Full wwPDB X-ray Structure Validation Report ⓘ

Oct 14, 2025 – 08:30 AM JST

PDB ID	:	9JTD / pdb_00009jtd
Title	:	Crystal structure of PCoV-GD receptor binding domain complexed with fox ACE2
Authors	:	Jun, L.; Xiaoyan, N.
Deposited on	:	2024-10-04
Resolution	:	3.59 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:

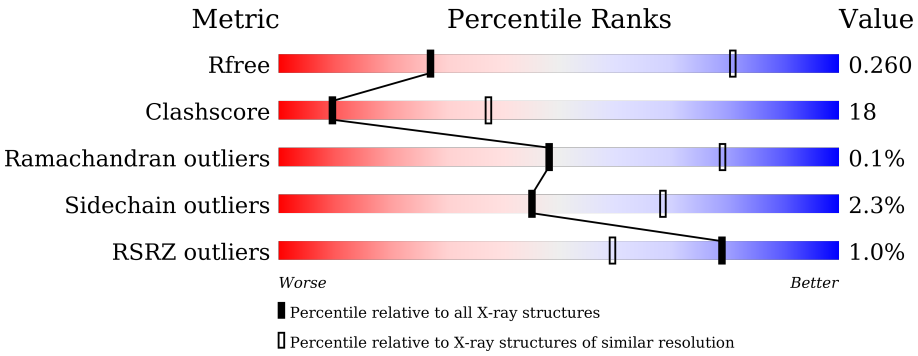
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

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 3.59 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}	164625	1563 (3.70-3.50)
Clashscore	180529	1665 (3.70-3.50)
Ramachandran outliers	177936	1641 (3.70-3.50)
Sidechain outliers	177891	1640 (3.70-3.50)
RSRZ outliers	164620	1562 (3.70-3.50)

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 <=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	592	% 61% 37% .
2	E	194	% 66% 33% .
3	B	3	67% 33%
3	C	3	67% 33%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 6479 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 Angiotensin-converting enzyme.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	592	Total	C	N	O	S	0	0	0
			4855	3103	807	916	29			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	19	PRO	-	expression tag	UNP A0A3Q7RAT9
A	306	ARG	LYS	conflict	UNP A0A3Q7RAT9

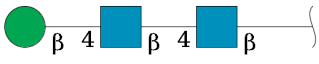
- Molecule 2 is a protein called Spike glycoprotein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	E	194	Total	C	N	O	S	0	0	0
			1532	979	255	290	8			

There is a discrepancy between the modelled and reference sequences:

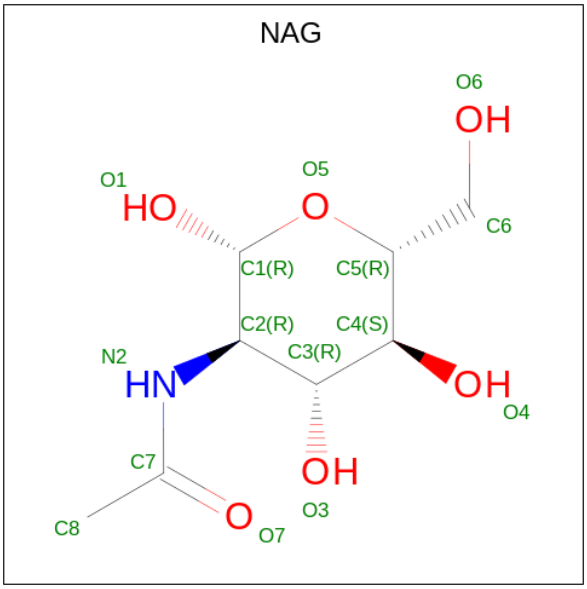
Chain	Residue	Modelled	Actual	Comment	Reference
E	337	THR	PRO	conflict	UNP A0A7D6PMV8

- Molecule 3 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
3	B	3	Total	C	N	O	0	0	0
			39	22	2	15			
3	C	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



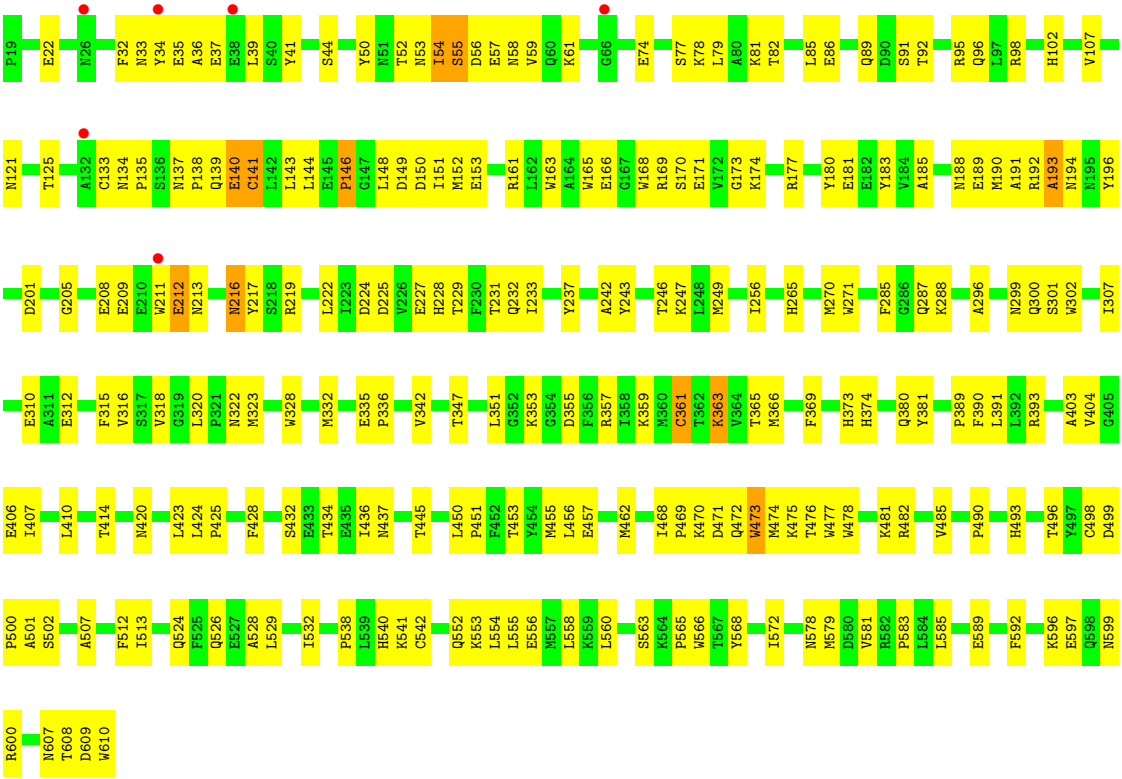
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
4	A	1	14	8	1	5	0	0

