



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 17, 2026 – 04:22 PM UTC

PDB ID : 5BNY / pdb\_00005bny  
Title : Crystal structure of hemagglutinin of A/Chicken/Guangdong/S1311/2010 (H6N6)  
Authors : Ni, F.; Kondrashkina, E.; Wang, Q.  
Deposited on : 2015-05-26  
Resolution : 2.66 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](mailto: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

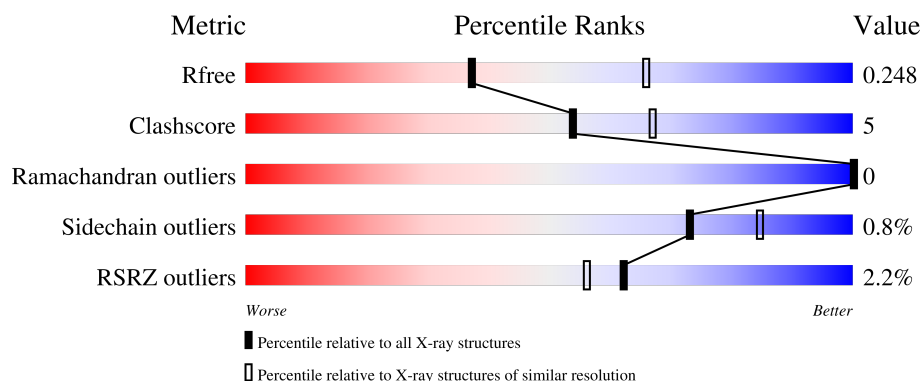
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.66 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	1110 (2.66-2.66)
Clashscore	190562	1141 (2.66-2.66)
Ramachandran outliers	187476	1126 (2.66-2.66)
Sidechain outliers	187428	1126 (2.66-2.66)
RSRZ outliers	180081	1110 (2.66-2.66)

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  $\geq 3$ , 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	<div> <div>0%</div> <div>88% 12%</div> </div>
1	C	324	<div> <div>0%</div> <div>85% 14%</div> </div>
1	E	324	<div> <div>4%</div> <div>88% 12%</div> </div>
2	B	191	<div> <div>2%</div> <div>82% 8% 10%</div> </div>
2	D	191	<div> <div>3%</div> <div>84% 6% 9%</div> </div>

*Continued on next page...*

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	F	191	<div><div></div><div>2%</div><div>82%</div><div>9%</div><div>8%</div></div>
3	G	2	<div><div></div><div>100%</div></div>
3	H	2	<div><div></div><div>50%</div><div>50%</div></div>
3	I	2	<div><div></div><div>50%</div><div>50%</div></div>
3	J	2	<div><div></div><div>50%</div><div>50%</div></div>
4	K	3	<div><div></div><div>67%</div><div>33%</div></div>

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 12460 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.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	324	Total	C	N	O	S	0	0	0
			2557	1613	451	481	12			
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.

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	176	Total	C	N	O	S	0	0	0
			1420	882	252	279	7			

There are 18 discrepancies between the modelled and reference sequences:

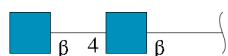
Chain	Residue	Modelled	Actual	Comment	Reference
B	186	GLY	-	expression tag	UNP A0A067YZV9
B	187	ALA	-	expression tag	UNP A0A067YZV9
B	188	LEU	-	expression tag	UNP A0A067YZV9
B	189	VAL	-	expression tag	UNP A0A067YZV9
B	190	PRO	-	expression tag	UNP A0A067YZV9
B	191	ARG	-	expression tag	UNP A0A067YZV9
D	186	GLY	-	expression tag	UNP A0A067YZV9
D	187	ALA	-	expression tag	UNP A0A067YZV9
D	188	LEU	-	expression tag	UNP A0A067YZV9
D	189	VAL	-	expression tag	UNP A0A067YZV9
D	190	PRO	-	expression tag	UNP A0A067YZV9
D	191	ARG	-	expression tag	UNP A0A067YZV9

*Continued on next page...*

Continued from previous page...

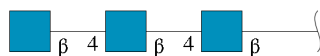
Chain	Residue	Modelled	Actual	Comment	Reference
F	186	GLY	-	expression tag	UNP A0A067YZV9
F	187	ALA	-	expression tag	UNP A0A067YZV9
F	188	LEU	-	expression tag	UNP A0A067YZV9
F	189	VAL	-	expression tag	UNP A0A067YZV9
F	190	PRO	-	expression tag	UNP A0A067YZV9
F	191	ARG	-	expression tag	UNP A0A067YZV9

- 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	H	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 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	K	3	Total	C	N	O	0	0	0
			42	24	3	15			

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



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

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	58	Total	O	0	0
			58	58		
6	B	45	Total	O	0	0
			45	45		
6	C	76	Total	O	0	0
			76	76		
6	D	46	Total	O	0	0
			46	46		

*Continued on next page...*

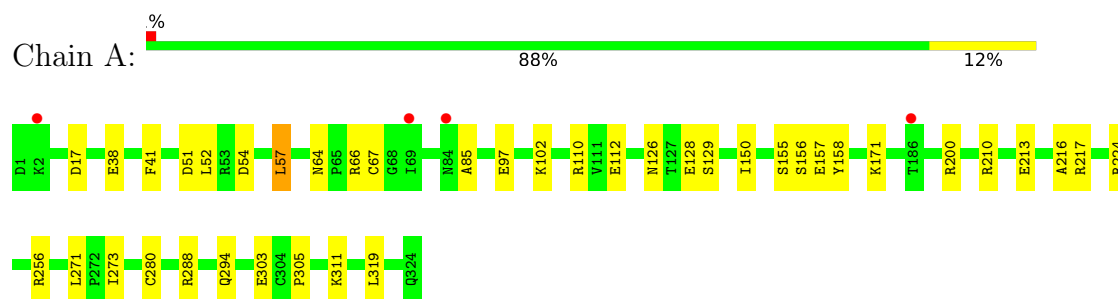
*Continued from previous page...*

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	E	66	Total	O	0	0
			66	66		
6	F	33	Total	O	0	0
			33	33		

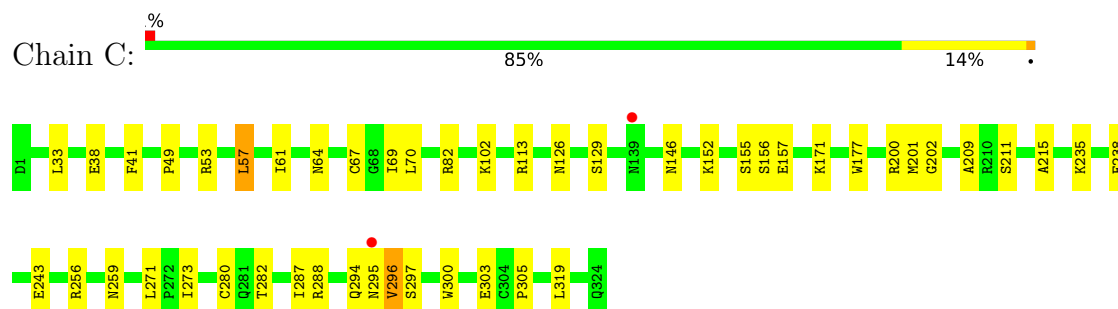
### 3 Residue-property plots [i](#)

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.

