



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 02:29 AM UTC

PDB ID : 5FX8 / pdb_00005fx8
Title : Complete structure of manganese lipoxygenase of *Gaeumannomyces graminis* and partial structure of zonadhesin of *Komagataella pastoris*
Authors : Chen, Y.; Wennman, A.; Karkehanadi, S.; Engstrom, A.; Oliw, E.H.
Deposited on : 2016-02-25
Resolution : 2.60 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

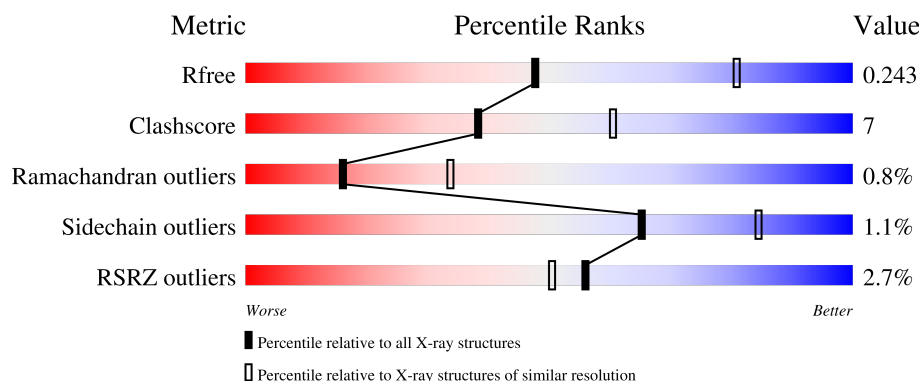
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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.



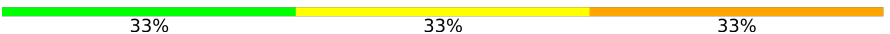
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

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	618	9% 80% 10% 9%
1	B	618	75% 15% 10%
2	U	320	9% 79% 15% ...
3	C	2	100%
3	E	2	100%

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Mol	Chain	Length	Quality of chain
3	F	2	 50%50%
4	D	3	 33%33%33%
5	G	2	 50%50%

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 11543 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 LINOLEATE 11-LIPOXYGENASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	563	Total	C	N	O	S	0	0	0
			4397	2807	780	799	11			
1	B	556	Total	C	N	O	S	0	0	0
			4353	2783	772	787	11			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	52	ASN	LYS	conflict	UNP Q8X151
A	158	CYS	TYR	conflict	UNP Q8X151
B	52	ASN	LYS	conflict	UNP Q8X151
B	158	CYS	TYR	conflict	UNP Q8X151

- Molecule 2 is a protein called ZONADHESIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	U	309	Total	C	N	O	S	0	0	0
			2344	1491	351	500	2			

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



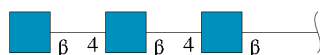
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	2	Total	C	N	O		0	0	0
			28	16	2	10				
3	E	2	Total	C	N	O		0	0	0
			28	16	2	10				

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

- Molecule 4 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(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
4	D	3	Total	C	N	O	0	0	0
			42	24	3	15			

- Molecule 5 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose.



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

- Molecule 6 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Mn	0	0
			1	1		
6	B	1	Total	Mn	0	0
			1	1		

- Molecule 7 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



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

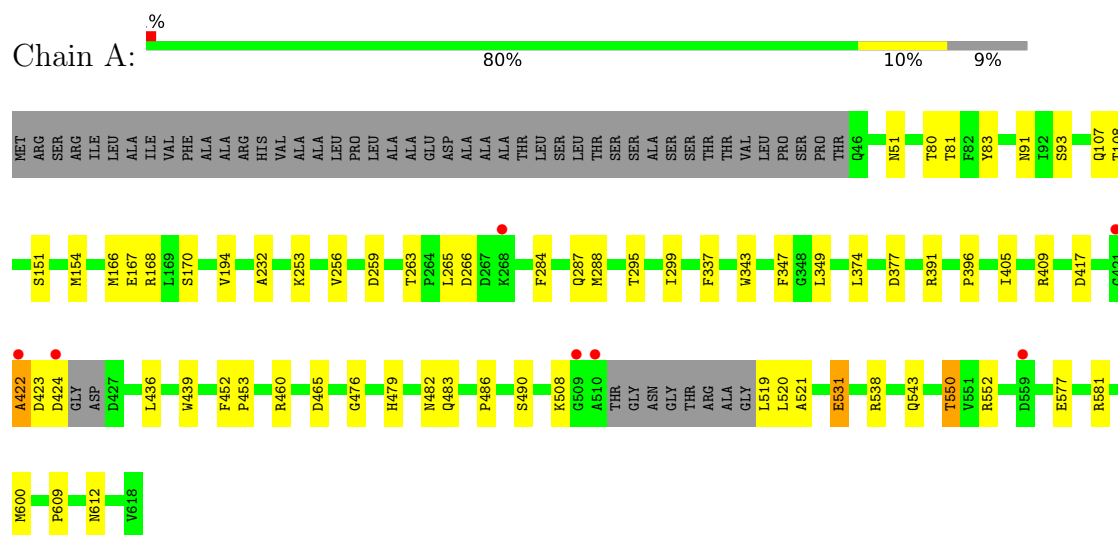
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	125	Total	O	0	0
			125	125		
8	B	72	Total	O	0	0
			72	72		
8	U	26	Total	O	0	0
			26	26		

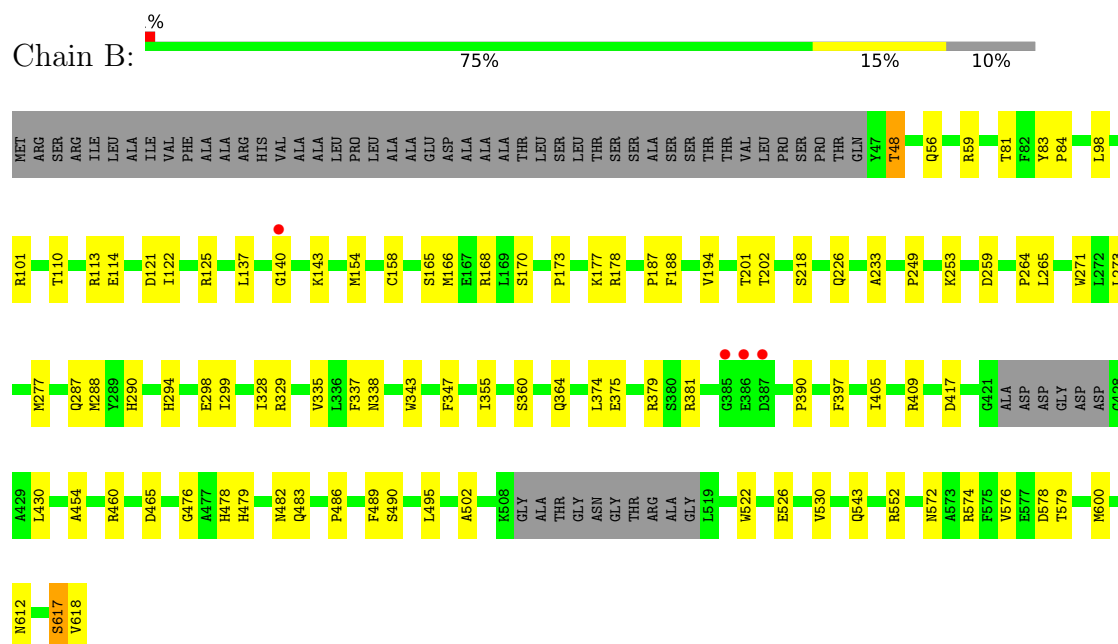
3 Residue-property plots

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 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.