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.

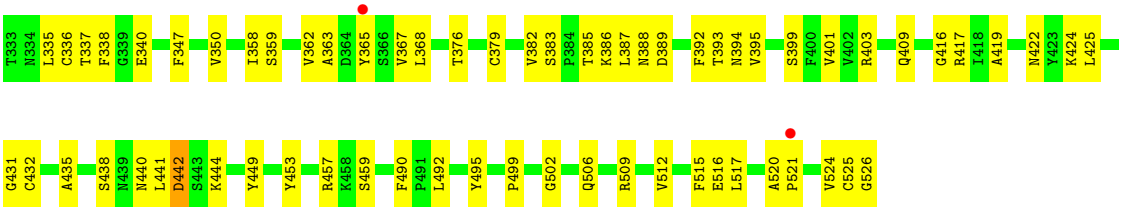
• Molecule 1: Angiotensin-converting enzyme

Chain A:



• Molecule 2: Spike glycoprotein

Chain E:



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

Chain B:

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

Chain C:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 41 2 2	Depositor
Cell constants a, b, c, α, β, γ	193.95Å 193.95Å 151.02Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	33.07 – 3.59 33.07 – 3.59	Depositor EDS
% Data completeness (in resolution range)	99.1 (33.07-3.59) 99.1 (33.07-3.59)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.05 (at 3.56Å)	Xtriage
Refinement program	PHENIX (1.19.1_4122: ???)	Depositor
R, R_{free}	0.229 , 0.263 0.231 , 0.260	Depositor DCC
R_{free} test set	853 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å^2)	98.3	Xtriage
Anisotropy	0.630	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.29 , 71.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.45$, $< L^2 > = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	6479	wwPDB-VP
Average B, all atoms (Å^2)	120.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.41% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: 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	0.36	0/4996	0.61	2/6787 (0.0%)
2	E	0.36	0/1574	0.57	0/2144
All	All	0.36	0/6570	0.60	2/8931 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	361	CYS	N-CA-C	-5.63	103.56	110.65
1	A	193	ALA	N-CA-C	-5.14	105.68	111.28

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	4855	0	4619	175	1
2	E	1532	0	1440	48	0
3	B	39	0	34	0	0
3	C	39	0	34	0	0
4	A	14	0	13	1	0
All	All	6479	0	6140	221	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 18.

