



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 02:18 AM UTC

PDB ID : 5W0D / pdb_00005w0d
Title : Inferred precursor (UCA) of the human antibody lineage K03.12 in complex with influenza hemagglutinin H1 Solomon Islands/03/2006
Authors : McCarthy, K.R.; Harrison, S.C.
Deposited on : 2017-05-30
Resolution : 1.90 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

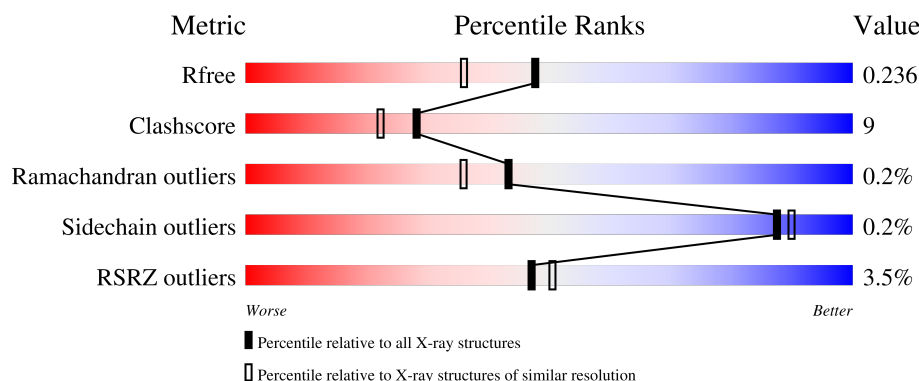
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (1.90-1.90)

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	223	4% 79% 16% .
2	B	244	2% 83% 13% .
3	C	214	4% 81% 14% 6%
4	D	2	50% 50%
4	E	2	50% 50%

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Mol	Chain	Length	Quality of chain
5	F	3	67% 33%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 5350 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.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	214	Total	C	N	O	S	0	0	0
			1710	1088	294	324	4			

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	50	ALA	-	expression tag	UNP D1MPH2
A	51	SER	-	expression tag	UNP D1MPH2
A	268	LEU	-	expression tag	UNP D1MPH2
A	269	GLU	-	expression tag	UNP D1MPH2
A	270	VAL	-	expression tag	UNP D1MPH2
A	271	LEU	-	expression tag	UNP D1MPH2
A	272	PHE	-	expression tag	UNP D1MPH2

- Molecule 2 is a protein called Lineage K03.12 UCA antibody heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	235	Total	C	N	O	S	0	0	0
			1784	1126	302	346	10			

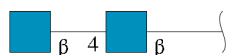
There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	239	HIS	-	expression tag	UNP S6B2A6
B	240	HIS	-	expression tag	UNP S6B2A6
B	241	HIS	-	expression tag	UNP S6B2A6
B	242	HIS	-	expression tag	UNP S6B2A6
B	243	HIS	-	expression tag	UNP S6B2A6
B	244	HIS	-	expression tag	UNP S6B2A6

- Molecule 3 is a protein called Lineage K03.12 UCA antibody light chain.

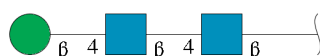
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	202	Total	C	N	O	S	0	0	0
			1485	927	249	303	6			

- Molecule 4 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
4	D	2	Total	C	N	O	0	0	0
			28	16	2	10			
4	E	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 5 is an oligosaccharide called 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
5	F	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 6 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (CCD ID: MES) (formula: C₆H₁₃NO₄S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
6	B	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

- Molecule 7 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	C	1	Total	C	O	0	0
			6	3	3		

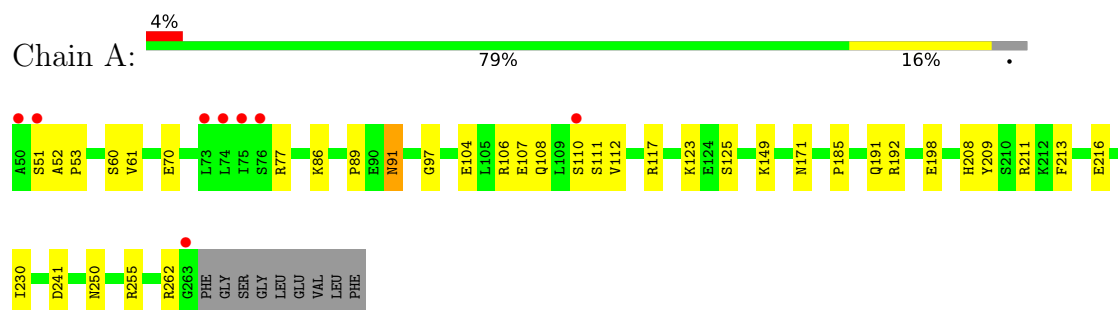
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	87	Total 87	O 87	0	0
8	B	108	Total 108	O 108	0	0
8	C	51	Total 51	O 51	0	0

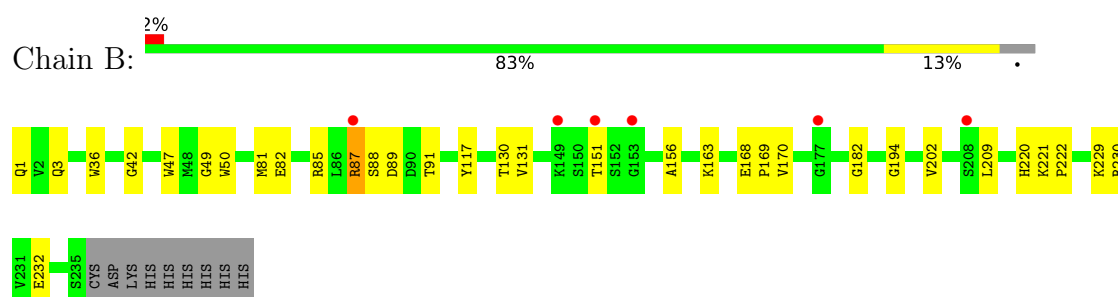
3 Residue-property plots

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.

