Full wwPDB X-ray Structure Validation Report ⓘ

Sep 29, 2025 – 04:10 PM JST

PDB ID	:	9JT8 / pdb_00009jt8
Title	:	Chito oligosaccharide deacetylase from vibrio campbellii (VhCOD) in complex with Triacetyl-Chitotriose (GlcNAc)3
Authors	:	Sirikan, P.; Tamo, F.; Robinson, R.C.; Wipa, S.
Deposited on	:	2024-10-03
Resolution	:	2.85 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:

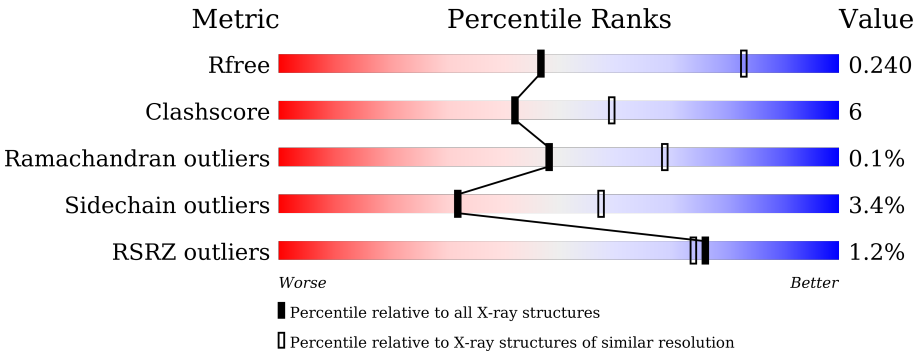
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal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

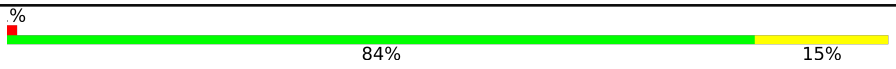
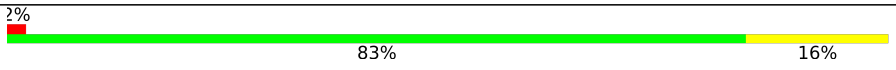
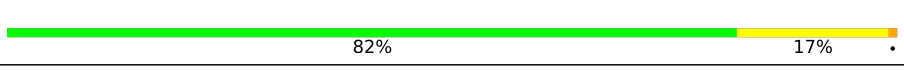
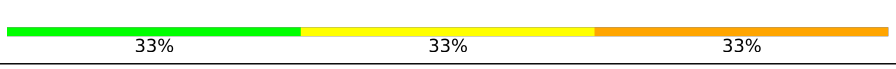
The reported resolution of this entry is 2.85 Å.

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	1268 (2.88-2.84)
Clashscore	180529	1351 (2.88-2.84)
Ramachandran outliers	177936	1318 (2.88-2.84)
Sidechain outliers	177891	1319 (2.88-2.84)
RSRZ outliers	164620	1269 (2.88-2.84)

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	405	
1	B	405	
1	C	405	
2	D	3	
2	E	3	
2	G	3	

2 Entry composition (i)

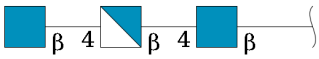
There are 4 unique types of molecules in this entry. The entry contains 9537 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 NodB homology domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	403	Total	C	N	O	S	0	0	0
			3131	1986	520	616	9			
1	B	404	Total	C	N	O	S	0	0	0
			3138	1990	521	618	9			
1	C	404	Total	C	N	O	S	0	0	0
			3138	1990	521	618	9			

- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-amino-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	E	3	Total	C	N	O	0	0	0
			40	22	3	15			
2	G	3	Total	C	N	O	0	0	0
			40	22	3	15			
2	D	3	Total	C	N	O	0	0	0
			40	22	3	15			

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Zn	0	0
			1	1		
3	B	1	Total	Zn	0	0
			1	1		
3	C	1	Total	Zn	0	0
			1	1		

- Molecule 4 is water.

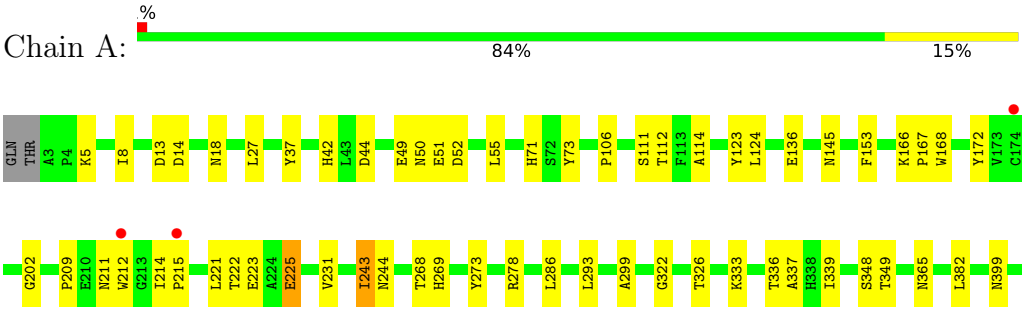
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total O 1 1	0	0
4	B	3	Total O 3 3	0	0
4	C	3	Total O 3 3	0	0

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.

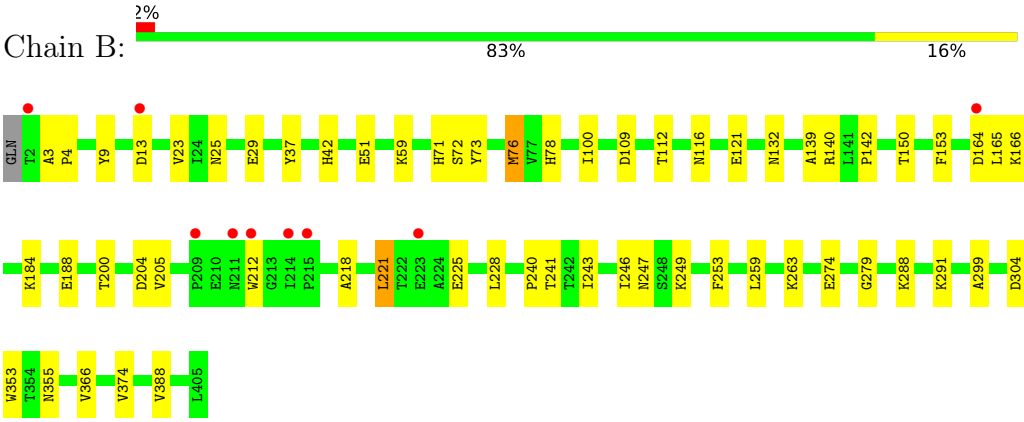
• Molecule 1: NodB homology domain-containing protein

Chain A:



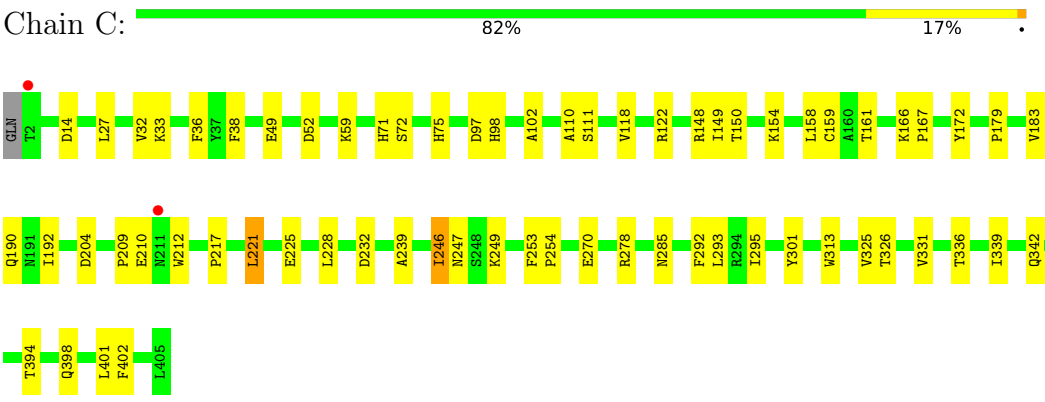
• Molecule 1: NodB homology domain-containing protein

