



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 04:35 PM UTC

PDB ID : 3N85 / pdb_00003n85
Title : Crystallographic trimer of HER2 extracellular regions in complex with tryptophan-rich antibody fragment
Authors : Eigenbrot, C.
Deposited on : 2010-05-27
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

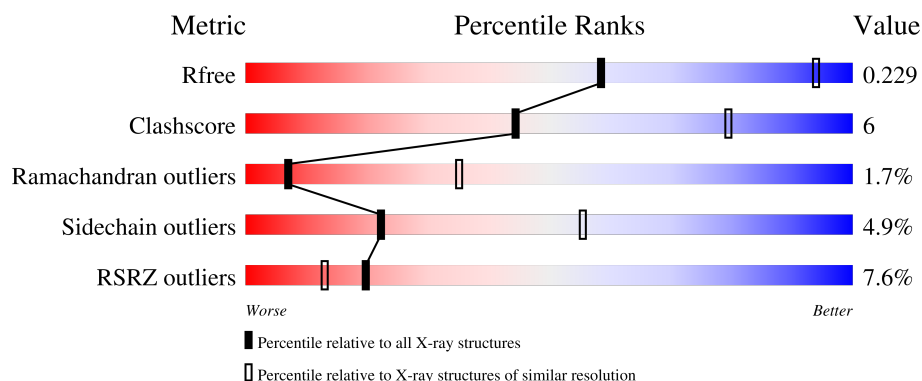
1 Overall quality at a glance

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	624	9% 81% 13% ..
2	L	217	5% 80% 16% ..
3	H	224	7% 84% 10% ..
4	B	4	25% 75%
5	C	3	100%

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 8114 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 Receptor tyrosine-protein kinase erbB-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	605	Total	C	N	O	S	0	0	0
			4657	2891	833	877	56			

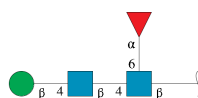
- Molecule 2 is a protein called Fab37 Light Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	L	214	Total	C	N	O	S	0	1	0
			1669	1051	279	333	6			

- Molecule 3 is a protein called Fab37 Heavy Chain.

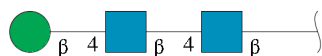
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	H	214	Total	C	N	O	S	0	1	0
			1619	1032	270	311	6			

- Molecule 4 is an oligosaccharide called 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
4	B	4	Total	C	N	O	0	0	0
			49	28	2	19			

- 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.

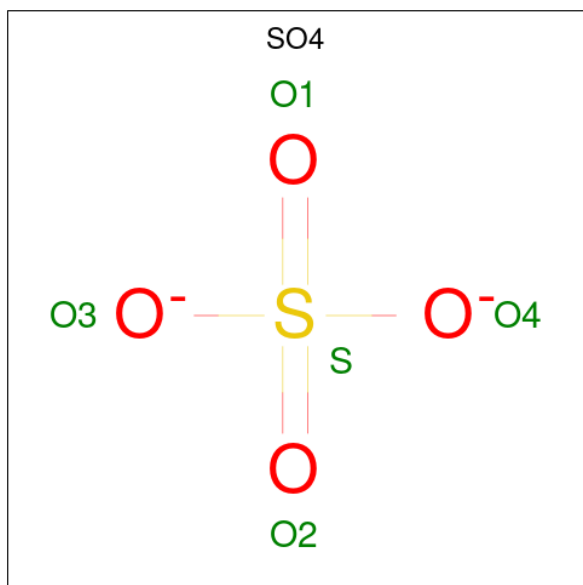


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	C	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 6 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

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

- Molecule 7 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		

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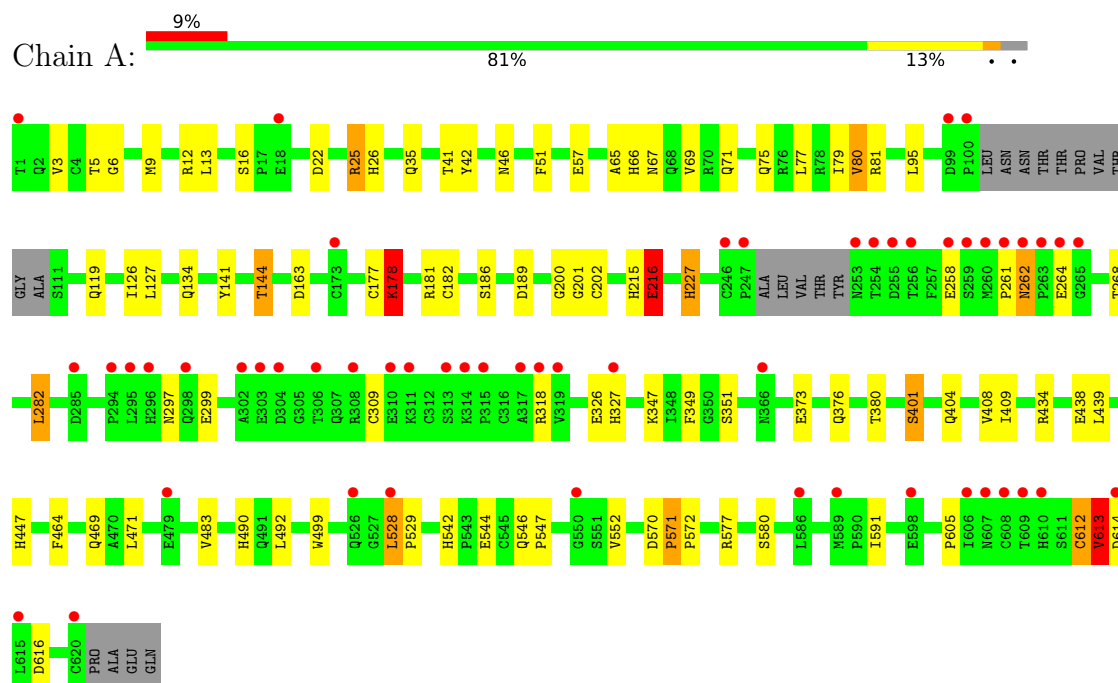
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	L	1	Total	O	S	0	0
			5	4	1		
7	L	1	Total	O	S	0	0
			5	4	1		
7	H	1	Total	O	S	0	0
			5	4	1		

