Full wwPDB X-ray Structure Validation Report ⓘ

Oct 15, 2023 – 05:31 AM EDT

PDB ID	:	8DWB
Title	:	Neuraminidase from influenza virus A/Moscow/10/1999(H3N2) in complex with sialic acid
Authors	:	Lei, R.; Hernandez Garcia, A.
Deposited on	:	2022-08-01
Resolution	:	1.60 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

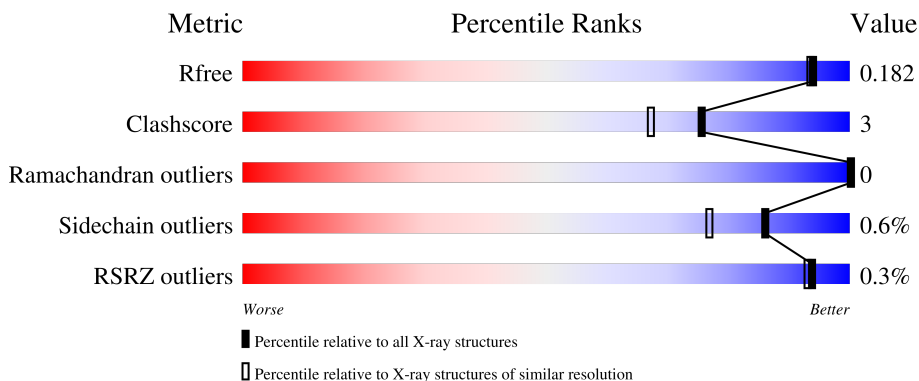|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

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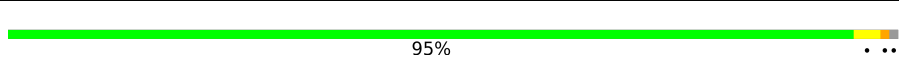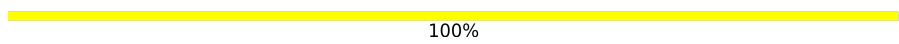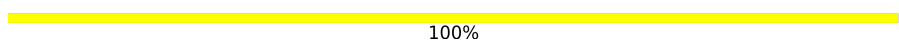*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.60 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	Percentile Ranks	Value
Rfree		0.182
Clashscore		3
Ramachandran outliers		0
Sidechain outliers		0.6%
RSRZ outliers		0.3%

Worse   *Better*

▊ Percentile relative to all X-ray structures
▊ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3398 (1.60-1.60)
Clashscore	141614	3665 (1.60-1.60)
Ramachandran outliers	138981	3564 (1.60-1.60)
Sidechain outliers	138945	3563 (1.60-1.60)
RSRZ outliers	127900	3321 (1.60-1.60)

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	AAA	393	95% ‧ ‥
2	AcA	5	100%
3	AiA	2	100%

2 Entry composition ⓘ

There are 8 unique types of molecules in this entry. The entry contains 3428 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 Neuraminidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	AAA	388	Total 3055	C 1900	N 535	O 598	S 22	0	13	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
AAA	77	GLY	-	expression tag	UNP Q8AZ87
AAA	78	SER	-	expression tag	UNP Q8AZ87
AAA	79	PRO	-	expression tag	UNP Q8AZ87
AAA	80	SER	-	expression tag	UNP Q8AZ87
AAA	81	ARG	-	expression tag	UNP Q8AZ87

- Molecule 2 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.
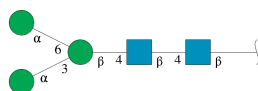
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	AcA	5	Total 61	C 34	N 2	O 25	0	0	0

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

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

- Molecule 4 is N-acetyl-alpha-neuraminic acid (three-letter code: SIA) (formula: $C_{11}H_{19}NO_9$) (labeled as "Ligand of Interest" by depositor).
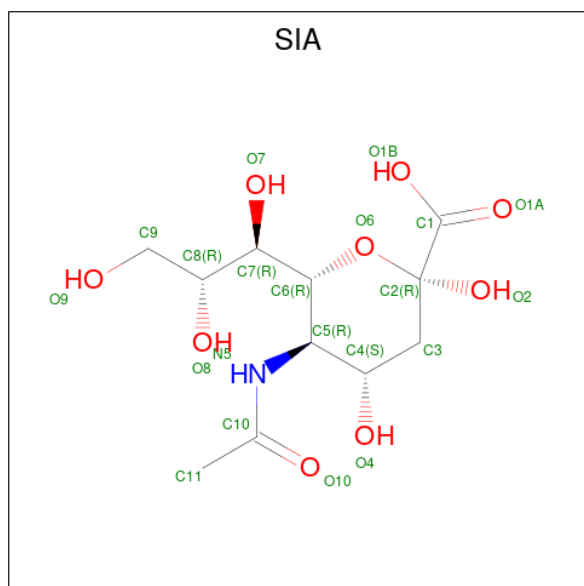
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	AAA	1	Total 21	C 11	N 1	O 9	0	0