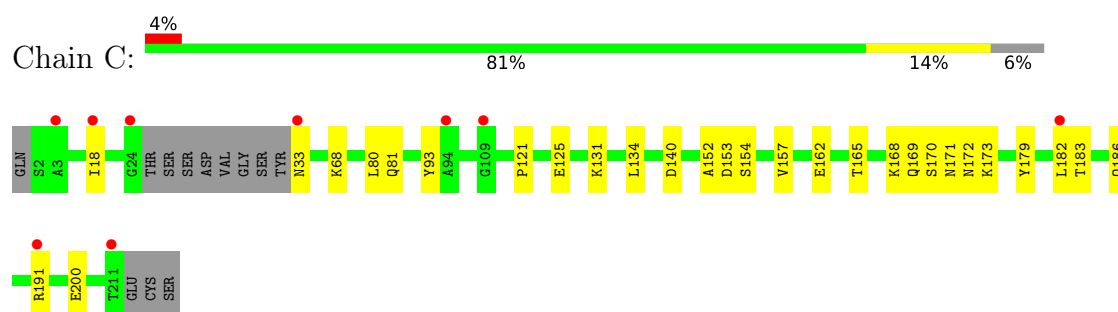
• Molecule 1: Hemagglutinin HA1



• Molecule 2: Lineage K03.12 UCA antibody heavy chain



• Molecule 3: Lineage K03.12 UCA antibody light chain



• Molecule 4: 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

Chain E:
50% 50%



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

Chain F:
67% 33%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	40.62Å 61.66Å 83.86Å 106.57° 95.25° 106.70°	Depositor
Resolution (Å)	39.85 – 1.90 39.85 – 1.90	Depositor EDS
% Data completeness (in resolution range)	94.0 (39.85-1.90) 94.2 (39.85-1.90)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.06 (at 1.89Å)	Xtriage
Refinement program	PHENIX (1.12_2829: ???)	Depositor
R, R_{free}	0.196 , 0.234 0.201 , 0.236	Depositor DCC
R_{free} test set	2721 reflections (4.69%)	wwPDB-VP
Wilson B-factor (Å ²)	33.6	Xtriage
Anisotropy	0.476	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 43.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	5350	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.59% 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, BMA, MES, 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	0.36	0/1762	0.58	1/2399 (0.0%)
2	B	0.41	1/1831 (0.1%)	0.62	1/2494 (0.0%)
3	C	0.31	0/1519	0.53	0/2068
All	All	0.37	1/5112 (0.0%)	0.58	2/6961 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	87	ARG	NE-CZ	-5.50	1.26	1.33

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	87	ARG	NE-CZ-NH1	-5.57	115.93	121.50
1	A	91	ASN	CA-CB-CG	-5.04	107.56	112.60

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	1710	0	1622	32	0
2	B	1784	0	1733	35	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	1485	0	1446	25	0
4	D	28	0	25	0	0
4	E	28	0	25	0	0
5	F	39	0	34	1	0
6	A	12	0	12	1	0
6	B	12	0	12	1	0
7	C	6	0	8	0	0
8	A	87	0	0	15	1
8	B	108	0	0	6	0
8	C	51	0	0	7	0
All	All	5350	0	4917	89	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 9.

