



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 15, 2024 – 03:20 PM EDT

PDB ID : 2ID5  
Title : Crystal Structure of the Lingo-1 Ectodomain  
Authors : Mosyak, L.; Wood, A.; Dwyer, B.; Johnson, M.; Stahl, M.L.; Somers, W.S.  
Deposited on : 2006-09-14  
Resolution : 2.70 Å(reported)

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

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

A user guide is available at

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

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:

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.37.1

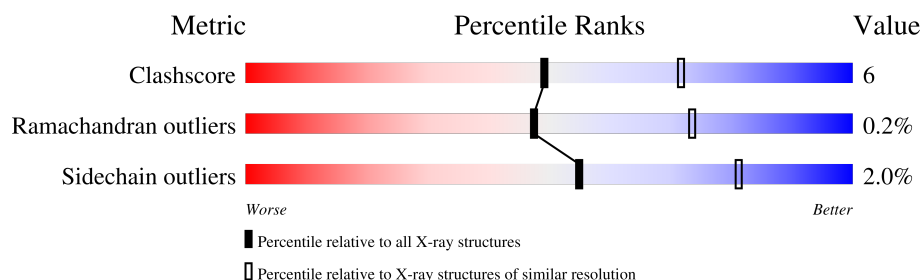
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 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)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)

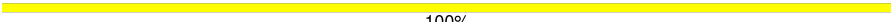


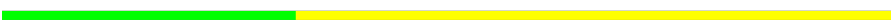





The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	477	82% 17% .
1	B	477	81% 19% .
1	C	477	86% 12% .
1	D	477	83% 15% ..
2	E	3	100%
2	F	3	33% 33% 33%
2	H	3	33% 67%
2	J	3	67% 33%

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Mol	Chain	Length	Quality of chain
2	K	3	 100%
2	L	3	 33% 67%
2	M	3	 67% 33%
2	N	3	 33% 67%
2	Q	3	 33% 67%
3	G	2	 100%
3	P	2	 50% 50%
4	I	4	 75% 25%
4	O	4	 25% 25% 50%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	MAN	E	3	X	-	-	-
2	MAN	F	3	X	-	-	-
2	MAN	H	3	X	-	-	-
2	MAN	J	3	X	-	-	-
2	MAN	K	3	X	-	-	-
2	MAN	L	3	X	-	-	-
2	MAN	M	3	X	-	-	-
2	MAN	N	3	X	-	-	-
3	NAG	G	1	X	-	-	-
3	NAG	G	2	X	-	-	-
4	MAN	I	3	X	-	-	-
4	MAN	O	3	X	-	-	-
5	NAG	B	485	X	-	-	-
5	NAG	C	485	X	-	-	-

## 2 Entry composition [i](#)

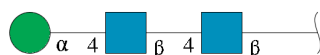
There are 6 unique types of molecules in this entry. The entry contains 16119 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Leucine rich repeat neuronal 6A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	470	Total	C	N	O	S	0	0	0
			3769	2402	671	679	17			
1	B	473	Total	C	N	O	S	0	0	0
			3790	2414	676	683	17			
1	C	472	Total	C	N	O	S	0	0	0
			3785	2410	677	681	17			
1	D	471	Total	C	N	O	S	0	0	0
			3778	2407	677	677	17			

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



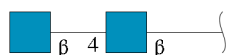
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	E	3	Total	C	N	O		0	0	0
			39	22	2	15				
2	F	3	Total	C	N	O		0	0	0
			39	22	2	15				
2	H	3	Total	C	N	O		0	0	0
			39	22	2	15				
2	J	3	Total	C	N	O		0	0	0
			39	22	2	15				
2	K	3	Total	C	N	O		0	0	0
			39	22	2	15				
2	L	3	Total	C	N	O		0	0	0
			39	22	2	15				
2	M	3	Total	C	N	O		0	0	0
			39	22	2	15				
2	N	3	Total	C	N	O		0	0	0
			39	22	2	15				

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	Q	3	Total	C	N	O	0	0	0
			39	22	2	15			

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	G	2	Total	C	N	O	0	0	0
			28	16	2	10			
3	P	2	Total	C	N	O	0	0	0
			28	16	2	10			

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	I	4	Total	C	N	O	0	0	0
			50	28	2	20			
4	O	4	Total	C	N	O	0	0	0
			50	28	2	20			

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).




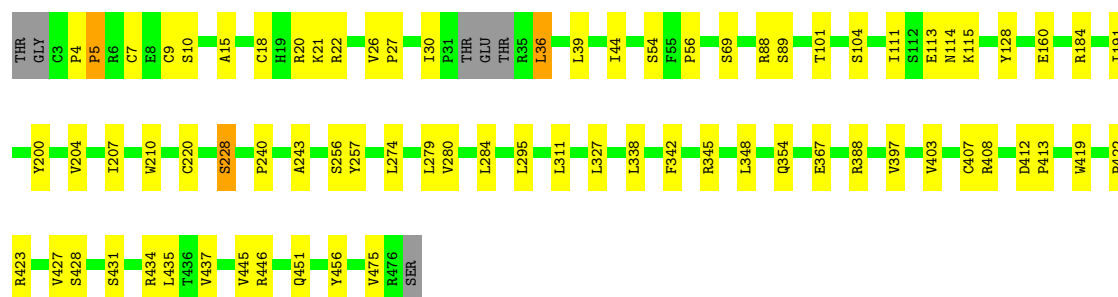
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	A	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	B	1	Total	C	N	O	0	0
			14	8	1	5		
5	C	1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

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	81	Total 81	O 81	0	0
6	B	102	Total 102	O 102	0	0
6	C	66	Total 66	O 66	0	0
6	D	59	Total 59	O 59	0	0



Chain D:  83% 15% ..



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

Chain E:  100%

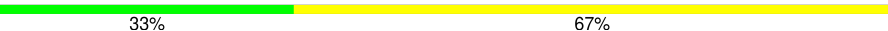


- Molecule 2: alpha-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:  33% 33% 33%



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

Chain H:  33% 67%



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

Chain J:  67% 33%



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

Chain K:  100%



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

Chain L:  33% 67%



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

Chain M:  67% 33%



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

Chain N:  33% 67%



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

Chain Q:  33% 67%



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

Chain G:  100%



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

Chain P:  50% 50%



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

Chain I:  75% 25%



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

Chain O: 25% 25% 50%



## 4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	201.52Å 149.72Å 157.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	158.11 – 2.70	Depositor
% Data completeness (in resolution range)	98.7 (158.11-2.70)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.09	Depositor
Refinement program	REFMAC 5.2	Depositor
R, $R_{free}$	0.214 , 0.255	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	16119	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	78.0	wwPDB-VP

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, MAN

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	0.48	0/3850	0.62	0/5233
1	B	0.48	0/3872	0.59	0/5263
1	C	0.43	0/3866	0.58	0/5253
1	D	0.42	0/3859	0.57	0/5242
All	All	0.45	0/15447	0.59	0/20991

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	B	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	344	ARG	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	3769	0	3787	47	0
1	B	3790	0	3807	58	0
1	C	3785	0	3797	42	0
1	D	3778	0	3801	41	0
2	E	39	0	34	0	0
2	F	39	0	34	1	0
2	H	39	0	34	0	0
2	J	39	0	34	2	0
2	K	39	0	34	0	0
2	L	39	0	34	0	0
2	M	39	0	34	2	0
2	N	39	0	34	0	0
2	Q	39	0	34	0	0
3	G	28	0	25	0	0
3	P	28	0	25	0	0
4	I	50	0	43	1	0
4	O	50	0	43	1	0
5	A	42	0	39	1	0
5	B	56	0	52	0	0
5	C	56	0	52	2	0
5	D	28	0	26	0	0
6	A	81	0	0	0	0
6	B	102	0	0	5	0
6	C	66	0	0	0	0
6	D	59	0	0	0	0
All	All	16119	0	15803	186	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

The worst 5 of 186 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:352:ARG:HH12	2:M:3:MAN:H3	1.24	0.97
1:C:41:LYS:HE3	1:C:65:GLU:OE1	1.74	0.86
1:B:276:GLU:HG2	1:B:300:VAL:HB	1.58	0.85
1:B:356:THR:HG22	1:B:367:GLU:HG2	1.60	0.82
1:B:46:THR:HG22	1:B:70:ALA:HB3	1.60	0.81

