



# wwPDB X-ray Structure Validation Summary Report

Mar 8, 2026 – 08:31 AM UTC

PDB ID : 1FLC / pdb\_00001flc  
Title : X-RAY STRUCTURE OF THE HAEMAGGLUTININ-ESTERASE-FUSION GLYCOPROTEIN OF INFLUENZA C VIRUS  
Authors : Rosenthal, P.B.; Zhang, X.; Formanowski, F.; Fitz, W.; Wong, C.H.; Meier-Ewert, H.; Skehel, J.J.; Wiley, D.C.  
Deposited on : 1999-02-22  
Resolution : 3.20 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 : 4-5-2 with Phenix2.0  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

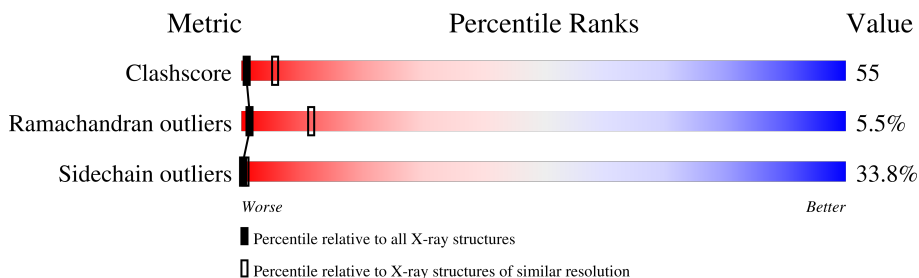
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.20 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	190562	1573 (3.20-3.20)
Ramachandran outliers	187476	1548 (3.20-3.20)
Sidechain outliers	187428	1547 (3.20-3.20)

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	432	35% 38% 22% ..
1	C	432	33% 44% 19% ..
1	E	432	34% 42% 19% ..
2	B	175	22% 33% 34% . 7%
2	D	175	22% 37% 30% . 7%
2	F	175	21% 40% 27% 5% 7%
3	G	3	33% 67%
3	H	3	33% 67%

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Mol	Chain	Length	Quality of chain
3	I	3	100%
3	J	3	33% 67%
3	L	3	33% 67%
3	M	3	33% 67%
3	O	3	100%
3	Q	3	33% 33% 33%
3	R	3	33% 33% 33%
3	S	3	33% 33% 33%
3	T	3	67% 33%
4	K	3	67% 33%
4	P	3	33% 67%
4	U	3	33% 67%
5	N	3	33% 67%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	NAG	G	1	X	-	-	-
3	NAG	L	1	X	-	-	-
3	NAG	Q	1	X	-	-	-
4	NDG	K	2	-	-	X	-
4	MAN	K	3	-	-	X	-
4	NDG	U	2	-	-	X	-

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 14285 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 HAEMAGGLUTININ-ESTERASE-FUSION GLYCOPROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	427	Total 3339	C 2113	N 565	O 636	S 25	0	0	0
1	C	427	Total 3338	C 2112	N 565	O 636	S 25	0	0	0
1	E	427	Total 3339	C 2113	N 565	O 636	S 25	0	0	0

- Molecule 2 is a protein called HAEMAGGLUTININ-ESTERASE-FUSION GLYCOPROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	162	Total 1228	C 773	N 206	O 246	S 3	0	0	0
2	D	162	Total 1228	C 773	N 206	O 246	S 3	0	0	0
2	F	162	Total 1228	C 773	N 206	O 246	S 3	0	0	0

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



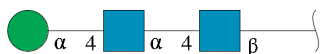
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	G	3	Total 39	C 22	N 2	O 15	0	0	0
3	H	3	Total 39	C 22	N 2	O 15	0	0	0
3	I	3	Total 39	C 22	N 2	O 15	0	0	0

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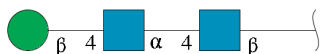
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	J	3	Total	C	N	O	0	0	0
			39	22	2	15			
3	L	3	Total	C	N	O	0	0	0
			39	22	2	15			
3	M	3	Total	C	N	O	0	0	0
			39	22	2	15			
3	O	3	Total	C	N	O	0	0	0
			39	22	2	15			
3	Q	3	Total	C	N	O	0	0	0
			39	22	2	15			
3	R	3	Total	C	N	O	0	0	0
			39	22	2	15			
3	S	3	Total	C	N	O	0	0	0
			39	22	2	15			
3	T	3	Total	C	N	O	0	0	0
			39	22	2	15			

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	K	3	Total	C	N	O	0	0	0
			39	22	2	15			
4	P	3	Total	C	N	O	0	0	0
			39	22	2	15			
4	U	3	Total	C	N	O	0	0	0
			39	22	2	15			

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



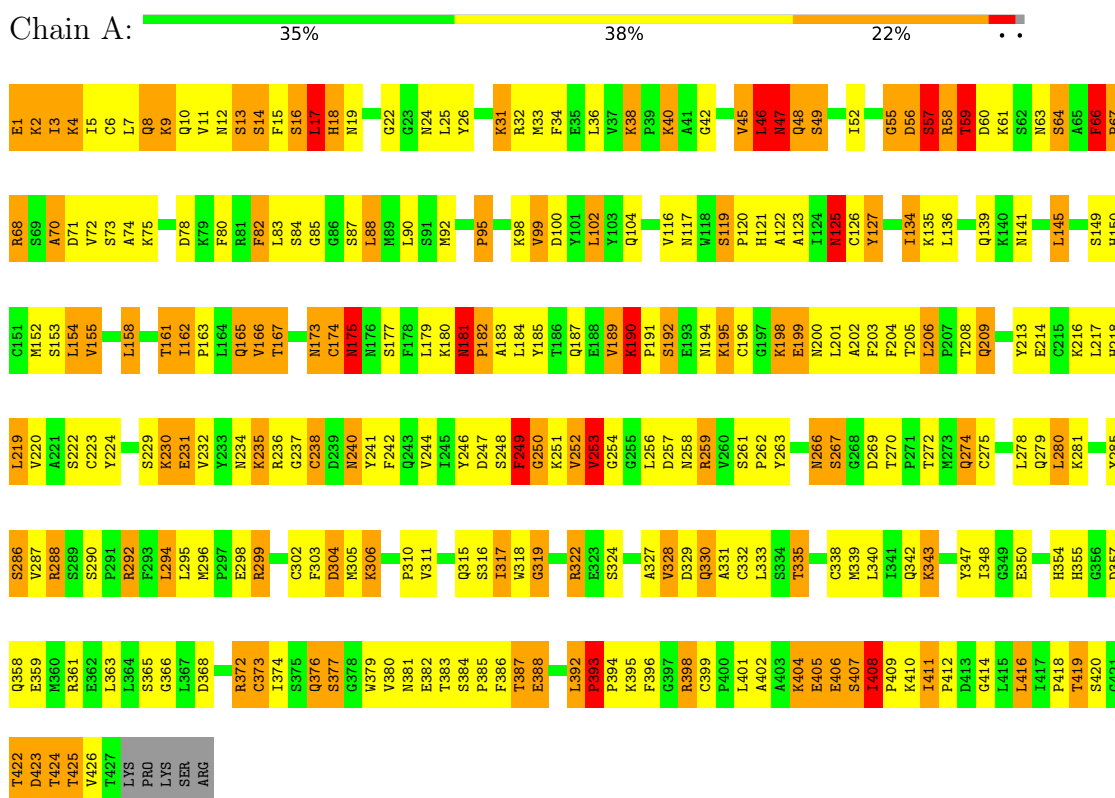
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	N	3	Total	C	N	O	0	0	0
			39	22	2	15			

### 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.

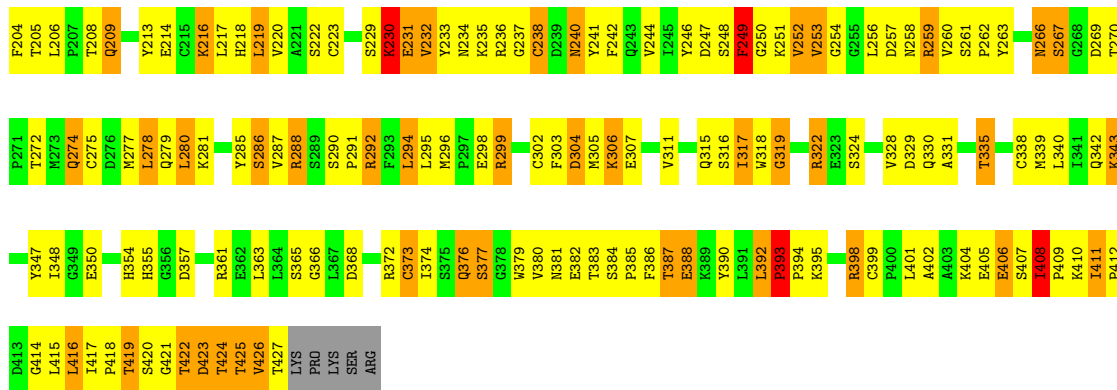
Note EDS was not executed.