Chain B:



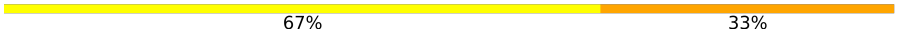
• Molecule 1: NodB homology domain-containing protein

Chain C:



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

Chain E:

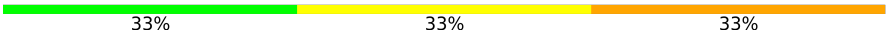


• Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-amino-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G:

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

Chain D:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 31 1 2	Depositor
Cell constants a, b, c, α, β, γ	107.88Å 107.88Å 260.73Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	29.24 – 2.85 29.24 – 2.85	Depositor EDS
% Data completeness (in resolution range)	99.3 (29.24-2.85) 95.5 (29.24-2.85)	Depositor EDS
R_{merge}	0.40	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.81 (at 2.85Å)	Xtriage
Refinement program	PHENIX (1.21.2_5419: ???)	Depositor
R, R_{free}	0.182 , 0.239 0.182 , 0.240	Depositor DCC
R_{free} test set	2040 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å^2)	45.5	Xtriage
Anisotropy	0.167	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 25.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.046 for -h,-k,l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	9537	wwPDB-VP
Average B, all atoms (Å^2)	49.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.71% 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: NAG, GCS, ZN

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	0.39	0/3223	0.56	0/4421
1	B	0.43	0/3230	0.60	2/4431 (0.0%)
1	C	0.38	0/3230	0.57	0/4431
All	All	0.40	0/9683	0.58	2/13283 (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	B	13	ASP	CA-C-N	-7.25	110.99	123.25
1	B	13	ASP	C-N-CA	-7.25	110.99	123.25

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	3131	0	2919	35	0
1	B	3138	0	2926	45	0
1	C	3138	0	2926	37	0
2	D	40	0	37	5	0
2	E	40	0	37	1	0
2	G	40	0	37	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
4	A	1	0	0	0	0
4	B	3	0	0	0	0
4	C	3	0	0	0	0
All	All	9537	0	8882	114	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 (114) 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:C:212:TRP:HD1	2:G:1:NAG:H82	1.39	0.87
1:B:247:ASN:HD22	2:D:1:NAG:H82	1.51	0.75
1:B:247:ASN:ND2	2:D:1:NAG:H82	2.06	0.70
1:C:27:LEU:HD23	1:C:293:LEU:HD11	1.75	0.69
1:B:76:MET:HE3	1:B:78:HIS:CE1	2.28	0.68
1:B:76:MET:HE3	1:B:78:HIS:HE1	1.57	0.68
1:B:167:PRO:HG2	1:B:247:ASN:HD21	1.59	0.68
1:C:32:VAL:HG21	1:C:293:LEU:HD22	1.77	0.67
1:A:73:TYR:H	1:A:112:THR:HG22	1.60	0.65
1:B:100:ILE:HD11	1:B:166:LYS:HG3	1.80	0.64
1:B:167:PRO:HG2	1:B:247:ASN:ND2	2.13	0.64
1:C:212:TRP:CD1	2:G:1:NAG:H82	2.29	0.62
1:A:8:ILE:HD11	1:A:231:VAL:HG11	1.82	0.60
1:B:37:TYR:HB3	1:B:71:HIS:HB2	1.83	0.60
1:C:97:ASP:OD1	1:C:166:LYS:NZ	2.35	0.59
1:B:212:TRP:CD1	2:D:1:NAG:H2	2.37	0.59
1:A:209:PRO:HG2	1:A:212:TRP:CE2	2.40	0.57
1:B:246:ILE:HA	1:B:249:LYS:HE2	1.85	0.57
1:C:232:ASP:OD1	1:C:301:TYR:OH	2.20	0.57
1:B:167:PRO:CG	1:B:247:ASN:HD21	2.18	0.57
1:C:49:GLU:OE2	1:C:278:ARG:NH1	2.35	0.56
1:C:209:PRO:HG3	1:C:217:PRO:HB2	1.86	0.56
1:A:111:SER:HB2	1:C:118:VAL:HG13	1.88	0.56
1:B:9:TYR:HE1	1:B:263:LYS:HG2	1.71	0.55
1:A:167:PRO:HA	1:A:172:TYR:CG	2.42	0.55
1:B:221:LEU:O	1:B:288:LYS:NZ	2.37	0.55
1:C:71:HIS:O	1:C:72:SER:HB3	2.05	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:268:THR:HG22	1:A:269:HIS:H	1.73	0.54
1:C:188:GLU:O	1:C:192:ILE:HG13	2.08	0.53
1:B:212:TRP:HD1	2:D:1:NAG:H2	1.73	0.53
1:C:167:PRO:HA	1:C:172:TYR:CD2	2.42	0.53
1:B:164:ASP:O	1:B:165:LEU:HB2	2.07	0.53
1:A:55:LEU:HD13	1:A:123:TYR:HB3	1.91	0.52
1:A:106:PRO:HG2	1:A:188:GLU:OE2	2.11	0.51
1:C:110:ALA:HB2	1:C:189:VAL:HG13	1.93	0.50
1:B:225:GLU:HG2	1:B:291:LYS:NZ	2.27	0.50
1:A:166:LYS:HD3	1:A:168:TRP:CZ2	2.46	0.49
1:A:243:ILE:HG12	1:A:244:ASN:N	2.27	0.49
1:B:164:ASP:OD1	1:B:165:LEU:HD13	2.12	0.49
1:A:13:ASP:HB3	1:A:14:ASP:OD1	2.12	0.49
1:B:132:ASN:OD1	1:B:132:ASN:N	2.39	0.49
1:A:209:PRO:HG2	1:A:212:TRP:CD2	2.48	0.49
1:B:355:ASN:HB3	1:B:366:VAL:HG22	1.95	0.49
1:B:346:PRO:HB3	1:B:353:TRP:CG	2.48	0.48
1:B:72:SER:HB2	1:B:112:THR:HG22	1.95	0.48
1:A:18:ASN:HD22	1:A:50:ASN:HB3	1.78	0.48
1:A:42:HIS:HA	1:A:51:GLU:OE1	2.13	0.47
1:B:240:PRO:HG2	1:B:253:PHE:CE2	2.50	0.47
1:A:225:GLU:H	1:A:225:GLU:CD	2.23	0.47
1:C:204:ASP:OD1	1:C:239:ALA:HB3	2.14	0.47
1:A:44:ASP:OD1	1:A:123:TYR:OH	2.29	0.46
1:A:27:LEU:HD23	1:A:293:LEU:HD11	1.97	0.46
1:B:73:TYR:H	1:B:112:THR:HG22	1.81	0.46
1:B:71:HIS:ND1	1:B:140:ARG:O	2.47	0.45
1:C:75:HIS:CG	2:G:3:NAG:H62	2.51	0.45
1:B:204:ASP:OD1	1:B:240:PRO:HD3	2.17	0.45
1:A:268:THR:HG21	1:A:273:TYR:OH	2.17	0.45
1:B:225:GLU:HG2	1:B:291:LYS:HZ1	1.81	0.45
1:B:150:THR:H	1:B:153:PHE:HB3	1.81	0.45
1:B:218:ALA:HB3	1:B:279:GLY:HA3	1.99	0.45
1:C:221:LEU:HD22	1:C:285:ASN:ND2	2.32	0.45
1:A:37:TYR:HB3	1:A:71:HIS:HB2	1.99	0.44
1:A:286:LEU:HD23	1:A:286:LEU:HA	1.71	0.44
1:C:246:ILE:HA	1:C:249:LYS:HE2	1.99	0.44
1:A:222:THR:HG22	1:A:223:GLU:O	2.17	0.44
1:B:3:ALA:HB1	1:B:4:PRO:HD2	1.99	0.44
1:C:158:LEU:HA	1:C:183:VAL:HG11	2.00	0.44
1:B:247:ASN:HD22	2:D:1:NAG:C8	2.27	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:243:ILE:O	1:B:249:LYS:HD3	2.18	0.44
1:A:5:LYS:HD2	1:A:299:ALA:O	2.18	0.43
1:C:102:ALA:HB3	1:C:161:THR:HG21	2.00	0.43
1:A:349:THR:O	1:C:342:GLN:HG2	2.18	0.43
1:B:167:PRO:HA	1:B:172:TYR:CG	2.53	0.43
1:B:241:THR:HG23	1:B:253:PHE:HB3	2.00	0.43
1:C:225:GLU:H	1:C:225:GLU:CD	2.25	0.43
1:A:268:THR:HG22	1:A:269:HIS:N	2.33	0.43
1:A:145:ASN:OD1	1:A:202:GLY:HA3	2.19	0.43
1:C:292:PHE:HA	1:C:295:ILE:HG12	2.00	0.43
1:A:49:GLU:OE2	1:A:278:ARG:NH2	2.45	0.43
1:B:76:MET:HG2	1:B:142:PRO:HG2	2.00	0.43
1:C:149:ILE:HG22	1:C:150:THR:HG23	2.01	0.43
1:A:212:TRP:NE1	2:E:1:NAG:H82	2.34	0.42
1:B:109:ASP:O	1:B:112:THR:HB	2.19	0.42
1:C:159:CYS:HB2	1:C:247:ASN:HA	2.00	0.42
1:C:313:TRP:HB2	1:C:325:VAL:HG21	2.00	0.42
1:A:348:SER:O	1:A:365:ASN:HB2	2.19	0.42
1:C:52:ASP:OD1	1:C:52:ASP:N	2.51	0.42
1:B:139:ALA:O	1:B:200:THR:HA	2.20	0.42
1:B:228:LEU:HD21	1:B:299:ALA:HB2	2.02	0.42
1:B:352:LEU:HD23	1:B:352:LEU:HA	1.88	0.42
1:C:150:THR:HG22	1:C:331:VAL:HG11	2.01	0.42
1:C:383:VAL:HG22	1:C:402:PHE:CE1	2.54	0.42
1:C:398:GLN:HG3	1:C:401:LEU:HD12	2.01	0.42
1:C:253:PHE:HA	1:C:254:PRO:HD3	1.89	0.42
1:B:25:ASN:O	1:B:29:GLU:HG3	2.19	0.42
1:A:211:ASN:ND2	1:A:214:ILE:HG13	2.34	0.41
1:C:98:HIS:CE1	2:G:3:NAG:H3	2.55	0.41
1:B:73:TYR:HA	1:B:116:ASN:OD1	2.20	0.41
1:B:42:HIS:ND1	1:B:51:GLU:OE1	2.50	0.41
1:B:366:VAL:O	1:B:388:VAL:HA	2.20	0.41
1:C:36:PHE:HB3	1:C:38:PHE:CE1	2.55	0.41
1:C:228:LEU:HD22	1:C:295:ILE:HG13	2.01	0.41
1:A:336:THR:HG22	1:A:337:ALA:O	2.21	0.41
1:B:304:ASP:OD1	1:B:305:THR:N	2.43	0.41
1:A:214:ILE:HG23	1:A:215:PRO:HD2	2.02	0.41
1:A:114:ALA:HB1	1:C:118:VAL:HG22	2.03	0.41
1:A:153:PHE:C	1:A:153:PHE:CD1	2.99	0.41
1:C:179:PRO:O	1:C:184:LYS:NZ	2.54	0.41
1:B:179:PRO:O	1:B:184:LYS:HE3	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:210:GLU:N	1:C:210:GLU:CD	2.80	0.40
1:C:148:ARG:HD3	1:C:154:LYS:HG2	2.03	0.40
1:A:183:VAL:O	1:A:187:ILE:HG13	2.21	0.40
1:B:73:TYR:H	1:B:112:THR:CG2	2.35	0.40
1:A:322:GLY:HA2	1:A:333:LYS:HG2	2.04	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	401/405 (99%)	380 (95%)	21 (5%)	0	100	100
1	B	402/405 (99%)	378 (94%)	24 (6%)	0	100	100
1	C	402/405 (99%)	381 (95%)	20 (5%)	1 (0%)	44	63
All	All	1205/1215 (99%)	1139 (94%)	65 (5%)	1 (0%)	48	69

