



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 16, 2026 – 10:24 AM UTC

PDB ID : 1V0Z / pdb_00001v0z
Title : Structure of Neuraminidase from English duck subtype N6
Authors : Rudino-Pinera, E.; Tunnah, P.; Crennell, S.J.; Webster, R.G.; Laver, W.G.; Garman, E.F.
Deposited on : 2004-03-12
Resolution : 1.84 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

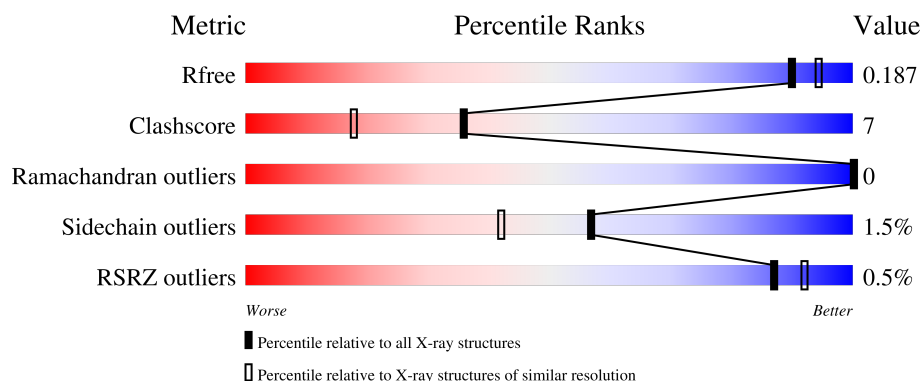
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

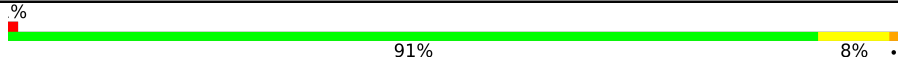
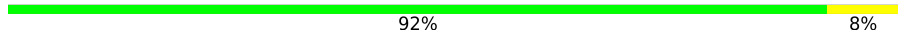
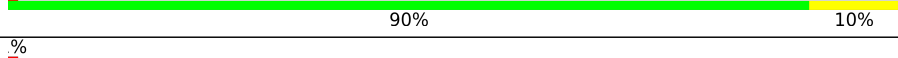
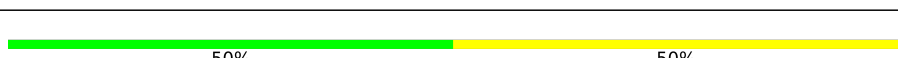
The reported resolution of this entry is 1.84 Å.

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.



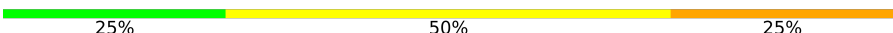
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1296 (1.84-1.84)
Clashscore	190562	1329 (1.84-1.84)
Ramachandran outliers	187476	1318 (1.84-1.84)
Sidechain outliers	187428	1318 (1.84-1.84)
RSRZ outliers	180081	1296 (1.84-1.84)

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	389	
1	B	389	
1	C	389	
1	D	389	
2	E	2	

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Mol	Chain	Length	Quality of chain
2	I	2	 50% 50%
3	F	4	 25% 50% 25%
4	G	6	 17% 50% 33%
5	H	3	 33% 67%
6	J	2	 100%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
11	PEG	C	503	-	X	X	-
9	NAG	A	506	-	-	X	-
9	NAG	D	508	-	-	X	-

2 Entry composition [i](#)

There are 12 unique types of molecules in this entry. The entry contains 14347 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 NEURAMINIDASE.

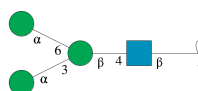
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	389	Total	C	N	O	S	0	0	0
			3009	1875	535	572	27			
1	B	389	Total	C	N	O	S	0	0	0
			3009	1875	535	572	27			
1	C	389	Total	C	N	O	S	0	0	0
			3009	1875	535	572	27			
1	D	389	Total	C	N	O	S	0	0	0
			3009	1875	535	572	27			

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



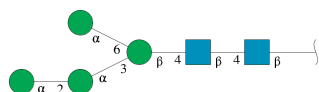
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	E	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	I	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 3 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.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	F	4	Total	C	N	O	0	0	0
			47	26	1	20			

- Molecule 4 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
4	G	6	Total	C	N	O	0	0	0
			72	40	2	30			

- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	H	3	Total	C	N	O	0	0	0
			36	20	1	15			

- Molecule 6 is an oligosaccharide called alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
6	J	2	Total	C	O	0	0	0
			22	12	10			

- Molecule 7 is CALCIUM ION (CCD ID: CA) (formula: Ca).

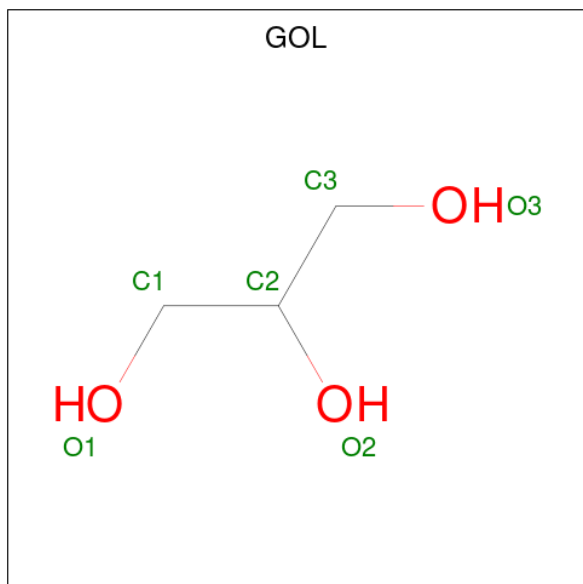
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Ca	0	0
			1	1		
7	B	1	Total	Ca	0	0
			1	1		
7	C	1	Total	Ca	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	D	1	Total	Ca	0	0
			1	1		

- Molecule 8 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



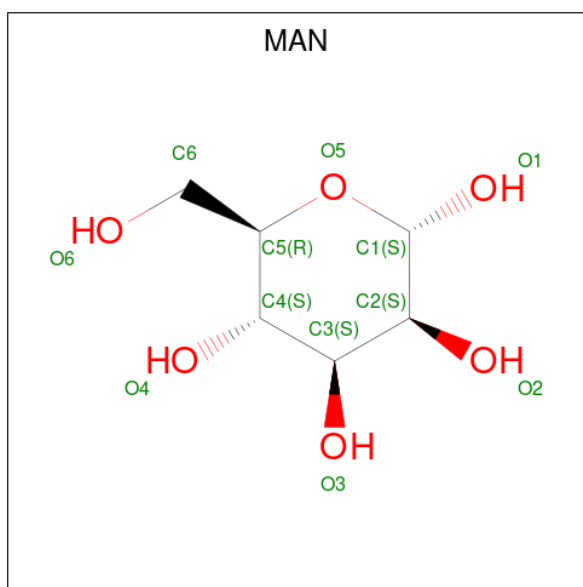
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	C	O	0	0
			6	3	3		
8	B	1	Total	C	O	0	0
			6	3	3		
8	C	1	Total	C	O	0	0
			6	3	3		
8	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 9 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



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

- Molecule 10 is alpha-D-mannopyranose (CCD ID: MAN) (formula: C₆H₁₂O₆).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	A	1	Total	C	O	0	0
			11	6	5		
10	A	1	Total	C	O	0	0
			11	6	5		
10	A	1	Total	C	O	0	0
			11	6	5		
10	A	1	Total	C	O	0	0
			11	6	5		
10	B	1	Total	C	O	0	0
			11	6	5		
10	B	1	Total	C	O	0	0
			11	6	5		
10	D	1	Total	C	O	0	0
			11	6	5		

- Molecule 11 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: C₄H₁₀O₃).