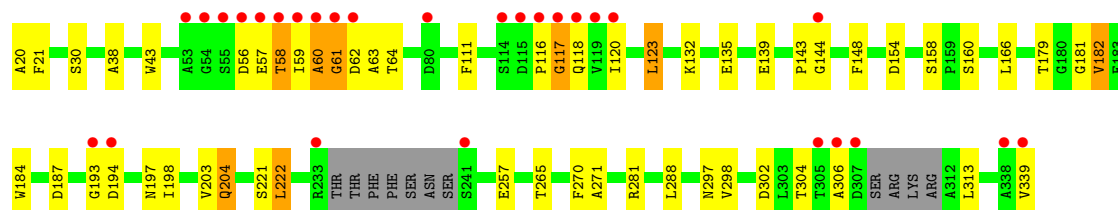
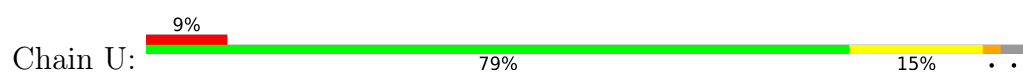
• Molecule 1: LINOLEATE 11-LIPOXYGENASE



• Molecule 1: LINOLEATE 11-LIPOXYGENASE



• Molecule 2: ZONADHESIN



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



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



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



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



- Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	226.31Å 50.47Å 177.62Å 90.00° 91.28° 90.00°	Depositor
Resolution (Å)	43.16 – 2.60 43.16 – 2.60	Depositor EDS
% Data completeness (in resolution range)	96.0 (43.16-2.60) 96.0 (43.16-2.60)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.33 (at 2.61Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, R_{free}	0.195 , 0.245 0.195 , 0.243	Depositor DCC
R_{free} test set	3050 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å ²)	27.5	Xtriage
Anisotropy	0.529	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 35.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.014 for -h,-k,l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	11543	wwPDB-VP
Average B, all atoms (Å ²)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.46% 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: MN, 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	0.62	0/4513	0.69	2/6132 (0.0%)
1	B	0.54	0/4469	0.60	0/6072
2	U	0.54	0/2397	0.62	1/3283 (0.0%)
All	All	0.57	0/11379	0.64	3/15487 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	347	PHE	CA-C-N	5.69	126.15	119.94
1	A	347	PHE	C-N-CA	5.69	126.15	119.94
2	U	60	ALA	CA-C-O	-5.29	116.05	121.87

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	4397	0	4297	53	0
1	B	4353	0	4266	61	0
2	U	2344	0	2176	38	0
3	C	28	0	25	0	0
3	E	28	0	25	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	F	28	0	25	1	0
4	D	42	0	37	1	0
5	G	28	0	25	2	0
6	A	1	0	0	0	0
6	B	1	0	0	1	0
7	A	28	0	26	1	0
7	B	42	0	39	0	0
8	A	125	0	0	6	0
8	B	72	0	0	5	0
8	U	26	0	0	0	0
All	All	11543	0	10941	154	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 7.

