



Full wwPDB X-ray Structure Validation Report ⓘ

Nov 13, 2023 – 03:48 PM JST

PDB ID : 5XJF
Title : Crystal structure of fucosylated IgG Fc Y296W mutant complexed with bis-glycosylated soluble form of Fc gamma receptor IIIa
Authors : Sakae, Y.; Satoh, T.; Yagi, H.; Yanaka, S.; Yamaguchi, T.; Isoda, Y.; Iida, S.; Okamoto, Y.; Kato, K.
Deposited on : 2017-05-01
Resolution : 2.50 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

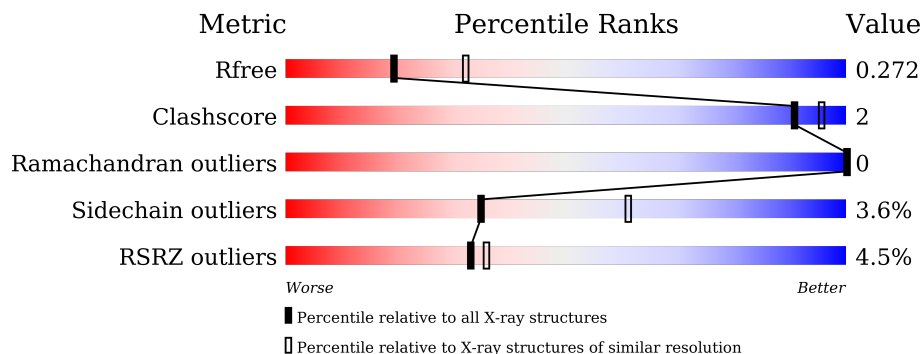
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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}	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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% 87% 9% .
1	B	223	 95% . .
2	C	179	 9% 72% 11% . 17%
3	D	9	 22% 67% 11%
3	E	9	 11% 89%
4	F	5	 80% 20%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	NAG	D	8	-	-	-	X
3	GAL	E	6	-	-	-	X
4	MAN	F	4	-	-	-	X
4	NAG	F	5	-	-	-	X

2 Entry composition i

There are 7 unique types of molecules in this entry. The entry contains 5061 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 Immunoglobulin gamma-1 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	215	1714	1093	288	327	6	0	0	0
1	B	215	1714	1093	288	327	6	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	296	TRP	TYR	engineered mutation	UNP P0DOX5
B	296	TRP	TYR	engineered mutation	UNP P0DOX5

- Molecule 2 is a protein called Low affinity immunoglobulin gamma Fc region receptor III-A.

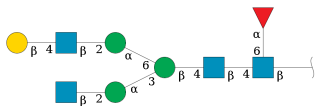
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	C	149	1225	785	210	226	4	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	38	GLN	ASN	engineered mutation	UNP P08637
C	74	GLN	ASN	engineered mutation	UNP P08637
C	158	VAL	PHE	engineered mutation	UNP P08637
C	169	GLN	ASN	engineered mutation	UNP P08637
C	176	HIS	-	expression tag	UNP P08637
C	177	HIS	-	expression tag	UNP P08637
C	178	HIS	-	expression tag	UNP P08637
C	179	HIS	-	expression tag	UNP P08637
C	180	HIS	-	expression tag	UNP P08637
C	181	HIS	-	expression tag	UNP P08637

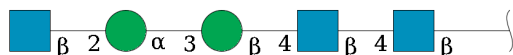
- Molecule 3 is an oligosaccharide called beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-b

eta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-6)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	D	9	Total	C	N	O	0	0	0
			110	62	4	44			
3	E	9	Total	C	N	O	0	0	0
			110	62	4	44			

- Molecule 4 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-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
			Total	C	N	O			
4	F	5	Total	C	N	O	0	0	0
			64	36	3	25			

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Cl	0	0
			1	1		

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



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

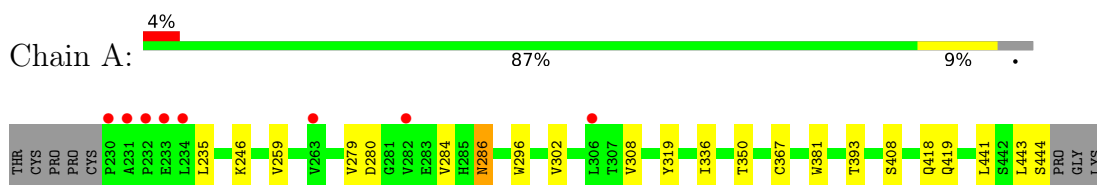
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	39	Total	O	0	0
			39	39		
7	B	55	Total	O	0	0
			55	55		
7	C	15	Total	O	0	0
			15	15		

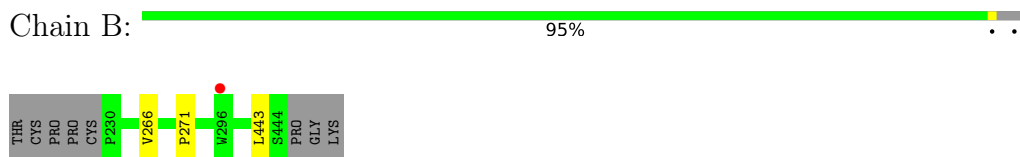
3 Residue-property plots [i](#)

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.

