



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 25, 2023 – 04:06 PM EDT

PDB ID : 8FIA
Title : The structure of fly Teneurin self assembly
Authors : Bandekar, S.J.; Li, J.; Arac, D.
Deposited on : 2022-12-15
Resolution : 2.40 Å(reported)

This is a Full wwPDB X-ray Structure 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/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>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (Phenix) : 1.13
EDS : **FAILED**
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.32.2

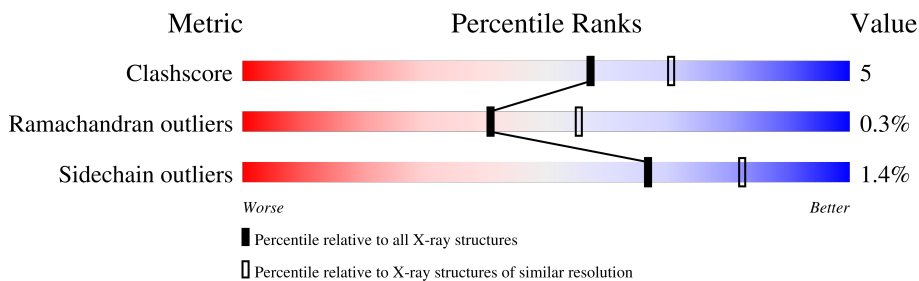
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)

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 ≥ 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 failed to run properly.

Mol	Chain	Length	Quality of chain
1	A	1962	
2	B	6	
3	C	3	
4	D	6	
5	E	3	
6	F	2	

2 Entry composition i

There are 10 unique types of molecules in this entry. The entry contains 14844 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.

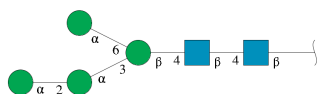
- Molecule 1 is a protein called Teneurin-m.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	1772	14201	8978	2494	2676	53	0	2	0

There are 9 discrepancies between the modelled and reference sequences:

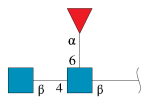
Chain	Residue	Modelled	Actual	Comment	Reference
A	776	ALA	-	expression tag	UNP O61307
A	777	ASP	-	expression tag	UNP O61307
A	778	PRO	-	expression tag	UNP O61307
A	2732	HIS	-	expression tag	UNP O61307
A	2733	HIS	-	expression tag	UNP O61307
A	2734	HIS	-	expression tag	UNP O61307
A	2735	HIS	-	expression tag	UNP O61307
A	2736	HIS	-	expression tag	UNP O61307
A	2737	HIS	-	expression tag	UNP O61307

- Molecule 2 is an oligosaccharide called alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



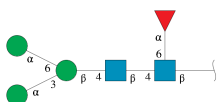
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	B	6	72	40	2	30	0	0	0

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose.



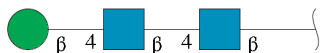
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	3	38	22	2	14	0	0	0

- Molecule 4 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	D	6	71	40	2	29	0	0	0

- Molecule 5 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			
5	E	3	39	22	2	15	0	0	0

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



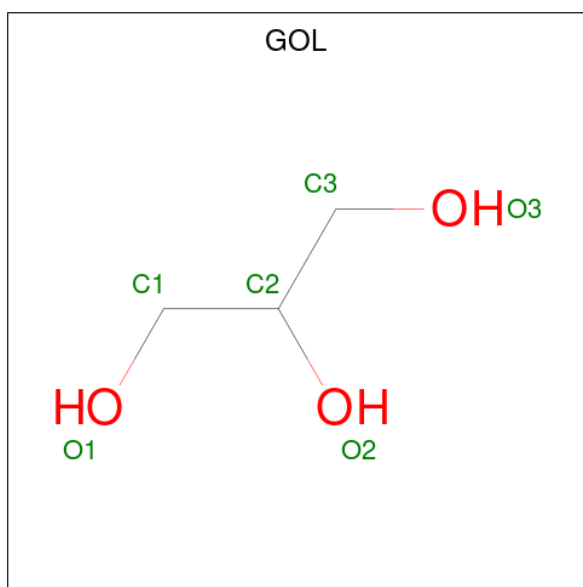
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
6	F	2	28	16	2	10	0	0	0

- Molecule 7 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



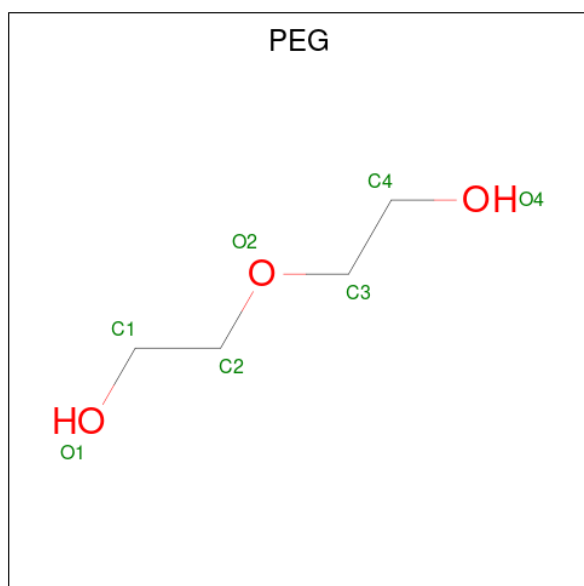
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
7	A	1	Total	C	N	O	0	0
			14	8	1	5		
7	A	1	Total	C	N	O	0	0
			14	8	1	5		
7	A	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	C	O	0	0
			6	3	3		
8	A	1	Total	C	O	0	0
			6	3	3		
8	A	1	Total	C	O	0	0
			6	3	3		
8	A	1	Total	C	O	0	0
			6	3	3		