- Molecule 5 is alpha-D-mannopyranose (three-letter code: MAN) (formula: $C_6H_{12}O_6$).
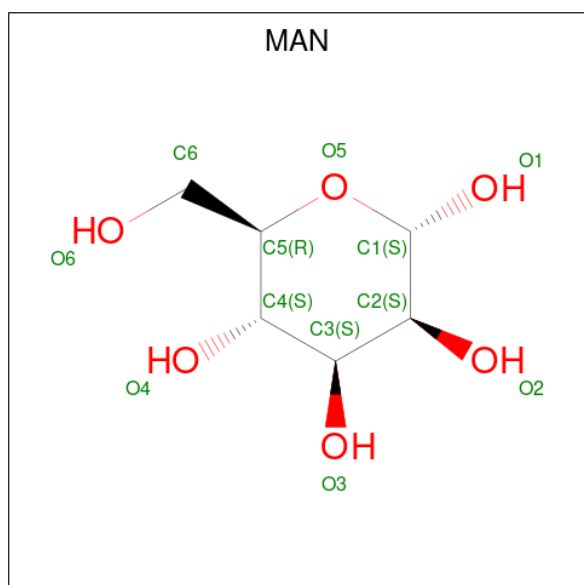
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	AAA	1	Total 11	C 6	O 5	0	0

- Molecule 6 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

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

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

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

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	AAA	241	Total 241	O 241	0	0

3 Residue-property plots ⓘ
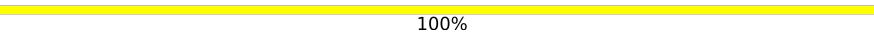
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Neuraminidase

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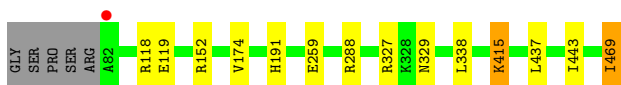
• Molecule 2: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain AcA:

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

Chain AiA:

4 Data and refinement statistics (i)
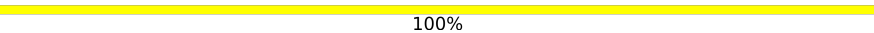
Property	Value	Source
Space group	I 4 2 2	Depositor
Cell constants a, b, c, α, β, γ	136.22Å 136.22Å 150.16Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	100.89 – 1.60 34.98 – 1.60	Depositor EDS
% Data completeness (in resolution range)	100.0 (100.89-1.60) 100.0 (34.98-1.60)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.25 (at 1.60Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.169 , 0.182 0.170 , 0.182	Depositor DCC
R_{free} test set	4566 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å^2)	16.6	Xtriage
Anisotropy	0.048	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 47.7	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	3428	wwPDB-VP
Average B, all atoms (Å^2)	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.97% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: NAG, SIA, MAN, CA, BMA, SO4

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	AAA	0.65	3/3161 (0.1%)	0.90	3/4285 (0.1%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	AAA	119	GLU	CD-OE2	5.96	1.32	1.25
1	AAA	259[A]	GLU	CD-OE1	-5.03	1.20	1.25
1	AAA	259[B]	GLU	CD-OE1	-5.03	1.20	1.25

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	AAA	288	ARG	NE-CZ-NH2	-6.18	117.21	120.30
1	AAA	327	ARG	NE-CZ-NH2	-6.02	117.29	120.30
1	AAA	118	ARG	NE-CZ-NH2	-5.60	117.50	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	AAA	3055	0	2934	14	1
2	AcA	61	0	52	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	AiA	28	0	25	0	0
4	AAA	21	0	18	5	0
5	AAA	11	0	9	0	0
6	AAA	10	0	0	0	0
7	AAA	1	0	0	0	0
8	AAA	241	0	0	8	0
All	All	3428	0	3038	15	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (15) 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:AAA:443:ILE:HG21	8:AAA:1121:HOH:O	1.61	1.01
1:AAA:443:ILE:HD13	8:AAA:1121:HOH:O	1.64	0.97
1:AAA:152:ARG:HH11	4:AAA:802:SIA:H111	1.44	0.80
1:AAA:152:ARG:HH11	4:AAA:802:SIA:C11	1.94	0.79
1:AAA:415:LYS:HD3	8:AAA:1106:HOH:O	1.88	0.72
1:AAA:329:ASN:ND2	8:AAA:902:HOH:O	2.17	0.71
1:AAA:443:ILE:CG2	8:AAA:1121:HOH:O	2.27	0.70
1:AAA:152:ARG:HD3	4:AAA:802:SIA:H111	1.77	0.65
4:AAA:802:SIA:H113	8:AAA:936:HOH:O	2.03	0.58
1:AAA:415:LYS:HD3	1:AAA:415:LYS:H	1.71	0.55
1:AAA:469:ILE:HG22	8:AAA:1093:HOH:O	2.06	0.55
1:AAA:437:LEU:HG	1:AAA:469:ILE:HG12	1.92	0.51
1:AAA:152:ARG:NH1	4:AAA:802:SIA:C11	2.71	0.50
1:AAA:174[B]:VAL:HG11	1:AAA:191:HIS:CD2	2.53	0.44
1:AAA:443:ILE:CD1	8:AAA:1121:HOH:O	2.44	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:AAA:338:LEU:CD2	1:AAA:338:LEU:CD2[16_444]	1.79	0.41