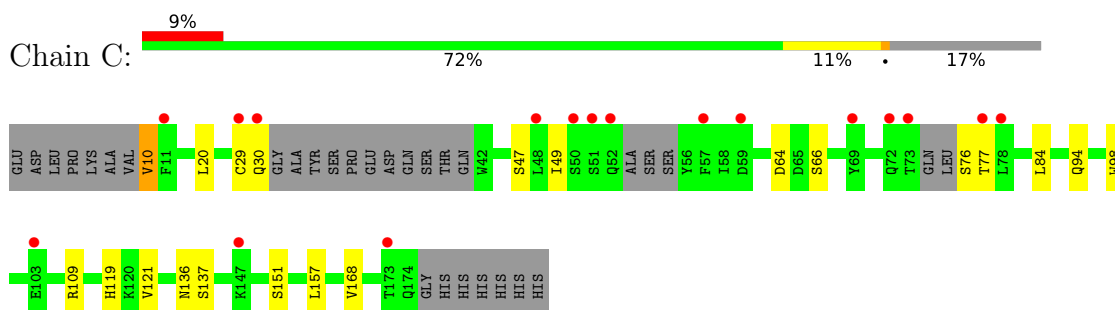
- Molecule 1: Immunoglobulin gamma-1 heavy chain



- Molecule 1: Immunoglobulin gamma-1 heavy chain



- Molecule 2: Low affinity immunoglobulin gamma Fc region receptor III-A



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




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

anose-(1-3)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose

Chain E:  11% 89%

MAG1
MAG2
BMA3
MAN4
NAG5
GAL6
MAN7
MAG8
FUC9

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

Chain F:  80% 20%

MAG1
MAG2
BMA3
MAN4
MAG5

4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	77.30Å 77.30Å 349.80Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.50 19.97 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.5 (20.00-2.50) 99.8 (19.97-2.50)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.41 (at 2.50Å)	Xtrriage
Refinement program	REFMAC 5.8.0158	Depositor
R, R_{free}	0.220 , 0.270 0.223 , 0.272	Depositor DCC
R_{free} test set	1890 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	64.6	Xtrriage
Anisotropy	0.077	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 32.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.26$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5061	wwPDB-VP
Average B, all atoms (Å ²)	68.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.90% 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: FUC, CL, BMA, NAG, MAN, GAL

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	0.54	0/1763	0.70	0/2404
1	B	0.56	0/1763	0.71	0/2404
2	C	0.56	0/1257	0.69	0/1702
All	All	0.55	0/4783	0.70	0/6510

There are no bond length outliers.

There are no bond angle outliers.

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	1714	0	1682	8	0
1	B	1714	0	1682	1	0
2	C	1225	0	1176	7	0
3	D	110	0	94	1	0
3	E	110	0	94	0	0
4	F	64	0	55	1	0
5	A	1	0	0	0	0
6	C	14	0	13	0	0
7	A	39	0	0	0	0
7	B	55	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	C	15	0	0	1	0
All	All	5061	0	4796	17	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 2.

All (17) 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:A:308:VAL:HG22	1:A:319:TYR:CE2	2.45	0.52
2:C:94:GLN:OE1	2:C:109:ARG:NH1	2.39	0.51
1:A:367:CYS:HB2	1:A:381:TRP:CZ2	2.45	0.51
2:C:119:HIS:HB2	7:C:1108:HOH:O	2.15	0.46
2:C:66:SER:HA	2:C:84:LEU:O	2.17	0.45
2:C:121:VAL:HG21	2:C:136:ASN:HA	1.97	0.45
1:A:350:THR:HB	1:A:441:LEU:HD22	1.98	0.45
1:A:259:VAL:HG13	1:A:336:ILE:HD11	2.00	0.44
1:A:284:VAL:HG12	1:A:286:ASN:HD22	1.83	0.44
2:C:98:TRP:CZ3	2:C:168:VAL:HG21	2.54	0.43
3:D:8:NAG:H3	3:D:8:NAG:H83	1.99	0.42
1:A:393:THR:HA	1:A:408:SER:HA	2.02	0.42
2:C:64:ASP:OD1	4:F:2:NAG:O6	2.37	0.41
1:B:266:VAL:CG1	1:B:271:PRO:HA	2.51	0.41
2:C:10:VAL:CG2	2:C:30:GLN:HE21	2.34	0.41
1:A:418:GLN:HA	1:A:443:LEU:HD22	2.03	0.40
1:A:279:VAL:HG23	1:A:284:VAL:HG21	2.02	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	213/223 (96%)	205 (96%)	8 (4%)	0	100	100
1	B	213/223 (96%)	212 (100%)	1 (0%)	0	100	100
2	C	141/179 (79%)	131 (93%)	10 (7%)	0	100	100
All	All	567/625 (91%)	548 (97%)	19 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	199/206 (97%)	191 (96%)	8 (4%)	31	56
1	B	199/206 (97%)	198 (100%)	1 (0%)	88	96
2	C	137/162 (85%)	127 (93%)	10 (7%)	14	27
All	All	535/574 (93%)	516 (96%)	19 (4%)	35	61

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	235	LEU
1	A	246	LYS
1	A	280	ASP
1	A	286	ASN
1	A	296	TRP
1	A	302	VAL
1	A	419	GLN
1	A	444	SER
1	B	443	LEU
2	C	10	VAL
2	C	20	LEU
2	C	29	CYS
2	C	47	SER
2	C	49	ILE
2	C	76	SER

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Mol	Chain	Res	Type
2	C	77	THR
2	C	137	SER
2	C	151	SER
2	C	157	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	286	ASN
1	A	419	GLN
1	A	421	ASN
1	B	421	ASN
1	B	438	GLN
2	C	15	GLN
2	C	30	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](#)

