



wwPDB EM Validation Summary Report ⓘ

Jun 25, 2025 – 07:05 pm BST

PDB ID : 9GXG / pdb_00009gxg
EMDB ID : EMD-51660
Title : Structure of the SARS-CoV spike glycoprotein in complex with a biparatopic Bicycle molecule
Authors : Drulyte, I.; Pellegrino, S.; Harman, M.; Bezerra, G.A.
Deposited on : 2024-09-30
Resolution : 1.92 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/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.dev118
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0rc1
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

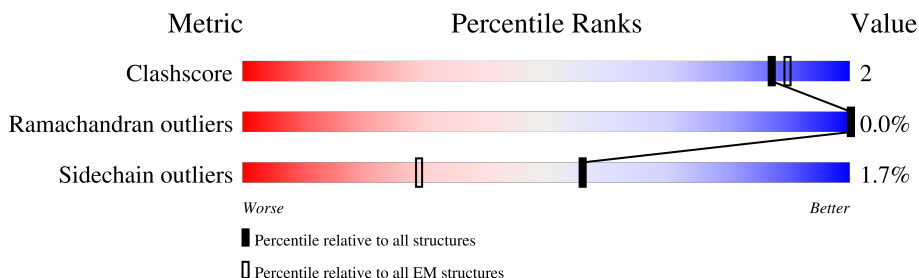
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 1.92 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)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	A	1133	
1	B	1133	
1	C	1133	
2	D	15	
2	E	15	
2	F	15	
3	G	16	
3	H	16	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
3	I	16	
4	AA	2	
4	AB	2	
4	AC	2	
4	AD	2	
4	AE	2	
4	AF	2	
4	AG	2	
4	AH	2	
4	BA	2	
4	BB	2	
4	BC	2	
4	BD	2	
4	BE	2	
4	BF	2	
4	BG	2	
4	BH	2	
4	BI	2	
4	CA	2	
4	CB	2	
4	CC	2	
4	CD	2	
4	CE	2	
4	CF	2	
4	CG	2	

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 28265 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 Spike glycoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1102	Total	C	N	O	S	1	0
			8620	5498	1440	1642	40		
1	B	1101	Total	C	N	O	S	2	0
			8620	5499	1442	1639	40		
1	C	1102	Total	C	N	O	S	1	0
			8620	5498	1440	1642	40		

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	817	PRO	PHE	engineered mutation	UNP P0DTC2
A	892	PRO	ALA	engineered mutation	UNP P0DTC2
A	899	PRO	ALA	engineered mutation	UNP P0DTC2
A	942	PRO	ALA	engineered mutation	UNP P0DTC2
A	986	PRO	LYS	engineered mutation	UNP P0DTC2
A	987	PRO	VAL	engineered mutation	UNP P0DTC2
B	817	PRO	PHE	engineered mutation	UNP P0DTC2
B	892	PRO	ALA	engineered mutation	UNP P0DTC2
B	899	PRO	ALA	engineered mutation	UNP P0DTC2
B	942	PRO	ALA	engineered mutation	UNP P0DTC2
B	986	PRO	LYS	engineered mutation	UNP P0DTC2
B	987	PRO	VAL	engineered mutation	UNP P0DTC2
C	817	PRO	PHE	engineered mutation	UNP P0DTC2
C	892	PRO	ALA	engineered mutation	UNP P0DTC2
C	899	PRO	ALA	engineered mutation	UNP P0DTC2
C	942	PRO	ALA	engineered mutation	UNP P0DTC2
C	986	PRO	LYS	engineered mutation	UNP P0DTC2
C	987	PRO	VAL	engineered mutation	UNP P0DTC2

- Molecule 2 is a protein called Biparatopic bicycle molecule (14mer).

Mol	Chain	Residues	Atoms					AltConf	Trace
2	D	15	Total	C	N	O	S	0	1
			100	64	15	17	4		
2	E	15	Total	C	N	O	S	0	1
			100	64	15	17	4		
2	F	15	Total	C	N	O	S	0	1
			100	64	15	17	4		

- Molecule 3 is a protein called Biparatopic bicycle molecule (15mer).

Mol	Chain	Residues	Atoms					AltConf	Trace
3	G	16	Total	C	N	O	S	0	1
			101	63	18	17	3		
3	H	16	Total	C	N	O	S	0	1
			101	63	18	17	3		
3	I	16	Total	C	N	O	S	0	1
			101	63	18	17	3		

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



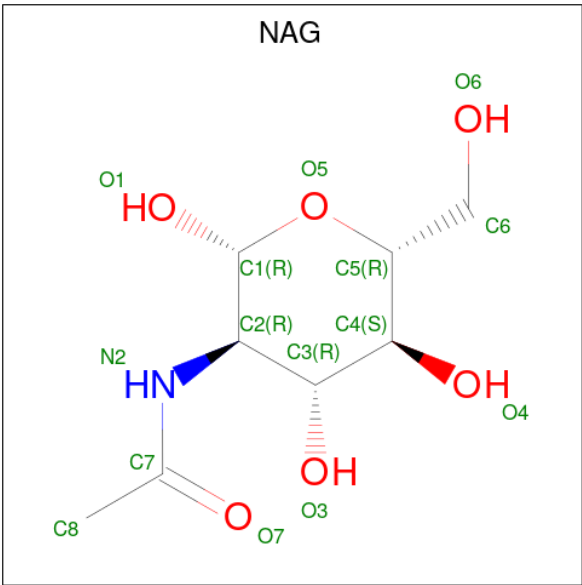
Mol	Chain	Residues	Atoms				AltConf	Trace
4	AA	2	Total	C	N	O	0	0
			28	16	2	10		
4	AB	2	Total	C	N	O	0	0
			28	16	2	10		
4	AC	2	Total	C	N	O	0	0
			28	16	2	10		
4	AD	2	Total	C	N	O	0	0
			28	16	2	10		
4	AE	2	Total	C	N	O	0	0
			28	16	2	10		
4	AF	2	Total	C	N	O	0	0
			28	16	2	10		
4	AG	2	Total	C	N	O	0	0
			28	16	2	10		
4	AH	2	Total	C	N	O	0	0
			28	16	2	10		
4	BA	2	Total	C	N	O	0	0
			28	16	2	10		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms				AltConf	Trace
4	BB	2	Total	C	N	O	0	0
			28	16	2	10		
4	BC	2	Total	C	N	O	0	0
			28	16	2	10		
4	BD	2	Total	C	N	O	0	0
			28	16	2	10		
4	BE	2	Total	C	N	O	0	0
			28	16	2	10		
4	BF	2	Total	C	N	O	0	0
			28	16	2	10		
4	BG	2	Total	C	N	O	0	0
			28	16	2	10		
4	BH	2	Total	C	N	O	0	0
			28	16	2	10		
4	BI	2	Total	C	N	O	0	0
			28	16	2	10		
4	CA	2	Total	C	N	O	0	0
			28	16	2	10		
4	CB	2	Total	C	N	O	0	0
			28	16	2	10		
4	CC	2	Total	C	N	O	0	0
			28	16	2	10		
4	CD	2	Total	C	N	O	0	0
			28	16	2	10		
4	CE	2	Total	C	N	O	0	0
			28	16	2	10		
4	CF	2	Total	C	N	O	0	0
			28	16	2	10		
4	CG	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



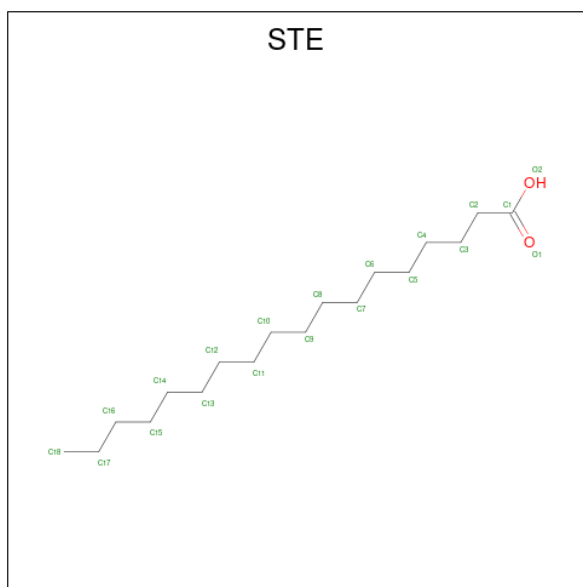
Mol	Chain	Residues	Atoms				AltConf
5	A	1	Total	C	N	O	0
			14	8	1	5	
5	A	1	Total	C	N	O	0
			14	8	1	5	
5	A	1	Total	C	N	O	0
			14	8	1	5	
5	A	1	Total	C	N	O	0
			14	8	1	5	
5	A	1	Total	C	N	O	0
			14	8	1	5	
5	A	1	Total	C	N	O	0
			14	8	1	5	
5	A	1	Total	C	N	O	0
			14	8	1	5	
5	B	1	Total	C	N	O	0
			14	8	1	5	
5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

Continued on next page...

Continued from previous page...

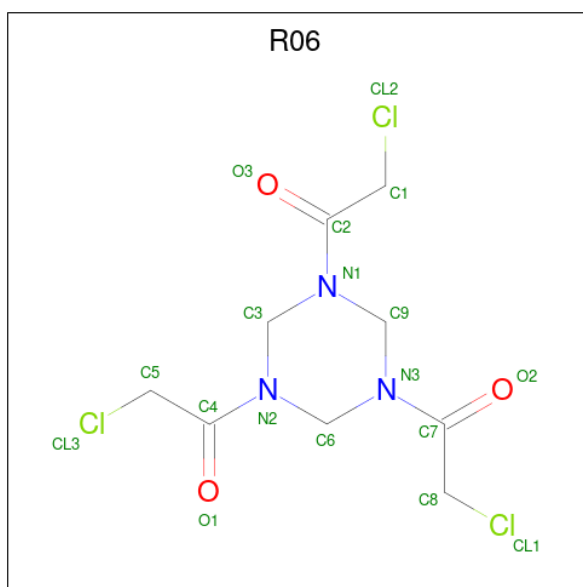
Mol	Chain	Residues	Atoms				AltConf
5	B	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5	C	1	Total	C	N	O	0
			14	8	1	5	
5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

- Molecule 6 is STEARIC ACID (CCD ID: STE) (formula: $C_{18}H_{36}O_2$).