- Molecule 9 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C₄H₁₀O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	A	1	Total	C	O	0	0
			7	4	3		
9	A	1	Total	C	O	0	0
			7	4	3		

- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	309	Total	O	0	0
			309	309		

ARG
LYS
ARG
ARG
LYS
THR
GLY
SER
SER
HIS
ARG
SER
ALA
SER
ASN
ARG
ARG
GLN
LEU
LEU
LYS
PHE
GLY
GLU
LEU
SER
SER
ALA
HIS
HIS
HIS
HIS
HIS
HIS

- Molecule 2: alpha-D-mannopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain B:  67% 33%

MAG1
MAG2
BMA3
MAN4
MAN5
MAN6

- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C:  33% 67%

MAG1
MAG2
FUC3

- Molecule 4: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D:  67% 17% 17%

MAG1
MAG2
BMA3
MAN4
MAN5
FUC6

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

Chain E:  33% 67%

MAG1
MAG2
BMA3

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

Chain F:  100%

MAG1
MAG2

4 Data and refinement statistics

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	95.20Å 129.86Å 188.16Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.57 – 2.40	Depositor
% Data completeness (in resolution range)	99.9 (48.57-2.40)	Depositor
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.27 (at 2.27Å)	Xtrriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.216 , 0.243	Depositor
Wilson B-factor (Å ²)	40.4	Xtrriage
Anisotropy	0.337	Xtrriage
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	14844	wwPDB-VP
Average B, all atoms (Å ²)	68.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.60% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

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: FUC, PEG, MAN, GOL, 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	0.46	0/14525	0.62	0/19683

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	14201	0	13874	141	0
2	B	72	0	61	0	0
3	C	38	0	34	1	0
4	D	71	0	61	2	0
5	E	39	0	34	1	0
6	F	28	0	25	1	0
7	A	42	0	39	1	0
8	A	30	0	40	0	0
9	A	14	0	20	1	0
10	A	309	0	0	2	0
All	All	14844	0	14188	142	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 5.

