



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 19, 2024 – 12:05 PM EDT

PDB ID : 4GDJ
Title : A subtype N10 neuraminidase-like protein of A/little yellow-shouldered bat/
Guatemala/060/2010
Authors : Zhu, X.; Wilson, I.A.
Deposited on : 2012-07-31
Resolution : 2.00 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 : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 1.20.1
EDS : 2.37.1
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.37.1

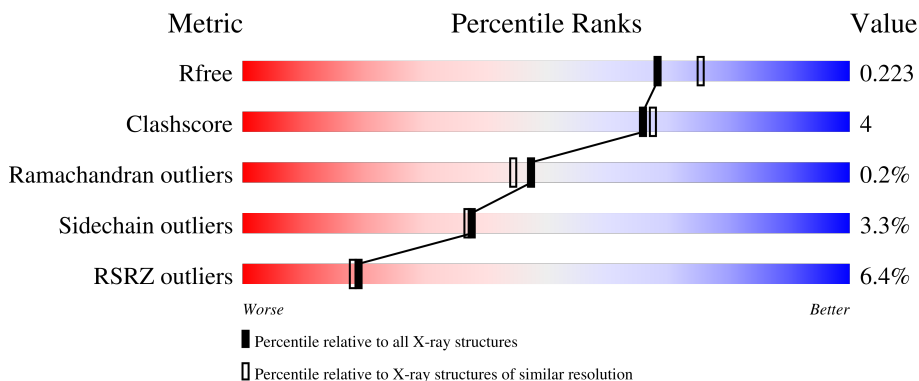
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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.



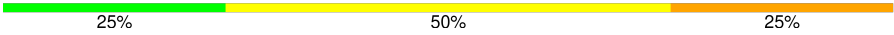
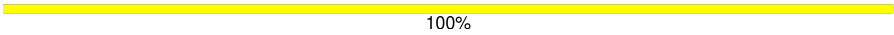
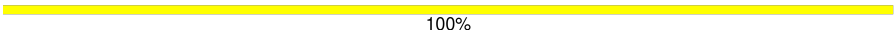
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	373	 5% 78% 6% 15%
1	B	373	 5% 78% 8% 14%
1	C	373	 6% 74% 9% 16%
1	D	373	 5% 75% 8% 16%
2	E	4	 50% 50%

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Mol	Chain	Length	Quality of chain
2	F	4	 25% 50% 25%
2	G	4	 100%
2	H	4	 100%

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 20514 atoms, of which 9599 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.

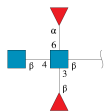
- Molecule 1 is a protein called Neuraminidase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	317	4874	1560	2396	421	479	18	0	0	0
1	B	321	4942	1579	2435	426	484	18	0	0	0
1	C	314	4839	1546	2383	418	474	18	0	0	0
1	D	314	4841	1547	2385	418	474	17	0	0	0

There are 20 discrepancies between the modelled and reference sequences:

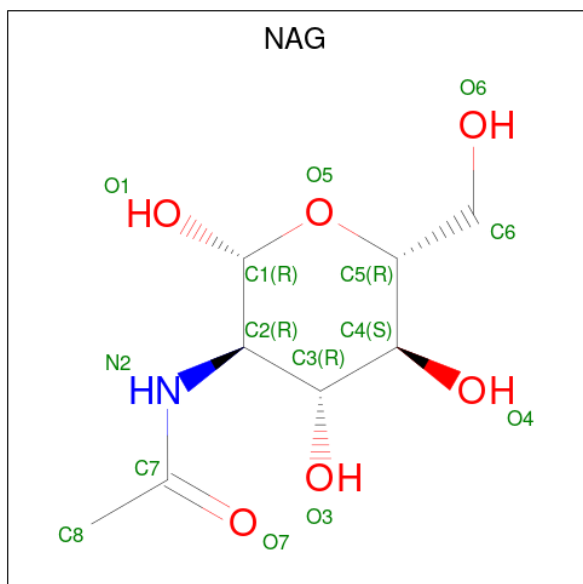
Chain	Residue	Modelled	Actual	Comment	Reference
A	77	GLY	-	expression tag	UNP H6QM95
A	78	SER	-	expression tag	UNP H6QM95
A	79	PRO	-	expression tag	UNP H6QM95
A	80	SER	-	expression tag	UNP H6QM95
A	81	ARG	-	expression tag	UNP H6QM95
B	77	GLY	-	expression tag	UNP H6QM95
B	78	SER	-	expression tag	UNP H6QM95
B	79	PRO	-	expression tag	UNP H6QM95
B	80	SER	-	expression tag	UNP H6QM95
B	81	ARG	-	expression tag	UNP H6QM95
C	77	GLY	-	expression tag	UNP H6QM95
C	78	SER	-	expression tag	UNP H6QM95
C	79	PRO	-	expression tag	UNP H6QM95
C	80	SER	-	expression tag	UNP H6QM95
C	81	ARG	-	expression tag	UNP H6QM95
D	77	GLY	-	expression tag	UNP H6QM95
D	78	SER	-	expression tag	UNP H6QM95
D	79	PRO	-	expression tag	UNP H6QM95
D	80	SER	-	expression tag	UNP H6QM95
D	81	ARG	-	expression tag	UNP H6QM95

- Molecule 2 is an oligosaccharide called beta-L-fucopyranose-(1-3)-[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			
2	E	4	Total	C	N	O	0	0	0
			48	28	2	18			
2	F	4	Total	C	N	O	0	0	0
			48	28	2	18			
2	G	4	Total	C	N	O	0	0	0
			48	28	2	18			
2	H	4	Total	C	N	O	0	0	0
			48	28	2	18			

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



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

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

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Ca	0	0
			1	1		
4	B	1	Total	Ca	0	0
			1	1		
4	C	1	Total	Ca	0	0
			1	1		
4	D	1	Total	Ca	0	0
			1	1		

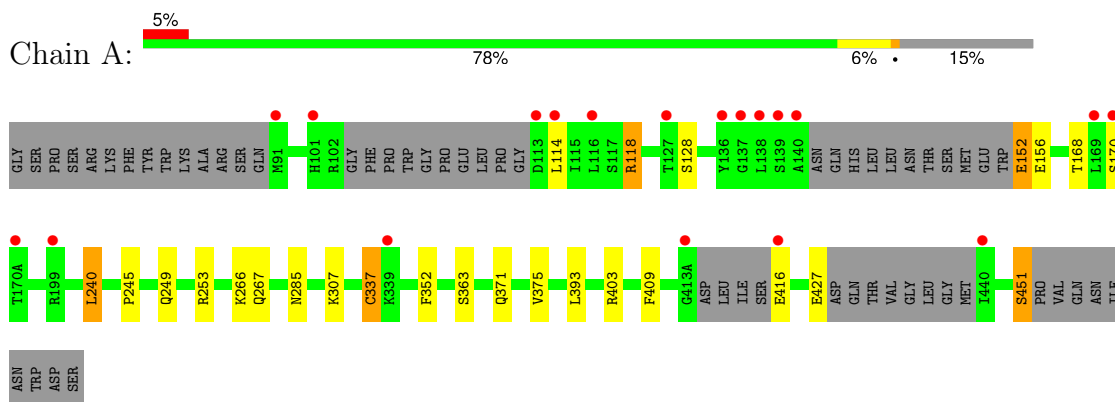
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	189	Total	O	0	0
			189	189		
5	B	195	Total	O	0	0
			195	195		
5	C	180	Total	O	0	0
			180	180		
5	D	174	Total	O	0	0
			174	174		

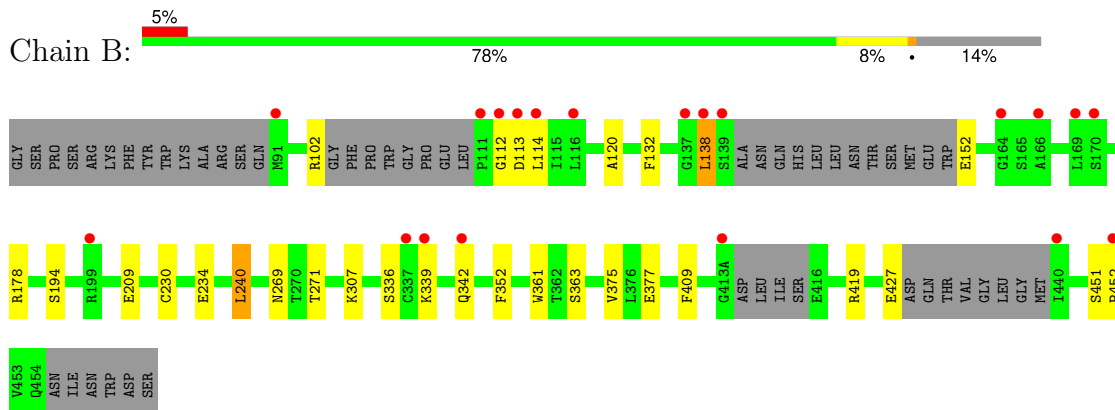
3 Residue-property plots i

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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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.