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	14	ASP

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	332/334 (99%)	322 (97%)	10 (3%)	36	62
1	B	333/334 (100%)	323 (97%)	10 (3%)	36	62
1	C	333/334 (100%)	319 (96%)	14 (4%)	25	48
All	All	998/1002 (100%)	964 (97%)	34 (3%)	32	57

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	52	ASP
1	A	124	LEU
1	A	136	GLU
1	A	221	LEU
1	A	225	GLU
1	A	243	ILE
1	A	326	THR
1	A	339	ILE
1	A	382	LEU
1	A	399	ASN
1	B	23	VAL
1	B	59	LYS
1	B	76	MET
1	B	121	GLU
1	B	188	GLU
1	B	205	VAL
1	B	221	LEU
1	B	259	LEU
1	B	274	GLU
1	B	374	VAL
1	C	33	LYS
1	C	59	LYS
1	C	111	SER
1	C	122	ARG
1	C	188	GLU
1	C	190	GLN
1	C	221	LEU
1	C	246	ILE
1	C	270	GLU
1	C	326	THR
1	C	336	THR
1	C	339	ILE
1	C	363	THR
1	C	394	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	42	HIS
1	A	132	ASN
1	A	284	GLN
1	A	314	GLN
1	A	341	GLN
1	A	377	GLN
1	B	78	HIS
1	B	219	ASN
1	B	247	ASN
1	B	327	HIS
1	B	342	GLN
1	C	30	GLN
1	C	247	ASN
1	C	285	ASN
1	C	384	ASN

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

9 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	$\#\|Z\| > 2$
2	NAG	D	1	2	15,15,15	0.61	0	21,21,21	1.91	5 (23%)
2	GCS	D	2	2	11,11,12	0.79	0	12,15,17	1.28	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
2	NAG	D	3	2	14,14,15	0.75	0	17,19,21	1.32	1 (5%)
2	NAG	E	1	2	15,15,15	0.62	0	21,21,21	1.54	6 (28%)
2	GCS	E	2	2	11,11,12	0.87	0	12,15,17	1.32	1 (8%)
2	NAG	E	3	2	14,14,15	0.81	1 (7%)	17,19,21	1.28	1 (5%)
2	NAG	G	1	2	15,15,15	0.61	0	21,21,21	2.07	4 (19%)
2	GCS	G	2	2	11,11,12	0.78	0	12,15,17	1.69	2 (16%)
2	NAG	G	3	2	14,14,15	0.98	1 (7%)	17,19,21	1.73	6 (35%)