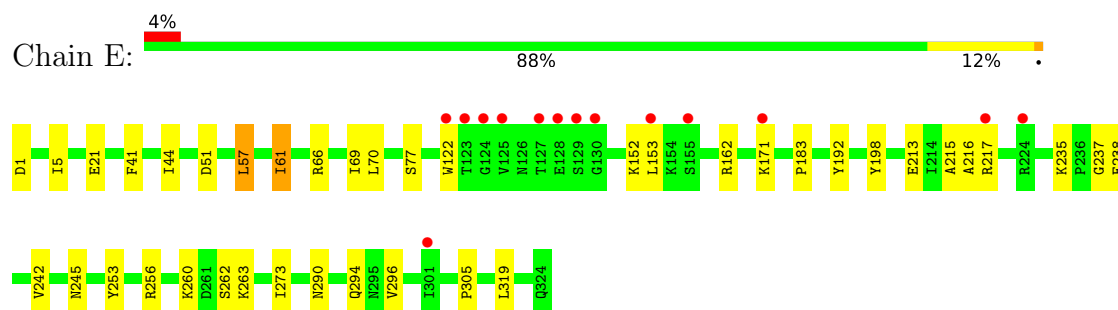
- Molecule 1: Hemagglutinin



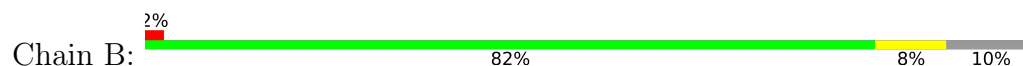
- Molecule 1: Hemagglutinin



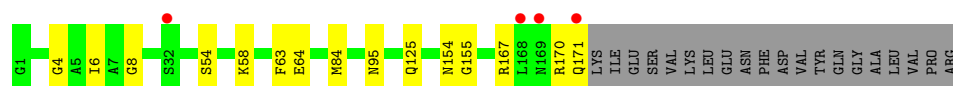
- Molecule 1: Hemagglutinin



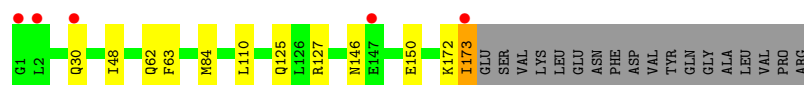
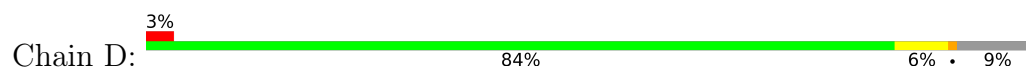
- Molecule 2: Hemagglutinin



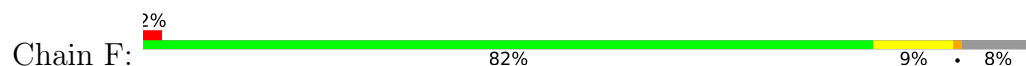




• Molecule 2: Hemagglutinin



• Molecule 2: Hemagglutinin



• 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 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

Chain K:



MAG1  
MAG2  
MAG3

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	69.26Å 137.37Å 198.87Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.75 – 2.66 46.75 – 2.66	Depositor EDS
% Data completeness (in resolution range)	96.6 (46.75-2.66) 96.7 (46.75-2.66)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.58 (at 2.65Å)	Xtriage
Refinement program	PHENIX	Depositor
R, $R_{free}$	0.202 , 0.245 0.206 , 0.248	Depositor DCC
$R_{free}$ test set	2710 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	40.5	Xtriage
Anisotropy	0.645	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 41.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	12460	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.34% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: 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	0.31	0/2617	0.77	0/3553
1	C	0.32	0/2617	0.80	7/3553 (0.2%)
1	E	0.31	0/2617	0.77	0/3553
2	B	0.30	0/1409	0.75	0/1897
2	D	0.28	0/1426	0.70	1/1919 (0.1%)
2	F	0.29	0/1448	0.74	0/1949
All	All	0.30	0/12134	0.76	8/16424 (0.0%)

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	82	ARG	CA-C-N	5.90	125.38	119.24
1	C	82	ARG	C-N-CA	5.90	125.38	119.24
1	C	296	VAL	N-CA-C	5.76	115.98	110.74
2	D	127	ARG	CB-CA-C	-5.59	110.11	116.54
1	C	53	ARG	CB-CA-C	-5.26	110.07	117.23
1	C	297	SER	CA-C-N	5.25	124.87	119.56
1	C	297	SER	C-N-CA	5.25	124.87	119.56
1	C	155	SER	N-CA-C	5.12	117.85	111.24

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	2557	0	2511	26	1
1	C	2557	0	2511	29	0
1	E	2557	0	2512	34	0
2	B	1381	0	1292	12	1
2	D	1398	0	1317	7	0
2	F	1420	0	1336	14	0
3	G	28	0	25	0	0
3	H	28	0	25	0	0
3	I	28	0	25	0	0
3	J	28	0	25	1	0
4	K	42	0	37	2	0
5	A	42	0	39	0	0
5	C	42	0	39	0	0
5	E	28	0	26	1	0
6	A	58	0	0	8	0
6	B	45	0	0	5	0
6	C	76	0	0	4	0
6	D	46	0	0	3	0
6	E	66	0	0	10	0
6	F	33	0	0	3	0
All	All	12460	0	11720	117	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

All (117) 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:259:ASN:OD1	6:C:501:HOH:O	1.85	0.94
1:C:113:ARG:O	6:C:502:HOH:O	1.86	0.93
2:B:63:PHE:O	6:B:401:HOH:O	1.86	0.92
1:E:290:ASN:ND2	6:E:505:HOH:O	2.08	0.86
1:A:128:GLU:O	6:A:501:HOH:O	1.96	0.82
1:E:171:LYS:HE2	1:E:256:ARG:HD2	1.63	0.81
1:E:21:GLU:OE2	6:E:501:HOH:O	1.99	0.79
1:E:296:VAL:O	6:E:502:HOH:O	2.01	0.77
1:E:263:LYS:O	6:E:503:HOH:O	2.05	0.75
2:F:127:ARG:O	6:F:401:HOH:O	2.03	0.75
1:C:171:LYS:HE2	1:C:256:ARG:HD2	1.69	0.74

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:122:TRP:O	6:E:504:HOH:O	2.05	0.73
2:B:58:LYS:O	6:B:402:HOH:O	2.08	0.72
2:D:125:GLN:OE1	6:D:202:HOH:O	2.08	0.71
2:B:125:GLN:HE22	2:B:155:GLY:HA2	1.56	0.69
1:C:211:SER:O	6:C:503:HOH:O	2.10	0.68
2:B:6:ILE:O	6:B:403:HOH:O	2.13	0.66
1:A:150:ILE:O	6:A:503:HOH:O	2.13	0.66
1:A:200:ARG:HD3	1:C:215:ALA:HB2	1.79	0.65
2:F:76:ARG:O	6:F:403:HOH:O	2.13	0.65
2:F:125:GLN:HE22	2:F:155:GLY:HA2	1.61	0.64
1:E:215:ALA:HB1	1:E:217:ARG:NH2	2.13	0.63
2:F:170:ARG:O	2:F:174:GLU:HG2	1.99	0.63
1:A:110:ARG:NH2	6:A:510:HOH:O	2.31	0.62
5:E:401:NAG:H3	5:E:401:NAG:H83	1.81	0.62
1:A:112:GLU:HB2	1:A:256:ARG:HB2	1.82	0.61
1:E:294:GLN:HG2	1:E:305:PRO:HG2	1.83	0.61
1:A:97:GLU:OE1	6:A:504:HOH:O	2.17	0.60
2:D:172:LYS:HG3	2:D:173:ILE:HD12	1.84	0.60
3:J:1:NAG:H3	3:J:1:NAG:H83	1.85	0.58
1:C:209:ALA:HB3	1:E:213:GLU:HB3	1.85	0.57
2:D:63:PHE:HZ	2:D:84:MET:HE3	1.69	0.57
1:E:152:LYS:HG2	1:E:153:LEU:O	2.05	0.57
2:B:125:GLN:NE2	2:B:155:GLY:HA2	2.22	0.54
1:E:260:LYS:NZ	6:E:511:HOH:O	2.39	0.54
1:C:152:LYS:NZ	6:C:511:HOH:O	2.42	0.53
1:E:216:ALA:O	1:E:217:ARG:NH1	2.41	0.53
2:F:150:GLU:O	2:F:154:ASN:HB3	2.08	0.53
1:C:202:GLY:HA3	1:E:217:ARG:CD	2.39	0.53
1:E:51:ASP:HB2	1:E:273:ILE:HD12	1.91	0.53
1:A:51:ASP:HB2	1:A:273:ILE:HD12	1.92	0.52
1:E:1:ASP:N	6:E:513:HOH:O	2.41	0.52
1:A:17:ASP:OD1	6:A:505:HOH:O	2.18	0.52
1:C:202:GLY:HA3	1:E:217:ARG:HD2	1.91	0.52
1:C:200:ARG:NH1	1:C:243:GLU:OE1	2.40	0.51
1:C:57:LEU:HD22	1:C:102:LYS:HG2	1.91	0.51
2:D:62:GLN:NE2	6:D:201:HOH:O	2.00	0.51
1:E:152:LYS:HD3	1:E:192:TYR:O	2.10	0.51
1:C:280:CYS:HB2	1:C:303:GLU:O	2.11	0.51
1:C:126:ASN:ND2	1:C:129:SER:OG	2.44	0.51
2:B:63:PHE:HZ	2:B:84:MET:HE3	1.77	0.50
2:B:171:GLN:CD	2:B:171:GLN:H	2.19	0.50