All (89) 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)
3:C:171:ASN:N	8:C:403:HOH:O	1.81	1.13
1:A:112:VAL:N	8:A:401:HOH:O	1.83	1.09
1:A:111:SER:C	8:A:401:HOH:O	1.95	1.08
2:B:87:ARG:NH2	8:B:401:HOH:O	1.90	1.03
3:C:171:ASN:HA	8:C:403:HOH:O	1.57	1.02
3:C:171:ASN:CA	8:C:403:HOH:O	2.04	1.01
3:C:179:TYR:OH	8:C:401:HOH:O	1.81	0.97
3:C:162:GLU:OE2	8:C:404:HOH:O	1.82	0.96
3:C:168:LYS:HD3	3:C:172:ASN:HA	1.50	0.92
2:B:87:ARG:NE	2:B:88:SER:H	1.71	0.88
1:A:191:GLN:HE22	1:A:250:ASN:HD21	1.23	0.86
6:B:301:MES:O2S	8:B:402:HOH:O	1.94	0.85
3:C:170:SER:C	8:C:403:HOH:O	2.11	0.85
1:A:216:GLU:C	8:A:406:HOH:O	2.23	0.81
1:A:216:GLU:CB	8:A:406:HOH:O	2.33	0.76
1:A:110:SER:OG	8:A:402:HOH:O	2.04	0.75
1:A:216:GLU:HB2	8:A:406:HOH:O	1.87	0.74
1:A:241:ASP:OD2	8:A:403:HOH:O	2.07	0.71
1:A:53:PRO:O	1:A:77:ARG:NH1	2.22	0.71
2:B:82:GLU:OE1	8:B:403:HOH:O	2.07	0.71
1:A:61:VAL:HG21	1:A:106:ARG:HG3	1.75	0.69
2:B:1:GLN:NE2	2:B:3:GLN:NE2	2.43	0.66
3:C:168:LYS:CD	3:C:172:ASN:HA	2.23	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:1:GLN:HE22	2:B:3:GLN:NE2	1.95	0.65
1:A:70:GLU:OE2	8:A:404:HOH:O	2.14	0.64
1:A:216:GLU:CA	8:A:406:HOH:O	2.44	0.64
2:B:194:GLY:O	8:B:404:HOH:O	2.15	0.63
2:B:230:ARG:HG2	2:B:232:GLU:OE1	2.00	0.62
3:C:33:ASN:HB2	3:C:68:LYS:HD3	1.82	0.60
1:A:117:ARG:HH12	1:A:149:LYS:HE3	1.67	0.58
2:B:151:THR:HG22	2:B:156:ALA:HB2	1.84	0.58
1:A:209:TYR:CE1	6:A:308:MES:H32	2.39	0.58
1:A:211:ARG:HG2	1:A:213:PHE:CZ	2.39	0.58
3:C:152:ALA:HB2	3:C:157:VAL:HG21	1.86	0.57
1:A:97:GLY:HA3	1:A:230:ILE:O	2.05	0.57
2:B:221:LYS:HD2	2:B:222:PRO:CD	2.34	0.57
1:A:208:HIS:HE1	8:A:403:HOH:O	1.89	0.56
3:C:140:ASP:OD1	3:C:171:ASN:ND2	2.39	0.55
2:B:1:GLN:HE22	2:B:3:GLN:HE22	1.54	0.55
3:C:18:ILE:HD11	3:C:80:LEU:HD11	1.88	0.55
3:C:18:ILE:HD11	3:C:80:LEU:CD1	2.36	0.55
3:C:169:GLN:HG2	3:C:173:LYS:O	2.07	0.54
2:B:87:ARG:HG3	2:B:89:ASP:H	1.73	0.54
1:A:125:SER:OG	8:A:405:HOH:O	2.19	0.53
2:B:1:GLN:CD	2:B:3:GLN:NE2	2.67	0.52
3:C:81:GLN:NE2	8:C:402:HOH:O	1.81	0.52
2:B:1:GLN:OE1	2:B:3:GLN:NE2	2.43	0.50
2:B:221:LYS:HD2	2:B:222:PRO:N	2.26	0.50
2:B:87:ARG:HE	2:B:88:SER:H	1.57	0.50
2:B:168:GLU:CD	2:B:169:PRO:HA	2.37	0.49
2:B:182:GLY:O	2:B:202:VAL:HA	2.12	0.49
2:B:87:ARG:NE	2:B:88:SER:N	2.52	0.49
2:B:229:LYS:NZ	3:C:125:GLU:OE2	2.43	0.48
2:B:163:LYS:HZ1	3:C:131:LYS:HE2	1.79	0.48
1:A:192:ARG:HD3	1:A:198:GLU:OE1	2.13	0.48
3:C:153:ASP:OD2	3:C:191:ARG:HB3	2.14	0.47
3:C:18:ILE:CD1	3:C:80:LEU:HD11	2.44	0.47
1:A:60:SER:HB3	1:A:89:PRO:HG2	1.97	0.47
2:B:91:THR:HG23	2:B:130:THR:HA	1.96	0.47
3:C:121:PRO:HA	3:C:134:LEU:HD23	1.98	0.45
1:A:216:GLU:O	8:A:406:HOH:O	2.21	0.45
1:A:108:GLN:HA	1:A:262:ARG:HH11	1.82	0.45
1:A:123:LYS:HE3	1:A:255:ARG:CZ	2.46	0.45
2:B:88:SER:HA	2:B:131:VAL:HB	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:221:LYS:HD2	2:B:222:PRO:HD3	1.98	0.44
1:A:86:LYS:O	1:A:89:PRO:HD3	2.18	0.44
1:A:52:ALA:O	1:A:77:ARG:NH2	2.40	0.44
2:B:170:VAL:HG12	2:B:220:HIS:HB2	2.00	0.44
3:C:183:THR:OG1	3:C:186:GLN:HG3	2.18	0.43
3:C:134:LEU:HD12	3:C:182:LEU:HD11	2.00	0.43
2:B:42:GLY:HA3	3:C:165:THR:HG21	2.00	0.43
2:B:168:GLU:OE1	2:B:169:PRO:HA	2.19	0.43
1:A:208:HIS:CE1	8:A:403:HOH:O	2.67	0.43
2:B:117:TYR:HB3	3:C:93:TYR:CG	2.54	0.43
1:A:91:ASN:OD1	5:F:1:NAG:O5	2.36	0.42
2:B:47:TRP:CZ2	2:B:49:GLY:HA2	2.54	0.42
2:B:85:ARG:NE	8:B:405:HOH:O	2.24	0.42
3:C:200:GLU:O	3:C:200:GLU:HG3	2.18	0.42
1:A:185:PRO:HG2	1:A:191:GLN:NE2	2.35	0.42
2:B:82:GLU:CD	8:B:409:HOH:O	2.63	0.42
2:B:87:ARG:HG3	2:B:88:SER:N	2.35	0.42
1:A:104:GLU:OE2	1:A:104:GLU:N	2.41	0.42
2:B:36:TRP:CE2	2:B:81:MET:HB2	2.54	0.42
2:B:50:TRP:CD1	2:B:50:TRP:C	2.97	0.42
2:B:87:ARG:CZ	2:B:88:SER:H	2.28	0.41
2:B:209:LEU:HD23	2:B:209:LEU:HA	1.88	0.41
1:A:107:GLU:O	1:A:110:SER:HB2	2.20	0.41
1:A:171:ASN:HB3	8:A:429:HOH:O	2.21	0.41
1:A:241:ASP:CG	8:A:403:HOH:O	2.61	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)
8:A:407:HOH:O	8:A:409:HOH:O[1_655]	2.02	0.18

