



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 09:53 AM UTC

PDB ID : 5BQY / pdb_00005bqy
Title : Crystal structure of hemagglutinin of A/Chicken/Guangdong/S1311/2010 (H6N6) in complex with avian-like receptor LSTa
Authors : Ni, F.; Kondrashkina, E.; Wang, Q.
Deposited on : 2015-05-29
Resolution : 2.78 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

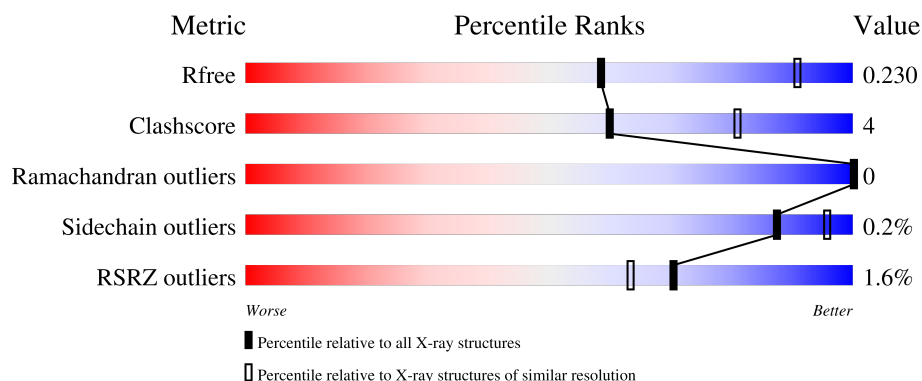
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.78 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	5248 (2.80-2.76)
Clashscore	190562	5693 (2.80-2.76)
Ramachandran outliers	187476	5590 (2.80-2.76)
Sidechain outliers	187428	5592 (2.80-2.76)
RSRZ outliers	180081	5251 (2.80-2.76)

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	324	2% 85% 11% .
1	C	324	87% 13%
1	E	324	% 86% 14%
2	B	191	3% 83% 6% 10%
2	D	191	2% 85% 5% 9%

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Mol	Chain	Length	Quality of chain
2	F	191	2% 86% 5% 9%
3	G	2	50% 50%
3	I	2	50% 50%
3	J	2	100%
4	H	2	50% 50%
5	K	3	33% 33% 33%
6	L	3	33% 67%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 12278 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 HEMAGGLUTININ HA1 CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	313	Total	C	N	O	S	0	0	1
			2467	1555	436	465	11			
1	C	324	Total	C	N	O	S	0	0	0
			2557	1613	451	481	12			
1	E	324	Total	C	N	O	S	0	0	0
			2557	1613	451	481	12			

- Molecule 2 is a protein called HEMAGGLUTININ HA2 CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	171	Total	C	N	O	S	0	0	0
			1381	857	246	271	7			
2	D	173	Total	C	N	O	S	0	0	0
			1398	869	249	273	7			
2	F	174	Total	C	N	O	S	0	0	0
			1407	874	250	276	7			

There are 18 discrepancies between the modelled and reference sequences:

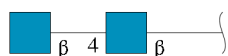
Chain	Residue	Modelled	Actual	Comment	Reference
B	186	GLY	-	expression tag	UNP A0A067YZ73
B	187	ALA	-	expression tag	UNP A0A067YZ73
B	188	LEU	-	expression tag	UNP A0A067YZ73
B	189	VAL	-	expression tag	UNP A0A067YZ73
B	190	PRO	-	expression tag	UNP A0A067YZ73
B	191	ARG	-	expression tag	UNP A0A067YZ73
D	186	GLY	-	expression tag	UNP A0A067YZ73
D	187	ALA	-	expression tag	UNP A0A067YZ73
D	188	LEU	-	expression tag	UNP A0A067YZ73
D	189	VAL	-	expression tag	UNP A0A067YZ73
D	190	PRO	-	expression tag	UNP A0A067YZ73
D	191	ARG	-	expression tag	UNP A0A067YZ73

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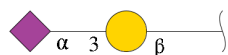
Chain	Residue	Modelled	Actual	Comment	Reference
F	186	GLY	-	expression tag	UNP A0A067YZ73
F	187	ALA	-	expression tag	UNP A0A067YZ73
F	188	LEU	-	expression tag	UNP A0A067YZ73
F	189	VAL	-	expression tag	UNP A0A067YZ73
F	190	PRO	-	expression tag	UNP A0A067YZ73
F	191	ARG	-	expression tag	UNP A0A067YZ73

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



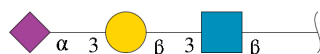
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	G	2	Total	C	N	O	0	0	0
			28	16	2	10			
3	I	2	Total	C	N	O	0	0	0
			28	16	2	10			
3	J	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 4 is an oligosaccharide called N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose.



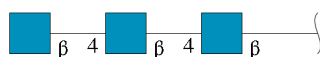
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	H	2	Total	C	N	O	0	0	0
			31	17	1	13			

- Molecule 5 is an oligosaccharide called N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose.



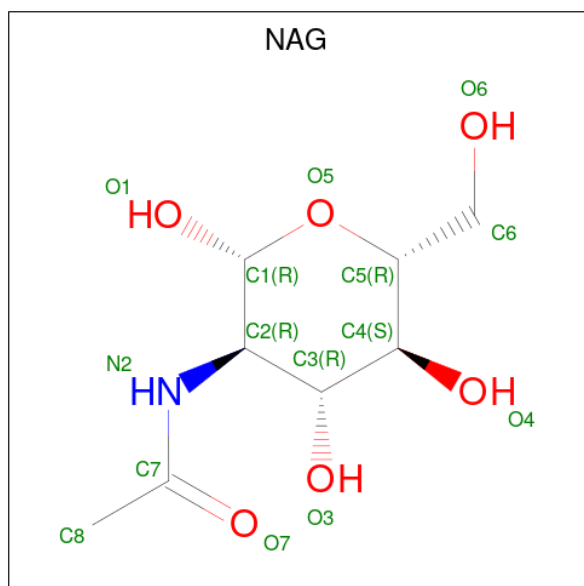
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	K	3	Total	C	N	O	0	0	0
			45	25	2	18			

- Molecule 6 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
6	L	3	Total	C	N	O	0	0	0
			42	24	3	15			

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



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	A	1	Total	C	N	O	0	0
			14	8	1	5		
7	C	1	Total	C	N	O	0	0
			14	8	1	5		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	C	1	Total	C	N	O	0	0
			14	8	1	5		
7	C	1	Total	C	N	O	0	0
			13	8	1	4		
7	C	1	Total	C	N	O	0	0
			14	8	1	5		
7	E	1	Total	C	N	O	0	0
			14	8	1	5		
7	E	1	Total	C	N	O	0	0
			14	8	1	5		

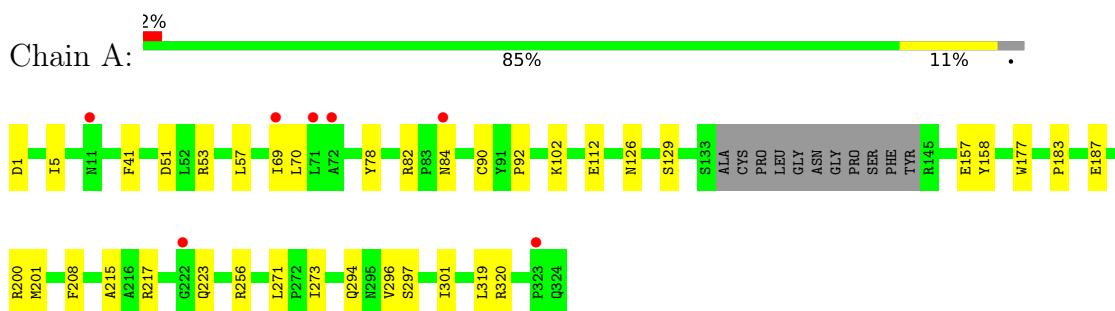
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	30	Total	O	0	0
			30	30		
8	B	23	Total	O	0	0
			23	23		
8	C	46	Total	O	0	0
			46	46		
8	D	13	Total	O	0	0
			13	13		
8	E	40	Total	O	0	0
			40	40		
8	F	32	Total	O	0	0
			32	32		

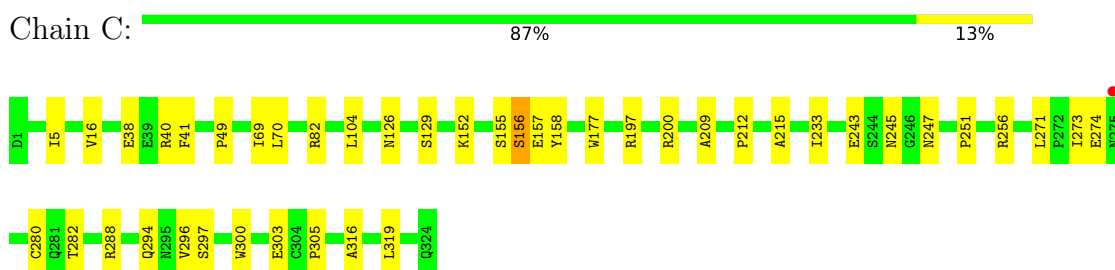
3 Residue-property plots

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.