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	466/477 (98%)	439 (94%)	27 (6%)	0	100	100
1	B	471/477 (99%)	445 (94%)	24 (5%)	2 (0%)	34	60
1	C	468/477 (98%)	443 (95%)	25 (5%)	0	100	100
1	D	467/477 (98%)	422 (90%)	44 (9%)	1 (0%)	47	73
All	All	1872/1908 (98%)	1749 (93%)	120 (6%)	3 (0%)	47	73

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	361	GLU
1	D	5	PRO
1	B	388	ARG

### 5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	422/427 (99%)	417 (99%)	5 (1%)	71	88
1	B	424/427 (99%)	417 (98%)	7 (2%)	60	84
1	C	423/427 (99%)	413 (98%)	10 (2%)	49	77
1	D	422/427 (99%)	410 (97%)	12 (3%)	43	73
All	All	1691/1708 (99%)	1657 (98%)	34 (2%)	55	81

5 of 34 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	200	TYR
1	D	228	SER
1	D	348	LEU
1	C	135	VAL
1	B	403	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	233	HIS
1	D	296	ASN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates ⓘ

39 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	E	1	2,1	14,14,15	0.52	0	17,19,21	1.23	2 (11%)
2	NAG	E	2	2	14,14,15	0.61	0	17,19,21	1.37	3 (17%)
2	MAN	E	3	2	11,11,12	0.65	0	15,15,17	0.86	1 (6%)
2	NAG	F	1	2,1	14,14,15	0.50	0	17,19,21	0.85	0
2	NAG	F	2	2	14,14,15	0.54	0	17,19,21	1.07	1 (5%)
2	MAN	F	3	2	11,11,12	0.58	0	15,15,17	0.87	1 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	NAG	G	1	3,1	14,14,15	0.43	0	17,19,21	1.57	2 (11%)
3	NAG	G	2	3	14,14,15	0.49	0	17,19,21	1.18	2 (11%)
2	NAG	H	1	2,1	14,14,15	0.52	0	17,19,21	1.08	0
2	NAG	H	2	2	14,14,15	0.61	0	17,19,21	1.46	2 (11%)
2	MAN	H	3	2	11,11,12	0.75	0	15,15,17	1.10	1 (6%)
4	NAG	I	1	1,4	14,14,15	0.50	0	17,19,21	1.74	3 (17%)
4	NAG	I	2	4	14,14,15	0.59	0	17,19,21	1.42	2 (11%)
4	MAN	I	3	4	11,11,12	0.63	0	15,15,17	1.23	1 (6%)
4	MAN	I	4	4	11,11,12	0.64	0	15,15,17	1.02	1 (6%)
2	NAG	J	1	2,1	14,14,15	0.60	0	17,19,21	0.98	1 (5%)
2	NAG	J	2	2	14,14,15	0.55	0	17,19,21	0.91	1 (5%)
2	MAN	J	3	2	11,11,12	0.73	0	15,15,17	1.03	1 (6%)
2	NAG	K	1	2,1	14,14,15	0.59	0	17,19,21	1.14	2 (11%)
2	NAG	K	2	2	14,14,15	0.69	0	17,19,21	1.46	3 (17%)
2	MAN	K	3	2	11,11,12	0.72	0	15,15,17	1.25	2 (13%)
2	NAG	L	1	2,1	14,14,15	0.51	0	17,19,21	1.30	2 (11%)
2	NAG	L	2	2	14,14,15	0.54	0	17,19,21	0.82	0
2	MAN	L	3	2	11,11,12	0.63	0	15,15,17	0.79	1 (6%)
2	NAG	M	1	2,1	14,14,15	0.53	0	17,19,21	1.14	1 (5%)
2	NAG	M	2	2	14,14,15	0.42	0	17,19,21	1.85	2 (11%)
2	MAN	M	3	2	11,11,12	0.56	0	15,15,17	1.06	1 (6%)
2	NAG	N	1	2,1	14,14,15	0.50	0	17,19,21	1.12	0
2	NAG	N	2	2	14,14,15	0.67	0	17,19,21	1.68	4 (23%)
2	MAN	N	3	2	11,11,12	0.61	0	15,15,17	1.83	2 (13%)
4	NAG	O	1	1,4	14,14,15	0.50	0	17,19,21	1.21	1 (5%)
4	NAG	O	2	4	14,14,15	0.52	0	17,19,21	1.19	2 (11%)
4	MAN	O	3	4	11,11,12	0.72	0	15,15,17	0.89	0
4	MAN	O	4	4	11,11,12	0.56	0	15,15,17	1.35	2 (13%)
3	NAG	P	1	3,1	14,14,15	0.51	0	17,19,21	0.87	0
3	NAG	P	2	3	14,14,15	0.46	0	17,19,21	1.07	1 (5%)
2	NAG	Q	1	2,1	14,14,15	0.51	0	17,19,21	0.89	0
2	NAG	Q	2	2	14,14,15	0.56	0	17,19,21	1.11	1 (5%)
2	MAN	Q	3	2	11,11,12	0.59	0	15,15,17	1.51	2 (13%)

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	E	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	E	2	2	-	3/6/23/26	0/1/1/1
2	MAN	E	3	2	1/1/4/5	0/2/19/22	0/1/1/1
2	NAG	F	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	F	2	2	-	2/6/23/26	0/1/1/1
2	MAN	F	3	2	1/1/4/5	2/2/19/22	0/1/1/1
3	NAG	G	1	3,1	1/1/5/7	2/6/23/26	0/1/1/1
3	NAG	G	2	3	1/1/5/7	4/6/23/26	0/1/1/1
2	NAG	H	1	2,1	-	1/6/23/26	0/1/1/1
2	NAG	H	2	2	-	4/6/23/26	0/1/1/1
2	MAN	H	3	2	1/1/4/5	2/2/19/22	0/1/1/1
4	NAG	I	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	I	2	4	-	4/6/23/26	0/1/1/1
4	MAN	I	3	4	1/1/4/5	2/2/19/22	0/1/1/1
4	MAN	I	4	4	-	0/2/19/22	0/1/1/1
2	NAG	J	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	J	2	2	-	2/6/23/26	0/1/1/1
2	MAN	J	3	2	1/1/4/5	2/2/19/22	0/1/1/1
2	NAG	K	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	K	2	2	-	4/6/23/26	0/1/1/1
2	MAN	K	3	2	1/1/4/5	1/2/19/22	0/1/1/1
2	NAG	L	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	L	2	2	-	4/6/23/26	0/1/1/1
2	MAN	L	3	2	1/1/4/5	2/2/19/22	0/1/1/1
2	NAG	M	1	2,1	-	3/6/23/26	0/1/1/1
2	NAG	M	2	2	-	2/6/23/26	0/1/1/1
2	MAN	M	3	2	1/1/4/5	2/2/19/22	0/1/1/1
2	NAG	N	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	N	2	2	-	3/6/23/26	0/1/1/1
2	MAN	N	3	2	1/1/4/5	1/2/19/22	1/1/1/1
4	NAG	O	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	O	2	4	-	4/6/23/26	0/1/1/1
4	MAN	O	3	4	1/1/4/5	2/2/19/22	0/1/1/1
4	MAN	O	4	4	-	1/2/19/22	0/1/1/1
3	NAG	P	1	3,1	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	P	2	3	-	2/6/23/26	0/1/1/1
2	NAG	Q	1	2,1	-	2/6/23/26	0/1/1/1
2	NAG	Q	2	2	-	4/6/23/26	0/1/1/1
2	MAN	Q	3	2	-	2/2/19/22	1/1/1/1

There are no bond length outliers.

