



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 05:46 PM UTC

PDB ID : 5Z14 / pdb_00005z14
Title : Crystal structure of human TLR8 in complex with CU-CPT9a
Authors : Tanji, H.; Ohto, U.; Shimizu, T.
Deposited on : 2017-12-25
Resolution : 2.80 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
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
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

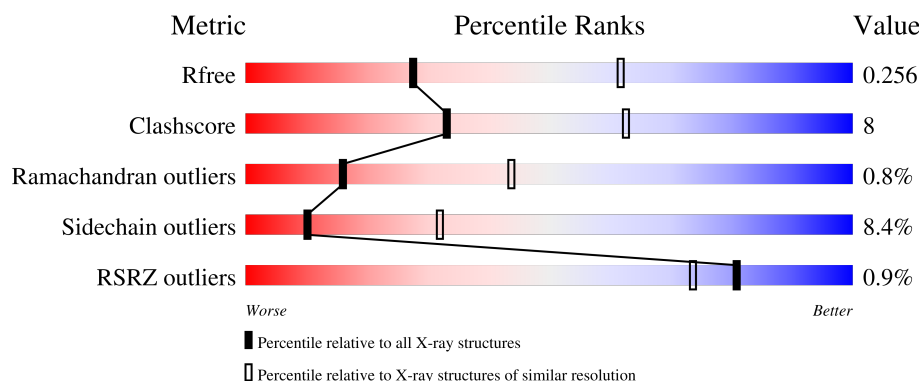
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

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	811	% 69% 19% • 8%
1	B	811	% 68% 20% • 9%
2	C	3	67% 33%
3	D	2	100%
3	G	2	100%

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Mol	Chain	Length	Quality of chain
4	E	5	100%
5	F	4	75% 25%
6	H	4	75% 25%

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 12281 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.

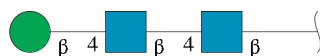
- Molecule 1 is a protein called Toll-like receptor 8.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	743	Total	C	N	O	S	0	0	0
			5980	3823	1018	1120	19			
1	B	734	Total	C	N	O	S	0	0	0
			5915	3785	1004	1107	19			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	23	ARG	-	expression tag	UNP Q9NR97
A	24	SER	-	expression tag	UNP Q9NR97
A	25	PRO	-	expression tag	UNP Q9NR97
A	26	TRP	-	expression tag	UNP Q9NR97
A	828	GLU	-	expression tag	UNP Q9NR97
A	829	PHE	-	expression tag	UNP Q9NR97
A	830	LEU	-	expression tag	UNP Q9NR97
A	831	VAL	-	expression tag	UNP Q9NR97
A	832	PRO	-	expression tag	UNP Q9NR97
A	833	ARG	-	expression tag	UNP Q9NR97
B	23	ARG	-	expression tag	UNP Q9NR97
B	24	SER	-	expression tag	UNP Q9NR97
B	25	PRO	-	expression tag	UNP Q9NR97
B	26	TRP	-	expression tag	UNP Q9NR97
B	828	GLU	-	expression tag	UNP Q9NR97
B	829	PHE	-	expression tag	UNP Q9NR97
B	830	LEU	-	expression tag	UNP Q9NR97
B	831	VAL	-	expression tag	UNP Q9NR97
B	832	PRO	-	expression tag	UNP Q9NR97
B	833	ARG	-	expression tag	UNP Q9NR97

- Molecule 2 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.



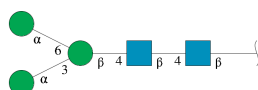
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	D	2	Total	C	N	O	0	0	0
			28	16	2	10			
3	G	2	Total	C	N	O	0	0	0
			28	16	2	10			

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	E	5	Total	C	N	O	0	0	0
			61	34	2	25			

- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-6)-alpha-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



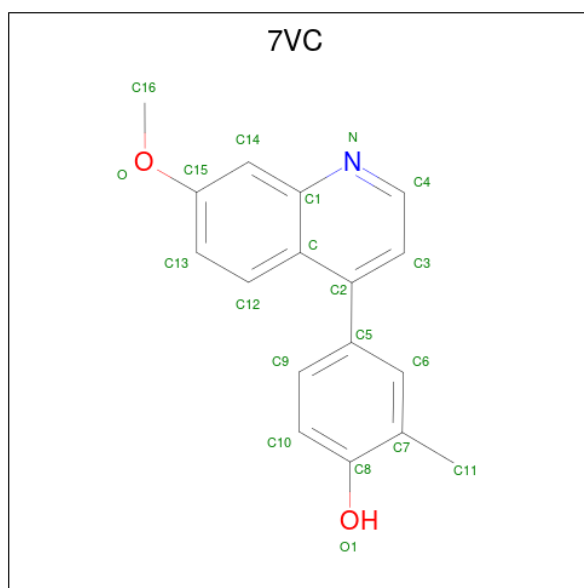
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	F	4	Total	C	N	O	0	0	0
			50	28	2	20			

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



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
6	H	4	Total	C	N	O	0	0	0
			50	28	2	20			

- Molecule 7 is 4-(7-methoxyquinolin-4-yl)-2-methyl-phenol (CCD ID: 7VC) (formula: C₁₇H₁₅NO₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	A	1	Total	C	N	O	0	0
			20	17	1	2		
7	A	1	Total	C	N	O	0	0
			20	17	1	2		

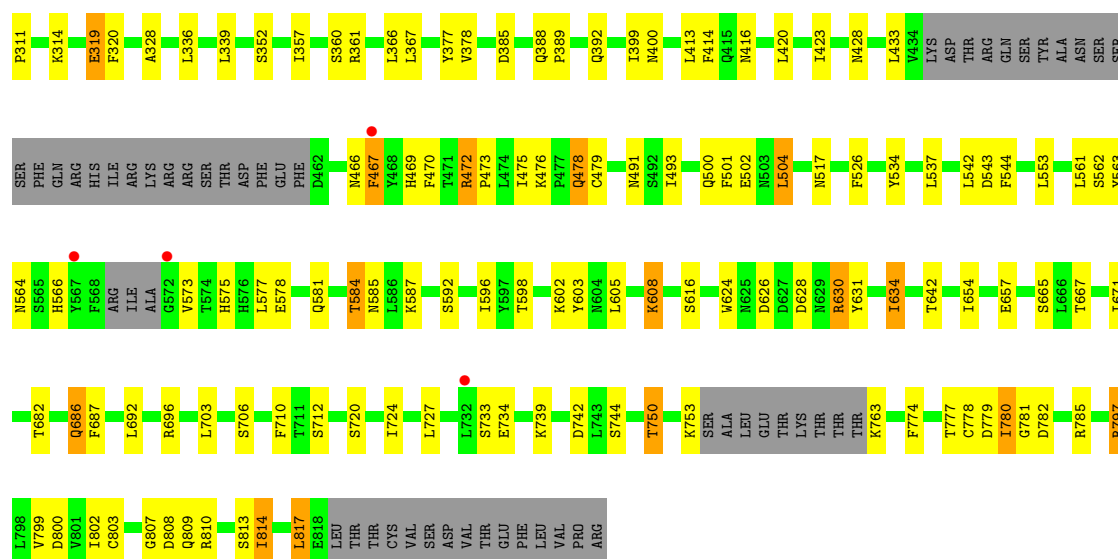
- Molecule 8 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



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

- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	28	Total	O	0	0
			28	28		
9	B	20	Total	O	0	0
			20	20		



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

Chain C: 67% (yellow) / 33% (orange)



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

Chain D: 100% (yellow)



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

Chain G: 100% (yellow)

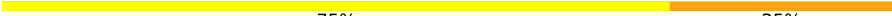


- Molecule 4: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain E: 100% (yellow)



- Molecule 5: alpha-D-mannopyranose-(1-6)-alpha-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:  75% 25%

MAG1
MAG2
MAN3
MAN4

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

Chain H:  75% 25%

MAG1
MAG2
EMJ3
MAN4

4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	143.51Å 99.00Å 139.49Å 90.00° 108.51° 90.00°	Depositor
Resolution (Å)	44.09 – 2.80 44.09 – 2.80	Depositor EDS
% Data completeness (in resolution range)	100.0 (44.09-2.80) 100.0 (44.09-2.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.13 (at 2.81Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, R_{free}	0.201 , 0.277 (Not available) , 0.256	Depositor DCC
R_{free} test set	2310 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	68.4	Xtriage
Anisotropy	0.040	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 36.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	12281	wwPDB-VP
Average B, all atoms (Å ²)	71.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.44% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: BMA, 7VC, MAN, 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	0.72	0/6102	0.93	3/8275 (0.0%)
1	B	0.71	1/6036 (0.0%)	0.95	5/8183 (0.1%)
All	All	0.72	1/12138 (0.0%)	0.94	8/16458 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	563	TYR	CA-C	-6.50	1.47	1.53

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	634	ILE	CB-CA-C	-6.22	103.75	112.14
1	B	781	GLY	N-CA-C	-5.80	106.00	115.46
1	B	750	THR	N-CA-C	5.26	116.14	108.14
1	A	809	GLN	N-CA-C	5.26	116.82	111.14
1	B	265	PHE	CA-C-N	-5.22	114.26	120.11
1	B	265	PHE	C-N-CA	-5.22	114.26	120.11
1	A	45	VAL	CB-CA-C	5.13	118.26	110.62
1	A	634	ILE	CB-CA-C	-5.10	102.93	111.29

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	780	ILE	Peptide

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	5980	0	5973	96	1
1	B	5915	0	5906	94	1
2	C	39	0	34	2	0
3	D	28	0	25	0	0
3	G	28	0	25	0	0
4	E	61	0	52	0	0
5	F	50	0	43	1	0
6	H	50	0	43	2	0
7	A	40	0	0	1	0
8	A	28	0	26	0	0
8	B	14	0	13	1	0
9	A	28	0	0	1	0
9	B	20	0	0	2	0
All	All	12281	0	12140	190	2

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 8.