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	212/223 (95%)	205 (97%)	7 (3%)	0	100	100
2	B	233/244 (96%)	228 (98%)	5 (2%)	0	100	100
3	C	198/214 (92%)	187 (94%)	10 (5%)	1 (0%)	24	16
All	All	643/681 (94%)	620 (96%)	22 (3%)	1 (0%)	43	36

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	C	154	SER

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	186/193 (96%)	185 (100%)	1 (0%)	81	84
2	B	197/206 (96%)	197 (100%)	0	100	100
3	C	167/178 (94%)	167 (100%)	0	100	100
All	All	550/577 (95%)	549 (100%)	1 (0%)	87	90

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	51	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	191	GLN
1	A	196	HIS
2	B	3	GLN

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Mol	Chain	Res	Type
2	B	43	GLN
2	B	65	GLN
3	C	39	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](#)

7 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	$\# Z > 2$
4	NAG	D	1	1,4	14,14,15	0.44	0	17,19,21	1.41	3 (17%)
4	NAG	D	2	4	14,14,15	0.30	0	17,19,21	0.57	0
4	NAG	E	1	1,4	14,14,15	0.61	0	17,19,21	0.71	1 (5%)
4	NAG	E	2	4	14,14,15	0.50	0	17,19,21	0.45	0
5	NAG	F	1	1,5	14,14,15	0.81	1 (7%)	17,19,21	0.50	0
5	NAG	F	2	5	14,14,15	0.92	2 (14%)	17,19,21	0.62	0
5	BMA	F	3	5	11,11,12	1.04	1 (9%)	15,15,17	1.26	1 (6%)

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
4	NAG	D	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	D	2	4	-	0/6/23/26	0/1/1/1
4	NAG	E	1	1,4	-	1/6/23/26	0/1/1/1
4	NAG	E	2	4	-	0/6/23/26	0/1/1/1
5	NAG	F	1	1,5	-	0/6/23/26	0/1/1/1
5	NAG	F	2	5	-	1/6/23/26	0/1/1/1
5	BMA	F	3	5	-	2/2/19/22	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	F	3	BMA	C1-C2	2.69	1.58	1.52
5	F	2	NAG	O5-C1	-2.62	1.39	1.43
5	F	1	NAG	C1-C2	2.52	1.55	1.52
5	F	2	NAG	C1-C2	2.04	1.55	1.52

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	1	NAG	C1-O5-C5	4.10	117.68	112.19
5	F	3	BMA	C1-C2-C3	2.93	113.91	109.64
4	D	1	NAG	O3-C3-C2	-2.62	103.97	109.40
4	E	1	NAG	C1-O5-C5	2.36	115.35	112.19
4	D	1	NAG	C3-C4-C5	-2.28	106.09	110.23

There are no chirality outliers.

All (4) torsion outliers are listed below:

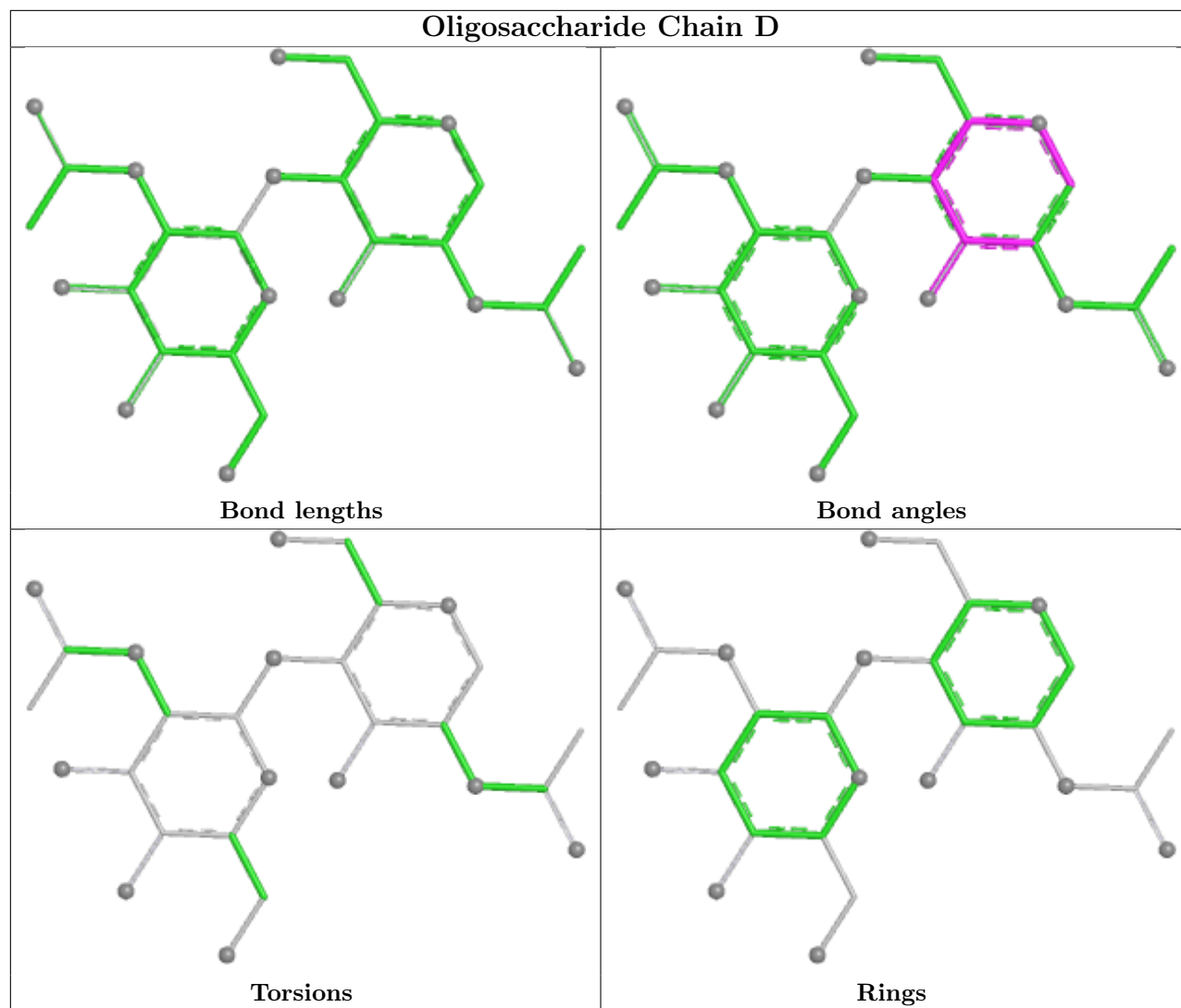
Mol	Chain	Res	Type	Atoms
5	F	2	NAG	C4-C5-C6-O6
5	F	3	BMA	C4-C5-C6-O6
5	F	3	BMA	O5-C5-C6-O6
4	E	1	NAG	C4-C5-C6-O6

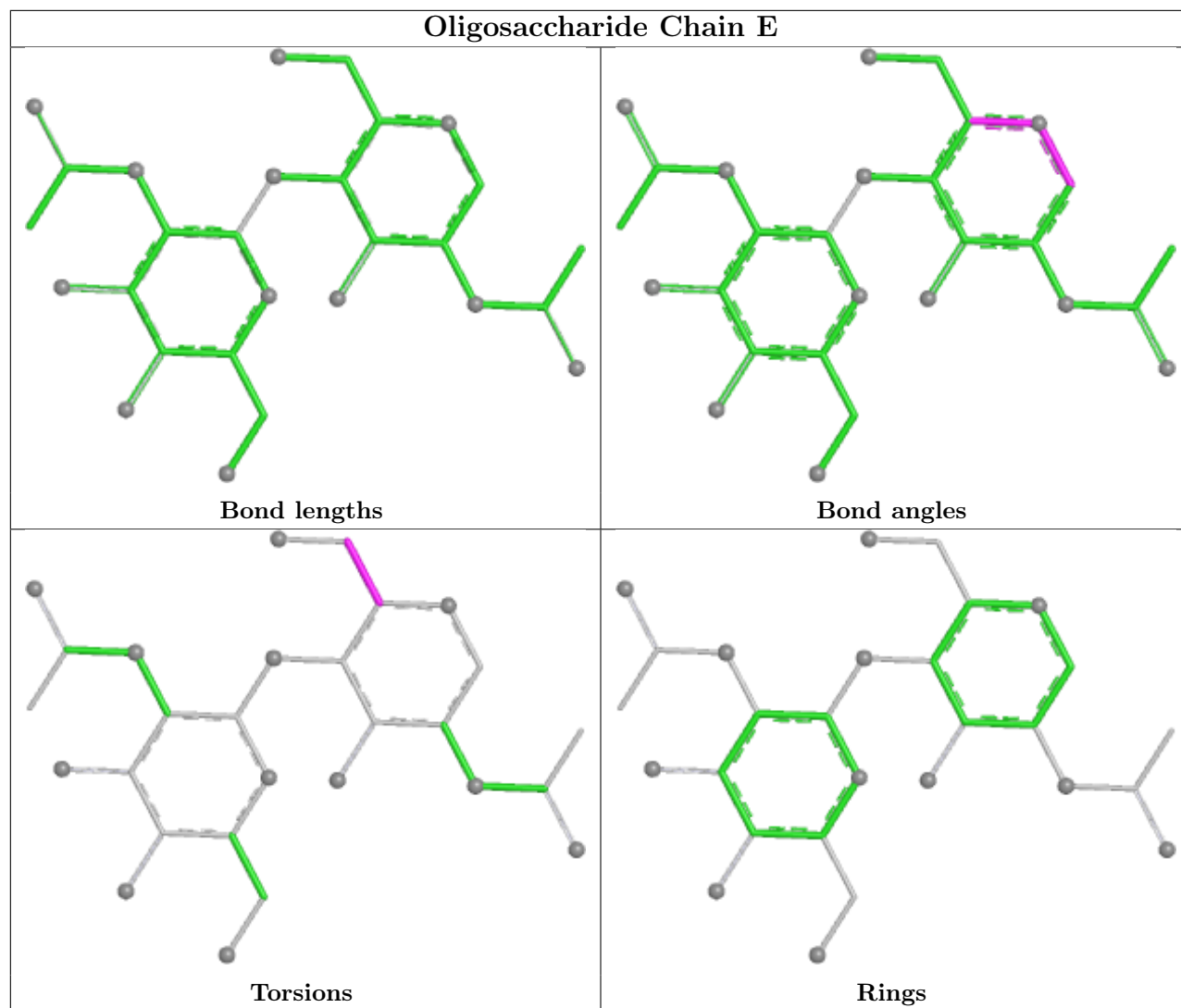
There are no ring outliers.