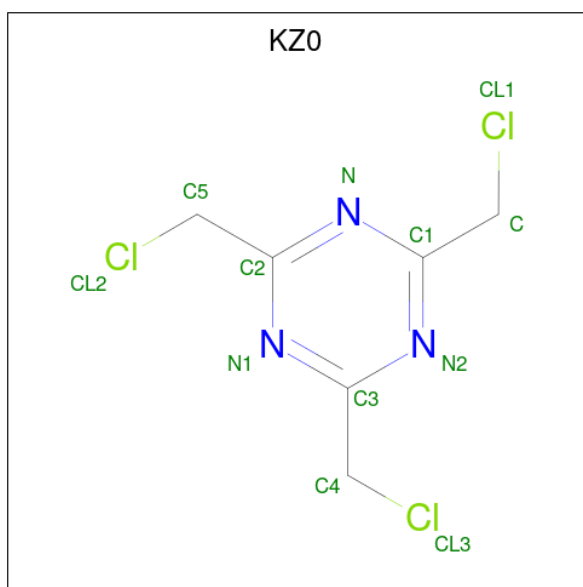
Mol	Chain	Residues	Atoms			AltConf
6	A	1	Total	C	O	0
			20	18	2	
6	B	1	Total	C	O	0
			20	18	2	
6	C	1	Total	C	O	0
			20	18	2	

- Molecule 7 is 1-[3,5-bis(2-chloranylethanoyl)-1,3,5-triazinan-1-yl]-2-chloranyl-ethanone (CCD ID: R06) (formula: $C_9H_{12}Cl_3N_3O_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				AltConf
7	D	1	Total	C	N	O	0
			15	9	3	3	
7	E	1	Total	C	N	O	0
			15	9	3	3	
7	F	1	Total	C	N	O	0
			15	9	3	3	

- Molecule 8 is 2,4,6-tris(chloromethyl)-1,3,5-triazine (CCD ID: KZ0) (formula: $C_6H_6Cl_3N_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			AltConf
8	G	1	Total	C	N	0
			9	6	3	
8	H	1	Total	C	N	0
			9	6	3	
8	I	1	Total	C	N	0
			9	6	3	

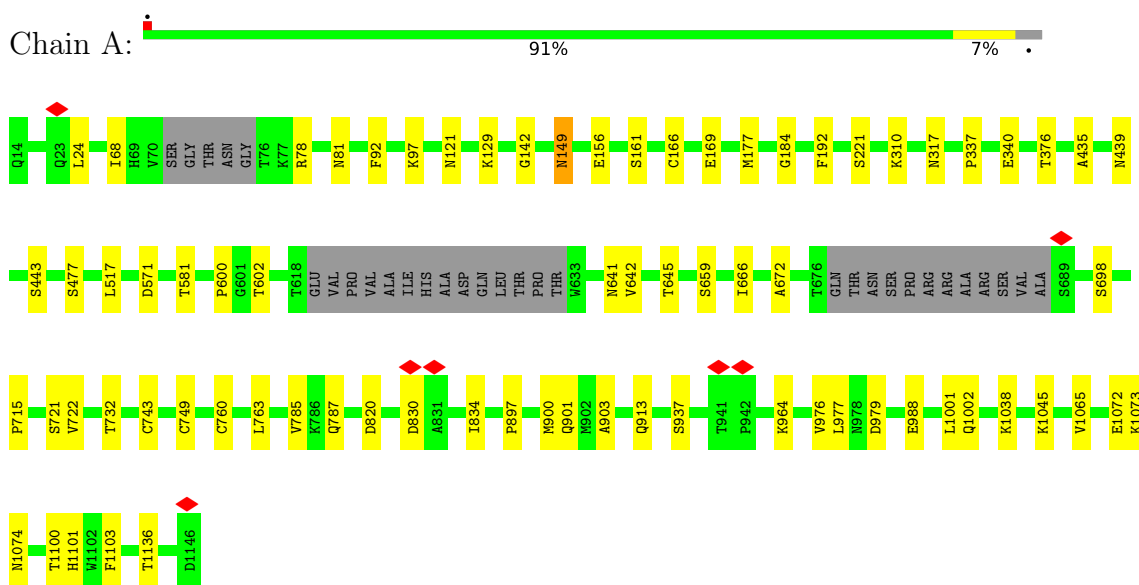
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		AltConf
9	A	228	Total	O	0
			228	228	
9	B	217	Total	O	0
			217	217	
9	C	203	Total	O	0
			203	203	

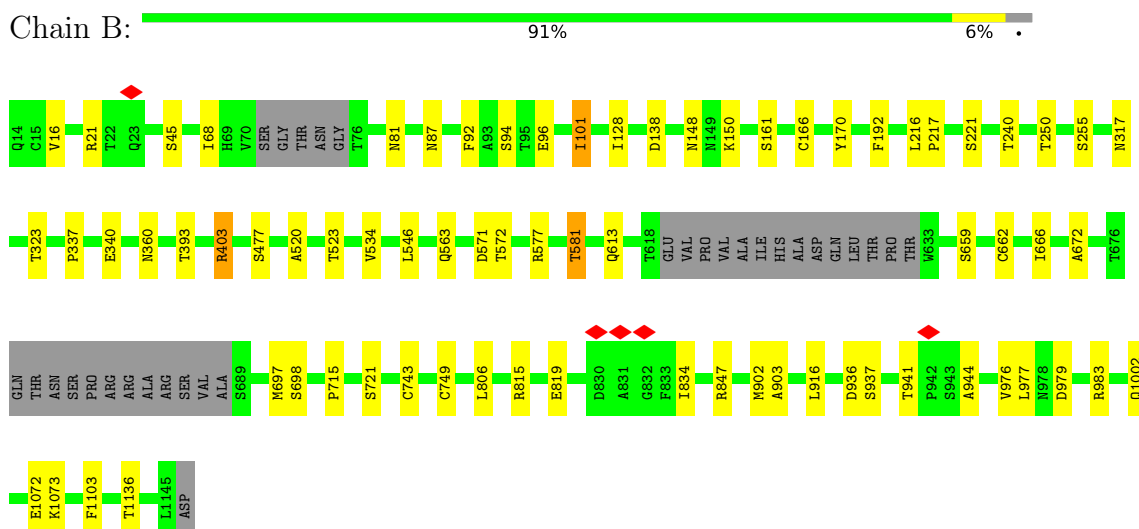
3 Residue-property plots [i](#)

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: Spike glycoprotein

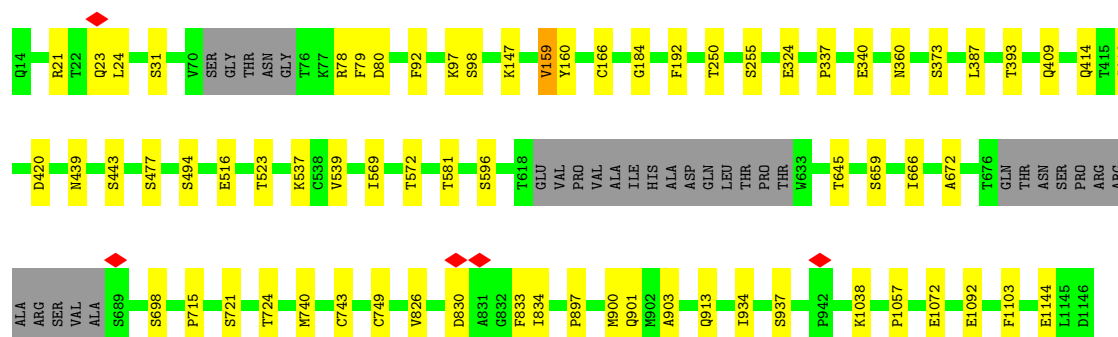


• Molecule 1: Spike glycoprotein




• Molecule 1: Spike glycoprotein

Chain C:  91% 6%



- Molecule 2: Biparatopic bicycle molecule (14mer)

Chain D:  7% 87% 13%



- Molecule 2: Biparatopic bicycle molecule (14mer)

Chain E:  7% 100%



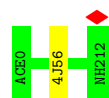
- Molecule 2: Biparatopic bicycle molecule (14mer)

Chain F:  7% 100%




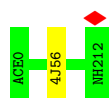
- Molecule 3: Biparatopic bicycle molecule (15mer)

Chain G:  6% 94% 6%

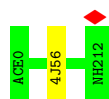
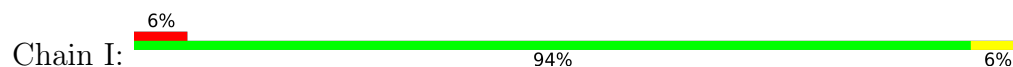


- Molecule 3: Biparatopic bicycle molecule (15mer)

Chain H:  6% 94% 6%



- Molecule 3: Biparatopic bicycle molecule (15mer)



- Molecule 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)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 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)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 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)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain AF:  100%



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

Chain AG:  50% 50%



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

Chain AH:  50% 100%



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

Chain BA:  50% 50% 50%



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

Chain BB:  50% 50% 50%



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

Chain BC:  50% 100%



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

Chain BD:  100%



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

Chain BE:  50% 50%



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

Chain BF:  50% 100%



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

Chain BG:  50% 50%



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

Chain BH:  100%



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

Chain BI:  100%



- Molecule 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)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 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)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 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)-2-acetamido-2-deoxy-beta-D-glucopyranose



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

Chain CG:  100%

MAG1
MAG2

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	117262	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.904	Depositor
Minimum map value	-0.329	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.022	Depositor
Recommended contour level	0.15	Depositor
Map size (Å)	365.0, 365.0, 365.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.9125, 0.9125, 0.9125	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: DAL, NH2, 4J5, 0JY, KZ0, R06, STE, ACE, NAG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.21	0/8827	0.44	1/12018 (0.0%)
1	B	0.21	0/8830	0.44	1/12021 (0.0%)
1	C	0.21	0/8827	0.43	1/12018 (0.0%)
2	D	0.64	1/99 (1.0%)	0.57	0/136
2	E	0.60	0/99	0.53	0/136
2	F	0.59	0/99	0.53	0/136
3	G	0.69	0/73	0.53	0/97
3	H	0.68	0/73	0.49	0/97
3	I	0.69	0/73	0.51	0/97
All	All	0.23	1/27000 (0.0%)	0.44	3/36756 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	0	ACE	C-N	5.32	1.46	1.34

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	166	CYS	CA-CB-SG	7.57	131.82	114.40
1	C	166	CYS	CA-CB-SG	7.34	131.28	114.40
1	A	166	CYS	CA-CB-SG	6.92	130.31	114.40

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	403	ARG	Sidechain
1	B	96	GLU	Peptide

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	8620	0	8391	36	0
1	B	8620	0	8400	35	0
1	C	8620	0	8391	37	0
2	D	100	0	95	0	0
2	E	100	0	95	0	0
2	F	100	0	95	0	0
3	G	101	0	88	0	0
3	H	101	0	88	0	0
3	I	101	0	88	0	0
4	AA	28	0	25	0	0
4	AB	28	0	25	0	0
4	AC	28	0	25	0	0
4	AD	28	0	25	1	0
4	AE	28	0	25	0	0
4	AF	28	0	25	0	0
4	AG	28	0	25	1	0
4	AH	28	0	25	0	0
4	BA	28	0	25	0	0
4	BB	28	0	25	0	0
4	BC	28	0	25	0	0
4	BD	28	0	25	0	0
4	BE	28	0	25	1	0
4	BF	28	0	25	0	0
4	BG	28	0	25	1	0
4	BH	28	0	25	0	0
4	BI	28	0	25	0	0
4	CA	28	0	25	0	0
4	CB	28	0	25	1	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	CC	28	0	25	1	0
4	CD	28	0	25	0	0
4	CE	28	0	25	0	0
4	CF	28	0	25	0	0
4	CG	28	0	25	0	0
5	A	112	0	104	0	0
5	B	98	0	91	1	0
5	C	140	0	130	0	0
6	A	20	0	35	0	0
6	B	20	0	35	1	0
6	C	20	0	35	0	0
7	D	15	0	0	0	0
7	E	15	0	0	0	0
7	F	15	0	0	0	0
8	G	9	0	0	0	0
8	H	9	0	0	0	0
8	I	9	0	0	0	0
9	A	228	0	0	3	0
9	B	217	0	0	1	0
9	C	203	0	0	1	0
All	All	28265	0	26761	104	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.