All (221) 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:133:CYS:HA	1:A:141:CYS:HA	1.66	0.78
1:A:144:LEU:HD12	1:A:148:LEU:HB2	1.67	0.77
1:A:137:ASN:HB2	1:A:140:GLU:HB2	1.66	0.76
2:E:393:THR:HB	2:E:516:GLU:HG3	1.67	0.76
1:A:91:SER:HB3	1:A:211:TRP:CG	2.21	0.75
1:A:137:ASN:CB	1:A:140:GLU:HB2	2.19	0.73
1:A:22:GLU:CD	1:A:89:GLN:H	1.98	0.71
1:A:560:LEU:HD11	1:A:572:ILE:HD12	1.74	0.70
1:A:211:TRP:CD1	1:A:212:GLU:H	2.12	0.68
2:E:394:ASN:HB2	2:E:516:GLU:OE2	1.93	0.68
1:A:57:GLU:HG2	1:A:61:LYS:HE3	1.76	0.67
1:A:607:ASN:HB3	1:A:610:TRP:HA	1.78	0.66
1:A:91:SER:HB3	1:A:211:TRP:CD1	2.30	0.65
1:A:32:PHE:HE2	1:A:391:LEU:HD21	1.63	0.64
2:E:389:ASP:HA	2:E:526:GLY:HA3	1.79	0.63
1:A:208:GLU:HB2	1:A:219:ARG:HG2	1.81	0.62
2:E:395:VAL:HG22	2:E:515:PHE:HB3	1.82	0.62
1:A:529:LEU:HA	1:A:532:ILE:HD12	1.82	0.62
1:A:320:LEU:HD13	1:A:380:GLN:HG2	1.81	0.61
1:A:152:MET:HE2	1:A:270:MET:HA	1.82	0.60
1:A:138:PRO:HB2	1:A:139:GLN:NE2	2.17	0.60
1:A:32:PHE:CE2	1:A:391:LEU:HD21	2.37	0.59
1:A:592:PHE:CE2	1:A:596:LYS:HD2	2.37	0.59
1:A:209:GLU:HG3	1:A:566:TRP:HD1	1.65	0.59
1:A:265:HIS:CE1	1:A:490:PRO:HB3	2.37	0.59
1:A:91:SER:O	1:A:95:ARG:HG3	2.03	0.58
2:E:367:VAL:HG13	2:E:368:LEU:HD12	1.84	0.58
1:A:55:SER:O	1:A:56:ASP:C	2.46	0.58
1:A:455:MET:HE2	1:A:485:VAL:HG21	1.85	0.58
1:A:227:GLU:O	1:A:231:THR:HG23	2.03	0.57
1:A:351:LEU:HD13	1:A:357:ARG:HD2	1.86	0.57
1:A:462:MET:HE3	1:A:468:ILE:HD11	1.86	0.57
2:E:336:CYS:SG	2:E:363:ALA:HB2	2.45	0.57
1:A:450:LEU:HB2	1:A:451:PRO:HD3	1.87	0.57
1:A:318:VAL:HG23	1:A:320:LEU:HG	1.87	0.56
1:A:404:VAL:O	1:A:407:ILE:HG12	2.06	0.56
2:E:394:ASN:HB2	2:E:516:GLU:CD	2.29	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:177:ARG:O	1:A:181:GLU:HG3	2.06	0.56
1:A:296:ALA:O	1:A:300:GLN:HG3	2.06	0.56
1:A:225:ASP:HA	1:A:228:HIS:ND1	2.21	0.55
1:A:403:ALA:O	1:A:407:ILE:HG23	2.07	0.55
1:A:532:ILE:HD11	1:A:553:LYS:HD2	1.87	0.55
1:A:209:GLU:HG3	1:A:566:TRP:CD1	2.41	0.55
2:E:335:LEU:HD23	2:E:362:VAL:HG13	1.86	0.55
1:A:170:SER:O	1:A:174:LYS:HD2	2.07	0.55
1:A:50:TYR:CD1	1:A:59:VAL:HG22	2.42	0.55
1:A:232:GLN:HB2	1:A:581:VAL:HG21	1.88	0.55
1:A:320:LEU:HB3	1:A:380:GLN:HE21	1.73	0.54
1:A:138:PRO:HB2	1:A:139:GLN:HE22	1.73	0.54
1:A:554:LEU:O	1:A:558:LEU:HG	2.07	0.54
1:A:168:TRP:CD1	1:A:502:SER:HB2	2.43	0.54
1:A:323:MET:HE1	1:A:380:GLN:OE1	2.08	0.53
2:E:457:ARG:NH1	2:E:459:SER:O	2.40	0.53
1:A:477:TRP:CE3	1:A:500:PRO:HG3	2.43	0.53
1:A:52:THR:O	1:A:342:VAL:HG22	2.08	0.53
1:A:150:ASP:HA	1:A:153:GLU:HG3	1.92	0.52
1:A:478:TRP:HA	1:A:481:LYS:HB2	1.91	0.52
2:E:337:THR:O	2:E:340:GLU:HG2	2.10	0.52
2:E:376:THR:HB	2:E:435:ALA:HB3	1.90	0.52
1:A:191:ALA:O	1:A:196:TYR:HB2	2.09	0.52
1:A:474:MET:O	1:A:477:TRP:HB3	2.09	0.52
1:A:424:LEU:HD12	1:A:425:PRO:HD2	1.91	0.52
1:A:135:PRO:HD2	1:A:163:TRP:CD1	2.44	0.52
1:A:538:PRO:HB2	1:A:541:LYS:HG3	1.92	0.51
1:A:524:GLN:HG2	1:A:583:PRO:HG2	1.92	0.51
1:A:79:LEU:O	1:A:82:THR:OG1	2.26	0.51
2:E:392:PHE:HE2	2:E:517:LEU:HB2	1.76	0.51
2:E:425:LEU:HD21	2:E:512:VAL:HG11	1.91	0.51
2:E:449:TYR:HA	2:E:495:TYR:O	2.11	0.51
1:A:36:ALA:O	1:A:37:GLU:C	2.54	0.51
1:A:190:MET:O	1:A:193:ALA:HB3	2.10	0.51
1:A:374:HIS:HE1	1:A:406:GLU:HG2	1.76	0.51
2:E:382:VAL:HG21	2:E:387:LEU:HD12	1.92	0.50
