



Full wwPDB EM Validation Report ⓘ

Jan 29, 2026 – 12:36 PM EST

PDB ID : 9O8Q / pdb_00009o8q
EMDB ID : EMD-70233
Title : Cryo-EM structure of NI06063_d30_103 Fab in complex with influenza virus hemagglutinin from A/Hong Kong/485197/2014 (H3N2)
Authors : Jo, G.; Ward, A.B.
Deposited on : 2025-04-16
Resolution : 2.62 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp>
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:

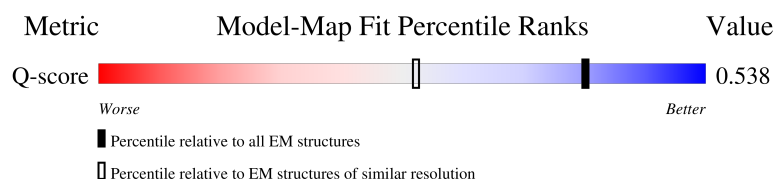
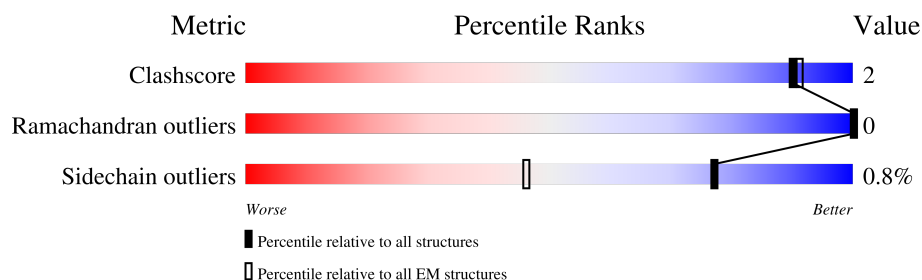
EMDB validation analysis : 0.0.1.dev129
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.47

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

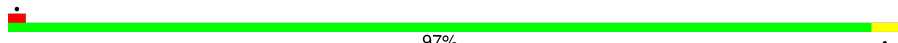
The reported resolution of this entry is 2.62 Å.

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.



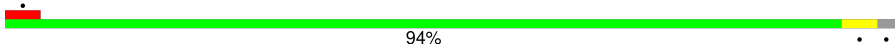
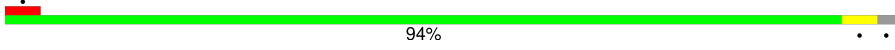
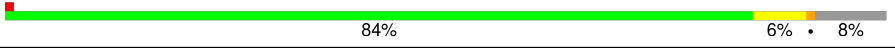
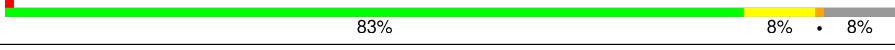
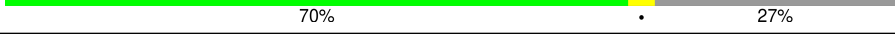
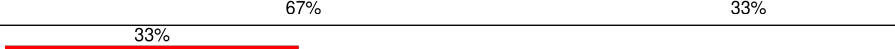
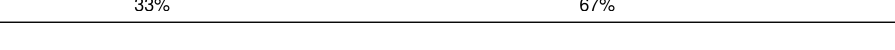
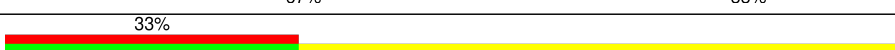
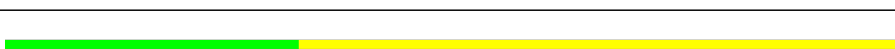
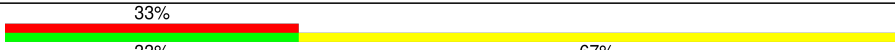
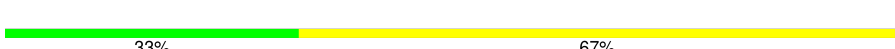
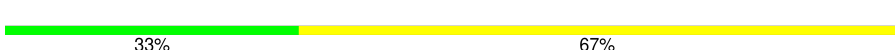
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	8810 (2.12 - 3.12)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	G	121	 97% .
1	H	121	 97% .
1	I	121	 97% .
2	J	109	 93% 6% .

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Mol	Chain	Length	Quality of chain
2	K	109	
2	L	109	
3	A	345	
3	C	345	
3	D	345	
4	B	236	
4	E	236	
4	F	236	
5	M	3	
5	O	3	
5	P	3	
5	Q	3	
5	S	3	
5	T	3	
5	U	3	
5	W	3	
5	X	3	
6	N	3	
6	R	3	
6	V	3	

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 17502 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 NI06063_d30_103 Fab heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	H	121	Total	C	N	O	S	0	0
			951	605	163	178	5		
1	G	121	Total	C	N	O	S	0	0
			951	605	163	178	5		
1	I	121	Total	C	N	O	S	0	0
			951	605	163	178	5		

- Molecule 2 is a protein called NI06063_d30_103 Fab light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	L	107	Total	C	N	O	S	0	0
			771	477	134	156	4		
2	J	107	Total	C	N	O	S	0	0
			771	477	134	156	4		
2	K	107	Total	C	N	O	S	0	0
			771	477	134	156	4		

- Molecule 3 is a protein called Hemagglutinin HA1.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	A	316	Total	C	N	O	S	0	0
			2471	1549	439	471	12		
3	C	316	Total	C	N	O	S	0	0
			2471	1549	439	471	12		
3	D	316	Total	C	N	O	S	0	0
			2471	1549	439	471	12		

- Molecule 4 is a protein called Hemagglutinin HA2.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	B	172	Total	C	N	O	S	0	0
			1388	863	246	273	6		

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Mol	Chain	Residues	Atoms					AltConf	Trace
4	E	172	Total	C	N	O	S	0	0
			1388	863	246	273	6		
4	F	172	Total	C	N	O	S	0	0
			1388	863	246	273	6		

There are 180 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	177	GLY	-	expression tag	UNP A0A0K0YAS1
B	178	TYR	-	expression tag	UNP A0A0K0YAS1
B	179	ILE	-	expression tag	UNP A0A0K0YAS1
B	180	PRO	-	expression tag	UNP A0A0K0YAS1
B	181	GLU	-	expression tag	UNP A0A0K0YAS1
B	182	ALA	-	expression tag	UNP A0A0K0YAS1
B	183	PRO	-	expression tag	UNP A0A0K0YAS1
B	184	ARG	-	expression tag	UNP A0A0K0YAS1
B	185	ASP	-	expression tag	UNP A0A0K0YAS1
B	186	GLY	-	expression tag	UNP A0A0K0YAS1
B	187	GLN	-	expression tag	UNP A0A0K0YAS1
B	188	ALA	-	expression tag	UNP A0A0K0YAS1
B	189	TYR	-	expression tag	UNP A0A0K0YAS1
B	190	VAL	-	expression tag	UNP A0A0K0YAS1
B	191	ARG	-	expression tag	UNP A0A0K0YAS1
B	192	LYS	-	expression tag	UNP A0A0K0YAS1
B	193	ASP	-	expression tag	UNP A0A0K0YAS1
B	194	GLY	-	expression tag	UNP A0A0K0YAS1
B	195	GLU	-	expression tag	UNP A0A0K0YAS1
B	196	TRP	-	expression tag	UNP A0A0K0YAS1
B	197	VAL	-	expression tag	UNP A0A0K0YAS1
B	198	LEU	-	expression tag	UNP A0A0K0YAS1
B	199	LEU	-	expression tag	UNP A0A0K0YAS1
B	200	SER	-	expression tag	UNP A0A0K0YAS1
B	201	THR	-	expression tag	UNP A0A0K0YAS1
B	202	PHE	-	expression tag	UNP A0A0K0YAS1
B	203	LEU	-	expression tag	UNP A0A0K0YAS1
B	204	GLY	-	expression tag	UNP A0A0K0YAS1
B	205	SER	-	expression tag	UNP A0A0K0YAS1
B	206	GLU	-	expression tag	UNP A0A0K0YAS1
B	207	ASN	-	expression tag	UNP A0A0K0YAS1
B	208	LEU	-	expression tag	UNP A0A0K0YAS1
B	209	TYR	-	expression tag	UNP A0A0K0YAS1
B	210	PHE	-	expression tag	UNP A0A0K0YAS1

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Chain	Residue	Modelled	Actual	Comment	Reference
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B	212	GLY	-	expression tag	UNP A0A0K0YAS1
B	213	SER	-	expression tag	UNP A0A0K0YAS1
B	214	ALA	-	expression tag	UNP A0A0K0YAS1
B	215	TRP	-	expression tag	UNP A0A0K0YAS1
B	216	SER	-	expression tag	UNP A0A0K0YAS1
B	217	HIS	-	expression tag	UNP A0A0K0YAS1
B	218	PRO	-	expression tag	UNP A0A0K0YAS1
B	219	GLN	-	expression tag	UNP A0A0K0YAS1
B	220	PHE	-	expression tag	UNP A0A0K0YAS1
B	221	GLU	-	expression tag	UNP A0A0K0YAS1
B	222	LYS	-	expression tag	UNP A0A0K0YAS1
B	223	GLY	-	expression tag	UNP A0A0K0YAS1
B	224	GLY	-	expression tag	UNP A0A0K0YAS1
B	225	GLY	-	expression tag	UNP A0A0K0YAS1
B	226	SER	-	expression tag	UNP A0A0K0YAS1
B	227	GLY	-	expression tag	UNP A0A0K0YAS1
B	228	GLY	-	expression tag	UNP A0A0K0YAS1
B	229	GLY	-	expression tag	UNP A0A0K0YAS1
B	230	SER	-	expression tag	UNP A0A0K0YAS1
B	231	HIS	-	expression tag	UNP A0A0K0YAS1
B	232	HIS	-	expression tag	UNP A0A0K0YAS1
B	233	HIS	-	expression tag	UNP A0A0K0YAS1
B	234	HIS	-	expression tag	UNP A0A0K0YAS1
B	235	HIS	-	expression tag	UNP A0A0K0YAS1
B	236	HIS	-	expression tag	UNP A0A0K0YAS1
E	177	GLY	-	expression tag	UNP A0A0K0YAS1
E	178	TYR	-	expression tag	UNP A0A0K0YAS1
E	179	ILE	-	expression tag	UNP A0A0K0YAS1
E	180	PRO	-	expression tag	UNP A0A0K0YAS1
E	181	GLU	-	expression tag	UNP A0A0K0YAS1
E	182	ALA	-	expression tag	UNP A0A0K0YAS1
E	183	PRO	-	expression tag	UNP A0A0K0YAS1
E	184	ARG	-	expression tag	UNP A0A0K0YAS1
E	185	ASP	-	expression tag	UNP A0A0K0YAS1
E	186	GLY	-	expression tag	UNP A0A0K0YAS1
E	187	GLN	-	expression tag	UNP A0A0K0YAS1
E	188	ALA	-	expression tag	UNP A0A0K0YAS1
E	189	TYR	-	expression tag	UNP A0A0K0YAS1
E	190	VAL	-	expression tag	UNP A0A0K0YAS1
E	191	ARG	-	expression tag	UNP A0A0K0YAS1
E	192	LYS	-	expression tag	UNP A0A0K0YAS1

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Chain	Residue	Modelled	Actual	Comment	Reference
E	193	ASP	-	expression tag	UNP A0A0K0YAS1
E	194	GLY	-	expression tag	UNP A0A0K0YAS1
E	195	GLU	-	expression tag	UNP A0A0K0YAS1
E	196	TRP	-	expression tag	UNP A0A0K0YAS1
E	197	VAL	-	expression tag	UNP A0A0K0YAS1
E	198	LEU	-	expression tag	UNP A0A0K0YAS1
E	199	LEU	-	expression tag	UNP A0A0K0YAS1
E	200	SER	-	expression tag	UNP A0A0K0YAS1
E	201	THR	-	expression tag	UNP A0A0K0YAS1
E	202	PHE	-	expression tag	UNP A0A0K0YAS1
E	203	LEU	-	expression tag	UNP A0A0K0YAS1
E	204	GLY	-	expression tag	UNP A0A0K0YAS1
E	205	SER	-	expression tag	UNP A0A0K0YAS1
E	206	GLU	-	expression tag	UNP A0A0K0YAS1
E	207	ASN	-	expression tag	UNP A0A0K0YAS1
E	208	LEU	-	expression tag	UNP A0A0K0YAS1
E	209	TYR	-	expression tag	UNP A0A0K0YAS1
E	210	PHE	-	expression tag	UNP A0A0K0YAS1
E	211	GLN	-	expression tag	UNP A0A0K0YAS1
E	212	GLY	-	expression tag	UNP A0A0K0YAS1
E	213	SER	-	expression tag	UNP A0A0K0YAS1
E	214	ALA	-	expression tag	UNP A0A0K0YAS1
E	215	TRP	-	expression tag	UNP A0A0K0YAS1
E	216	SER	-	expression tag	UNP A0A0K0YAS1
E	217	HIS	-	expression tag	UNP A0A0K0YAS1
E	218	PRO	-	expression tag	UNP A0A0K0YAS1
E	219	GLN	-	expression tag	UNP A0A0K0YAS1
E	220	PHE	-	expression tag	UNP A0A0K0YAS1
E	221	GLU	-	expression tag	UNP A0A0K0YAS1
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E	225	GLY	-	expression tag	UNP A0A0K0YAS1
E	226	SER	-	expression tag	UNP A0A0K0YAS1
E	227	GLY	-	expression tag	UNP A0A0K0YAS1
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E	230	SER	-	expression tag	UNP A0A0K0YAS1
E	231	HIS	-	expression tag	UNP A0A0K0YAS1
E	232	HIS	-	expression tag	UNP A0A0K0YAS1
E	233	HIS	-	expression tag	UNP A0A0K0YAS1
E	234	HIS	-	expression tag	UNP A0A0K0YAS1

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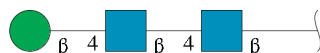
Chain	Residue	Modelled	Actual	Comment	Reference
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E	236	HIS	-	expression tag	UNP A0A0K0YAS1
F	177	GLY	-	expression tag	UNP A0A0K0YAS1
F	178	TYR	-	expression tag	UNP A0A0K0YAS1
F	179	ILE	-	expression tag	UNP A0A0K0YAS1
F	180	PRO	-	expression tag	UNP A0A0K0YAS1
F	181	GLU	-	expression tag	UNP A0A0K0YAS1
F	182	ALA	-	expression tag	UNP A0A0K0YAS1
F	183	PRO	-	expression tag	UNP A0A0K0YAS1
F	184	ARG	-	expression tag	UNP A0A0K0YAS1
F	185	ASP	-	expression tag	UNP A0A0K0YAS1
F	186	GLY	-	expression tag	UNP A0A0K0YAS1
F	187	GLN	-	expression tag	UNP A0A0K0YAS1
F	188	ALA	-	expression tag	UNP A0A0K0YAS1
F	189	TYR	-	expression tag	UNP A0A0K0YAS1
F	190	VAL	-	expression tag	UNP A0A0K0YAS1
F	191	ARG	-	expression tag	UNP A0A0K0YAS1
F	192	LYS	-	expression tag	UNP A0A0K0YAS1
F	193	ASP	-	expression tag	UNP A0A0K0YAS1
F	194	GLY	-	expression tag	UNP A0A0K0YAS1
F	195	GLU	-	expression tag	UNP A0A0K0YAS1
F	196	TRP	-	expression tag	UNP A0A0K0YAS1
F	197	VAL	-	expression tag	UNP A0A0K0YAS1
F	198	LEU	-	expression tag	UNP A0A0K0YAS1
F	199	LEU	-	expression tag	UNP A0A0K0YAS1
F	200	SER	-	expression tag	UNP A0A0K0YAS1
F	201	THR	-	expression tag	UNP A0A0K0YAS1
F	202	PHE	-	expression tag	UNP A0A0K0YAS1
F	203	LEU	-	expression tag	UNP A0A0K0YAS1
F	204	GLY	-	expression tag	UNP A0A0K0YAS1
F	205	SER	-	expression tag	UNP A0A0K0YAS1
F	206	GLU	-	expression tag	UNP A0A0K0YAS1
F	207	ASN	-	expression tag	UNP A0A0K0YAS1
F	208	LEU	-	expression tag	UNP A0A0K0YAS1
F	209	TYR	-	expression tag	UNP A0A0K0YAS1
F	210	PHE	-	expression tag	UNP A0A0K0YAS1
F	211	GLN	-	expression tag	UNP A0A0K0YAS1
F	212	GLY	-	expression tag	UNP A0A0K0YAS1
F	213	SER	-	expression tag	UNP A0A0K0YAS1
F	214	ALA	-	expression tag	UNP A0A0K0YAS1
F	215	TRP	-	expression tag	UNP A0A0K0YAS1
F	216	SER	-	expression tag	UNP A0A0K0YAS1

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Chain	Residue	Modelled	Actual	Comment	Reference
F	217	HIS	-	expression tag	UNP A0A0K0YAS1
F	218	PRO	-	expression tag	UNP A0A0K0YAS1
F	219	GLN	-	expression tag	UNP A0A0K0YAS1
F	220	PHE	-	expression tag	UNP A0A0K0YAS1
F	221	GLU	-	expression tag	UNP A0A0K0YAS1
F	222	LYS	-	expression tag	UNP A0A0K0YAS1
F	223	GLY	-	expression tag	UNP A0A0K0YAS1
F	224	GLY	-	expression tag	UNP A0A0K0YAS1
F	225	GLY	-	expression tag	UNP A0A0K0YAS1
F	226	SER	-	expression tag	UNP A0A0K0YAS1
F	227	GLY	-	expression tag	UNP A0A0K0YAS1
F	228	GLY	-	expression tag	UNP A0A0K0YAS1
F	229	GLY	-	expression tag	UNP A0A0K0YAS1
F	230	SER	-	expression tag	UNP A0A0K0YAS1
F	231	HIS	-	expression tag	UNP A0A0K0YAS1
F	232	HIS	-	expression tag	UNP A0A0K0YAS1
F	233	HIS	-	expression tag	UNP A0A0K0YAS1
F	234	HIS	-	expression tag	UNP A0A0K0YAS1
F	235	HIS	-	expression tag	UNP A0A0K0YAS1
F	236	HIS	-	expression tag	UNP A0A0K0YAS1

- Molecule 5 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.