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:156:SER:OG	1:C:157:GLU:N	2.45	0.50
1:E:253:TYR:O	6:E:506:HOH:O	2.20	0.50
2:D:30:GLN:OE1	6:D:203:HOH:O	2.20	0.49
1:E:5:ILE:HD11	2:F:122:VAL:HG21	1.94	0.49
1:A:294:GLN:HG2	1:A:305:PRO:HG2	1.93	0.49
2:F:153:LYS:NZ	6:F:409:HOH:O	2.44	0.48
1:A:213:GLU:O	1:A:217:ARG:NH2	2.48	0.47
1:C:177:TRP:CD2	1:C:201:MET:HE2	2.48	0.47
2:F:48:ILE:HD11	2:F:110:LEU:HD23	1.97	0.47
1:E:215:ALA:HB1	1:E:217:ARG:CZ	2.44	0.47
1:E:237:GLY:O	6:E:507:HOH:O	2.20	0.47
1:A:52:LEU:HD11	1:A:57:LEU:HD12	1.95	0.47
1:C:33:LEU:HD21	1:C:295:ASN:HB2	1.96	0.46
1:A:157:GLU:HG2	1:A:158:TYR:H	1.81	0.46
2:B:95:ASN:ND2	6:B:404:HOH:O	2.24	0.45
1:C:38:GLU:CD	1:C:288:ARG:HE	2.24	0.45
2:B:64:GLU:HB3	6:B:431:HOH:O	2.15	0.45
2:D:48:ILE:HD11	2:D:110:LEU:HD23	1.99	0.45
2:F:154:ASN:HD22	4:K:1:NAG:H62	1.82	0.45
2:B:4:GLY:O	2:B:8:GLY:HA3	2.17	0.44
1:E:217:ARG:HA	1:E:217:ARG:HD3	1.72	0.44
2:F:4:GLY:O	2:F:8:GLY:HA3	2.17	0.44
1:C:282:THR:HG22	1:C:300:TRP:HB3	1.99	0.44
2:B:167:ARG:O	2:B:170:ARG:HG3	2.18	0.44
1:C:200:ARG:HB3	1:E:217:ARG:NH2	2.32	0.44
1:C:61:ILE:O	1:C:146:ASN:ND2	2.50	0.44
1:C:69:ILE:HG23	1:C:70:LEU:HG	1.99	0.44
1:A:156:SER:OG	1:A:157:GLU:N	2.49	0.44
1:A:64:ASN:HB3	1:A:67:CYS:SG	2.58	0.44
1:C:41:PHE:CE2	1:C:271:LEU:HB2	2.53	0.44
1:E:198:TYR:N	1:E:245:ASN:OD1	2.38	0.44
1:E:66:ARG:NE	6:E:516:HOH:O	2.50	0.43
1:A:216:ALA:HB1	1:A:224:ARG:HH21	1.83	0.43
1:C:287:ILE:HD11	1:C:296:VAL:HB	2.00	0.43
1:A:210:ARG:NH1	6:A:517:HOH:O	2.46	0.43
1:E:44:ILE:HB	1:E:77:SER:HB2	2.01	0.43
1:C:41:PHE:HB2	1:C:273:ILE:HG12	2.00	0.43
1:E:41:PHE:HB2	1:E:273:ILE:HG12	2.00	0.43
1:A:57:LEU:HD22	1:A:102:LYS:HG2	1.99	0.43
1:C:49:PRO:HG2	1:C:273:ILE:HD13	2.00	0.43
1:E:183:PRO:HA	1:E:215:ALA:O	2.19	0.43

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:146:ASN:O	2:F:150:GLU:HG2	2.19	0.42
2:F:154:ASN:ND2	4:K:1:NAG:H62	2.35	0.42
1:A:54:ASP:C	1:A:85:ALA:HB1	2.43	0.42
1:A:41:PHE:CE2	1:A:271:LEU:HB2	2.54	0.42
1:A:311:LYS:HD3	1:A:311:LYS:HA	1.79	0.42
1:A:171:LYS:NZ	6:A:507:HOH:O	2.24	0.41
2:F:141:TRP:CE2	2:F:170:ARG:HG2	2.56	0.41
1:E:235:LYS:O	1:E:238:GLU:HB2	2.20	0.41
1:C:294:GLN:HG2	1:C:305:PRO:HG2	2.01	0.41
1:A:126:ASN:ND2	1:A:129:SER:OG	2.54	0.41
1:E:57:LEU:O	1:E:61:ILE:HG13	2.20	0.41
1:A:38:GLU:CD	1:A:288:ARG:HE	2.29	0.41
1:A:128:GLU:OE1	1:A:128:GLU:N	2.54	0.41
1:C:64:ASN:HB3	1:C:67:CYS:SG	2.61	0.41
1:C:202:GLY:HA3	1:E:217:ARG:NE	2.36	0.41
2:F:63:PHE:HZ	2:F:84:MET:HE3	1.86	0.41
1:A:280:CYS:HB2	1:A:303:GLU:O	2.20	0.41
1:E:69:ILE:HG23	1:E:70:LEU:HG	2.02	0.41
1:A:66:ARG:NE	6:A:519:HOH:O	2.51	0.40
2:B:54:SER:O	2:B:58:LYS:HG2	2.20	0.40
1:C:235:LYS:O	1:C:238:GLU:HB2	2.21	0.40
2:D:146:ASN:O	2:D:150:GLU:HG2	2.22	0.40
1:E:162:ARG:HA	1:E:242:VAL:O	2.22	0.40
1:E:260:LYS:HG2	1:E:262:SER:H	1.86	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:155:SER:OG	2:B:154:ASN:OD1[3_554]	2.11	0.09

## 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	322/324 (99%)	317 (98%)	5 (2%)	0	100	100
1	C	322/324 (99%)	317 (98%)	5 (2%)	0	100	100
1	E	322/324 (99%)	314 (98%)	8 (2%)	0	100	100
2	B	169/191 (88%)	168 (99%)	1 (1%)	0	100	100
2	D	171/191 (90%)	170 (99%)	1 (1%)	0	100	100
2	F	174/191 (91%)	173 (99%)	1 (1%)	0	100	100
All	All	1480/1545 (96%)	1459 (99%)	21 (1%)	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	281/281 (100%)	279 (99%)	2 (1%)	76	86
1	C	281/281 (100%)	279 (99%)	2 (1%)	76	86
1	E	281/281 (100%)	278 (99%)	3 (1%)	65	80
2	B	146/164 (89%)	146 (100%)	0	100	100
2	D	148/164 (90%)	147 (99%)	1 (1%)	76	86
2	F	151/164 (92%)	149 (99%)	2 (1%)	61	77
All	All	1288/1335 (96%)	1278 (99%)	10 (1%)	73	85

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	57	LEU
1	A	319	LEU
1	C	57	LEU
1	C	319	LEU
2	D	173	ILE