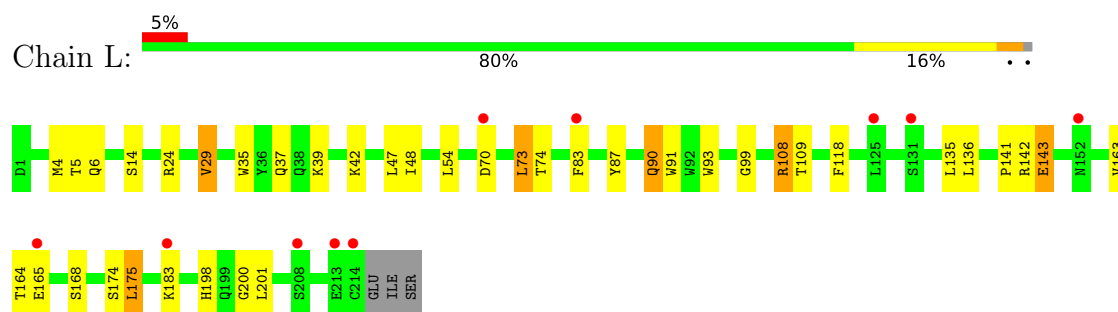
3 Residue-property plots [i](#)

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.

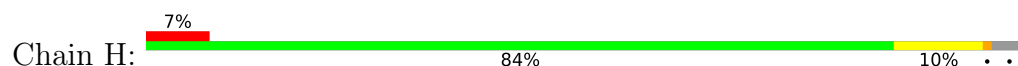
• Molecule 1: Receptor tyrosine-protein kinase erbB-2

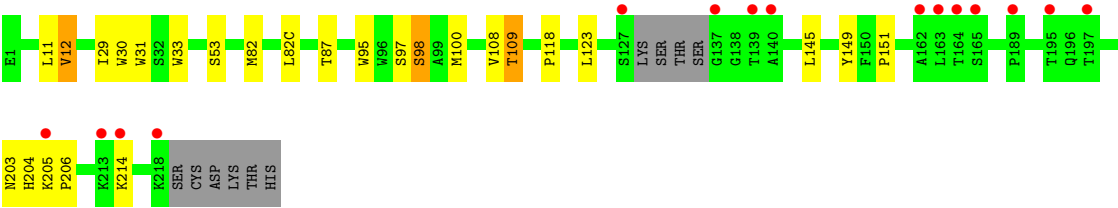


• Molecule 2: Fab37 Light Chain

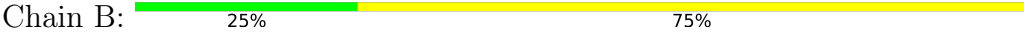


• Molecule 3: Fab37 Heavy Chain

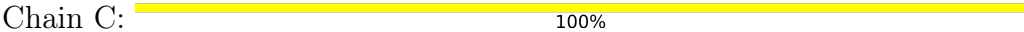




- Molecule 4: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[alpha-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose



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



4 Data and refinement statistics

Property	Value	Source
Space group	P 63 2 2	Depositor
Cell constants a, b, c, α , β , γ	182.22Å 182.22Å 330.85Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	50.00 – 3.20 50.00 – 3.20	Depositor EDS
% Data completeness (in resolution range)	96.3 (50.00-3.20) 96.3 (50.00-3.20)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.15	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.87 (at 3.19Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.206 , 0.230 0.205 , 0.229	Depositor DCC
R_{free} test set	1636 reflections (3.13%)	wwPDB-VP
Wilson B-factor (Å ²)	62.9	Xtriage
Anisotropy	0.083	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 69.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	8114	wwPDB-VP
Average B, all atoms (Å ²)	75.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.87% 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: BMA, CL, NAG, FUC, SO4

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	0.47	0/4768	0.82	6/6486 (0.1%)
2	L	0.43	0/1711	0.76	0/2327
3	H	0.44	0/1667	0.71	0/2280
All	All	0.45	0/8146	0.79	6/11093 (0.1%)

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	13	LEU	CA-C-N	5.28	126.44	119.84
1	A	13	LEU	C-N-CA	5.28	126.44	119.84
1	A	570	ASP	CA-C-N	5.07	125.60	120.38
1	A	570	ASP	C-N-CA	5.07	125.60	120.38
1	A	262	ASN	CA-C-N	5.02	126.11	119.84
1	A	262	ASN	C-N-CA	5.02	126.11	119.84