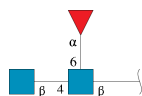
Mol	Chain	Residues	Atoms				AltConf	Trace
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			39	22	2	15		
5	O	3	Total	C	N	O	0	0
			39	22	2	15		
5	P	3	Total	C	N	O	0	0
			39	22	2	15		
5	Q	3	Total	C	N	O	0	0
			39	22	2	15		
5	S	3	Total	C	N	O	0	0
			39	22	2	15		
5	T	3	Total	C	N	O	0	0
			39	22	2	15		

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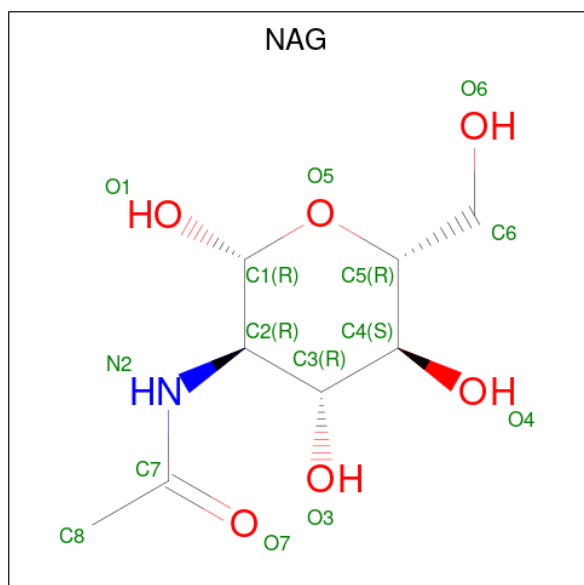
Mol	Chain	Residues	Atoms				AltConf	Trace
5	U	3	Total	C	N	O	0	0
			39	22	2	15		
5	W	3	Total	C	N	O	0	0
			39	22	2	15		
5	X	3	Total	C	N	O	0	0
			39	22	2	15		

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



Mol	Chain	Residues	Atoms				AltConf	Trace
6	N	3	Total	C	N	O	0	0
			38	22	2	14		
6	R	3	Total	C	N	O	0	0
			38	22	2	14		
6	V	3	Total	C	N	O	0	0
			38	22	2	14		

- Molecule 7 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).

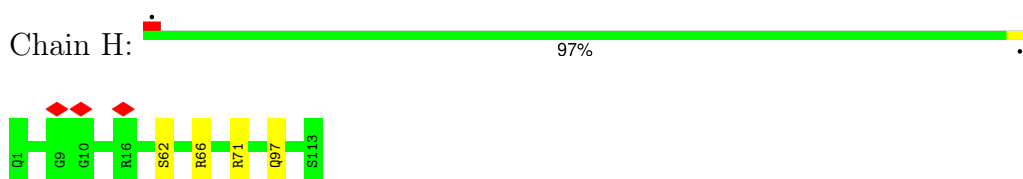


Mol	Chain	Residues	Atoms				AltConf
7	A	1	Total	C	N	O	0
			14	8	1	5	
7	A	1	Total	C	N	O	0
			14	8	1	5	
7	A	1	Total	C	N	O	0
			14	8	1	5	
7	A	1	Total	C	N	O	0
			14	8	1	5	
7	A	1	Total	C	N	O	0
			14	8	1	5	
7	B	1	Total	C	N	O	0
			14	8	1	5	
7	C	1	Total	C	N	O	0
			14	8	1	5	
7	C	1	Total	C	N	O	0
			14	8	1	5	
7	C	1	Total	C	N	O	0
			14	8	1	5	
7	C	1	Total	C	N	O	0
			14	8	1	5	
7	C	1	Total	C	N	O	0
			14	8	1	5	
7	E	1	Total	C	N	O	0
			14	8	1	5	
7	D	1	Total	C	N	O	0
			14	8	1	5	
7	D	1	Total	C	N	O	0
			14	8	1	5	
7	D	1	Total	C	N	O	0
			14	8	1	5	
7	D	1	Total	C	N	O	0
			14	8	1	5	
7	D	1	Total	C	N	O	0
			14	8	1	5	
7	D	1	Total	C	N	O	0
			14	8	1	5	
7	F	1	Total	C	N	O	0
			14	8	1	5	

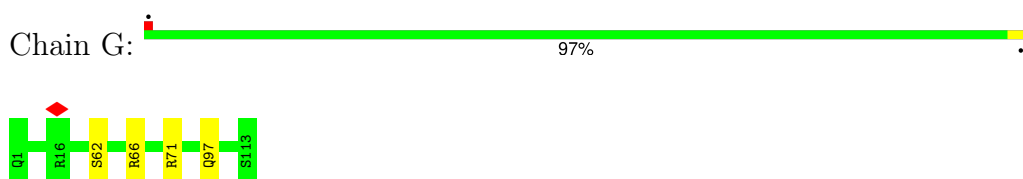
3 Residue-property plots [i](#)

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 atom inclusion in map 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 diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). 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.

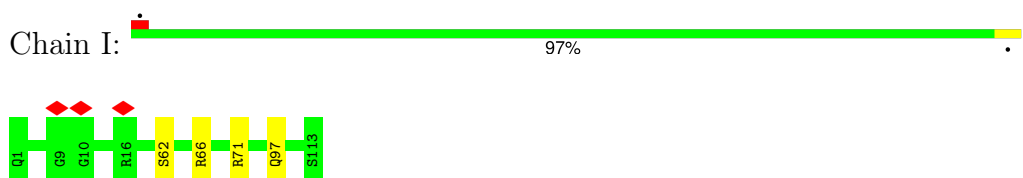
- Molecule 1: NI06063_d30_103 Fab heavy chain



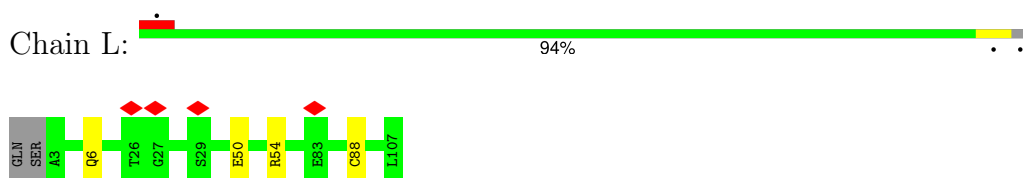
- Molecule 1: NI06063_d30_103 Fab heavy chain



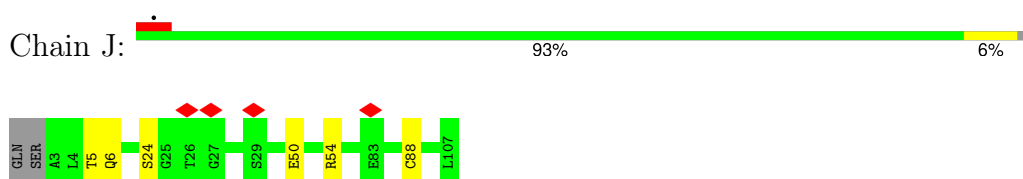
- Molecule 1: NI06063_d30_103 Fab heavy chain



- Molecule 2: NI06063_d30_103 Fab light chain



- Molecule 2: NI06063_d30_103 Fab light chain



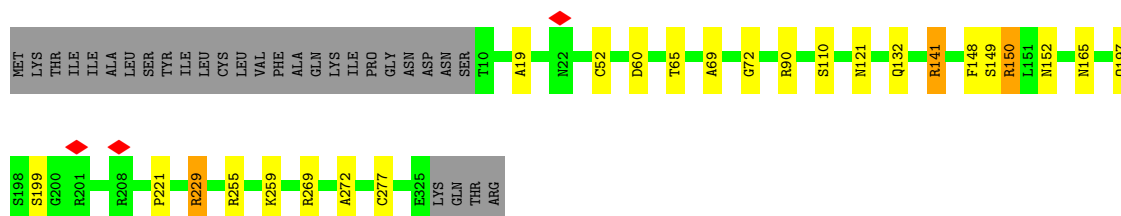
- Molecule 2: NI06063_d30_103 Fab light chain

Chain K:  94%



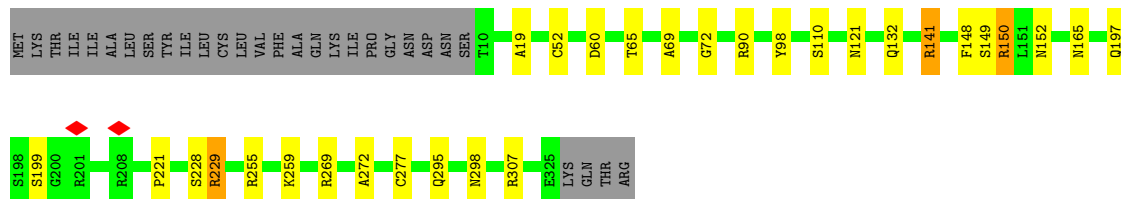
- Molecule 3: Hemagglutinin HA1

Chain A:  84% 6% 8%



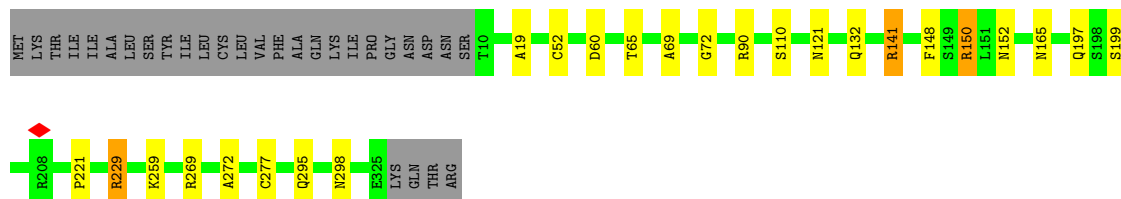
- Molecule 3: Hemagglutinin HA1

Chain C:  83% 8% 8%



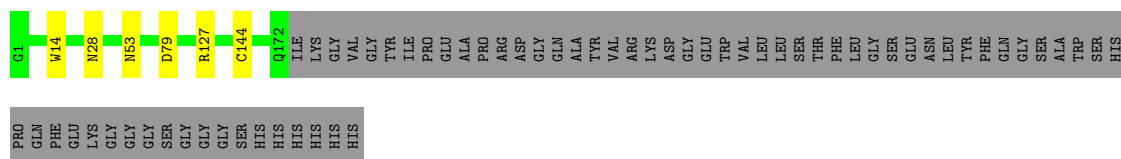
- Molecule 3: Hemagglutinin HA1

Chain D:  84% 6% 8%



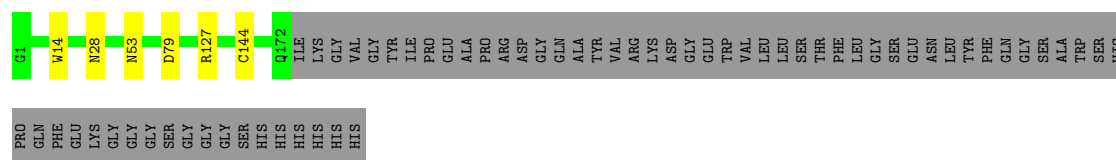
- Molecule 4: Hemagglutinin HA2

Chain B:  70% 27%



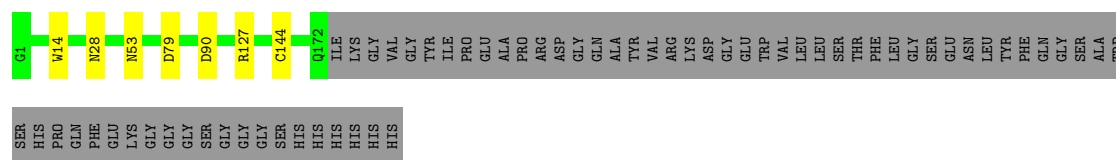
- Molecule 4: Hemagglutinin HA2

Chain E:  70% 27%



- Molecule 4: Hemagglutinin HA2

Chain F:  70% 27%



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

Chain M:  67% 33%



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

Chain O:  33% 67%



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

Chain P:  33% 67%



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

Chain Q:  67% 33%



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



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



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



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



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



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



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



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



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C3	Depositor
Number of particles used	156709	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	45.09	Depositor
Minimum defocus (nm)	600	Depositor
Maximum defocus (nm)	1400	Depositor
Magnification	190000	Depositor
Image detector	TFS FALCON 4i (4k x 4k)	Depositor
Maximum map value	0.427	Depositor
Minimum map value	-0.230	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.010	Depositor
Recommended contour level	0.06	Depositor
Map size (Å)	315.91998, 315.91998, 315.91998	wwPDB
Map dimensions	440, 440, 440	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.71799994, 0.71799994, 0.71799994	Depositor

5 Model quality

5.1 Standard geometry

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

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	G	0.19	0/977	0.42	0/1322
1	H	0.19	0/977	0.42	0/1322
1	I	0.19	0/977	0.42	0/1322
2	J	0.19	0/787	0.46	0/1063
2	K	0.19	0/787	0.46	0/1063
2	L	0.19	0/787	0.46	0/1063
3	A	0.22	0/2528	0.51	0/3439
3	C	0.22	0/2528	0.52	0/3439
3	D	0.22	0/2528	0.52	0/3439
4	B	0.20	0/1412	0.42	0/1895
4	E	0.20	0/1412	0.42	0/1895
4	F	0.21	0/1412	0.42	0/1895
All	All	0.21	0/17112	0.47	0/23157

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	J	0	1
2	K	0	1
2	L	0	1
3	A	0	4
3	C	0	4
3	D	0	4
4	B	0	1
4	E	0	1
4	F	0	1
All	All	0	18

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (18) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	A	141	ARG	Sidechain
3	A	150	ARG	Sidechain
3	A	229	ARG	Sidechain
3	A	269	ARG	Sidechain
4	B	127	ARG	Sidechain
3	C	141	ARG	Sidechain
3	C	150	ARG	Sidechain
3	C	229	ARG	Sidechain
3	C	269	ARG	Sidechain
3	D	141	ARG	Sidechain
3	D	150	ARG	Sidechain
3	D	229	ARG	Sidechain
3	D	269	ARG	Sidechain
4	E	127	ARG	Sidechain
4	F	127	ARG	Sidechain
2	J	54	ARG	Sidechain
2	K	54	ARG	Sidechain
2	L	54	ARG	Sidechain

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	G	951	0	893	2	0
1	H	951	0	893	2	0
1	I	951	0	893	2	0
2	J	771	0	747	2	0
2	K	771	0	747	1	0
2	L	771	0	747	1	0
3	A	2471	0	2418	12	0
3	C	2471	0	2418	15	0
3	D	2471	0	2418	12	0
4	B	1388	0	1318	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	E	1388	0	1318	4	0
4	F	1388	0	1318	5	0
5	M	39	0	34	0	0
5	O	39	0	34	0	0
5	P	39	0	34	0	0
5	Q	39	0	34	0	0
5	S	39	0	34	0	0
5	T	39	0	34	0	0
5	U	39	0	34	0	0
5	W	39	0	34	0	0
5	X	39	0	34	0	0
6	N	38	0	34	0	0
6	R	38	0	34	0	0
6	V	38	0	34	0	0
7	A	84	0	78	1	0
7	B	14	0	13	0	0
7	C	84	0	78	1	0
7	D	84	0	78	1	0
7	E	14	0	13	0	0
7	F	14	0	13	0	0
All	All	17502	0	16809	55	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 2.

All (55) 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:I:62:SER:O	1:I:66:ARG:NH2	2.21	0.73
1:H:62:SER:O	1:H:66:ARG:NH2	2.21	0.73
1:G:62:SER:O	1:G:66:ARG:NH2	2.21	0.73
4:B:79:ASP:OD2	3:D:110:SER:OG	2.12	0.64
3:A:221:PRO:O	3:A:229:ARG:NH2	2.31	0.64
3:C:221:PRO:O	3:C:229:ARG:NH2	2.31	0.63
3:D:221:PRO:O	3:D:229:ARG:NH2	2.31	0.62
3:A:110:SER:OG	4:E:79:ASP:OD2	2.13	0.59
3:C:90:ARG:NH1	3:C:272:ALA:O	2.39	0.56
3:A:90:ARG:NH1	3:A:272:ALA:O	2.39	0.54
3:D:90:ARG:NH1	3:D:272:ALA:O	2.39	0.54
2:L:6:GLN:NE2	2:L:88:CYS:SG	2.80	0.54
3:C:110:SER:OG	4:F:79:ASP:OD2	2.14	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:6:GLN:NE2	2:K:88:CYS:SG	2.81	0.53
2:J:6:GLN:NE2	2:J:88:CYS:SG	2.81	0.53
3:C:98:TYR:HH	3:C:228:SER:HG	1.56	0.53
4:E:28:ASN:ND2	4:E:144:CYS:O	2.43	0.52
4:F:28:ASN:ND2	4:F:144:CYS:O	2.43	0.51
4:B:28:ASN:ND2	4:B:144:CYS:O	2.43	0.51
3:D:72:GLY:O	3:D:141:ARG:NH2	2.44	0.51
3:C:72:GLY:O	3:C:141:ARG:NH2	2.44	0.50
1:I:97:GLN:NE2	4:F:53:ASN:OD1	2.43	0.49
3:A:72:GLY:O	3:A:141:ARG:NH2	2.44	0.49
3:D:132:GLN:OE1	3:D:152:ASN:ND2	2.46	0.49
1:G:97:GLN:NE2	4:E:53:ASN:OD1	2.43	0.49
1:H:97:GLN:NE2	4:B:53:ASN:OD1	2.43	0.49
3:A:132:GLN:OE1	3:A:152:ASN:ND2	2.46	0.48
3:C:132:GLN:OE1	3:C:152:ASN:ND2	2.47	0.48
3:D:60:ASP:OD2	3:D:90:ARG:NH2	2.47	0.48
3:C:52:CYS:SG	3:C:277:CYS:N	2.88	0.46
3:A:60:ASP:OD2	3:A:90:ARG:NH2	2.46	0.46
3:A:52:CYS:SG	3:A:277:CYS:N	2.88	0.46
3:D:52:CYS:SG	3:D:277:CYS:N	2.88	0.45
3:C:60:ASP:OD2	3:C:90:ARG:NH2	2.46	0.44
3:C:65:THR:O	3:C:69:ALA:N	2.52	0.43
3:A:19:ALA:N	4:B:14:TRP:O	2.51	0.42
3:A:197:GLN:NE2	3:A:199:SER:O	2.52	0.42
3:D:121:ASN:OD1	3:D:259:LYS:NZ	2.53	0.42
3:D:19:ALA:N	4:F:14:TRP:O	2.51	0.42
3:C:197:GLN:NE2	3:C:199:SER:O	2.52	0.42
3:C:19:ALA:N	4:E:14:TRP:O	2.50	0.41
3:A:149:SER:O	3:A:255:ARG:NE	2.51	0.41
3:C:121:ASN:OD1	3:C:259:LYS:NZ	2.53	0.41
3:D:65:THR:O	3:D:69:ALA:N	2.52	0.41
3:C:295:GLN:NE2	3:C:298:ASN:O	2.53	0.41
3:D:295:GLN:NE2	3:D:298:ASN:O	2.54	0.41
2:J:5:THR:N	2:J:24:SER:O	2.54	0.41
3:A:121:ASN:OD1	3:A:259:LYS:NZ	2.53	0.41
3:A:65:THR:O	3:A:69:ALA:N	2.52	0.41
7:A:403:NAG:H83	7:A:403:NAG:H3	2.03	0.41
3:C:149:SER:O	3:C:255:ARG:NE	2.52	0.41
3:C:307:ARG:NH2	4:F:90:ASP:OD2	2.52	0.40
3:D:197:GLN:NE2	3:D:199:SER:O	2.52	0.40
7:D:403:NAG:H3	7:D:403:NAG:H83	2.04	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:C:403:NAG:H83	7:C:403:NAG:H3	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

