



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 6, 2026 – 07:38 PM UTC

PDB ID : 8TJC / pdb_00008tjc
Title : Structure of human beta 1,3-N-acetylglucosaminyltransferase 2 with compound 8a
Authors : Sudom, A.; Min, X.
Deposited on : 2023-07-20
Resolution : 2.20 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

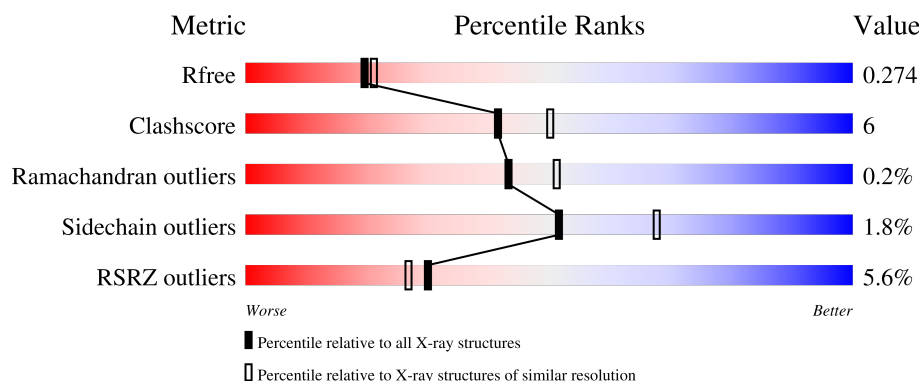
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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.



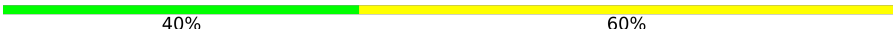
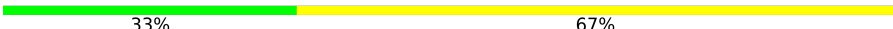
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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	397	3% 72% 10% • 17%
1	B	397	7% 67% 17% • 15%
1	C	397	2% 68% 14% • 18%
1	D	397	7% 65% 16% • 18%
2	E	2	100%

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Mol	Chain	Length	Quality of chain
3	F	4	 50% 50%
4	G	4	 25% 25% 50%
5	H	5	 40% 60%
6	I	3	 33% 67%

2 Entry composition [i](#)

There are 11 unique types of molecules in this entry. The entry contains 11359 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 N-acetylglucosaminide beta-1,3-N-acetylglucosaminyltransferase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	329	Total	C	N	O	S	0	0	0
			2709	1742	465	489	13			
1	B	336	Total	C	N	O	S	0	0	0
			2774	1788	475	499	12			
1	C	324	Total	C	N	O	S	0	0	0
			2672	1717	460	483	12			
1	D	325	Total	C	N	O	S	0	0	0
			2684	1729	459	483	13			

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



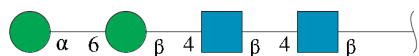
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	E	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 3 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.



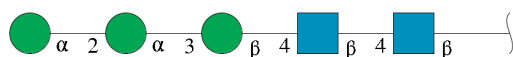
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	F	4	Total	C	N	O	0	0	0
			50	28	2	20			

- Molecule 4 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.



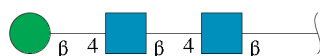
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	G	4	Total	C	N	O	0	0	0
			50	28	2	20			

- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-2)-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
5	H	5	Total	C	N	O	0	0	0
			61	34	2	25			

- Molecule 6 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
6	I	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 7 is MANGANESE (II) ION (CCD ID: MN) (formula: Mn).

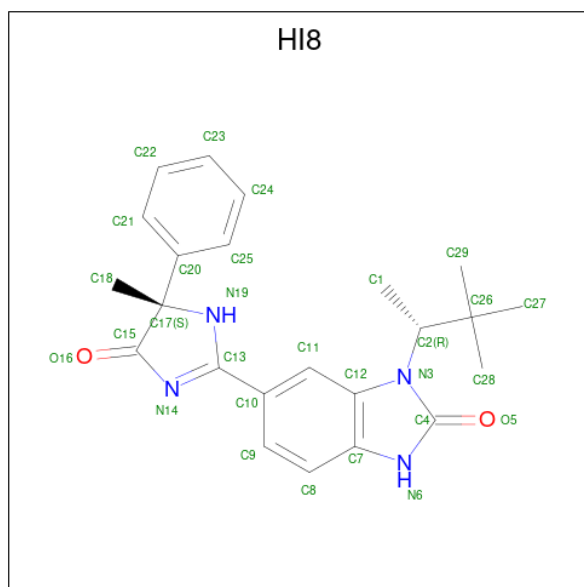
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Mn	0	0
			1	1		
7	B	1	Total	Mn	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	C	1	Total	Mn	0	0
			1	1		
7	D	1	Total	Mn	0	0
			1	1		

- Molecule 8 is (6M)-1-[(2R)-3,3-dimethylbutan-2-yl]-6-[(5S)-5-methyl-4-oxo-5-phenyl-4,5-dihydro-1H-imidazol-2-yl]-1,3-dihydro-2H-benzimidazol-2-one (CCD ID: HI8) (formula: $C_{23}H_{26}N_4O_2$) (labeled as "Ligand of Interest" by depositor).



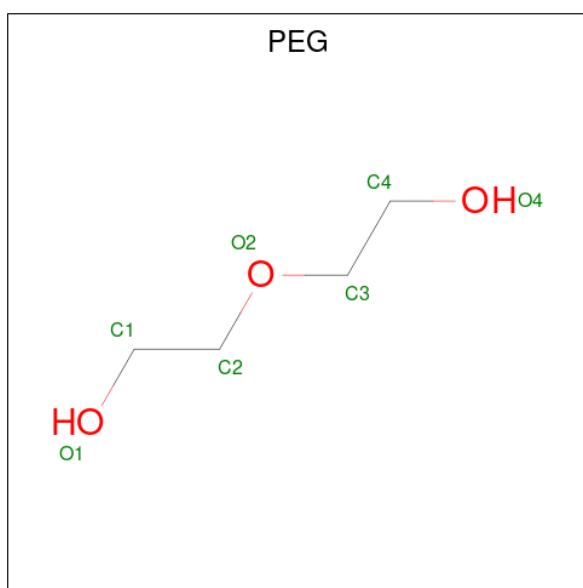
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	A	1	Total	C	N	O	0	0
			29	23	4	2		
8	B	1	Total	C	N	O	0	0
			29	23	4	2		
8	C	1	Total	C	N	O	0	0
			29	23	4	2		
8	D	1	Total	C	N	O	0	0
			29	23	4	2		

- Molecule 9 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



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

- Molecule 10 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	B	1	Total	C	O	0	0
			7	4	3		
10	C	1	Total	C	O	0	0
			7	4	3		

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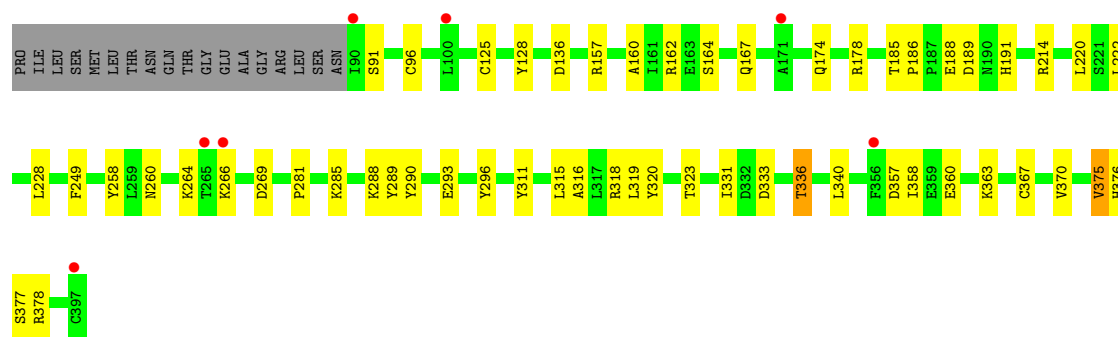
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	D	1	Total	C	O	0	0
			7	4	3		

- Molecule 11 is water.