The worst 5 of 54 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	M	2	NAG	C1-O5-C5	6.27	120.58	112.19
2	N	3	MAN	C1-O5-C5	5.78	119.93	112.19
4	I	1	NAG	C1-O5-C5	4.98	118.86	112.19
2	Q	3	MAN	C1-O5-C5	4.80	118.62	112.19
3	G	1	NAG	C1-O5-C5	4.60	118.35	112.19

5 of 12 chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	E	3	MAN	C1
2	F	3	MAN	C1
2	H	3	MAN	C1
2	J	3	MAN	C1
2	K	3	MAN	C1

5 of 85 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	H	2	NAG	C8-C7-N2-C2
2	H	2	NAG	O7-C7-N2-C2
2	K	1	NAG	C8-C7-N2-C2
2	K	1	NAG	O7-C7-N2-C2
2	L	1	NAG	C8-C7-N2-C2

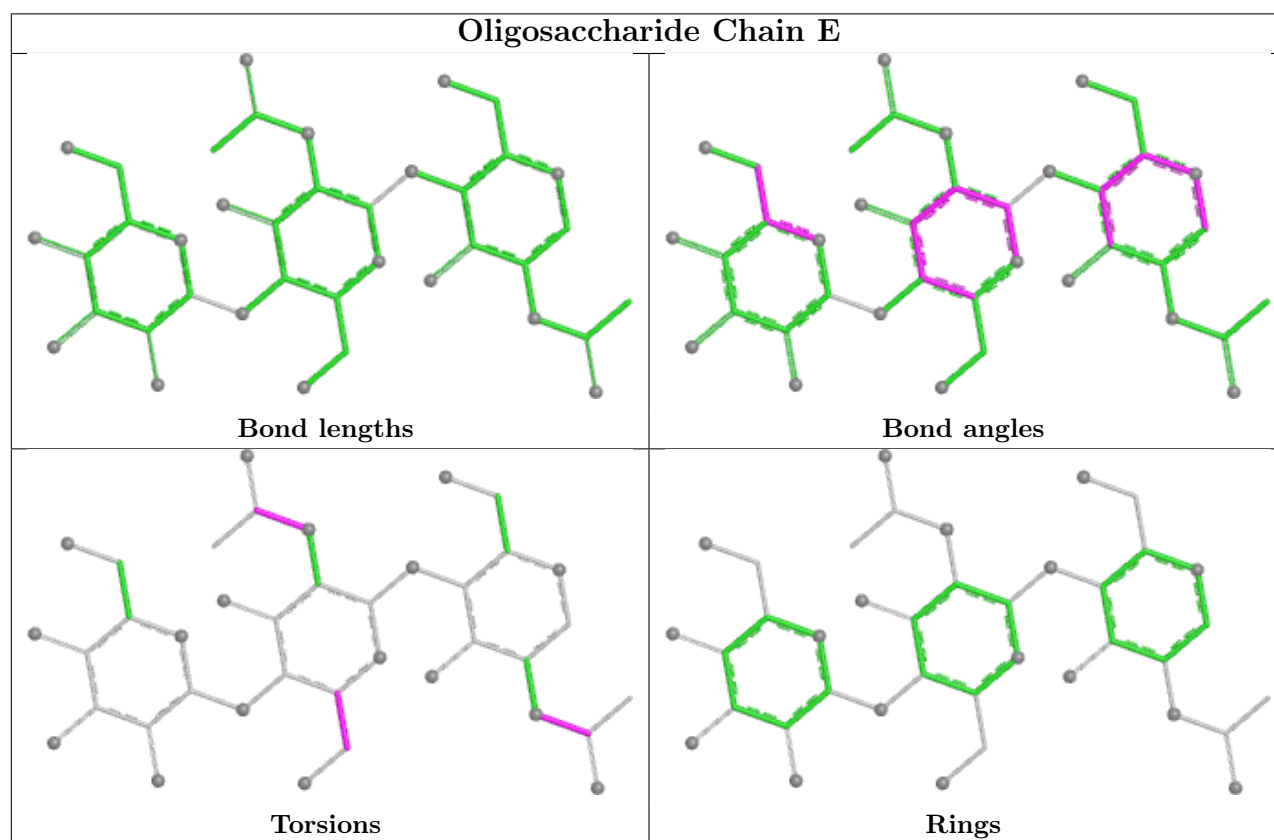
All (2) ring outliers are listed below:

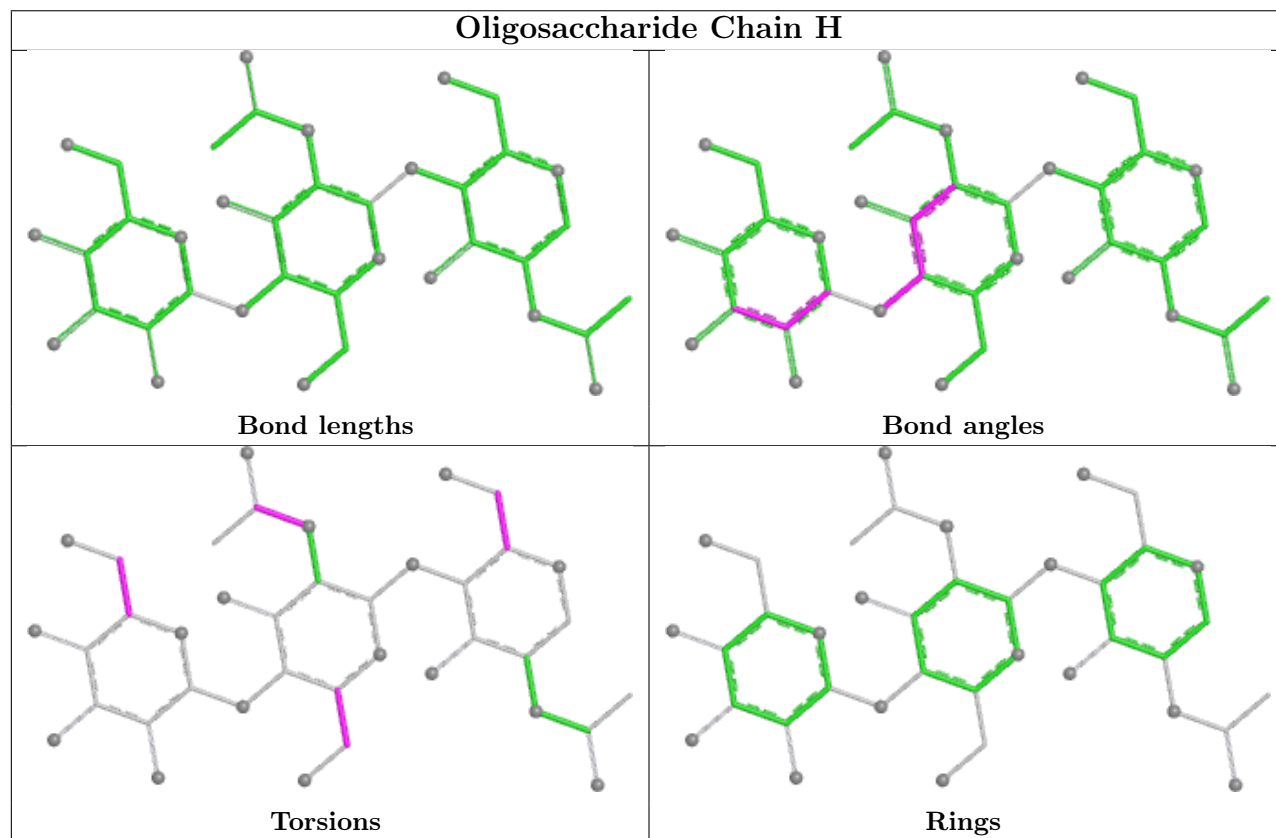
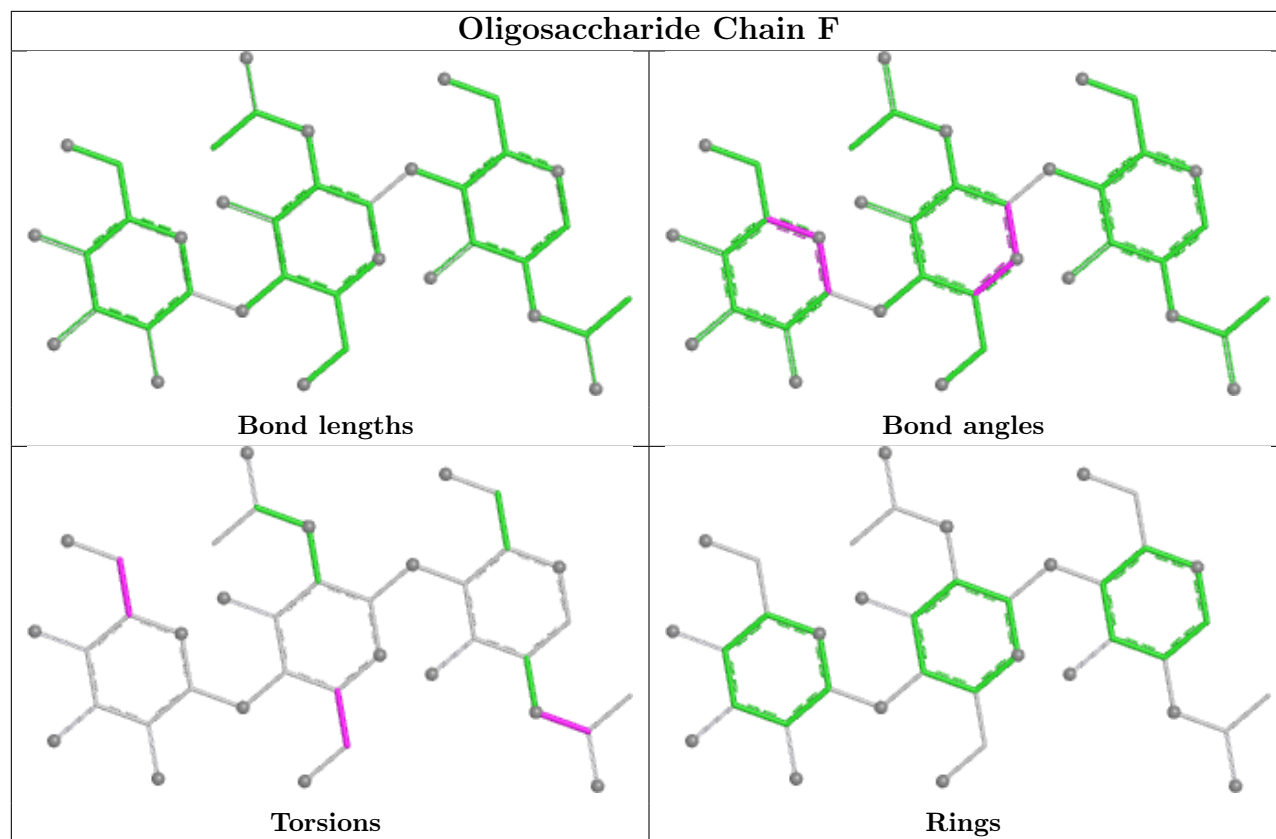
Mol	Chain	Res	Type	Atoms
2	N	3	MAN	C1-C2-C3-C4-C5-O5
2	Q	3	MAN	C1-C2-C3-C4-C5-O5