23 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	D	1	1,3	14,14,15	0.49	0	17,19,21	1.24	2 (11%)
3	NAG	D	2	3	14,14,15	0.59	0	17,19,21	0.97	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	BMA	D	3	3	11,11,12	0.55	0	15,15,17	1.21	2 (13%)
3	MAN	D	4	3	11,11,12	0.79	0	15,15,17	1.43	2 (13%)
3	NAG	D	5	3	14,14,15	0.54	0	17,19,21	1.47	2 (11%)
3	GAL	D	6	3	11,11,12	0.58	0	15,15,17	1.10	0
3	MAN	D	7	3	11,11,12	0.66	0	15,15,17	1.28	2 (13%)
3	NAG	D	8	3	14,14,15	0.76	0	17,19,21	2.47	6 (35%)
3	FUC	D	9	3	10,10,11	1.05	1 (10%)	14,14,16	1.64	4 (28%)
3	NAG	E	1	1,3	14,14,15	0.46	0	17,19,21	1.28	3 (17%)
3	NAG	E	2	3	14,14,15	0.43	0	17,19,21	0.92	0
3	BMA	E	3	3	11,11,12	0.41	0	15,15,17	0.99	1 (6%)
3	MAN	E	4	3	11,11,12	0.28	0	15,15,17	1.34	2 (13%)
3	NAG	E	5	3	14,14,15	0.52	0	17,19,21	1.29	1 (5%)
3	GAL	E	6	3	11,11,12	0.69	0	15,15,17	1.59	4 (26%)
3	MAN	E	7	3	11,11,12	0.45	0	15,15,17	1.25	2 (13%)
3	NAG	E	8	3	14,14,15	0.41	0	17,19,21	2.12	5 (29%)
3	FUC	E	9	3	10,10,11	1.15	1 (10%)	14,14,16	2.72	4 (28%)
4	NAG	F	1	2,4	14,14,15	0.61	0	17,19,21	1.12	1 (5%)
4	NAG	F	2	4	14,14,15	0.67	0	17,19,21	1.61	5 (29%)
4	BMA	F	3	4	11,11,12	0.68	0	15,15,17	1.74	3 (20%)
4	MAN	F	4	4	11,11,12	0.61	0	15,15,17	1.92	3 (20%)
4	NAG	F	5	4	14,14,15	0.57	0	17,19,21	1.31	3 (17%)

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	D	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	D	2	3	-	0/6/23/26	0/1/1/1
3	BMA	D	3	3	-	0/2/19/22	0/1/1/1
3	MAN	D	4	3	-	0/2/19/22	0/1/1/1
3	NAG	D	5	3	-	2/6/23/26	0/1/1/1
3	GAL	D	6	3	-	0/2/19/22	0/1/1/1
3	MAN	D	7	3	-	2/2/19/22	0/1/1/1
3	NAG	D	8	3	-	5/6/23/26	0/1/1/1
3	FUC	D	9	3	-	-	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	E	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	E	2	3	-	0/6/23/26	0/1/1/1
3	BMA	E	3	3	-	0/2/19/22	0/1/1/1
3	MAN	E	4	3	-	0/2/19/22	0/1/1/1
3	NAG	E	5	3	-	2/6/23/26	0/1/1/1
3	GAL	E	6	3	-	0/2/19/22	0/1/1/1
3	MAN	E	7	3	-	2/2/19/22	0/1/1/1
3	NAG	E	8	3	-	3/6/23/26	0/1/1/1
3	FUC	E	9	3	-	-	0/1/1/1
4	NAG	F	1	2,4	-	0/6/23/26	0/1/1/1
4	NAG	F	2	4	-	2/6/23/26	0/1/1/1
4	BMA	F	3	4	-	2/2/19/22	0/1/1/1
4	MAN	F	4	4	-	2/2/19/22	0/1/1/1
4	NAG	F	5	4	-	2/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	E	9	FUC	O5-C1	-2.69	1.39	1.43
3	D	9	FUC	O5-C1	-2.63	1.39	1.43

All (57) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	9	FUC	C1-C2-C3	-7.81	100.07	109.67
3	D	8	NAG	C2-N2-C7	5.55	130.81	122.90
3	E	8	NAG	C2-N2-C7	5.40	130.59	122.90
4	F	4	MAN	C1-O5-C5	5.27	119.33	112.19
3	D	8	NAG	C4-C3-C2	4.76	117.99	111.02
4	F	3	BMA	C1-O5-C5	4.73	118.59	112.19
3	E	8	NAG	C8-C7-N2	4.32	123.41	116.10
3	D	8	NAG	C8-C7-N2	3.85	122.62	116.10
3	E	9	FUC	O5-C5-C4	3.78	116.31	109.52
3	E	4	MAN	C1-O5-C5	3.56	117.01	112.19
3	D	8	NAG	C3-C4-C5	3.55	116.57	110.24
3	D	7	MAN	O2-C2-C1	3.43	116.17	109.15
3	D	1	NAG	O5-C5-C6	3.39	112.53	107.20
3	E	6	GAL	C1-C2-C3	3.34	113.78	109.67
3	D	4	MAN	C1-O5-C5	3.30	116.67	112.19
3	E	8	NAG	O5-C1-C2	-3.26	106.14	111.29

