



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 26, 2023 – 04:24 AM EDT

PDB ID : 6ARU
Title : Structure of Cetuximab Fab mutant in complex with EGFR extracellular domain
Authors : Christie, M.; Christ, D.
Deposited on : 2017-08-23
Resolution : 3.20 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 : 2.35.1
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) : 2.35.1

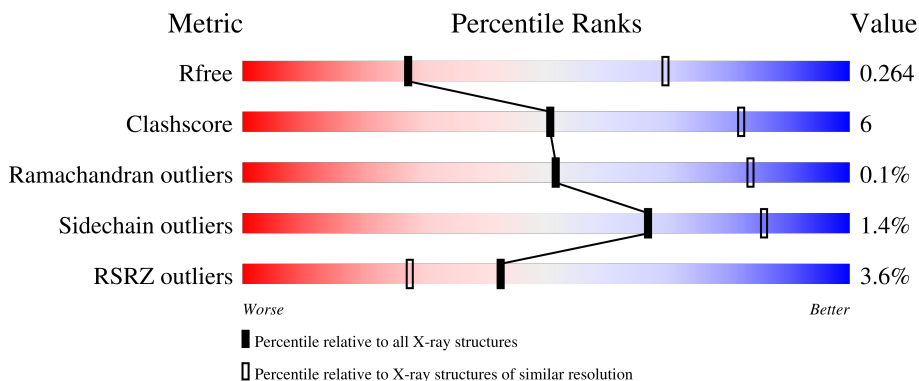
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.20 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	1133 (3.20-3.20)
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)
RSRZ outliers	127900	1095 (3.20-3.20)

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	622	 4% 81% 17%
2	B	214	 4% 86% 12%
3	C	222	 2% 83% 13% 5%
4	D	8	 75% 25%
5	E	2	 100%

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 8087 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 Epidermal growth factor receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	609	4686	2892	839	895	60	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	516	LYS	ASN	conflict	UNP P00533
A	610	ARG	GLU	conflict	UNP P00533
A	617	HIS	-	expression tag	UNP P00533
A	618	HIS	-	expression tag	UNP P00533
A	619	HIS	-	expression tag	UNP P00533
A	620	HIS	-	expression tag	UNP P00533
A	621	HIS	-	expression tag	UNP P00533
A	622	HIS	-	expression tag	UNP P00533

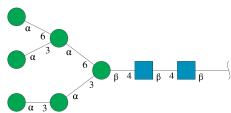
- Molecule 2 is a protein called Cetuximab mutant light chain, Uncharacterized protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	210	1622	1011	274	333	4	0	0	0

- Molecule 3 is a protein called Cetuximab mutant heavy chain Fab fragment, Immunoglobulin gamma-1 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	212	1615	1030	264	316	5	0	0	0

- Molecule 4 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



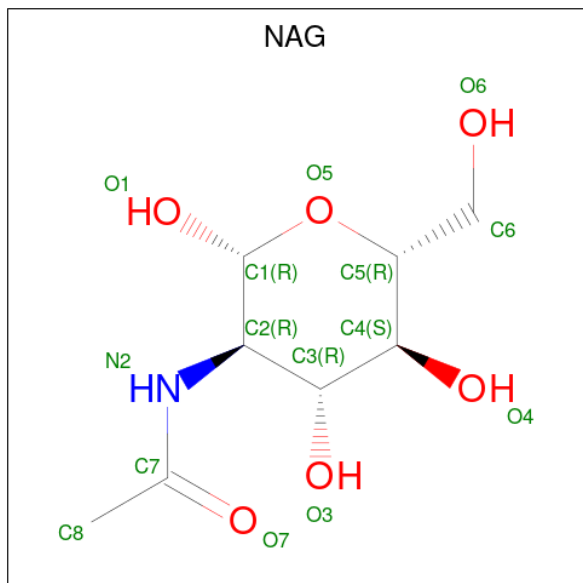
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	D	8	94	52	2	40	0	0	0

- Molecule 5 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
			Total	C	N	O			
5	E	2	28	16	2	10	0	0	0

