Full wwPDB X-ray Structure Validation Report ⓘ

Jun 12, 2024 – 07:06 AM EDT

PDB ID	:	6NSG
Title	:	Crystal structure of the A/Brisbane/10/2007 (H3N2) influenza virus hemagglutinin G186V/L194P mutant in complex with 6'-SLNLN
Authors	:	Wu, N.C.; Wilson, I.A.
Deposited on	:	2019-01-24
Resolution	:	2.40 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:

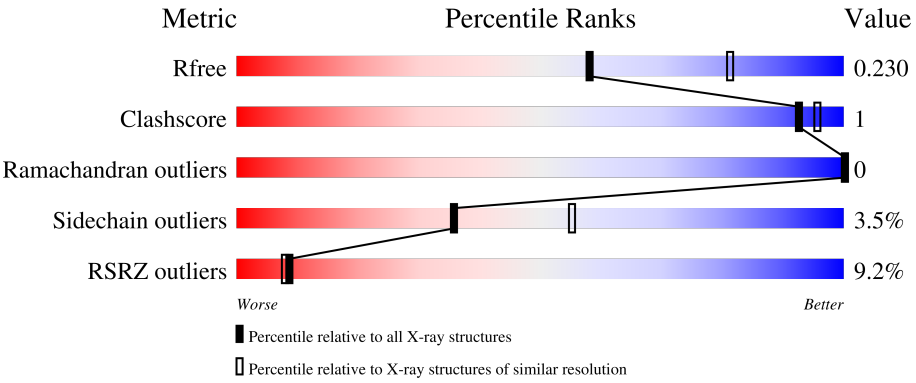
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36.2
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	321	14% 89% 9% .
2	B	176	94% . . .
3	C	5	20% 80%
4	D	3	33% 67%
5	E	2	100%

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Mol	Chain	Length	Quality of chain
5	F	2	50% 50%

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	FUL	D	3	-	-	-	X
5	NAG	E	1	-	-	-	X
6	NAG	A	401	-	-	-	X
7	SIA	A	415	-	-	-	X

2 Entry composition (i)

There are 8 unique types of molecules in this entry. The entry contains 4287 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 Hemagglutinin HA1 chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	317	Total	C	N	O	S	0	2	0
			2484	1559	441	472	12			

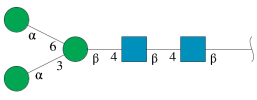
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	9	PRO	-	expression tag	UNP C3PR70
A	10	GLY	-	expression tag	UNP C3PR70
A	190	ASP	ASN	conflict	UNP C3PR70
A	194	PRO	LEU	engineered mutation	UNP C3PR70

- Molecule 2 is a protein called Hemagglutinin HA2 chain.

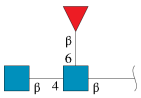
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	173	Total	C	N	O	S	0	4	0
			1413	885	245	277	6			

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



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

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

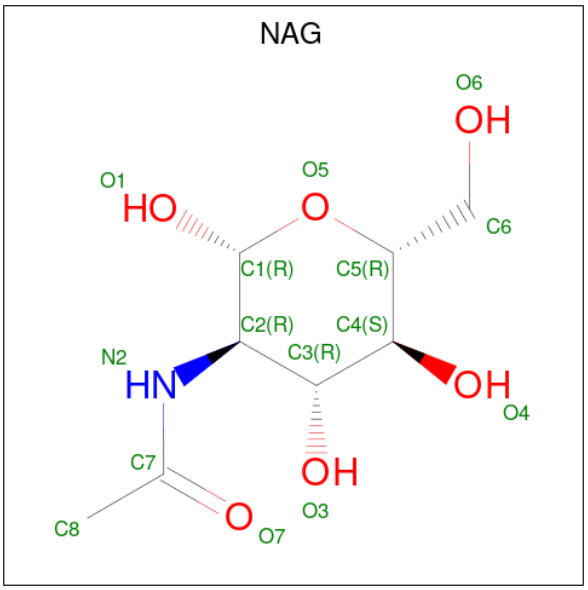


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	D	3	Total	C	N	O	0	0	0
			38	22	2	14			

- Molecule 5 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
5	E	2	Total	C	N	O	0	0	0
			28	16	2	10			
5	F	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



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

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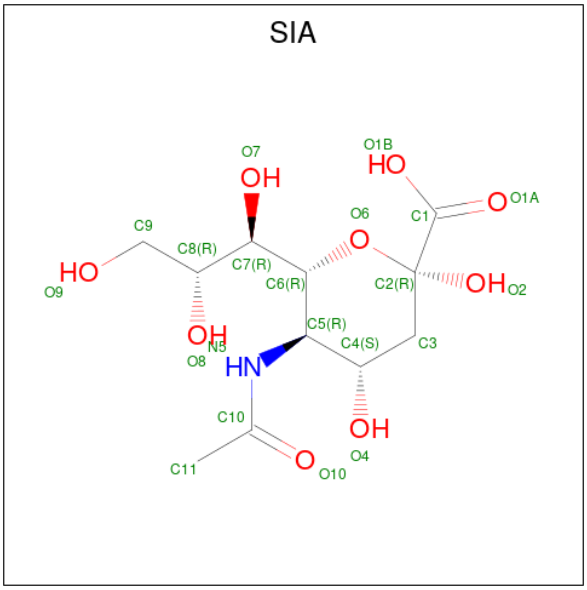
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C N O 14 8 1 5	0	0
6	B	1	Total C N O 14 8 1 5	0	0

- Molecule 7 is N-acetyl-alpha-neuraminic acid (three-letter code: SIA) (formula: $C_{11}H_{19}NO_9$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total C N O 21 11 1 9	0	0

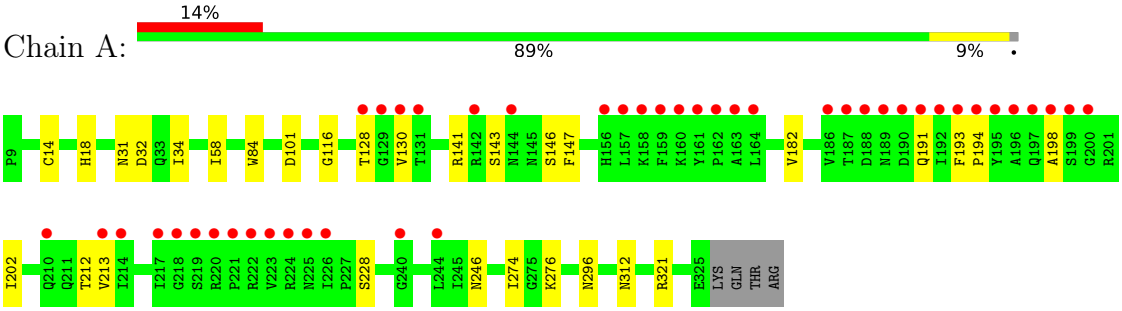
- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	84	Total O 84 84	0	0
8	B	88	Total O 88 88	0	0

