



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 30, 2024 – 06:10 PM EST

PDB ID : 8TTZ
Title : Crystal structure of monkey TLR7 ectodomain with compound 20
Authors : Critton, D.A.
Deposited on : 2023-08-15
Resolution : 3.14 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

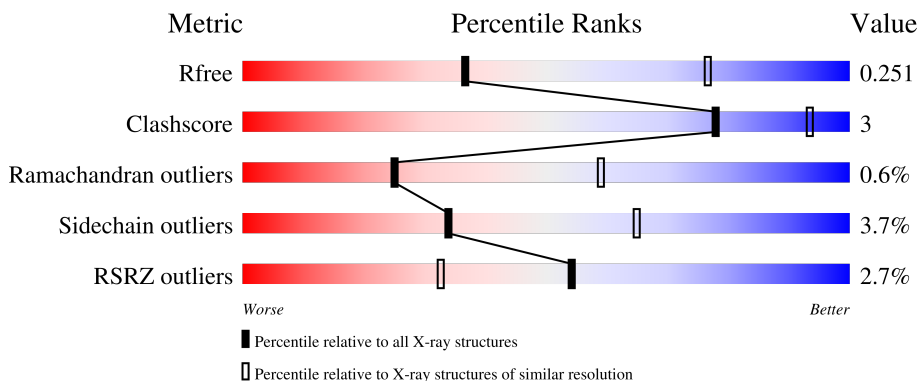
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.14 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}	130704	1626 (3.18-3.10)
Clashscore	141614	1735 (3.18-3.10)
Ramachandran outliers	138981	1677 (3.18-3.10)
Sidechain outliers	138945	1677 (3.18-3.10)
RSRZ outliers	127900	1588 (3.18-3.10)

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	817	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 83%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 10%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 6%; height: 10px; background-color: grey;"></div> </div>
1	B	817	<div style="display: flex; align-items: center;"> <div style="width: 3%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 84%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 10%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 6%; height: 10px; background-color: grey;"></div> </div>
2	C	2	<div style="width: 100%; height: 10px; background-color: yellow;"></div>
2	D	2	<div style="display: flex; align-items: center;"> <div style="width: 50%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 50%; height: 10px; background-color: yellow;"></div> </div>
2	E	2	<div style="width: 100%; height: 10px; background-color: yellow;"></div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	SO4	A	915	-	-	-	X
4	SO4	A	918	-	-	-	X
4	SO4	A	919	-	-	-	X
4	SO4	B	908	-	-	-	X
4	SO4	B	912	-	-	-	X
4	SO4	B	913	-	-	-	X
4	SO4	B	914	-	-	-	X
4	SO4	B	915	-	-	-	X

2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 13077 atoms, of which 74 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 7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	772	6258	4010	1066	1152	30	0	1	0
1	B	772	6272	4017	1068	1157	30	0	3	0

There are 16 discrepancies between the modelled and reference sequences:

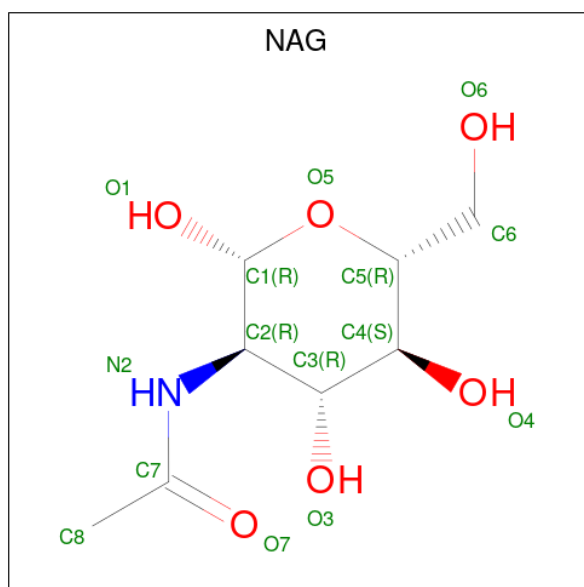
Chain	Residue	Modelled	Actual	Comment	Reference
A	23	ARG	-	expression tag	UNP G8E2R2
A	24	SER	-	expression tag	UNP G8E2R2
A	25	PRO	-	expression tag	UNP G8E2R2
A	26	TRP	-	expression tag	UNP G8E2R2
A	167	GLN	ASN	conflict	UNP G8E2R2
A	389	GLN	ASN	conflict	UNP G8E2R2
A	488	GLN	ASN	conflict	UNP G8E2R2
A	799	GLN	ASN	conflict	UNP G8E2R2
B	23	ARG	-	expression tag	UNP G8E2R2
B	24	SER	-	expression tag	UNP G8E2R2
B	25	PRO	-	expression tag	UNP G8E2R2
B	26	TRP	-	expression tag	UNP G8E2R2
B	167	GLN	ASN	conflict	UNP G8E2R2
B	389	GLN	ASN	conflict	UNP G8E2R2
B	488	GLN	ASN	conflict	UNP G8E2R2
B	799	GLN	ASN	conflict	UNP G8E2R2

- Molecule 2 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
2	C	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	D	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	E	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



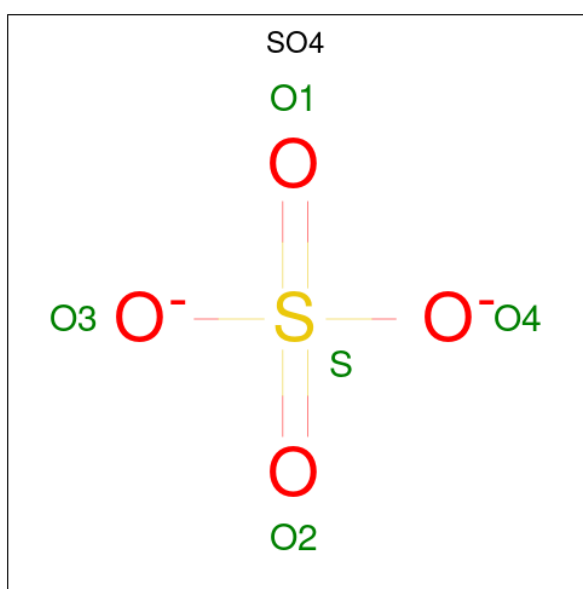
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	B	1	Total	C	N	O	0	0
			14	8	1	5		

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

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

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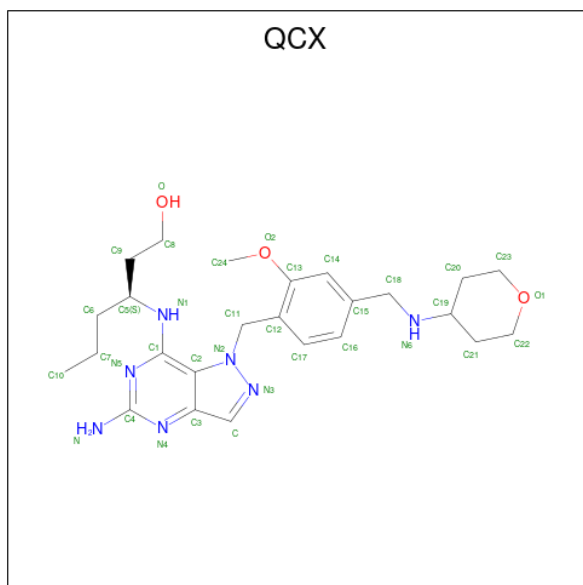
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total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

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

- Molecule 5 is (3S)-3-({5-amino-1-[(2-methoxy-4-[(oxan-4-yl)amino]methyl}phenyl)methyl]-1H-pyrazolo[4,3-d]pyrimidin-7-yl}amino)hexan-1-ol (three-letter code: QCX) (formula: C₂₅H₃₇N₇O₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	H	N	O	0	0
			72	25	37	7	3		
5	B	1	Total	C	H	N	O	0	0
			72	25	37	7	3		

