



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 28, 2026 – 09:04 PM UTC

PDB ID : 6ARU / pdb_00006aru
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	:	4-5-2 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

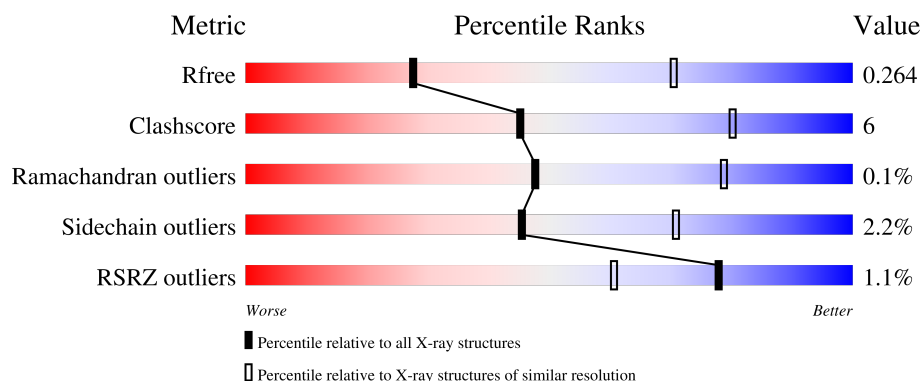
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

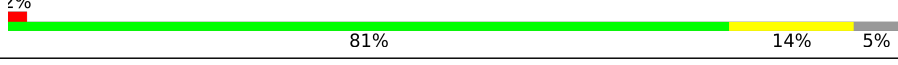
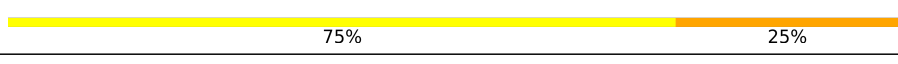
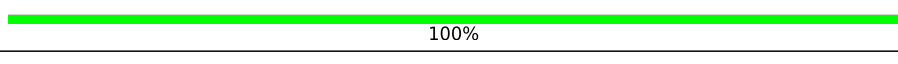
The reported resolution of this entry is 3.20 Å.

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}	180053	1466 (3.20-3.20)
Clashscore	190562	1573 (3.20-3.20)
Ramachandran outliers	187476	1548 (3.20-3.20)
Sidechain outliers	187428	1547 (3.20-3.20)
RSRZ outliers	180081	1466 (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	
2	B	214	
3	C	222	
4	D	8	
5	E	2	

2 Entry composition

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
1	A	609	Total	C	N	O	S	0	0	0
			4686	2892	839	895	60			

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

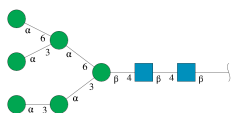
- Molecule 2 is a protein called Cetuximab mutant light chain,Uncharacterized protein.

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

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

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

- 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.



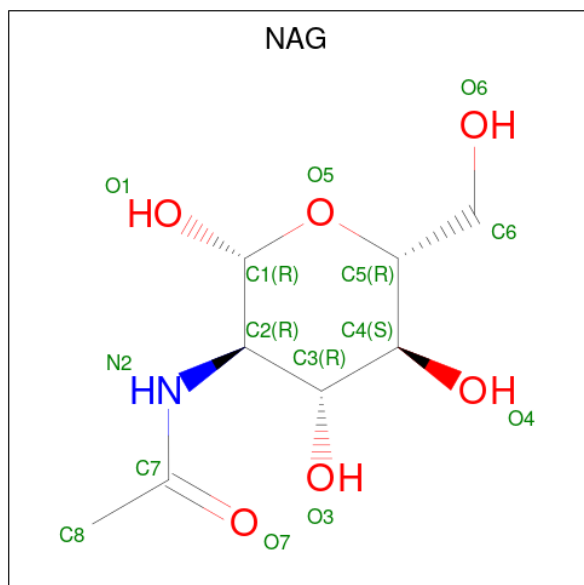
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	D	8	Total	C	N	O	0	0	0
			94	52	2	40			

