



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 18, 2026 – 10:51 PM UTC

PDB ID : 4X3R / pdb_00004x3r
Title : Avi-GCPII structure in complex with FITC-conjugated GCPII-specific inhibitor
Authors : Tykvart, J.; Konvalinka, J.
Deposited on : 2014-12-01
Resolution : 1.86 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

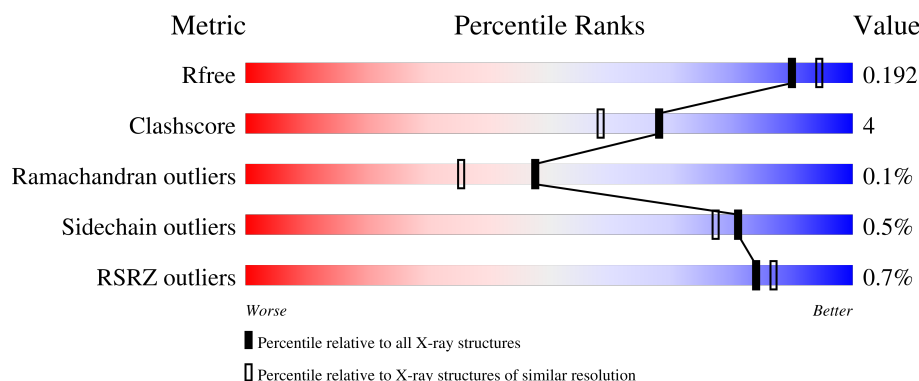
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.86 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	3428 (1.86-1.86)
Clashscore	190562	3579 (1.86-1.86)
Ramachandran outliers	187476	3553 (1.86-1.86)
Sidechain outliers	187428	3553 (1.86-1.86)
RSRZ outliers	180081	3429 (1.86-1.86)

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	739	86% 7% 7%
2	B	2	100%
2	C	2	100%
2	D	2	100%
3	E	3	33% 67%

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Mol	Chain	Length	Quality of chain
4	F	4	 100%

2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 6517 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 Glutamate carboxypeptidase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	690	Total	C	N	O	S	0	8	0
			5540	3564	931	1026	19			

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	12	ARG	-	expression tag	UNP Q04609
A	13	SER	-	expression tag	UNP Q04609
A	14	GLY	-	expression tag	UNP Q04609
A	15	LEU	-	expression tag	UNP Q04609
A	16	ASN	-	expression tag	UNP Q04609
A	17	ASP	-	expression tag	UNP Q04609
A	18	ILE	-	expression tag	UNP Q04609
A	19	PHE	-	expression tag	UNP Q04609
A	20	GLU	-	expression tag	UNP Q04609
A	21	ALA	-	expression tag	UNP Q04609
A	22	GLN	-	expression tag	UNP Q04609
A	23	LYS	-	expression tag	UNP Q04609
A	24	ILE	-	expression tag	UNP Q04609
A	25	GLU	-	expression tag	UNP Q04609
A	26	TRP	-	expression tag	UNP Q04609
A	27	HIS	-	expression tag	UNP Q04609
A	28	GLU	-	expression tag	UNP Q04609
A	29	GLY	-	expression tag	UNP Q04609
A	30	SER	-	expression tag	UNP Q04609
A	31	GLY	-	expression tag	UNP Q04609
A	32	SER	-	expression tag	UNP Q04609
A	33	GLY	-	expression tag	UNP Q04609
A	34	SER	-	expression tag	UNP Q04609
A	35	GLU	-	expression tag	UNP Q04609
A	36	ASN	-	expression tag	UNP Q04609
A	37	LEU	-	expression tag	UNP Q04609
A	38	TYR	-	expression tag	UNP Q04609

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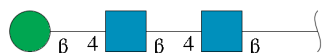
Chain	Residue	Modelled	Actual	Comment	Reference
A	39	PHE	-	expression tag	UNP Q04609
A	40	GLN	-	expression tag	UNP Q04609
A	41	GLY	-	expression tag	UNP Q04609
A	42	ARG	-	expression tag	UNP Q04609
A	43	SER	-	expression tag	UNP Q04609

- 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	B	2	Total	C	N	O	0	0	0
			28	16	2	10			
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			

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



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

- Molecule 4 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-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	F	4	Total	C	N	O	0	0	0
			50	28	2	20			

- Molecule 5 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	2	Total	Zn	0	0
			2	2		

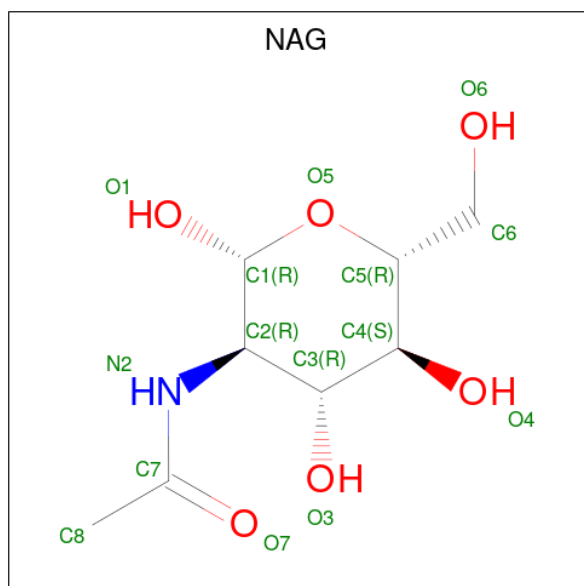
- Molecule 6 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

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

- Molecule 7 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Ca	0	0
			1	1		

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



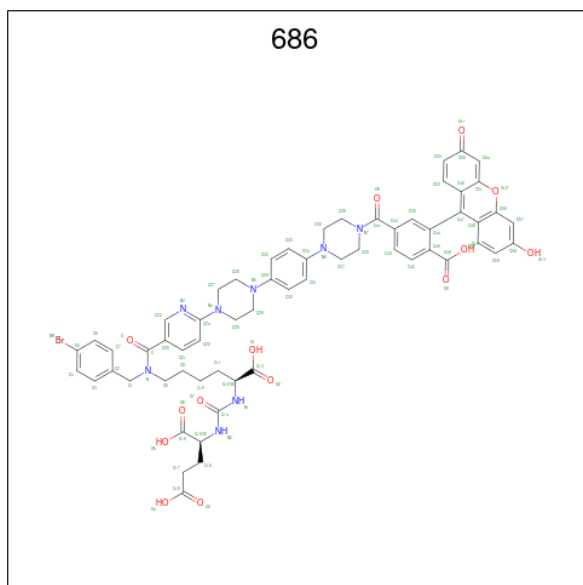
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	A	1	Total	C	N	O	0	0
			14	8	1	5		

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

- Molecule 9 is N-((1S)-5-[(4-bromobenzyl)(6-[4-(4-{4-carboxy-3-(6-hydroxy-3-oxo-3H-xanthen-9-yl)benzoyl]piperazin-1-yl}phenyl)piperazin-1-yl]pyridin-3-yl)carbonyl)amino]-1-carboxypentyl}carbamoyl)-L-glutamic acid (CCD ID: 686) (formula: C₆₀H₅₉BrN₈O₁₄).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	A	1	Total	Br	C	N	O	0	1
			138	3	95	16	24		

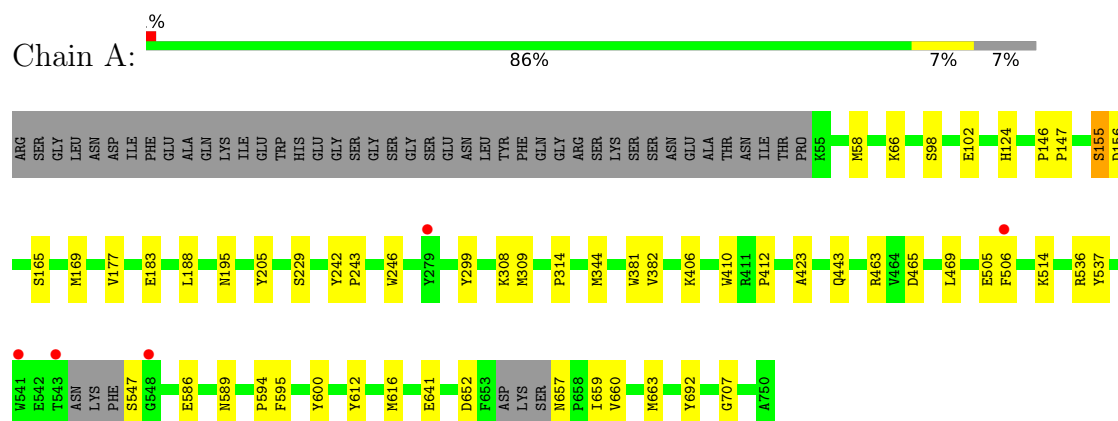
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	632	Total	O	0	5
			634	634		

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: Glutamate carboxypeptidase 2



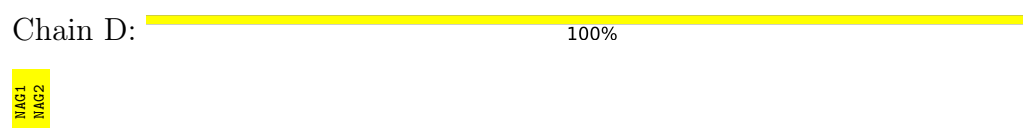
- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



