



Full wwPDB EM Validation Report ⓘ

Mar 19, 2026 – 11:59 PM UTC

PDB ID : 9BA4 / pdb_00009ba4
EMDB ID : EMD-44395
Title : Full-length cross-linked Contactin 2 (CNTN2)
Authors : Liu, J.L.; Fan, S.F.; Ren, G.R.; Rudenko, G.R.
Deposited on : 2024-04-03
Resolution : 3.54 Å(reported)

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

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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 : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : **NOT EXECUTED**
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

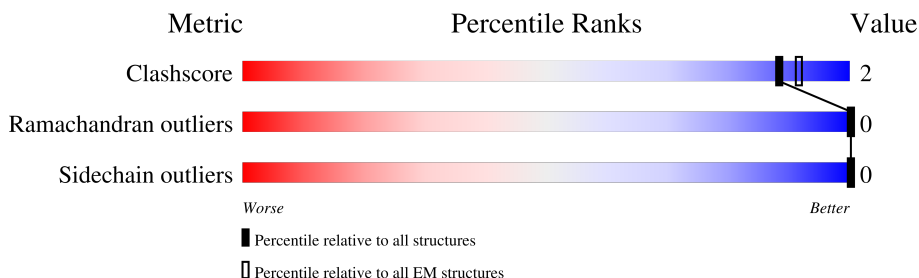
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.54 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	229148	23984
Ramachandran outliers	224038	23583
Sidechain outliers	223484	23102

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	992	92% 6% .
1	B	992	92% 6% .
2	C	2	100%
2	E	2	100%
2	F	2	100%
2	H	2	100%
2	J	2	100%
2	K	2	100%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 15204 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 Contactin-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	970	Total	C	N	O	S	0	0
			7490	4714	1330	1419	27		
1	B	970	Total	C	N	O	S	0	0
			7490	4714	1330	1419	27		

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	24	GLU	-	expression tag	UNP Q02246
A	25	LEU	-	expression tag	UNP Q02246
A	26	GLY	-	expression tag	UNP Q02246
A	27	THR	-	expression tag	UNP Q02246
A	28	GLY	-	expression tag	UNP Q02246
A	29	LEU	-	expression tag	UNP Q02246
A	30	GLU	-	expression tag	UNP Q02246
A	1005	SER	-	expression tag	UNP Q02246
A	1006	ALA	-	expression tag	UNP Q02246
A	1007	SER	-	expression tag	UNP Q02246
A	1008	THR	-	expression tag	UNP Q02246
A	1009	SER	-	expression tag	UNP Q02246
A	1010	HIS	-	expression tag	UNP Q02246
A	1011	HIS	-	expression tag	UNP Q02246
A	1012	HIS	-	expression tag	UNP Q02246
A	1013	HIS	-	expression tag	UNP Q02246
A	1014	HIS	-	expression tag	UNP Q02246
A	1015	HIS	-	expression tag	UNP Q02246
B	24	GLU	-	expression tag	UNP Q02246
B	25	LEU	-	expression tag	UNP Q02246
B	26	GLY	-	expression tag	UNP Q02246
B	27	THR	-	expression tag	UNP Q02246
B	28	GLY	-	expression tag	UNP Q02246
B	29	LEU	-	expression tag	UNP Q02246
B	30	GLU	-	expression tag	UNP Q02246
B	1005	SER	-	expression tag	UNP Q02246

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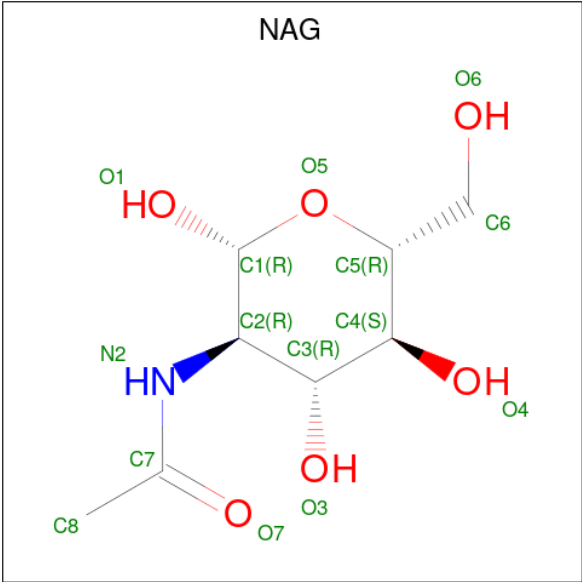
Chain	Residue	Modelled	Actual	Comment	Reference
B	1006	ALA	-	expression tag	UNP Q02246
B	1007	SER	-	expression tag	UNP Q02246
B	1008	THR	-	expression tag	UNP Q02246
B	1009	SER	-	expression tag	UNP Q02246
B	1010	HIS	-	expression tag	UNP Q02246
B	1011	HIS	-	expression tag	UNP Q02246
B	1012	HIS	-	expression tag	UNP Q02246
B	1013	HIS	-	expression tag	UNP Q02246
B	1014	HIS	-	expression tag	UNP Q02246
B	1015	HIS	-	expression tag	UNP Q02246

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



Mol	Chain	Residues	Atoms				AltConf	Trace
2	C	2	Total	C	N	O	0	0
			28	16	2	10		
2	E	2	Total	C	N	O	0	0
			28	16	2	10		
2	F	2	Total	C	N	O	0	0
			28	16	2	10		
2	H	2	Total	C	N	O	0	0
			28	16	2	10		
2	J	2	Total	C	N	O	0	0
			28	16	2	10		
2	K	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆) (labeled as "Ligand of Interest" by depositor).

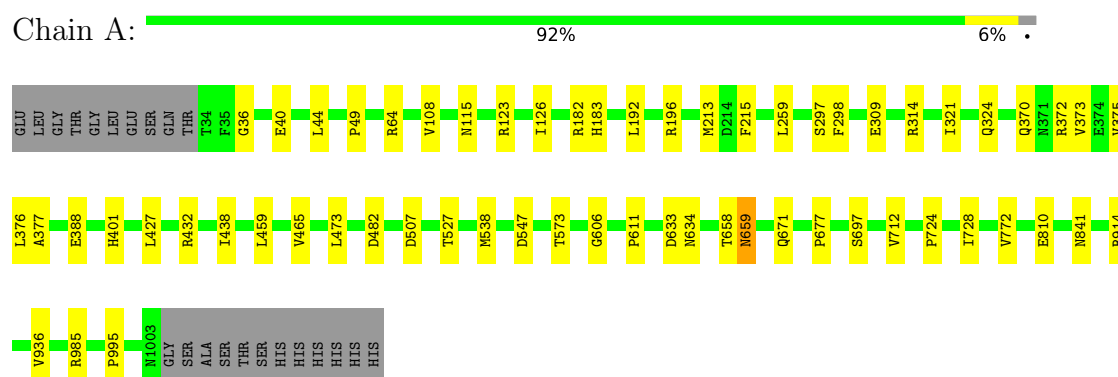


Mol	Chain	Residues	Atoms				AltConf
3	A	1	Total	C	N	O	0
			14	8	1	5	
3	A	1	Total	C	N	O	0
			14	8	1	5	
3	B	1	Total	C	N	O	0
			14	8	1	5	
3	B	1	Total	C	N	O	0
			14	8	1	5	