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	F	5	NAG	C1-O5-C5	3.26	116.61	112.19
3	E	9	FUC	C3-C4-C5	3.21	114.77	109.77
4	F	2	NAG	O5-C5-C6	3.13	112.11	107.20
3	D	8	NAG	O5-C5-C6	3.02	111.93	107.20
3	E	6	GAL	C2-C3-C4	3.01	116.10	110.89
3	D	9	FUC	C2-C3-C4	-2.95	105.78	110.89
4	F	4	MAN	O5-C1-C2	-2.95	106.22	110.77
4	F	3	BMA	C1-C2-C3	2.94	113.28	109.67
3	E	5	NAG	C8-C7-N2	2.88	120.97	116.10
4	F	5	NAG	C2-N2-C7	2.85	126.96	122.90
3	D	9	FUC	C1-O5-C5	-2.82	106.37	112.78
4	F	2	NAG	C1-O5-C5	2.81	116.00	112.19
3	D	9	FUC	C1-C2-C3	-2.71	106.33	109.67
3	D	5	NAG	C8-C7-N2	2.70	120.67	116.10
3	E	7	MAN	O4-C4-C3	-2.68	104.15	110.35
3	D	9	FUC	O2-C2-C3	2.60	115.35	110.14
3	D	4	MAN	C1-C2-C3	2.54	112.78	109.67
3	D	1	NAG	C1-O5-C5	2.43	115.49	112.19
3	E	3	BMA	C1-C2-C3	2.42	112.64	109.67
4	F	2	NAG	C4-C3-C2	-2.40	107.50	111.02
4	F	3	BMA	C3-C4-C5	2.38	114.48	110.24
3	D	3	BMA	C1-O5-C5	2.37	115.41	112.19
3	E	1	NAG	O6-C6-C5	-2.31	103.37	111.29
3	E	9	FUC	O2-C2-C3	2.30	114.74	110.14
3	E	8	NAG	O7-C7-N2	-2.28	117.75	121.95
3	D	7	MAN	O2-C2-C3	-2.26	105.61	110.14
3	E	8	NAG	C3-C4-C5	2.24	114.23	110.24
4	F	2	NAG	O5-C1-C2	-2.21	107.80	111.29
3	D	5	NAG	O4-C4-C3	-2.16	105.37	110.35
3	E	6	GAL	O5-C5-C6	2.15	110.58	107.20
4	F	1	NAG	O5-C1-C2	-2.14	107.90	111.29
3	D	8	NAG	O7-C7-C8	-2.14	118.08	122.06
4	F	5	NAG	C1-C2-N2	2.14	114.14	110.49
3	E	4	MAN	O4-C4-C5	2.10	114.52	109.30
3	E	7	MAN	O2-C2-C3	-2.10	105.93	110.14
3	E	1	NAG	O4-C4-C3	2.07	115.13	110.35
3	D	3	BMA	O3-C3-C2	-2.06	106.05	109.99
4	F	2	NAG	C3-C4-C5	-2.05	106.58	110.24
3	E	6	GAL	O5-C1-C2	-2.05	107.61	110.77
3	E	1	NAG	C1-O5-C5	2.02	114.93	112.19
4	F	4	MAN	C1-C2-C3	-2.00	107.21	109.67

There are no chirality outliers.

All (26) torsion outliers are listed below:

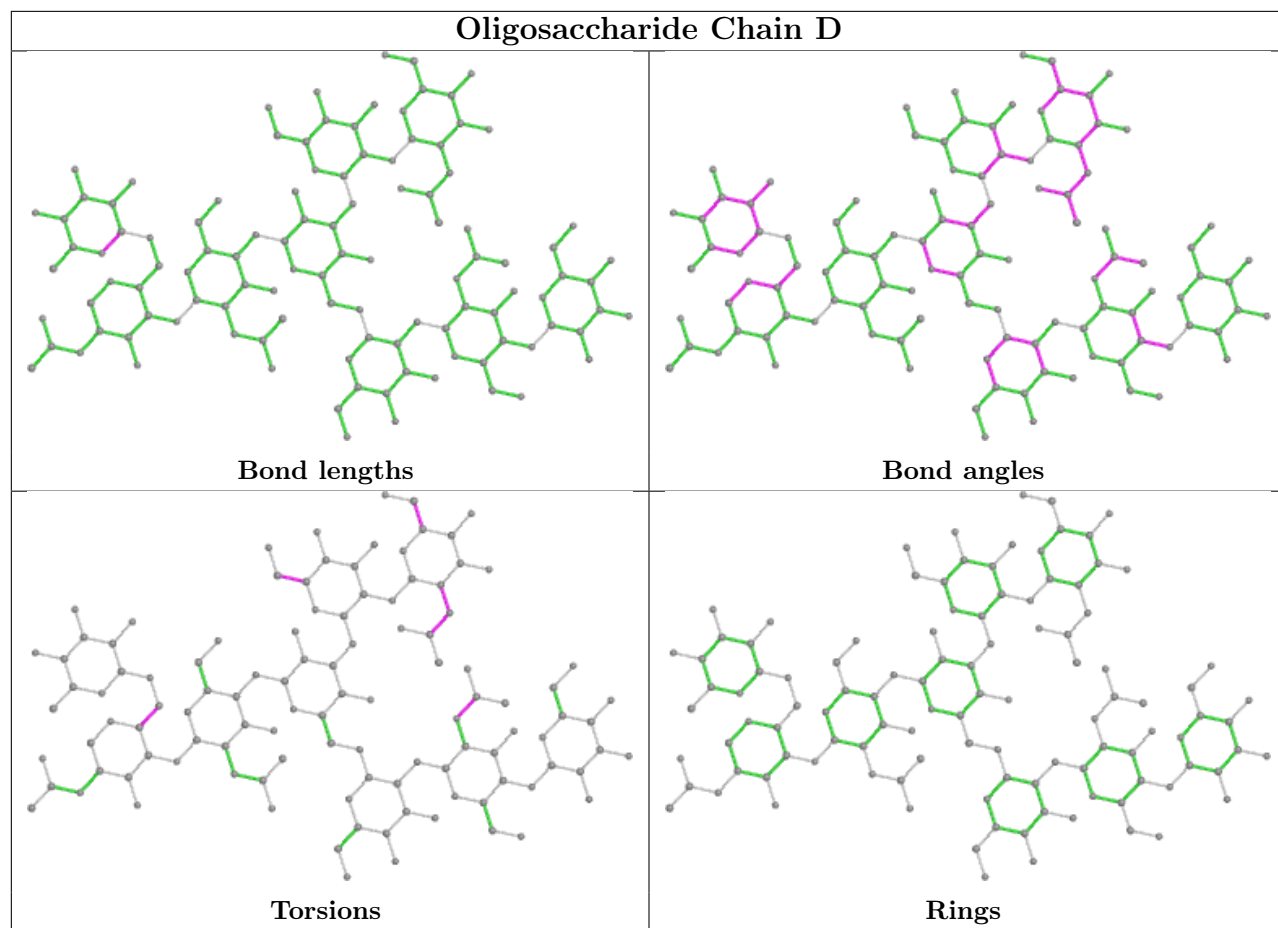
Mol	Chain	Res	Type	Atoms
3	D	8	NAG	O5-C5-C6-O6
3	E	7	MAN	O5-C5-C6-O6
3	D	1	NAG	O5-C5-C6-O6
4	F	2	NAG	O5-C5-C6-O6
3	D	7	MAN	C4-C5-C6-O6
3	D	7	MAN	O5-C5-C6-O6
3	D	8	NAG	C4-C5-C6-O6
3	E	7	MAN	C4-C5-C6-O6
4	F	3	BMA	O5-C5-C6-O6
4	F	2	NAG	C4-C5-C6-O6
4	F	4	MAN	C4-C5-C6-O6
4	F	3	BMA	C4-C5-C6-O6
3	D	1	NAG	C4-C5-C6-O6
3	D	5	NAG	C8-C7-N2-C2
3	D	5	NAG	O7-C7-N2-C2
3	D	8	NAG	C8-C7-N2-C2
3	D	8	NAG	O7-C7-N2-C2
3	E	5	NAG	C8-C7-N2-C2
3	E	5	NAG	O7-C7-N2-C2
3	E	8	NAG	C8-C7-N2-C2
3	E	8	NAG	O7-C7-N2-C2
4	F	5	NAG	O5-C5-C6-O6
4	F	4	MAN	O5-C5-C6-O6
3	D	8	NAG	C3-C2-N2-C7
3	E	8	NAG	C3-C2-N2-C7
4	F	5	NAG	C3-C2-N2-C7