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	4657	0	4440	59	0
2	L	1669	0	1610	24	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	H	1619	0	1565	16	0
4	B	49	0	43	2	0
5	C	39	0	34	0	0
6	A	1	0	0	0	0
7	A	65	0	0	0	0
7	H	5	0	0	0	0
7	L	10	0	0	0	0
All	All	8114	0	7692	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)
1:A:25:ARG:HH11	1:A:25:ARG:HG2	1.09	1.10
1:A:326:GLU:HG3	1:A:327:HIS:H	1.33	0.91
1:A:408:VAL:HG12	1:A:438:GLU:HB3	1.57	0.84
1:A:25:ARG:HG2	1:A:25:ARG:NH1	1.87	0.82
1:A:528:LEU:HB2	1:A:529:PRO:CD	2.11	0.80
2:L:90:GLN:HE22	2:L:93:TRP:H	1.30	0.79
1:A:528:LEU:CB	1:A:529:PRO:HD3	2.13	0.78
1:A:326:GLU:HG3	1:A:327:HIS:N	1.98	0.78
1:A:528:LEU:CB	1:A:529:PRO:CD	2.65	0.75
2:L:24:ARG:NH1	2:L:70:ASP:HB2	2.04	0.71
2:L:24:ARG:HH11	2:L:70:ASP:HB2	1.55	0.71
1:A:144:THR:CG2	1:A:181:ARG:HA	2.21	0.70
1:A:144:THR:HG23	1:A:181:ARG:HA	1.72	0.69
1:A:528:LEU:HB3	1:A:529:PRO:HD3	1.75	0.67
1:A:25:ARG:HH11	1:A:25:ARG:CG	1.97	0.67
3:H:87:THR:HG23	3:H:109:THR:HA	1.76	0.66
1:A:25:ARG:HG3	1:A:51:PHE:CD2	2.33	0.64
2:L:6:GLN:HE21	2:L:99:GLY:HA3	1.61	0.63
1:A:144:THR:HG21	1:A:182:CYS:H	1.63	0.63
1:A:215:HIS:CD2	1:A:227:HIS:HB3	2.35	0.62
1:A:401:SER:O	1:A:404:GLN:HB2	1.99	0.61
1:A:141:TYR:O	1:A:144:THR:HB	2.01	0.61
2:L:37:GLN:HB2	2:L:47:LEU:HD11	1.81	0.61
1:A:297:ASN:HD22	1:A:309:CYS:HB3	1.67	0.60
1:A:528:LEU:HB2	1:A:529:PRO:HD3	1.77	0.59
1:A:178:LYS:HD2	1:A:178:LYS:H	1.68	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:1:NAG:H61	4:B:4:FUC:H5	1.86	0.57
2:L:118:PHE:CD1	3:H:123:LEU:HB3	2.39	0.57
2:L:4:MET:HE3	2:L:90:GLN:HG2	1.87	0.57
1:A:546:GLN:HE21	1:A:547:PRO:HD2	1.69	0.57
1:A:542:HIS:HD2	1:A:544:GLU:H	1.53	0.57
2:L:164:THR:HG22	2:L:165:GLU:O	2.07	0.55
2:L:39:LYS:HG3	2:L:42:LYS:HE3	1.87	0.55
2:L:198:HIS:CD2	2:L:200:GLY:H	2.25	0.55
2:L:6:GLN:HE22	2:L:87:TYR:HA	1.72	0.55
2:L:142:ARG:HD2	2:L:163:VAL:HG11	1.88	0.54
1:A:9:MET:HA	1:A:12:ARG:HH12	1.73	0.53
2:L:29:VAL:HG21	2:L:90:GLN:HB2	1.90	0.53
1:A:144:THR:CG2	1:A:182:CYS:H	2.22	0.53
1:A:282:LEU:HD21	1:A:299:GLU:HG3	1.89	0.53
4:B:1:NAG:H61	4:B:4:FUC:H3	1.91	0.53
1:A:490:HIS:HD2	1:A:492:LEU:HB2	1.75	0.52
1:A:376:GLN:HG2	3:H:31:TRP:NE1	2.24	0.51
2:L:35:TRP:CD2	2:L:73:LEU:HB2	2.46	0.51
3:H:123:LEU:HD11	3:H:145:LEU:HB2	1.93	0.51
3:H:11:LEU:HB2	3:H:151:PRO:HG3	1.93	0.51
3:H:33:TRP:HB3	3:H:95:TRP:HB3	1.93	0.51
1:A:57:GLU:HG3	1:A:79:ILE:HG23	1.92	0.50
1:A:528:LEU:HB2	1:A:529:PRO:HD2	1.91	0.50
2:L:136:LEU:HB2	2:L:175:LEU:HB3	1.94	0.50
1:A:376:GLN:HG2	3:H:31:TRP:HE1	1.76	0.50
3:H:205:LYS:HB2	3:H:206:PRO:HD3	1.93	0.49
1:A:25:ARG:NH1	1:A:25:ARG:CG	2.62	0.49
1:A:542:HIS:CD2	1:A:544:GLU:H	2.31	0.48
1:A:434:ARG:HA	1:A:499:TRP:CD1	2.49	0.48
2:L:143:GLU:H	2:L:143:GLU:CD	2.22	0.48
3:H:12:VAL:HG21	3:H:82(C):LEU:HD13	1.96	0.47
1:A:612:CYS:O	1:A:613:VAL:HG13	2.15	0.47
3:H:118:PRO:HD3	3:H:204:HIS:CD2	2.50	0.47
1:A:215:HIS:CG	1:A:227:HIS:HB3	2.50	0.47
2:L:29:VAL:CG2	2:L:90:GLN:HB2	2.44	0.47
2:L:91:TRP:HZ2	3:H:100:MET:HE3	1.80	0.47
1:A:41:THR:HA	1:A:65:ALA:O	2.16	0.46
2:L:141:PRO:O	2:L:198:HIS:HE1	1.98	0.46
1:A:42:TYR:HA	1:A:66:HIS:O	2.15	0.46
1:A:5:THR:HG22	1:A:6:GLY:N	2.32	0.45
1:A:376:GLN:CG	3:H:31:TRP:HE1	2.29	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:490:HIS:CD2	1:A:492:LEU:H	2.35	0.45
1:A:81:ARG:HG2	1:A:127:LEU:HD12	1.98	0.45
2:L:164:THR:HB	2:L:174:SER:H	1.82	0.45
1:A:571:PRO:HA	1:A:572:PRO:HA	1.72	0.44
1:A:326:GLU:CG	1:A:327:HIS:N	2.71	0.44
1:A:16:SER:HB3	1:A:447:HIS:CE1	2.53	0.43
1:A:347:LYS:HE2	1:A:349:PHE:CZ	2.53	0.43
1:A:409:ILE:HB	1:A:439:LEU:HD23	1.99	0.43
1:A:67:ASN:HB3	1:A:69:VAL:HG12	2.00	0.43
1:A:216:GLU:H	1:A:216:GLU:HG3	1.45	0.43
1:A:178:LYS:H	1:A:178:LYS:CD	2.32	0.43
1:A:80:VAL:HG22	1:A:126:ILE:HG12	2.01	0.42
1:A:186:SER:HB3	1:A:189:ASP:CG	2.45	0.42
2:L:108:ARG:HD3	2:L:109:THR:O	2.20	0.42
1:A:404:GLN:NE2	3:H:53:SER:O	2.52	0.42
3:H:118:PRO:HB3	3:H:149:TYR:HB3	2.01	0.42
2:L:91:TRP:CZ2	3:H:100:MET:HE3	2.55	0.41
2:L:35:TRP:CE2	2:L:73:LEU:HB2	2.56	0.41
1:A:577:ARG:HH12	1:A:580:SER:HB2	1.86	0.41
1:A:134:GLN:HA	1:A:163:ASP:HB3	2.02	0.41
1:A:75:GLN:NE2	1:A:119:GLN:HB3	2.36	0.41
3:H:82:MET:HE1	3:H:108:VAL:HG21	2.02	0.40
1:A:3:VAL:HG13	1:A:35:GLN:HG2	2.04	0.40
1:A:65:ALA:HA	1:A:95:LEU:O	2.21	0.40
1:A:22:ASP:O	1:A:26:HIS:HD2	2.03	0.40
1:A:464:PHE:HB3	1:A:469:GLN:HG3	2.04	0.40
2:L:83[B]:PHE:HE2	2:L:168:SER:HB3	1.85	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	599/624 (96%)	542 (90%)	42 (7%)	15 (2%)	4	27
2	L	213/217 (98%)	204 (96%)	9 (4%)	0	100	100
3	H	211/224 (94%)	201 (95%)	8 (4%)	2 (1%)	14	47
All	All	1023/1065 (96%)	947 (93%)	59 (6%)	17 (2%)	7	35