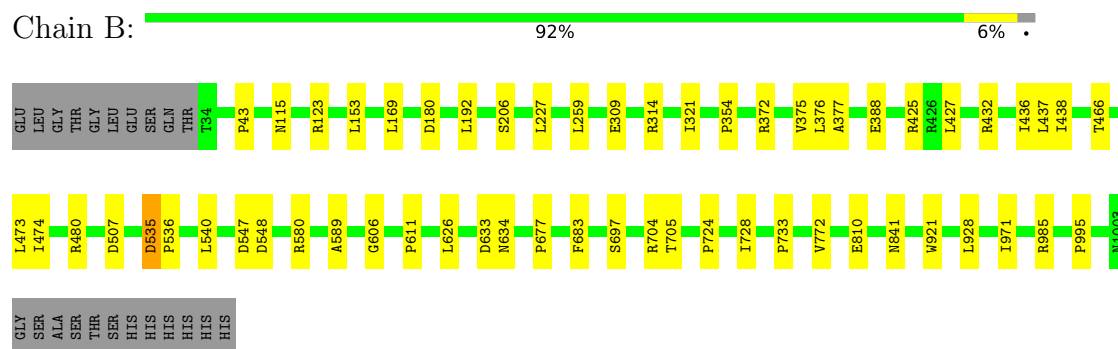
3 Residue-property plots [i](#)

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

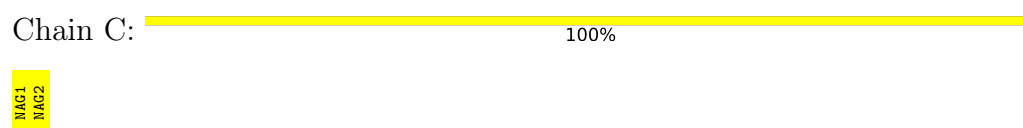
- Molecule 1: Contactin-2



- Molecule 1: Contactin-2



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



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



MAG1
MAG2

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

Chain F:  100%MAG1
MAG2

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

Chain H:  100%MAG1
MAG2

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

Chain J:  100%MAG1
MAG2

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

Chain K:  100%MAG1
MAG2

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	86023	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	600	Depositor
Maximum defocus (nm)	1600	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

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	0.41	0/7683	0.71	11/10473 (0.1%)
1	B	0.41	0/7683	0.70	9/10473 (0.1%)
All	All	0.41	0/15366	0.70	20/20946 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	3
All	All	0	5

There are no bond length outliers.

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	547	ASP	CA-C-N	6.96	132.31	122.08
1	B	547	ASP	C-N-CA	6.96	132.31	122.08
1	B	427	LEU	CB-CG-CD2	-6.65	90.75	110.70
1	A	712	VAL	CA-C-N	6.55	130.63	120.68
1	A	712	VAL	C-N-CA	6.55	130.63	120.68
1	B	677	PRO	CA-C-N	6.48	133.92	121.54
1	B	677	PRO	C-N-CA	6.48	133.92	121.54
1	A	659	ASN	CA-CB-CG	6.31	118.91	112.60
1	A	677	PRO	CA-C-N	5.85	130.43	122.19
1	A	677	PRO	C-N-CA	5.85	130.43	122.19
1	A	547	ASP	CA-C-N	5.75	130.29	122.07
1	A	547	ASP	C-N-CA	5.75	130.29	122.07

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	376	LEU	CA-CB-CG	5.29	134.81	116.30
1	A	659	ASN	CB-CA-C	5.29	116.56	109.42
1	B	548	ASP	CA-CB-CG	5.26	117.86	112.60
1	A	482	ASP	CB-CA-C	5.22	118.33	109.55
1	B	115	ASN	CB-CA-C	5.18	120.38	110.17
1	A	213	MET	CA-CB-CG	5.18	124.46	114.10
1	A	376	LEU	CA-CB-CG	5.11	134.18	116.30
1	B	535	ASP	N-CA-C	5.06	116.06	109.64

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	427	LEU	Peptide
1	A	658	THR	Peptide
1	B	354	PRO	Peptide
1	B	580	ARG	Sidechain
1	B	733	PRO	Peptide

5.2 Too-close contacts ⓘ

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	7490	0	7332	29	0
1	B	7490	0	7332	28	0
2	C	28	0	25	0	0
2	E	28	0	25	0	0
2	F	28	0	25	0	0
2	H	28	0	25	0	0
2	J	28	0	25	0	0
2	K	28	0	25	0	0
3	A	28	0	26	0	0
3	B	28	0	26	0	0
All	All	15204	0	14866	57	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 2.

All (57) 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:370:GLN:HB2	1:A:373:VAL:HB	1.90	0.52
1:A:659:ASN:OD1	1:A:671:GLN:NE2	2.45	0.50
1:A:611:PRO:HD2	1:A:697:SER:HB3	1.94	0.50
1:A:728:ILE:HG12	1:A:772:VAL:HG22	1.95	0.49
1:A:606:GLY:HA2	1:A:634:ASN:HB3	1.95	0.49
1:A:49:PRO:HG3	1:A:215:PHE:HB2	1.95	0.49
1:B:928:LEU:HD23	1:B:971:ILE:HD11	1.95	0.49
1:B:704:ARG:NH1	1:B:705:THR:O	2.47	0.48
1:A:40:GLU:HG2	1:A:64:ARG:HH21	1.79	0.48
1:B:259:LEU:HD11	1:B:321:ILE:HD11	1.96	0.48
1:B:728:ILE:HG12	1:B:772:VAL:HG22	1.96	0.47
1:B:43:PRO:O	1:B:123:ARG:NH1	2.47	0.47
1:B:375:VAL:HG12	1:B:377:ALA:H	1.79	0.47
1:B:466:THR:HB	1:B:474:ILE:HB	1.96	0.47
1:A:182:ARG:NH2	1:A:196:ARG:O	2.48	0.46
1:B:180:ASP:N	1:B:180:ASP:OD1	2.48	0.46
1:A:183:HIS:HB3	1:A:192:LEU:HD11	1.98	0.46
1:A:538:MET:HE2	1:A:538:MET:HB3	1.86	0.46
1:A:375:VAL:HG12	1:A:377:ALA:H	1.81	0.46
1:B:633:ASP:OD1	1:B:633:ASP:N	2.49	0.46
1:B:372:ARG:NH2	1:B:388:GLU:OE2	2.49	0.45
1:B:507:ASP:HB2	1:B:535:ASP:HB3	1.98	0.45
1:B:309:GLU:OE2	1:B:314:ARG:NH1	2.49	0.45
1:B:438:ILE:HD12	1:B:473:LEU:HD23	1.98	0.45
1:A:633:ASP:N	1:A:633:ASP:OD1	2.49	0.45
1:A:724:PRO:HB2	1:A:810:GLU:HG2	1.98	0.45
1:A:36:GLY:HA2	1:A:115:ASN:HD21	1.81	0.45
1:B:724:PRO:HB2	1:B:810:GLU:HG2	1.99	0.45
1:B:153:LEU:HD11	1:B:227:LEU:HD13	1.99	0.44
1:A:44:LEU:HD23	1:A:123:ARG:HH22	1.82	0.44
1:A:459:LEU:HD22	1:A:465:VAL:HG11	2.00	0.44
1:A:259:LEU:HD11	1:A:321:ILE:HD11	1.99	0.44
1:A:438:ILE:HG23	1:A:473:LEU:HB3	1.99	0.44
1:A:108:VAL:HG23	1:A:126:ILE:HG13	2.00	0.44
1:A:372:ARG:NH1	1:A:388:GLU:OE2	2.51	0.44
1:B:153:LEU:HD13	1:B:192:LEU:HD22	2.00	0.43
1:B:921:TRP:HB2	1:B:928:LEU:HD11	2.01	0.43
1:B:611:PRO:HD2	1:B:697:SER:HB3	2.01	0.43
1:B:540:LEU:HD11	1:B:589:ALA:HB1	2.00	0.43
1:B:626:LEU:HD13	1:B:683:PHE:HD2	1.84	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:810:GLU:HB2	1:A:841:ASN:HB3	2.01	0.43
1:B:810:GLU:HB2	1:B:841:ASN:HB3	2.01	0.43
1:A:309:GLU:OE2	1:A:314:ARG:NH1	2.50	0.42
1:A:324:GLN:OE1	1:A:401:HIS:NE2	2.48	0.42
1:A:182:ARG:HH22	1:A:196:ARG:HB3	1.84	0.41
1:A:297:SER:OG	1:A:298:PHE:N	2.52	0.41
1:B:432:ARG:HH22	1:B:480:ARG:HE	1.67	0.41
1:A:432:ARG:NH1	1:A:507:ASP:OD1	2.47	0.41
1:A:985:ARG:HB3	1:A:995:PRO:HB3	2.02	0.41
1:A:914:ARG:NH2	1:A:936:VAL:O	2.50	0.41
1:B:436:ILE:HD12	1:B:436:ILE:HA	1.95	0.41
1:B:606:GLY:HA2	1:B:634:ASN:HB3	2.03	0.41
1:B:985:ARG:HB3	1:B:995:PRO:HB3	2.03	0.41
1:B:535:ASP:HA	1:B:536:PRO:HD3	1.90	0.41
1:B:169:LEU:HB2	1:B:206:SER:HB2	2.02	0.40
1:A:527:THR:HA	1:A:573:THR:HA	2.04	0.40
1:B:425:ARG:NH2	1:B:437:LEU:O	2.55	0.40