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



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



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

Chain E:  33% 67%

NAG1
NAG2
BMA3

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

Chain F:  100%

NAG1
NAG2
BMA3
MAN4

4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	101.71Å 130.16Å 159.54Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 1.86 30.00 – 1.86	Depositor EDS
% Data completeness (in resolution range)	99.5 (30.00-1.86) 99.7 (30.00-1.86)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.08 (at 1.85Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, R_{free}	0.148 , 0.180 0.160 , 0.192	Depositor DCC
R_{free} test set	4429 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	26.0	Xtriage
Anisotropy	0.136	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 48.1	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	0.97	EDS
Total number of atoms	6517	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.03% 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: CA, CL, 686, BMA, MAN, ZN, 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	1.25	10/5715 (0.2%)	1.10	6/7743 (0.1%)

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	A	0	1

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	657	ASN	N-CA	7.94	1.61	1.46
1	A	314	PRO	C-O	-5.78	1.20	1.25
1	A	594	PRO	CA-C	5.63	1.58	1.53
1	A	147	PRO	CA-C	5.56	1.55	1.52
1	A	309	MET	CG-SD	-5.50	1.67	1.80
1	A	707	GLY	C-O	5.38	1.30	1.23
1	A	155	SER	C-O	5.36	1.30	1.23
1	A	652	ASP	C-O	-5.19	1.17	1.24
1	A	660	VAL	CA-C	5.12	1.59	1.52
1	A	381	TRP	C-O	-5.12	1.18	1.24

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	146	PRO	CA-C-N	-7.21	114.47	119.66
1	A	146	PRO	C-N-CA	-7.21	114.47	119.66
1	A	165	SER	CA-C-N	-5.91	114.54	120.21

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	165	SER	C-N-CA	-5.91	114.54	120.21
1	A	124	HIS	N-CA-CB	-5.43	104.36	111.09
1	A	423	ALA	N-CA-C	5.20	118.76	111.90

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	205	TYR	Sidechain

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	5540	0	5400	32	0
2	B	28	0	25	0	0
2	C	28	0	25	0	0
2	D	28	0	25	0	0
3	E	39	0	34	0	0
4	F	50	0	43	0	0
5	A	2	0	0	0	0
6	A	1	0	0	0	0
7	A	1	0	0	0	0
8	A	28	0	26	2	0
9	A	138	0	99	17	0
10	A	634	0	0	5	0
All	All	6517	0	5677	41	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 4.

All (41) 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:659:ILE:O	1:A:663[B]:MET:HG3	1.85	0.77

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
9:A:1320[B]:686:O	9:A:1320[B]:686:H25	1.86	0.74
1:A:463[B]:ARG:HH22	9:A:1320[B]:686:H16	1.56	0.70
1:A:58:MET:HE1	1:A:586:GLU:HG2	1.81	0.62
1:A:463[B]:ARG:HH22	9:A:1320[B]:686:C23	2.13	0.62
1:A:465:ASP:OD2	9:A:1320[B]:686:H20	2.00	0.61
9:A:1320[B]:686:H19	10:A:1684:HOH:O	2.01	0.60
1:A:505:GLU:HB3	1:A:506:PHE:CD2	2.37	0.60
9:A:1320[B]:686:O	9:A:1320[B]:686:C9	2.50	0.58
1:A:463[B]:ARG:HG2	9:A:1320[B]:686:BR	2.61	0.55
1:A:612:TYR:CZ	1:A:616:MET:HG3	2.43	0.54
1:A:505:GLU:HB3	1:A:506:PHE:CE2	2.43	0.53
1:A:169:MET:HA	1:A:344:MET:O	2.09	0.53
1:A:58:MET:CE	1:A:586:GLU:HG2	2.39	0.52
1:A:195:ASN:HD22	8:A:1311:NAG:H83	1.75	0.52
1:A:183:GLU:HG3	10:A:1956:HOH:O	2.11	0.51
1:A:463[B]:ARG:NH2	9:A:1320[B]:686:H16	2.24	0.50
1:A:66:LYS:HE2	10:A:1727:HOH:O	2.12	0.50
1:A:641:GLU:HG3	10:A:1805:HOH:O	2.13	0.49
1:A:155:SER:O	1:A:156:ASP:HB2	2.14	0.48
1:A:412:PRO:HA	1:A:589[B]:ASN:OD1	2.14	0.48
1:A:536:ARG:HG2	9:A:1320[B]:686:BR	2.70	0.47
9:A:1320[B]:686:C23	9:A:1320[B]:686:H18	2.45	0.46
9:A:1320[C]:686:H14	9:A:1320[C]:686:H8	1.76	0.46
1:A:469:LEU:O	1:A:595:PHE:HA	2.16	0.45
1:A:505:GLU:CB	1:A:506:PHE:CD2	3.00	0.45
9:A:1320[A]:686:H5	9:A:1320[A]:686:H10	1.83	0.45
1:A:246:TRP:CD1	8:A:1312:NAG:H83	2.53	0.44
9:A:1320[A]:686:C20	9:A:1320[A]:686:C7	2.95	0.44
1:A:514[A]:LYS:HD2	1:A:692:TYR:HE1	1.82	0.44
1:A:659:ILE:HG22	1:A:663[B]:MET:HE2	2.00	0.44
1:A:242:TYR:CG	1:A:243:PRO:HA	2.53	0.43
1:A:547:SER:N	9:A:1320[C]:686:C6	2.82	0.42
9:A:1320[C]:686:H5	9:A:1320[C]:686:H10	1.84	0.42
1:A:406:LYS:HA	1:A:410:TRP:O	2.19	0.42
1:A:465:ASP:OD2	9:A:1320[B]:686:C6	2.67	0.41
9:A:1320[B]:686:O7	9:A:1320[B]:686:C19	2.66	0.41
1:A:308:LYS:HB2	10:A:1537:HOH:O	2.20	0.41
1:A:98:SER:O	1:A:102:GLU:HG3	2.20	0.41
1:A:177:VAL:HG12	1:A:188:LEU:HD11	2.03	0.41
1:A:229:SER:O	1:A:299:TYR:HB3	2.21	0.41

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	692/739 (94%)	672 (97%)	19 (3%)	1 (0%)	48	35

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	382	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	593/629 (94%)	589 (99%)	4 (1%)	76	70

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	443[A]	GLN
1	A	443[B]	GLN
1	A	537	TYR
1	A	600	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	667	GLN

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 ⓘ

13 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	B	1	2,1	14,14,15	0.96	1 (7%)	17,19,21	2.02	7 (41%)
2	NAG	B	2	2	14,14,15	0.90	1 (7%)	17,19,21	1.80	6 (35%)
2	NAG	C	1	2,1	14,14,15	1.30	1 (7%)	17,19,21	2.82	11 (64%)
2	NAG	C	2	2	14,14,15	0.84	1 (7%)	17,19,21	1.46	1 (5%)
2	NAG	D	1	2,1	14,14,15	1.18	2 (14%)	17,19,21	1.26	2 (11%)
2	NAG	D	2	2	14,14,15	0.89	1 (7%)	17,19,21	1.94	5 (29%)
3	NAG	E	1	1,3	14,14,15	1.20	1 (7%)	17,19,21	1.76	6 (35%)
3	NAG	E	2	3	14,14,15	0.77	0	17,19,21	1.18	0
3	BMA	E	3	3	11,11,12	0.93	0	15,15,17	1.57	5 (33%)
4	NAG	F	1	1,4	14,14,15	1.23	0	17,19,21	1.57	3 (17%)
4	NAG	F	2	4	14,14,15	1.04	1 (7%)	17,19,21	1.91	7 (41%)
4	BMA	F	3	4	11,11,12	0.99	0	15,15,17	1.14	1 (6%)
4	MAN	F	4	4	11,11,12	0.95	1 (9%)	15,15,17	1.93	4 (26%)

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	B	1	2,1	-	1/6/23/26	0/1/1/1
2	NAG	B	2	2	-	0/6/23/26	0/1/1/1
2	NAG	C	1	2,1	-	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	2,1	-	0/6/23/26	0/1/1/1
2	NAG	D	2	2	-	2/6/23/26	0/1/1/1
3	NAG	E	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	E	2	3	-	0/6/23/26	0/1/1/1
3	BMA	E	3	3	-	2/2/19/22	0/1/1/1
4	NAG	F	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	F	2	4	-	0/6/23/26	0/1/1/1
4	BMA	F	3	4	-	0/2/19/22	0/1/1/1
4	MAN	F	4	4	-	0/2/19/22	0/1/1/1

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	1	NAG	C4-C5	2.91	1.59	1.53
4	F	2	NAG	O5-C1	-2.58	1.39	1.43
2	B	1	NAG	C1-C2	-2.54	1.48	1.52
2	C	1	NAG	C6-C5	2.45	1.60	1.51
4	F	4	MAN	O2-C2	-2.27	1.38	1.43
3	E	1	NAG	C7-N2	-2.21	1.27	1.34
2	D	1	NAG	C1-C2	2.20	1.55	1.52
2	C	2	NAG	C4-C5	2.18	1.57	1.53
2	B	2	NAG	C3-C2	2.08	1.56	1.52
2	D	2	NAG	O3-C3	-2.08	1.37	1.43

All (58) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1	NAG	O6-C6-C5	4.93	128.11	111.33
2	C	2	NAG	O4-C4-C5	4.75	121.02	109.32
2	D	2	NAG	O4-C4-C5	4.63	120.72	109.32
4	F	1	NAG	O5-C1-C2	-4.55	104.25	111.29
2	C	1	NAG	O5-C5-C6	4.22	115.88	107.66
2	C	1	NAG	C1-C2-N2	-4.14	103.90	110.43
2	B	1	NAG	C1-O5-C5	4.04	117.60	112.19
4	F	4	MAN	O2-C2-C1	-3.99	100.10	109.22
4	F	2	NAG	C1-C2-N2	-3.96	104.19	110.43
2	C	1	NAG	O4-C4-C3	-3.93	101.11	110.38
2	C	1	NAG	C6-C5-C4	3.76	122.25	113.02