All (142) 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:1267:LEU:HB3	1:A:1270:ASP:HB3	1.59	0.83
1:A:1940:SER:HB3	1:A:1943:ASN:HD22	1.49	0.76
1:A:1805:VAL:HG21	5:E:1:NAG:H82	1.70	0.74
1:A:1271:GLU:HB3	1:A:1274:CYS:SG	2.30	0.72
1:A:1604:THR:CG2	1:A:1608:TYR:HB3	2.21	0.71
1:A:1233:SER:HB3	1:A:1291:ILE:HD11	1.74	0.70
1:A:2240:GLU:HB3	1:A:2243:ARG:HB2	1.74	0.70
1:A:1604:THR:HG22	1:A:1608:TYR:HB3	1.73	0.69
1:A:1025:THR:HB	1:A:1029:ILE:HD11	1.73	0.68
1:A:1271:GLU:HG3	1:A:1284:LYS:HD2	1.74	0.68
1:A:1828:PHE:HB2	1:A:1838:VAL:HB	1.75	0.68
1:A:1384:PRO:HG2	1:A:1387:CYS:SG	2.34	0.67
1:A:2609:HIS:HA	1:A:2614:VAL:HG12	1.78	0.65
1:A:1852:LYS:HG2	1:A:1857:GLN:HG2	1.80	0.64
1:A:1834:ASP:HB3	4:D:1:NAG:H82	1.79	0.63
1:A:1239:GLN:HA	1:A:1285:LEU:HD12	1.81	0.61
1:A:1107:MET:SD	1:A:1124:ASN:HB2	2.41	0.60
1:A:1806:VAL:HG11	1:A:2429:LEU:HD21	1.84	0.60
1:A:1320:ILE:HG12	1:A:1340:LEU:HD12	1.82	0.60
1:A:2222:ARG:HB2	1:A:2227:TYR:HE2	1.66	0.60
1:A:2288:ILE:HD12	1:A:2290:ARG:HD2	1.85	0.59
1:A:1795:LEU:HB3	1:A:2487:PHE:HE1	1.68	0.59
1:A:997:LEU:HD11	1:A:1610:VAL:HG11	1.85	0.58
1:A:1333:PRO:HG2	1:A:1338:LEU:HD22	1.85	0.58
1:A:2581:LEU:HD13	1:A:2608:LEU:HD21	1.85	0.57
1:A:2069:LYS:HB3	1:A:2079:VAL:HB	1.87	0.57
1:A:1363:ILE:HD11	1:A:1410:ILE:HG23	1.87	0.57
1:A:1792:VAL:HG13	1:A:2434:TYR:HE2	1.69	0.57
1:A:1647:THR:HG21	1:A:1651:ARG:HH21	1.70	0.57
1:A:1760:ARG:HB3	1:A:1780:GLU:HB2	1.86	0.56
1:A:2635:HIS:O	1:A:2636:LYS:C	2.43	0.56
1:A:849:ASN:HA	1:A:853:LEU:HD13	1.87	0.56
1:A:1564:ALA:HB3	1:A:1566:ASN:HD22	1.70	0.56
1:A:1841:GLU:HB2	1:A:1850:SER:HB3	1.88	0.56
1:A:1271:GLU:O	1:A:1272:ALA:C	2.43	0.55
1:A:1320:ILE:HD11	1:A:1371:MET:SD	2.46	0.55
1:A:1903:LEU:HB2	1:A:1916:THR:HB	1.88	0.55
1:A:846:SER:O	1:A:849:ASN:ND2	2.40	0.55
1:A:1570:LEU:HD13	1:A:1581:ILE:HG12	1.88	0.55
1:A:1235:PRO:HA	1:A:1288:PRO:HG2	1.88	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1622:ARG:HG2	1:A:1623:THR:HG23	1.88	0.54
1:A:2625:GLN:HA	1:A:2628:HIS:CD2	2.43	0.54
1:A:1158:PRO:HG2	1:A:1161:CYS:HB3	1.89	0.54
1:A:1943:ASN:O	1:A:1944:ARG:HB2	2.08	0.53
1:A:2203:ILE:HG13	1:A:2204:LYS:HG2	1.90	0.53
1:A:1877:SER:HB3	1:A:1897:PRO:HB3	1.89	0.53
1:A:1647:THR:HG21	1:A:1651:ARG:HE	1.72	0.52
1:A:2629:ARG:HA	1:A:2632:LYS:HE3	1.91	0.52
1:A:1367:MET:SD	1:A:1384:PRO:HD3	2.49	0.52
1:A:1076:VAL:HG13	1:A:1101:LYS:HB3	1.91	0.52
1:A:893:THR:HG22	1:A:899:PHE:HB3	1.92	0.52
1:A:2228:ARG:HB2	1:A:2237:HIS:HB3	1.91	0.52
1:A:1808:VAL:HG12	1:A:1809:ASP:N	2.24	0.52
1:A:1678:LEU:CD1	1:A:1687:VAL:HG22	2.40	0.52
1:A:2564:PHE:HB2	1:A:2615:VAL:HG22	1.92	0.51
1:A:2685:ILE:HB	1:A:2692:ALA:HB2	1.92	0.51
1:A:2158:ASN:HD21	1:A:2162:HIS:HB2	1.76	0.51
1:A:1238:HIS:NE2	1:A:1265:ARG:HD2	2.25	0.51
1:A:1937:GLN:HG2	1:A:1948:GLU:HG2	1.93	0.51
1:A:2626:GLU:O	1:A:2630:ILE:HG13	2.11	0.50
1:A:852:LYS:HD3	1:A:887:LEU:HA	1.92	0.50
1:A:2017:LYS:HB2	1:A:2025:ASP:HB3	1.94	0.50
1:A:1587:GLN:HB2	1:A:1605:PRO:HG2	1.91	0.50
1:A:2173:LYS:HB2	1:A:2186:VAL:HB	1.94	0.50
1:A:1214:ARG:CZ	3:C:3:FUC:H5	2.42	0.50
1:A:1604:THR:HG21	1:A:1608:TYR:HB3	1.94	0.49
1:A:1941:PRO:HB2	1:A:2198:ILE:HG22	1.94	0.49
1:A:1110:SER:HB2	1:A:1116:ASN:HA	1.94	0.49
1:A:864:ILE:HG21	1:A:911:LEU:HD11	1.95	0.48
1:A:2121:VAL:O	1:A:2124:ILE:HG12	2.14	0.48
1:A:2629:ARG:HG2	1:A:2632:LYS:NZ	2.28	0.48
1:A:1809:ASP:O	1:A:1810:ASP:C	2.52	0.48