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



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

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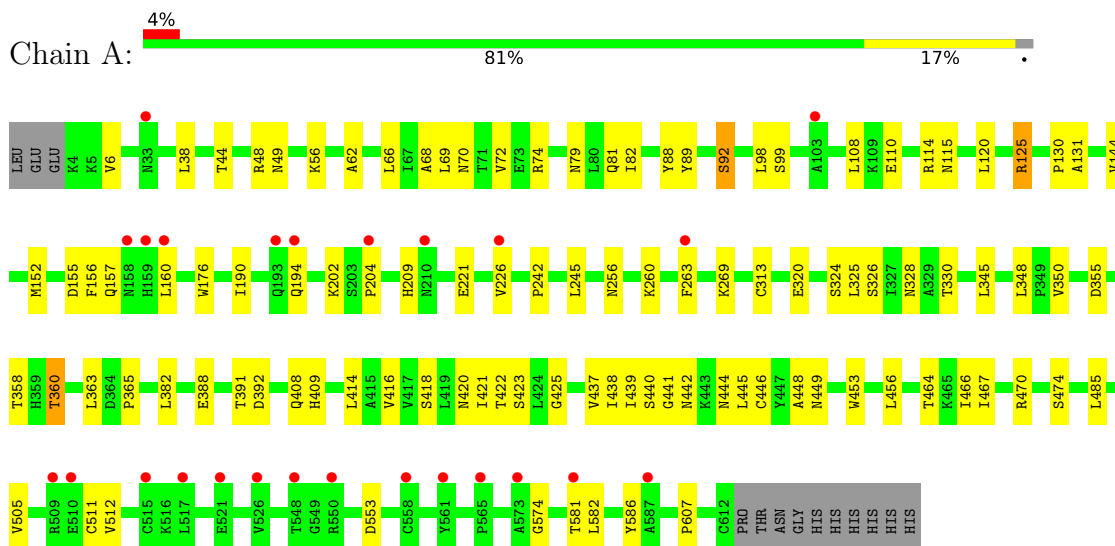
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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
6	C	1	14	8	1	5	0	0

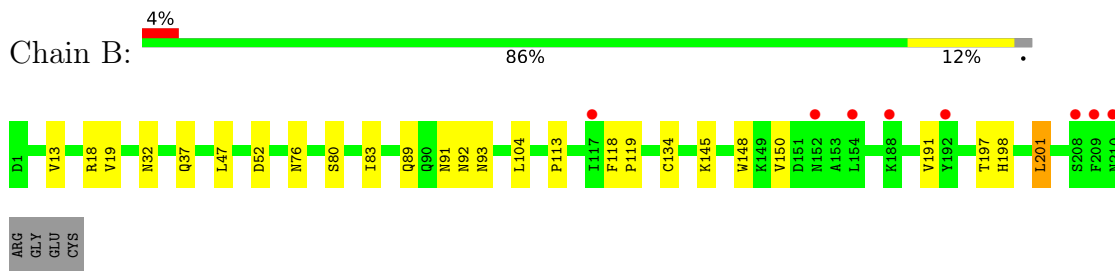
3 Residue-property plots [i](#)

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.

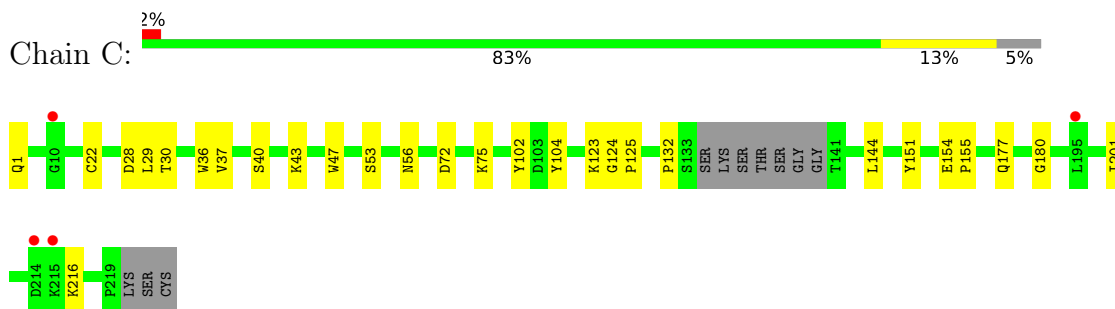
- Molecule 1: Epidermal growth factor receptor




- Molecule 2: Cetuximab mutant light chain, Uncharacterized protein



- Molecule 3: Cetuximab mutant heavy chain Fab fragment, Immunoglobulin gamma-1 heavy chain



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

Chain D:  75% 25%

MAG1
MAG2
BMA3
MAN4
MAN5
MAN6
MAN7
MAN8

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

Chain E:  100%

MAG1
MAG2

4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	77.50Å 70.44Å 149.08Å 90.00° 100.95° 90.00°	Depositor
Resolution (Å)	40.11 – 3.20 46.88 – 3.20	Depositor EDS
% Data completeness (in resolution range)	99.8 (40.11-3.20) 99.8 (46.88-3.20)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.02 (at 3.19Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.232 , 0.267 0.230 , 0.264	Depositor DCC
R_{free} test set	1351 reflections (5.13%)	wwPDB-VP
Wilson B-factor (Å ²)	70.0	Xtrriage
Anisotropy	0.237	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 34.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.28$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.89	EDS
Total number of atoms	8087	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.40% 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: MAN, NAG, BMA

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	0.37	0/4777	0.64	0/6459
2	B	0.38	0/1656	0.59	0/2251
3	C	0.43	0/1658	0.64	0/2266
All	All	0.39	0/8091	0.63	0/10976

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	4686	0	4526	58	0
2	B	1622	0	1564	17	0
3	C	1615	0	1570	16	0
4	D	94	0	79	3	0
5	E	28	0	25	0	0
6	A	28	0	26	1	0
6	C	14	0	13	0	0
All	All	8087	0	7803	90	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 6.