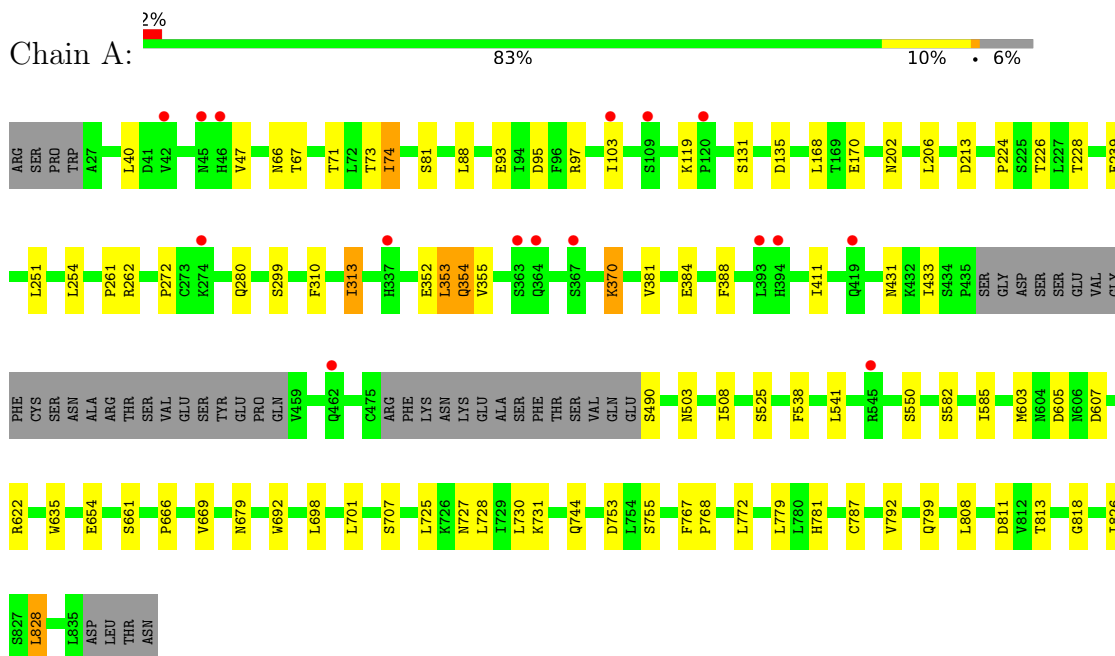
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	5	Total	O	0	0
			5	5		
6	B	1	Total	O	0	0
			1	1		

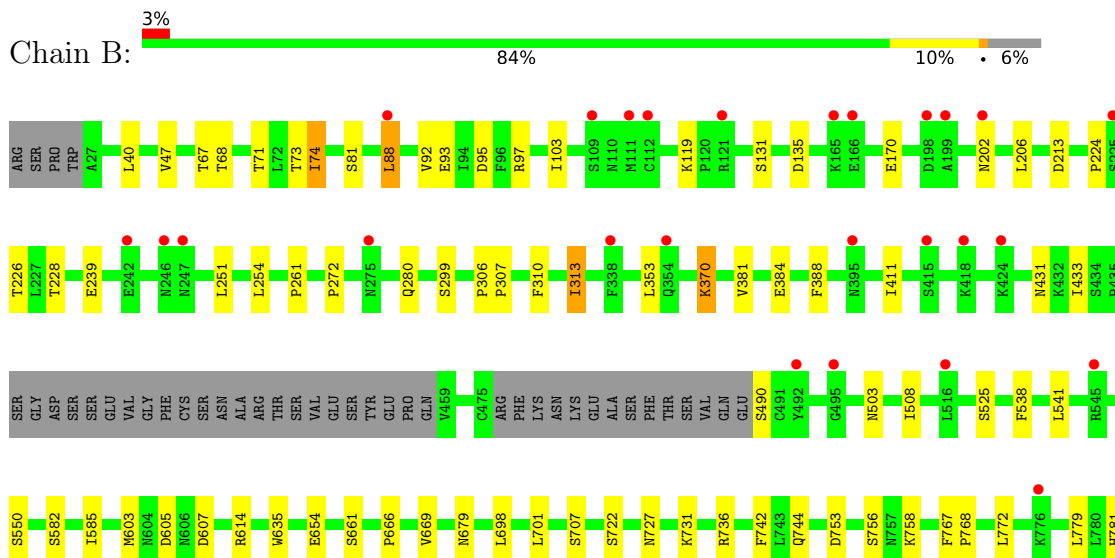
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Toll-like receptor 7




- Molecule 1: Toll-like receptor 7





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

Chain C:  100%

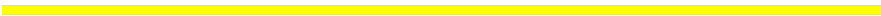


- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D:  50% 50%



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

Chain E:  100%



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	97.81Å 138.69Å 148.67Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	41.80 – 3.14 41.80 – 3.14	Depositor EDS
% Data completeness (in resolution range)	92.9 (41.80-3.14) 92.9 (41.80-3.14)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.68 (at 3.12Å)	Xtrriage
Refinement program	BUSTER 2.11.7	Depositor
R, R_{free}	0.194 , 0.241 0.208 , 0.251	Depositor DCC
R_{free} test set	1633 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å ²)	68.2	Xtrriage
Anisotropy	0.038	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 54.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	13077	wwPDB-VP
Average B, all atoms (Å ²)	74.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.06% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: SO4, NAG, QCX

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	0.42	0/6389	0.64	0/8657
1	B	0.42	0/6403	0.64	0/8676
All	All	0.42	0/12792	0.64	0/17333

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	6258	0	6301	39	0
1	B	6272	0	6309	36	0
2	C	28	0	25	0	0
2	D	28	0	25	0	0
2	E	28	0	25	0	0
3	A	98	0	91	0	0
3	B	70	0	65	0	0
4	A	95	0	0	0	0
4	B	50	0	0	0	0
5	A	35	37	0	1	0
5	B	35	37	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	A	5	0	0	0	0
6	B	1	0	0	0	0
All	All	13003	74	12841	75	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 3.