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	G	119/121 (98%)	109 (92%)	10 (8%)	0	100	100
1	H	119/121 (98%)	109 (92%)	10 (8%)	0	100	100
1	I	119/121 (98%)	109 (92%)	10 (8%)	0	100	100
2	J	105/109 (96%)	99 (94%)	6 (6%)	0	100	100
2	K	105/109 (96%)	99 (94%)	6 (6%)	0	100	100
2	L	105/109 (96%)	99 (94%)	6 (6%)	0	100	100
3	A	314/345 (91%)	308 (98%)	6 (2%)	0	100	100
3	C	314/345 (91%)	308 (98%)	6 (2%)	0	100	100
3	D	314/345 (91%)	309 (98%)	5 (2%)	0	100	100
4	B	170/236 (72%)	168 (99%)	2 (1%)	0	100	100
4	E	170/236 (72%)	168 (99%)	2 (1%)	0	100	100
4	F	170/236 (72%)	168 (99%)	2 (1%)	0	100	100
All	All	2124/2433 (87%)	2053 (97%)	71 (3%)	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 PDB entries followed by that with respect to all EM

entries.

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	G	97/98 (99%)	96 (99%)	1 (1%)	73	87
1	H	97/98 (99%)	96 (99%)	1 (1%)	73	87
1	I	97/98 (99%)	96 (99%)	1 (1%)	73	87
2	J	85/87 (98%)	84 (99%)	1 (1%)	67	84
2	K	85/87 (98%)	84 (99%)	1 (1%)	67	84
2	L	85/87 (98%)	84 (99%)	1 (1%)	67	84
3	A	280/306 (92%)	277 (99%)	3 (1%)	70	86
3	C	280/306 (92%)	277 (99%)	3 (1%)	70	86
3	D	280/306 (92%)	277 (99%)	3 (1%)	70	86
4	B	145/194 (75%)	145 (100%)	0	100	100
4	E	145/194 (75%)	145 (100%)	0	100	100
4	F	145/194 (75%)	145 (100%)	0	100	100
All	All	1821/2055 (89%)	1806 (99%)	15 (1%)	77	91

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

Mol	Chain	Res	Type
1	H	71	ARG
2	L	50	GLU
3	A	148	PHE
3	A	150	ARG
3	A	165	ASN
1	G	71	ARG
2	J	50	GLU
3	C	148	PHE
3	C	150	ARG
3	C	165	ASN
1	I	71	ARG
2	K	50	GLU
3	D	148	PHE
3	D	150	ARG
3	D	165	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
2	L	37	GLN
3	A	56	HIS
4	B	47	GLN
4	B	65	GLN
4	B	159	HIS
2	J	37	GLN
3	C	56	HIS
3	C	81	ASN
3	C	211	GLN
4	E	47	GLN
4	E	65	GLN
4	E	159	HIS
2	K	37	GLN
3	D	56	HIS
3	D	81	ASN
3	D	211	GLN
4	F	47	GLN
4	F	65	GLN
4	F	159	HIS

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 ⓘ

36 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	$\# Z > 2$
5	NAG	M	1	3,5	14,14,15	0.30	0	17,19,21	0.97	2 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	M	2	5	14,14,15	0.34	0	17,19,21	0.53	0
5	BMA	M	3	5	11,11,12	0.53	0	15,15,17	0.75	0
6	NAG	N	1	3,6	14,14,15	0.24	0	17,19,21	0.76	1 (5%)
6	NAG	N	2	6	14,14,15	0.37	0	17,19,21	0.85	1 (5%)
6	FUC	N	3	6	10,10,11	0.62	0	14,14,16	0.61	0
5	NAG	O	1	3,5	14,14,15	0.32	0	17,19,21	0.59	0
5	NAG	O	2	5	14,14,15	0.34	0	17,19,21	0.92	2 (11%)
5	BMA	O	3	5	11,11,12	0.61	0	15,15,17	0.80	1 (6%)
5	NAG	P	1	3,5	14,14,15	0.66	0	17,19,21	0.70	0
5	NAG	P	2	5	14,14,15	0.25	0	17,19,21	1.00	2 (11%)
5	BMA	P	3	5	11,11,12	1.83	3 (27%)	15,15,17	1.56	2 (13%)
5	NAG	Q	1	3,5	14,14,15	0.30	0	17,19,21	0.96	2 (11%)
5	NAG	Q	2	5	14,14,15	0.31	0	17,19,21	0.52	0
5	BMA	Q	3	5	11,11,12	0.52	0	15,15,17	0.74	0
6	NAG	R	1	3,6	14,14,15	0.22	0	17,19,21	0.77	1 (5%)
6	NAG	R	2	6	14,14,15	0.42	0	17,19,21	0.83	1 (5%)
6	FUC	R	3	6	10,10,11	0.62	0	14,14,16	0.61	0
5	NAG	S	1	3,5	14,14,15	0.32	0	17,19,21	0.59	0
5	NAG	S	2	5	14,14,15	0.33	0	17,19,21	0.91	2 (11%)
5	BMA	S	3	5	11,11,12	0.61	0	15,15,17	0.81	1 (6%)
5	NAG	T	1	3,5	14,14,15	0.65	0	17,19,21	0.70	0
5	NAG	T	2	5	14,14,15	0.25	0	17,19,21	1.00	2 (11%)
5	BMA	T	3	5	11,11,12	1.86	3 (27%)	15,15,17	1.55	2 (13%)
5	NAG	U	1	3,5	14,14,15	0.32	0	17,19,21	0.97	2 (11%)
5	NAG	U	2	5	14,14,15	0.30	0	17,19,21	0.53	0
5	BMA	U	3	5	11,11,12	0.53	0	15,15,17	0.74	0
6	NAG	V	1	3,6	14,14,15	0.23	0	17,19,21	0.76	1 (5%)
6	NAG	V	2	6	14,14,15	0.38	0	17,19,21	0.85	1 (5%)
6	FUC	V	3	6	10,10,11	0.63	0	14,14,16	0.61	0
5	NAG	W	1	3,5	14,14,15	0.33	0	17,19,21	0.59	0
5	NAG	W	2	5	14,14,15	0.33	0	17,19,21	0.92	2 (11%)
5	BMA	W	3	5	11,11,12	0.62	0	15,15,17	0.81	1 (6%)
5	NAG	X	1	3,5	14,14,15	0.65	0	17,19,21	0.70	0
5	NAG	X	2	5	14,14,15	0.25	0	17,19,21	1.00	2 (11%)
5	BMA	X	3	5	11,11,12	1.84	3 (27%)	15,15,17	1.57	2 (13%)

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
5	NAG	M	1	3,5	-	2/6/23/26	0/1/1/1
5	NAG	M	2	5	-	2/6/23/26	0/1/1/1
5	BMA	M	3	5	-	0/2/19/22	0/1/1/1
6	NAG	N	1	3,6	-	4/6/23/26	0/1/1/1
6	NAG	N	2	6	-	2/6/23/26	0/1/1/1
6	FUC	N	3	6	-	-	0/1/1/1
5	NAG	O	1	3,5	-	0/6/23/26	0/1/1/1
5	NAG	O	2	5	-	2/6/23/26	0/1/1/1
5	BMA	O	3	5	-	0/2/19/22	0/1/1/1
5	NAG	P	1	3,5	-	2/6/23/26	0/1/1/1
5	NAG	P	2	5	-	4/6/23/26	0/1/1/1
5	BMA	P	3	5	-	2/2/19/22	0/1/1/1
5	NAG	Q	1	3,5	-	2/6/23/26	0/1/1/1
5	NAG	Q	2	5	-	2/6/23/26	0/1/1/1
5	BMA	Q	3	5	-	0/2/19/22	0/1/1/1
6	NAG	R	1	3,6	-	4/6/23/26	0/1/1/1
6	NAG	R	2	6	-	2/6/23/26	0/1/1/1
6	FUC	R	3	6	-	-	0/1/1/1
5	NAG	S	1	3,5	-	0/6/23/26	0/1/1/1
5	NAG	S	2	5	-	2/6/23/26	0/1/1/1
5	BMA	S	3	5	-	0/2/19/22	0/1/1/1
5	NAG	T	1	3,5	-	2/6/23/26	0/1/1/1
5	NAG	T	2	5	-	4/6/23/26	0/1/1/1
5	BMA	T	3	5	-	2/2/19/22	0/1/1/1
5	NAG	U	1	3,5	-	2/6/23/26	0/1/1/1
5	NAG	U	2	5	-	2/6/23/26	0/1/1/1
5	BMA	U	3	5	-	0/2/19/22	0/1/1/1
6	NAG	V	1	3,6	-	4/6/23/26	0/1/1/1
6	NAG	V	2	6	-	2/6/23/26	0/1/1/1
6	FUC	V	3	6	-	-	0/1/1/1
5	NAG	W	1	3,5	-	0/6/23/26	0/1/1/1
5	NAG	W	2	5	-	2/6/23/26	0/1/1/1
5	BMA	W	3	5	-	0/2/19/22	0/1/1/1
5	NAG	X	1	3,5	-	2/6/23/26	0/1/1/1
5	NAG	X	2	5	-	4/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	BMA	X	3	5	-	2/2/19/22	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	T	3	BMA	O5-C1	4.51	1.51	1.43
5	P	3	BMA	O5-C1	4.46	1.51	1.43
5	X	3	BMA	O5-C1	4.45	1.51	1.43
5	X	3	BMA	O5-C5	2.46	1.48	1.43
5	T	3	BMA	O5-C5	2.44	1.48	1.43
5	P	3	BMA	O5-C5	2.43	1.48	1.43
5	T	3	BMA	C1-C2	2.35	1.57	1.52
5	X	3	BMA	C1-C2	2.31	1.57	1.52
5	P	3	BMA	C1-C2	2.28	1.57	1.52

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	X	3	BMA	C1-O5-C5	4.23	117.85	112.19
5	T	3	BMA	C1-O5-C5	4.21	117.83	112.19
5	P	3	BMA	C1-O5-C5	4.18	117.78	112.19
5	M	1	NAG	C2-N2-C7	2.92	126.81	122.90
5	U	1	NAG	C2-N2-C7	2.92	126.81	122.90
5	Q	1	NAG	C2-N2-C7	2.87	126.75	122.90
5	X	2	NAG	C2-N2-C7	2.86	126.73	122.90
5	T	2	NAG	C2-N2-C7	2.84	126.71	122.90
5	P	2	NAG	C2-N2-C7	2.83	126.69	122.90
5	O	2	NAG	C2-N2-C7	2.81	126.67	122.90
5	W	2	NAG	C2-N2-C7	2.79	126.64	122.90
5	S	2	NAG	C2-N2-C7	2.78	126.62	122.90
6	V	2	NAG	C2-N2-C7	2.77	126.61	122.90
6	N	2	NAG	C2-N2-C7	2.75	126.59	122.90
6	R	1	NAG	C1-O5-C5	2.69	115.80	112.19
6	R	2	NAG	C2-N2-C7	2.68	126.49	122.90
6	V	1	NAG	C1-O5-C5	2.64	115.73	112.19
6	N	1	NAG	C1-O5-C5	2.63	115.71	112.19
5	X	3	BMA	C3-C4-C5	2.40	114.59	110.23
5	P	3	BMA	C3-C4-C5	2.38	114.55	110.23
5	P	2	NAG	C1-O5-C5	2.34	115.33	112.19
5	T	3	BMA	C3-C4-C5	2.33	114.46	110.23
5	T	2	NAG	C1-O5-C5	2.33	115.31	112.19
5	X	2	NAG	C1-O5-C5	2.32	115.29	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	S	3	BMA	C1-O5-C5	2.22	115.16	112.19
5	W	3	BMA	C1-O5-C5	2.20	115.13	112.19
5	O	3	BMA	C1-O5-C5	2.20	115.13	112.19
5	M	1	NAG	C1-O5-C5	2.06	114.95	112.19
5	O	2	NAG	C1-O5-C5	2.05	114.93	112.19
5	W	2	NAG	C1-O5-C5	2.03	114.91	112.19
5	Q	1	NAG	C1-O5-C5	2.03	114.91	112.19
5	U	1	NAG	C1-O5-C5	2.03	114.90	112.19
5	S	2	NAG	C1-O5-C5	2.01	114.89	112.19

There are no chirality outliers.

All (60) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	T	2	NAG	O5-C5-C6-O6
5	X	2	NAG	O5-C5-C6-O6
5	P	2	NAG	O5-C5-C6-O6
5	T	2	NAG	C4-C5-C6-O6
5	X	2	NAG	C4-C5-C6-O6
5	P	2	NAG	C4-C5-C6-O6
5	T	1	NAG	O5-C5-C6-O6
5	X	1	NAG	O5-C5-C6-O6
5	P	1	NAG	O5-C5-C6-O6
5	X	1	NAG	C4-C5-C6-O6
5	M	1	NAG	C8-C7-N2-C2
5	M	1	NAG	O7-C7-N2-C2
5	O	2	NAG	C8-C7-N2-C2
5	O	2	NAG	O7-C7-N2-C2
5	P	2	NAG	C8-C7-N2-C2
5	P	2	NAG	O7-C7-N2-C2
5	Q	1	NAG	C8-C7-N2-C2
5	Q	1	NAG	O7-C7-N2-C2
5	S	2	NAG	C8-C7-N2-C2
5	S	2	NAG	O7-C7-N2-C2
5	T	2	NAG	C8-C7-N2-C2
5	T	2	NAG	O7-C7-N2-C2
5	U	1	NAG	C8-C7-N2-C2
5	U	1	NAG	O7-C7-N2-C2
5	W	2	NAG	C8-C7-N2-C2
5	W	2	NAG	O7-C7-N2-C2
5	X	2	NAG	C8-C7-N2-C2
5	X	2	NAG	O7-C7-N2-C2