All (90) 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:40:SER:HB2	3:C:43:LYS:HB3	1.68	0.74
1:A:82:ILE:HG21	1:A:226:VAL:HG11	1.73	0.69
1:A:408:GLN:HE21	1:A:409:HIS:CD2	2.12	0.67
1:A:98:LEU:HD21	1:A:125:ARG:HG2	1.76	0.66
2:B:32:ASN:HB3	2:B:91:ASN:HB3	1.78	0.65
1:A:114:ARG:HA	1:A:176:TRP:CD1	2.33	0.63
1:A:324:SER:HB3	4:D:1:NAG:H4	1.80	0.62
3:C:28:ASP:OD2	3:C:30:THR:OG1	2.18	0.61
3:C:132:PRO:HD3	3:C:144:LEU:HB3	1.82	0.61
3:C:123:LYS:NZ	3:C:124:GLY:O	2.30	0.61
2:B:13:VAL:HG11	2:B:19:VAL:HG22	1.83	0.60
2:B:113:PRO:HD2	2:B:201:LEU:HD11	1.84	0.58
1:A:88:TYR:CD2	1:A:92:SER:HA	2.39	0.57
1:A:56:LYS:O	1:A:79:ASN:ND2	2.38	0.57
1:A:358:THR:OG1	1:A:360:THR:OG1	2.22	0.57
3:C:154:GLU:HG2	3:C:155:PRO:HA	1.88	0.56
1:A:391:THR:HB	1:A:422:THR:OG1	2.06	0.55
3:C:37:VAL:HG22	3:C:47:TRP:HA	1.88	0.55
3:C:72:ASP:OD2	3:C:75:LYS:HE2	2.07	0.55
6:A:710:NAG:H3	6:A:710:NAG:H83	1.89	0.53
1:A:448:ALA:HB1	1:A:466:ILE:HD13	1.90	0.53
1:A:414:LEU:HB3	1:A:437:VAL:HG22	1.90	0.53
3:C:125:PRO:HB3	3:C:151:TYR:HB3	1.90	0.53
1:A:416:VAL:HB	1:A:439:ILE:HD13	1.90	0.52
3:C:22:CYS:HB2	3:C:36:TRP:CH2	2.44	0.52
2:B:198:HIS:HB3	2:B:201:LEU:HD13	1.92	0.52
1:A:82:ILE:HD11	1:A:120:LEU:HG	1.91	0.51
1:A:464:THR:HG22	1:A:466:ILE:HG13	1.93	0.51
2:B:37:GLN:HB2	2:B:47:LEU:HD11	1.94	0.50
1:A:422:THR:HG22	1:A:444:ASN:HB3	1.94	0.48
1:A:156:PHE:O	1:A:157:GLN:HG3	2.14	0.48
2:B:18:ARG:HG3	2:B:76:ASN:HA	1.95	0.48
1:A:130:PRO:HB2	1:A:160:LEU:HG	1.96	0.48
1:A:81:GLN:HA	1:A:115:ASN:O	2.14	0.48
2:B:145:LYS:HB2	2:B:197:THR:HB	1.95	0.48
3:C:201:ILE:HD13	3:C:216:LYS:HA	1.96	0.48
1:A:242:PRO:HG2	1:A:245:LEU:HD21	1.95	0.47
3:C:56:ASN:OD1	3:C:56:ASN:N	2.47	0.47
1:A:574:GLY:HA2	1:A:582:LEU:HD13	1.98	0.46
1:A:245:LEU:HG	1:A:256:ASN:HB2	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:113:PRO:HD2	2:B:201:LEU:CD1	2.46	0.46
1:A:131:ALA:HB2	1:A:160:LEU:HD12	1.97	0.46
1:A:382:LEU:HD13	1:A:408:GLN:OE1	2.16	0.46
2:B:52:ASP:OD1	2:B:52:ASP:N	2.49	0.46
1:A:350:VAL:HG22	1:A:355:ASP:HB2	1.97	0.45
1:A:388:GLU:HG2	1:A:420:ASN:HB2	1.97	0.45
1:A:442:ASN:HB2	1:A:445:LEU:HB2	1.99	0.45
1:A:467:ILE:HG21	2:B:91:ASN:ND2	2.31	0.45
1:A:326:SER:HB2	1:A:348:LEU:HD12	1.99	0.45
1:A:445:LEU:O	1:A:470:ARG:HB3	2.17	0.45
1:A:453:TRP:CE3	1:A:456:LEU:HD12	2.52	0.44
3:C:177:GLN:O	3:C:180:GLY:N	2.46	0.44
1:A:44:THR:HA	1:A:68:ALA:O	2.18	0.44
1:A:421:ILE:HG13	1:A:445:LEU:HD13	2.00	0.44
1:A:74:ARG:HG3	1:A:110:GLU:HB2	2.00	0.44
2:B:83:ILE:HG23	2:B:104:LEU:O	2.18	0.43
1:A:418:SER:HA	1:A:441:GLY:O	2.19	0.43
1:A:190:ILE:O	1:A:202:LYS:HG3	2.18	0.43
1:A:209:HIS:CE1	1:A:221:GLU:HB3	2.53	0.43
1:A:48:ARG:O	1:A:49:ASN:HB2	2.19	0.43
2:B:118:PHE:HA	2:B:119:PRO:HD3	1.87	0.43
1:A:66:LEU:HD22	1:A:89:TYR:CE1	2.54	0.43
1:A:392:ASP:HA	1:A:423:SER:O	2.19	0.43
1:A:363:LEU:O	1:A:365:PRO:HD3	2.19	0.43
1:A:438:ILE:HD13	3:C:102:TYR:HB2	2.00	0.42
1:A:320:GLU:H	1:A:320:GLU:CD	2.18	0.42
2:B:80:SER:O	2:B:83:ILE:HG13	2.18	0.42
4:D:2:NAG:H61	4:D:3:BMA:H2	2.02	0.42
1:A:69:LEU:HD23	1:A:99:SER:O	2.20	0.42
1:A:485:LEU:HD13	1:A:511:CYS:O	2.20	0.42
3:C:1:GLN:OE1	3:C:1:GLN:N	2.41	0.42
1:A:328:ASN:HD22	4:D:1:NAG:C7	2.32	0.41
1:A:445:LEU:HA	1:A:445:LEU:HD12	1.77	0.41
1:A:38:LEU:O	1:A:62:ALA:HB3	2.20	0.41
1:A:6:VAL:HG21	1:A:263:PHE:HZ	1.85	0.41
1:A:144:VAL:HG11	1:A:152:MET:HE2	2.02	0.41
2:B:92:ASN:ND2	2:B:93:ASN:OD1	2.54	0.41
2:B:134:CYS:HB2	2:B:148:TRP:CH2	2.56	0.41
3:C:29:LEU:HD23	3:C:29:LEU:HA	1.84	0.41
1:A:70:ASN:HB3	1:A:72:VAL:HG12	2.03	0.41
1:A:194:GLN:OE1	1:A:204:PRO:HB3	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:586:TYR:OH	1:A:607:PRO:HB3	2.21	0.41
1:A:72:VAL:O	1:A:108:LEU:HA	2.21	0.41
1:A:325:LEU:HA	1:A:325:LEU:HD12	1.84	0.41
1:A:505:VAL:HG23	1:A:512:VAL:HG23	2.03	0.40
1:A:330:THR:OG1	1:A:360:THR:HG22	2.21	0.40
1:A:440:SER:HA	1:A:467:ILE:O	2.21	0.40
1:A:260:LYS:HE2	1:A:269:LYS:HB2	2.03	0.40
2:B:89:GLN:NE2	3:C:104:TYR:O	2.36	0.40
2:B:150:VAL:HA	2:B:191:VAL:O	2.22	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	607/622 (98%)	570 (94%)	36 (6%)	1 (0%)	47	79
2	B	208/214 (97%)	203 (98%)	5 (2%)	0	100	100
3	C	208/222 (94%)	199 (96%)	9 (4%)	0	100	100
All	All	1023/1058 (97%)	972 (95%)	50 (5%)	1 (0%)	51	83