All (190) 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:708:SER:OG	1:A:734:GLU:O	1.90	0.90
1:B:750:THR:OG1	1:B:780:ILE:HG21	1.76	0.84
1:A:478:GLN:HE21	1:A:478:GLN:H	1.25	0.83
1:B:478:GLN:HE21	1:B:478:GLN:H	1.33	0.76
1:A:159:TYR:CD1	1:A:187:CYS:HB3	2.20	0.76
1:B:703:LEU:HD21	1:B:724:ILE:HD13	1.69	0.74
1:B:807:GLY:HA3	1:B:810:ARG:H	1.53	0.72
1:A:467:PHE:HB3	2:C:1:NAG:H81	1.72	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:319:GLU:OE1	1:B:469:HIS:HB2	1.93	0.68
1:B:750:THR:HG1	1:B:780:ILE:HG21	1.58	0.68
1:A:732:LEU:HA	1:A:735:VAL:HG13	1.78	0.65
1:B:626:ASP:OD1	1:B:630:ARG:NH1	2.30	0.64
1:A:276:ILE:HD11	1:A:299:LEU:HD21	1.79	0.64
1:B:413:LEU:C	1:B:413:LEU:HD12	2.23	0.63
1:A:34:TYR:O	1:A:60:THR:OG1	2.16	0.62
1:A:538:THR:HG22	1:A:562:SER:HB2	1.83	0.61
1:A:428:ASN:O	1:A:491:ASN:HA	2.01	0.60
1:A:807:GLY:HA2	1:A:809:GLN:N	2.16	0.60
1:B:578:GLU:HG2	1:B:602:LYS:HE2	1.83	0.60
1:A:581:GLN:HA	1:A:606:GLU:O	2.01	0.59
1:B:467:PHE:HB2	5:F:1:NAG:H81	1.85	0.59
1:A:184:ASN:ND2	1:A:186:VAL:O	2.36	0.59
1:B:797:ARG:NH1	1:B:800:ASP:OD2	2.35	0.58
1:B:526:PHE:HB3	1:B:553:LEU:HD21	1.84	0.58
1:B:807:GLY:HA2	1:B:809:GLN:N	2.19	0.58
1:B:413:LEU:HD12	1:B:414:PHE:N	2.19	0.58
1:A:276:ILE:CG1	1:A:297:THR:HB	2.35	0.57
1:A:373:HIS:HA	1:A:400:ASN:HB3	1.86	0.56
1:B:537:LEU:HB3	1:B:542:LEU:HD11	1.86	0.56
1:B:433:LEU:HD12	1:B:500:GLN:HA	1.88	0.56
1:A:621:ASP:OD1	1:A:622:ILE:N	2.39	0.56
1:B:543:ASP:C	1:B:543:ASP:OD2	2.47	0.55
1:A:319:GLU:HG2	9:A:1019:HOH:O	2.07	0.55
1:A:300:ARG:HG2	1:A:300:ARG:HH11	1.72	0.55
1:A:276:ILE:HG13	1:A:297:THR:HB	1.89	0.54
1:B:777:THR:OG1	1:B:779:ASP:OD1	2.23	0.54
1:A:167:SER:OG	1:A:199:THR:OG1	2.24	0.54
1:B:314:LYS:C	1:B:339:LEU:HD12	2.33	0.54
1:A:807:GLY:HA2	1:A:808:ASP:C	2.33	0.53
1:B:479:CYS:SG	1:B:534:TYR:CD1	3.02	0.53
1:B:780:ILE:HG22	1:B:780:ILE:O	2.07	0.53
1:A:703:LEU:HD21	1:A:724:ILE:CD1	2.38	0.53
1:B:566:HIS:HB2	1:B:573:VAL:HG21	1.92	0.52
1:A:315:VAL:HG22	1:A:341:ILE:HB	1.91	0.52
1:B:118:ASP:OD2	1:B:118:ASP:C	2.53	0.52
1:B:272:GLY:O	1:B:274:ALA:N	2.42	0.52
1:B:475:ILE:O	1:B:476:LYS:C	2.51	0.52
1:B:93:ASN:OD1	1:B:93:ASN:C	2.53	0.51
1:B:686:GLN:O	1:B:686:GLN:HG3	2.10	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:193:GLU:O	1:A:196:VAL:HG23	2.10	0.51
1:A:740:HIS:NE2	1:A:768:GLU:OE2	2.41	0.51
1:B:624:TRP:CZ3	1:B:654:ILE:HG23	2.46	0.51
1:A:634:ILE:HD12	1:A:635:PHE:CE2	2.46	0.51
1:B:501:PHE:HA	1:B:504:LEU:HD22	1.92	0.51
1:A:197:PHE:O	1:A:198:GLU:HB3	2.11	0.50
1:B:336:LEU:HD13	1:B:339:LEU:HD22	1.94	0.50
1:A:187:CYS:SG	1:A:189:LYS:C	2.95	0.50
1:A:660:LEU:HD21	1:A:683:LEU:HD22	1.94	0.50
1:B:780:ILE:N	1:B:780:ILE:HD12	2.27	0.50
1:A:817:LEU:HD13	1:A:817:LEU:N	2.26	0.49
1:A:237:ILE:HB	1:A:278:ILE:HG23	1.93	0.49
1:A:364:SER:HA	1:A:393:LEU:HD21	1.94	0.49
1:A:494:PHE:O	1:A:517:ASN:HA	2.11	0.49
1:B:250:LEU:C	1:B:250:LEU:HD23	2.37	0.49
1:A:467:PHE:CB	2:C:1:NAG:H81	2.42	0.49
1:B:155:GLN:HA	1:B:179:TRP:O	2.12	0.49
1:A:276:ILE:CD1	1:A:299:LEU:HD21	2.42	0.49
1:B:205:LEU:C	1:B:205:LEU:HD23	2.38	0.49
1:B:310:MET:N	1:B:311:PRO:CD	2.74	0.49
1:A:803:CYS:O	1:A:810:ARG:HA	2.13	0.48
1:B:774:PHE:CG	1:B:814:ILE:HD11	2.48	0.48
1:A:49:CYS:HB3	1:A:70:LEU:HD23	1.96	0.48
1:A:379:PHE:CZ	1:A:406:ILE:HD11	2.49	0.48
1:B:682:THR:HG22	1:B:710:PHE:CZ	2.48	0.48
1:A:645:ASP:HA	1:A:670:HIS:HB2	1.95	0.48
1:B:154:ILE:HD11	1:B:176:TYR:HB3	1.95	0.48
1:B:542:LEU:N	1:B:564:ASN:HD21	2.12	0.48
1:A:256:ASN:O	1:A:276:ILE:HG23	2.14	0.48
1:B:211:ASN:O	1:B:232:THR:HA	2.14	0.48
1:A:585:ASN:O	1:A:587:LYS:HD2	2.14	0.47
1:A:161:ILE:HD12	1:A:177:LEU:HD13	1.96	0.47
1:A:188:GLU:CD	1:A:188:GLU:H	2.22	0.47
1:B:803:CYS:SG	1:B:817:LEU:HD21	2.55	0.47
1:B:544:PHE:CE2	1:B:561:LEU:HD13	2.49	0.47
1:B:225:ARG:HA	1:B:248:LEU:HA	1.96	0.47
1:B:720:SER:HA	1:B:744:SER:O	2.15	0.47
1:A:784:ARG:HD3	1:A:814:ILE:O	2.15	0.47
1:A:276:ILE:HD13	1:A:278:ILE:HD11	1.96	0.46
1:A:300:ARG:HH11	1:A:300:ARG:CG	2.28	0.46
1:B:592:SER:HA	1:B:616:SER:O	2.16	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:577:LEU:HD12	1:B:605:LEU:HD11	1.98	0.46
1:B:493:ILE:O	1:B:517:ASN:ND2	2.42	0.46
1:B:578:GLU:HG2	1:B:602:LYS:CE	2.44	0.46
1:B:300:ARG:HG2	1:B:300:ARG:HH11	1.80	0.46
1:B:720:SER:HB3	1:B:742:ASP:OD2	2.16	0.46
1:A:536:ASP:OD1	1:A:536:ASP:C	2.59	0.46
1:B:69:ASP:OD1	1:B:69:ASP:C	2.59	0.46
1:B:817:LEU:HD13	1:B:817:LEU:N	2.30	0.46
1:A:57:VAL:HG21	1:A:82:SER:HB3	1.98	0.46
1:B:319:GLU:CD	1:B:469:HIS:HB2	2.40	0.46
1:B:630:ARG:HB2	1:B:630:ARG:HH11	1.81	0.46
1:A:141:PRO:HB2	1:A:144:LEU:HD21	1.98	0.46
1:A:234:ILE:O	1:A:256:ASN:HB3	2.16	0.46
1:B:178:ALA:HA	1:B:209:SER:O	2.16	0.46
1:B:692:LEU:C	1:B:692:LEU:HD23	2.40	0.46
1:A:776:CYS:SG	1:A:814:ILE:HG22	2.56	0.45
1:B:260:CYS:SG	1:B:267:CYS:C	2.99	0.45
1:B:782:ASP:HA	1:B:785:ARG:NH2	2.32	0.45
1:A:296:SER:HA	1:A:320:PHE:O	2.17	0.45
1:B:227:LEU:HD21	1:B:229:LEU:HD11	1.99	0.45
1:A:46:ILE:HD11	1:A:67:GLU:CD	2.42	0.45
1:B:400:ASN:C	1:B:400:ASN:OD1	2.60	0.45
1:B:399:ILE:HG13	1:B:420:LEU:HD21	1.99	0.45
1:A:186:VAL:HA	1:A:187:CYS:C	2.41	0.45
1:A:592:SER:HA	1:A:616:SER:O	2.17	0.45
1:A:366:LEU:O	1:A:393:LEU:HD22	2.17	0.45
1:B:250:LEU:HA	1:B:291:TYR:HB2	1.99	0.45
1:A:798:LEU:O	1:A:799:VAL:C	2.59	0.44
1:A:815:VAL:HG12	1:A:815:VAL:O	2.16	0.44
1:A:211:ASN:O	1:A:232:THR:HA	2.16	0.44
1:A:654:ILE:O	1:A:655:PRO:C	2.59	0.44
1:A:319:GLU:HA	1:A:345:SER:O	2.17	0.44
1:A:403:ILE:HA	1:A:427:GLU:O	2.17	0.44
1:B:278:ILE:HB	1:B:306:TRP:CZ2	2.52	0.44
1:B:357:ILE:HG13	1:B:377:TYR:CZ	2.53	0.44
1:B:584:THR:HG23	1:B:585:ASN:ND2	2.33	0.44
1:B:608:LYS:O	8:B:911:NAG:H82	2.18	0.44
1:A:336:LEU:HD13	1:A:339:LEU:HD22	1.99	0.44
1:B:249:THR:HG22	1:B:290:ARG:HG2	2.00	0.44
1:A:81:GLU:OE1	1:A:84:GLN:NE2	2.51	0.44
1:A:403:ILE:HG12	1:A:403:ILE:O	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:740:HIS:CD2	1:A:766:MET:HE3	2.51	0.44
1:B:739:LYS:NZ	1:B:763:LYS:O	2.48	0.44
1:A:182:TYR:O	1:A:183:PHE:C	2.61	0.43
1:A:276:ILE:HD13	1:A:278:ILE:CD1	2.48	0.43
1:B:799:VAL:O	1:B:802:ILE:HD11	2.19	0.43
1:A:489:SER:HA	1:A:513:SER:O	2.18	0.43
1:A:733:SER:HA	1:A:734:GLU:HA	1.83	0.43
1:A:179:TRP:HE3	1:A:182:TYR:CZ	2.36	0.43
1:A:197:PHE:O	1:A:198:GLU:CB	2.66	0.43
1:A:645:ASP:OD1	1:A:645:ASP:C	2.62	0.43
1:A:383:ARG:O	1:A:384:GLU:C	2.61	0.43
1:B:603:TYR:HD2	1:B:631:TYR:CE1	2.36	0.43
1:A:159:TYR:CG	1:A:187:CYS:HB3	2.54	0.43
1:B:478:GLN:H	1:B:478:GLN:NE2	2.11	0.43
1:A:276:ILE:HG12	1:A:297:THR:HB	2.00	0.43
1:A:727:LEU:HD21	1:A:743:LEU:HD13	2.01	0.43
1:B:388:GLN:N	1:B:389:PRO:CD	2.81	0.43
1:B:750:THR:OG1	1:B:780:ILE:CG2	2.59	0.43
1:A:333:LEU:HB2	1:A:362:ASN:HB3	2.01	0.42
1:A:582:ASN:OD1	1:A:582:ASN:C	2.62	0.42
1:A:628:ASP:OD2	1:A:628:ASP:N	2.51	0.42
1:A:818:GLU:N	1:A:818:GLU:OE2	2.52	0.42
1:B:575:HIS:CE1	1:B:596:ILE:HG12	2.54	0.42
1:B:626:ASP:CG	1:B:630:ARG:NH1	2.78	0.42
1:A:395:ASN:HA	1:A:419:ASN:HD22	1.84	0.42
1:A:642:THR:HB	1:A:667:THR:HB	2.01	0.42
1:B:428:ASN:O	1:B:491:ASN:HA	2.19	0.42
1:B:156:ASN:O	1:B:180:ASN:HA	2.19	0.42
1:A:289:LEU:HD12	1:A:289:LEU:HA	1.89	0.42
1:B:124:LEU:HB3	9:B:1004:HOH:O	2.18	0.42
1:B:703:LEU:HD21	1:B:724:ILE:CD1	2.45	0.42
1:B:566:HIS:CB	1:B:573:VAL:HG21	2.49	0.42
1:B:182:TYR:CD1	1:B:182:TYR:N	2.88	0.42
1:B:472:ARG:O	1:B:473:PRO:C	2.61	0.42
1:A:809:GLN:O	1:A:810:ARG:C	2.63	0.42
1:B:83:PHE:O	1:B:123:ASN:ND2	2.53	0.42
1:B:296:SER:HA	1:B:320:PHE:O	2.20	0.42
1:A:187:CYS:SG	1:A:189:LYS:N	2.93	0.41
1:A:321:ASN:C	1:A:347:ASN:OD1	2.63	0.41
1:A:476:LYS:O	1:A:477:PRO:C	2.63	0.41
1:B:272:GLY:C	1:B:274:ALA:N	2.79	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:300:ARG:O	1:B:301:LYS:HE2	2.20	0.41
1:B:562:SER:HB2	6:H:1:NAG:H82	2.02	0.41
1:A:203:LEU:HD21	1:A:206:LEU:HB2	2.02	0.41
1:B:802:ILE:HD13	1:B:813:SER:HA	2.02	0.41
1:B:774:PHE:CD1	1:B:814:ILE:HD11	2.55	0.41
1:A:403:ILE:HD11	7:A:901:7VC:O1	2.21	0.41
1:B:328:ALA:O	1:B:360:SER:HB2	2.21	0.41
1:A:213:LEU:C	1:A:215:HIS:H	2.28	0.41
1:A:342:LEU:HD21	1:A:344:LEU:HD11	2.03	0.40
1:A:413:LEU:HD12	1:A:413:LEU:C	2.46	0.40
1:A:236:TYR:HA	1:A:277:ASN:O	2.20	0.40
1:B:687:PHE:C	9:B:1009:HOH:O	2.63	0.40
1:B:733:SER:HA	1:B:734:GLU:HA	1.69	0.40
1:B:628:ASP:HB2	1:B:630:ARG:CD	2.52	0.40
1:A:243:LYS:HG3	1:A:285:ASN:HD22	1.85	0.40
1:A:501:PHE:HA	1:A:504:LEU:HD22	2.04	0.40
1:A:575:HIS:ND1	1:A:596:ILE:HG12	2.37	0.40
1:B:562:SER:CB	6:H:1:NAG:H82	2.52	0.40