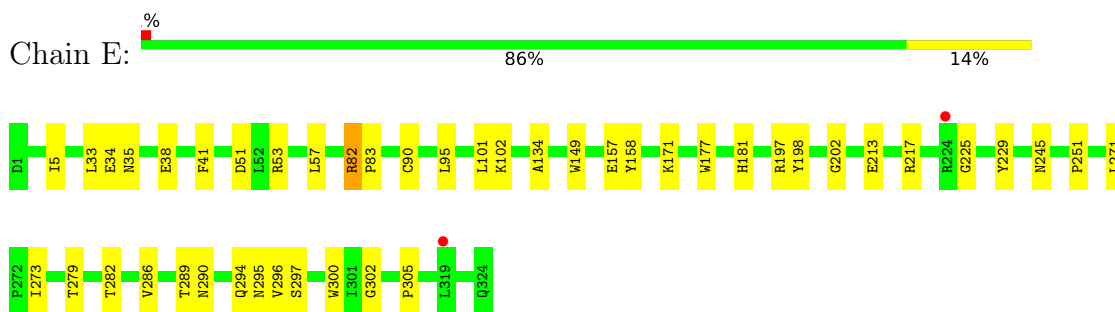
• Molecule 1: HEMAGGLUTININ HA1 CHAIN



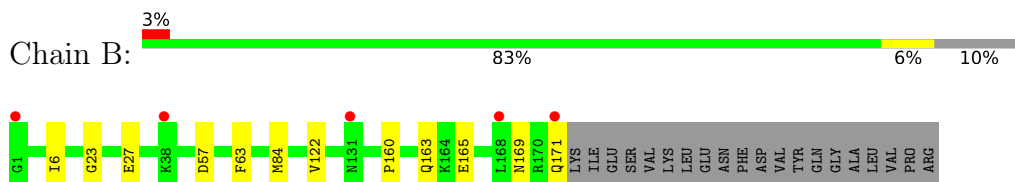
• Molecule 1: HEMAGGLUTININ HA1 CHAIN



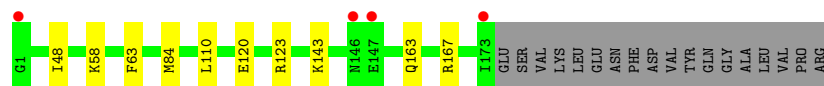
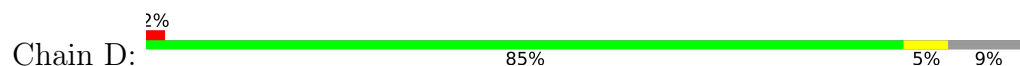
• Molecule 1: HEMAGGLUTININ HA1 CHAIN



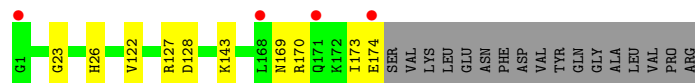
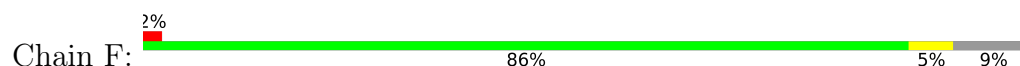
• Molecule 2: HEMAGGLUTININ HA2 CHAIN



- Molecule 2: HEMAGGLUTININ HA2 CHAIN



- Molecule 2: HEMAGGLUTININ HA2 CHAIN



- 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: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose



- Molecule 5: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-3)-2-acetamido-2-deoxy-beta-D-glucopyranose





- Molecule 6: 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

Chain L:  33% 67%

A horizontal progress bar for Chain L. The bar is divided into two segments: a yellow segment on the left representing 33% and an orange segment on the right representing 67%.



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	69.35Å 137.77Å 199.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.87 – 2.78 48.87 – 2.78	Depositor EDS
% Data completeness (in resolution range)	99.3 (48.87-2.78) 99.3 (48.87-2.78)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.22 (at 2.77Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.196 , 0.252 (Not available) , 0.230	Depositor DCC
R_{free} test set	2461 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	47.1	Xtriage
Anisotropy	0.552	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 41.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	12278	wwPDB-VP
Average B, all atoms (Å ²)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.57% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GAL, NAG, SIA

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	0.34	0/2535	0.76	3/3440 (0.1%)
1	C	0.35	0/2617	0.79	3/3553 (0.1%)
1	E	0.34	0/2617	0.76	3/3553 (0.1%)
2	B	0.33	0/1409	0.70	1/1897 (0.1%)
2	D	0.32	0/1426	0.69	0/1919
2	F	0.35	0/1435	0.72	1/1931 (0.1%)
All	All	0.34	0/12039	0.75	11/16293 (0.1%)

There are no bond length outliers.

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	82	ARG	CA-C-N	7.32	126.85	119.24
1	C	82	ARG	C-N-CA	7.32	126.85	119.24
2	B	23	GLY	N-CA-C	6.05	118.73	110.69
1	C	156	SER	N-CA-C	5.95	118.94	109.65
1	E	82	ARG	CA-C-N	5.90	125.37	119.24
1	E	82	ARG	C-N-CA	5.90	125.37	119.24
1	A	82	ARG	CA-C-N	5.67	125.14	119.24
1	A	82	ARG	C-N-CA	5.67	125.14	119.24
2	F	23	GLY	N-CA-C	5.50	118.56	110.80
1	E	53	ARG	CB-CA-C	-5.21	110.15	117.23
1	A	53	ARG	CB-CA-C	-5.05	110.36	117.23