1:A:229:THR:O	1:A:233:ILE:HG13	2.11	0.50
1:A:389:PRO:O	1:A:393:ARG:HG3	2.11	0.50
1:A:528:ALA:O	1:A:532:ILE:HG13	2.12	0.50
1:A:229:THR:HG21	1:A:579:MET:HE3	1.94	0.50
1:A:307:ILE:HG23	1:A:369:PHE:HD1	1.76	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:359:SER:HA	2:E:524:VAL:HG22	1.93	0.50
1:A:225:ASP:OD2	1:A:578:ASN:ND2	2.39	0.50
1:A:149:ASP:O	1:A:150:ASP:C	2.54	0.49
1:A:174:LYS:NZ	1:A:496:THR:OG1	2.45	0.49
1:A:351:LEU:CD1	1:A:357:ARG:HD2	2.43	0.49
1:A:414:THR:HG21	1:A:542:CYS:H	1.78	0.49
2:E:438:SER:HB2	2:E:442:ASP:HB2	1.94	0.49
1:A:57:GLU:CG	1:A:61:LYS:HE3	2.42	0.49
1:A:592:PHE:O	1:A:596:LYS:HG3	2.12	0.49
1:A:249:MET:HG3	1:A:256:ILE:HB	1.95	0.49
1:A:374:HIS:CE1	1:A:406:GLU:HG2	2.48	0.49
1:A:456:LEU:HD23	1:A:512:PHE:CD2	2.48	0.49
1:A:95:ARG:NH1	1:A:563:SER:O	2.46	0.48
2:E:358:ILE:O	2:E:395:VAL:HB	2.12	0.48
1:A:217:TYR:OH	1:A:222:LEU:HA	2.13	0.48
2:E:387:LEU:O	2:E:387:LEU:HD23	2.13	0.48
1:A:336:PRO:HG3	1:A:342:VAL:HG23	1.96	0.48
1:A:407:ILE:HB	1:A:526:GLN:OE1	2.14	0.48
1:A:95:ARG:HH22	1:A:565:PRO:HG3	1.78	0.48
1:A:53:ASN:ND2	4:A:701:NAG:O7	2.47	0.47
1:A:169:ARG:HB3	1:A:499:ASP:OD1	2.14	0.47
1:A:121:ASN:O	1:A:125:THR:HG23	2.15	0.47
1:A:92:THR:O	1:A:96:GLN:HG3	2.14	0.47
1:A:475:LYS:HG2	1:A:476:THR:N	2.29	0.47
2:E:419:ALA:O	2:E:424:LYS:HB2	2.15	0.47
1:A:53:ASN:O	1:A:54:ILE:C	2.58	0.47
2:E:382:VAL:HG21	2:E:387:LEU:HB2	1.97	0.47
2:E:401:VAL:HG22	2:E:509:ARG:HG2	1.97	0.47
1:A:424:LEU:HD21	1:A:428:PHE:CD1	2.50	0.47
1:A:320:LEU:HD22	1:A:555:LEU:HG	1.97	0.47
1:A:390:PHE:HA	1:A:393:ARG:HD2	1.97	0.47
2:E:383:SER:H	2:E:386:LYS:HB3	1.80	0.47
1:A:44:SER:HB3	1:A:351:LEU:HG	1.97	0.46
1:A:149:ASP:O	1:A:152:MET:N	2.48	0.46
1:A:315:PHE:HD1	1:A:320:LEU:HD12	1.79	0.46
1:A:469:PRO:HB2	1:A:471:ASP:OD1	2.14	0.46
1:A:307:ILE:HG23	1:A:369:PHE:CD1	2.50	0.46
1:A:98:ARG:HG2	1:A:102:HIS:HE1	1.80	0.46
1:A:288:LYS:HB3	1:A:434:THR:HG23	1.96	0.46
2:E:338:PHE:CE1	2:E:363:ALA:HB1	2.51	0.46
1:A:201:ASP:CG	1:A:219:ARG:HE	2.24	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:242:ALA:HB3	1:A:599:ASN:ND2	2.31	0.46
1:A:585:LEU:O	1:A:589:GLU:N	2.49	0.46
1:A:185:ALA:O	1:A:189:GLU:HG3	2.16	0.45
1:A:347:THR:OG1	1:A:359:LYS:HE3	2.17	0.45
2:E:335:LEU:HA	2:E:362:VAL:O	2.17	0.45
2:E:440:ASN:N	2:E:440:ASN:OD1	2.48	0.45
1:A:134:ASN:O	1:A:135:PRO:C	2.59	0.45
1:A:285:PHE:HD2	1:A:437:ASN:OD1	1.99	0.45
1:A:233:ILE:HD13	1:A:450:LEU:HD13	1.98	0.45
1:A:457:GLU:HG2	1:A:513:ILE:HB	1.99	0.45
2:E:393:THR:HA	2:E:521:PRO:O	2.17	0.45
1:A:50:TYR:CE1	1:A:59:VAL:HG22	2.50	0.45
1:A:312:GLU:OE2	1:A:322:ASN:HB2	2.17	0.45
1:A:335:GLU:HG2	1:A:361:CYS:SG	2.57	0.45
1:A:432:SER:O	1:A:436:ILE:HG12	2.17	0.45
2:E:453:TYR:HB3	2:E:495:TYR:CE2	2.52	0.45
2:E:438:SER:O	2:E:442:ASP:HB2	2.16	0.45
1:A:474:MET:HB3	1:A:474:MET:HE3	1.71	0.45
2:E:409:GLN:CD	2:E:416:GLY:HA3	2.42	0.45
1:A:225:ASP:HA	1:A:228:HIS:CE1	2.51	0.44
1:A:152:MET:O	1:A:161:ARG:NH2	2.48	0.44
2:E:338:PHE:HE1	2:E:363:ALA:HB1	1.82	0.44
1:A:95:ARG:NH2	1:A:565:PRO:HG3	2.33	0.44
1:A:216:ASN:N	1:A:216:ASN:OD1	2.50	0.44
1:A:77:SER:O	1:A:81:LYS:HG3	2.18	0.44
1:A:366:MET:O	1:A:369:PHE:HB3	2.17	0.44
1:A:287:GLN:O	1:A:288:LYS:C	2.60	0.44
1:A:302:TRP:CH2	1:A:310:GLU:HG3	2.52	0.44
2:E:350:VAL:HG22	2:E:422:ASN:HB3	2.00	0.44