The worst 5 of 104 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:902:MET:HG3	1:B:916:LEU:HD11	1.78	0.65
1:B:148:ASN:HD21	5:B:1402:NAG:H82	1.66	0.60
1:B:403:ARG:NH1	1:C:373:SER:OG	2.35	0.60
1:A:149:ASN:N	1:A:149:ASN:OD1	2.35	0.59
1:B:337:PRO:HB2	1:B:340:GLU:HB2	1.84	0.59

There are no symmetry-related clashes.

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 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	A	1095/1133 (97%)	1059 (97%)	36 (3%)	0	100	100
1	B	1095/1133 (97%)	1062 (97%)	33 (3%)	0	100	100
1	C	1095/1133 (97%)	1056 (96%)	39 (4%)	0	100	100
2	D	13/15 (87%)	12 (92%)	0	1 (8%)	1	0
2	E	13/15 (87%)	13 (100%)	0	0	100	100
2	F	13/15 (87%)	13 (100%)	0	0	100	100
3	G	11/16 (69%)	10 (91%)	1 (9%)	0	100	100
3	H	11/16 (69%)	10 (91%)	1 (9%)	0	100	100
3	I	11/16 (69%)	10 (91%)	1 (9%)	0	100	100
All	All	3357/3492 (96%)	3245 (97%)	111 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	0(A)	CYS

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 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	A	963/987 (98%)	945 (98%)	18 (2%)	52	39
1	B	963/987 (98%)	944 (98%)	19 (2%)	50	36
1	C	963/987 (98%)	950 (99%)	13 (1%)	65	55

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	D	11/11 (100%)	11 (100%)	0	100	100
2	E	11/11 (100%)	11 (100%)	0	100	100
2	F	11/11 (100%)	11 (100%)	0	100	100
3	G	8/8 (100%)	8 (100%)	0	100	100
3	H	8/8 (100%)	8 (100%)	0	100	100
3	I	8/8 (100%)	8 (100%)	0	100	100
All	All	2946/3018 (98%)	2896 (98%)	50 (2%)	56	45

5 of 50 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	546	LEU
1	B	1002	GLN
1	C	1144	GLU
1	B	571	ASP
1	B	721	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 30 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	370	ASN
1	C	913	GLN
1	B	564	GLN
1	C	1011	GLN
1	C	536	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

6 non-standard protein/DNA/RNA residues 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	4J5	I	6	3	8,9,10	2.15	2 (25%)	4,10,12	0.34	0
3	DAL	I	7	3	3,4,5	0.97	0	2,4,6	0.71	0
3	4J5	H	6	3	8,9,10	2.16	2 (25%)	4,10,12	0.35	0
3	DAL	H	7	3	3,4,5	0.97	0	2,4,6	0.75	0
3	DAL	G	7	3	3,4,5	0.95	0	2,4,6	0.72	0
3	4J5	G	6	3	8,9,10	2.30	2 (25%)	4,10,12	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	4J5	I	6	3	-	0/7/8/10	-
3	DAL	I	7	3	-	0/0/2/4	-
3	4J5	H	6	3	-	0/7/8/10	-
3	DAL	H	7	3	-	0/0/2/4	-
3	DAL	G	7	3	-	0/0/2/4	-
3	4J5	G	6	3	-	2/7/8/10	-

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	6	4J5	CE-ND	4.41	1.42	1.33
3	H	6	4J5	CE-ND	4.40	1.42	1.33
3	I	6	4J5	CE-ND	4.39	1.42	1.33
3	G	6	4J5	CE-NH2	3.80	1.47	1.32
3	I	6	4J5	CE-NH1	3.06	1.47	1.34

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	G	6	4J5	C-CA-CB-CG
3	G	6	4J5	N-CA-CB-CG

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates

48 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	$\# Z > 2$
4	NAG	AA	1	1,4	14,14,15	0.30	0	17,19,21	0.52	0
4	NAG	AA	2	4	14,14,15	0.30	0	17,19,21	0.48	0
4	NAG	AB	1	1,4	14,14,15	0.26	0	17,19,21	0.51	0
4	NAG	AB	2	4	14,14,15	0.33	0	17,19,21	0.45	0
4	NAG	AC	1	1,4	14,14,15	0.28	0	17,19,21	0.56	0
4	NAG	AC	2	4	14,14,15	0.31	0	17,19,21	0.46	0
4	NAG	AD	1	1,4	14,14,15	0.30	0	17,19,21	0.58	0
4	NAG	AD	2	4	14,14,15	0.33	0	17,19,21	0.44	0
4	NAG	AE	1	4	14,14,15	0.17	0	17,19,21	0.47	0
4	NAG	AE	2	4	14,14,15	0.32	0	17,19,21	0.50	0
4	NAG	AF	1	1,4	14,14,15	0.31	0	17,19,21	0.56	0
4	NAG	AF	2	4	14,14,15	0.30	0	17,19,21	0.48	0
4	NAG	AG	1	1,4	14,14,15	0.26	0	17,19,21	0.52	0
4	NAG	AG	2	4	14,14,15	0.31	0	17,19,21	0.43	0
4	NAG	AH	1	1,4	14,14,15	0.22	0	17,19,21	0.49	0
4	NAG	AH	2	4	14,14,15	0.25	0	17,19,21	0.51	0
4	NAG	BA	1	1,4	14,14,15	0.22	0	17,19,21	0.51	0
4	NAG	BA	2	4	14,14,15	0.32	0	17,19,21	0.58	1 (5%)
4	NAG	BB	1	4	14,14,15	0.76	1 (7%)	17,19,21	1.18	3 (17%)
4	NAG	BB	2	4	14,14,15	0.43	0	17,19,21	0.41	0
4	NAG	BC	1	1,4	14,14,15	0.30	0	17,19,21	0.52	0
4	NAG	BC	2	4	14,14,15	0.31	0	17,19,21	0.48	0
4	NAG	BD	1	1,4	14,14,15	0.27	0	17,19,21	0.44	0
4	NAG	BD	2	4	14,14,15	0.37	0	17,19,21	0.47	0
4	NAG	BE	1	1,4	14,14,15	0.27	0	17,19,21	0.60	1 (5%)
4	NAG	BE	2	4	14,14,15	0.32	0	17,19,21	0.45	0
4	NAG	BF	1	1,4	14,14,15	0.26	0	17,19,21	0.54	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	NAG	BF	2	4	14,14,15	0.33	0	17,19,21	0.55	0
4	NAG	BG	1	1,4	14,14,15	0.29	0	17,19,21	0.52	0
4	NAG	BG	2	4	14,14,15	0.34	0	17,19,21	0.42	0
4	NAG	BH	1	1,4	14,14,15	0.31	0	17,19,21	0.56	0
4	NAG	BH	2	4	14,14,15	0.31	0	17,19,21	0.46	0
4	NAG	BI	1	1,4	14,14,15	0.30	0	17,19,21	0.54	0
4	NAG	BI	2	4	14,14,15	0.29	0	17,19,21	0.48	0
4	NAG	CA	1	1,4	14,14,15	0.21	0	17,19,21	0.49	0
4	NAG	CA	2	4	14,14,15	0.30	0	17,19,21	0.56	0
4	NAG	CB	1	1,4	14,14,15	0.30	0	17,19,21	0.60	0
4	NAG	CB	2	4	14,14,15	0.34	0	17,19,21	0.44	0
4	NAG	CC	1	1,4	14,14,15	0.28	0	17,19,21	0.53	0
4	NAG	CC	2	4	14,14,15	0.33	0	17,19,21	0.44	0
4	NAG	CD	1	1,4	14,14,15	0.30	0	17,19,21	0.56	0
4	NAG	CD	2	4	14,14,15	0.30	0	17,19,21	0.47	0
4	NAG	CE	1	1,4	14,14,15	0.30	0	17,19,21	0.58	0
4	NAG	CE	2	4	14,14,15	0.30	0	17,19,21	0.47	0
4	NAG	CF	1	1,4	14,14,15	0.23	0	17,19,21	0.52	0
4	NAG	CF	2	4	14,14,15	0.33	0	17,19,21	0.45	0
4	NAG	CG	1	1,4	14,14,15	0.29	0	17,19,21	0.51	0
4	NAG	CG	2	4	14,14,15	0.29	0	17,19,21	0.48	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
4	NAG	AA	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	AA	2	4	-	0/6/23/26	0/1/1/1
4	NAG	AB	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	AB	2	4	-	0/6/23/26	0/1/1/1
4	NAG	AC	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	AC	2	4	-	2/6/23/26	0/1/1/1
4	NAG	AD	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	AD	2	4	-	0/6/23/26	0/1/1/1
4	NAG	AE	1	4	-	2/6/23/26	0/1/1/1
4	NAG	AE	2	4	-	2/6/23/26	0/1/1/1
4	NAG	AF	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	AF	2	4	-	0/6/23/26	0/1/1/1
4	NAG	AG	1	1,4	-	0/6/23/26	0/1/1/1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	AG	2	4	-	2/6/23/26	0/1/1/1
4	NAG	AH	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	AH	2	4	-	0/6/23/26	0/1/1/1
4	NAG	BA	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	BA	2	4	-	2/6/23/26	0/1/1/1
4	NAG	BB	1	4	-	2/6/23/26	0/1/1/1
4	NAG	BB	2	4	-	2/6/23/26	0/1/1/1
4	NAG	BC	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	BC	2	4	-	1/6/23/26	0/1/1/1
4	NAG	BD	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	BD	2	4	-	0/6/23/26	0/1/1/1
4	NAG	BE	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	BE	2	4	-	0/6/23/26	0/1/1/1
4	NAG	BF	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	BF	2	4	-	0/6/23/26	0/1/1/1
4	NAG	BG	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	BG	2	4	-	0/6/23/26	0/1/1/1
4	NAG	BH	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	BH	2	4	-	2/6/23/26	0/1/1/1
4	NAG	BI	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	BI	2	4	-	0/6/23/26	0/1/1/1
4	NAG	CA	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	CA	2	4	-	2/6/23/26	0/1/1/1
4	NAG	CB	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	CB	2	4	-	0/6/23/26	0/1/1/1
4	NAG	CC	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	CC	2	4	-	0/6/23/26	0/1/1/1
4	NAG	CD	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	CD	2	4	-	0/6/23/26	0/1/1/1
4	NAG	CE	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	CE	2	4	-	2/6/23/26	0/1/1/1
4	NAG	CF	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	CF	2	4	-	0/6/23/26	0/1/1/1
4	NAG	CG	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	CG	2	4	-	0/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	BB	1	NAG	C1-C2	2.47	1.56	1.52

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	BB	1	NAG	O4-C4-C5	2.50	115.50	109.30
4	BB	1	NAG	C3-C4-C5	-2.32	106.09	110.24
4	BB	1	NAG	C1-O5-C5	2.05	114.97	112.19
4	BA	2	NAG	C1-O5-C5	2.01	114.91	112.19
4	BE	1	NAG	C1-O5-C5	2.01	114.91	112.19

There are no chirality outliers.