All (154) 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)
2:U:61:GLY:O	2:U:63:ALA:N	1.87	1.06
1:A:166:MET:HB3	1:A:600:MET:HE2	1.52	0.92
1:A:263:THR:HG22	1:A:265:LEU:H	1.34	0.90
8:A:2079:HOH:O	1:B:101:ARG:NH2	2.13	0.80
1:A:577:GLU:OE1	8:A:2119:HOH:O	1.99	0.79
1:A:519:LEU:HD13	1:A:520:LEU:N	2.00	0.77
2:U:194:ASP:OD1	2:U:306:ALA:N	2.18	0.76
1:B:454:ALA:O	8:B:2062:HOH:O	2.04	0.75
2:U:60:ALA:HB3	2:U:120:ILE:HD13	1.67	0.75
1:A:519:LEU:HD12	1:A:521:ALA:H	1.50	0.74
1:B:81:THR:CG2	1:B:299:ILE:HB	2.19	0.73
1:B:140:GLY:C	1:B:143:LYS:HZ1	1.96	0.73
1:B:574:ARG:NH1	1:B:578:ASP:OD1	2.22	0.72
1:A:81:THR:CG2	1:A:299:ILE:HB	2.18	0.72
1:B:166:MET:HB3	1:B:600:MET:HE3	1.73	0.70
1:B:288:MET:HE3	1:B:343:TRP:CZ3	2.26	0.70
2:U:203:VAL:HG12	2:U:265:THR:HG22	1.73	0.70
1:A:396:PRO:HG2	1:A:600:MET:HE3	1.73	0.69
2:U:60:ALA:HA	2:U:61:GLY:O	1.92	0.69
1:A:423:ASP:OD1	1:A:423:ASP:O	2.11	0.68
1:A:288:MET:HE3	1:A:343:TRP:CZ3	2.29	0.68
1:B:618:VAL:N	8:B:2013:HOH:O	2.15	0.68
2:U:203:VAL:HG22	2:U:298:VAL:CG1	2.26	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:81:THR:HG21	1:A:299:ILE:HB	1.78	0.66
2:U:61:GLY:C	2:U:63:ALA:H	1.99	0.66
1:B:194:VAL:HG13	1:B:265:LEU:HD12	1.77	0.65
1:B:618:VAL:O	8:B:2043:HOH:O	2.15	0.64
1:A:424:ASP:C	1:A:460:ARG:HD2	2.22	0.64
1:B:486:PRO:HA	1:B:490:SER:HB2	1.80	0.64
1:A:170:SER:HB3	1:A:600:MET:HE1	1.79	0.64
5:G:1:NAG:H83	5:G:1:NAG:H3	1.79	0.64
1:A:519:LEU:CD1	1:A:521:ALA:H	2.11	0.62
1:B:81:THR:HG21	1:B:299:ILE:HB	1.79	0.62
1:B:178:ARG:NH2	1:B:390:PRO:O	2.33	0.62
1:B:218:SER:HA	1:B:233:ALA:HB1	1.82	0.62
6:B:1000:MN:MN	8:B:2043:HOH:O	1.56	0.61
4:D:3:NAG:H3	4:D:3:NAG:H83	1.83	0.61
2:U:193:GLY:HA2	2:U:194:ASP:HB3	1.83	0.61
2:U:203:VAL:HG22	2:U:298:VAL:HG12	1.84	0.60
1:B:298:GLU:OE1	1:B:329:ARG:NH2	2.34	0.59
2:U:193:GLY:CA	2:U:194:ASP:HB3	2.32	0.59
1:B:165:SER:HB3	1:B:249:PRO:HD3	1.83	0.59
1:B:166:MET:HB3	1:B:600:MET:CE	2.32	0.58
1:A:550:THR:HG23	1:A:609:PRO:O	2.03	0.58
2:U:204:GLN:HE21	2:U:297:ASN:HD22	1.51	0.58
1:B:110:THR:O	1:B:114:GLU:HG3	2.04	0.58
1:A:452:PHE:CG	1:A:453:PRO:HD2	2.38	0.58
1:B:81:THR:HG23	1:B:299:ILE:HB	1.86	0.58
1:B:483:GLN:NE2	1:B:617:SER:O	2.32	0.57
1:A:151:SER:HB3	1:A:154:MET:HB2	1.86	0.57
1:A:81:THR:HG23	1:A:299:ILE:HB	1.86	0.57
1:A:80:THR:OG1	1:A:81:THR:N	2.38	0.56
2:U:58:THR:C	2:U:60:ALA:H	2.14	0.56
2:U:221:SER:OG	2:U:222:LEU:N	2.29	0.56
1:A:581:ARG:HH12	2:U:194:ASP:H	1.54	0.56
2:U:60:ALA:CB	2:U:120:ILE:HD13	2.36	0.56
1:B:543:GLN:HG3	5:G:1:NAG:C7	2.35	0.56
2:U:184:TRP:HE1	2:U:204:GLN:HE22	1.52	0.55
1:A:519:LEU:HD13	1:A:520:LEU:H	1.71	0.55
2:U:21:PHE:CE1	2:U:56:ASP:HB2	2.42	0.54
1:B:360:SER:O	1:B:364:GLN:HG3	2.09	0.53
1:B:409:ARG:NH1	1:B:465:ASP:OD1	2.35	0.53
1:A:83:TYR:OH	1:A:93:SER:OG	2.20	0.52
2:U:43:TRP:CE2	2:U:132:LYS:HE3	2.44	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:288:MET:HE1	1:B:337:PHE:HZ	1.74	0.52
1:A:107:GLN:HB2	1:A:543:GLN:HE22	1.75	0.52
1:A:266:ASP:OD2	1:A:508:LYS:NZ	2.35	0.51
2:U:21:PHE:CZ	2:U:56:ASP:HB2	2.46	0.51
1:A:377:ASP:OD1	8:A:2087:HOH:O	2.19	0.50
1:A:170:SER:CB	1:A:600:MET:HE1	2.42	0.50
2:U:135:GLU:O	2:U:139:GLU:HG2	2.12	0.50
1:A:422:ALA:HB3	1:A:460:ARG:NH2	2.26	0.50
2:U:58:THR:O	2:U:60:ALA:N	2.45	0.49
2:U:187:ASP:OD2	2:U:281:ARG:NH2	2.39	0.49
1:B:253:LYS:HE3	1:B:259:ASP:OD1	2.12	0.49
1:B:374:LEU:HD22	1:B:405:ILE:HD12	1.95	0.49
1:B:113:ARG:HG3	1:B:114:GLU:N	2.28	0.49
1:B:170:SER:OG	1:B:600:MET:HE1	2.13	0.49
1:A:486:PRO:HA	1:A:490:SER:HB2	1.95	0.49
1:B:83:TYR:CG	1:B:84:PRO:HD2	2.49	0.48
1:B:526:GLU:O	1:B:530:VAL:HG23	2.14	0.48
1:A:253:LYS:HE2	1:A:259:ASP:OD1	2.13	0.48
1:B:187:PRO:HB2	1:B:188:PHE:CD2	2.49	0.48
1:B:287:GLN:C	1:B:288:MET:HE2	2.38	0.48
1:B:375:GLU:O	1:B:379:ARG:HG2	2.14	0.48
1:B:56:GLN:HG2	3:F:1:NAG:HN2	1.78	0.47
2:U:257:GLU:CD	2:U:271:ALA:HB2	2.40	0.47
1:A:374:LEU:HD22	1:A:405:ILE:HD12	1.97	0.47
1:A:108:THR:HG23	1:A:538:ARG:HD3	1.97	0.46
1:A:417:ASP:OD1	1:A:460:ARG:NH1	2.48	0.46
1:A:452:PHE:CD1	1:A:453:PRO:HD2	2.50	0.46
1:B:495:LEU:HD23	1:B:495:LEU:HA	1.78	0.46
1:A:287:GLN:C	1:A:288:MET:HE2	2.40	0.46
1:B:158:CYS:O	1:B:495:LEU:HD11	2.16	0.46
2:U:116:PRO:O	2:U:117:GLY:C	2.59	0.46
1:A:51:ASN:OD1	1:A:51:ASN:N	2.50	0.45
1:A:417:ASP:HA	1:A:460:ARG:HH12	1.80	0.45
1:B:502:ALA:HB3	1:B:522:TRP:CD1	2.51	0.45
1:A:288:MET:HE1	1:A:337:PHE:HZ	1.81	0.45
1:A:424:ASP:HA	8:A:2096:HOH:O	2.17	0.45
1:B:264:PRO:HG3	1:B:271:TRP:CZ2	2.52	0.45
1:B:168:ARG:HD3	8:B:2024:HOH:O	2.16	0.45
2:U:197:ASN:HB2	2:U:304:THR:HB	1.97	0.45
1:B:298:GLU:OE1	1:B:329:ARG:NE	2.46	0.45
1:B:552:ARG:HG2	1:B:579:THR:OG1	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:572:ASN:O	1:B:576:VAL:HG23	2.17	0.44
1:A:550:THR:HG22	1:A:552:ARG:H	1.83	0.44
1:A:81:THR:HB	1:A:295:THR:HB	1.99	0.44
1:A:436:LEU:HD12	1:A:439:TRP:HE3	1.82	0.44
1:B:177:LYS:HE2	1:B:381:ARG:HG2	1.99	0.44
2:U:198:ILE:HB	2:U:270:PHE:HB2	2.00	0.44
1:A:479:HIS:CD2	1:A:612:ASN:HB3	2.53	0.44
1:B:355:ILE:HD13	1:B:355:ILE:HA	1.86	0.44
2:U:182:VAL:CG2	2:U:288:LEU:HD11	2.48	0.44
1:A:232:ALA:HA	1:A:256:VAL:HG21	1.99	0.44
1:B:294:HIS:CE1	1:B:328:ILE:HG12	2.53	0.44
1:B:478:HIS:CE1	1:B:482:ASN:HB3	2.53	0.44
1:B:201:THR:OG1	1:B:202:THR:N	2.51	0.43
1:A:91:ASN:HD22	7:A:1006:NAG:H83	1.82	0.43
1:B:417:ASP:HA	1:B:460:ARG:HH12	1.81	0.43
2:U:143:PRO:HA	2:U:144:GLY:HA2	1.75	0.43
2:U:57:GLU:H	2:U:57:GLU:HG3	1.66	0.43
1:B:121:ASP:CG	1:B:125:ARG:HE	2.27	0.43
2:U:64:THR:HA	2:U:111:PHE:O	2.19	0.43
2:U:123:LEU:HD23	2:U:123:LEU:HA	1.93	0.43
1:B:122:ILE:HD11	1:B:137:LEU:HA	1.99	0.43
1:B:173:PRO:HG3	1:B:397:PHE:CG	2.54	0.43
2:U:194:ASP:OD1	2:U:194:ASP:O	2.37	0.43
1:B:48:THR:O	1:B:59:ARG:NH2	2.46	0.42
2:U:30:SER:HB2	2:U:38:ALA:HB2	2.00	0.42
2:U:302:ASP:HB3	2:U:313:LEU:HD21	2.00	0.42
1:A:409:ARG:NH1	1:A:465:ASP:OD1	2.47	0.42
1:B:48:THR:HG22	1:B:59:ARG:HH12	1.85	0.42
2:U:118:GLN:NE2	2:U:339:VAL:O	2.53	0.42
2:U:58:THR:C	2:U:60:ALA:N	2.77	0.42
1:A:194:VAL:HG13	1:A:265:LEU:HD12	2.02	0.42
1:B:140:GLY:CA	1:B:143:LYS:HZ1	2.33	0.42
1:B:479:HIS:CD2	1:B:612:ASN:HB3	2.55	0.42
1:B:338:ASN:OD1	1:B:338:ASN:N	2.49	0.41
1:A:284:PHE:CE2	1:A:349:LEU:HD12	2.55	0.41
1:A:482:ASN:CG	1:A:483:GLN:H	2.28	0.41
1:B:288:MET:HE1	1:B:337:PHE:CZ	2.54	0.41
1:B:140:GLY:C	1:B:143:LYS:NZ	2.75	0.41
1:B:226:GLN:NE2	1:B:347:PHE:O	2.54	0.41
1:A:288:MET:HE1	1:A:337:PHE:CZ	2.56	0.41
1:B:154:MET:HE3	1:B:489:PHE:HA	2.02	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:273:LEU:O	1:B:277:MET:HG3	2.21	0.40
2:U:20:ALA:N	2:U:154:ASP:OD1	2.53	0.40
1:A:167:GLU:OE1	1:A:168:ARG:NH2	2.54	0.40
1:A:531:GLU:OE2	8:A:2112:HOH:O	2.22	0.40
1:A:391:ARG:NH1	8:A:2090:HOH:O	2.23	0.40
1:A:396:PRO:HG2	1:A:600:MET:CE	2.45	0.40
1:A:543:GLN:CD	1:A:543:GLN:H	2.29	0.40
2:U:148:PHE:O	2:U:158:SER:HA	2.21	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 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	557/618 (90%)	533 (96%)	22 (4%)	2 (0%)	30	51
1	B	550/618 (89%)	523 (95%)	26 (5%)	1 (0%)	43	66
2	U	303/320 (95%)	282 (93%)	13 (4%)	8 (3%)	4	7
All	All	1410/1556 (91%)	1338 (95%)	61 (4%)	11 (1%)	16	34

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	U	58	THR
2	U	62	ASP
2	U	61	GLY
2	U	117	GLY
1	A	476	GLY
2	U	179	THR
1	A	422	ALA
1	B	476	GLY
2	U	222	LEU

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Mol	Chain	Res	Type
2	U	181	GLY
2	U	59	ILE

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 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	451/491 (92%)	449 (100%)	2 (0%)	84	93
1	B	448/491 (91%)	442 (99%)	6 (1%)	61	82
2	U	265/277 (96%)	260 (98%)	5 (2%)	50	75
All	All	1164/1259 (92%)	1151 (99%)	13 (1%)	65	84

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	531	GLU
1	A	550	THR
1	B	48	THR
1	B	98	LEU
1	B	290	HIS
1	B	335	VAL
1	B	430	LEU
1	B	617	SER
2	U	123	LEU
2	U	160	SER
2	U	166	LEU
2	U	182	VAL
2	U	204	GLN

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	235	GLN
1	A	346	ASN

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Mol	Chain	Res	Type
1	A	462	GLN
1	A	543	GLN
1	A	572	ASN
1	B	281	ASN
1	B	346	ASN
1	B	370	GLN
2	U	118	GLN
2	U	204	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

