



Full wwPDB EM Validation Report ⓘ

Jul 16, 2025 – 01:14 PM JST

PDB ID : 8ZHD / pdb_00008zhd
EMDB ID : EMD-60099
Title : SARS-CoV-2 spike trimer (6P) in complex with two R1-26 Fabs
Authors : Yan, Q.; Gao, X.; Liu, B.; Hou, R.; He, P.; Li, Z.; Chen, Q.; Wang, J.; He, J.;
Chen, L.; Zhao, J.; Xiong, X.
Deposited on : 2024-05-10
Resolution : 3.41 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

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 : 4-5-2 with Phenix2.0rc1
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) : 2.44

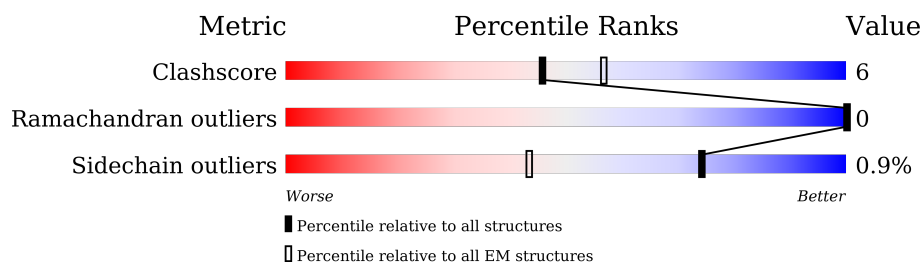
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.41 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	1278	
1	B	1278	
1	C	1278	
2	F	243	
2	H	243	
3	G	240	
3	L	240	
4	D	2	
4	E	2	

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

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 29306 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,Fibritin,Expression Tag.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1066	Total	C	N	O	S	0	0
			8326	5312	1388	1588	38		
1	B	1066	Total	C	N	O	S	0	0
			8326	5312	1388	1588	38		
1	C	1066	Total	C	N	O	S	0	0
			8326	5312	1388	1588	38		

There are 33 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	682	GLY	ARG	conflict	UNP P0DTC2
A	683	SER	ARG	conflict	UNP P0DTC2
A	685	SER	ARG	conflict	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	986	PRO	LYS	variant	UNP P0DTC2
A	987	PRO	VAL	variant	UNP P0DTC2
A	1209	GLY	-	linker	UNP P0DTC2
A	1210	SER	-	linker	UNP P0DTC2
B	682	GLY	ARG	conflict	UNP P0DTC2
B	683	SER	ARG	conflict	UNP P0DTC2
B	685	SER	ARG	conflict	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	986	PRO	LYS	variant	UNP P0DTC2
B	987	PRO	VAL	variant	UNP P0DTC2
B	1209	GLY	-	linker	UNP P0DTC2
B	1210	SER	-	linker	UNP P0DTC2
C	682	GLY	ARG	conflict	UNP P0DTC2
C	683	SER	ARG	conflict	UNP P0DTC2

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Chain	Residue	Modelled	Actual	Comment	Reference
C	685	SER	ARG	conflict	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	986	PRO	LYS	variant	UNP P0DTC2
C	987	PRO	VAL	variant	UNP P0DTC2
C	1209	GLY	-	linker	UNP P0DTC2
C	1210	SER	-	linker	UNP P0DTC2

- Molecule 2 is a protein called Heavy chain of R1-26 Fab.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	H	119	Total	C	N	O	S	0	0
			920	583	158	175	4		
2	F	119	Total	C	N	O	S	0	0
			920	583	158	175	4		

- Molecule 3 is a protein called Light chain of R1-26 Fab.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	L	110	Total	C	N	O	S	0	0
			824	506	136	179	3		
3	G	110	Total	C	N	O	S	0	0
			824	506	136	179	3		

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



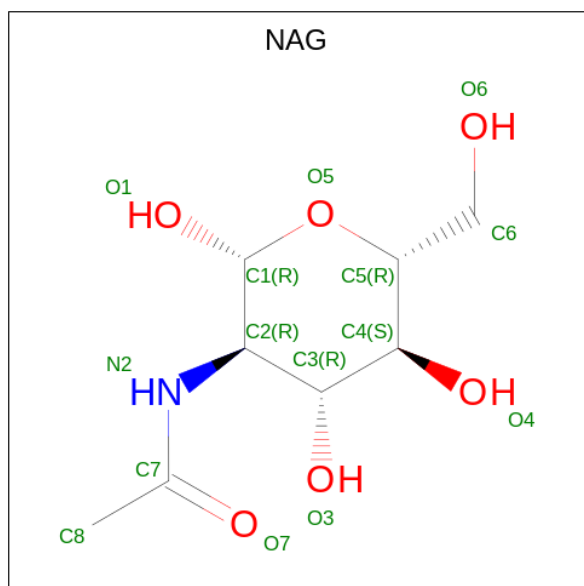
Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	2	Total	C	N	O		0	0
			28	16	2	10			
4	E	2	Total	C	N	O		0	0
			28	16	2	10			
4	I	2	Total	C	N	O		0	0
			28	16	2	10			
4	J	2	Total	C	N	O		0	0
			28	16	2	10			

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Mol	Chain	Residues	Atoms				AltConf	Trace
4	K	2	Total	C	N	O	0	0
			28	16	2	10		
4	M	2	Total	C	N	O	0	0
			28	16	2	10		
4	N	2	Total	C	N	O	0	0
			28	16	2	10		
4	O	2	Total	C	N	O	0	0
			28	16	2	10		
4	P	2	Total	C	N	O	0	0
			28	16	2	10		
4	Q	2	Total	C	N	O	0	0
			28	16	2	10		
4	R	2	Total	C	N	O	0	0
			28	16	2	10		
4	S	2	Total	C	N	O	0	0
			28	16	2	10		
4	T	2	Total	C	N	O	0	0
			28	16	2	10		
4	U	2	Total	C	N	O	0	0
			28	16	2	10		
4	V	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



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

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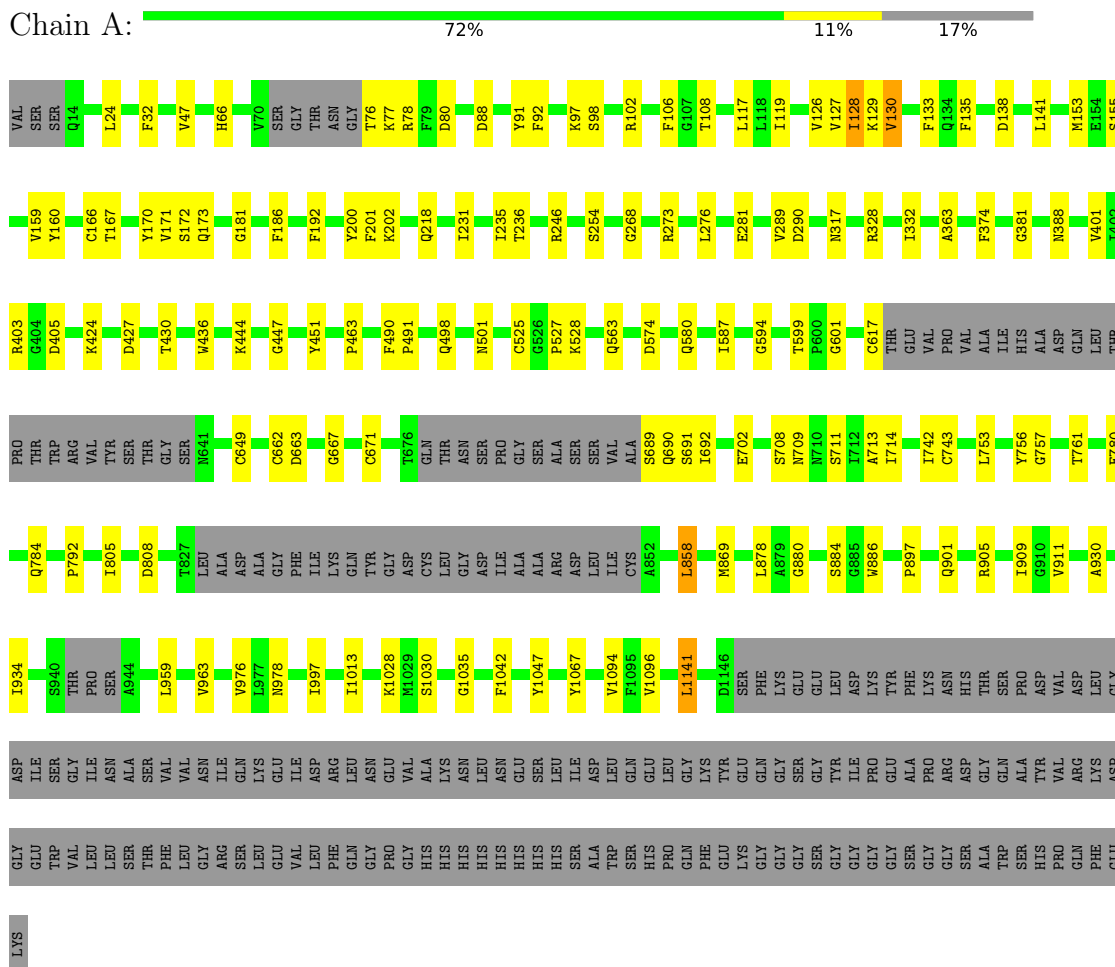
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Mol	Chain	Residues	Atoms				AltConf
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C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

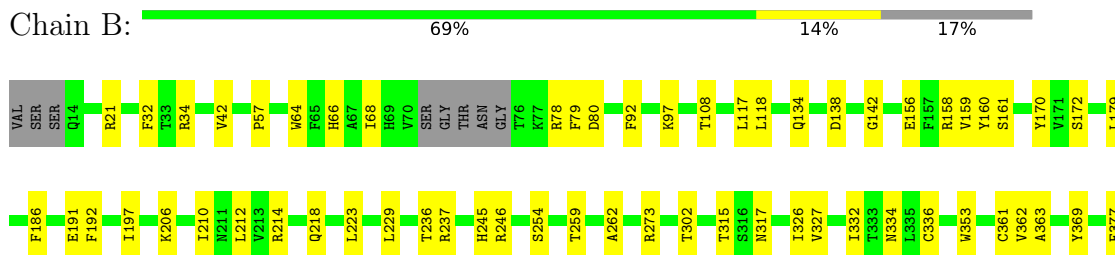
3 Residue-property plots

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,Fibritin,Expression Tag



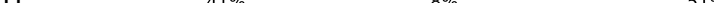
• Molecule 1: Spike glycoprotein,Fibritin,Expression Tag





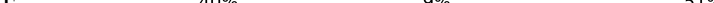
[illegible]

- Molecule 2: Heavy chain of R1-26 Fab

Chain H:  41% 8% 51%

[illegible]

- Molecule 2: Heavy chain of R1-26 Fab

Chain F:  40% 9% 51%

[illegible]

- Molecule 3: Light chain of R1-26 Fab

Chain L: 37% 8% 54%

[illegible]

- Molecule 3: Light chain of R1-26 Fab

Chain G:  37% 9% 54%

MET	GLY	TRP	SER	CYS	ILE	LEU	PHE	LEU	VAL	ALA	THR	THR	GLY	VAL	NH ₂	F2	H8	S26	W36	Q37	Q38	Q39	R40	R49	Q54	R55	P56	V59	D60	D61	R62	F63	S64	T77	E84	D85	E86	A87	D95	T105	Q106	L107	T108	V109	I110	GLY	TRP
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LYS LEU THR VAL SER LYS LEU GLY GLN PRO LYS LYS ALA PRO PRO VAL THR THR PHE PRO PRO SER SER GLU GLU GLN LYS LYS ALA HIS LYS ALA THR THR LEU VAL CYS GLN THR ILE THR HIS SER GLY ASP PHE THR PRO THR GLY ALA VAL THR THR VAL ALA TRP THR LYS ALA ASP SER SER PRO VAL LYS ALA GLY VAL THR

THR PRO SER LYS LEU GLN SER ASN LYS LYS ALA ALA SER SER THR THR LEU LEU THR PRO SER GLN TRP LYS LYS SER SER HIS ASN ARG SER TYR THR SER CYS GLN VAL THR THR HIS SER GLY GLY SER THR VAL GLY ALA LYS THR VAL VAL ALA TRP THR THR LYS ALA GLY CYS SER

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

Chain D:  100%

MG1
MG2

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

Chain E:  100%

MG1
MG2

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

Chain I:  100%

MG1
MG2

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

Chain J:  100%

MG1
MG2

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

Chain K:  100%

MG1
MG2

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

Chain M:  100%

MG1
MG2

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

Chain N:  100%



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

Chain O:  100%



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

Chain P:  100%



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

Chain Q:  100%



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

Chain R:  100%



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

Chain S:  50% 50%



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

Chain T:  100%

MAG2

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

Chain U:  100%

MAG2

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

Chain V:  100%

MAG2

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	110522	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k 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	0.18	0/8522	0.35	0/11605
1	B	0.22	0/8522	0.41	0/11605
1	C	0.15	0/8522	0.33	0/11605
2	F	0.14	0/942	0.39	0/1277
2	H	0.16	0/942	0.37	0/1277
3	G	0.12	0/843	0.34	0/1151
3	L	0.34	0/843	0.50	0/1151
All	All	0.19	0/29136	0.37	0/39671

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	8326	0	8079	87	0
1	B	8326	0	8079	114	0
1	C	8326	0	8079	113	0
2	F	920	0	887	12	0
2	H	920	0	887	15	0
3	G	824	0	755	14	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	L	824	0	755	16	0
4	D	28	0	25	0	0
4	E	28	0	25	0	0
4	I	28	0	25	0	0
4	J	28	0	25	0	0
4	K	28	0	25	0	0
4	M	28	0	25	0	0
4	N	28	0	25	0	0
4	O	28	0	25	0	0
4	P	28	0	25	0	0
4	Q	28	0	25	0	0
4	R	28	0	25	0	0
4	S	28	0	25	1	0
4	T	28	0	25	0	0
4	U	28	0	25	0	0
4	V	28	0	25	0	0
5	A	140	0	130	1	0
5	B	140	0	130	0	0
5	C	140	0	130	0	0
All	All	29306	0	28286	346	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.