1:A:2055:GLU:HG2	1:A:2065:THR:HG22	1.96	0.48
1:A:2007:GLU:HB2	1:A:2010:PHE:HB3	1.96	0.47
1:A:1066:LEU:HD23	1:A:1072:ARG:HA	1.96	0.47
1:A:2518:LEU:HB2	1:A:2529:SER:HB2	1.95	0.47
1:A:1871:ILE:HD13	1:A:2500:ARG:HD3	1.97	0.47
1:A:2317:ASP:OD2	1:A:2321:SER:HB2	2.15	0.47
1:A:1688:ARG:HH11	1:A:1688:ARG:HB3	1.80	0.46
1:A:1011:SER:HA	1:A:1016:TYR:CG	2.51	0.46
1:A:1280:ALA:HA	1:A:1316:VAL:CG2	2.46	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:860:ARG:HG2	1:A:929:TRP:CZ2	2.51	0.46
1:A:1008:TYR:HB2	1:A:1115:TRP:CE2	2.51	0.46
1:A:1296:ASP:OD1	1:A:1296:ASP:N	2.44	0.46
1:A:1207:VAL:HG22	1:A:1208:VAL:HG23	1.97	0.45
1:A:1939:TYR:CE2	1:A:1946:PRO:HB3	2.51	0.45
1:A:2474:ILE:HG22	9:A:2806:PEG:H42	1.97	0.45
1:A:1006:LEU:HD12	1:A:1006:LEU:HA	1.89	0.45
1:A:2138:ARG:HE	1:A:2138:ARG:HB2	1.67	0.45
1:A:1307:ILE:HG13	1:A:1362:ILE:HD13	1.99	0.44
1:A:1655:LEU:HG	1:A:1668:VAL:HG22	1.99	0.44
1:A:1491:GLN:HG2	10:A:2935:HOH:O	2.18	0.44
1:A:1562:ASP:CG	1:A:1566:ASN:HB2	2.38	0.44
1:A:1562:ASP:C	1:A:1564:ALA:H	2.22	0.43
1:A:1179:LEU:HD21	1:A:1496:ILE:HD12	2.00	0.43
1:A:2625:GLN:HA	1:A:2628:HIS:HD2	1.82	0.43
1:A:1343:MET:HE1	1:A:1369:LEU:HD21	2.00	0.43
1:A:2340:PRO:HB3	1:A:2413:ILE:HD11	2.00	0.43
1:A:1808:VAL:O	1:A:1809:ASP:C	2.57	0.43
1:A:1793:LEU:HD23	1:A:1795:LEU:HD11	2.02	0.42
1:A:2629:ARG:O	1:A:2632:LYS:HB2	2.18	0.42
1:A:2547:ASN:CG	7:A:2810:NAG:HN2	2.22	0.42
1:A:1337:THR:C	1:A:1338:LEU:HD23	2.40	0.42
1:A:1843:ASP:OD1	1:A:1846:GLY:N	2.52	0.42
1:A:2302:LEU:HD22	1:A:2314:VAL:HG21	2.00	0.42
1:A:2633:HIS:O	1:A:2636:LYS:HG3	2.19	0.42
1:A:1267:LEU:HD13	1:A:1268:PRO:HD2	2.01	0.42
1:A:1271:GLU:O	1:A:1273:HIS:N	2.53	0.42
1:A:1320:ILE:HG12	1:A:1340:LEU:CD1	2.47	0.42
1:A:2089:ALA:HA	4:D:6:FUC:H3	2.01	0.42
1:A:849:ASN:ND2	1:A:850:TYR:N	2.68	0.42
1:A:1755:TRP:CZ3	1:A:1785:LEU:HB2	2.55	0.42
1:A:1042:ILE:HD11	1:A:1061:TYR:HE2	1.85	0.42
1:A:1306:ASN:HD21	1:A:1323:HIS:HB3	1.85	0.42
1:A:1783:ARG:HG2	1:A:2487:PHE:CZ	2.55	0.42
1:A:2268:GLN:NE2	1:A:2270:TYR:OH	2.52	0.42
1:A:2037:ALA:HB3	1:A:2268:GLN:HE22	1.84	0.42
1:A:852:LYS:HB2	1:A:887:LEU:O	2.20	0.41
1:A:1852:LYS:HD3	1:A:1857:GLN:NE2	2.35	0.41
1:A:1924:ALA:HB3	1:A:1939:TYR:HB2	2.01	0.41
1:A:2148:ARG:HA	1:A:2148:ARG:HD2	1.90	0.41
1:A:2632:LYS:O	1:A:2635:HIS:HB2	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:2441:SER:HA	1:A:2444:TYR:CZ	2.55	0.41
6:F:1:NAG:H62	6:F:2:NAG:H82	2.02	0.41
1:A:835:PHE:CE1	1:A:902:MET:HE1	2.55	0.41
1:A:853:LEU:C	1:A:855:THR:H	2.23	0.41
1:A:876:LEU:HD12	1:A:876:LEU:HA	1.86	0.41
1:A:1566:ASN:OD1	1:A:1584:THR:HG21	2.21	0.41
1:A:2319:ASN:O	1:A:2359:HIS:HA	2.21	0.41
1:A:2558:ILE:HG12	1:A:2563:VAL:HG21	2.03	0.41
1:A:2302:LEU:HD12	1:A:2356:ILE:HG13	2.03	0.41
1:A:2632:LYS:O	1:A:2633:HIS:C	2.59	0.41
1:A:1340:LEU:HD13	1:A:1377:VAL:CG2	2.51	0.41
1:A:1567:LYS:H	1:A:1584:THR:HB	1.86	0.41
1:A:2071:SER:HB2	10:A:3092:HOH:O	2.21	0.40
1:A:2240:GLU:HB2	1:A:2244:PHE:CE2	2.57	0.40
1:A:2314:VAL:HG22	1:A:2325:PHE:CD2	2.57	0.40
1:A:2628:HIS:O	1:A:2632:LYS:HG3	2.21	0.40
1:A:851:ALA:HB3	1:A:889:GLY:HA2	2.04	0.40
1:A:1267:LEU:HA	1:A:1267:LEU:HD22	1.77	0.40
1:A:1810:ASP:O	1:A:1811:LYS:HB2	2.21	0.40
1:A:2550:TYR:HD1	1:A:2567:VAL:O	2.04	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 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	1750/1962 (89%)	1663 (95%)	82 (5%)	5 (0%)	41 55