11 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	NAG	C	1	1,3	14,14,15	0.61	0	17,19,21	0.40	0
3	NAG	C	2	3	14,14,15	0.40	0	17,19,21	0.66	0
4	NAG	D	1	4,1	14,14,15	0.59	0	17,19,21	0.57	0
4	NAG	D	2	4	14,14,15	0.54	0	17,19,21	1.03	1 (5%)
4	NAG	D	3	4	14,14,15	1.27	1 (7%)	17,19,21	2.20	4 (23%)
3	NAG	E	1	1,3	14,14,15	0.20	0	17,19,21	0.54	0
3	NAG	E	2	3	14,14,15	0.29	0	17,19,21	0.54	0
3	NAG	F	1	1,3	14,14,15	0.97	1 (7%)	17,19,21	1.99	2 (11%)
3	NAG	F	2	3	14,14,15	1.41	1 (7%)	17,19,21	0.76	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	G	1	1,5	14,14,15	0.57	0	17,19,21	1.57	2 (11%)
5	NAG	G	2	5	14,14,15	0.32	0	17,19,21	0.70	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	C	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	C	2	3	-	2/6/23/26	0/1/1/1
4	NAG	D	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	D	2	4	-	1/6/23/26	0/1/1/1
4	NAG	D	3	4	-	6/6/23/26	0/1/1/1
3	NAG	E	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	E	2	3	-	2/6/23/26	0/1/1/1
3	NAG	F	1	1,3	-	1/6/23/26	0/1/1/1
3	NAG	F	2	3	-	4/6/23/26	0/1/1/1
5	NAG	G	1	1,5	-	5/6/23/26	0/1/1/1
5	NAG	G	2	5	-	2/6/23/26	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	F	2	NAG	O5-C1	-4.74	1.35	1.43
4	D	3	NAG	O5-C1	4.37	1.51	1.43
3	F	1	NAG	O5-C1	2.91	1.48	1.43

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	3	NAG	C1-O5-C5	6.02	120.25	112.19
3	F	1	NAG	C1-O5-C5	5.54	119.61	112.19
3	F	1	NAG	O4-C4-C5	5.16	122.03	109.32
4	D	3	NAG	C2-N2-C7	4.50	128.93	122.90
5	G	1	NAG	C2-N2-C7	4.47	128.90	122.90
5	G	1	NAG	C1-C2-N2	3.07	115.28	110.43
4	D	3	NAG	C1-C2-N2	3.01	115.18	110.43
4	D	2	NAG	C1-O5-C5	2.53	115.57	112.19
4	D	3	NAG	O3-C3-C4	2.24	115.66	110.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	G	2	NAG	C1-O5-C5	2.07	114.96	112.19

There are no chirality outliers.

All (25) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	E	2	NAG	C4-C5-C6-O6
3	E	2	NAG	O5-C5-C6-O6
3	C	2	NAG	O5-C5-C6-O6
4	D	3	NAG	O5-C5-C6-O6
3	C	2	NAG	C4-C5-C6-O6
3	F	2	NAG	C4-C5-C6-O6
4	D	3	NAG	C4-C5-C6-O6
3	F	2	NAG	C8-C7-N2-C2
3	F	2	NAG	O7-C7-N2-C2
4	D	3	NAG	C8-C7-N2-C2
4	D	3	NAG	O7-C7-N2-C2
5	G	1	NAG	C8-C7-N2-C2
5	G	1	NAG	O7-C7-N2-C2
3	F	2	NAG	O5-C5-C6-O6
5	G	2	NAG	C4-C5-C6-O6
3	C	1	NAG	O5-C5-C6-O6
3	C	1	NAG	C4-C5-C6-O6
5	G	2	NAG	O5-C5-C6-O6
5	G	1	NAG	O5-C5-C6-O6
4	D	3	NAG	C3-C2-N2-C7
5	G	1	NAG	C3-C2-N2-C7
3	F	1	NAG	C4-C5-C6-O6
4	D	3	NAG	C1-C2-N2-C7
5	G	1	NAG	C1-C2-N2-C7
4	D	2	NAG	C4-C5-C6-O6

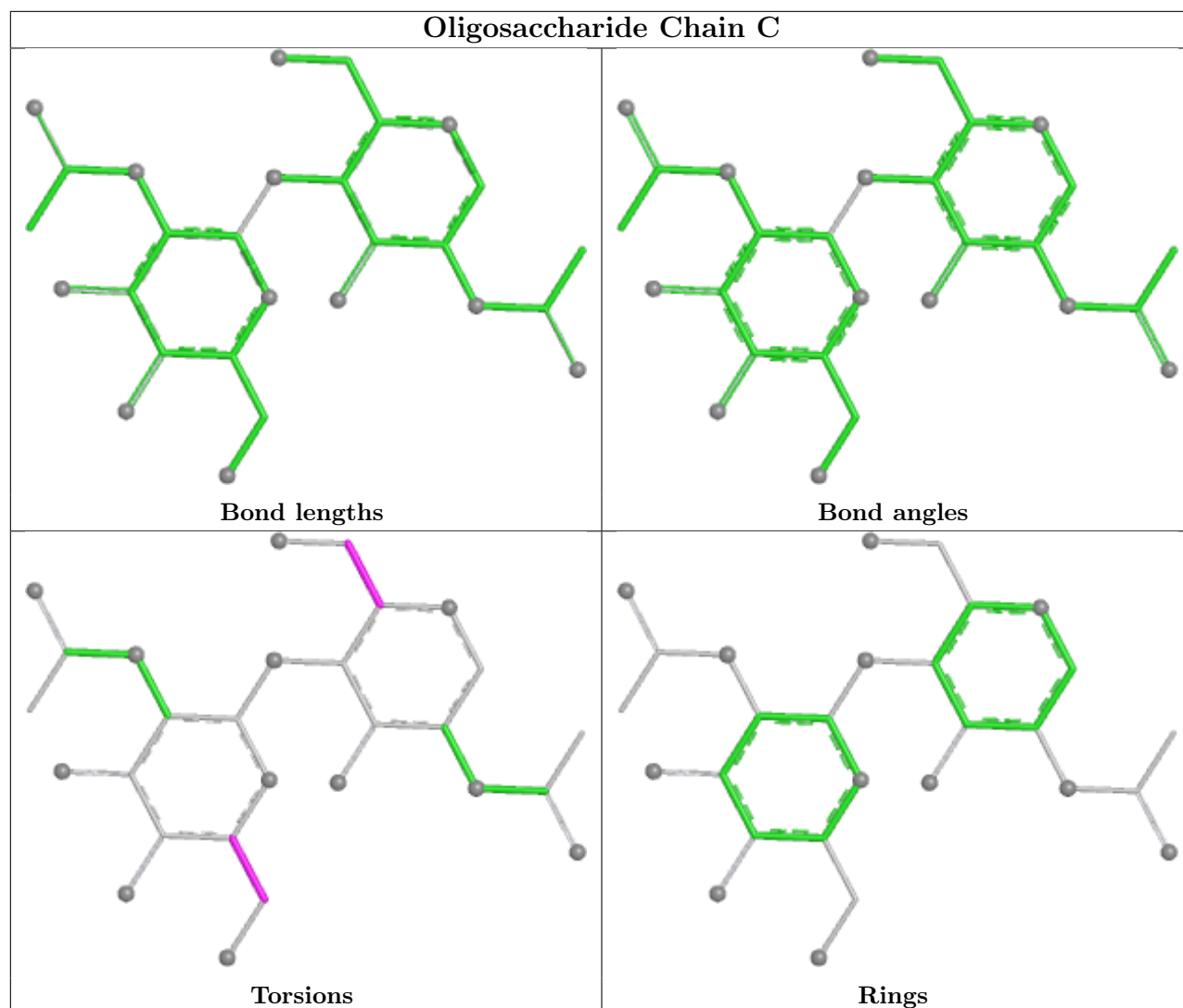
There are no ring outliers.