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2467	0	2442	25	0
1	C	2557	0	2511	26	0
1	E	2557	0	2512	32	0
2	B	1381	0	1292	8	0
2	D	1398	0	1317	6	0
2	F	1407	0	1321	9	0
3	G	28	0	25	0	0
3	I	28	0	25	1	0
3	J	28	0	25	1	0
4	H	31	0	26	1	0
5	K	45	0	38	2	0
6	L	42	0	37	1	0
7	A	42	0	39	0	0
7	C	55	0	49	1	0
7	E	28	0	26	0	0
8	A	30	0	0	3	0
8	B	23	0	0	3	0
8	C	46	0	0	3	0
8	D	13	0	0	1	0
8	E	40	0	0	5	0
8	F	32	0	0	2	0
All	All	12278	0	11685	104	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 (104) 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:C:5:ILE:O	8:C:501:HOH:O	1.84	0.94
1:A:1:ASP:N	8:A:502:HOH:O	1.95	0.91
2:F:127:ARG:O	8:F:401:HOH:O	1.92	0.88
1:A:84:ASN:ND2	8:A:503:HOH:O	2.15	0.80
1:E:34:GLU:OE2	8:E:501:HOH:O	2.00	0.79
1:C:49:PRO:O	8:C:502:HOH:O	2.05	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:156:SER:OG	1:C:157:GLU:N	2.20	0.74
1:C:294:GLN:HG2	1:C:296:VAL:H	1.55	0.71
1:A:294:GLN:HG2	1:A:296:VAL:H	1.57	0.70
2:B:57:ASP:OD1	8:B:401:HOH:O	2.09	0.70
1:E:35:ASN:N	8:E:501:HOH:O	2.26	0.69
2:B:6:ILE:O	8:B:402:HOH:O	2.10	0.69
1:A:256:ARG:NH1	8:A:501:HOH:O	1.88	0.68
1:E:57:LEU:HD22	1:E:102:LYS:HG2	1.75	0.68
1:C:126:ASN:ND2	1:C:129:SER:OG	2.28	0.67
1:E:290:ASN:ND2	8:E:502:HOH:O	2.25	0.65
2:D:63:PHE:HZ	2:D:84:MET:HE3	1.64	0.62
1:E:294:GLN:HG2	1:E:296:VAL:H	1.64	0.62
1:A:200:ARG:HD3	1:C:215:ALA:HB2	1.82	0.61
2:B:27:GLU:OE1	8:B:403:HOH:O	2.16	0.61
1:E:294:GLN:NE2	1:E:297:SER:O	2.34	0.60
1:E:5:ILE:HD11	2:F:122:VAL:HG21	1.84	0.60
2:B:165:GLU:O	2:B:169:ASN:ND2	2.35	0.58
2:B:63:PHE:HZ	2:B:84:MET:HE3	1.69	0.57
1:E:157:GLU:HG2	1:E:158:TYR:H	1.69	0.57
1:C:294:GLN:NE2	1:C:297:SER:O	2.38	0.57
1:E:217:ARG:HH21	1:E:225:GLY:HA2	1.71	0.56
1:A:126:ASN:ND2	1:A:129:SER:OG	2.39	0.56
1:A:157:GLU:HG2	1:A:158:TYR:H	1.71	0.55
1:E:157:GLU:HG2	1:E:158:TYR:N	2.23	0.54
1:C:40:ARG:NH1	1:C:274:GLU:OE1	2.39	0.54
1:E:181:HIS:O	1:E:217:ARG:NH2	2.40	0.54
1:C:294:GLN:HB3	1:C:305:PRO:HG2	1.91	0.52
1:C:200:ARG:NH1	1:C:243:GLU:OE1	2.38	0.52
1:A:51:ASP:HB2	1:A:273:ILE:HD12	1.92	0.52
1:A:41:PHE:CE2	1:A:271:LEU:HB2	2.45	0.51
1:A:112:GLU:HB2	1:A:256:ARG:HB2	1.93	0.51
1:C:41:PHE:CE2	1:C:271:LEU:HB2	2.47	0.50
1:A:157:GLU:HG2	1:A:158:TYR:N	2.26	0.50
2:F:26:HIS:HD2	8:F:405:HOH:O	1.95	0.49
1:A:187:GLU:OE2	4:H:2:SIA:O8	2.21	0.49
1:E:294:GLN:HB3	1:E:305:PRO:HG2	1.94	0.49
1:A:177:TRP:CD1	1:A:201:MET:HE3	2.47	0.49
2:D:48:ILE:HD11	2:D:110:LEU:HD23	1.94	0.49
2:F:128:ASP:O	2:F:170:ARG:NH1	2.46	0.48
3:I:1:NAG:H3	3:I:1:NAG:H83	1.95	0.48
1:C:41:PHE:HB2	1:C:273:ILE:HG12	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:92:PRO:HG3	1:A:223:GLN:HB2	1.96	0.48
3:J:1:NAG:H61	3:J:2:NAG:O5	2.14	0.47
1:C:209:ALA:HB3	1:E:213:GLU:HB3	1.97	0.47
1:A:69:ILE:HG23	1:A:70:LEU:HG	1.96	0.47
1:E:149:TRP:HH2	5:K:3:SIA:H91	1.80	0.47
1:C:256:ARG:NH2	8:C:508:HOH:O	2.46	0.47
6:L:2:NAG:H3	6:L:3:NAG:H61	1.97	0.47
1:C:197:ARG:HD2	1:C:245:ASN:O	2.14	0.46
2:B:160:PRO:HA	2:B:163:GLN:HB2	1.96	0.46
8:E:509:HOH:O	2:F:143:LYS:HE3	2.14	0.46
1:E:282:THR:HG22	1:E:300:TRP:HB3	1.96	0.46
1:E:34:GLU:OE1	1:E:289:THR:OG1	2.29	0.46
1:C:282:THR:HG22	1:C:300:TRP:HB3	1.97	0.46
7:C:401:NAG:H3	7:C:401:NAG:O7	2.15	0.45
1:A:5:ILE:HD11	2:B:122:VAL:HG21	1.97	0.45
1:C:69:ILE:HG23	1:C:70:LEU:HG	1.97	0.45
1:E:51:ASP:HB2	1:E:273:ILE:HD12	1.99	0.45
1:A:294:GLN:NE2	1:A:297:SER:O	2.50	0.45
1:A:319:LEU:HD23	1:A:320:ARG:O	2.18	0.45
2:F:143:LYS:HB3	2:F:143:LYS:HE2	1.71	0.45
1:E:41:PHE:CE2	1:E:271:LEU:HB2	2.52	0.44
1:E:90:CYS:HB2	1:E:134:ALA:O	2.18	0.44
1:E:171:LYS:NZ	8:E:505:HOH:O	2.37	0.44
1:C:49:PRO:HG2	1:C:273:ILE:HD13	2.00	0.44
1:A:217:ARG:CD	1:E:202:GLY:HA3	2.47	0.44
1:E:38:GLU:HB2	1:E:286:VAL:HB	1.99	0.44
1:A:183:PRO:HA	1:A:215:ALA:O	2.18	0.44
1:E:95:LEU:HD21	1:E:101:LEU:HD23	1.99	0.44
2:D:58:LYS:NZ	8:D:202:HOH:O	2.40	0.44
1:E:149:TRP:CH2	5:K:3:SIA:H91	2.53	0.44
1:A:57:LEU:HD22	1:A:102:LYS:HG2	1.99	0.44
2:D:120:GLU:CD	2:D:123:ARG:HE	2.26	0.44
2:F:173:ILE:HG22	2:F:174:GLU:N	2.33	0.43
1:C:280:CYS:HB2	1:C:303:GLU:O	2.19	0.43
1:C:16:VAL:HG21	1:C:316:ALA:HB2	2.01	0.43
1:A:78:TYR:HB3	1:A:301:ILE:HD13	2.01	0.43
2:F:173:ILE:HG22	2:F:174:GLU:H	1.83	0.43
1:C:177:TRP:HB3	1:C:251:PRO:HG3	2.01	0.42
1:E:197:ARG:HD2	1:E:245:ASN:O	2.18	0.42
2:D:143:LYS:HD3	2:D:143:LYS:HA	1.91	0.42
2:D:163:GLN:O	2:D:167:ARG:HG3	2.18	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:198:TYR:N	1:E:245:ASN:OD1	2.45	0.42
2:B:171:GLN:OE1	2:B:171:GLN:N	2.41	0.42
1:E:279:THR:O	1:E:302:GLY:HA3	2.20	0.41
1:E:95:LEU:HA	1:E:229:TYR:HB2	2.02	0.41
1:C:152:LYS:HB3	1:C:158:TYR:HB2	2.03	0.41
1:C:294:GLN:HE21	1:C:297:SER:H	1.67	0.41
1:C:38:GLU:CD	1:C:288:ARG:HE	2.28	0.41
1:E:82:ARG:HA	1:E:83:PRO:HD3	1.95	0.41
1:A:217:ARG:HD3	1:E:202:GLY:HA3	2.02	0.41
1:E:33:LEU:HD21	1:E:295:ASN:HB2	2.02	0.41
1:C:212:PRO:HG3	1:C:247:ASN:CG	2.46	0.41
1:E:177:TRP:HB3	1:E:251:PRO:HD3	2.04	0.40
1:C:104:LEU:HD21	1:C:233:ILE:HD11	2.03	0.40
2:F:169:ASN:O	2:F:173:ILE:HD13	2.21	0.40
1:A:201:MET:HB2	1:A:208:PHE:HB3	2.04	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	311/324 (96%)	302 (97%)	9 (3%)	0	100	100
1	C	322/324 (99%)	313 (97%)	9 (3%)	0	100	100
1	E	322/324 (99%)	312 (97%)	10 (3%)	0	100	100
2	B	169/191 (88%)	165 (98%)	4 (2%)	0	100	100
2	D	171/191 (90%)	168 (98%)	3 (2%)	0	100	100
2	F	172/191 (90%)	168 (98%)	4 (2%)	0	100	100
All	All	1467/1545 (95%)	1428 (97%)	39 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	273/281 (97%)	273 (100%)	0	100	100
1	C	281/281 (100%)	279 (99%)	2 (1%)	76	90
1	E	281/281 (100%)	281 (100%)	0	100	100
2	B	146/164 (89%)	146 (100%)	0	100	100
2	D	130/164 (79%)	130 (100%)	0	100	100
2	F	149/164 (91%)	149 (100%)	0	100	100
All	All	1260/1335 (94%)	1258 (100%)	2 (0%)	87	96

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	155	SER
1	C	319	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	126	ASN
1	A	189	ASN
2	B	25	HIS
2	B	26	HIS
1	C	126	ASN
1	C	189	ASN
1	C	294	GLN
2	D	25	HIS
2	D	119	HIS
1	E	87	ASN
1	E	294	GLN
1	E	324	GLN
2	F	26	HIS
2	F	163	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 ⓘ

14 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	G	1	1,3	14,14,15	0.45	0	17,19,21	0.52	0
3	NAG	G	2	3	14,14,15	0.50	0	17,19,21	1.03	2 (11%)
4	GAL	H	1	4	11,11,12	0.82	0	15,15,17	0.97	0
4	SIA	H	2	4	20,20,21	1.06	1 (5%)	21,28,31	2.14	7 (33%)
3	NAG	I	1	2,3	14,14,15	0.35	0	17,19,21	1.47	2 (11%)
3	NAG	I	2	3	14,14,15	0.36	0	17,19,21	0.54	0
3	NAG	J	1	1,3	14,14,15	0.70	1 (7%)	17,19,21	0.83	1 (5%)
3	NAG	J	2	3	14,14,15	1.11	1 (7%)	17,19,21	1.05	1 (5%)
5	NAG	K	1	5	14,14,15	0.23	0	17,19,21	0.50	0
5	GAL	K	2	5	11,11,12	0.56	0	15,15,17	1.08	1 (6%)
5	SIA	K	3	5	20,20,21	1.14	1 (5%)	21,28,31	2.16	5 (23%)
6	NAG	L	1	2,6	14,14,15	0.84	0	17,19,21	0.79	1 (5%)
6	NAG	L	2	6	14,14,15	0.64	0	17,19,21	1.30	2 (11%)
6	NAG	L	3	6	14,14,15	1.01	2 (14%)	17,19,21	1.00	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	G	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	G	2	3	-	0/6/23/26	0/1/1/1
4	GAL	H	1	4	-	1/2/19/22	0/1/1/1
4	SIA	H	2	4	-	8/18/34/38	0/1/1/1
3	NAG	I	1	2,3	-	4/6/23/26	0/1/1/1
3	NAG	I	2	3	-	0/6/23/26	0/1/1/1
3	NAG	J	1	1,3	-	4/6/23/26	0/1/1/1
3	NAG	J	2	3	-	4/6/23/26	0/1/1/1
5	NAG	K	1	5	-	2/6/23/26	0/1/1/1
5	GAL	K	2	5	-	2/2/19/22	0/1/1/1
5	SIA	K	3	5	-	6/18/34/38	0/1/1/1
6	NAG	L	1	2,6	-	4/6/23/26	0/1/1/1
6	NAG	L	2	6	-	2/6/23/26	0/1/1/1
6	NAG	L	3	6	-	1/6/23/26	0/1/1/1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	J	2	NAG	O5-C1	3.50	1.49	1.43
6	L	3	NAG	C1-C2	2.92	1.56	1.52
5	K	3	SIA	C10-N5	2.61	1.42	1.34
4	H	2	SIA	C10-N5	2.57	1.42	1.34
3	J	1	NAG	C1-C2	2.14	1.55	1.52
6	L	3	NAG	O5-C1	2.11	1.47	1.43