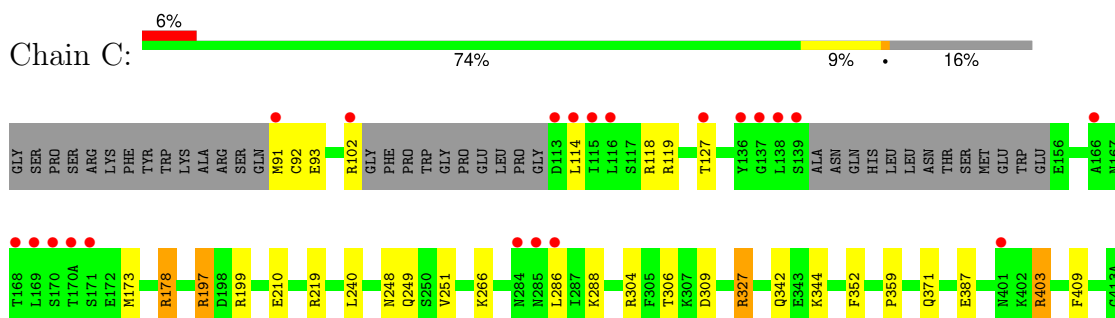
- Molecule 1: Neuraminidase

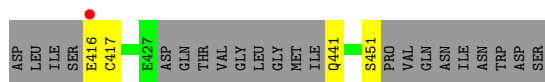


- Molecule 1: Neuraminidase

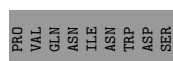
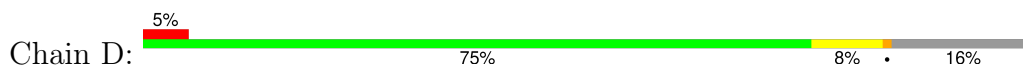


- Molecule 1: Neuraminidase





- Molecule 1: Neuraminidase



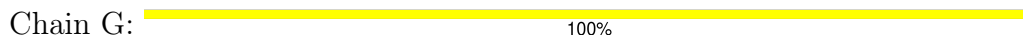
- Molecule 2: beta-L-fucopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)][alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose



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



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



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



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	107.90Å 107.90Å 345.21Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.85 – 2.00 48.85 – 2.00	Depositor EDS
% Data completeness (in resolution range)	97.9 (48.85-2.00) 97.7 (48.85-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.85 (at 2.00Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.7.2_869)	Depositor
R, R_{free}	0.189 , 0.226 0.186 , 0.223	Depositor DCC
R_{free} test set	6807 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	28.2	Xtrriage
Anisotropy	0.576	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.41 , 55.9	EDS
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
F_o, F_c correlation	0.96	EDS
Total number of atoms	20514	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 15.30% 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: CA, NAG, FUL, FUC

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	0.64	0/2527	0.78	4/3413 (0.1%)
1	B	0.62	0/2558	0.75	2/3456 (0.1%)
1	C	0.60	0/2505	0.78	3/3383 (0.1%)
1	D	0.59	0/2505	0.74	1/3384 (0.0%)
All	All	0.61	0/10095	0.76	10/13636 (0.1%)

There are no bond length outliers.

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	337	CYS	CA-CB-SG	11.11	133.99	114.00
1	A	118	ARG	NE-CZ-NH2	-7.49	116.55	120.30
1	C	197	ARG	NE-CZ-NH2	7.12	123.86	120.30
1	D	240	LEU	CA-CB-CG	-5.63	102.35	115.30
1	B	138	LEU	CB-CG-CD2	-5.35	101.91	111.00
1	C	178	ARG	CG-CD-NE	-5.22	100.83	111.80
1	B	240	LEU	CA-CB-CG	-5.22	103.29	115.30
1	A	118	ARG	NE-CZ-NH1	5.13	122.87	120.30
1	A	240	LEU	CB-CG-CD1	-5.13	102.28	111.00
1	C	327	ARG	NE-CZ-NH1	5.12	122.86	120.30

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	2478	2396	2403	16	0
1	B	2507	2435	2433	16	0
1	C	2456	2383	2382	29	0
1	D	2456	2385	2384	22	0
2	E	48	0	43	0	0
2	F	48	0	43	1	0
2	G	48	0	43	0	0
2	H	48	0	43	0	0
3	A	28	0	26	0	0
3	B	28	0	26	0	0
3	C	14	0	13	0	0
3	D	14	0	13	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	189	0	0	3	0
5	B	195	0	0	2	0
5	C	180	0	0	5	0
5	D	174	0	0	2	0
All	All	10915	9599	9852	81	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 4.