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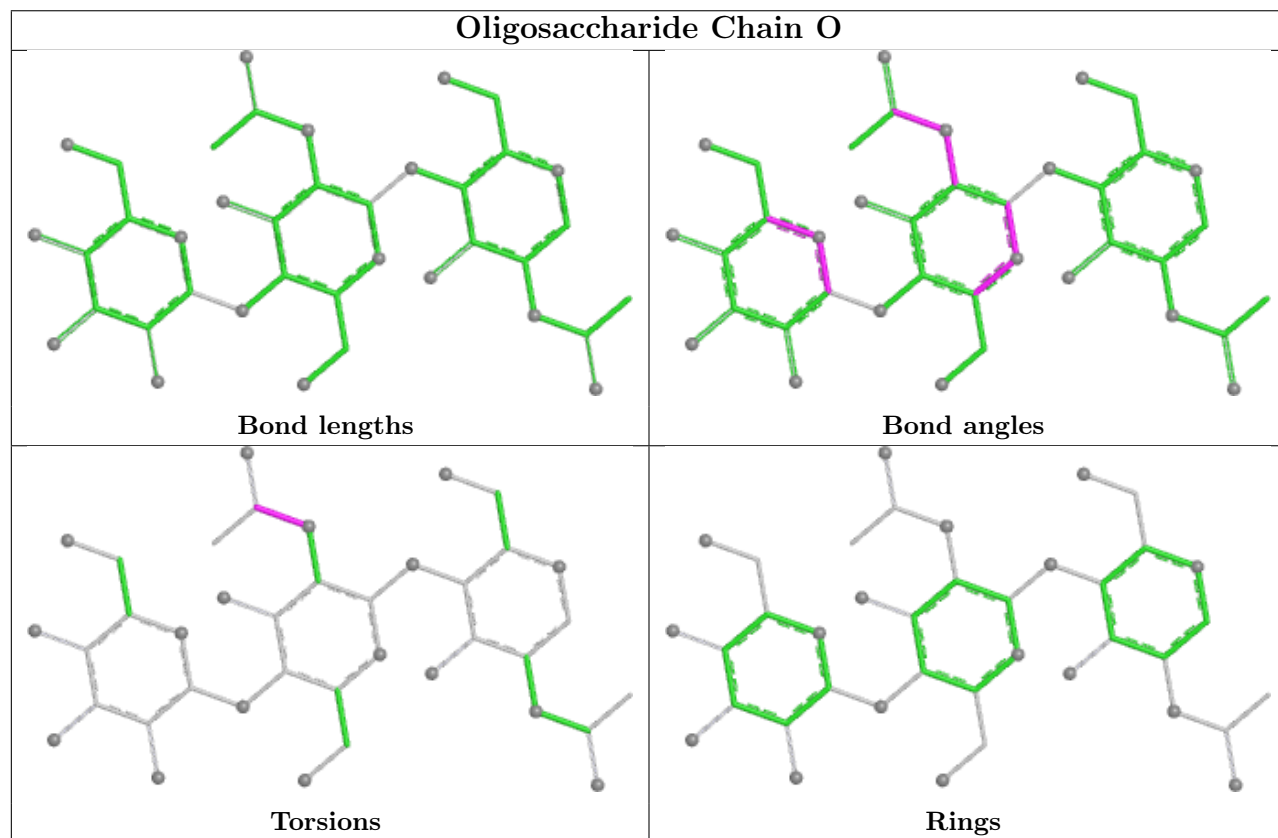
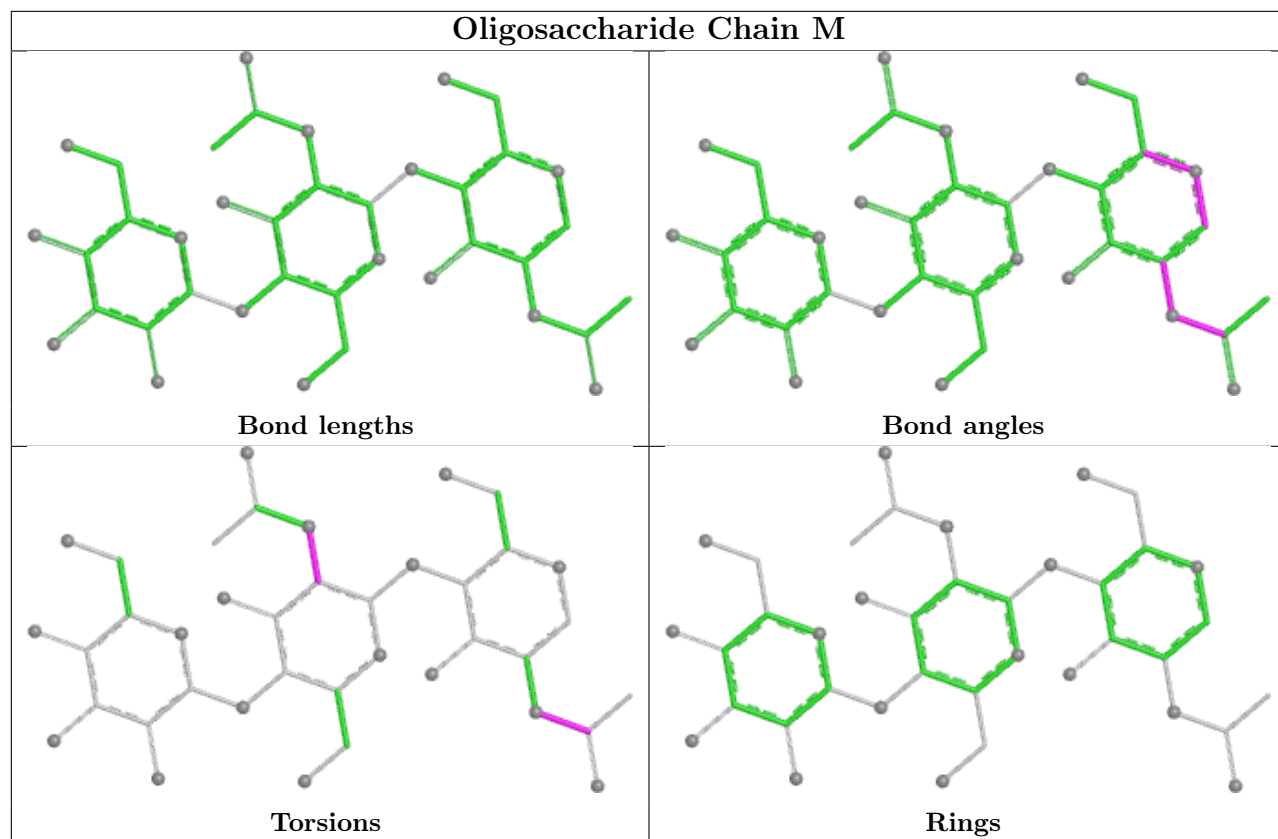
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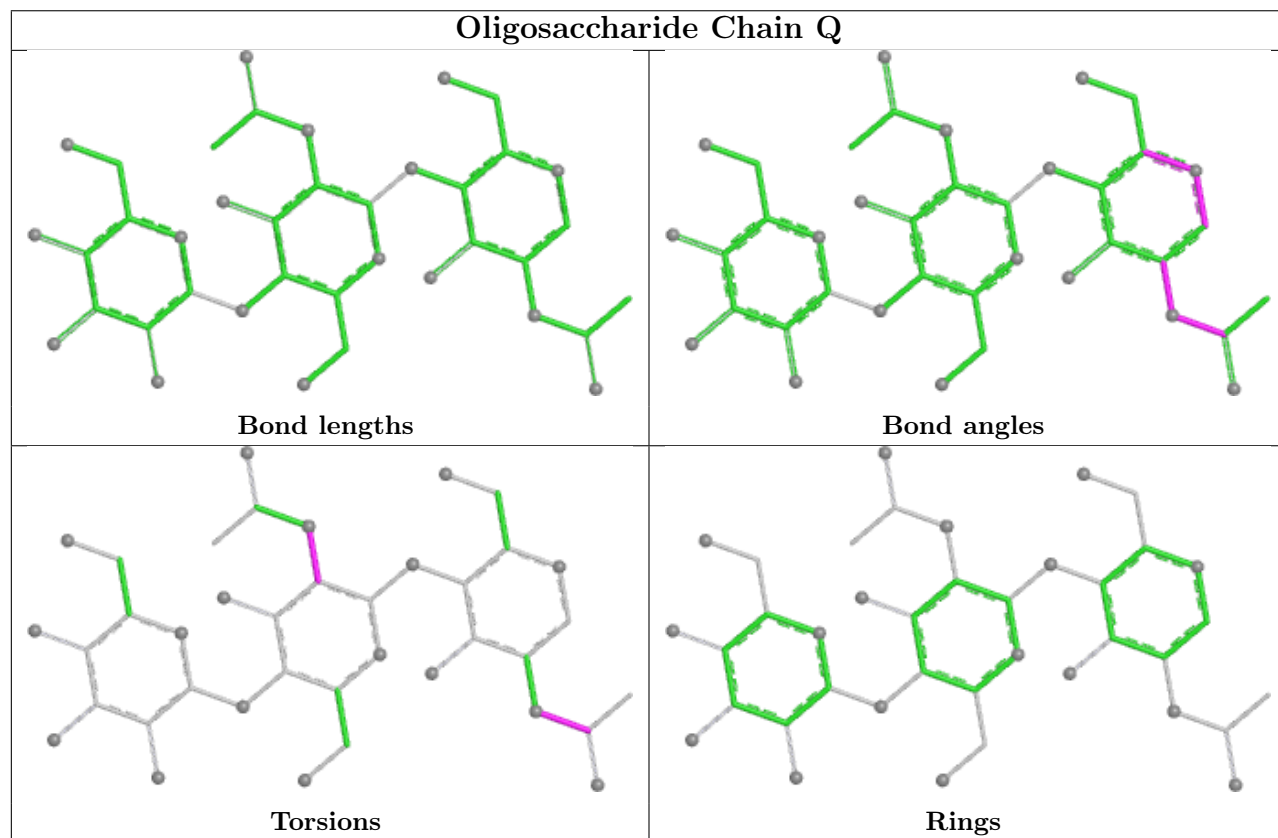
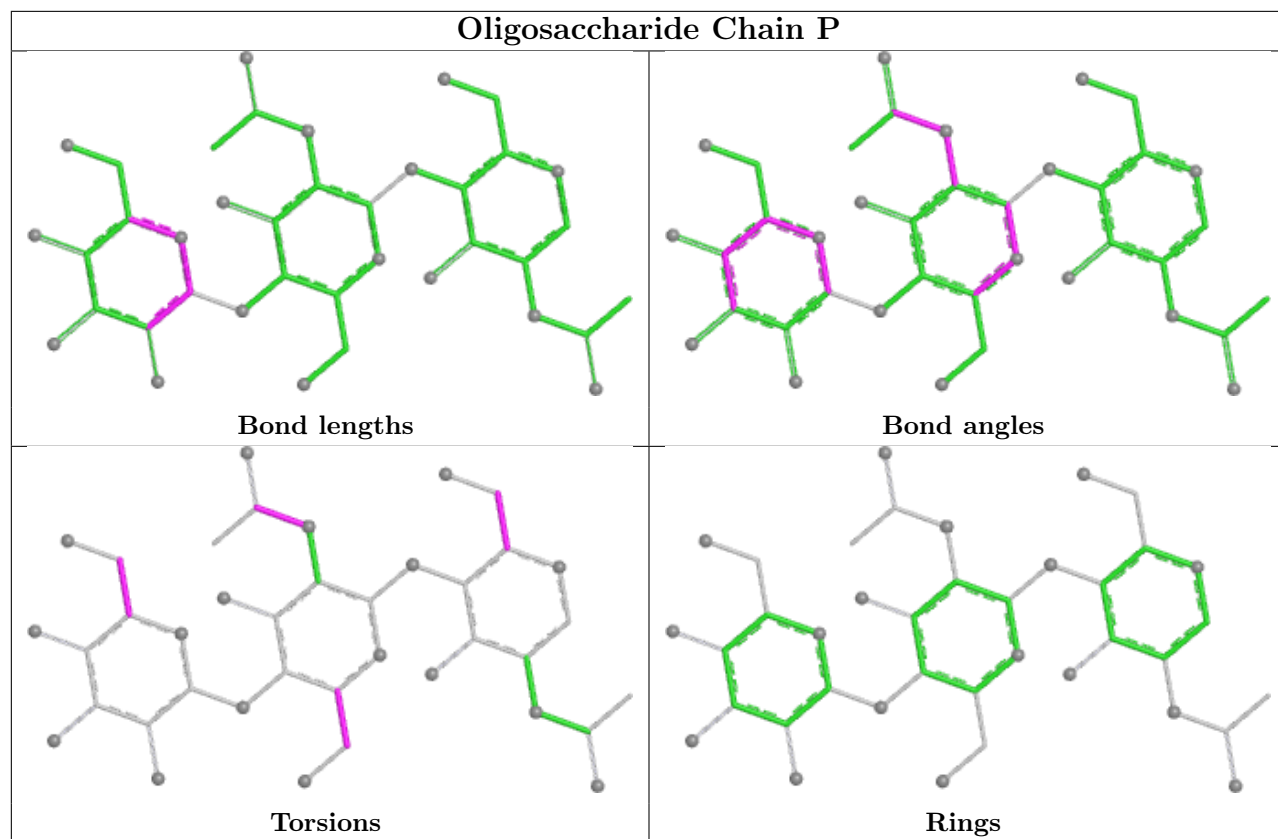
Mol	Chain	Res	Type	Atoms
6	N	2	NAG	C8-C7-N2-C2
6	N	2	NAG	O7-C7-N2-C2
6	R	2	NAG	C8-C7-N2-C2
6	R	2	NAG	O7-C7-N2-C2
6	V	2	NAG	C8-C7-N2-C2
6	V	2	NAG	O7-C7-N2-C2
5	P	1	NAG	C4-C5-C6-O6
5	T	1	NAG	C4-C5-C6-O6
5	P	3	BMA	C4-C5-C6-O6
5	T	3	BMA	C4-C5-C6-O6
5	X	3	BMA	C4-C5-C6-O6
5	P	3	BMA	O5-C5-C6-O6
5	T	3	BMA	O5-C5-C6-O6
5	X	3	BMA	O5-C5-C6-O6
5	M	2	NAG	C1-C2-N2-C7
5	Q	2	NAG	C1-C2-N2-C7
5	U	2	NAG	C1-C2-N2-C7
6	N	1	NAG	C1-C2-N2-C7
6	R	1	NAG	C1-C2-N2-C7
6	V	1	NAG	C1-C2-N2-C7
6	R	1	NAG	C4-C5-C6-O6
6	N	1	NAG	C4-C5-C6-O6
6	V	1	NAG	C4-C5-C6-O6
5	M	2	NAG	C3-C2-N2-C7
5	Q	2	NAG	C3-C2-N2-C7
5	U	2	NAG	C3-C2-N2-C7
6	N	1	NAG	C3-C2-N2-C7
6	R	1	NAG	C3-C2-N2-C7
6	V	1	NAG	C3-C2-N2-C7
6	R	1	NAG	O5-C5-C6-O6
6	N	1	NAG	O5-C5-C6-O6
6	V	1	NAG	O5-C5-C6-O6

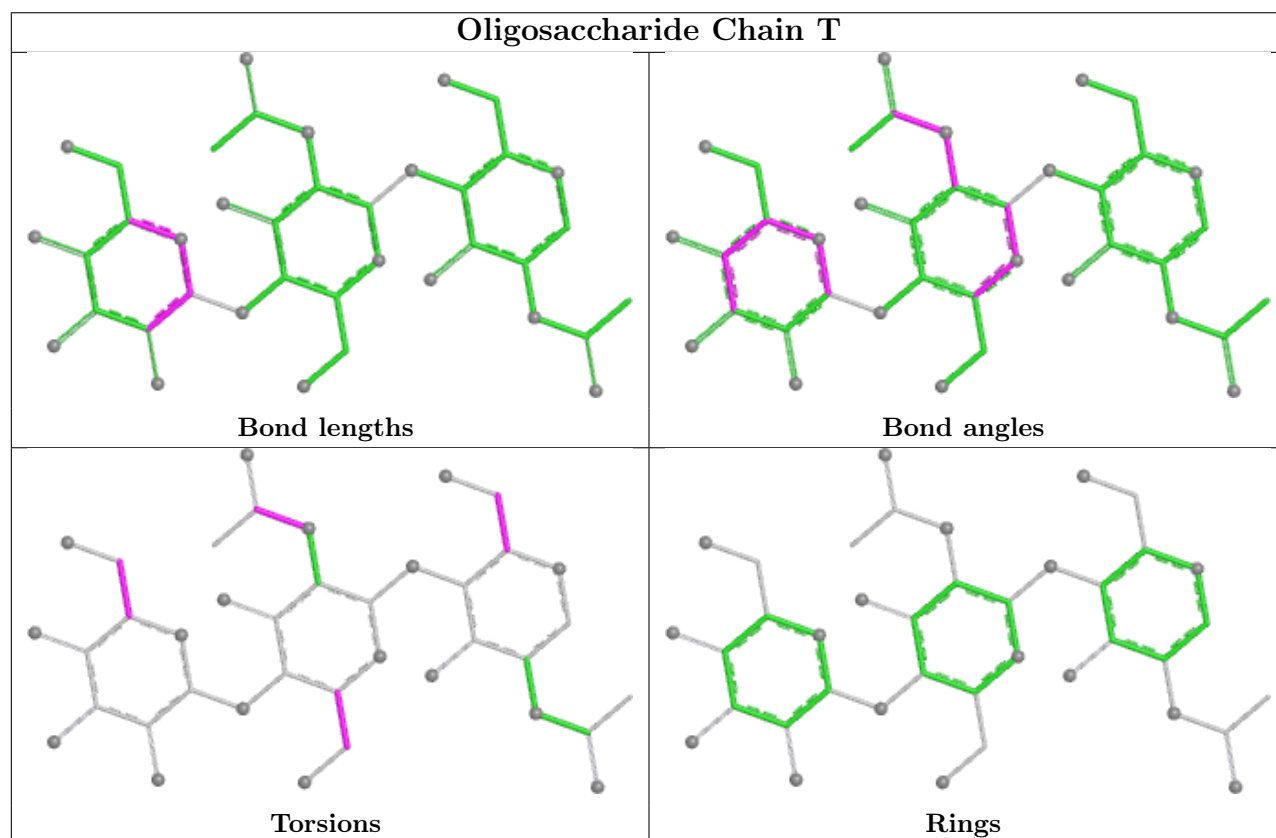
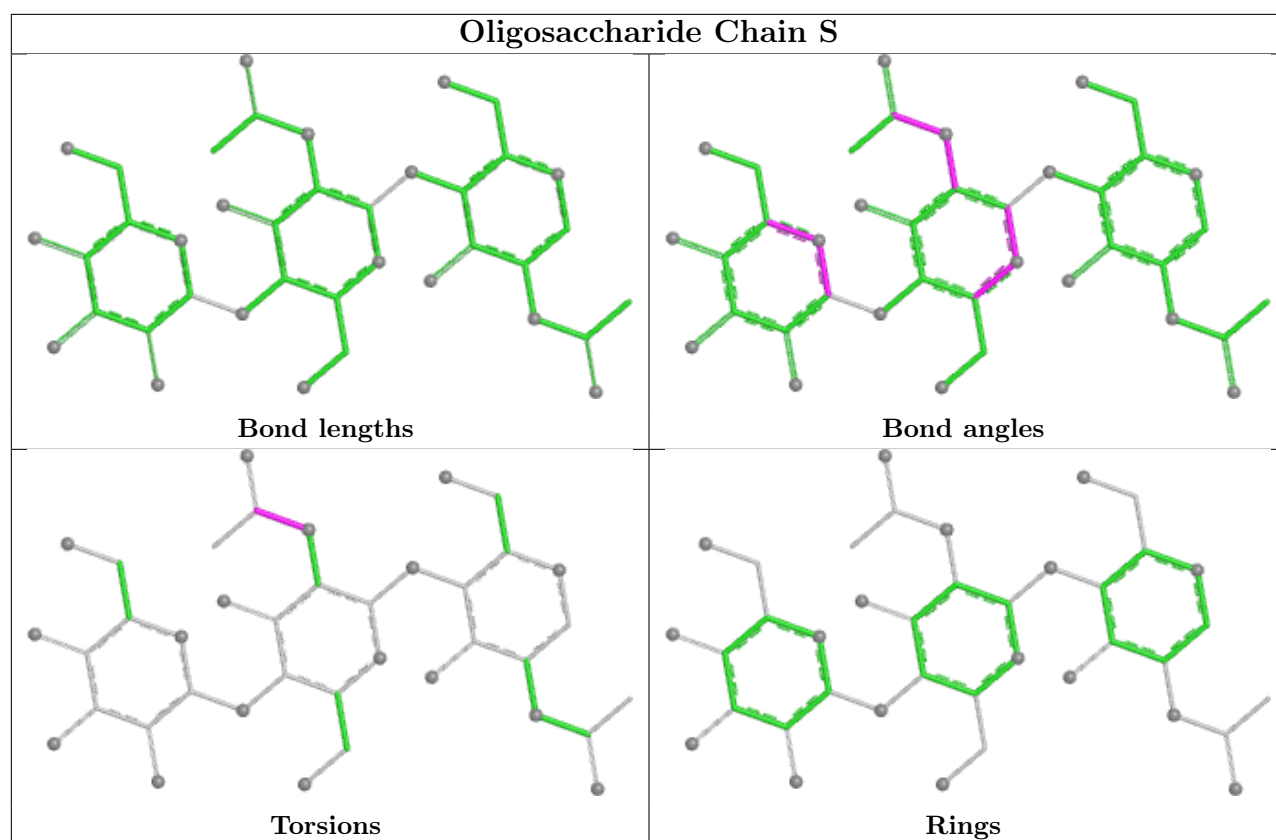
There are no ring outliers.