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1272	ALA

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Mol	Chain	Res	Type
1	A	2636	LYS
1	A	1811	LYS
1	A	1271	GLU
1	A	1109	ILE

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	1550/1708 (91%)	1528 (99%)	22 (1%)	67 82

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	837	ARG
1	A	849	ASN
1	A	850	TYR
1	A	1070	ARG
1	A	1267	LEU
1	A	1323	HIS
1	A	1338	LEU
1	A	1383	ARG
1	A	1518	ASP
1	A	1580	SER
1	A	1658	ASP
1	A	1688	ARG
1	A	1721	TYR
1	A	1762	GLN
1	A	1926	SER
1	A	2486	ASP
1	A	2551	PHE
1	A	2588	PHE
1	A	2593	HIS
1	A	2621	VAL
1	A	2633	HIS
1	A	2637	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	849	ASN
1	A	930	ASN
1	A	1239	GLN
1	A	1741	GLN
1	A	1812	GLN
1	A	1943	ASN
1	A	2096	GLN
1	A	2268	GLN
1	A	2366	HIS
1	A	2628	HIS

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](#)

20 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	B	1	1,2	14,14,15	0.42	0	17,19,21	0.89	1 (5%)
2	NAG	B	2	2	14,14,15	0.43	0	17,19,21	0.74	0
2	BMA	B	3	2	11,11,12	0.38	0	15,15,17	0.95	1 (6%)
2	MAN	B	4	2	11,11,12	0.22	0	15,15,17	0.74	0
2	MAN	B	5	2	11,11,12	0.20	0	15,15,17	0.71	0
2	MAN	B	6	2	11,11,12	0.30	0	15,15,17	0.75	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	C	1	1,3	14,14,15	0.40	0	17,19,21	1.38	3 (17%)
3	NAG	C	2	3	14,14,15	0.33	0	17,19,21	0.71	0
3	FUC	C	3	3	10,10,11	0.27	0	14,14,16	0.66	0
4	NAG	D	1	1,4	14,14,15	0.42	0	17,19,21	1.10	1 (5%)
4	NAG	D	2	4	14,14,15	0.42	0	17,19,21	0.83	0
4	BMA	D	3	4	11,11,12	0.37	0	15,15,17	0.66	0
4	MAN	D	4	4	11,11,12	0.26	0	15,15,17	0.64	0
4	MAN	D	5	4	11,11,12	0.26	0	15,15,17	0.67	0
4	FUC	D	6	4	10,10,11	0.29	0	14,14,16	0.59	0
5	NAG	E	1	1,5	14,14,15	0.47	0	17,19,21	0.66	0
5	NAG	E	2	5	14,14,15	0.38	0	17,19,21	0.85	1 (5%)
5	BMA	E	3	5	11,11,12	0.30	0	15,15,17	0.77	0
6	NAG	F	1	1,6	14,14,15	0.38	0	17,19,21	0.88	0
6	NAG	F	2	6	14,14,15	0.38	0	17,19,21	0.76	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	B	1	1,2	-	2/6/23/26	0/1/1/1
2	NAG	B	2	2	-	0/6/23/26	0/1/1/1
2	BMA	B	3	2	-	1/2/19/22	0/1/1/1
2	MAN	B	4	2	-	0/2/19/22	0/1/1/1
2	MAN	B	5	2	-	0/2/19/22	0/1/1/1
2	MAN	B	6	2	-	0/2/19/22	0/1/1/1
3	NAG	C	1	1,3	-	4/6/23/26	0/1/1/1
3	NAG	C	2	3	-	0/6/23/26	0/1/1/1
3	FUC	C	3	3	-	-	0/1/1/1
4	NAG	D	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	D	2	4	-	1/6/23/26	0/1/1/1
4	BMA	D	3	4	-	0/2/19/22	0/1/1/1
4	MAN	D	4	4	-	0/2/19/22	0/1/1/1
4	MAN	D	5	4	-	0/2/19/22	0/1/1/1
4	FUC	D	6	4	-	-	0/1/1/1
5	NAG	E	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	E	2	5	-	2/6/23/26	0/1/1/1
5	BMA	E	3	5	-	0/2/19/22	0/1/1/1
6	NAG	F	1	1,6	-	2/6/23/26	0/1/1/1
6	NAG	F	2	6	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1	NAG	C2-N2-C7	-3.26	118.27	122.90
3	C	1	NAG	O5-C1-C2	-3.10	106.39	111.29
4	D	1	NAG	O5-C1-C2	-2.76	106.93	111.29
2	B	3	BMA	C1-O5-C5	2.46	115.52	112.19
2	B	1	NAG	O5-C1-C2	-2.22	107.78	111.29
3	C	1	NAG	C4-C3-C2	-2.12	107.92	111.02
5	E	2	NAG	O5-C1-C2	-2.01	108.11	111.29

There are no chirality outliers.

All (15) torsion outliers are listed below:

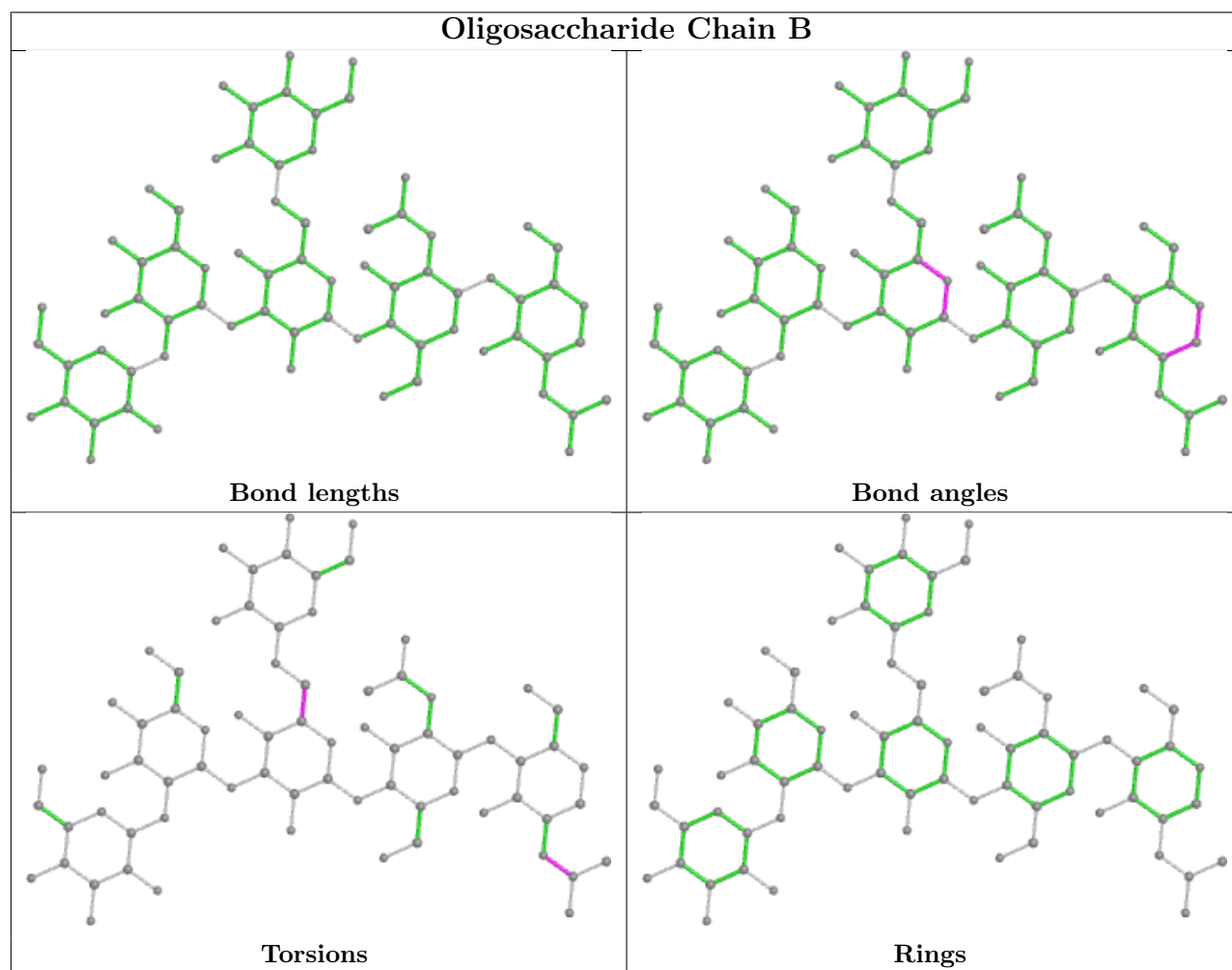
Mol	Chain	Res	Type	Atoms
3	C	1	NAG	C8-C7-N2-C2
3	C	1	NAG	O7-C7-N2-C2
4	D	1	NAG	C8-C7-N2-C2
4	D	1	NAG	O7-C7-N2-C2
2	B	1	NAG	C8-C7-N2-C2
2	B	1	NAG	O7-C7-N2-C2
5	E	2	NAG	C8-C7-N2-C2
6	F	1	NAG	C8-C7-N2-C2
6	F	1	NAG	O7-C7-N2-C2
5	E	2	NAG	O7-C7-N2-C2
2	B	3	BMA	O5-C5-C6-O6
4	D	2	NAG	O5-C5-C6-O6
6	F	2	NAG	O5-C5-C6-O6
3	C	1	NAG	C4-C5-C6-O6
3	C	1	NAG	O5-C5-C6-O6