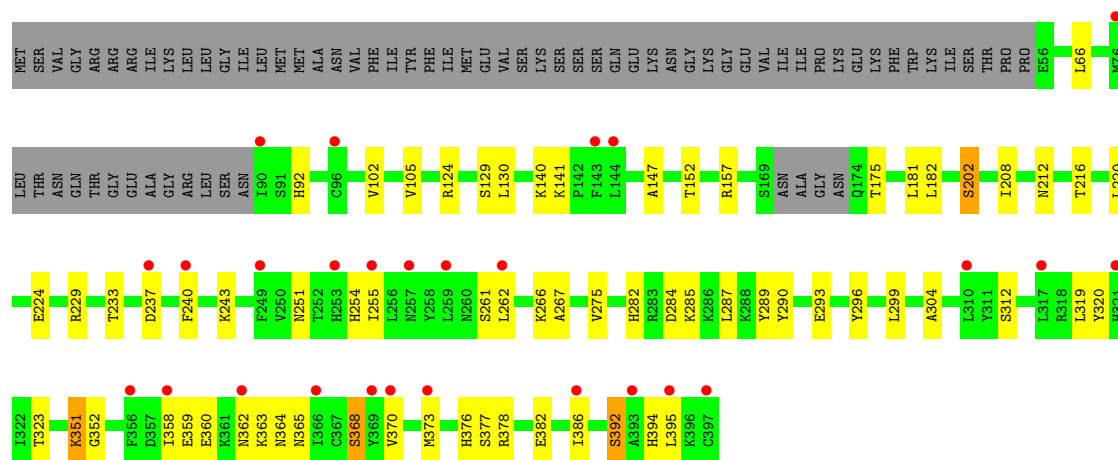
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	50	Total	O	0	0
			50	50		
11	B	29	Total	O	0	0
			29	29		
11	C	25	Total	O	0	0
			25	25		
11	D	19	Total	O	0	0
			19	19		

- Molecule 1: N-acetyllactosaminide beta-1,3-N-acetylglucosaminyltransferase 2





- Molecule 1: N-acetylactosaminide beta-1,3-N-acetylglucosaminyltransferase 2



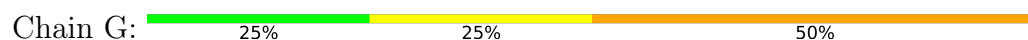
- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 3: 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



- Molecule 4: 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





- Molecule 5: alpha-D-mannopyranose-(1-2)-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 H: 40% 60%



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

Chain I: 33% 67%



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	89.41Å 93.88Å 205.07Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.01 – 2.20 47.01 – 2.20	Depositor EDS
% Data completeness (in resolution range)	99.9 (47.01-2.20) 100.0 (47.01-2.20)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.40 (at 2.20Å)	Xtriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.227 , 0.275 0.226 , 0.274	Depositor DCC
R_{free} test set	4353 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å ²)	49.0	Xtriage
Anisotropy	0.583	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 44.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.022 for k,h,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	11359	wwPDB-VP
Average B, all atoms (Å ²)	64.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.11% 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: PEG, HI8, BMA, MN, 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	0.10	0/2782	0.30	0/3768
1	B	0.10	0/2852	0.30	0/3865
1	C	0.10	0/2744	0.29	0/3716
1	D	0.11	0/2756	0.29	0/3731
All	All	0.11	0/11134	0.30	0/15080

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	2709	0	2657	25	0
1	B	2774	0	2720	37	0
1	C	2672	0	2614	33	0
1	D	2684	0	2637	42	0
2	E	28	0	25	0	0
3	F	50	0	43	0	0
4	G	50	0	43	2	0
5	H	61	0	52	0	0
6	I	39	0	34	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	A	1	0	0	0	0
7	B	1	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
8	A	29	0	0	2	0
8	B	29	0	0	0	0
8	C	29	0	0	3	0
8	D	29	0	0	2	0
9	B	14	0	13	0	0
9	C	14	0	13	0	0
10	B	7	0	10	2	0
10	C	7	0	10	1	0
10	D	7	0	10	1	0
11	A	50	0	0	1	0
11	B	29	0	0	1	0
11	C	25	0	0	0	0
11	D	19	0	0	0	0
All	All	11359	0	10881	141	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

The worst 5 of 141 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:B:360:GLU:HA	1:B:363:LYS:HD2	1.66	0.77
1:C:258:TYR:OH	1:C:266:LYS:NZ	2.21	0.73
1:C:157:ARG:HG3	10:C:404:PEG:H41	1.72	0.71
1:D:255:ILE:HG22	1:D:373:MET:HB3	1.72	0.71
1:B:51:ILE:HD12	1:B:54:PRO:HD3	1.73	0.70

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	325/397 (82%)	317 (98%)	7 (2%)	1 (0%)	36	42
1	B	332/397 (84%)	318 (96%)	13 (4%)	1 (0%)	36	42
1	C	320/397 (81%)	307 (96%)	13 (4%)	0	100	100
1	D	319/397 (80%)	307 (96%)	12 (4%)	0	100	100
All	All	1296/1588 (82%)	1249 (96%)	45 (4%)	2 (0%)	43	51

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	53	THR
1	A	172	GLY

5.3.2 Protein sidechains ⓘ

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	302/362 (83%)	296 (98%)	6 (2%)	48	64
1	B	309/362 (85%)	305 (99%)	4 (1%)	61	76
1	C	297/362 (82%)	294 (99%)	3 (1%)	68	81
1	D	300/362 (83%)	291 (97%)	9 (3%)	36	49
All	All	1208/1448 (83%)	1186 (98%)	22 (2%)	51	68

5 of 22 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	202	SER
1	D	351	LYS
1	D	312	SER
1	D	362	ASN
1	B	52	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	205	HIS
1	D	389	GLN
1	B	205	HIS
1	B	376	HIS
1	B	391	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 ⓘ

18 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	E	1	1,2	14,14,15	0.55	0	17,19,21	1.19	1 (5%)
2	NAG	E	2	2	14,14,15	0.54	0	17,19,21	1.20	3 (17%)
3	NAG	F	1	3,1	14,14,15	0.56	0	17,19,21	1.19	2 (11%)
3	NAG	F	2	3	14,14,15	0.60	0	17,19,21	1.27	2 (11%)
3	BMA	F	3	3	11,11,12	0.34	0	15,15,17	0.90	0
3	MAN	F	4	3	11,11,12	0.35	0	15,15,17	1.02	0
4	NAG	G	1	4,1	14,14,15	0.58	0	17,19,21	1.28	3 (17%)
4	NAG	G	2	4	14,14,15	0.57	0	17,19,21	1.21	3 (17%)
4	BMA	G	3	4	11,11,12	0.35	0	15,15,17	0.80	0
4	MAN	G	4	4	11,11,12	0.41	0	15,15,17	0.95	1 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	H	1	5,1	14,14,15	0.55	0	17,19,21	1.26	3 (17%)
5	NAG	H	2	5	14,14,15	0.59	0	17,19,21	1.24	3 (17%)
5	BMA	H	3	5	11,11,12	0.45	0	15,15,17	1.35	1 (6%)
5	MAN	H	4	5	11,11,12	0.30	0	15,15,17	0.93	0
5	MAN	H	5	5	11,11,12	0.34	0	15,15,17	0.82	0
6	NAG	I	1	6,1	14,14,15	0.55	0	17,19,21	1.23	2 (11%)
6	NAG	I	2	6	14,14,15	0.57	0	17,19,21	1.25	3 (17%)
6	BMA	I	3	6	11,11,12	0.32	0	15,15,17	0.73	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	E	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	E	2	2	-	2/6/23/26	0/1/1/1
3	NAG	F	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	F	2	3	-	1/6/23/26	0/1/1/1
3	BMA	F	3	3	-	2/2/19/22	0/1/1/1
3	MAN	F	4	3	-	2/2/19/22	0/1/1/1
4	NAG	G	1	4,1	-	2/6/23/26	0/1/1/1
4	NAG	G	2	4	-	2/6/23/26	0/1/1/1
4	BMA	G	3	4	-	0/2/19/22	0/1/1/1
4	MAN	G	4	4	-	1/2/19/22	0/1/1/1
5	NAG	H	1	5,1	-	0/6/23/26	0/1/1/1
5	NAG	H	2	5	-	1/6/23/26	0/1/1/1
5	BMA	H	3	5	-	1/2/19/22	0/1/1/1
5	MAN	H	4	5	-	2/2/19/22	0/1/1/1
5	MAN	H	5	5	-	2/2/19/22	0/1/1/1
6	NAG	I	1	6,1	-	0/6/23/26	0/1/1/1
6	NAG	I	2	6	-	4/6/23/26	0/1/1/1
6	BMA	I	3	6	-	2/2/19/22	0/1/1/1

There are no bond length outliers.