All (2) 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:418:SER:O	1:A:715:ARG:NH2[2_454]	2.16	0.04
1:B:288:GLN:NE2	1:B:712:SER:OG[4_445]	2.16	0.04

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	735/811 (91%)	646 (88%)	83 (11%)	6 (1%)	16 44

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	724/811 (89%)	635 (88%)	83 (12%)	6 (1%)	16	44
All	All	1459/1622 (90%)	1281 (88%)	166 (11%)	12 (1%)	16	44

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	198	GLU
1	A	378	VAL
1	B	71	SER
1	B	378	VAL
1	B	472	ARG
1	A	808	ASP
1	A	810	ARG
1	B	696	ARG
1	B	808	ASP
1	A	672	ASN
1	A	799	VAL
1	B	686	GLN

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	690/755 (91%)	628 (91%)	62 (9%)	9	28
1	B	683/755 (90%)	630 (92%)	53 (8%)	11	35
All	All	1373/1510 (91%)	1258 (92%)	115 (8%)	10	32

All (115) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	LYS
1	A	44	SER
1	A	45	VAL
1	A	46	ILE

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Mol	Chain	Res	Type
1	A	49	CYS
1	A	50	SER
1	A	56	GLU
1	A	76	THR
1	A	87	GLN
1	A	90	THR
1	A	100	VAL
1	A	122	LEU
1	A	146	GLU
1	A	164	GLU
1	A	186	VAL
1	A	188	GLU
1	A	197	PHE
1	A	199	THR
1	A	212	SER
1	A	233	GLN
1	A	235	LYS
1	A	243	LYS
1	A	248	LEU
1	A	276	ILE
1	A	286	LEU
1	A	300	ARG
1	A	301	LYS
1	A	317	ASP
1	A	355	GLN
1	A	366	LEU
1	A	367	LEU
1	A	382	LEU
1	A	384	GLU
1	A	385	ASP
1	A	388	GLN
1	A	410	ASP
1	A	465	SER
1	A	470	PHE
1	A	472	ARG
1	A	478	GLN
1	A	504	LEU
1	A	567	TYR
1	A	574	THR
1	A	587	LYS
1	A	598	THR
1	A	599	LEU

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Mol	Chain	Res	Type
1	A	627	ASP
1	A	628	ASP
1	A	630	ARG
1	A	634	ILE
1	A	653	HIS
1	A	667	THR
1	A	677	LYS
1	A	706	SER
1	A	708	SER
1	A	729	SER
1	A	734	GLU
1	A	766	MET
1	A	778	CYS
1	A	797	ARG
1	A	798	LEU
1	A	817	LEU
1	B	40	LYS
1	B	41	GLN
1	B	49	CYS
1	B	60	THR
1	B	61	VAL
1	B	90	THR
1	B	122	LEU
1	B	123	ASN
1	B	139	GLN
1	B	142	SER
1	B	167	SER
1	B	199	THR
1	B	200	LEU
1	B	201	THR
1	B	243	LYS
1	B	249	THR
1	B	287	THR
1	B	300	ARG
1	B	301	LYS
1	B	319	GLU
1	B	352	SER
1	B	361	ARG
1	B	366	LEU
1	B	367	LEU
1	B	385	ASP
1	B	392	GLN

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Mol	Chain	Res	Type
1	B	416	ASN
1	B	423	ILE
1	B	466	ASN
1	B	467	PHE
1	B	470	PHE
1	B	478	GLN
1	B	502	GLU
1	B	504	LEU
1	B	581	GLN
1	B	584	THR
1	B	587	LYS
1	B	598	THR
1	B	608	LYS
1	B	630	ARG
1	B	634	ILE
1	B	642	THR
1	B	657	GLU
1	B	665	SER
1	B	667	THR
1	B	671	ILE
1	B	706	SER
1	B	727	LEU
1	B	753	LYS
1	B	778	CYS
1	B	797	ARG
1	B	814	ILE
1	B	817	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (28) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	96	HIS
1	A	231	ASN
1	A	233	GLN
1	A	285	ASN
1	A	362	ASN
1	A	415	GLN
1	A	419	ASN
1	A	478	GLN
1	A	593	HIS
1	A	752	ASN
1	B	41	GLN

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Mol	Chain	Res	Type
1	B	77	HIS
1	B	135	ASN
1	B	155	GLN
1	B	157	ASN
1	B	160	ASN
1	B	174	ASN
1	B	288	GLN
1	B	356	HIS
1	B	373	HIS
1	B	415	GLN
1	B	478	GLN
1	B	499	ASN
1	B	531	HIS
1	B	564	ASN
1	B	566	HIS
1	B	585	ASN
1	B	604	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

19 non-standard protein/DNA/RNA residues 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	E	1	4,1	14,14,15	0.88	1 (7%)	17,19,21	1.54	3 (17%)
2	NAG	C	1	2,1	14,14,15	0.64	0	17,19,21	1.46	4 (23%)
3	NAG	D	2	3	14,14,15	0.67	0	17,19,21	1.62	3 (17%)
6	MAN	H	4	6	11,11,12	0.81	0	15,15,17	1.08	1 (6%)
2	NAG	C	2	2	14,14,15	0.81	0	17,19,21	1.44	3 (17%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
8	NAG	A	913	1	14,14,15	0.57	0	17,19,21	1.02	1 (5%)
5	NAG	F	2	5	14,14,15	0.69	0	17,19,21	2.20	6 (35%)
3	NAG	G	2	3	14,14,15	0.78	0	17,19,21	1.24	3 (17%)
4	MAN	E	4	4	11,11,12	0.51	0	15,15,17	1.84	1 (6%)
8	NAG	A	905	1	14,14,15	0.48	0	17,19,21	1.36	2 (11%)
5	MAN	F	4	5	11,11,12	0.57	0	15,15,17	1.27	3 (20%)
4	MAN	E	5	4	11,11,12	0.51	0	15,15,17	1.32	1 (6%)
8	NAG	B	911	1	14,14,15	0.68	0	17,19,21	1.21	1 (5%)
6	NAG	H	1	6,1	14,14,15	0.77	0	17,19,21	1.30	1 (5%)
6	NAG	H	2	6	14,14,15	0.98	1 (7%)	17,19,21	1.40	2 (11%)
3	NAG	D	1	3,1	14,14,15	0.71	0	17,19,21	1.66	6 (35%)
5	NAG	F	1	5,1	14,14,15	0.64	0	17,19,21	1.39	4 (23%)
4	NAG	E	2	4	14,14,15	1.10	1 (7%)	17,19,21	1.83	4 (23%)
3	NAG	G	1	3,1	14,14,15	0.74	0	17,19,21	1.77	4 (23%)

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	E	1	4,1	-	0/6/23/26	0/1/1/1
2	NAG	C	1	2,1	-	0/6/23/26	0/1/1/1
3	NAG	D	2	3	-	2/6/23/26	0/1/1/1
6	MAN	H	4	6	-	0/2/19/22	0/1/1/1
2	NAG	C	2	2	-	0/6/23/26	0/1/1/1
8	NAG	A	913	1	-	0/6/23/26	0/1/1/1
5	NAG	F	2	5	-	0/6/23/26	0/1/1/1
3	NAG	G	2	3	-	0/6/23/26	0/1/1/1
4	MAN	E	4	4	-	0/2/19/22	0/1/1/1
8	NAG	A	905	1	-	2/6/23/26	0/1/1/1
5	MAN	F	4	5	-	0/2/19/22	0/1/1/1
4	MAN	E	5	4	-	1/2/19/22	0/1/1/1
8	NAG	B	911	1	-	0/6/23/26	0/1/1/1
6	NAG	H	1	6,1	-	0/6/23/26	0/1/1/1
6	NAG	H	2	6	-	0/6/23/26	0/1/1/1
3	NAG	D	1	3,1	-	0/6/23/26	0/1/1/1
5	NAG	F	1	5,1	-	2/6/23/26	0/1/1/1
4	NAG	E	2	4	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	G	1	3,1	-	0/6/23/26	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	1	NAG	O5-C1	-2.25	1.39	1.43
6	H	2	NAG	O5-C1	-2.22	1.40	1.43
4	E	2	NAG	O5-C1	-2.12	1.40	1.43

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	4	MAN	C1-O5-C5	5.99	120.22	112.19
5	F	2	NAG	O4-C4-C3	4.55	121.09	110.38
5	F	2	NAG	O5-C1-C2	-4.26	104.69	111.29
3	D	2	NAG	C1-O5-C5	3.95	117.47	112.19
4	E	2	NAG	O3-C3-C2	3.92	117.55	109.40
3	G	1	NAG	O7-C7-C8	-3.82	115.25	122.05
8	A	905	NAG	C1-O5-C5	3.77	117.23	112.19
4	E	1	NAG	O7-C7-C8	-3.55	115.72	122.05
3	G	1	NAG	O7-C7-N2	3.53	128.22	121.98
5	F	4	MAN	C1-O5-C5	3.43	116.79	112.19
8	B	911	NAG	C1-C2-N2	-3.37	105.13	110.43
4	E	5	MAN	O5-C5-C6	3.17	113.82	107.66
5	F	2	NAG	C3-C4-C5	-3.15	104.52	110.23
5	F	1	NAG	C1-C2-N2	3.03	115.21	110.43
4	E	2	NAG	O4-C4-C5	-3.00	101.94	109.32
2	C	2	NAG	O4-C4-C5	2.93	116.55	109.32
3	D	2	NAG	O4-C4-C5	2.92	116.50	109.32
3	G	2	NAG	O4-C4-C5	2.87	116.40	109.32
3	D	1	NAG	O7-C7-N2	2.86	127.04	121.98
4	E	2	NAG	O7-C7-C8	-2.81	117.06	122.05
6	H	2	NAG	C4-C3-C2	-2.80	106.92	111.02
4	E	1	NAG	O3-C3-C2	-2.79	103.61	109.40
5	F	2	NAG	O7-C7-C8	-2.76	117.14	122.05
6	H	2	NAG	O5-C1-C2	-2.70	107.11	111.29
2	C	2	NAG	C1-O5-C5	-2.70	108.57	112.19
3	D	1	NAG	O6-C6-C5	-2.63	102.37	111.33
4	E	2	NAG	O7-C7-N2	2.61	126.59	121.98
2	C	1	NAG	O3-C3-C4	2.57	116.44	110.38
3	D	1	NAG	C3-C4-C5	-2.57	105.58	110.23
2	C	2	NAG	O5-C1-C2	-2.56	107.33	111.29

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	1	NAG	C2-N2-C7	2.56	126.33	122.90
6	H	1	NAG	C1-O5-C5	2.55	115.60	112.19
5	F	1	NAG	O5-C1-C2	-2.45	107.50	111.29
3	G	2	NAG	O5-C1-C2	-2.45	107.50	111.29
3	G	1	NAG	C2-N2-C7	2.43	126.16	122.90
5	F	2	NAG	C1-C2-N2	2.43	114.26	110.43
3	D	2	NAG	O7-C7-C8	-2.42	117.75	122.05
8	A	905	NAG	O5-C5-C6	2.40	112.34	107.66
4	E	1	NAG	C8-C7-N2	2.40	120.09	116.12
5	F	1	NAG	O3-C3-C2	-2.36	104.49	109.40
2	C	1	NAG	C1-C2-N2	2.35	114.14	110.43
8	A	913	NAG	O5-C1-C2	-2.31	107.72	111.29
5	F	2	NAG	O3-C3-C4	2.28	115.75	110.38
3	D	1	NAG	O7-C7-C8	-2.27	118.02	122.05
5	F	4	MAN	O3-C3-C2	-2.19	105.58	110.05
3	D	1	NAG	C1-C2-N2	-2.16	107.03	110.43
6	H	4	MAN	C1-C2-C3	2.12	112.73	109.64
2	C	1	NAG	O7-C7-C8	-2.12	118.29	122.05
5	F	1	NAG	O6-C6-C5	-2.09	104.20	111.33
2	C	1	NAG	C8-C7-N2	2.08	119.56	116.12
3	G	2	NAG	C1-O5-C5	2.08	114.97	112.19
3	G	1	NAG	O3-C3-C2	-2.05	105.14	109.40
5	F	4	MAN	O5-C5-C6	2.04	111.64	107.66

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	2	NAG	O5-C5-C6-O6
3	D	2	NAG	C4-C5-C6-O6
5	F	1	NAG	C4-C5-C6-O6
8	A	905	NAG	C4-C5-C6-O6
4	E	5	MAN	O5-C5-C6-O6
8	A	905	NAG	O5-C5-C6-O6
5	F	1	NAG	O5-C5-C6-O6

There are no ring outliers.