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	E	57	LEU
1	E	61	ILE
1	E	319	LEU
2	F	154	ASN
2	F	176	VAL

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

Mol	Chain	Res	Type
2	B	42	GLN
2	B	50	ASN
1	C	126	ASN
1	C	207	ASN
2	D	25	HIS
2	D	30	GLN
2	D	42	GLN
2	D	125	GLN
1	E	36	GLN
1	E	87	ASN
1	E	324	GLN
2	F	26	HIS
2	F	50	ASN
2	F	125	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	G	1	1,3	14,14,15	0.36	0	17,19,21	0.60	0
3	NAG	G	2	3	14,14,15	0.17	0	17,19,21	0.38	0
3	NAG	H	1	2,3	14,14,15	0.17	0	17,19,21	0.65	1 (5%)
3	NAG	H	2	3	14,14,15	0.17	0	17,19,21	0.41	0
3	NAG	I	1	1,3	14,14,15	2.14	2 (14%)	17,19,21	0.99	1 (5%)
3	NAG	I	2	3	14,14,15	0.15	0	17,19,21	0.46	0
3	NAG	J	1	1,3	14,14,15	0.54	0	17,19,21	1.42	2 (11%)
3	NAG	J	2	3	14,14,15	0.27	0	17,19,21	0.70	1 (5%)
4	NAG	K	1	2,4	14,14,15	0.52	0	17,19,21	1.11	1 (5%)
4	NAG	K	2	4	14,14,15	1.57	2 (14%)	17,19,21	1.29	3 (17%)
4	NAG	K	3	4	14,14,15	0.34	0	17,19,21	0.72	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	-	2/6/23/26	0/1/1/1
3	NAG	H	1	2,3	-	1/6/23/26	0/1/1/1
3	NAG	H	2	3	-	2/6/23/26	0/1/1/1
3	NAG	I	1	1,3	-	3/6/23/26	0/1/1/1
3	NAG	I	2	3	-	1/6/23/26	0/1/1/1
3	NAG	J	1	1,3	-	6/6/23/26	0/1/1/1
3	NAG	J	2	3	-	4/6/23/26	0/1/1/1
4	NAG	K	1	2,4	-	3/6/23/26	0/1/1/1
4	NAG	K	2	4	-	0/6/23/26	0/1/1/1
4	NAG	K	3	4	-	2/6/23/26	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	I	1	NAG	O5-C1	-6.32	1.33	1.43
4	K	2	NAG	C1-C2	5.11	1.59	1.52

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	I	1	NAG	C1-C2	4.53	1.58	1.52
4	K	2	NAG	C3-C2	2.13	1.57	1.52

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	J	1	NAG	C2-N2-C7	4.59	129.05	122.90
4	K	1	NAG	C1-O5-C5	4.18	117.79	112.19
4	K	2	NAG	C4-C3-C2	3.25	115.77	111.02
4	K	2	NAG	O5-C5-C4	-2.65	104.37	110.83
3	I	1	NAG	C4-C3-C2	2.58	114.80	111.02
4	K	3	NAG	C1-O5-C5	2.42	115.43	112.19
3	J	2	NAG	C1-O5-C5	2.40	115.41	112.19
4	K	2	NAG	C1-O5-C5	2.39	115.39	112.19
3	J	1	NAG	C1-C2-N2	2.20	113.91	110.43
3	H	1	NAG	C1-O5-C5	2.12	115.03	112.19

There are no chirality outliers.

All (26) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	G	1	NAG	C4-C5-C6-O6
3	I	1	NAG	O5-C5-C6-O6
3	G	1	NAG	O5-C5-C6-O6
3	I	1	NAG	C4-C5-C6-O6
3	G	2	NAG	C8-C7-N2-C2
3	G	2	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	K	1	NAG	C8-C7-N2-C2
4	K	1	NAG	O7-C7-N2-C2
3	J	2	NAG	O5-C5-C6-O6
3	J	1	NAG	O5-C5-C6-O6
4	K	1	NAG	O5-C5-C6-O6
3	I	2	NAG	O5-C5-C6-O6
3	J	2	NAG	C4-C5-C6-O6
3	I	1	NAG	C3-C2-N2-C7
3	H	2	NAG	C4-C5-C6-O6
3	H	1	NAG	O5-C5-C6-O6
4	K	3	NAG	C3-C2-N2-C7

*Continued on next page...*

*Continued from previous page...*

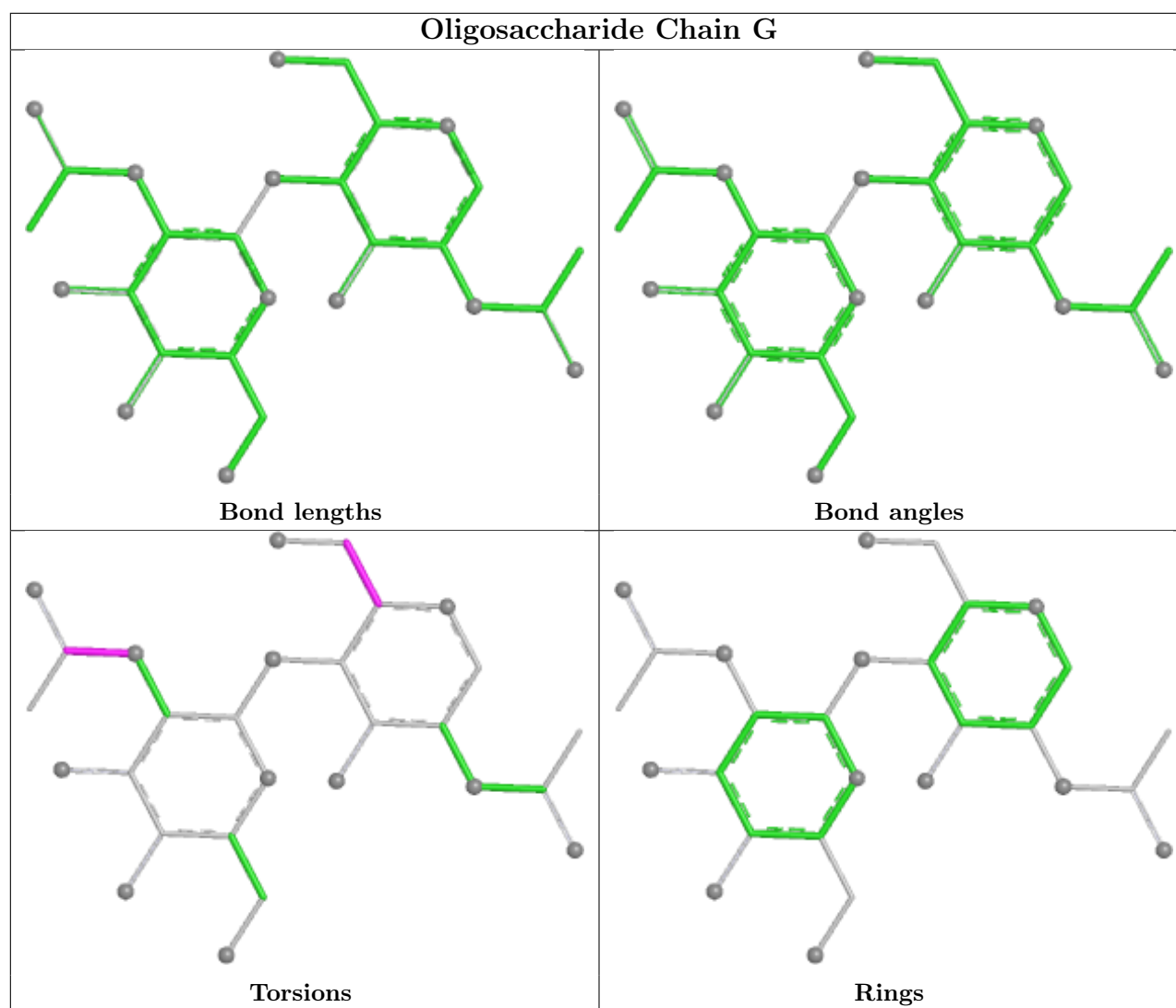
Mol	Chain	Res	Type	Atoms
3	J	1	NAG	C4-C5-C6-O6
3	H	2	NAG	O5-C5-C6-O6
3	J	1	NAG	C1-C2-N2-C7
4	K	3	NAG	C1-C2-N2-C7
3	J	1	NAG	C3-C2-N2-C7