The worst 5 of 27 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	F	1	NAG	C8-C7-N2	-3.22	110.77	116.12
6	I	1	NAG	C8-C7-N2	-3.14	110.90	116.12
3	F	2	NAG	C8-C7-N2	-3.14	110.91	116.12
5	H	1	NAG	C8-C7-N2	-3.12	110.94	116.12
4	G	2	NAG	C8-C7-N2	-2.99	111.17	116.12

There are no chirality outliers.

5 of 28 torsion outliers are listed below:

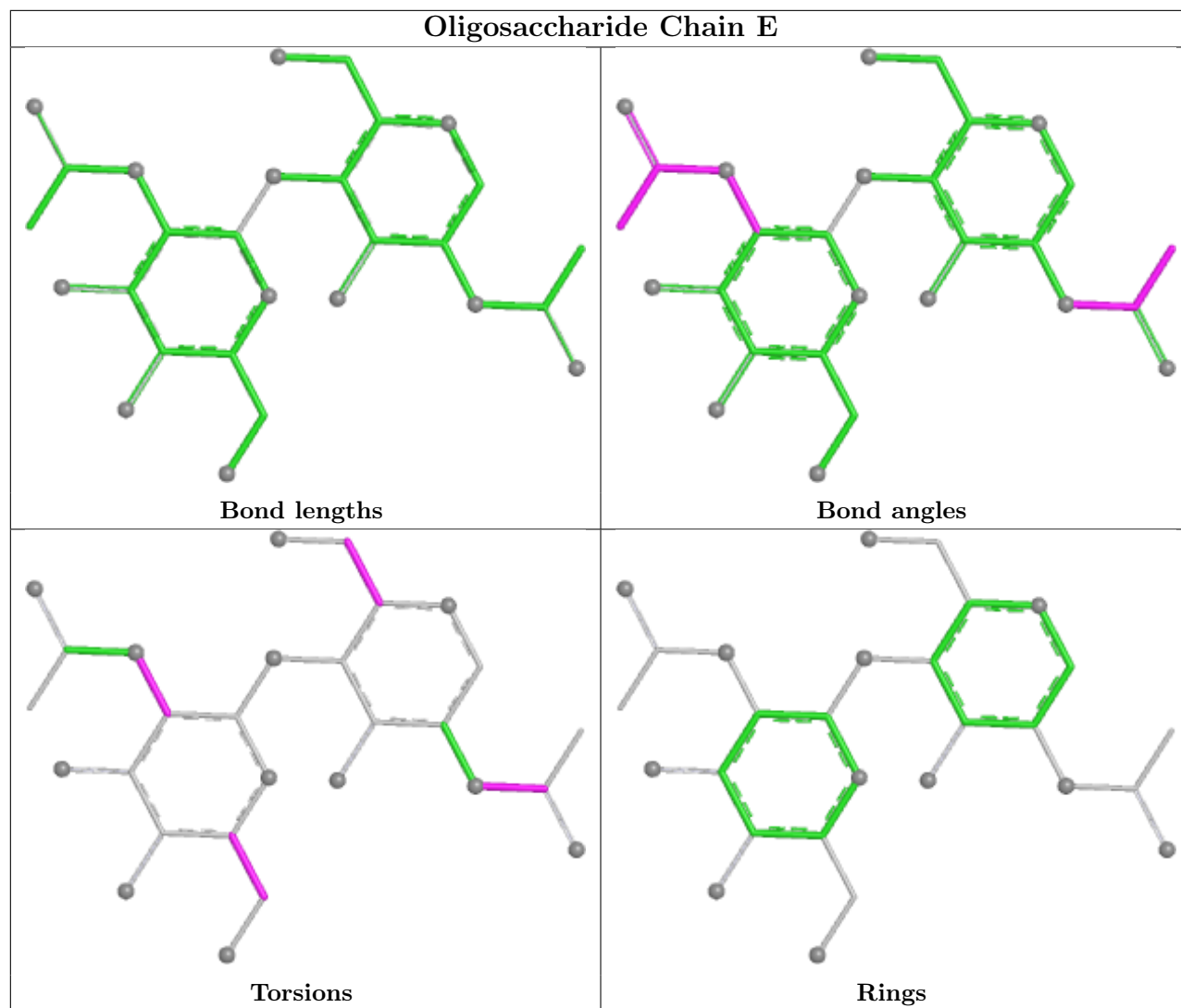
Mol	Chain	Res	Type	Atoms
2	E	1	NAG	O5-C5-C6-O6
5	H	5	MAN	O5-C5-C6-O6
2	E	1	NAG	C4-C5-C6-O6
3	F	4	MAN	C4-C5-C6-O6
3	F	4	MAN	O5-C5-C6-O6