- Molecule 1: HAEMAGGLUTININ-ESTERASE-FUSION GLYCOPROTEIN

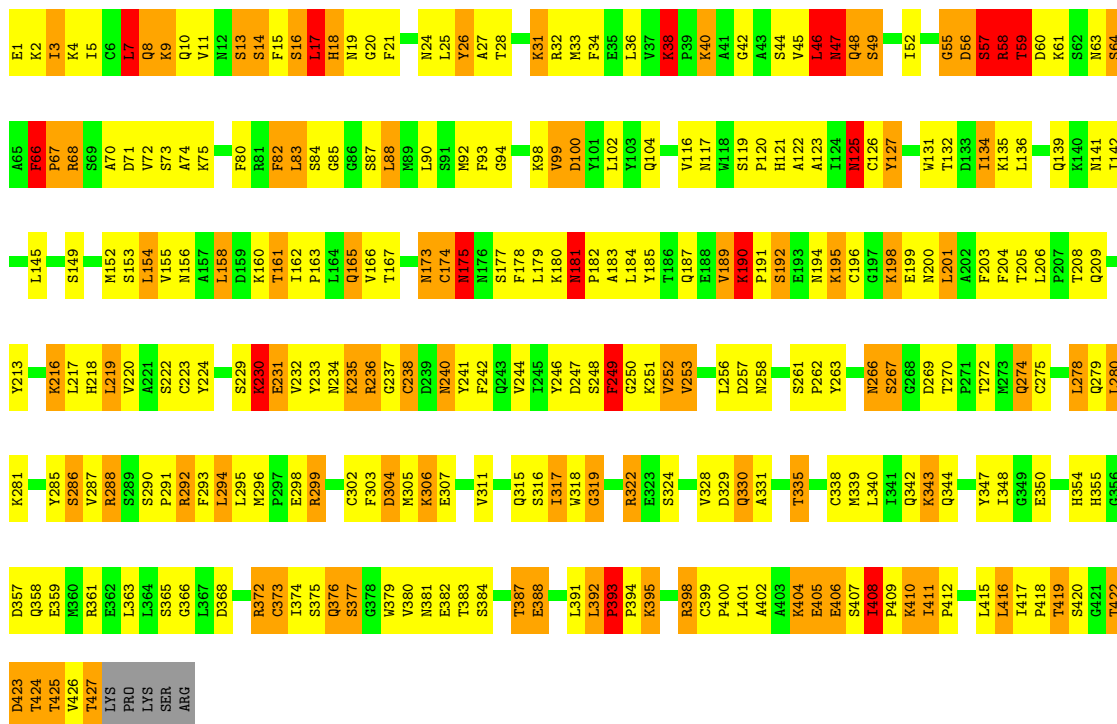


- Molecule 1: HAEMAGGLUTININ-ESTERASE-FUSION GLYCOPROTEIN

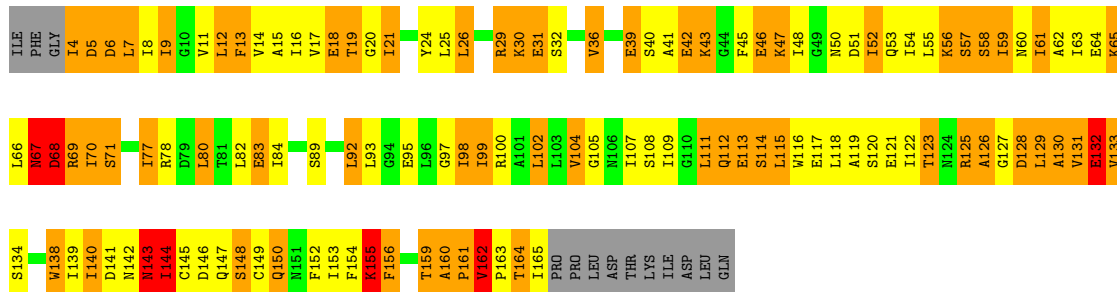
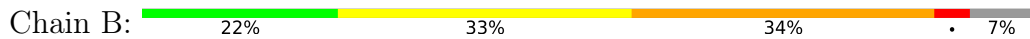




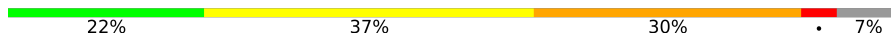
● Molecule 1: HAEMAGGLUTININ-ESTERASE-FUSION GLYCOPROTEIN

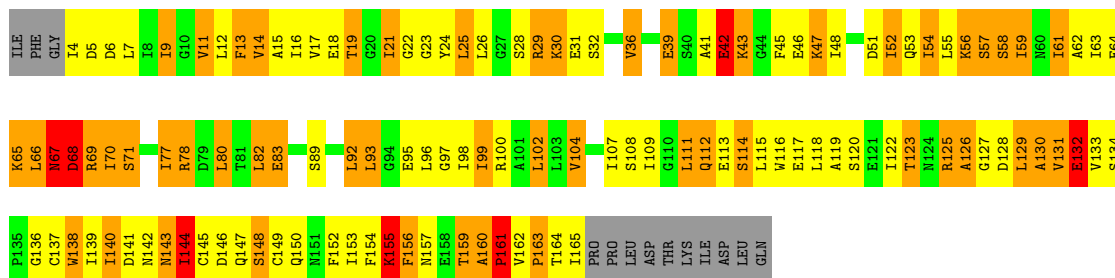


● Molecule 2: HAEMAGGLUTININ-ESTERASE-FUSION GLYCOPROTEIN

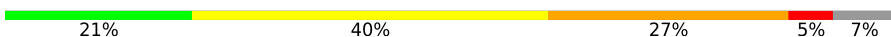


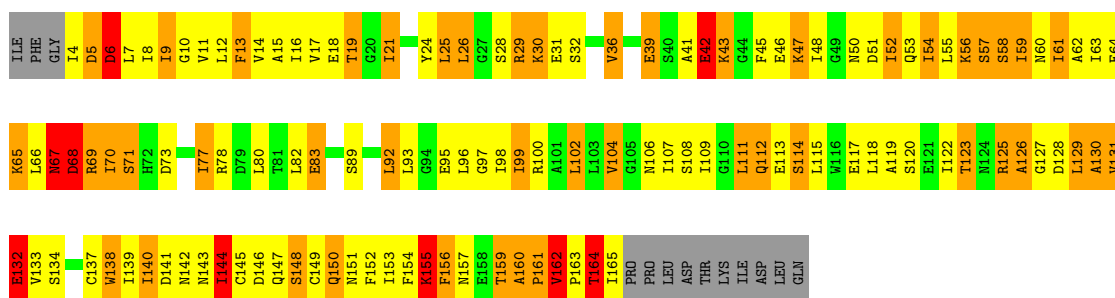
- Molecule 2: HAEMAGGLUTININ-ESTERASE-FUSION GLYCOPROTEIN

Chain D: 



- Molecule 2: HAEMAGGLUTININ-ESTERASE-FUSION GLYCOPROTEIN

Chain F: 

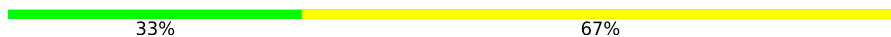


- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G: 



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

Chain H: 

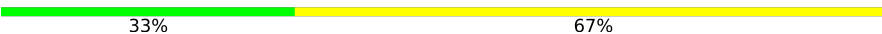


- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain I: 



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

Chain J:  33% 67%




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

Chain L:  33% 67%



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

Chain M:  33% 67%



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

Chain O:  100%

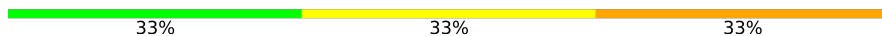


- Molecule 3: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain Q:  33% 33% 33%



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

Chain R:  33% 33% 33%



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

Chain S:  33% 33% 33%



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



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



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



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



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



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 43 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	155.40Å 155.40Å 414.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 3.20	Depositor
% Data completeness (in resolution range)	99.0 (10.00-3.20)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.10	Depositor
Refinement program	X-PLOR 3.54	Depositor
R, $R_{free}$	0.223 , 0.267	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	14285	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	59.0	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: NDG, MAN, 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	0.85	2/3420 (0.1%)	1.36	58/4622 (1.3%)
1	C	0.84	0/3418	1.37	53/4618 (1.1%)
1	E	0.87	0/3420	1.35	50/4622 (1.1%)
2	B	0.77	0/1241	1.17	9/1678 (0.5%)
2	D	0.74	0/1241	1.22	9/1678 (0.5%)
2	F	0.77	1/1241 (0.1%)	1.28	14/1678 (0.8%)
All	All	0.83	3/13981 (0.0%)	1.32	193/18896 (1.0%)

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	1
1	C	0	1
1	E	0	1
All	All	0	3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	162	VAL	CA-CB	7.44	1.63	1.54
1	A	155	VAL	CA-CB	-5.30	1.47	1.53
1	A	166	VAL	CA-CB	-5.04	1.48	1.54

The worst 5 of 193 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	69	ARG	N-CA-C	-15.88	96.14	112.97

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	69	ARG	N-CA-C	-15.38	96.67	112.97
1	A	57	SER	N-CA-C	-13.42	99.32	114.62
1	A	392	LEU	CA-C-N	13.37	134.15	120.38
1	A	392	LEU	C-N-CA	13.37	134.15	120.38

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	249	PHE	Sidechain
1	C	249	PHE	Sidechain
1	E	249	PHE	Sidechain

## 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	3339	0	3251	357	0
1	C	3338	0	3245	380	0
1	E	3339	0	3250	363	0
2	B	1228	0	1232	211	0
2	D	1228	0	1232	243	0
2	F	1228	0	1232	199	0
3	G	39	0	34	2	0
3	H	39	0	34	0	0
3	I	39	0	34	0	0
3	J	39	0	34	0	0
3	L	39	0	34	3	0
3	M	39	0	34	0	0
3	O	39	0	34	0	0
3	Q	39	0	34	6	0
3	R	39	0	34	1	0
3	S	39	0	34	1	0
3	T	39	0	34	2	0
4	K	39	0	33	10	0
4	P	39	0	33	5	0
4	U	39	0	33	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	N	39	0	33	0	0
All	All	14285	0	13948	1554	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 55.