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	K	3	SIA	O6-C2-C3	-7.07	101.05	110.56
4	H	2	SIA	O6-C2-C3	-5.51	103.15	110.56
4	H	2	SIA	O6-C2-C1	5.13	117.40	107.72
3	I	1	NAG	C2-N2-C7	4.63	129.10	122.90
5	K	3	SIA	O6-C2-C1	4.09	115.44	107.72
6	L	2	NAG	C1-O5-C5	4.03	117.59	112.19
6	L	3	NAG	C1-O5-C5	3.64	117.06	112.19
4	H	2	SIA	O1B-C1-C2	3.43	121.64	112.71
5	K	2	GAL	C1-O5-C5	2.87	116.03	112.19
5	K	3	SIA	C8-C7-C6	-2.58	108.22	113.05
3	I	1	NAG	C1-C2-N2	2.41	114.24	110.43
4	H	2	SIA	O1B-C1-O1A	-2.33	118.79	124.08
3	G	2	NAG	C3-C4-C5	2.30	114.40	110.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	K	3	SIA	C6-C5-N5	-2.25	107.32	110.91
5	K	3	SIA	C11-C10-N5	2.23	119.82	116.12
6	L	1	NAG	O4-C4-C3	-2.21	105.17	110.38
3	J	1	NAG	C1-O5-C5	2.18	115.11	112.19
4	H	2	SIA	C6-C5-N5	-2.15	107.48	110.91
3	J	2	NAG	C1-C2-N2	2.11	113.76	110.43
4	H	2	SIA	C11-C10-N5	2.11	119.62	116.12
6	L	2	NAG	C4-C3-C2	2.10	114.09	111.02
4	H	2	SIA	C8-C7-C6	-2.08	109.14	113.05
3	G	2	NAG	C1-O5-C5	2.06	114.95	112.19

There are no chirality outliers.

All (40) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	H	2	SIA	C5-C6-C7-C8
4	H	2	SIA	C5-C6-C7-O7
4	H	2	SIA	O6-C6-C7-C8
4	H	2	SIA	O6-C6-C7-O7
4	H	2	SIA	C7-C8-C9-O9
4	H	2	SIA	O8-C8-C9-O9
3	J	1	NAG	O5-C5-C6-O6
3	J	2	NAG	O5-C5-C6-O6
5	K	1	NAG	O5-C5-C6-O6
5	K	1	NAG	C4-C5-C6-O6
5	K	2	GAL	C4-C5-C6-O6
3	J	1	NAG	C4-C5-C6-O6
3	I	1	NAG	C8-C7-N2-C2
3	I	1	NAG	O7-C7-N2-C2
3	J	1	NAG	C8-C7-N2-C2
3	J	1	NAG	O7-C7-N2-C2
3	J	2	NAG	C8-C7-N2-C2
3	J	2	NAG	O7-C7-N2-C2
4	H	2	SIA	C11-C10-N5-C5
4	H	2	SIA	O10-C10-N5-C5
5	K	3	SIA	C11-C10-N5-C5
5	K	3	SIA	O10-C10-N5-C5
6	L	1	NAG	C8-C7-N2-C2
6	L	1	NAG	O7-C7-N2-C2
5	K	3	SIA	O7-C7-C8-C9
5	K	3	SIA	C6-C7-C8-C9
5	K	2	GAL	O5-C5-C6-O6

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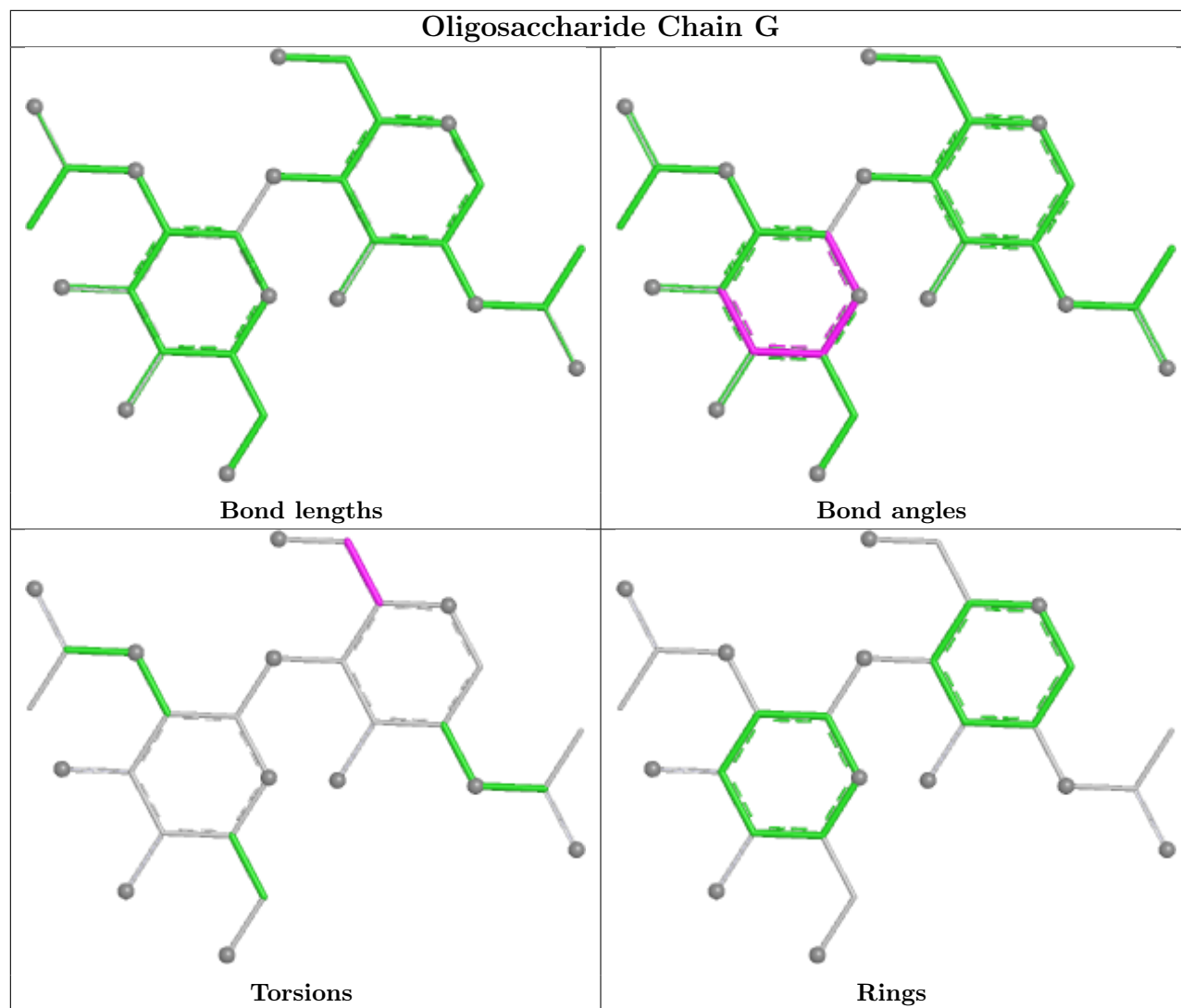
Mol	Chain	Res	Type	Atoms
3	J	2	NAG	C4-C5-C6-O6
3	G	1	NAG	O5-C5-C6-O6
3	G	1	NAG	C4-C5-C6-O6
6	L	2	NAG	O5-C5-C6-O6
6	L	2	NAG	C4-C5-C6-O6
5	K	3	SIA	C6-C7-C8-O8
3	I	1	NAG	C1-C2-N2-C7
4	H	1	GAL	C4-C5-C6-O6
6	L	1	NAG	O5-C5-C6-O6
5	K	3	SIA	O7-C7-C8-O8
6	L	1	NAG	C4-C5-C6-O6
3	I	1	NAG	C3-C2-N2-C7
6	L	3	NAG	C3-C2-N2-C7