4 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	1	NAG	2	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	911	NAG	1	0
6	H	1	NAG	2	0
5	F	1	NAG	1	0

5.5 Carbohydrates [i](#)

20 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	C	1	2,1	14,14,15	0.64	0	17,19,21	1.46	4 (23%)
2	NAG	C	2	2	14,14,15	0.81	0	17,19,21	1.44	3 (17%)
2	BMA	C	3	2	11,11,12	0.87	0	15,15,17	1.76	4 (26%)
3	NAG	D	1	3,1	14,14,15	0.71	0	17,19,21	1.66	6 (35%)
3	NAG	D	2	3	14,14,15	0.67	0	17,19,21	1.62	3 (17%)
4	NAG	E	1	4,1	14,14,15	0.88	1 (7%)	17,19,21	1.54	3 (17%)
4	NAG	E	2	4	14,14,15	1.10	1 (7%)	17,19,21	1.83	4 (23%)
4	BMA	E	3	4	11,11,12	0.52	0	15,15,17	1.35	3 (20%)
4	MAN	E	4	4	11,11,12	0.51	0	15,15,17	1.84	1 (6%)
4	MAN	E	5	4	11,11,12	0.51	0	15,15,17	1.32	1 (6%)
5	NAG	F	1	5,1	14,14,15	0.64	0	17,19,21	1.39	4 (23%)
5	NAG	F	2	5	14,14,15	0.69	0	17,19,21	2.20	6 (35%)
5	MAN	F	3	5	11,11,12	0.41	0	15,15,17	2.57	3 (20%)
5	MAN	F	4	5	11,11,12	0.57	0	15,15,17	1.27	3 (20%)
3	NAG	G	1	3,1	14,14,15	0.74	0	17,19,21	1.77	4 (23%)
3	NAG	G	2	3	14,14,15	0.78	0	17,19,21	1.24	3 (17%)
6	NAG	H	1	6,1	14,14,15	0.77	0	17,19,21	1.30	1 (5%)
6	NAG	H	2	6	14,14,15	0.98	1 (7%)	17,19,21	1.40	2 (11%)
6	BMA	H	3	6	11,11,12	0.43	0	15,15,17	1.55	3 (20%)
6	MAN	H	4	6	11,11,12	0.81	0	15,15,17	1.08	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
2	NAG	C	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	C	2	2	-	0/6/23/26	0/1/1/1
2	BMA	C	3	2	-	1/2/19/22	0/1/1/1
3	NAG	D	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	D	2	3	-	2/6/23/26	0/1/1/1
4	NAG	E	1	4,1	-	0/6/23/26	0/1/1/1
4	NAG	E	2	4	-	0/6/23/26	0/1/1/1
4	BMA	E	3	4	-	2/2/19/22	0/1/1/1
4	MAN	E	4	4	-	0/2/19/22	0/1/1/1
4	MAN	E	5	4	-	1/2/19/22	0/1/1/1
5	NAG	F	1	5,1	-	2/6/23/26	0/1/1/1
5	NAG	F	2	5	-	0/6/23/26	0/1/1/1
5	MAN	F	3	5	-	0/2/19/22	0/1/1/1
5	MAN	F	4	5	-	0/2/19/22	0/1/1/1
3	NAG	G	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	G	2	3	-	0/6/23/26	0/1/1/1
6	NAG	H	1	6,1	-	0/6/23/26	0/1/1/1
6	NAG	H	2	6	-	0/6/23/26	0/1/1/1
6	BMA	H	3	6	-	0/2/19/22	0/1/1/1
6	MAN	H	4	6	-	0/2/19/22	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	1	NAG	O5-C1	-2.25	1.39	1.43
6	H	2	NAG	O5-C1	-2.22	1.40	1.43
4	E	2	NAG	O5-C1	-2.12	1.40	1.43

All (62) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	F	3	MAN	C1-O5-C5	8.59	123.70	112.19
4	E	4	MAN	C1-O5-C5	5.99	120.22	112.19
5	F	2	NAG	O4-C4-C3	4.55	121.09	110.38
5	F	2	NAG	O5-C1-C2	-4.26	104.69	111.29
3	D	2	NAG	C1-O5-C5	3.95	117.47	112.19
4	E	2	NAG	O3-C3-C2	3.92	117.55	109.40
3	G	1	NAG	O7-C7-C8	-3.82	115.25	122.05

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	1	NAG	O7-C7-C8	-3.55	115.72	122.05
3	G	1	NAG	O7-C7-N2	3.53	128.22	121.98
2	C	3	BMA	C3-C4-C5	3.43	116.46	110.23
5	F	4	MAN	C1-O5-C5	3.43	116.79	112.19
2	C	3	BMA	O5-C5-C6	3.31	114.10	107.66
5	F	3	MAN	C1-C2-C3	3.26	114.39	109.64
4	E	3	BMA	C3-C4-C5	3.23	116.09	110.23
4	E	5	MAN	O5-C5-C6	3.17	113.82	107.66
5	F	2	NAG	C3-C4-C5	-3.15	104.52	110.23
5	F	1	NAG	C1-C2-N2	3.03	115.21	110.43
4	E	2	NAG	O4-C4-C5	-3.00	101.94	109.32
2	C	2	NAG	O4-C4-C5	2.93	116.55	109.32
3	D	2	NAG	O4-C4-C5	2.92	116.50	109.32
3	G	2	NAG	O4-C4-C5	2.87	116.40	109.32
3	D	1	NAG	O7-C7-N2	2.86	127.04	121.98
4	E	2	NAG	O7-C7-C8	-2.81	117.06	122.05
6	H	3	BMA	O5-C1-C2	2.80	117.47	110.79
6	H	2	NAG	C4-C3-C2	-2.80	106.92	111.02
4	E	1	NAG	O3-C3-C2	-2.79	103.61	109.40
5	F	2	NAG	O7-C7-C8	-2.76	117.14	122.05
6	H	2	NAG	O5-C1-C2	-2.70	107.11	111.29
2	C	2	NAG	C1-O5-C5	-2.70	108.57	112.19
3	D	1	NAG	O6-C6-C5	-2.63	102.37	111.33
4	E	2	NAG	O7-C7-N2	2.61	126.59	121.98
2	C	1	NAG	O3-C3-C4	2.57	116.44	110.38
3	D	1	NAG	C3-C4-C5	-2.57	105.58	110.23
2	C	2	NAG	O5-C1-C2	-2.56	107.33	111.29
3	D	1	NAG	C2-N2-C7	2.56	126.33	122.90
6	H	1	NAG	C1-O5-C5	2.55	115.60	112.19
2	C	3	BMA	O6-C6-C5	2.48	119.77	111.33
6	H	3	BMA	C1-O5-C5	2.46	115.48	112.19
5	F	1	NAG	O5-C1-C2	-2.45	107.50	111.29
3	G	2	NAG	O5-C1-C2	-2.45	107.50	111.29
3	G	1	NAG	C2-N2-C7	2.43	126.16	122.90
5	F	2	NAG	C1-C2-N2	2.43	114.26	110.43
3	D	2	NAG	O7-C7-C8	-2.42	117.75	122.05
4	E	1	NAG	C8-C7-N2	2.40	120.09	116.12
5	F	3	MAN	O5-C1-C2	2.39	116.48	110.79
5	F	1	NAG	O3-C3-C2	-2.36	104.49	109.40
2	C	1	NAG	C1-C2-N2	2.35	114.14	110.43
5	F	2	NAG	O3-C3-C4	2.28	115.75	110.38
6	H	3	BMA	O5-C5-C6	2.27	112.08	107.66

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	1	NAG	O7-C7-C8	-2.27	118.02	122.05
4	E	3	BMA	C1-C2-C3	-2.23	106.40	109.64
2	C	3	BMA	O3-C3-C2	-2.21	105.53	110.05
5	F	4	MAN	O3-C3-C2	-2.19	105.58	110.05
3	D	1	NAG	C1-C2-N2	-2.16	107.03	110.43
6	H	4	MAN	C1-C2-C3	2.12	112.73	109.64
2	C	1	NAG	O7-C7-C8	-2.12	118.29	122.05
4	E	3	BMA	O2-C2-C3	2.10	114.51	110.15
5	F	1	NAG	O6-C6-C5	-2.09	104.20	111.33
2	C	1	NAG	C8-C7-N2	2.08	119.56	116.12
3	G	2	NAG	C1-O5-C5	2.08	114.97	112.19
3	G	1	NAG	O3-C3-C2	-2.05	105.14	109.40
5	F	4	MAN	O5-C5-C6	2.04	111.64	107.66

There are no chirality outliers.

All (8) torsion outliers are listed below:

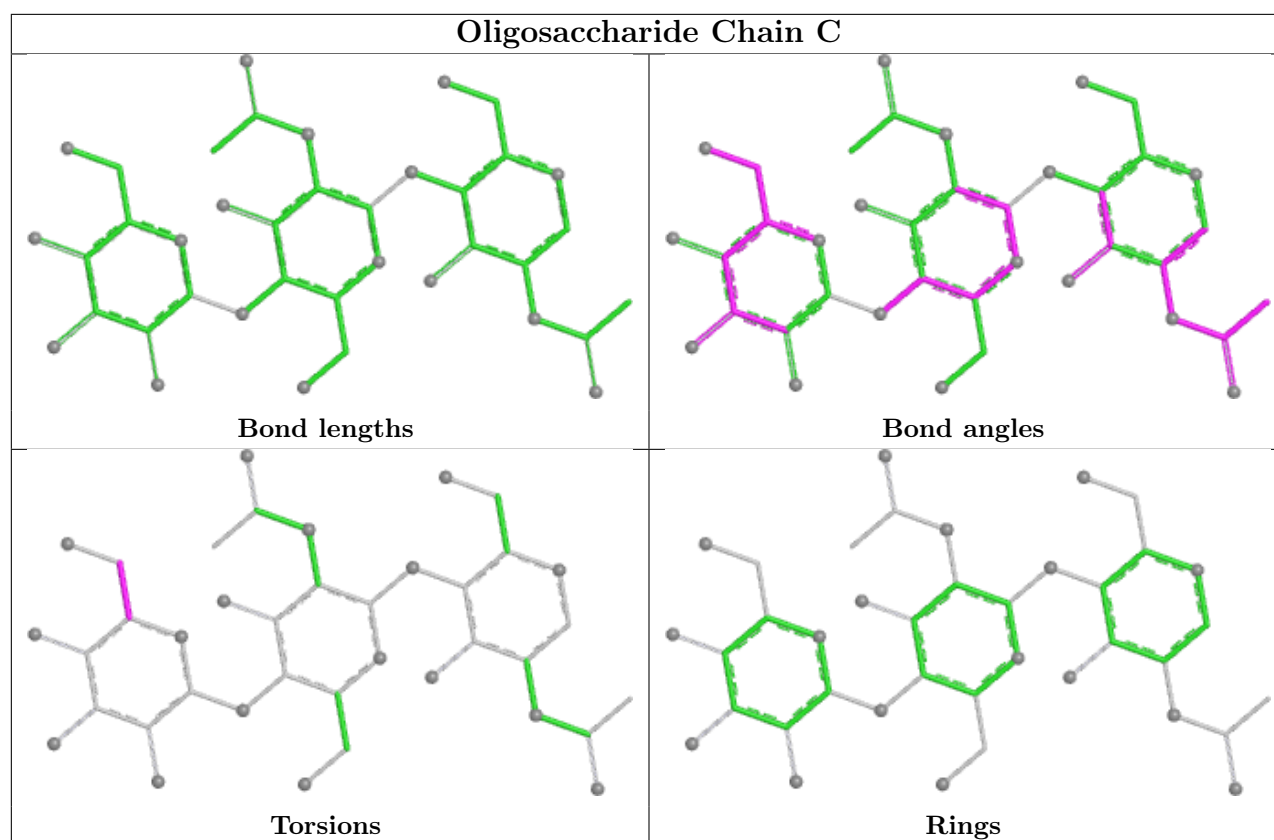
Mol	Chain	Res	Type	Atoms
3	D	2	NAG	O5-C5-C6-O6
3	D	2	NAG	C4-C5-C6-O6
5	F	1	NAG	C4-C5-C6-O6
4	E	5	MAN	O5-C5-C6-O6
2	C	3	BMA	C4-C5-C6-O6
4	E	3	BMA	C4-C5-C6-O6
4	E	3	BMA	O5-C5-C6-O6
5	F	1	NAG	O5-C5-C6-O6

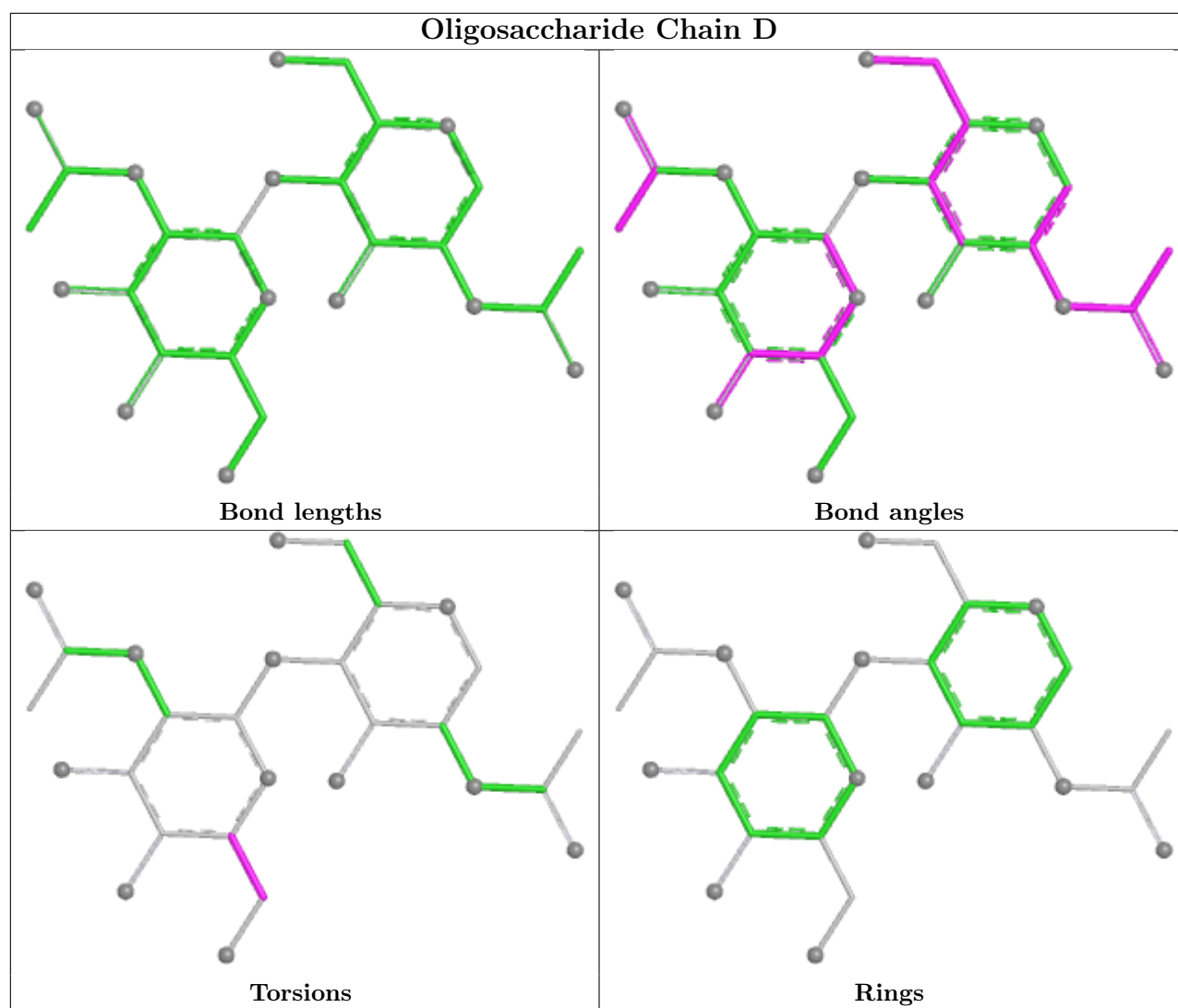
There are no ring outliers.

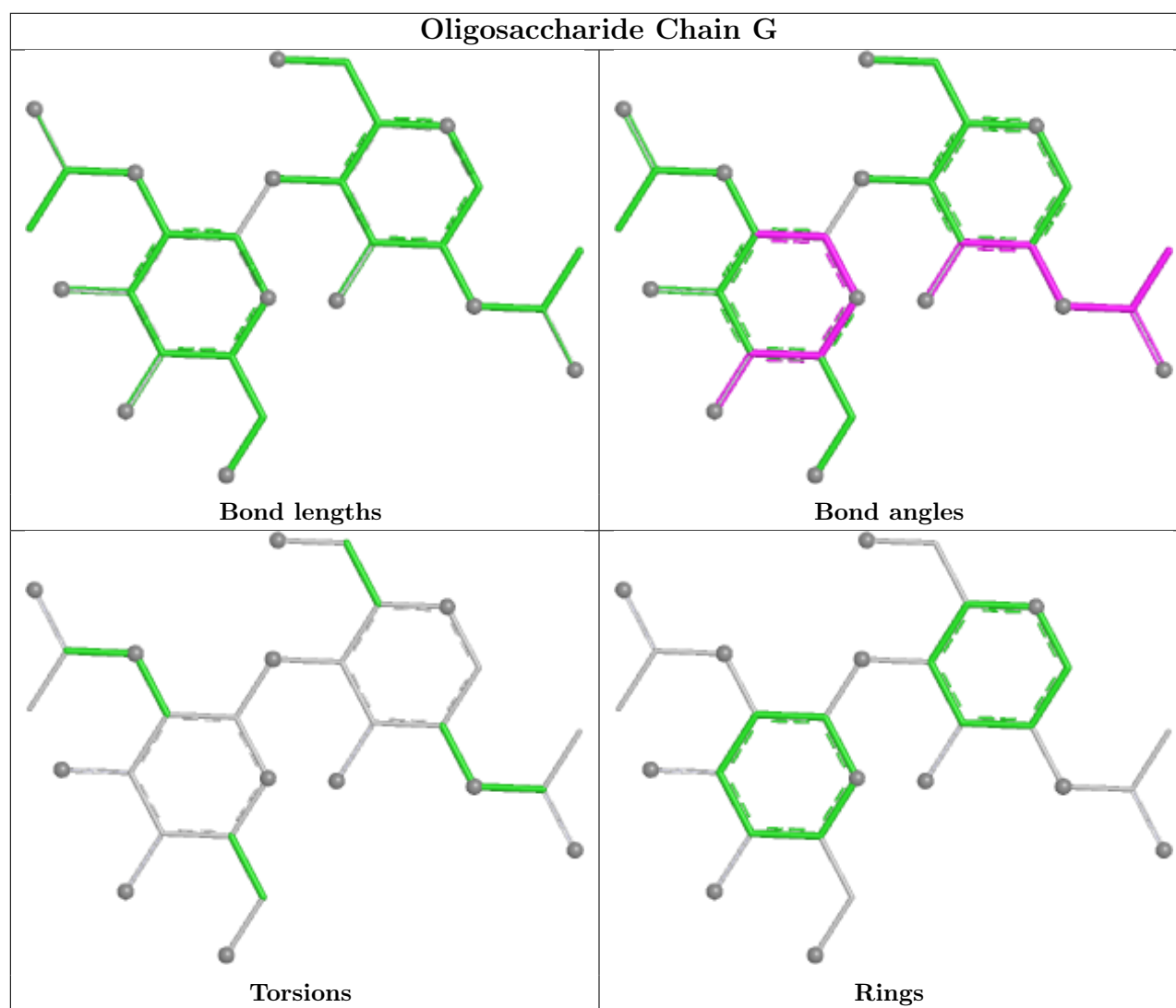
3 monomers are involved in 5 short contacts:

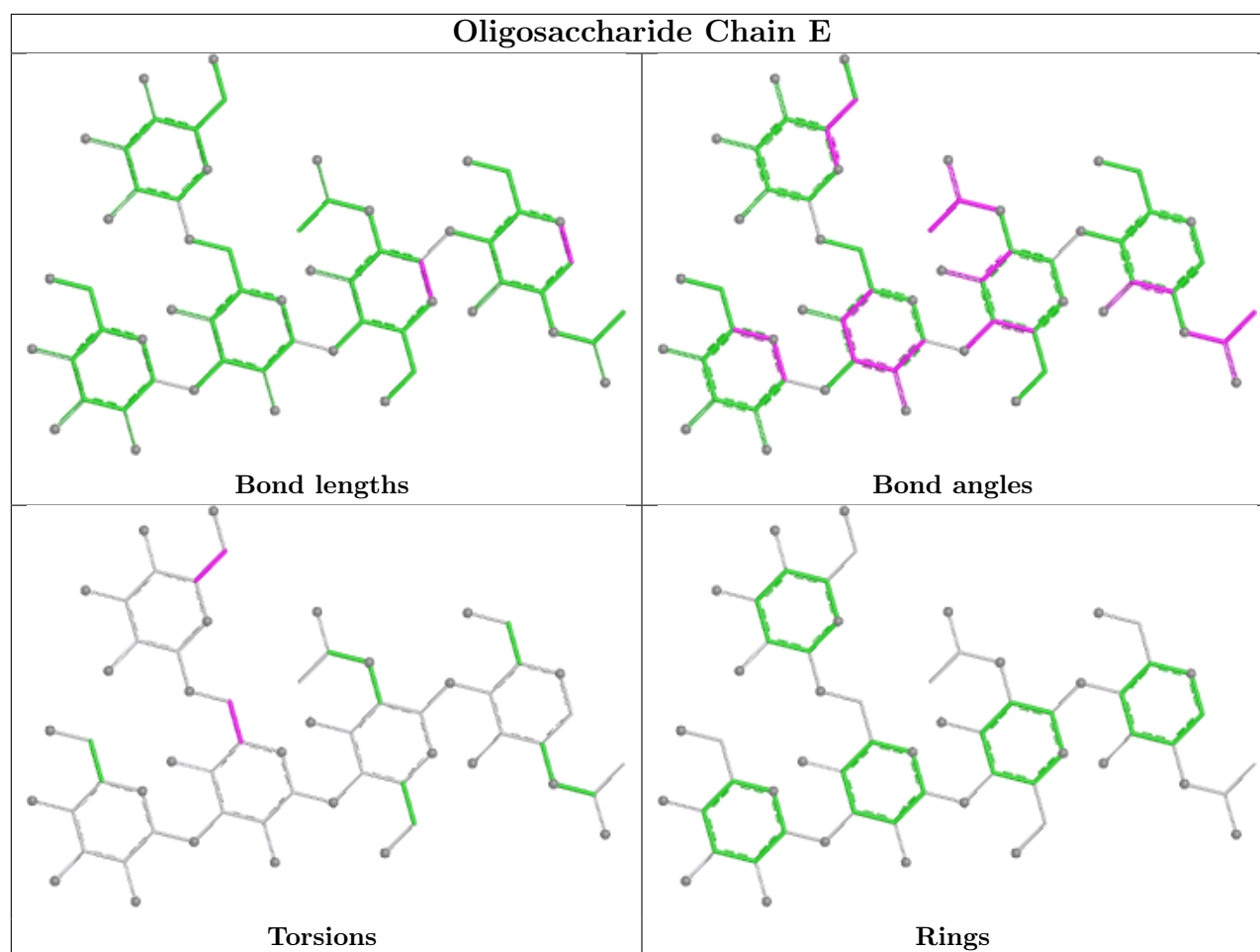
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	1	NAG	2	0
6	H	1	NAG	2	0
5	F	1	NAG	1	0