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

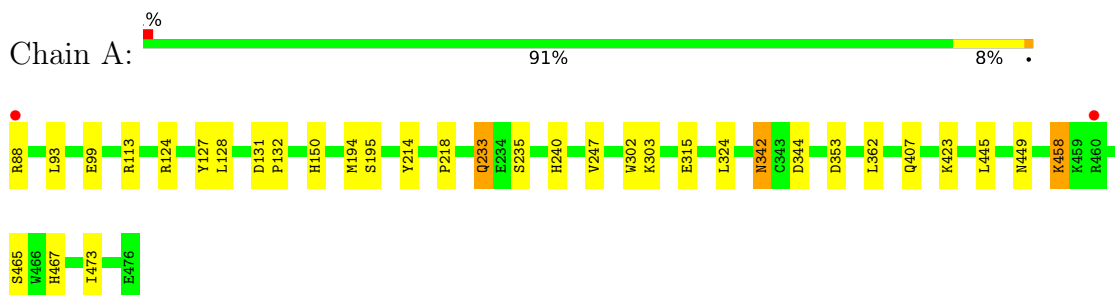
- Molecule 12 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	A	460	Total	O	0	0
			460	460		
12	B	442	Total	O	0	0
			442	442		
12	C	454	Total	O	0	0
			454	454		
12	D	442	Total	O	0	0
			442	442		

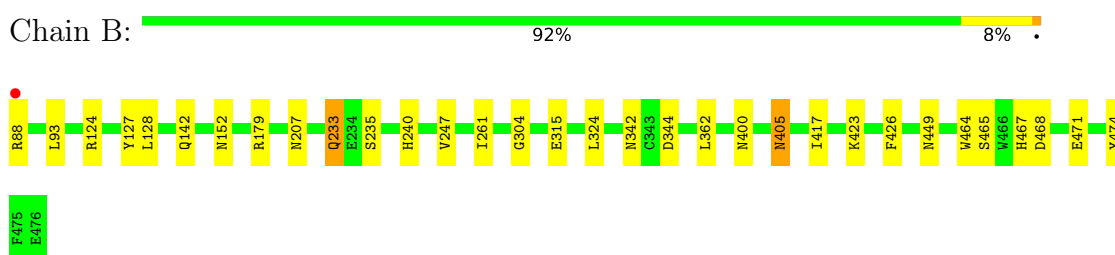
3 Residue-property plots [i](#)

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.

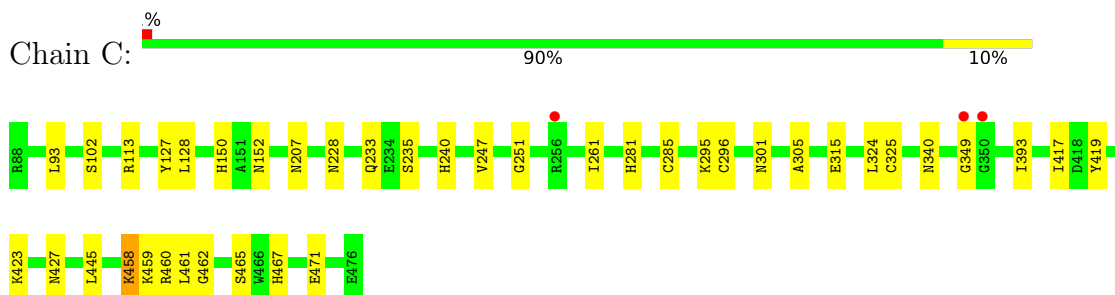
• Molecule 1: NEURAMINIDASE



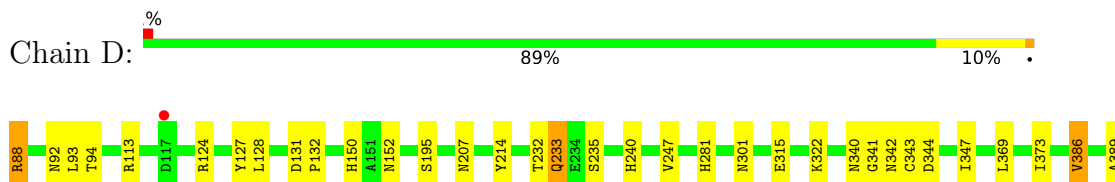
• Molecule 1: NEURAMINIDASE

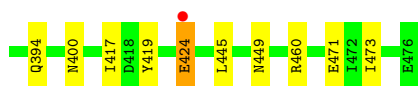


• Molecule 1: NEURAMINIDASE



• Molecule 1: NEURAMINIDASE





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

Chain E: 50% 50%



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

Chain I: 50% 50%



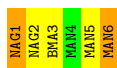
- Molecule 3: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F: 25% 50% 25%



- Molecule 4: 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 G: 17% 50% 33%



- Molecule 5: alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain H: 33% 67%



- Molecule 6: alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose

Chain J: 100%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	106.48Å 73.75Å 106.81Å 90.00° 90.37° 90.00°	Depositor
Resolution (Å)	19.96 – 1.84 19.96 – 1.84	Depositor EDS
% Data completeness (in resolution range)	100.0 (19.96-1.84) 93.1 (19.96-1.84)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.28 (at 1.84Å)	Xtriage
Refinement program	REFMAC 5.0	Depositor
R, R_{free}	0.149 , 0.190 0.150 , 0.187	Depositor DCC
R_{free} test set	6696 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	12.7	Xtriage
Anisotropy	1.044	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.40 , 59.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.006 for l,k,-h 0.016 for h,-k,-l 0.012 for l,-k,h	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	14347	wwPDB-VP
Average B, all atoms (Å ²)	15.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.12% 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: GOL, CA, PEG, NAG, BMA, MAN

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	0.77	0/3084	0.81	1/4185 (0.0%)
1	B	0.77	0/3084	0.82	2/4185 (0.0%)
1	C	0.79	0/3084	0.78	0/4185
1	D	0.76	0/3084	0.81	2/4185 (0.0%)
All	All	0.77	0/12336	0.81	5/16740 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	233	GLN	N-CA-C	7.64	119.61	111.28
1	A	233	GLN	N-CA-C	5.54	117.40	111.36
1	D	233	GLN	N-CA-C	5.51	117.36	111.36
1	B	304	GLY	N-CA-C	5.28	118.42	111.03
1	D	232	THR	N-CA-C	5.11	115.12	108.07

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	3009	0	2885	27	0
1	B	3009	0	2888	32	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	3009	0	2888	53	0
1	D	3009	0	2888	53	0
2	E	28	0	25	0	0
2	I	28	0	25	7	0
3	F	47	0	40	7	0
4	G	72	0	61	8	0
5	H	36	0	31	7	0
6	J	22	0	19	6	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
8	A	6	0	8	2	0
8	B	6	0	8	1	0
8	C	6	0	8	1	0
8	D	6	0	8	0	0
9	A	42	0	39	9	0
9	B	28	0	26	4	0
9	C	42	0	39	5	0
9	D	56	0	52	17	0
10	A	44	0	40	9	0
10	B	22	0	20	2	0
10	D	11	0	10	2	0
11	C	7	0	10	16	0
12	A	460	0	0	5	0
12	B	442	0	0	1	0
12	C	454	0	0	6	0
12	D	442	0	0	1	0
All	All	14347	0	12018	180	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.

The worst 5 of 180 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:D:207:ASN:HD21	9:D:508:NAG:C1	1.03	1.63
1:D:152:ASN:HD21	9:D:507:NAG:C1	1.01	1.55
1:B:152:ASN:HD21	9:B:504:NAG:C1	0.97	1.54
1:C:152:ASN:HD21	9:C:506:NAG:C1	0.92	1.53
1:C:207:ASN:HD21	2:I:1:NAG:C1	0.94	1.52

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	387/389 (100%)	375 (97%)	12 (3%)	0	100	100
1	B	387/389 (100%)	375 (97%)	12 (3%)	0	100	100
1	C	387/389 (100%)	374 (97%)	13 (3%)	0	100	100
1	D	387/389 (100%)	373 (96%)	14 (4%)	0	100	100
All	All	1548/1556 (100%)	1497 (97%)	51 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	331/331 (100%)	327 (99%)	4 (1%)	63	51
1	B	331/331 (100%)	325 (98%)	6 (2%)	51	35
1	C	331/331 (100%)	327 (99%)	4 (1%)	63	51
1	D	331/331 (100%)	325 (98%)	6 (2%)	51	35
All	All	1324/1324 (100%)	1304 (98%)	20 (2%)	57	42

5 of 20 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	88	ARG
1	D	424	GLU
1	D	460	ARG
1	D	445	LEU
1	B	142	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 53 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	467	HIS
1	C	281	HIS
1	D	394	GLN
1	C	150	HIS
1	C	233	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