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	2	NAG	C4-C3-C2	3.73	116.48	111.02
2	D	2	NAG	C3-C4-C5	-3.58	103.74	110.23
4	F	2	NAG	C3-C4-C5	-3.50	103.89	110.23
3	E	1	NAG	O4-C4-C3	-3.40	102.37	110.38
4	F	4	MAN	C1-O5-C5	3.35	116.68	112.19
2	B	1	NAG	O5-C5-C6	3.29	114.07	107.66
2	B	2	NAG	C2-N2-C7	3.29	127.30	122.90
2	C	1	NAG	C4-C3-C2	3.20	115.71	111.02
4	F	2	NAG	O3-C3-C4	3.15	117.81	110.38
2	B	1	NAG	O4-C4-C3	-2.83	103.69	110.38
2	B	1	NAG	O5-C1-C2	-2.83	106.91	111.29
2	B	2	NAG	C3-C4-C5	-2.83	105.11	110.23
4	F	4	MAN	O5-C5-C6	2.77	113.06	107.66
3	E	3	BMA	O5-C5-C6	2.75	113.02	107.66
3	E	1	NAG	O5-C1-C2	-2.73	107.07	111.29
2	D	1	NAG	C3-C4-C5	2.72	115.16	110.23
4	F	3	BMA	O3-C3-C2	-2.65	104.65	110.05
2	B	1	NAG	C2-N2-C7	-2.61	119.40	122.90
3	E	1	NAG	C3-C4-C5	-2.60	105.52	110.23
2	D	2	NAG	O3-C3-C4	-2.53	104.41	110.38
3	E	3	BMA	C1-O5-C5	-2.46	108.89	112.19
2	D	2	NAG	O7-C7-C8	-2.46	117.68	122.05
2	C	1	NAG	O4-C4-C5	2.45	115.36	109.32
3	E	1	NAG	C1-O5-C5	-2.44	108.92	112.19
2	C	1	NAG	C8-C7-N2	2.43	120.16	116.12
2	D	1	NAG	O3-C3-C2	-2.43	104.35	109.40
2	C	1	NAG	O7-C7-C8	-2.35	117.88	122.05
2	B	2	NAG	O4-C4-C5	2.32	115.03	109.32
2	B	1	NAG	O7-C7-C8	-2.29	117.97	122.05
4	F	4	MAN	C2-C3-C4	2.27	114.86	110.86
2	C	1	NAG	O5-C5-C4	-2.27	105.31	110.83
3	E	1	NAG	O6-C6-C5	-2.26	103.64	111.33
2	D	2	NAG	O7-C7-N2	2.26	125.97	121.98
2	B	1	NAG	O7-C7-N2	2.24	125.94	121.98
3	E	3	BMA	C3-C4-C5	2.23	114.28	110.23
4	F	2	NAG	C6-C5-C4	2.23	118.49	113.02
3	E	3	BMA	O2-C2-C3	2.21	114.72	110.15
4	F	2	NAG	O5-C5-C4	-2.20	105.47	110.83
4	F	1	NAG	C1-O5-C5	2.20	115.13	112.19
4	F	2	NAG	O6-C6-C5	-2.18	103.91	111.33
2	B	2	NAG	O5-C1-C2	-2.15	107.96	111.29
2	C	1	NAG	C2-N2-C7	-2.14	120.03	122.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	F	1	NAG	C6-C5-C4	-2.11	107.83	113.02
3	E	3	BMA	O3-C3-C2	2.09	114.33	110.05
4	F	2	NAG	O7-C7-N2	-2.07	118.32	121.98
2	B	2	NAG	O4-C4-C3	2.03	115.15	110.38
3	E	1	NAG	O5-C5-C4	-2.02	105.92	110.83

There are no chirality outliers.

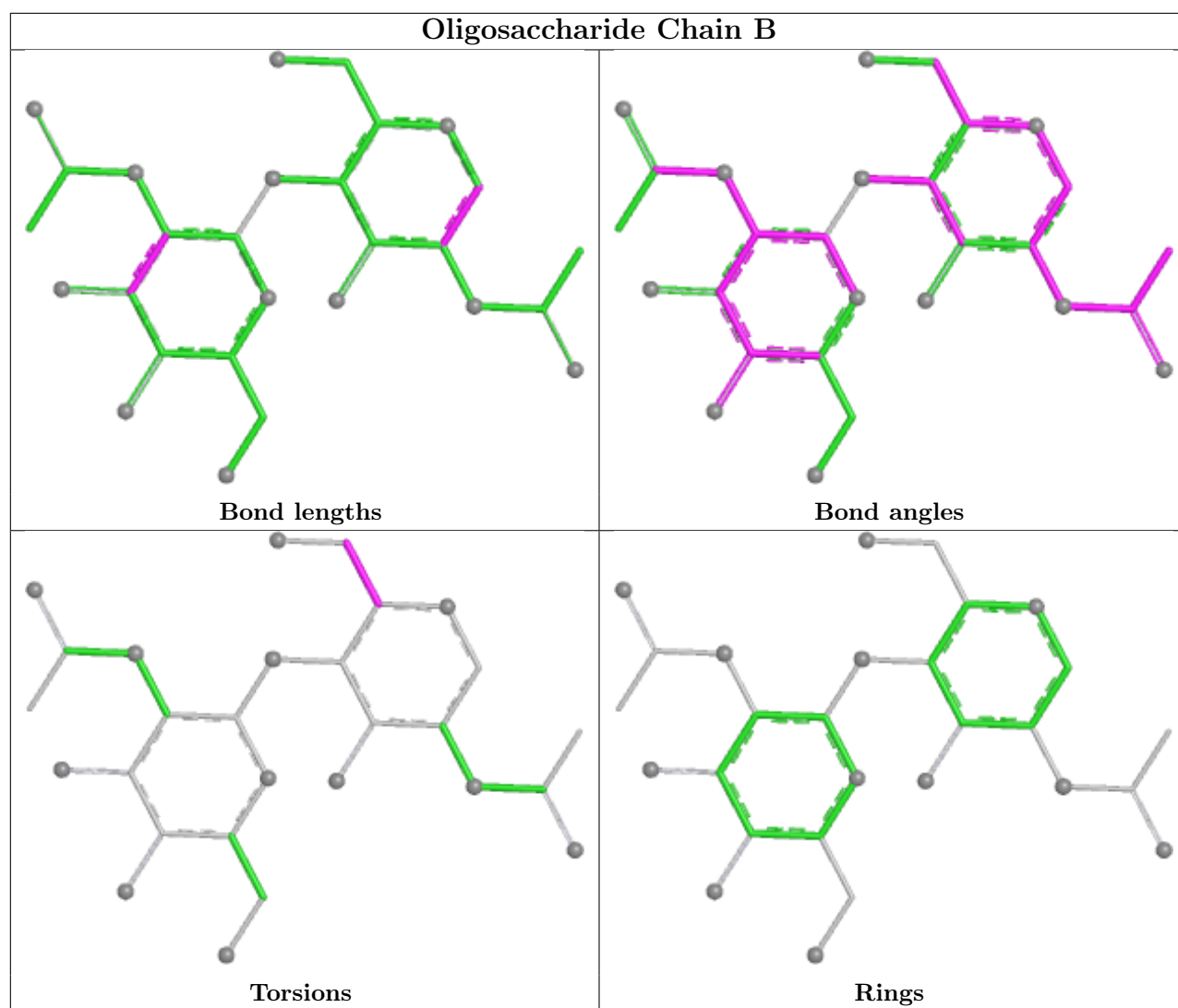
All (9) torsion outliers are listed below:

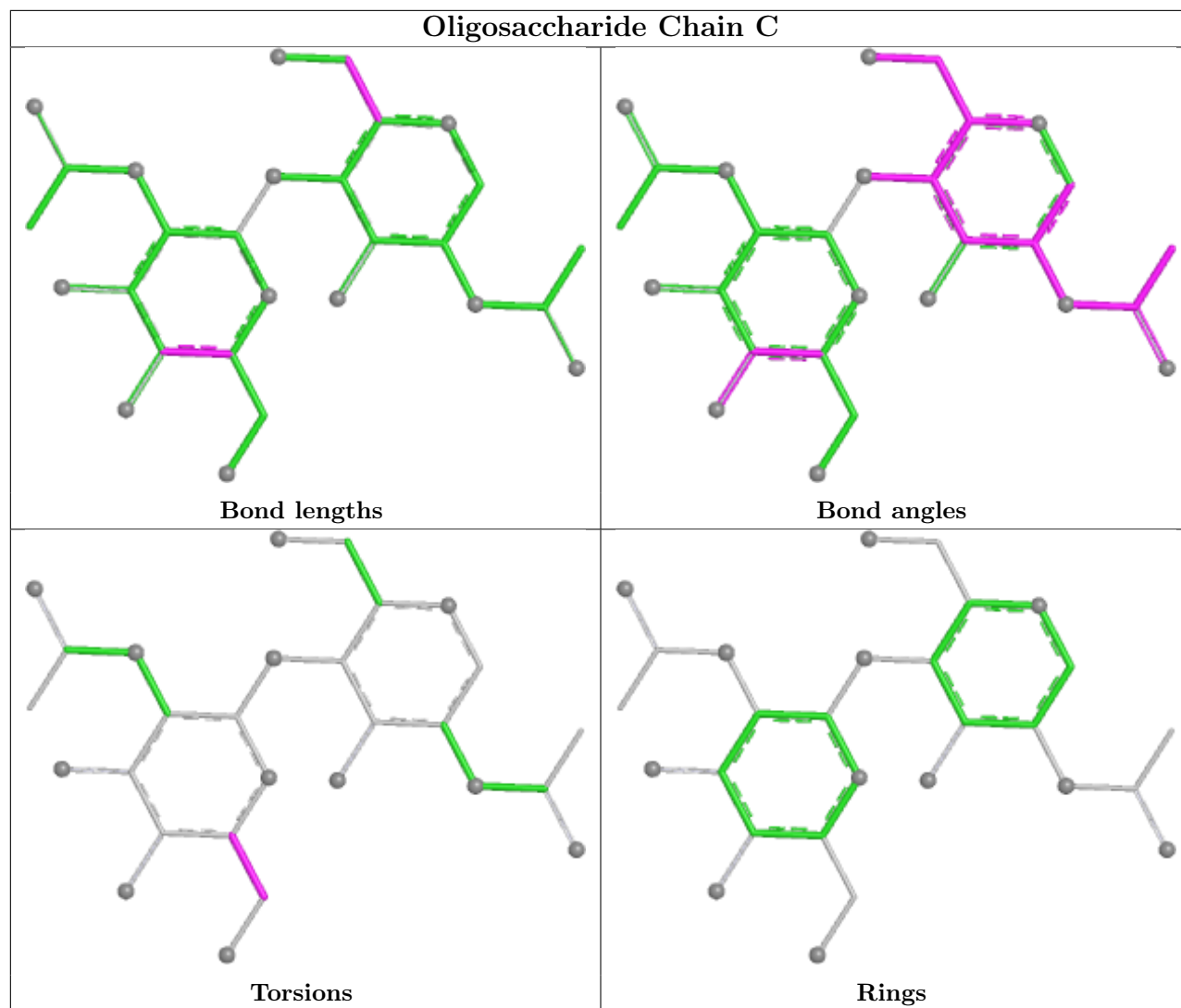
Mol	Chain	Res	Type	Atoms
3	E	3	BMA	O5-C5-C6-O6
2	C	2	NAG	C4-C5-C6-O6
3	E	3	BMA	C4-C5-C6-O6
2	C	2	NAG	O5-C5-C6-O6
2	B	1	NAG	C4-C5-C6-O6
4	F	1	NAG	C4-C5-C6-O6
2	D	2	NAG	C4-C5-C6-O6
4	F	1	NAG	O5-C5-C6-O6
2	D	2	NAG	O5-C5-C6-O6