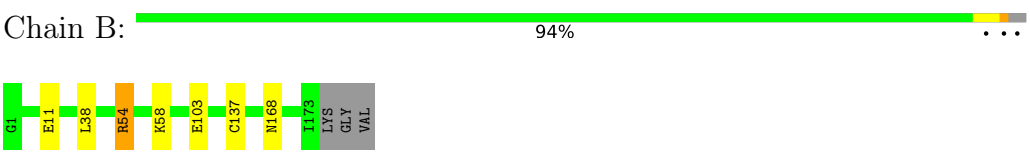
3 Residue-property plots (i)

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

• Molecule 1: Hemagglutinin HA1 chain



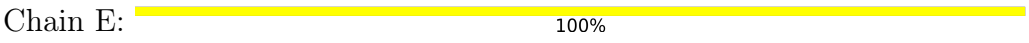
• Molecule 2: Hemagglutinin HA2 chain



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

• Molecule 4: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-[beta-L-fucopyranose-(1-6)]2-acetamido-2-deoxy-beta-D-glucopyranose

• Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



• Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	H 3 2	Depositor
Cell constants a, b, c, α, β, γ	100.26Å 100.26Å 383.64Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	50.00 – 2.40 43.14 – 2.40	Depositor EDS
% Data completeness (in resolution range)	100.0 (50.00-2.40) 100.0 (43.14-2.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$< I/\sigma(I) >$ [1]	2.94 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.8.0158	Depositor
R, R_{free}	0.187 , 0.231 0.190 , 0.230	Depositor DCC
R_{free} test set	1448 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å^2)	48.2	Xtriage
Anisotropy	0.154	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 43.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	4287	wwPDB-VP
Average B, all atoms (Å^2)	71.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.47% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: FUL, MAN, BMA, NAG, SIA

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	0.52	0/2548	0.72	2/3467 (0.1%)
2	B	0.54	0/1449	0.73	1/1947 (0.1%)
All	All	0.53	0/3997	0.72	3/5414 (0.1%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	312	ASN	CB-CA-C	-5.81	98.77	110.40
2	B	54	ARG	NE-CZ-NH1	5.32	122.96	120.30
1	A	321	ARG	NE-CZ-NH1	5.14	122.87	120.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2484	0	2442	11	0
2	B	1413	0	1359	2	0
3	C	61	0	52	0	0
4	D	38	0	34	0	0
5	E	28	0	25	0	0
5	F	28	0	25	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	A	28	0	26	0	0
6	B	14	0	13	0	0
7	A	21	0	18	0	0
8	A	84	0	0	0	0
8	B	88	0	0	0	0
All	All	4287	0	3994	12	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 1.

All (12) 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:141:ARG:NH1	1:A:147:PHE:O	2.42	0.53
1:A:182:VAL:HG21	1:A:213:VAL:CG1	2.43	0.48
1:A:193:PHE:HB3	1:A:194:PRO:HD3	1.98	0.46
2:B:54:ARG:NH2	2:B:103:GLU:OE2	2.42	0.43
1:A:58:ILE:HG21	1:A:274:ILE:HD12	2.00	0.43
1:A:141:ARG:HB3	1:A:146:SER:CB	2.49	0.43
1:A:182:VAL:HG22	1:A:202:ILE:HD13	1.99	0.43
1:A:191:GLN:NE2	1:A:198:ALA:O	2.51	0.43
1:A:182:VAL:HG21	1:A:213:VAL:HG11	2.00	0.42
1:A:31:ASN:ND2	1:A:34[B]:ILE:HD11	2.34	0.42
1:A:14:CYS:HA	2:B:137:CYS:HA	2.02	0.41
1:A:84:TRP:CE2	1:A:116:GLY:HA2	2.56	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	317/321 (99%)	302 (95%)	15 (5%)	0	100	100
2	B	175/176 (99%)	166 (95%)	9 (5%)	0	100	100
All	All	492/497 (99%)	468 (95%)	24 (5%)	0	100	100

There are no Ramachandran outliers to report.

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	283/285 (99%)	272 (96%)	11 (4%)	32	50
2	B	150/148 (101%)	146 (97%)	4 (3%)	44	65
All	All	433/433 (100%)	418 (96%)	15 (4%)	36	55

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	HIS
1	A	32	ASP
1	A	101	ASP
1	A	128	THR
1	A	130	VAL
1	A	143	SER
1	A	212	THR
1	A	228	SER
1	A	246	ASN
1	A	276	LYS
1	A	296	ASN
2	B	11	GLU
2	B	38	LEU
2	B	58	LYS
2	B	168	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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

12 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	$\#\|Z\| > 2$
3	NAG	C	1	1,3	14,14,15	0.53	0	17,19,21	1.36	1 (5%)
3	NAG	C	2	3	14,14,15	0.42	0	17,19,21	1.13	1 (5%)
3	BMA	C	3	3	11,11,12	0.40	0	15,15,17	0.82	0
3	MAN	C	4	3	11,11,12	0.44	0	15,15,17	1.13	2 (13%)
3	MAN	C	5	3	11,11,12	0.75	0	15,15,17	2.36	3 (20%)
4	NAG	D	1	1,4	14,14,15	0.50	0	17,19,21	1.28	3 (17%)
4	NAG	D	2	4	14,14,15	0.36	0	17,19,21	0.83	1 (5%)
4	FUL	D	3	4	10,10,11	0.47	0	14,14,16	0.79	0
5	NAG	E	1	5,1	14,14,15	0.51	0	17,19,21	1.25	1 (5%)
5	NAG	E	2	5	14,14,15	0.51	0	17,19,21	1.40	1 (5%)
5	NAG	F	1	5,1	14,14,15	0.44	0	17,19,21	0.90	1 (5%)
5	NAG	F	2	5	14,14,15	0.29	0	17,19,21	0.44	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
3	NAG	C	1	1,3	-	0/6/23/26	0/1/1/1

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

There are no bond length outliers.