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

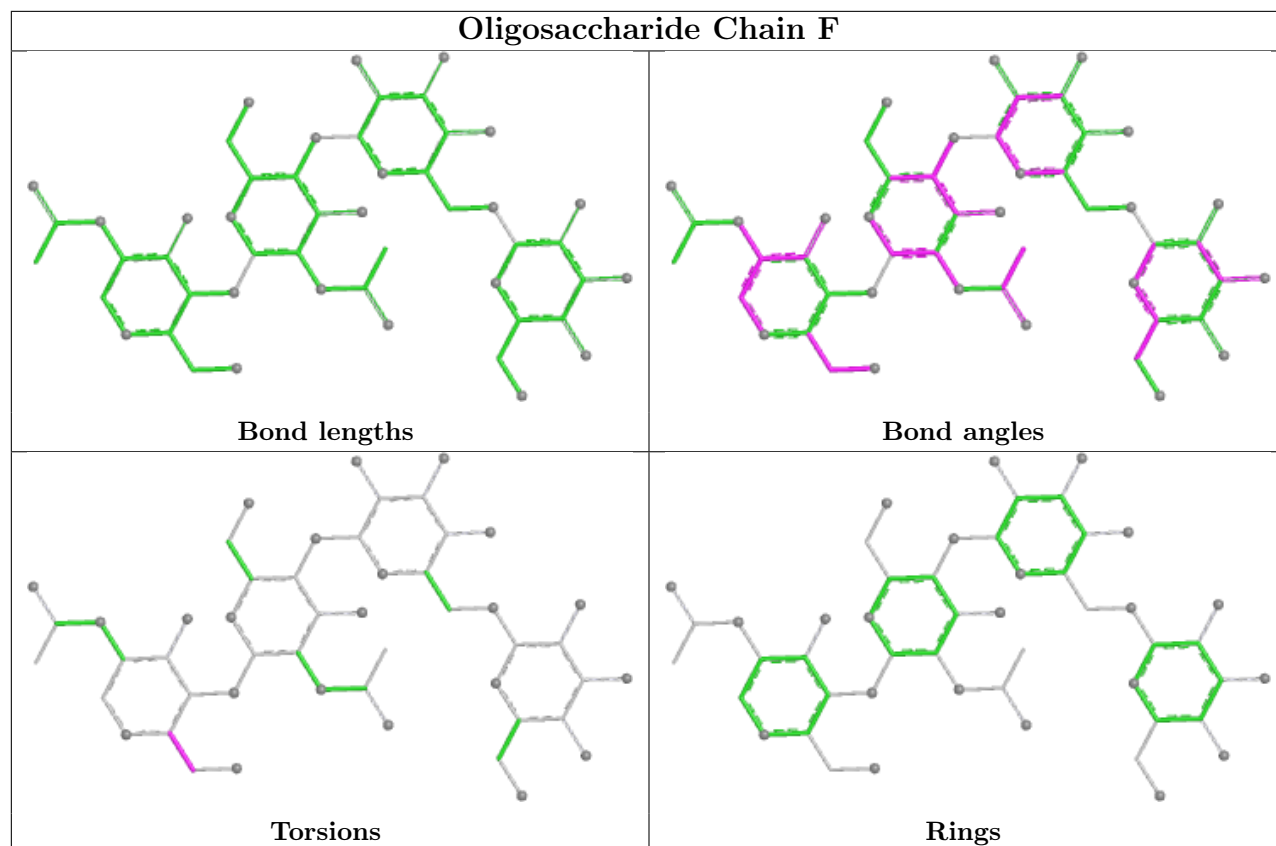




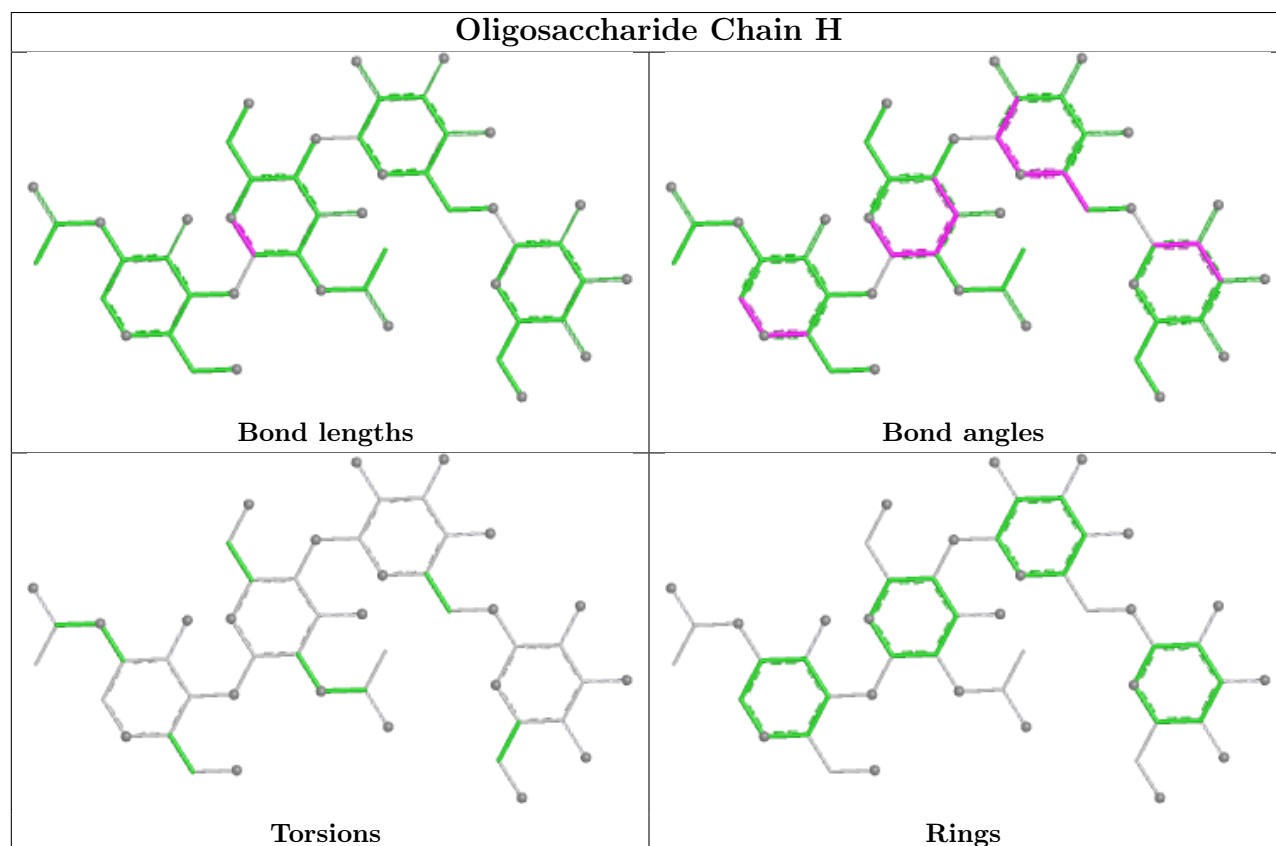




Oligosaccharide Chain F



Oligosaccharide Chain H



5.6 Ligand geometry

5 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	7VC	A	914	-	22,22,22	1.76	3 (13%)	31,31,31	1.58	7 (22%)
8	NAG	B	911	1	14,14,15	0.68	0	17,19,21	1.21	1 (5%)
8	NAG	A	913	1	14,14,15	0.57	0	17,19,21	1.02	1 (5%)
7	7VC	A	901	-	22,22,22	1.85	3 (13%)	31,31,31	1.80	7 (22%)
8	NAG	A	905	1	14,14,15	0.48	0	17,19,21	1.36	2 (11%)

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
7	7VC	A	914	-	-	0/6/6/6	0/3/3/3
8	NAG	B	911	1	-	0/6/23/26	0/1/1/1
8	NAG	A	913	1	-	0/6/23/26	0/1/1/1
7	7VC	A	901	-	-	0/6/6/6	0/3/3/3
8	NAG	A	905	1	-	2/6/23/26	0/1/1/1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	901	7VC	C8-C7	6.74	1.49	1.40
7	A	914	7VC	C8-C7	4.88	1.46	1.40
7	A	914	7VC	C-C1	3.96	1.48	1.42
7	A	914	7VC	C2-C	3.41	1.50	1.42
7	A	901	7VC	C-C1	3.07	1.47	1.42
7	A	901	7VC	C2-C	2.06	1.47	1.42

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	901	7VC	C4-N-C1	4.26	123.37	116.93
8	A	905	NAG	C1-O5-C5	3.77	117.23	112.19
7	A	914	7VC	C-C1-N	-3.62	118.98	122.82
7	A	901	7VC	C-C1-N	-3.59	119.02	122.82
8	B	911	NAG	C1-C2-N2	-3.37	105.13	110.43
7	A	901	7VC	C16-O-C15	3.23	124.44	117.50
7	A	901	7VC	O1-C8-C7	3.22	123.80	117.60
7	A	914	7VC	C16-O-C15	3.14	124.22	117.50
7	A	914	7VC	C14-C1-N	3.07	121.54	118.01
7	A	914	7VC	C4-N-C1	2.85	121.24	116.93
7	A	901	7VC	C9-C5-C2	-2.83	116.18	120.87
7	A	901	7VC	C9-C5-C6	2.56	121.75	118.23
7	A	901	7VC	C14-C1-N	2.49	120.87	118.01
7	A	914	7VC	C2-C-C1	2.41	119.22	117.54
8	A	905	NAG	O5-C5-C6	2.40	112.34	107.66
8	A	913	NAG	O5-C1-C2	-2.31	107.72	111.29
7	A	914	7VC	C11-C7-C8	-2.18	118.45	120.69
7	A	914	7VC	C10-C8-C7	-2.09	118.08	120.93

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	A	905	NAG	C4-C5-C6-O6
8	A	905	NAG	O5-C5-C6-O6