All (81) 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:B:178:ARG:NH1	5:B:707:HOH:O	1.59	1.32
1:A:118:ARG:NH2	1:A:156:GLU:OE2	1.97	0.96
1:C:178:ARG:CZ	1:C:197:ARG:HH12	1.79	0.96
1:B:336:SER:OG	1:B:339:LYS:HG2	1.69	0.93
1:C:306:THR:HG23	1:C:309:ASP:OD1	1.73	0.88
1:D:118:ARG:NH2	1:D:156:GLU:OE2	2.14	0.80
1:C:371:GLN:HB2	1:C:403:ARG:HD3	1.64	0.79
1:C:210:GLU:OE2	5:C:715:HOH:O	2.02	0.76
1:D:337:CYS:SG	5:D:663:HOH:O	2.43	0.76
1:B:451:SER:OG	1:B:452:PRO:HD3	1.85	0.76
1:B:451:SER:OG	1:B:452:PRO:CD	2.39	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:178:ARG:CZ	1:C:197:ARG:NH1	2.55	0.69
1:A:249:GLN:HG3	5:A:763:HOH:O	1.94	0.67
1:C:178:ARG:NH2	1:C:197:ARG:HH12	1.92	0.67
1:C:286:LEU:HD23	1:C:288:LYS:NZ	2.09	0.67
1:A:451:SER:OG	1:A:451:SER:O	2.07	0.66
1:C:327:ARG:O	1:C:344:LYS:HE3	1.95	0.65
1:C:93:GLU:HB2	1:C:359:PRO:HD2	1.78	0.64
1:A:427:GLU:N	1:A:427:GLU:OE1	2.31	0.64
1:B:271:THR:OG1	2:F:1:NAG:H5	1.98	0.63
1:D:118:ARG:HH21	1:D:156:GLU:CD	2.03	0.61
1:D:131:LYS:HG3	1:D:163:ILE:HD12	1.84	0.58
1:A:118:ARG:NH2	1:A:156:GLU:CD	2.56	0.57
1:A:152:GLU:OE2	1:A:152:GLU:HA	2.04	0.57
1:C:286:LEU:HD23	1:C:288:LYS:HZ2	1.69	0.57
1:A:403:ARG:O	1:A:427:GLU:OE1	2.22	0.57
1:B:194:SER:OG	5:B:707:HOH:O	2.18	0.55
1:C:210:GLU:CD	5:C:715:HOH:O	2.44	0.54
1:D:197:ARG:CA	1:D:197:ARG:HE	2.18	0.54
1:C:93:GLU:HG2	1:C:451:SER:O	2.08	0.54
1:C:118:ARG:NH1	1:C:119:ARG:HD2	2.23	0.53
1:D:403:ARG:HD3	1:D:427:GLU:CD	2.28	0.53
1:C:288:LYS:CD	1:C:304:ARG:HG2	2.39	0.53
1:C:441:GLN:OE1	1:C:441:GLN:HA	2.07	0.53
1:A:245:PRO:HD2	5:A:763:HOH:O	2.09	0.52
1:A:352:PHE:HB2	1:A:409:PHE:CE2	2.44	0.52
1:D:113:ASP:OD1	1:D:113:ASP:N	2.43	0.52
1:C:93:GLU:HB2	1:C:359:PRO:CD	2.41	0.51
1:B:114:LEU:O	1:B:138:LEU:HD12	2.10	0.51
1:D:440:ILE:HD11	1:D:442:GLU:OE2	2.11	0.51
1:D:440:ILE:CD1	1:D:442:GLU:OE2	2.59	0.51
1:C:416:GLU:N	5:C:745:HOH:O	2.44	0.50
1:D:168:THR:HG22	1:D:170(A):THR:OG1	2.12	0.49
1:C:306:THR:CG2	1:C:309:ASP:OD1	2.54	0.49
1:D:118:ARG:NH1	1:D:119:ARG:HD2	2.28	0.49
1:B:209:GLU:H	1:B:209:GLU:CD	2.16	0.49
1:C:91:MET:HG2	1:C:92:CYS:H	1.78	0.48
1:A:393:LEU:HD13	1:D:397:LEU:CD2	2.43	0.48
1:B:269:ASN:OD1	1:B:271:THR:HG23	2.14	0.48
1:C:219:ARG:HG3	1:C:251:VAL:HG21	1.95	0.47
1:C:248:ASN:OD1	1:C:249:GLN:HG3	2.14	0.47
1:C:288:LYS:HE3	1:C:304:ARG:HG2	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:197:ARG:HE	1:D:197:ARG:HA	1.78	0.46
1:D:120:ALA:HA	1:D:132:PHE:O	2.16	0.46
1:B:120:ALA:HA	1:B:132:PHE:O	2.16	0.46
1:B:209:GLU:CD	1:B:209:GLU:N	2.69	0.46
1:C:199:ARG:NH1	5:C:697:HOH:O	2.49	0.46
1:C:173:MET:HE1	5:C:743:HOH:O	2.16	0.45
1:B:113:ASP:OD1	1:B:113:ASP:N	2.46	0.45
1:C:327:ARG:O	1:C:344:LYS:CE	2.65	0.43
1:B:352:PHE:HB2	1:B:409:PHE:CE2	2.54	0.43
1:B:363:SER:HA	1:B:375:VAL:O	2.19	0.43
1:A:363:SER:HA	1:A:375:VAL:O	2.19	0.43
1:B:361:TRP:HA	1:B:377:GLU:O	2.18	0.42
1:D:115:ILE:HG13	1:D:168:THR:HA	2.00	0.42
1:B:234:GLU:OE1	1:B:307:LYS:NZ	2.41	0.42
1:C:286:LEU:CD2	1:C:288:LYS:HZ2	2.33	0.42
1:D:363:SER:HB2	1:D:374:PHE:CZ	2.54	0.42
1:C:327:ARG:C	1:C:344:LYS:HE3	2.39	0.42
1:D:156:GLU:OE1	1:D:178:ARG:HG2	2.20	0.42
1:C:352:PHE:HB2	1:C:409:PHE:CE2	2.55	0.41
1:D:403:ARG:HD3	1:D:427:GLU:OE2	2.21	0.41
1:A:114:LEU:HD12	1:A:168:THR:HG22	2.03	0.41
1:C:178:ARG:NH2	1:C:197:ARG:NH1	2.63	0.41
1:D:339:LYS:HE3	5:D:721:HOH:O	2.20	0.41
1:A:253:ARG:HG2	1:A:267:GLN:HA	2.03	0.41
1:A:371:GLN:OE1	1:A:403:ARG:NH2	2.54	0.41
1:D:125:ASP:OD1	1:D:128:SER:N	2.50	0.41
1:D:197:ARG:HA	1:D:197:ARG:NE	2.36	0.41
1:A:393:LEU:HD13	1:D:397:LEU:HD23	2.03	0.40
1:A:249:GLN:CD	5:A:738:HOH:O	2.60	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	307/373 (82%)	294 (96%)	12 (4%)	1 (0%)	41	37
1	B	311/373 (83%)	300 (96%)	10 (3%)	1 (0%)	41	37
1	C	304/373 (82%)	294 (97%)	10 (3%)	0	100	100
1	D	304/373 (82%)	292 (96%)	12 (4%)	0	100	100
All	All	1226/1492 (82%)	1180 (96%)	44 (4%)	2 (0%)	47	44

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	285	ASN
1	B	112	GLY

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	279/328 (85%)	270 (97%)	9 (3%)	39	38
1	B	283/328 (86%)	276 (98%)	7 (2%)	47	49
1	C	277/328 (84%)	268 (97%)	9 (3%)	39	38
1	D	277/328 (84%)	265 (96%)	12 (4%)	29	26
All	All	1116/1312 (85%)	1079 (97%)	37 (3%)	38	37

All (37) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	128	SER
1	A	152	GLU
1	A	170	SER
1	A	240	LEU
1	A	266	LYS
1	A	307	LYS
1	A	337	CYS
1	A	416	GLU
1	A	451	SER

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Mol	Chain	Res	Type
1	B	102	ARG
1	B	152	GLU
1	B	230	CYS
1	B	240	LEU
1	B	342	GLN
1	B	419	ARG
1	B	427	GLU
1	C	102	ARG
1	C	114	LEU
1	C	127	THR
1	C	240	LEU
1	C	266	LYS
1	C	342	GLN
1	C	387	GLU
1	C	403	ARG
1	C	417	CYS
1	D	101	HIS
1	D	102	ARG
1	D	113	ASP
1	D	127	THR
1	D	138	LEU
1	D	170	SER
1	D	197	ARG
1	D	230	CYS
1	D	240	LEU
1	D	337	CYS
1	D	342	GLN
1	D	416	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	258	GLN

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](#)

16 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	E	1	2,1	14,14,15	0.80	0	17,19,21	1.15	1 (5%)
2	FUL	E	2	2	10,10,11	0.90	0	14,14,16	3.49	4 (28%)
2	NAG	E	3	2	14,14,15	0.46	0	17,19,21	1.00	0
2	FUC	E	4	2	10,10,11	0.77	0	14,14,16	0.99	0
2	NAG	F	1	2,1	14,14,15	0.75	0	17,19,21	1.18	2 (11%)
2	FUL	F	2	2	10,10,11	0.87	0	14,14,16	3.49	6 (42%)
2	NAG	F	3	2	14,14,15	0.64	0	17,19,21	0.90	0
2	FUC	F	4	2	10,10,11	0.85	0	14,14,16	1.09	1 (7%)
2	NAG	G	1	2,1	14,14,15	0.58	0	17,19,21	1.40	2 (11%)
2	FUL	G	2	2	10,10,11	0.81	0	14,14,16	3.77	6 (42%)
2	NAG	G	3	2	14,14,15	0.58	0	17,19,21	1.33	4 (23%)
2	FUC	G	4	2	10,10,11	0.83	0	14,14,16	1.36	3 (21%)
2	NAG	H	1	2,1	14,14,15	0.70	0	17,19,21	1.13	2 (11%)
2	FUL	H	2	2	10,10,11	0.87	0	14,14,16	1.71	3 (21%)
2	NAG	H	3	2	14,14,15	0.60	0	17,19,21	1.15	1 (5%)
2	FUC	H	4	2	10,10,11	0.69	0	14,14,16	0.94	1 (7%)

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

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

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	FUL	E	2	2	-	-	0/1/1/1
2	NAG	E	3	2	-	0/6/23/26	0/1/1/1
2	FUC	E	4	2	-	-	0/1/1/1
2	NAG	F	1	2,1	-	0/6/23/26	0/1/1/1
2	FUL	F	2	2	-	-	0/1/1/1
2	NAG	F	3	2	-	1/6/23/26	0/1/1/1
2	FUC	F	4	2	-	-	0/1/1/1
2	NAG	G	1	2,1	-	0/6/23/26	0/1/1/1
2	FUL	G	2	2	-	-	0/1/1/1
2	NAG	G	3	2	-	0/6/23/26	0/1/1/1
2	FUC	G	4	2	-	-	0/1/1/1
2	NAG	H	1	2,1	-	0/6/23/26	0/1/1/1
2	FUL	H	2	2	-	-	0/1/1/1
2	NAG	H	3	2	-	0/6/23/26	0/1/1/1
2	FUC	H	4	2	-	-	0/1/1/1

There are no bond length outliers.