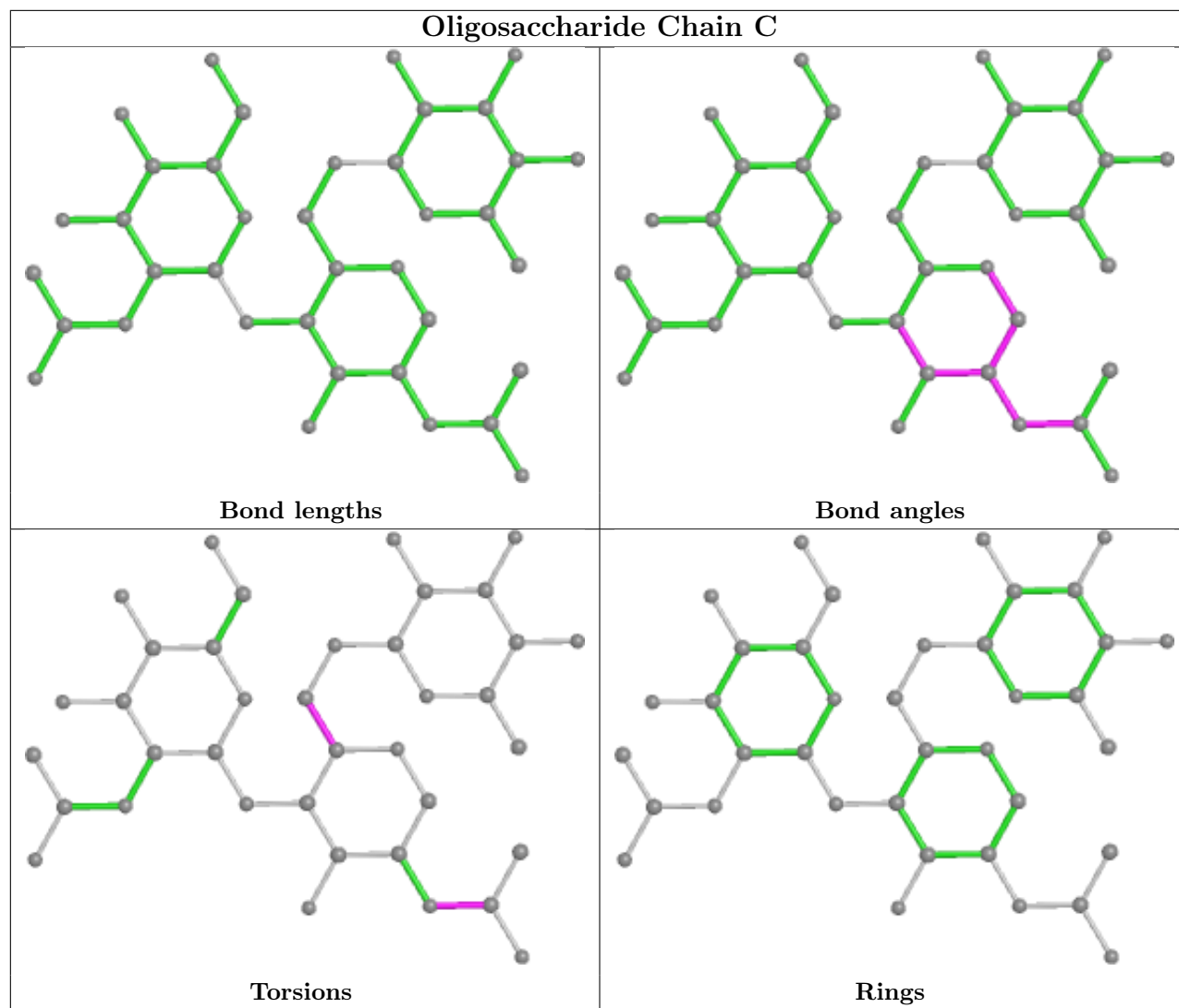
There are no ring outliers.