All (17) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	202	CYS
1	A	528	LEU
1	A	178	LYS
1	A	216	GLU
1	A	264	GLU
1	A	605	PRO
1	A	614	ASP
1	A	616	ASP
3	H	97	SER
1	A	200	GLY
1	A	612	CYS
3	H	98	SER
1	A	261	PRO
1	A	262	ASN
1	A	571	PRO
1	A	201	GLY
1	A	613	VAL

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	523/538 (97%)	500 (96%)	23 (4%)	25	59
2	L	190/192 (99%)	176 (93%)	14 (7%)	13	43
3	H	178/187 (95%)	170 (96%)	8 (4%)	24	58
All	All	891/917 (97%)	846 (95%)	45 (5%)	22	54

All (45) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	ARG
1	A	46	ASN
1	A	71	GLN
1	A	77	LEU
1	A	80	VAL
1	A	144	THR
1	A	177	CYS
1	A	178	LYS
1	A	216	GLU
1	A	227	HIS
1	A	258	GLU
1	A	268	THR
1	A	282	LEU
1	A	318	ARG
1	A	351	SER
1	A	373	GLU
1	A	380	THR
1	A	401	SER
1	A	471	LEU
1	A	483	VAL
1	A	552	VAL
1	A	591	ILE
1	A	613	VAL
2	L	5	THR
2	L	14	SER
2	L	29	VAL
2	L	48	ILE
2	L	54	LEU
2	L	73	LEU
2	L	74	THR
2	L	90	GLN
2	L	108	ARG
2	L	135	LEU
2	L	143	GLU
2	L	175	LEU
2	L	183	LYS
2	L	201	LEU
3	H	12	VAL
3	H	29	ILE
3	H	30[A]	TRP
3	H	30[B]	TRP
3	H	98	SER