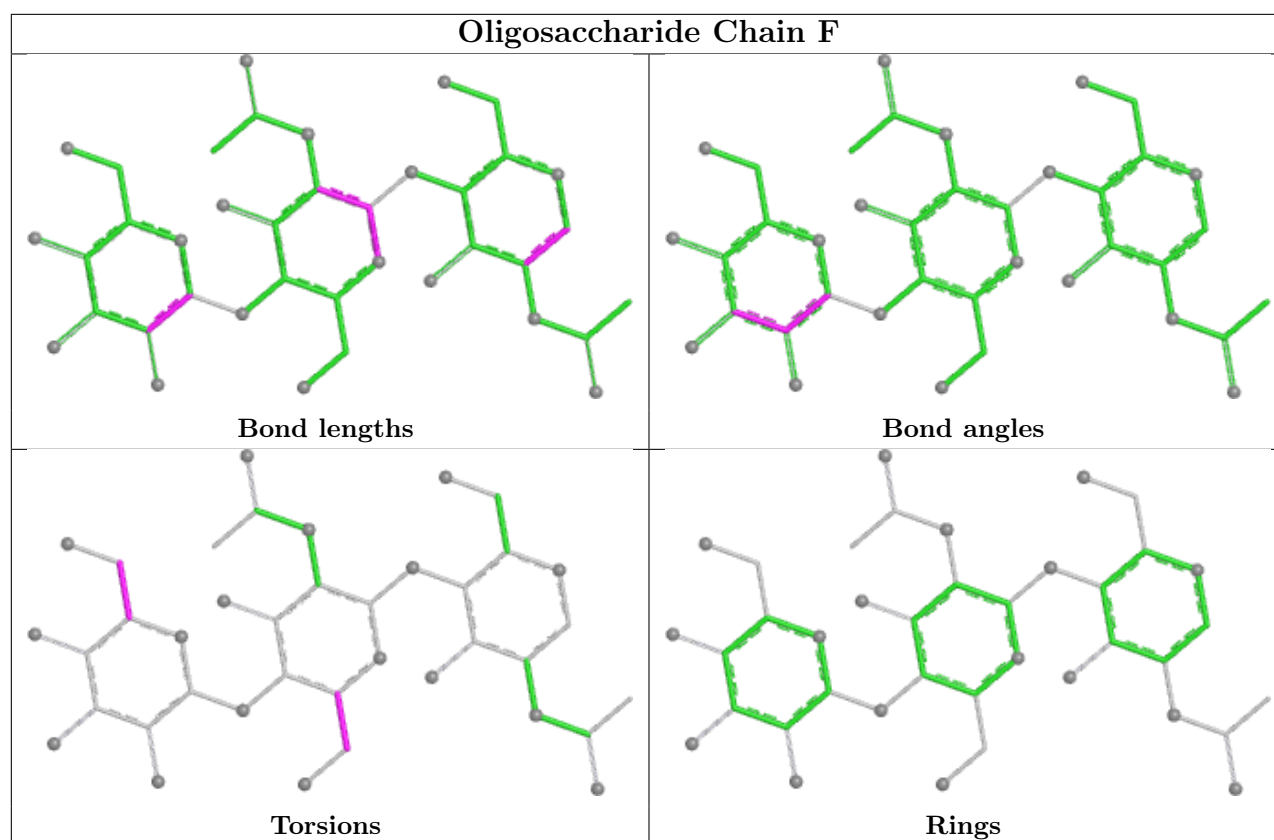
1 monomer is involved in 1 short contact:

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

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







5.6 Ligand geometry [i](#)

3 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	$\# Z > 2$
6	MES	A	308	-	12,12,12	2.20	1 (8%)	15,16,16	2.07	5 (33%)
6	MES	B	301	-	12,12,12	1.95	1 (8%)	15,16,16	2.09	5 (33%)
7	GOL	C	301	-	5,5,5	0.36	0	5,5,5	0.53	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
6	MES	A	308	-	-	2/6/14/14	0/1/1/1
6	MES	B	301	-	-	1/6/14/14	0/1/1/1
7	GOL	C	301	-	-	0/4/4/4	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	308	MES	C8-S	-7.27	1.67	1.77
6	B	301	MES	C8-S	-6.40	1.68	1.77