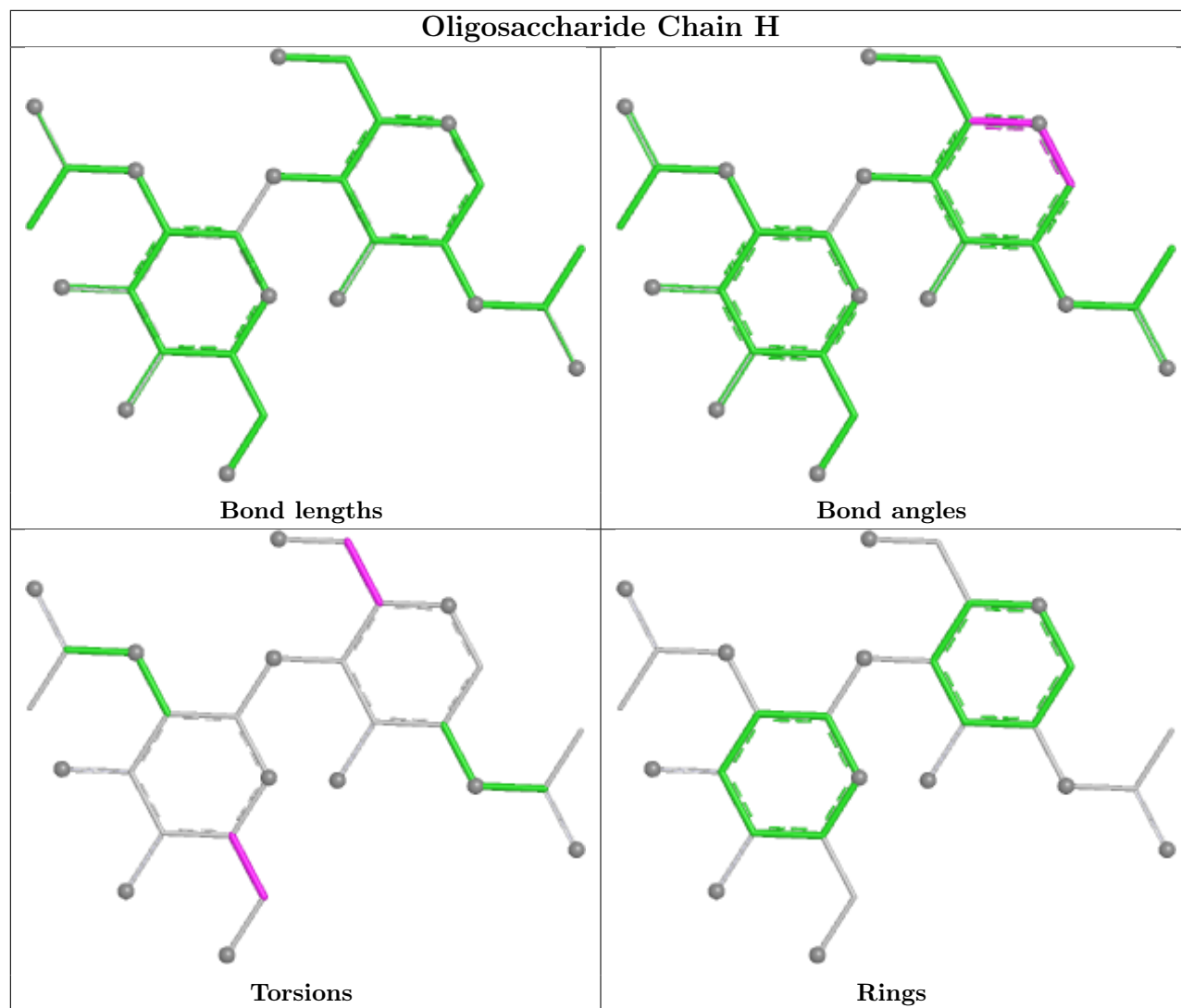
There are no ring outliers.

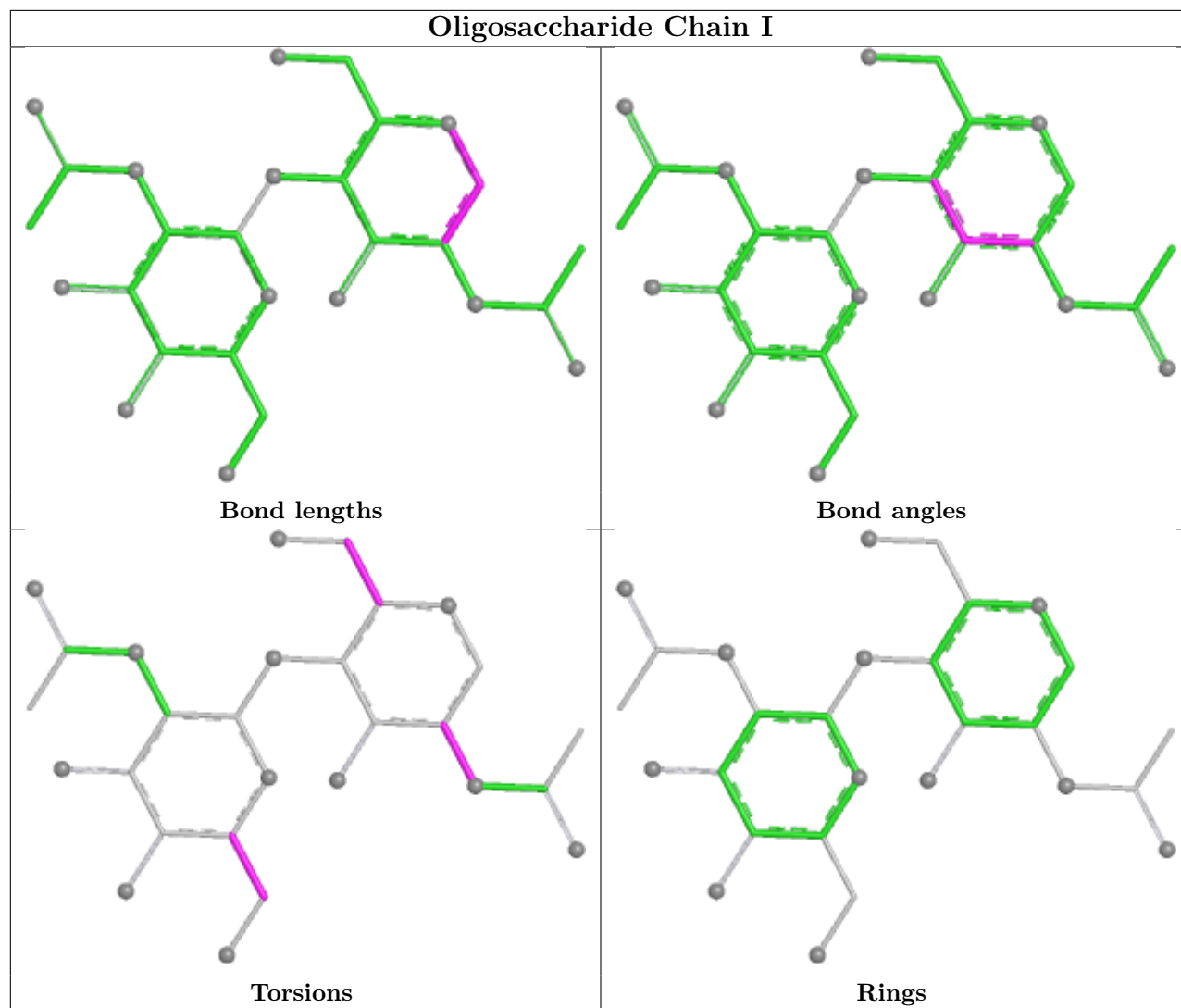
2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	K	1	NAG	2	0
3	J	1	NAG	1	0