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

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



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

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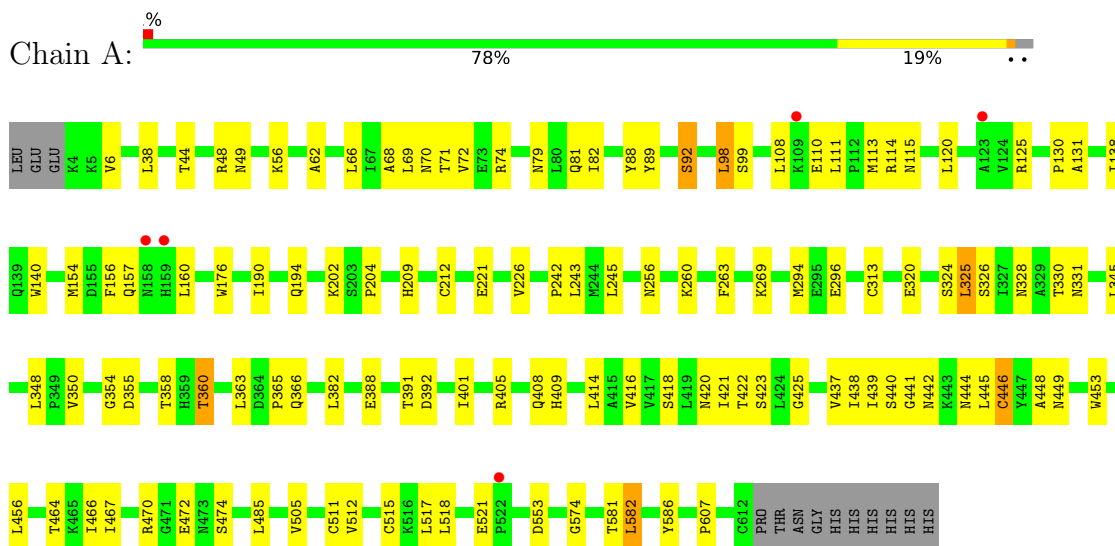
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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	C	1	Total	C	N	O	0	0
			14	8	1	5		

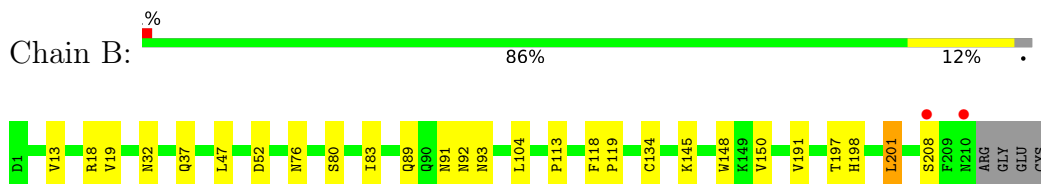
3 Residue-property plots

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.

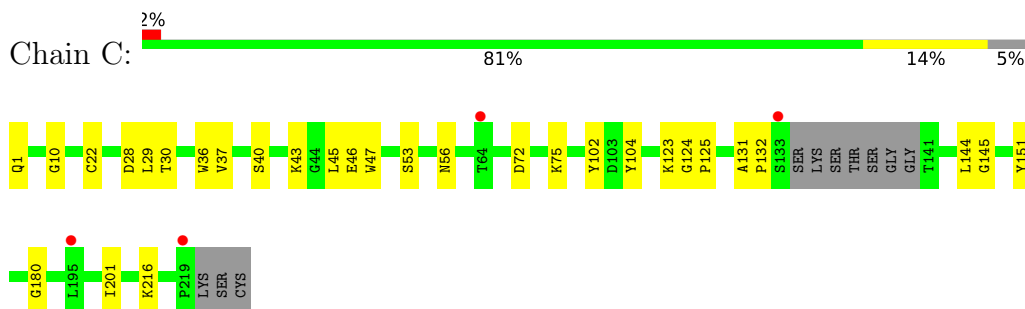
- Molecule 1: Epidermal growth factor receptor



- 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 40.11 – 3.20	Depositor EDS
% Data completeness (in resolution range)	99.8 (40.11-3.20) 99.7 (40.11-3.20)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.02 (at 3.19Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.232 , 0.267 0.231 , 0.264	Depositor DCC
R_{free} test set	1351 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å ²)	70.0	Xtriage
Anisotropy	0.237	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 48.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	8087	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtriage'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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MAN, BMA, 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	0.48	0/4777	0.98	10/6459 (0.2%)
2	B	0.49	0/1656	0.87	1/2251 (0.0%)
3	C	0.53	0/1658	0.97	4/2266 (0.2%)
All	All	0.50	0/8091	0.95	15/10976 (0.1%)

There are no bond length outliers.