All (75) 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:781:HIS:HB2	1:A:811:ASP:HB3	1.65	0.78
1:B:781:HIS:HB2	1:B:811:ASP:HB3	1.66	0.76
1:A:767:PHE:HB3	1:A:772:LEU:HD11	1.73	0.70
1:B:767:PHE:HB3	1:B:772:LEU:HD11	1.75	0.68
1:B:73:THR:HG22	1:B:74:ILE:HG13	1.82	0.62
1:A:73:THR:HG22	1:A:74:ILE:HG13	1.82	0.62
1:B:261:PRO:HD2	1:B:272:PRO:HA	1.84	0.60
1:A:384:GLU:HG3	1:A:411:ILE:HB	1.84	0.60
1:B:384:GLU:HG3	1:B:411:ILE:HB	1.85	0.59
1:B:433:ILE:H	1:B:503:ASN:HD22	1.51	0.57
1:A:261:PRO:HD2	1:A:272:PRO:HA	1.85	0.57
1:B:753:ASP:HA	1:B:779:LEU:HB2	1.86	0.57
1:A:433:ILE:H	1:A:503:ASN:HD22	1.52	0.56
1:A:753:ASP:HA	1:A:779:LEU:HB2	1.86	0.56
1:B:736:ARG:HG2	1:B:758:LYS:HB2	1.87	0.56
1:B:97:ARG:HG2	1:B:135:ASP:HB2	1.87	0.56
1:A:352:GLU:HG3	1:A:355:VAL:HB	1.88	0.56
1:A:239:GLU:HG2	1:A:280:GLN:HB2	1.89	0.55
1:B:698:LEU:HD23	1:B:701:LEU:HD13	1.90	0.54
1:A:97:ARG:HG2	1:A:135:ASP:HB2	1.89	0.54
1:B:93:GLU:HG3	1:B:131:SER:HB2	1.89	0.54
1:B:635:TRP:HB3	1:B:666:PRO:HG2	1.90	0.53
1:B:239:GLU:HG2	1:B:280:GLN:HB2	1.90	0.53
1:A:635:TRP:HB3	1:A:666:PRO:HG2	1.90	0.52
1:A:431:ASN:HB2	1:A:503:ASN:HD21	1.74	0.52
1:A:310:PHE:HA	1:A:313:ILE:HD12	1.92	0.52
1:A:654:GLU:HG3	1:A:679[A]:ASN:HB3	1.92	0.52
1:B:654:GLU:HG3	1:B:679[A]:ASN:HB3	1.92	0.52
1:B:431:ASN:HB2	1:B:503:ASN:HD21	1.75	0.51
1:A:744:GLN:HA	1:A:768:PRO:HG3	1.93	0.51
1:A:206:LEU:O	1:A:226:THR:HG23	2.11	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:585:ILE:HG23	5:A:926:QCX:N	2.26	0.50
1:B:310:PHE:HA	1:B:313:ILE:HD12	1.92	0.50
1:A:47:VAL:HB	1:A:67:THR:HA	1.94	0.49
1:A:725:LEU:HD21	1:A:728:LEU:HB2	1.95	0.49
1:B:206:LEU:O	1:B:226:THR:HG23	2.13	0.49
1:B:538:PHE:HB3	1:B:541:LEU:HD12	1.95	0.48
1:A:698:LEU:HD23	1:A:701:LEU:HD13	1.94	0.48
1:B:47:VAL:HB	1:B:67:THR:HA	1.95	0.48
1:A:538:PHE:HB3	1:A:541:LEU:HD12	1.96	0.47
1:A:353:LEU:O	1:A:354:GLN:HB2	2.15	0.47
1:A:224:PRO:HB2	1:A:226:THR:HG22	1.97	0.47
1:B:525:SER:HA	1:B:550:SER:O	2.14	0.47
1:A:354:GLN:HB2	1:A:354:GLN:HE21	1.64	0.46
1:A:787:CYS:HB3	1:A:828:LEU:HD21	1.97	0.46
1:B:787:CYS:HB3	1:B:828:LEU:HD21	1.96	0.46
1:A:779:LEU:HD23	1:A:781:HIS:HE1	1.80	0.46
1:A:582:SER:HB2	1:A:585:ILE:HD12	1.98	0.45
1:B:71:THR:HA	1:B:95:ASP:HB3	1.99	0.45
1:B:224:PRO:HB2	1:B:226:THR:HG22	1.98	0.45
1:B:779:LEU:HD23	1:B:781:HIS:HE1	1.81	0.45
1:A:81:SER:HA	1:A:119:LYS:HB2	1.99	0.44
1:A:228:THR:HA	1:A:251:LEU:HA	2.00	0.44
1:B:81:SER:HA	1:B:119:LYS:HB2	1.99	0.44
1:B:228:THR:HA	1:B:251:LEU:HA	2.00	0.43
1:A:654:GLU:HG3	1:A:679[B]:ASN:HB2	2.00	0.43
1:B:68:THR:HB	1:B:92:VAL:HG22	2.00	0.43
1:A:71:THR:HA	1:A:95:ASP:HB3	1.99	0.43
1:B:582:SER:HB2	1:B:585:ILE:HD12	2.00	0.43
1:B:654:GLU:HG3	1:B:679[B]:ASN:HB2	2.01	0.43
1:A:251:LEU:HD21	1:A:254:LEU:HB2	2.01	0.42
1:B:251:LEU:HD21	1:B:254:LEU:HB2	2.00	0.42
1:A:666:PRO:HD2	1:A:669:VAL:HG21	2.01	0.42
1:B:744:GLN:HA	1:B:768:PRO:HG3	2.00	0.42
1:B:88:LEU:H	1:B:88:LEU:HG	1.60	0.42
1:B:767:PHE:CD1	1:B:772:LEU:HD21	2.55	0.42
1:B:666:PRO:HD2	1:B:669:VAL:HG21	2.02	0.41
1:A:707:SER:HA	1:A:731:LYS:O	2.20	0.41
1:A:692:TRP:HH2	1:A:730:LEU:HD21	1.85	0.41
1:B:306:PRO:HA	1:B:307:PRO:HD3	1.97	0.41
1:A:525:SER:HA	1:A:550:SER:O	2.21	0.41
1:B:707:SER:HA	1:B:731:LYS:O	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:799:GLN:HA	1:A:826:ILE:HD12	2.03	0.41
1:A:93:GLU:HG3	1:A:131:SER:HB2	2.03	0.41
1:A:353:LEU:H	1:A:353:LEU:HG	1.47	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	767/817 (94%)	700 (91%)	63 (8%)	4 (0%)	29	63
1	B	769/817 (94%)	693 (90%)	71 (9%)	5 (1%)	22	56
All	All	1536/1634 (94%)	1393 (91%)	134 (9%)	9 (1%)	25	59

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	818	GLY
1	B	818	GLY
1	A	370	LYS
1	B	370	LYS
1	B	742	PHE
1	A	103	ILE
1	A	381	VAL
1	B	103	ILE
1	B	381	VAL

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	726/768 (94%)	698 (96%)	28 (4%)	32	63
1	B	728/768 (95%)	703 (97%)	25 (3%)	37	67
All	All	1454/1536 (95%)	1401 (96%)	53 (4%)	34	66

All (53) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	40	LEU
1	A	66	ASN
1	A	74	ILE
1	A	88	LEU
1	A	168	LEU
1	A	170	GLU
1	A	202	ASN
1	A	213	ASP
1	A	262	ARG
1	A	299	SER
1	A	313	ILE
1	A	353	LEU
1	A	354	GLN
1	A	370	LYS
1	A	388	PHE
1	A	490	SER
1	A	508	ILE
1	A	603	MET
1	A	605	ASP
1	A	607	ASP
1	A	622	ARG
1	A	661	SER
1	A	727	ASN
1	A	755	SER
1	A	792	VAL
1	A	808	LEU
1	A	813	THR
1	A	828	LEU
1	B	40	LEU
1	B	74	ILE
1	B	88	LEU
1	B	170	GLU
1	B	202	ASN

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Mol	Chain	Res	Type
1	B	213	ASP
1	B	299	SER
1	B	313	ILE
1	B	353	LEU
1	B	370	LYS
1	B	388	PHE
1	B	490	SER
1	B	508	ILE
1	B	603	MET
1	B	605	ASP
1	B	607	ASP
1	B	614	ARG
1	B	661	SER
1	B	722	SER
1	B	727	ASN
1	B	756	SER
1	B	792	VAL
1	B	808	LEU
1	B	813	THR
1	B	828	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	159	ASN
1	A	354	GLN
1	A	503	ASN
1	A	781	HIS
1	B	159	ASN
1	B	503	ASN
1	B	734	GLN
1	B	781	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates i

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
2	NAG	C	1	1,2	14,14,15	0.28	0	17,19,21	0.73	1 (5%)
2	NAG	C	2	2	14,14,15	0.31	0	17,19,21	0.89	2 (11%)
2	NAG	D	1	1,2	14,14,15	0.29	0	17,19,21	0.48	0
2	NAG	D	2	2	14,14,15	0.30	0	17,19,21	0.74	1 (5%)
2	NAG	E	1	1,2	14,14,15	0.34	0	17,19,21	0.72	1 (5%)
2	NAG	E	2	2	14,14,15	0.31	0	17,19,21	0.83	1 (5%)

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	1,2	-	0/6/23/26	0/1/1/1
2	NAG	C	2	2	-	2/6/23/26	0/1/1/1
2	NAG	D	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	D	2	2	-	2/6/23/26	0/1/1/1
2	NAG	E	1	1,2	-	1/6/23/26	0/1/1/1
2	NAG	E	2	2	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	2	NAG	C1-O5-C5	2.60	115.71	112.19
2	E	2	NAG	C1-O5-C5	2.58	115.69	112.19
2	C	2	NAG	O5-C1-C2	-2.52	107.31	111.29
2	C	1	NAG	O5-C1-C2	-2.12	107.94	111.29
2	C	2	NAG	C1-O5-C5	2.12	115.06	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	1	NAG	O5-C1-C2	-2.01	108.12	111.29

There are no chirality outliers.