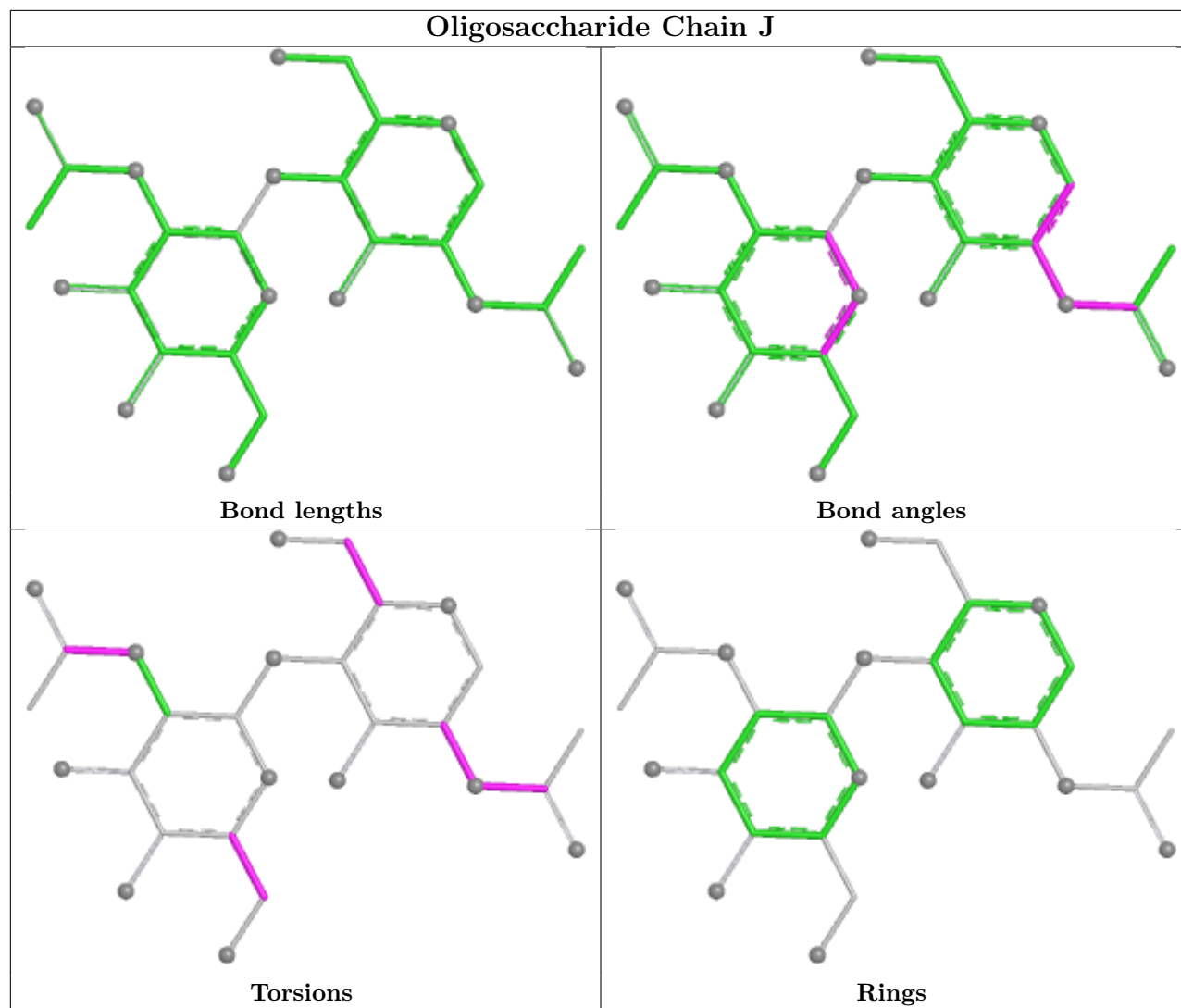
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