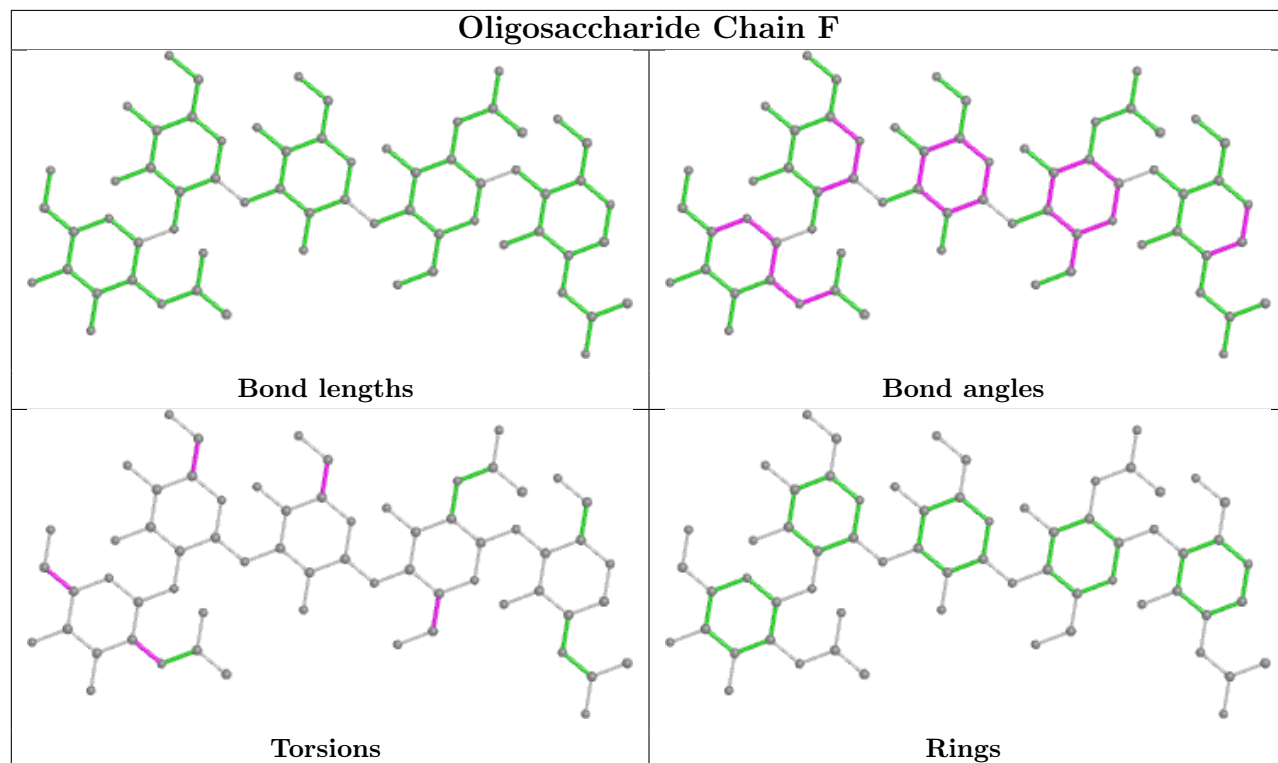
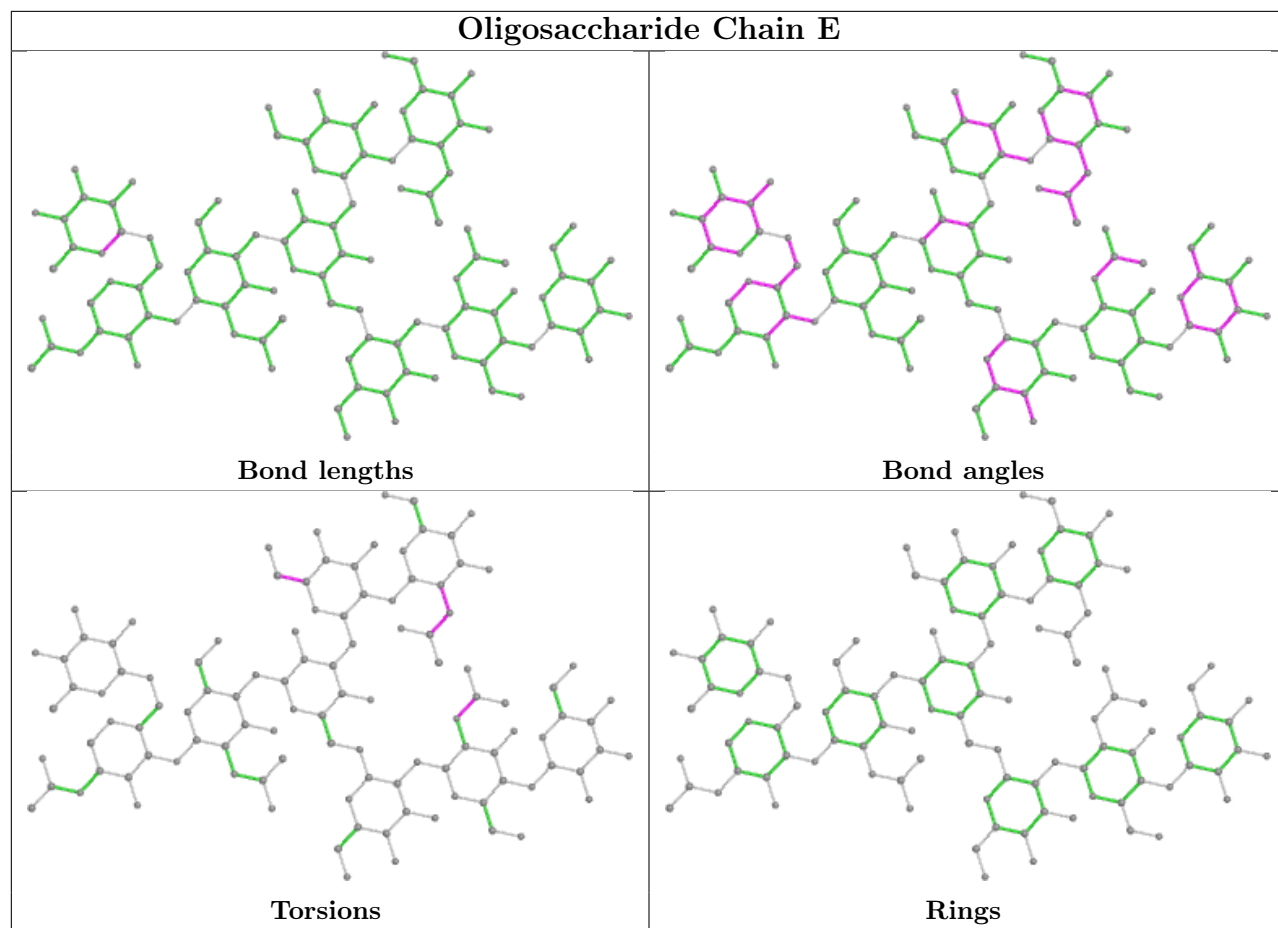
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	8	NAG	1	0
4	F	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.