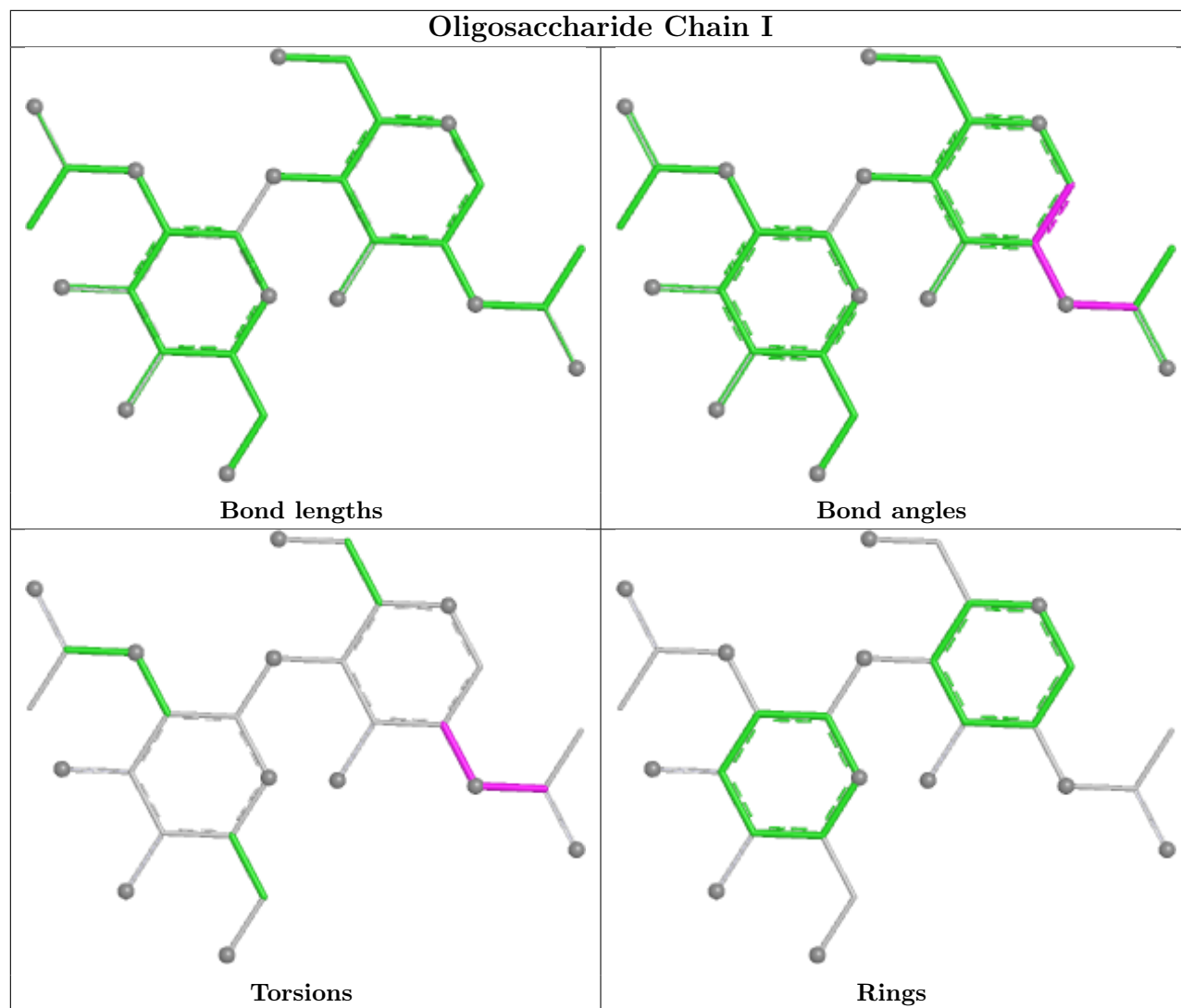
There are no ring outliers.

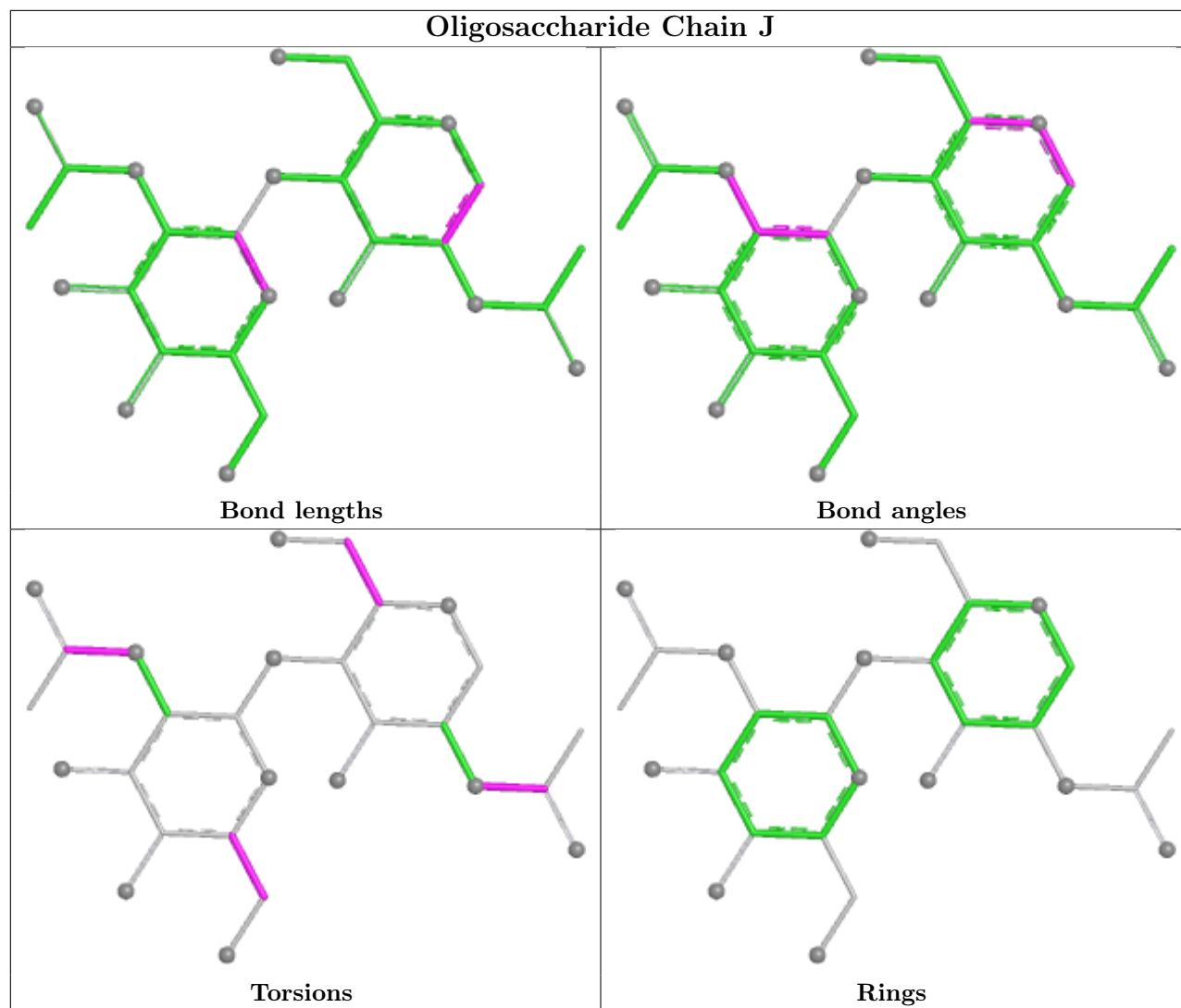
7 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	K	3	SIA	2	0
4	H	2	SIA	1	0
6	L	3	NAG	1	0
6	L	2	NAG	1	0
3	I	1	NAG	1	0
3	J	1	NAG	1	0
3	J	2	NAG	1	0

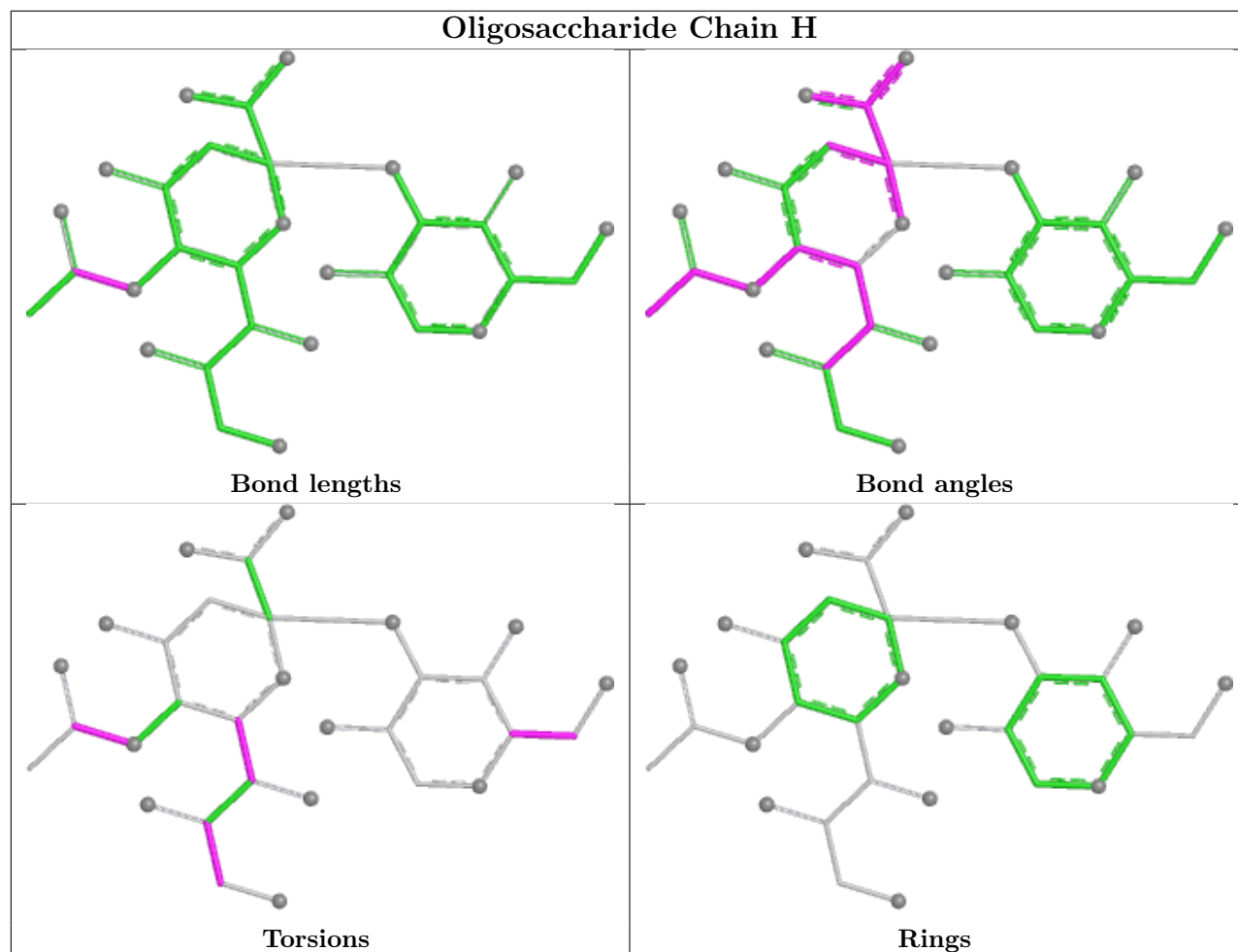
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