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	5	MAN	C1-C2-C3	6.50	117.66	109.67
3	C	5	MAN	C1-O5-C5	4.65	118.49	112.19
5	E	2	NAG	C1-O5-C5	4.63	118.46	112.19
3	C	1	NAG	C1-O5-C5	4.33	118.06	112.19
5	E	1	NAG	C1-O5-C5	3.98	117.59	112.19
3	C	5	MAN	O5-C1-C2	3.25	115.79	110.77
3	C	2	NAG	C1-O5-C5	3.23	116.57	112.19
4	D	1	NAG	O5-C5-C4	-2.78	104.06	110.83
4	D	1	NAG	O5-C5-C6	2.65	111.36	107.20
3	C	4	MAN	C1-O5-C5	2.63	115.76	112.19
3	C	4	MAN	C3-C4-C5	2.52	114.73	110.24
4	D	1	NAG	C6-C5-C4	2.39	118.59	113.00
4	D	2	NAG	C4-C3-C2	2.24	114.30	111.02
5	F	1	NAG	O5-C5-C4	-2.06	105.81	110.83

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	3	BMA	O5-C5-C6-O6
3	C	4	MAN	O5-C5-C6-O6
3	C	3	BMA	C4-C5-C6-O6
3	C	4	MAN	C4-C5-C6-O6
3	C	2	NAG	C4-C5-C6-O6

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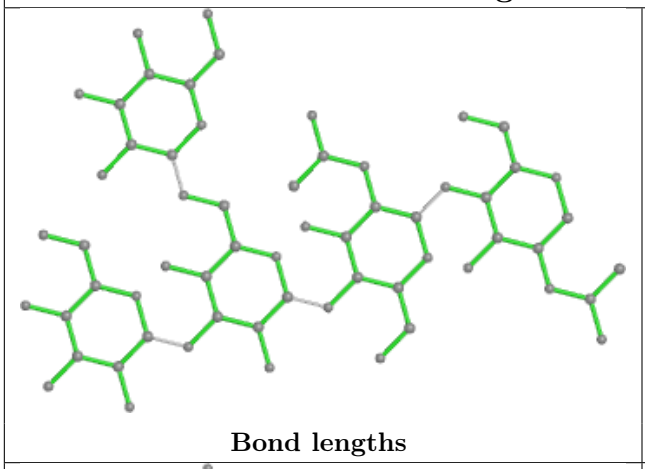
Mol	Chain	Res	Type	Atoms
4	D	2	NAG	O5-C5-C6-O6
3	C	2	NAG	O5-C5-C6-O6
5	F	2	NAG	C4-C5-C6-O6

There are no ring outliers.

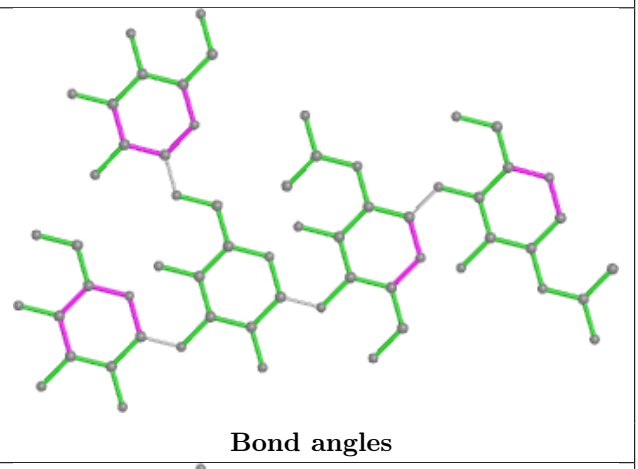
No monomer is involved in short contacts.