All (346) 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)
3:L:92:GLN:HE22	3:L:99:TRP:HB3	1.47	0.80
1:A:200:TYR:HB3	1:A:202:LYS:HE3	1.70	0.73
1:C:273:ARG:NH2	1:C:290:ASP:OD2	2.26	0.68
1:B:577:ARG:HG3	1:B:584:ILE:HD13	1.76	0.67
1:B:206:LYS:HG2	1:B:223:LEU:HD12	1.77	0.67
1:B:425:LEU:HD12	1:B:426:PRO:HD2	1.76	0.66
1:C:131:CYS:SG	1:C:167:THR:N	2.63	0.66
1:B:394:ASN:HD22	1:B:396:TYR:HE1	1.45	0.64
1:A:574:ASP:HA	1:A:587:ILE:HB	1.80	0.64
1:A:328:ARG:HH21	1:A:580:GLN:HB2	1.63	0.62
1:A:119:ILE:HG12	1:A:128:ILE:HG23	1.81	0.62
1:A:153:MET:HE1	1:A:155:SER:HB3	1.81	0.62
1:B:1116:THR:HG23	1:B:1118:ASP:H	1.65	0.62
1:A:1141:LEU:HD11	1:B:1141:LEU:HD12	1.81	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:667:GLY:HA2	1:B:864:LEU:HA	1.82	0.61
1:C:142:GLY:HA3	1:C:156:GLU:HB2	1.83	0.61
1:B:642:VAL:HG22	1:B:651:ILE:HG13	1.83	0.61
1:C:126:VAL:HB	1:C:172:SER:HB3	1.82	0.61
3:L:94:TYR:HE1	3:L:97:SER:H	1.49	0.60
3:G:36:TRP:HB2	3:G:49:ILE:HB	1.81	0.60
1:B:97:LYS:HB2	1:B:186:PHE:HA	1.83	0.60
1:C:738:CYS:HB3	1:C:742:ILE:HD12	1.84	0.60
1:C:742:ILE:O	1:C:1000:ARG:NH1	2.34	0.60
3:G:86:GLU:HB2	3:G:108:THR:HA	1.83	0.59
1:A:128:ILE:HG13	1:A:170:TYR:HD2	1.66	0.59
1:C:951:VAL:O	1:C:955:ASN:ND2	2.36	0.59
1:C:1082:CYS:HB2	1:C:1132:ILE:HG12	1.84	0.59
1:B:142:GLY:HA3	1:B:156:GLU:HB2	1.85	0.59
1:B:425:LEU:HD11	1:B:429:PHE:CD1	2.38	0.59
1:C:130:VAL:O	1:C:167:THR:OG1	2.21	0.58
1:C:901:GLN:HG2	1:C:905:ARG:HE	1.68	0.58
1:B:596:SER:HB2	1:B:611:LEU:HB3	1.86	0.58
1:B:21:ARG:NH2	1:B:79:PHE:O	2.37	0.57
1:C:66:HIS:HB3	1:C:78:ARG:HG2	1.85	0.57
2:F:40:ALA:HB3	2:F:43:LYS:HB2	1.85	0.57
1:A:32:PHE:HB3	1:A:218:GLN:HG3	1.85	0.57
1:B:474:GLN:OE1	1:B:474:GLN:N	2.36	0.57
1:B:236:THR:HG23	1:B:237:ARG:HG3	1.86	0.57
1:B:566:GLY:HA3	1:B:575:ALA:HB3	1.87	0.57
1:A:126:VAL:HB	1:A:172:SER:HB3	1.85	0.57
1:B:317:ASN:HA	1:B:594:GLY:HA2	1.87	0.57
2:H:19:ARG:NH1	2:H:20:LEU:O	2.38	0.57
1:A:780:GLU:O	1:A:784:GLN:NE2	2.39	0.56
1:A:714:ILE:HD11	1:A:1096:VAL:HG11	1.87	0.56
1:A:753:LEU:HD23	1:A:756:TYR:HB2	1.87	0.56
1:B:138:ASP:OD1	1:B:138:ASP:N	2.38	0.56
1:A:317:ASN:HA	1:A:594:GLY:HA2	1.86	0.56
1:B:32:PHE:HB3	1:B:218:GLN:HG3	1.87	0.56
1:C:21:ARG:NH2	1:C:79:PHE:O	2.39	0.56
1:A:108:THR:HA	1:A:236:THR:HG22	1.88	0.56
1:B:170:TYR:CE2	1:B:172:SER:HB3	2.41	0.56
1:B:134:GLN:HB2	1:B:161:SER:HB2	1.88	0.56
1:C:117:LEU:HB2	1:C:130:VAL:HG13	1.88	0.56
1:A:97:LYS:HB2	1:A:186:PHE:HA	1.88	0.55
1:B:395:VAL:HG12	1:B:524:VAL:HG21	1.88	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:780:GLU:O	1:C:784:GLN:NE2	2.39	0.55
1:C:159:VAL:HG23	1:C:160:TYR:HD1	1.72	0.55
1:C:317:ASN:HA	1:C:594:GLY:HA2	1.89	0.55
1:C:731:MET:HG2	1:C:774:GLN:HE22	1.70	0.55
1:C:617:CYS:N	1:C:649:CYS:SG	2.80	0.55
1:B:905:ARG:NH1	1:B:1049:LEU:O	2.39	0.54
1:B:401:VAL:HG22	1:B:509:ARG:HG2	1.90	0.54
1:A:246:ARG:HH22	1:A:254:SER:HB3	1.73	0.54
1:A:708:SER:HB3	1:A:711:SER:HB3	1.90	0.54
1:B:444:LYS:NZ	1:B:447:GLY:O	2.38	0.54
1:C:129:LYS:HZ3	1:C:169:GLU:HG3	1.71	0.54
1:C:395:VAL:HG23	1:C:524:VAL:HG21	1.89	0.54
3:L:48:VAL:HG22	3:L:49:ILE:HG12	1.88	0.54
1:B:426:PRO:HD3	1:B:463:PRO:HB3	1.89	0.53
1:A:976:VAL:HG22	1:A:978:ASN:H	1.73	0.53
1:B:1049:LEU:HD11	1:B:1067:TYR:HB2	1.90	0.53
2:H:51:ILE:HD12	2:H:70:ILE:HG23	1.90	0.53
1:B:1047:TYR:HB2	1:B:1067:TYR:HB3	1.90	0.53
1:B:479:PRO:HD2	3:G:54:GLN:HA	1.90	0.53
1:B:976:VAL:HG22	1:B:978:ASN:H	1.74	0.53
1:C:40:ASP:N	1:C:40:ASP:OD1	2.41	0.53
1:C:102:ARG:HG3	1:C:141:LEU:HG	1.91	0.53
1:B:1028:LYS:NZ	1:B:1042:PHE:O	2.42	0.52
1:C:990:GLU:HA	1:C:993:ILE:HD12	1.91	0.52
1:B:969:ASN:ND2	1:B:972:ALA:O	2.43	0.52
1:B:1084:ASP:N	1:B:1084:ASP:OD1	2.43	0.52
1:B:552:LEU:HD13	1:B:585:LEU:HD13	1.91	0.52
2:H:52:LYS:O	2:H:72:ARG:NH1	2.43	0.52
3:L:51:GLU:C	3:L:53:ASN:H	2.17	0.52
1:A:133:PHE:HB2	1:A:135:PHE:CE1	2.45	0.52
1:B:566:GLY:HA2	1:C:43:PHE:CD2	2.44	0.52
1:A:78:ARG:HE	1:A:80:ASP:HB2	1.74	0.52
1:A:1030:SER:HB3	1:C:1041:ASP:HB3	1.92	0.52
1:C:374:PHE:HA	1:C:436:TRP:HB3	1.90	0.52
2:F:52:LYS:HG2	2:F:53:GLN:OE1	2.09	0.52
1:C:976:VAL:HG22	1:C:978:ASN:H	1.74	0.52
1:A:858:LEU:HD13	1:A:959:LEU:HG	1.90	0.52
1:B:702:GLU:HG2	1:C:788:ILE:HD11	1.90	0.52
1:A:273:ARG:NH1	1:A:290:ASP:OD2	2.43	0.51
2:H:51:ILE:HD11	2:H:58:LYS:HE3	1.92	0.51
1:A:47:VAL:HG22	1:C:569:ILE:HD13	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:34:ARG:NH1	1:C:217:PRO:O	2.44	0.51
1:C:498:GLN:HB2	1:C:501:ASN:HB3	1.91	0.51
1:C:691:SER:OG	1:C:692:ILE:N	2.43	0.51
1:A:444:LYS:NZ	1:A:447:GLY:O	2.36	0.51
1:C:97:LYS:HB2	1:C:186:PHE:HA	1.92	0.51
1:C:574:ASP:HA	1:C:587:ILE:HB	1.93	0.51
1:A:792:PRO:HG3	1:C:707:TYR:HD2	1.75	0.51
1:A:897:PRO:HA	1:C:707:TYR:HE1	1.76	0.51
1:C:80:ASP:OD1	1:C:80:ASP:N	2.44	0.51
2:F:39:GLN:HB3	2:F:45:LEU:HD23	1.93	0.51
2:H:104:TRP:HB3	3:L:33:TYR:HD1	1.75	0.51
1:A:617:CYS:N	1:A:649:CYS:SG	2.84	0.50
1:C:1080:ALA:HB3	1:C:1129:VAL:HG11	1.94	0.50
1:B:425:LEU:HD12	1:B:426:PRO:CD	2.41	0.50
1:A:1028:LYS:NZ	1:A:1042:PHE:O	2.44	0.50
1:C:763:LEU:HD22	1:C:1008:VAL:HG21	1.94	0.50
1:C:922:LEU:HD11	4:S:1:NAG:H3	1.93	0.50
1:C:298:GLU:HG2	1:C:315:THR:HB	1.94	0.50
3:G:2:PHE:HD1	3:G:26:SER:HB3	1.76	0.50
1:B:334:ASN:HA	1:B:362:VAL:HB	1.93	0.49
1:B:92:PHE:HB3	1:B:192:PHE:HB2	1.94	0.49
1:A:130:VAL:HG11	1:A:231:ILE:HD12	1.93	0.49
1:B:66:HIS:HB2	1:B:78:ARG:HG2	1.95	0.49
1:C:948:LEU:HD21	1:C:1059:GLY:HA3	1.93	0.49
1:C:129:LYS:NZ	1:C:169:GLU:HG3	2.27	0.49
1:C:372:ALA:HB2	2:F:33:TRP:HH2	1.77	0.49
1:B:903:ALA:HB1	1:B:913:GLN:HB2	1.94	0.49
2:F:52:LYS:O	2:F:72:ARG:NH1	2.45	0.49
1:A:159:VAL:HG23	1:A:160:TYR:HD1	1.78	0.49
1:B:327:VAL:HA	1:B:542:ASN:HB2	1.95	0.49
1:B:689:SER:OG	1:B:690:GLN:N	2.44	0.49
1:B:777:ASN:O	1:B:781:VAL:HG12	2.12	0.49
1:C:92:PHE:O	1:C:192:PHE:N	2.43	0.49
1:A:363:ALA:N	1:A:525:CYS:O	2.44	0.49
1:C:172:SER:OG	1:C:173:GLN:N	2.46	0.49
1:B:406:GLU:HG3	1:B:418:ILE:HG13	1.95	0.48
1:B:431:GLY:HA2	1:B:515:PHE:CD1	2.48	0.48
1:C:212:LEU:HD21	1:C:215:ASP:HB3	1.95	0.48
1:C:381:GLY:HA3	1:C:430:THR:HA	1.95	0.48
1:C:805:ILE:HB	1:C:878:LEU:HD11	1.94	0.48
1:B:34:ARG:NH1	1:B:191:GLU:OE2	2.45	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:481:ASN:ND2	3:G:63:PHE:O	2.46	0.48
1:C:822:LEU:HD21	1:C:938:LEU:HD21	1.94	0.48
1:A:332:ILE:HD13	1:A:528:LYS:H	1.78	0.48
1:C:804:GLN:OE1	1:C:935:GLN:NE2	2.42	0.48
1:A:381:GLY:HA3	1:A:430:THR:HA	1.95	0.48
1:A:689:SER:OG	1:A:690:GLN:N	2.45	0.48
1:A:1094:VAL:HG23	1:B:900:MET:HE1	1.96	0.48
1:B:880:GLY:O	1:B:884:SER:OG	2.25	0.48
2:H:37:VAL:HG13	2:H:95:TYR:HB2	1.94	0.48
3:G:8:HIS:O	3:G:106:GLN:N	2.47	0.48
1:A:88:ASP:N	1:A:88:ASP:OD1	2.42	0.48
1:B:394:ASN:OD1	1:B:394:ASN:N	2.47	0.47
1:B:206:LYS:HD2	1:B:223:LEU:HA	1.97	0.47
1:B:552:LEU:HD22	1:B:585:LEU:HB3	1.96	0.47
1:A:374:PHE:HA	1:A:436:TRP:HB3	1.96	0.47
1:B:80:ASP:N	1:B:80:ASP:OD1	2.47	0.47
1:B:855:PHE:HB2	1:B:858:LEU:HD12	1.96	0.47
1:C:334:ASN:OD1	1:C:334:ASN:N	2.48	0.47
1:B:560:LEU:O	1:B:577:ARG:NH2	2.48	0.47
1:B:663:ASP:OD1	1:B:663:ASP:N	2.48	0.47
1:B:951:VAL:O	1:B:955:ASN:ND2	2.48	0.47
1:C:609:ALA:HB2	1:C:692:ILE:HD12	1.96	0.47
1:C:985:ASP:OD1	1:C:985:ASP:N	2.47	0.47
1:B:709:ASN:OD1	1:B:709:ASN:N	2.44	0.47
1:C:909:ILE:HD13	1:C:1049:LEU:HD21	1.97	0.47
1:C:909:ILE:HG13	1:C:911:VAL:HG23	1.96	0.47
2:H:97:ALA:HB1	2:H:107:VAL:HG13	1.95	0.47
1:B:64:TRP:CZ2	1:B:214:ARG:HD3	2.50	0.47
3:G:95:ASP:OD1	3:G:95:ASP:N	2.39	0.47
1:C:444:LYS:NZ	1:C:447:GLY:O	2.36	0.47
1:B:159:VAL:HG23	1:B:160:TYR:CD2	2.50	0.46
1:C:106:PHE:HB3	1:C:235:ILE:HG21	1.96	0.46
1:A:963:VAL:HG11	1:C:570:ALA:HB1	1.97	0.46
1:C:105:ILE:HG13	1:C:239:GLN:HB3	1.97	0.46
1:B:412:PRO:HB3	1:B:425:LEU:HG	1.97	0.46
1:B:92:PHE:O	1:B:192:PHE:N	2.41	0.46
1:C:403:ARG:HG3	1:C:405:ASP:H	1.81	0.46
1:B:566:GLY:HA2	1:C:43:PHE:HD2	1.79	0.46
2:F:8:GLY:HA3	2:F:20:LEU:HG	1.97	0.46
1:A:92:PHE:O	1:A:192:PHE:N	2.41	0.46
1:C:689:SER:OG	1:C:690:GLN:N	2.48	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:886:TRP:HB3	1:C:1035:GLY:HA2	1.97	0.46
2:F:35:SER:HB2	2:F:97:ALA:HB3	1.98	0.46
1:B:108:THR:HA	1:B:236:THR:HG22	1.98	0.46