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
2	NAG	D	1	2	-	2/6/26/26	0/1/1/1
2	GCS	D	2	2	-	0/2/19/22	0/1/1/1
2	NAG	D	3	2	-	0/6/23/26	0/1/1/1
2	NAG	E	1	2	-	2/6/26/26	0/1/1/1
2	GCS	E	2	2	-	0/2/19/22	0/1/1/1
2	NAG	E	3	2	-	0/6/23/26	0/1/1/1
2	NAG	G	1	2	-	2/6/26/26	0/1/1/1
2	GCS	G	2	2	-	0/2/19/22	0/1/1/1
2	NAG	G	3	2	-	0/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	G	3	NAG	O5-C1	-2.97	1.39	1.43
2	E	3	NAG	O5-C1	-2.11	1.40	1.43

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	G	1	NAG	O5-C1-C2	-5.85	103.64	109.52
2	G	1	NAG	C1-C2-C3	-4.95	103.80	110.54
2	E	3	NAG	C1-O5-C5	4.36	118.10	112.19
2	D	1	NAG	C3-C2-N2	4.35	118.83	110.62
2	D	3	NAG	C1-O5-C5	4.29	118.01	112.19
2	D	1	NAG	C4-C3-C2	-4.27	104.09	110.34
2	G	2	GCS	C1-O5-C5	4.26	117.97	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	G	1	NAG	C1-C2-N2	3.61	114.92	110.73
2	E	1	NAG	C3-C4-C5	3.41	116.31	110.24
2	G	3	NAG	C1-O5-C5	3.07	116.36	112.19
2	E	2	GCS	C1-O5-C5	2.98	116.23	112.19
2	E	1	NAG	O5-C1-C2	-2.85	106.65	109.52
2	G	3	NAG	C2-N2-C7	2.70	126.75	122.90
2	G	3	NAG	C8-C7-N2	-2.66	111.60	116.10
2	G	3	NAG	O5-C1-C2	-2.59	107.20	111.29
2	D	1	NAG	C1-C2-N2	2.48	113.60	110.73
2	G	3	NAG	O3-C3-C2	-2.44	104.42	109.47
2	G	2	GCS	C3-C4-C5	-2.42	105.93	110.24
2	G	3	NAG	O7-C7-N2	2.33	126.23	121.95
2	E	1	NAG	C4-C3-C2	2.30	113.71	110.34
2	E	1	NAG	O5-C5-C4	2.16	113.61	109.69
2	G	1	NAG	O3-C3-C2	-2.07	105.48	109.66
2	D	1	NAG	O7-C7-C8	-2.06	118.23	122.06
2	E	1	NAG	C6-C5-C4	-2.05	108.20	113.00
2	E	1	NAG	O3-C3-C2	-2.03	105.56	109.66
2	D	1	NAG	O1-C1-O5	-2.02	104.31	110.38

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	E	1	NAG	C8-C7-N2-C2
2	E	1	NAG	O7-C7-N2-C2
2	G	1	NAG	C8-C7-N2-C2
2	G	1	NAG	O7-C7-N2-C2
2	D	1	NAG	O5-C5-C6-O6
2	D	1	NAG	C4-C5-C6-O6

There are no ring outliers.

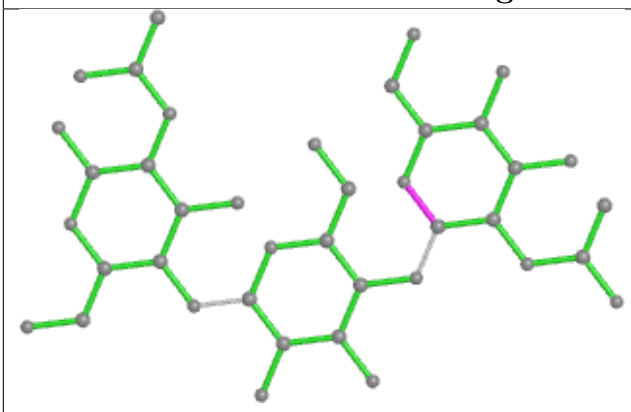
4 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	1	NAG	1	0
2	G	3	NAG	2	0
2	D	1	NAG	5	0
2	G	1	NAG	2	0

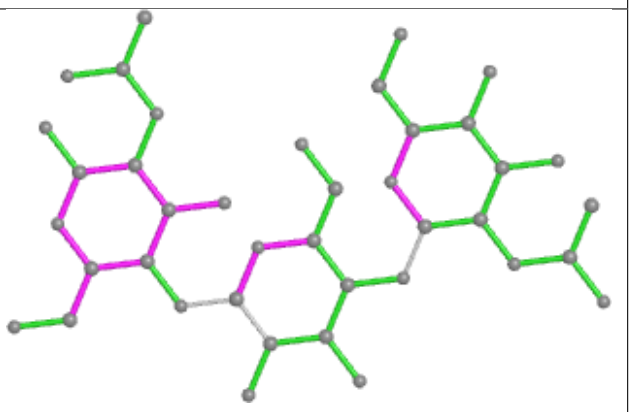
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

bond angles, torsion angles, and ring geometry for oligosaccharide.