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 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	968/992 (98%)	914 (94%)	54 (6%)	0	100	100
1	B	968/992 (98%)	910 (94%)	58 (6%)	0	100	100
All	All	1936/1984 (98%)	1824 (94%)	112 (6%)	0	100	100

There are no Ramachandran outliers to report.

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 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	806/824 (98%)	806 (100%)	0	100	100
1	B	806/824 (98%)	806 (100%)	0	100	100
All	All	1612/1648 (98%)	1612 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	88	HIS
1	A	115	ASN
1	A	212	HIS
1	A	521	ASN
1	A	529	GLN
1	A	625	GLN
1	A	689	ASN
1	A	757	HIS
1	A	999	HIS
1	B	212	HIS
1	B	256	GLN
1	B	343	ASN
1	B	363	ASN
1	B	529	GLN
1	B	531	HIS
1	B	625	GLN
1	B	659	ASN
1	B	757	HIS

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 ⓘ

12 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	C	1	2,1	14,14,15	1.54	2 (14%)	17,19,21	1.35	2 (11%)
2	NAG	C	2	2	14,14,15	1.89	2 (14%)	17,19,21	1.24	1 (5%)
2	NAG	E	1	2,1	14,14,15	1.67	2 (14%)	17,19,21	1.49	2 (11%)
2	NAG	E	2	2	14,14,15	1.72	2 (14%)	17,19,21	1.46	1 (5%)
2	NAG	F	1	2,1	14,14,15	1.53	1 (7%)	17,19,21	1.33	2 (11%)
2	NAG	F	2	2	14,14,15	1.85	2 (14%)	17,19,21	1.27	1 (5%)
2	NAG	H	1	2,1	14,14,15	1.60	2 (14%)	17,19,21	1.39	2 (11%)
2	NAG	H	2	2	14,14,15	1.85	2 (14%)	17,19,21	1.29	1 (5%)
2	NAG	J	1	2,1	14,14,15	1.66	2 (14%)	17,19,21	1.52	2 (11%)
2	NAG	J	2	2	14,14,15	1.78	2 (14%)	17,19,21	1.41	1 (5%)
2	NAG	K	1	2,1	14,14,15	1.55	1 (7%)	17,19,21	1.34	2 (11%)
2	NAG	K	2	2	14,14,15	1.86	2 (14%)	17,19,21	1.27	1 (5%)

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	C	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	C	2	2	-	2/6/23/26	0/1/1/1
2	NAG	E	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	E	2	2	-	0/6/23/26	0/1/1/1
2	NAG	F	1	2,1	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	F	2	2	-	2/6/23/26	0/1/1/1
2	NAG	H	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	H	2	2	-	0/6/23/26	0/1/1/1
2	NAG	J	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	J	2	2	-	0/6/23/26	0/1/1/1
2	NAG	K	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	K	2	2	-	0/6/23/26	0/1/1/1

All (22) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	2	NAG	O5-C1	6.33	1.54	1.43
2	H	2	NAG	O5-C1	6.22	1.54	1.43
2	K	2	NAG	O5-C1	6.16	1.54	1.43
2	F	2	NAG	O5-C1	6.12	1.54	1.43
2	J	2	NAG	O5-C1	5.87	1.53	1.43
2	E	2	NAG	O5-C1	5.63	1.53	1.43
2	E	1	NAG	O5-C1	5.06	1.52	1.43
2	J	1	NAG	O5-C1	5.00	1.52	1.43
2	K	1	NAG	O5-C1	4.95	1.52	1.43
2	F	1	NAG	O5-C1	4.92	1.52	1.43
2	H	1	NAG	O5-C1	4.91	1.51	1.43
2	C	1	NAG	O5-C1	4.77	1.51	1.43
2	J	1	NAG	C1-C2	3.07	1.56	1.52
2	E	1	NAG	C1-C2	2.99	1.56	1.52
2	H	1	NAG	C1-C2	2.59	1.55	1.52
2	F	2	NAG	C1-C2	2.51	1.55	1.52
2	E	2	NAG	C1-C2	2.47	1.55	1.52
2	J	2	NAG	C1-C2	2.46	1.55	1.52
2	K	2	NAG	C1-C2	2.45	1.55	1.52
2	C	2	NAG	C1-C2	2.38	1.55	1.52
2	H	2	NAG	C1-C2	2.26	1.55	1.52
2	C	1	NAG	C1-C2	2.26	1.55	1.52

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	2	NAG	C1-O5-C5	5.68	119.80	112.19
2	J	1	NAG	C1-O5-C5	5.55	119.62	112.19
2	J	2	NAG	C1-O5-C5	5.49	119.55	112.19
2	E	1	NAG	C1-O5-C5	5.40	119.43	112.19
2	H	1	NAG	C1-O5-C5	4.97	118.85	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	2	NAG	C1-O5-C5	4.96	118.83	112.19
2	K	2	NAG	C1-O5-C5	4.85	118.68	112.19
2	F	2	NAG	C1-O5-C5	4.84	118.68	112.19
2	K	1	NAG	C1-O5-C5	4.77	118.58	112.19
2	C	1	NAG	C1-O5-C5	4.74	118.53	112.19
2	C	2	NAG	C1-O5-C5	4.72	118.52	112.19
2	F	1	NAG	C1-O5-C5	4.68	118.46	112.19
2	J	1	NAG	C4-C3-C2	2.24	114.30	111.02
2	E	1	NAG	C4-C3-C2	2.22	114.27	111.02
2	C	1	NAG	C4-C3-C2	2.18	114.21	111.02
2	F	1	NAG	C4-C3-C2	2.16	114.18	111.02
2	K	1	NAG	C4-C3-C2	2.09	114.08	111.02
2	H	1	NAG	C4-C3-C2	2.05	114.03	111.02

There are no chirality outliers.