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	2	FUL	C1-C2-C3	-10.48	94.38	109.64
2	E	2	FUL	C1-C2-C3	-10.37	94.54	109.64
2	G	2	FUL	C1-O5-C5	-8.97	91.79	112.97
2	G	2	FUL	C1-C2-C3	-8.67	97.02	109.64
2	E	2	FUL	C1-O5-C5	-6.04	98.72	112.97
2	F	2	FUL	C1-O5-C5	-4.64	102.02	112.97
2	H	2	FUL	C1-C2-C3	-4.10	103.68	109.64
2	G	1	NAG	O3-C3-C2	-3.70	101.71	109.40
2	E	1	NAG	O3-C3-C2	-3.62	101.88	109.40
2	H	3	NAG	C1-O5-C5	3.56	116.96	112.19
2	G	2	FUL	C2-C3-C4	-3.55	104.63	110.86
2	F	2	FUL	O2-C2-C3	3.53	117.47	110.15
2	E	2	FUL	C3-C4-C5	3.35	114.91	109.81
2	H	2	FUL	O5-C1-C2	-2.75	104.22	110.79
2	G	2	FUL	O2-C2-C3	2.71	115.77	110.15
2	F	2	FUL	C3-C4-C5	2.70	113.92	109.81
2	H	1	NAG	C2-N2-C7	-2.67	119.32	122.90
2	G	4	FUC	C6-C5-C4	-2.55	108.42	113.08
2	F	2	FUL	C2-C3-C4	-2.52	106.43	110.86
2	G	3	NAG	C1-O5-C5	2.47	115.50	112.19
2	F	1	NAG	C1-O5-C5	2.47	115.49	112.19
2	G	1	NAG	C1-O5-C5	2.35	115.33	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	G	3	NAG	C3-C4-C5	2.30	114.41	110.23
2	H	1	NAG	O5-C1-C2	-2.30	107.73	111.29
2	F	1	NAG	O5-C1-C2	-2.28	107.76	111.29
2	G	3	NAG	C6-C5-C4	-2.26	107.46	113.02
2	F	4	FUC	O2-C2-C3	-2.25	105.48	110.15
2	E	2	FUL	O2-C2-C1	2.25	114.38	109.22
2	G	2	FUL	O2-C2-C1	2.22	114.31	109.22
2	G	4	FUC	O2-C2-C1	-2.20	104.18	109.22
2	G	3	NAG	O5-C5-C6	2.19	111.94	107.66
2	G	2	FUL	C3-C4-C5	2.19	113.14	109.81
2	F	2	FUL	O5-C1-C2	-2.18	105.59	110.79
2	G	4	FUC	O2-C2-C3	-2.18	105.63	110.15
2	H	4	FUC	O2-C2-C1	-2.15	104.31	109.22
2	H	2	FUL	C3-C4-C5	2.14	113.06	109.81

There are no chirality outliers.

All (1) torsion outliers are listed below:

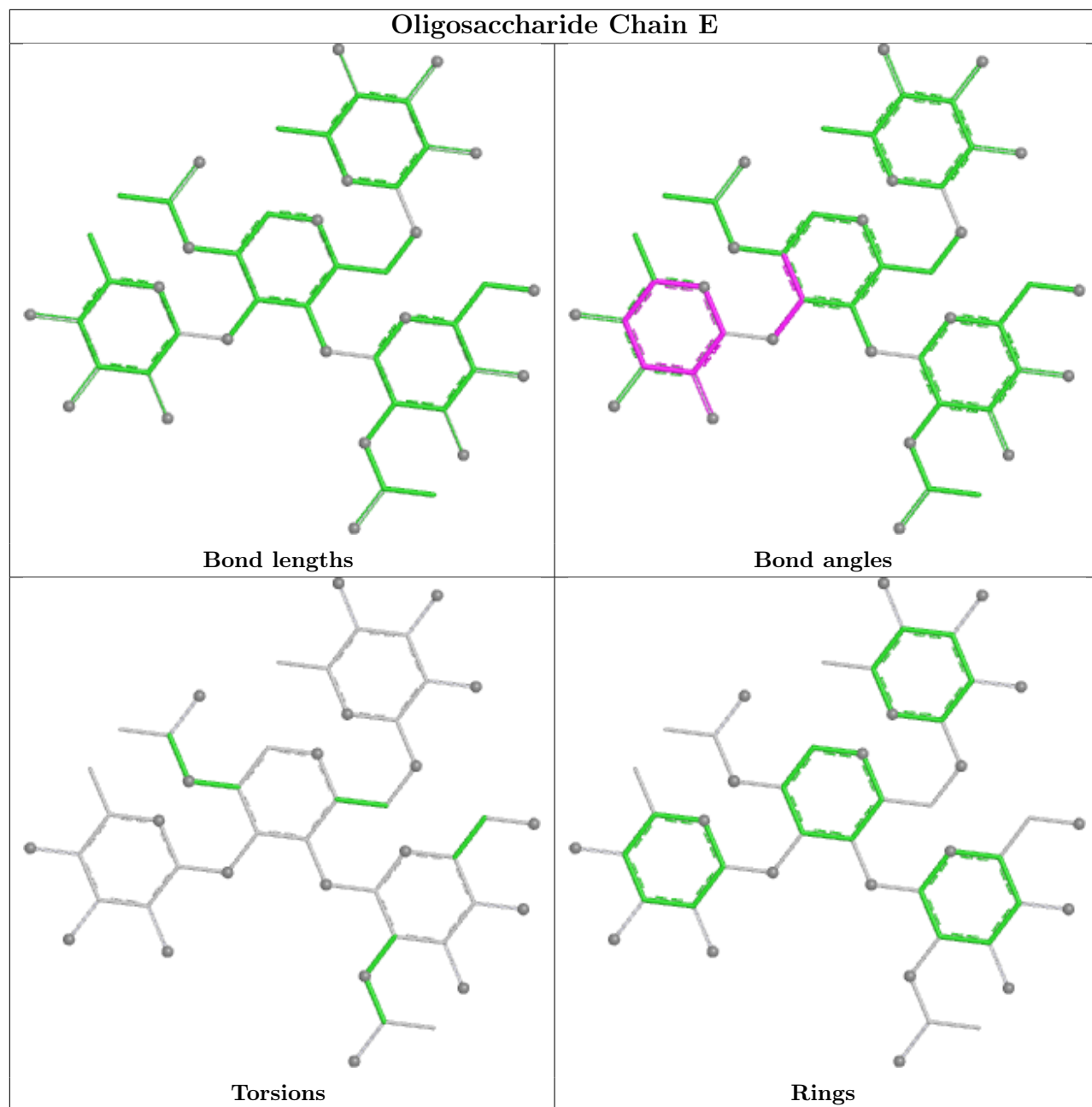
Mol	Chain	Res	Type	Atoms
2	F	3	NAG	C1-C2-N2-C7