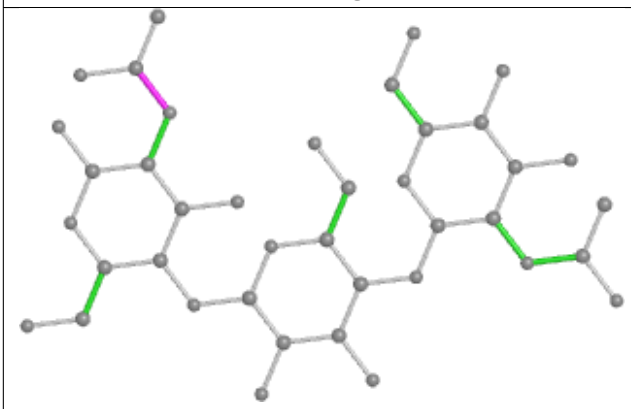
Oligosaccharide Chain E



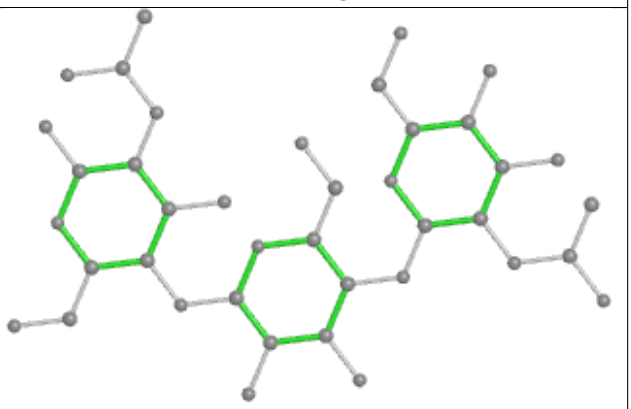
Bond lengths



Bond angles

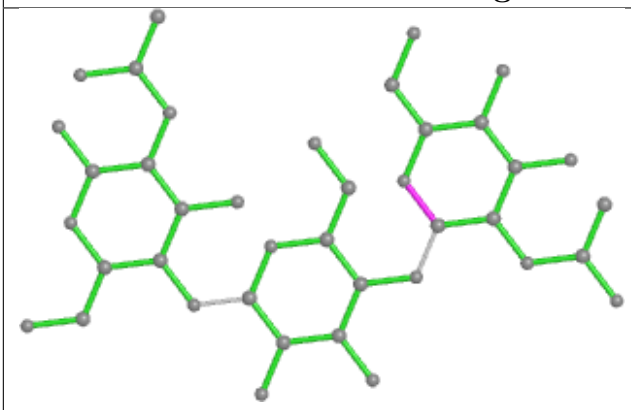


Torsions

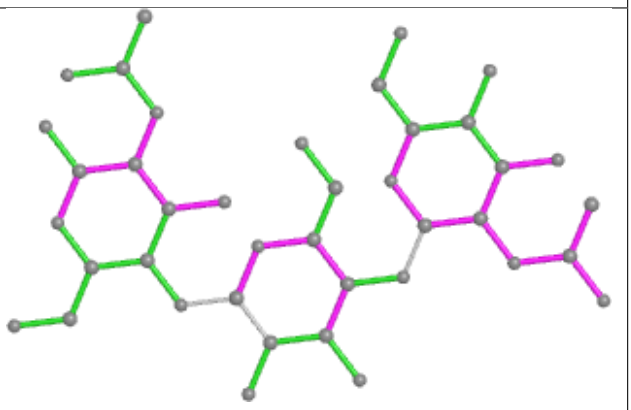


Rings

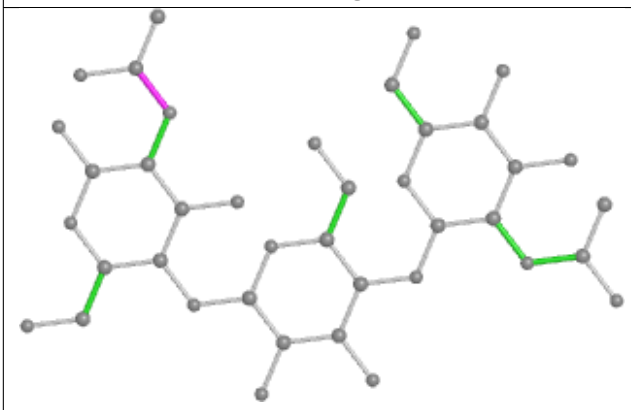
Oligosaccharide Chain G



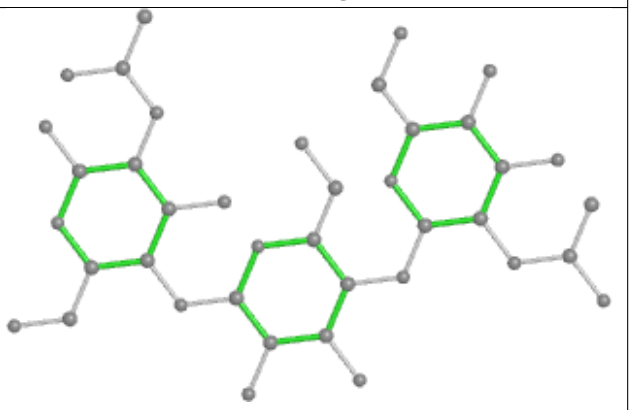
Bond lengths



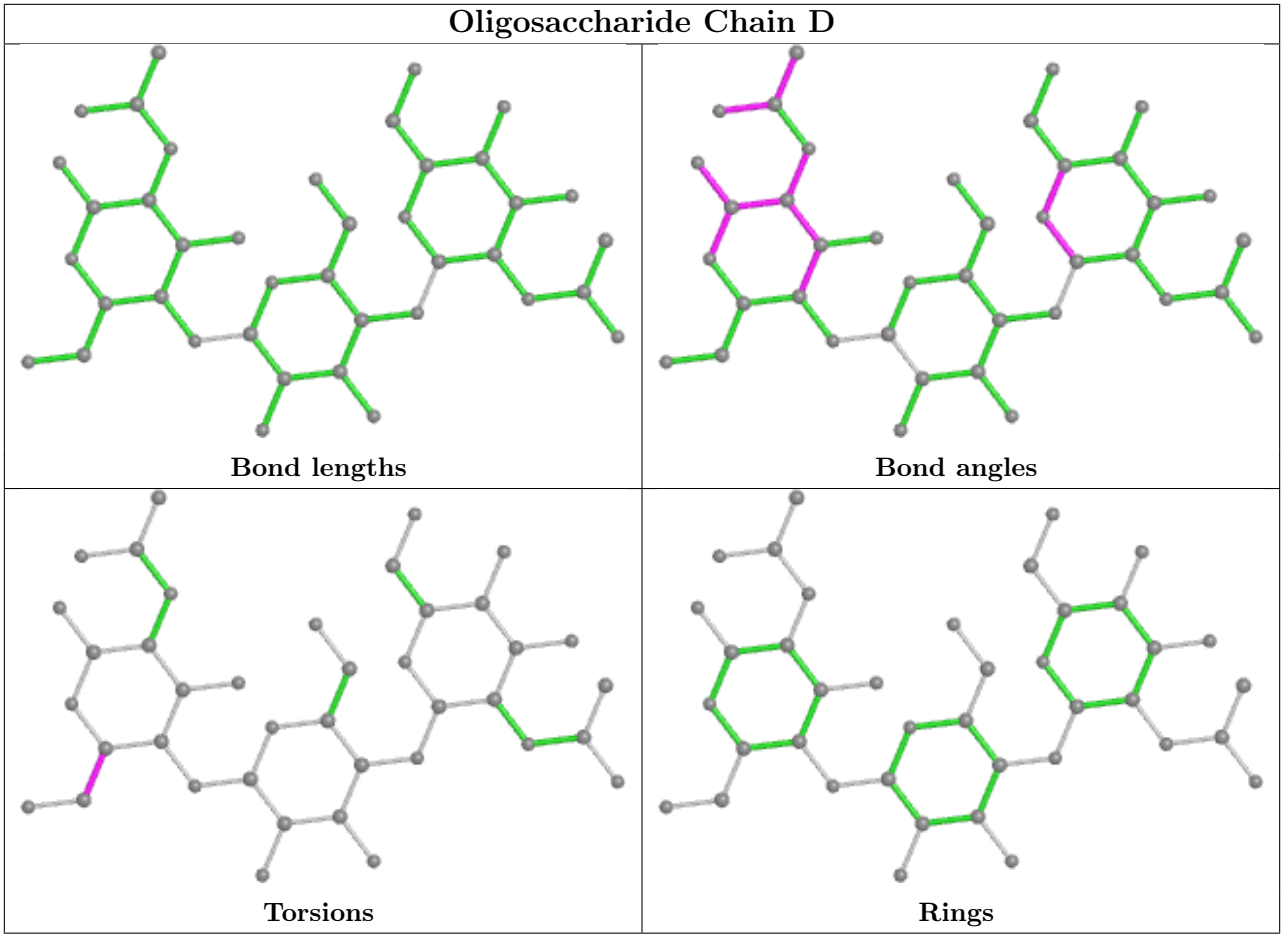
Bond angles



Torsions



Rings



5.6 Ligand geometry

Of 3 ligands modelled in this entry, 3 are monoatomic - leaving 0 for Mogul analysis.