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	131	ALA	CA-C-N	9.37	130.60	120.11
3	C	131	ALA	C-N-CA	9.37	130.60	120.11
1	A	354	GLY	N-CA-C	-7.85	102.78	112.68
1	A	446	CYS	N-CA-C	6.51	123.16	114.12
1	A	405	ARG	N-CA-C	-5.98	104.76	111.28
1	A	331	ASN	N-CA-C	5.88	118.47	111.71
1	A	521	GLU	CA-C-N	-5.45	113.03	119.84
1	A	521	GLU	C-N-CA	-5.45	113.03	119.84
3	C	145	GLY	N-CA-C	5.36	118.96	111.19
1	A	138	ILE	N-CA-C	5.25	116.17	109.30
2	B	208	SER	N-CA-C	5.24	117.03	109.07
1	A	71	THR	N-CA-C	-5.16	106.95	114.12
1	A	212	CYS	N-CA-C	5.11	118.05	110.48
1	A	401	ILE	N-CA-C	5.05	115.93	108.45
3	C	10	GLY	N-CA-C	-5.03	101.26	113.18

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4686	0	4526	61	0
2	B	1622	0	1564	17	0
3	C	1615	0	1570	17	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	94	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 (94) 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:111:LEU:HG	1:A:113:MET:HE2	1.85	0.57
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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:710:NAG:HB3	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
1:A:320:GLU:H	1:A:320:GLU:CD	2.18	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
1:A:294:MET:HE2	1:A:296:GLU:HB2	1.97	0.46
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
3:C:56:ASN:OD1	3:C:56:ASN:N	2.47	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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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:515:CYS:C	1:A:517:LEU:H	2.26	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
2:B:80:SER:O	2:B:83:ILE:HG13	2.18	0.42
3:C:43:LYS:HE2	3:C:46:GLU:CD	2.44	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
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:140:TRP:CD1	1:A:154:MET:HE3	2.56	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
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

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	607/622 (98%)	570 (94%)	36 (6%)	1 (0%)	43	73
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%)	48	79

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	425	GLY

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	531/543 (98%)	515 (97%)	16 (3%)	36	66
2	B	187/190 (98%)	186 (100%)	1 (0%)	81	85
3	C	184/192 (96%)	181 (98%)	3 (2%)	55	75
All	All	902/925 (98%)	882 (98%)	20 (2%)	45	71

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	92	SER
1	A	98	LEU

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Mol	Chain	Res	Type
1	A	243	LEU
1	A	313	CYS
1	A	325	LEU
1	A	345	LEU
1	A	360	THR
1	A	366	GLN
1	A	446	CYS
1	A	449	ASN
1	A	472	GLU
1	A	474	SER
1	A	518	LEU
1	A	553	ASP
1	A	581	THR
1	A	582	LEU
2	B	201	LEU
3	C	45	LEU
3	C	53	SER
3	C	154	GLU

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

Mol	Chain	Res	Type
1	A	28	GLN
1	A	32	ASN
1	A	81	GLN
1	A	117	GLN
1	A	129	ASN
1	A	211	GLN
1	A	384	GLN
1	A	408	GLN
1	A	409	HIS
2	B	32	ASN
2	B	38	GLN
2	B	92	ASN
3	C	39	GLN
3	C	170	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