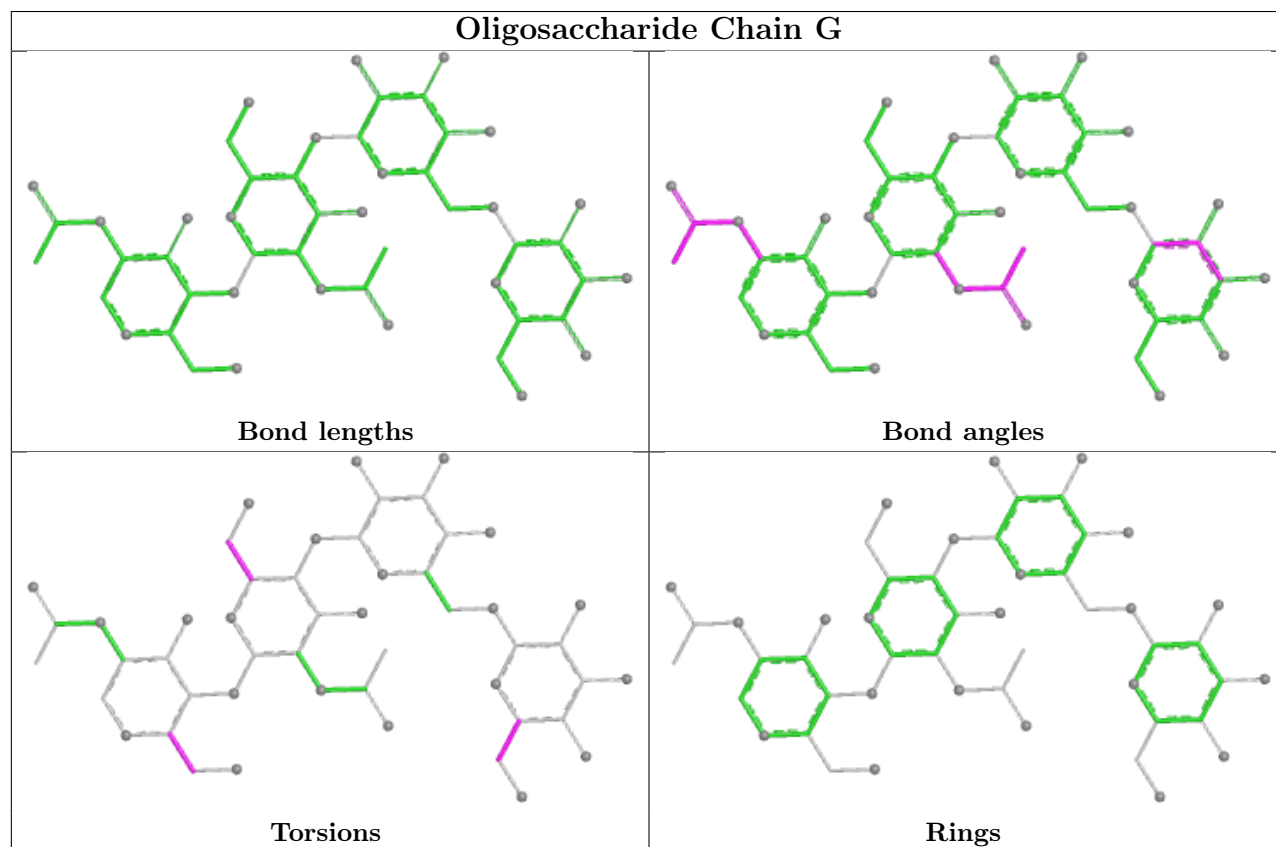
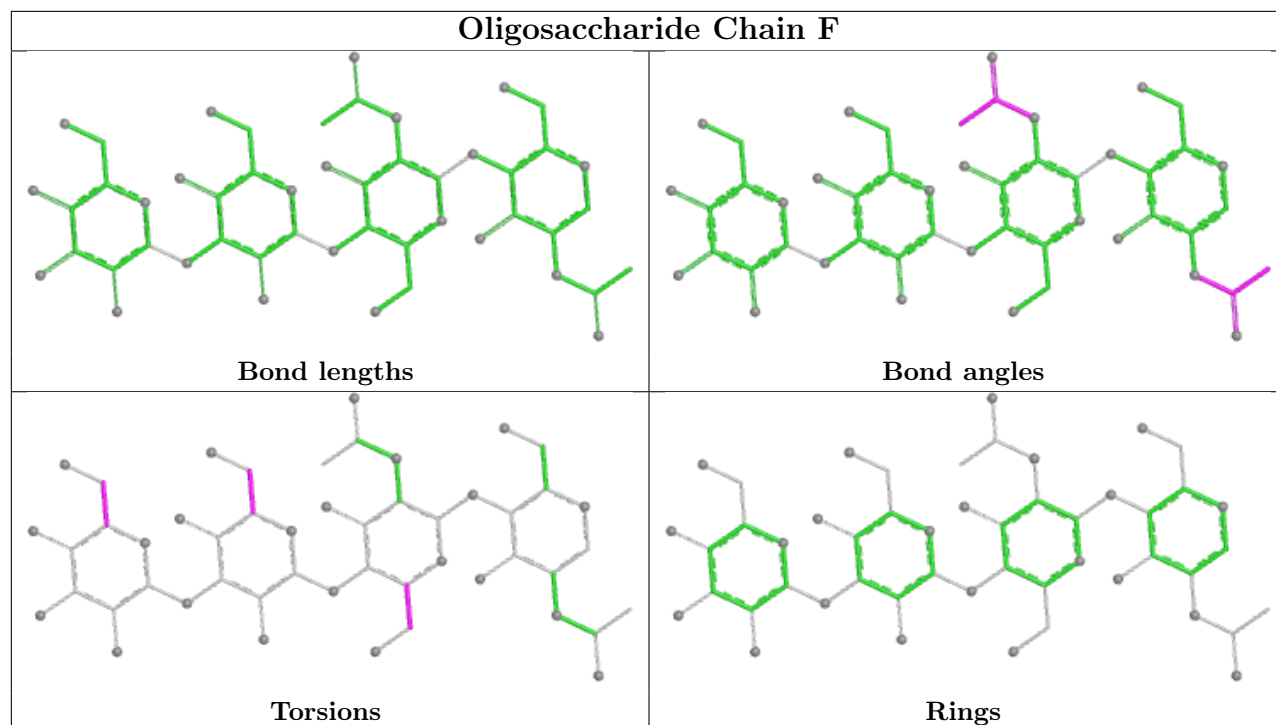
There are no ring outliers.

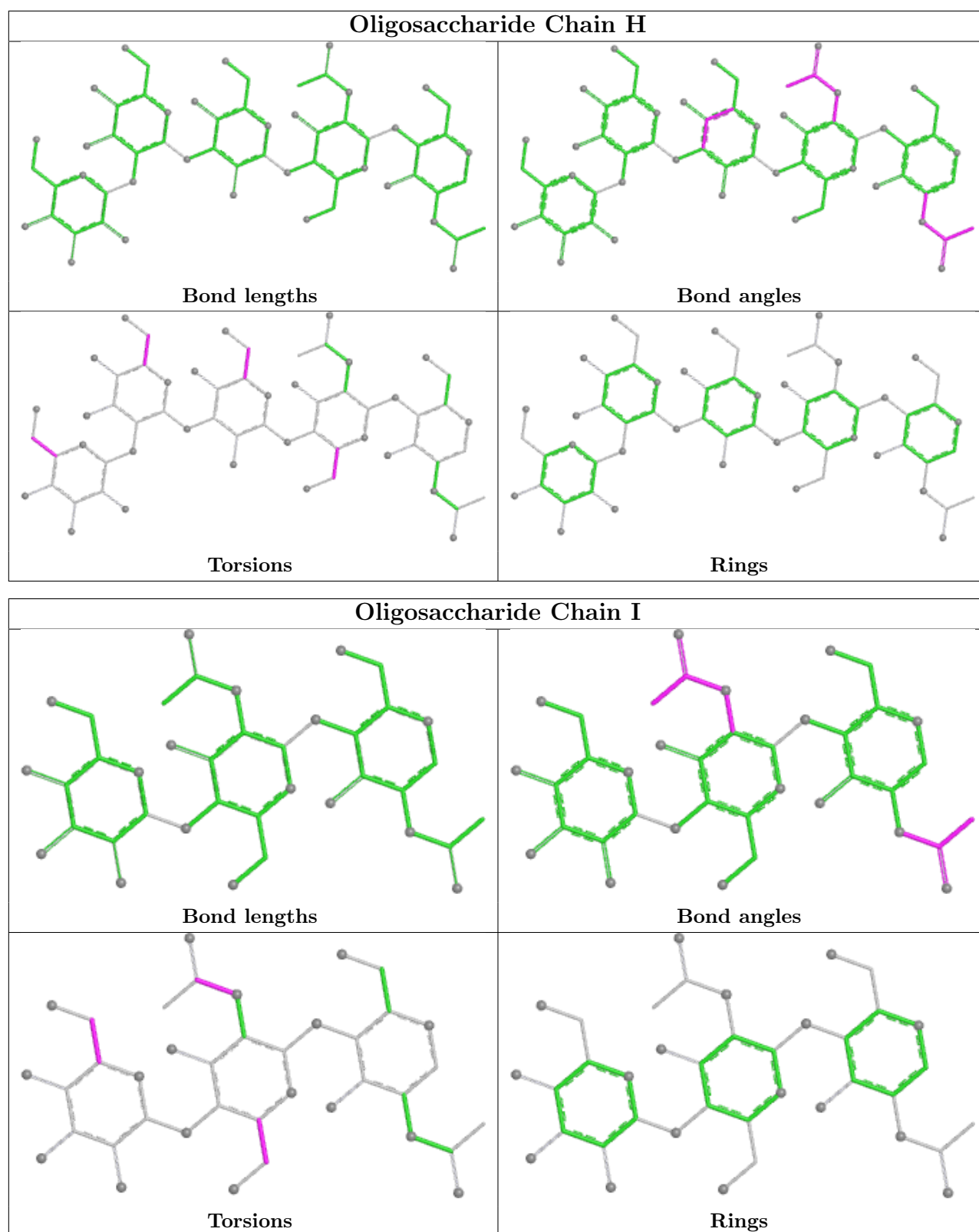
2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	G	2	NAG	1	0
4	G	1	NAG	2	0