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

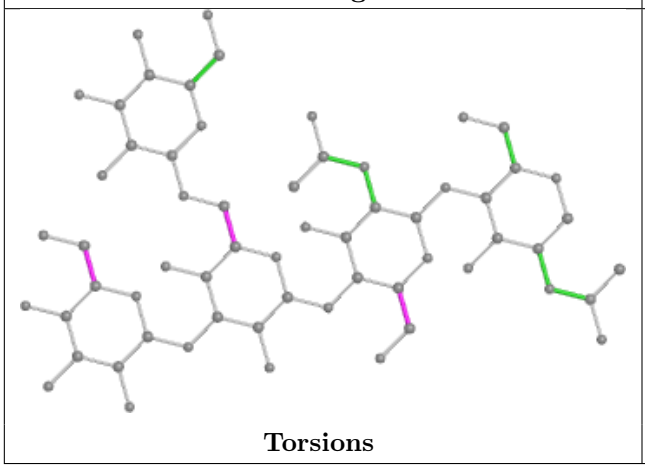
Oligosaccharide Chain C



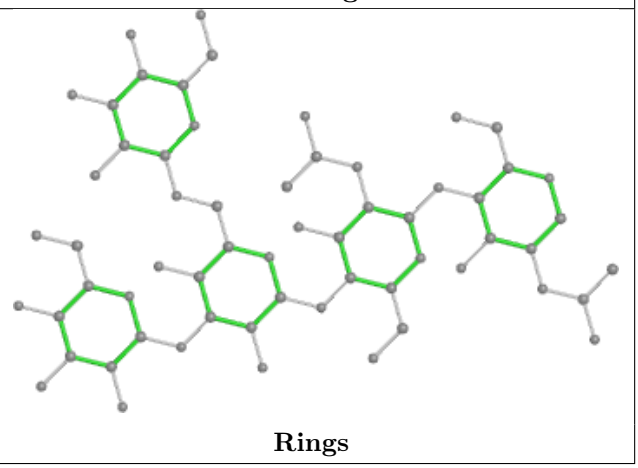
Bond lengths



Bond angles

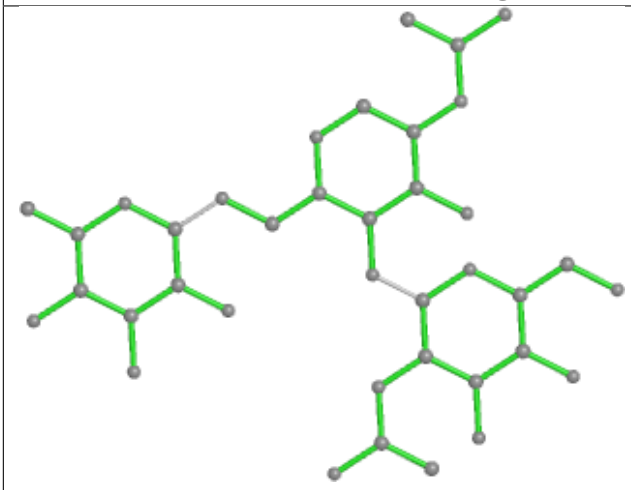


Torsions

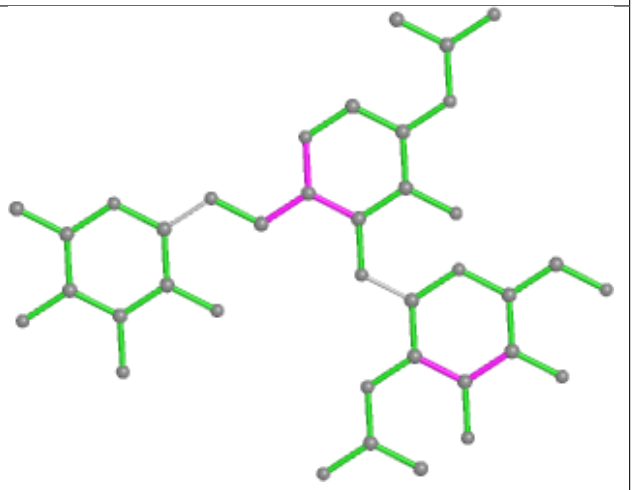


Rings

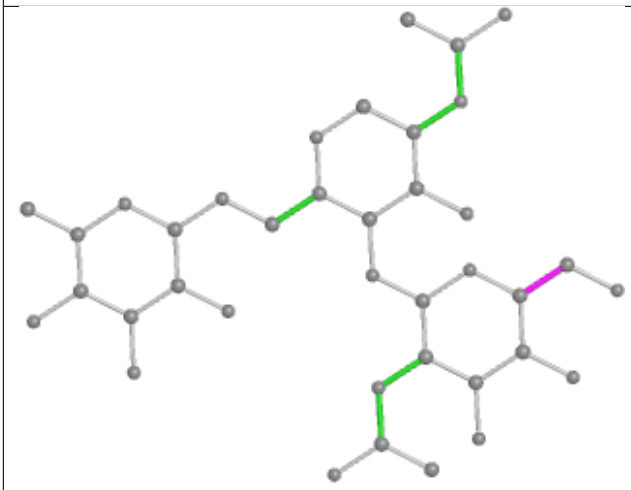
Oligosaccharide Chain D



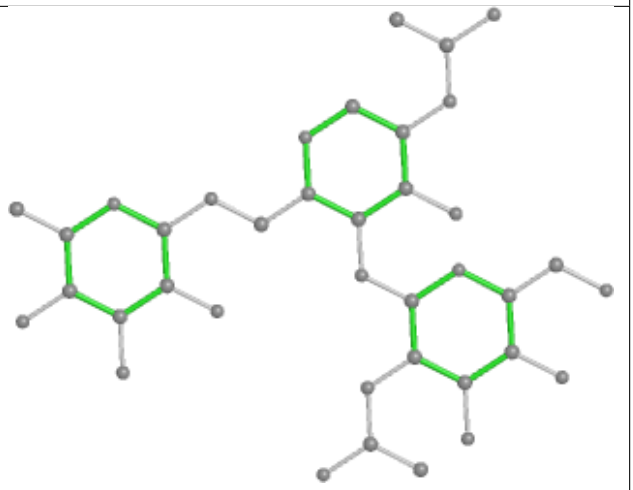
Bond lengths



Bond angles

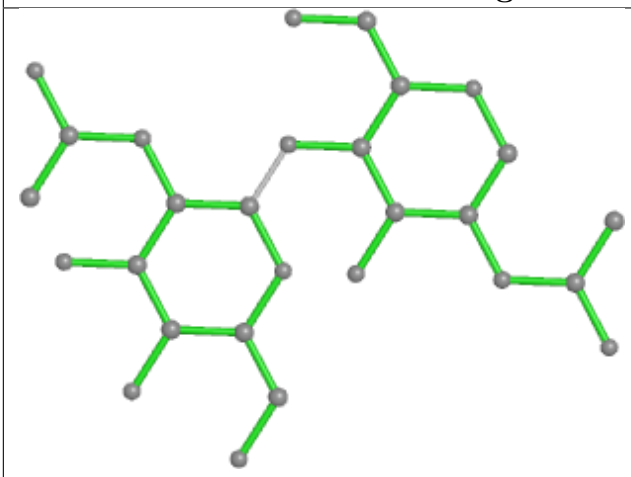


Torsions

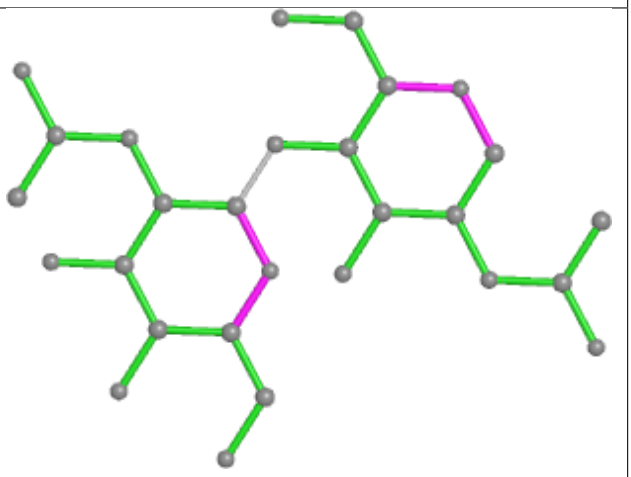


Rings

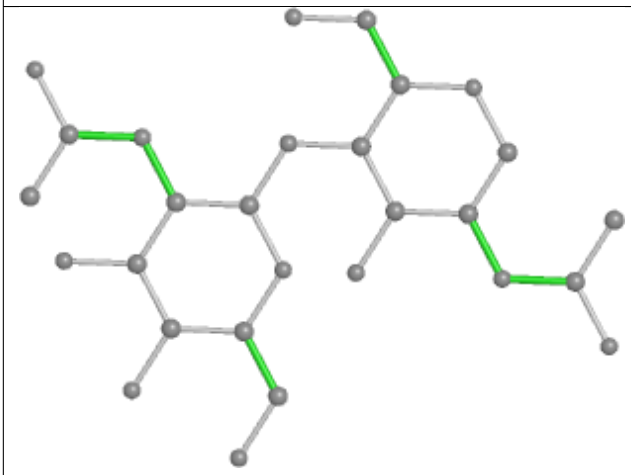
Oligosaccharide Chain E



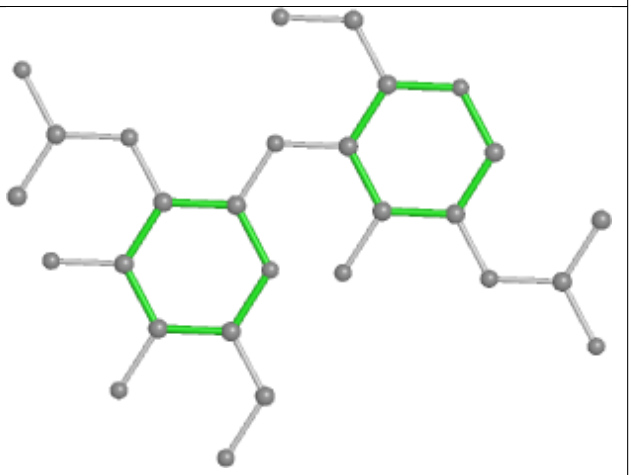
Bond lengths



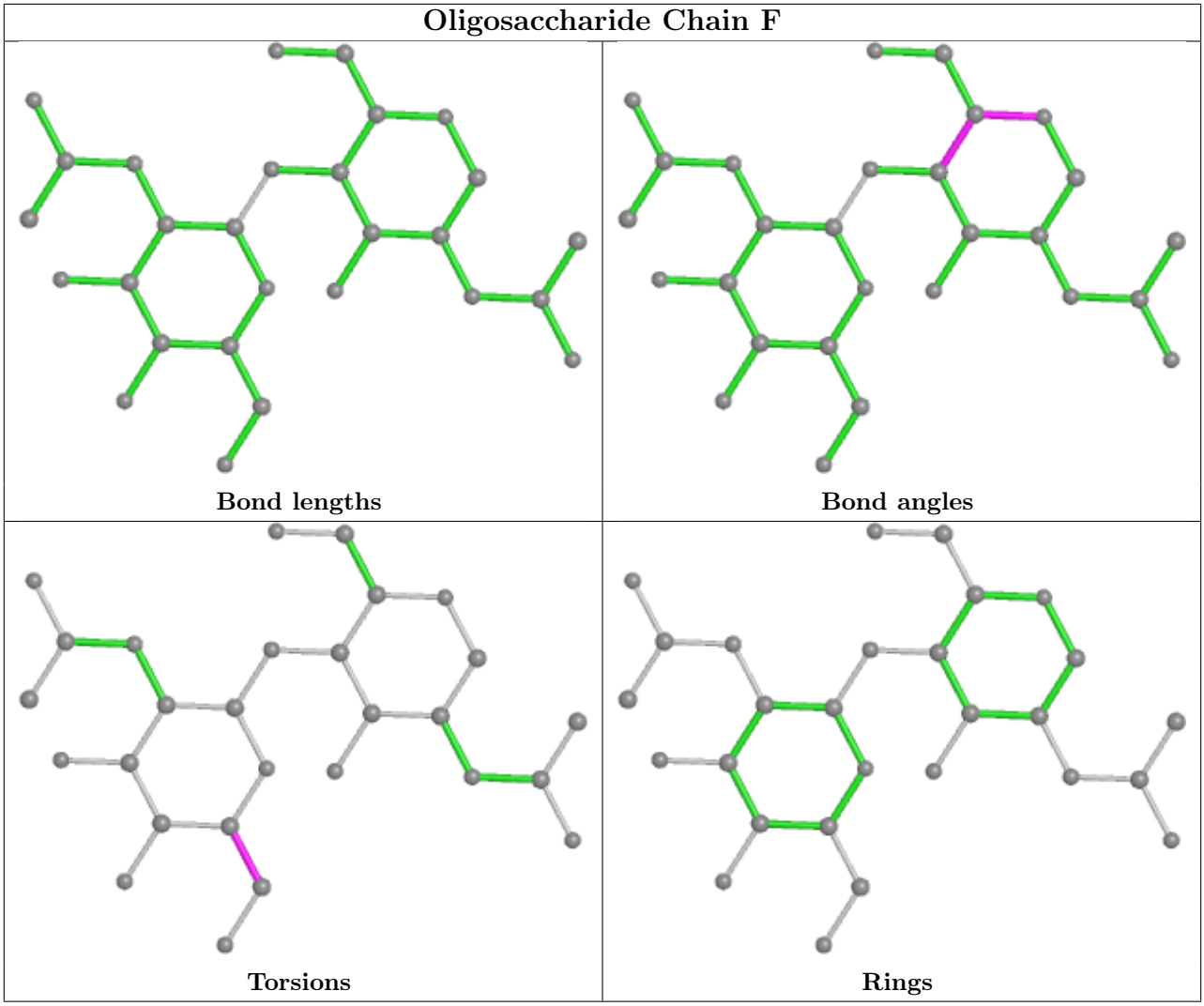
Bond angles



Torsions



Rings



5.6 Ligand geometry (i)

4 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	$\#\|Z\| > 2$
6	NAG	B	201	2	14,14,15	0.46	0	17,19,21	1.03	1 (5%)