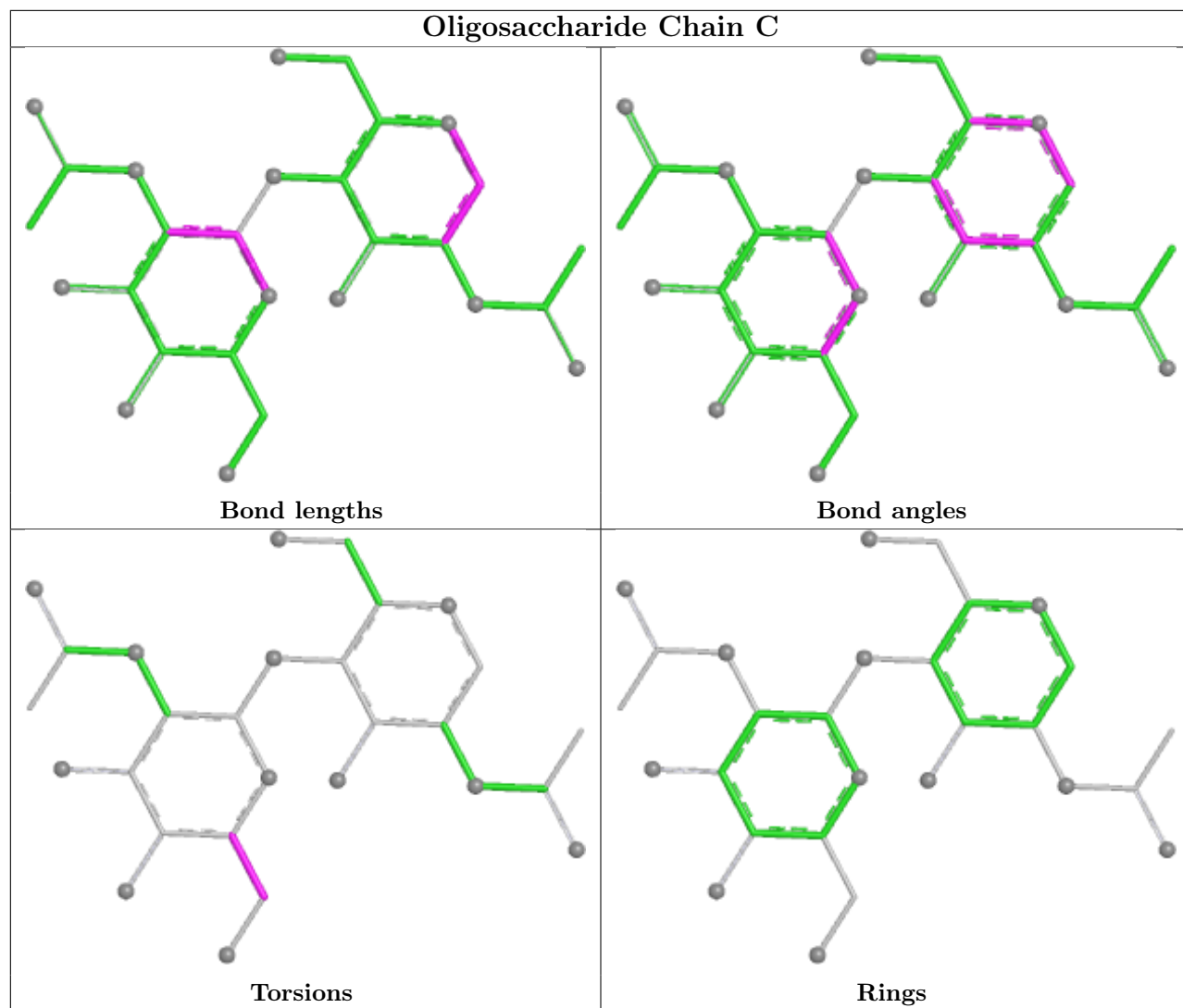
All (6) torsion outliers are listed below:

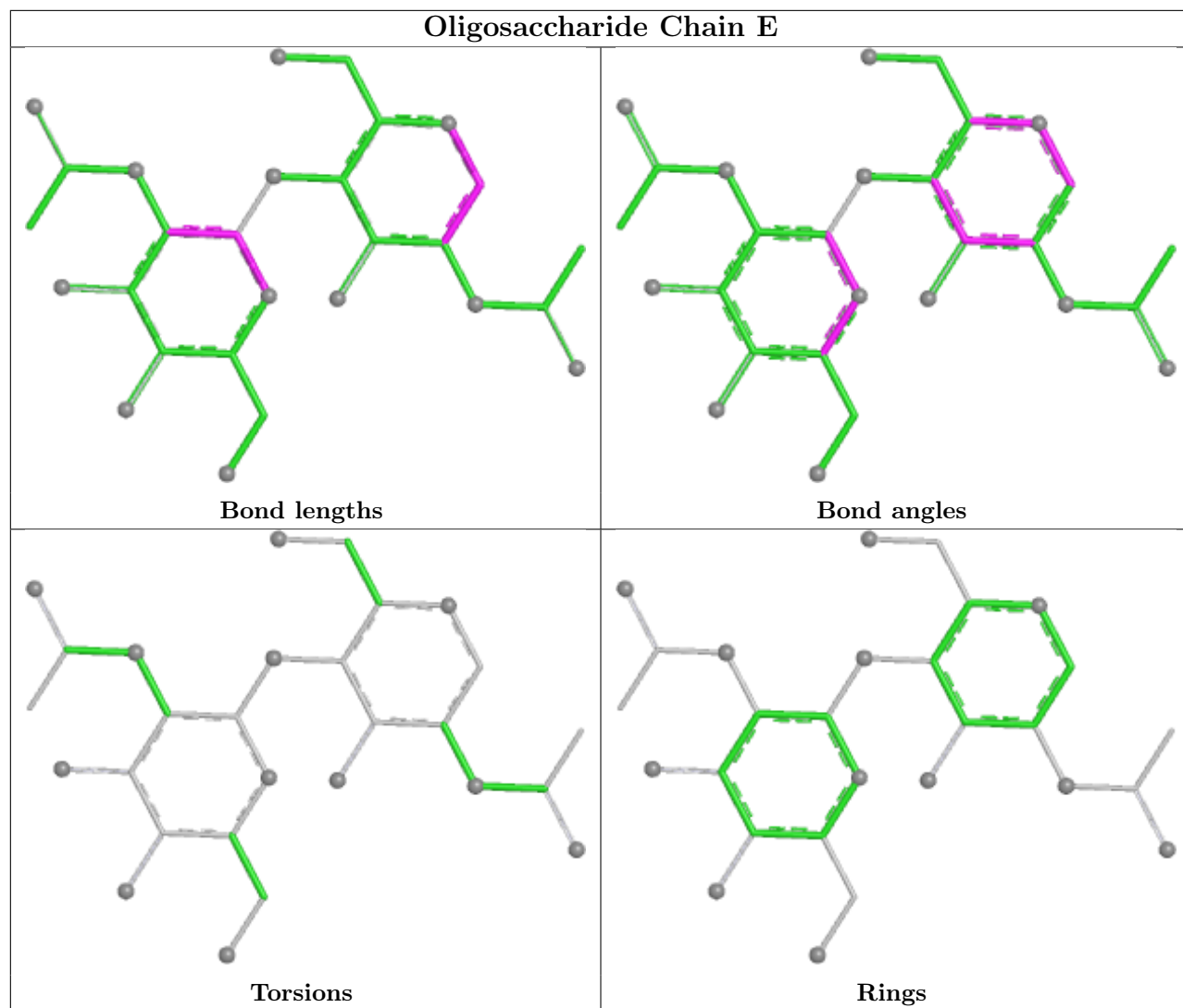
Mol	Chain	Res	Type	Atoms
2	F	1	NAG	C4-C5-C6-O6
2	C	2	NAG	C4-C5-C6-O6
2	F	2	NAG	C4-C5-C6-O6
2	F	2	NAG	O5-C5-C6-O6
2	C	2	NAG	O5-C5-C6-O6
2	F	1	NAG	O5-C5-C6-O6