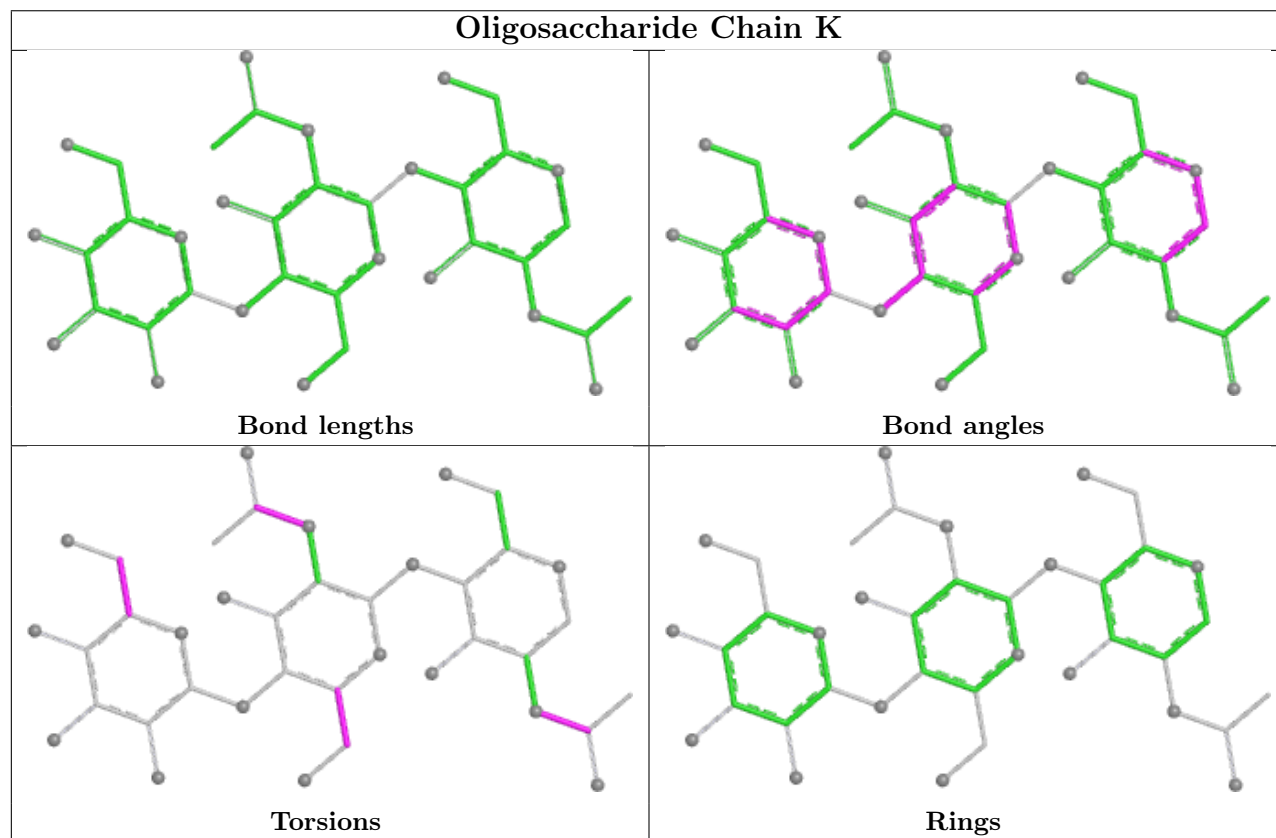
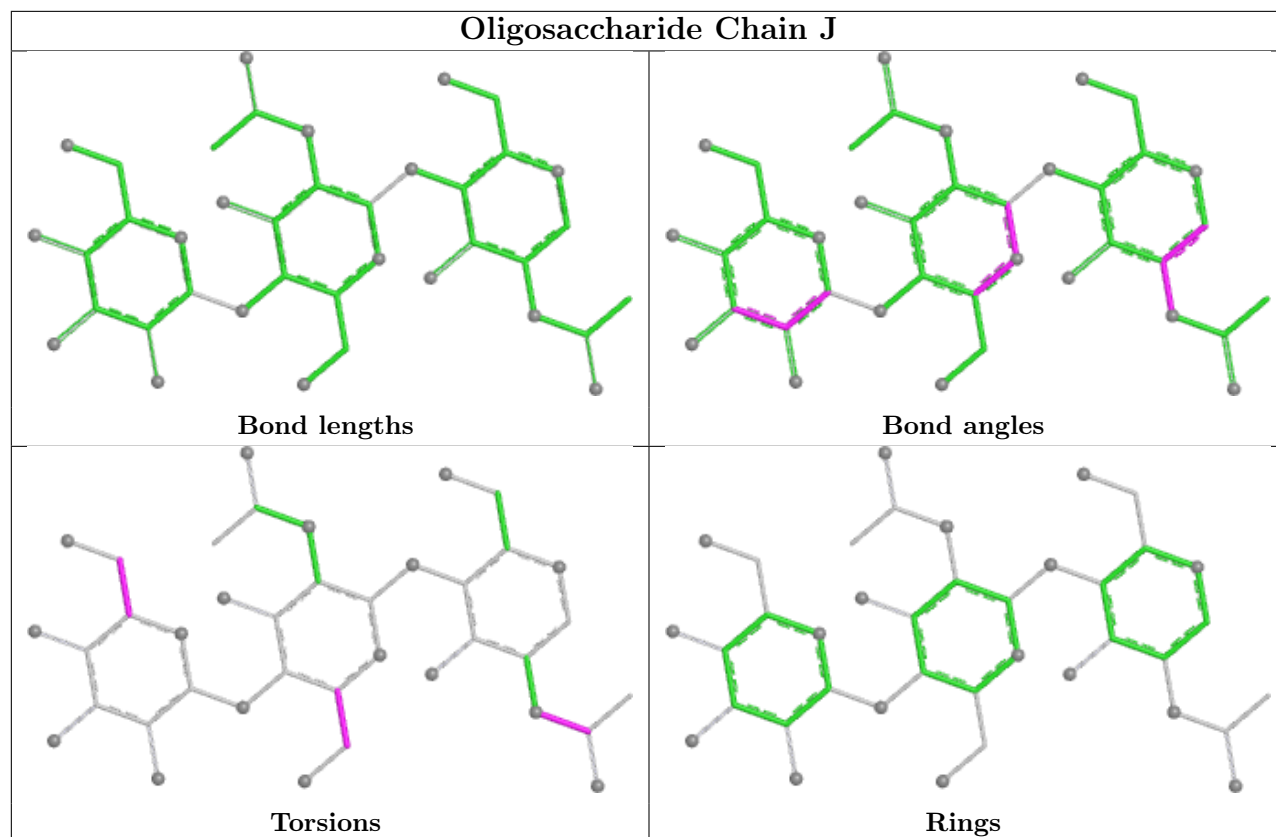
6 monomers are involved in 7 short contacts:

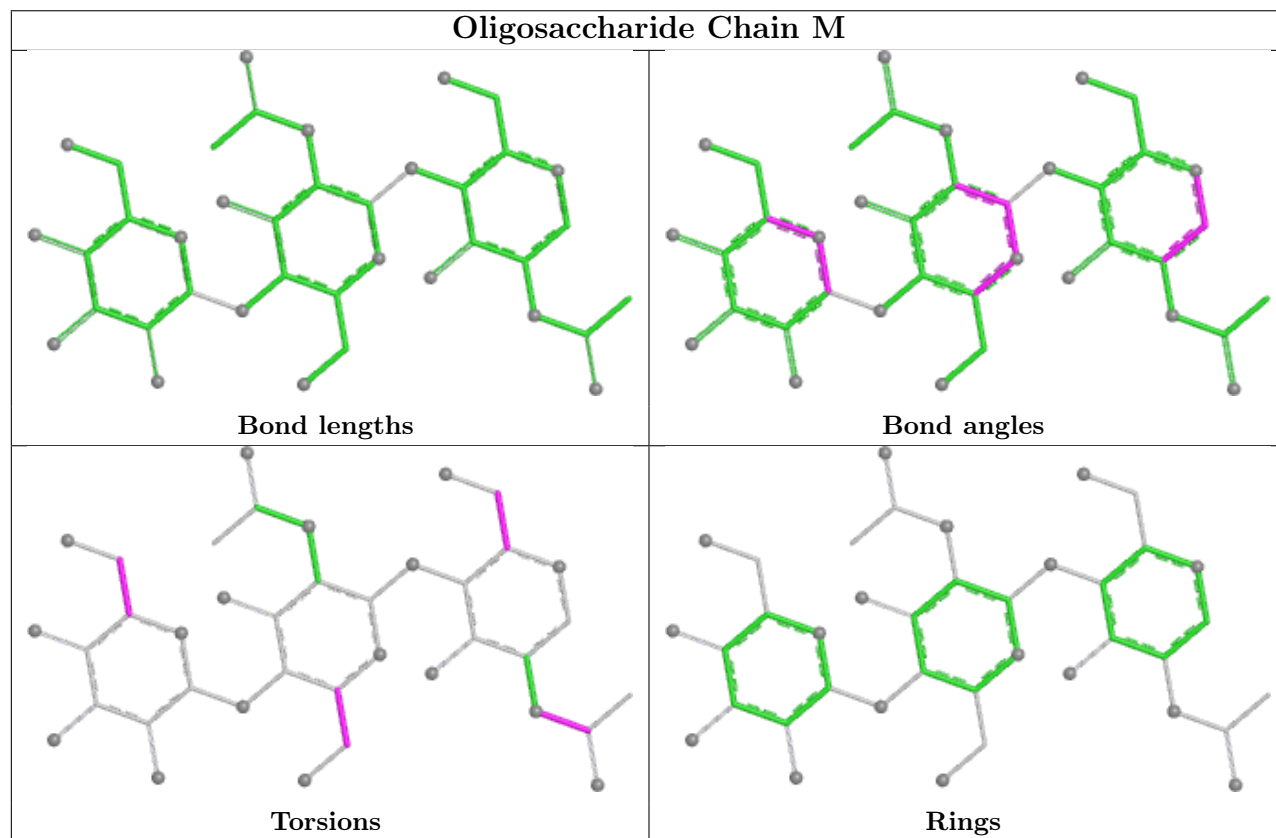
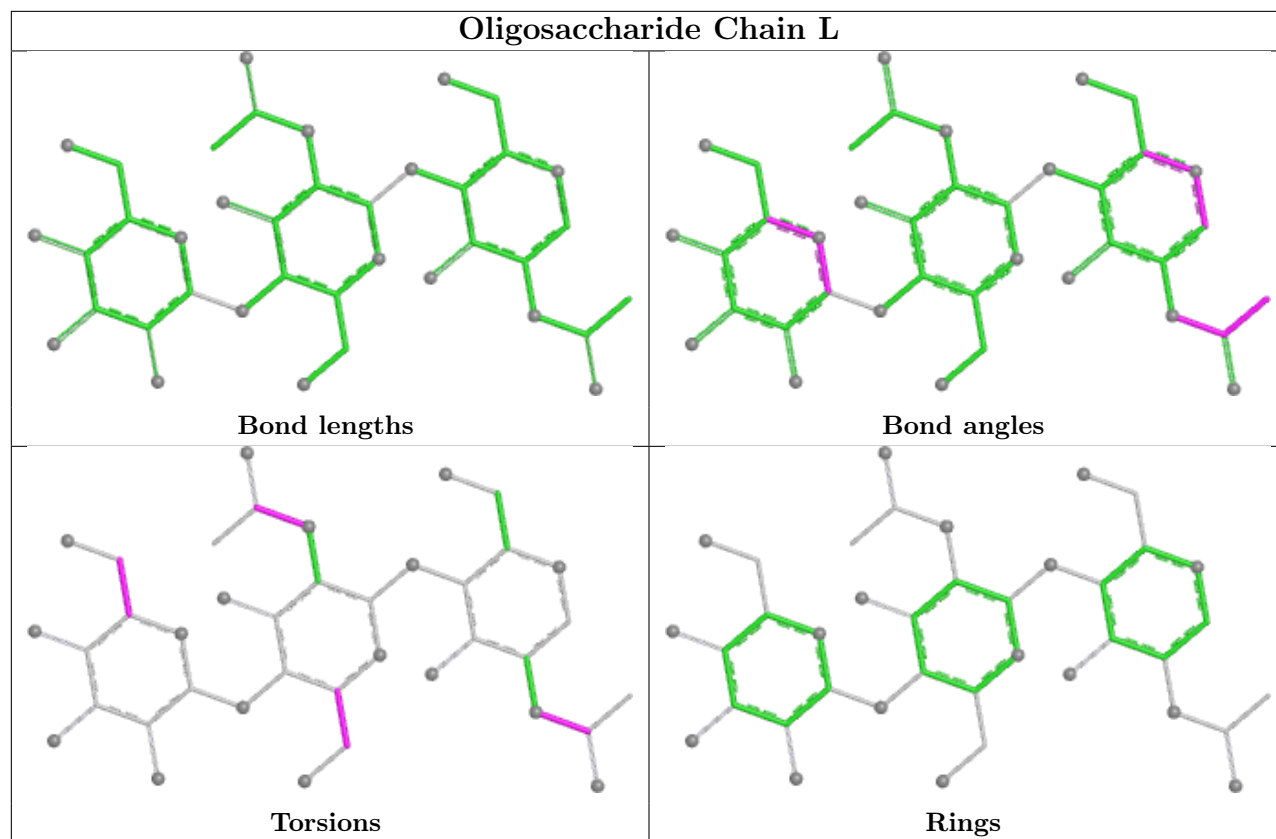
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	M	3	MAN	2	0
2	J	3	MAN	2	0
4	I	2	NAG	1	0
4	O	2	NAG	1	0
4	O	1	NAG	1	0
2	F	2	NAG	1	0