The worst 5 of 1554 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:55:GLY:HA3	1:A:82:PHE:HB3	1.26	1.17
1:E:55:GLY:HA3	1:E:82:PHE:HB3	1.23	1.17
1:C:55:GLY:HA3	1:C:82:PHE:HB3	1.19	1.16
2:F:126:ALA:HB3	2:F:129:LEU:HG	1.25	1.15
2:B:126:ALA:HB3	2:B:129:LEU:HG	1.21	1.14

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 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	425/432 (98%)	359 (84%)	49 (12%)	17 (4%)	2	17
1	C	425/432 (98%)	359 (84%)	50 (12%)	16 (4%)	2	18
1	E	425/432 (98%)	358 (84%)	51 (12%)	16 (4%)	2	18
2	B	160/175 (91%)	113 (71%)	32 (20%)	15 (9%)	0	3
2	D	160/175 (91%)	111 (69%)	32 (20%)	17 (11%)	0	2
2	F	160/175 (91%)	115 (72%)	29 (18%)	16 (10%)	0	2
All	All	1755/1821 (96%)	1415 (81%)	243 (14%)	97 (6%)	1	11

5 of 97 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	47	ASN
1	A	48	GLN
1	A	66	PHE
1	A	393	PRO
2	B	18	GLU

### 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 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	369/374 (99%)	262 (71%)	107 (29%)	0	1
1	C	368/374 (98%)	259 (70%)	109 (30%)	0	1
1	E	369/374 (99%)	259 (70%)	110 (30%)	0	1
2	B	134/147 (91%)	70 (52%)	64 (48%)	0	0
2	D	134/147 (91%)	74 (55%)	60 (45%)	0	0
2	F	134/147 (91%)	74 (55%)	60 (45%)	0	0
All	All	1508/1563 (96%)	998 (66%)	510 (34%)	0	1

5 of 510 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	252	VAL
1	E	411	ILE
2	D	19	THR
1	E	398	ARG
2	F	59	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 62 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	141	ASN
1	E	330	GLN
1	C	315	GLN
1	E	315	GLN

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Mol	Chain	Res	Type
2	F	112	GLN

### 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](#)

45 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	NAG	G	1	3,1	14,14,15	0.70	0	17,19,21	1.32	2 (11%)
3	NAG	G	2	3	14,14,15	0.71	0	17,19,21	1.73	2 (11%)
3	BMA	G	3	3	11,11,12	1.11	0	15,15,17	0.72	0
3	NAG	H	1	3,1	14,14,15	0.65	0	17,19,21	1.16	2 (11%)
3	NAG	H	2	3	14,14,15	0.63	0	17,19,21	0.83	1 (5%)
3	BMA	H	3	3	11,11,12	0.90	0	15,15,17	0.40	0
3	NAG	I	1	3,1	14,14,15	0.70	1 (7%)	17,19,21	1.12	2 (11%)
3	NAG	I	2	3	14,14,15	0.64	0	17,19,21	1.12	2 (11%)
3	BMA	I	3	3	11,11,12	0.96	1 (9%)	15,15,17	0.74	1 (6%)
3	NAG	J	1	3,1	14,14,15	0.75	0	17,19,21	1.18	1 (5%)
3	NAG	J	2	3	14,14,15	0.54	0	17,19,21	0.83	1 (5%)
3	BMA	J	3	3	11,11,12	0.81	0	15,15,17	0.39	0
4	NAG	K	1	2,4	14,14,15	0.52	0	17,19,21	1.31	3 (17%)
4	NDG	K	2	4	14,14,15	0.98	1 (7%)	17,19,21	1.49	2 (11%)
4	MAN	K	3	4	11,11,12	0.83	0	15,15,17	0.35	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	NAG	L	1	3,1	14,14,15	0.58	0	17,19,21	1.66	3 (17%)
3	NAG	L	2	3	14,14,15	0.67	0	17,19,21	0.86	1 (5%)
3	BMA	L	3	3	11,11,12	0.80	0	15,15,17	0.47	0
3	NAG	M	1	3,1	14,14,15	0.78	0	17,19,21	1.26	2 (11%)
3	NAG	M	2	3	14,14,15	0.68	0	17,19,21	0.92	1 (5%)
3	BMA	M	3	3	11,11,12	0.88	0	15,15,17	0.60	0
5	NAG	N	1	5,1	14,14,15	0.98	0	17,19,21	0.97	1 (5%)
5	NDG	N	2	5	14,14,15	0.96	1 (7%)	17,19,21	0.92	0
5	BMA	N	3	5	11,11,12	0.96	0	15,15,17	0.58	0
3	NAG	O	1	3,1	14,14,15	0.76	0	17,19,21	1.40	2 (11%)
3	NAG	O	2	3	14,14,15	0.62	0	17,19,21	1.10	1 (5%)
3	BMA	O	3	3	11,11,12	0.63	0	15,15,17	0.76	1 (6%)
4	NAG	P	1	2,4	14,14,15	0.81	0	17,19,21	1.24	3 (17%)
4	NDG	P	2	4	14,14,15	1.07	1 (7%)	17,19,21	1.26	2 (11%)
4	MAN	P	3	4	11,11,12	0.89	0	15,15,17	0.40	0
3	NAG	Q	1	3,1	14,14,15	0.90	1 (7%)	17,19,21	1.31	3 (17%)
3	NAG	Q	2	3	14,14,15	0.61	0	17,19,21	1.01	1 (5%)
3	BMA	Q	3	3	11,11,12	0.91	0	15,15,17	0.35	0
3	NAG	R	1	3,1	14,14,15	0.63	0	17,19,21	0.93	1 (5%)
3	NAG	R	2	3	14,14,15	0.90	0	17,19,21	0.78	0
3	BMA	R	3	3	11,11,12	0.82	0	15,15,17	0.50	0
3	NAG	S	1	3,1	14,14,15	0.53	0	17,19,21	0.90	0
3	NAG	S	2	3	14,14,15	0.78	0	17,19,21	1.34	3 (17%)
3	BMA	S	3	3	11,11,12	0.92	1 (9%)	15,15,17	0.62	0
3	NAG	T	1	3,1	14,14,15	0.57	0	17,19,21	1.02	2 (11%)
3	NAG	T	2	3	14,14,15	0.54	0	17,19,21	0.74	0
3	BMA	T	3	3	11,11,12	0.93	1 (9%)	15,15,17	0.44	0
4	NAG	U	1	2,4	14,14,15	0.49	0	17,19,21	1.45	2 (11%)
4	NDG	U	2	4	14,14,15	1.13	1 (7%)	17,19,21	1.91	5 (29%)
4	MAN	U	3	4	11,11,12	0.89	0	15,15,17	0.59	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. <sup>1,2</sup> means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	G	1	3,1	1/1/5/7	1/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	G	2	3	-	0/6/23/26	0/1/1/1
3	BMA	G	3	3	-	1/2/19/22	0/1/1/1
3	NAG	H	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	H	2	3	-	1/6/23/26	0/1/1/1
3	BMA	H	3	3	-	2/2/19/22	0/1/1/1
3	NAG	I	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	I	2	3	-	2/6/23/26	0/1/1/1
3	BMA	I	3	3	-	2/2/19/22	0/1/1/1
3	NAG	J	1	3,1	-	1/6/23/26	0/1/1/1
3	NAG	J	2	3	-	2/6/23/26	0/1/1/1
3	BMA	J	3	3	-	2/2/19/22	0/1/1/1
4	NAG	K	1	2,4	-	1/6/23/26	0/1/1/1
4	NDG	K	2	4	-	3/6/23/26	0/1/1/1
4	MAN	K	3	4	-	2/2/19/22	0/1/1/1
3	NAG	L	1	3,1	1/1/5/7	1/6/23/26	0/1/1/1
3	NAG	L	2	3	-	2/6/23/26	0/1/1/1
3	BMA	L	3	3	-	0/2/19/22	0/1/1/1
3	NAG	M	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	M	2	3	-	0/6/23/26	0/1/1/1
3	BMA	M	3	3	-	2/2/19/22	0/1/1/1
5	NAG	N	1	5,1	-	0/6/23/26	0/1/1/1
5	NDG	N	2	5	-	1/6/23/26	0/1/1/1
5	BMA	N	3	5	-	0/2/19/22	0/1/1/1
3	NAG	O	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	O	2	3	-	0/6/23/26	0/1/1/1
3	BMA	O	3	3	-	2/2/19/22	0/1/1/1
4	NAG	P	1	2,4	-	0/6/23/26	0/1/1/1
4	NDG	P	2	4	-	0/6/23/26	0/1/1/1
4	MAN	P	3	4	-	2/2/19/22	0/1/1/1
3	NAG	Q	1	3,1	1/1/5/7	0/6/23/26	0/1/1/1
3	NAG	Q	2	3	-	2/6/23/26	0/1/1/1
3	BMA	Q	3	3	-	1/2/19/22	0/1/1/1
3	NAG	R	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	R	2	3	-	2/6/23/26	0/1/1/1
3	BMA	R	3	3	-	2/2/19/22	0/1/1/1
3	NAG	S	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	S	2	3	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	BMA	S	3	3	-	2/2/19/22	0/1/1/1
3	NAG	T	1	3,1	-	2/6/23/26	0/1/1/1
3	NAG	T	2	3	-	0/6/23/26	0/1/1/1
3	BMA	T	3	3	-	2/2/19/22	0/1/1/1
4	NAG	U	1	2,4	-	0/6/23/26	0/1/1/1
4	NDG	U	2	4	-	2/6/23/26	0/1/1/1
4	MAN	U	3	4	-	0/2/19/22	0/1/1/1

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	U	2	NDG	C1-C2	3.34	1.56	1.52
4	K	2	NDG	C1-C2	3.12	1.56	1.52
4	P	2	NDG	C1-C2	2.76	1.56	1.52
3	Q	1	NAG	C1-C2	2.65	1.56	1.52
3	I	3	BMA	C4-C5	2.53	1.58	1.53

The worst 5 of 53 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	G	2	NAG	C4-C3-C2	-5.37	103.15	111.02
4	U	2	NDG	C3-C4-C5	-5.24	100.73	110.23
3	L	1	NAG	C4-C3-C2	-5.01	103.67	111.02
4	K	2	NDG	C3-C4-C5	-4.39	102.27	110.23
3	O	1	NAG	C2-N2-C7	-3.76	117.86	122.90

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	G	1	NAG	C1
3	L	1	NAG	C1
3	Q	1	NAG	C1

5 of 57 torsion outliers are listed below:

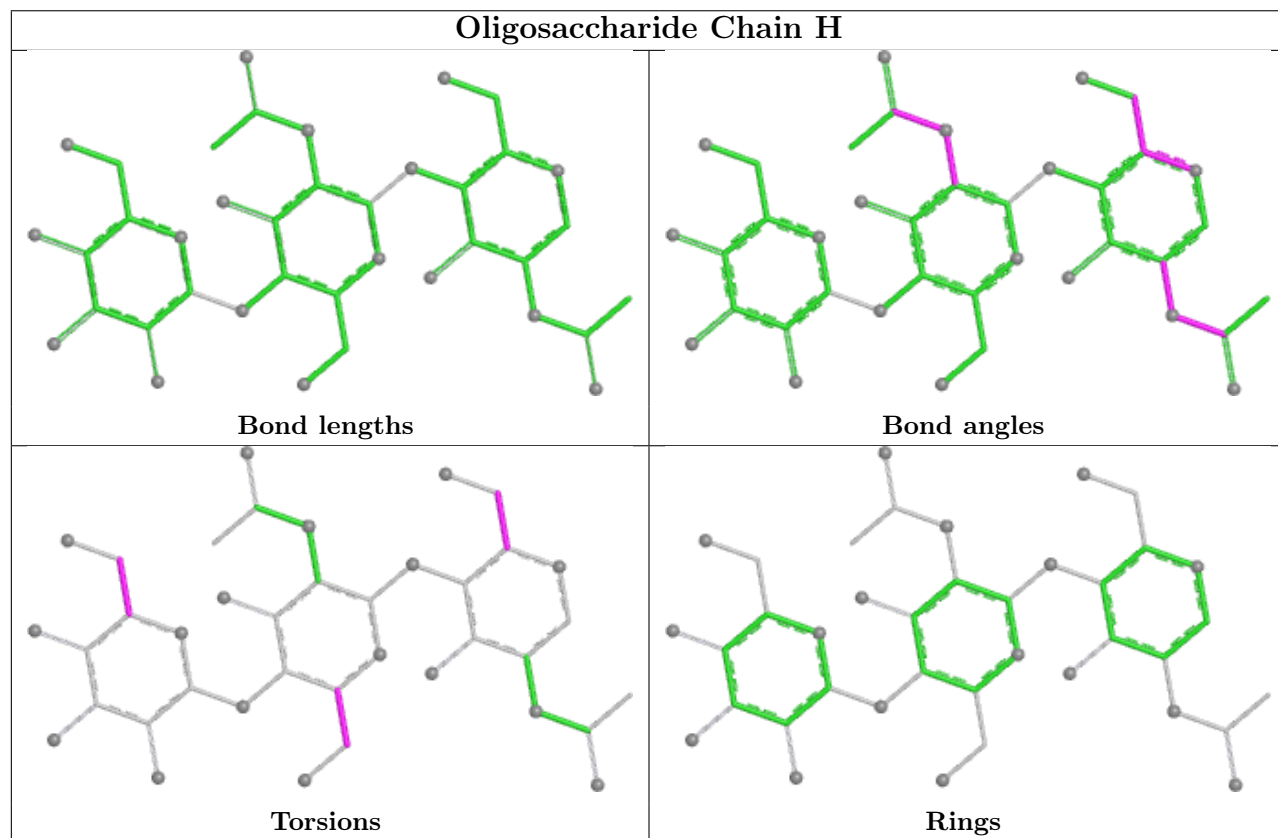
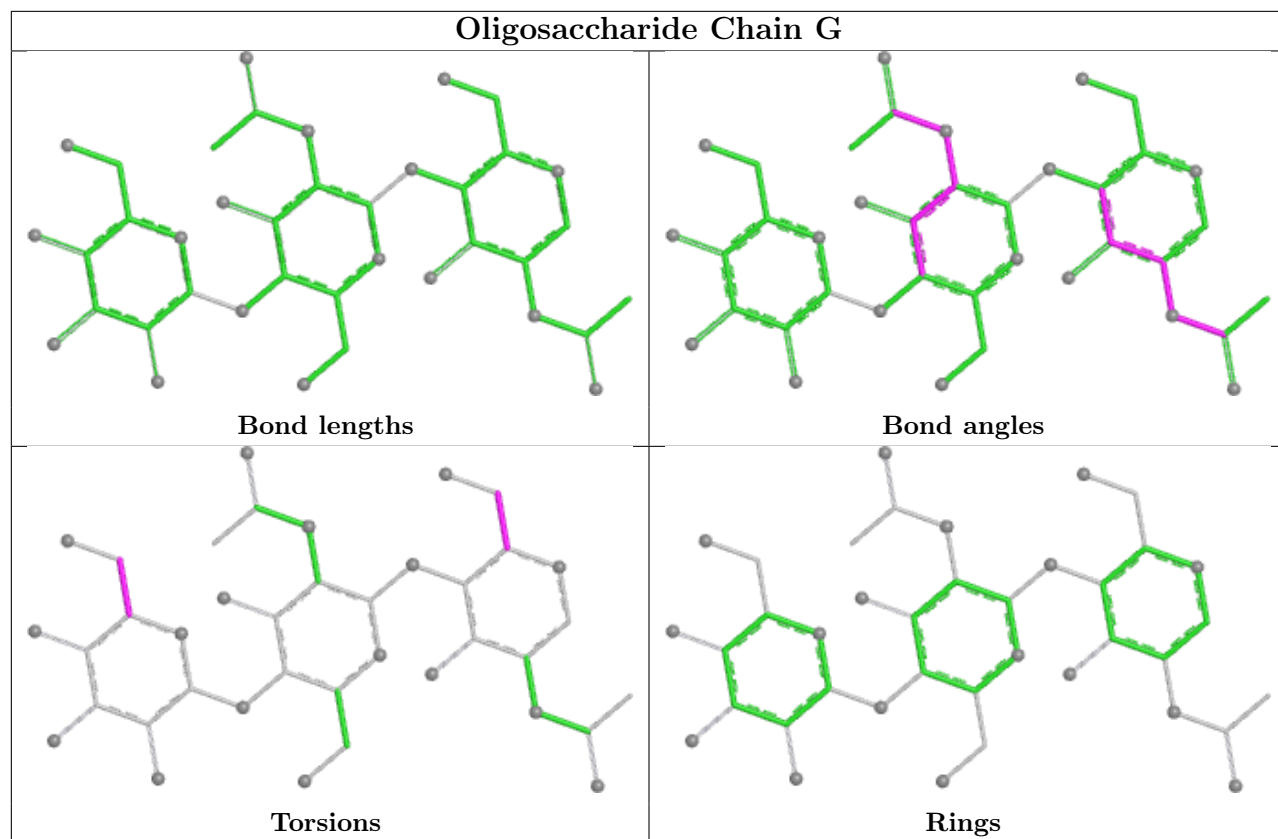
Mol	Chain	Res	Type	Atoms
4	K	2	NDG	C3-C2-N2-C7
4	U	2	NDG	C3-C2-N2-C7
3	R	3	BMA	O5-C5-C6-O6
3	L	2	NAG	O5-C5-C6-O6
3	T	3	BMA	O5-C5-C6-O6

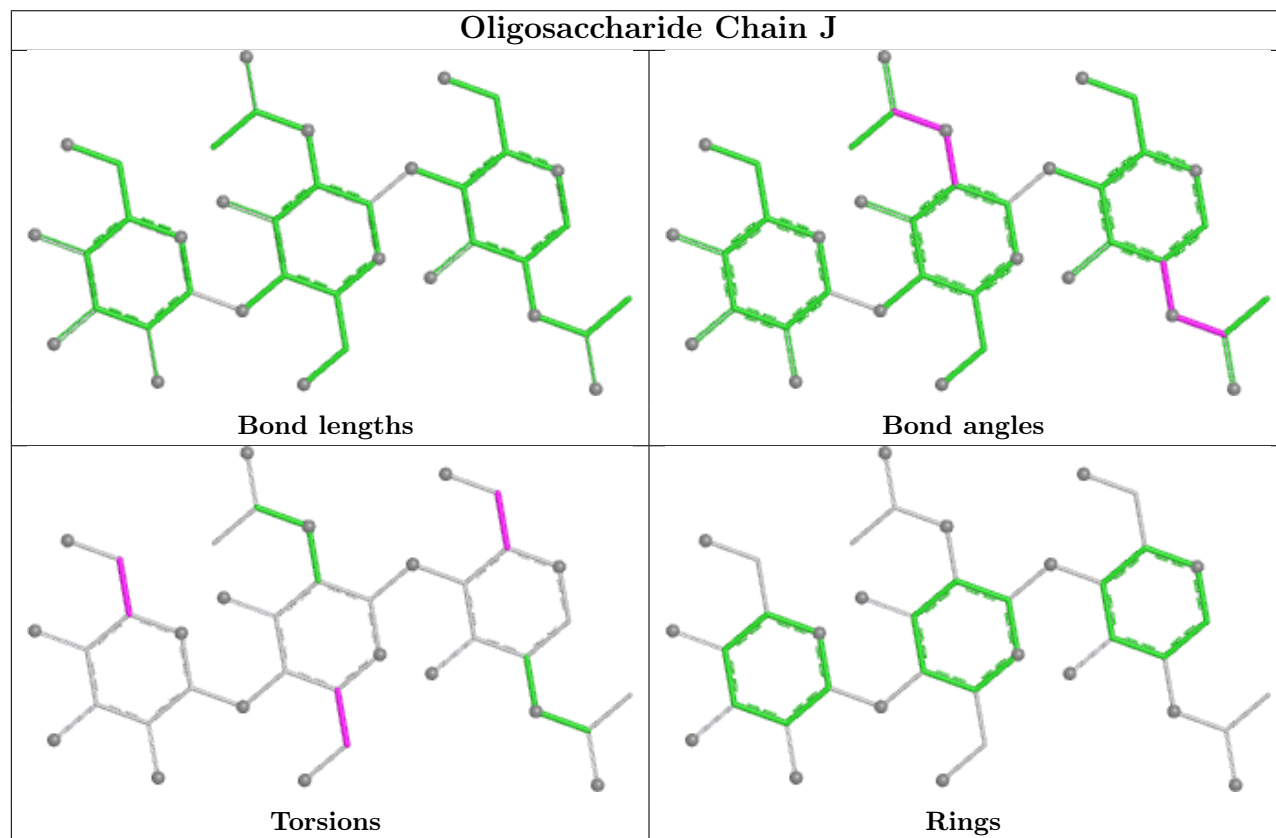
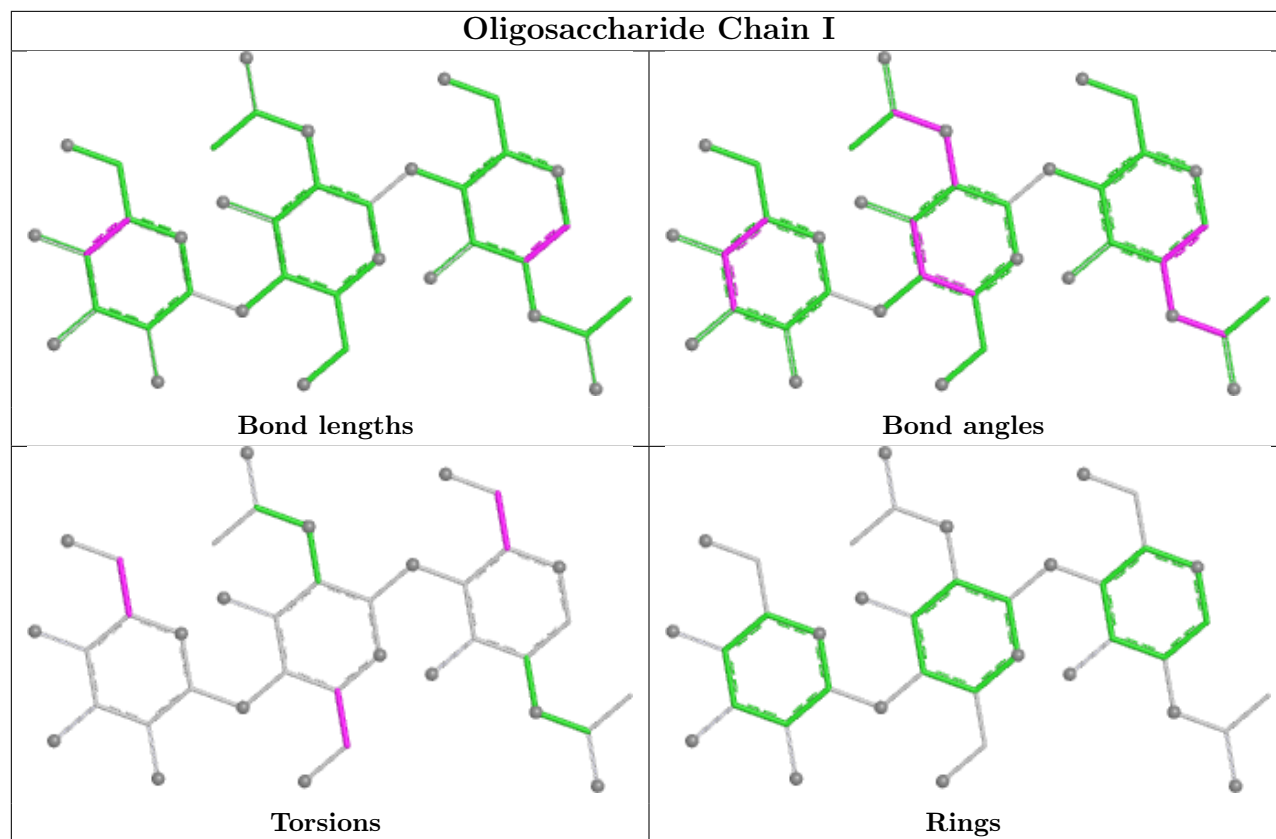
There are no ring outliers.