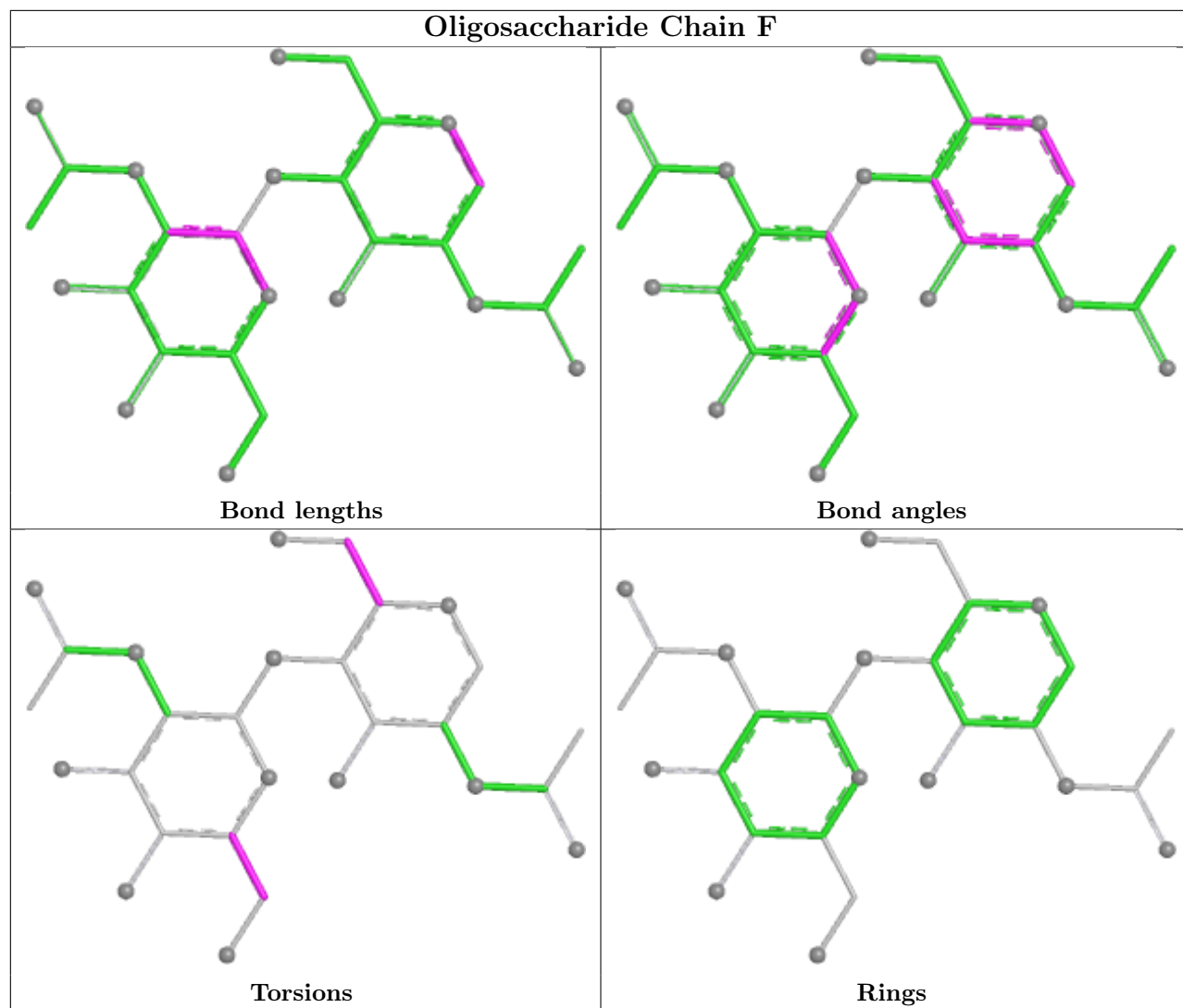
There are no ring outliers.

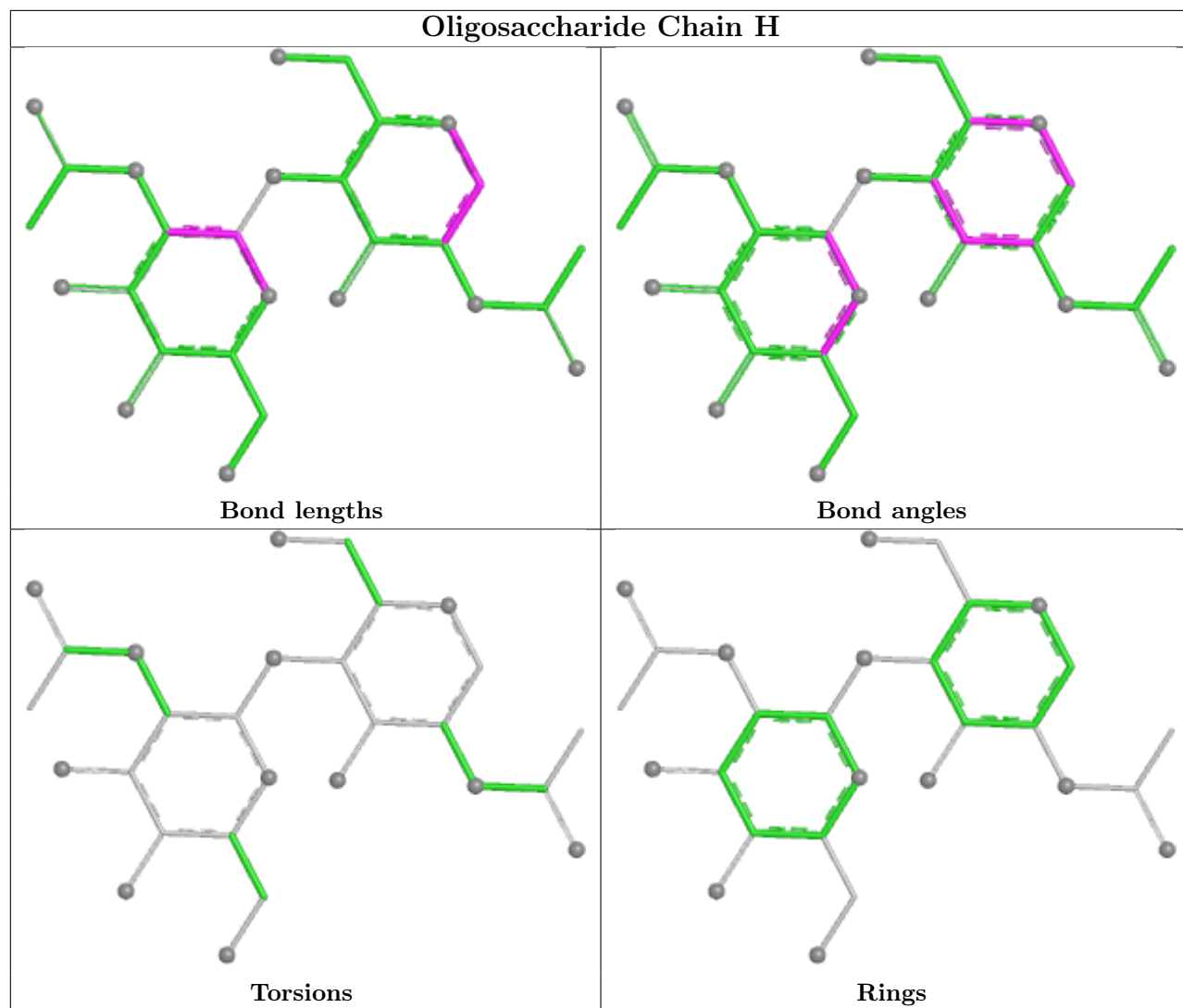
No monomer is involved in short contacts.