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	425	GLY

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	531/543 (98%)	520 (98%)	11 (2%)	53	79
2	B	187/190 (98%)	186 (100%)	1 (0%)	88	95
3	C	184/192 (96%)	183 (100%)	1 (0%)	88	95
All	All	902/925 (98%)	889 (99%)	13 (1%)	67	86

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	92	SER
1	A	125	ARG
1	A	155	ASP
1	A	313	CYS
1	A	345	LEU
1	A	360	THR
1	A	446	CYS
1	A	449	ASN
1	A	474	SER
1	A	553	ASP
1	A	581	THR
2	B	201	LEU
3	C	53	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	172	ASN

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

10 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	4,1	14,14,15	0.64	1 (7%)	17,19,21	0.58	0
4	NAG	D	2	4	14,14,15	0.42	0	17,19,21	0.72	0
4	BMA	D	3	4	11,11,12	1.71	3 (27%)	15,15,17	1.16	0
4	MAN	D	4	4	11,11,12	1.08	1 (9%)	15,15,17	1.24	2 (13%)
4	MAN	D	5	4	11,11,12	1.41	3 (27%)	15,15,17	1.22	3 (20%)
4	MAN	D	6	4	11,11,12	0.86	1 (9%)	15,15,17	1.14	1 (6%)
4	MAN	D	7	4	11,11,12	0.94	0	15,15,17	1.02	1 (6%)
4	MAN	D	8	4	11,11,12	0.75	0	15,15,17	1.42	1 (6%)
5	NAG	E	1	5,1	14,14,15	0.37	0	17,19,21	0.56	0
5	NAG	E	2	5	14,14,15	0.28	0	17,19,21	0.32	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
4	NAG	D	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	D	2	4	-	0/6/23/26	0/1/1/1
4	BMA	D	3	4	-	2/2/19/22	0/1/1/1
4	MAN	D	4	4	-	2/2/19/22	0/1/1/1
4	MAN	D	5	4	-	0/2/19/22	0/1/1/1
4	MAN	D	6	4	-	0/2/19/22	0/1/1/1
4	MAN	D	7	4	-	1/2/19/22	0/1/1/1
4	MAN	D	8	4	-	2/2/19/22	0/1/1/1
5	NAG	E	1	5,1	-	2/6/23/26	0/1/1/1
5	NAG	E	2	5	-	2/6/23/26	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	3	BMA	O5-C1	-4.53	1.36	1.43
4	D	5	MAN	C2-C3	3.33	1.57	1.52
4	D	4	MAN	C2-C3	2.59	1.56	1.52
4	D	6	MAN	O5-C1	-2.28	1.40	1.43
4	D	1	NAG	O5-C1	-2.20	1.40	1.43
4	D	5	MAN	O5-C1	-2.14	1.40	1.43
4	D	5	MAN	C4-C3	2.08	1.57	1.52
4	D	3	BMA	C4-C3	2.05	1.57	1.52
4	D	3	BMA	C1-C2	-2.01	1.47	1.52