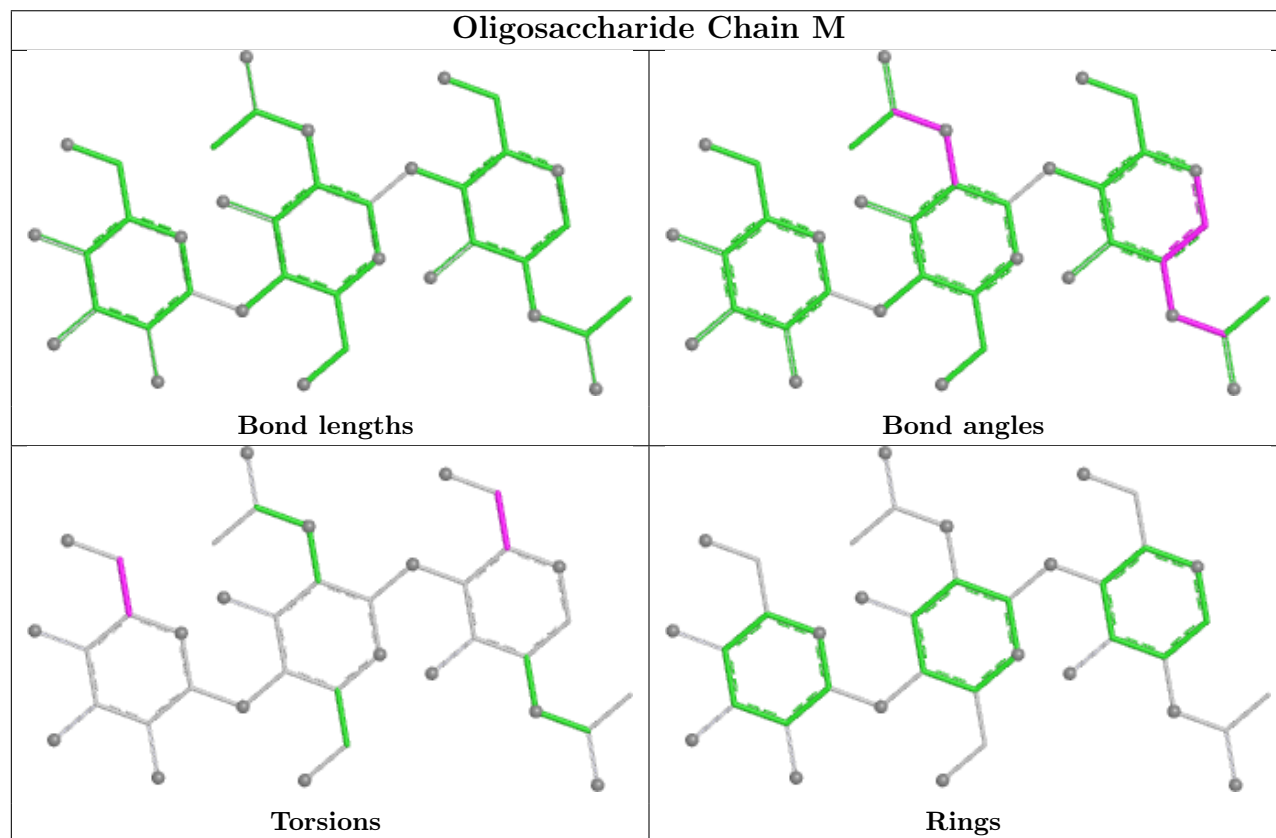
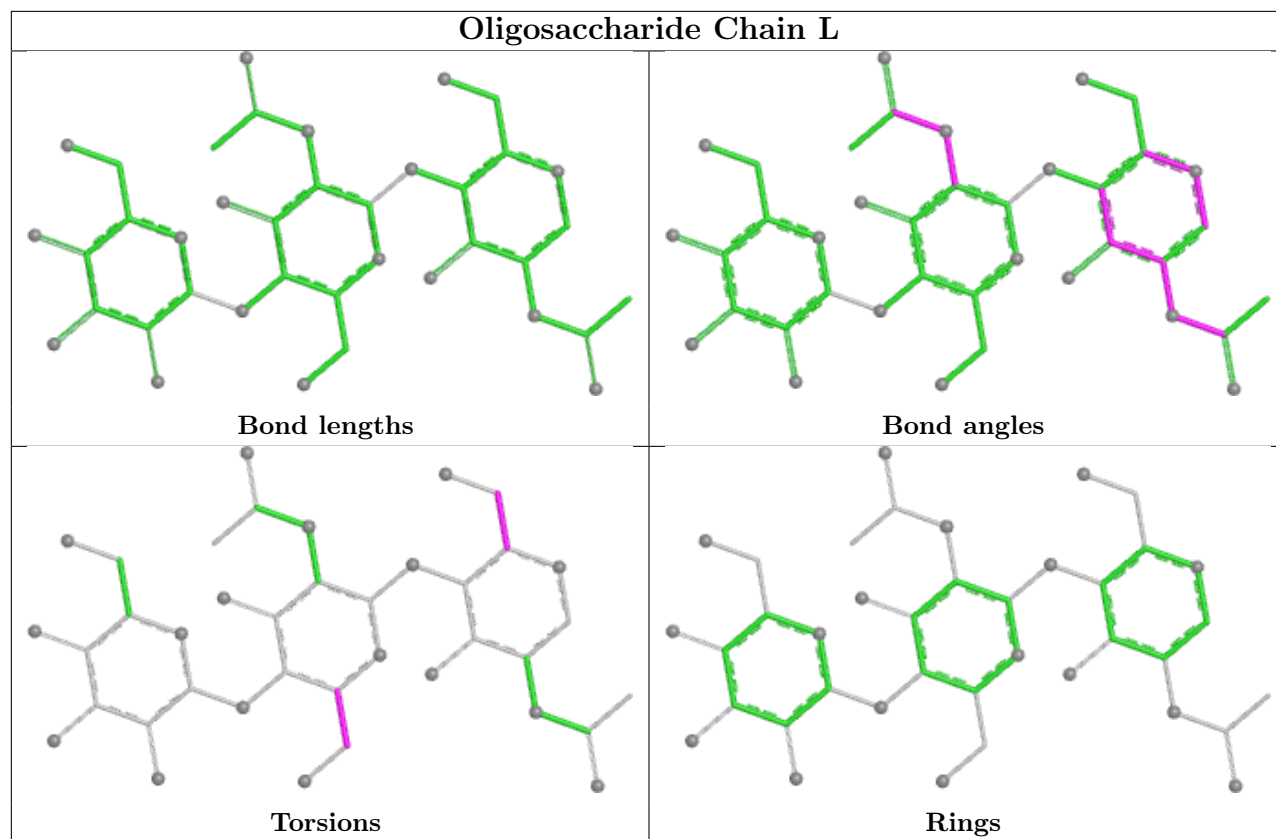
18 monomers are involved in 38 short contacts:

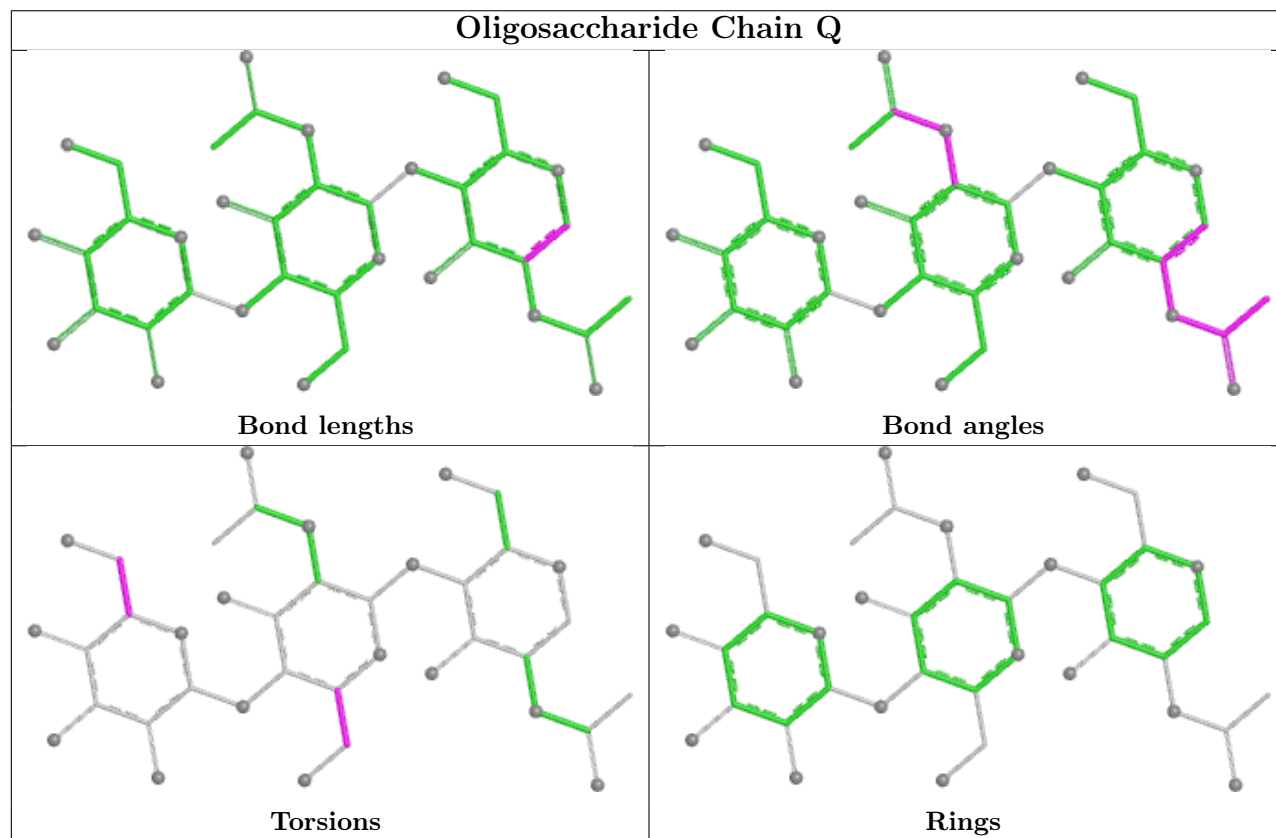
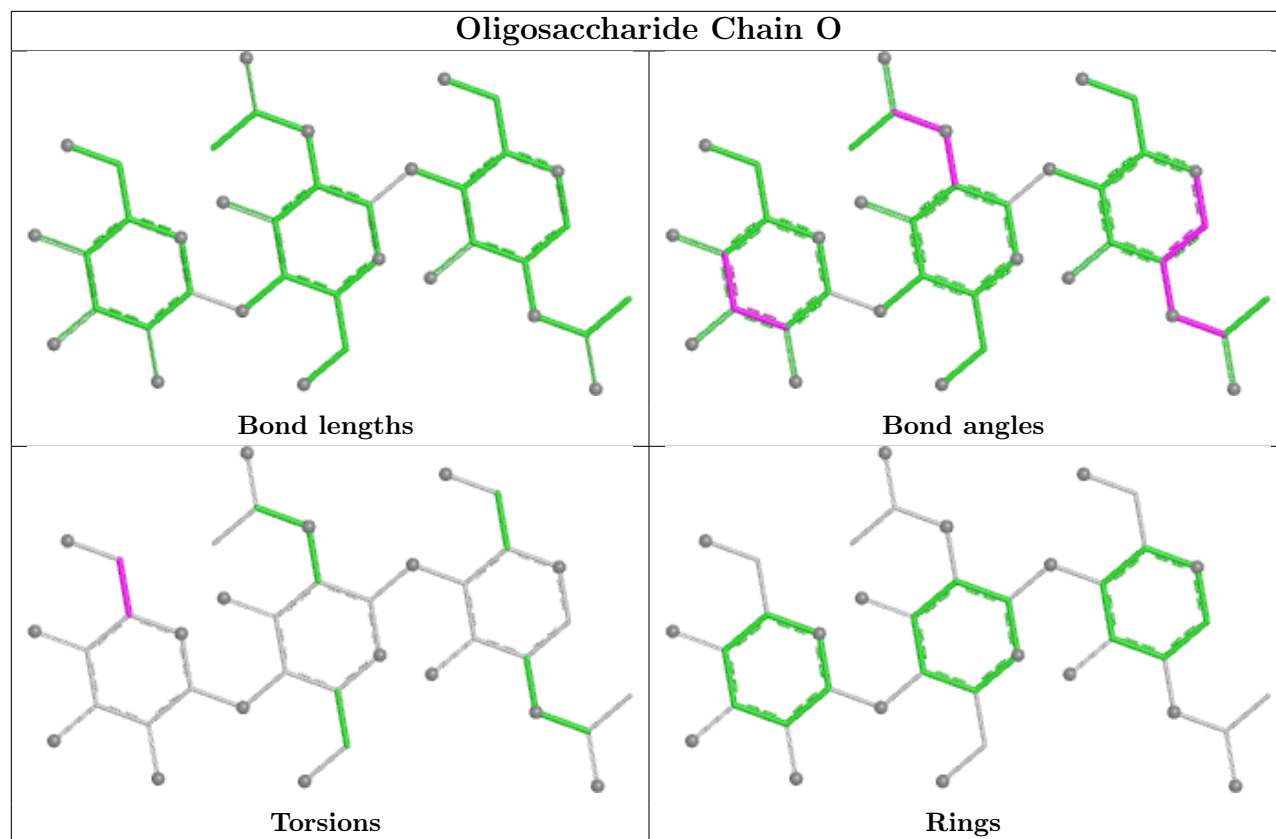
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	U	3	MAN	1	0
3	Q	2	NAG	6	0
4	K	3	MAN	6	0
3	S	2	NAG	1	0
3	L	2	NAG	1	0
3	G	2	NAG	1	0
4	P	3	MAN	1	0
3	T	1	NAG	2	0
3	L	1	NAG	2	0
3	G	1	NAG	2	0
3	T	2	NAG	2	0
4	K	2	NDG	10	0
3	R	2	NAG	1	0
4	P	2	NDG	4	0
4	U	2	NDG	8	0
4	P	1	NAG	1	0
4	U	1	NAG	3	0
3	R	1	NAG	1	0

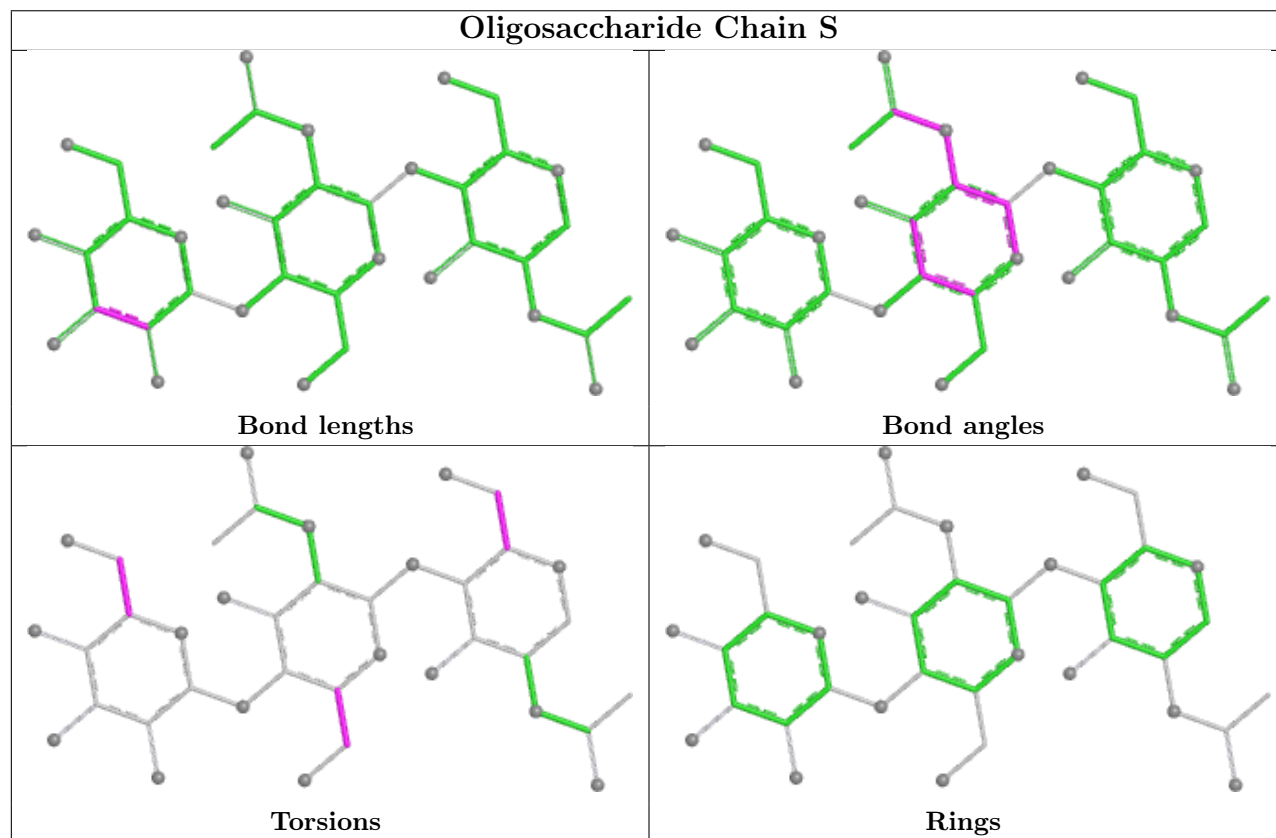
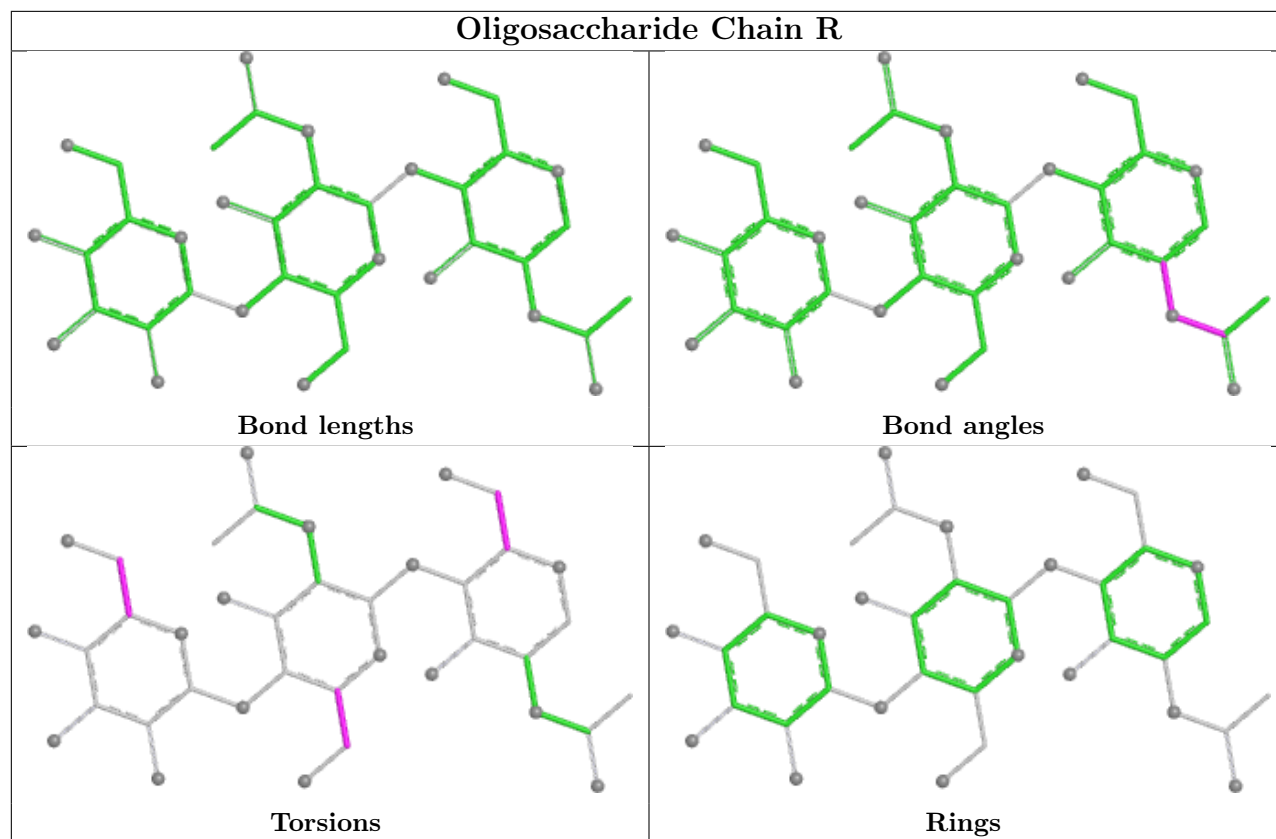
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