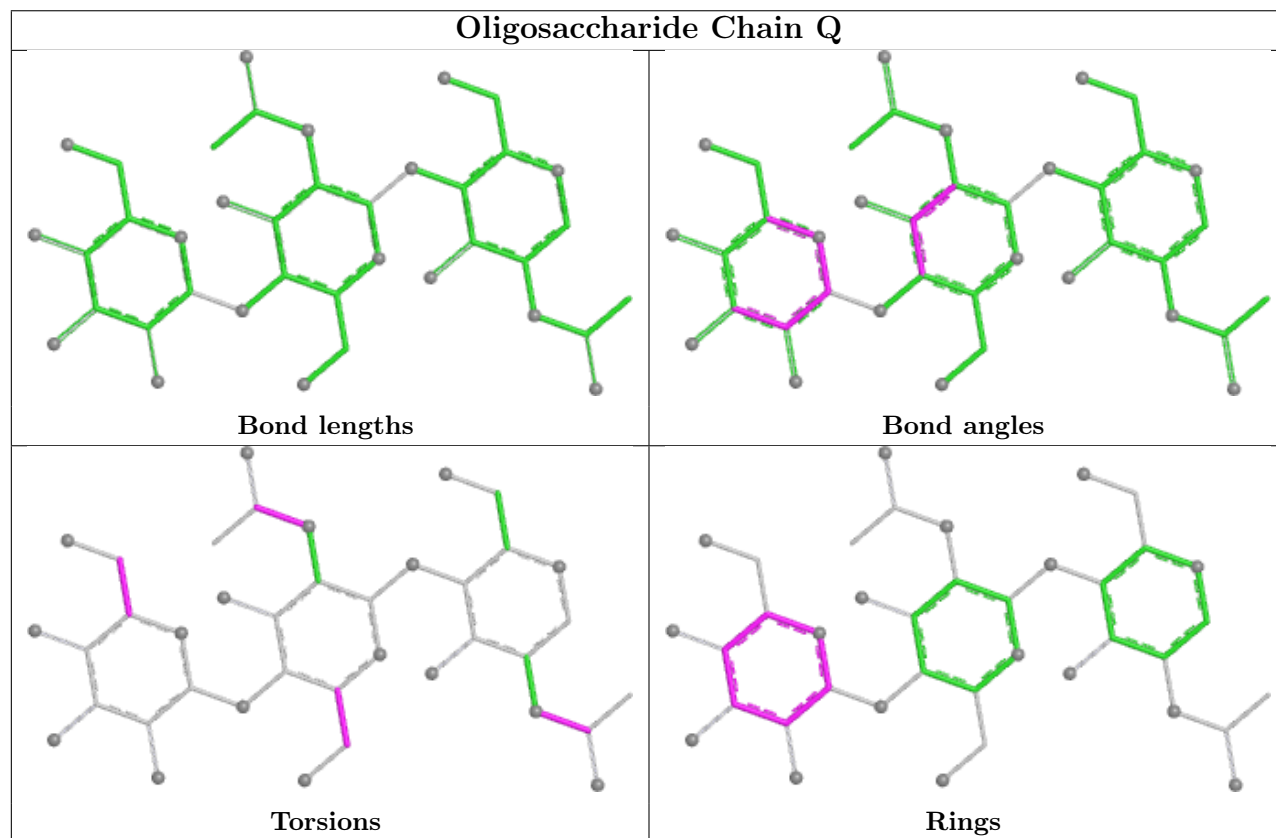
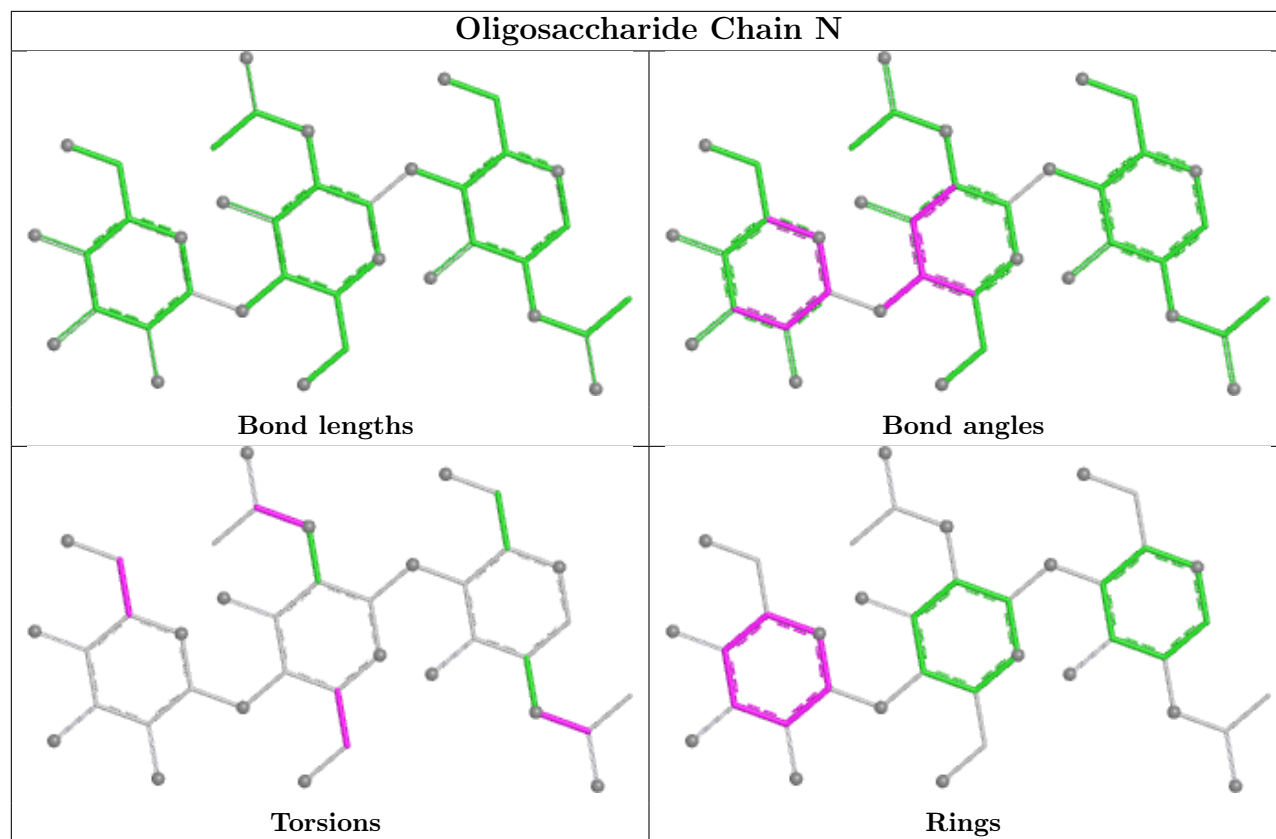
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