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	8	MAN	C1-O5-C5	4.59	118.41	112.19
4	D	6	MAN	O2-C2-C3	-2.69	104.75	110.14
4	D	7	MAN	C1-O5-C5	2.60	115.71	112.19
4	D	4	MAN	O5-C1-C2	2.28	114.29	110.77
4	D	5	MAN	C1-C2-C3	2.26	112.45	109.67
4	D	4	MAN	C1-O5-C5	2.15	115.11	112.19
4	D	5	MAN	C2-C3-C4	2.06	114.46	110.89
4	D	5	MAN	O5-C1-C2	2.03	113.90	110.77

There are no chirality outliers.

All (11) torsion outliers are listed below:

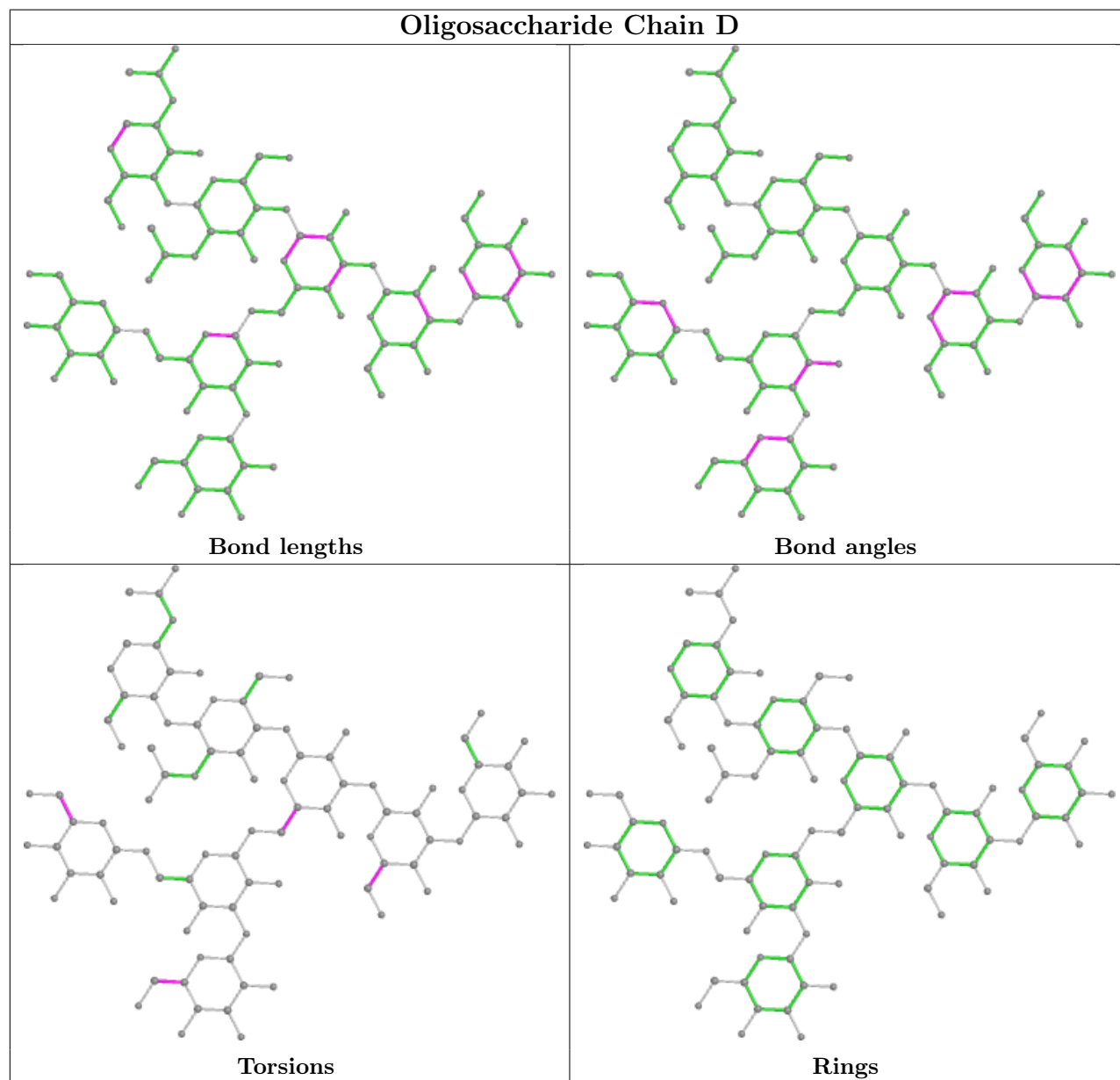
Mol	Chain	Res	Type	Atoms
4	D	4	MAN	O5-C5-C6-O6
4	D	8	MAN	O5-C5-C6-O6
5	E	1	NAG	O5-C5-C6-O6
4	D	8	MAN	C4-C5-C6-O6
4	D	4	MAN	C4-C5-C6-O6
5	E	2	NAG	C8-C7-N2-C2
5	E	2	NAG	O7-C7-N2-C2
5	E	1	NAG	C4-C5-C6-O6
4	D	3	BMA	O5-C5-C6-O6
4	D	3	BMA	C4-C5-C6-O6
4	D	7	MAN	O5-C5-C6-O6