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	308	MES	C5-N4-C3	5.67	121.06	108.84
6	B	301	MES	C5-N4-C3	5.11	119.85	108.84
6	B	301	MES	C7-N4-C3	3.45	120.44	111.24
6	A	308	MES	C7-N4-C5	2.59	118.14	111.24
6	B	301	MES	O3S-S-C8	2.57	111.03	106.00
6	A	308	MES	C7-N4-C3	2.52	117.94	111.24
6	B	301	MES	C7-N4-C5	2.48	117.85	111.24
6	B	301	MES	C6-C5-N4	-2.44	106.41	110.12
6	A	308	MES	O1S-S-C8	2.20	110.05	106.73
6	A	308	MES	O3S-S-C8	2.15	110.20	106.00

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	308	MES	N4-C7-C8-S
6	B	301	MES	C8-C7-N4-C3
6	A	308	MES	C8-C7-N4-C3

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	308	MES	1	0
6	B	301	MES	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 [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	214/223 (95%)	0.31	8 (3%)	45	48	24, 41, 76, 103	0
2	B	235/244 (96%)	0.33	6 (2%)	57	61	25, 47, 79, 134	0
3	C	202/214 (94%)	0.64	9 (4%)	38	40	26, 54, 85, 109	0
All	All	651/681 (95%)	0.42	23 (3%)	47	50	24, 48, 81, 134	0

All (23) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	C	33	ASN	5.4
1	A	75	ILE	4.4
1	A	263	GLY	3.9
1	A	50	ALA	3.8
1	A	74	LEU	3.6
2	B	149	LYS	3.1
1	A	110	SER	3.1
1	A	73	LEU	2.8
2	B	153	GLY	2.8
2	B	208	SER	2.7
2	B	151	THR	2.6
3	C	18	ILE	2.6
3	C	24	GLY	2.4
1	A	76	SER	2.3
3	C	211	THR	2.3
1	A	51	SER	2.3
3	C	94	ALA	2.2
3	C	109	GLY	2.2
2	B	87	ARG	2.1
3	C	191	ARG	2.1
3	C	182	LEU	2.1
3	C	3	ALA	2.1
2	B	177	GLY	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](#)

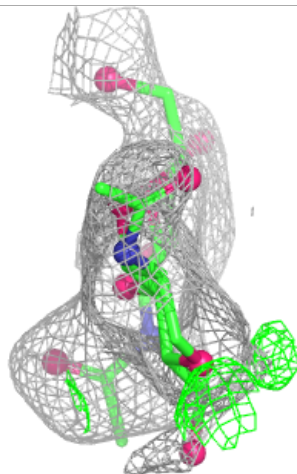
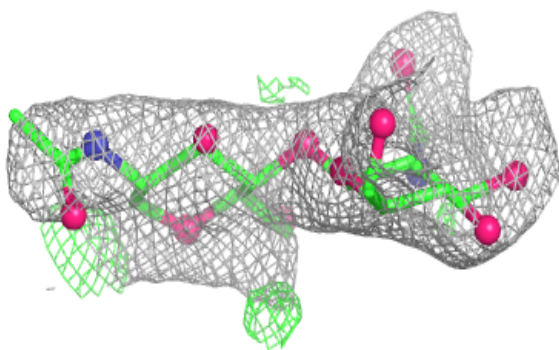
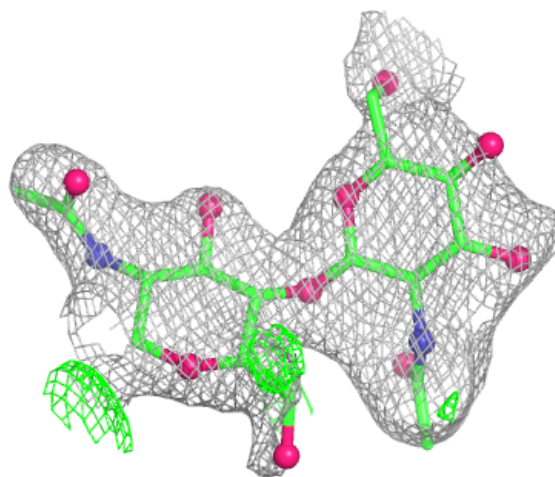
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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
5	BMA	F	3	11/12	0.42	0.15	91,94,99,101	0
4	NAG	E	2	14/15	0.67	0.14	99,104,110,110	0
5	NAG	F	2	14/15	0.80	0.14	61,68,81,86	0
4	NAG	E	1	14/15	0.80	0.12	64,70,80,90	0
4	NAG	D	1	14/15	0.85	0.12	55,68,75,80	0
4	NAG	D	2	14/15	0.88	0.10	71,77,80,81	0
5	NAG	F	1	14/15	0.91	0.10	34,37,49,52	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.