5 of 35 torsion outliers are listed below:

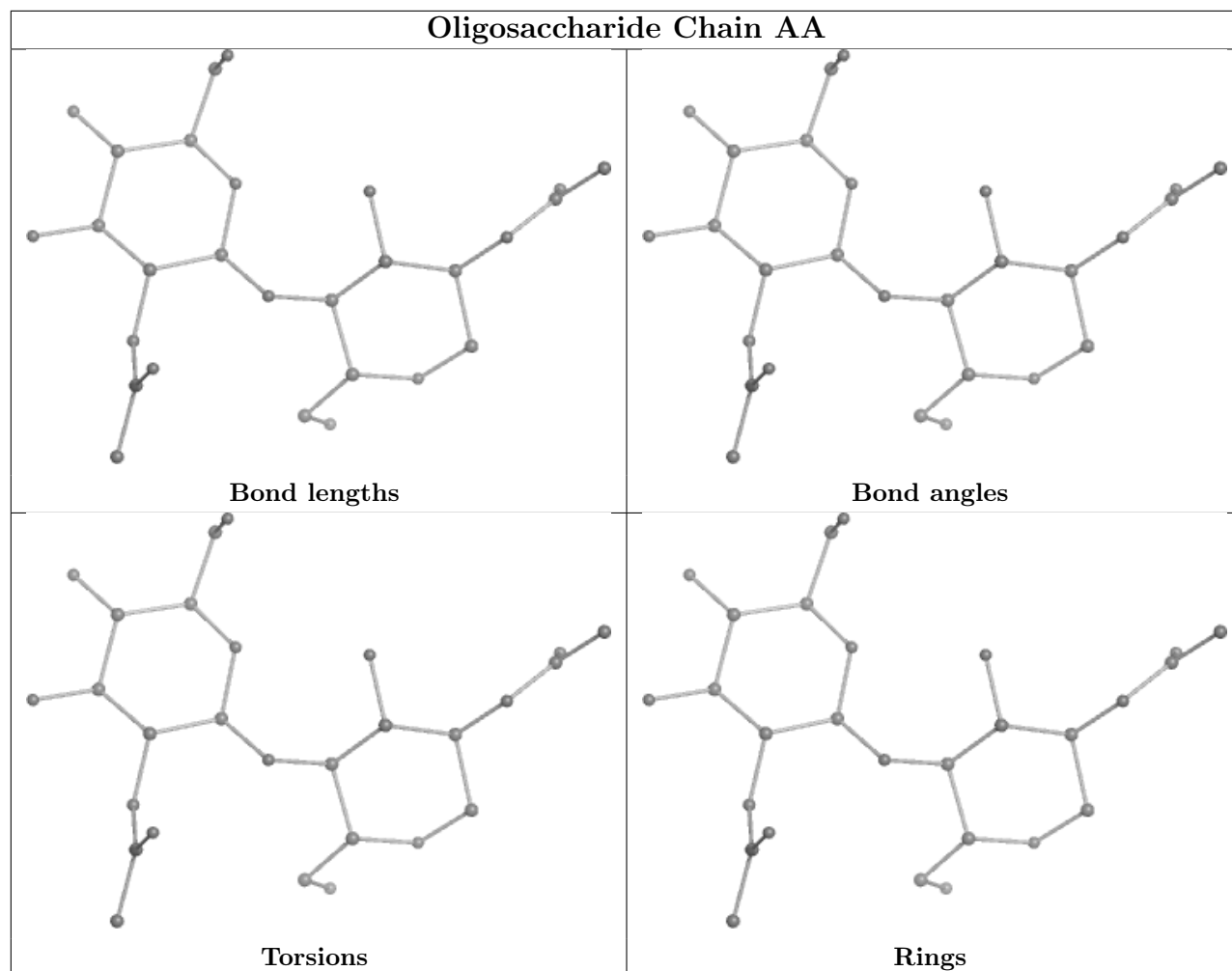
Mol	Chain	Res	Type	Atoms
4	AE	1	NAG	O5-C5-C6-O6
4	BB	2	NAG	O5-C5-C6-O6
4	AE	2	NAG	O5-C5-C6-O6
4	BI	1	NAG	O5-C5-C6-O6
4	CG	1	NAG	O5-C5-C6-O6

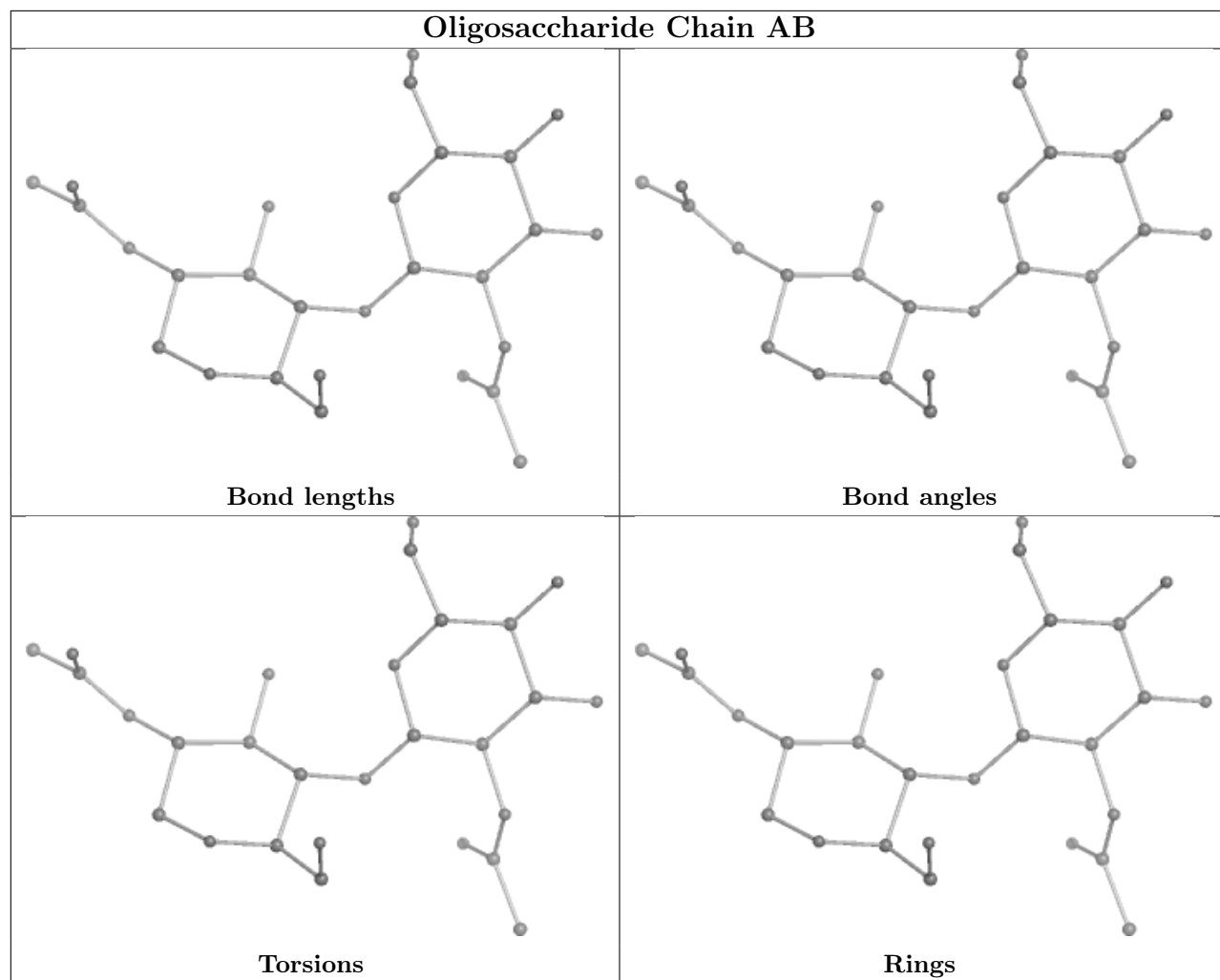
There are no ring outliers.

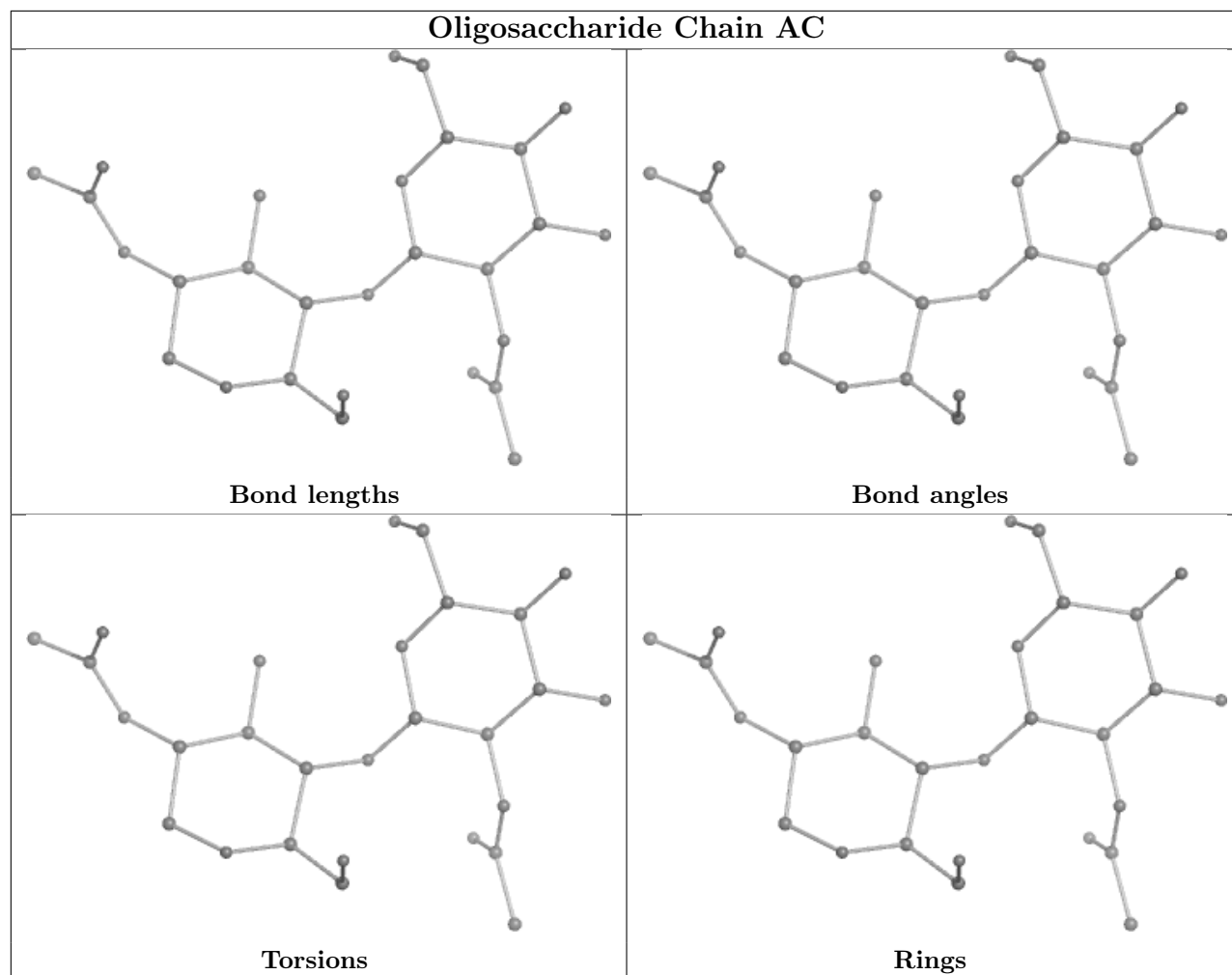
6 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	AD	1	NAG	1	0
4	CB	1	NAG	1	0
4	BE	1	NAG	1	0
4	CC	1	NAG	1	0
4	BG	1	NAG	1	0
4	AG	1	NAG	1	0