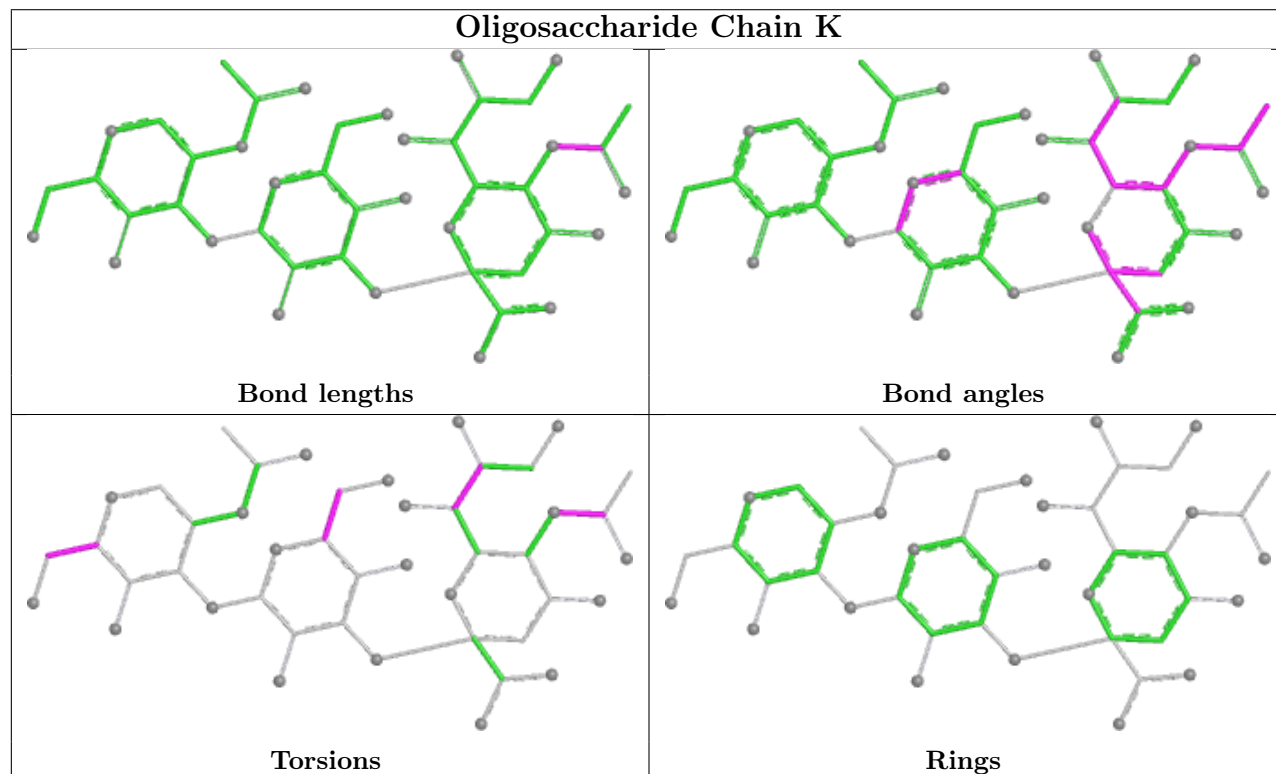


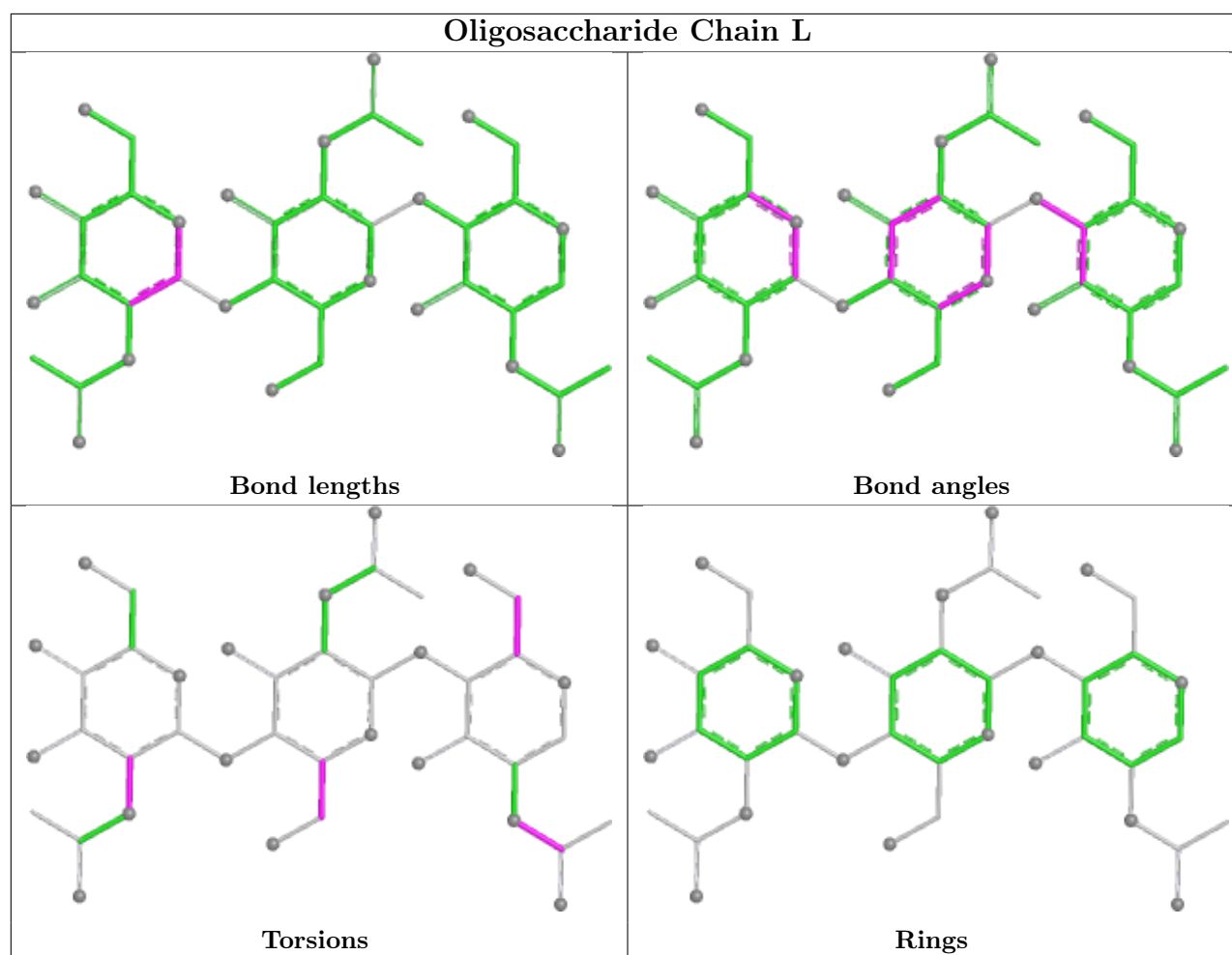


Oligosaccharide Chain H



Oligosaccharide Chain K





5.6 Ligand geometry [i](#)

9 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
7	NAG	A	403	1	14,14,15	0.49	0	17,19,21	0.62	0
7	NAG	E	404	1	14,14,15	1.26	1 (7%)	17,19,21	0.92	1 (5%)
7	NAG	A	402	1	14,14,15	0.36	0	17,19,21	0.43	0
7	NAG	C	403	1	13,13,15	0.34	0	16,18,21	0.31	0
7	NAG	C	401	1	14,14,15	0.51	0	17,19,21	1.30	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	NAG	C	404	1	14,14,15	0.48	0	17,19,21	0.78	1 (5%)
7	NAG	C	402	1	14,14,15	0.80	1 (7%)	17,19,21	1.13	1 (5%)
7	NAG	A	401	1	14,14,15	0.46	0	17,19,21	0.39	0
7	NAG	E	401	1	14,14,15	0.85	1 (7%)	17,19,21	0.84	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
7	NAG	A	403	1	-	4/6/23/26	0/1/1/1
7	NAG	E	404	1	-	2/6/23/26	0/1/1/1
7	NAG	A	402	1	-	2/6/23/26	0/1/1/1
7	NAG	C	403	1	-	0/4/21/26	0/1/1/1
7	NAG	C	401	1	-	3/6/23/26	0/1/1/1
7	NAG	C	404	1	-	2/6/23/26	0/1/1/1
7	NAG	C	402	1	-	2/6/23/26	0/1/1/1
7	NAG	A	401	1	-	2/6/23/26	0/1/1/1
7	NAG	E	401	1	-	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)
7	E	404	NAG	O5-C1	-4.12	1.36	1.43
7	C	402	NAG	O5-C1	2.63	1.48	1.43
7	E	401	NAG	C1-C2	2.50	1.55	1.52

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	C	401	NAG	C1-O5-C5	4.29	117.94	112.19
7	C	402	NAG	C1-O5-C5	4.14	117.74	112.19
7	C	404	NAG	C1-O5-C5	2.74	115.86	112.19
7	E	404	NAG	C4-C3-C2	2.39	114.52	111.02
7	E	401	NAG	C1-O5-C5	2.34	115.33	112.19

There are no chirality outliers.