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	1,4	14,14,15	0.62	1 (7%)	17,19,21	0.60	0
4	NAG	D	2	4	14,14,15	0.41	0	17,19,21	0.71	0
4	BMA	D	3	4	11,11,12	1.63	2 (18%)	15,15,17	1.10	0
4	MAN	D	4	4	11,11,12	1.05	1 (9%)	15,15,17	1.10	1 (6%)
4	MAN	D	5	4	11,11,12	1.37	3 (27%)	15,15,17	1.09	1 (6%)
4	MAN	D	6	4	11,11,12	0.82	1 (9%)	15,15,17	1.09	1 (6%)
4	MAN	D	7	4	11,11,12	0.94	0	15,15,17	0.95	1 (6%)
4	MAN	D	8	4	11,11,12	0.77	0	15,15,17	1.38	1 (6%)
5	NAG	E	1	5,1	14,14,15	0.35	0	17,19,21	0.57	0
5	NAG	E	2	5	14,14,15	0.28	0	17,19,21	0.34	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	1,4	-	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

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
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 (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	3	BMA	O5-C1	-4.30	1.36	1.43
4	D	5	MAN	C2-C3	3.21	1.57	1.52
4	D	4	MAN	C2-C3	2.51	1.56	1.52
4	D	6	MAN	O5-C1	-2.16	1.40	1.43
4	D	1	NAG	O5-C1	-2.08	1.40	1.43
4	D	5	MAN	C4-C3	2.03	1.57	1.52
4	D	5	MAN	O5-C1	-2.02	1.40	1.43
4	D	3	BMA	C4-C3	2.01	1.57	1.52

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	8	MAN	C1-O5-C5	4.64	118.41	112.19
4	D	7	MAN	C1-O5-C5	2.63	115.71	112.19
4	D	6	MAN	O2-C2-C3	-2.61	104.75	110.15
4	D	4	MAN	C1-O5-C5	2.18	115.11	112.19
4	D	5	MAN	C2-C3-C4	2.04	114.46	110.86

There are no chirality outliers.

All (11) torsion outliers are listed below:

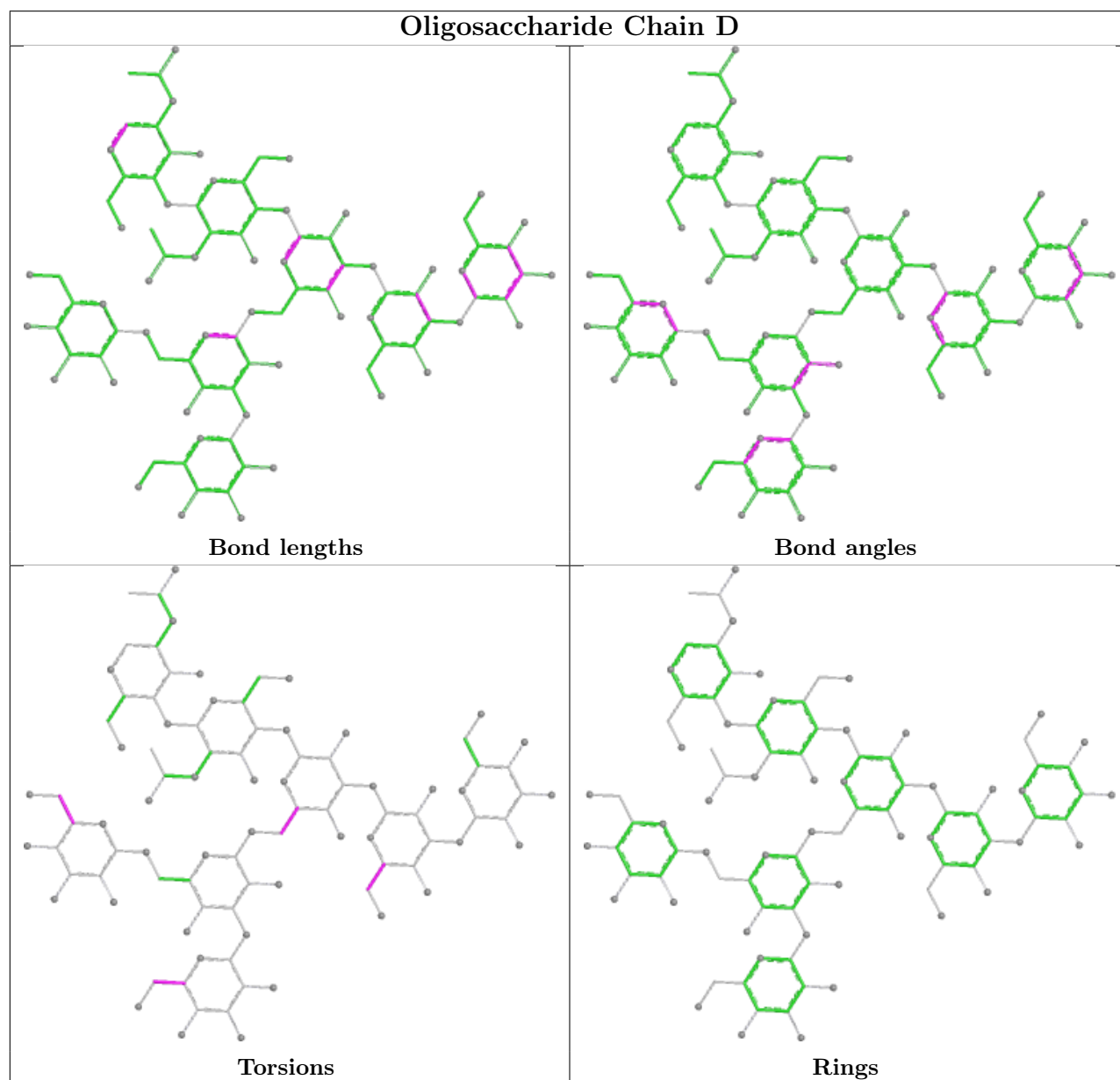
Mol	Chain	Res	Type	Atoms
4	D	4	MAN	O5-C5-C6-O6
4	D	8	MAN	O5-C5-C6-O6
5	E	1	NAG	O5-C5-C6-O6
4	D	8	MAN	C4-C5-C6-O6
4	D	4	MAN	C4-C5-C6-O6
5	E	1	NAG	C4-C5-C6-O6
5	E	2	NAG	C8-C7-N2-C2
5	E	2	NAG	O7-C7-N2-C2
4	D	3	BMA	O5-C5-C6-O6
4	D	3	BMA	C4-C5-C6-O6
4	D	7	MAN	O5-C5-C6-O6