19 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	0.65	0	17,19,21	0.90	0
2	NAG	E	2	2	14,14,15	0.55	0	17,19,21	0.78	1 (5%)
3	NAG	F	1	3	14,14,15	0.58	0	17,19,21	0.64	0
3	BMA	F	2	3	11,11,12	0.25	0	15,15,17	1.15	1 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	MAN	F	3	3	11,11,12	0.40	0	15,15,17	0.79	0
3	MAN	F	4	3	11,11,12	0.53	0	15,15,17	1.34	1 (6%)
4	NAG	G	1	4,1	14,14,15	0.79	0	17,19,21	2.36	6 (35%)
4	NAG	G	2	4	14,14,15	0.63	0	17,19,21	1.43	2 (11%)
4	BMA	G	3	4	11,11,12	0.56	0	15,15,17	0.98	1 (6%)
4	MAN	G	4	4	11,11,12	0.51	0	15,15,17	0.78	0
4	MAN	G	5	4	11,11,12	0.43	0	15,15,17	0.87	1 (6%)
4	MAN	G	6	4	11,11,12	0.38	0	15,15,17	1.31	2 (13%)
5	NAG	H	1	5	14,14,15	0.66	0	17,19,21	2.61	6 (35%)
5	BMA	H	2	5	11,11,12	0.41	0	15,15,17	1.14	1 (6%)
5	MAN	H	3	5	11,11,12	0.40	0	15,15,17	1.05	1 (6%)
2	NAG	I	1	2	14,14,15	0.61	0	17,19,21	1.54	3 (17%)
2	NAG	I	2	2	14,14,15	0.60	0	17,19,21	0.62	0
6	BMA	J	1	6	11,11,12	0.44	0	15,15,17	0.98	1 (6%)
6	MAN	J	2	6	11,11,12	0.50	0	15,15,17	1.54	2 (13%)

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
2	NAG	E	2	2	-	0/6/23/26	0/1/1/1
3	NAG	F	1	3	-	0/6/23/26	0/1/1/1
3	BMA	F	2	3	-	0/2/19/22	0/1/1/1
3	MAN	F	3	3	-	2/2/19/22	0/1/1/1
3	MAN	F	4	3	-	0/2/19/22	0/1/1/1
4	NAG	G	1	4,1	-	4/6/23/26	0/1/1/1
4	NAG	G	2	4	-	0/6/23/26	0/1/1/1
4	BMA	G	3	4	-	0/2/19/22	0/1/1/1
4	MAN	G	4	4	-	0/2/19/22	0/1/1/1
4	MAN	G	5	4	-	2/2/19/22	0/1/1/1
4	MAN	G	6	4	-	0/2/19/22	0/1/1/1
5	NAG	H	1	5	-	2/6/23/26	0/1/1/1
5	BMA	H	2	5	-	0/2/19/22	0/1/1/1
5	MAN	H	3	5	-	0/2/19/22	0/1/1/1
2	NAG	I	1	2	-	0/6/23/26	0/1/1/1
2	NAG	I	2	2	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	BMA	J	1	6	-	0/2/19/22	0/1/1/1
6	MAN	J	2	6	-	1/2/19/22	0/1/1/1

There are no bond length outliers.

The worst 5 of 29 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	G	1	NAG	C3-C4-C5	-5.93	99.49	110.23
5	H	1	NAG	C4-C3-C2	-5.51	102.94	111.02
5	H	1	NAG	C2-N2-C7	4.77	129.29	122.90
5	H	1	NAG	C1-C2-N2	4.62	117.71	110.43
5	H	1	NAG	O5-C1-C2	-4.41	104.47	111.29

There are no chirality outliers.

5 of 11 torsion outliers are listed below:

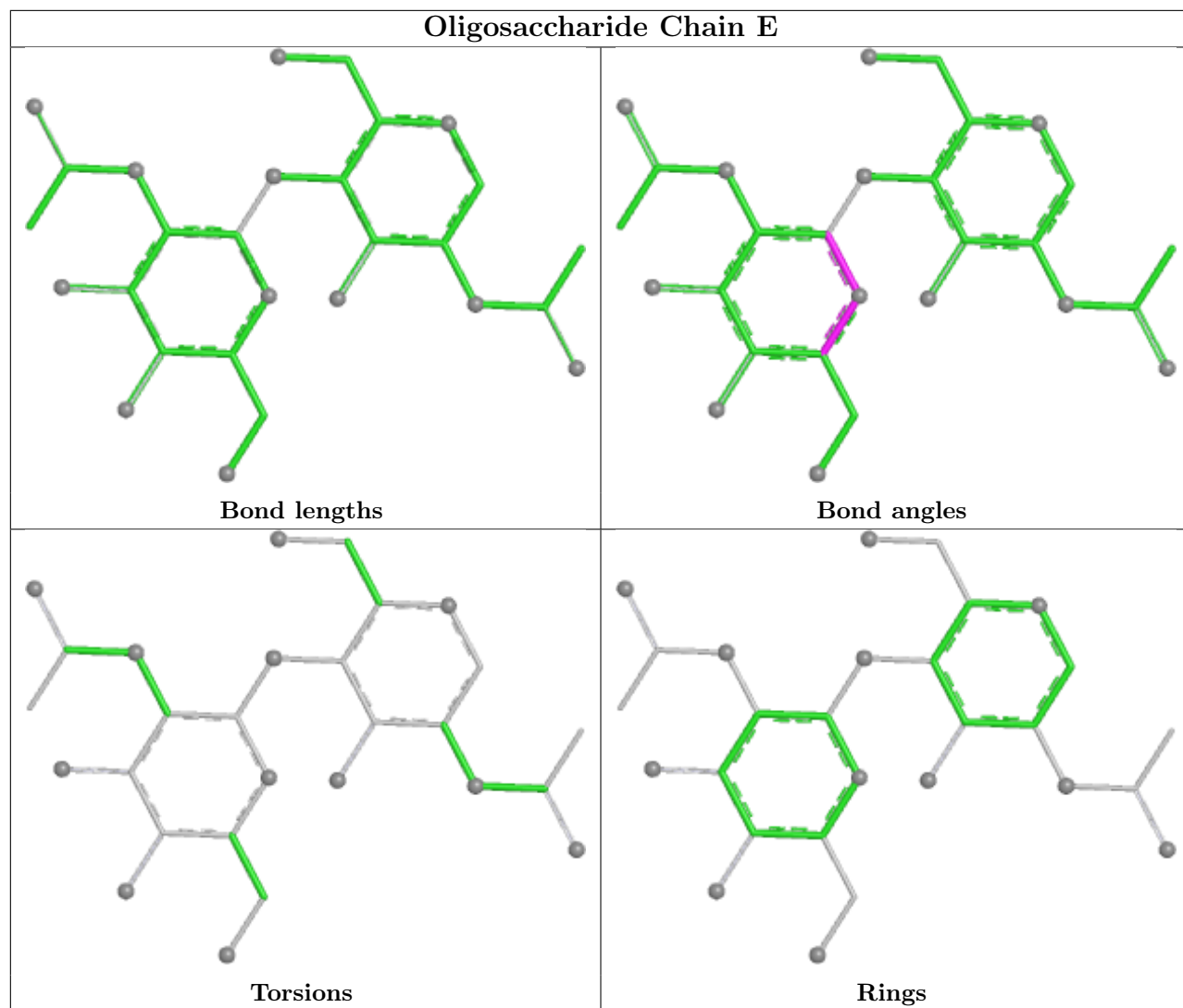
Mol	Chain	Res	Type	Atoms
4	G	1	NAG	C8-C7-N2-C2
4	G	1	NAG	O7-C7-N2-C2
4	G	1	NAG	O5-C5-C6-O6
3	F	3	MAN	O5-C5-C6-O6
4	G	1	NAG	C4-C5-C6-O6