All (19) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	C	401	NAG	O5-C5-C6-O6
7	A	403	NAG	O5-C5-C6-O6
7	C	402	NAG	O5-C5-C6-O6
7	C	404	NAG	O5-C5-C6-O6
7	C	401	NAG	C4-C5-C6-O6
7	E	404	NAG	C4-C5-C6-O6
7	C	402	NAG	C4-C5-C6-O6
7	A	403	NAG	C4-C5-C6-O6
7	E	404	NAG	O5-C5-C6-O6
7	C	404	NAG	C4-C5-C6-O6
7	A	403	NAG	C8-C7-N2-C2
7	A	403	NAG	O7-C7-N2-C2
7	A	402	NAG	O5-C5-C6-O6
7	C	401	NAG	C3-C2-N2-C7
7	E	401	NAG	O5-C5-C6-O6
7	E	401	NAG	C3-C2-N2-C7
7	A	402	NAG	C4-C5-C6-O6
7	A	401	NAG	C3-C2-N2-C7
7	A	401	NAG	O5-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	C	401	NAG	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

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	311/324 (95%)	-0.10	7 (2%) 61 53	28, 44, 66, 91	0
1	C	324/324 (100%)	-0.14	1 (0%) 90 88	29, 42, 64, 94	0
1	E	324/324 (100%)	-0.10	2 (0%) 85 81	29, 45, 65, 90	0
2	B	171/191 (89%)	-0.08	5 (2%) 53 46	27, 42, 74, 90	0
2	D	173/191 (90%)	-0.09	4 (2%) 61 53	28, 42, 68, 88	0
2	F	174/191 (91%)	-0.13	4 (2%) 61 53	28, 41, 65, 95	0
All	All	1477/1545 (95%)	-0.11	23 (1%) 70 63	27, 43, 68, 95	0

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	F	168	LEU	3.9
2	F	1	GLY	3.5
2	B	131	ASN	3.3
1	A	11	ASN	3.2
2	B	168	LEU	3.0
2	D	147	GLU	3.0
1	A	84	ASN	2.9
2	D	173	ILE	2.9
2	F	174	GLU	2.8
2	B	1	GLY	2.8
2	B	171	GLN	2.7
2	D	1	GLY	2.7
1	C	275	ASN	2.6
2	F	171	GLN	2.6
1	A	72	ALA	2.5
1	E	319	LEU	2.4
1	A	69	ILE	2.3
1	A	71	LEU	2.3
2	B	38	LYS	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	323	PRO	2.2
2	D	146	ASN	2.1
1	A	222	GLY	2.1
1	E	224	ARG	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](#)

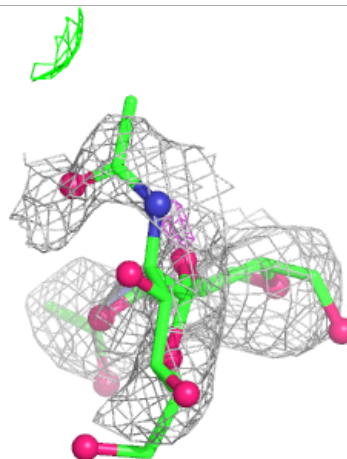
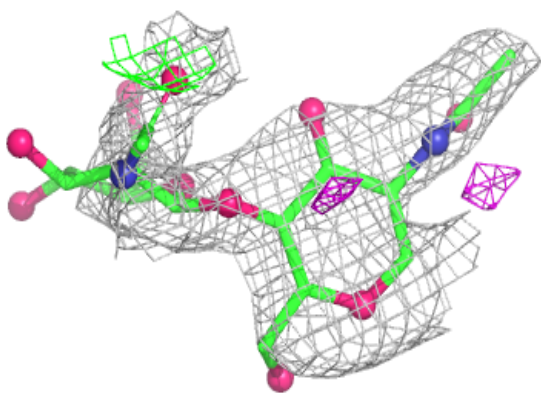
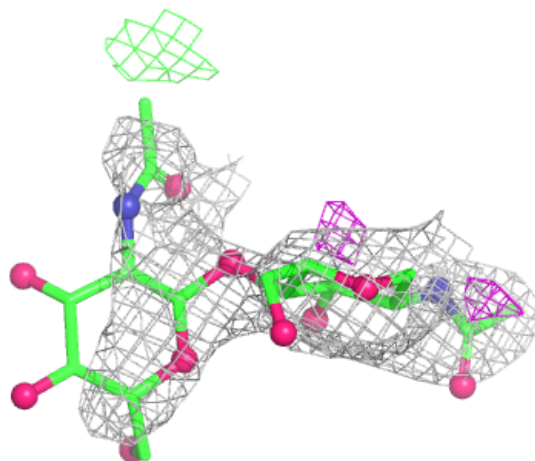
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	NAG	J	2	14/15	0.34	0.20	88,116,140,148	0
3	NAG	J	1	14/15	0.43	0.18	77,104,119,120	0
3	NAG	G	2	14/15	0.49	0.17	87,111,124,125	0
4	GAL	H	1	11/12	0.50	0.17	81,95,107,109	0
5	NAG	K	1	14/15	0.51	0.16	82,100,105,106	0
6	NAG	L	3	14/15	0.54	0.17	83,110,124,126	0
3	NAG	I	1	14/15	0.66	0.17	53,78,102,111	0
4	SIA	H	2	20/21	0.67	0.17	61,87,103,112	0
5	GAL	K	2	11/12	0.72	0.14	62,68,83,86	0
6	NAG	L	2	14/15	0.77	0.14	66,80,97,99	0
6	NAG	L	1	14/15	0.78	0.17	58,72,87,115	0
3	NAG	I	2	14/15	0.80	0.13	55,76,87,94	0
3	NAG	G	1	14/15	0.80	0.14	53,85,102,103	0
5	SIA	K	3	20/21	0.89	0.12	50,56,68,77	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.

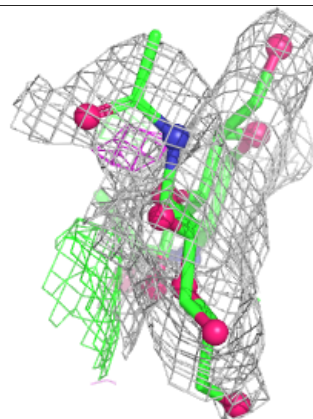
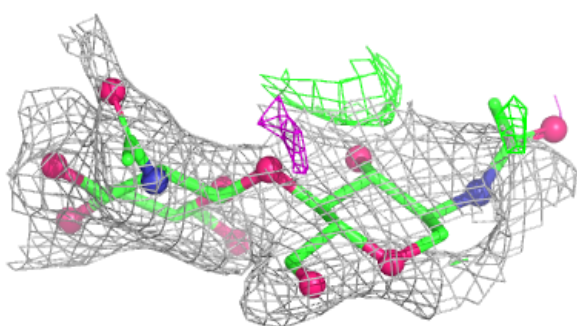
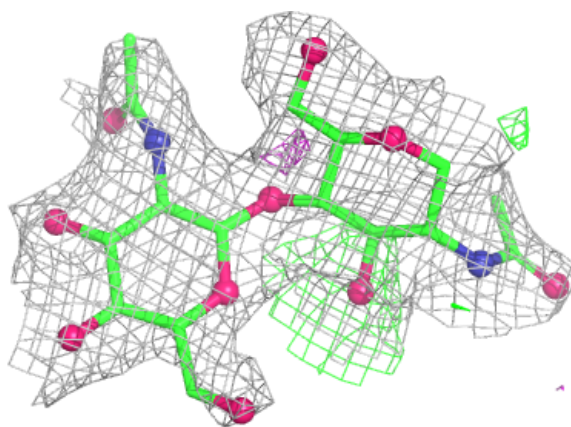
Electron density around Chain G:

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



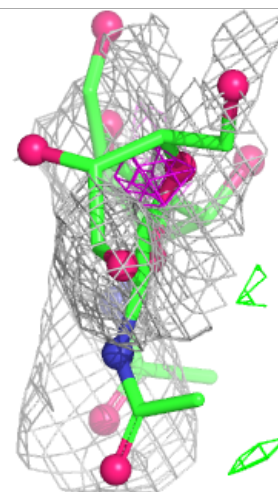
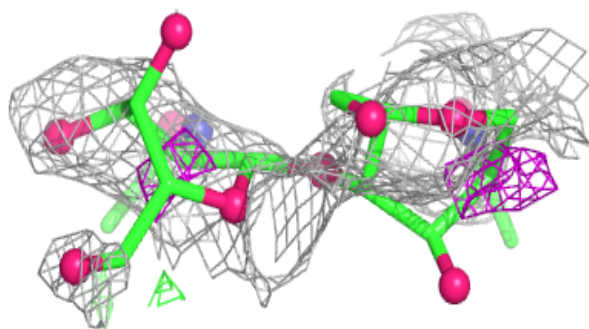
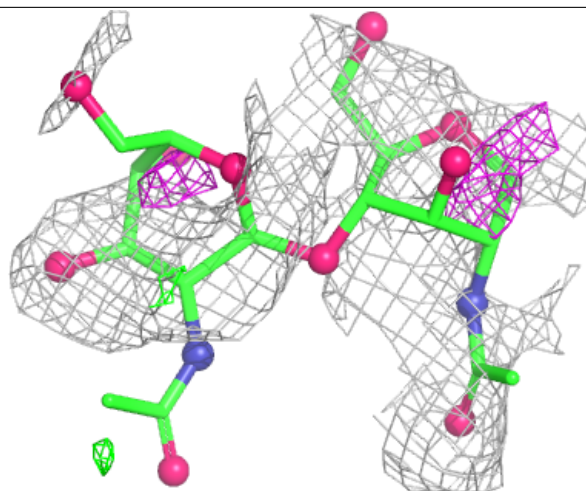
Electron density around Chain I:

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



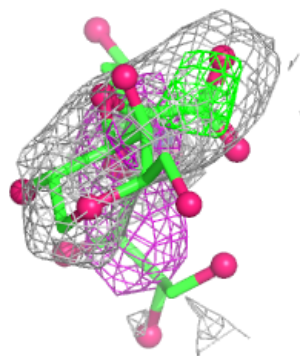
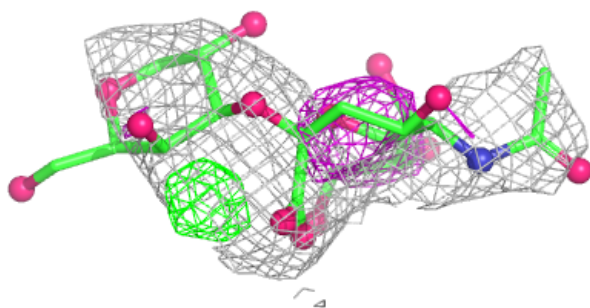
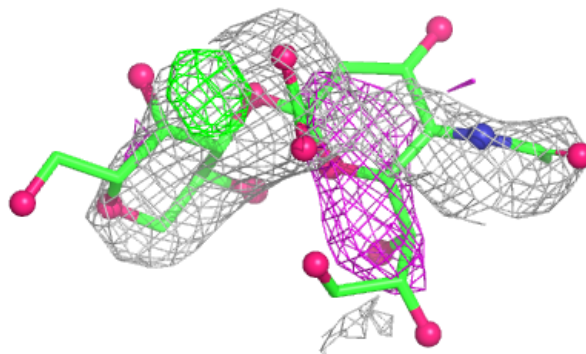
Electron density around Chain J:

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

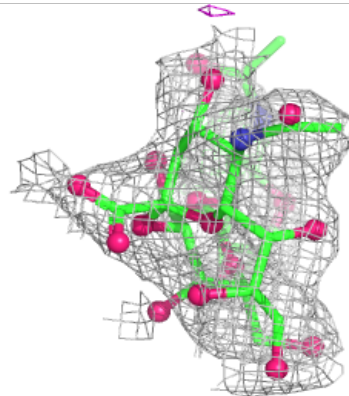
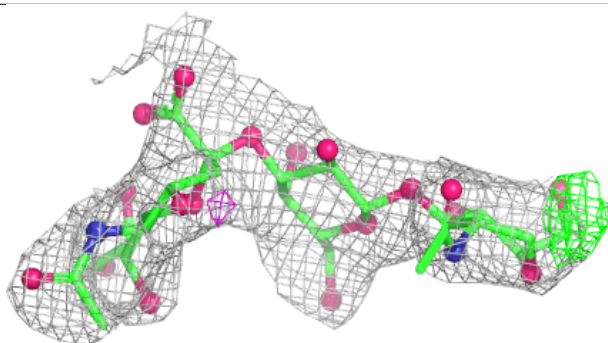
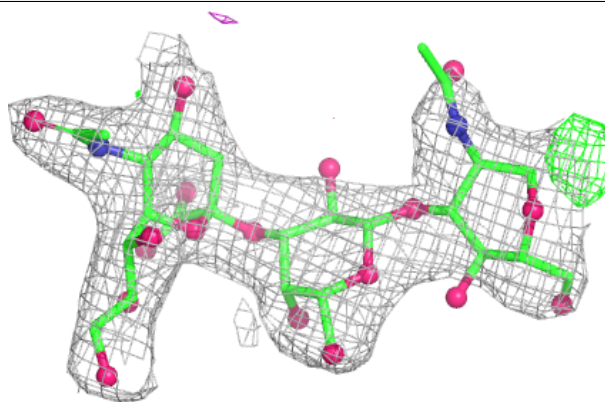


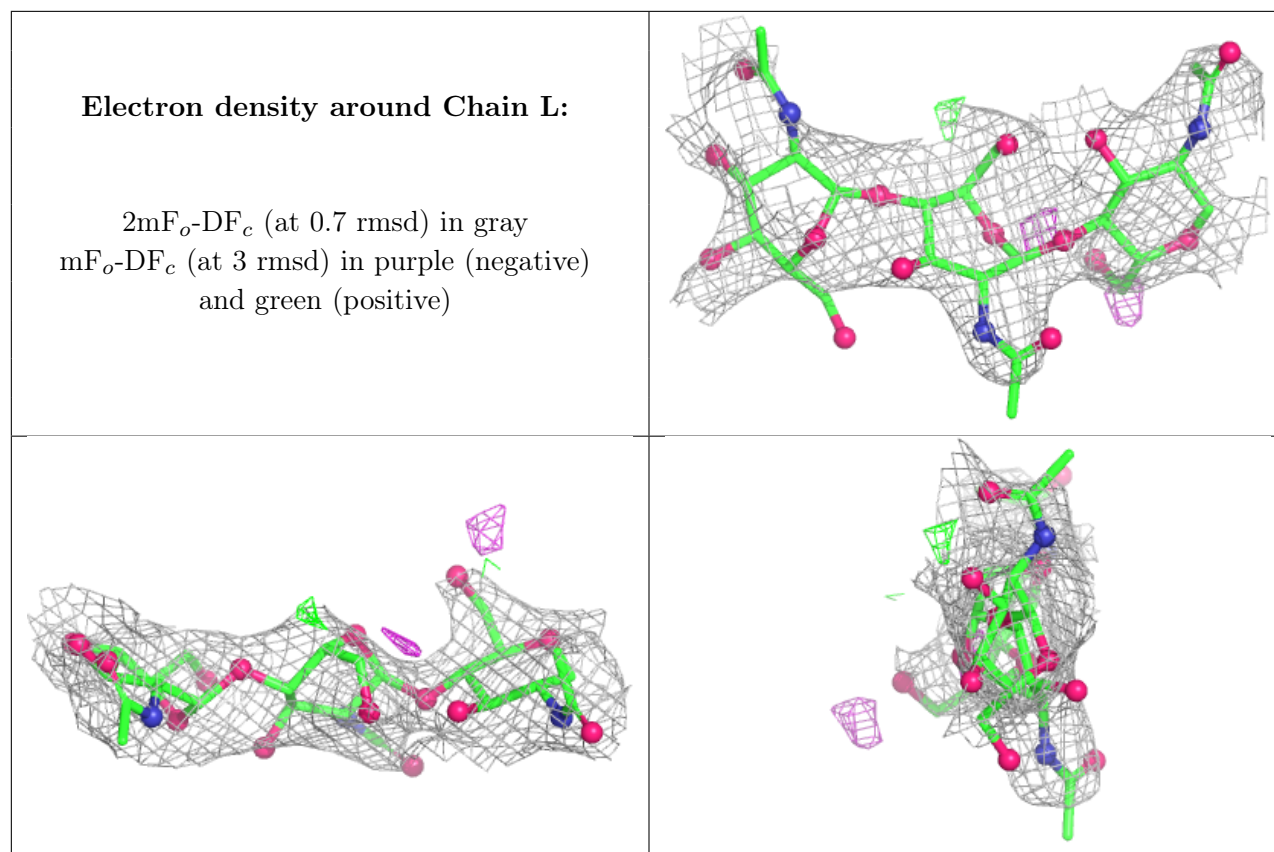
Electron density around Chain H:

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

**Electron density around Chain K:**

$2mF_o-DF_c$ (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($\text{\AA}^2$)	Q<0.9
7	NAG	A	401	14/15	0.36	0.21	72,93,117,121	0
7	NAG	C	401	14/15	0.36	0.18	86,101,110,110	0
7	NAG	E	404	14/15	0.41	0.18	60,88,100,103	0
7	NAG	E	401	14/15	0.47	0.15	81,105,114,117	0
7	NAG	C	403	13/15	0.51	0.21	45,111,131,138	0
7	NAG	A	402	14/15	0.53	0.18	87,106,114,117	0
7	NAG	C	404	14/15	0.56	0.17	85,107,120,121	0
7	NAG	C	402	14/15	0.65	0.14	65,82,103,107	0
7	NAG	A	403	14/15	0.68	0.20	69,90,104,119	0

6.5 Other polymers [i](#)

There are no such residues in this entry.