1:C:236:THR:HG23	1:C:237:ARG:HG3	1.98	0.46
1:A:869:MET:HB3	1:C:699:LEU:HD21	1.97	0.46
1:A:91:TYR:O	1:A:268:GLY:N	2.41	0.46
1:B:1091:ARG:NH1	1:B:1118:ASP:O	2.49	0.45
2:H:104:TRP:HB3	3:L:33:TYR:CD1	2.52	0.45
1:A:424:LYS:HG3	1:A:463:PRO:HG3	1.98	0.45
1:C:103:GLY:HA3	1:C:120:VAL:HA	1.99	0.45
1:C:332:ILE:HD12	1:C:362:VAL:HG11	1.98	0.45
1:A:427:ASP:N	1:A:427:ASP:OD1	2.50	0.45
1:B:742:ILE:HD11	1:B:997:ILE:HG23	1.99	0.45
1:A:138:ASP:OD1	1:A:138:ASP:N	2.47	0.45
1:A:201:PHE:C	1:A:202:LYS:HD3	2.41	0.45
1:C:364:ASP:OD1	1:C:366:SER:OG	2.33	0.45
1:A:98:SER:HB3	1:A:181:GLY:HA2	1.99	0.45
1:A:901:GLN:HG2	1:A:905:ARG:HE	1.82	0.45
1:C:808:ASP:OD1	1:C:808:ASP:N	2.50	0.45
1:A:24:LEU:HB2	1:A:78:ARG:HH11	1.80	0.45
1:A:374:PHE:O	3:L:94:TYR:OH	2.35	0.45
1:C:1028:LYS:NZ	1:C:1042:PHE:O	2.50	0.45
1:A:281:GLU:HG3	5:A:1305:NAG:H62	1.98	0.44
1:A:742:ILE:HD11	1:A:997:ILE:HA	1.99	0.44
1:A:930:ALA:O	1:A:934:ILE:HG22	2.17	0.44
1:C:730:SER:OG	1:C:731:MET:N	2.51	0.44
1:B:326:ILE:HG23	1:B:539:VAL:HG11	1.97	0.44
1:B:452:LEU:HD12	1:B:492:LEU:HG	1.99	0.44
1:B:369:TYR:HB3	1:B:377:PHE:HE1	1.81	0.44
1:C:117:LEU:HD11	1:C:119:ILE:HG13	1.98	0.44
2:F:6:GLU:OE1	2:F:112:GLN:NE2	2.51	0.44
1:A:808:ASP:OD1	1:A:808:ASP:N	2.41	0.44
1:B:461:LEU:HD12	1:B:461:LEU:HA	1.88	0.44
1:C:427:ASP:OD1	1:C:427:ASP:N	2.50	0.44
2:H:8:GLY:HA3	2:H:20:LEU:HA	1.98	0.44
3:L:38:GLN:HE21	3:L:40:ARG:HH22	1.66	0.44
1:B:179:LEU:HD23	1:B:179:LEU:HA	1.87	0.44
3:G:40:ARG:HE	3:G:87:ALA:HB2	1.82	0.44
1:B:490:PHE:HD1	1:B:491:PRO:HD2	1.82	0.44
1:C:366:SER:HA	1:C:369:TYR:CZ	2.53	0.44
3:L:8:HIS:HA	3:L:105:THR:HA	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:567:ARG:HG3	1:B:568:ASP:H	1.83	0.44
1:B:617:CYS:N	1:B:649:CYS:SG	2.90	0.44
3:L:39:GLN:HA	3:L:45:PRO:HA	1.99	0.44
1:B:406:GLU:HA	1:B:409:GLN:HG3	2.00	0.43
1:C:709:ASN:OD1	1:C:709:ASN:N	2.50	0.43
1:C:867:ASP:N	1:C:867:ASP:OD1	2.51	0.43
3:G:38:GLN:N	3:G:38:GLN:OE1	2.51	0.43
1:B:427:ASP:OD1	1:B:427:ASP:N	2.51	0.43
1:B:600:PRO:HG2	1:B:605:SER:HB2	2.00	0.43
1:B:728:PRO:O	1:B:1021:SER:OG	2.30	0.43
1:C:1047:TYR:HB2	1:C:1067:TYR:HB3	2.01	0.43
1:A:880:GLY:O	1:A:884:SER:OG	2.33	0.43
1:B:353:TRP:CZ2	1:B:466:ARG:HB3	2.53	0.43
2:F:91:THR:HG22	2:F:118:VAL:H	1.83	0.43
1:C:930:ALA:O	1:C:934:ILE:HG22	2.19	0.43
1:A:403:ARG:HG3	1:A:405:ASP:H	1.83	0.43
1:B:417:LYS:O	1:B:421:TYR:HB2	2.18	0.43
1:C:642:VAL:HG22	1:C:651:ILE:HG12	2.00	0.43
3:G:60:PRO:HD2	3:G:63:PHE:HE2	1.84	0.43
1:C:528:LYS:HA	1:C:528:LYS:HD3	1.68	0.43
1:C:959:LEU:HD12	1:C:959:LEU:HA	1.86	0.43
1:A:66:HIS:HB3	1:A:78:ARG:HG2	2.01	0.43
1:A:490:PHE:HD1	1:A:491:PRO:HD2	1.84	0.43
1:A:1013:ILE:HD13	1:B:1012:LEU:HD13	2.01	0.43
1:A:1047:TYR:HB2	1:A:1067:TYR:HB3	1.99	0.43
1:B:212:LEU:HD12	1:B:212:LEU:HA	1.88	0.43
1:B:768:THR:O	1:B:772:VAL:HG23	2.18	0.43
2:H:40:ALA:HB3	2:H:43:LYS:HB2	2.00	0.43
1:C:816:SER:OG	1:C:819:GLU:OE2	2.29	0.43
1:A:127:VAL:HG12	1:A:171:VAL:HG22	2.01	0.43
1:B:1086:LYS:HB2	1:B:1086:LYS:HE2	1.80	0.43
1:C:95:THR:HA	1:C:189:LEU:HA	2.01	0.43
1:C:139:PRO:HB3	1:C:159:VAL:HA	2.00	0.43
1:C:697:MET:H	1:C:697:MET:HG2	1.57	0.43
2:H:47:TRP:HB2	3:L:101:PHE:HE1	1.84	0.43
3:G:56:PRO:HD2	3:G:59:VAL:HG21	2.00	0.43
1:A:24:LEU:HB2	1:A:78:ARG:HD3	2.01	0.42
1:A:498:GLN:HB2	1:A:501:ASN:HB3	2.01	0.42
1:B:470:THR:HG21	1:B:492:LEU:HD22	2.01	0.42
1:B:1041:ASP:HB3	1:C:1030:SER:HB3	2.01	0.42
1:A:117:LEU:HD21	1:A:119:ILE:HG13	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:245:HIS:HB2	1:B:259:THR:HG23	2.01	0.42
1:B:363:ALA:N	1:B:525:CYS:O	2.50	0.42
1:A:106:PHE:HB2	1:A:117:LEU:HB3	2.00	0.42
1:B:962:LEU:HD23	1:B:962:LEU:HA	1.91	0.42
1:C:34:ARG:HH22	1:C:217:PRO:HD2	1.83	0.42
1:C:490:PHE:HD1	1:C:491:PRO:HD2	1.84	0.42
1:B:825:LYS:HD2	1:B:825:LYS:HA	1.81	0.42
1:A:276:LEU:HB3	1:A:289:VAL:HG23	2.01	0.42
1:A:713:ALA:HB3	1:B:894:LEU:HB3	2.01	0.42
1:B:886:TRP:HB3	1:B:1035:GLY:HA2	2.01	0.42
1:C:133:PHE:HB2	1:C:135:PHE:CZ	2.54	0.42
1:C:226:LEU:HD12	1:C:226:LEU:HA	1.78	0.42
1:C:805:ILE:HD12	1:C:878:LEU:HD21	2.00	0.42
1:B:197:ILE:HD12	1:B:197:ILE:HA	1.87	0.42
1:C:119:ILE:HG12	1:C:128:ILE:HG12	2.02	0.42
1:C:727:LEU:HD23	1:C:727:LEU:HA	1.91	0.42
1:A:662:CYS:HB2	1:A:671:CYS:HB2	1.74	0.42
1:A:709:ASN:OD1	1:A:709:ASN:N	2.51	0.42
1:B:332:ILE:HG23	1:B:362:VAL:HG22	2.00	0.42
1:B:730:SER:OG	1:B:731:MET:N	2.53	0.42
3:L:37:TYR:HE2	3:L:92:GLN:HG3	1.85	0.42
3:G:62:ARG:HH22	3:G:84:GLU:CD	2.28	0.42
1:A:886:TRP:HB3	1:A:1035:GLY:HA2	2.01	0.42
1:A:663:ASP:OD1	1:A:663:ASP:N	2.44	0.42
1:C:418:ILE:HA	1:C:422:ASN:HB2	2.01	0.42
2:H:36:TRP:HE1	2:H:79:LEU:HD22	1.85	0.42
1:C:24:LEU:HD12	1:C:78:ARG:HD3	2.02	0.41
2:H:22:CYS:HB3	2:H:79:LEU:HD13	2.01	0.41
1:A:388:ASN:HB3	1:A:527:PRO:HD2	2.02	0.41
1:A:106:PHE:HB3	1:A:235:ILE:HD12	2.02	0.41
1:A:401:VAL:O	1:A:451:TYR:OH	2.33	0.41
1:A:691:SER:OG	1:A:692:ILE:N	2.52	0.41
2:F:50:ASN:C	2:F:51:ILE:HD12	2.45	0.41
1:B:156:GLU:OE1	1:B:158:ARG:NE	2.43	0.41
1:C:57:PRO:HB3	1:C:273:ARG:NH1	2.35	0.41
3:L:60:PRO:HD2	3:L:63:PHE:HE2	1.84	0.41
1:B:336:CYS:N	1:B:361:CYS:HB2	2.36	0.41
1:C:37:TYR:HB3	1:C:223:LEU:HB2	2.02	0.41
2:H:19:ARG:NH1	2:H:80:TYR:HA	2.34	0.41
1:A:909:ILE:HG13	1:A:911:VAL:HG12	2.03	0.41
1:B:934:ILE:HG13	1:B:935:GLN:N	2.36	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:92:PHE:HB3	1:C:192:PHE:HB2	2.02	0.41
1:C:351:TYR:HA	1:C:454:ARG:NH2	2.35	0.41
1:C:553:THR:OG1	1:C:586:ASP:OD2	2.39	0.41
1:C:733:LYS:HB2	1:C:861:LEU:HB2	2.03	0.41
1:B:57:PRO:HB3	1:B:273:ARG:HH22	1.86	0.41
1:C:417:LYS:O	1:C:421:TYR:HB2	2.21	0.41
1:A:76:THR:OG1	1:A:77:LYS:N	2.54	0.41
1:B:452:LEU:HD13	1:B:493:GLN:C	2.46	0.41
1:B:598:ILE:HB	1:B:609:ALA:HB3	2.02	0.41
1:C:656:VAL:HG12	1:C:658:ASN:H	1.86	0.41
1:B:418:ILE:H	1:B:418:ILE:HG12	1.75	0.41
1:B:731:MET:HE2	1:B:774:GLN:HE22	1.86	0.41
1:B:745:ASP:OD2	1:B:745:ASP:N	2.54	0.41
1:C:76:THR:OG1	1:C:77:LYS:N	2.53	0.41
1:C:130:VAL:HG11	1:C:231:ILE:HG12	2.02	0.41
1:C:1105:THR:HG22	1:C:1112:PRO:HA	2.03	0.41
1:A:599:THR:HG22	1:A:601:GLY:H	1.86	0.41
1:A:757:GLY:O	1:A:761:THR:OG1	2.34	0.41
1:C:134:GLN:HB3	1:C:162:SER:H	1.86	0.41
1:C:276:LEU:HD23	1:C:289:VAL:HB	2.03	0.41
1:C:369:TYR:HB3	1:C:377:PHE:HE2	1.85	0.41
3:L:92:GLN:NE2	3:L:99:TRP:HB3	2.26	0.41
3:G:8:HIS:HA	3:G:105:THR:HA	2.02	0.41
3:G:64:SER:HB2	3:G:77:THR:OG1	2.21	0.41
1:A:102:ARG:HG3	1:A:141:LEU:HD12	2.02	0.40
1:A:173:GLN:H	1:A:173:GLN:HG3	1.70	0.40
1:B:564:GLN:HG2	1:B:577:ARG:HB3	2.02	0.40
2:F:54:ASP:OD1	2:F:54:ASP:N	2.52	0.40
1:A:563:GLN:NE2	1:B:42:VAL:O	2.54	0.40
1:A:805:ILE:HB	1:A:878:LEU:HD11	2.02	0.40
1:A:959:LEU:HA	1:A:959:LEU:HD12	1.87	0.40
1:B:210:ILE:HD12	1:B:210:ILE:HA	2.00	0.40
1:B:302:THR:HG21	1:B:315:THR:HG22	2.02	0.40
1:B:564:GLN:HG3	1:B:579:PRO:HG3	2.04	0.40
3:L:50:TYR:CE1	3:L:54:GLN:HB3	2.56	0.40
2:F:61:VAL:HG22	2:F:64:VAL:HG22	2.03	0.40
1:B:117:LEU:HD12	1:B:118:LEU:N	2.36	0.40
1:A:702:GLU:HG2	1:B:788:ILE:HD11	2.03	0.40
1:A:743:CYS:SG	1:A:753:LEU:HD12	2.61	0.40
1:B:246:ARG:HH22	1:B:254:SER:HB3	1.86	0.40
1:C:1073:LYS:HB3	1:C:1073:LYS:HE2	1.75	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:68:ILE:HG13	1:B:262:ALA:HA	2.04	0.40
1:C:759:PHE:O	1:C:763:LEU:HG	2.22	0.40
1:C:880:GLY:O	1:C:884:SER:OG	2.28	0.40
2:H:47:TRP:CG	3:L:99:TRP:HB2	2.56	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	1054/1278 (82%)	1020 (97%)	34 (3%)	0	100	100
1	B	1054/1278 (82%)	1019 (97%)	35 (3%)	0	100	100
1	C	1054/1278 (82%)	1016 (96%)	38 (4%)	0	100	100
2	F	117/243 (48%)	110 (94%)	7 (6%)	0	100	100
2	H	117/243 (48%)	109 (93%)	8 (7%)	0	100	100
3	G	108/240 (45%)	98 (91%)	10 (9%)	0	100	100
3	L	108/240 (45%)	100 (93%)	8 (7%)	0	100	100
All	All	3612/4800 (75%)	3472 (96%)	140 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	930/1106 (84%)	923 (99%)	7 (1%)	79	87
1	B	930/1106 (84%)	916 (98%)	14 (2%)	60	76
1	C	930/1106 (84%)	926 (100%)	4 (0%)	89	93
2	F	96/203 (47%)	96 (100%)	0	100	100
2	H	96/203 (47%)	96 (100%)	0	100	100
3	G	95/206 (46%)	95 (100%)	0	100	100
3	L	95/206 (46%)	92 (97%)	3 (3%)	34	59
All	All	3172/4136 (77%)	3144 (99%)	28 (1%)	74	86