6	NAG	A	414	1	14,14,15	0.53	0	17,19,21	0.99	1 (5%)
6	NAG	A	401	1	14,14,15	0.58	0	17,19,21	1.16	2 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
7	SIA	A	415	-	21,21,21	0.97	1 (4%)	25,31,31	0.94	1 (4%)

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
6	NAG	B	201	2	-	0/6/23/26	0/1/1/1
6	NAG	A	414	1	-	0/6/23/26	0/1/1/1
6	NAG	A	401	1	-	0/6/23/26	0/1/1/1
7	SIA	A	415	-	-	3/20/38/38	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	415	SIA	O2-C2	3.27	1.43	1.39

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
7	A	415	SIA	O1A-C1-C2	-3.00	119.05	123.59
6	A	401	NAG	C1-O5-C5	2.97	116.22	112.19
6	A	414	NAG	C1-O5-C5	2.59	115.70	112.19
6	A	401	NAG	O5-C5-C6	2.44	111.02	107.20
6	B	201	NAG	O5-C5-C6	2.26	110.75	107.20

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	415	SIA	C7-C8-C9-O9
7	A	415	SIA	O1A-C1-C2-O2
7	A	415	SIA	O8-C8-C9-O9

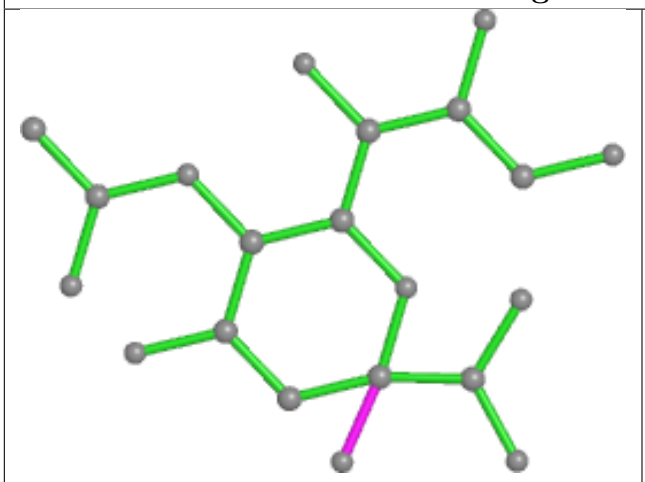
There are no ring outliers.