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	AAA	399/393 (102%)	384 (96%)	15 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	AAA	349/340 (103%)	347 (99%)	2 (1%)	86	77

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	AAA	415	LYS
1	AAA	469	ILE

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 ⓘ

7 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	AcA	1	2,1	14,14,15	1.74	2 (14%)	17,19,21	2.43	4 (23%)
2	NAG	AcA	2	2	14,14,15	1.16	2 (14%)	17,19,21	1.41	3 (17%)
2	BMA	AcA	3	2	11,11,12	1.02	0	15,15,17	1.32	3 (20%)
2	MAN	AcA	4	2	11,11,12	1.07	1 (9%)	15,15,17	1.20	1 (6%)
2	MAN	AcA	5	2	11,11,12	0.67	0	15,15,17	1.31	2 (13%)
3	NAG	AiA	1	1,3	14,14,15	1.09	1 (7%)	17,19,21	2.06	8 (47%)
3	NAG	AiA	2	3	14,14,15	1.07	1 (7%)	17,19,21	1.69	5 (29%)

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	AcA	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	AcA	2	2	-	0/6/23/26	0/1/1/1
2	BMA	AcA	3	2	-	0/2/19/22	0/1/1/1
2	MAN	AcA	4	2	-	0/2/19/22	0/1/1/1
2	MAN	AcA	5	2	-	0/2/19/22	0/1/1/1
3	NAG	AiA	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	AiA	2	3	-	0/6/23/26	0/1/1/1

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	AcA	1	NAG	O4-C4	5.07	1.54	1.43
2	AcA	1	NAG	O7-C7	2.65	1.29	1.23
2	AcA	2	NAG	O7-C7	2.58	1.29	1.23
2	AcA	2	NAG	O5-C1	-2.57	1.39	1.43
3	AiA	1	NAG	C1-C2	2.31	1.55	1.52
2	AcA	4	MAN	C2-C3	2.11	1.55	1.52
3	AiA	2	NAG	C1-C2	2.08	1.55	1.52

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	AcA	1	NAG	C2-N2-C7	-7.12	112.77	122.90
3	AiA	1	NAG	O5-C1-C2	-5.10	103.23	111.29
2	AcA	4	MAN	O2-C2-C1	-3.63	101.72	109.15
2	AcA	1	NAG	C4-C3-C2	-3.57	105.79	111.02
2	AcA	1	NAG	O5-C5-C4	-3.43	102.49	110.83
2	AcA	3	BMA	C1-C2-C3	-3.08	105.88	109.67
3	AiA	2	NAG	O5-C5-C4	-2.84	103.91	110.83
3	AiA	1	NAG	C4-C3-C2	-2.76	106.97	111.02
2	AcA	5	MAN	C1-C2-C3	2.69	112.97	109.67
2	AcA	1	NAG	O7-C7-N2	2.67	126.85	121.95
3	AiA	2	NAG	O6-C6-C5	-2.60	102.39	111.29
2	AcA	2	NAG	O7-C7-N2	-2.58	117.20	121.95
2	AcA	2	NAG	C4-C3-C2	2.56	114.77	111.02
2	AcA	5	MAN	C2-C3-C4	-2.42	106.70	110.89
3	AiA	1	NAG	O5-C5-C4	-2.37	105.06	110.83
3	AiA	1	NAG	O7-C7-N2	2.32	126.22	121.95
3	AiA	2	NAG	C1-C2-N2	2.24	114.31	110.49
3	AiA	2	NAG	C6-C5-C4	2.12	117.97	113.00
3	AiA	1	NAG	O4-C4-C3	-2.10	105.49	110.35
2	AcA	3	BMA	C1-O5-C5	-2.10	109.35	112.19
2	AcA	2	NAG	O4-C4-C3	-2.08	105.55	110.35
2	AcA	3	BMA	O4-C4-C3	-2.06	105.59	110.35
3	AiA	1	NAG	O3-C3-C4	-2.06	105.60	110.35
3	AiA	1	NAG	C3-C4-C5	-2.02	106.64	110.24
3	AiA	1	NAG	C1-O5-C5	2.01	114.92	112.19
3	AiA	2	NAG	O7-C7-C8	-2.01	118.33	122.06

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	AiA	1	NAG	C3-C2-N2-C7

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| Mol	Chain	Res	Type	Atoms
3	AiA	1	NAG	C1-C2-N2-C7