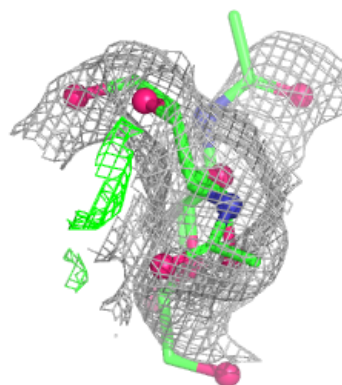
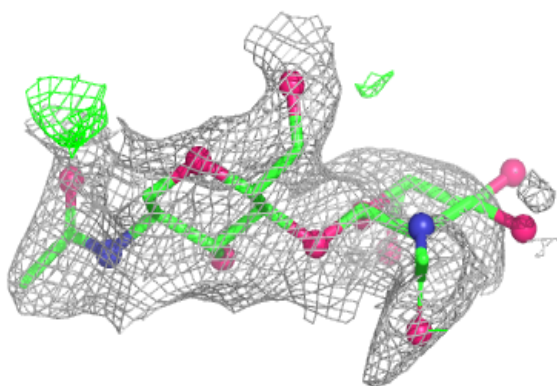
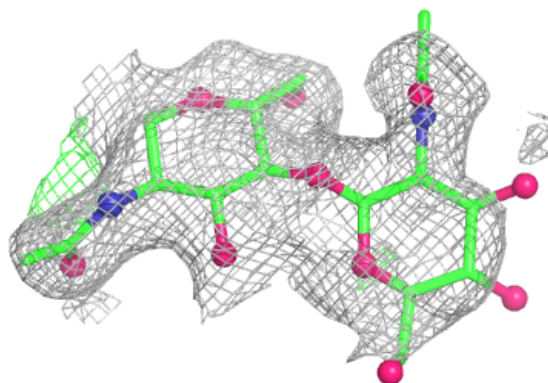
Electron density around Chain D:

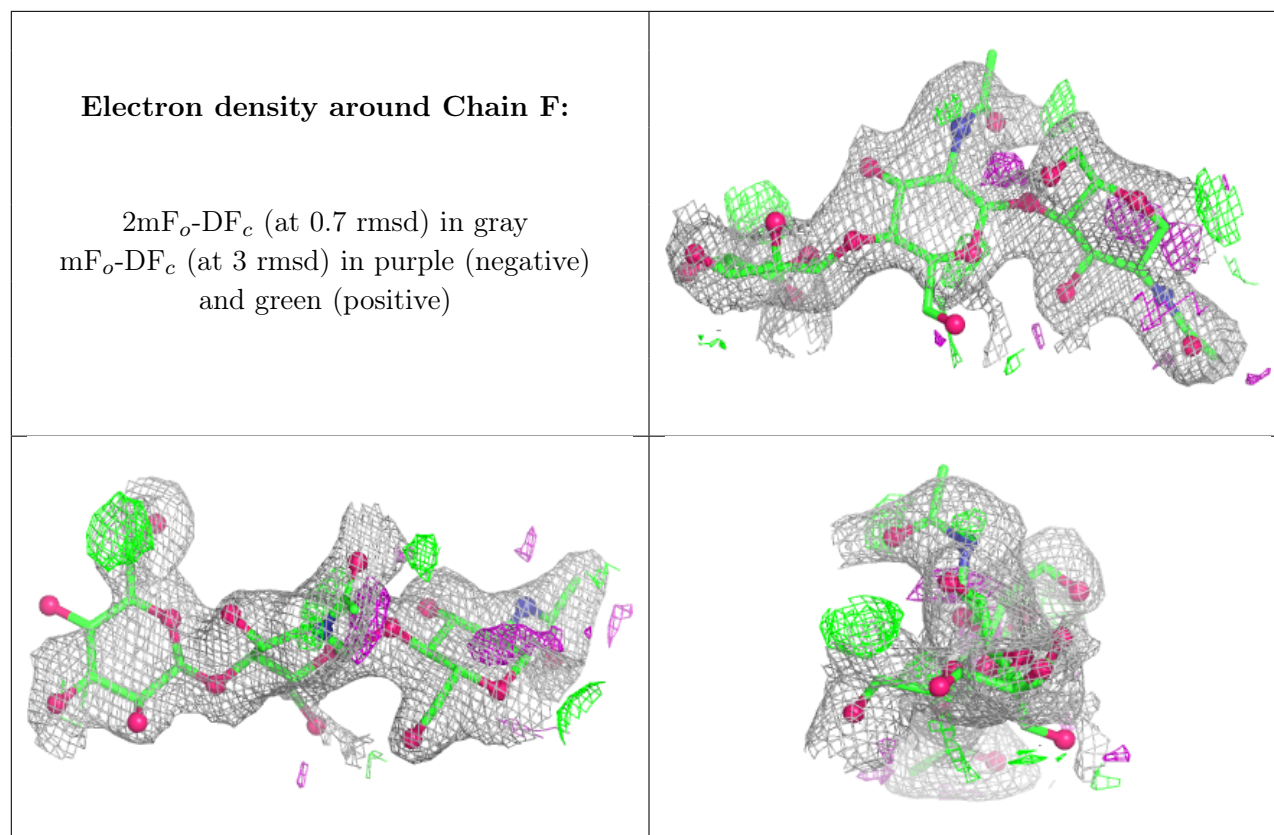
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain E:

$2mF_o-DF_c$ (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
6	MES	A	308	12/12	0.82	0.14	80,89,104,105	0
7	GOL	C	301	6/6	0.85	0.15	76,77,78,79	0
6	MES	B	301	12/12	0.92	0.12	40,55,59,60	0

6.5 Other polymers [i](#)

There are no such residues in this entry.