5.6 Ligand geometry

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	NAG	C	1001	2	14,14,15	0.83	0	17,19,21	1.32	2 (11%)

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	NAG	C	1001	2	-	3/6/23/26	0/1/1/1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	C	1001	NAG	C1-O5-C5	2.16	115.12	112.19
6	C	1001	NAG	C2-N2-C7	2.11	125.91	122.90

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	C	1001	NAG	C3-C2-N2-C7
6	C	1001	NAG	O5-C5-C6-O6
6	C	1001	NAG	C4-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

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	215/223 (96%)	0.02	8 (3%) 41 45	38, 63, 93, 161	0
1	B	215/223 (96%)	-0.29	1 (0%) 91 91	40, 54, 73, 123	0
2	C	149/179 (83%)	0.48	17 (11%) 5 4	47, 73, 130, 146	0
All	All	579/625 (92%)	0.02	26 (4%) 33 36	38, 61, 113, 161	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	296	TRP	5.7
1	A	231	ALA	5.5
2	C	11	PHE	4.8
2	C	48	LEU	4.7
2	C	73	THR	4.4
2	C	29	CYS	4.0
2	C	77	THR	3.8
1	A	230	PRO	3.8
2	C	78	LEU	3.8
2	C	51	SER	3.7
2	C	72	GLN	3.3
1	A	232	PRO	3.1
1	A	282	VAL	3.1
1	A	233	GLU	3.1
2	C	50	SER	3.1
2	C	59	ASP	2.8
2	C	57	PHE	2.7
2	C	52	GLN	2.6
2	C	103	GLU	2.5
1	A	234	LEU	2.4
2	C	69	TYR	2.4
2	C	173	THR	2.4
1	A	306	LEU	2.3

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Mol	Chain	Res	Type	RSRZ
2	C	30	GLN	2.2
2	C	147	LYS	2.1
1	A	263	VAL	2.0