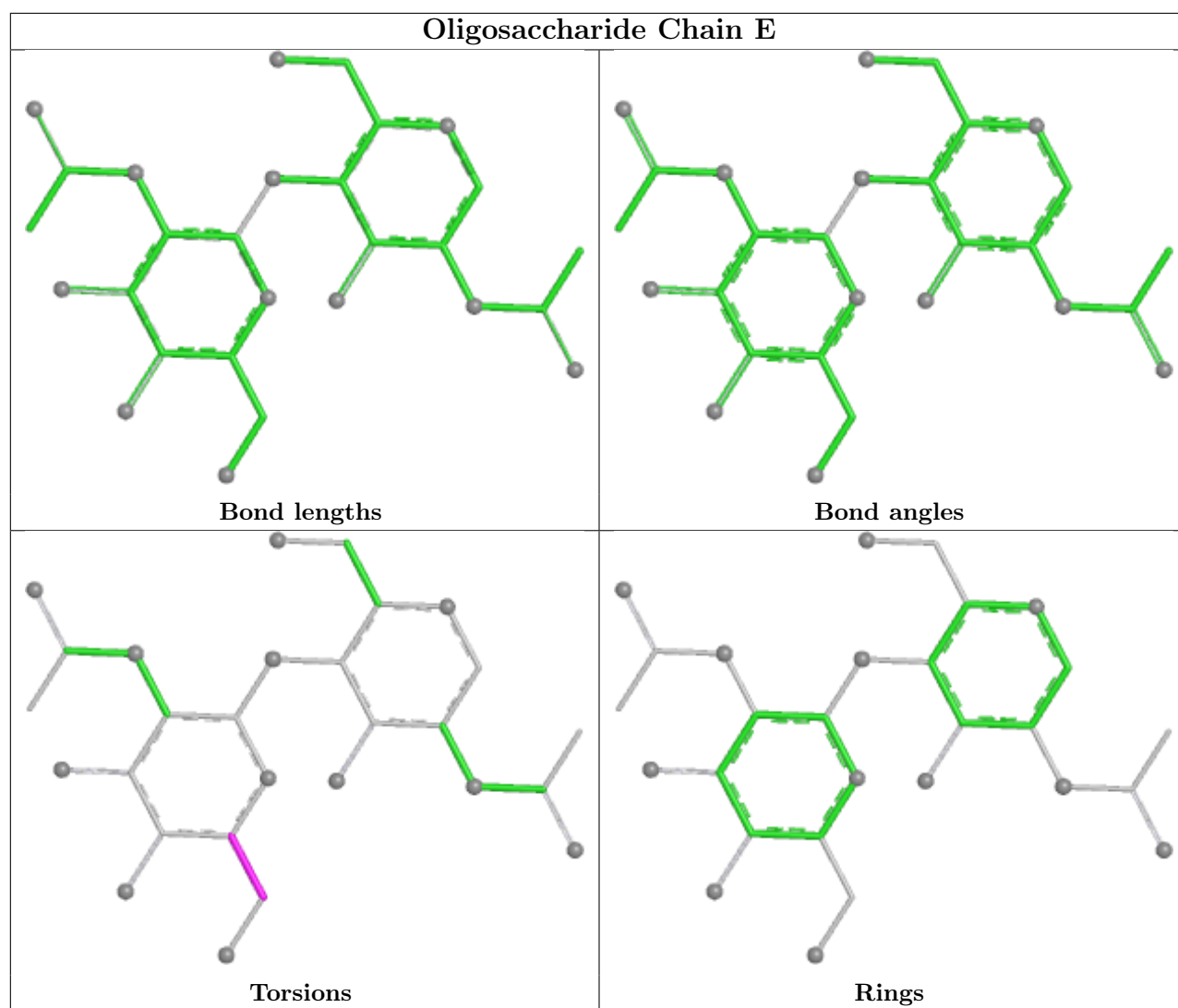
3 monomers are involved in 4 short contacts:

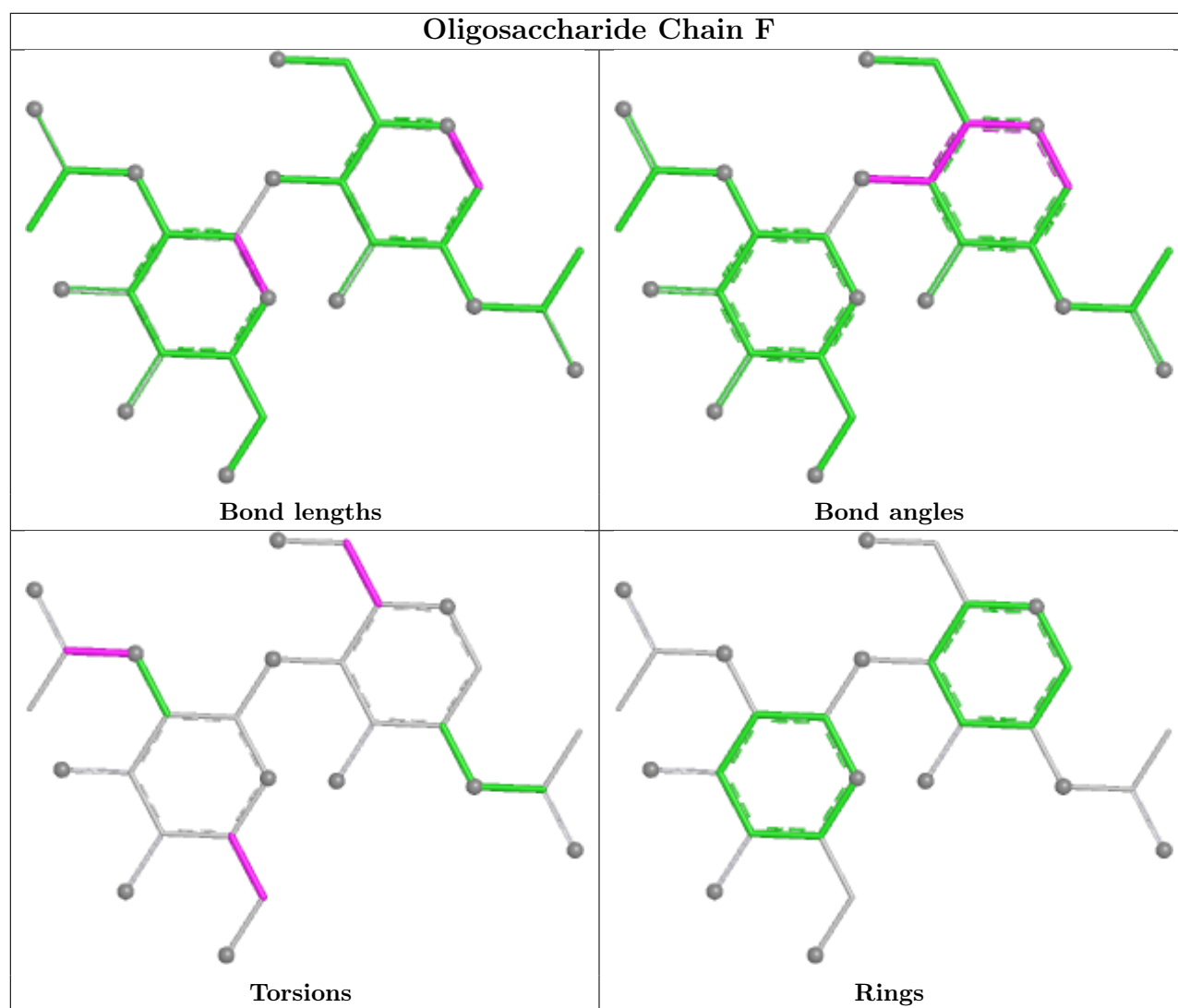
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	3	NAG	1	0
3	F	1	NAG	1	0
5	G	1	NAG	2	0