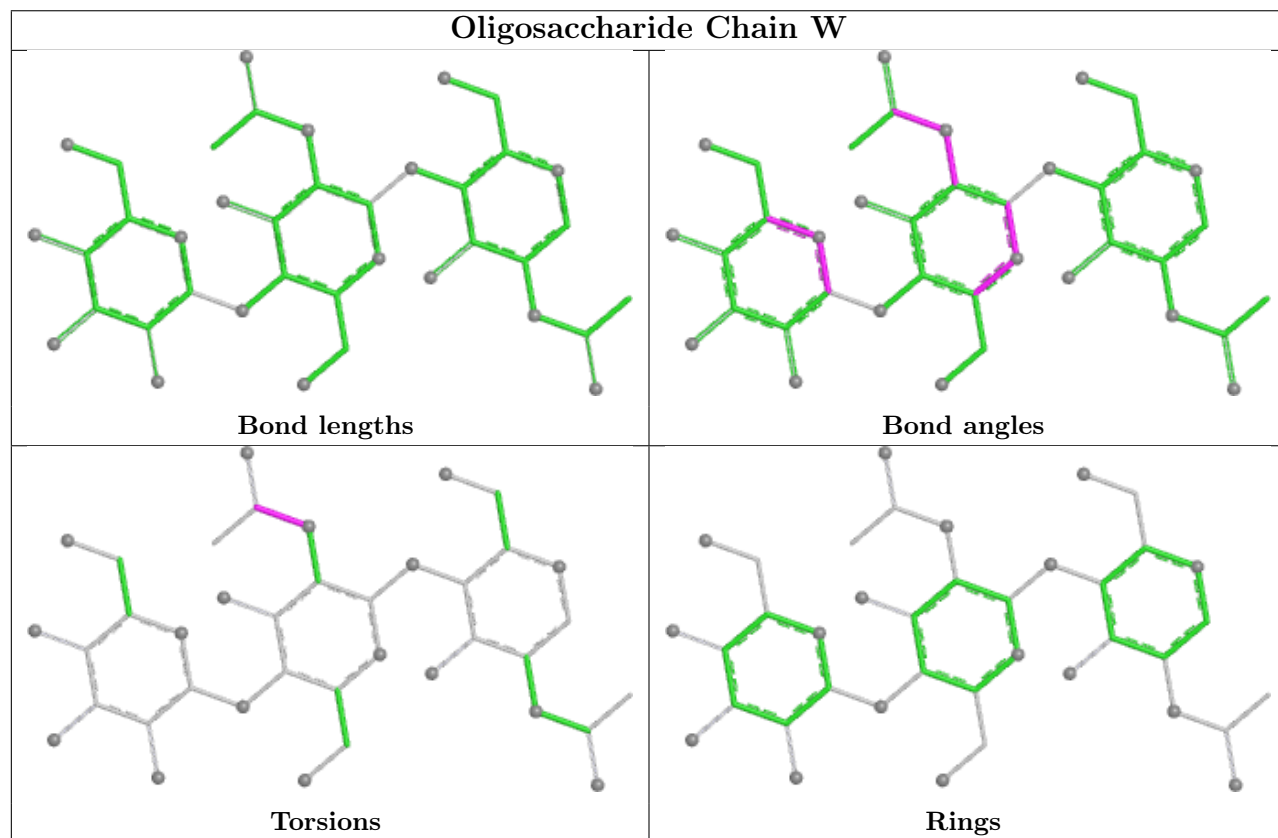
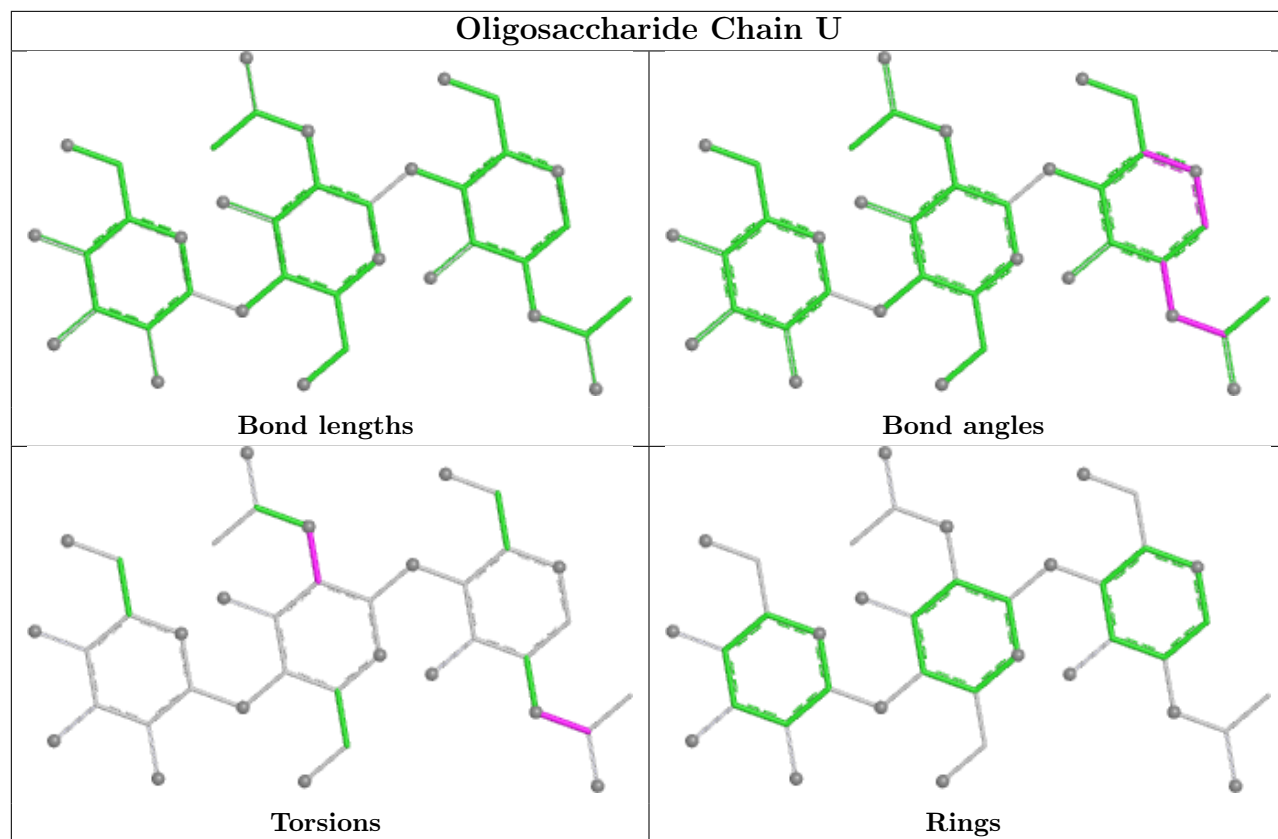
No monomer is involved in short contacts.

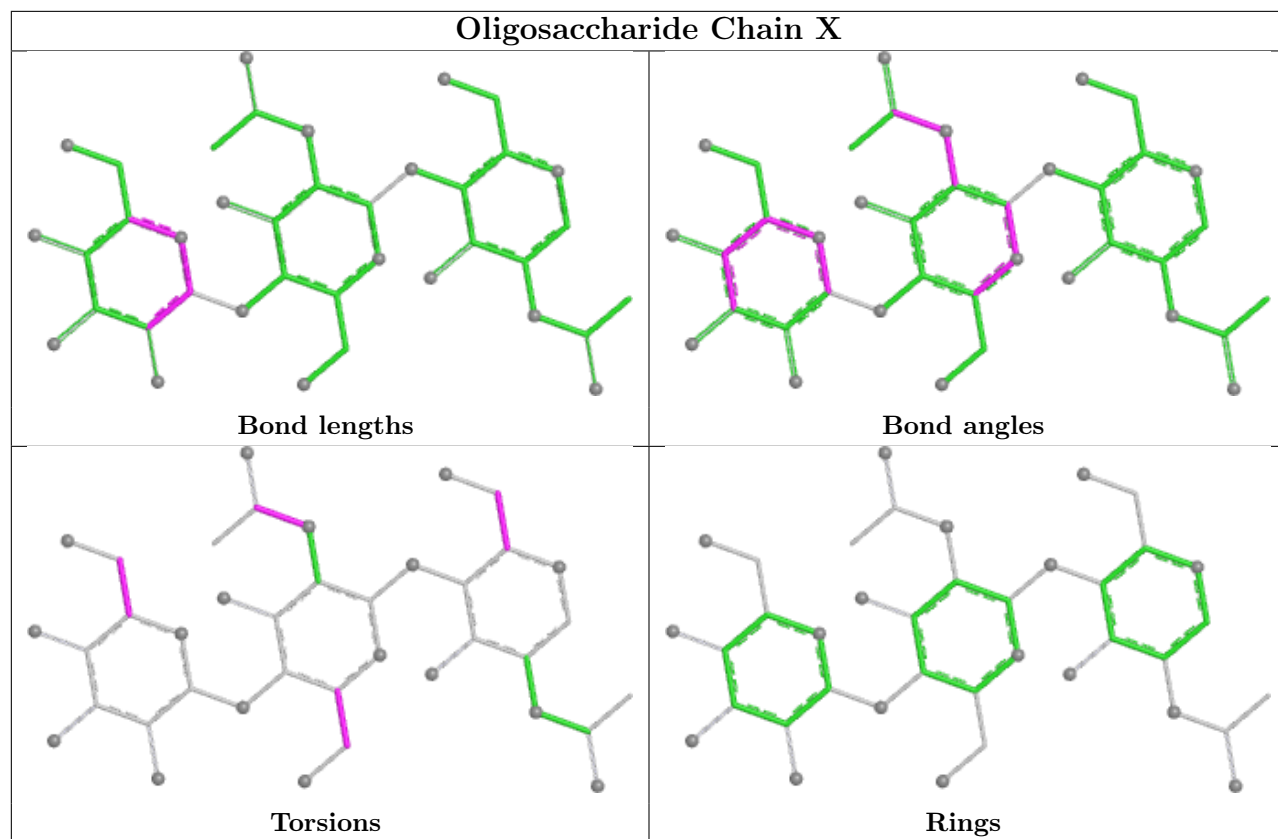
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