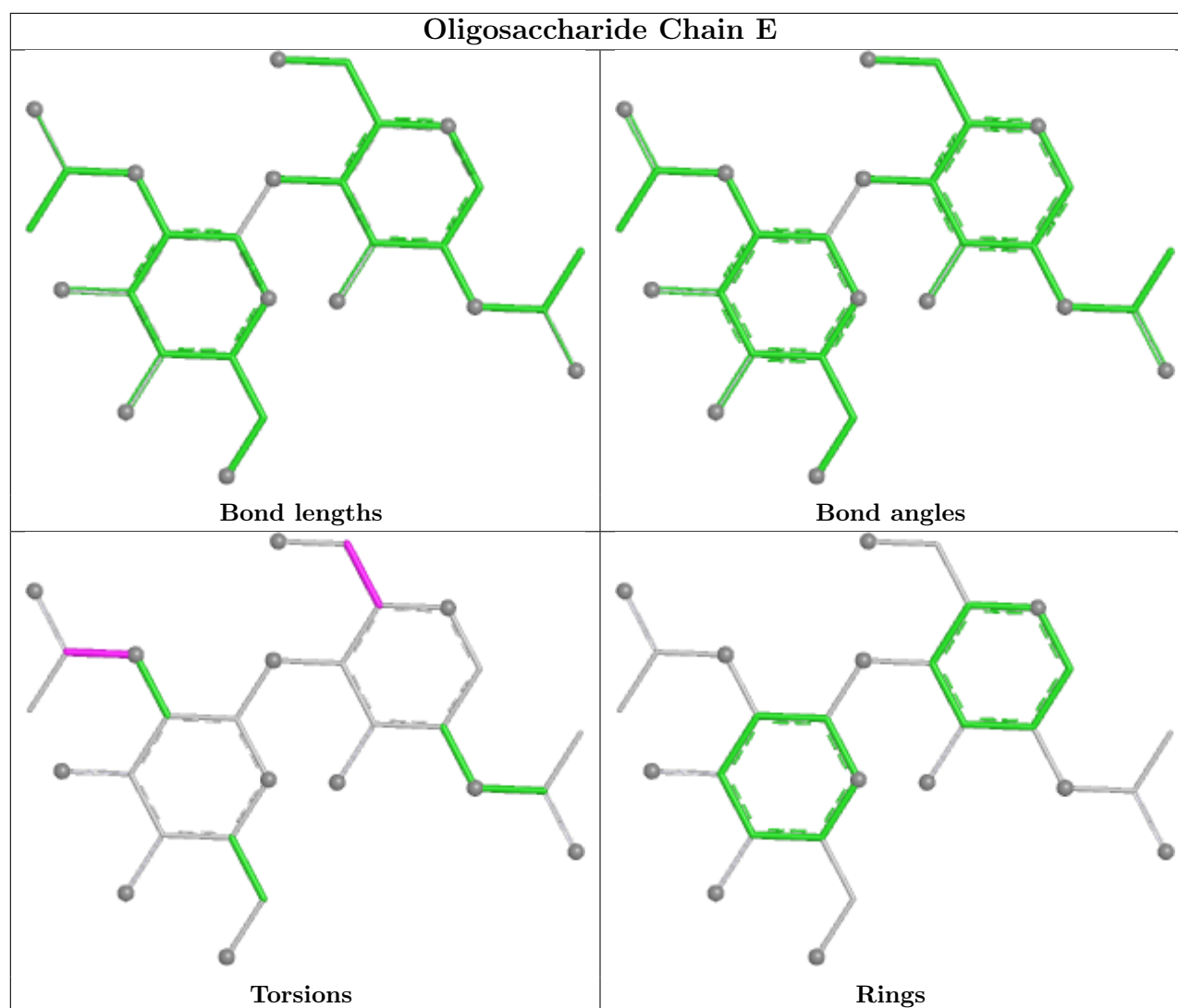
There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	1	NAG	2	0
4	D	2	NAG	1	0
4	D	3	BMA	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	A	709	1	14,14,15	0.28	0	17,19,21	0.73	1 (5%)
6	NAG	C	301	3	14,14,15	0.44	0	17,19,21	0.70	0
6	NAG	A	710	1	14,14,15	0.63	0	17,19,21	1.44	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	A	709	1	-	1/6/23/26	0/1/1/1
6	NAG	C	301	3	-	2/6/23/26	0/1/1/1
6	NAG	A	710	1	-	6/6/23/26	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	4.47	128.89	122.90
6	A	710	NAG	C1-C2-N2	2.44	114.28	110.43
6	A	709	NAG	C1-O5-C5	2.44	115.45	112.19
6	A	710	NAG	C1-O5-C5	2.36	115.35	112.19