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 AcA

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain AiA

Bond lengths

Bond angles

Torsions

Rings
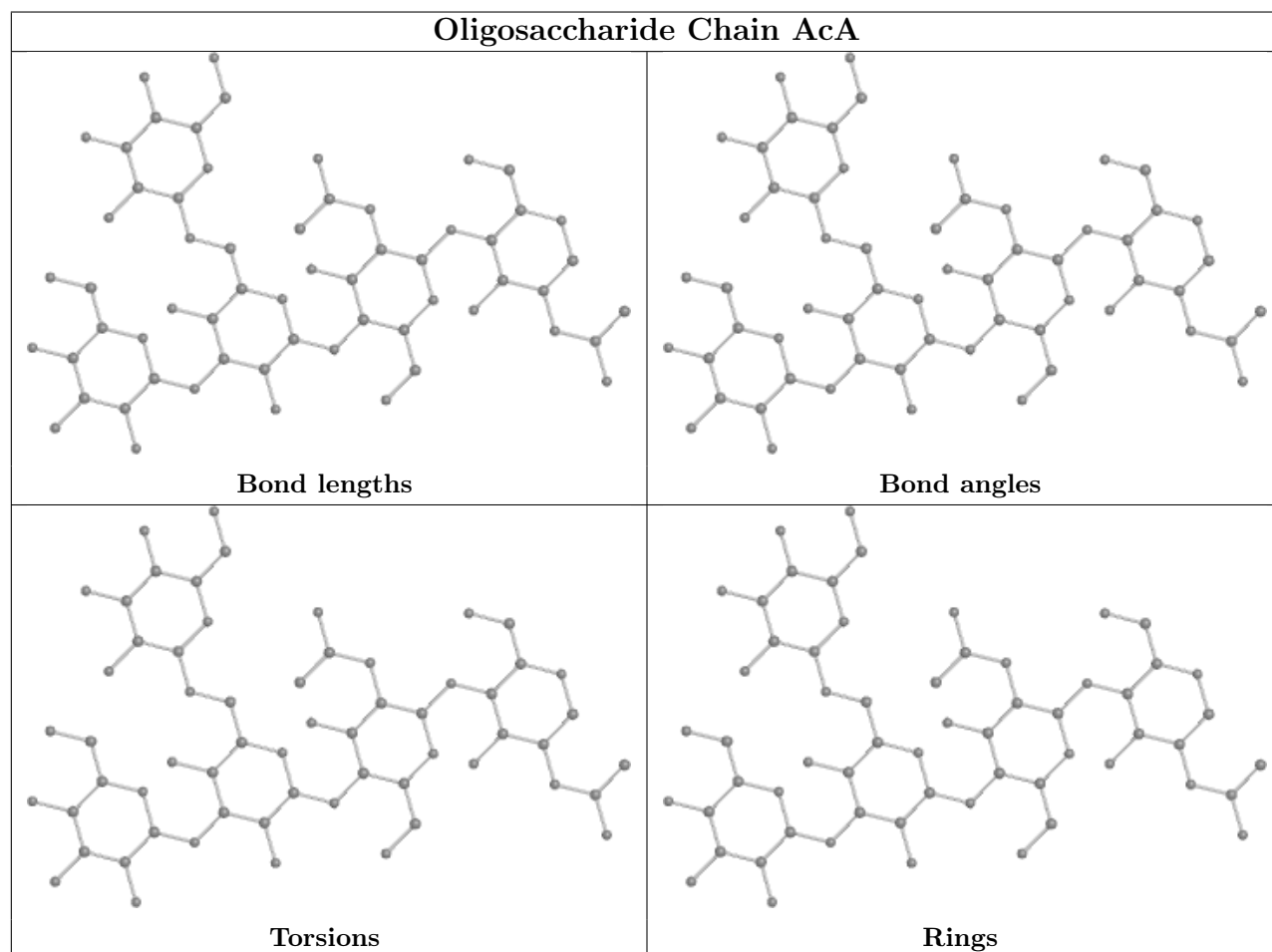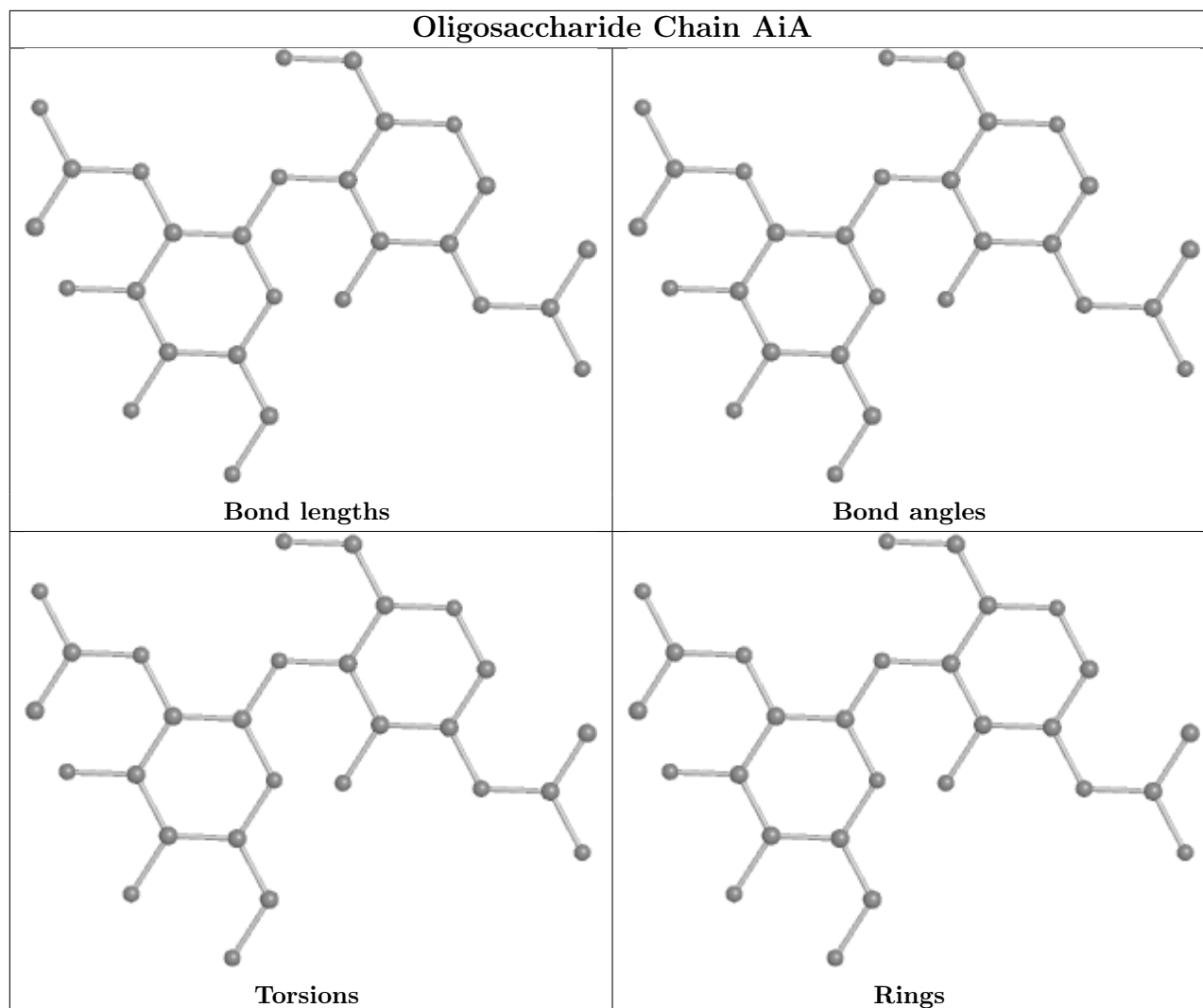
5.6 Ligand geometry ⓘ