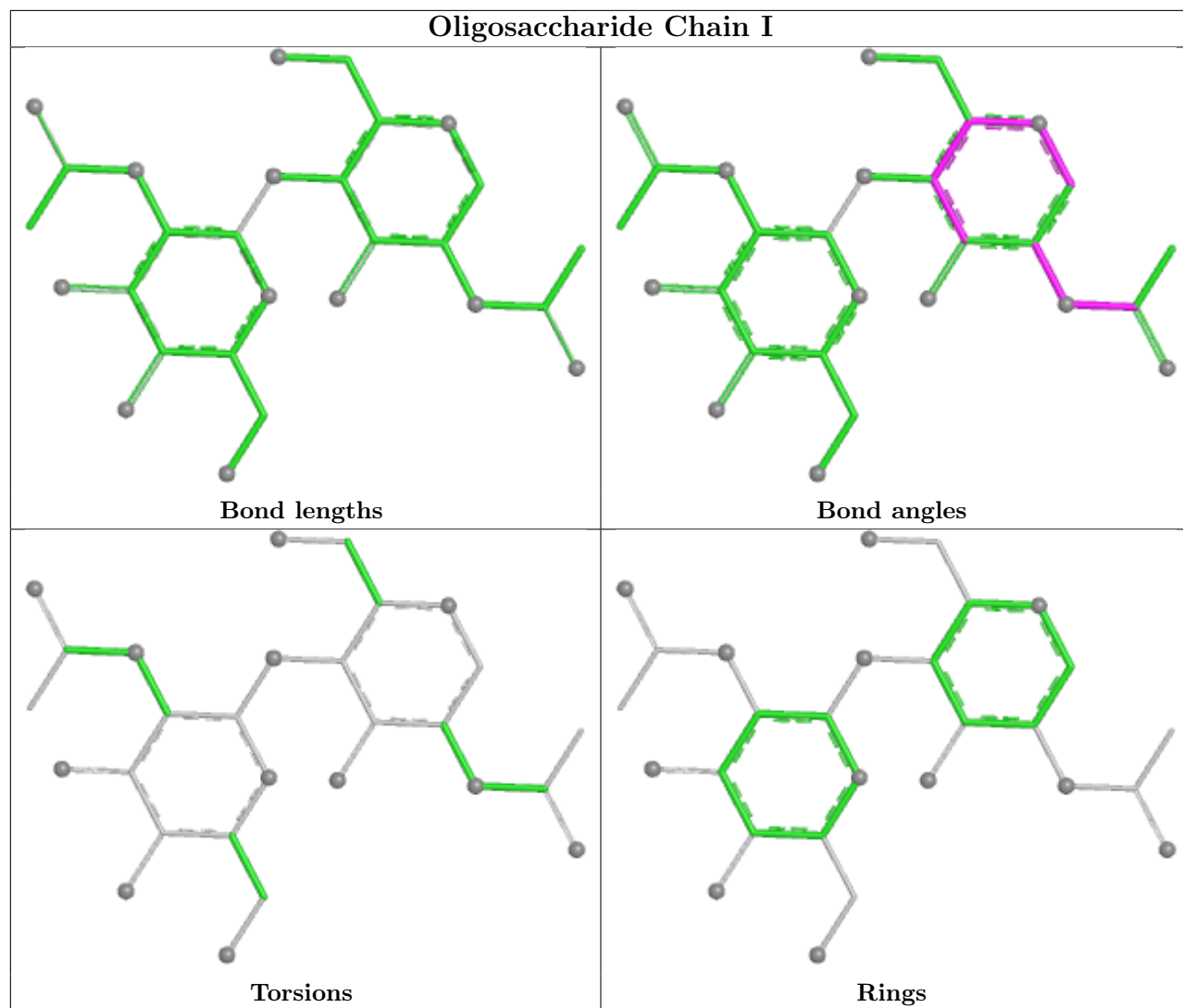
There are no ring outliers.

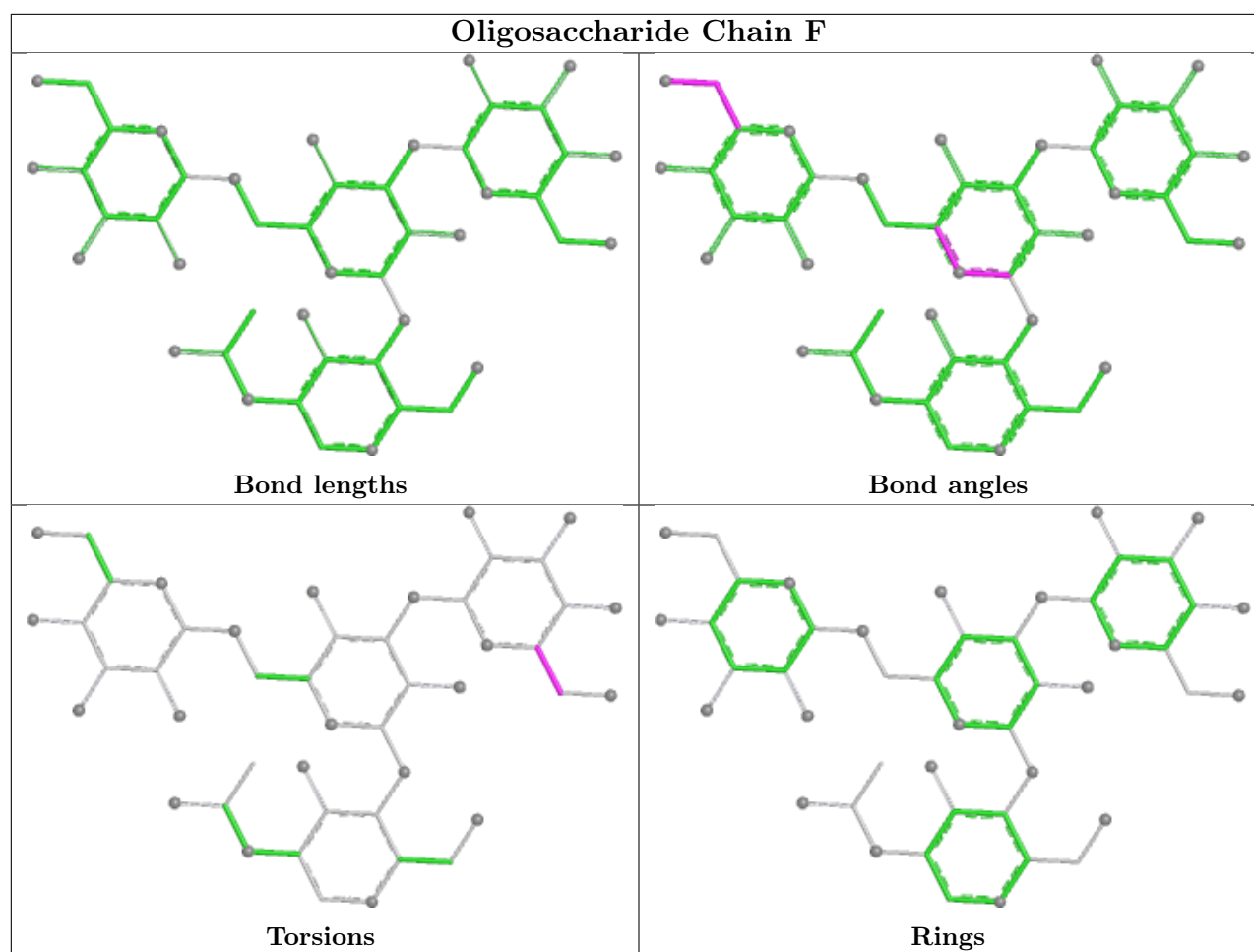
10 monomers are involved in 32 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	G	1	NAG	3	0
5	H	1	NAG	5	0
4	G	6	MAN	5	0
6	J	1	BMA	3	0
2	I	2	NAG	3	0
3	F	1	NAG	3	0
3	F	4	MAN	4	0
6	J	2	MAN	3	0
5	H	3	MAN	2	0
2	I	1	NAG	4	0

