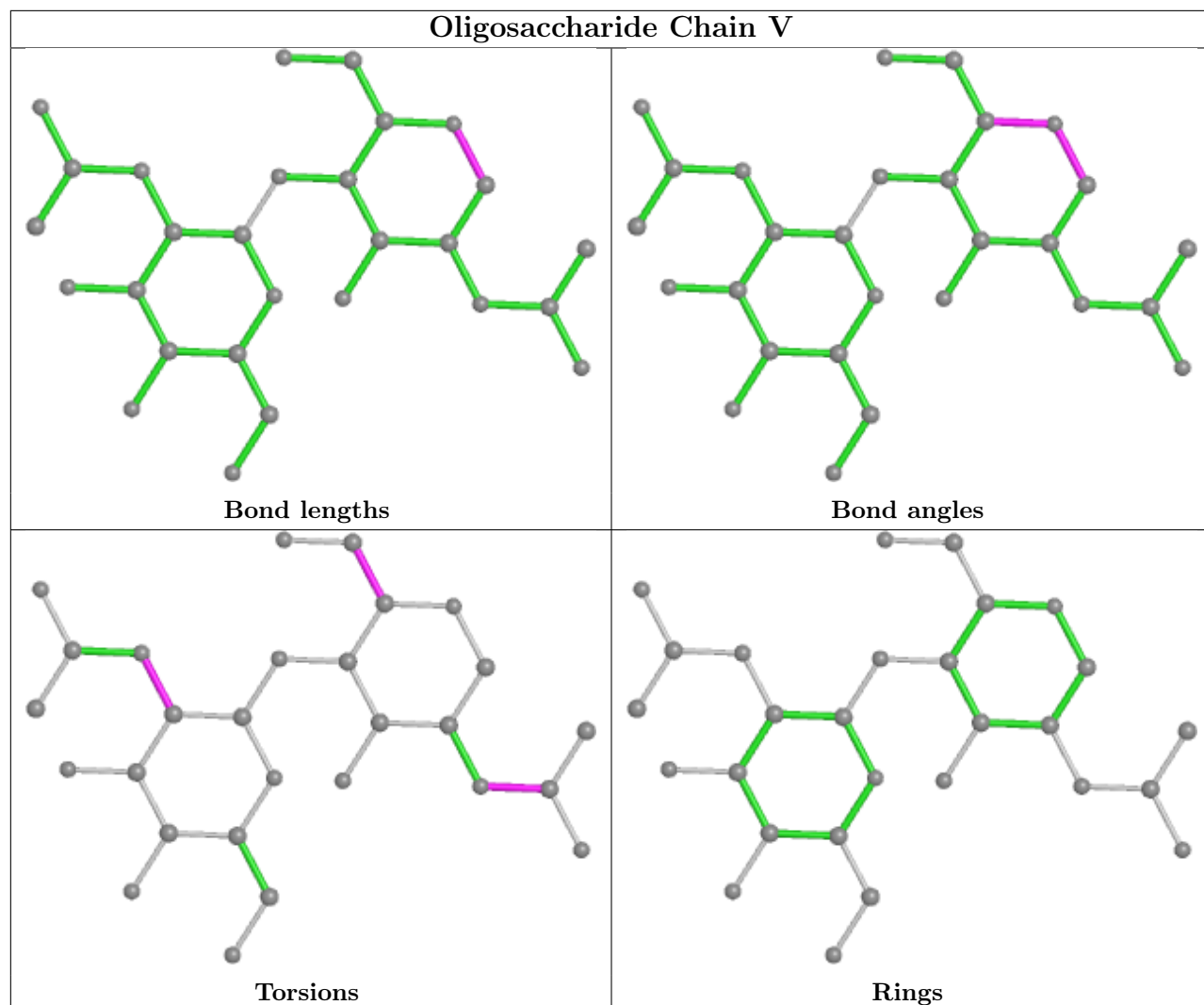


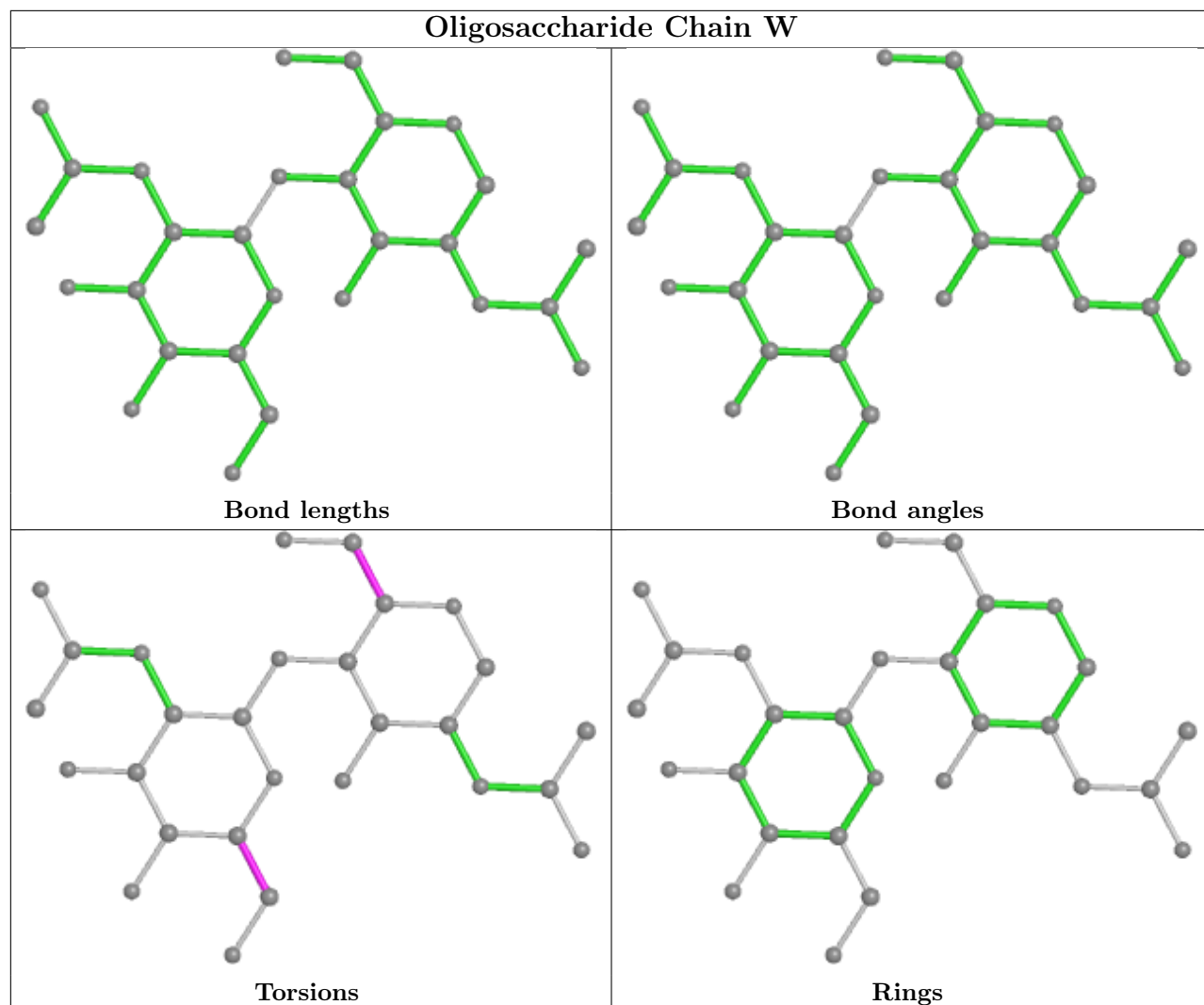


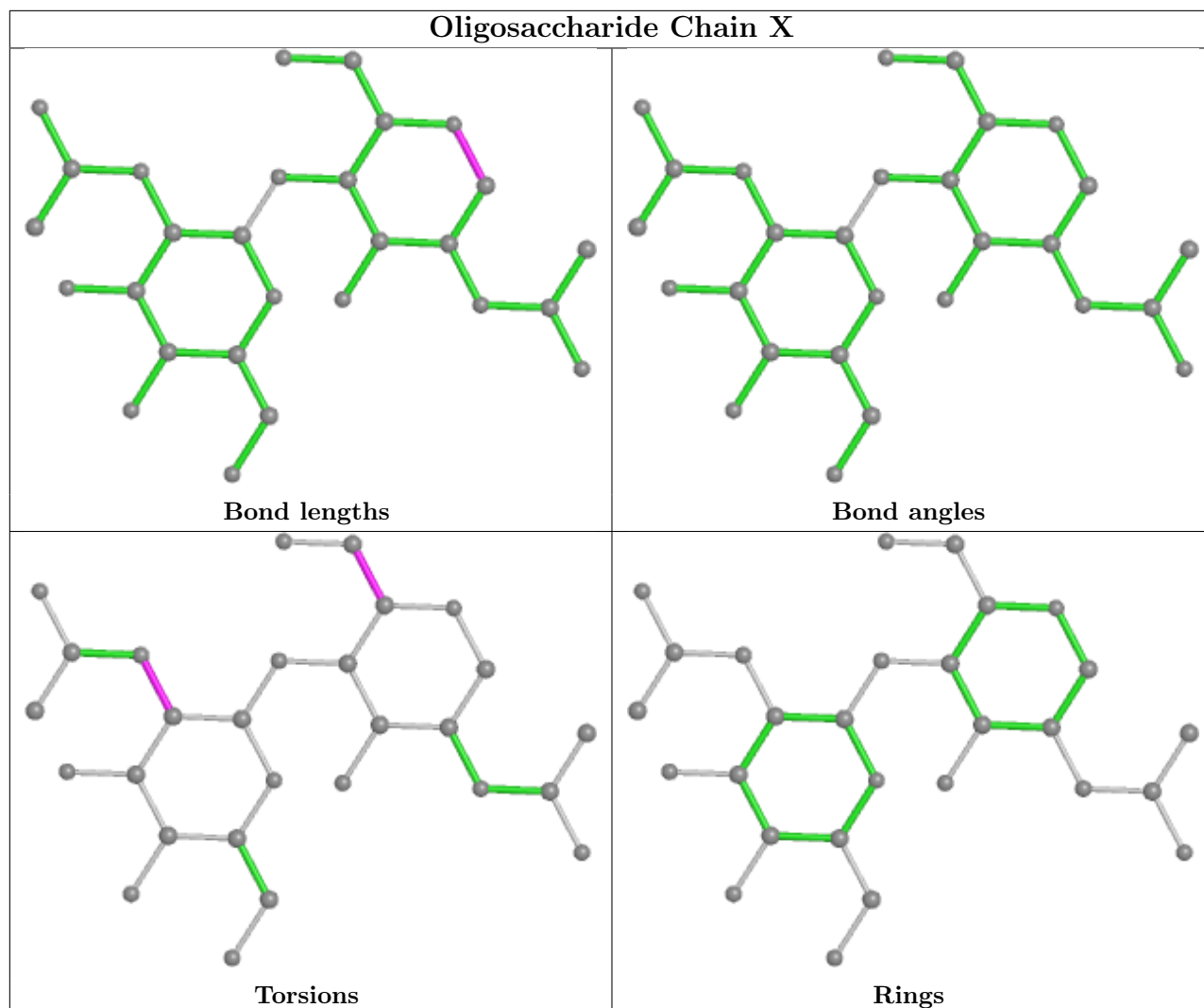












5.6 Ligand geometry [i](#)

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	$\# Z > 2$
3	NAG	A	1304	1	14,14,15	0.51	0	17,19,21	0.43	0
3	NAG	B	1307	1	14,14,15	0.40	0	17,19,21	0.95	1 (5%)
3	NAG	B	1305	1	14,14,15	0.47	0	17,19,21	0.43	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	A	1303	1	14,14,15	0.21	0	17,19,21	0.38	0
3	NAG	A	1306	1	14,14,15	0.38	0	17,19,21	0.54	0
3	NAG	C	1301	1	14,14,15	0.22	0	17,19,21	0.43	0
3	NAG	B	1303	1	14,14,15	0.18	0	17,19,21	0.49	0
3	NAG	A	1305	1	14,14,15	0.63	1 (7%)	17,19,21	0.94	2 (11%)
3	NAG	A	1307	1	14,14,15	0.39	0	17,19,21	0.44	0
3	NAG	B	1302	1	14,14,15	0.21	0	17,19,21	0.44	0
3	NAG	B	1301	1	14,14,15	0.38	0	17,19,21	0.45	0
3	NAG	B	1304	1	14,14,15	0.18	0	17,19,21	0.41	0
3	NAG	C	1303	1	14,14,15	0.18	0	17,19,21	0.40	0