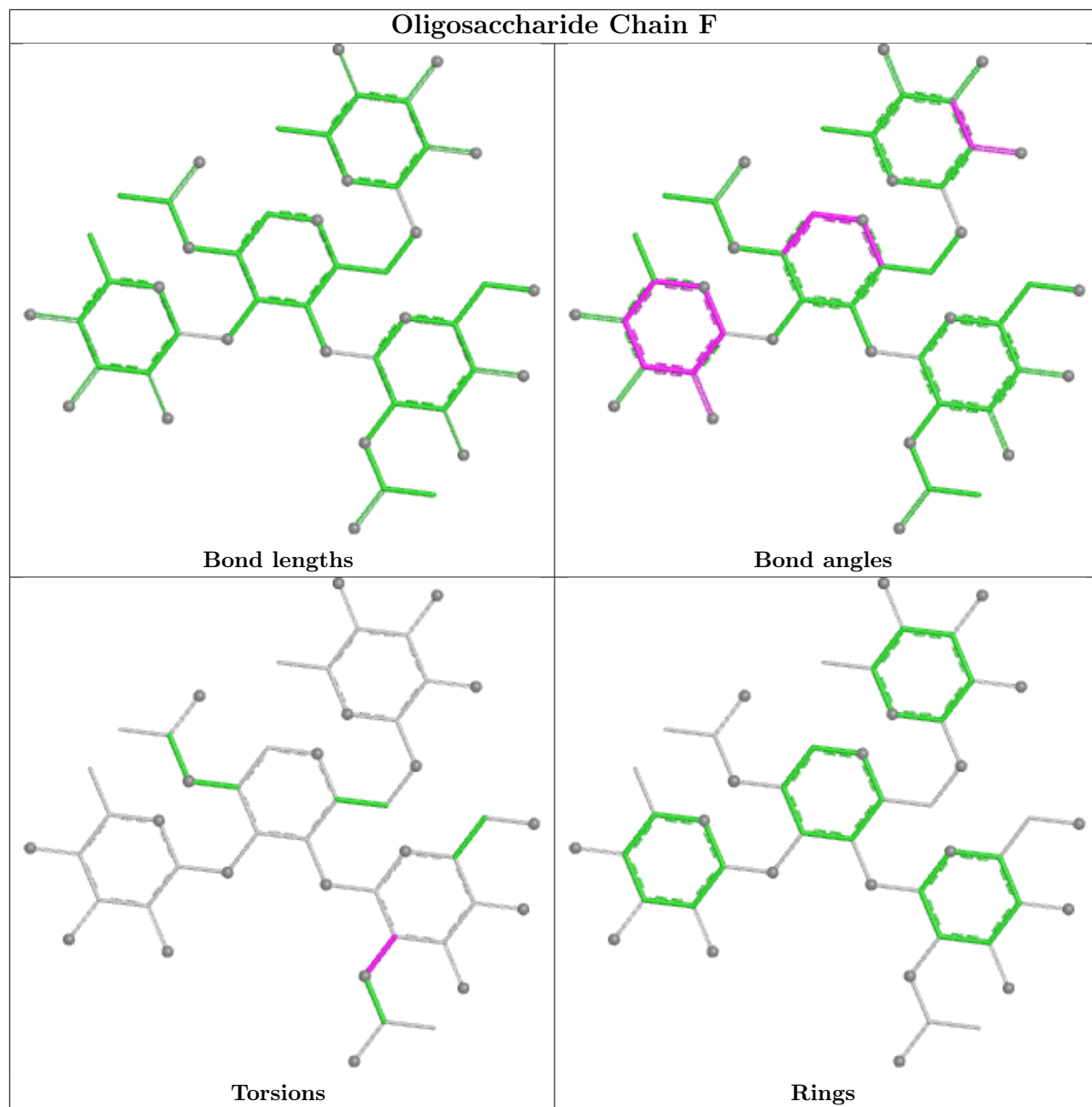
There are no ring outliers.

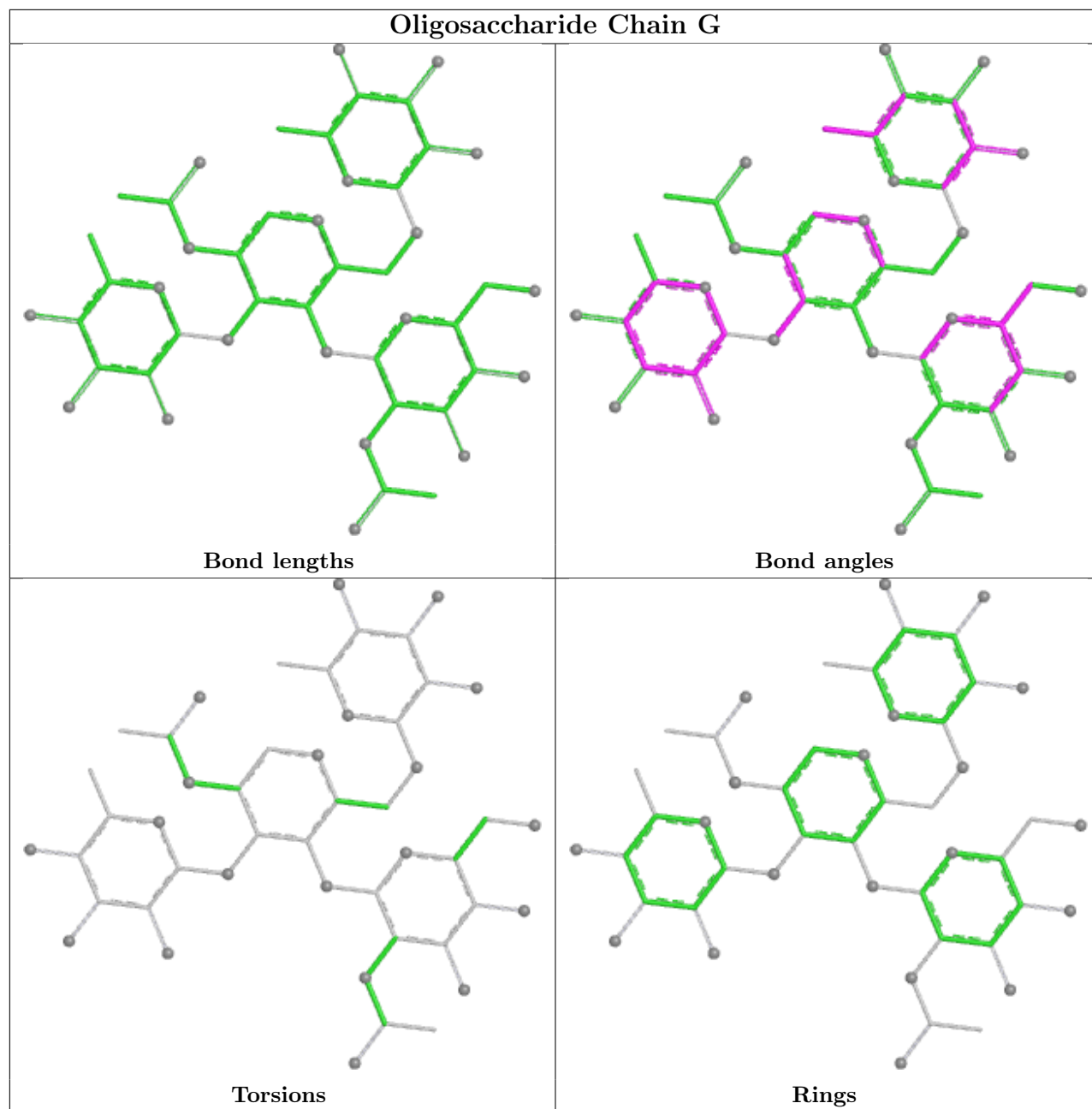
1 monomer is involved in 1 short contact:

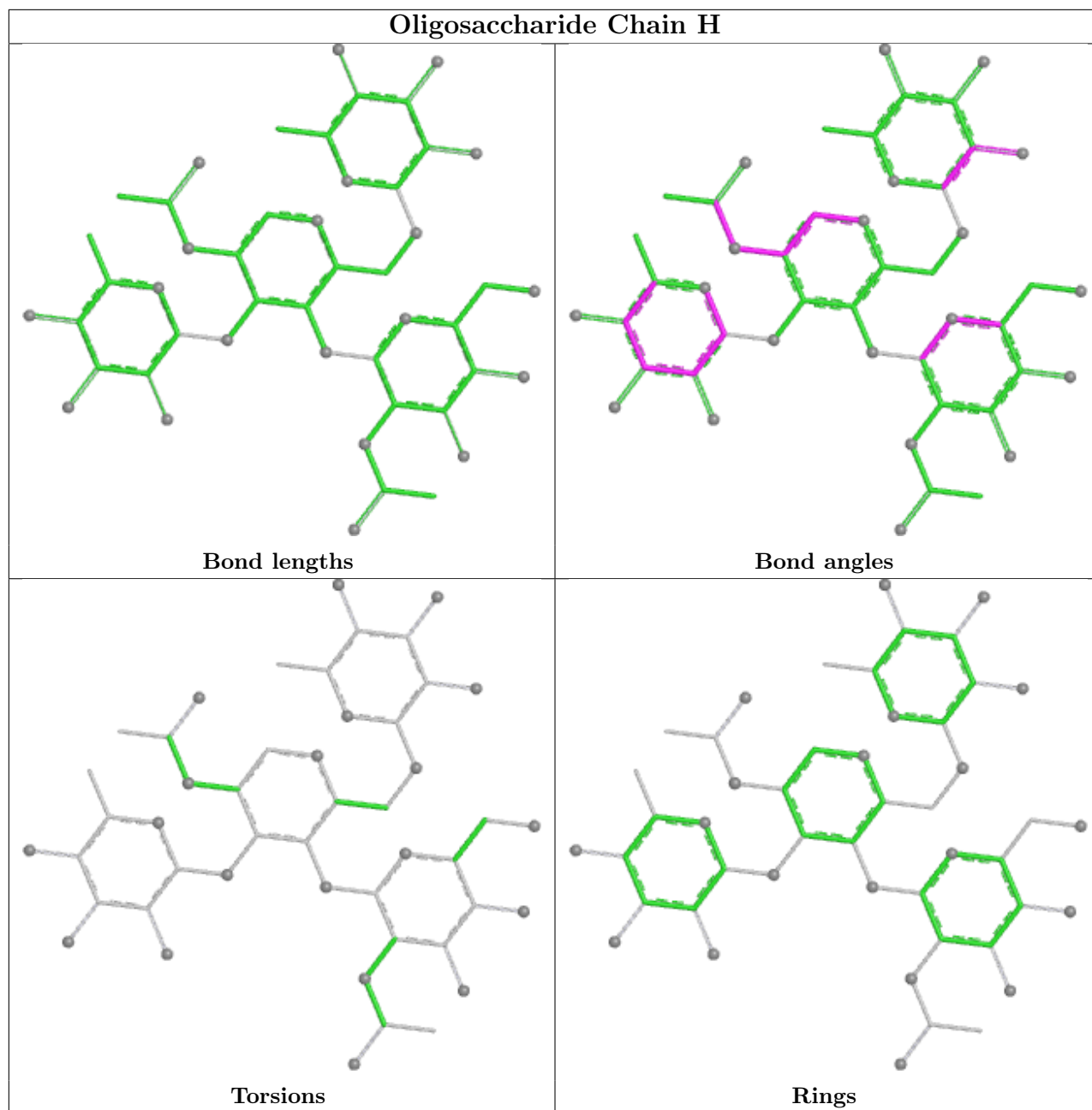
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	F	1	NAG	1	0

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](#)

Of 10 ligands modelled in this entry, 4 are monoatomic - leaving 6 for Mogul analysis.

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	A	505	1	14,14,15	0.56	0	17,19,21	1.19	1 (5%)
3	NAG	D	505	1	14,14,15	0.55	0	17,19,21	0.87	0
3	NAG	A	506	1	14,14,15	0.46	0	17,19,21	0.73	0
3	NAG	B	505	1	14,14,15	0.57	0	17,19,21	0.76	0
3	NAG	C	505	1	14,14,15	0.42	0	17,19,21	1.34	1 (5%)
3	NAG	B	506	1	14,14,15	0.53	0	17,19,21	0.91	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	A	505	1	-	2/6/23/26	0/1/1/1
3	NAG	D	505	1	-	0/6/23/26	0/1/1/1
3	NAG	A	506	1	-	0/6/23/26	0/1/1/1
3	NAG	B	505	1	-	1/6/23/26	0/1/1/1
3	NAG	C	505	1	-	2/6/23/26	0/1/1/1
3	NAG	B	506	1	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	505	NAG	C1-O5-C5	4.54	118.27	112.19
3	A	505	NAG	C1-O5-C5	-3.48	107.53	112.19
3	B	506	NAG	C1-O5-C5	2.98	116.18	112.19

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	505	NAG	C8-C7-N2-C2
3	C	505	NAG	O7-C7-N2-C2
3	A	505	NAG	C4-C5-C6-O6
3	B	506	NAG	C8-C7-N2-C2
3	A	505	NAG	O5-C5-C6-O6
3	B	506	NAG	O7-C7-N2-C2
3	B	505	NAG	C4-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

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

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

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	317/373 (84%)	0.25	19 (5%) 21 20	19, 30, 63, 96	0
1	B	321/373 (86%)	0.27	20 (6%) 20 19	19, 30, 67, 108	0
1	C	314/373 (84%)	0.23	22 (7%) 16 15	20, 33, 68, 101	0
1	D	314/373 (84%)	0.30	20 (6%) 19 18	21, 33, 69, 103	0
All	All	1266/1492 (84%)	0.26	81 (6%) 19 18	19, 31, 68, 108	0

All (81) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	138	LEU	8.5
1	A	440	ILE	7.3
1	B	111	PRO	7.3
1	D	413(A)	GLY	7.1
1	D	114	LEU	6.5
1	C	114	LEU	6.4
1	C	138	LEU	6.3
1	D	139	SER	6.2
1	A	140	ALA	6.2
1	C	139	SER	5.5
1	B	139	SER	5.5
1	B	138	LEU	5.1
1	B	114	LEU	5.0
1	B	452	PRO	4.8
1	C	137	GLY	4.8
1	D	136	TYR	4.6
1	D	169	LEU	4.5
1	A	113	ASP	4.5
1	B	113	ASP	4.4
1	C	169	LEU	4.4
1	D	116	LEU	4.4

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Mol	Chain	Res	Type	RSRZ
1	C	170(A)	THR	4.4
1	A	138	LEU	4.3
1	B	91	MET	4.2
1	D	199	ARG	4.1
1	B	112	GLY	4.0
1	A	416	GLU	3.9
1	A	114	LEU	3.8
1	B	116	LEU	3.8
1	A	91	MET	3.8
1	D	137	GLY	3.8
1	C	113	ASP	3.8
1	A	169	LEU	3.7
1	C	136	TYR	3.6
1	A	139	SER	3.6
1	C	168	THR	3.6
1	C	170	SER	3.5
1	B	199	ARG	3.4
1	C	127	THR	3.4
1	D	285	ASN	3.4
1	A	137	GLY	3.4
1	C	285	ASN	3.4
1	A	127	THR	3.3
1	C	91	MET	3.3
1	B	440	ILE	3.3
1	D	113	ASP	3.2
1	D	115	ILE	3.2
1	C	115	ILE	3.2
1	D	440	ILE	3.1
1	C	401	ASN	3.0
1	B	413(A)	GLY	3.0
1	C	102	ARG	3.0
1	D	168	THR	3.0
1	C	416	GLU	2.9
1	D	416	GLU	2.9
1	C	166	ALA	2.8
1	C	116	LEU	2.8
1	D	284	ASN	2.6
1	D	101	HIS	2.5
1	D	126	LEU	2.5
1	B	169	LEU	2.5
1	B	137	GLY	2.5
1	A	116	LEU	2.4