There are no chirality outliers.

All (9) 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	C1-C2-N2-C7
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 [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	609/622 (97%)	0.13	5 (0%)	82 67	26, 84, 119, 153	0
2	B	210/214 (98%)	0.07	2 (0%)	79 63	32, 68, 121, 160	0
3	C	212/222 (95%)	0.01	4 (1%)	66 46	33, 54, 115, 131	0
All	All	1031/1058 (97%)	0.09	11 (1%)	78 61	26, 73, 120, 160	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	210	ASN	3.0
1	A	159	HIS	2.8
3	C	64	THR	2.6
3	C	219	PRO	2.5
1	A	522	PRO	2.5
3	C	195	LEU	2.4
1	A	158	ASN	2.3
1	A	109	LYS	2.2
1	A	123	ALA	2.2
3	C	133	SER	2.1
2	B	208	SER	2.0

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

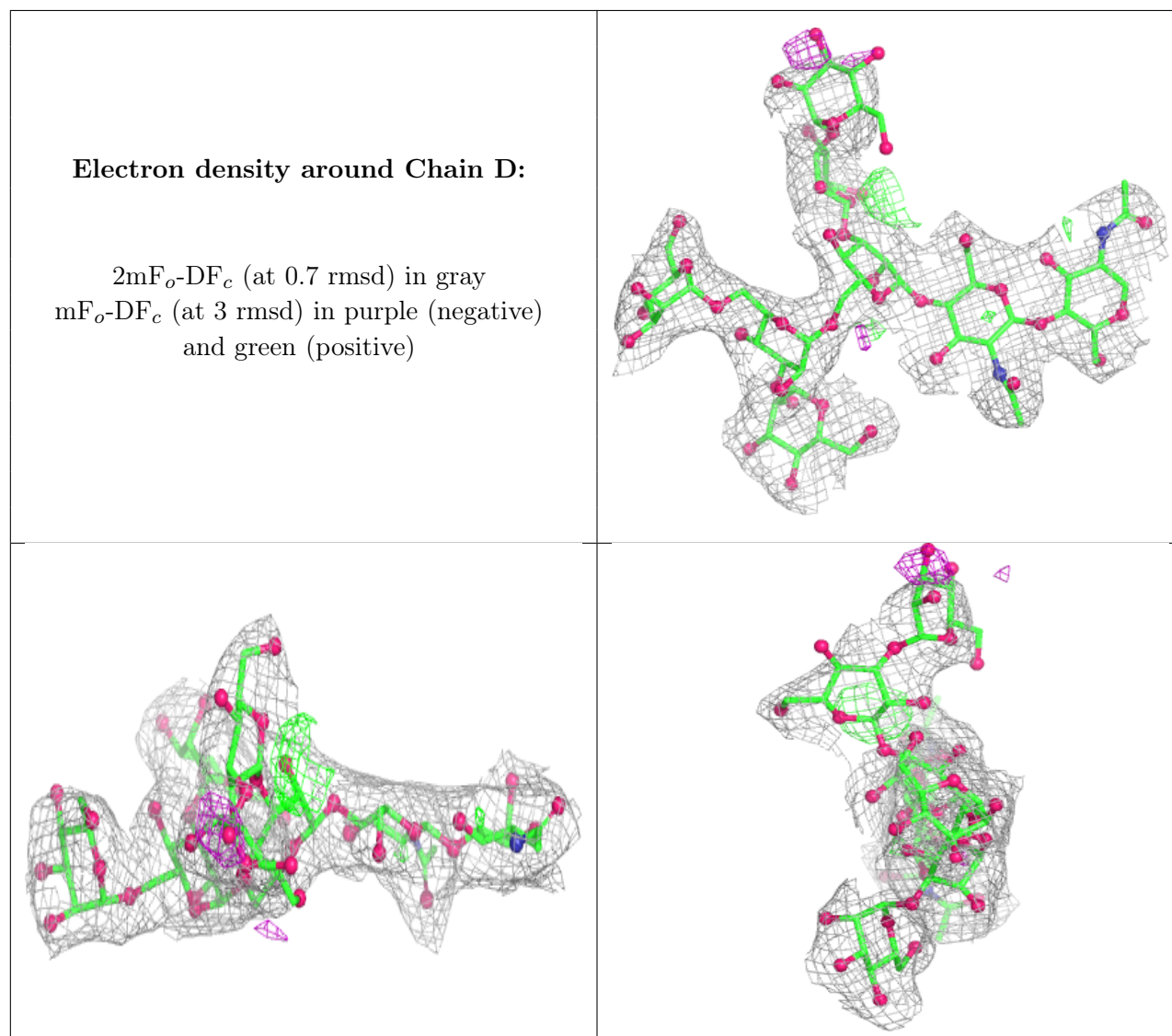
There are no non-standard protein/DNA/RNA residues in this entry.