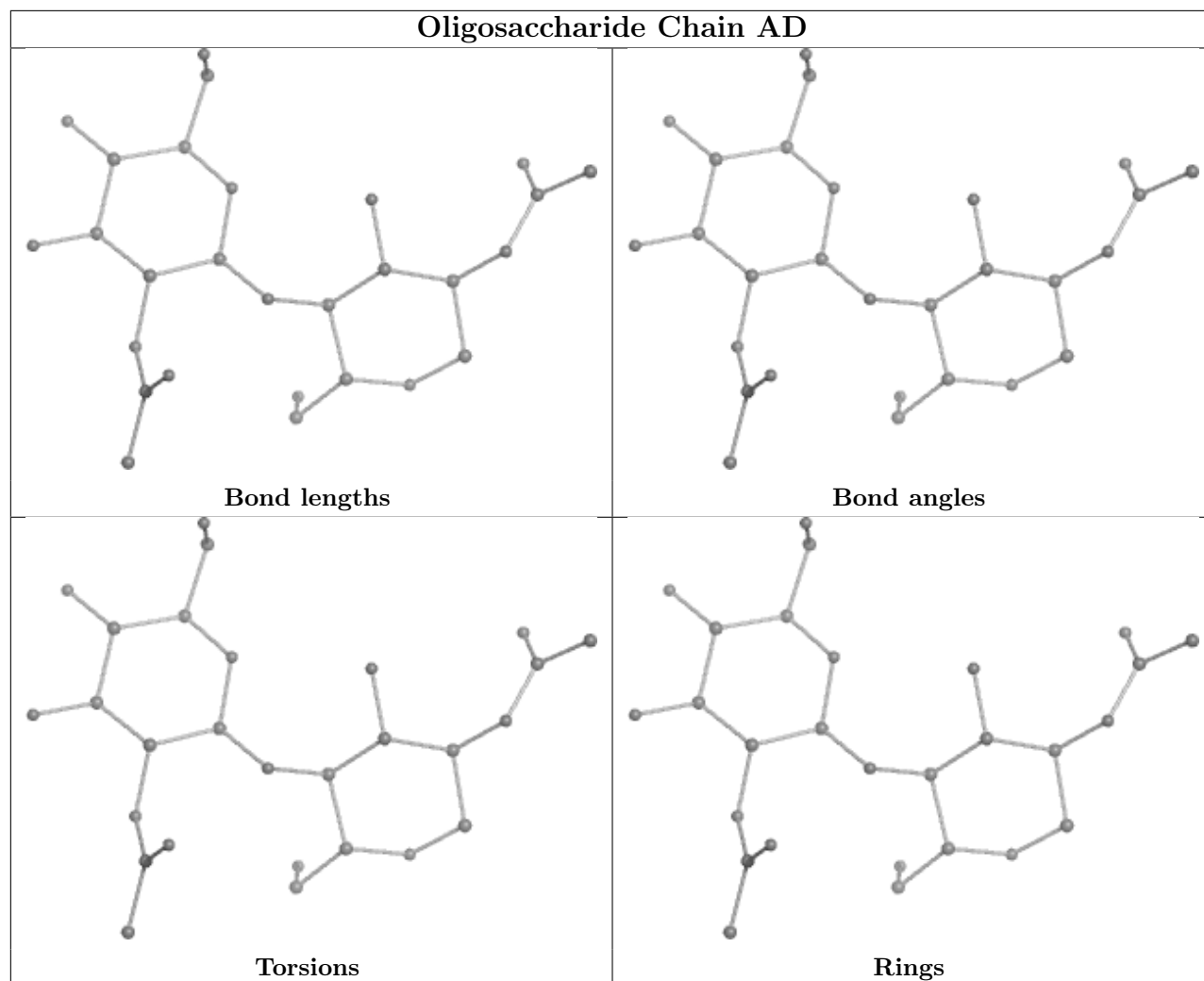
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