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Mol	Chain	Res	Type	RSRZ
1	C	284	ASN	2.4
1	B	164	GLY	2.4
1	B	337	CYS	2.4
1	A	170(A)	THR	2.3
1	A	339	LYS	2.3
1	D	170(A)	THR	2.3
1	B	342	GLN	2.3
1	A	136	TYR	2.2
1	B	339	LYS	2.2
1	A	101	HIS	2.2
1	A	413(A)	GLY	2.2
1	B	170	SER	2.2
1	C	286	LEU	2.2
1	B	166	ALA	2.1
1	A	199	ARG	2.1
1	A	170	SER	2.0
1	C	171	SER	2.0
1	D	413	LYS	2.0

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

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

6.3 Carbohydrates [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

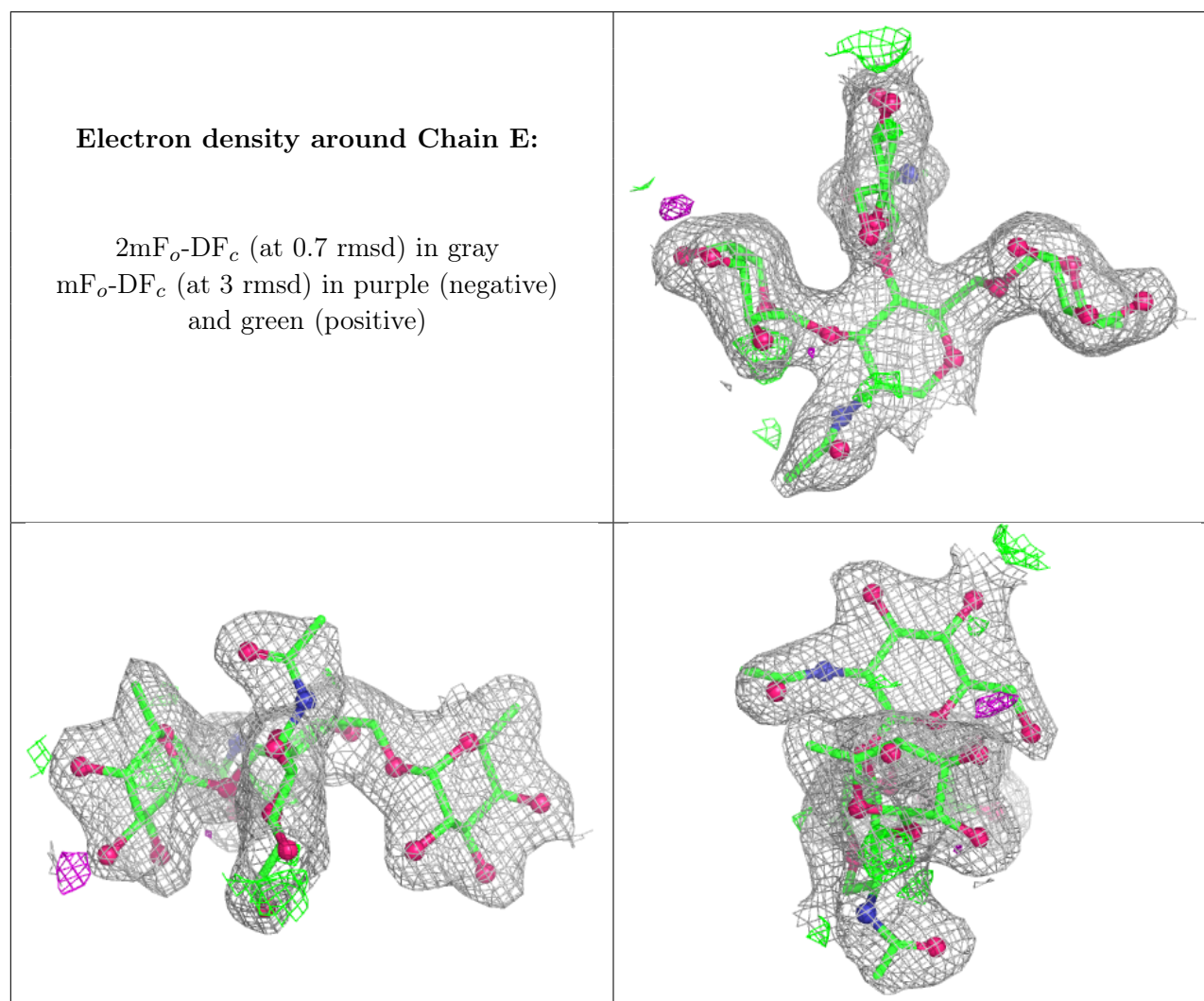
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	FUL	F	2	10/11	0.88	0.18	42,52,62,66	0
2	FUL	H	2	10/11	0.88	0.22	47,56,79,92	0
2	NAG	G	3	14/15	0.90	0.16	47,57,73,83	0
2	FUL	E	2	10/11	0.90	0.12	43,50,53,55	0
2	FUL	G	2	10/11	0.92	0.13	36,43,57,58	0
2	NAG	F	1	14/15	0.92	0.14	26,42,46,49	0
2	NAG	F	3	14/15	0.92	0.16	41,57,69,84	0
2	NAG	E	3	14/15	0.93	0.17	28,49,62,87	0
2	NAG	G	1	14/15	0.94	0.12	31,36,46,48	0
2	NAG	H	1	14/15	0.94	0.13	33,46,52,57	0

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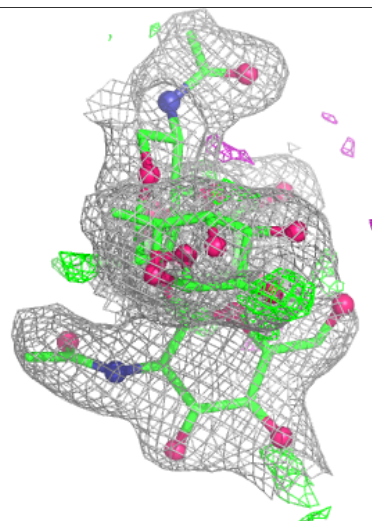
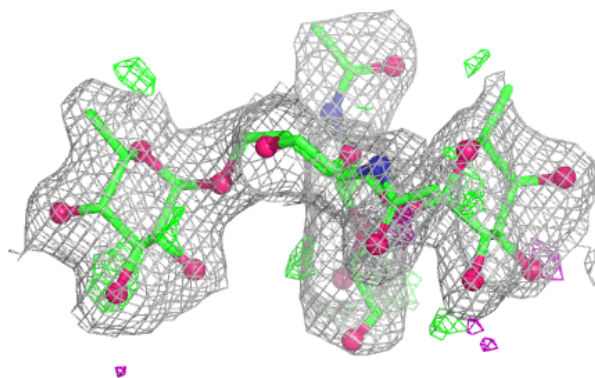
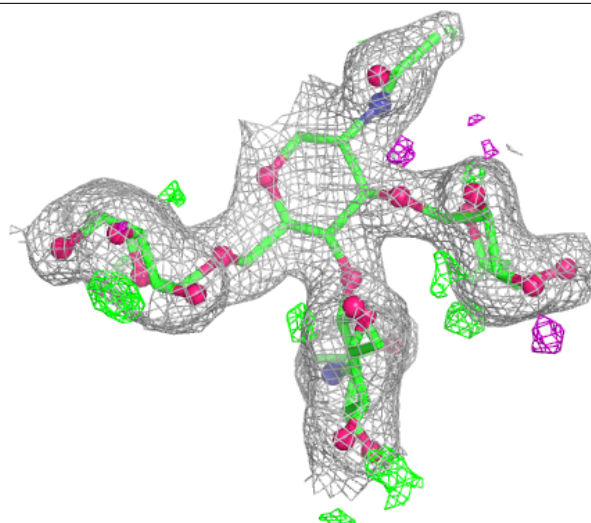
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	NAG	E	1	14/15	0.94	0.11	32,39,48,48	0
2	NAG	H	3	14/15	0.94	0.21	53,60,75,88	0
2	FUC	F	4	10/11	0.95	0.08	29,36,44,51	0
2	FUC	E	4	10/11	0.96	0.10	35,41,45,46	0
2	FUC	H	4	10/11	0.96	0.11	33,36,43,45	0
2	FUC	G	4	10/11	0.97	0.08	32,36,39,41	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.