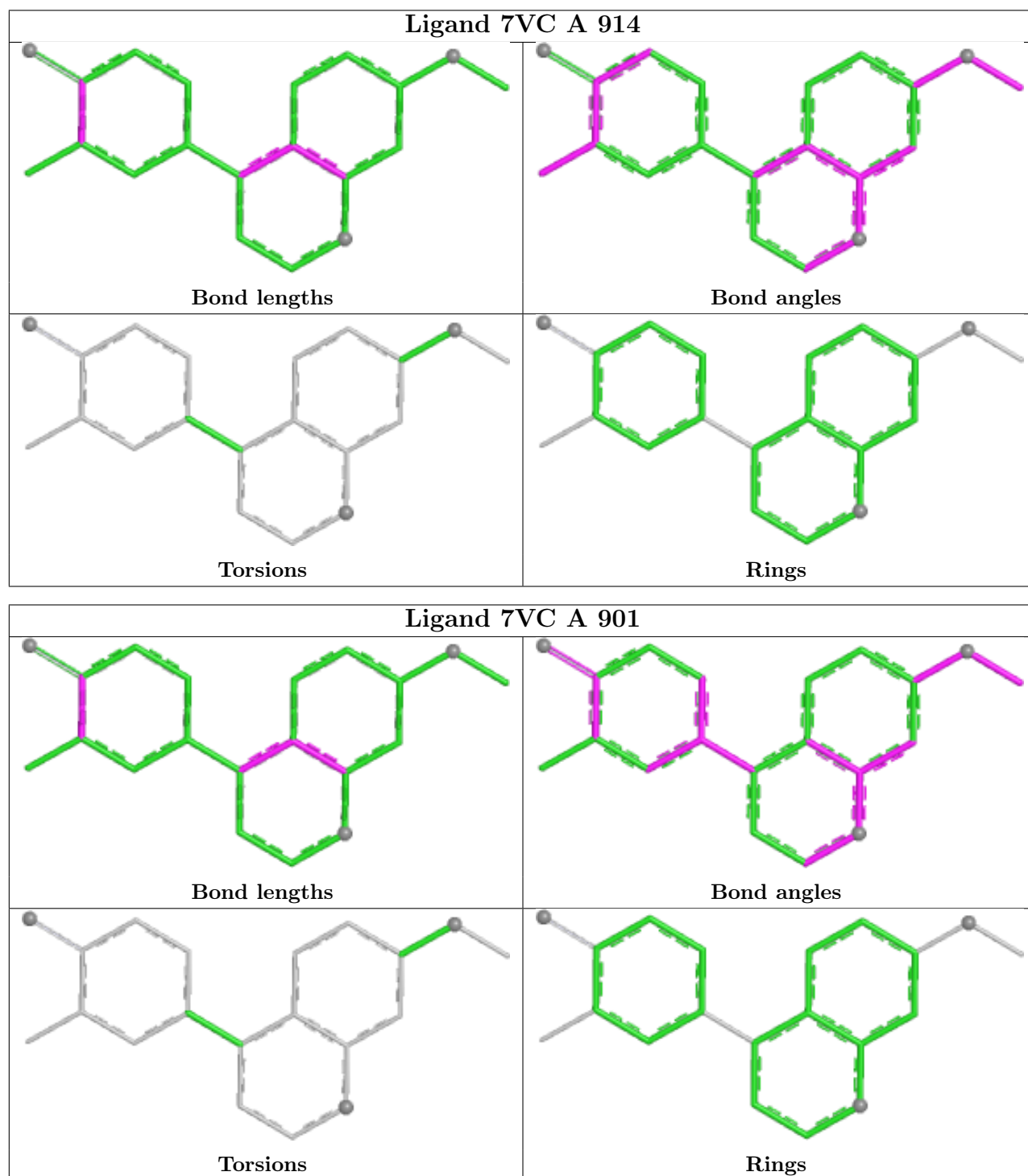
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	911	NAG	1	0
7	A	901	7VC	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier.

The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	743/811 (91%)	-0.27	7 (0%) 81 74	34, 67, 109, 167	0
1	B	734/811 (90%)	-0.22	6 (0%) 82 75	41, 69, 108, 155	0
All	All	1477/1622 (91%)	-0.25	13 (0%) 81 74	34, 68, 109, 167	0

All (13) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	182	TYR	3.6
1	B	732	LEU	3.0
1	A	100	VAL	2.6
1	B	572	GLY	2.5
1	A	732	LEU	2.5
1	B	567	TYR	2.5
1	A	567	TYR	2.3
1	A	265	PHE	2.2
1	A	182	TYR	2.1
1	A	470	PHE	2.1
1	B	467	PHE	2.1
1	B	179	TRP	2.1
1	A	183	PHE	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [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
5	MAN	F	4	11/12	0.44	0.14	89,105,117,125	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	MAN	E	4	11/12	0.65	0.09	94,101,109,112	0
4	MAN	E	5	11/12	0.68	0.10	91,96,101,102	0
6	MAN	H	4	11/12	0.70	0.10	87,95,100,105	0
3	NAG	G	2	14/15	0.80	0.11	52,81,97,100	0
3	NAG	D	2	14/15	0.85	0.09	57,73,86,93	0
8	NAG	B	911	14/15	0.90	0.11	72,89,93,93	0
8	NAG	A	913	14/15	0.91	0.09	64,69,76,78	0
5	NAG	F	2	14/15	0.91	0.11	52,55,64,76	0
8	NAG	A	905	14/15	0.92	0.07	63,69,73,73	0
6	NAG	H	2	14/15	0.94	0.08	46,51,55,56	0
5	NAG	F	1	14/15	0.94	0.08	37,52,61,64	0
4	NAG	E	1	14/15	0.94	0.07	38,42,47,49	0
2	NAG	C	1	14/15	0.95	0.07	42,46,53,58	0
2	NAG	C	2	14/15	0.95	0.07	38,45,53,60	0
6	NAG	H	1	14/15	0.95	0.06	40,47,55,63	0
3	NAG	G	1	14/15	0.96	0.06	45,49,53,60	0
3	NAG	D	1	14/15	0.97	0.05	36,43,50,52	0
4	NAG	E	2	14/15	0.97	0.05	40,46,56,59	0

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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

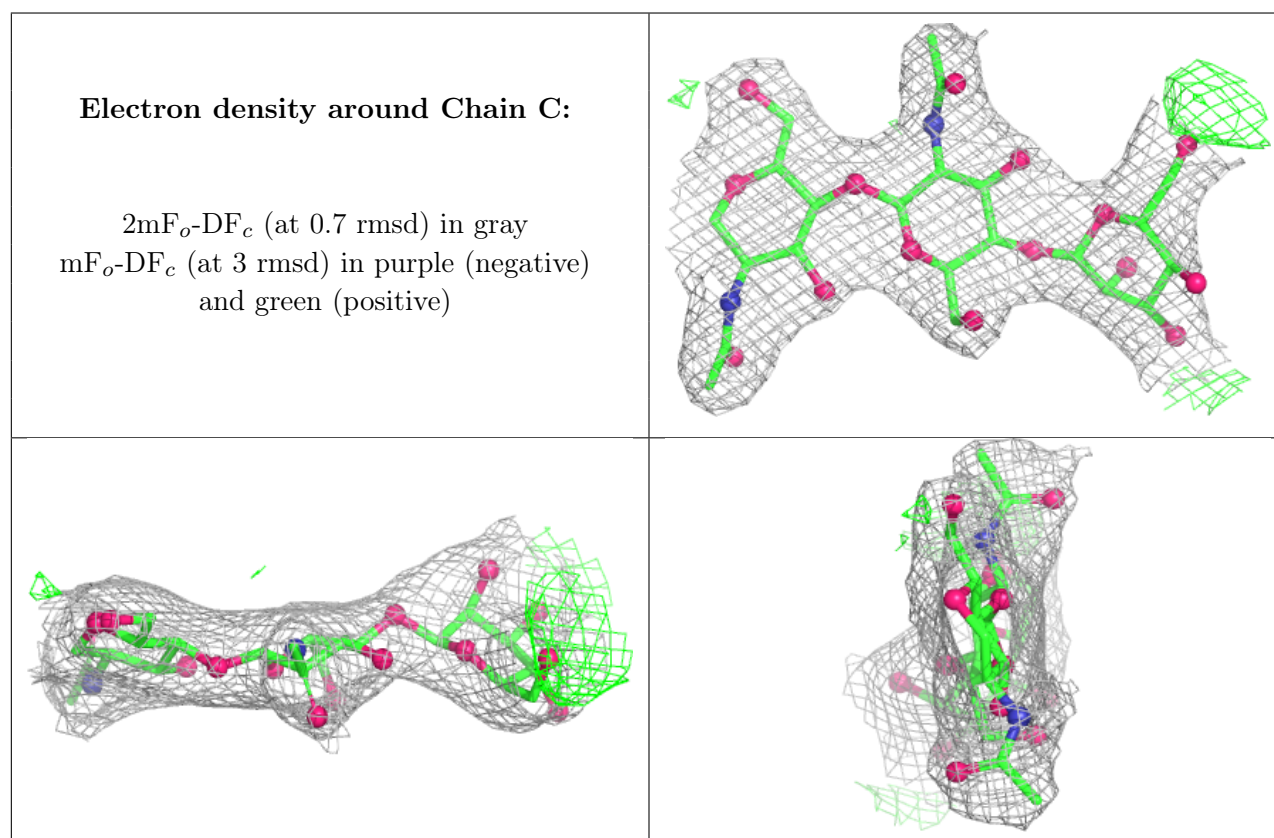
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	MAN	F	4	11/12	0.44	0.14	89,105,117,125	0
4	MAN	E	4	11/12	0.65	0.09	94,101,109,112	0
4	MAN	E	5	11/12	0.68	0.10	91,96,101,102	0
6	MAN	H	4	11/12	0.70	0.10	87,95,100,105	0
5	MAN	F	3	11/12	0.71	0.11	84,89,102,113	0
2	BMA	C	3	11/12	0.79	0.09	58,65,73,86	0
3	NAG	G	2	14/15	0.80	0.11	52,81,97,100	0
3	NAG	D	2	14/15	0.85	0.09	57,73,86,93	0
6	BMA	H	3	11/12	0.88	0.08	57,63,83,99	0
5	NAG	F	2	14/15	0.91	0.11	52,55,64,76	0
4	BMA	E	3	11/12	0.92	0.06	64,74,84,85	0
6	NAG	H	2	14/15	0.94	0.08	46,51,55,56	0
5	NAG	F	1	14/15	0.94	0.08	37,52,61,64	0
4	NAG	E	1	14/15	0.94	0.07	38,42,47,49	0
2	NAG	C	2	14/15	0.95	0.07	38,45,53,60	0

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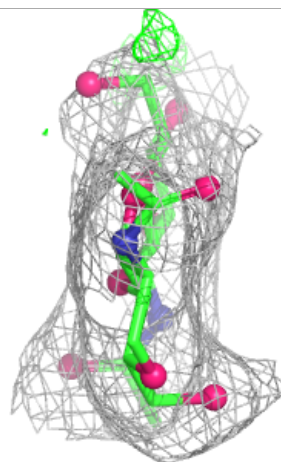
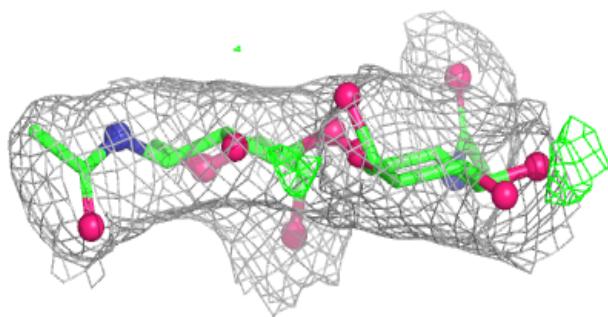
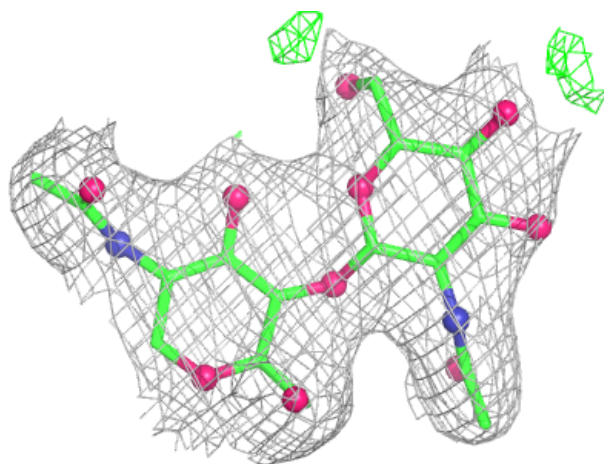
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	NAG	C	1	14/15	0.95	0.07	42,46,53,58	0
6	NAG	H	1	14/15	0.95	0.06	40,47,55,63	0
3	NAG	G	1	14/15	0.96	0.06	45,49,53,60	0
4	NAG	E	2	14/15	0.97	0.05	40,46,56,59	0
3	NAG	D	1	14/15	0.97	0.05	36,43,50,52	0