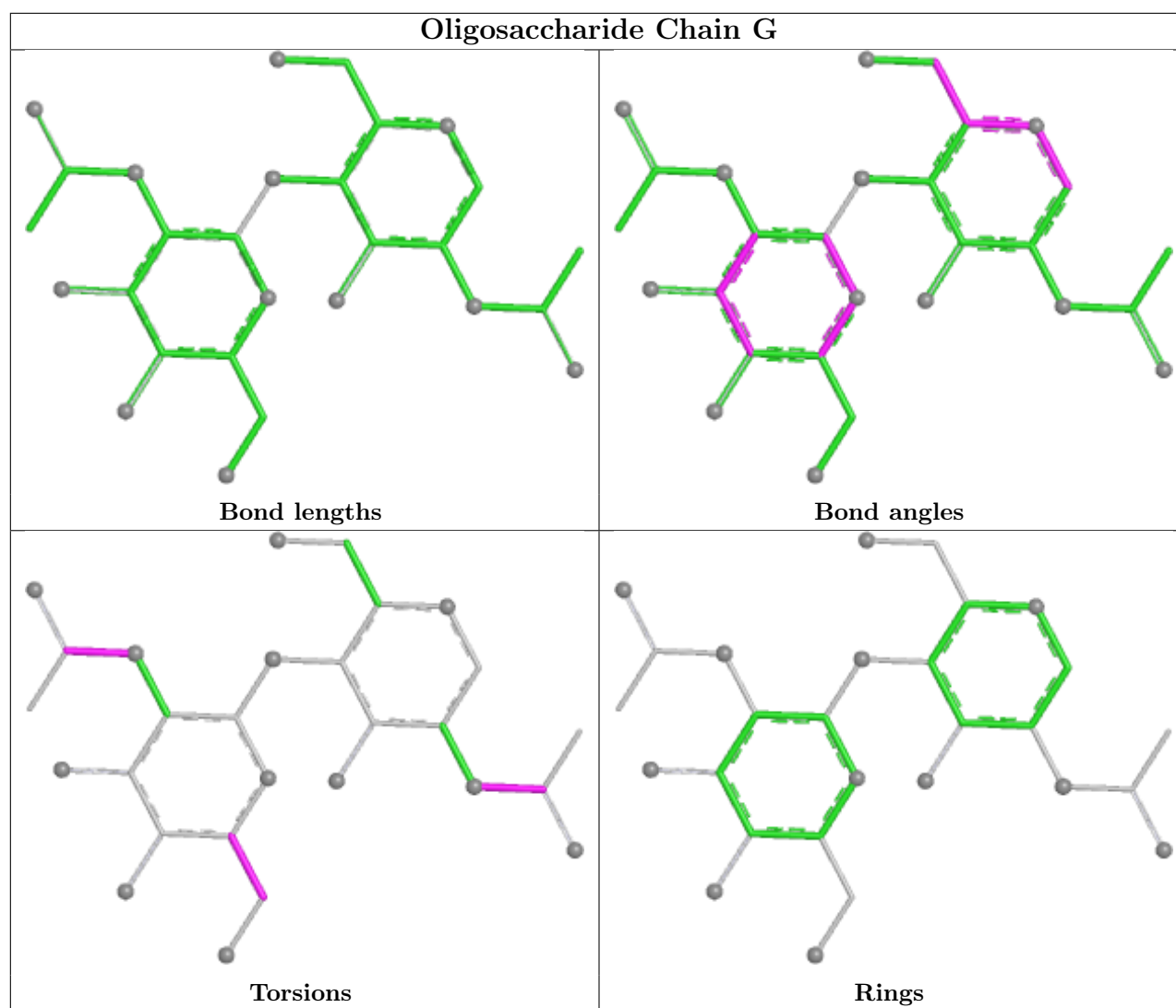


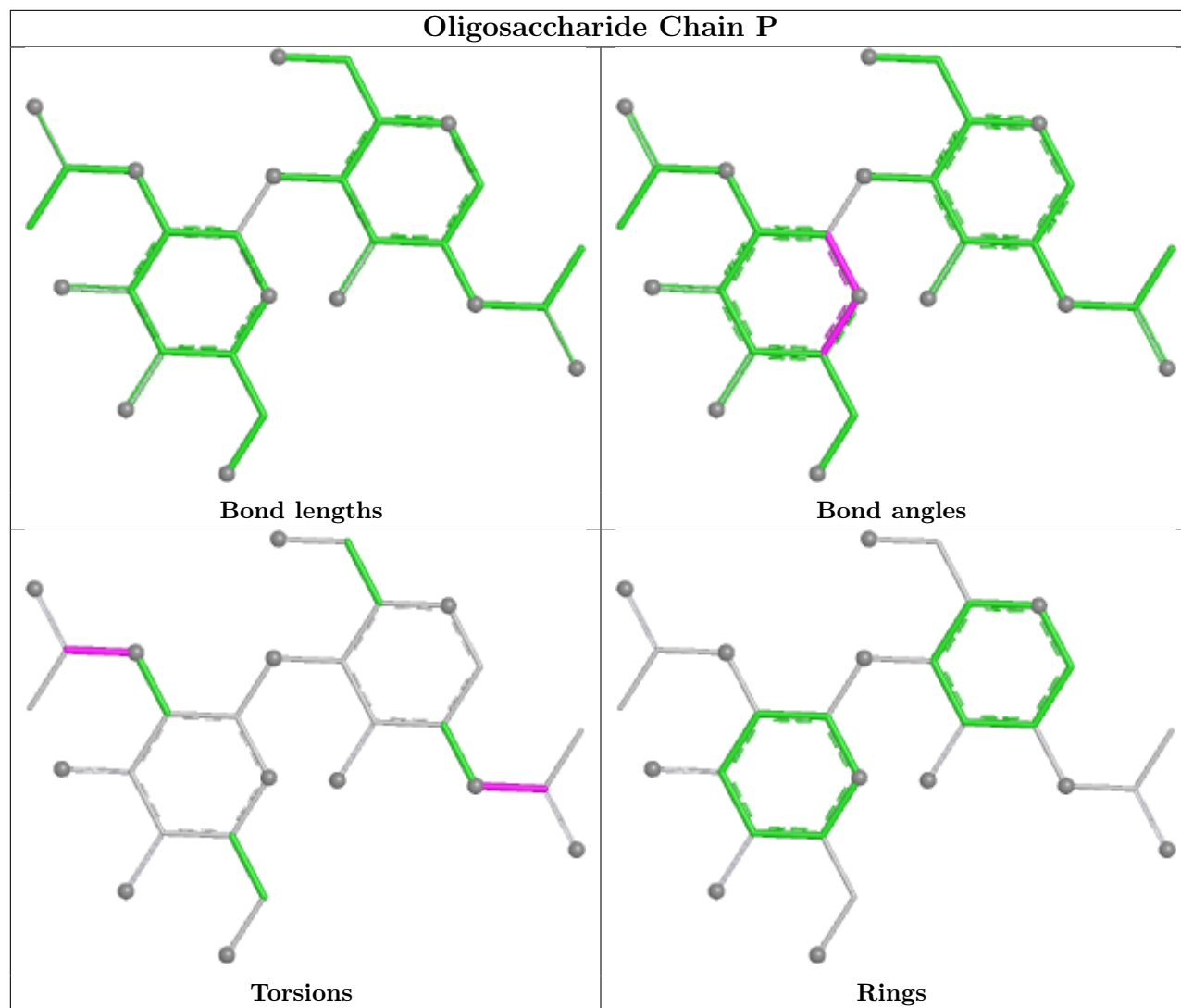


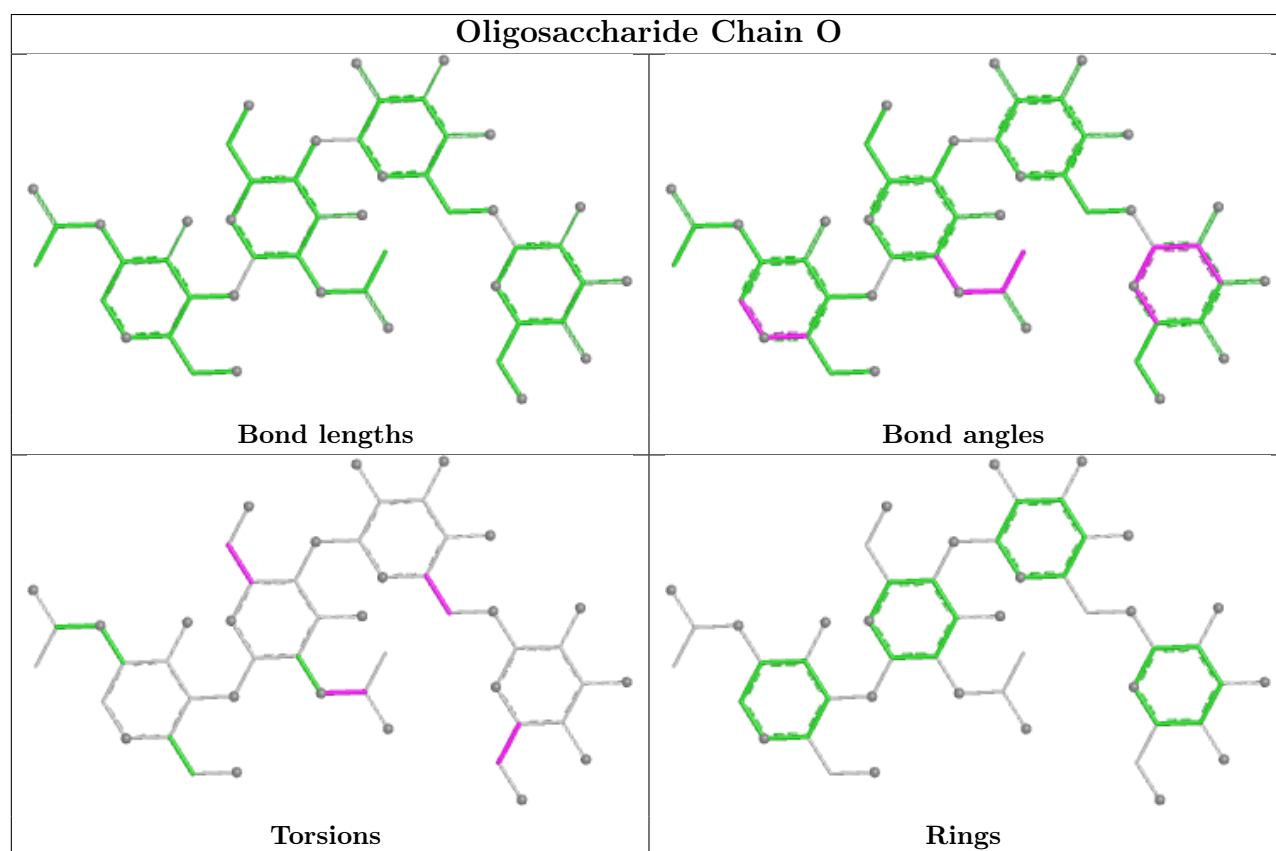
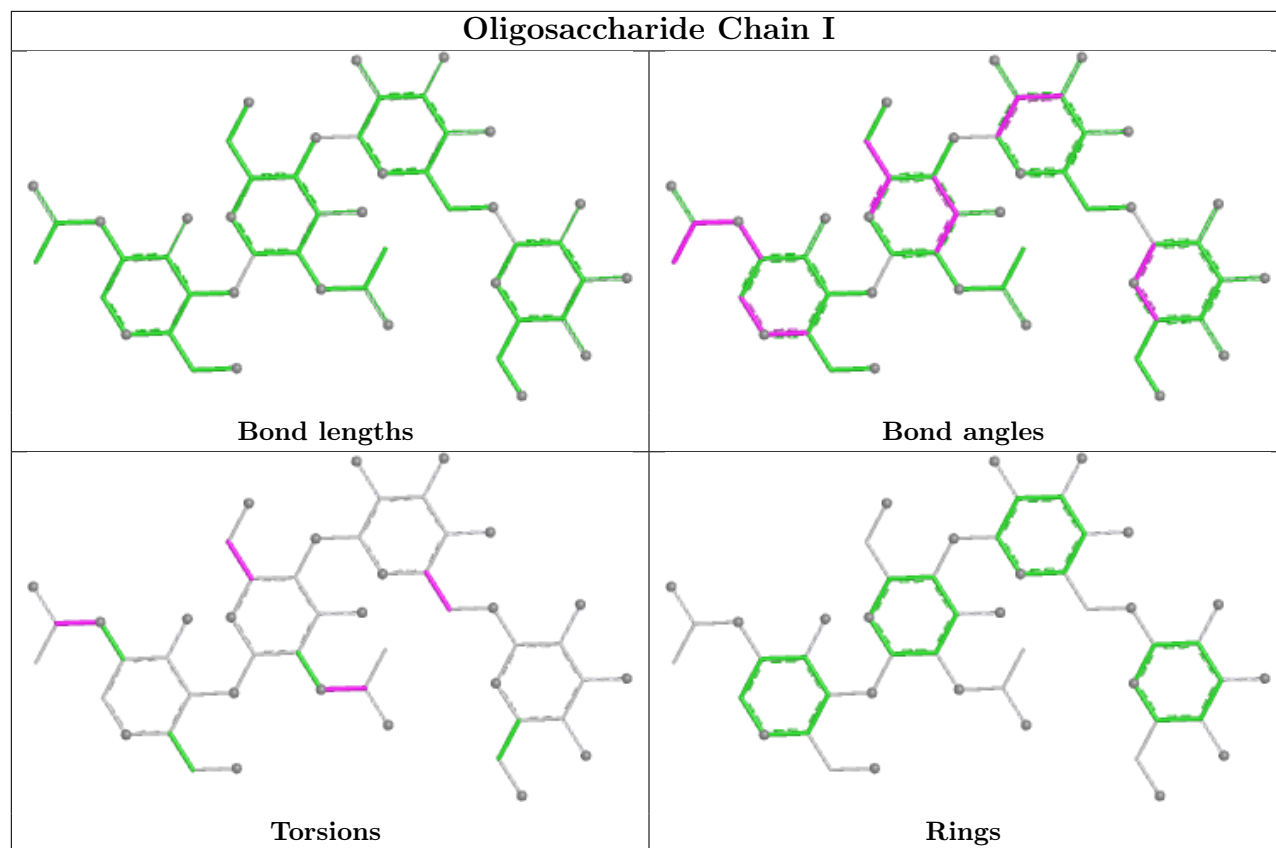












## 5.6 Ligand geometry

13 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$
5	NAG	B	487	1	14,14,15	0.55	0	17,19,21	1.38	1 (5%)
5	NAG	C	485	1	14,14,15	0.67	0	17,19,21	0.98	0
5	NAG	C	486	1	14,14,15	1.15	1 (7%)	17,19,21	1.57	4 (23%)
5	NAG	B	485	1	14,14,15	0.71	0	17,19,21	1.66	5 (29%)
5	NAG	A	491	1	14,14,15	0.58	0	17,19,21	0.81	0
5	NAG	A	484	1	14,14,15	0.90	1 (7%)	17,19,21	1.38	2 (11%)
5	NAG	B	486	1	14,14,15	0.56	0	17,19,21	0.62	0
5	NAG	B	488	1	14,14,15	0.55	0	17,19,21	0.89	0
5	NAG	A	485	1	14,14,15	0.46	0	17,19,21	0.97	2 (11%)
5	NAG	D	485	1	14,14,15	0.49	0	17,19,21	1.15	2 (11%)
5	NAG	D	484	1	14,14,15	0.62	0	17,19,21	0.84	0
5	NAG	C	484	1	14,14,15	0.74	0	17,19,21	1.52	2 (11%)
5	NAG	C	487	1	14,14,15	0.48	0	17,19,21	1.54	4 (23%)

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	B	487	1	-	2/6/23/26	0/1/1/1
5	NAG	C	485	1	1/1/5/7	4/6/23/26	0/1/1/1
5	NAG	C	486	1	-	6/6/23/26	0/1/1/1
5	NAG	B	485	1	1/1/5/7	4/6/23/26	1/1/1/1
5	NAG	A	491	1	-	4/6/23/26	0/1/1/1
5	NAG	A	484	1	-	1/6/23/26	0/1/1/1