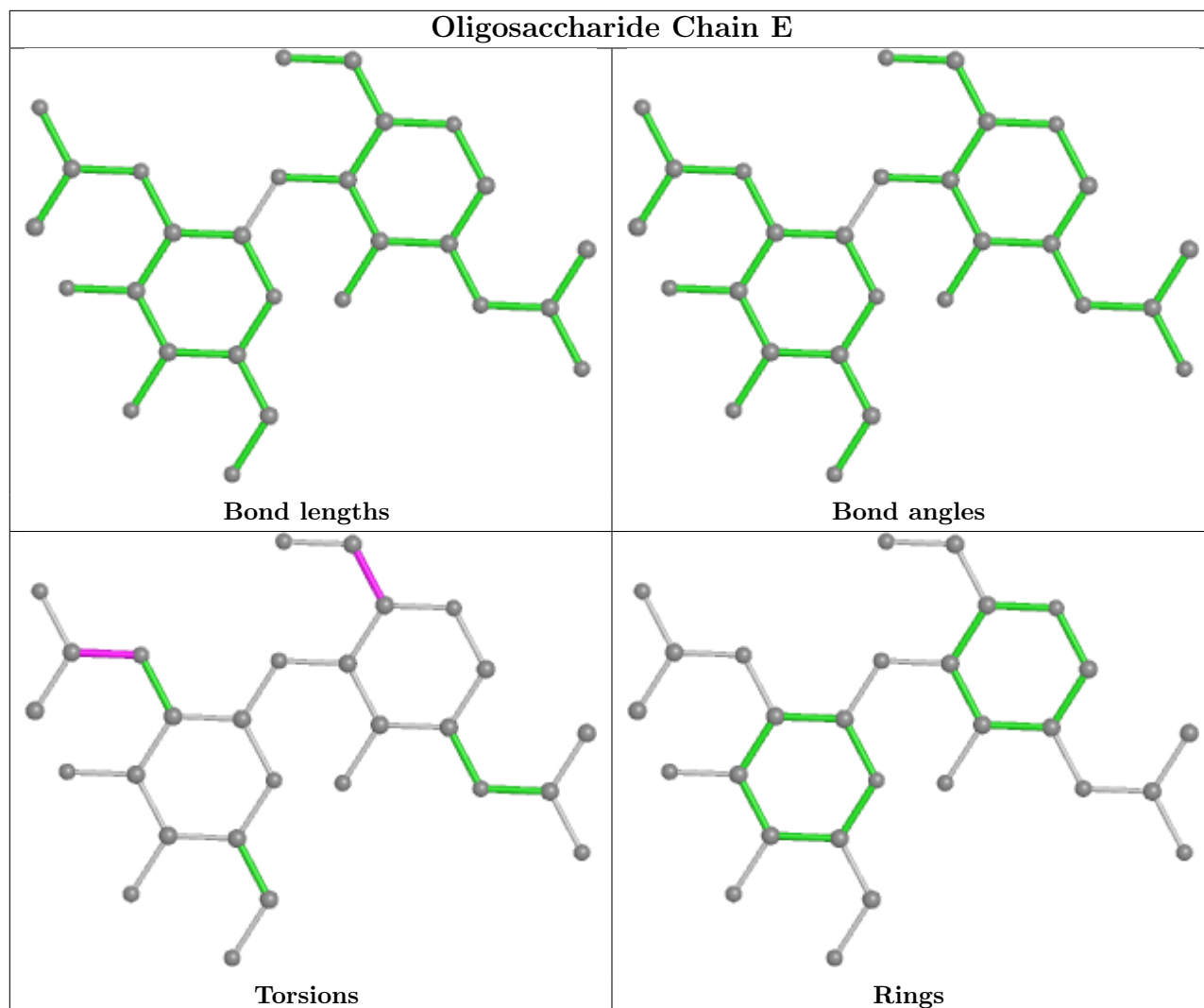
There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	1	NAG	2	0
4	D	3	BMA	1	0
4	D	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 [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	NAG	C	301	3	14,14,15	0.42	0	17,19,21	0.69	0
6	NAG	A	709	1	14,14,15	0.28	0	17,19,21	0.71	1 (5%)
6	NAG	A	710	1	14,14,15	0.60	0	17,19,21	1.36	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
6	NAG	C	301	3	-	2/6/23/26	0/1/1/1
6	NAG	A	709	1	-	1/6/23/26	0/1/1/1
6	NAG	A	710	1	-	5/6/23/26	0/1/1/1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	710	NAG	C2-N2-C7	4.20	128.89	122.90
6	A	709	NAG	C1-O5-C5	2.41	115.45	112.19
6	A	710	NAG	C1-O5-C5	2.33	115.35	112.19
6	A	710	NAG	C1-C2-N2	2.22	114.28	110.49