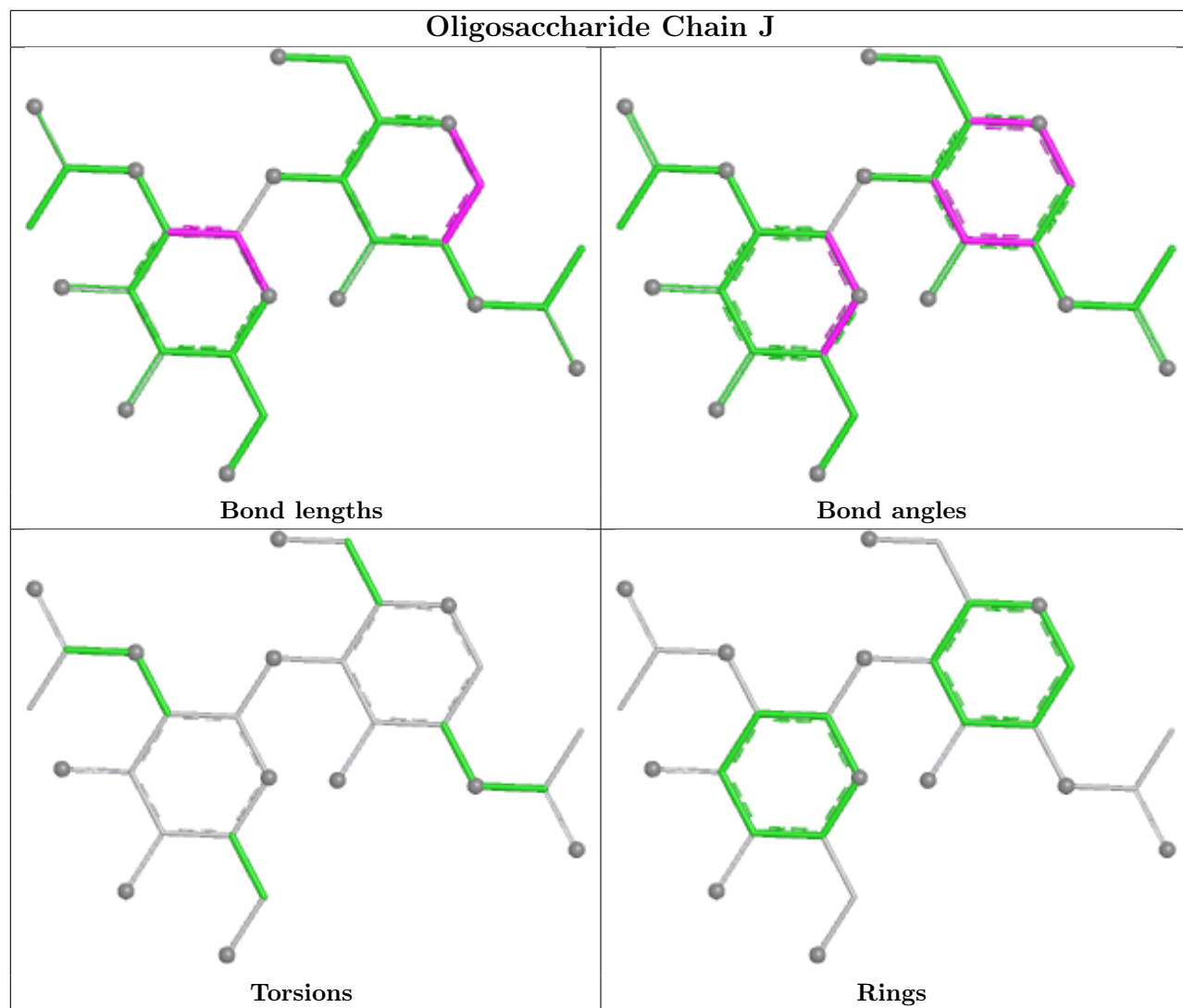
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

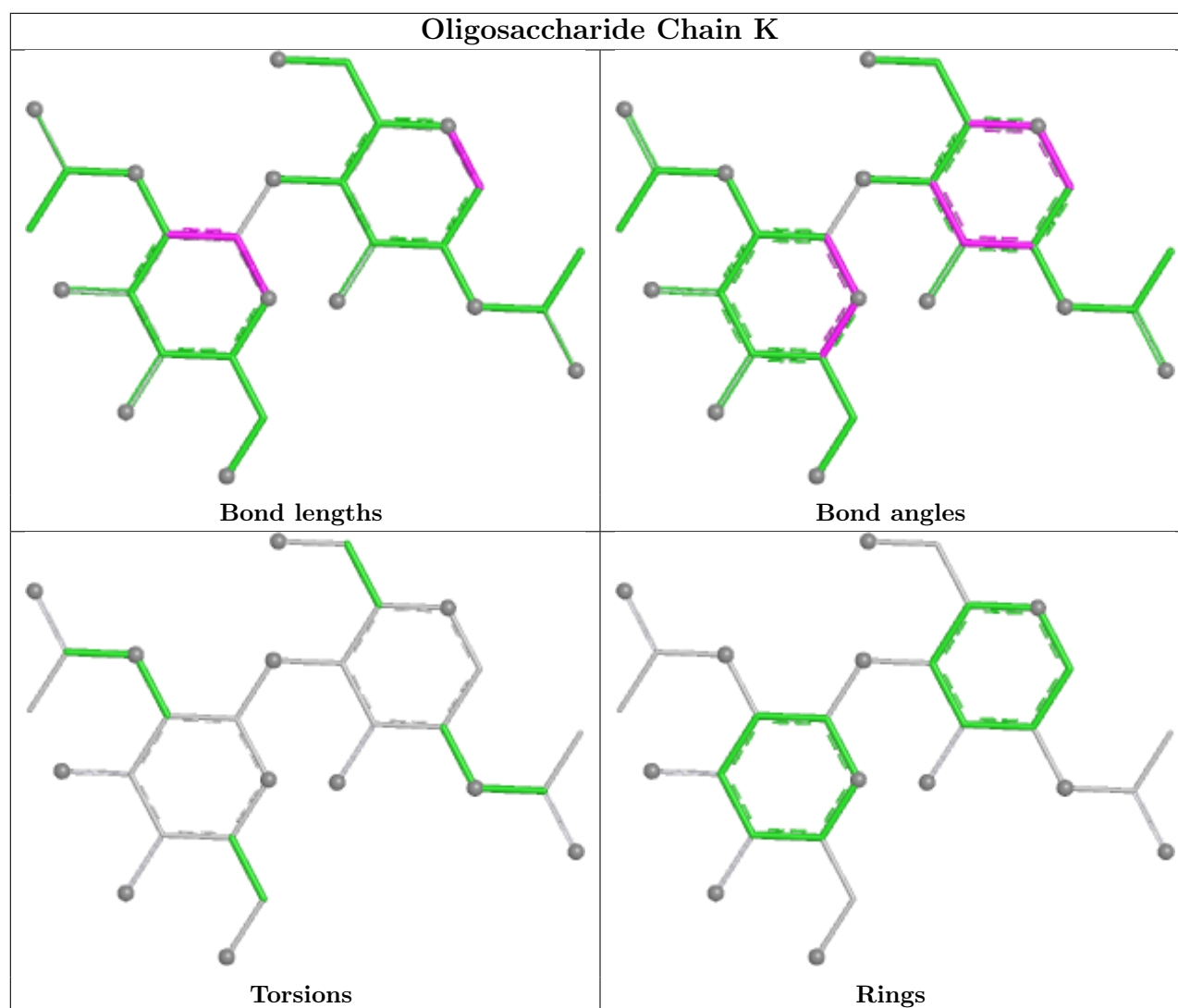












5.6 Ligand geometry [i](#)

4 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	NAG	B	1102	1	14,14,15	1.98	2 (14%)	17,19,21	1.19	1 (5%)
3	NAG	B	1101	1	14,14,15	2.04	2 (14%)	17,19,21	1.23	1 (5%)
3	NAG	A	1101	1	14,14,15	1.94	2 (14%)	17,19,21	1.23	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	A	1102	1	14,14,15	1.98	2 (14%)	17,19,21	1.17	1 (5%)

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
3	NAG	B	1102	1	-	0/6/23/26	0/1/1/1
3	NAG	B	1101	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1101	1	-	2/6/23/26	0/1/1/1
3	NAG	A	1102	1	-	0/6/23/26	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	1101	NAG	O5-C1	6.67	1.54	1.43
3	B	1102	NAG	O5-C1	6.33	1.54	1.43
3	A	1101	NAG	O5-C1	6.33	1.54	1.43
3	A	1102	NAG	O5-C1	6.33	1.54	1.43
3	B	1102	NAG	C1-C2	3.23	1.56	1.52
3	A	1102	NAG	C1-C2	3.20	1.56	1.52
3	B	1101	NAG	C1-C2	3.18	1.56	1.52
3	A	1101	NAG	C1-C2	2.92	1.56	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1101	NAG	C1-O5-C5	4.62	118.38	112.19
3	A	1101	NAG	C1-O5-C5	4.59	118.34	112.19
3	B	1102	NAG	C1-O5-C5	4.37	118.05	112.19
3	A	1102	NAG	C1-O5-C5	4.29	117.93	112.19

There are no chirality outliers.