Of 5 ligands modelled in this entry, 1 is monoatomic - leaving 4 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	$\#\|Z\| > 2$
6	SO4	AAA	804	-	4,4,4	0.26	0	6,6,6	0.19	0
6	SO4	AAA	805	-	4,4,4	0.23	0	6,6,6	0.31	0
4	SIA	AAA	802	-	21,21,21	1.20	3 (14%)	25,31,31	1.49	4 (16%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
5	MAN	AAA	803	-	11,11,12	1.23	1 (9%)	15,15,17	4.26	8 (53%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	SIA	AAA	802	-	-	3/20/38/38	0/1/1/1
5	MAN	AAA	803	-	-	1/2/19/22	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	AAA	803	MAN	C2-C3	2.94	1.56	1.52
4	AAA	802	SIA	O10-C10	2.66	1.29	1.23
4	AAA	802	SIA	C11-C10	-2.26	1.45	1.50
4	AAA	802	SIA	C5-N5	2.13	1.49	1.45

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	AAA	803	MAN	C6-C5-C4	7.37	130.27	113.00
5	AAA	803	MAN	C3-C4-C5	-6.98	97.79	110.24
5	AAA	803	MAN	O5-C5-C4	-6.33	95.42	110.83
5	AAA	803	MAN	O2-C2-C3	6.30	122.75	110.14
5	AAA	803	MAN	O5-C5-C6	6.22	116.96	107.20
5	AAA	803	MAN	C1-C2-C3	4.61	115.33	109.67
4	AAA	802	SIA	O2-C2-C1	-3.94	102.75	110.76
5	AAA	803	MAN	O3-C3-C2	3.73	117.14	109.99
4	AAA	802	SIA	O6-C6-C5	2.95	112.66	109.78
4	AAA	802	SIA	O2-C2-C3	2.86	113.53	109.40
4	AAA	802	SIA	O1A-C1-C2	-2.66	119.57	123.59
5	AAA	803	MAN	O4-C4-C5	2.54	115.61	109.30

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	AAA	802	SIA	C11-C10-N5-C5
4	AAA	802	SIA	O10-C10-N5-C5

Continued on next page...