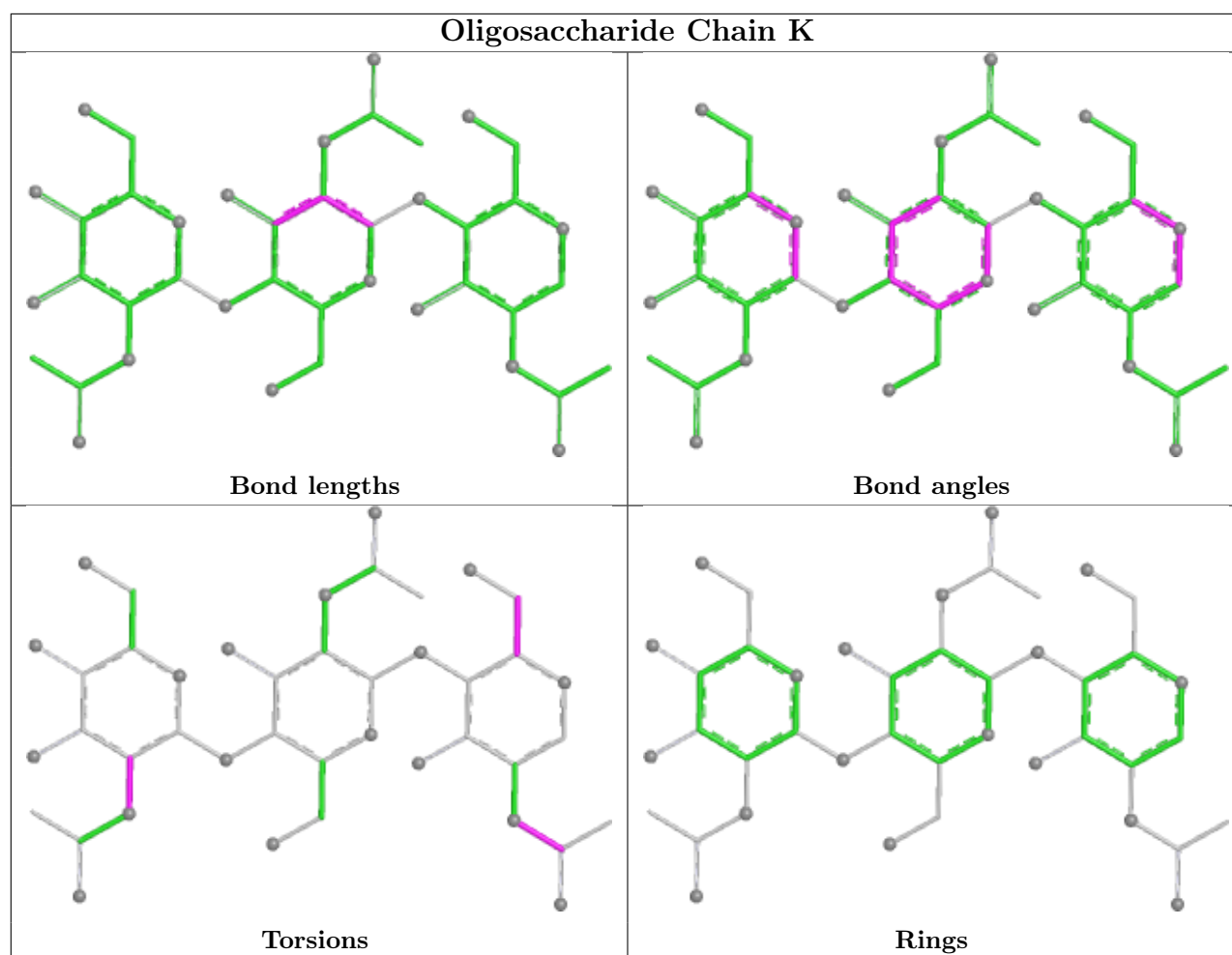












## 5.6 Ligand geometry [i](#)

8 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	$\# Z  > 2$
5	NAG	E	401	1	14,14,15	0.74	1 (7%)	17,19,21	1.45	3 (17%)
5	NAG	A	402	1	14,14,15	0.29	0	17,19,21	1.06	1 (5%)
5	NAG	A	403	1	14,14,15	0.18	0	17,19,21	0.76	1 (5%)
5	NAG	A	401	1	14,14,15	0.42	0	17,19,21	0.42	0
5	NAG	C	402	1	14,14,15	1.11	1 (7%)	17,19,21	1.27	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	NAG	E	404	1	14,14,15	0.59	0	17,19,21	0.51	0
5	NAG	C	403	1	14,14,15	0.30	0	17,19,21	0.52	0
5	NAG	C	401	1	14,14,15	0.29	0	17,19,21	0.38	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
5	NAG	E	401	1	-	6/6/23/26	0/1/1/1
5	NAG	A	402	1	-	3/6/23/26	0/1/1/1
5	NAG	A	403	1	-	4/6/23/26	0/1/1/1
5	NAG	A	401	1	-	0/6/23/26	0/1/1/1
5	NAG	C	402	1	-	2/6/23/26	0/1/1/1
5	NAG	E	404	1	-	0/6/23/26	0/1/1/1
5	NAG	C	403	1	-	2/6/23/26	0/1/1/1
5	NAG	C	401	1	-	0/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	402	NAG	O5-C1	3.96	1.50	1.43
5	E	401	NAG	C1-C2	2.40	1.55	1.52

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	402	NAG	C1-O5-C5	5.04	118.94	112.19
5	E	401	NAG	C2-N2-C7	4.54	128.99	122.90
5	A	402	NAG	C1-O5-C5	3.27	116.58	112.19
5	A	403	NAG	C1-O5-C5	2.65	115.73	112.19
5	E	401	NAG	C1-O5-C5	2.45	115.46	112.19
5	E	401	NAG	C1-C2-N2	2.13	113.80	110.43

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	E	401	NAG	O5-C5-C6-O6

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms
5	E	401	NAG	C4-C5-C6-O6
5	C	403	NAG	O5-C5-C6-O6
5	A	403	NAG	O5-C5-C6-O6
5	C	402	NAG	O5-C5-C6-O6
5	C	403	NAG	C4-C5-C6-O6
5	A	403	NAG	C4-C5-C6-O6
5	C	402	NAG	C4-C5-C6-O6
5	A	403	NAG	C8-C7-N2-C2
5	A	403	NAG	O7-C7-N2-C2
5	E	401	NAG	C8-C7-N2-C2
5	E	401	NAG	O7-C7-N2-C2
5	A	402	NAG	O5-C5-C6-O6
5	A	402	NAG	C1-C2-N2-C7
5	E	401	NAG	C3-C2-N2-C7
5	E	401	NAG	C1-C2-N2-C7
5	A	402	NAG	C3-C2-N2-C7

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	E	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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	324/324 (100%)	-0.02	4 (1%) 76 72	23, 37, 63, 77	0
1	C	324/324 (100%)	-0.09	2 (0%) 85 83	24, 36, 59, 81	0
1	E	324/324 (100%)	0.11	14 (4%) 40 32	24, 39, 66, 88	0
2	B	171/191 (89%)	0.09	4 (2%) 61 54	22, 39, 69, 91	0
2	D	173/191 (90%)	-0.11	5 (2%) 53 46	24, 37, 58, 75	0
2	F	176/191 (92%)	-0.08	4 (2%) 61 54	23, 36, 58, 91	0
All	All	1492/1545 (96%)	-0.01	33 (2%) 62 56	22, 37, 63, 91	0

All (33) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	F	176	VAL	7.0
1	E	153	LEU	4.5
1	E	122	TRP	4.3
1	A	84	ASN	4.1
1	E	301	ILE	3.8
2	F	1	GLY	3.7
1	E	217	ARG	3.7
1	E	130	GLY	3.5
1	E	127	THR	3.3
1	E	124	GLY	3.2
2	D	173	ILE	3.0
2	D	147	GLU	2.9
2	B	169	ASN	2.9
2	B	171	GLN	2.8
1	E	123	THR	2.7
1	E	171	LYS	2.7
2	B	168	LEU	2.6
1	C	295	ASN	2.5
1	C	139	ASN	2.5

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	E	125	VAL	2.4
1	E	129	SER	2.4
1	E	224	ARG	2.4
1	A	69	ILE	2.4
1	E	128	GLU	2.3
1	A	2	LYS	2.1
2	D	30	GLN	2.1
1	A	186	THR	2.1
2	D	2	LEU	2.1
2	D	1	GLY	2.1
1	E	155	SER	2.0
2	B	32	SER	2.0
2	F	148	CYS	2.0
2	F	154	ASN	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](#)

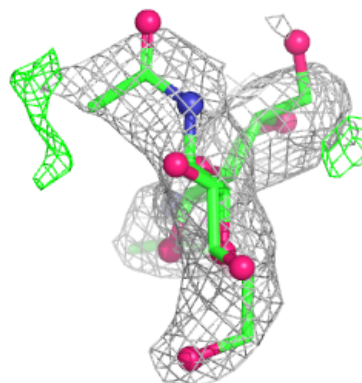
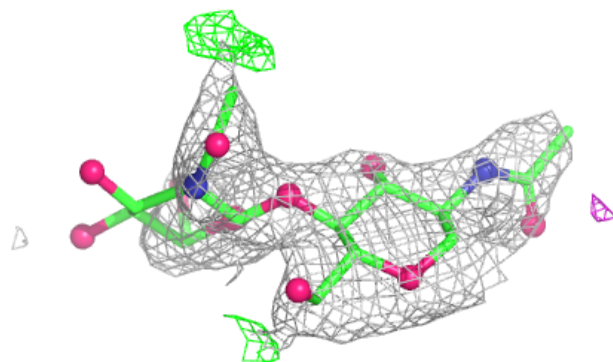
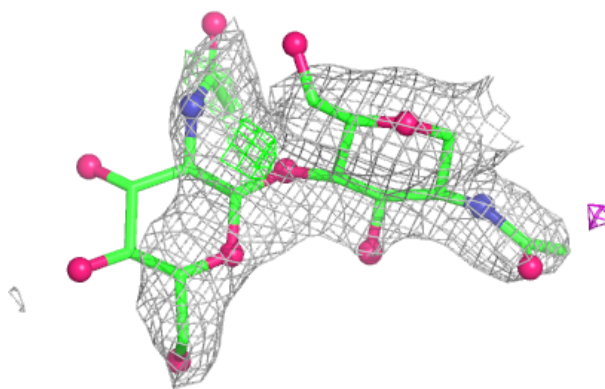
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	NAG	J	1	14/15	0.18	0.22	93,104,118,119	0
3	NAG	G	2	14/15	0.34	0.16	72,90,102,104	0
3	NAG	J	2	14/15	0.37	0.18	91,114,122,124	0
3	NAG	I	1	14/15	0.49	0.18	92,104,111,115	0
3	NAG	I	2	14/15	0.51	0.15	76,91,95,100	0
4	NAG	K	3	14/15	0.60	0.19	75,93,102,105	0
4	NAG	K	2	14/15	0.71	0.16	63,78,89,103	0
3	NAG	H	2	14/15	0.74	0.18	55,68,80,82	0
4	NAG	K	1	14/15	0.74	0.16	56,70,80,91	0
3	NAG	G	1	14/15	0.76	0.13	47,70,86,100	0
3	NAG	H	1	14/15	0.81	0.14	51,68,81,102	0