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	710	NAG	C8-C7-N2-C2
6	A	710	NAG	O7-C7-N2-C2
6	C	301	NAG	C8-C7-N2-C2
6	C	301	NAG	O7-C7-N2-C2
6	A	709	NAG	O5-C5-C6-O6
6	A	710	NAG	C4-C5-C6-O6
6	A	710	NAG	C3-C2-N2-C7
6	A	710	NAG	O5-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	710	NAG	1	0

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

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	609/622 (97%)	0.34	25 (4%) 37 24	26, 84, 119, 153	0
2	B	210/214 (98%)	0.18	8 (3%) 40 26	32, 68, 121, 160	0
3	C	212/222 (95%)	0.08	4 (1%) 66 53	33, 54, 115, 131	0
All	All	1031/1058 (97%)	0.25	37 (3%) 42 27	26, 73, 120, 160	0

All (37) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	517	LEU	4.2
2	B	154	LEU	4.0
1	A	103	ALA	3.5
2	B	192	TYR	3.4
1	A	565	PRO	3.4
1	A	159	HIS	3.4
1	A	194	GLN	3.1
2	B	208	SER	2.8
1	A	526	VAL	2.7
1	A	160	LEU	2.7
1	A	548	THR	2.7
1	A	515	CYS	2.6
1	A	587	ALA	2.6
3	C	195	LEU	2.6
1	A	263	PHE	2.5
3	C	215	LYS	2.5
1	A	573	ALA	2.5
2	B	152	ASN	2.5
1	A	510	GLU	2.5
1	A	509	ARG	2.4
1	A	550	ARG	2.4
1	A	204	PRO	2.4
2	B	210	ASN	2.4

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Mol	Chain	Res	Type	RSRZ
2	B	117	ILE	2.3
1	A	193	GLN	2.3
1	A	521	GLU	2.2
1	A	581	THR	2.2
1	A	158	ASN	2.2
1	A	33	ASN	2.1
1	A	561	TYR	2.1
2	B	188	LYS	2.1
1	A	226	VAL	2.1
3	C	10	GLY	2.1
1	A	210	ASN	2.1
2	B	209	PHE	2.0
1	A	558	CYS	2.0
3	C	214	ASP	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](#)

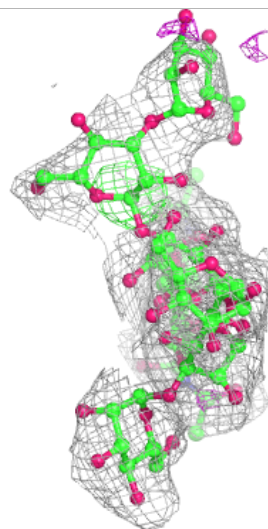
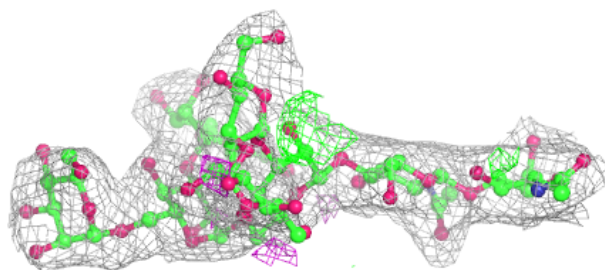
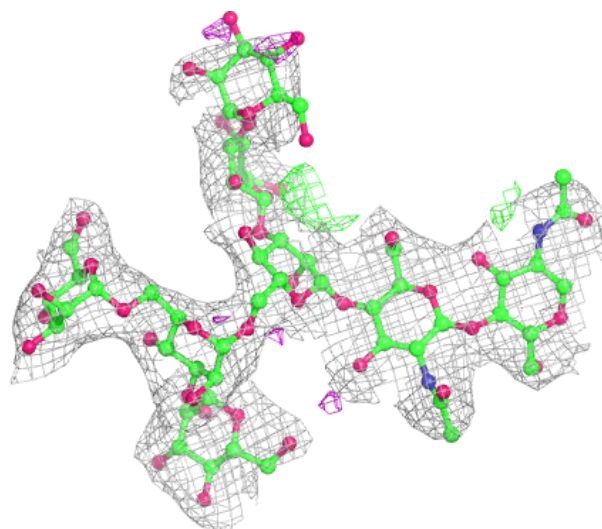
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