5	NAG	B	486	1	-	5/6/23/26	0/1/1/1
5	NAG	B	488	1	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	A	485	1	-	3/6/23/26	0/1/1/1
5	NAG	D	485	1	-	3/6/23/26	0/1/1/1
5	NAG	D	484	1	-	0/6/23/26	0/1/1/1
5	NAG	C	484	1	-	3/6/23/26	0/1/1/1
5	NAG	C	487	1	-	3/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	486	NAG	O5-C1	-4.03	1.36	1.43
5	A	484	NAG	C1-C2	2.80	1.56	1.52

The worst 5 of 22 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	487	NAG	C1-O5-C5	4.14	117.73	112.19
5	C	484	NAG	C2-N2-C7	3.62	127.75	122.90
5	C	486	NAG	C1-O5-C5	3.57	116.98	112.19
5	C	487	NAG	O5-C1-C2	-3.24	106.28	111.29
5	D	485	NAG	C1-O5-C5	3.06	116.28	112.19

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
5	B	485	NAG	C5
5	C	485	NAG	C1

5 of 40 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	485	NAG	C3-C2-N2-C7
5	A	485	NAG	C8-C7-N2-C2
5	A	485	NAG	O7-C7-N2-C2
5	B	486	NAG	C8-C7-N2-C2
5	B	486	NAG	O7-C7-N2-C2

All (1) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	485	NAG	C1-C2-C3-C4-C5-O5

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	484	NAG	1	0
5	C	484	NAG	2	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

### 6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.