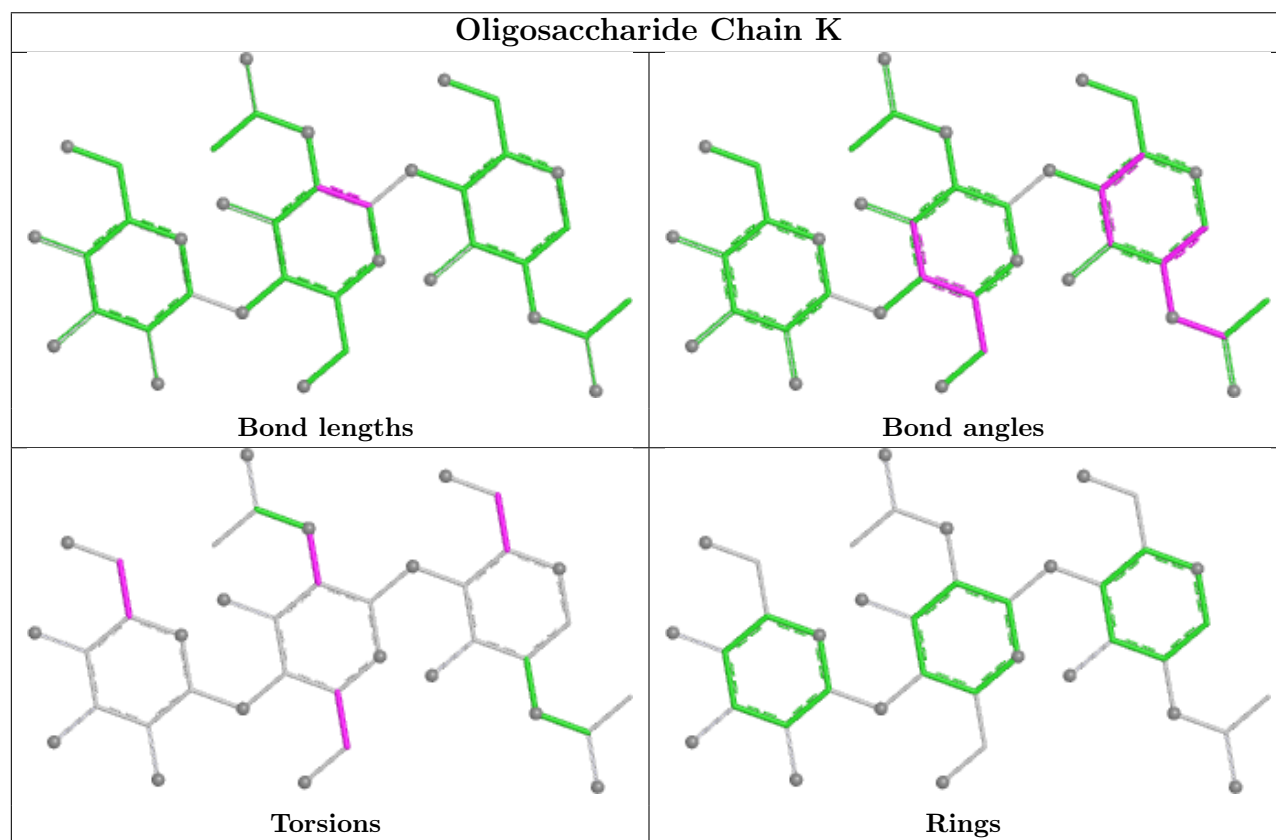
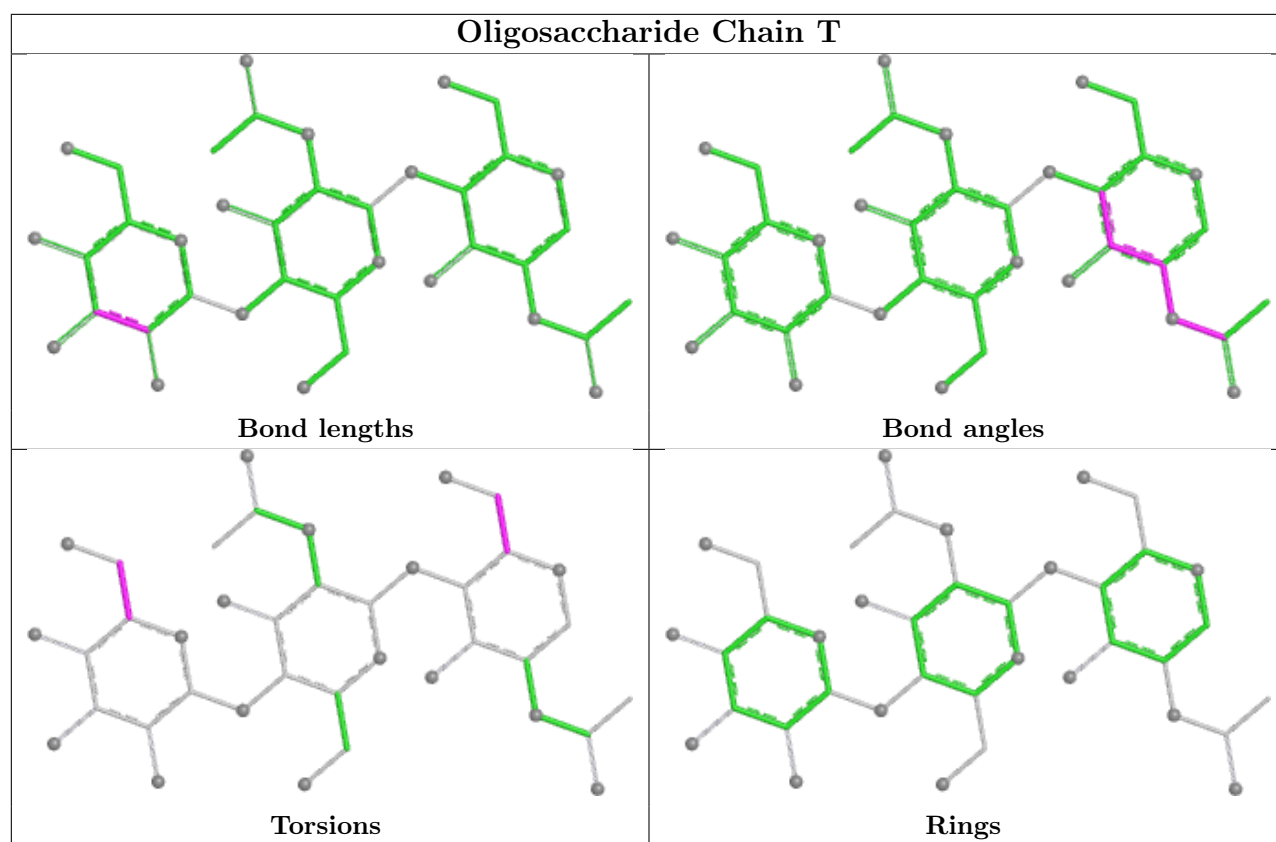