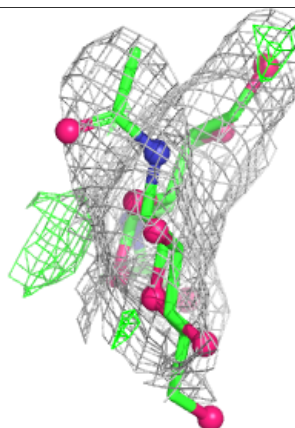
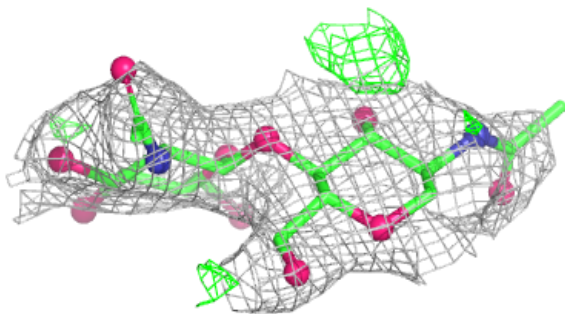
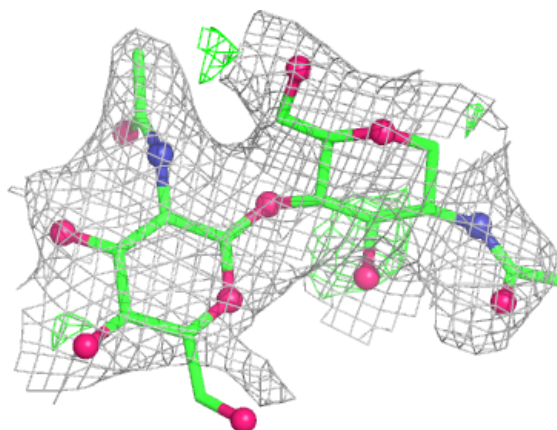
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

**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)

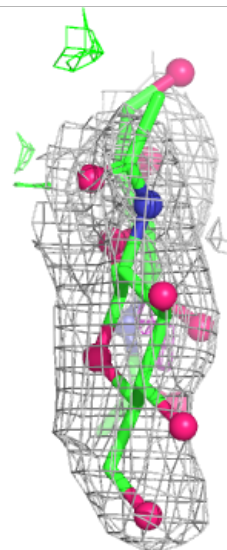
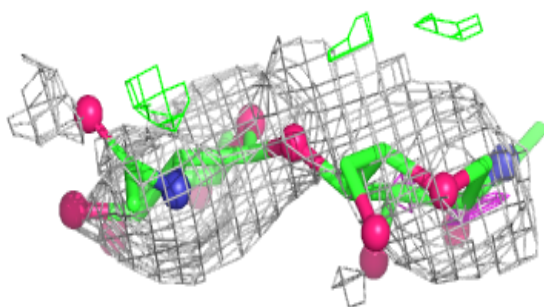
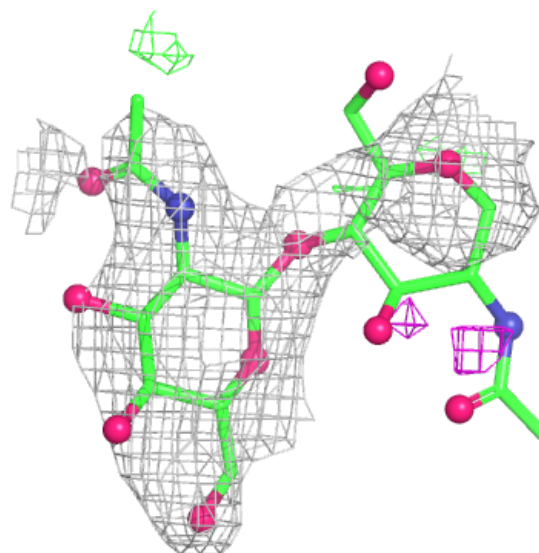
**Electron density around Chain H:**

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



**Electron density around Chain I:**

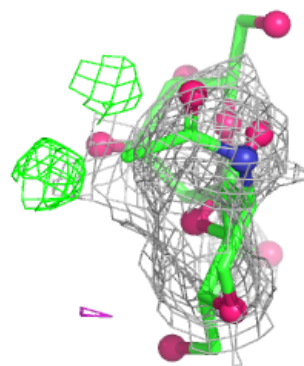
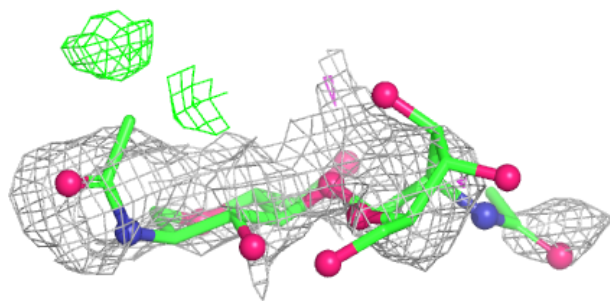
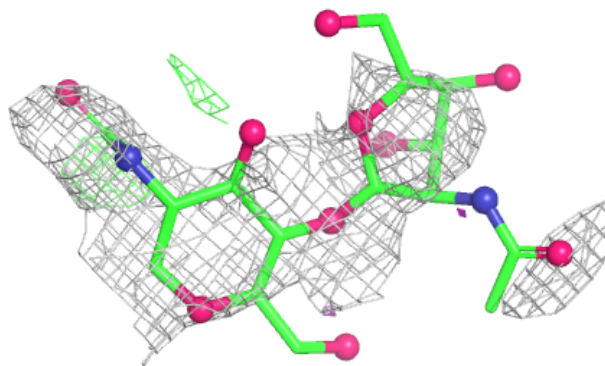
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



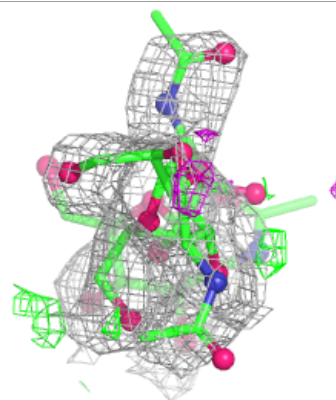
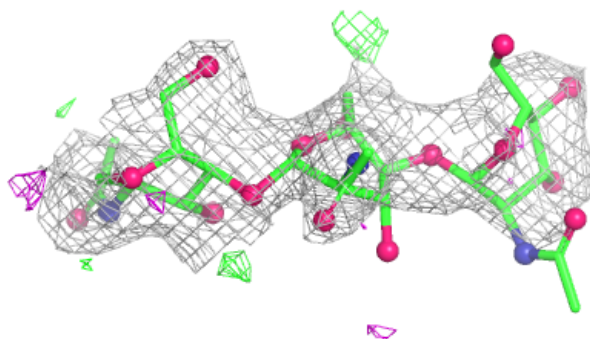
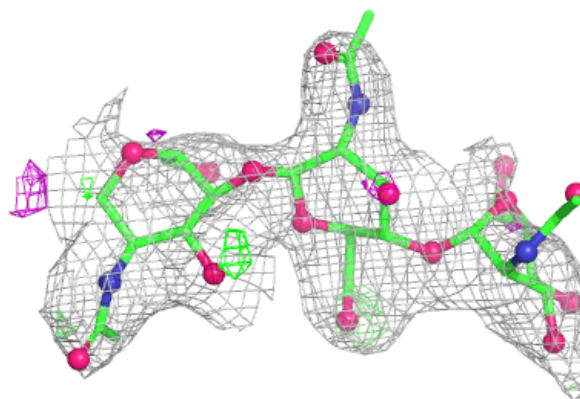


**Electron density around Chain J:**

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

**Electron density around Chain 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, 95<sup>th</sup> 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
5	NAG	E	401	14/15	0.17	0.21	96,102,111,116	0
5	NAG	C	401	14/15	0.26	0.20	81,96,104,110	0
5	NAG	E	404	14/15	0.34	0.19	79,89,96,97	0
5	NAG	C	402	14/15	0.46	0.17	68,84,96,96	0
5	NAG	A	401	14/15	0.51	0.19	78,92,105,106	0
5	NAG	A	403	14/15	0.60	0.17	53,72,86,86	0
5	NAG	A	402	14/15	0.62	0.16	68,87,92,104	0
5	NAG	C	403	14/15	0.74	0.14	57,75,90,113	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.