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







5.6 Ligand geometry [i](#)

Of 13 ligands modelled in this entry, 4 are monoatomic - leaving 9 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	$\# Z > 2$
9	NAG	B	401	1	14,14,15	0.55	0	17,19,21	1.18	2 (11%)
10	PEG	C	404	-	6,6,6	0.49	0	5,5,5	0.24	0
9	NAG	C	401	1	14,14,15	0.56	0	17,19,21	1.26	2 (11%)
10	PEG	B	404	-	6,6,6	0.49	0	5,5,5	0.28	0
10	PEG	D	403	-	6,6,6	0.50	0	5,5,5	0.27	0
8	HI8	B	403	-	31,32,32	1.57	4 (12%)	41,50,50	1.55	6 (14%)
8	HI8	C	403	-	31,32,32	1.60	4 (12%)	41,50,50	1.64	7 (17%)
8	HI8	D	402	-	31,32,32	1.60	4 (12%)	41,50,50	1.74	8 (19%)
8	HI8	A	501	-	31,32,32	1.61	4 (12%)	41,50,50	1.58	6 (14%)

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
9	NAG	B	401	1	-	0/6/23/26	0/1/1/1
10	PEG	C	404	-	-	1/4/4/4	-
9	NAG	C	401	1	-	2/6/23/26	0/1/1/1
10	PEG	B	404	-	-	2/4/4/4	-
10	PEG	D	403	-	-	1/4/4/4	-
8	HI8	B	403	-	-	5/20/35/35	0/4/4/4
8	HI8	C	403	-	-	5/20/35/35	0/4/4/4
8	HI8	D	402	-	-	7/20/35/35	0/4/4/4
8	HI8	A	501	-	-	7/20/35/35	0/4/4/4

The worst 5 of 16 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	A	501	HI8	C4-N6	5.47	1.43	1.37
8	D	402	HI8	C4-N6	5.35	1.42	1.37
8	C	403	HI8	C4-N6	5.26	1.42	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	B	403	HI8	C4-N6	5.08	1.42	1.37
8	A	501	HI8	C17-N19	3.92	1.50	1.46

The worst 5 of 31 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	D	402	HI8	C1-C2-C26	-6.22	110.23	114.71
8	C	403	HI8	C1-C2-C26	-6.03	110.36	114.71
8	A	501	HI8	C1-C2-C26	-5.60	110.67	114.71
8	B	403	HI8	C1-C2-C26	-4.98	111.12	114.71
8	D	402	HI8	N19-C13-N14	-3.98	111.10	116.35

There are no chirality outliers.

5 of 30 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	A	501	HI8	N19-C17-C20-C21
8	A	501	HI8	N19-C17-C20-C25
8	A	501	HI8	C1-C2-N3-C12
8	B	403	HI8	C1-C2-N3-C12
8	C	403	HI8	N19-C17-C20-C21

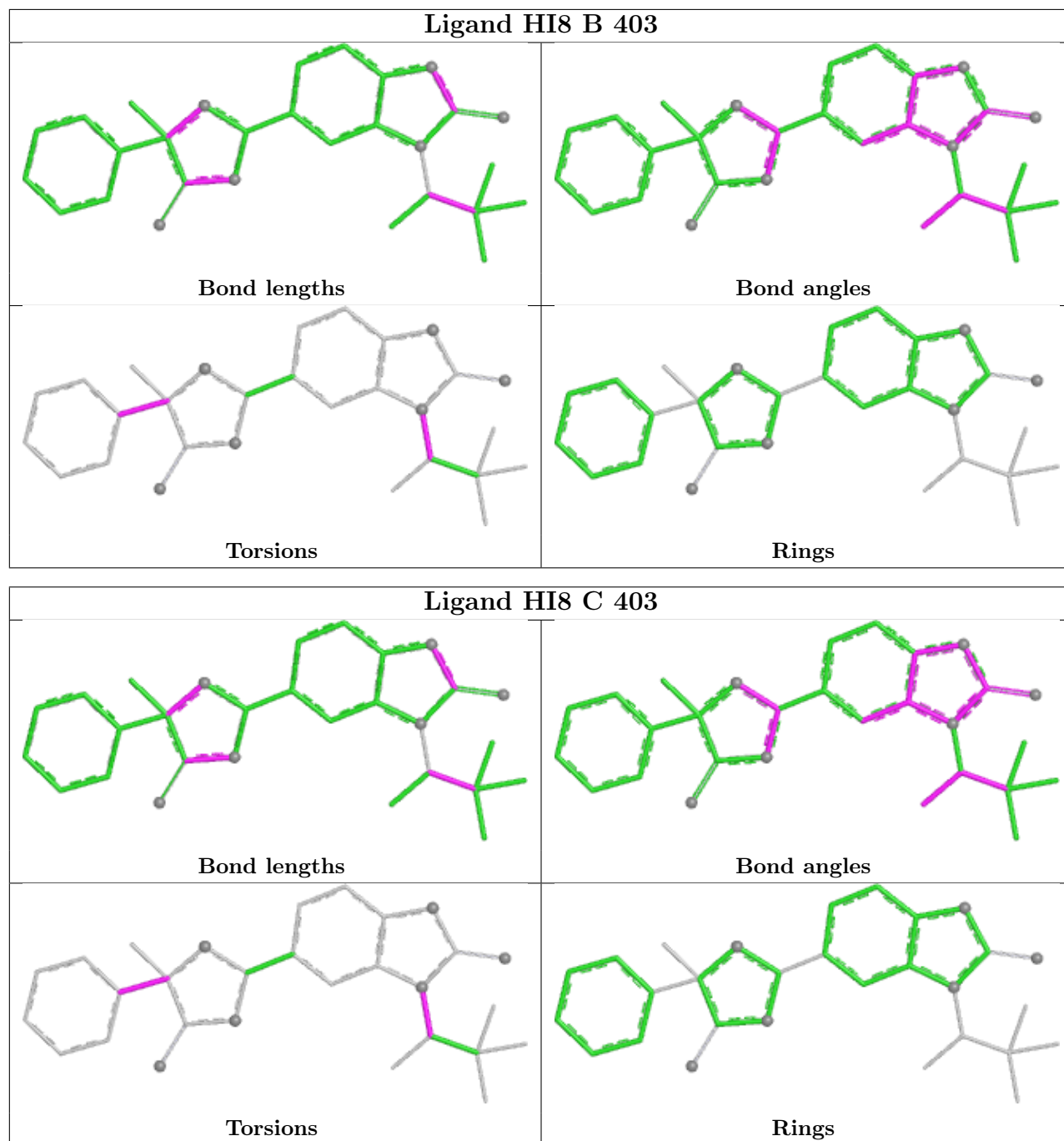
There are no ring outliers.