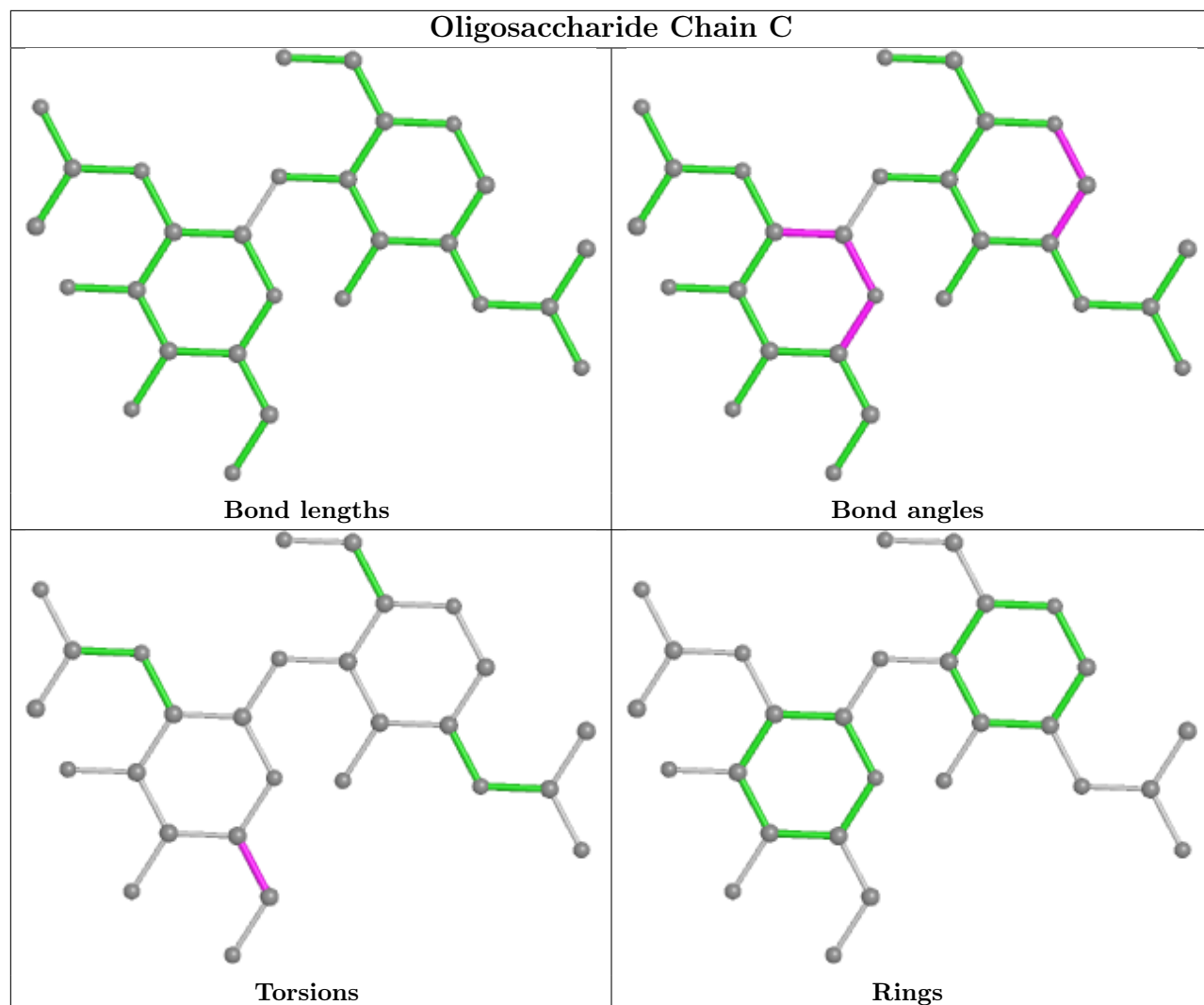
All (5) torsion outliers are listed below:

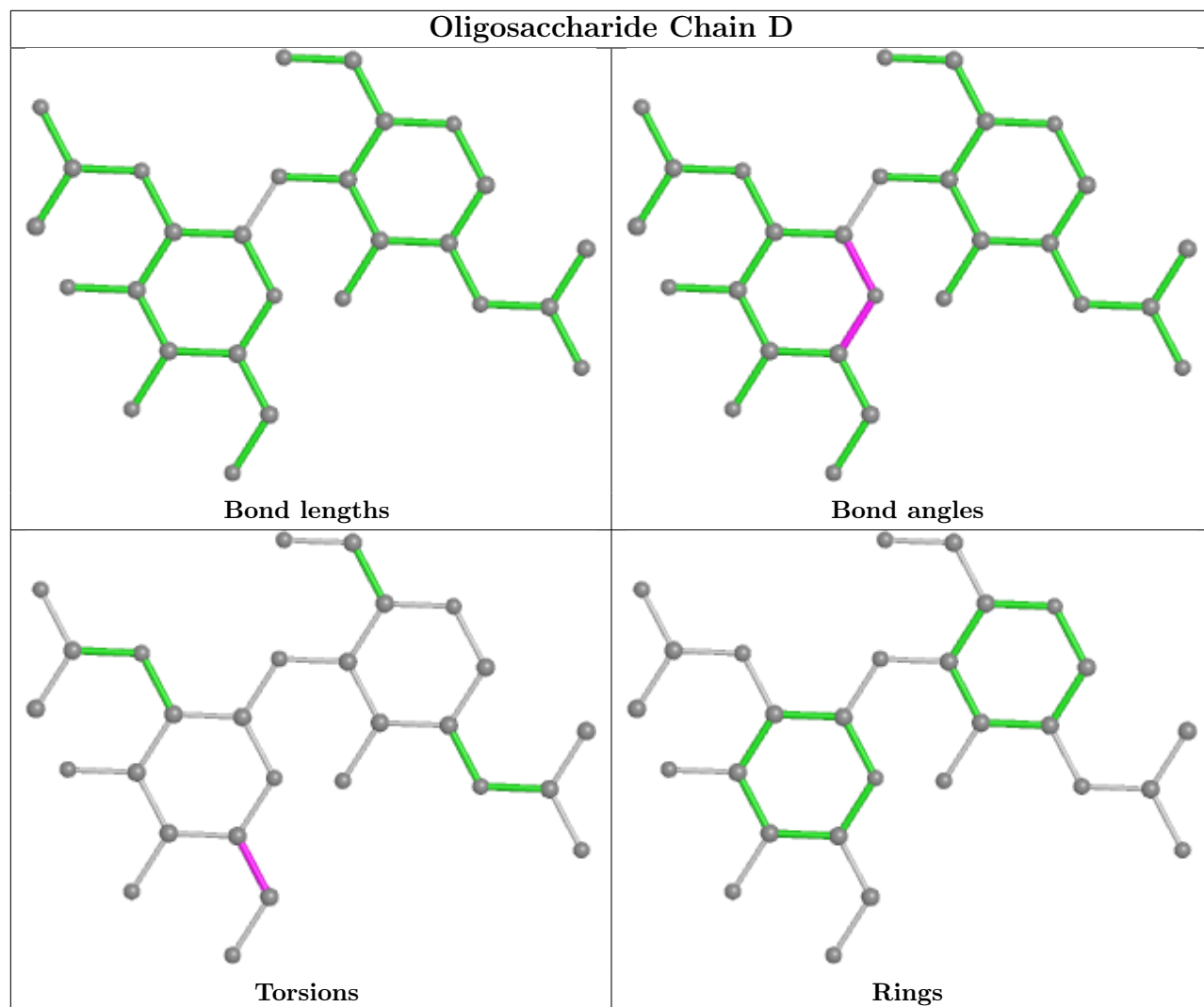
Mol	Chain	Res	Type	Atoms
2	C	2	NAG	O5-C5-C6-O6
2	C	2	NAG	C4-C5-C6-O6
2	D	2	NAG	C4-C5-C6-O6
2	D	2	NAG	O5-C5-C6-O6
2	E	1	NAG	C4-C5-C6-O6

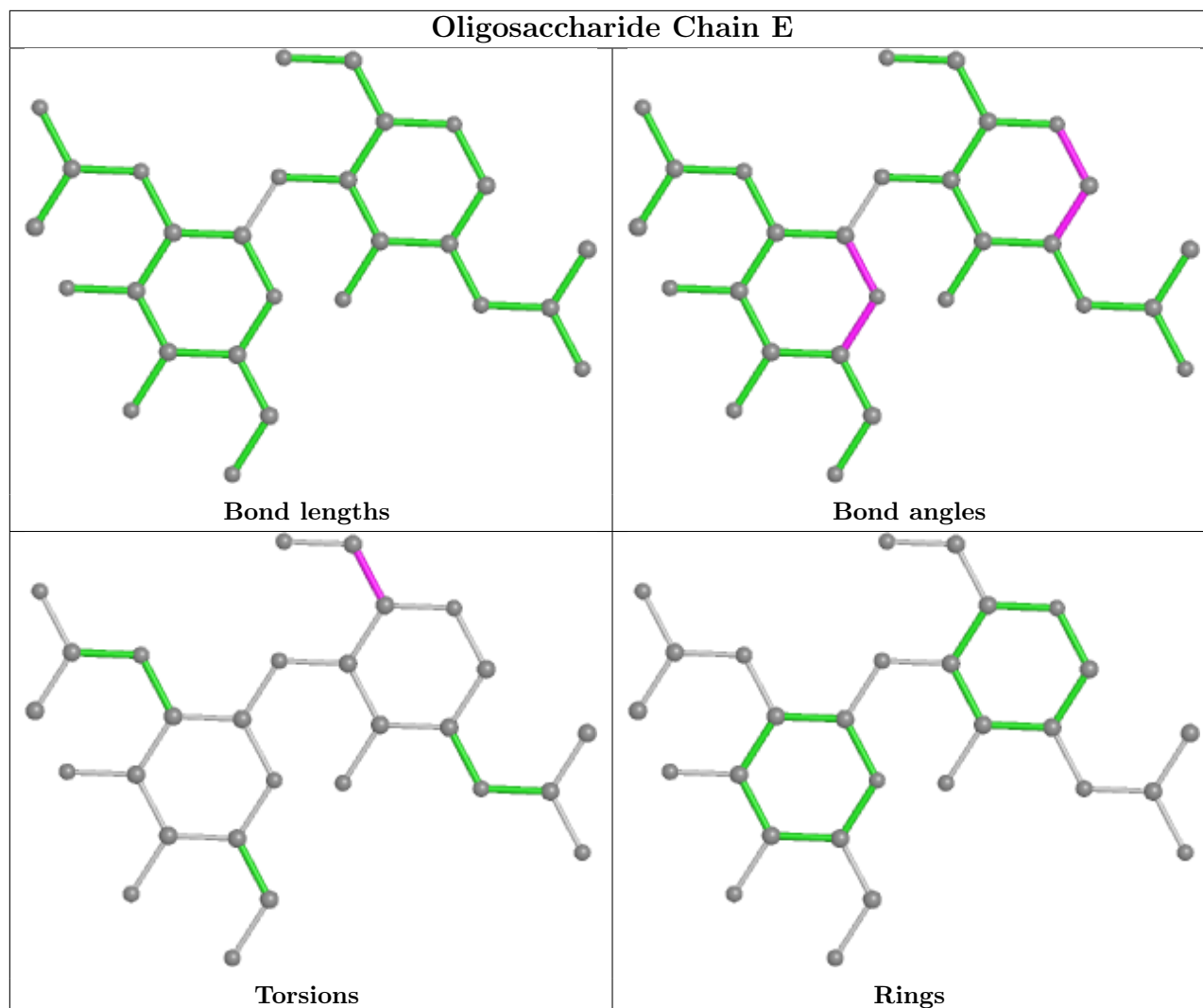
There are no ring outliers.