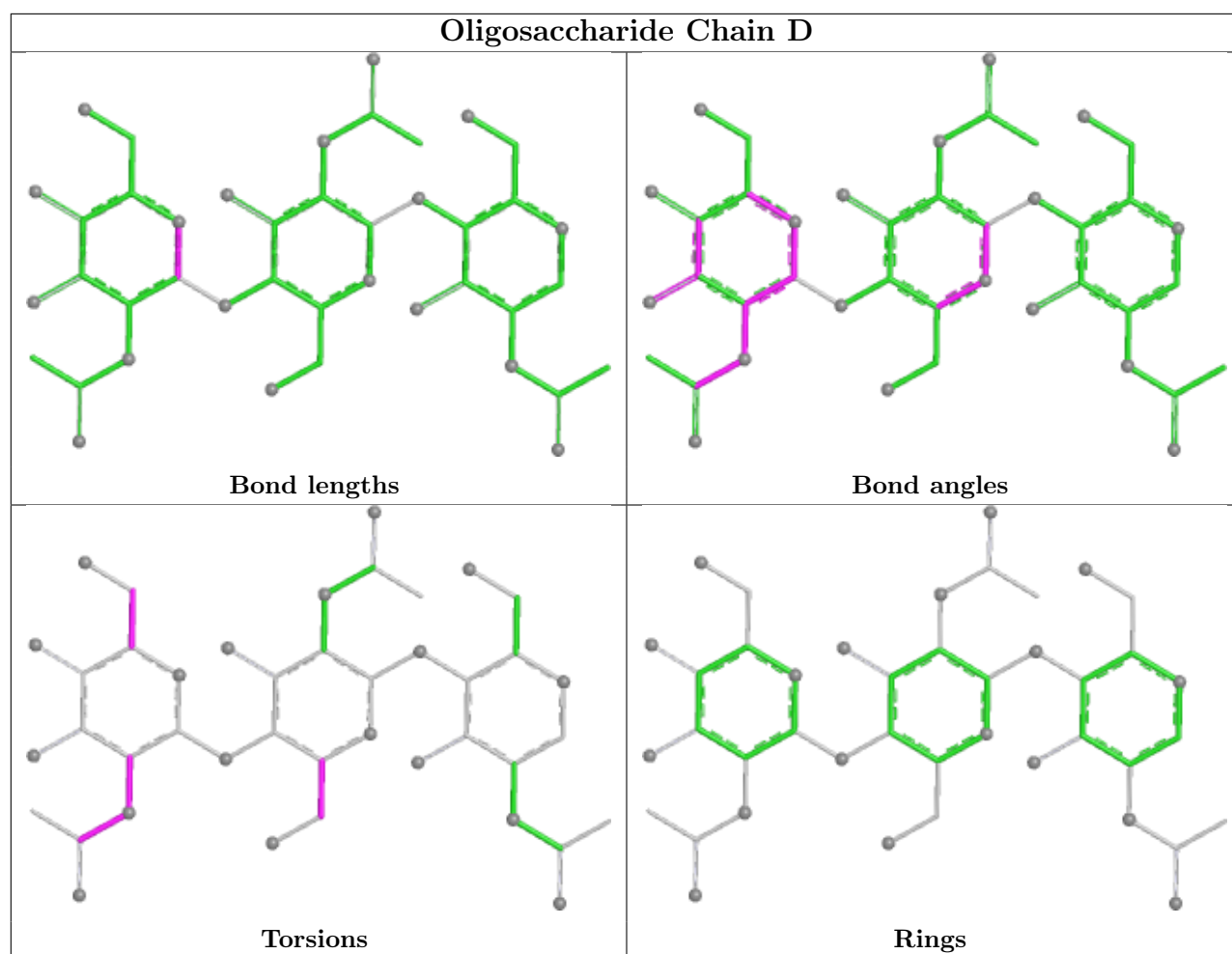
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

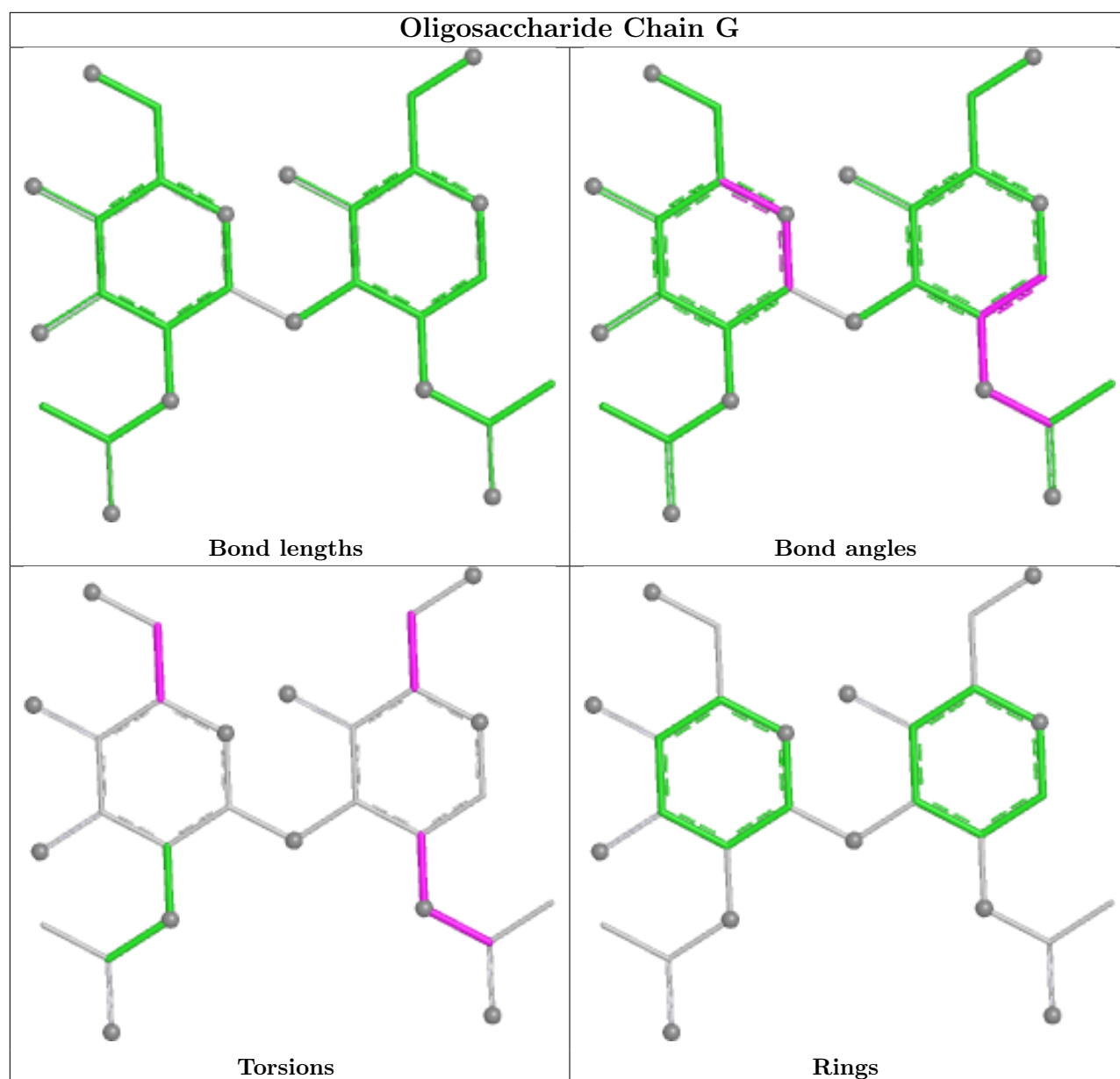
bond angles, torsion angles, and ring geometry for oligosaccharide.











5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 2 are monoatomic - leaving 5 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
7	NAG	B	1003	1	14,14,15	0.27	0	17,19,21	0.71	1 (5%)
7	NAG	B	1006	1	14,14,15	0.53	0	17,19,21	0.92	1 (5%)
7	NAG	B	1007	1	14,14,15	0.43	0	17,19,21	0.39	0
7	NAG	A	1006	1	14,14,15	0.43	0	17,19,21	0.66	0
7	NAG	A	1009	1	14,14,15	0.73	1 (7%)	17,19,21	0.75	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	B	1003	1	-	0/6/23/26	0/1/1/1
7	NAG	B	1006	1	-	2/6/23/26	0/1/1/1
7	NAG	B	1007	1	-	2/6/23/26	0/1/1/1
7	NAG	A	1006	1	-	3/6/23/26	0/1/1/1
7	NAG	A	1009	1	-	0/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	1009	NAG	O5-C1	-2.09	1.40	1.43

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	B	1006	NAG	C1-O5-C5	2.83	115.98	112.19
7	B	1003	NAG	C1-O5-C5	2.33	115.31	112.19

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	1006	NAG	C8-C7-N2-C2
7	A	1006	NAG	O7-C7-N2-C2
7	B	1006	NAG	O5-C5-C6-O6
7	B	1006	NAG	C4-C5-C6-O6
7	B	1007	NAG	C4-C5-C6-O6
7	B	1007	NAG	O5-C5-C6-O6
7	A	1006	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
7	A	1006	NAG	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	451:ASP	C	452:PHE	N	1.19

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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	563/618 (91%)	-0.47	7 (1%) 76 73	6, 14, 31, 69	0
1	B	556/618 (89%)	-0.18	4 (0%) 84 82	11, 23, 42, 73	0
2	U	309/320 (96%)	0.43	28 (9%) 15 11	15, 29, 74, 105	0
All	All	1428/1556 (91%)	-0.16	39 (2%) 56 50	6, 21, 43, 105	0