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



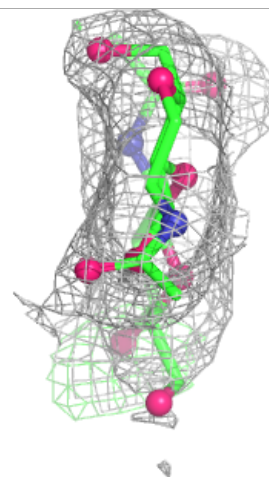
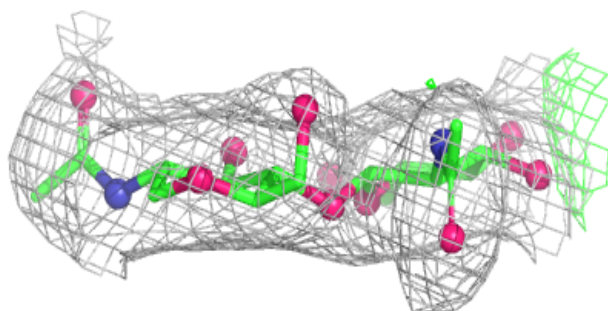
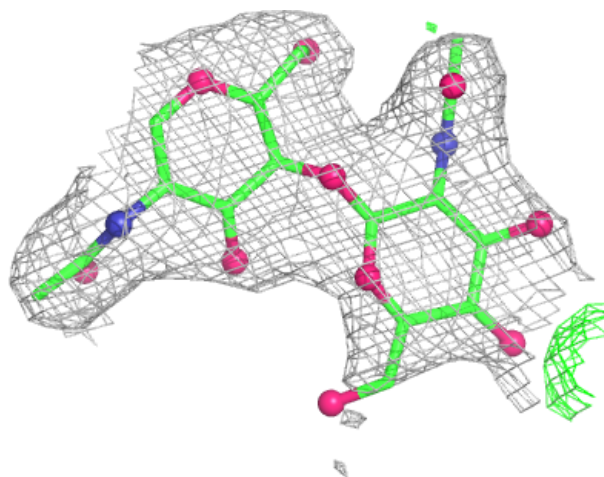
Electron density around Chain D:

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



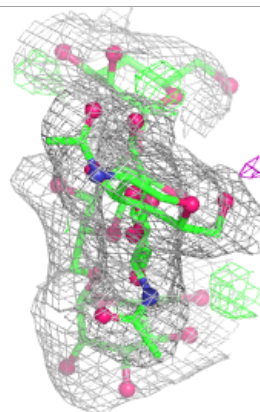
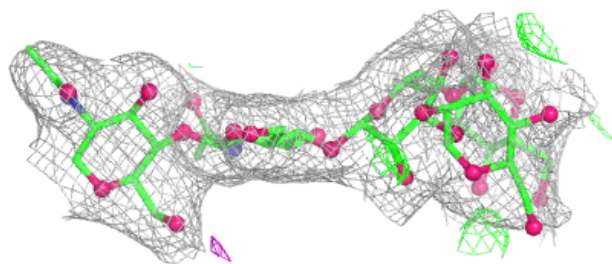
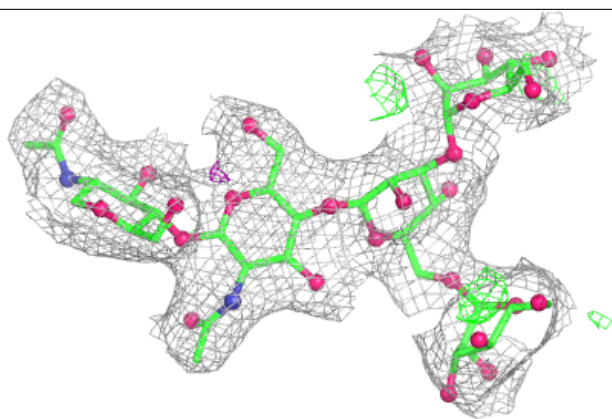
Electron density around Chain G:

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

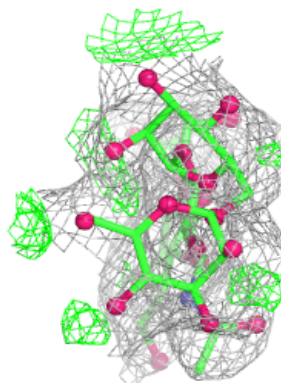
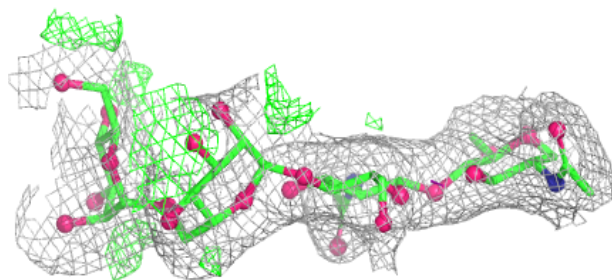
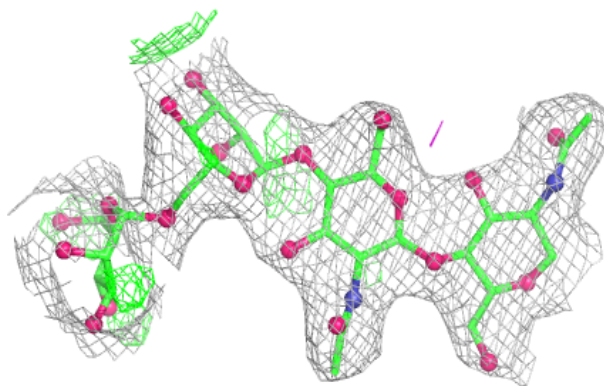


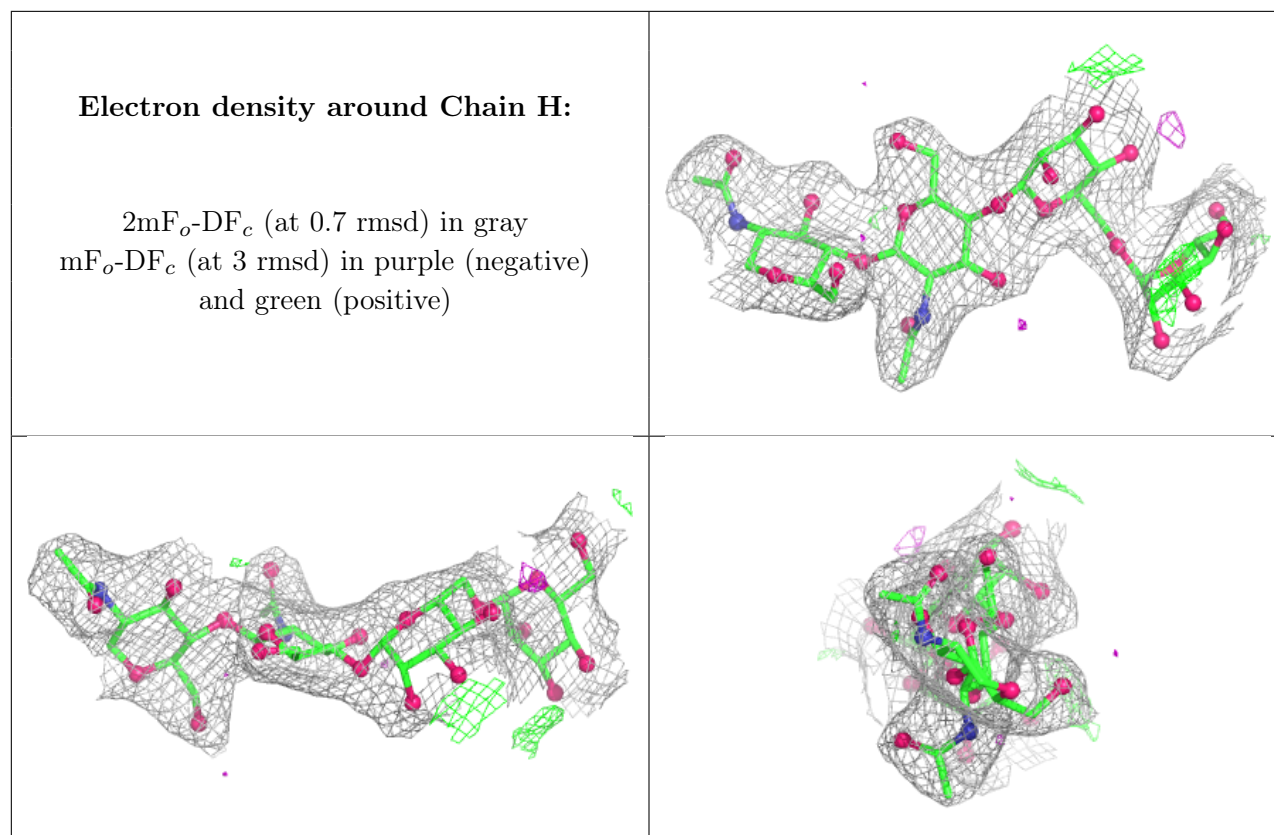
Electron density around Chain E:

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

**Electron density around Chain F:**

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





6.4 Ligands [i](#)

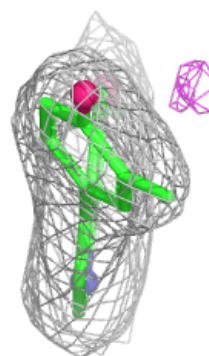
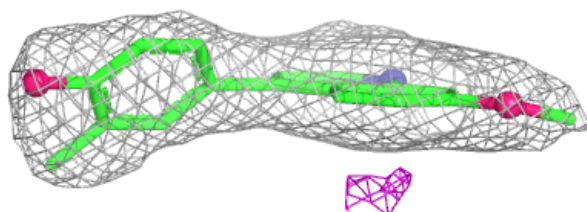
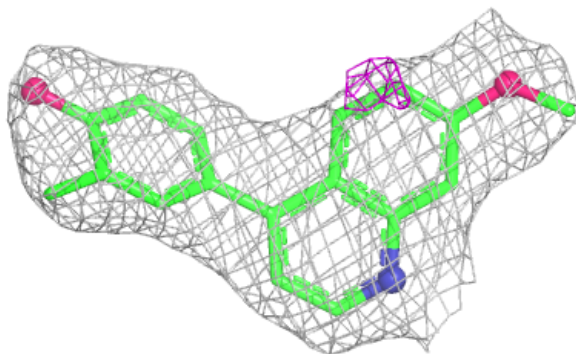
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
8	NAG	B	911	14/15	0.90	0.11	72,89,93,93	0
8	NAG	A	913	14/15	0.91	0.09	64,69,76,78	0
8	NAG	A	905	14/15	0.92	0.07	63,69,73,73	0
7	7VC	A	914	20/20	0.95	0.07	48,50,56,58	0
7	7VC	A	901	20/20	0.96	0.07	46,51,58,58	0

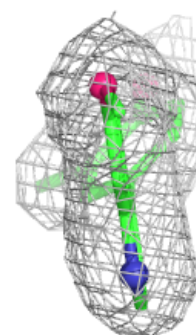
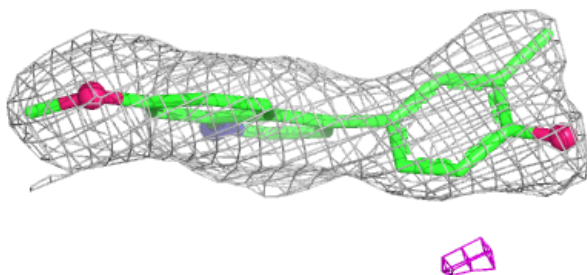
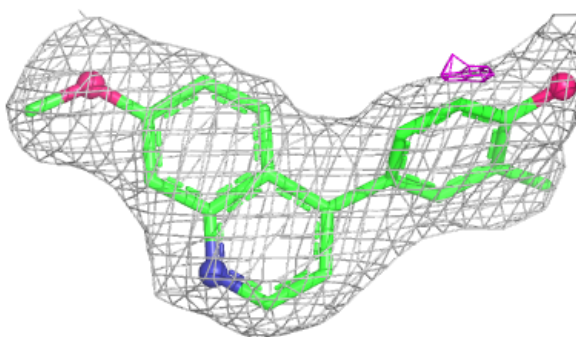
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 7VC A 914:

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

**Electron density around 7VC A 901:**

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



6.5 Other polymers [i](#)

There are no such residues in this entry.