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 (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	403/405 (99%)	-0.42	3 (0%)	84	83	35, 49, 76, 115	0
1	B	404/405 (99%)	-0.38	9 (2%)	62	59	33, 44, 69, 110	0
1	C	404/405 (99%)	-0.42	2 (0%)	87	86	36, 48, 76, 113	0
All	All	1211/1215 (99%)	-0.41	14 (1%)	76	74	33, 47, 75, 115	0

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	212	TRP	3.2
1	B	164	ASP	2.9
1	B	211	ASN	2.7
1	B	214	ILE	2.6
1	C	211	ASN	2.6
1	B	215	PRO	2.5
1	B	13	ASP	2.4
1	A	215	PRO	2.4
1	B	212	TRP	2.3
1	B	2	THR	2.3
1	C	2	THR	2.3
1	A	174	CYS	2.2
1	B	209	PRO	2.1
1	B	223	GLU	2.0

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 (i)

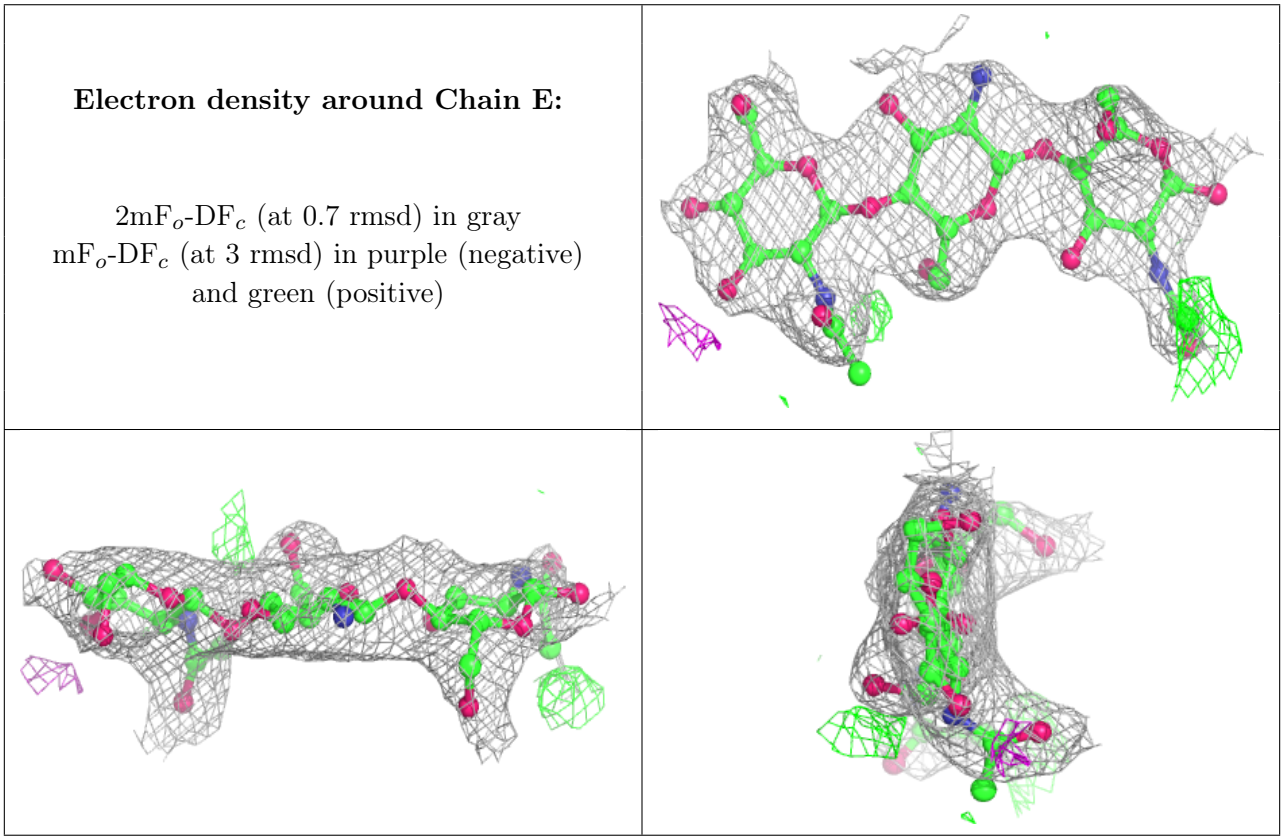
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
2	NAG	D	1	15/15	0.81	0.15	67,78,88,89	0
2	NAG	E	1	15/15	0.90	0.12	62,74,80,82	0
2	GCS	D	2	11/12	0.90	0.10	52,55,64,66	0
2	NAG	G	1	15/15	-	-	56,65,79,80	0
2	GCS	G	2	11/12	-	-	51,52,59,61	0
2	NAG	G	3	14/15	-	-	45,48,53,55	0
2	NAG	D	3	14/15	0.95	0.08	41,47,51,52	0
2	NAG	E	3	14/15	0.96	0.09	51,54,60,61	0
2	GCS	E	2	11/12	0.96	0.07	59,61,66,71	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.

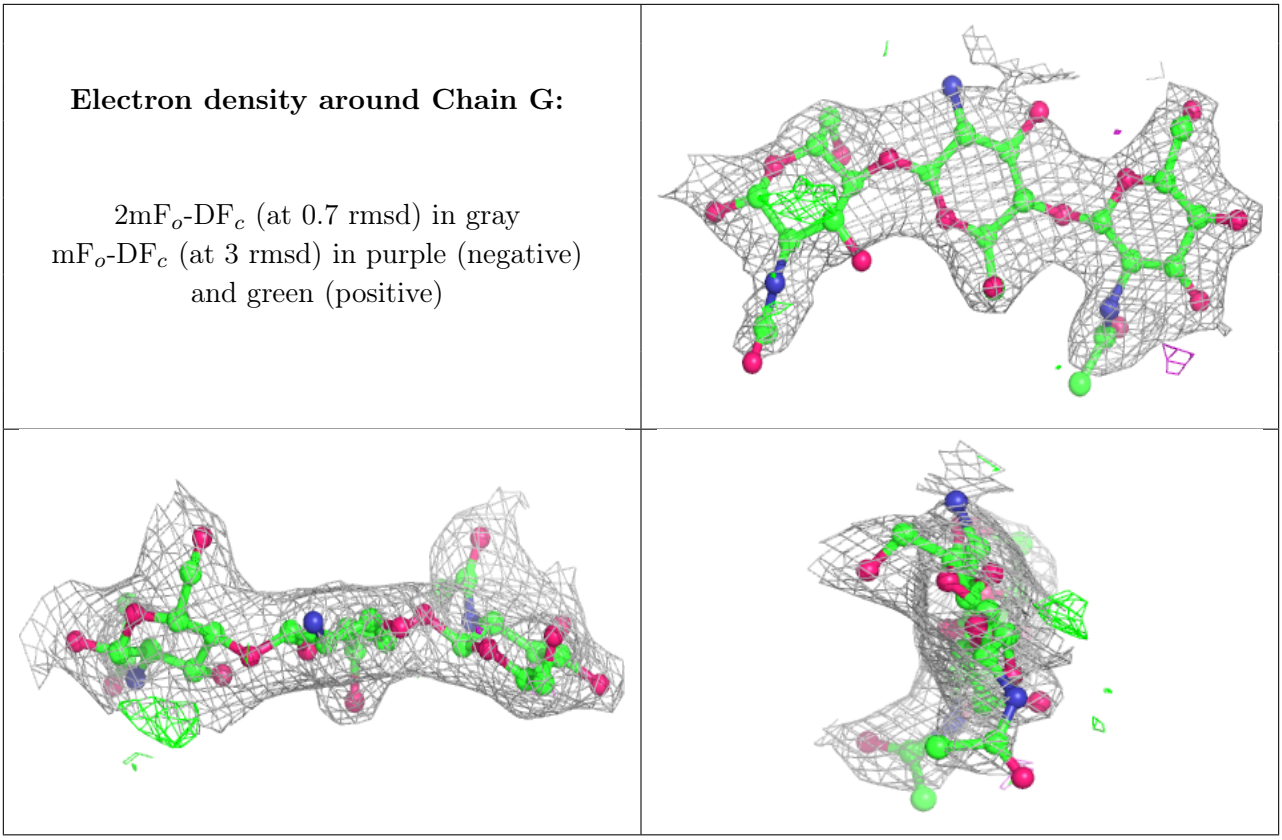
Electron density around Chain E:

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



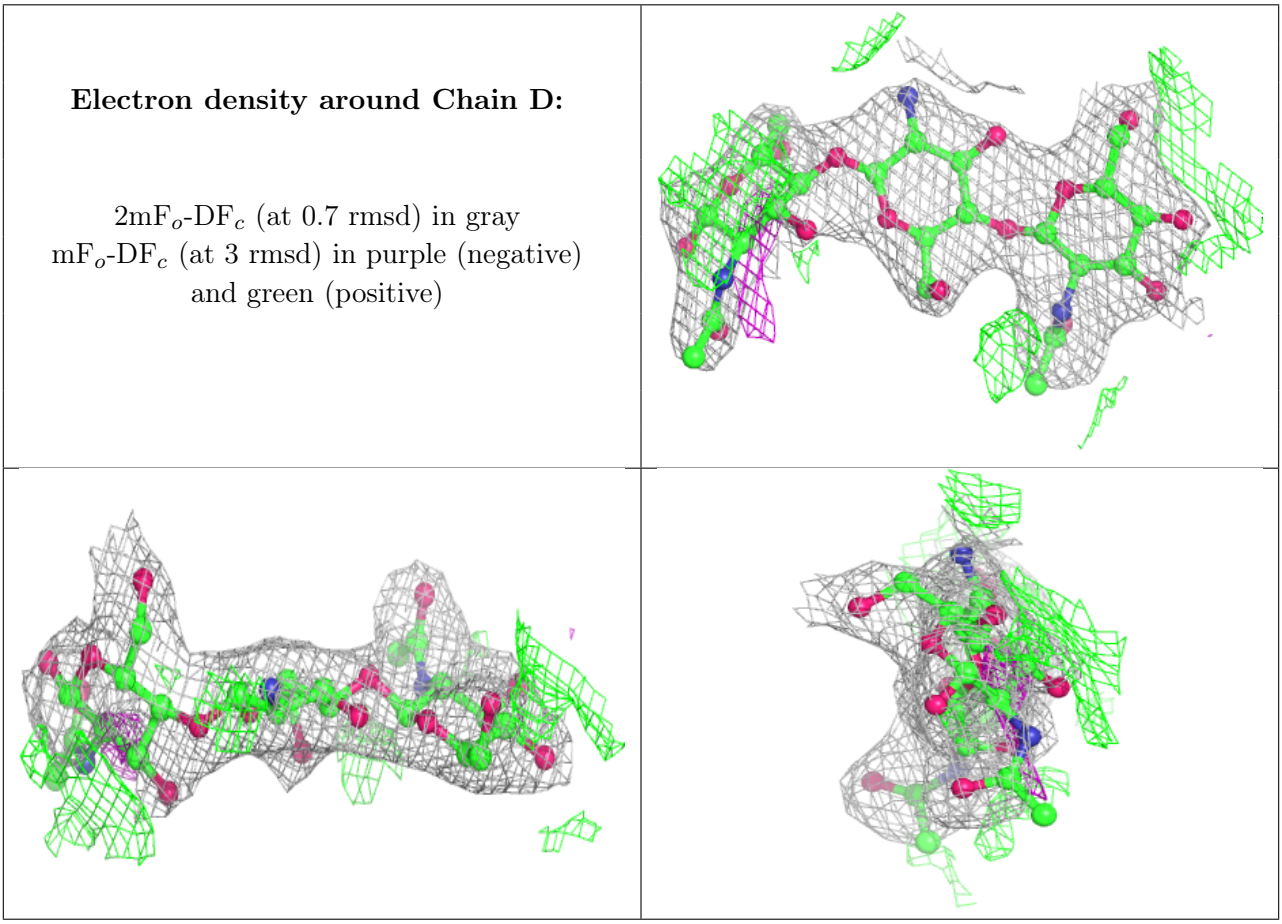
Electron density around Chain G:

$2mF_o$-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 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

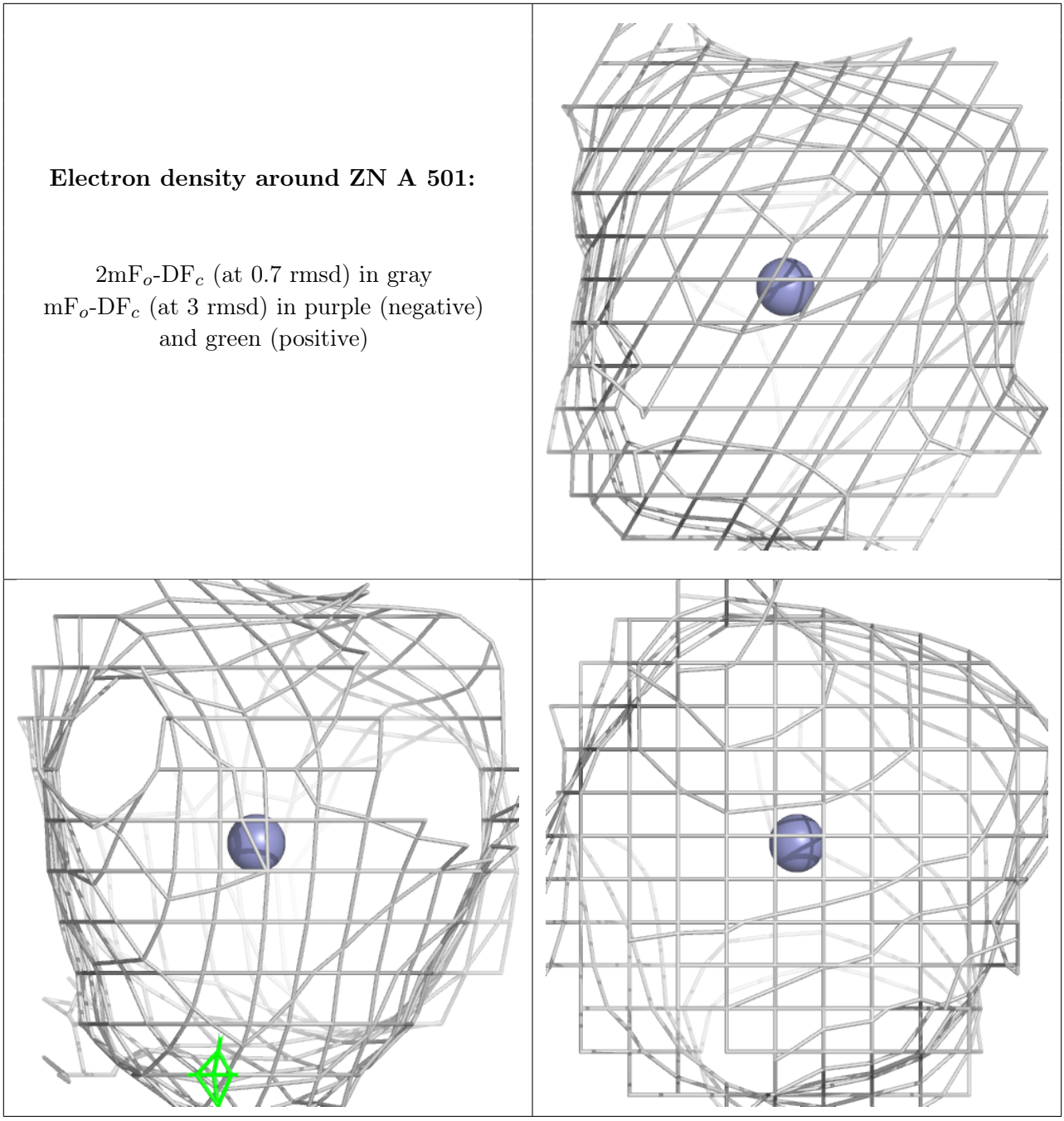
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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	ZN	A	501	1/1	1.00	0.02	46,46,46,46	0
3	ZN	B	501	1/1	1.00	0.03	41,41,41,41	0
3	ZN	C	501	1/1	1.00	0.01	42,42,42,42	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