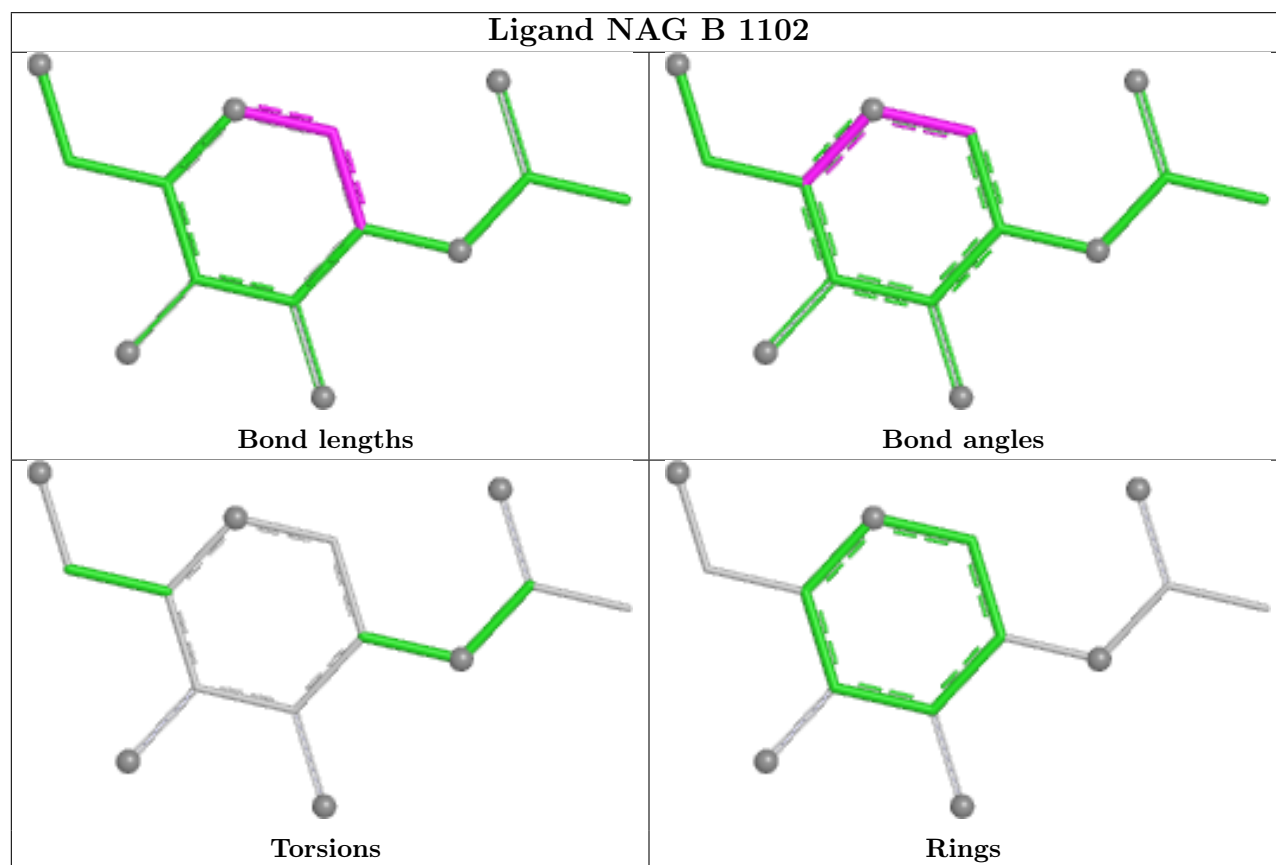
All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1101	NAG	C4-C5-C6-O6
3	A	1101	NAG	O5-C5-C6-O6
3	B	1101	NAG	C4-C5-C6-O6
3	B	1101	NAG	O5-C5-C6-O6

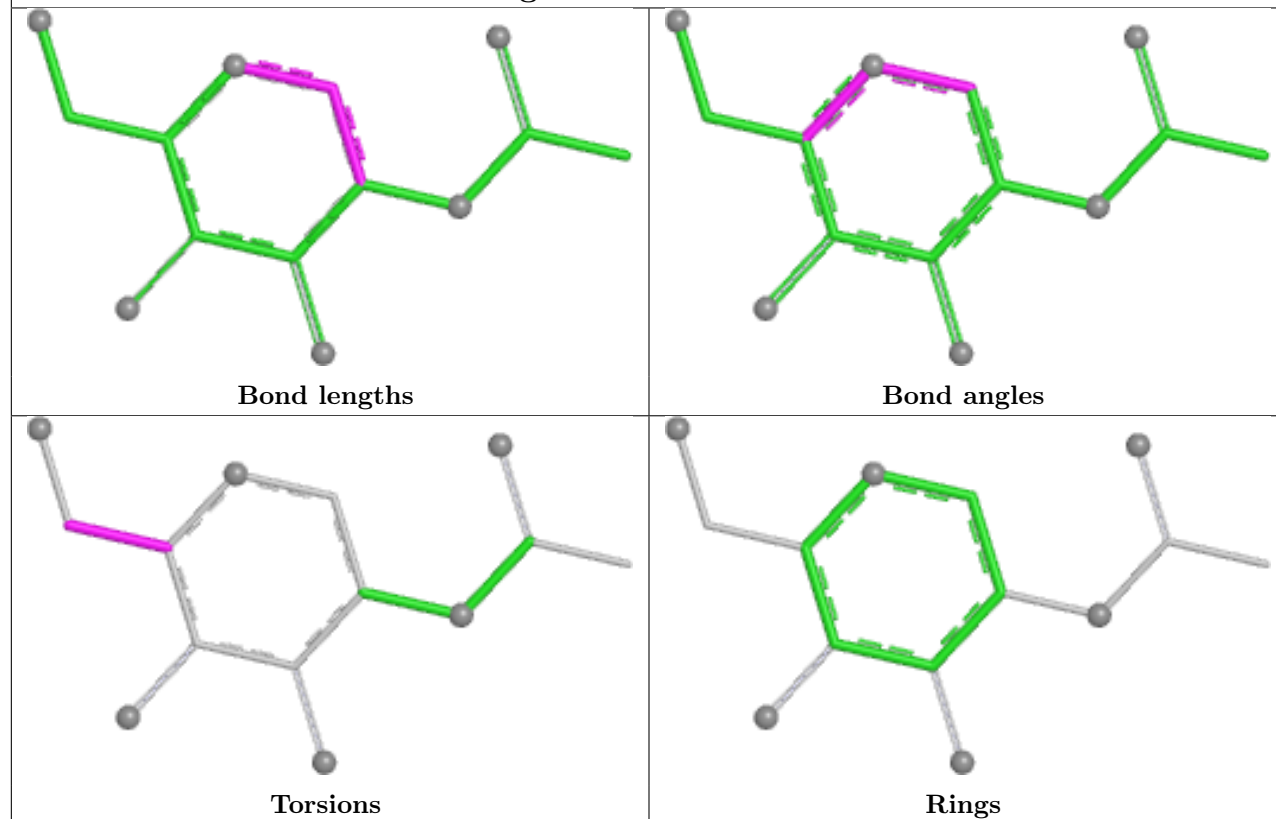
There are no ring outliers.

No monomer is involved in short contacts.