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

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

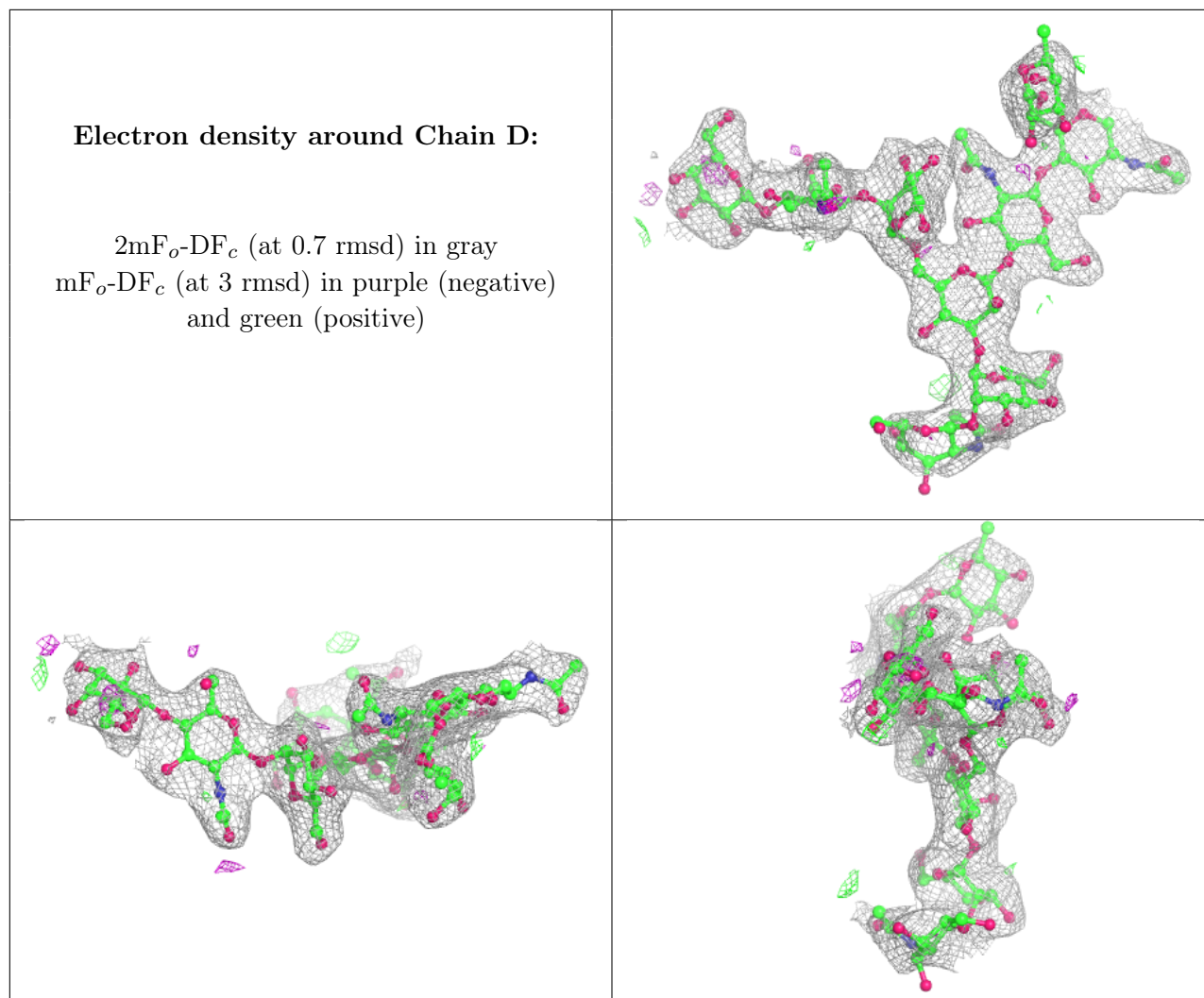
6.3 Carbohydrates [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	NAG	F	5	14/15	0.56	0.55	150,169,186,189	0
4	MAN	F	4	11/12	0.59	0.41	139,155,172,185	0
3	GAL	E	6	11/12	0.72	0.41	77,91,98,108	0
3	NAG	D	8	14/15	0.76	0.52	118,132,138,142	0
3	NAG	E	8	14/15	0.83	0.35	101,116,118,119	0
3	GAL	D	6	11/12	0.84	0.29	71,83,90,94	0
4	BMA	F	3	11/12	0.84	0.28	129,142,146,154	0
4	NAG	F	2	14/15	0.88	0.26	99,111,124,138	0
4	NAG	F	1	14/15	0.89	0.13	84,95,99,106	0
3	FUC	D	9	10/11	0.91	0.27	86,90,94,97	0
3	FUC	E	9	10/11	0.93	0.13	79,84,92,93	0
3	NAG	D	5	14/15	0.93	0.13	64,67,78,78	0
3	MAN	D	4	11/12	0.93	0.13	59,62,65,66	0
3	MAN	E	7	11/12	0.94	0.23	74,82,91,101	0
3	NAG	E	5	14/15	0.94	0.16	60,73,76,77	0
3	MAN	D	7	11/12	0.95	0.22	74,77,84,102	0
3	NAG	D	2	14/15	0.96	0.10	49,53,60,61	0
3	BMA	D	3	11/12	0.96	0.12	54,59,62,66	0
3	NAG	D	1	14/15	0.96	0.13	48,54,64,74	0
3	BMA	E	3	11/12	0.97	0.07	57,58,64,65	0
3	MAN	E	4	11/12	0.97	0.12	67,71,74,78	0
3	NAG	E	1	14/15	0.97	0.13	54,58,64,70	0
3	NAG	E	2	14/15	0.97	0.10	49,54,57,57	0