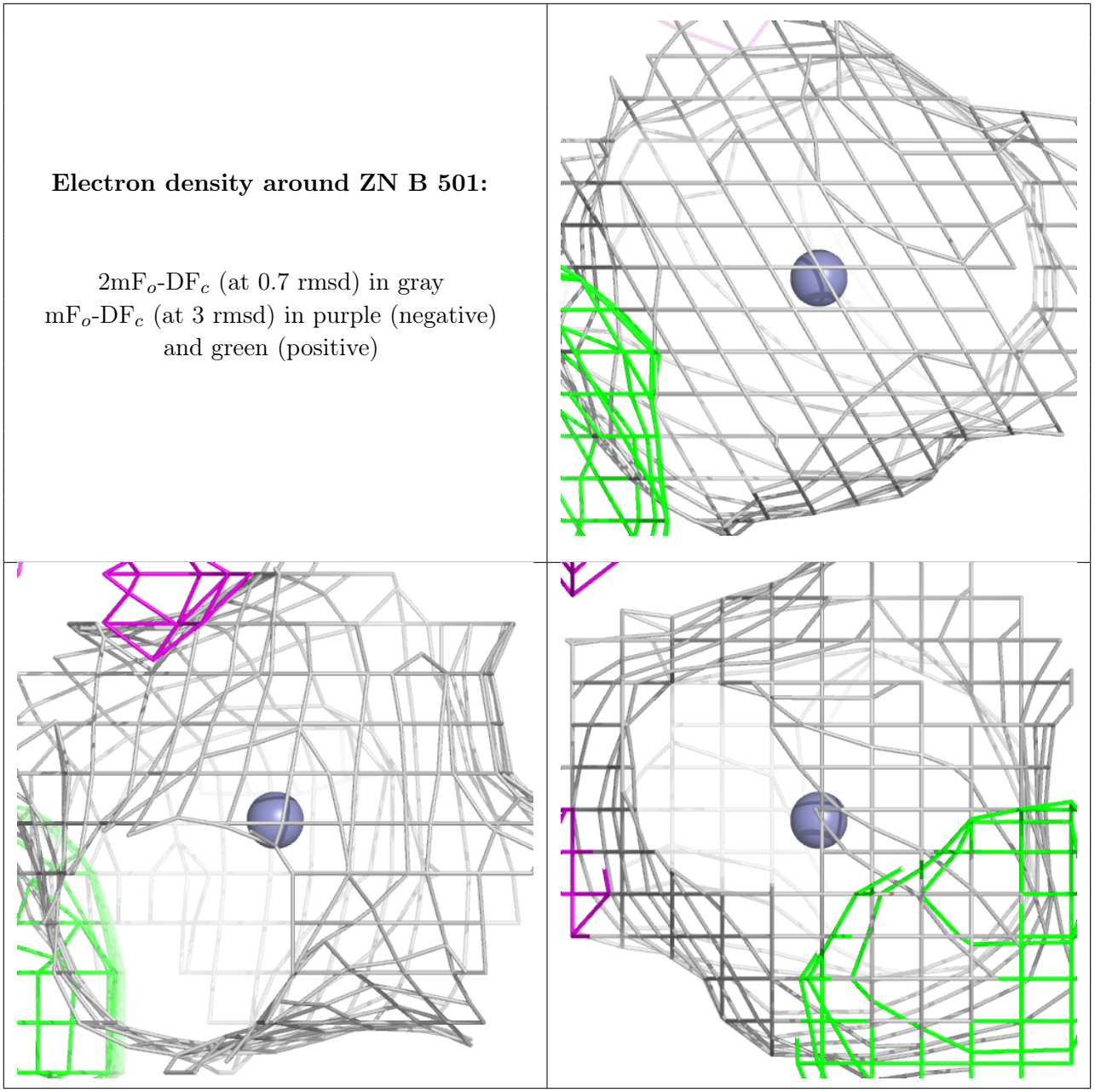
Electron density around ZN A 501:

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



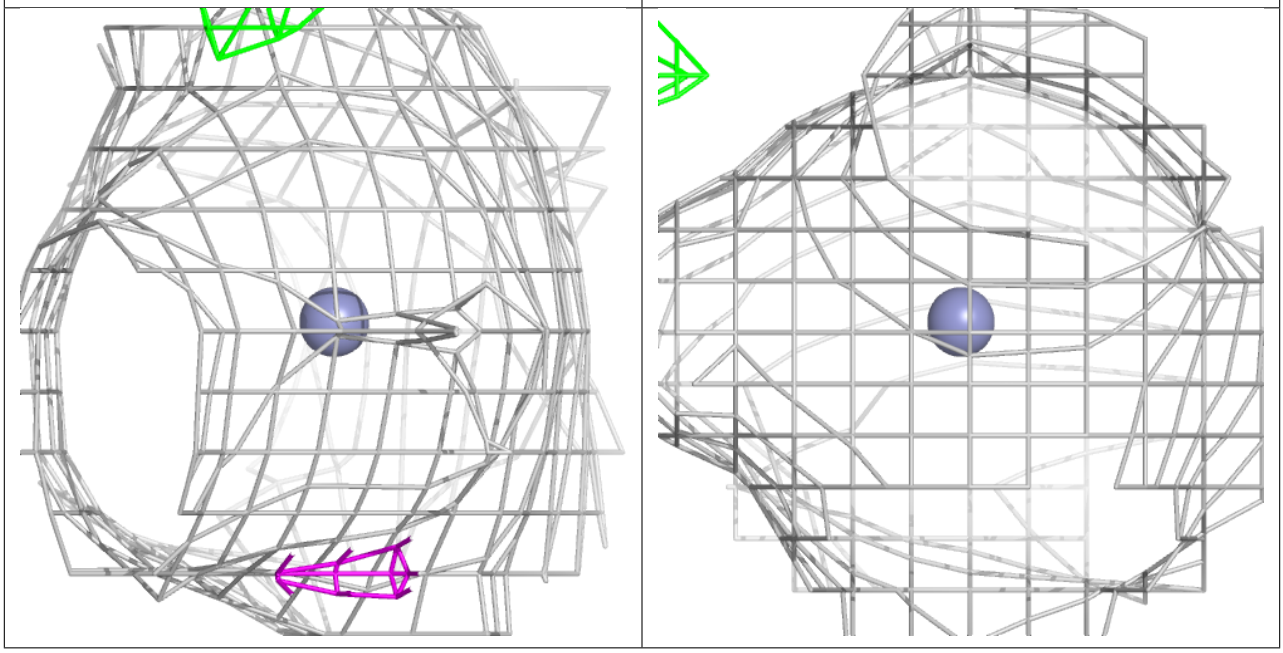
Electron density around ZN B 501:

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



Electron density around ZN C 501:

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



6.5 Other polymers

There are no such residues in this entry.