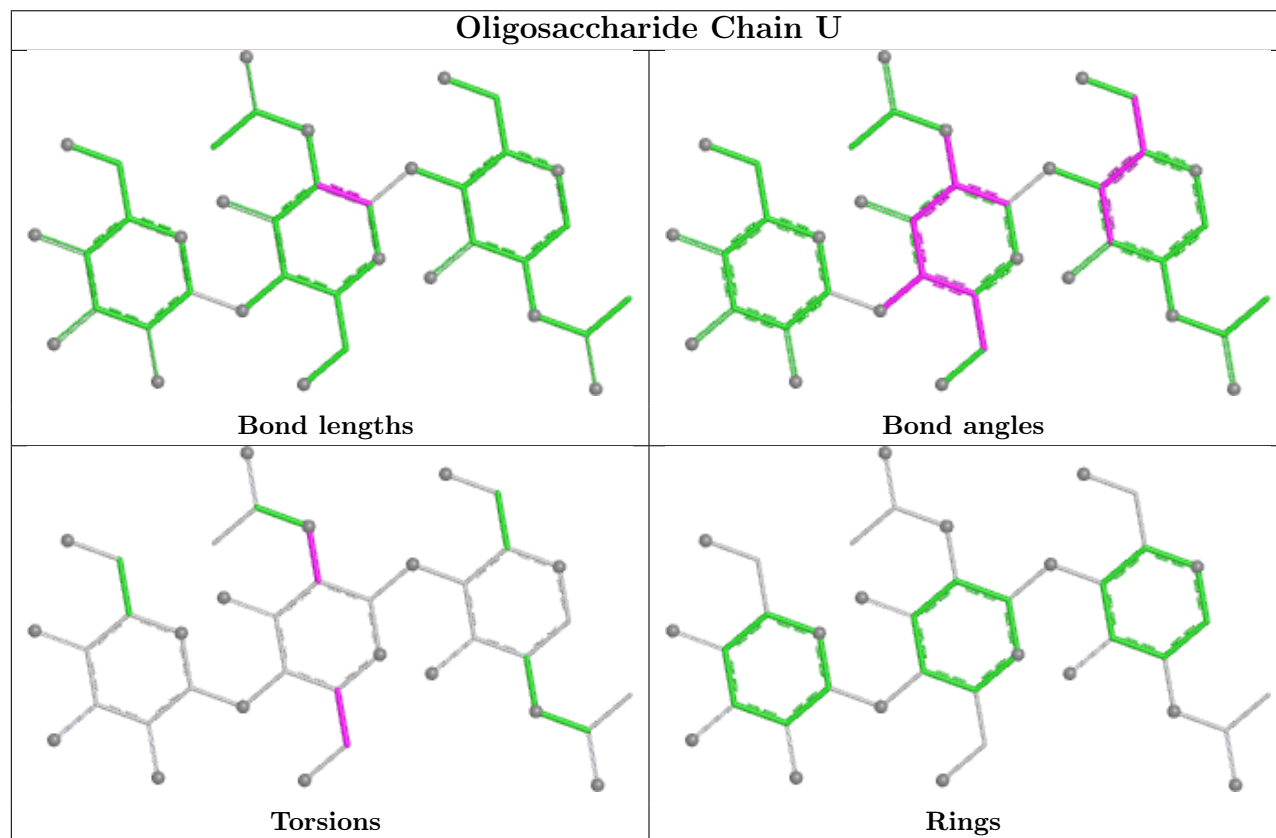
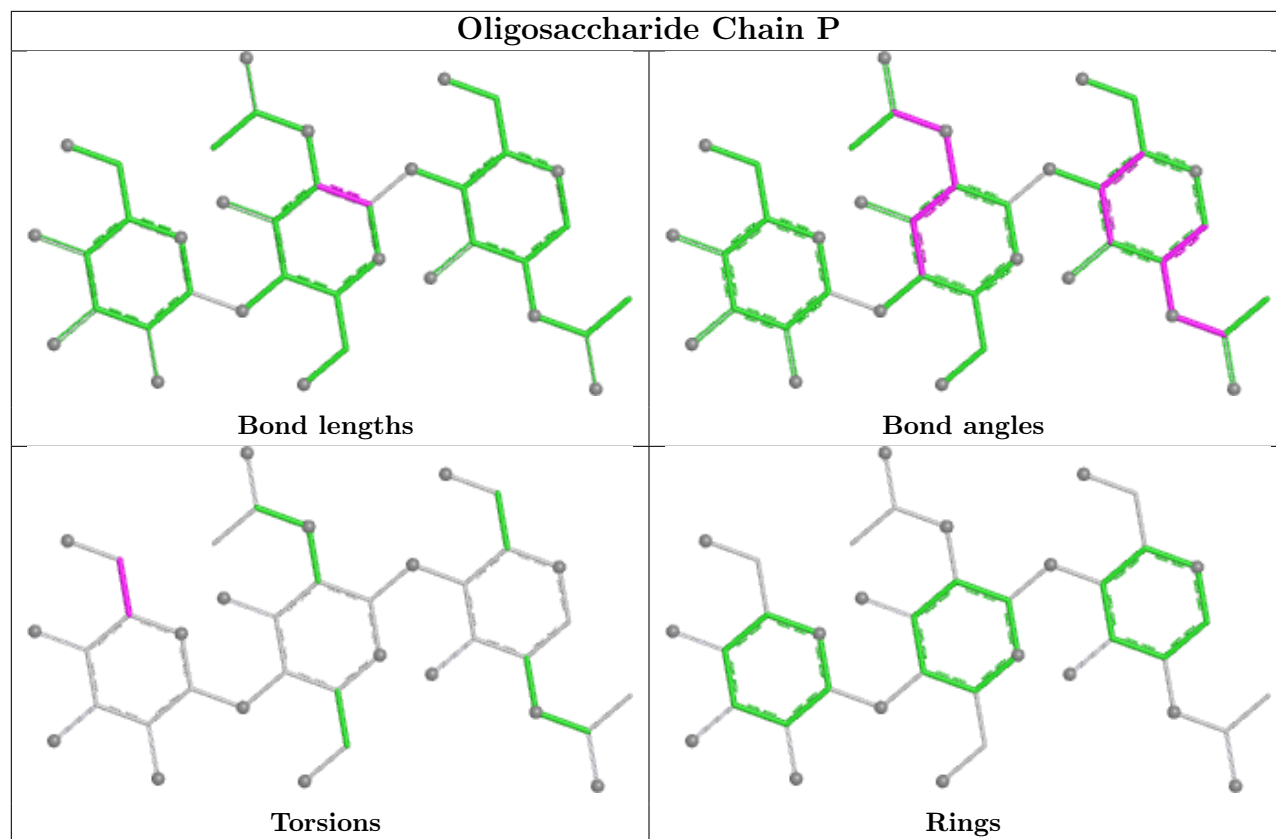


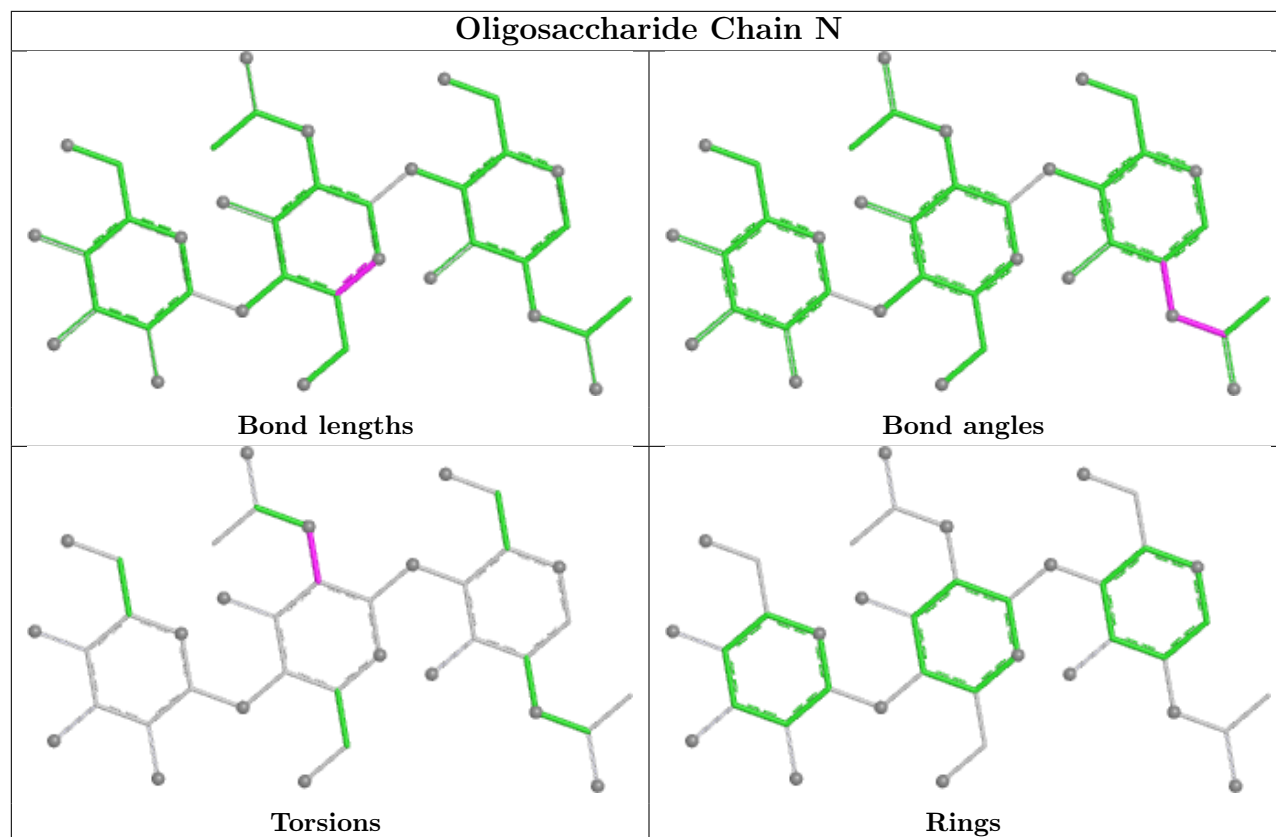












## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 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.