2:E:383:SER:HB3	2:E:386:LYS:HB2	2.00	0.44
1:A:166:GLU:CD	1:A:493:HIS:HE2	2.26	0.43
1:A:208:GLU:HA	1:A:217:TYR:O	2.18	0.43
1:A:406:GLU:O	1:A:410:LEU:HG	2.18	0.43
1:A:501:ALA:O	1:A:507:ALA:HB2	2.18	0.43
1:A:169:ARG:HH22	1:A:271:TRP:HA	1.84	0.43
1:A:470:LYS:HA	1:A:473:TRP:CG	2.53	0.43
1:A:165:TRP:HZ2	1:A:478:TRP:CZ2	2.37	0.43
1:A:232:GLN:CB	1:A:581:VAL:HG21	2.49	0.43
1:A:472:GLN:HB3	1:A:475:LYS:HD3	2.01	0.43
2:E:359:SER:HA	2:E:524:VAL:CG2	2.49	0.43
1:A:34:TYR:OH	2:E:417:ARG:HD2	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:180:TYR:HA	1:A:183:TYR:HB3	2.00	0.43
1:A:363:LYS:HD3	1:A:363:LYS:HA	1.69	0.43
2:E:385:THR:C	2:E:387:LEU:H	2.26	0.43
1:A:211:TRP:H	1:A:216:ASN:ND2	2.16	0.43
1:A:336:PRO:HG3	1:A:342:VAL:CG2	2.49	0.43
1:A:355:ASP:CG	1:A:357:ARG:HE	2.26	0.43
1:A:55:SER:O	1:A:59:VAL:HG23	2.18	0.43
1:A:139:GLN:C	1:A:141:CYS:H	2.25	0.43
1:A:139:GLN:C	1:A:141:CYS:N	2.76	0.42
1:A:335:GLU:OE1	1:A:336:PRO:HD2	2.19	0.42
1:A:456:LEU:HD13	1:A:477:TRP:HH2	1.84	0.42
2:E:431:GLY:HA2	2:E:515:PHE:CZ	2.54	0.42
1:A:205:GLY:HA2	1:A:219:ARG:HG2	2.01	0.42
1:A:56:ASP:O	1:A:57:GLU:C	2.61	0.42
2:E:365:TYR:HB2	2:E:388:ASN:HA	2.01	0.42
2:E:403:ARG:HG3	2:E:495:TYR:CE1	2.54	0.42
1:A:299:ASN:C	1:A:301:SER:H	2.26	0.42
1:A:242:ALA:O	1:A:246:THR:HG23	2.19	0.42
1:A:85:LEU:HD11	1:A:98:ARG:HA	2.01	0.42
1:A:482:ARG:HD3	1:A:608:THR:O	2.19	0.42
1:A:552:GLN:O	1:A:556:GLU:HG3	2.19	0.42
1:A:41:TYR:CD1	1:A:353:LYS:HG3	2.54	0.42
1:A:192:ARG:HA	1:A:196:TYR:O	2.20	0.42
1:A:225:ASP:CG	1:A:578:ASN:HD21	2.25	0.42
2:E:444:LYS:C	2:E:499:PRO:HD3	2.44	0.42
1:A:188:ASN:CG	1:A:192:ARG:HH21	2.28	0.42
1:A:568:TYR:O	1:A:572:ILE:HG13	2.20	0.42
2:E:393:THR:OG1	2:E:520:ALA:HB3	2.19	0.42
1:A:74:GLU:O	1:A:78:LYS:HG3	2.20	0.41
1:A:312:GLU:CD	1:A:328:TRP:HZ2	2.28	0.41
2:E:363:ALA:N	2:E:525:CYS:O	2.43	0.41
2:E:385:THR:HA	2:E:388:ASN:HB2	2.02	0.41
1:A:312:GLU:O	1:A:316:VAL:HG23	2.20	0.41
1:A:423:LEU:HD23	1:A:423:LEU:HA	1.92	0.41
1:A:143:LEU:C	1:A:146:PRO:HD2	2.45	0.41
2:E:347:PHE:CE2	2:E:399:SER:HB2	2.56	0.41
2:E:490:PHE:HE1	2:E:492:LEU:HB2	1.84	0.41
1:A:34:TYR:HD2	2:E:453:TYR:HH	1.67	0.41
1:A:35:GLU:O	1:A:39:LEU:HG	2.20	0.41
1:A:332:MET:SD	1:A:342:VAL:HG11	2.61	0.41
1:A:224:ASP:OD1	1:A:224:ASP:N	2.53	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:301:SER:O	1:A:302:TRP:C	2.64	0.41
1:A:455:MET:HE3	1:A:455:MET:HB3	1.59	0.41
2:E:379:CYS:HA	2:E:432:CYS:HA	2.03	0.41
1:A:56:ASP:N	1:A:56:ASP:OD1	2.52	0.41
1:A:173:GLY:O	1:A:498:CYS:HB3	2.21	0.41
1:A:381:TYR:CG	1:A:558:LEU:HD22	2.56	0.41
1:A:477:TRP:CD2	1:A:500:PRO:HG3	2.56	0.41
1:A:540:HIS:CE1	1:A:541:LYS:HG2	2.56	0.41
1:A:55:SER:O	1:A:58:ASN:N	2.54	0.41
1:A:107:VAL:HG11	1:A:193:ALA:HB1	2.03	0.41
1:A:369:PHE:O	1:A:373:HIS:HD2	2.03	0.41
1:A:453:THR:HG23	1:A:512:PHE:CD2	2.55	0.41
1:A:243:TYR:O	1:A:247:LYS:HG2	2.21	0.41
1:A:420:ASN:N	1:A:420:ASN:HD22	2.19	0.41
2:E:502:GLY:O	2:E:506:GLN:HG3	2.20	0.41
1:A:86:GLU:H	1:A:86:GLU:HG3	1.64	0.40
1:A:148:LEU:O	1:A:151:ILE:HB	2.22	0.40
1:A:237:TYR:CD1	1:A:451:PRO:HG2	2.56	0.40
1:A:98:ARG:HG2	1:A:102:HIS:CE1	2.57	0.40
1:A:597:GLU:HA	1:A:600:ARG:HD3	2.03	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:89:GLN:CA	1:A:213:ASN:ND2[5_555]	2.13	0.07