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Mol	Chain	Res	Type
3	H	109	THR
3	H	203	ASN
3	H	214	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	20	HIS
1	A	26	HIS
1	A	46	ASN
1	A	53	GLN
1	A	71	GLN
1	A	84	GLN
1	A	155	ASN
1	A	217	GLN
1	A	235	HIS
1	A	297	ASN
1	A	298	GLN
1	A	404	GLN
1	A	416	ASN
1	A	462	GLN
1	A	466	ASN
1	A	490	HIS
1	A	542	HIS
1	A	546	GLN
1	A	607	ASN
2	L	3	GLN
2	L	6	GLN
2	L	38	GLN
2	L	90	GLN
2	L	160	GLN
2	L	198	HIS
3	H	39	GLN
3	H	82(A)	ASN
3	H	203	ASN
3	H	204	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 ⓘ

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	B	1	1,4	14,14,15	0.53	0	17,19,21	0.98	0
4	NAG	B	2	4	14,14,15	0.53	0	17,19,21	1.24	3 (17%)
4	BMA	B	3	4	11,11,12	0.63	0	15,15,17	0.60	0
4	FUC	B	4	4	10,10,11	0.66	0	14,14,16	0.86	0
5	NAG	C	1	1,5	14,14,15	0.60	0	17,19,21	1.04	1 (5%)
5	NAG	C	2	5	14,14,15	0.66	0	17,19,21	1.55	5 (29%)
5	BMA	C	3	5	11,11,12	0.60	0	15,15,17	0.94	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	B	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	B	2	4	-	2/6/23/26	0/1/1/1
4	BMA	B	3	4	-	2/2/19/22	0/1/1/1
4	FUC	B	4	4	-	-	0/1/1/1
5	NAG	C	1	1,5	-	4/6/23/26	0/1/1/1
5	NAG	C	2	5	-	0/6/23/26	0/1/1/1
5	BMA	C	3	5	-	1/2/19/22	0/1/1/1

There are no bond length outliers.

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	2	NAG	C1-O5-C5	3.39	116.73	112.19
4	B	2	NAG	C1-O5-C5	2.84	116.00	112.19
5	C	1	NAG	C4-C3-C2	2.73	115.01	111.02
4	B	2	NAG	C4-C3-C2	2.30	114.40	111.02
5	C	2	NAG	C4-C3-C2	2.26	114.34	111.02
5	C	2	NAG	O5-C1-C2	2.26	114.79	111.29
5	C	3	BMA	C1-C2-C3	2.22	112.88	109.64
5	C	2	NAG	O4-C4-C5	2.20	114.73	109.32
4	B	2	NAG	O4-C4-C3	2.13	115.39	110.38
5	C	2	NAG	C2-N2-C7	2.11	125.73	122.90

There are no chirality outliers.

All (9) torsion outliers are listed below:

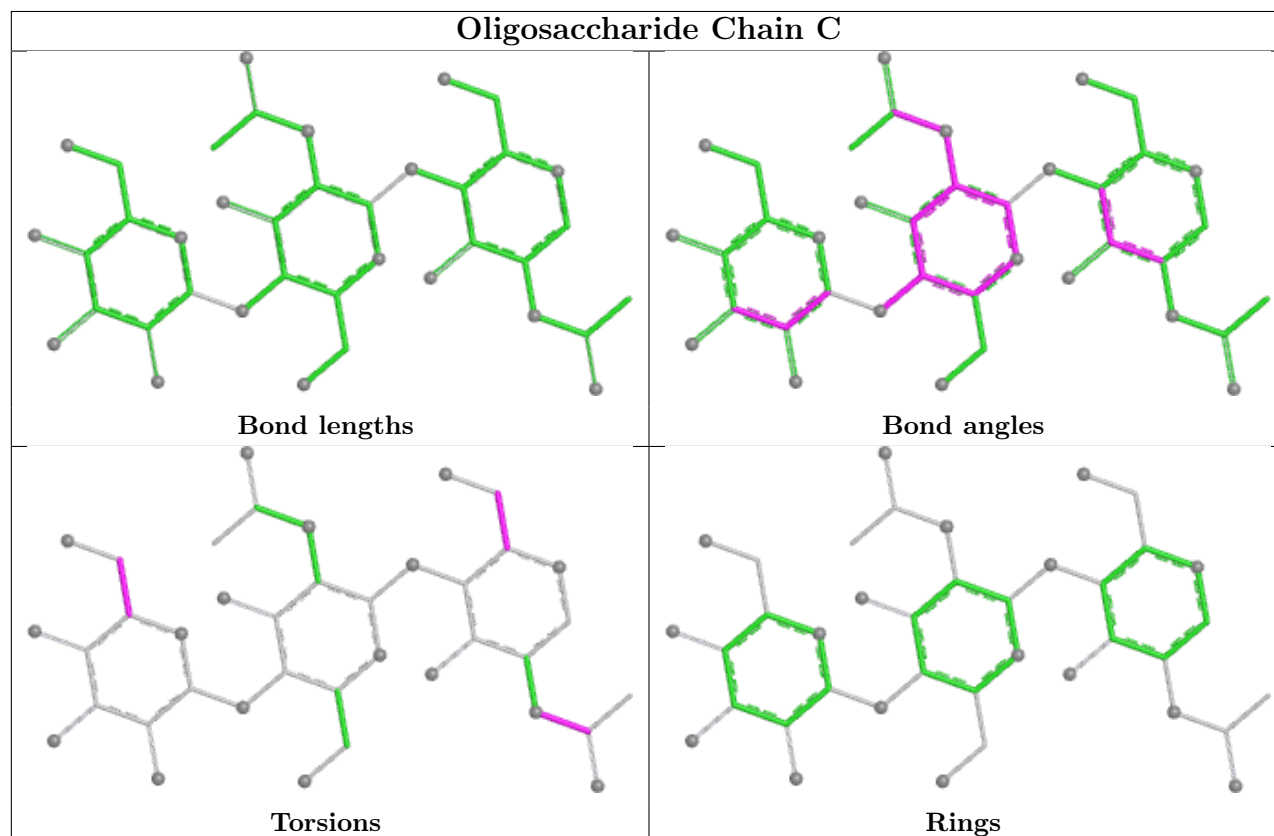
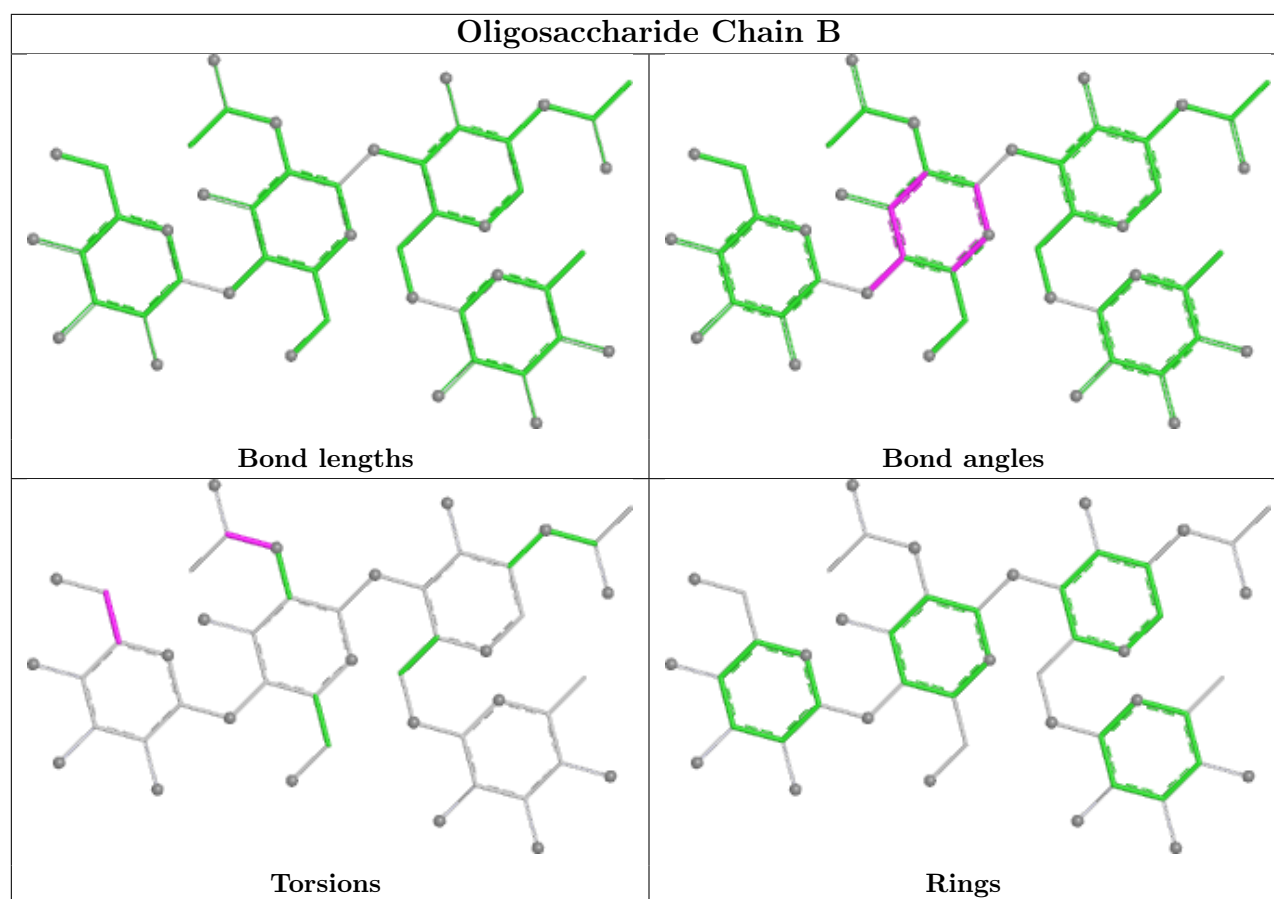
Mol	Chain	Res	Type	Atoms
5	C	1	NAG	O5-C5-C6-O6
5	C	1	NAG	C4-C5-C6-O6
4	B	2	NAG	C8-C7-N2-C2
4	B	2	NAG	O7-C7-N2-C2
5	C	1	NAG	C8-C7-N2-C2
5	C	1	NAG	O7-C7-N2-C2
4	B	3	BMA	C4-C5-C6-O6
5	C	3	BMA	C4-C5-C6-O6
4	B	3	BMA	O5-C5-C6-O6