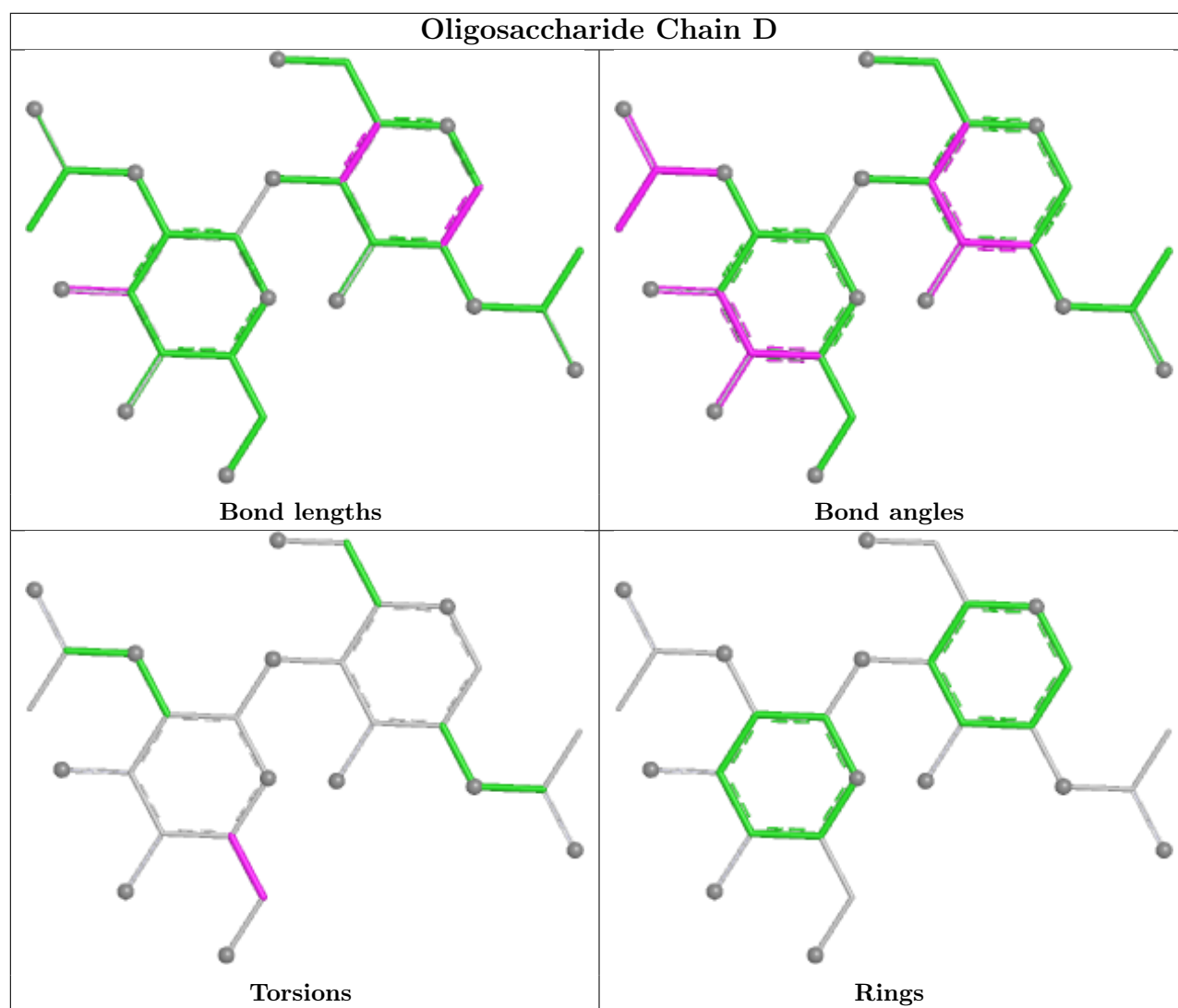
There are no ring outliers.

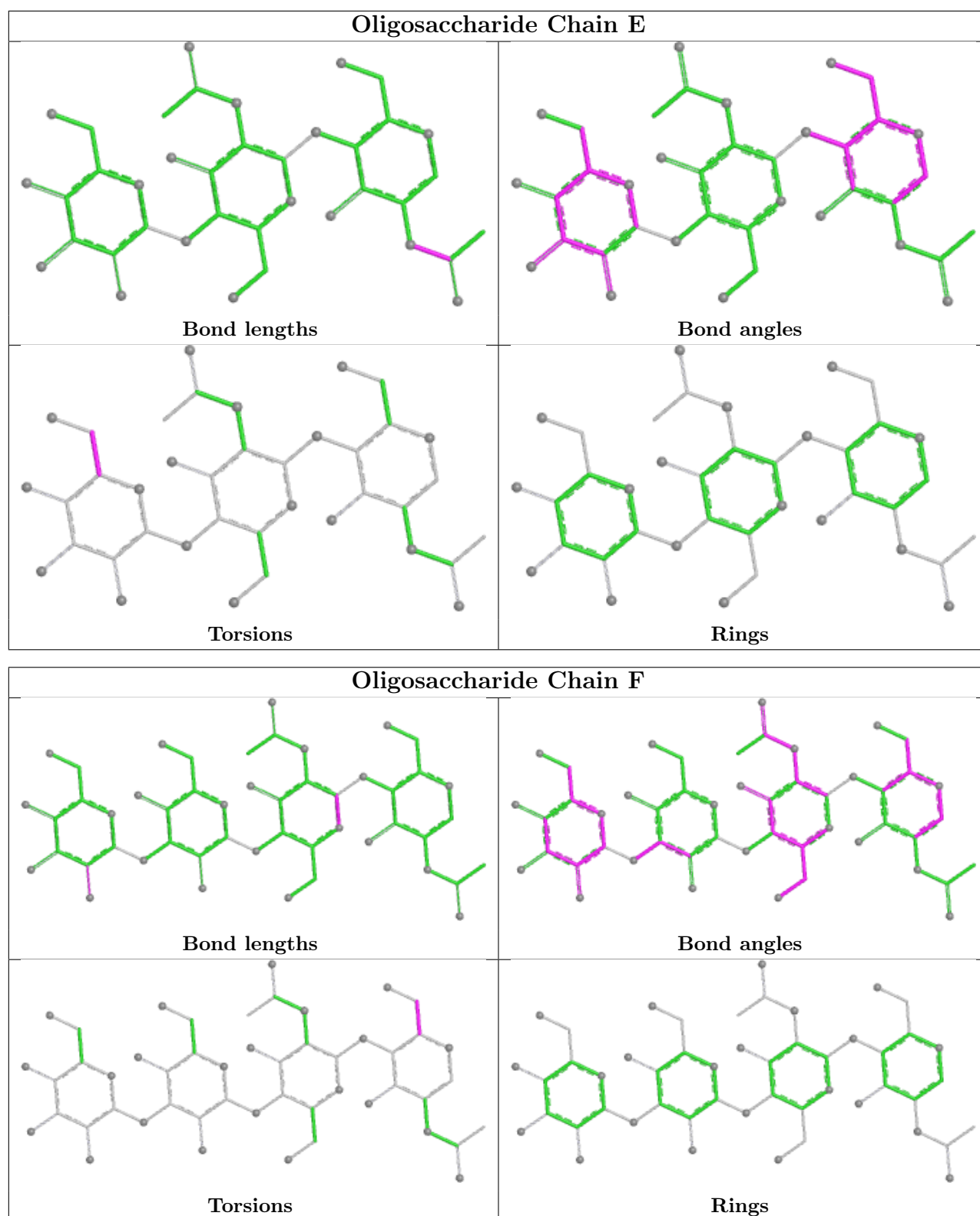
No monomer is involved in short contacts.