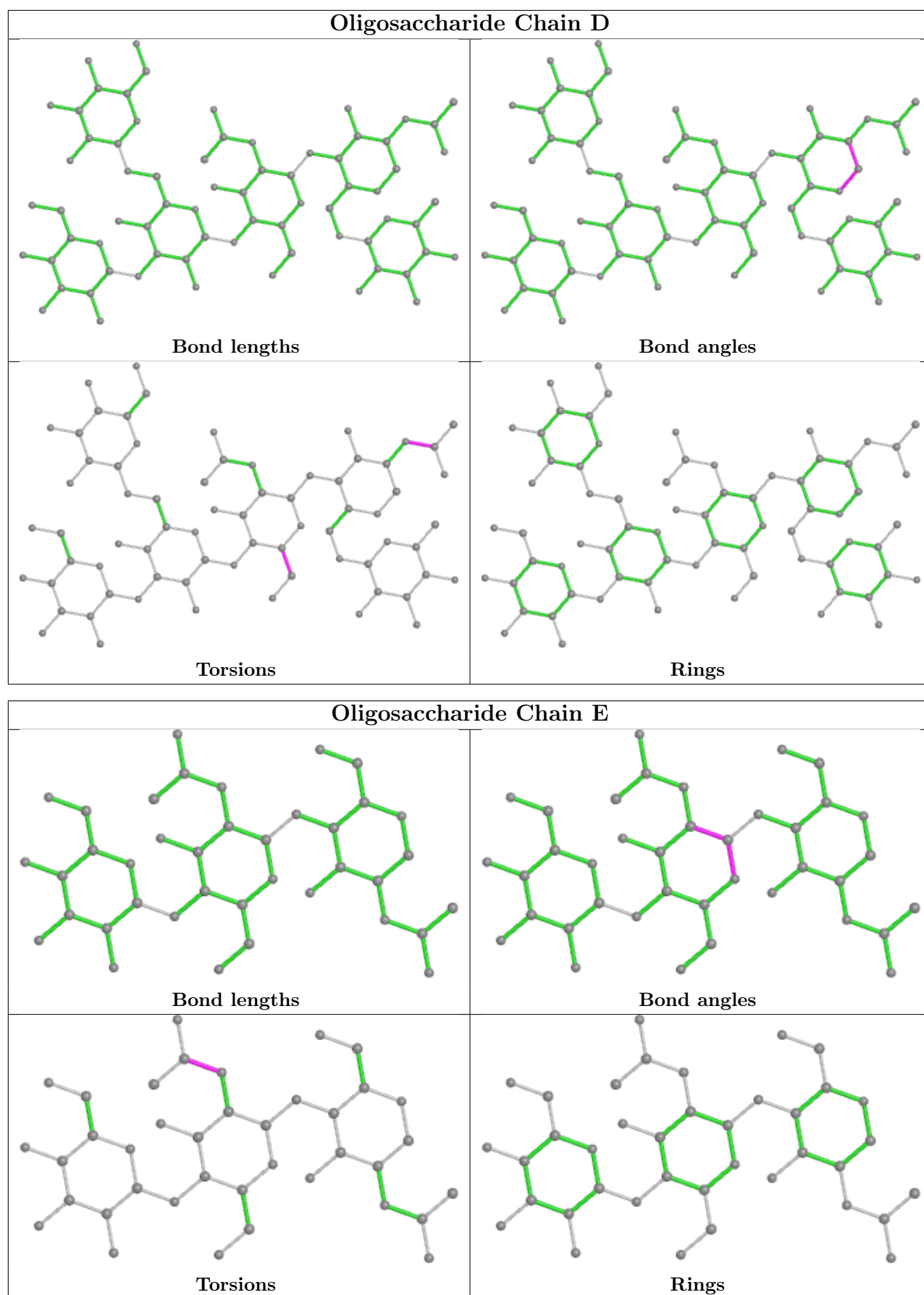
6 monomers are involved in 5 short contacts:

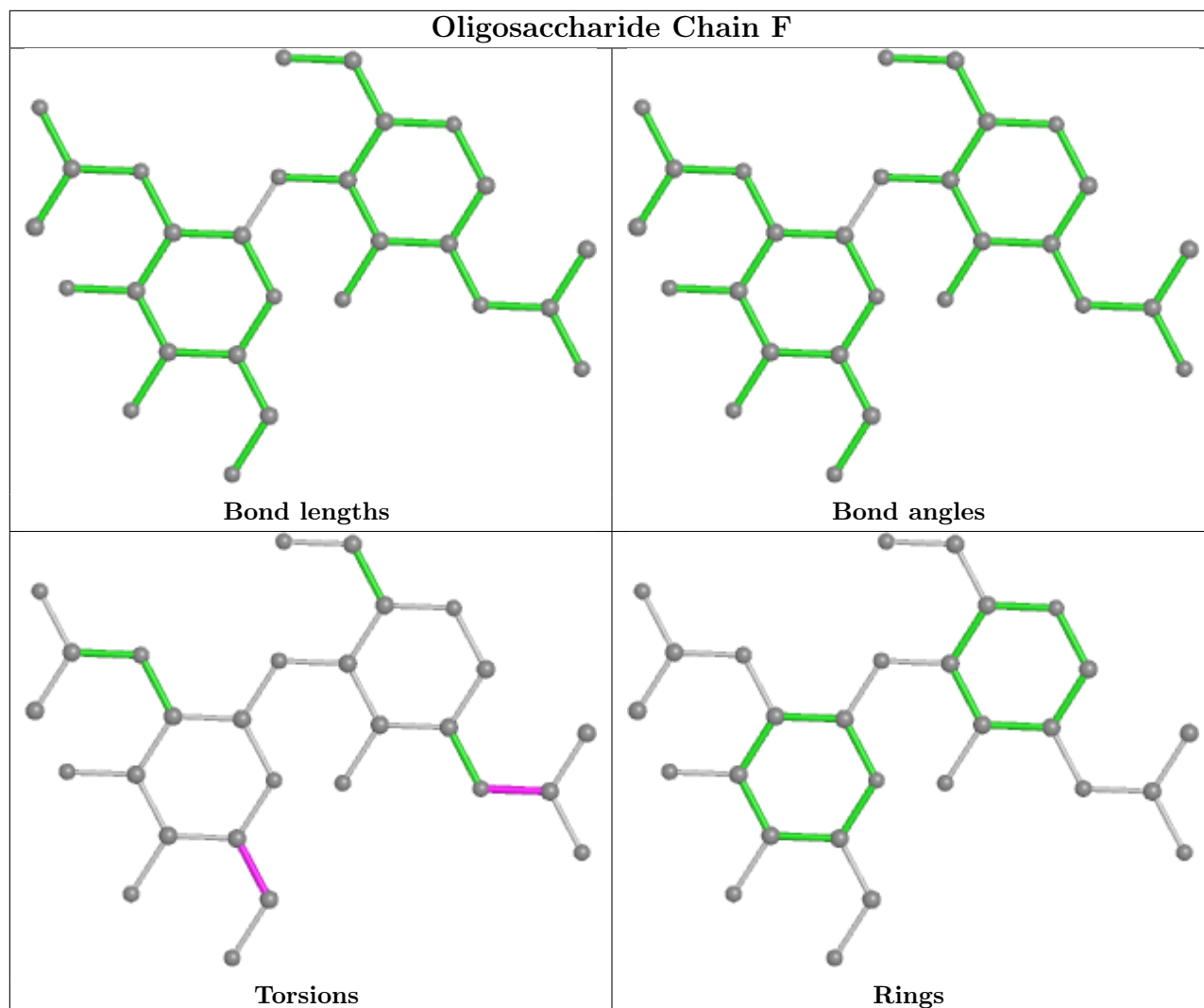
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	E	1	NAG	1	0
4	D	1	NAG	1	0
6	F	1	NAG	1	0
3	C	3	FUC	1	0
6	F	2	NAG	1	0
4	D	6	FUC	1	0

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](#)

10 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	$\# Z > 2$
7	NAG	A	2801	1	14,14,15	0.38	0	17,19,21	0.99	2 (11%)
8	GOL	A	2803	-	5,5,5	0.09	0	5,5,5	0.30	0
7	NAG	A	2810	1	14,14,15	0.30	0	17,19,21	0.88	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
8	GOL	A	2804	-	5,5,5	0.08	0	5,5,5	0.30	0
7	NAG	A	2802	1	14,14,15	0.31	0	17,19,21	0.83	0
9	PEG	A	2805	-	6,6,6	0.10	0	5,5,5	0.11	0
8	GOL	A	2808	-	5,5,5	0.08	0	5,5,5	0.34	0
9	PEG	A	2806	-	6,6,6	0.11	0	5,5,5	0.07	0
8	GOL	A	2809	-	5,5,5	0.08	0	5,5,5	0.32	0
8	GOL	A	2807	-	5,5,5	0.08	0	5,5,5	0.31	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
7	NAG	A	2801	1	-	3/6/23/26	0/1/1/1
8	GOL	A	2803	-	-	0/4/4/4	-
7	NAG	A	2810	1	-	5/6/23/26	0/1/1/1
8	GOL	A	2804	-	-	0/4/4/4	-
7	NAG	A	2802	1	-	5/6/23/26	0/1/1/1
9	PEG	A	2805	-	-	0/4/4/4	-
8	GOL	A	2808	-	-	0/4/4/4	-
9	PEG	A	2806	-	-	1/4/4/4	-
8	GOL	A	2809	-	-	0/4/4/4	-
8	GOL	A	2807	-	-	0/4/4/4	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	2801	NAG	C2-N2-C7	-2.45	119.42	122.90
7	A	2801	NAG	O5-C1-C2	2.06	114.54	111.29

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	2801	NAG	C8-C7-N2-C2
7	A	2801	NAG	O7-C7-N2-C2
7	A	2802	NAG	C3-C2-N2-C7
7	A	2802	NAG	C8-C7-N2-C2

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Mol	Chain	Res	Type	Atoms
7	A	2802	NAG	O7-C7-N2-C2
7	A	2810	NAG	C1-C2-N2-C7
7	A	2810	NAG	C8-C7-N2-C2
7	A	2810	NAG	O7-C7-N2-C2
7	A	2801	NAG	O5-C5-C6-O6
7	A	2810	NAG	O5-C5-C6-O6
7	A	2802	NAG	O5-C5-C6-O6
7	A	2802	NAG	C1-C2-N2-C7
7	A	2810	NAG	C3-C2-N2-C7
9	A	2806	PEG	C4-C3-O2-C2

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	2810	NAG	1	0
9	A	2806	PEG	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.

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

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

EDS failed to run properly - this section is therefore empty.

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

EDS failed to run properly - this section is therefore empty.

6.3 Carbohydrates [i](#)

EDS failed to run properly - this section is therefore empty.

6.4 Ligands [i](#)

EDS failed to run properly - this section is therefore empty.

6.5 Other polymers [i](#)

EDS failed to run properly - this section is therefore empty.