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	4	FUC	2	0
4	B	1	NAG	2	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 17 ligands modelled in this entry, 1 is monoatomic - leaving 16 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	$\# Z > 2$
7	SO4	H	225	-	4,4,4	0.24	0	6,6,6	0.08	0
7	SO4	L	219	-	4,4,4	0.24	0	6,6,6	0.04	0
7	SO4	A	637	-	4,4,4	0.24	0	6,6,6	0.10	0
7	SO4	A	627	-	4,4,4	0.22	0	6,6,6	0.13	0
7	SO4	L	218	-	4,4,4	0.24	0	6,6,6	0.18	0
7	SO4	A	628	-	4,4,4	0.25	0	6,6,6	0.16	0
7	SO4	A	626	-	4,4,4	0.19	0	6,6,6	0.16	0
7	SO4	A	630	-	4,4,4	0.21	0	6,6,6	0.13	0
7	SO4	A	632	-	4,4,4	0.24	0	6,6,6	0.21	0
7	SO4	A	631	-	4,4,4	0.26	0	6,6,6	0.11	0
7	SO4	A	638	-	4,4,4	0.24	0	6,6,6	0.09	0
7	SO4	A	635	-	4,4,4	0.24	0	6,6,6	0.10	0
7	SO4	A	629	-	4,4,4	0.24	0	6,6,6	0.10	0
7	SO4	A	634	-	4,4,4	0.25	0	6,6,6	0.10	0
7	SO4	A	633	-	4,4,4	0.25	0	6,6,6	0.08	0
7	SO4	A	636	-	4,4,4	0.24	0	6,6,6	0.04	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	605/624 (96%)	0.35	54 (8%)	15 10	24, 60, 135, 202	3 (0%)
2	L	214/217 (98%)	0.25	10 (4%)	36 23	35, 80, 133, 175	1 (0%)
3	H	214/224 (95%)	0.24	15 (7%)	22 14	29, 71, 146, 180	1 (0%)
All	All	1033/1065 (96%)	0.31	79 (7%)	20 13	24, 68, 138, 202	5 (0%)

All (79) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	295	LEU	9.0
1	A	606	ILE	8.5
1	A	311	LYS	6.3
1	A	263	PRO	5.9
1	A	260	MET	5.4
3	H	127	SER	5.2
3	H	137	GLY	5.1
1	A	528	LEU	5.0
1	A	259	SER	5.0
1	A	261	PRO	4.9
1	A	303	GLU	4.9
1	A	610	HIS	4.9
1	A	253	ASN	4.8
1	A	614	ASP	4.8
1	A	296	HIS	4.7
1	A	262	ASN	4.5
1	A	609	THR	4.5
1	A	304	ASP	4.4
1	A	1	THR	4.3
3	H	165	SER	4.2
1	A	608	CYS	4.1
1	A	315	PRO	4.1
1	A	256	THR	4.1

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Mol	Chain	Res	Type	RSRZ
3	H	162	ALA	4.0
1	A	100	PRO	3.8
1	A	550	GLY	3.8
1	A	264	GLU	3.7
1	A	247	PRO	3.7
1	A	314	LYS	3.7
1	A	255	ASP	3.7
1	A	258	GLU	3.6
1	A	615	LEU	3.5
1	A	302	ALA	3.5
1	A	265	GLY	3.5
3	H	214	LYS	3.4
3	H	195	THR	3.4
1	A	586	LEU	3.2
2	L	214	CYS	3.2
1	A	285	ASP	3.2
1	A	607	ASN	3.2
2	L	83[A]	PHE	3.2
1	A	598	GLU	3.1
1	A	318	ARG	3.0
2	L	213	GLU	2.9
3	H	139	THR	2.8
1	A	306	THR	2.8
2	L	70	ASP	2.8
2	L	125	LEU	2.8
2	L	165	GLU	2.7
2	L	208	SER	2.7
1	A	313	SER	2.7
3	H	164	THR	2.6
2	L	131	SER	2.6
3	H	163	LEU	2.6
1	A	327	HIS	2.6
3	H	205	LYS	2.5
1	A	246	CYS	2.5
2	L	183	LYS	2.5
3	H	213	LYS	2.5
3	H	140	ALA	2.4
1	A	317	ALA	2.4
1	A	308	ARG	2.4
1	A	310	GLU	2.4
1	A	173	CYS	2.4
1	A	620	CYS	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	589	MET	2.4
1	A	319	VAL	2.3
1	A	294	PRO	2.3
1	A	254	THR	2.3
2	L	152	ASN	2.3
3	H	189	PRO	2.2
1	A	99	ASP	2.2
3	H	218	LYS	2.1
3	H	197	THR	2.1
1	A	526	GLN	2.1
1	A	479	GLU	2.1
1	A	366	ASN	2.1
1	A	298	GLN	2.1
1	A	18	GLU	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](#)