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.







5.6 Ligand geometry [i](#)

43 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	$\# Z > 2$
4	SO4	A	915	-	4,4,4	0.16	0	6,6,6	0.05	0
3	NAG	B	904	1	14,14,15	0.31	0	17,19,21	0.46	0
4	SO4	A	925	-	4,4,4	0.13	0	6,6,6	0.08	0
4	SO4	B	913	-	4,4,4	0.15	0	6,6,6	0.08	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	SO4	A	918	-	4,4,4	0.14	0	6,6,6	0.09	0
3	NAG	A	901	1	14,14,15	0.29	0	17,19,21	0.93	1 (5%)
4	SO4	B	915	-	4,4,4	0.12	0	6,6,6	0.09	0
4	SO4	A	914	-	4,4,4	0.13	0	6,6,6	0.09	0
4	SO4	A	911	-	4,4,4	0.13	0	6,6,6	0.20	0
4	SO4	B	909	-	4,4,4	0.10	0	6,6,6	0.14	0
3	NAG	A	902	1	14,14,15	0.33	0	17,19,21	0.81	1 (5%)
4	SO4	A	909	-	4,4,4	0.13	0	6,6,6	0.09	0
4	SO4	A	923	-	4,4,4	0.15	0	6,6,6	0.08	0
4	SO4	A	919	-	4,4,4	0.16	0	6,6,6	0.06	0
4	SO4	A	921	-	4,4,4	0.15	0	6,6,6	0.19	0
3	NAG	A	903	1	14,14,15	0.29	0	17,19,21	1.07	2 (11%)
4	SO4	A	912	-	4,4,4	0.13	0	6,6,6	0.10	0
4	SO4	A	924	-	4,4,4	0.13	0	6,6,6	0.07	0
3	NAG	B	906	1	14,14,15	0.30	0	17,19,21	0.67	1 (5%)
4	SO4	B	907	-	4,4,4	0.18	0	6,6,6	0.12	0
4	SO4	B	914	-	4,4,4	0.16	0	6,6,6	0.08	0
3	NAG	B	902	1	14,14,15	0.28	0	17,19,21	0.87	0
5	QCX	A	926	-	33,38,38	0.53	0	37,51,51	1.14	4 (10%)
3	NAG	B	905	1	14,14,15	0.31	0	17,19,21	0.40	0
4	SO4	A	913	-	4,4,4	0.14	0	6,6,6	0.11	0
3	NAG	B	903	1	14,14,15	0.34	0	17,19,21	2.03	2 (11%)
4	SO4	B	912	-	4,4,4	0.16	0	6,6,6	0.07	0
3	NAG	A	907	1	14,14,15	0.31	0	17,19,21	0.66	1 (5%)
4	SO4	A	910	-	4,4,4	0.16	0	6,6,6	0.15	0
4	SO4	B	910	-	4,4,4	0.13	0	6,6,6	0.19	0
3	NAG	A	906	1	14,14,15	0.31	0	17,19,21	0.66	0
4	SO4	A	917	-	4,4,4	0.10	0	6,6,6	0.10	0
4	SO4	A	927	-	4,4,4	0.18	0	6,6,6	0.05	0
3	NAG	A	905	1	14,14,15	0.30	0	17,19,21	0.60	0
3	NAG	A	904	1	14,14,15	0.30	0	17,19,21	0.68	1 (5%)
4	SO4	A	908	-	4,4,4	0.14	0	6,6,6	0.16	0
4	SO4	B	908	-	4,4,4	0.13	0	6,6,6	0.06	0
4	SO4	A	922	-	4,4,4	0.14	0	6,6,6	0.07	0
5	QCX	B	901	-	33,38,38	0.54	0	37,51,51	1.11	4 (10%)
4	SO4	A	920	-	4,4,4	0.18	0	6,6,6	0.12	0
4	SO4	A	916	-	4,4,4	0.17	0	6,6,6	0.20	0
4	SO4	B	916	-	4,4,4	0.15	0	6,6,6	0.07	0
4	SO4	B	911	-	4,4,4	0.14	0	6,6,6	0.07	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	B	902	1	-	0/6/23/26	0/1/1/1
3	NAG	A	906	1	-	0/6/23/26	0/1/1/1
3	NAG	A	902	1	-	0/6/23/26	0/1/1/1
3	NAG	B	904	1	-	0/6/23/26	0/1/1/1
3	NAG	A	905	1	-	0/6/23/26	0/1/1/1
3	NAG	B	905	1	-	0/6/23/26	0/1/1/1
5	QCX	A	926	-	-	2/21/29/29	0/4/4/4
3	NAG	A	904	1	-	2/6/23/26	0/1/1/1
3	NAG	B	903	1	-	0/6/23/26	0/1/1/1
3	NAG	A	907	1	-	0/6/23/26	0/1/1/1
3	NAG	A	901	1	-	0/6/23/26	0/1/1/1
5	QCX	B	901	-	-	1/21/29/29	0/4/4/4
3	NAG	B	906	1	-	0/6/23/26	0/1/1/1
3	NAG	A	903	1	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	903	NAG	C1-O5-C5	7.09	121.80	112.19
5	A	926	QCX	C2-C1-N5	4.09	122.81	117.72
5	B	901	QCX	C2-C1-N5	3.84	122.49	117.72
3	B	903	NAG	O5-C1-C2	3.38	116.63	111.29
3	A	903	NAG	O5-C1-C2	-3.16	106.29	111.29
5	B	901	QCX	C1-N1-C5	2.97	129.80	124.16
5	A	926	QCX	N1-C1-N5	-2.89	112.78	118.90
5	B	901	QCX	N1-C1-N5	-2.60	113.38	118.90
3	A	903	NAG	C1-O5-C5	2.59	115.69	112.19
3	A	902	NAG	C1-O5-C5	2.45	115.51	112.19
3	A	904	NAG	C1-O5-C5	2.37	115.41	112.19
3	A	907	NAG	C1-O5-C5	2.37	115.41	112.19
3	B	906	NAG	C1-O5-C5	2.35	115.37	112.19
5	B	901	QCX	C3-C-N3	2.17	112.06	107.53
3	A	901	NAG	C1-C2-N2	-2.17	106.78	110.49
5	A	926	QCX	C3-C-N3	2.11	111.94	107.53
5	A	926	QCX	C1-N1-C5	2.11	128.18	124.16

There are no chirality outliers.