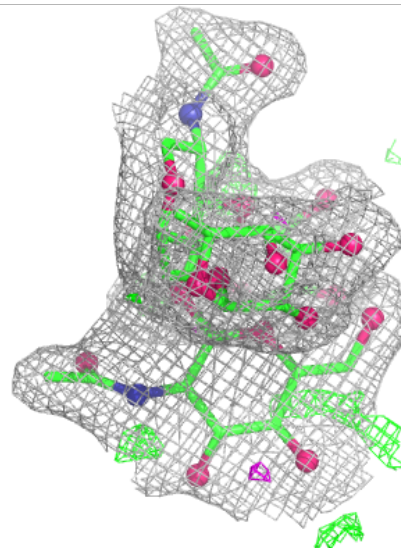
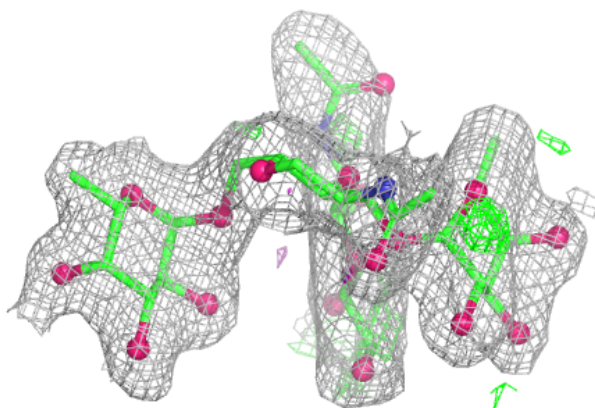
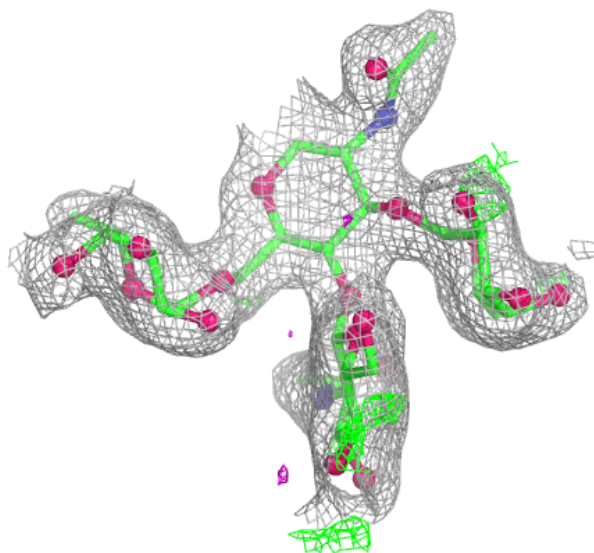
Electron density around Chain F:

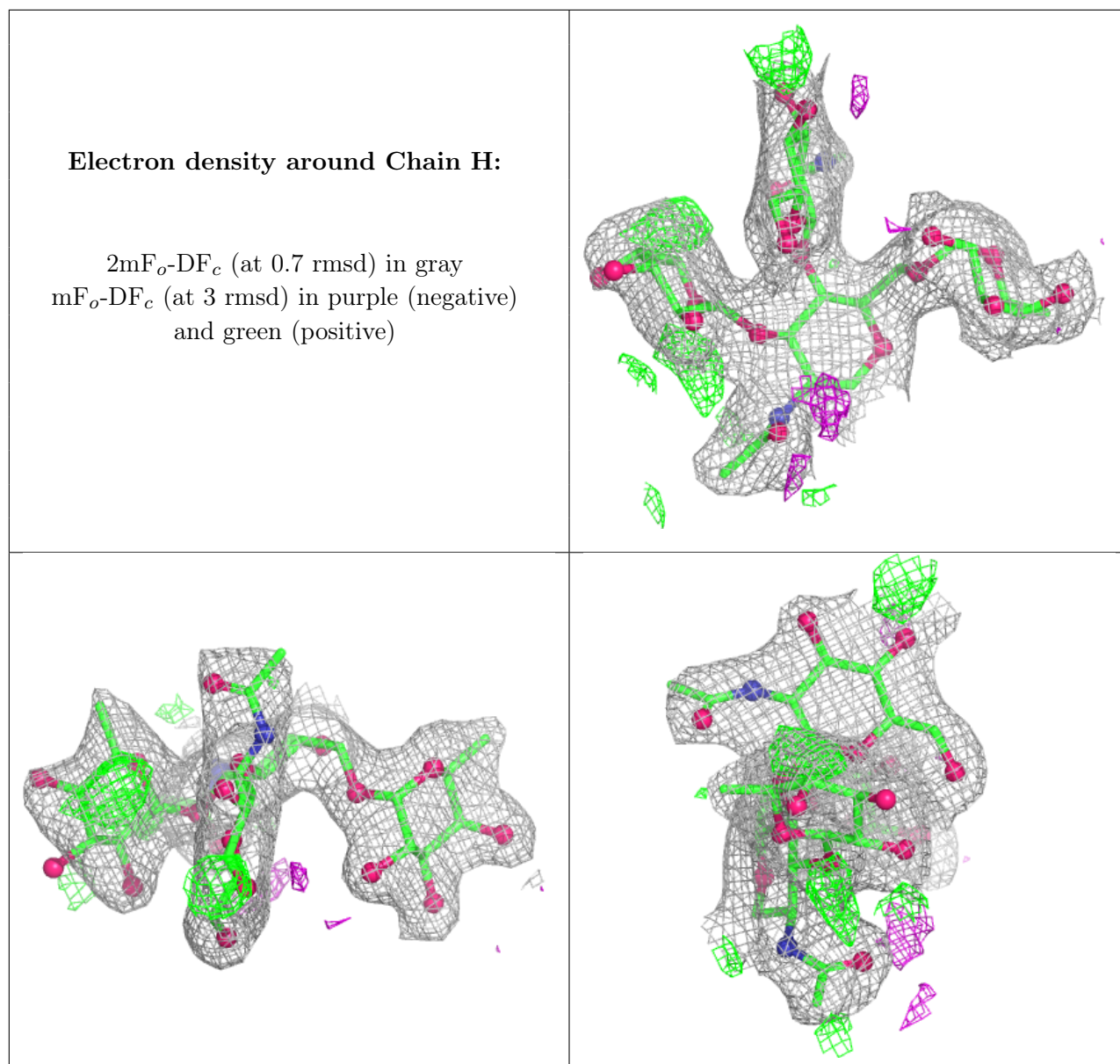
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain G:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





6.4 Ligands i

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	NAG	D	505	14/15	0.68	0.30	67,81,86,90	0
3	NAG	B	506	14/15	0.69	0.35	72,85,96,99	0
3	NAG	A	505	14/15	0.80	0.36	68,86,96,97	0
3	NAG	A	506	14/15	0.80	0.21	71,84,95,103	0
3	NAG	C	505	14/15	0.83	0.29	73,84,92,102	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	NAG	B	505	14/15	0.86	0.34	76,88,100,117	0
4	CA	C	506	1/1	0.99	0.07	25,25,25,25	0
4	CA	D	506	1/1	0.99	0.12	24,24,24,24	0
4	CA	A	507	1/1	1.00	0.10	23,23,23,23	0
4	CA	B	507	1/1	1.00	0.09	22,22,22,22	0

6.5 Other polymers [i](#)

There are no such residues in this entry.