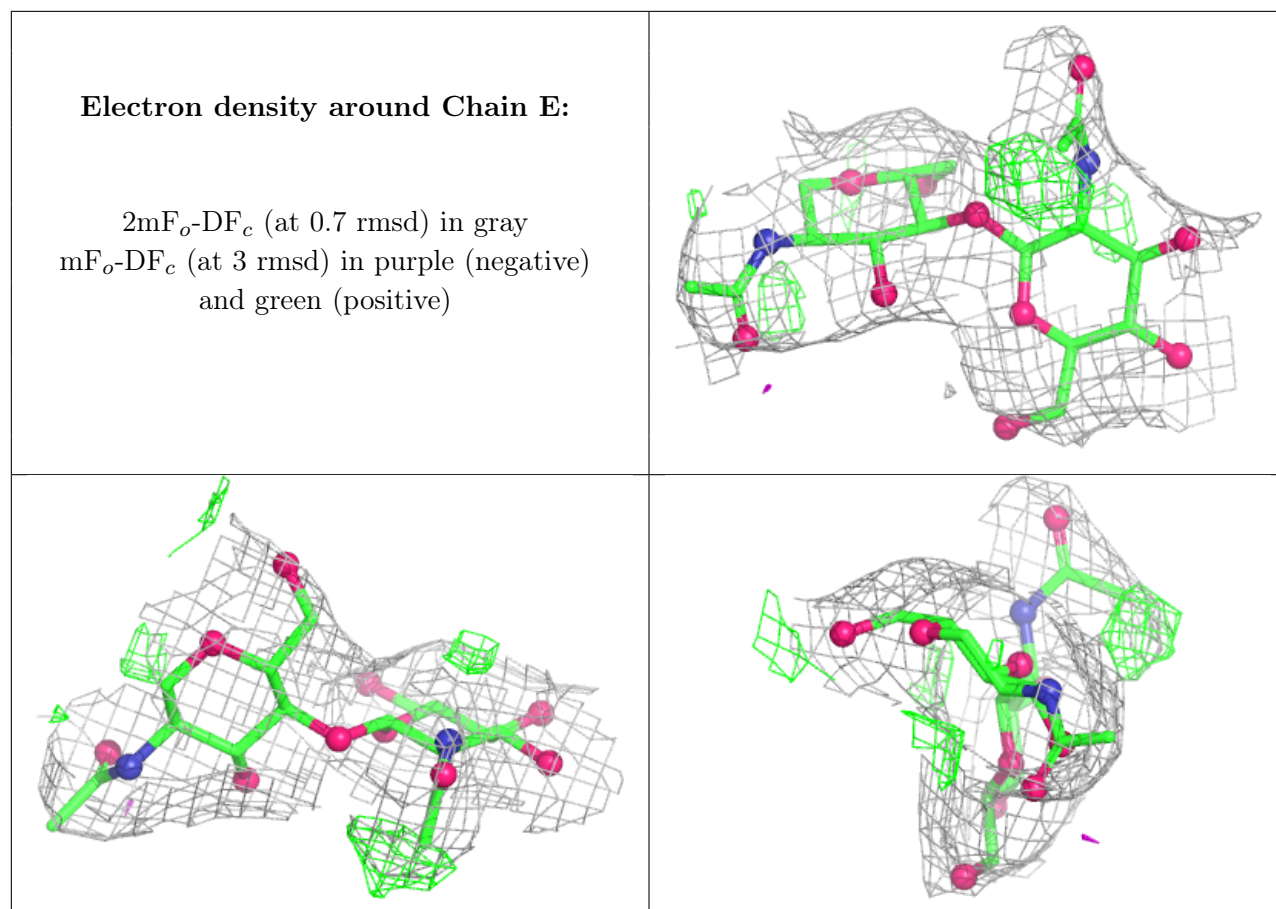
6.3 Carbohydrates [i](#)

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	NAG	E	2	14/15	0.60	0.12	97,100,102,103	0
4	MAN	D	4	11/12	0.64	0.13	71,79,81,83	0
4	MAN	D	5	11/12	0.75	0.17	77,85,85,88	0
4	MAN	D	7	11/12	0.81	0.08	68,68,69,70	0
5	NAG	E	1	14/15	0.88	0.10	64,68,72,75	0
4	BMA	D	3	11/12	0.89	0.10	58,58,60,62	0
4	MAN	D	8	11/12	0.90	0.07	76,79,79,79	0
4	MAN	D	6	11/12	0.92	0.08	64,68,70,70	0
4	NAG	D	1	14/15	0.95	0.09	29,36,38,39	0
4	NAG	D	2	14/15	0.96	0.08	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.





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	NAG	C	301	14/15	0.71	0.11	83,83,83,83	0
6	NAG	A	710	14/15	0.74	0.10	83,88,90,90	0
6	NAG	A	709	14/15	0.75	0.10	67,72,77,79	0

6.5 Other polymers [i](#)

There are no such residues in this entry.