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	U	59	ILE	7.6
2	U	339	VAL	5.9
2	U	193	GLY	5.6
2	U	116	PRO	5.5
2	U	241	SER	5.2
2	U	117	GLY	5.2
2	U	61	GLY	4.9
2	U	118	GLN	4.9
2	U	60	ALA	4.9
2	U	62	ASP	4.5
2	U	306	ALA	4.5
2	U	55	SER	4.0
2	U	58	THR	3.8
1	A	422	ALA	3.7
2	U	57	GLU	3.7
2	U	194	ASP	3.7
2	U	119	VAL	3.6
2	U	115	ASP	3.4
1	A	510	ALA	3.4
2	U	53	ALA	3.3
2	U	120	ILE	3.3
2	U	114	SER	3.2
2	U	233	ARG	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	386	GLU	2.8
2	U	56	ASP	2.8
1	A	424	ASP	2.7
1	A	509	GLY	2.7
1	B	385	GLY	2.7
2	U	54	GLY	2.6
1	A	421	GLY	2.6
2	U	338	ALA	2.6
2	U	307	ASP	2.5
1	B	387	ASP	2.4
2	U	80	ASP	2.4
2	U	305	THR	2.3
1	B	140	GLY	2.2
1	A	268	LYS	2.2
2	U	144	GLY	2.2
1	A	559	ASP	2.0

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

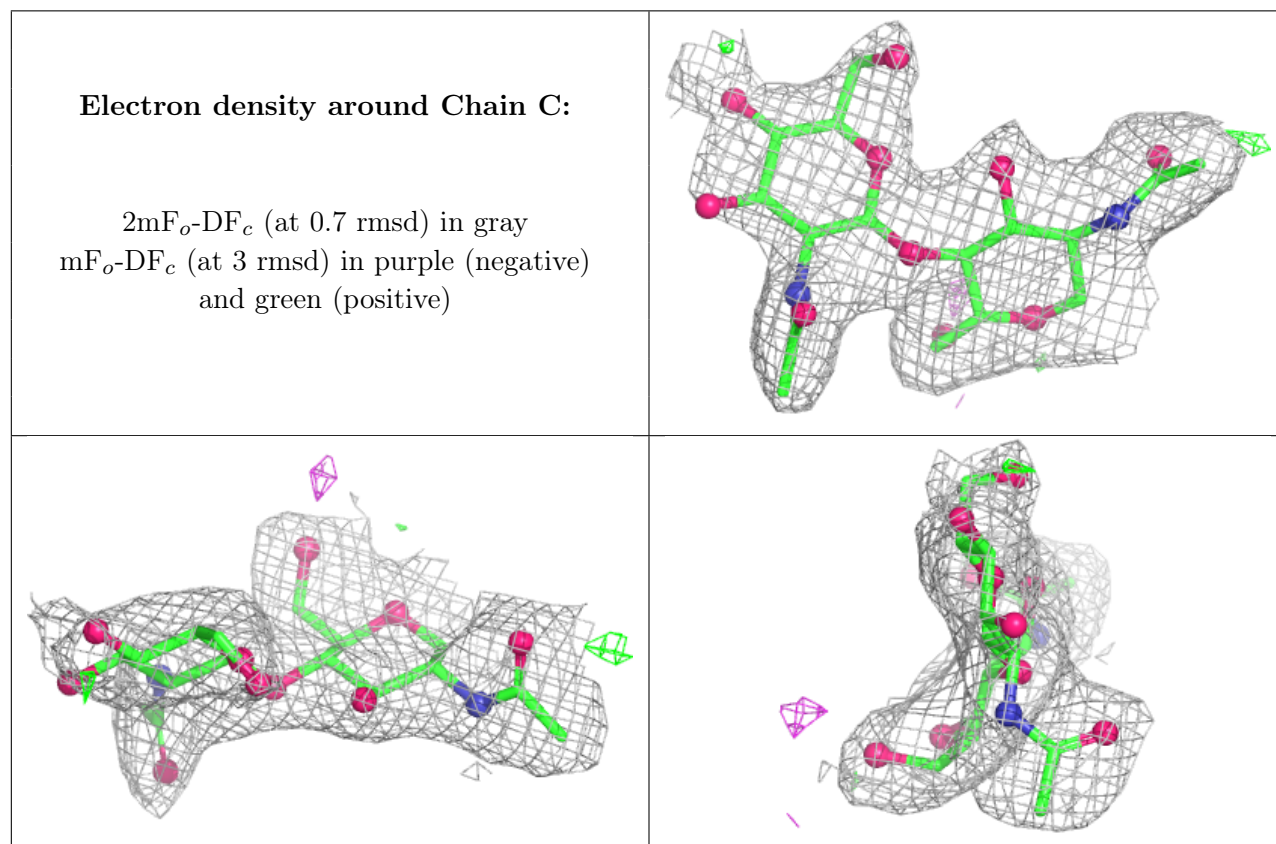
There are no non-standard protein/DNA/RNA residues in this entry.

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.

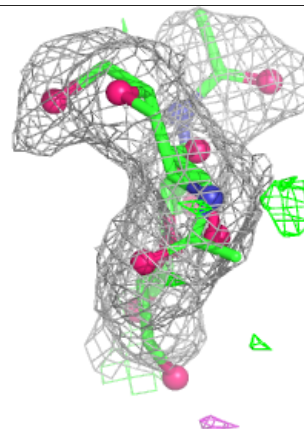
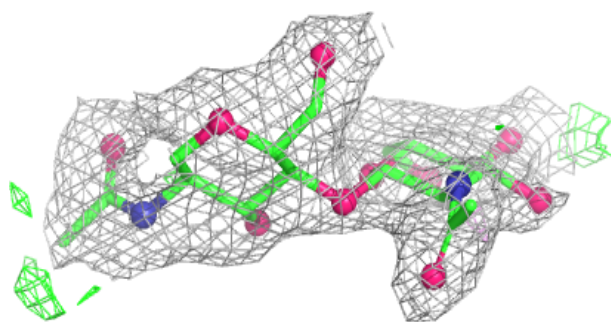
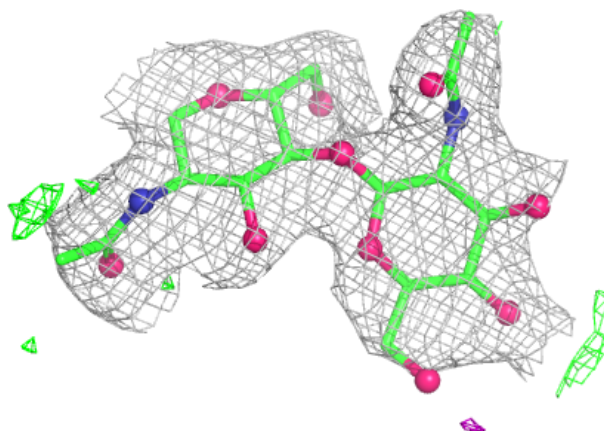
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	NAG	C	1	14/15	-	-	18,26,32,35	0
3	NAG	C	2	14/15	-	-	40,48,54,55	0
5	NAG	G	2	14/15	0.78	0.15	49,52,56,57	0
4	NAG	D	2	14/15	0.83	0.14	15,19,23,24	0
3	NAG	F	1	14/15	0.87	0.10	28,34,41,42	0
3	NAG	F	2	14/15	0.87	0.12	43,48,55,62	0
5	NAG	G	1	14/15	0.90	0.10	41,47,52,63	0
4	NAG	D	1	14/15	0.95	0.08	11,12,15,18	0
4	NAG	D	3	14/15	-	-	24,27,39,40	0
3	NAG	E	1	14/15	0.96	0.06	24,31,35,42	0
3	NAG	E	2	14/15	0.96	0.06	32,38,48,58	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.