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	128	ILE
1	A	129	LYS
1	A	130	VAL
1	A	166	CYS
1	A	167	THR
1	A	858	LEU
1	A	1141	LEU
1	B	229	LEU
1	B	385	THR
1	B	386	LYS
1	B	389	ASP
1	B	390	LEU
1	B	405	ASP
1	B	406	GLU
1	B	408	ARG
1	B	410	ILE
1	B	433	VAL
1	B	546	LEU
1	B	563	GLN
1	B	709	ASN
1	B	919	ASN
1	C	524	VAL
1	C	528	LYS
1	C	534	VAL
1	C	814	LYS
3	L	48	VAL
3	L	53	ASN
3	L	54	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (37) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	81	ASN
1	A	137	ASN
1	A	173	GLN
1	A	188	ASN
1	A	437	ASN
1	A	474	GLN
1	A	542	ASN
1	A	580	GLN
1	A	644	GLN
1	A	856	ASN
1	A	969	ASN
1	A	1048	HIS
1	A	1106	GLN
1	B	99	ASN
1	B	134	GLN
1	B	207	HIS
1	B	239	GLN
1	B	354	ASN
1	B	755	GLN
1	B	949	GLN
1	B	1058	HIS
1	C	134	GLN
1	C	437	ASN
1	C	493	GLN
1	C	613	GLN
1	C	655	HIS
1	C	919	ASN
1	C	1048	HIS
1	C	1058	HIS
2	H	77	ASN
2	H	84	ASN
3	L	38	GLN
3	L	92	GLN
2	F	3	GLN
2	F	74	ASN
2	F	77	ASN
2	F	84	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