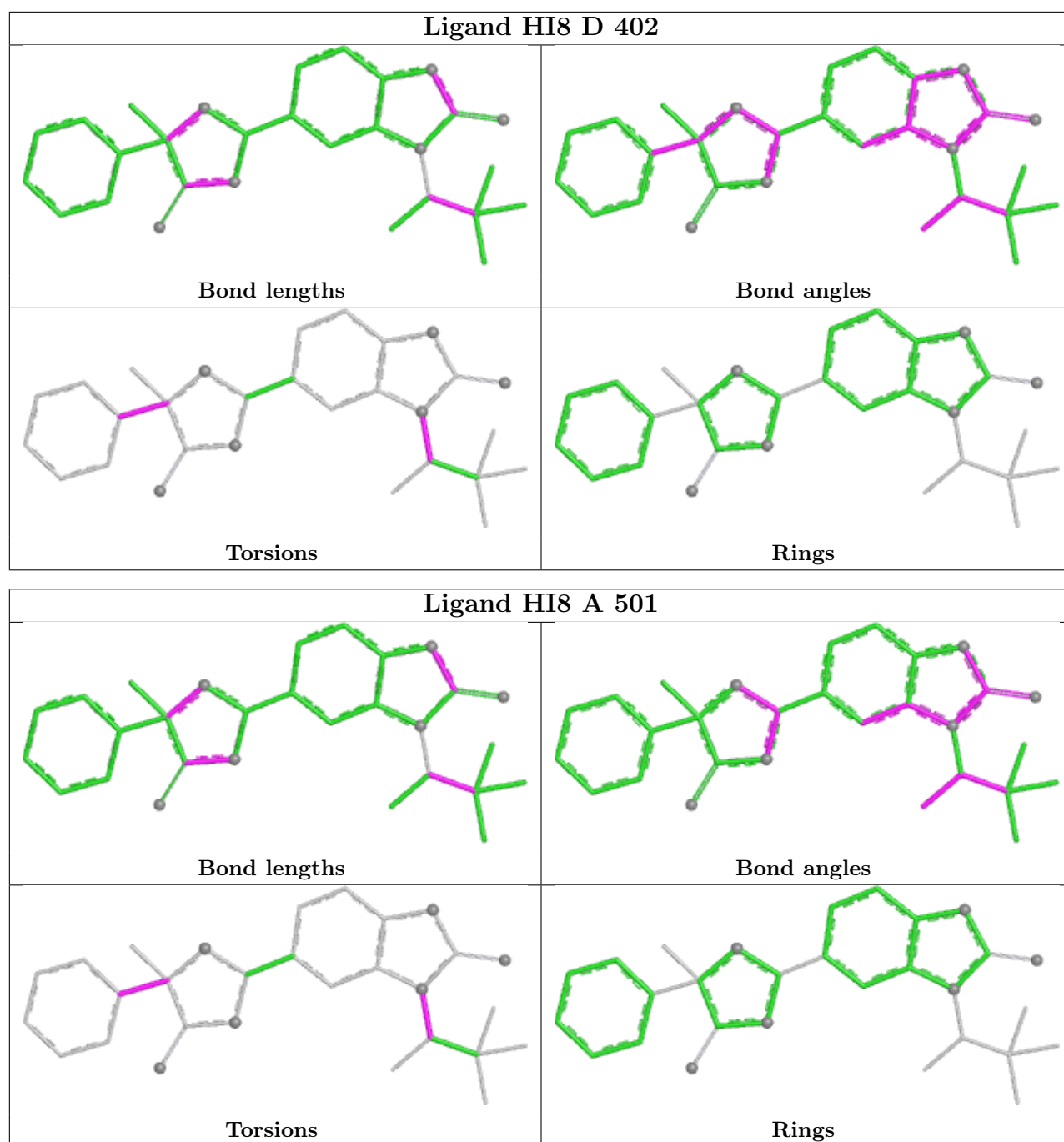
6 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	C	404	PEG	1	0
10	B	404	PEG	2	0
10	D	403	PEG	1	0
8	C	403	HI8	3	0
8	D	402	HI8	2	0
8	A	501	HI8	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for 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	329/397 (82%)	0.40	11 (3%) 49 46	38, 55, 85, 107	0
1	B	336/397 (84%)	0.78	28 (8%) 17 15	41, 65, 100, 121	0
1	C	324/397 (81%)	0.51	7 (2%) 62 59	39, 63, 89, 103	0
1	D	325/397 (81%)	0.86	27 (8%) 17 15	44, 67, 101, 136	0
All	All	1314/1588 (82%)	0.64	73 (5%) 30 27	38, 62, 93, 136	0

The worst 5 of 73 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	369	TYR	4.2
1	B	53	THR	4.2
1	D	370	VAL	4.0
1	B	355	THR	4.0
1	B	397	CYS	3.8

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
5	MAN	H	4	11/12	0.53	0.14	116,128,132,135	0
2	NAG	E	2	14/15	0.56	0.14	97,108,115,127	0

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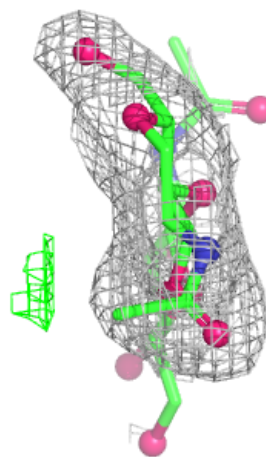
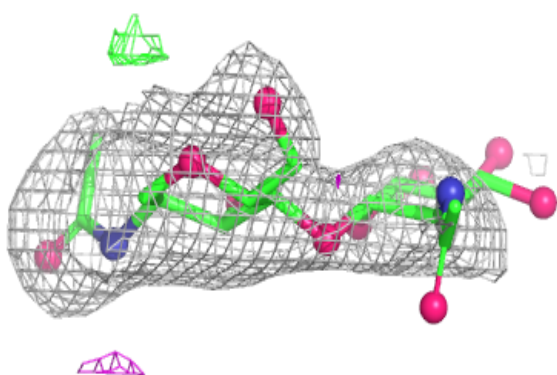
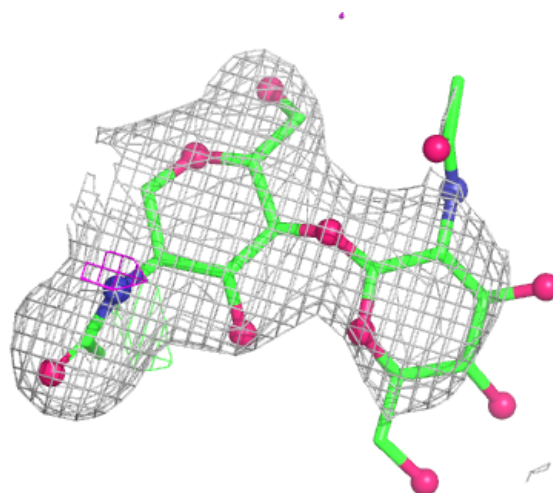
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	MAN	H	5	11/12	0.56	0.12	114,128,131,132	0
4	MAN	G	4	11/12	0.58	0.13	103,106,110,113	0
5	BMA	H	3	11/12	0.61	0.13	86,96,105,112	0
3	MAN	F	4	11/12	0.65	0.13	84,95,99,104	0
2	NAG	E	1	14/15	0.79	0.11	69,77,86,96	0
3	BMA	F	3	11/12	0.81	0.10	69,79,83,87	0
6	BMA	I	3	11/12	0.81	0.10	75,79,87,89	0
4	BMA	G	3	11/12	0.82	0.10	79,85,91,98	0
6	NAG	I	2	14/15	0.90	0.10	61,66,71,75	0
5	NAG	H	2	14/15	0.91	0.10	62,66,75,81	0
4	NAG	G	2	14/15	0.92	0.10	62,68,76,76	0
3	NAG	F	2	14/15	0.94	0.08	48,56,62,67	0
5	NAG	H	1	14/15	0.94	0.10	45,54,56,62	0
6	NAG	I	1	14/15	0.95	0.08	43,54,60,64	0
3	NAG	F	1	14/15	0.95	0.07	39,44,52,55	0
4	NAG	G	1	14/15	0.95	0.09	53,57,61,67	0

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

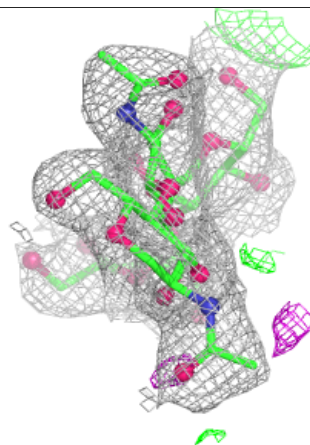
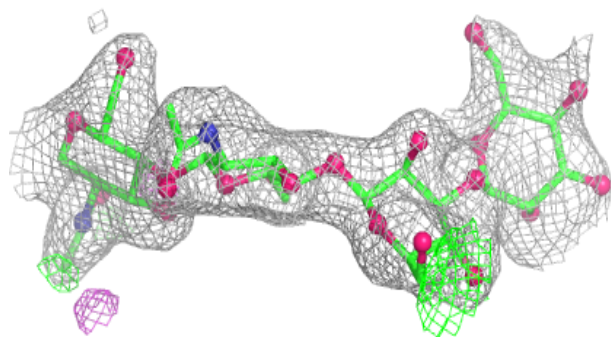
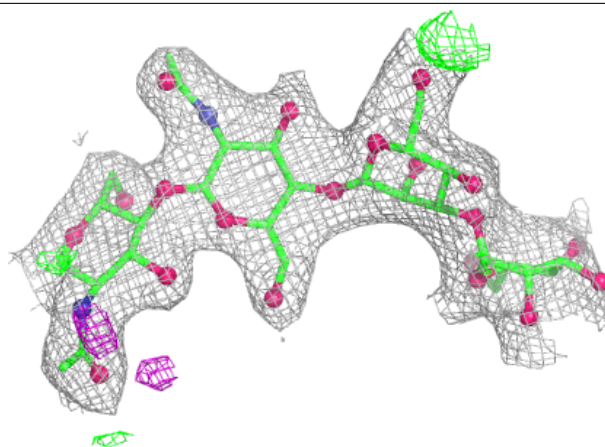
Electron density around Chain E:

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

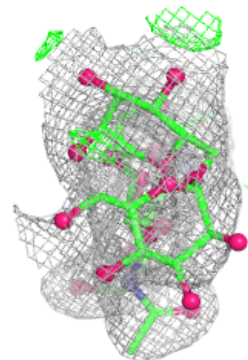
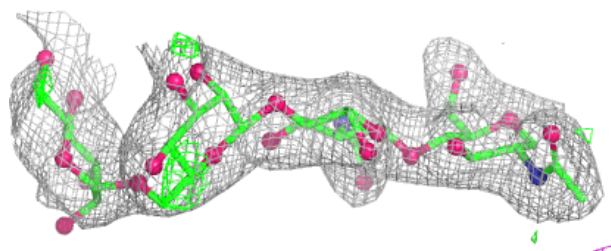
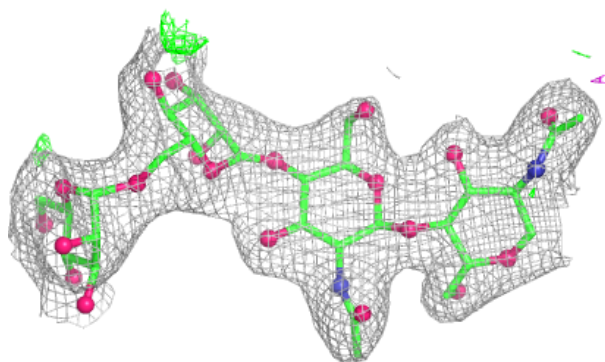


Electron density around Chain F:

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

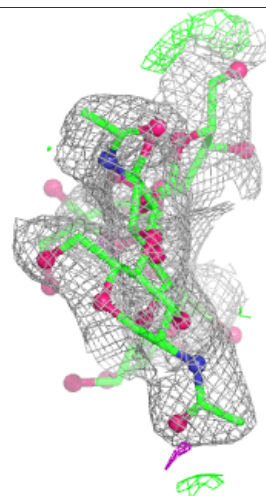
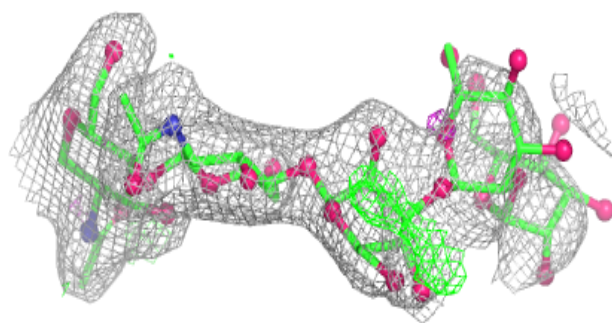
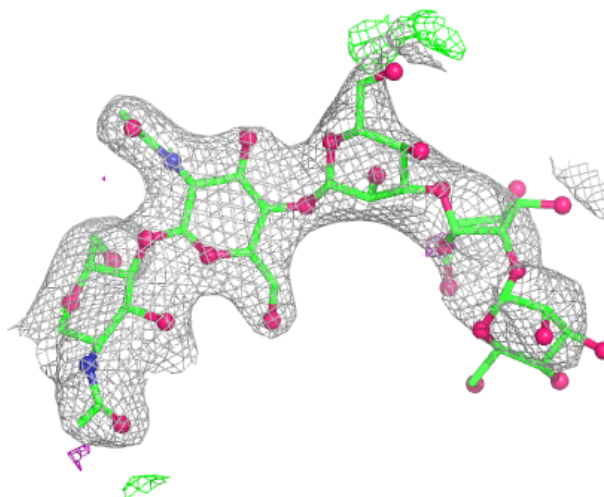
**Electron density around Chain G:**

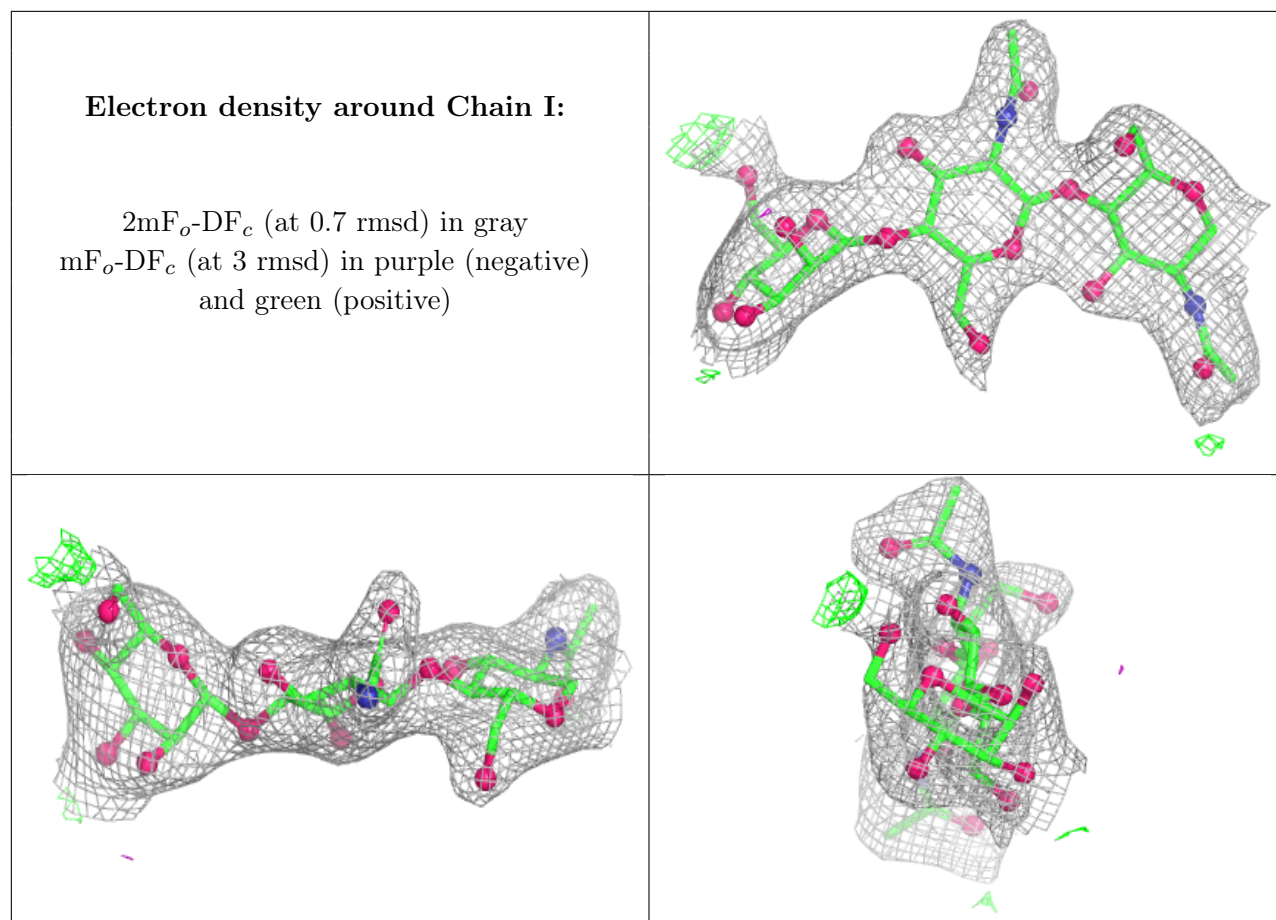
$2mF_o - DF_c$ (at 0.7 rmsd) in gray
 $mF_o - DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain H:

$2mF_o-DF_c$ (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.