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Mol	Chain	Res	Type	Atoms
4	AAA	802	SIA	O1A-C1-C2-O6
5	AAA	803	MAN	O5-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	AAA	802	SIA	5	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 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 AAA 802
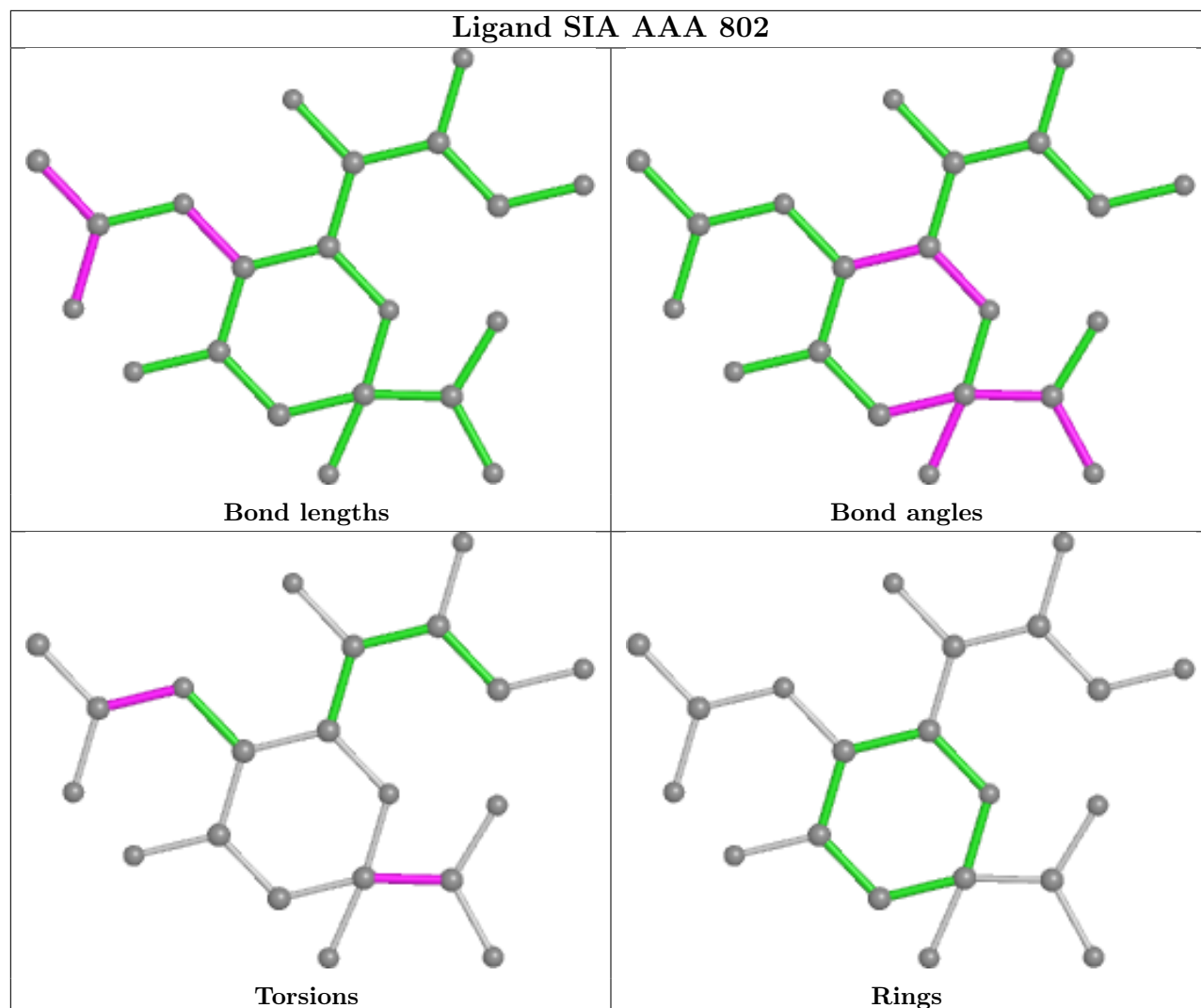
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

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, 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	AAA	388/393 (98%)	-0.44	1 (0%)	94	93	12, 16, 24, 42	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	AAA	82	ALA	3.0