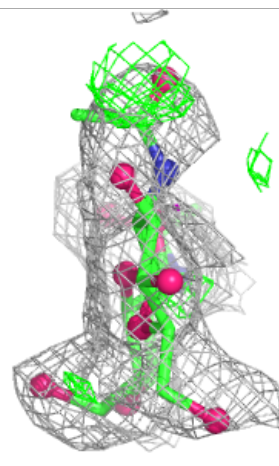
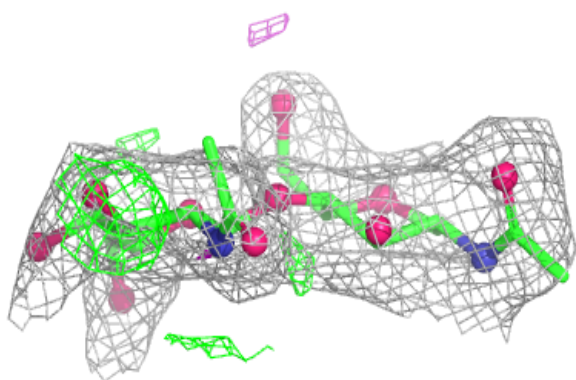
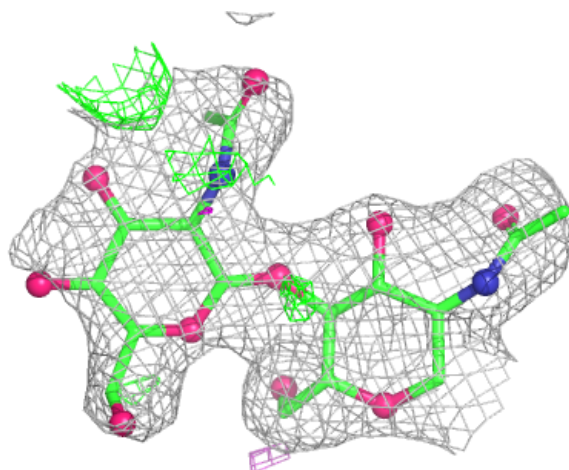
Electron density around Chain E:

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



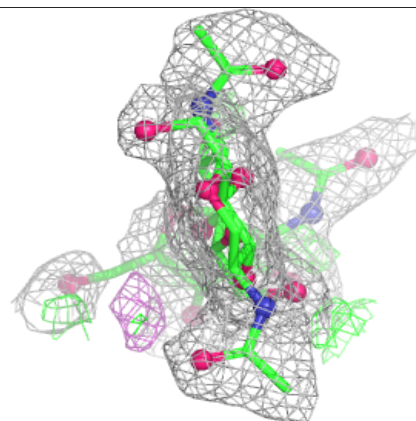
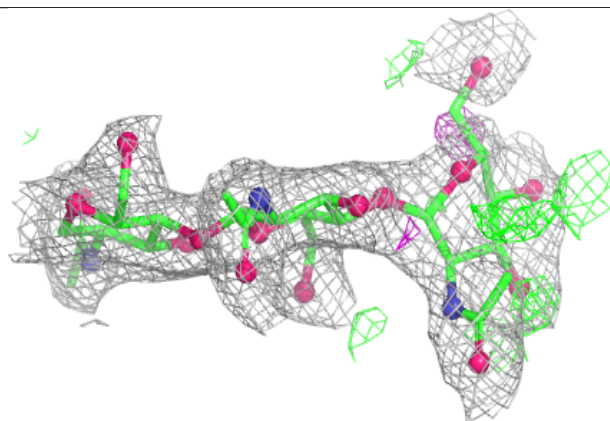
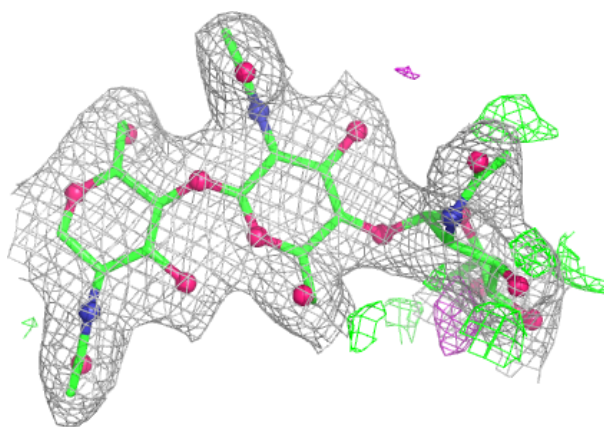
Electron density around Chain F:

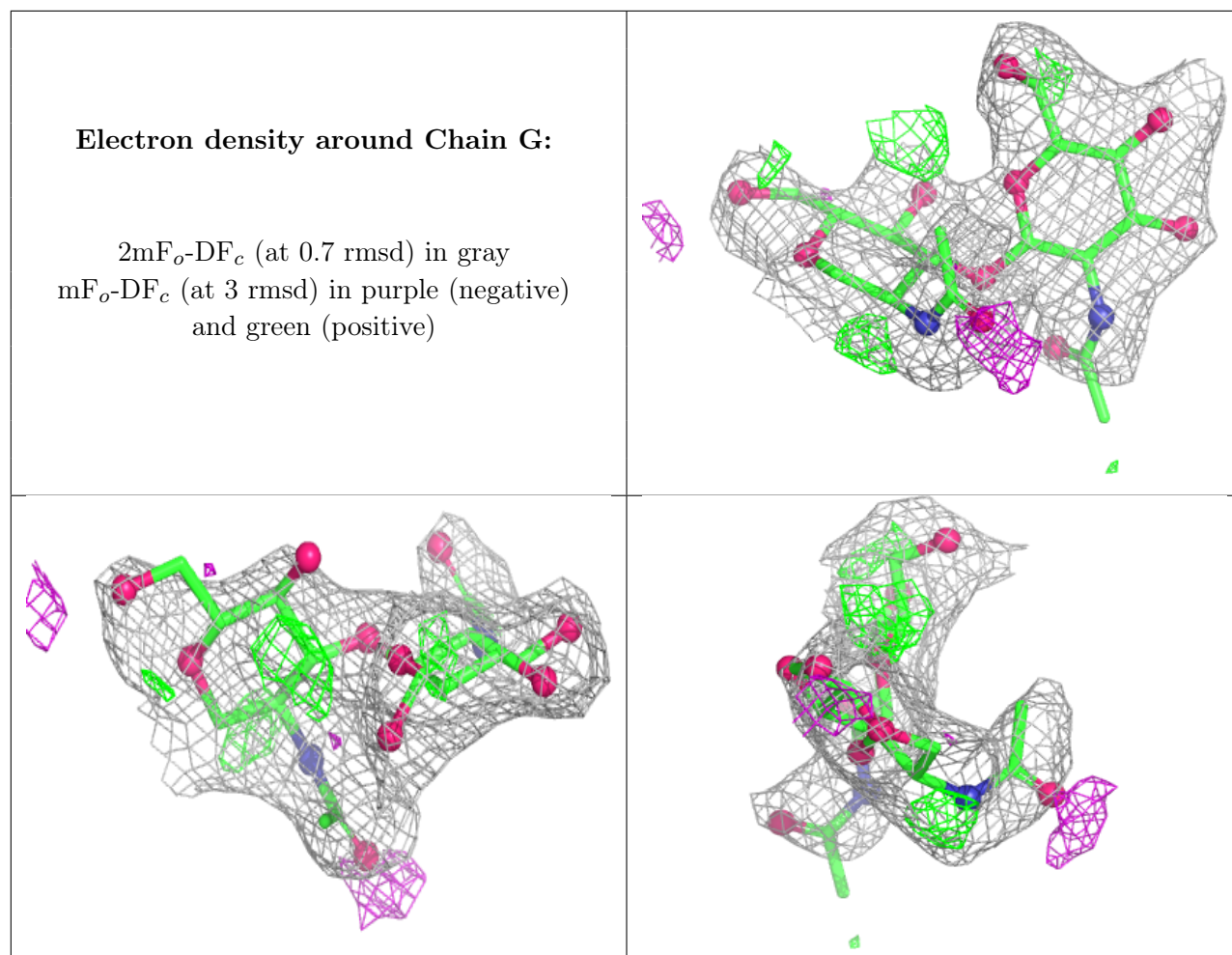
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain D:

$2mF_o - DF_c$ (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
7	NAG	B	1003	14/15	0.73	0.15	45,63,71,76	0
7	NAG	B	1006	14/15	0.73	0.20	47,59,66,73	0
7	NAG	A	1006	14/15	0.76	0.16	32,46,59,63	0
7	NAG	B	1007	14/15	0.88	0.10	32,35,39,40	0
7	NAG	A	1009	14/15	0.96	0.08	14,17,21,24	0
6	MN	B	1000	1/1	0.97	0.15	56,56,56,56	0
6	MN	A	1000	1/1	1.00	0.02	8,8,8,8	0

6.5 Other polymers [i](#)

There are no such residues in this entry.