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









5.6 Ligand geometry [i](#)

Of 9 ligands modelled in this entry, 4 are monoatomic - leaving 5 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
8	NAG	A	1311	1	14,14,15	0.92	1 (7%)	17,19,21	3.55	8 (47%)
9	686	A	1320[A]	5	53,53,91	1.01	2 (3%)	71,71,129	1.70	16 (22%)
9	686	A	1320[C]	5	53,53,91	0.98	2 (3%)	71,71,129	1.82	18 (25%)
8	NAG	A	1312	1	14,14,15	0.96	1 (7%)	17,19,21	2.52	8 (47%)
9	686	A	1320[B]	-	39,39,91	0.96	3 (7%)	51,51,129	1.73	10 (19%)

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
8	NAG	A	1311	1	-	4/6/23/26	0/1/1/1
9	686	A	1320[A]	5	-	0/48/58/92	0/4/4/9
9	686	A	1320[C]	5	-	0/48/58/92	0/4/4/9
8	NAG	A	1312	1	-	1/6/23/26	0/1/1/1
9	686	A	1320[B]	-	-	6/40/40/92	0/2/2/9

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	A	1320[C]	686	O3-C18	3.66	1.34	1.22
9	A	1320[A]	686	O3-C18	3.65	1.34	1.22
9	A	1320[B]	686	O3-C18	3.65	1.34	1.22
8	A	1312	NAG	C3-C2	2.67	1.58	1.52
9	A	1320[A]	686	C24-N4	2.34	1.42	1.37
9	A	1320[C]	686	C24-N4	2.18	1.42	1.37
9	A	1320[B]	686	C20-C	2.09	1.53	1.50
9	A	1320[B]	686	O4-C18	-2.08	1.23	1.30
8	A	1311	NAG	O5-C1	2.03	1.47	1.43

All (60) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	A	1311	NAG	C1-O5-C5	7.07	121.66	112.19
8	A	1311	NAG	C8-C7-N2	5.97	126.03	116.12
8	A	1311	NAG	O5-C1-C2	-5.85	102.24	111.29
9	A	1320[C]	686	C28-N5-C26	5.42	123.75	111.57
9	A	1320[A]	686	C28-N5-C26	5.26	123.41	111.57
9	A	1320[C]	686	N3-C24-N4	5.19	124.17	116.76
8	A	1311	NAG	O5-C5-C6	5.01	117.42	107.66
9	A	1320[A]	686	N3-C24-N4	4.88	123.73	116.76
9	A	1320[C]	686	C20-C-N	4.79	124.64	118.66
8	A	1312	NAG	O3-C3-C4	-4.62	99.48	110.38
8	A	1311	NAG	O3-C3-C2	-4.62	99.81	109.40
9	A	1320[B]	686	BR-C5-C4	4.51	125.44	119.30
8	A	1311	NAG	C1-C2-N2	4.45	117.44	110.43
8	A	1312	NAG	O5-C1-C2	-4.39	104.51	111.29
9	A	1320[B]	686	C20-C-N	3.60	123.16	118.66
9	A	1320[A]	686	O4-C18-C17	3.59	125.35	114.00
9	A	1320[C]	686	O4-C18-C17	3.59	125.35	114.00
8	A	1312	NAG	C1-O5-C5	3.59	117.00	112.19
9	A	1320[B]	686	BR-C5-C6	-3.54	114.47	119.30
9	A	1320[B]	686	C24-N3-C23	3.48	122.95	116.85
8	A	1312	NAG	O3-C3-C2	3.44	116.55	109.40
9	A	1320[A]	686	C2-C1-N	-3.42	107.78	113.15
8	A	1312	NAG	O7-C7-C8	-3.41	115.98	122.05
9	A	1320[A]	686	O-C-N	-3.36	117.06	122.35
8	A	1312	NAG	C8-C7-N2	3.08	121.22	116.12
9	A	1320[A]	686	C16-C15-N2	3.02	116.89	110.91
9	A	1320[C]	686	O1-C13-O2	-3.01	117.25	124.08
9	A	1320[B]	686	O4-C18-C17	2.99	123.43	114.00
9	A	1320[C]	686	C16-C15-N2	2.98	116.82	110.91
8	A	1311	NAG	O7-C7-C8	-2.97	116.77	122.05
9	A	1320[A]	686	C23-N3-C24	2.91	122.17	117.41
9	A	1320[C]	686	C28-C27-N4	-2.90	104.67	110.78
9	A	1320[A]	686	O1-C13-O2	-2.86	117.59	124.08
9	A	1320[A]	686	C22-C24-N3	-2.81	117.92	123.46
9	A	1320[B]	686	O1-C13-O2	-2.78	117.77	124.08
9	A	1320[C]	686	C23-N3-C24	2.72	121.87	117.41
8	A	1311	NAG	O7-C7-N2	-2.71	117.20	121.98
9	A	1320[A]	686	C21-C22-C24	2.70	121.39	117.65
8	A	1312	NAG	C3-C4-C5	-2.63	105.47	110.23
9	A	1320[C]	686	C22-C24-N4	-2.60	117.24	121.73
8	A	1312	NAG	O4-C4-C5	2.52	115.54	109.32
9	A	1320[C]	686	C22-C24-N3	-2.47	118.58	123.46
9	A	1320[C]	686	C21-C22-C24	2.45	121.04	117.65

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	A	1320[C]	686	C20-C23-N3	-2.41	120.04	123.59
9	A	1320[A]	686	C20-C-N	2.41	121.67	118.66
9	A	1320[B]	686	C1-N-C8	-2.41	111.17	116.45
9	A	1320[B]	686	O1-C13-C12	2.36	121.48	113.51
9	A	1320[C]	686	C11-C12-N1	-2.33	106.29	110.91
9	A	1320[B]	686	C1-C2-C7	-2.31	116.50	120.75
9	A	1320[C]	686	BR-C5-C4	2.29	122.42	119.30
9	A	1320[A]	686	C28-C27-N4	-2.28	105.99	110.78
9	A	1320[C]	686	C16-C15-C19	-2.21	105.11	110.35
9	A	1320[A]	686	C11-C12-N1	-2.18	106.58	110.91
9	A	1320[A]	686	C16-C15-C19	-2.18	105.17	110.35
9	A	1320[A]	686	O4-C18-O3	-2.17	117.75	123.33
9	A	1320[C]	686	O4-C18-O3	-2.17	117.76	123.33
9	A	1320[B]	686	C17-C16-C15	-2.12	109.24	113.16
9	A	1320[C]	686	O-C-N	-2.08	119.07	122.35
9	A	1320[A]	686	C20-C23-N3	-2.04	120.59	123.59
9	A	1320[C]	686	O-C-C20	-2.02	116.28	120.29

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
9	A	1320[B]	686	C9-C8-N-C
8	A	1311	NAG	O5-C5-C6-O6
8	A	1311	NAG	C4-C5-C6-O6
8	A	1311	NAG	C8-C7-N2-C2
8	A	1311	NAG	O7-C7-N2-C2
9	A	1320[B]	686	C10-C11-C12-C13
9	A	1320[B]	686	N-C8-C9-C10
9	A	1320[B]	686	C9-C8-N-C1
9	A	1320[B]	686	C10-C11-C12-N1
8	A	1312	NAG	O5-C5-C6-O6
9	A	1320[B]	686	C16-C17-C18-O4

There are no ring outliers.

5 monomers are involved in 19 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	A	1311	NAG	1	0
9	A	1320[A]	686	2	0
9	A	1320[C]	686	3	0

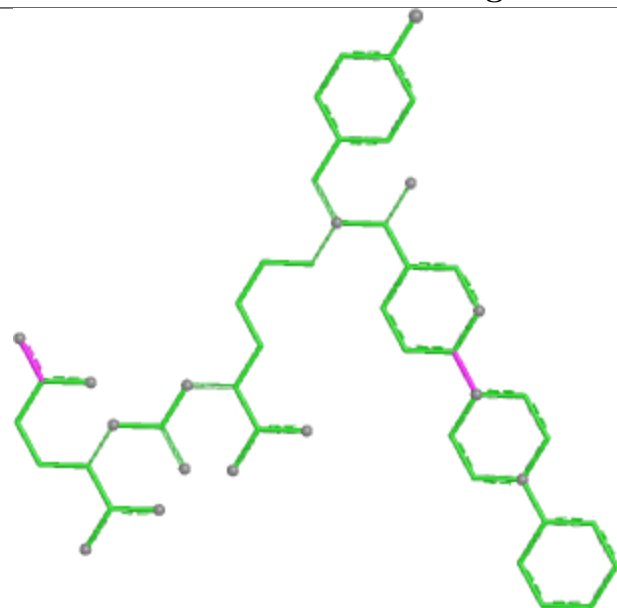
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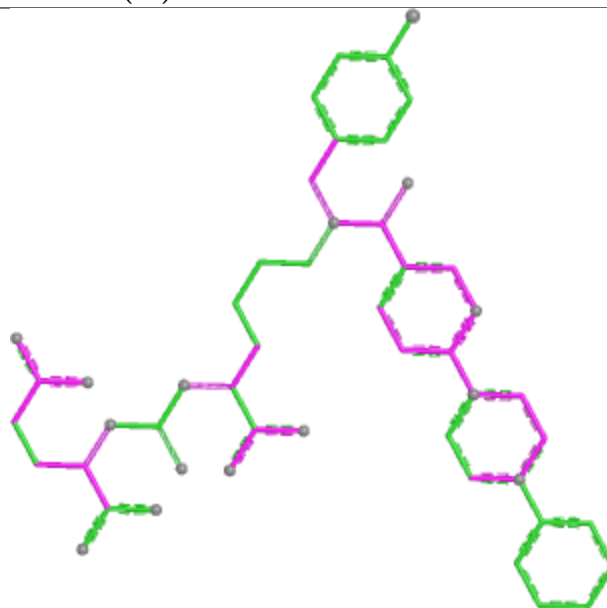
Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	A	1312	NAG	1	0
9	A	1320[B]	686	12	0

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.