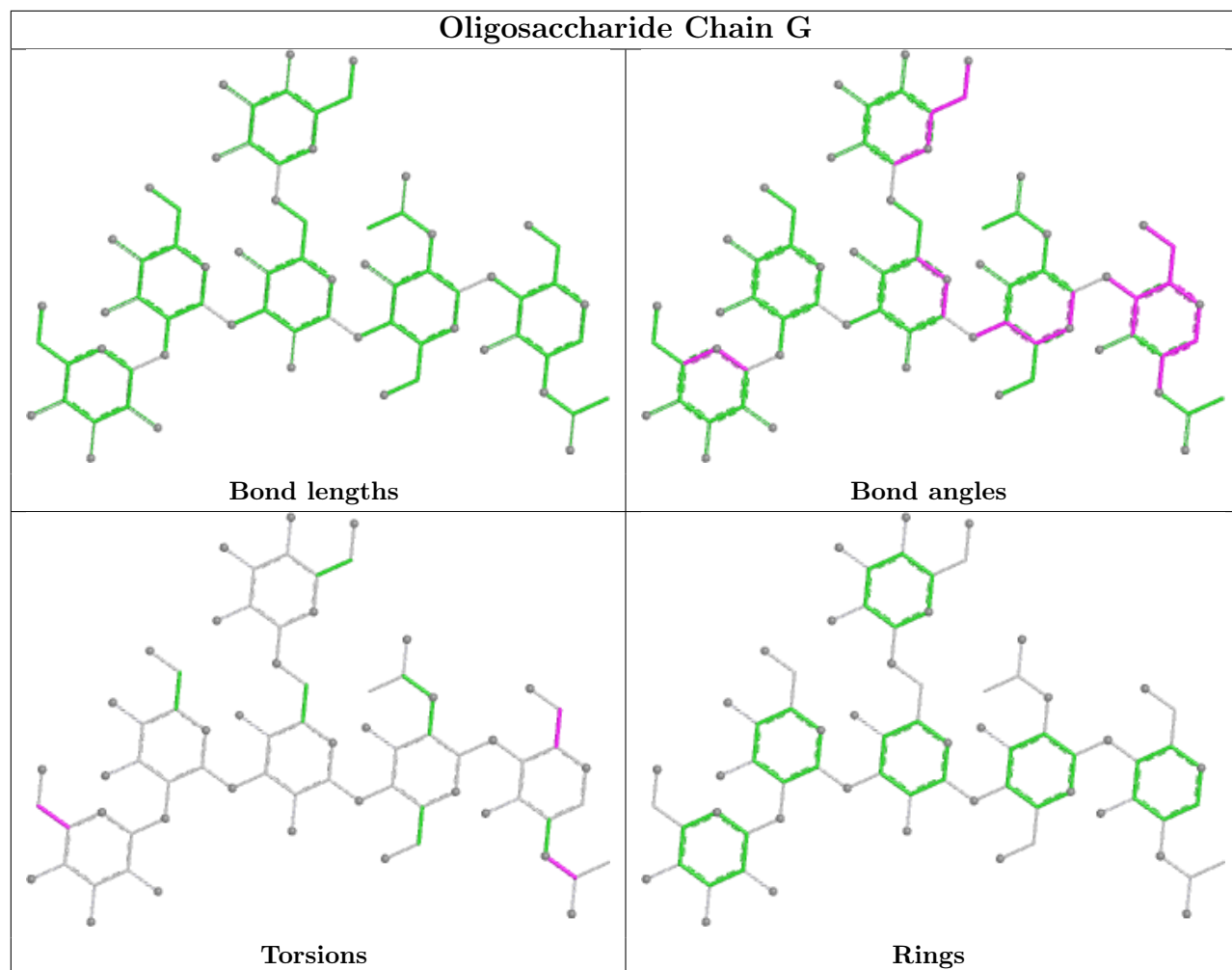
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