No monomer is involved in short contacts.

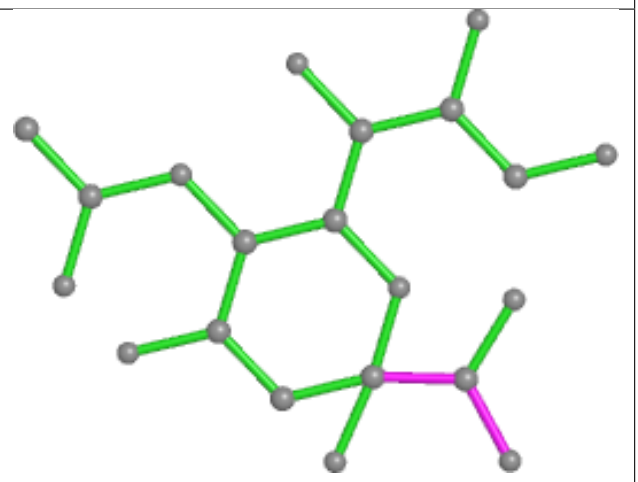
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

also be included. For torsion angles, if less then 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.

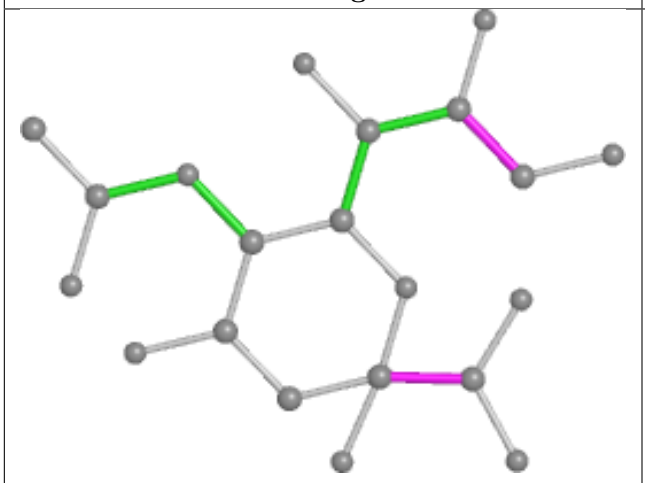
Ligand SIA A 415



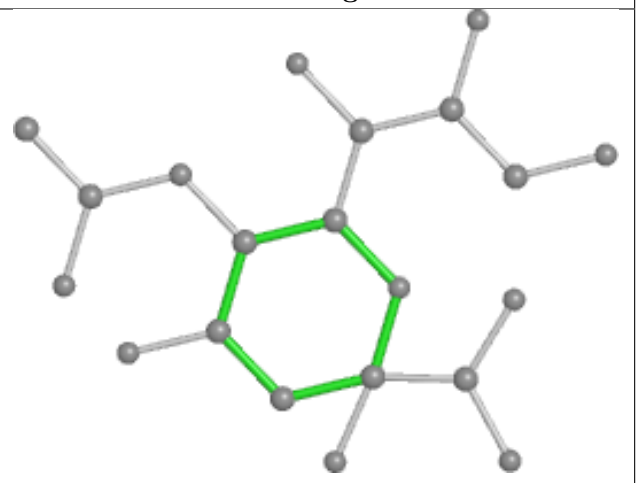
Bond lengths



Bond angles



Torsions



Rings

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

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	317/321 (98%)	0.74	45 (14%) 2 2	34, 64, 187, 250	0
2	B	173/176 (98%)	-0.43	0 100 100	33, 46, 66, 93	0
All	All	490/497 (98%)	0.32	45 (9%) 9 8	33, 53, 151, 250	0

All (45) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	193	PHE	18.8
1	A	196	ALA	16.9
1	A	159	PHE	11.6
1	A	195	TYR	11.1
1	A	194	PRO	10.9
1	A	156	HIS	10.8
1	A	157	LEU	10.6
1	A	189	ASN	10.5
1	A	190	ASP	10.2
1	A	186	VAL	9.8
1	A	199	SER	9.8
1	A	188	ASP	9.2
1	A	200	GLY	8.8
1	A	158	LYS	8.2
1	A	192	ILE	8.2
1	A	197	GLN	7.3
1	A	162	PRO	7.2
1	A	198	ALA	7.0
1	A	191	GLN	6.5
1	A	217	ILE	6.3
1	A	226	ILE	5.6
1	A	213	VAL	5.6
1	A	221	PRO	5.5
1	A	161	TYR	5.2

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Mol	Chain	Res	Type	RSRZ
1	A	129	GLY	5.2
1	A	225	ASN	5.2
1	A	222	ARG	5.1
1	A	214	ILE	4.9
1	A	187	THR	4.2
1	A	219	SER	4.1
1	A	160	LYS	4.1
1	A	142	ARG	4.0
1	A	223	VAL	3.9
1	A	163	ALA	3.3
1	A	240	GLY	3.3
1	A	220	ARG	3.3
1	A	130	VAL	2.8
1	A	128	THR	2.6
1	A	131	THR	2.6
1	A	164	LEU	2.4
1	A	144	ASN	2.4
1	A	218	GLY	2.3
1	A	224	ARG	2.3
1	A	244	LEU	2.1
1	A	210	GLN	2.1

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	NAG	E	1	14/15	0.58	0.42	127,135,141,142	0
3	MAN	C	5	11/12	0.66	0.32	126,135,141,141	0
5	NAG	E	2	14/15	0.75	0.39	133,140,144,145	0
4	FUL	D	3	10/11	0.78	0.42	118,122,125,126	0
3	BMA	C	3	11/12	0.79	0.24	126,131,140,142	0
5	NAG	F	2	14/15	0.83	0.35	96,101,103,104	0
3	MAN	C	4	11/12	0.84	0.27	123,138,143,144	0