30 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	NAG	D	1	4,1	14,14,15	0.41	0	17,19,21	0.69	0
4	NAG	D	2	4	14,14,15	0.23	0	17,19,21	0.48	0
4	NAG	E	1	4,1	14,14,15	0.22	0	17,19,21	0.44	0
4	NAG	E	2	4	14,14,15	0.24	0	17,19,21	0.43	0
4	NAG	I	1	4,1	14,14,15	0.24	0	17,19,21	0.44	0
4	NAG	I	2	4	14,14,15	0.25	0	17,19,21	0.42	0
4	NAG	J	1	4,1	14,14,15	0.21	0	17,19,21	0.45	0
4	NAG	J	2	4	14,14,15	0.29	0	17,19,21	0.41	0
4	NAG	K	1	4,1	14,14,15	0.23	0	17,19,21	0.45	0
4	NAG	K	2	4	14,14,15	0.27	0	17,19,21	0.44	0
4	NAG	M	1	4,1	14,14,15	0.29	0	17,19,21	0.48	0
4	NAG	M	2	4	14,14,15	0.28	0	17,19,21	0.45	0
4	NAG	N	1	4,1	14,14,15	0.23	0	17,19,21	0.44	0
4	NAG	N	2	4	14,14,15	0.26	0	17,19,21	0.43	0
4	NAG	O	1	4,1	14,14,15	0.25	0	17,19,21	0.51	0
4	NAG	O	2	4	14,14,15	0.26	0	17,19,21	0.42	0
4	NAG	P	1	4,1	14,14,15	0.22	0	17,19,21	0.44	0
4	NAG	P	2	4	14,14,15	0.27	0	17,19,21	0.42	0
4	NAG	Q	1	4,1	14,14,15	0.23	0	17,19,21	0.45	0
4	NAG	Q	2	4	14,14,15	0.26	0	17,19,21	0.41	0
4	NAG	R	1	4,1	14,14,15	0.24	0	17,19,21	0.43	0
4	NAG	R	2	4	14,14,15	0.30	0	17,19,21	0.44	0
4	NAG	S	1	4,1	14,14,15	0.23	0	17,19,21	0.44	0
4	NAG	S	2	4	14,14,15	0.27	0	17,19,21	0.42	0
4	NAG	T	1	4,1	14,14,15	0.23	0	17,19,21	0.44	0
4	NAG	T	2	4	14,14,15	0.27	0	17,19,21	0.42	0
4	NAG	U	1	4,1	14,14,15	0.21	0	17,19,21	0.43	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	NAG	U	2	4	14,14,15	0.26	0	17,19,21	0.43	0
4	NAG	V	1	4,1	14,14,15	0.22	0	17,19,21	0.46	0
4	NAG	V	2	4	14,14,15	0.25	0	17,19,21	0.43	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
4	NAG	D	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	D	2	4	-	1/6/23/26	0/1/1/1
4	NAG	E	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	E	2	4	-	2/6/23/26	0/1/1/1
4	NAG	I	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	I	2	4	-	2/6/23/26	0/1/1/1
4	NAG	J	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	J	2	4	-	2/6/23/26	0/1/1/1
4	NAG	K	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	K	2	4	-	2/6/23/26	0/1/1/1
4	NAG	M	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	M	2	4	-	2/6/23/26	0/1/1/1
4	NAG	N	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	N	2	4	-	2/6/23/26	0/1/1/1
4	NAG	O	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	O	2	4	-	2/6/23/26	0/1/1/1
4	NAG	P	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	P	2	4	-	2/6/23/26	0/1/1/1
4	NAG	Q	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	Q	2	4	-	2/6/23/26	0/1/1/1
4	NAG	R	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	R	2	4	-	2/6/23/26	0/1/1/1
4	NAG	S	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	S	2	4	-	2/6/23/26	0/1/1/1
4	NAG	T	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	T	2	4	-	2/6/23/26	0/1/1/1
4	NAG	U	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	U	2	4	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	V	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	V	2	4	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (43) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	O	1	NAG	O5-C5-C6-O6
4	P	2	NAG	C4-C5-C6-O6
4	K	2	NAG	O5-C5-C6-O6
4	Q	1	NAG	O5-C5-C6-O6
4	V	1	NAG	O5-C5-C6-O6
4	V	2	NAG	O5-C5-C6-O6
4	Q	2	NAG	O5-C5-C6-O6
4	U	2	NAG	C4-C5-C6-O6
4	I	1	NAG	O5-C5-C6-O6
4	V	2	NAG	C4-C5-C6-O6
4	E	2	NAG	O5-C5-C6-O6
4	M	2	NAG	O5-C5-C6-O6
4	K	2	NAG	C4-C5-C6-O6
4	O	1	NAG	C4-C5-C6-O6
4	Q	2	NAG	C4-C5-C6-O6
4	T	1	NAG	O5-C5-C6-O6
4	S	2	NAG	O5-C5-C6-O6
4	E	2	NAG	C4-C5-C6-O6
4	S	2	NAG	C4-C5-C6-O6
4	N	2	NAG	O5-C5-C6-O6
4	I	1	NAG	C4-C5-C6-O6
4	Q	1	NAG	C4-C5-C6-O6
4	J	2	NAG	O5-C5-C6-O6
4	V	1	NAG	C4-C5-C6-O6
4	R	2	NAG	O5-C5-C6-O6
4	T	1	NAG	C4-C5-C6-O6
4	P	2	NAG	O5-C5-C6-O6
4	D	1	NAG	C4-C5-C6-O6
4	N	2	NAG	C4-C5-C6-O6
4	K	1	NAG	O5-C5-C6-O6
4	T	2	NAG	C4-C5-C6-O6

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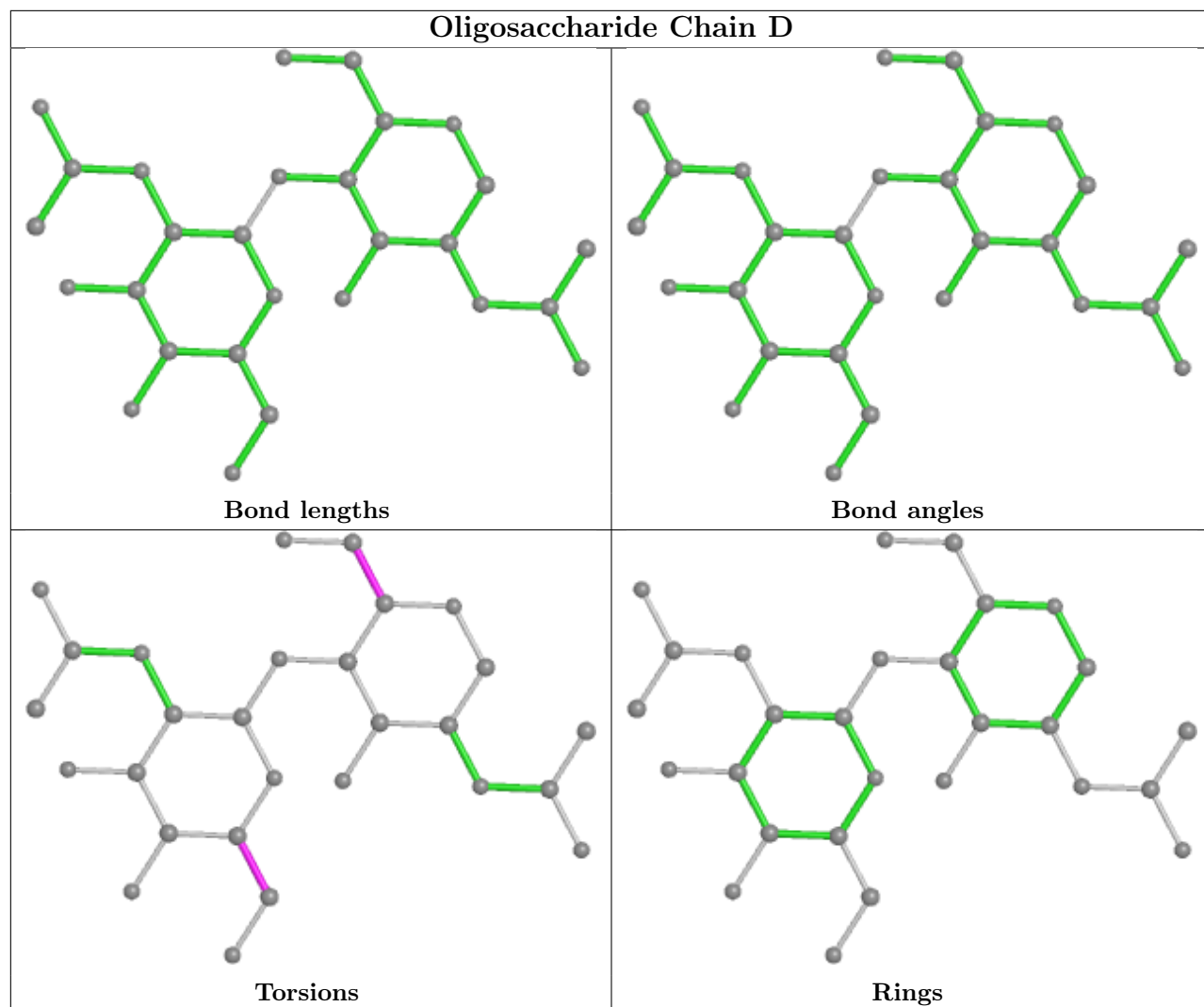
Mol	Chain	Res	Type	Atoms
4	U	2	NAG	O5-C5-C6-O6
4	K	1	NAG	C4-C5-C6-O6
4	O	2	NAG	C4-C5-C6-O6
4	D	2	NAG	O5-C5-C6-O6
4	J	2	NAG	C4-C5-C6-O6
4	D	1	NAG	O5-C5-C6-O6
4	T	2	NAG	O5-C5-C6-O6
4	O	2	NAG	O5-C5-C6-O6
4	M	2	NAG	C4-C5-C6-O6
4	I	2	NAG	C4-C5-C6-O6
4	R	2	NAG	C4-C5-C6-O6
4	I	2	NAG	O5-C5-C6-O6