All (7) torsion outliers are listed below:

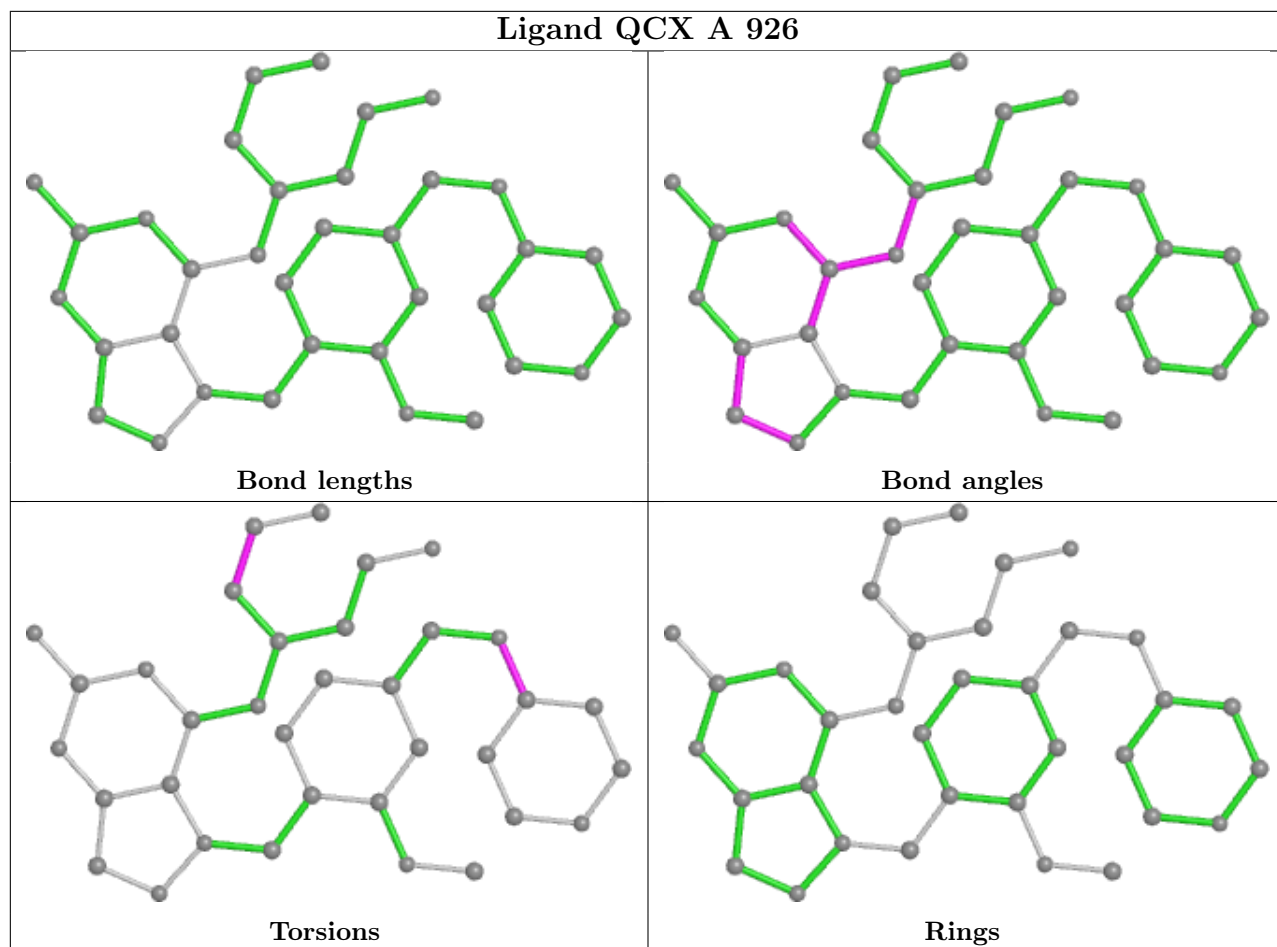
Mol	Chain	Res	Type	Atoms
5	A	926	QCX	C21-C19-N6-C18
3	A	903	NAG	O5-C5-C6-O6
3	A	904	NAG	O5-C5-C6-O6
3	A	904	NAG	C4-C5-C6-O6
5	A	926	QCX	C5-C6-C7-C10
5	B	901	QCX	C5-C6-C7-C10
3	A	903	NAG	C4-C5-C6-O6

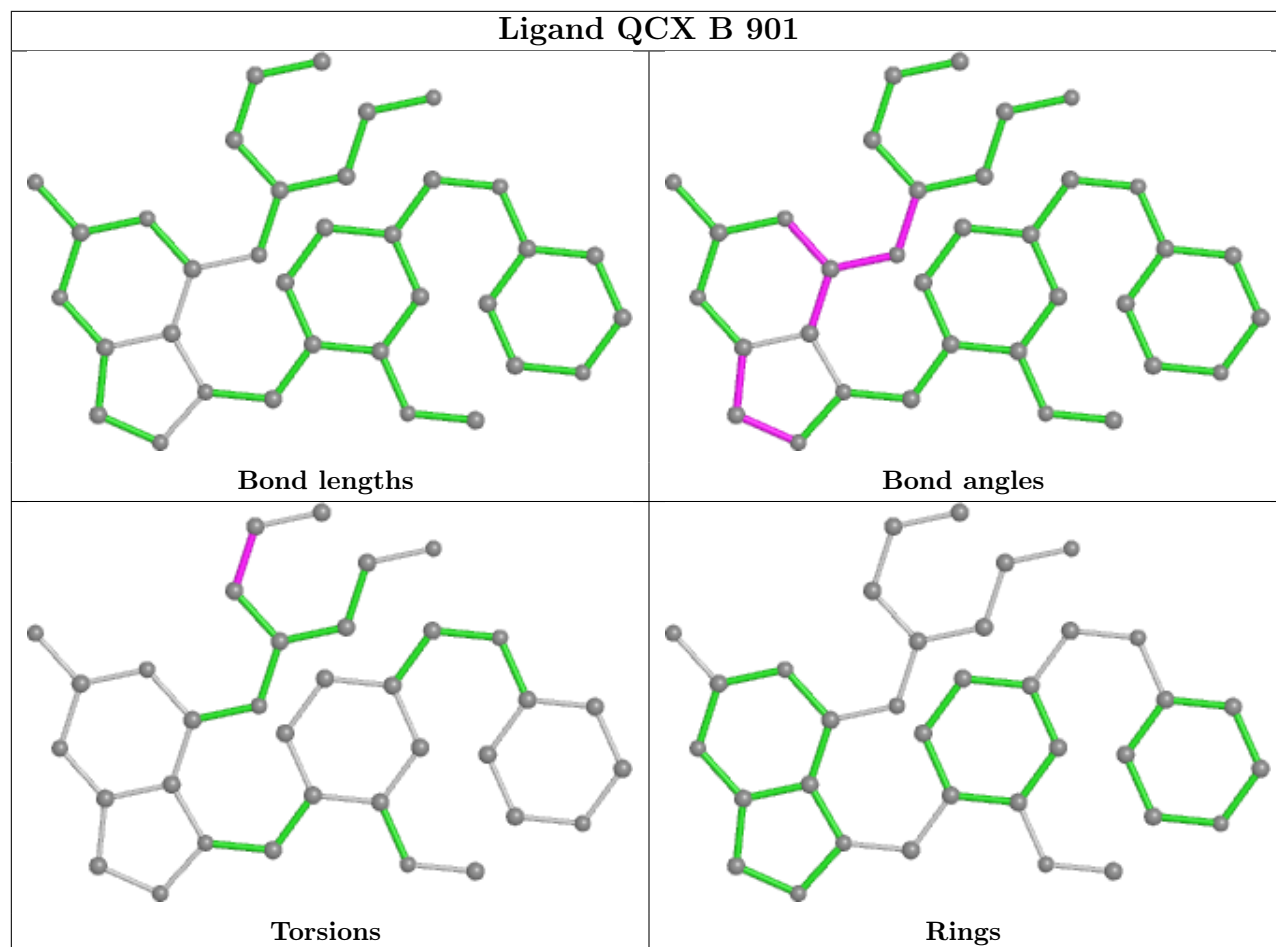
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	926	QCX	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 [i](#)

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	772/817 (94%)	0.04	16 (2%) 63 44	34, 67, 95, 123	0
1	B	772/817 (94%)	0.16	26 (3%) 45 24	40, 77, 107, 124	0
All	All	1544/1634 (94%)	0.10	42 (2%) 54 32	34, 72, 105, 124	0

All (42) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	246	ASN	4.2
1	B	354	GLN	3.5
1	A	103	ILE	3.4
1	B	198	ASP	3.1
1	B	415	SER	2.9
1	B	418	LYS	2.9
1	A	274	LYS	2.7
1	B	275	ASN	2.7
1	B	776	LYS	2.6
1	B	199	ALA	2.6
1	B	225[A]	SER	2.5
1	B	88	LEU	2.5
1	A	109	SER	2.5
1	B	202	ASN	2.4
1	A	394	HIS	2.4
1	A	45	ASN	2.4
1	A	393	LEU	2.4
1	A	545	ARG	2.4
1	B	112	CYS	2.4
1	A	337	HIS	2.4
1	A	462	GLN	2.4
1	B	121	ARG	2.4
1	A	419	GLN	2.3
1	B	111	MET	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	395	ASN	2.3
1	A	367	SER	2.3
1	B	424	LYS	2.3
1	B	545	ARG	2.3
1	B	242	GLU	2.2
1	B	109	SER	2.2
1	A	363	SER	2.1
1	A	120	PRO	2.1
1	B	165	LYS	2.1
1	B	492	TYR	2.1
1	B	247	ASN	2.1
1	B	338	PHE	2.1
1	A	42	VAL	2.1
1	B	516	LEU	2.1
1	A	46	HIS	2.1
1	B	495	GLY	2.0
1	B	166	GLU	2.0
1	A	364	GLN	2.0