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	590/592 (100%)	542 (92%)	47 (8%)	1 (0%)	44 73

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
2	E	192/194 (99%)	171 (89%)	21 (11%)	0	100 100
All	All	782/786 (100%)	713 (91%)	68 (9%)	1 (0%)	48 79

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	146	PRO

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	527/527 (100%)	513 (97%)	14 (3%)	40 65
2	E	167/168 (99%)	165 (99%)	2 (1%)	67 82
All	All	694/695 (100%)	678 (98%)	16 (2%)	45 68

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	33	ASN
1	A	54	ILE
1	A	55	SER
1	A	140	GLU
1	A	141	CYS
1	A	171	GLU
1	A	194	ASN
1	A	212	GLU
1	A	216	ASN
1	A	363	LYS
1	A	365	THR
1	A	445	THR
1	A	473	TRP
1	A	609	ASP
2	E	441	LEU

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Mol	Chain	Res	Type
2	E	442	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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

6 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	B	1	1,3	14,14,15	0.99	1 (7%)	17,19,21	1.04	1 (5%)
3	NAG	B	2	3	14,14,15	0.41	0	17,19,21	0.60	0
3	BMA	B	3	3	11,11,12	0.64	0	15,15,17	0.85	0
3	NAG	C	1	1,3	14,14,15	0.64	0	17,19,21	0.54	0
3	NAG	C	2	3	14,14,15	0.32	0	17,19,21	0.56	0
3	BMA	C	3	3	11,11,12	0.90	1 (9%)	15,15,17	0.88	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
3	NAG	B	1	1,3	-	3/6/23/26	0/1/1/1
3	NAG	B	2	3	-	2/6/23/26	0/1/1/1
3	BMA	B	3	3	-	2/2/19/22	0/1/1/1
3	NAG	C	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	C	2	3	-	2/6/23/26	0/1/1/1
3	BMA	C	3	3	-	1/2/19/22	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	1	NAG	O5-C1	-3.22	1.38	1.43
3	C	3	BMA	C4-C3	2.06	1.57	1.52

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	1	NAG	C4-C3-C2	2.66	114.92	111.02

There are no chirality outliers.

All (12) torsion outliers are listed below:

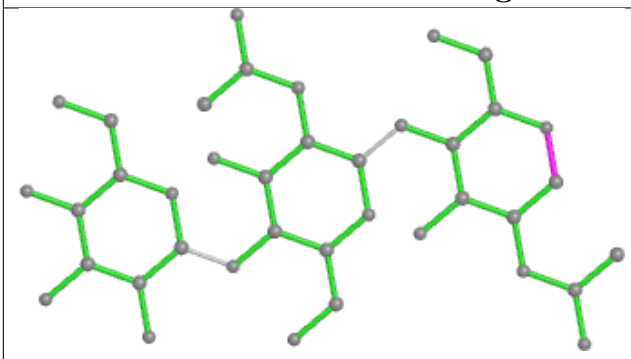
Mol	Chain	Res	Type	Atoms
3	C	1	NAG	C4-C5-C6-O6
3	B	2	NAG	C8-C7-N2-C2
3	B	2	NAG	O7-C7-N2-C2
3	C	2	NAG	C8-C7-N2-C2
3	C	2	NAG	O7-C7-N2-C2
3	C	1	NAG	O5-C5-C6-O6
3	B	1	NAG	C1-C2-N2-C7
3	B	1	NAG	O5-C5-C6-O6
3	C	3	BMA	O5-C5-C6-O6
3	B	1	NAG	C3-C2-N2-C7
3	B	3	BMA	C4-C5-C6-O6
3	B	3	BMA	O5-C5-C6-O6

There are no ring outliers.

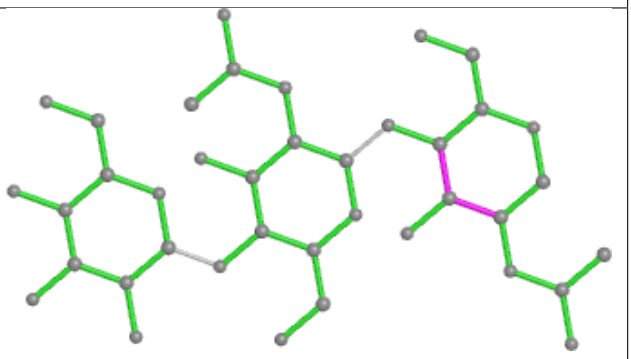
No monomer is involved in short contacts.