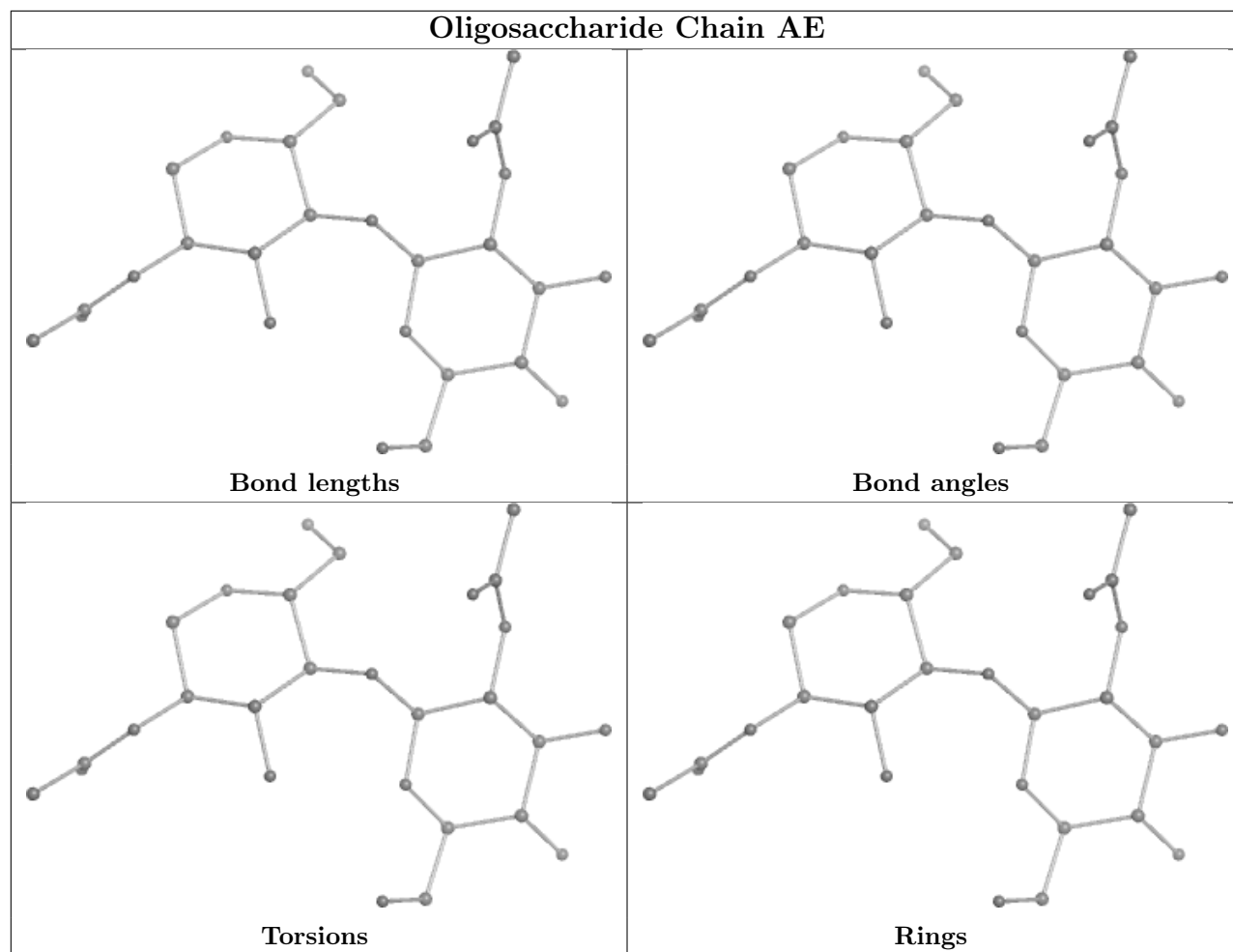


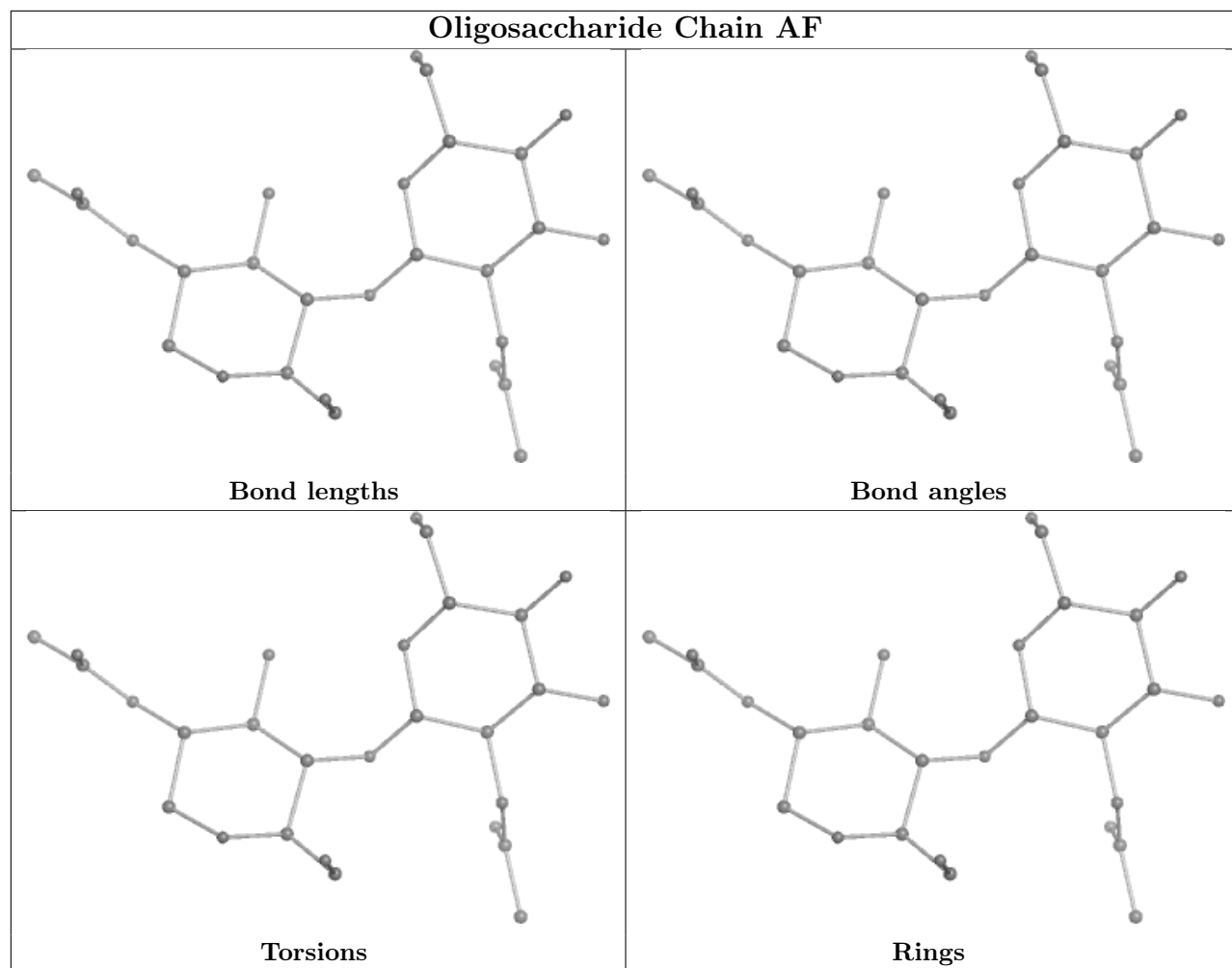


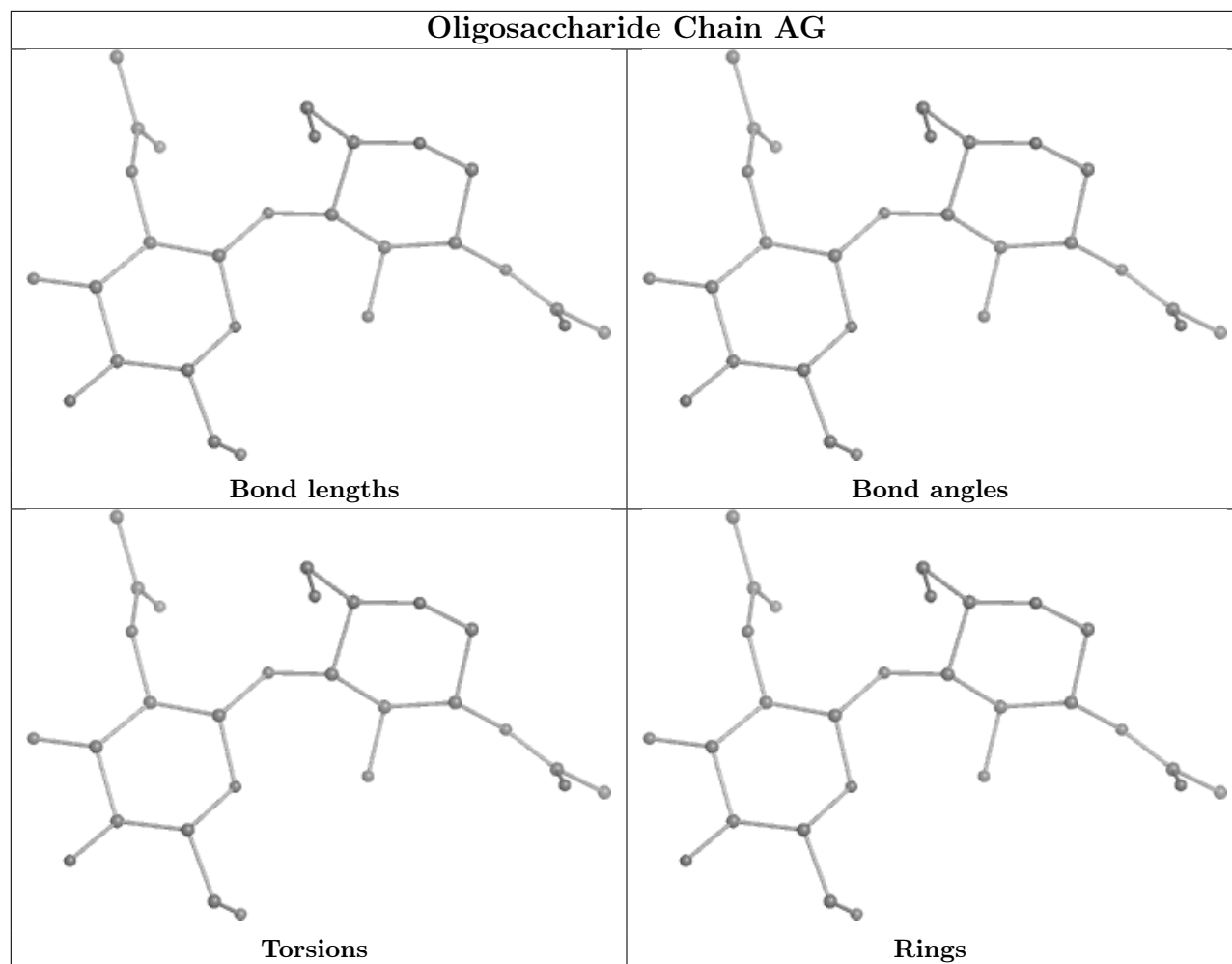


Oligosaccharide Chain AD

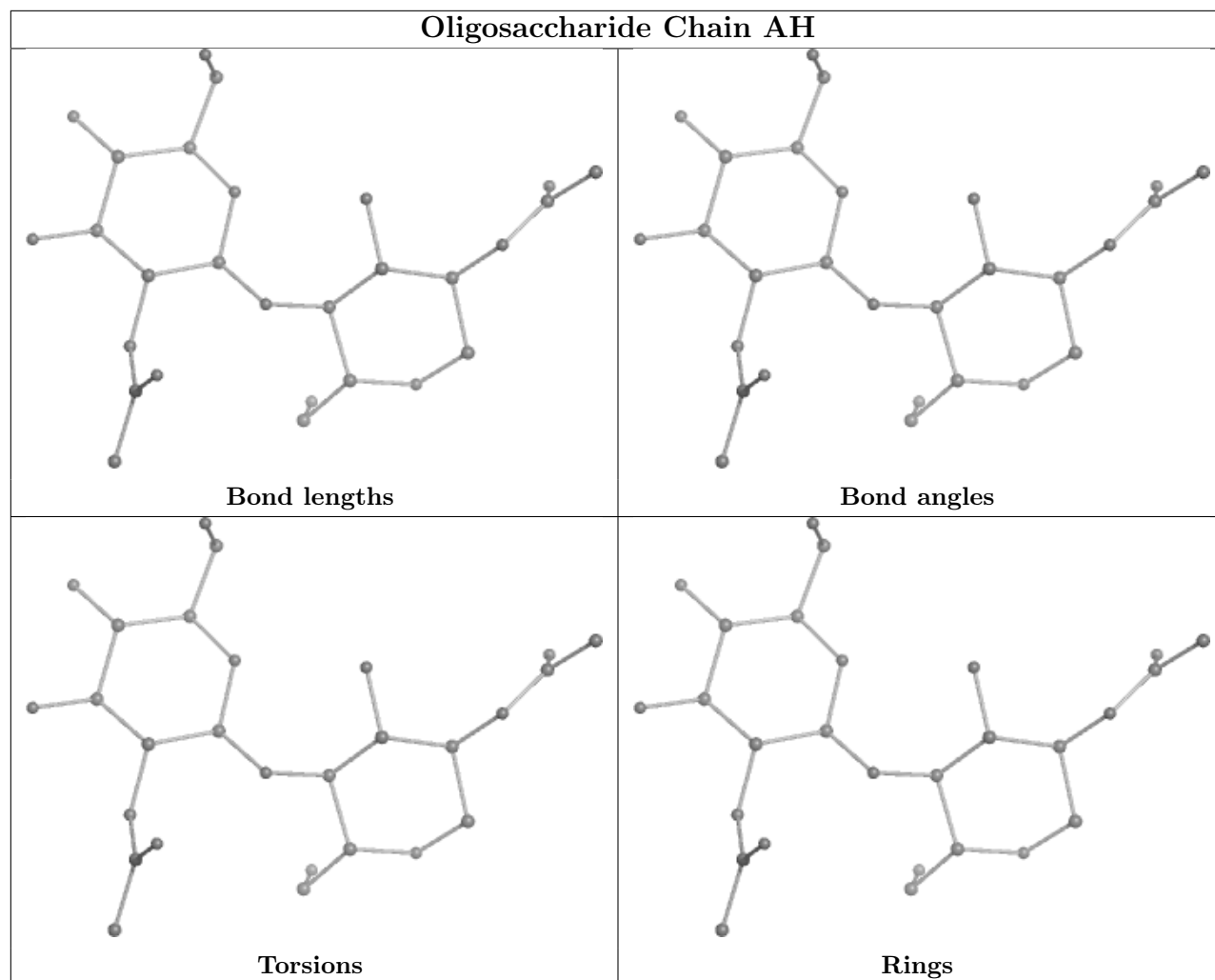