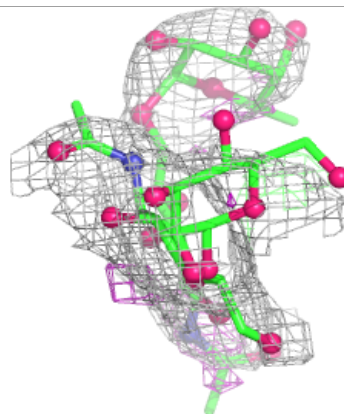
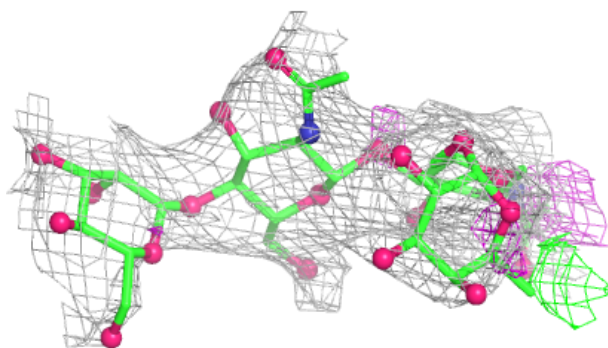
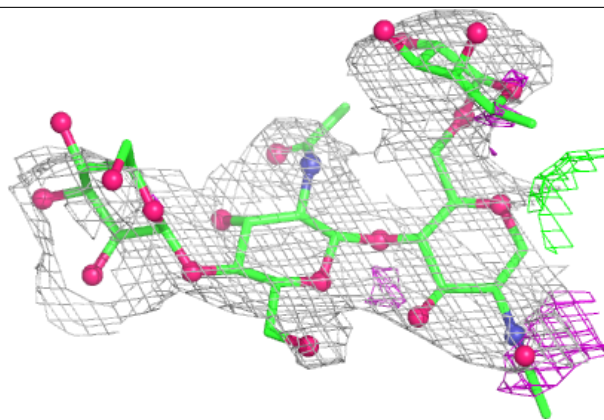
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	B	1	14/15	-	-	87,93,110,115	0
4	NAG	B	2	14/15	-	-	110,126,134,134	0
4	BMA	B	3	11/12	-	-	138,144,156,158	0
4	FUC	B	4	10/11	-	-	110,118,127,128	0
5	NAG	C	1	14/15	-	-	60,75,96,98	0
5	NAG	C	2	14/15	-	-	111,120,132,138	0
5	BMA	C	3	11/12	-	-	142,151,168,169	0

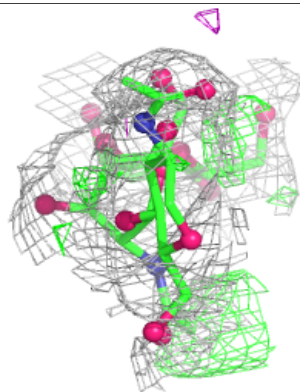
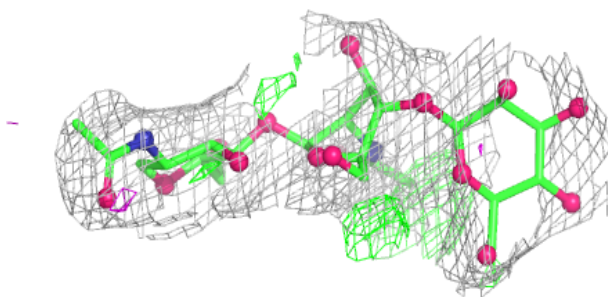
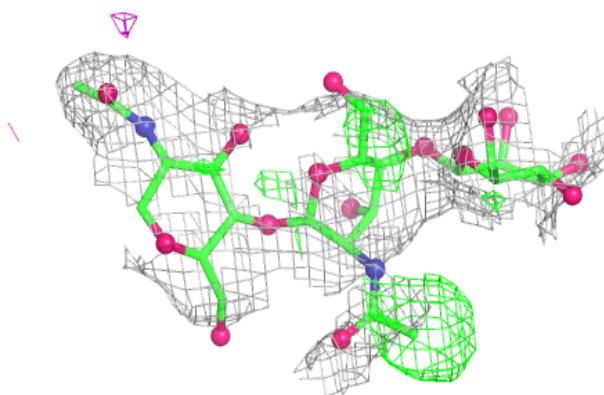
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain B:

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

**Electron density around Chain C:**

$2mF_o-DF_c$ (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
7	SO4	A	638	5/5	0.81	0.18	142,142,145,148	0
7	SO4	A	630	5/5	0.83	0.23	105,107,108,109	0
7	SO4	L	218	5/5	0.83	0.12	109,109,111,113	0
7	SO4	A	632	5/5	0.86	0.19	97,100,102,102	0
7	SO4	L	219	5/5	0.86	0.16	131,131,132,136	0
7	SO4	A	634	5/5	0.87	0.27	130,132,134,138	0
7	SO4	A	637	5/5	0.88	0.15	130,131,133,137	0
7	SO4	H	225	5/5	0.88	0.20	115,117,119,120	0
7	SO4	A	631	5/5	0.90	0.27	115,115,116,117	0
7	SO4	A	628	5/5	0.91	0.14	89,89,93,95	0
7	SO4	A	633	5/5	0.91	0.20	119,122,124,127	0
7	SO4	A	636	5/5	0.92	0.20	132,133,137,138	0
6	CL	A	625	1/1	0.92	0.10	76,76,76,76	0
7	SO4	A	629	5/5	0.96	0.12	78,82,85,87	0
7	SO4	A	635	5/5	0.96	0.16	99,103,104,107	0
7	SO4	A	627	5/5	0.97	0.10	86,90,91,93	0
7	SO4	A	626	5/5	0.98	0.08	55,56,58,59	0

6.5 Other polymers [i](#)

There are no such residues in this entry.