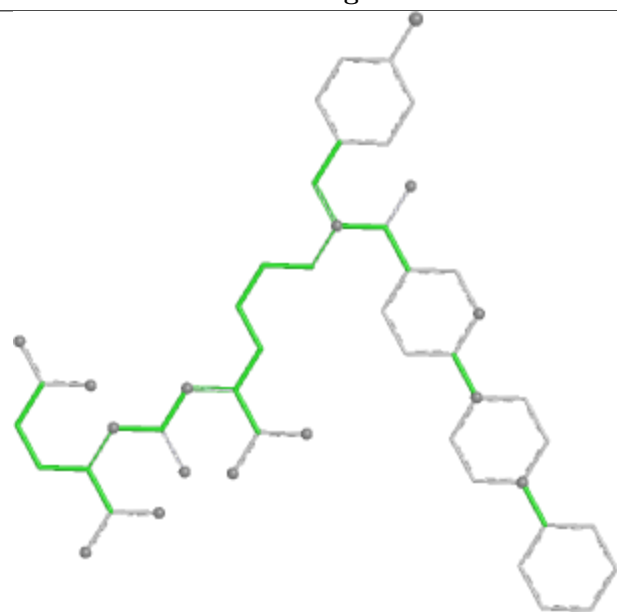
Ligand 686 A 1320 (A)



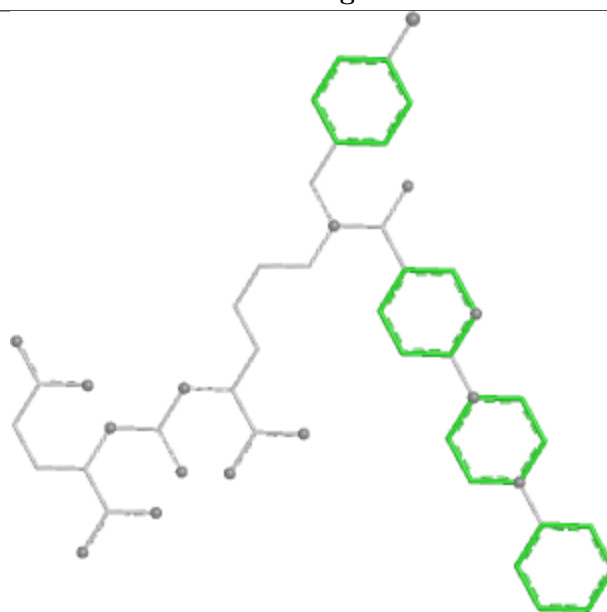
Bond lengths



Bond angles

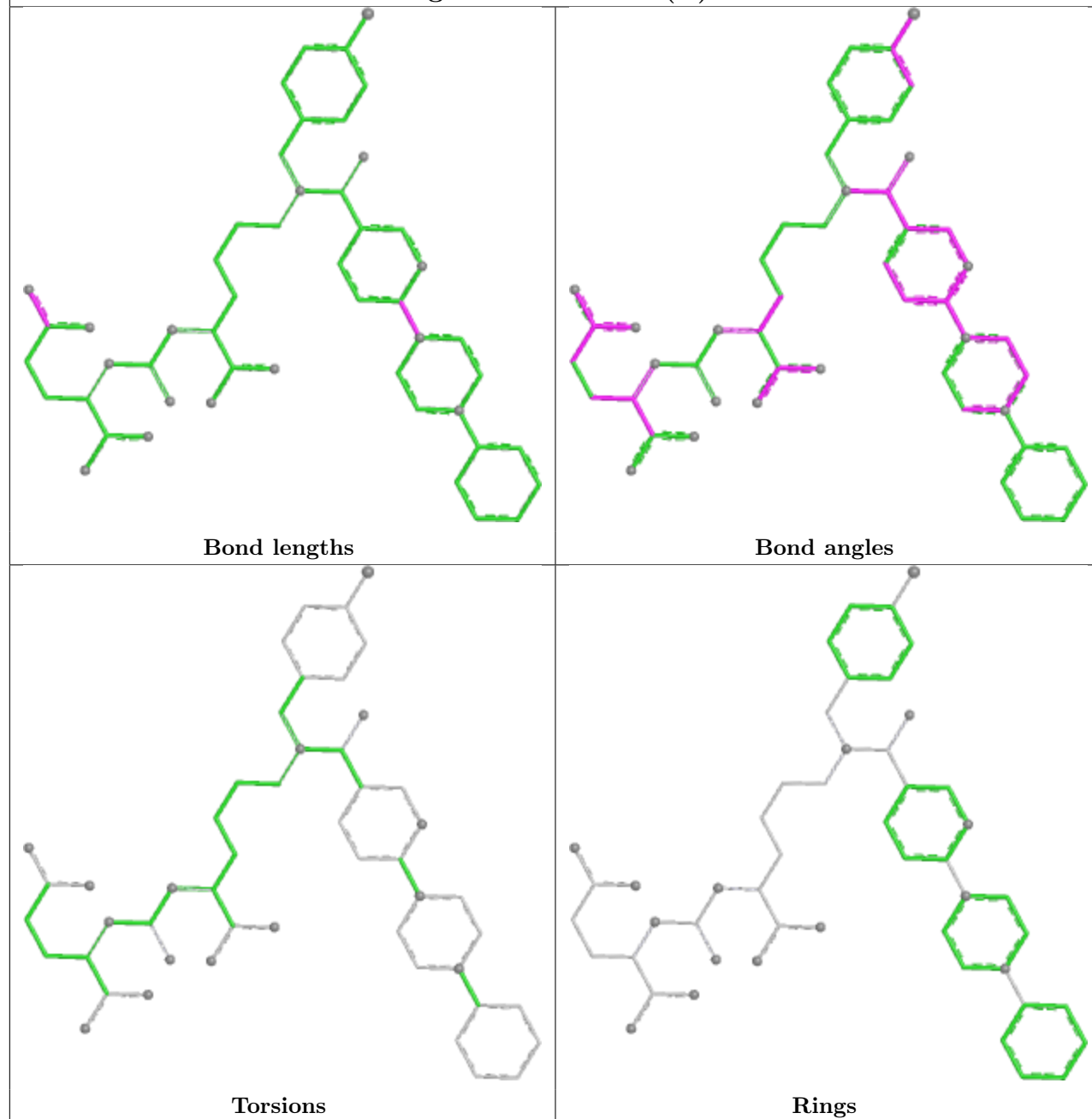


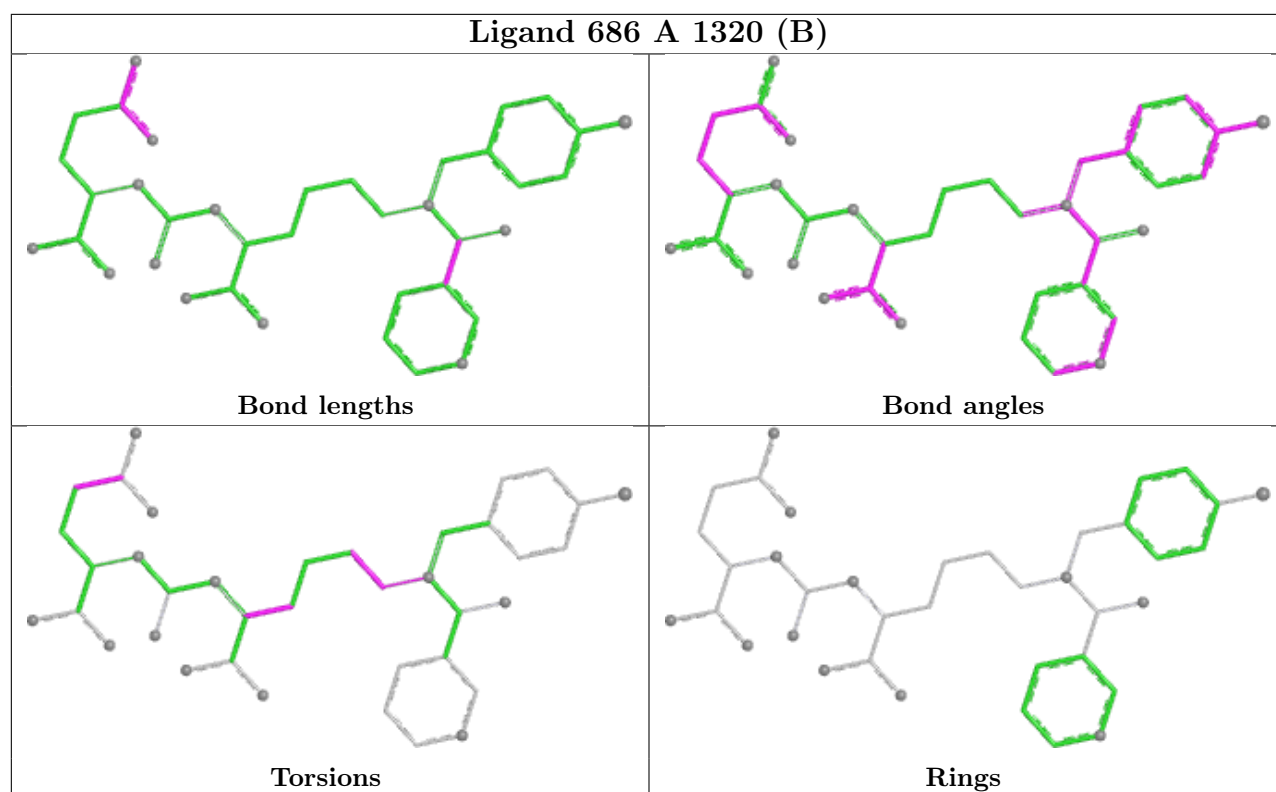
Torsions



Rings

Ligand 686 A 1320 (C)





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	690/739 (93%)	-0.43	5 (0%) 84 87	12, 27, 49, 92	8 (1%)

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	541	TRP	4.1
1	A	543	THR	3.7
1	A	506	PHE	2.7
1	A	548	GLY	2.6
1	A	279	TYR	2.4

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.