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

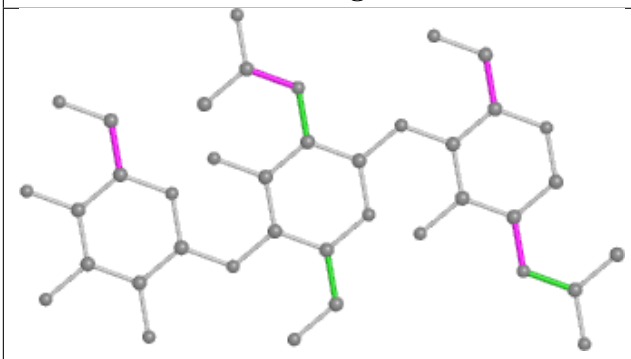
Oligosaccharide Chain B



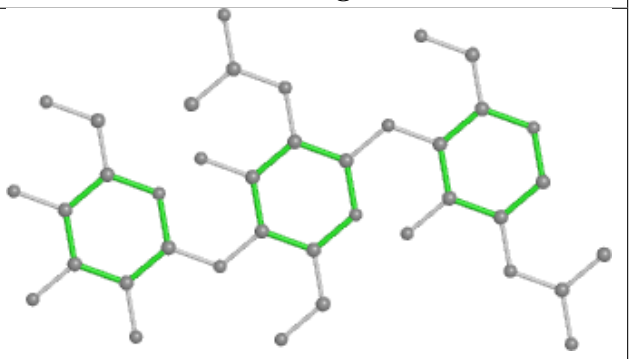
Bond lengths



Bond angles

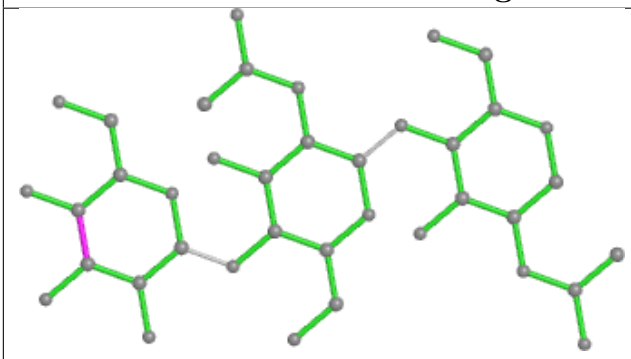


Torsions

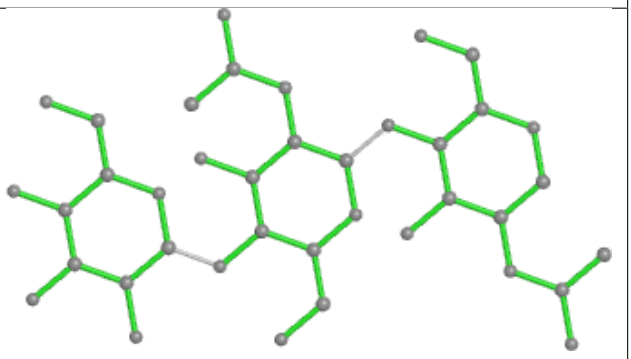


Rings

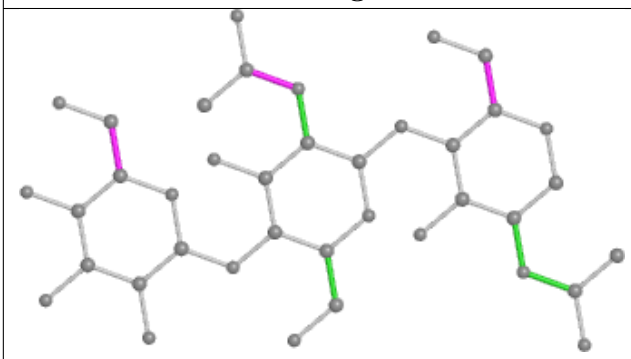
Oligosaccharide Chain C



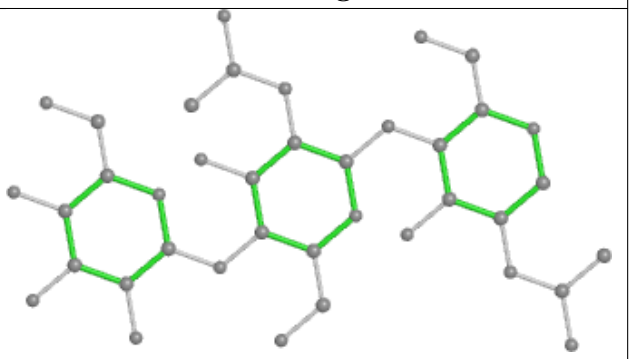
Bond lengths



Bond angles



Torsions



Rings

5.6 Ligand geometry (i)

1 ligand is 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	A	701	1	14,14,15	0.63	1 (7%)	17,19,21	0.63	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	A	701	1	-	0/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	701	NAG	C1-C2	2.04	1.55	1.52

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	701	NAG	1	0

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

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, 95^{th} 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	592/592 (100%)	-0.11	6 (1%)	79	59	73, 107, 172, 235	0
2	E	194/194 (100%)	-0.16	2 (1%)	79	59	85, 120, 237, 338	0
All	All	786/786 (100%)	-0.12	8 (1%)	79	59	73, 110, 202, 338	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	211	TRP	3.0
1	A	132	ALA	3.0
2	E	521	PRO	2.7
2	E	365	TYR	2.3
1	A	38	GLU	2.3
1	A	34	TYR	2.3
1	A	26	ASN	2.2
1	A	66	GLY	2.1

6.2 Non-standard residues in protein, DNA, RNA chains

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

6.3 Carbohydrates

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, 95^{th} 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
3	NAG	B	1	14/15	-	-	134,151,157,164	0

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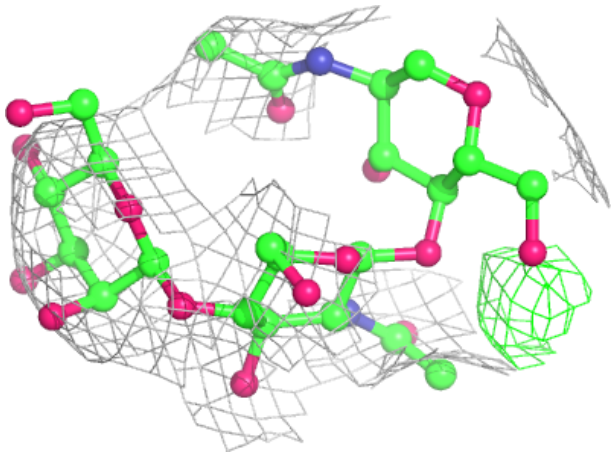
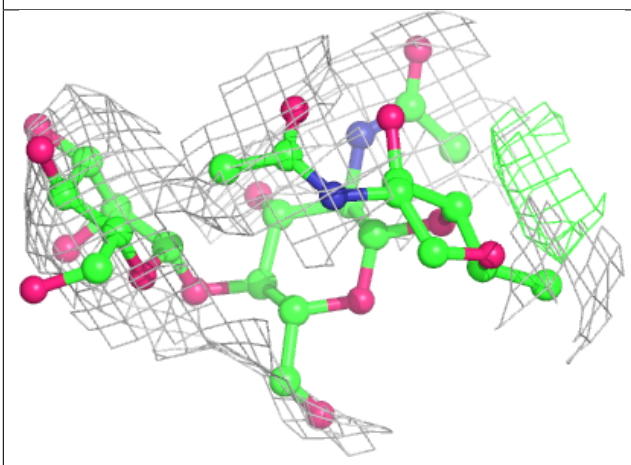
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	NAG	B	2	14/15	-	-	152,158,162,162	0
3	BMA	B	3	11/12	-	-	150,155,161,166	0
3	NAG	C	2	14/15	0.37	0.10	129,133,139,149	0
3	NAG	C	1	14/15	0.41	0.16	112,124,130,132	0
3	BMA	C	3	11/12	0.49	0.13	133,147,151,151	0