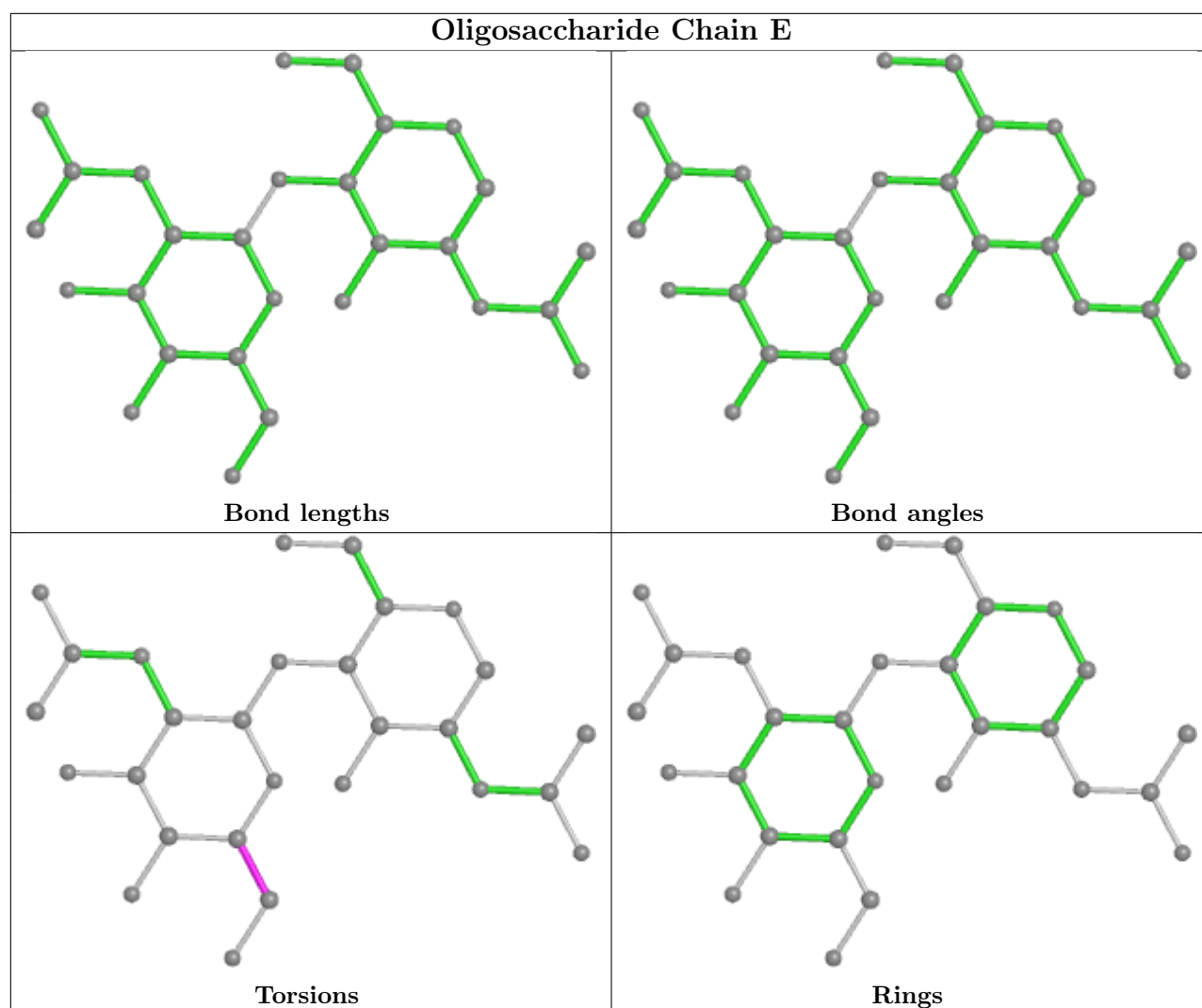
There are no ring outliers.

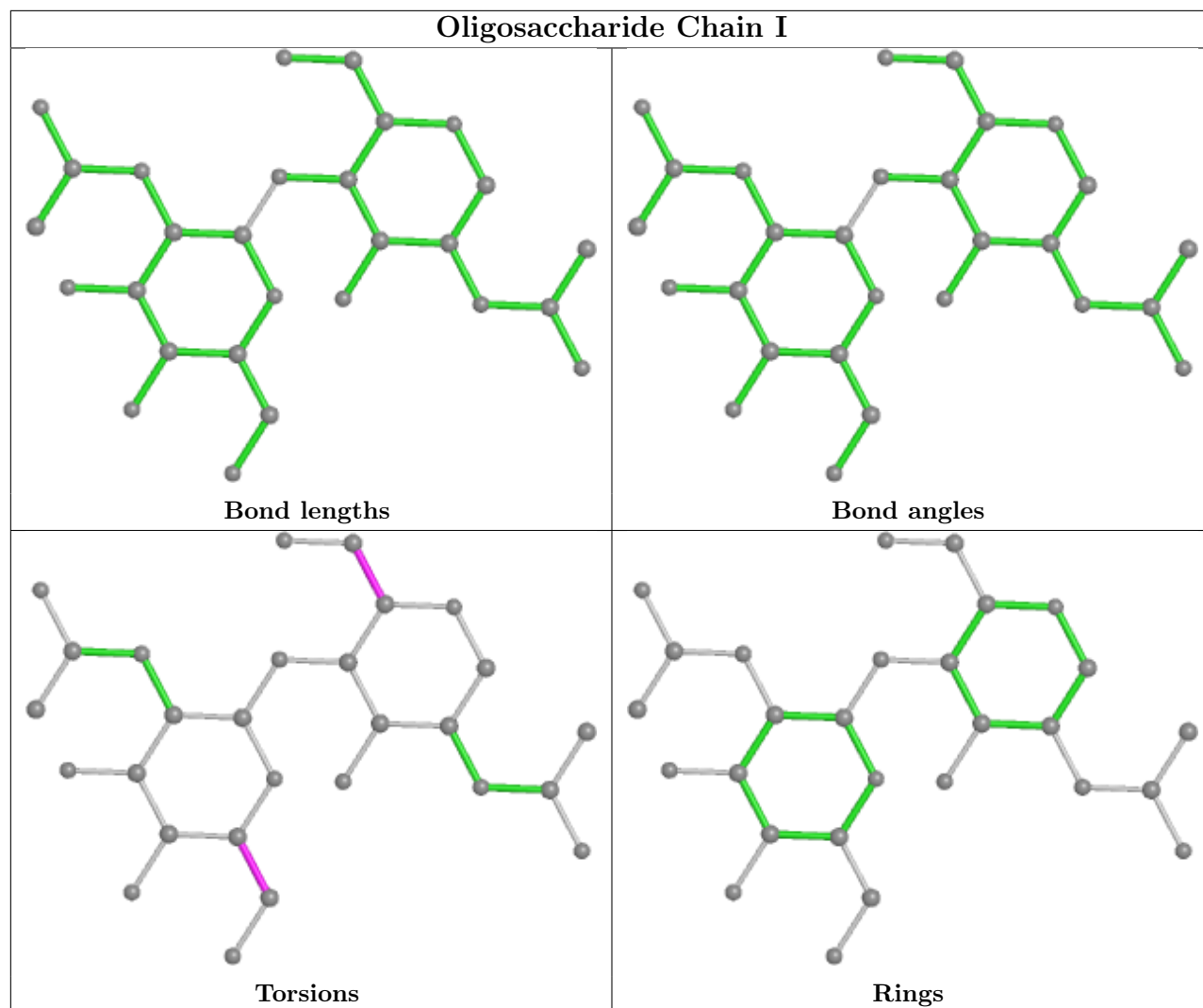
1 monomer is involved in 1 short contact:

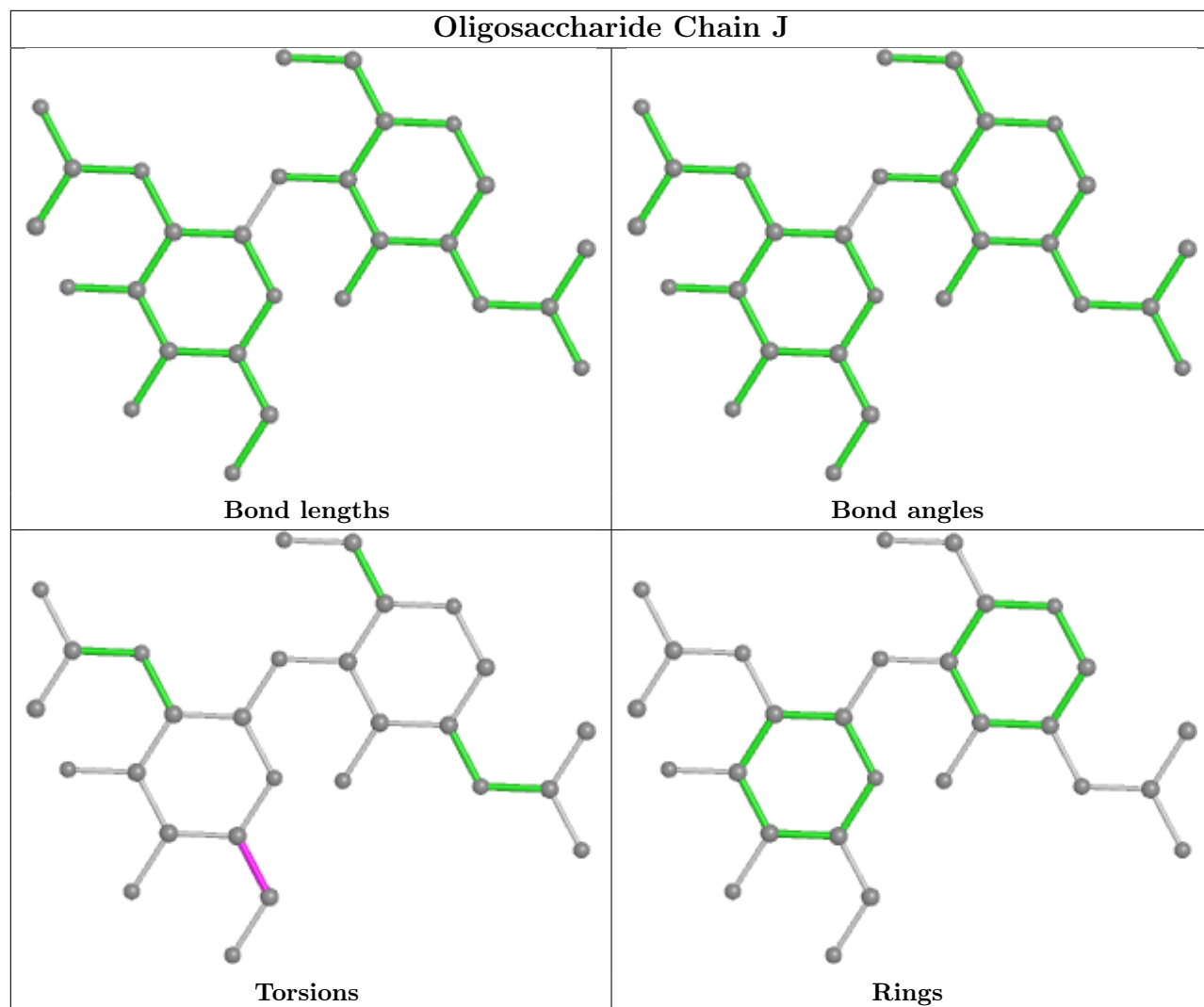
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	S	1	NAG	1	0

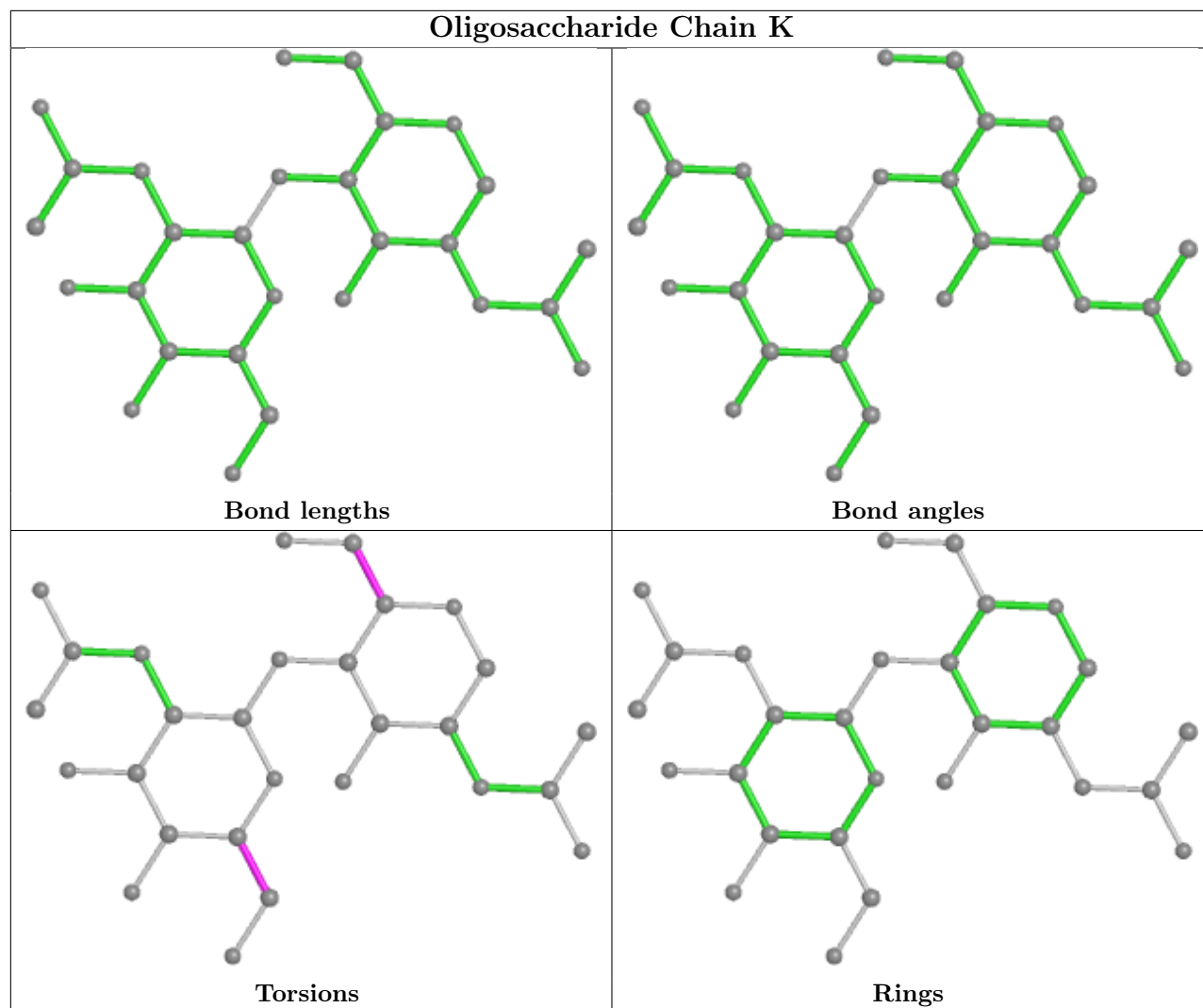
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