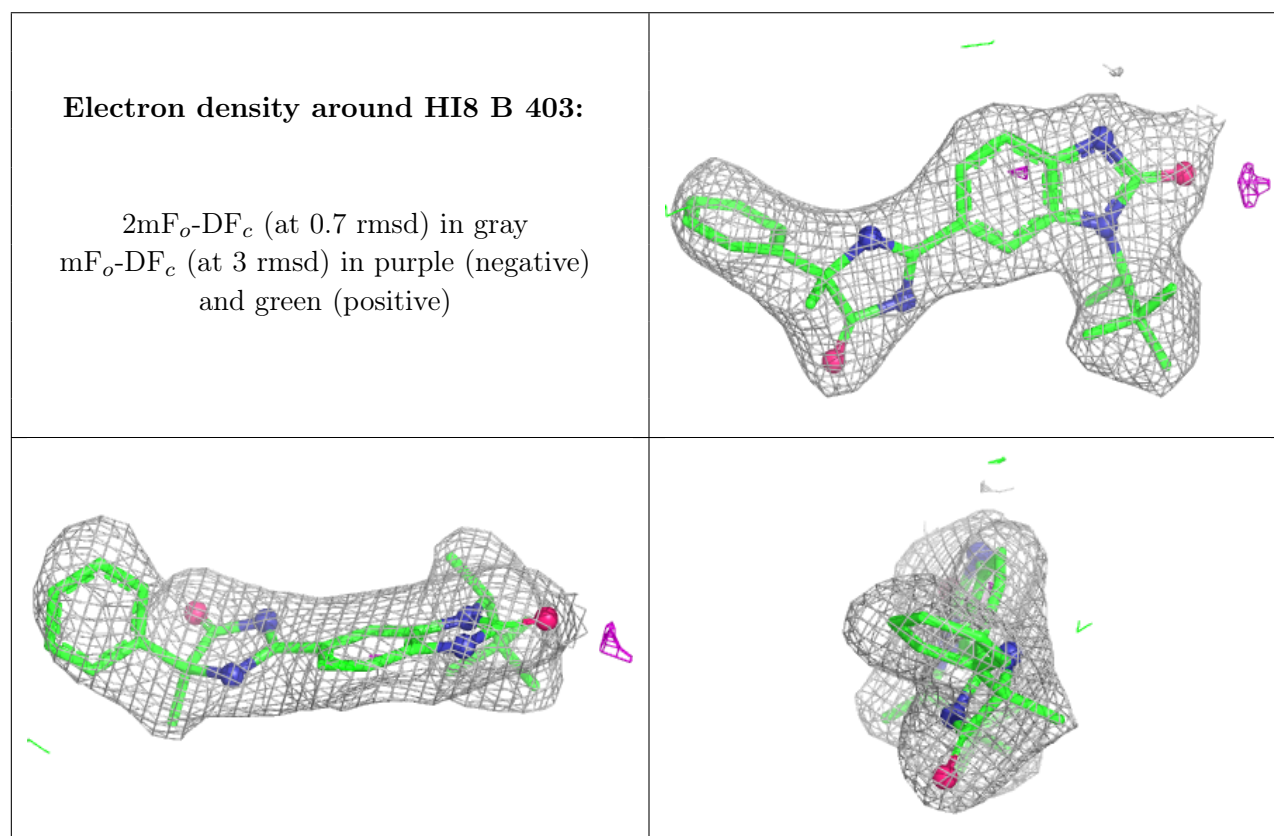
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
9	NAG	B	401	14/15	0.73	0.12	70,86,90,93	0
9	NAG	C	401	14/15	0.76	0.13	71,85,88,100	0
7	MN	D	401	1/1	0.86	0.10	106,106,106,106	0
10	PEG	B	404	7/7	0.87	0.14	48,63,70,72	0
10	PEG	D	403	7/7	0.87	0.15	43,58,65,68	0
7	MN	B	402	1/1	0.91	0.08	105,105,105,105	0
10	PEG	C	404	7/7	0.92	0.11	47,55,61,70	0
8	HI8	B	403	29/29	0.93	0.10	39,53,73,76	0
8	HI8	D	402	29/29	0.94	0.09	43,50,68,73	0
7	MN	C	402	1/1	0.94	0.06	95,95,95,95	0
8	HI8	C	403	29/29	0.95	0.09	40,46,69,70	0
8	HI8	A	501	29/29	0.96	0.08	31,43,61,66	0

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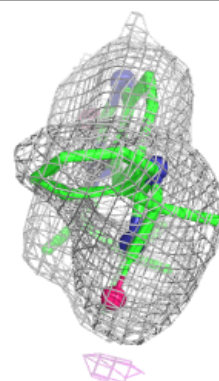
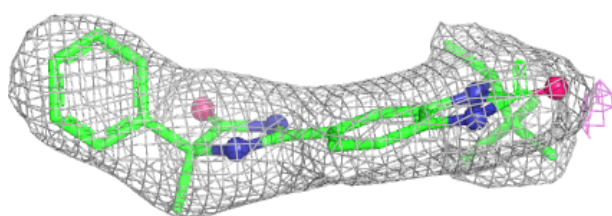
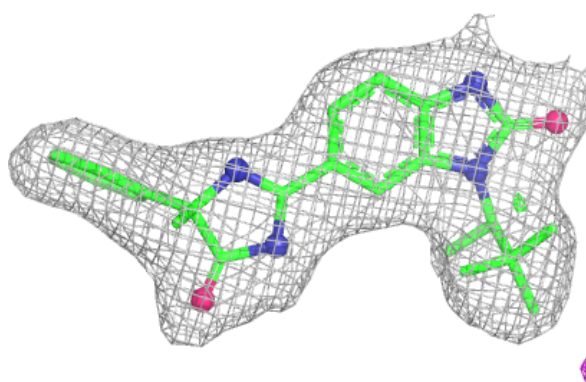
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
7	MN	A	500	1/1	0.99	0.03	65,65,65,65	0

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.

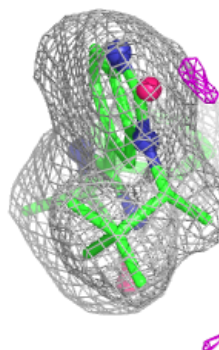
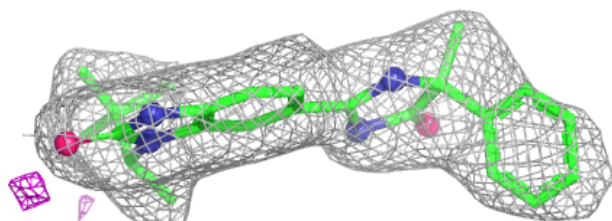
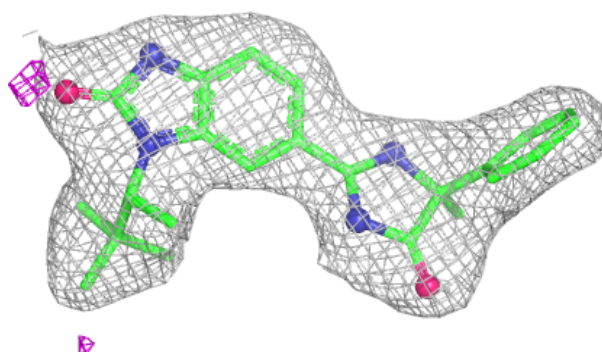


Electron density around HI8 D 402:

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

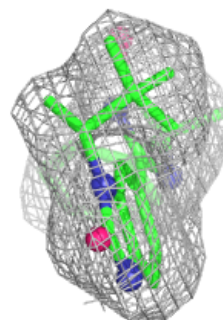
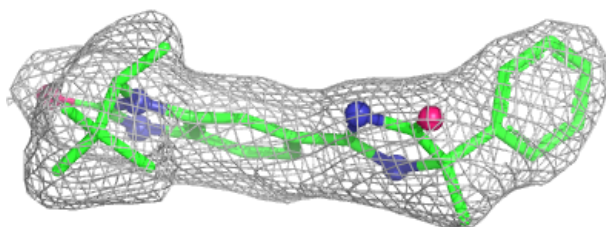
**Electron density around HI8 C 403:**

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



Electron density around HI8 A 501:

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



6.5 Other polymers [i](#)

There are no such residues in this entry.