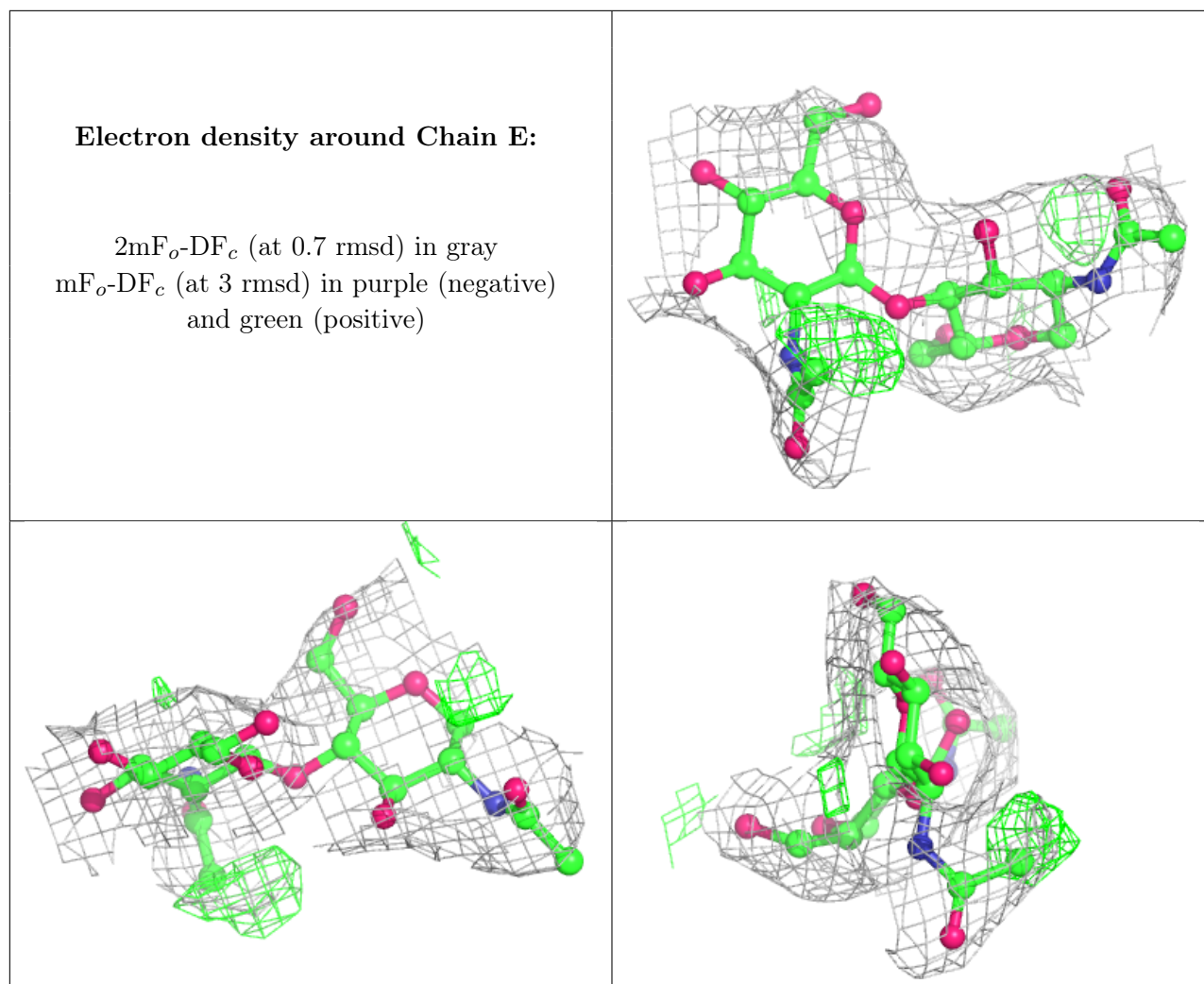
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	MAN	D	4	11/12	0.77	0.21	71,79,81,83	0
4	MAN	D	5	11/12	0.83	0.45	77,85,85,88	0
5	NAG	E	2	14/15	0.83	0.20	97,100,102,103	0
4	BMA	D	3	11/12	0.89	0.20	58,58,60,62	0
5	NAG	E	1	14/15	0.91	0.18	64,68,72,75	0
4	MAN	D	7	11/12	0.91	0.24	68,68,69,70	0
4	MAN	D	6	11/12	0.92	0.21	64,68,70,70	0
4	MAN	D	8	11/12	0.94	0.30	76,79,79,79	0
4	NAG	D	1	14/15	0.96	0.23	29,36,38,39	0
4	NAG	D	2	14/15	0.97	0.18	33,35,40,42	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)





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(Å ²)	Q<0.9
6	NAG	A	710	14/15	0.87	0.16	83,88,90,90	0
6	NAG	A	709	14/15	0.88	0.25	67,72,77,79	0
6	NAG	C	301	14/15	0.88	0.23	83,83,83,83	0

6.5 Other polymers [i](#)

There are no such residues in this entry.