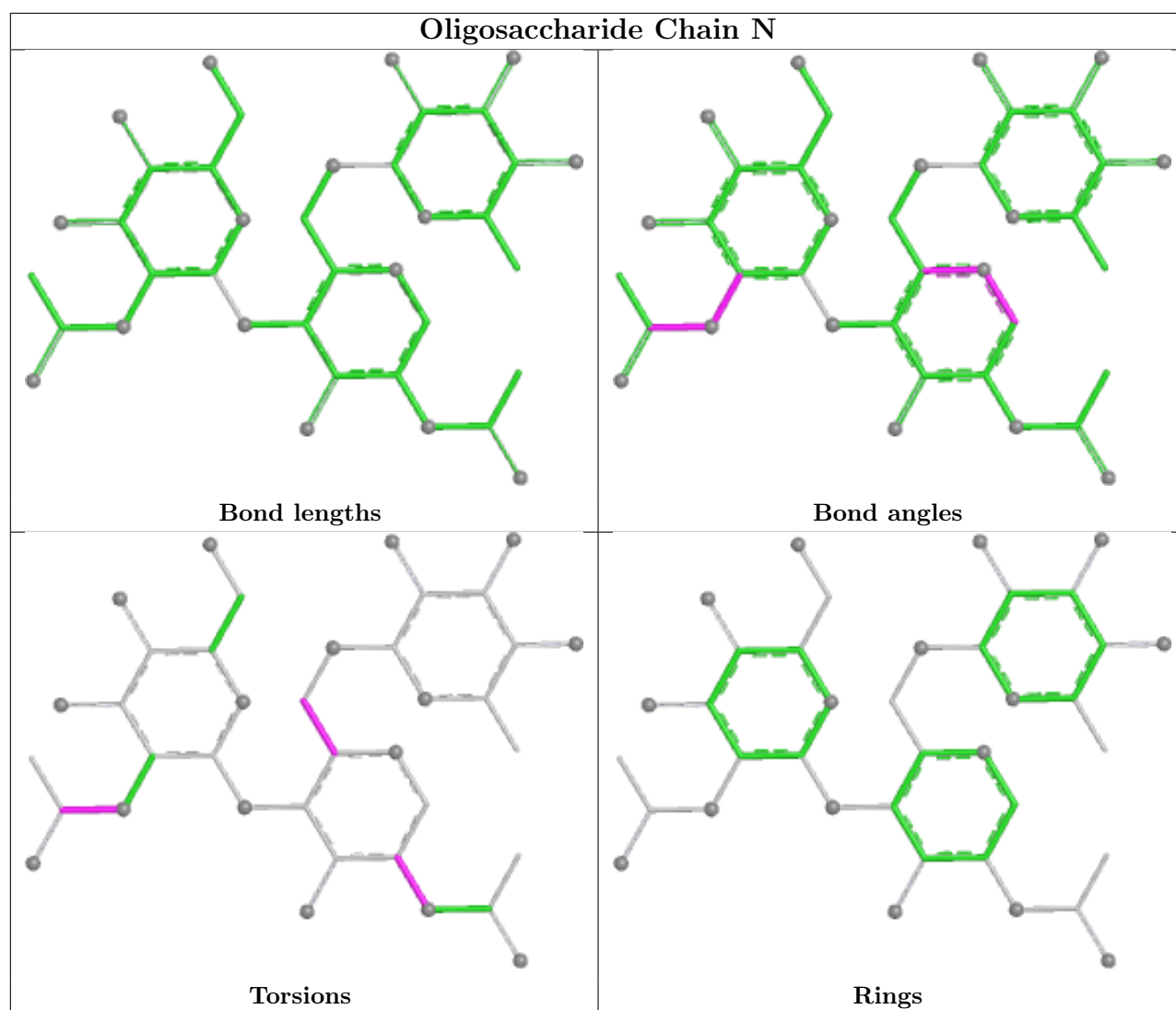


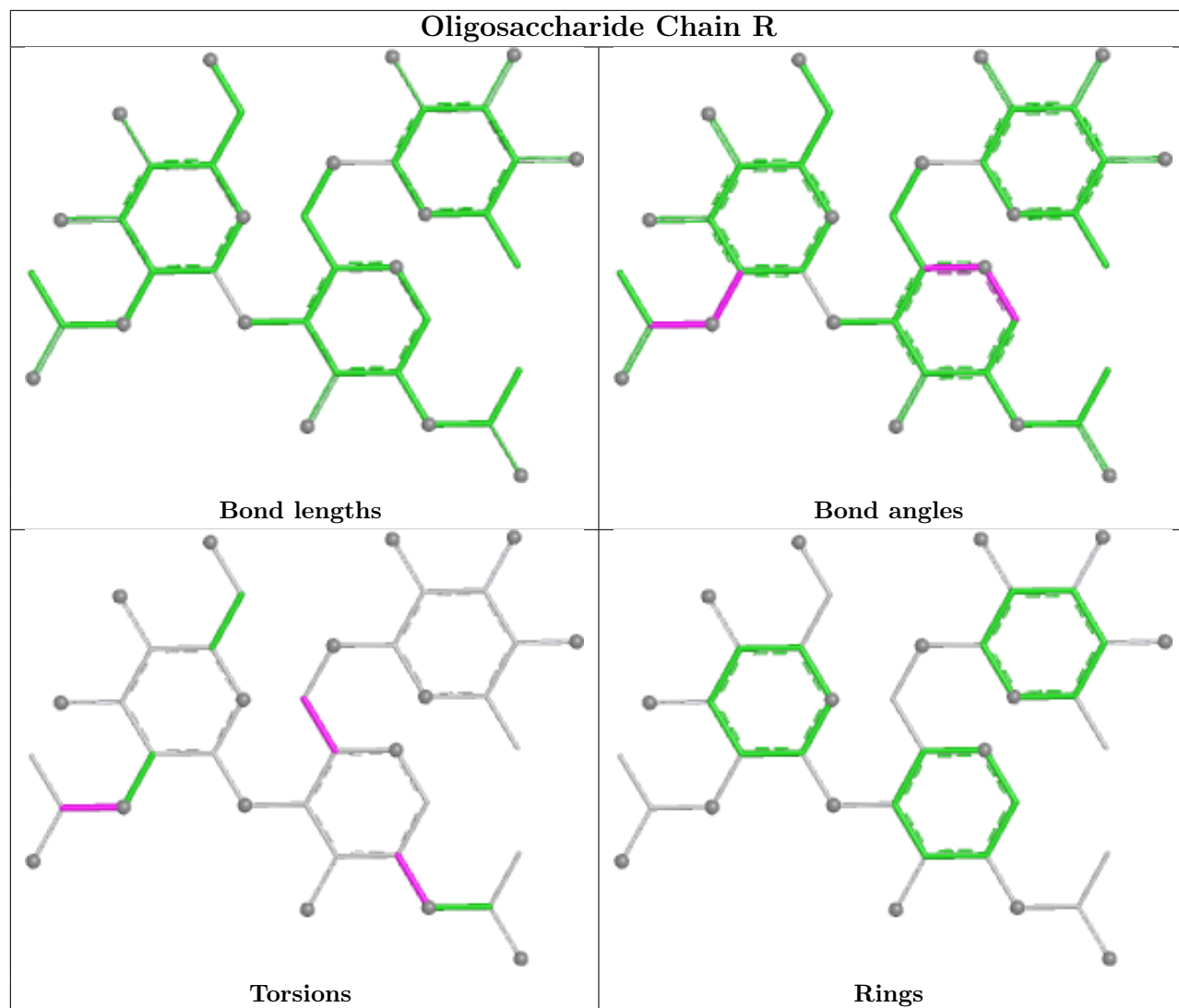


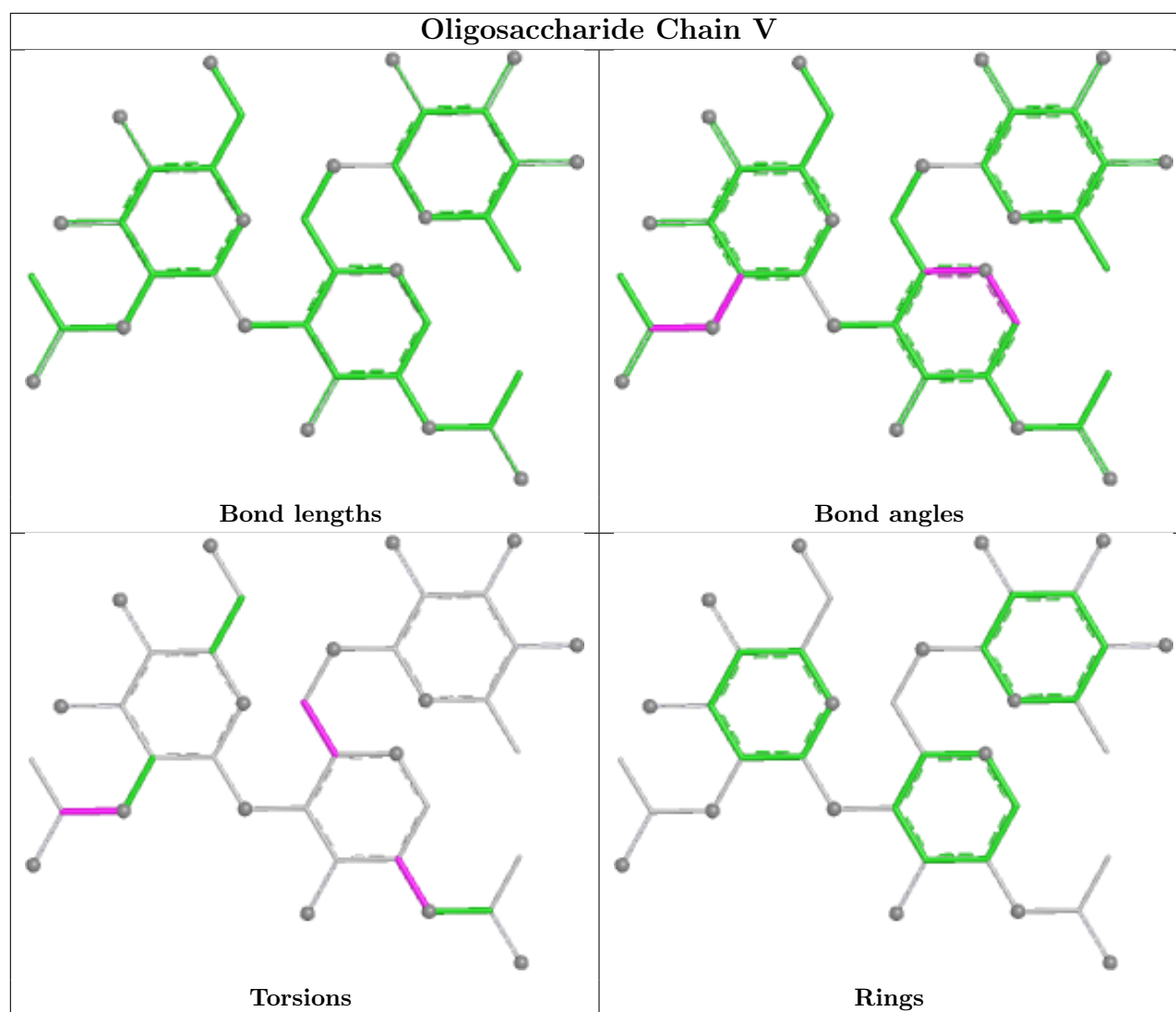












5.6 Ligand geometry [i](#)

21 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	$\# Z > 2$
7	NAG	C	406	3	14,14,15	0.34	0	17,19,21	0.88	1 (5%)
7	NAG	B	301	4	14,14,15	0.35	0	17,19,21	0.88	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
7	NAG	F	301	4	14,14,15	0.35	0	17,19,21	0.88	1 (5%)
7	NAG	A	406	3	14,14,15	0.35	0	17,19,21	0.88	1 (5%)
7	NAG	C	404	3	14,14,15	0.25	0	17,19,21	0.51	0
7	NAG	E	301	4	14,14,15	0.35	0	17,19,21	0.88	1 (5%)
7	NAG	D	401	3	14,14,15	0.32	0	17,19,21	0.48	0
7	NAG	C	405	3	14,14,15	0.31	0	17,19,21	0.52	0
7	NAG	D	403	3	14,14,15	0.34	0	17,19,21	1.49	2 (11%)
7	NAG	A	401	3	14,14,15	0.31	0	17,19,21	0.48	0
7	NAG	C	403	3	14,14,15	0.34	0	17,19,21	1.49	2 (11%)
7	NAG	D	404	3	14,14,15	0.26	0	17,19,21	0.51	0
7	NAG	D	406	3	14,14,15	0.35	0	17,19,21	0.88	1 (5%)
7	NAG	D	402	3	14,14,15	0.34	0	17,19,21	0.67	1 (5%)
7	NAG	A	403	3	14,14,15	0.34	0	17,19,21	1.49	2 (11%)
7	NAG	C	401	3	14,14,15	0.31	0	17,19,21	0.48	0
7	NAG	A	405	3	14,14,15	0.31	0	17,19,21	0.52	0
7	NAG	C	402	3	14,14,15	0.35	0	17,19,21	0.67	1 (5%)
7	NAG	A	404	3	14,14,15	0.25	0	17,19,21	0.51	0
7	NAG	D	405	3	14,14,15	0.32	0	17,19,21	0.52	0
7	NAG	A	402	3	14,14,15	0.34	0	17,19,21	0.67	1 (5%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	NAG	C	406	3	-	3/6/23/26	0/1/1/1
7	NAG	B	301	4	-	4/6/23/26	0/1/1/1
7	NAG	F	301	4	-	4/6/23/26	0/1/1/1
7	NAG	A	406	3	-	3/6/23/26	0/1/1/1
7	NAG	C	404	3	-	0/6/23/26	0/1/1/1
7	NAG	E	301	4	-	4/6/23/26	0/1/1/1
7	NAG	D	401	3	-	2/6/23/26	0/1/1/1
7	NAG	C	405	3	-	3/6/23/26	0/1/1/1
7	NAG	D	403	3	-	6/6/23/26	0/1/1/1
7	NAG	A	401	3	-	2/6/23/26	0/1/1/1
7	NAG	C	403	3	-	6/6/23/26	0/1/1/1
7	NAG	D	404	3	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	NAG	D	406	3	-	3/6/23/26	0/1/1/1
7	NAG	D	402	3	-	2/6/23/26	0/1/1/1
7	NAG	A	403	3	-	6/6/23/26	0/1/1/1
7	NAG	C	401	3	-	2/6/23/26	0/1/1/1
7	NAG	A	405	3	-	3/6/23/26	0/1/1/1
7	NAG	C	402	3	-	2/6/23/26	0/1/1/1
7	NAG	A	404	3	-	0/6/23/26	0/1/1/1
7	NAG	D	405	3	-	3/6/23/26	0/1/1/1
7	NAG	A	402	3	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	403	NAG	C2-N2-C7	4.80	129.33	122.90
7	C	403	NAG	C2-N2-C7	4.78	129.31	122.90
7	D	403	NAG	C2-N2-C7	4.77	129.30	122.90
7	E	301	NAG	C2-N2-C7	2.99	126.91	122.90
7	B	301	NAG	C2-N2-C7	2.97	126.88	122.90
7	F	301	NAG	C2-N2-C7	2.97	126.88	122.90
7	C	406	NAG	C2-N2-C7	2.94	126.84	122.90
7	D	406	NAG	C2-N2-C7	2.94	126.84	122.90
7	A	406	NAG	C2-N2-C7	2.94	126.84	122.90
7	A	403	NAG	C1-C2-N2	2.64	114.60	110.43
7	D	403	NAG	C1-C2-N2	2.64	114.59	110.43
7	C	403	NAG	C1-C2-N2	2.61	114.55	110.43
7	C	402	NAG	C1-O5-C5	2.42	115.42	112.19
7	A	402	NAG	C1-O5-C5	2.41	115.42	112.19
7	D	402	NAG	C1-O5-C5	2.39	115.39	112.19

There are no chirality outliers.

All (60) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	405	NAG	C4-C5-C6-O6
7	C	405	NAG	C4-C5-C6-O6
7	D	405	NAG	C4-C5-C6-O6
7	A	405	NAG	O5-C5-C6-O6
7	C	405	NAG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
7	D	405	NAG	O5-C5-C6-O6
7	A	403	NAG	O5-C5-C6-O6
7	D	403	NAG	O5-C5-C6-O6
7	C	403	NAG	O5-C5-C6-O6
7	A	403	NAG	C4-C5-C6-O6
7	C	403	NAG	C4-C5-C6-O6
7	D	403	NAG	C4-C5-C6-O6
7	D	401	NAG	O5-C5-C6-O6
7	F	301	NAG	O5-C5-C6-O6
7	A	401	NAG	O5-C5-C6-O6
7	B	301	NAG	O5-C5-C6-O6
7	C	401	NAG	O5-C5-C6-O6
7	E	301	NAG	O5-C5-C6-O6
7	A	403	NAG	C8-C7-N2-C2
7	A	403	NAG	O7-C7-N2-C2
7	A	406	NAG	C8-C7-N2-C2
7	A	406	NAG	O7-C7-N2-C2
7	B	301	NAG	C8-C7-N2-C2
7	B	301	NAG	O7-C7-N2-C2
7	C	403	NAG	C8-C7-N2-C2
7	C	403	NAG	O7-C7-N2-C2
7	C	406	NAG	C8-C7-N2-C2
7	C	406	NAG	O7-C7-N2-C2
7	E	301	NAG	C8-C7-N2-C2
7	E	301	NAG	O7-C7-N2-C2
7	D	403	NAG	C8-C7-N2-C2
7	D	403	NAG	O7-C7-N2-C2
7	D	406	NAG	C8-C7-N2-C2
7	D	406	NAG	O7-C7-N2-C2
7	F	301	NAG	C8-C7-N2-C2
7	F	301	NAG	O7-C7-N2-C2
7	F	301	NAG	C4-C5-C6-O6
7	E	301	NAG	C4-C5-C6-O6
7	B	301	NAG	C4-C5-C6-O6
7	A	401	NAG	C4-C5-C6-O6
7	D	401	NAG	C4-C5-C6-O6
7	C	401	NAG	C4-C5-C6-O6
7	A	406	NAG	O5-C5-C6-O6
7	D	406	NAG	O5-C5-C6-O6
7	C	406	NAG	O5-C5-C6-O6
7	A	402	NAG	C4-C5-C6-O6
7	C	402	NAG	C4-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
7	A	403	NAG	C1-C2-N2-C7
7	C	403	NAG	C1-C2-N2-C7
7	D	403	NAG	C1-C2-N2-C7
7	D	402	NAG	C4-C5-C6-O6
7	A	405	NAG	C1-C2-N2-C7
7	C	405	NAG	C1-C2-N2-C7
7	D	405	NAG	C1-C2-N2-C7
7	A	403	NAG	C3-C2-N2-C7
7	C	403	NAG	C3-C2-N2-C7
7	D	403	NAG	C3-C2-N2-C7
7	A	402	NAG	O5-C5-C6-O6
7	C	402	NAG	O5-C5-C6-O6
7	D	402	NAG	O5-C5-C6-O6

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	D	403	NAG	1	0
7	C	403	NAG	1	0
7	A	403	NAG	1	0

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.

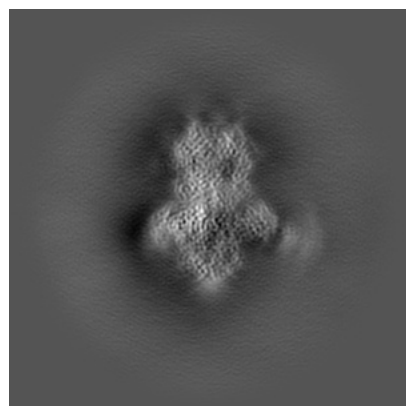
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-70233. These allow visual inspection of the internal detail of the map and identification of artifacts.

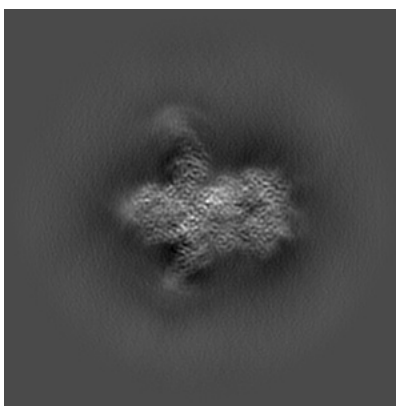
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

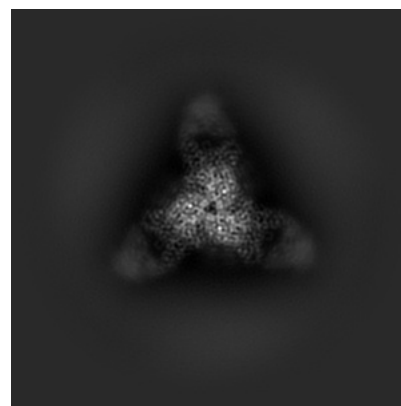
6.1.1 Primary map



X

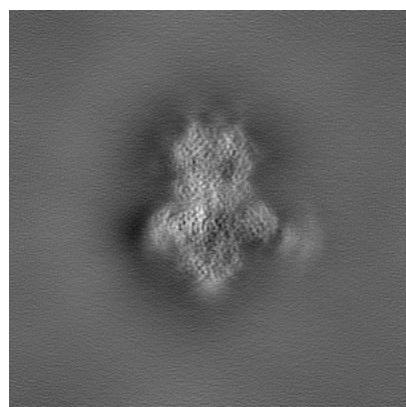


Y

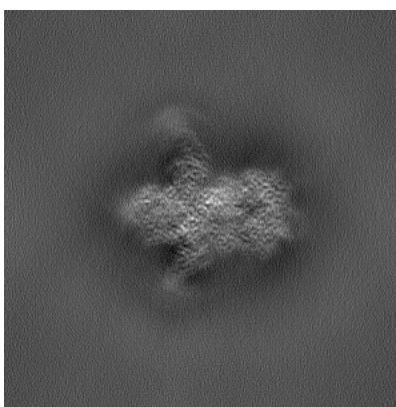


Z

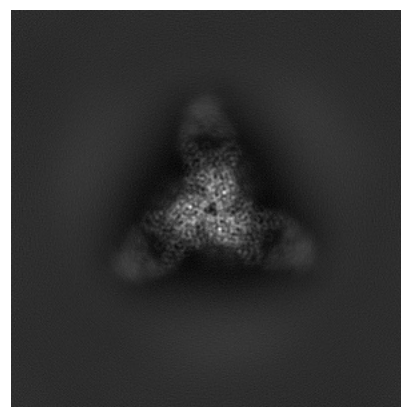
6.1.2 Raw map



X



Y

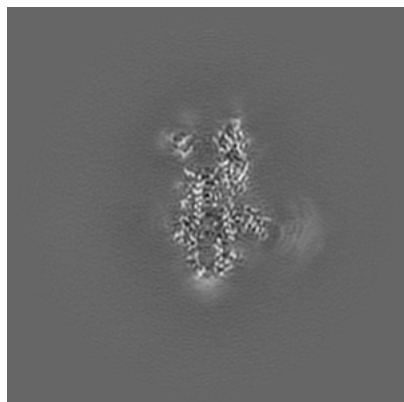


Z

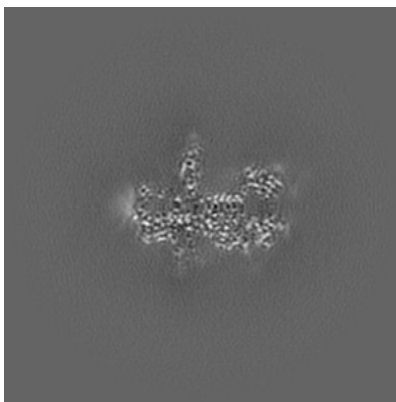
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