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

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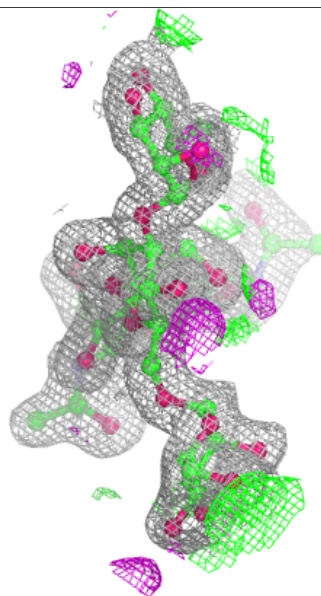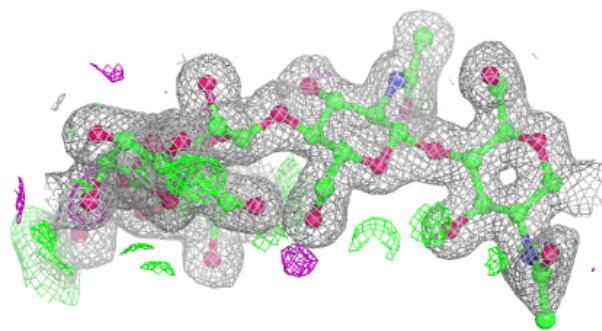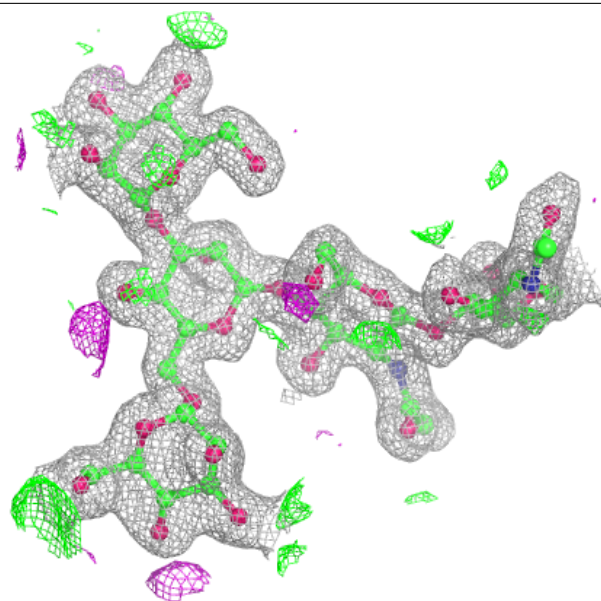
6.3 Carbohydrates ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.
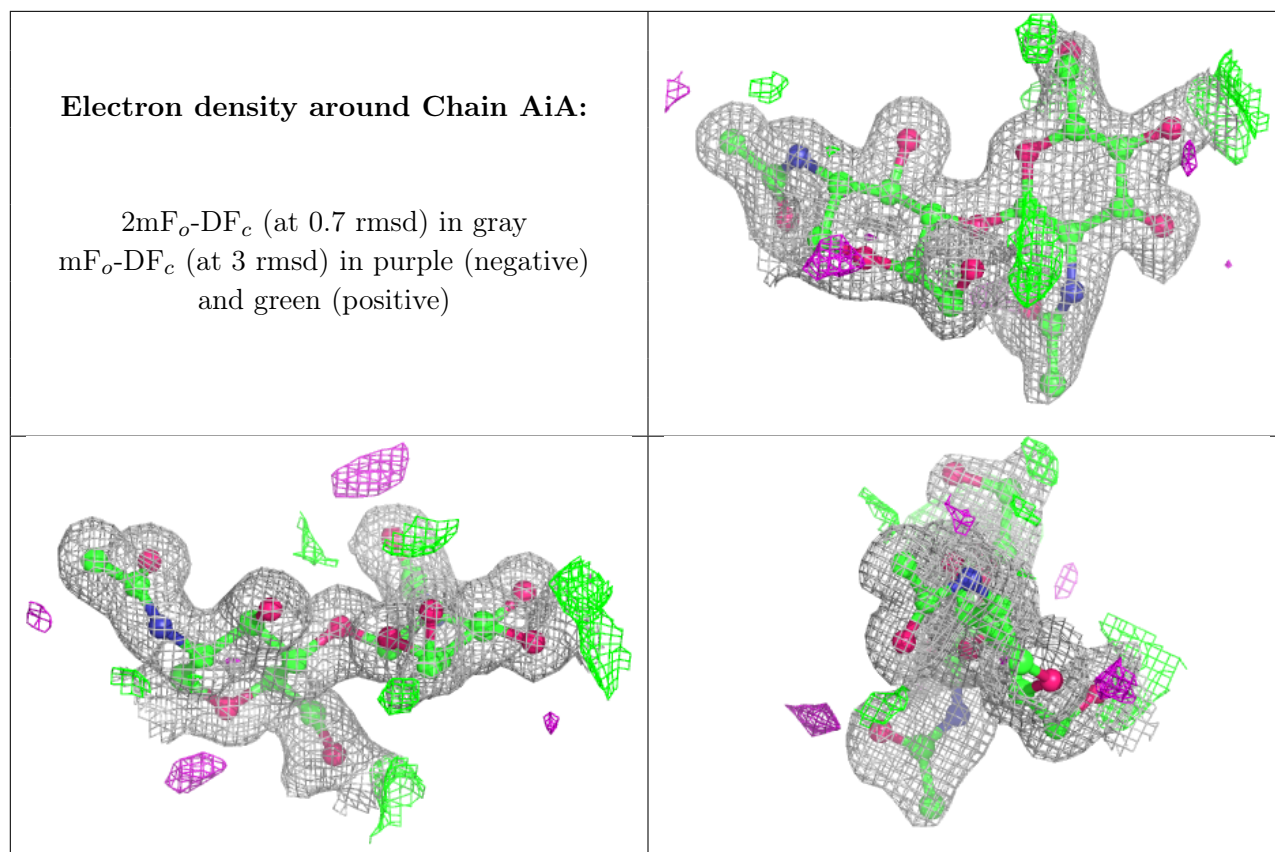
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	MAN	AcA	5	11/12	0.89	0.21	27,31,37,41	0
2	NAG	AcA	1	14/15	0.94	0.13	16,19,35,37	0
3	NAG	AiA	1	14/15	0.94	0.10	17,18,23,25	0
3	NAG	AiA	2	14/15	0.94	0.22	24,29,36,42	0
2	MAN	AcA	4	11/12	0.96	0.09	20,22,23,25	0
2	BMA	AcA	3	11/12	0.96	0.10	18,19,21,24	0
2	NAG	AcA	2	14/15	0.97	0.10	17,19,21,23	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 AcA:

$2mF_o$-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 AiA:

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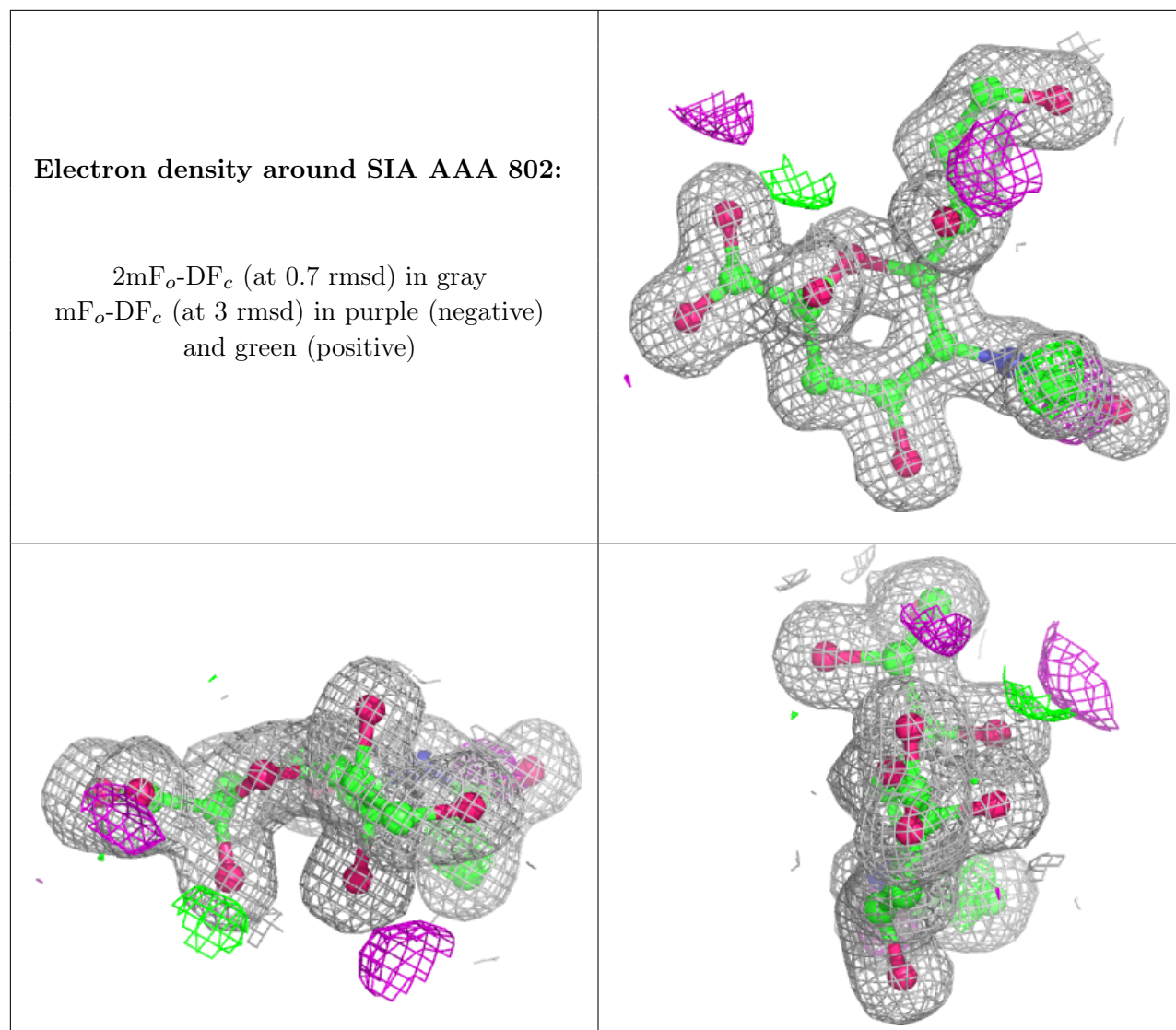$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

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
5	MAN	AAA	803	11/12	0.71	0.23	32,42,46,46	0
6	SO4	AAA	804	5/5	0.92	0.22	25,33,38,39	0
6	SO4	AAA	805	5/5	0.93	0.21	29,36,47,55	0
4	SIA	AAA	802	21/21	0.95	0.07	12,15,18,23	0
7	CA	AAA	806	1/1	1.00	0.05	15,15,15,15	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 AAA 802:

$2mF_o$-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.