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

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

6.3 Carbohydrates [i](#)

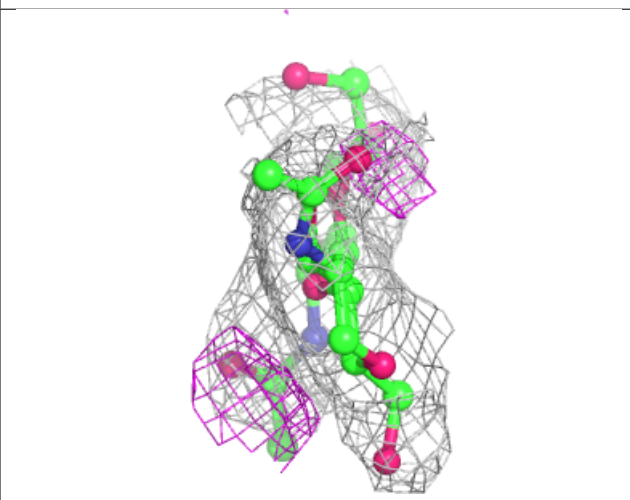
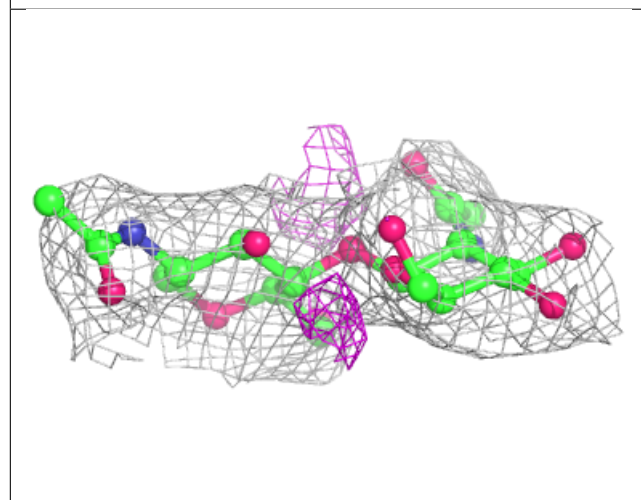
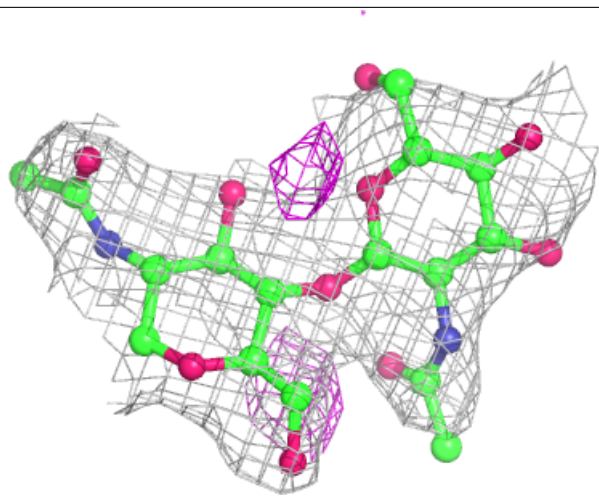
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NAG	E	2	14/15	0.73	0.37	106,108,111,112	0
2	NAG	C	2	14/15	0.86	0.38	68,73,77,79	0
2	NAG	D	2	14/15	0.87	0.24	79,82,83,84	0
2	NAG	E	1	14/15	0.92	0.17	94,97,99,103	0
2	NAG	D	1	14/15	0.94	0.21	69,72,77,79	0
2	NAG	C	1	14/15	0.95	0.25	54,56,58,62	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.

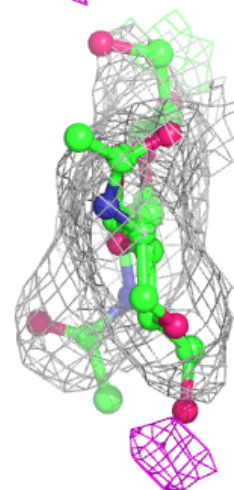
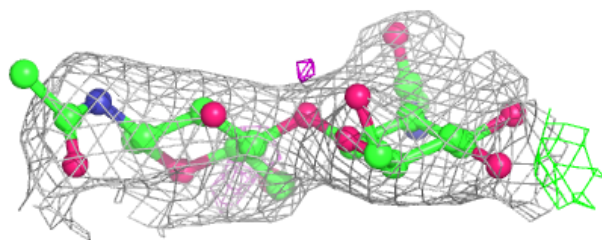
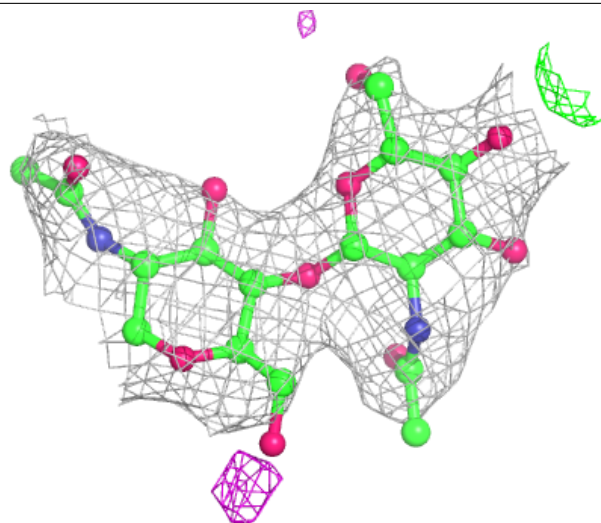
Electron density around Chain C:

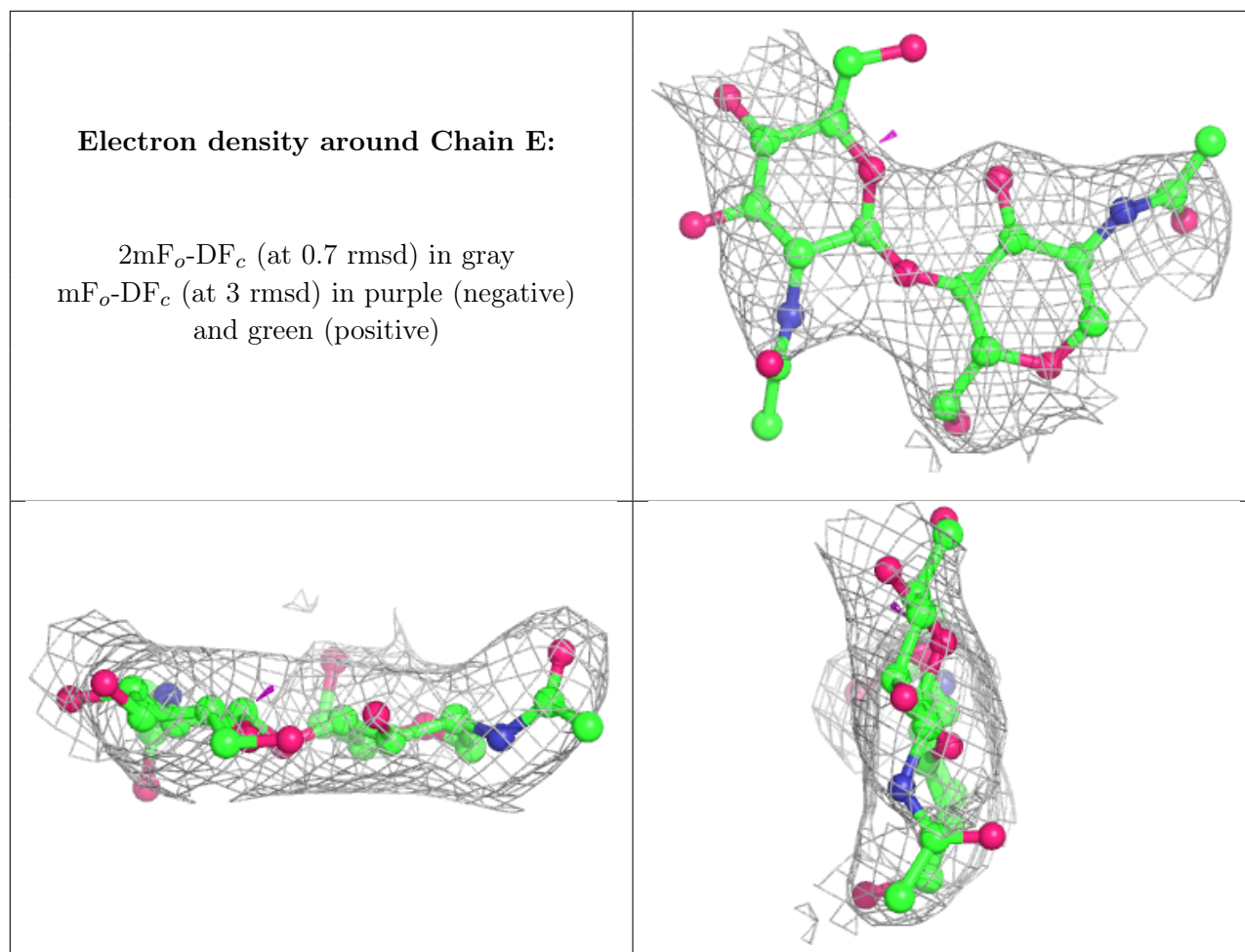
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