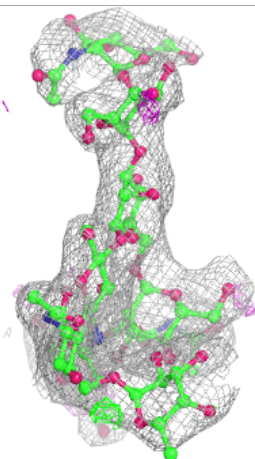
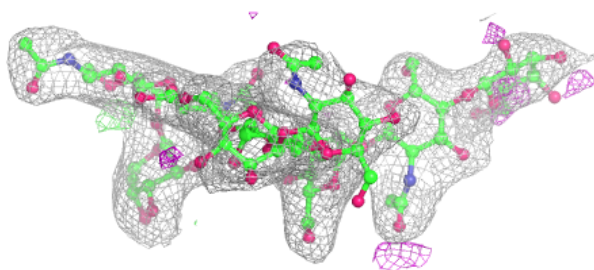
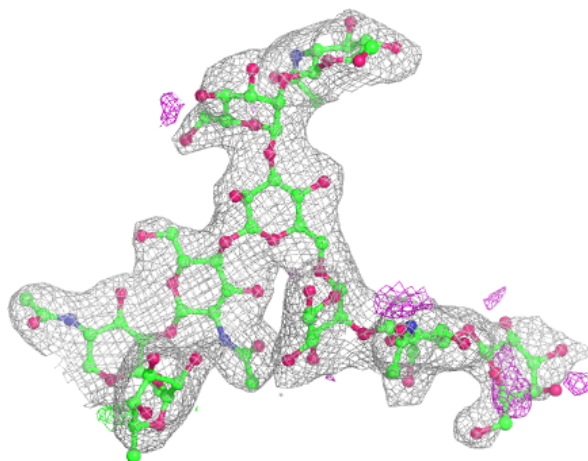
The following is a graphical depiction of the model fit to experimental electron density for oligosac-

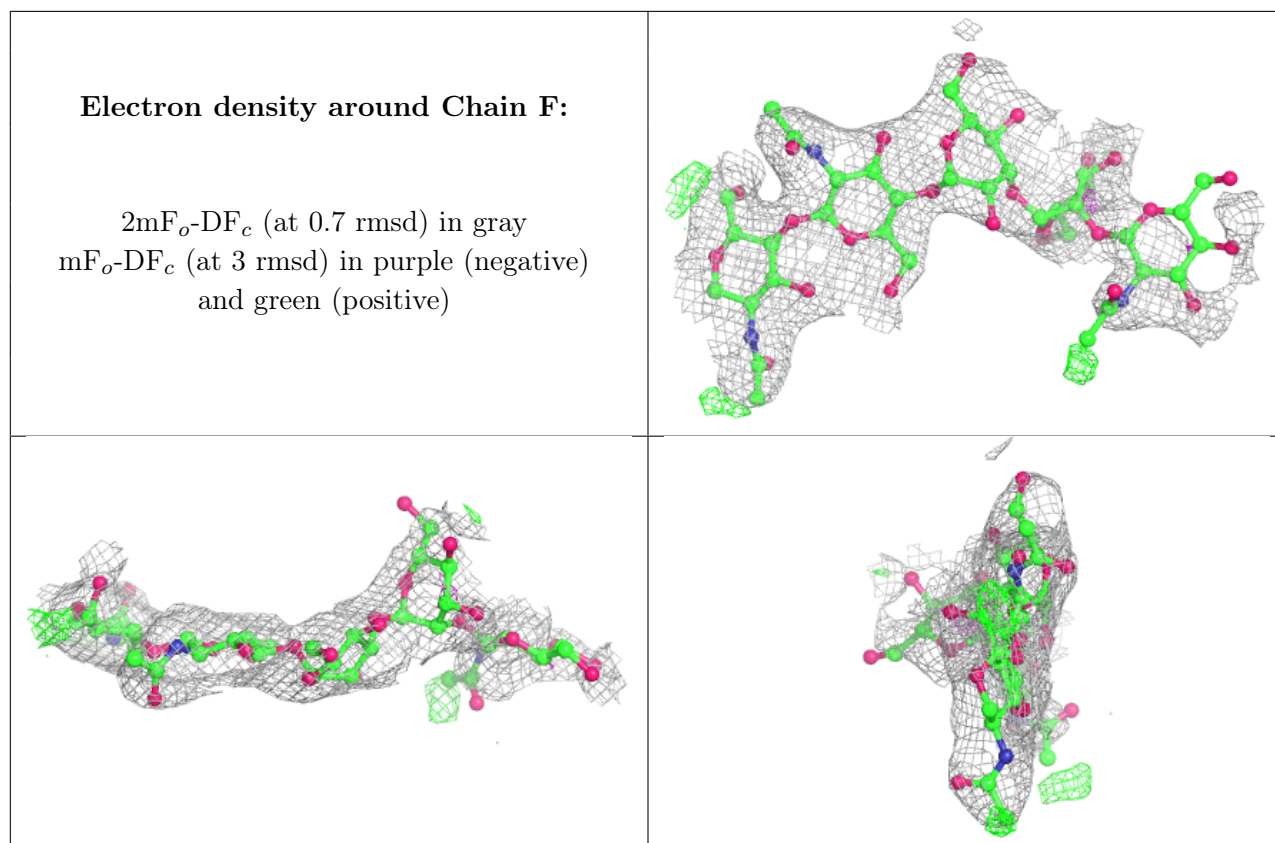
charide. Each fit is shown from different orientation to approximate a three-dimensional view.



Electron density around Chain E:

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





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(\AA^2)	Q<0.9
6	NAG	C	1001	14/15	0.91	0.19	84,93,102,107	0
5	CL	A	1010	1/1	0.93	0.06	82,82,82,82	0

6.5 Other polymers [i](#)

There are no such residues in this entry.