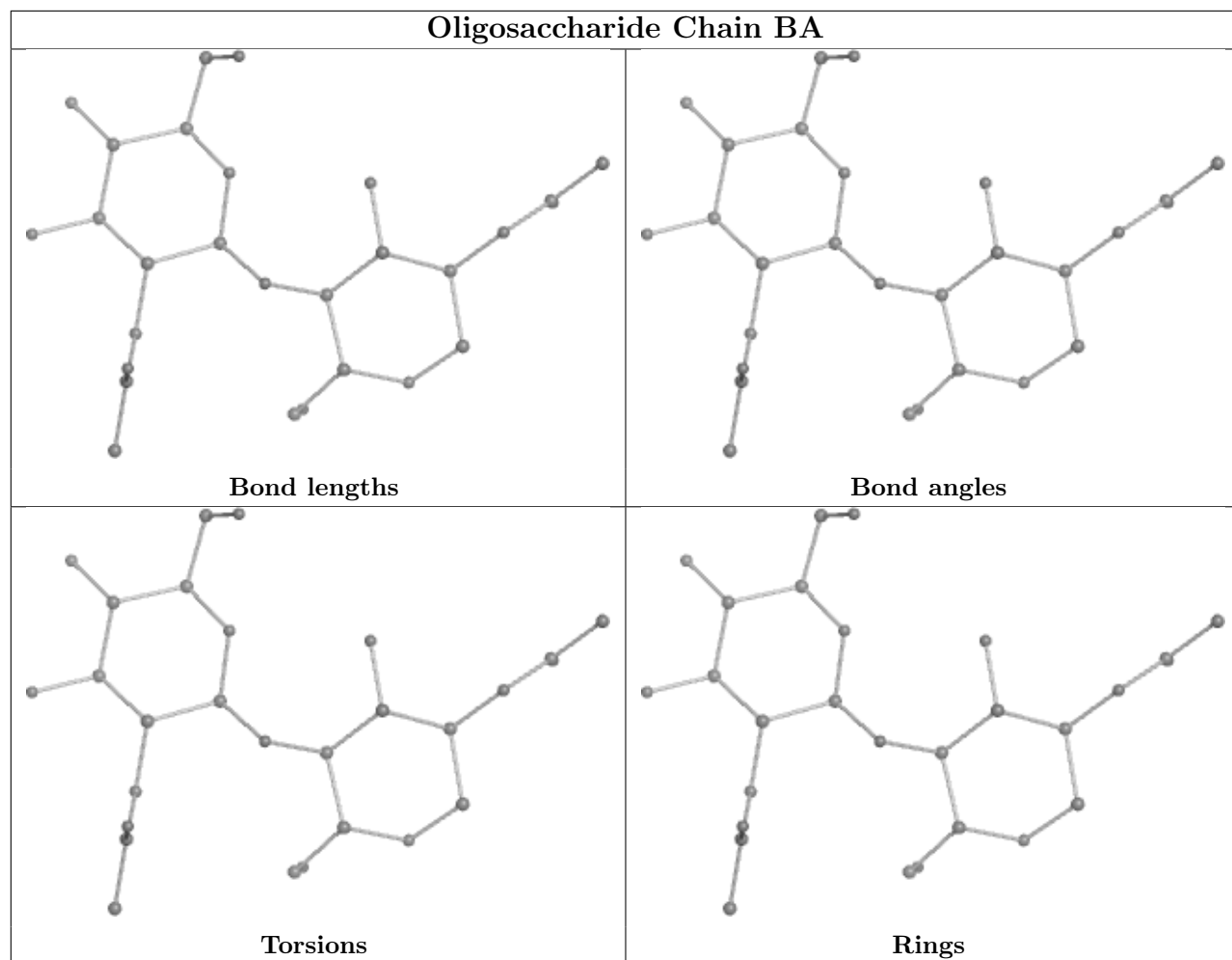


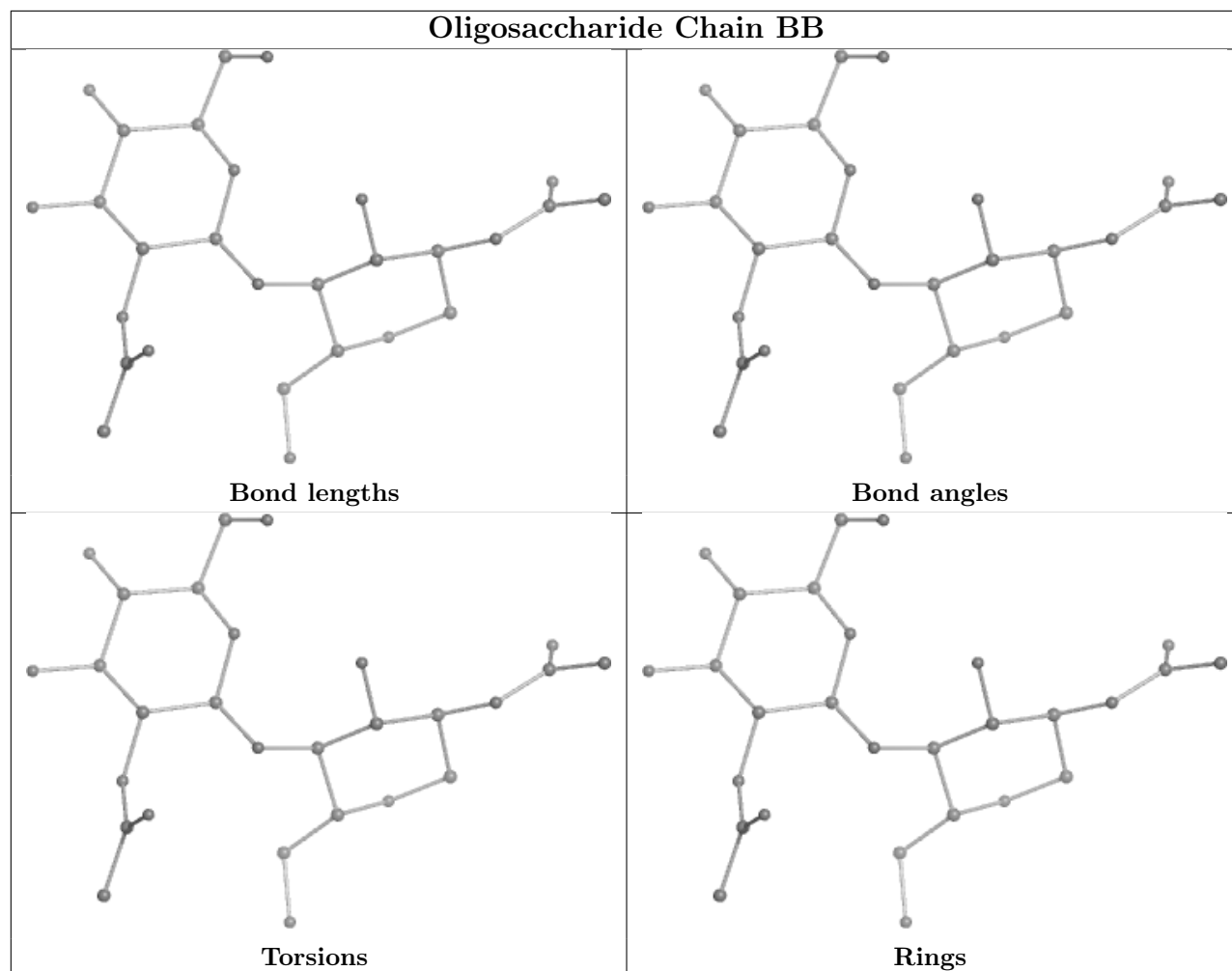
Oligosaccharide Chain AG

Oligosaccharide Chain AH

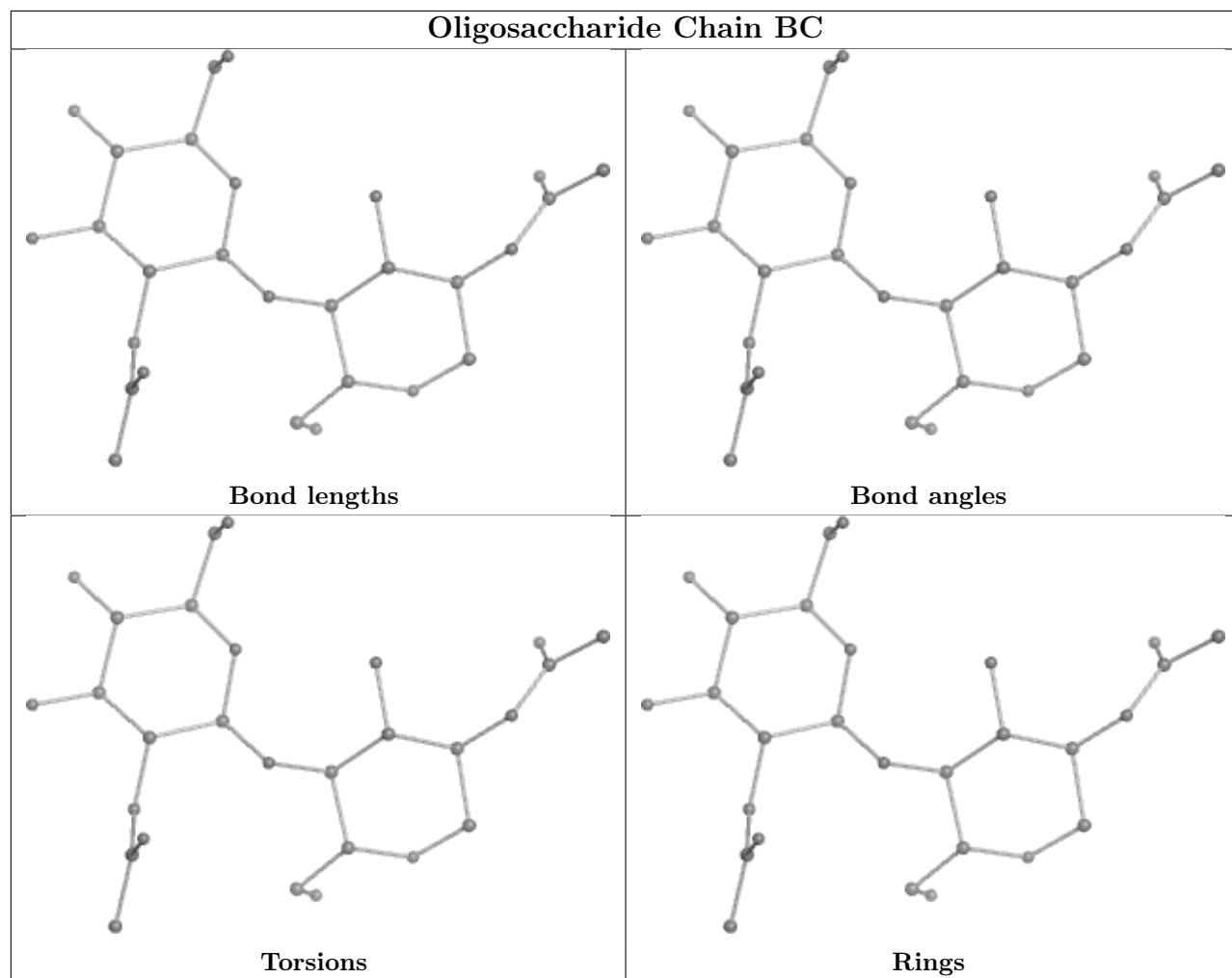