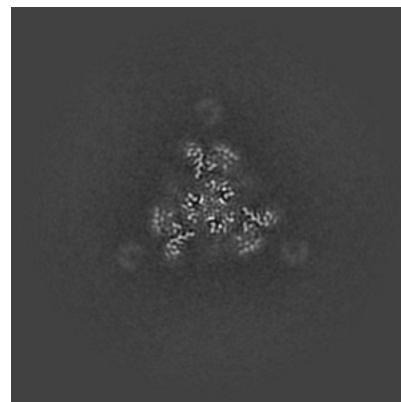
6.2.1 Primary map



X Index: 220

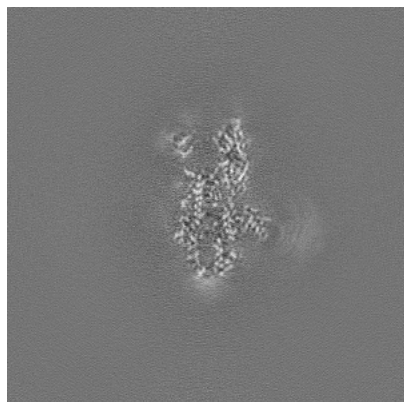


Y Index: 220

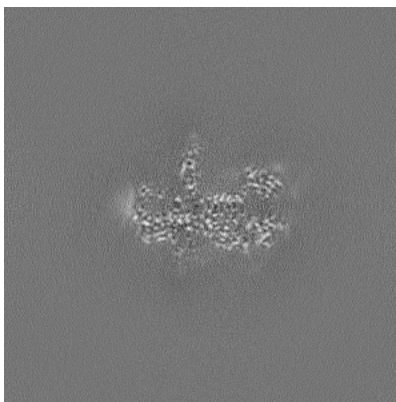


Z Index: 220

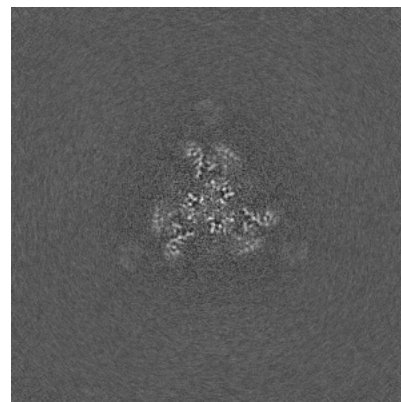
6.2.2 Raw map



X Index: 220



Y Index: 220

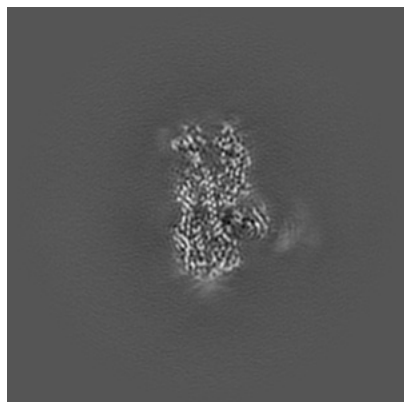


Z Index: 220

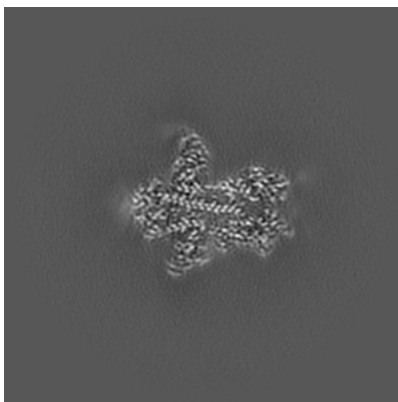
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

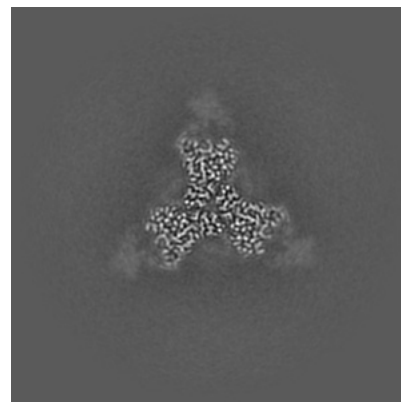
6.3.1 Primary map



X Index: 229

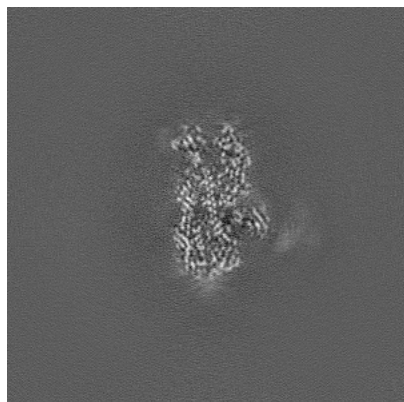


Y Index: 210

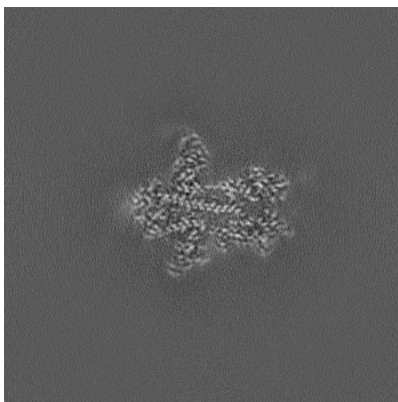


Z Index: 207

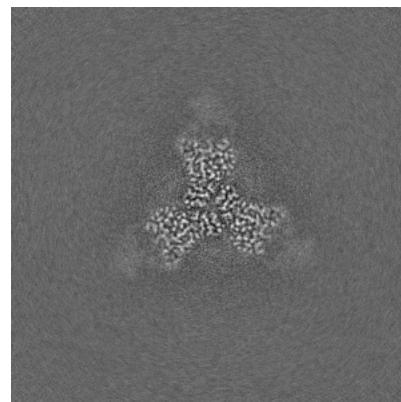
6.3.2 Raw map



X Index: 229



Y Index: 210

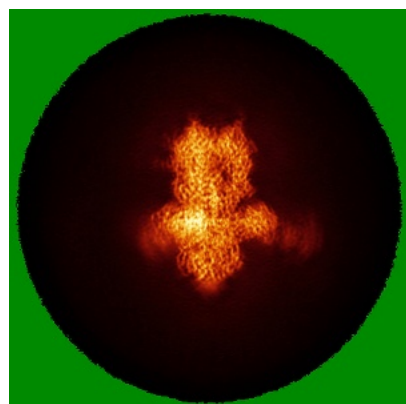


Z Index: 207

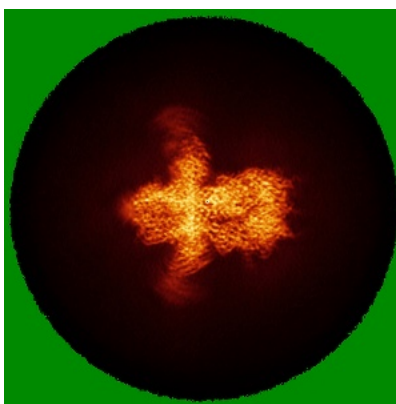
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

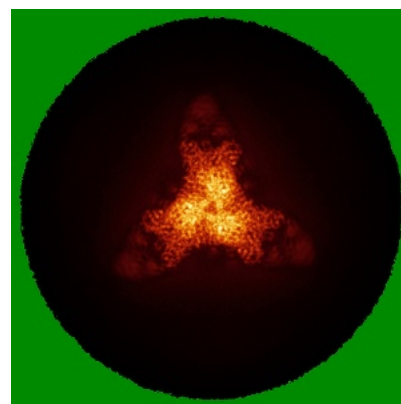
6.4.1 Primary map



X

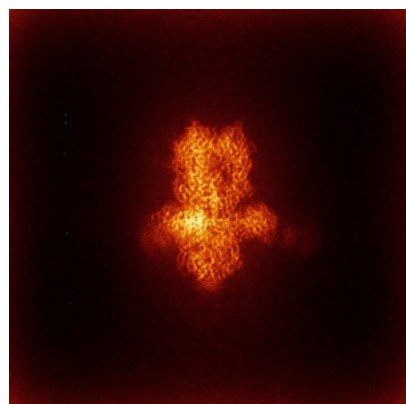


Y

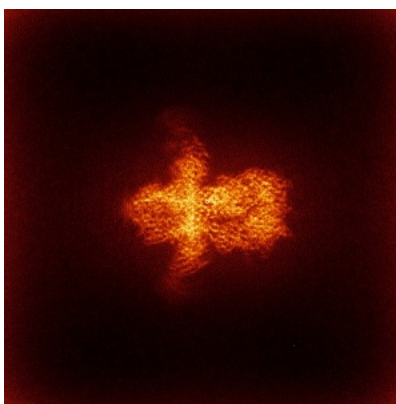


Z

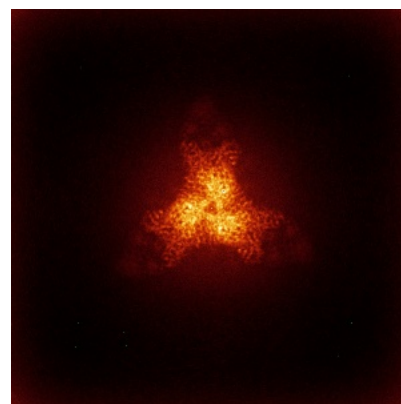
6.4.2 Raw map



X



Y

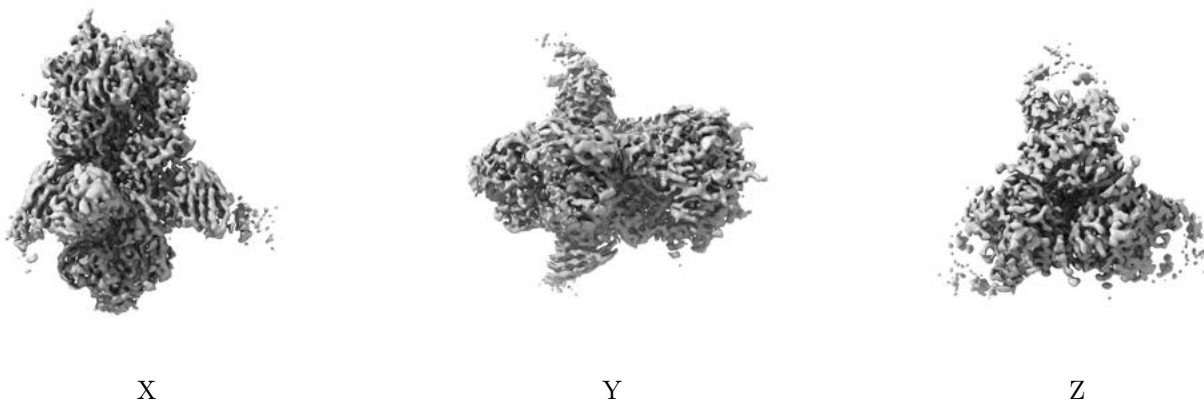


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

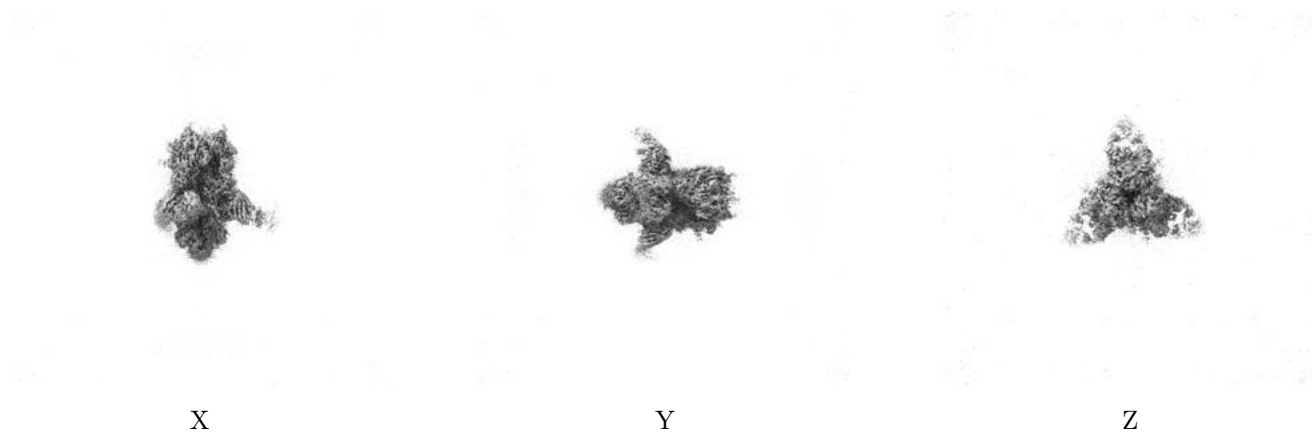
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.06. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

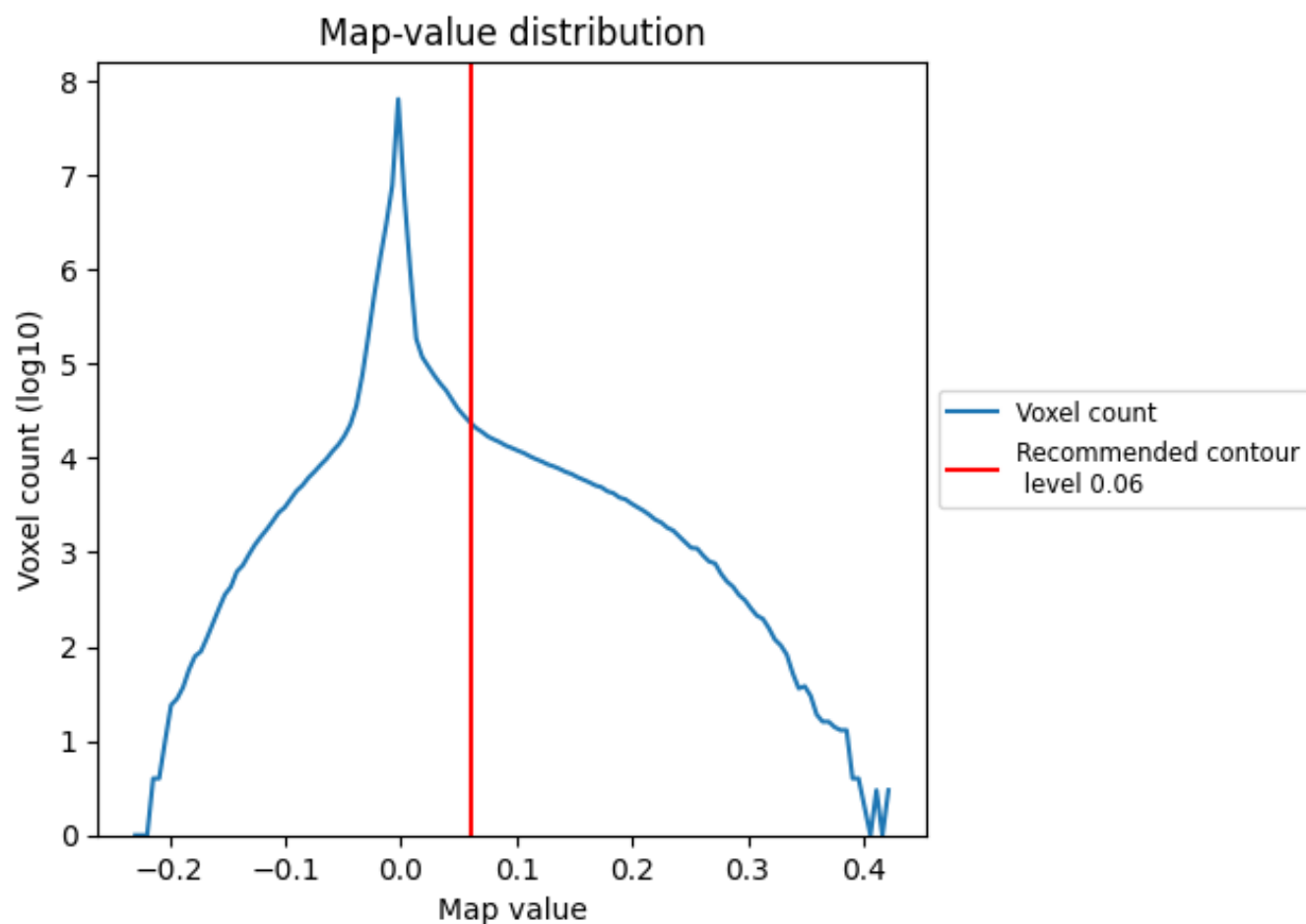
6.6 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis [i](#)

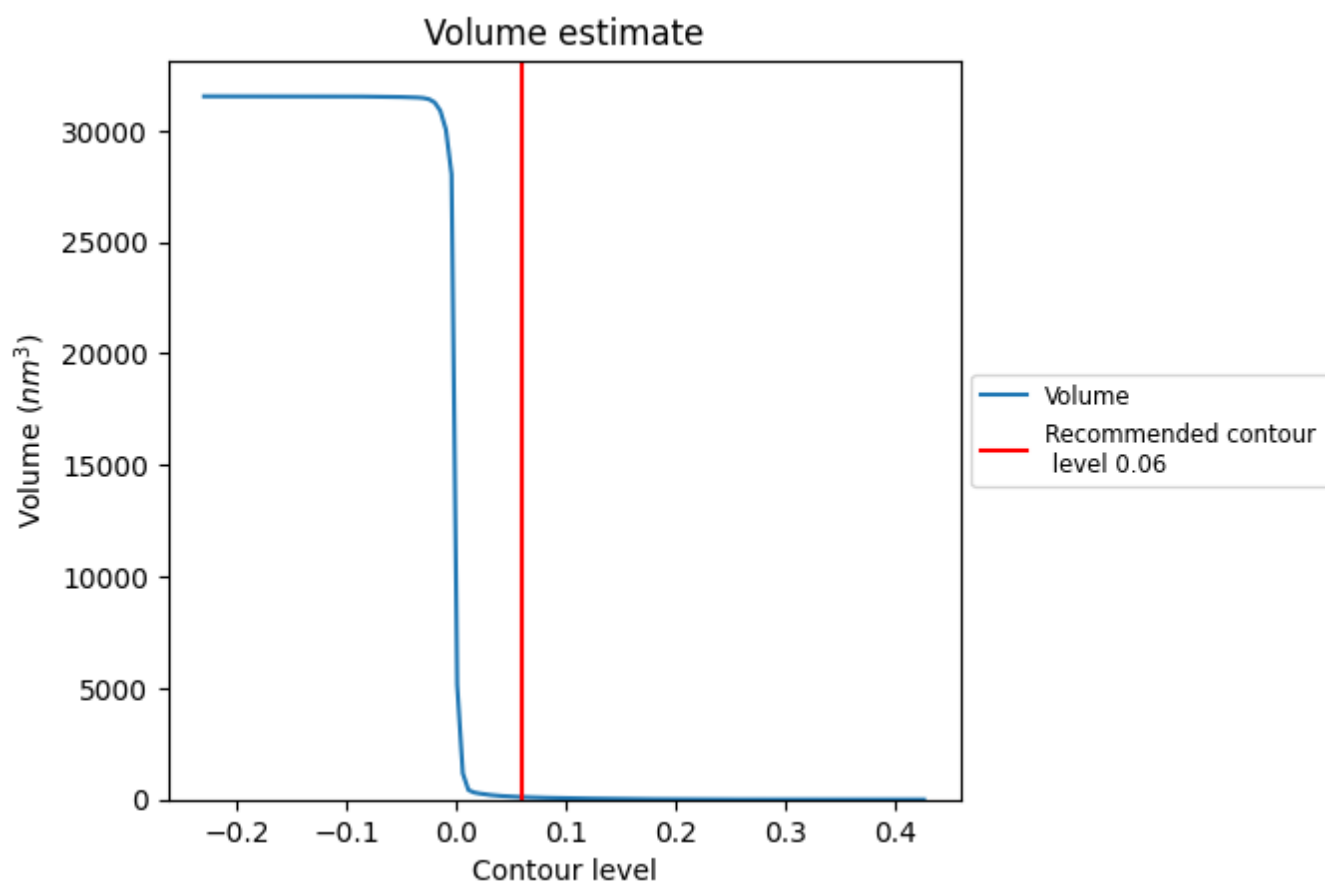
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