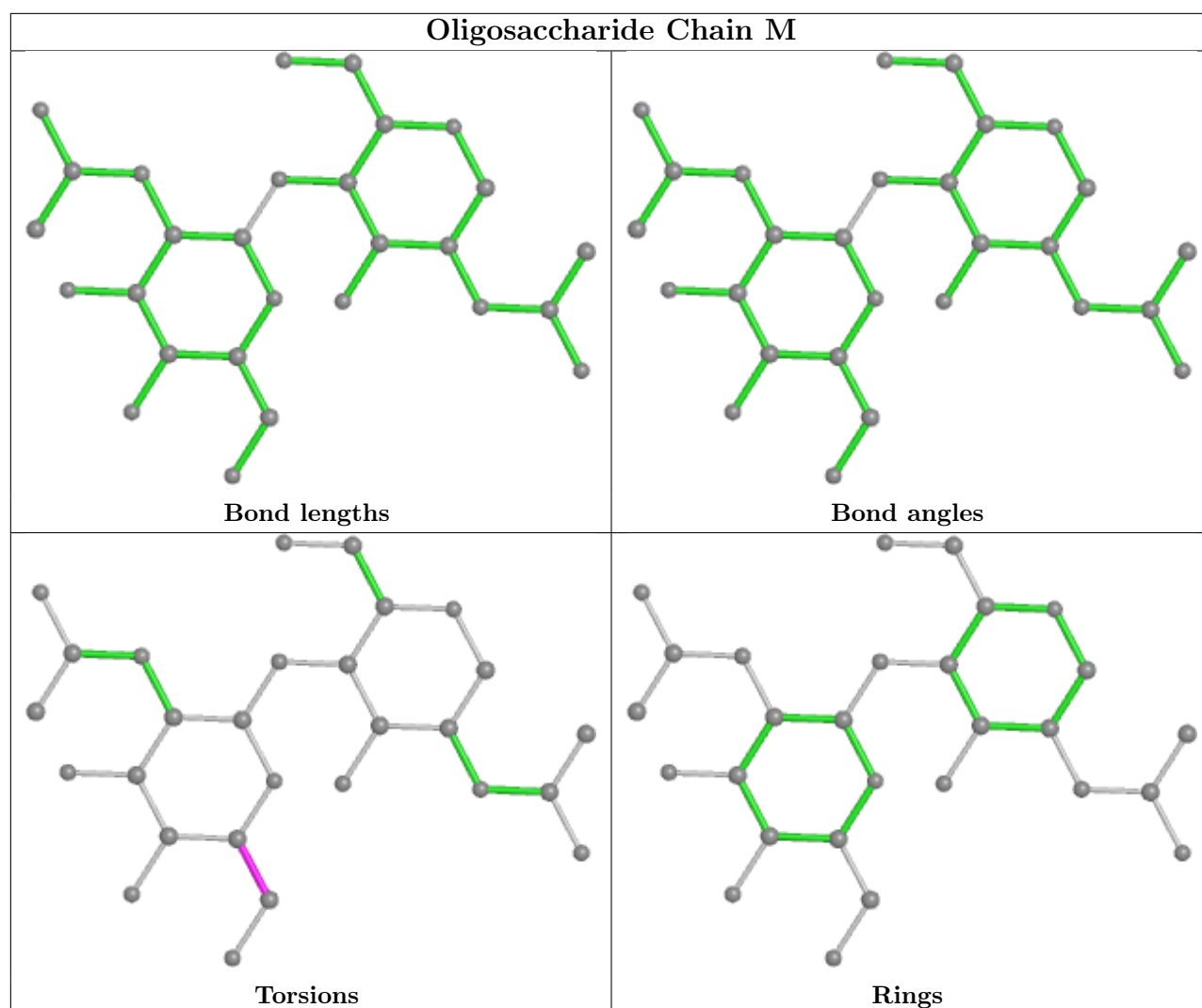


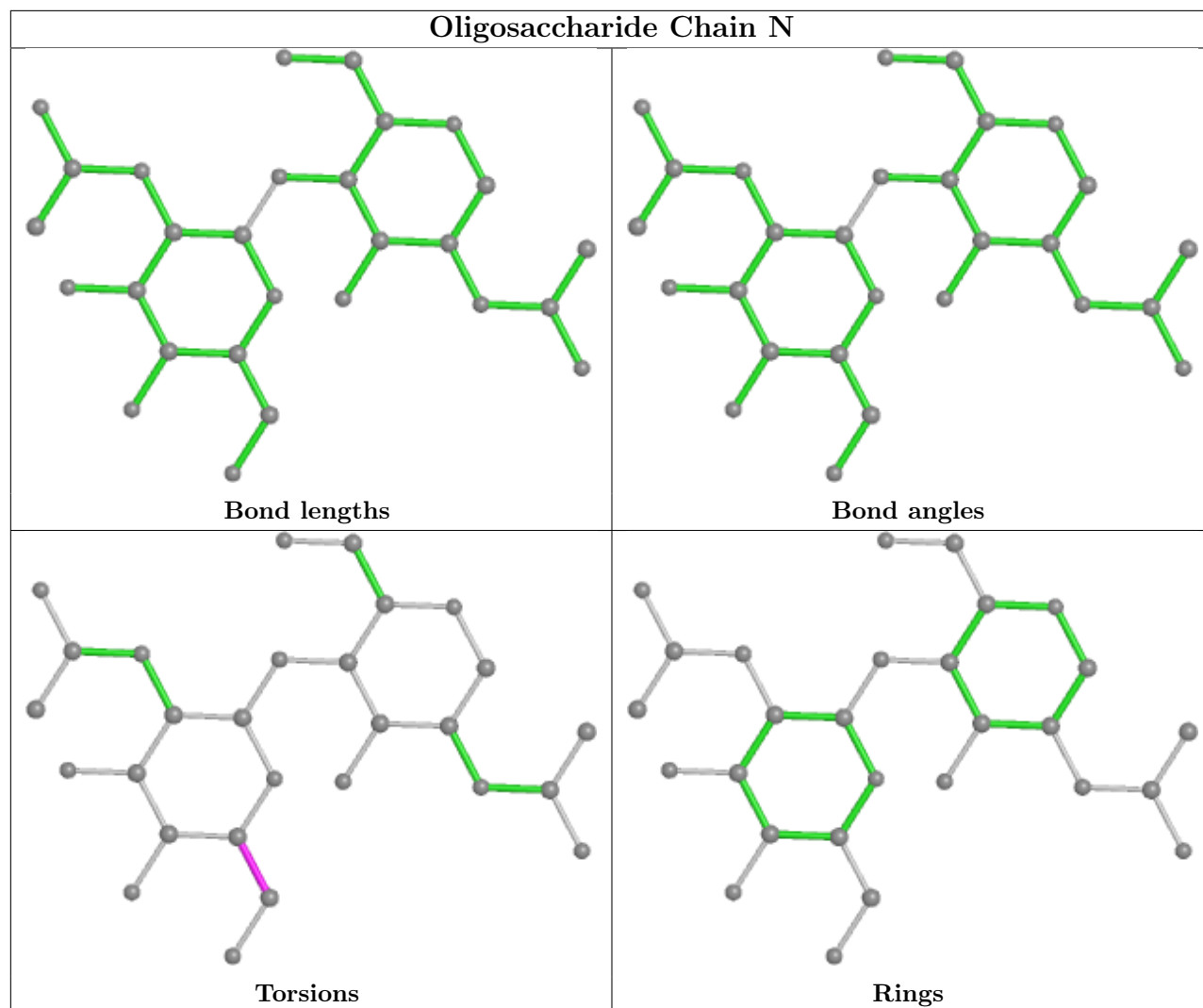


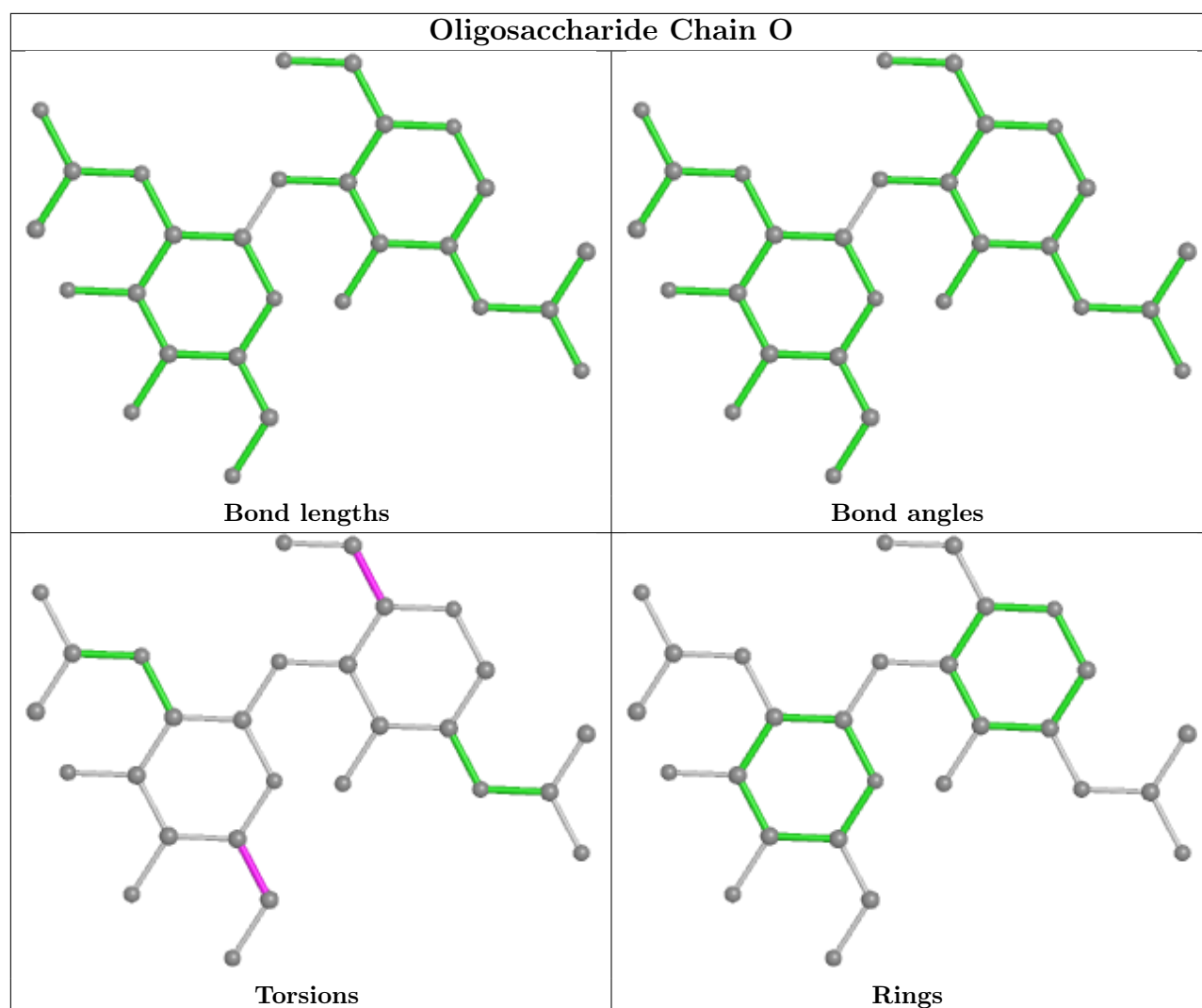


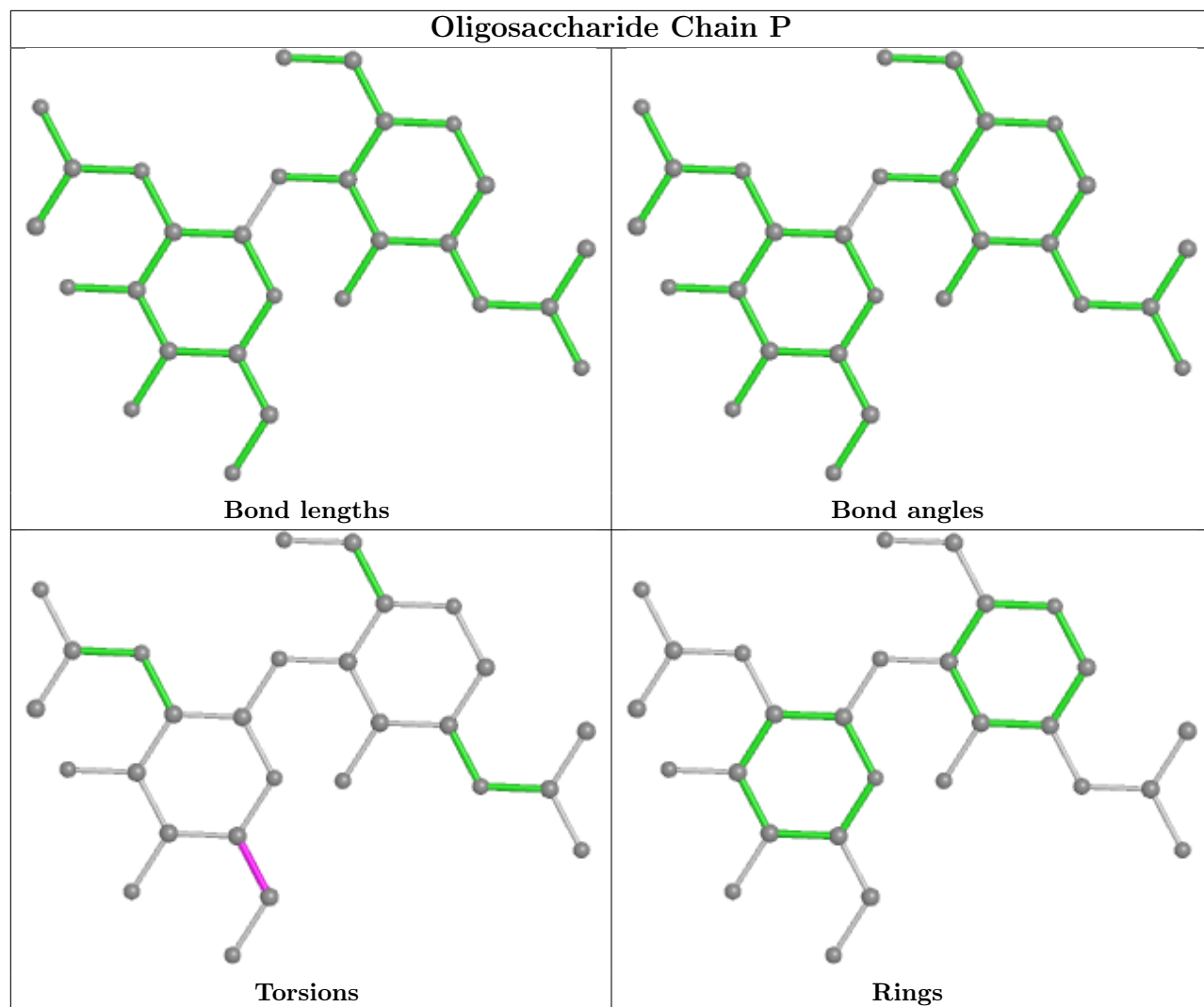


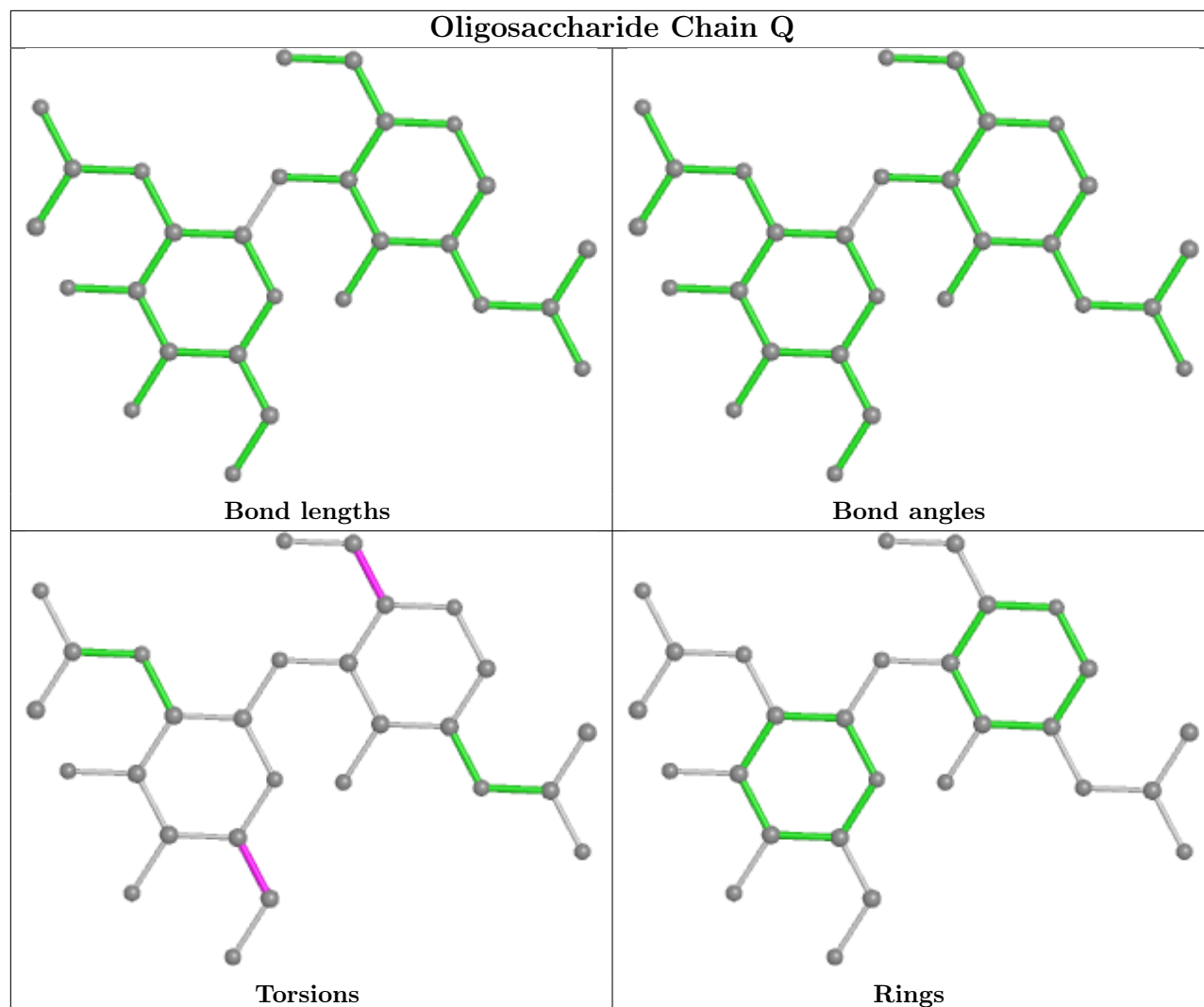


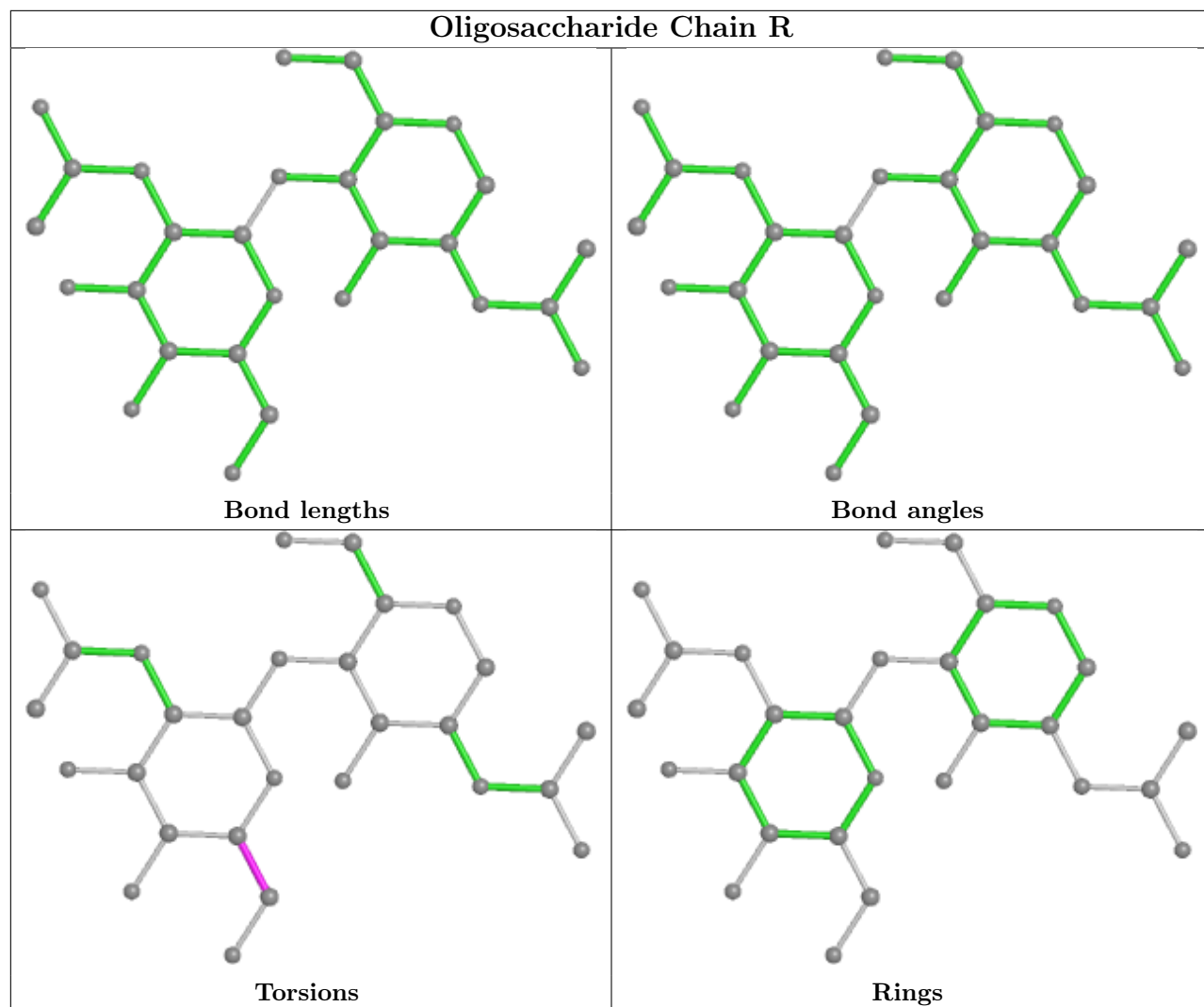


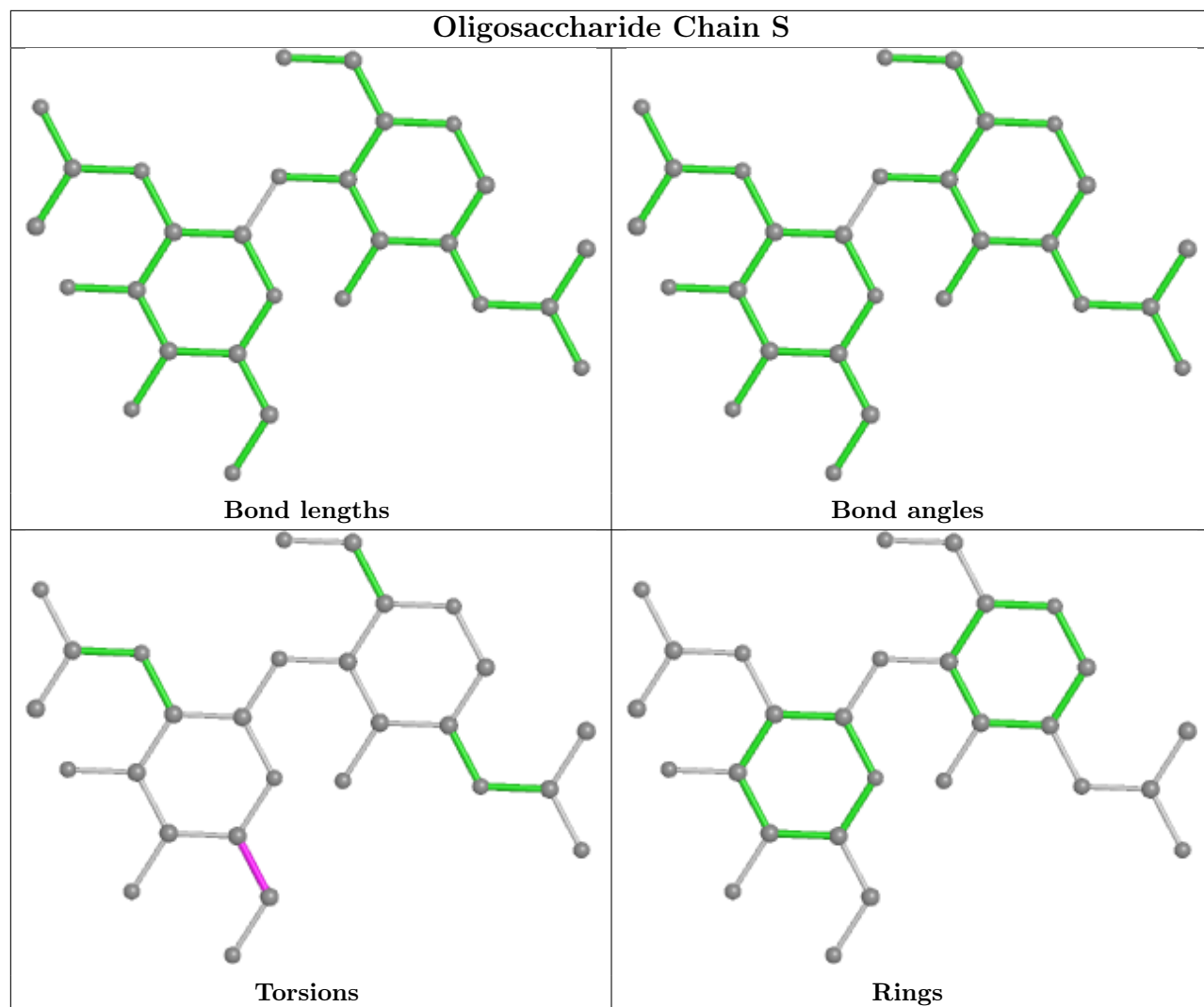


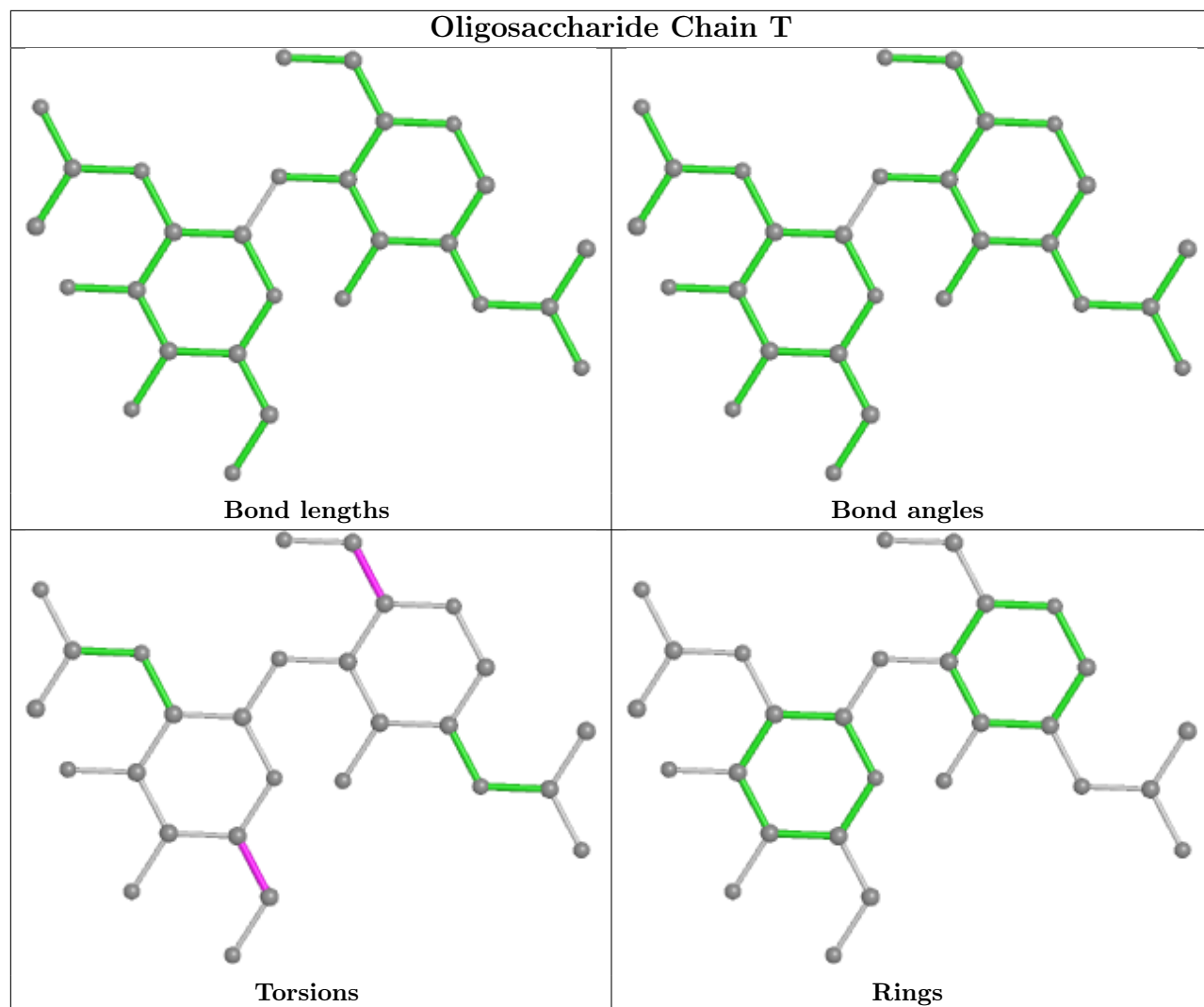


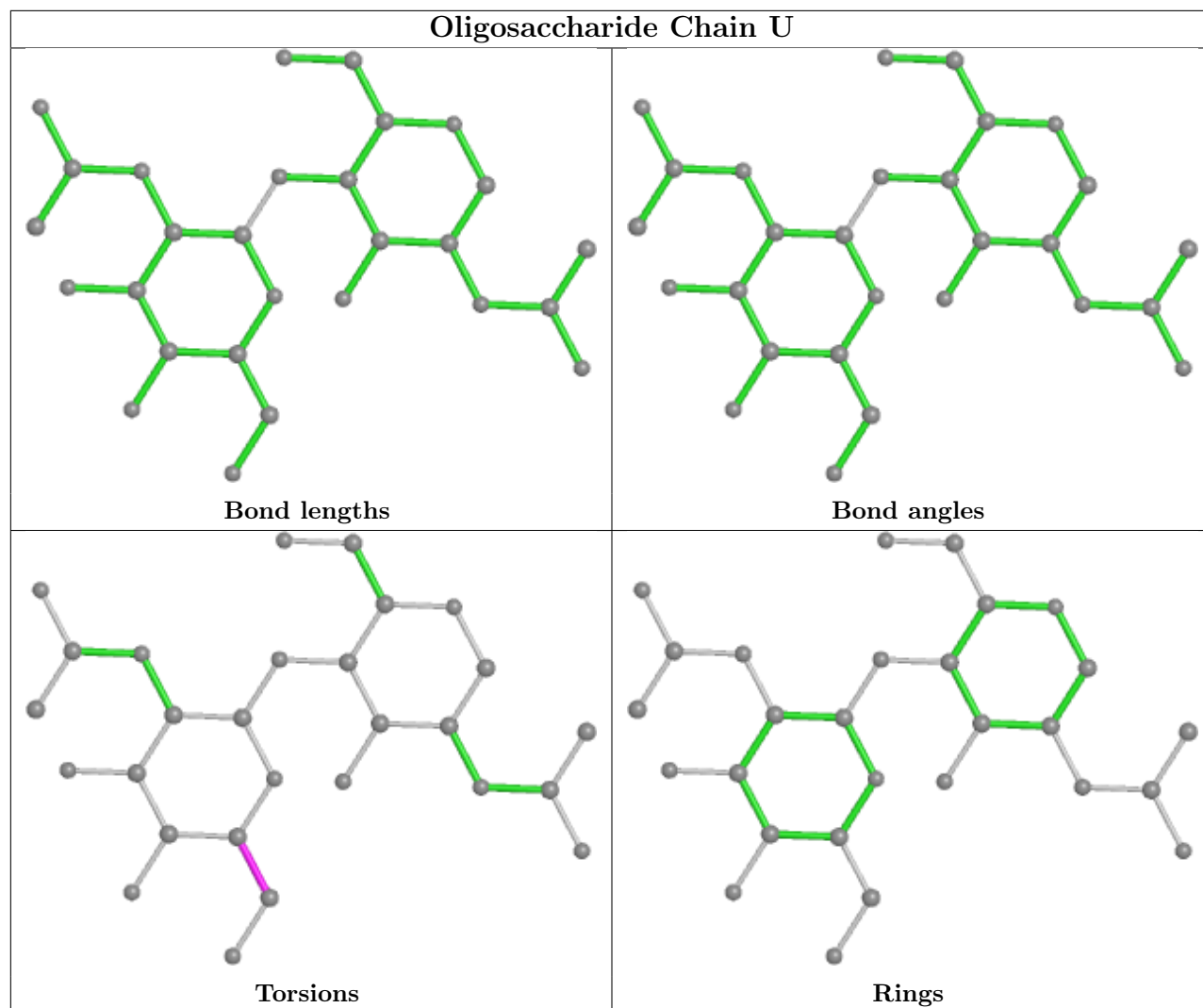


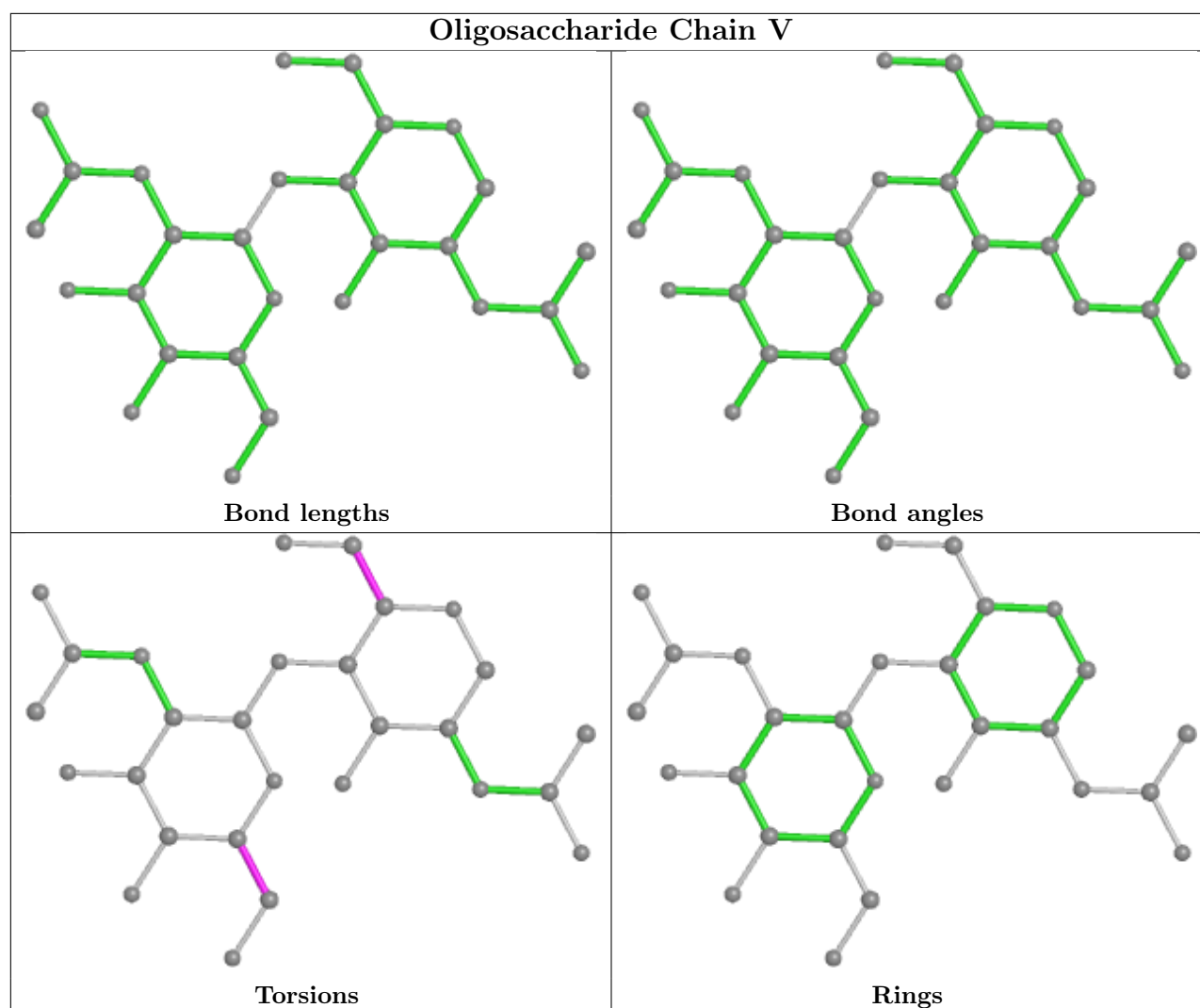












5.6 Ligand geometry [i](#)

30 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
5	NAG	A	1308	1	14,14,15	0.23	0	17,19,21	0.38	0
5	NAG	C	1306	1	14,14,15	0.27	0	17,19,21	0.42	0
5	NAG	A	1305	1	14,14,15	0.19	0	17,19,21	0.37	0
5	NAG	B	1310	1	14,14,15	0.27	0	17,19,21	0.47	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	B	1304	1	14,14,15	0.26	0	17,19,21	0.43	0
5	NAG	A	1304	1	14,14,15	0.21	0	17,19,21	0.43	0
5	NAG	C	1301	1	14,14,15	0.38	0	17,19,21	0.44	0
5	NAG	A	1310	1	14,14,15	0.24	0	17,19,21	0.46	0
5	NAG	B	1309	1	14,14,15	0.24	0	17,19,21	0.44	0
5	NAG	C	1308	1	14,14,15	0.26	0	17,19,21	0.43	0
5	NAG	B	1301	1	14,14,15	0.45	0	17,19,21	0.44	0
5	NAG	A	1309	1	14,14,15	0.24	0	17,19,21	0.45	0
5	NAG	B	1303	1	14,14,15	0.26	0	17,19,21	0.43	0
5	NAG	B	1305	1	14,14,15	0.25	0	17,19,21	0.41	0
5	NAG	A	1301	1	14,14,15	0.28	0	17,19,21	0.45	0
5	NAG	C	1304	1	14,14,15	0.29	0	17,19,21	0.43	0
5	NAG	B	1307	1	14,14,15	0.25	0	17,19,21	0.44	0
5	NAG	B	1306	1	14,14,15	0.41	0	17,19,21	0.63	1 (5%)
5	NAG	C	1310	1	14,14,15	0.45	0	17,19,21	0.40	0
5	NAG	A	1307	1	14,14,15	0.27	0	17,19,21	0.44	0
5	NAG	B	1308	1	14,14,15	0.56	0	17,19,21	0.51	0
5	NAG	B	1302	1	14,14,15	0.25	0	17,19,21	0.49	0
5	NAG	A	1306	1	14,14,15	0.23	0	17,19,21	0.46	0
5	NAG	C	1305	1	14,14,15	0.30	0	17,19,21	0.48	0
5	NAG	A	1302	1	14,14,15	0.21	0	17,19,21	0.50	0
5	NAG	C	1303	1	14,14,15	0.26	0	17,19,21	0.44	0
5	NAG	C	1309	1	14,14,15	0.24	0	17,19,21	0.43	0