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 [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	SO4	A	915	5/5	0.04	0.87	228,228,229,229	0
4	SO4	B	913	5/5	0.42	0.67	182,182,182,182	0
4	SO4	B	908	5/5	0.57	0.40	187,187,187,187	0
4	SO4	A	919	5/5	0.60	0.58	164,164,164,164	0
4	SO4	B	914	5/5	0.61	0.84	207,207,207,208	0
4	SO4	B	915	5/5	0.69	0.59	159,159,159,159	0
4	SO4	B	912	5/5	0.72	0.56	186,186,186,187	0
4	SO4	A	908	5/5	0.73	0.30	147,148,148,148	0
4	SO4	A	924	5/5	0.75	0.38	164,164,165,165	0
4	SO4	A	922	5/5	0.76	0.33	163,163,163,163	0
4	SO4	B	911	5/5	0.76	0.29	169,170,170,170	0

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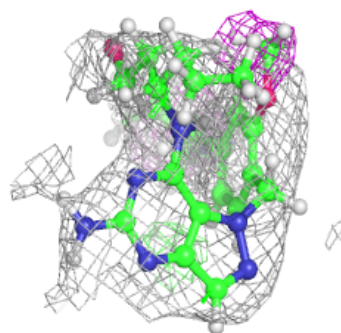
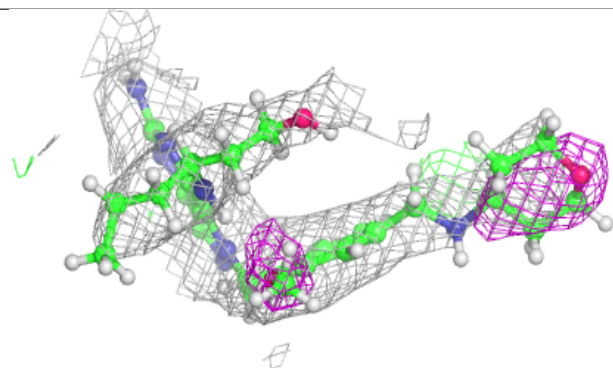
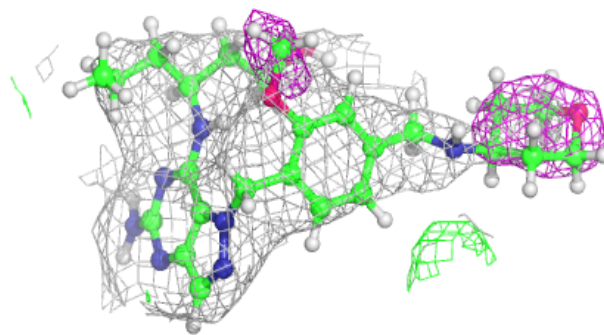
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	SO4	A	925	5/5	0.77	0.21	139,139,139,140	0
4	SO4	A	921	5/5	0.78	0.34	156,156,156,156	0
3	NAG	B	906	14/15	0.78	0.25	116,118,122,123	0
4	SO4	A	918	5/5	0.79	0.46	143,143,144,144	0
3	NAG	B	904	14/15	0.79	0.27	114,116,117,117	0
3	NAG	A	906	14/15	0.80	0.20	116,117,118,118	0
4	SO4	A	923	5/5	0.81	0.31	149,149,149,150	0
3	NAG	B	905	14/15	0.83	0.44	130,131,135,135	0
4	SO4	A	912	5/5	0.83	0.39	165,165,165,165	0
4	SO4	A	927	5/5	0.83	0.30	162,162,162,163	0
4	SO4	B	916	5/5	0.83	0.45	141,141,142,142	0
5	QCX	A	926	35/35	0.83	0.35	48,57,70,73	0
4	SO4	A	909	5/5	0.84	0.17	167,167,167,167	0
4	SO4	A	916	5/5	0.84	0.36	112,113,113,114	0
3	NAG	A	907	14/15	0.85	0.22	106,110,111,112	0
4	SO4	A	920	5/5	0.85	0.25	147,147,147,147	0
4	SO4	A	917	5/5	0.86	0.53	142,142,143,143	0
4	SO4	A	914	5/5	0.86	0.33	151,151,151,152	0
3	NAG	A	902	14/15	0.87	0.20	80,84,86,86	0
3	NAG	A	905	14/15	0.89	0.21	118,119,122,123	0
3	NAG	A	901	14/15	0.89	0.28	59,62,65,69	0
3	NAG	A	904	14/15	0.89	0.41	77,81,84,85	0
5	QCX	B	901	35/35	0.90	0.25	46,54,64,67	0
4	SO4	B	907	5/5	0.91	0.29	128,128,128,129	0
4	SO4	A	911	5/5	0.91	0.29	124,126,126,126	0
3	NAG	B	902	14/15	0.91	0.19	66,66,68,69	0
4	SO4	A	913	5/5	0.91	0.40	147,147,147,147	0
3	NAG	A	903	14/15	0.91	0.23	84,85,93,93	0
4	SO4	B	910	5/5	0.93	0.38	124,124,124,124	0
4	SO4	A	910	5/5	0.94	0.16	121,122,122,123	0
4	SO4	B	909	5/5	0.95	0.14	116,117,117,117	0
3	NAG	B	903	14/15	0.95	0.11	72,76,79,81	0

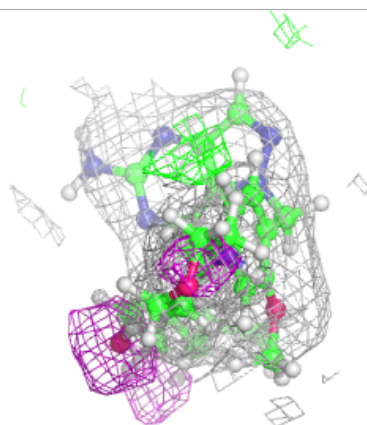
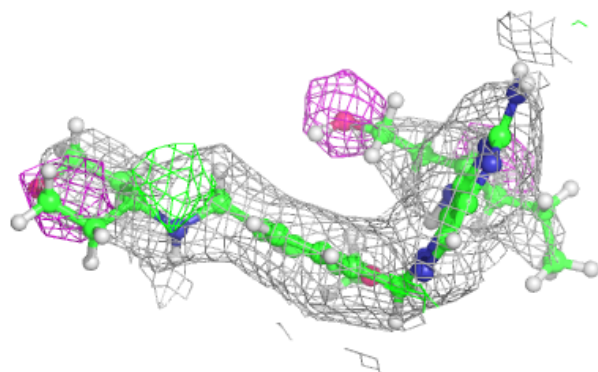
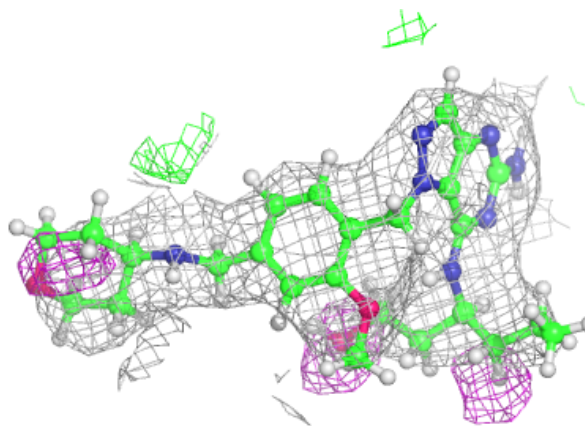
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around QCX A 926:

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

**Electron density around QCX B 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.