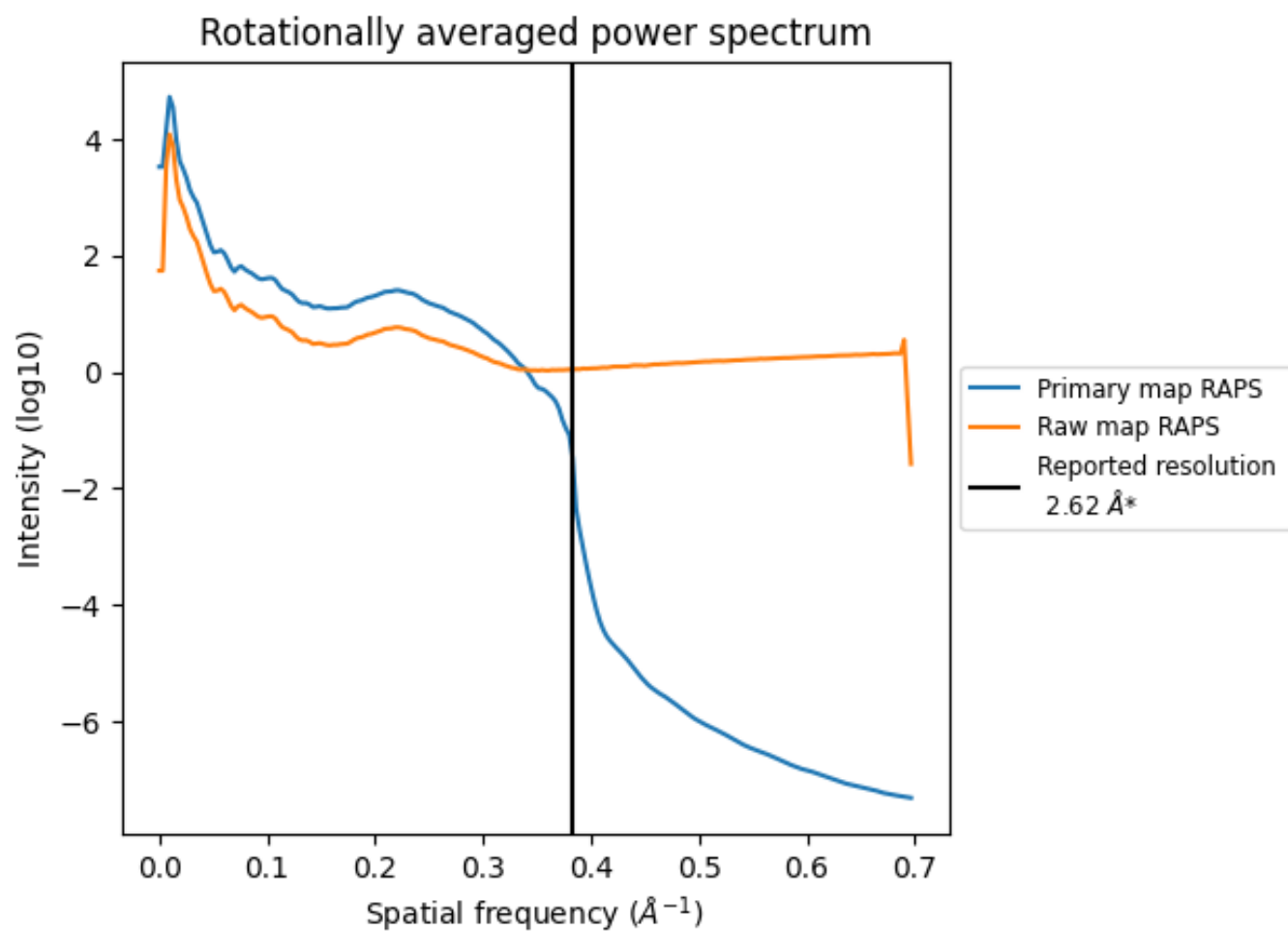
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 112 nm³; this corresponds to an approximate mass of 101 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ

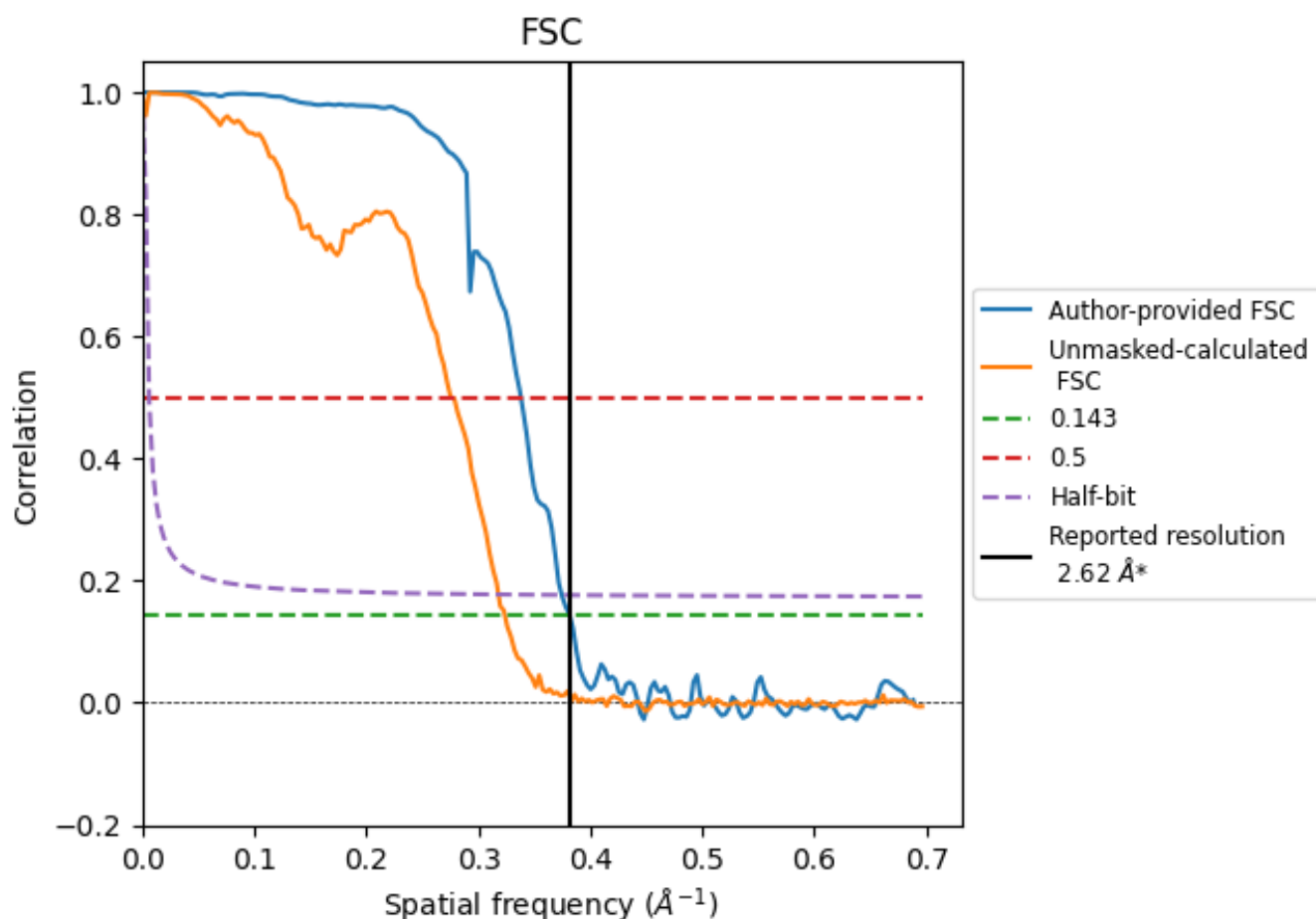


*Reported resolution corresponds to spatial frequency of 0.382 Å⁻¹

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.382 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

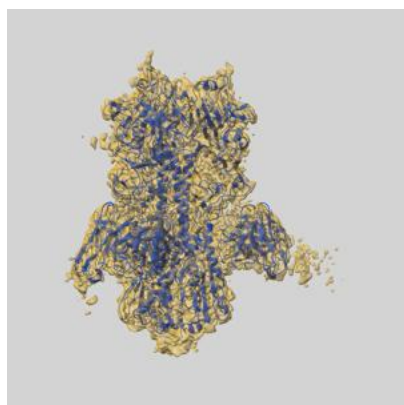
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.62	-	-
Author-provided FSC curve	2.62	2.96	2.67
Unmasked-calculated*	3.09	3.61	3.14

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.09 differs from the reported value 2.62 by more than 10 %

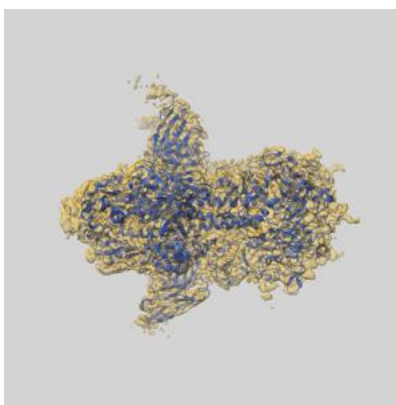
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-70233 and PDB model 9O8Q. Per-residue inclusion information can be found in section 3 on page 12.

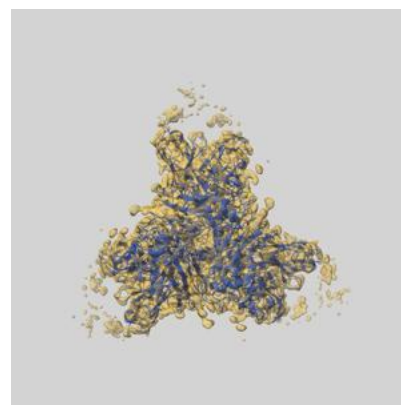
9.1 Map-model overlay [i](#)



X



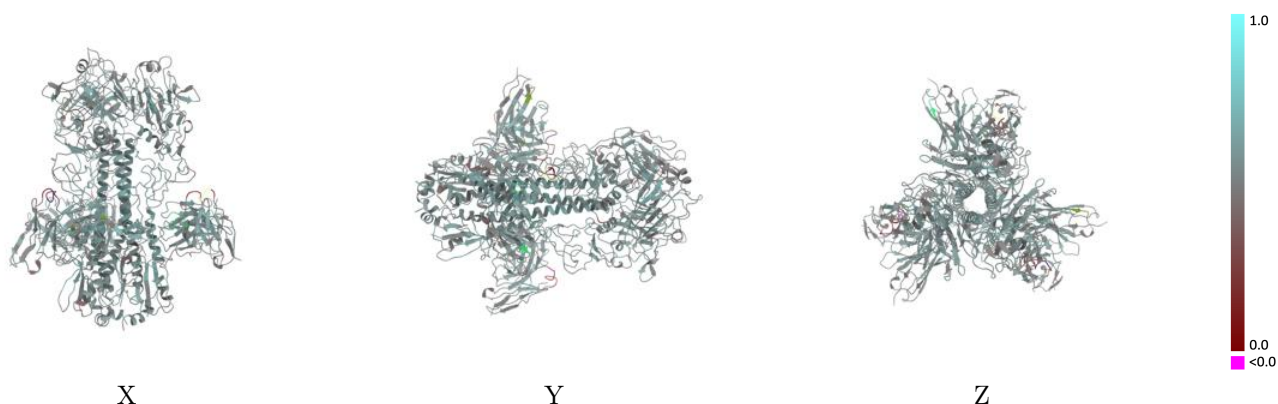
Y



Z

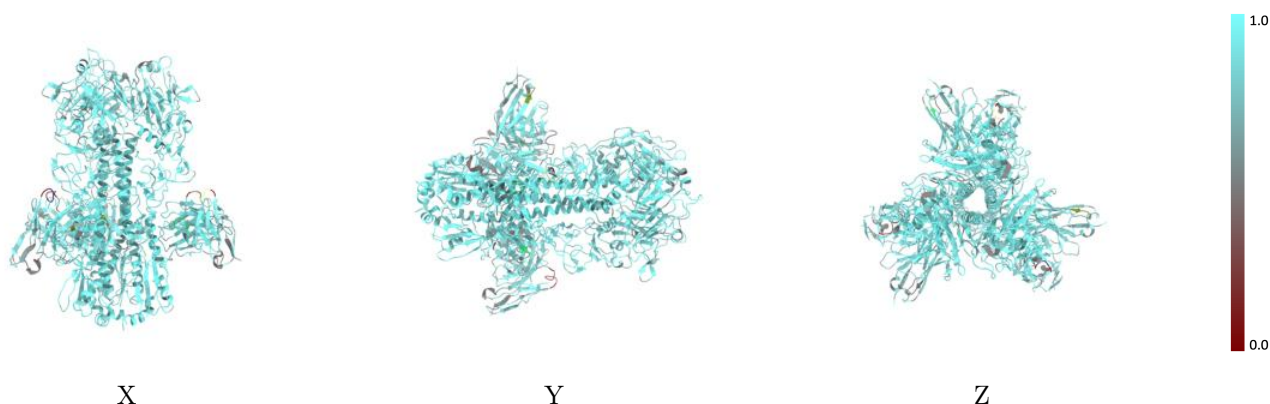
The images above show the 3D surface view of the map at the recommended contour level 0.06 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



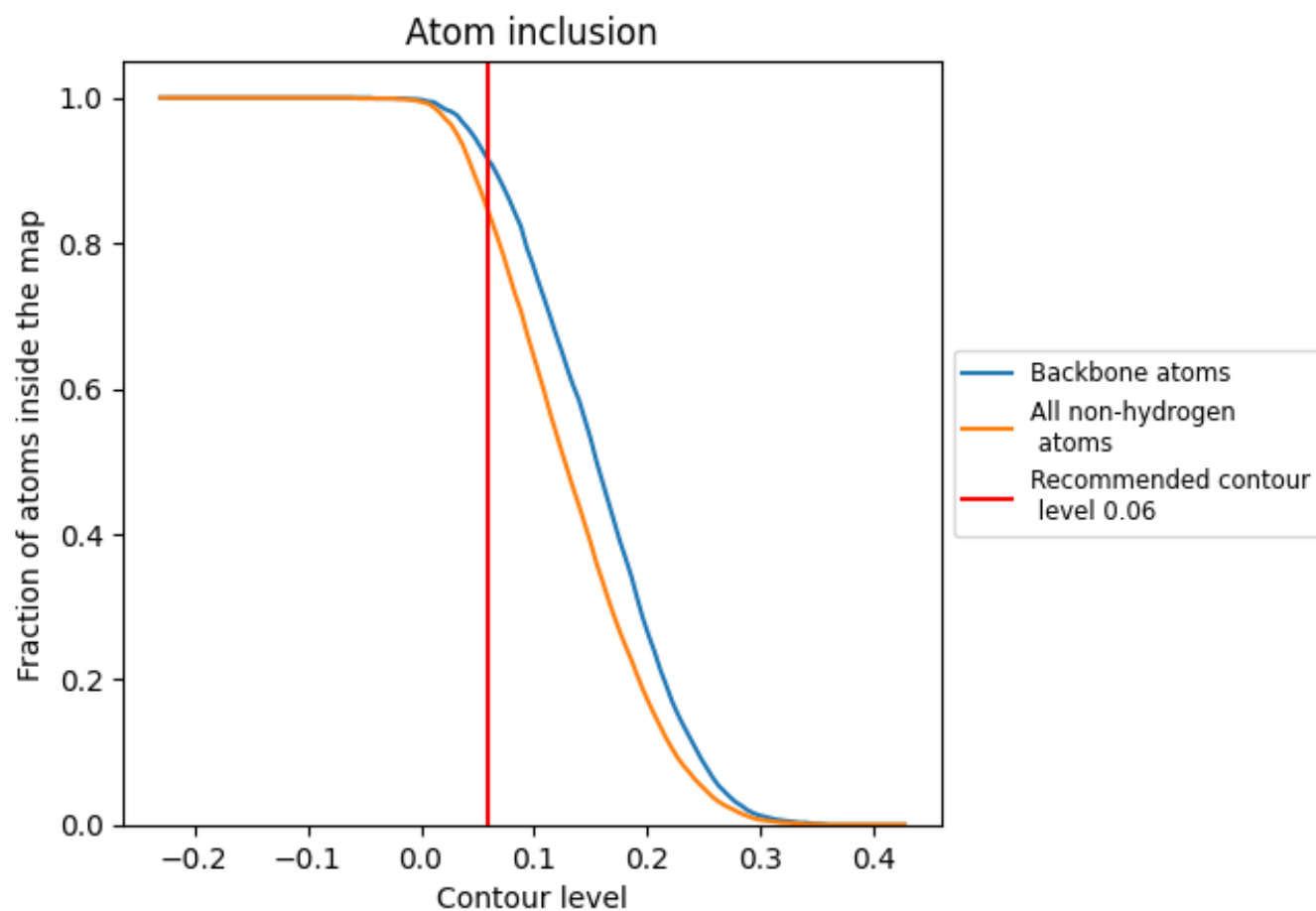
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.06).

9.4 Atom inclusion [i](#)



At the recommended contour level, 91% of all backbone atoms, 84% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.06) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8420	 0.5380
A	 0.8550	 0.5380
B	 0.8940	 0.5640
C	 0.8560	 0.5350
D	 0.8590	 0.5360
E	 0.8930	 0.5620
F	 0.8900	 0.5620
G	 0.8500	 0.5490
H	 0.8450	 0.5480
I	 0.8440	 0.5490
J	 0.7500	 0.5020
K	 0.7510	 0.4950
L	 0.7500	 0.4980
M	 0.3080	 0.5100
N	 0.5530	 0.4120
O	 0.6410	 0.5150
P	 0.8460	 0.4920
Q	 0.3080	 0.5230
R	 0.5260	 0.4120
S	 0.6410	 0.5120
T	 0.8460	 0.4970
U	 0.3080	 0.5180
V	 0.5260	 0.4060
W	 0.6150	 0.5030
X	 0.8460	 0.4980