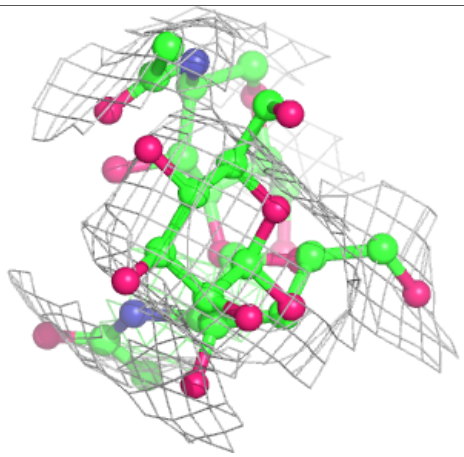
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

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)

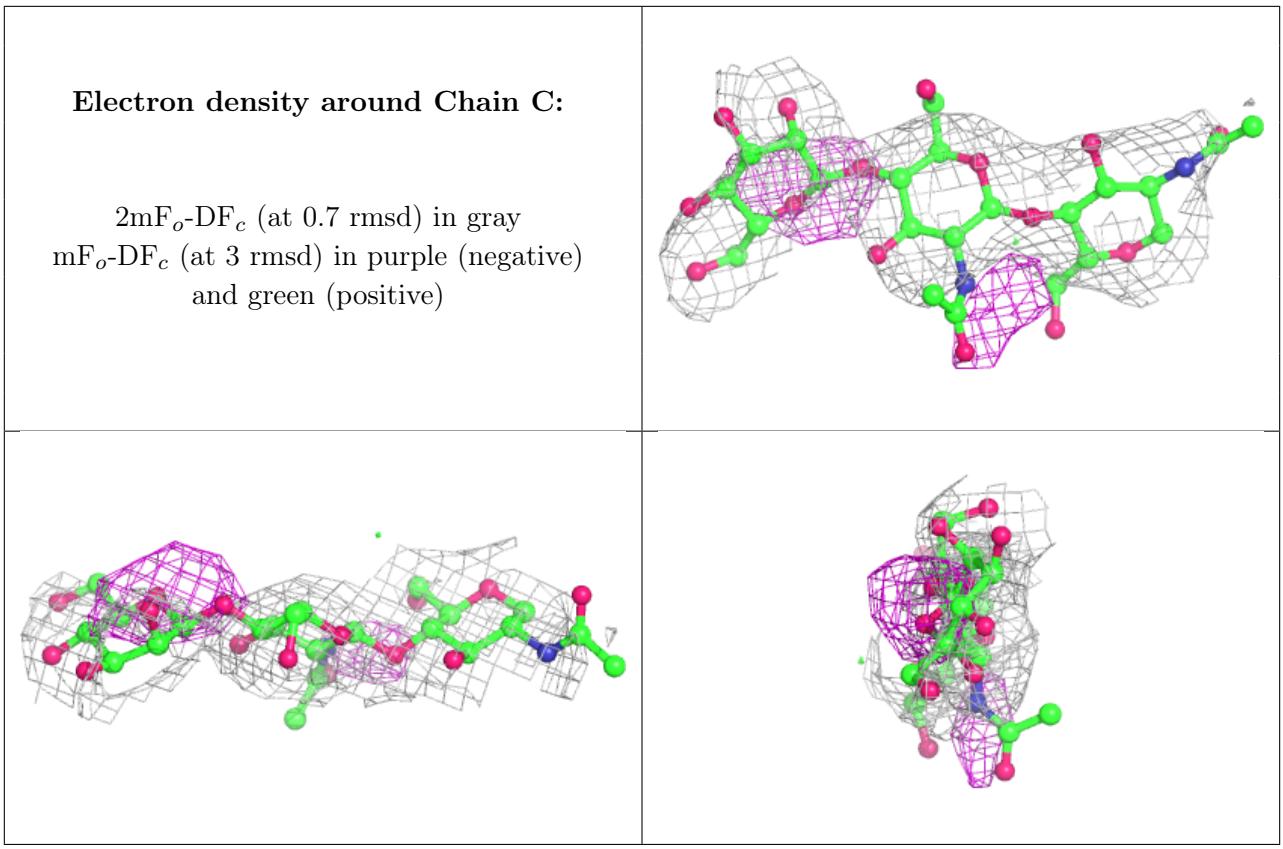






Electron density around Chain C:

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



6.4 Ligands

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, 95^{th} 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	A	701	14/15	0.48	0.13	137,154,159,159	0

6.5 Other polymers

There are no such residues in this entry.