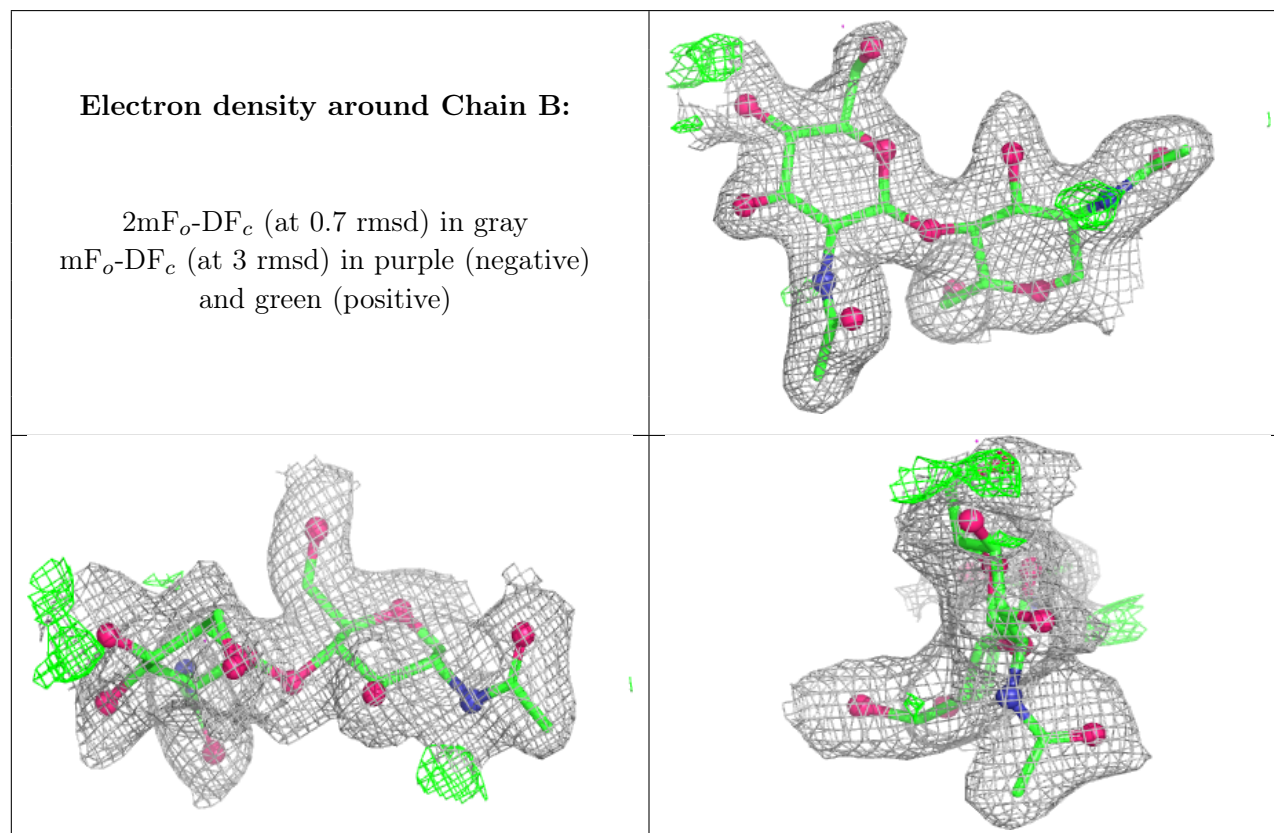
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NAG	C	2	14/15	0.69	0.15	69,75,82,91	0
3	BMA	E	3	11/12	0.75	0.12	60,67,72,80	0
2	NAG	B	2	14/15	0.78	0.13	41,58,68,70	0
2	NAG	C	1	14/15	0.79	0.14	46,58,76,85	0
2	NAG	D	2	14/15	0.83	0.11	56,63,71,72	0
4	NAG	F	2	14/15	0.85	0.12	40,48,57,61	0
4	MAN	F	4	11/12	0.85	0.11	50,52,60,61	0

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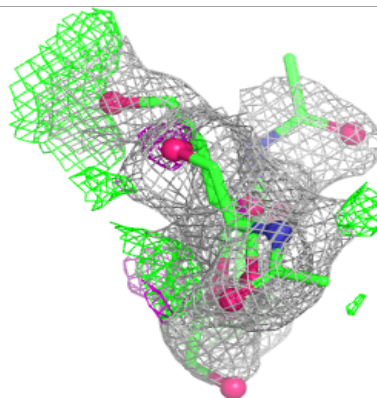
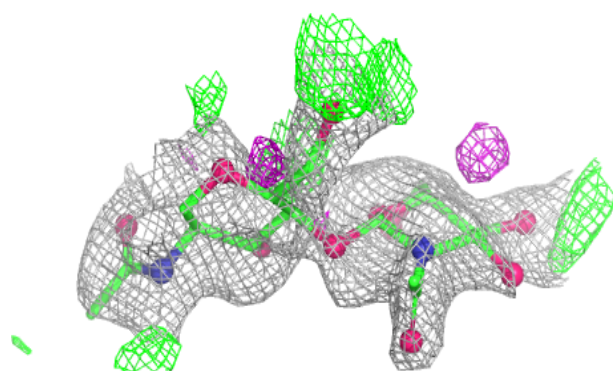
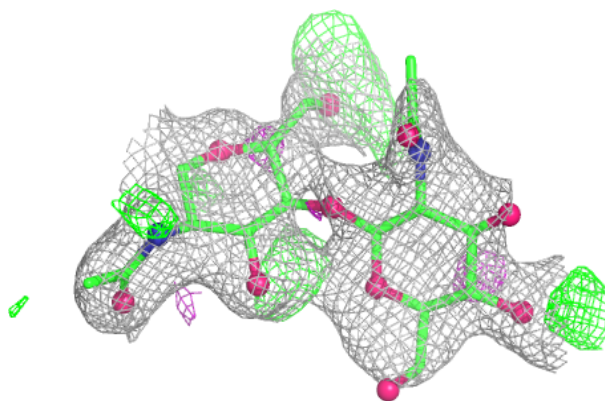
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	BMA	F	3	11/12	0.88	0.10	44,47,52,56	0
2	NAG	D	1	14/15	0.88	0.10	39,43,49,57	0
4	NAG	F	1	14/15	0.92	0.08	22,29,42,53	0
3	NAG	E	2	14/15	0.93	0.08	35,44,54,58	0
2	NAG	B	1	14/15	0.94	0.07	30,39,45,55	0
3	NAG	E	1	14/15	0.94	0.07	28,30,35,44	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.

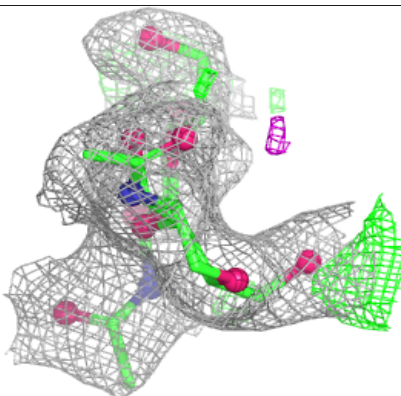
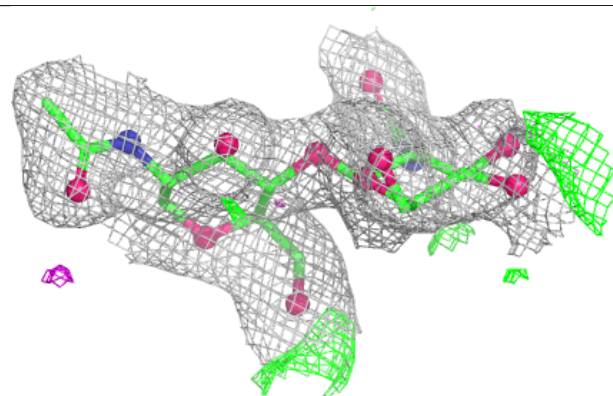
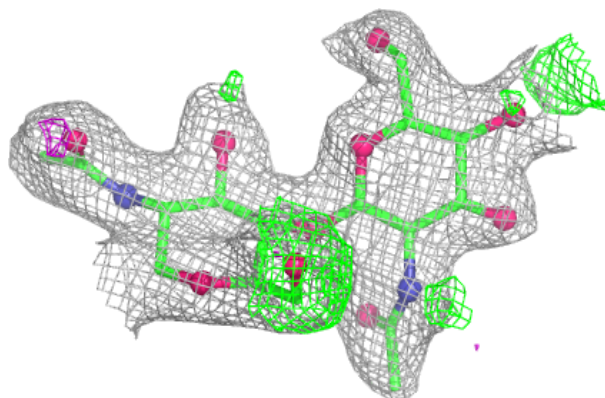


Electron density around Chain C:

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

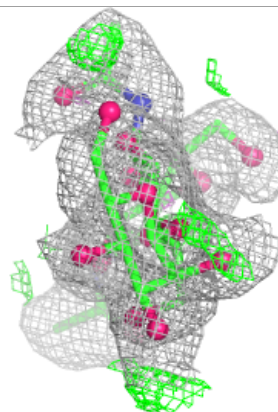
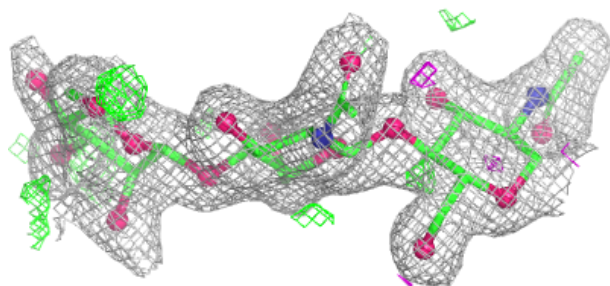
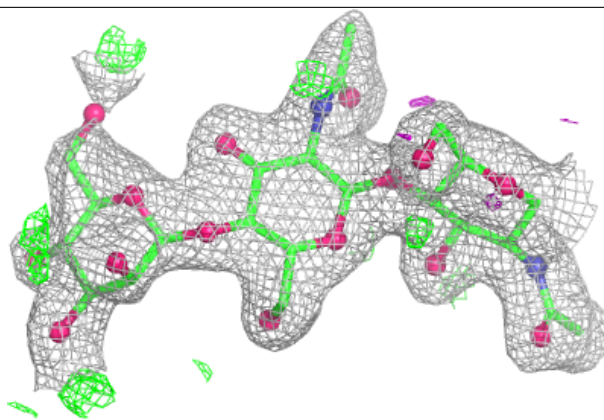
**Electron density around Chain D:**

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

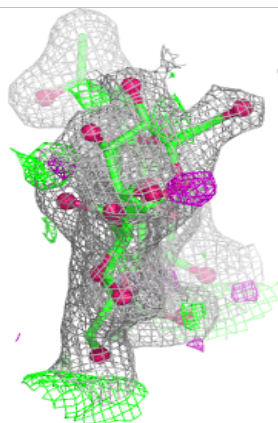
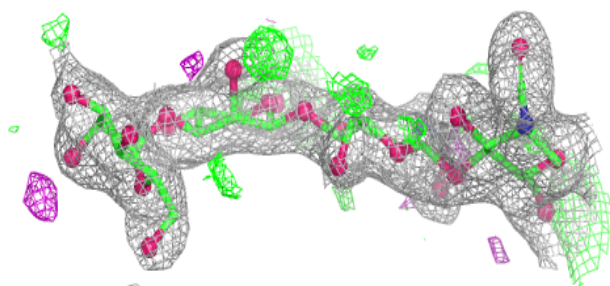
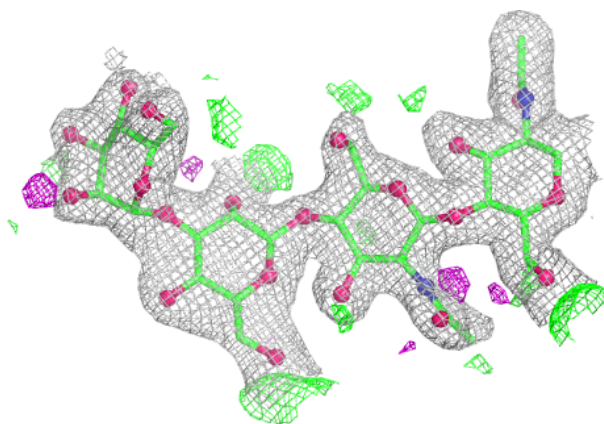


Electron density around Chain E:

$2mF_o-DF_c$ (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 ⓘ

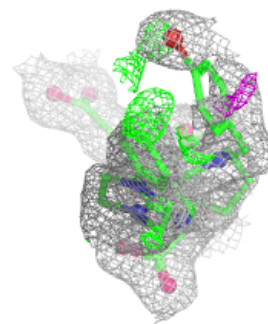
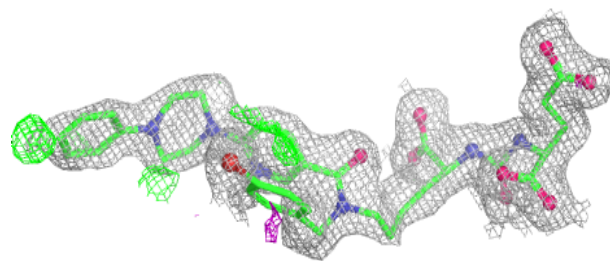
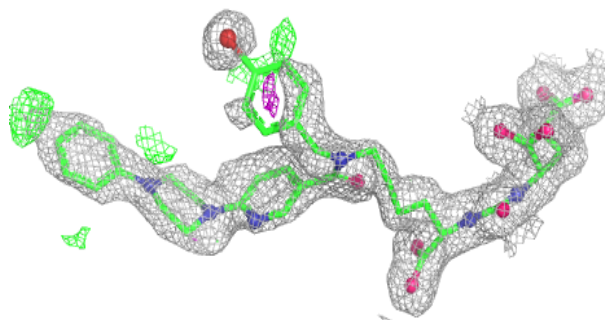
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
8	NAG	A	1311	14/15	0.69	0.15	60,71,80,86	0
8	NAG	A	1312	14/15	0.91	0.09	33,43,52,55	0
9	686	A	1320[A]	50/83	0.94	0.11	19,37,53,56	50
9	686	A	1320[C]	50/83	0.94	0.11	18,39,58,61	50
9	686	A	1320[B]	38/83	0.94	0.11	14,23,30,36	38
5	ZN	A	1302	1/1	1.00	0.01	20,20,20,20	0
6	CL	A	1303	1/1	1.00	0.02	20,20,20,20	0
7	CA	A	1304	1/1	1.00	0.01	17,17,17,17	0
5	ZN	A	1301	1/1	1.00	0.01	19,19,19,19	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.

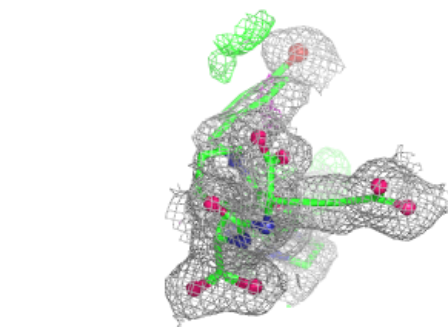
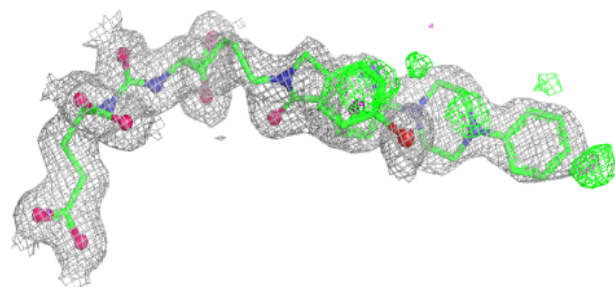
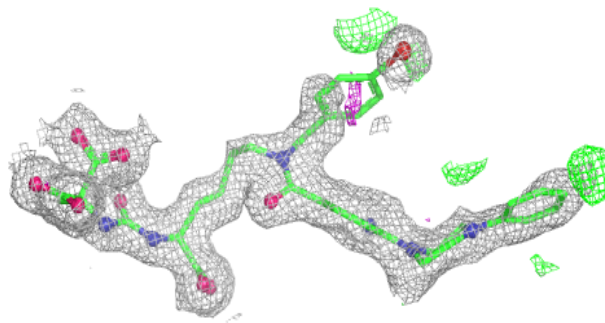
Electron density around 686 A 1320 (A):

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

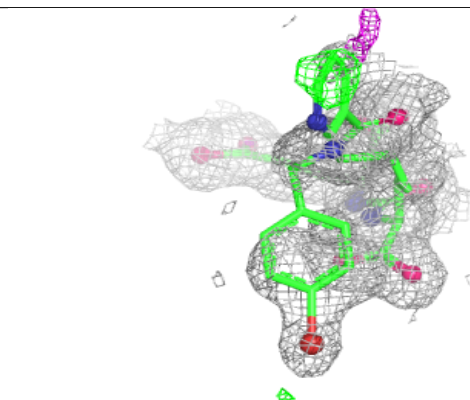
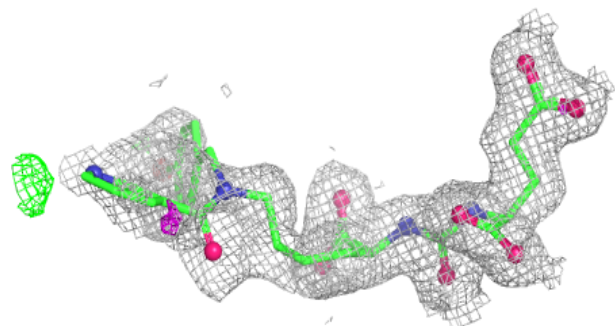
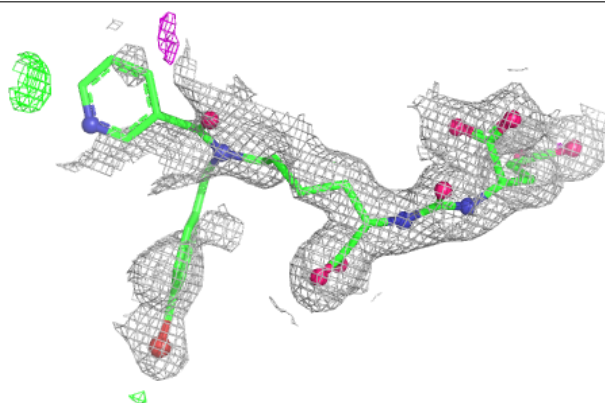


Electron density around 686 A 1320 (C):

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

**Electron density around 686 A 1320 (B):**

$2mF_o-DF_c$ (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.