5	NAG	C	1307	1	14,14,15	0.24	0	17,19,21	0.44	0
5	NAG	C	1302	1	14,14,15	0.54	0	17,19,21	0.42	0
5	NAG	A	1303	1	14,14,15	0.45	0	17,19,21	0.46	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	A	1308	1	-	1/6/23/26	0/1/1/1
5	NAG	C	1306	1	-	2/6/23/26	0/1/1/1
5	NAG	A	1305	1	-	2/6/23/26	0/1/1/1
5	NAG	B	1310	1	-	2/6/23/26	0/1/1/1
5	NAG	B	1304	1	-	2/6/23/26	0/1/1/1
5	NAG	A	1304	1	-	2/6/23/26	0/1/1/1
5	NAG	C	1301	1	-	2/6/23/26	0/1/1/1
5	NAG	A	1310	1	-	0/6/23/26	0/1/1/1

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

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	1306	NAG	C1-O5-C5	2.08	115.01	112.19

There are no chirality outliers.

All (39) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	1302	NAG	C4-C5-C6-O6
5	A	1301	NAG	O5-C5-C6-O6
5	A	1305	NAG	C4-C5-C6-O6
5	B	1310	NAG	O5-C5-C6-O6
5	A	1307	NAG	O5-C5-C6-O6
5	B	1303	NAG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
5	C	1307	NAG	O5-C5-C6-O6
5	A	1301	NAG	C4-C5-C6-O6
5	A	1302	NAG	O5-C5-C6-O6
5	B	1303	NAG	C4-C5-C6-O6
5	B	1310	NAG	C4-C5-C6-O6
5	B	1307	NAG	O5-C5-C6-O6
5	B	1308	NAG	O5-C5-C6-O6
5	C	1305	NAG	C4-C5-C6-O6
5	A	1305	NAG	O5-C5-C6-O6
5	C	1307	NAG	C4-C5-C6-O6
5	B	1307	NAG	C4-C5-C6-O6
5	A	1306	NAG	C8-C7-N2-C2
5	A	1306	NAG	O7-C7-N2-C2
5	C	1306	NAG	C8-C7-N2-C2
5	C	1306	NAG	O7-C7-N2-C2
5	C	1305	NAG	O5-C5-C6-O6
5	A	1307	NAG	C4-C5-C6-O6
5	A	1304	NAG	O5-C5-C6-O6
5	C	1308	NAG	O5-C5-C6-O6
5	A	1306	NAG	O5-C5-C6-O6
5	B	1304	NAG	O5-C5-C6-O6
5	A	1304	NAG	C4-C5-C6-O6
5	B	1304	NAG	C4-C5-C6-O6
5	C	1301	NAG	O5-C5-C6-O6
5	C	1302	NAG	O5-C5-C6-O6
5	A	1308	NAG	O5-C5-C6-O6
5	C	1310	NAG	O5-C5-C6-O6
5	C	1304	NAG	C4-C5-C6-O6
5	A	1306	NAG	C4-C5-C6-O6
5	B	1308	NAG	C4-C5-C6-O6
5	C	1301	NAG	C4-C5-C6-O6
5	C	1304	NAG	O5-C5-C6-O6
5	B	1301	NAG	C4-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	1305	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.