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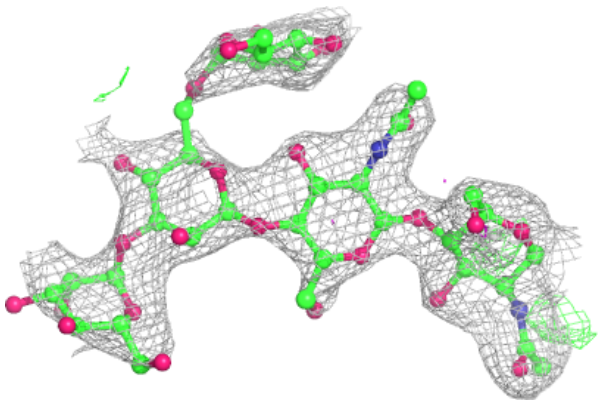
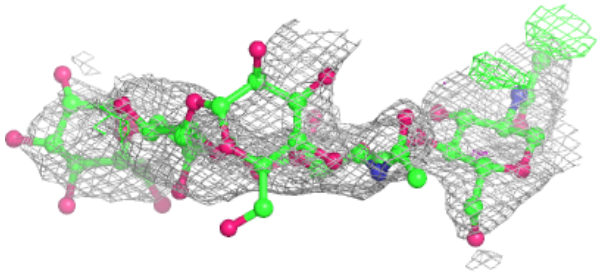
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	NAG	F	1	14/15	0.85	0.17	59,70,76,85	0
4	NAG	D	1	14/15	0.86	0.27	81,89,111,115	0
3	NAG	C	1	14/15	0.88	0.19	64,70,77,83	0
3	NAG	C	2	14/15	0.90	0.31	90,95,105,116	0
4	NAG	D	2	14/15	0.92	0.38	112,123,125,126	0

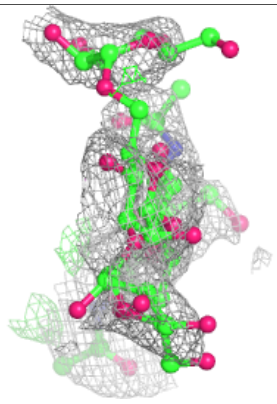
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

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)

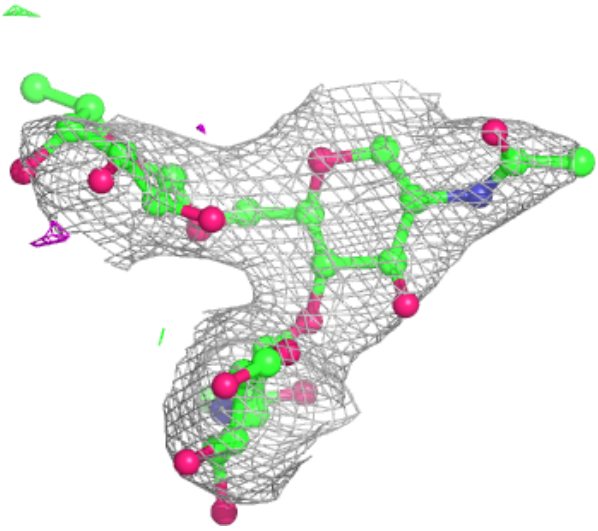


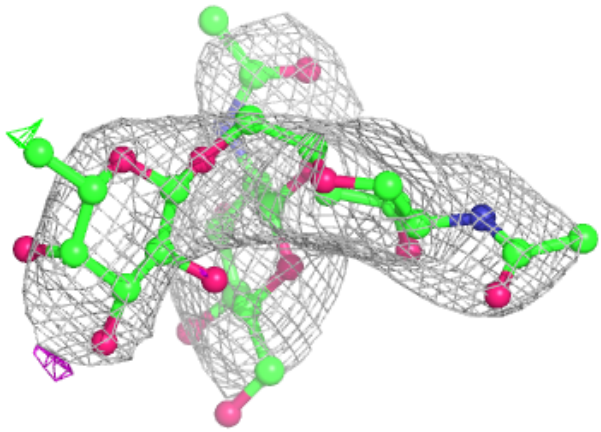


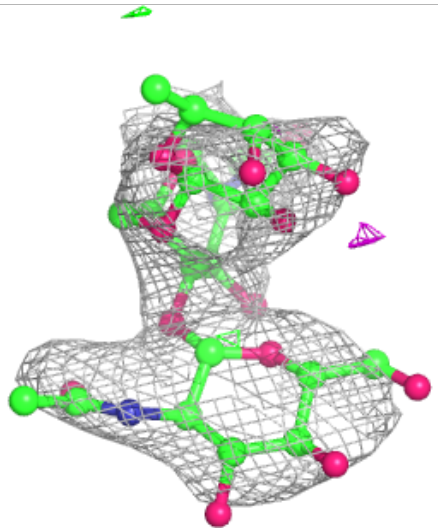


Electron density around Chain D:

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

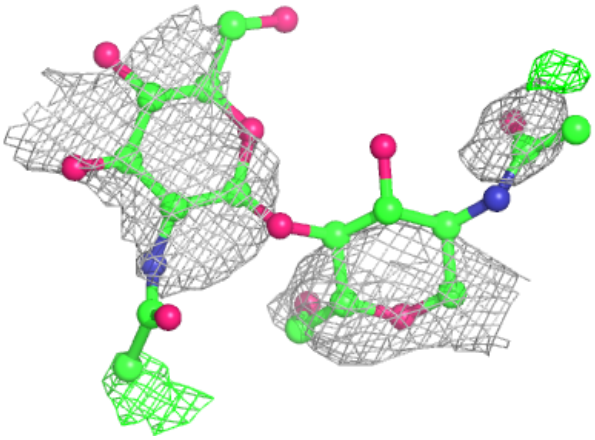


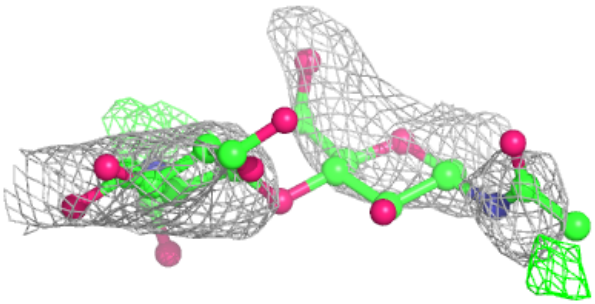


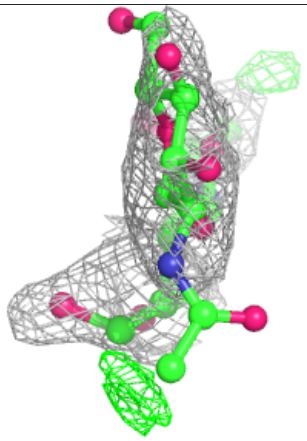


Electron density around Chain E:

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

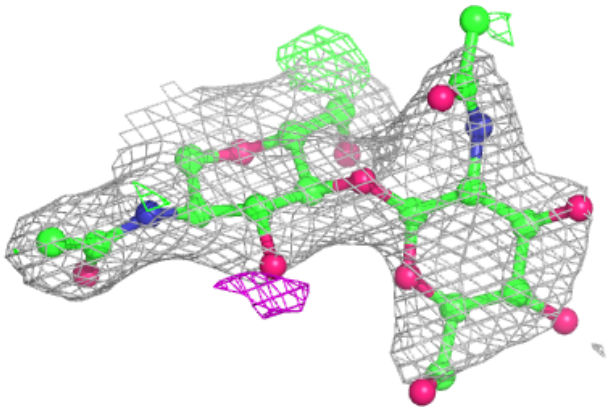


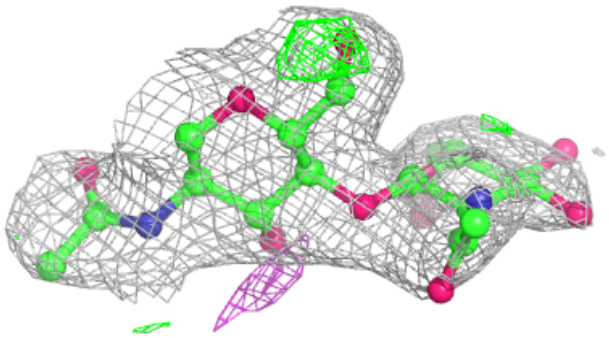


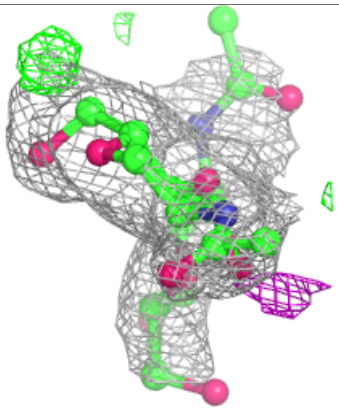


Electron density around Chain F:

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







6.4 Ligands (i)

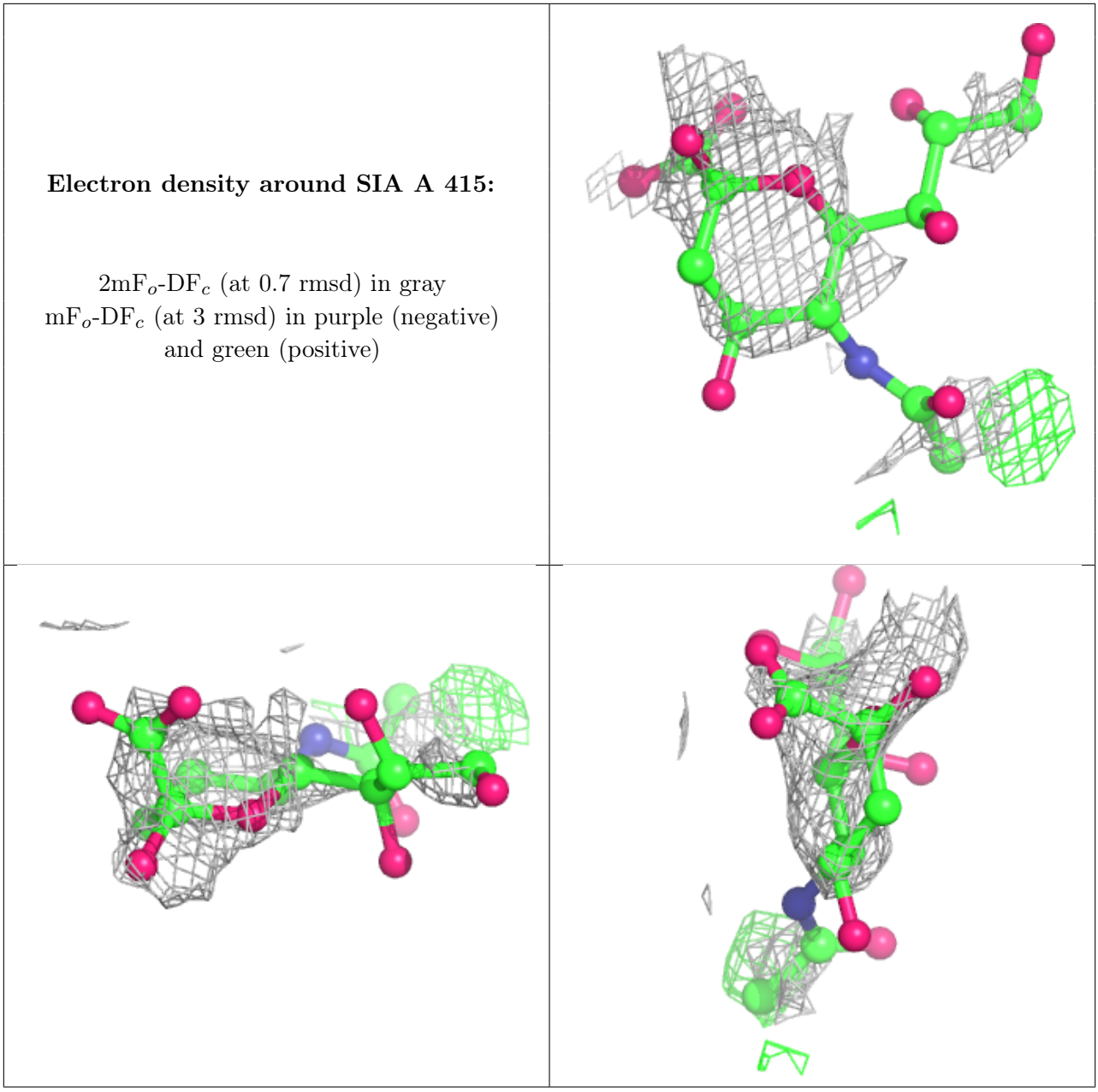
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
7	SIA	A	415	21/21	0.67	0.51	143,156,159,160	0
6	NAG	A	401	14/15	0.69	0.52	96,109,113,115	0
6	NAG	B	201	14/15	0.78	0.28	85,92,98,100	0
6	NAG	A	414	14/15	0.86	0.16	110,119,127,129	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 SIA A 415:

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



6.5 Other polymers

There are no such residues in this entry.