3	NAG	C	1306	1	14,14,15	0.39	0	17,19,21	1.01	3 (17%)
3	NAG	C	1302	1	14,14,15	0.23	0	17,19,21	0.42	0
3	NAG	A	1302	1	14,14,15	0.15	0	17,19,21	0.45	0
3	NAG	B	1306	1	14,14,15	0.57	0	17,19,21	0.95	2 (11%)
3	NAG	C	1307	1	14,14,15	0.37	0	17,19,21	0.42	0
3	NAG	A	1301	1	14,14,15	0.24	0	17,19,21	0.42	0
3	NAG	C	1304	1	14,14,15	0.55	0	17,19,21	1.00	2 (11%)
3	NAG	C	1305	1	14,14,15	0.27	0	17,19,21	0.58	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	A	1304	1	-	0/6/23/26	0/1/1/1
3	NAG	B	1307	1	-	3/6/23/26	0/1/1/1
3	NAG	B	1305	1	-	0/6/23/26	0/1/1/1
3	NAG	A	1303	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1306	1	-	0/6/23/26	0/1/1/1
3	NAG	C	1301	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1303	1	-	4/6/23/26	0/1/1/1
3	NAG	A	1305	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1307	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1302	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1301	1	-	2/6/23/26	0/1/1/1
3	NAG	B	1304	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1303	1	-	2/6/23/26	0/1/1/1
3	NAG	C	1306	1	-	4/6/23/26	0/1/1/1

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

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1305	NAG	O5-C1	-2.16	1.40	1.43

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1304	NAG	C1-O5-C5	2.98	116.24	112.19
3	B	1307	NAG	C1-C2-N2	2.89	115.43	110.49
3	B	1306	NAG	C1-O5-C5	2.65	115.79	112.19
3	A	1305	NAG	C1-O5-C5	2.54	115.63	112.19
3	B	1306	NAG	C3-C4-C5	2.21	114.19	110.24

There are no chirality outliers.

5 of 44 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	1306	NAG	C8-C7-N2-C2
3	C	1306	NAG	O7-C7-N2-C2
3	B	1307	NAG	C1-C2-N2-C7
3	B	1307	NAG	C8-C7-N2-C2
3	B	1307	NAG	O7-C7-N2-C2

There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1305	NAG	1	0
3	C	1306	NAG	2	0
3	C	1307	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.