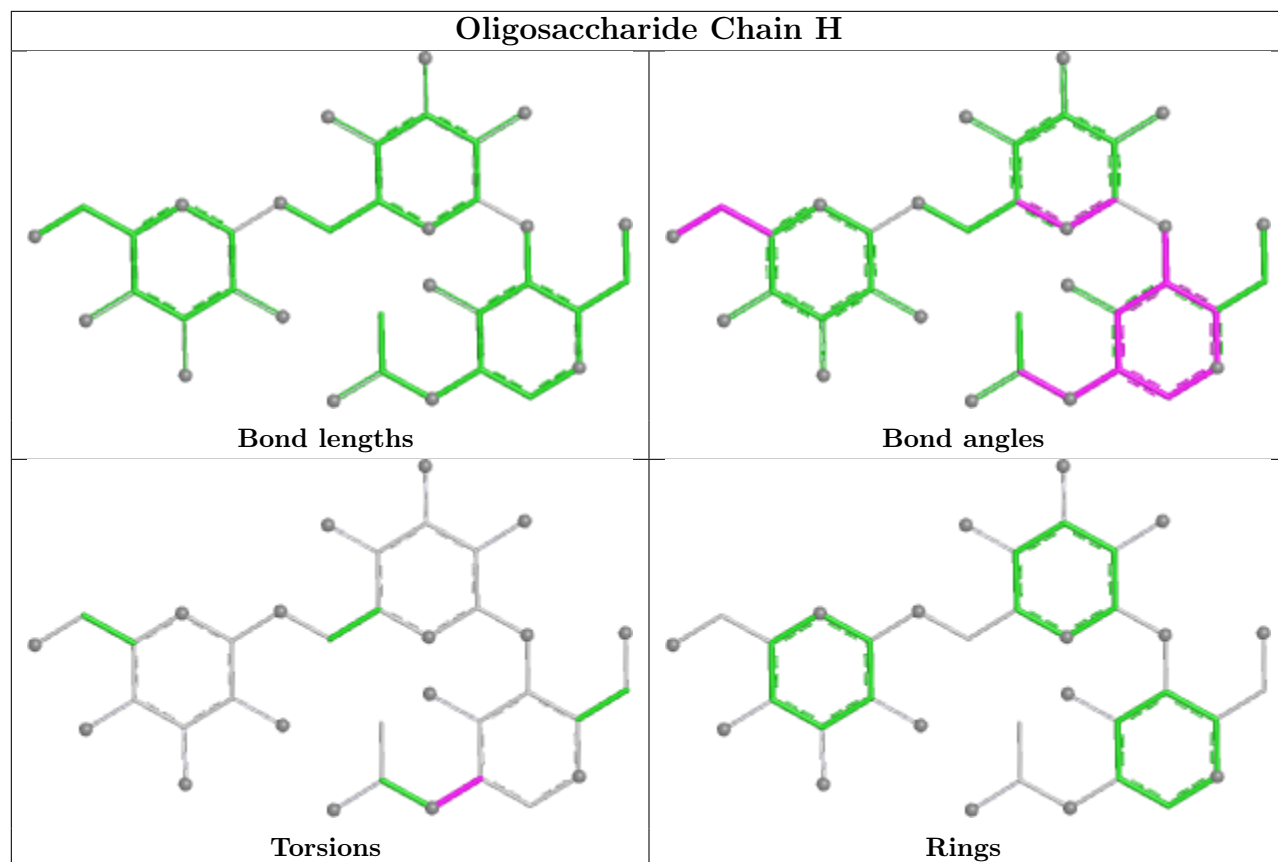




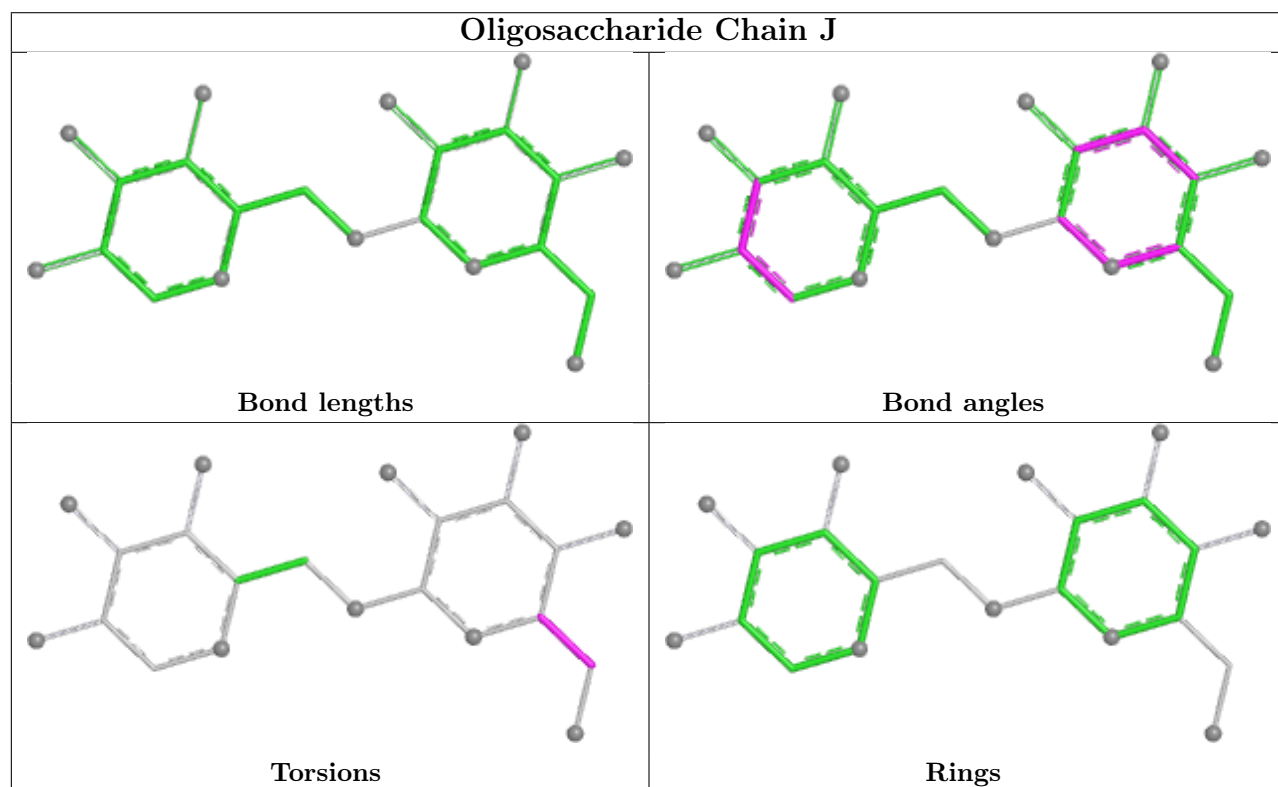
Oligosaccharide Chain G



Oligosaccharide Chain H



Oligosaccharide Chain J



5.6 Ligand geometry

Of 28 ligands modelled in this entry, 4 are monoatomic - leaving 24 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
10	MAN	B	509	-	11,11,12	0.50	0	15,15,17	1.65	3 (20%)
9	NAG	A	505	1	14,14,15	0.64	0	17,19,21	0.88	0
8	GOL	C	504	-	5,5,5	1.67	1 (20%)	5,5,5	2.21	2 (40%)
8	GOL	A	502	-	5,5,5	1.24	0	5,5,5	1.92	1 (20%)
9	NAG	D	508	-	14,14,15	0.63	0	17,19,21	1.68	4 (23%)
10	MAN	D	509	-	11,11,12	0.58	0	15,15,17	1.12	2 (13%)
9	NAG	D	501	-	14,14,15	0.48	0	17,19,21	0.93	1 (5%)
10	MAN	A	514	-	11,11,12	0.43	0	15,15,17	1.44	1 (6%)
10	MAN	A	508	-	11,11,12	0.37	0	15,15,17	1.40	1 (6%)
11	PEG	C	503	-	6,6,6	0.27	0	5,5,5	6.23	5 (100%)
9	NAG	B	504	-	14,14,15	0.69	0	17,19,21	1.00	1 (5%)
9	NAG	B	503	-	14,14,15	0.43	0	17,19,21	1.34	3 (17%)
9	NAG	C	505	-	14,14,15	0.54	0	17,19,21	1.51	5 (29%)
9	NAG	A	513	-	14,14,15	0.51	0	17,19,21	1.13	2 (11%)
10	MAN	B	506	-	11,11,12	0.37	0	15,15,17	1.10	1 (6%)
9	NAG	D	506	-	14,14,15	0.44	0	17,19,21	1.08	1 (5%)
9	NAG	A	506	-	14,14,15	0.57	0	17,19,21	1.59	3 (17%)
9	NAG	C	501	-	14,14,15	0.52	0	17,19,21	1.20	2 (11%)
9	NAG	D	507	-	14,14,15	0.58	0	17,19,21	1.13	1 (5%)
8	GOL	B	502	-	5,5,5	1.77	1 (20%)	5,5,5	2.23	3 (60%)
10	MAN	A	521	-	11,11,12	0.58	0	15,15,17	1.63	3 (20%)
10	MAN	A	509	-	11,11,12	0.51	0	15,15,17	1.26	1 (6%)
8	GOL	D	505	-	5,5,5	1.43	1 (20%)	5,5,5	1.97	1 (20%)
9	NAG	C	506	-	14,14,15	0.65	0	17,19,21	1.11	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
10	MAN	B	509	-	-	0/2/19/22	0/1/1/1
9	NAG	A	505	1	-	0/6/23/26	0/1/1/1
8	GOL	C	504	-	-	1/4/4/4	-
8	GOL	A	502	-	-	1/4/4/4	-
9	NAG	D	508	-	-	0/6/23/26	0/1/1/1
10	MAN	D	509	-	-	2/2/19/22	0/1/1/1
9	NAG	D	501	-	-	5/6/23/26	0/1/1/1
10	MAN	A	514	-	-	2/2/19/22	0/1/1/1
10	MAN	A	508	-	-	1/2/19/22	0/1/1/1
11	PEG	C	503	-	-	2/4/4/4	-
9	NAG	B	504	-	-	0/6/23/26	0/1/1/1
9	NAG	B	503	-	-	3/6/23/26	0/1/1/1
9	NAG	C	505	-	-	2/6/23/26	0/1/1/1
9	NAG	A	513	-	-	4/6/23/26	0/1/1/1
10	MAN	B	506	-	-	0/2/19/22	0/1/1/1
9	NAG	D	506	-	-	2/6/23/26	0/1/1/1
9	NAG	A	506	-	-	4/6/23/26	0/1/1/1
9	NAG	C	501	-	-	1/6/23/26	0/1/1/1
9	NAG	D	507	-	-	0/6/23/26	0/1/1/1
8	GOL	B	502	-	-	0/4/4/4	-
10	MAN	A	521	-	-	0/2/19/22	0/1/1/1
10	MAN	A	509	-	-	0/2/19/22	0/1/1/1
8	GOL	D	505	-	-	1/4/4/4	-
9	NAG	C	506	-	-	0/6/23/26	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	B	502	GOL	O3-C3	2.70	1.53	1.42
8	C	504	GOL	O3-C3	2.34	1.52	1.42
8	D	505	GOL	C3-C2	2.02	1.59	1.51

The worst 5 of 48 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	C	503	PEG	O1-C1-C2	8.97	164.65	111.82
11	C	503	PEG	O2-C2-C1	7.80	144.49	110.11

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	C	503	PEG	C3-O2-C2	-6.08	86.66	113.26
10	B	509	MAN	C1-O5-C5	4.98	118.86	112.19
10	A	514	MAN	C1-O5-C5	4.78	118.59	112.19

There are no chirality outliers.

5 of 31 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
9	A	506	NAG	C8-C7-N2-C2
9	A	506	NAG	O7-C7-N2-C2
9	B	503	NAG	C8-C7-N2-C2
9	B	503	NAG	O7-C7-N2-C2
9	D	501	NAG	C8-C7-N2-C2

There are no ring outliers.

17 monomers are involved in 68 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	C	504	GOL	1	0
8	A	502	GOL	2	0
9	D	508	NAG	9	0
10	D	509	MAN	2	0
9	D	501	NAG	1	0
10	A	514	MAN	2	0
10	A	508	MAN	2	0
11	C	503	PEG	16	0
9	B	504	NAG	4	0
10	B	506	MAN	2	0
9	D	506	NAG	3	0
9	A	506	NAG	9	0
9	D	507	NAG	4	0
8	B	502	GOL	1	0
10	A	521	MAN	3	0
10	A	509	MAN	2	0
9	C	506	NAG	5	0

5.7 Other polymers [i](#)

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	389/389 (100%)	-0.65	2 (0%) 87 92	7, 12, 20, 31	0
1	B	389/389 (100%)	-0.68	1 (0%) 90 94	7, 12, 18, 37	0
1	C	389/389 (100%)	-0.73	3 (0%) 82 88	7, 11, 19, 33	0
1	D	389/389 (100%)	-0.69	2 (0%) 87 92	7, 12, 18, 33	0
All	All	1556/1556 (100%)	-0.69	8 (0%) 87 92	7, 12, 19, 37	0

The worst 5 of 8 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	350	GLY	4.0
1	C	349	GLY	2.6
1	D	424	GLU	2.5
1	A	460	ARG	2.3
1	C	256	ARG	2.2

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
6	MAN	J	2	11/12	0.57	0.20	45,49,51,51	0
3	MAN	F	3	11/12	0.63	0.13	45,48,49,50	0