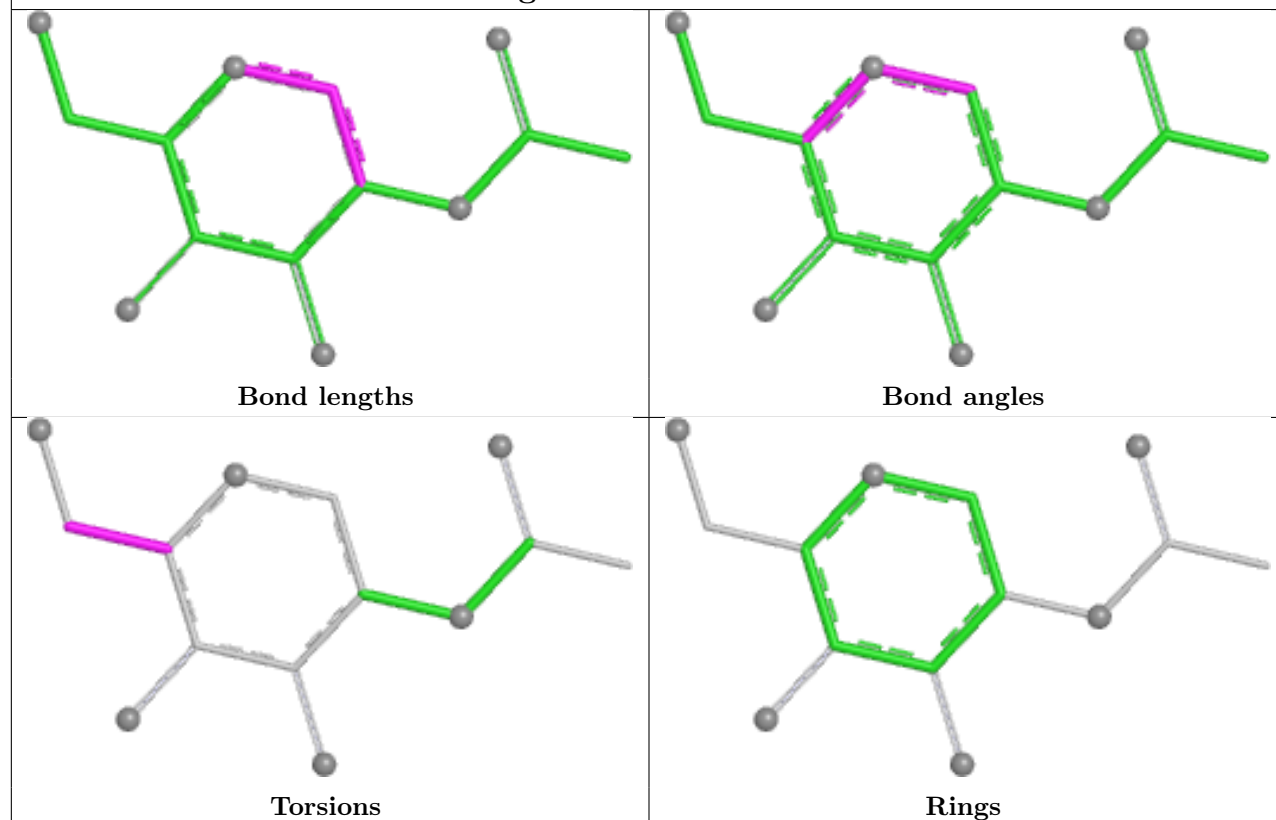
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

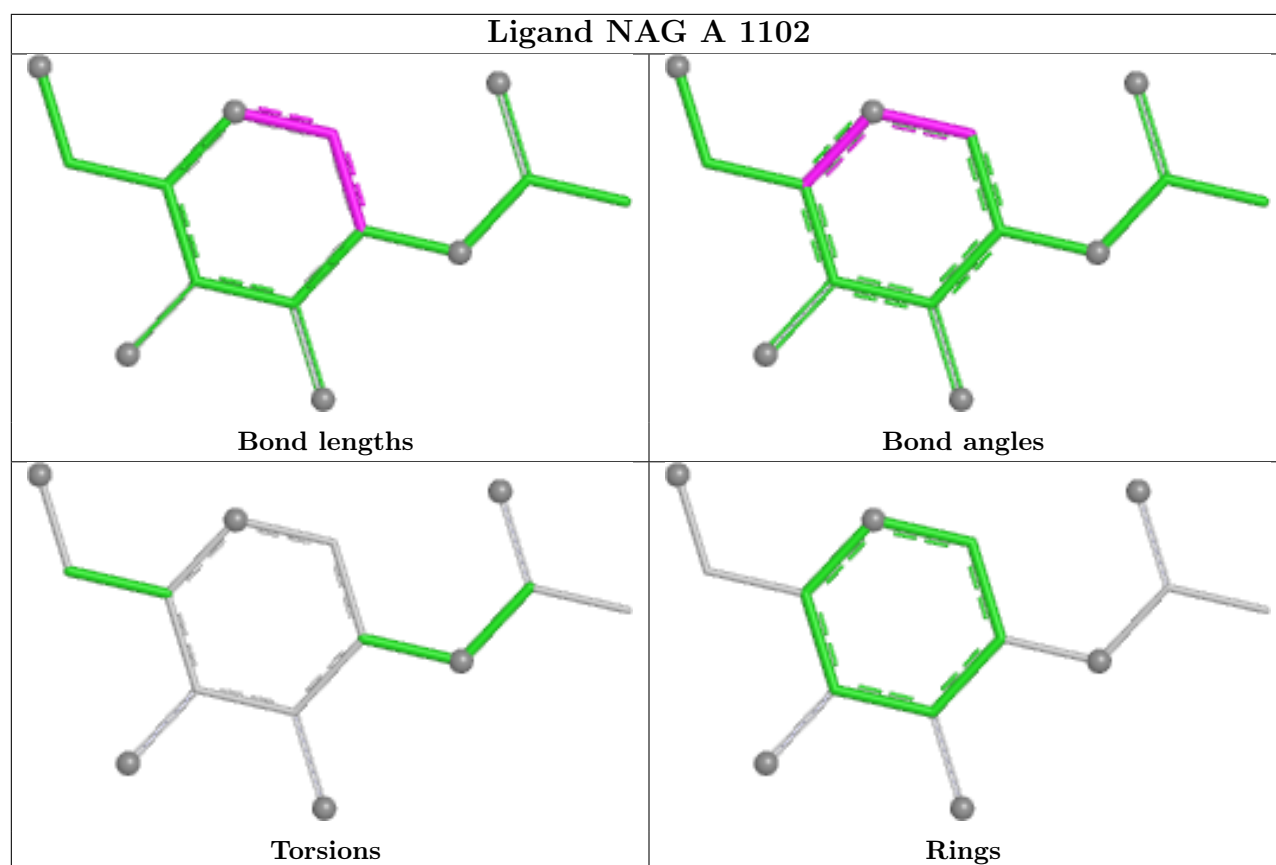


Ligand NAG B 1101



Ligand NAG A 1101





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 Map visualisation

This section contains visualisations of the EMDB entry EMD-44395. These allow visual inspection of the internal detail of the map and identification of artifacts.

Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

This section was not generated.

6.2 Central slices

This section was not generated.

6.3 Largest variance slices

This section was not generated.

6.4 Orthogonal standard-deviation projections (False-color)

This section was not generated.

6.5 Orthogonal surface views

This section was not generated.

6.6 Mask visualisation

This section was not generated. No masks/segmentation were deposited.

7 Map analysis ⓘ

This section contains the results of statistical analysis of the map.

7.1 Map-value distribution ⓘ

This section was not generated.

7.2 Volume estimate versus contour level ⓘ

This section was not generated.

7.3 Rotationally averaged power spectrum ⓘ

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

8 Fourier-Shell correlation ⓘ

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit

This section was not generated.