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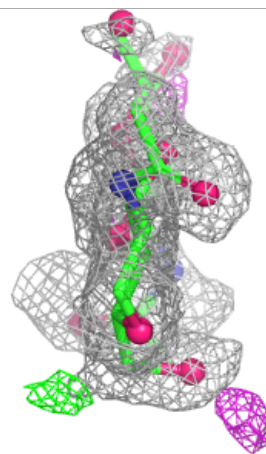
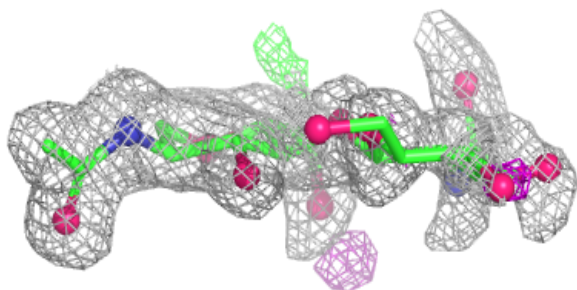
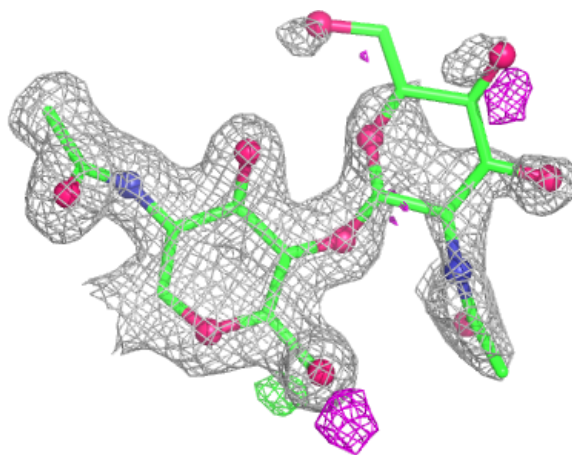
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	NAG	E	2	14/15	0.67	0.14	39,43,45,45	0
5	NAG	H	1	14/15	0.70	0.17	26,35,39,43	0
4	MAN	G	5	11/12	0.73	0.12	38,42,44,44	0
4	NAG	G	1	14/15	0.75	0.14	26,31,35,38	0
5	BMA	H	2	11/12	0.76	0.13	35,36,37,38	0
3	NAG	F	1	14/15	0.82	0.11	20,24,27,30	0
5	MAN	H	3	11/12	0.83	0.11	35,37,37,37	0
6	BMA	J	1	11/12	0.86	0.10	32,35,36,40	0
2	NAG	I	2	14/15	0.86	0.10	18,24,29,33	0
2	NAG	I	1	14/15	0.87	0.10	25,29,32,34	0
3	MAN	F	4	11/12	0.91	0.09	22,24,24,27	0
2	NAG	E	1	14/15	0.91	0.08	20,22,26,32	0
4	NAG	G	2	14/15	0.92	0.07	14,20,24,25	0
4	MAN	G	4	11/12	0.92	0.08	24,25,27,27	0
4	BMA	G	3	11/12	0.93	0.06	16,19,19,21	0
4	MAN	G	6	11/12	0.94	0.07	14,15,16,19	0
3	BMA	F	2	11/12	0.96	0.05	21,25,26,31	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.

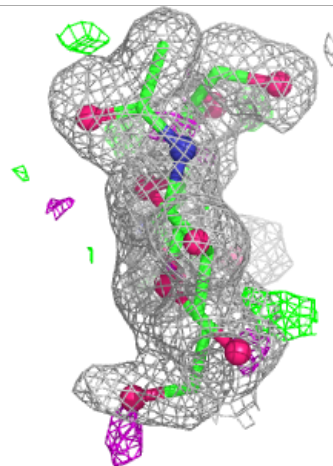
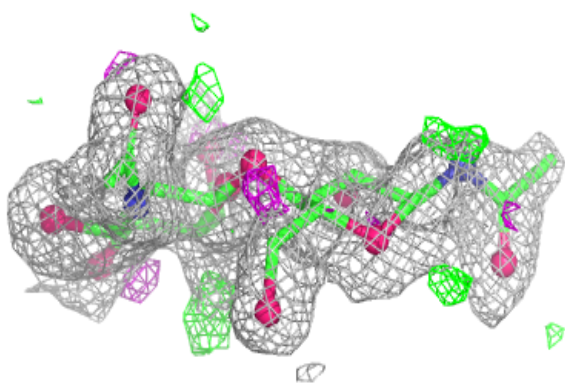
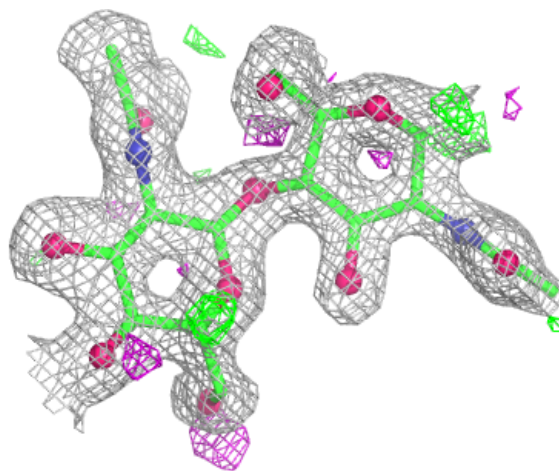
Electron density around Chain E:

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



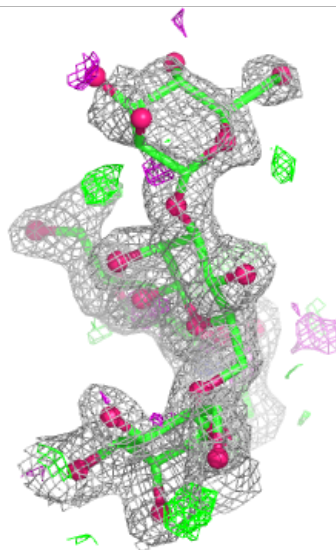
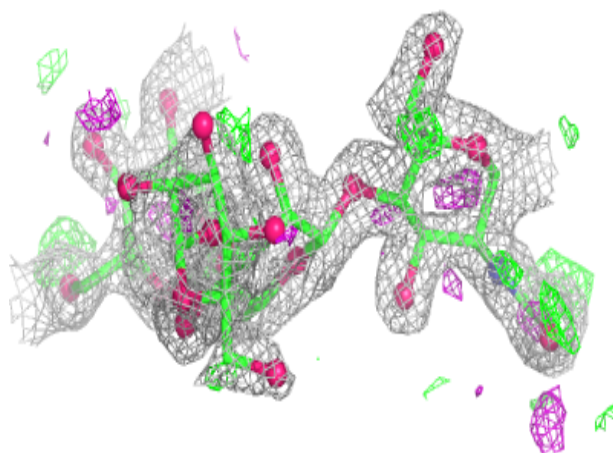
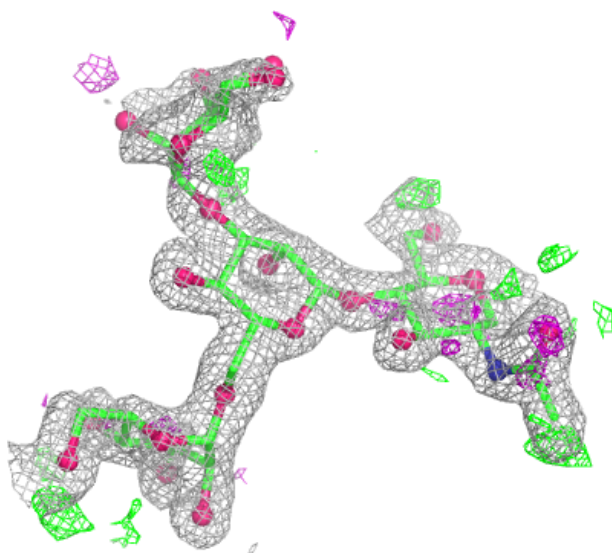
Electron density around Chain I:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



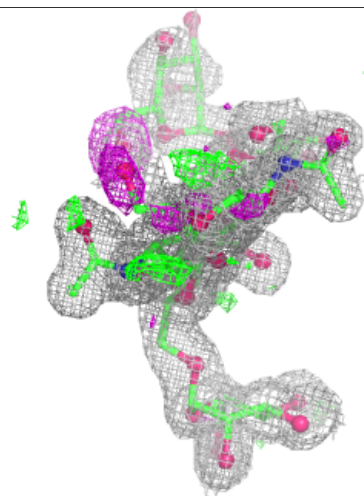
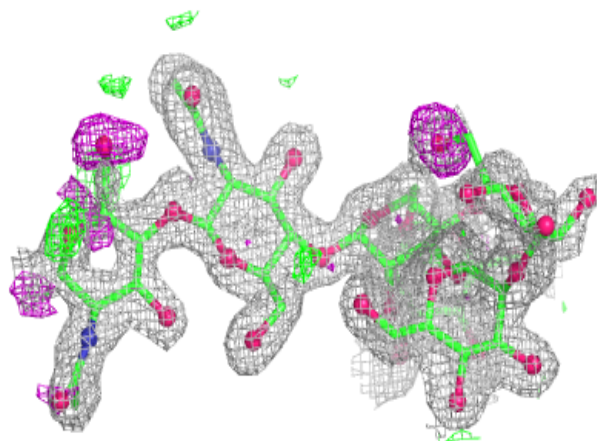
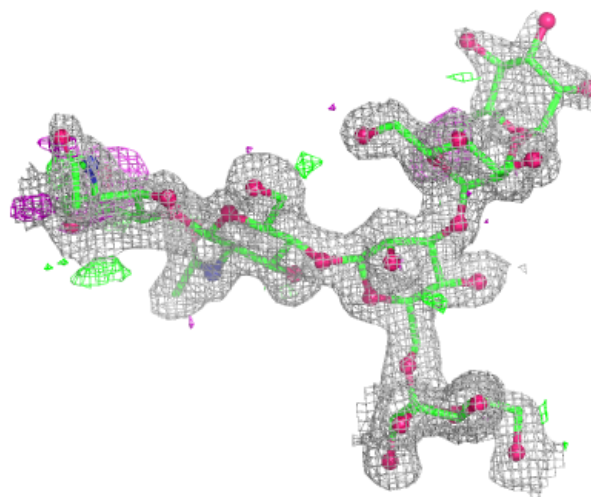
Electron density around Chain F:

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



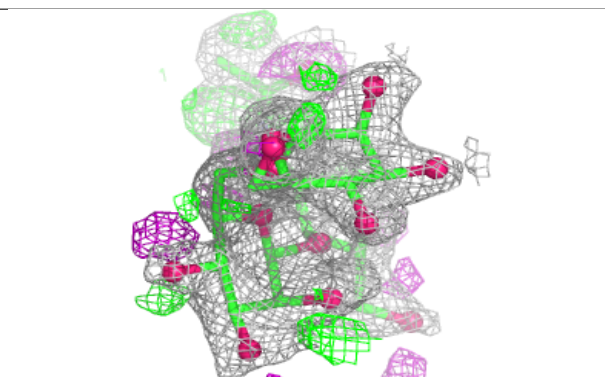
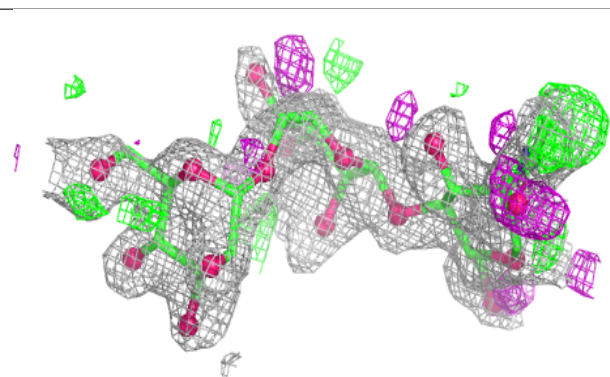
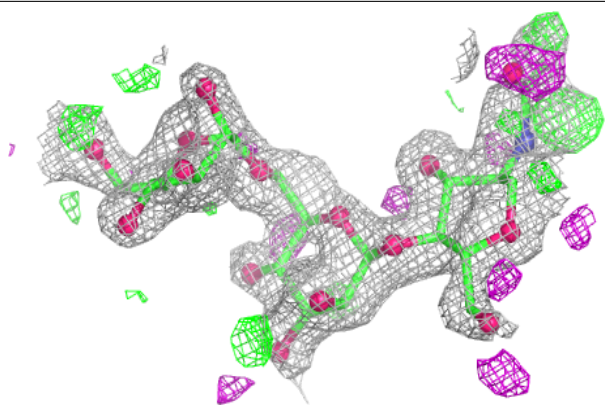
Electron density around Chain G:

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

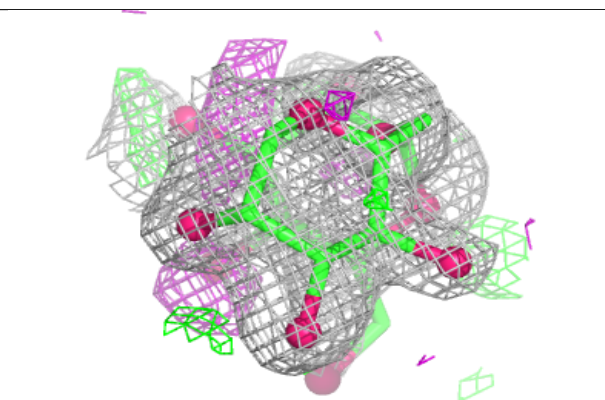
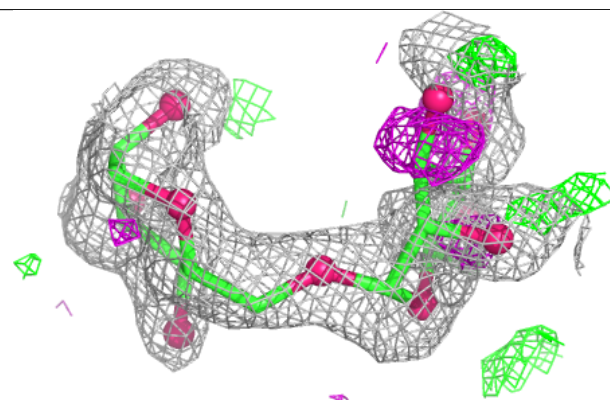
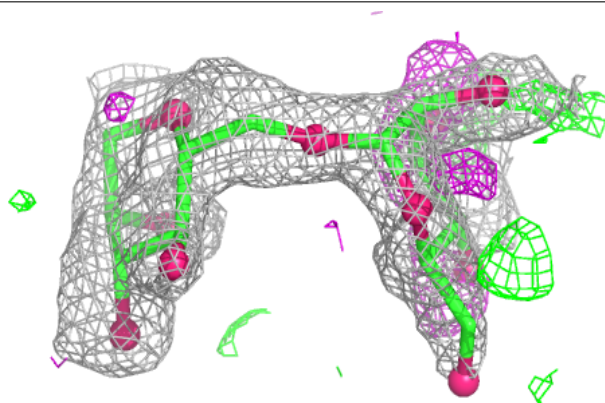


Electron density around Chain H:

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

**Electron density around Chain J:**

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



6.4 Ligands ⓘ

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
9	NAG	A	513	14/15	0.40	0.26	95,96,97,97	0
9	NAG	B	503	14/15	0.41	0.23	98,99,99,99	0
9	NAG	D	506	14/15	0.56	0.31	105,105,106,106	0
10	MAN	D	509	11/12	0.58	0.19	67,68,68,68	0
9	NAG	D	501	14/15	0.59	0.24	74,77,77,77	0
9	NAG	C	505	14/15	0.63	0.21	62,63,64,64	0
9	NAG	C	501	14/15	0.64	0.19	64,67,68,68	0
8	GOL	B	502	6/6	0.69	0.23	12,25,26,28	0
9	NAG	A	506	14/15	0.71	0.17	42,44,45,45	0
10	MAN	B	509	11/12	0.72	0.16	44,47,48,49	0
8	GOL	A	502	6/6	0.74	0.21	19,29,30,31	0
8	GOL	D	505	6/6	0.75	0.24	17,29,30,30	0
8	GOL	C	504	6/6	0.77	0.22	13,26,28,29	0
11	PEG	C	503	7/7	0.79	0.17	20,24,28,29	0
10	MAN	B	506	11/12	0.80	0.12	32,33,36,38	0
10	MAN	A	514	11/12	0.83	0.12	30,33,36,38	0
10	MAN	A	508	11/12	0.84	0.11	26,30,35,38	0
9	NAG	D	508	14/15	0.85	0.10	23,26,27,27	0
10	MAN	A	509	11/12	0.88	0.10	24,27,28,29	0
9	NAG	A	505	14/15	0.89	0.09	19,22,27,28	0
9	NAG	B	504	14/15	0.92	0.07	16,22,26,29	0
9	NAG	D	507	14/15	0.92	0.07	17,22,26,26	0
9	NAG	C	506	14/15	0.93	0.07	15,18,25,26	0
10	MAN	A	521	11/12	0.93	0.07	19,20,21,21	0
7	CA	C	502	1/1	0.98	0.17	19,19,19,19	0
7	CA	B	501	1/1	0.99	0.12	19,19,19,19	0
7	CA	A	501	1/1	0.99	0.15	20,20,20,20	0
7	CA	D	504	1/1	0.99	0.16	19,19,19,19	0

6.5 Other polymers ⓘ

There are no such residues in this entry.