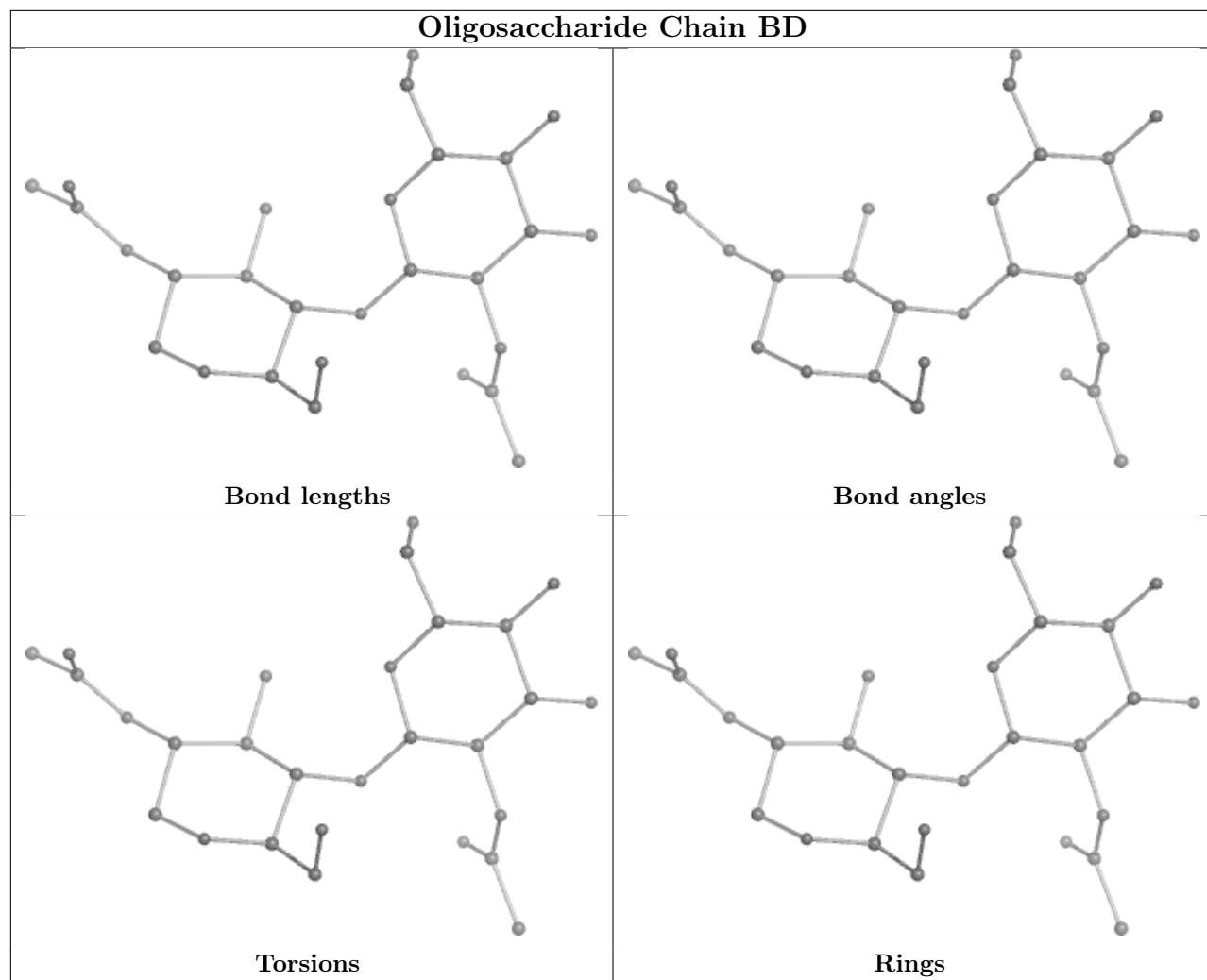
Oligosaccharide Chain BA

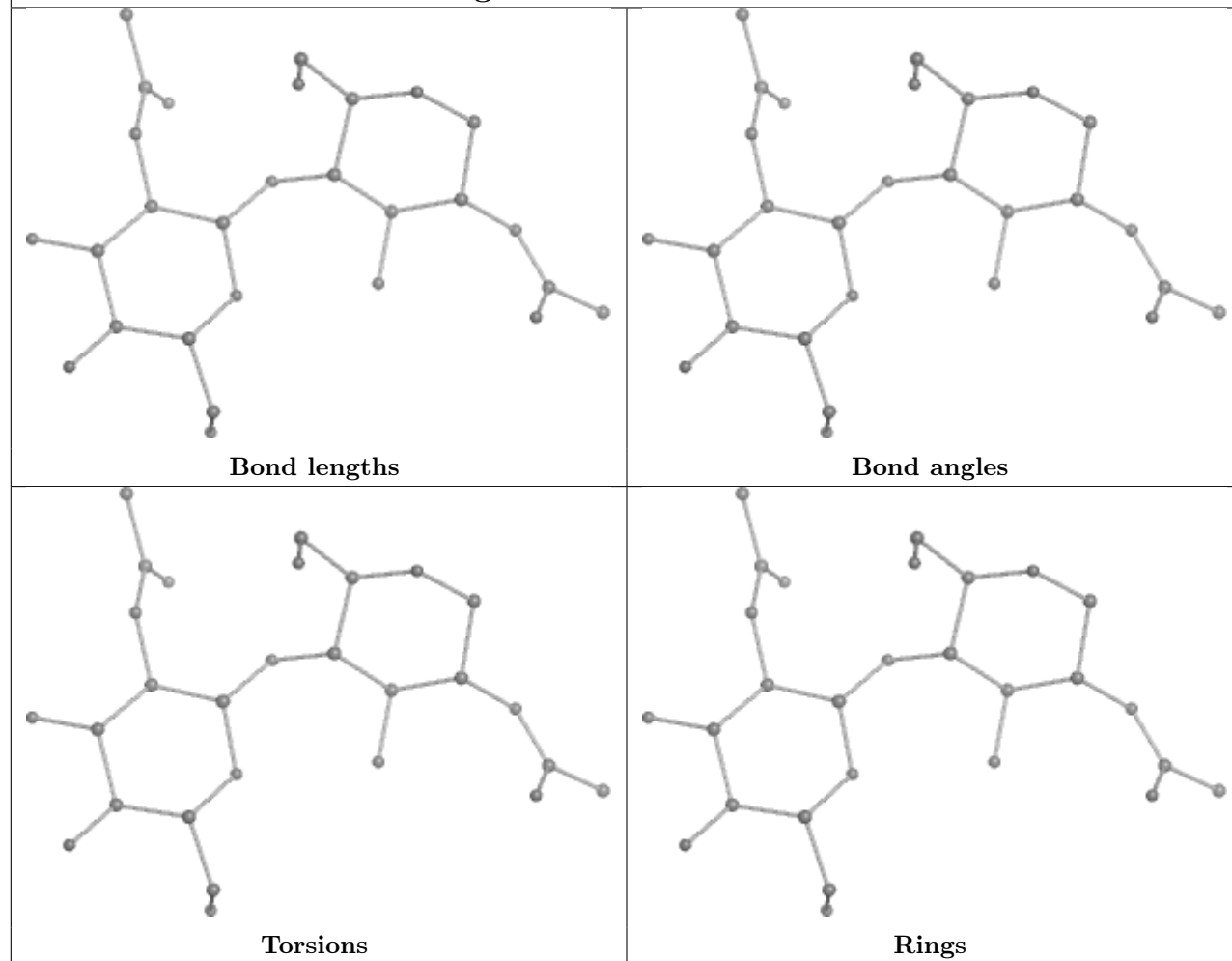


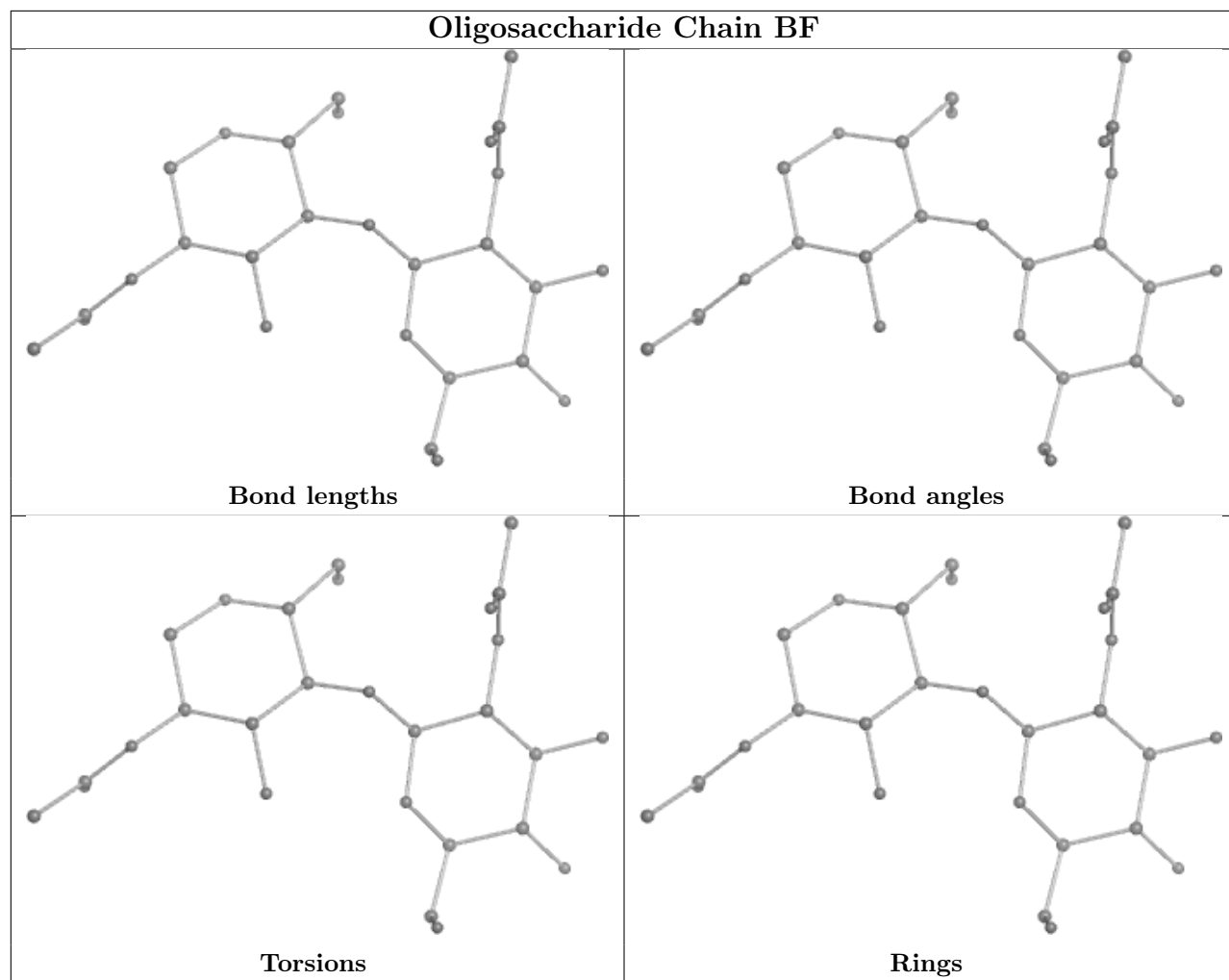


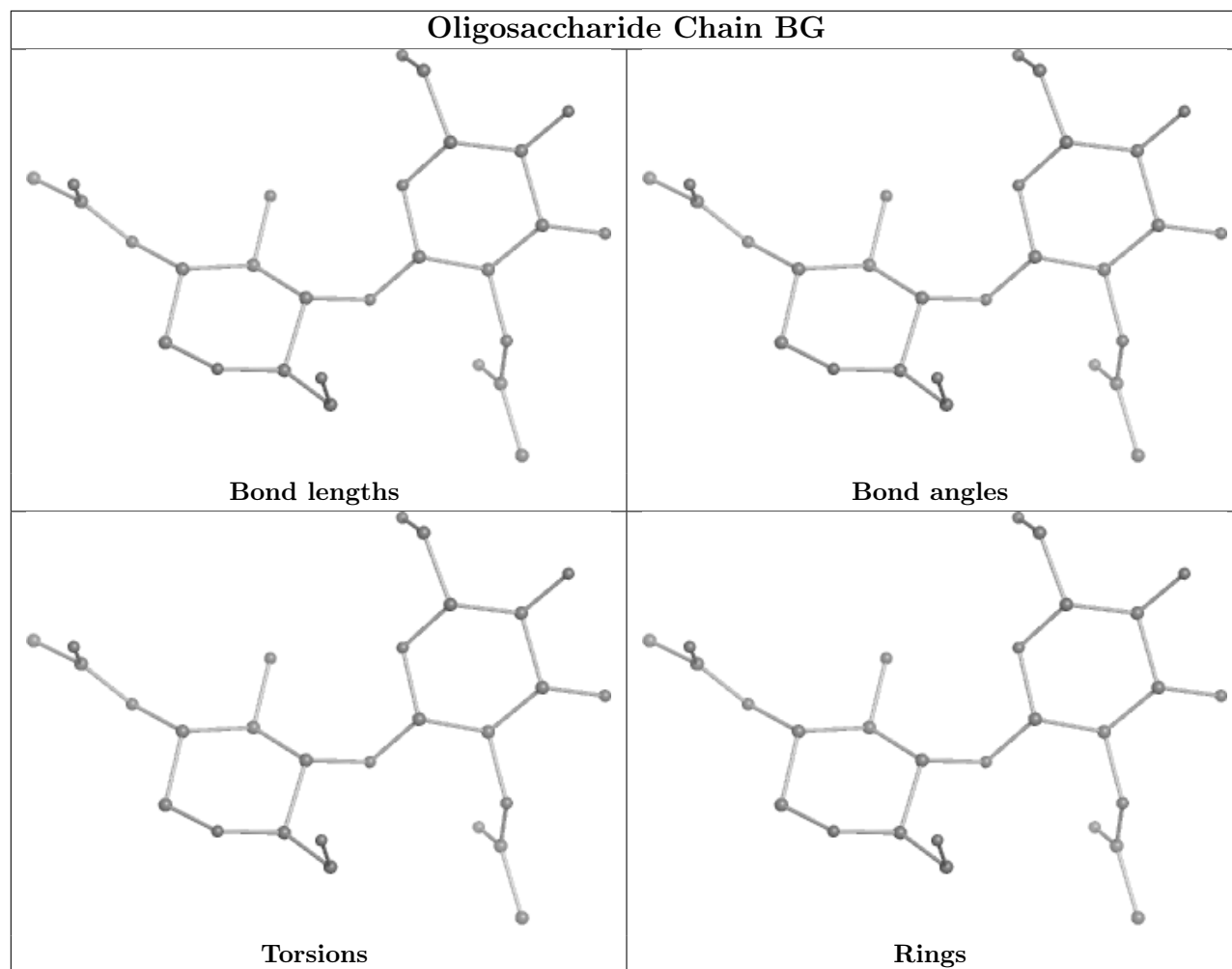
Oligosaccharide Chain BC

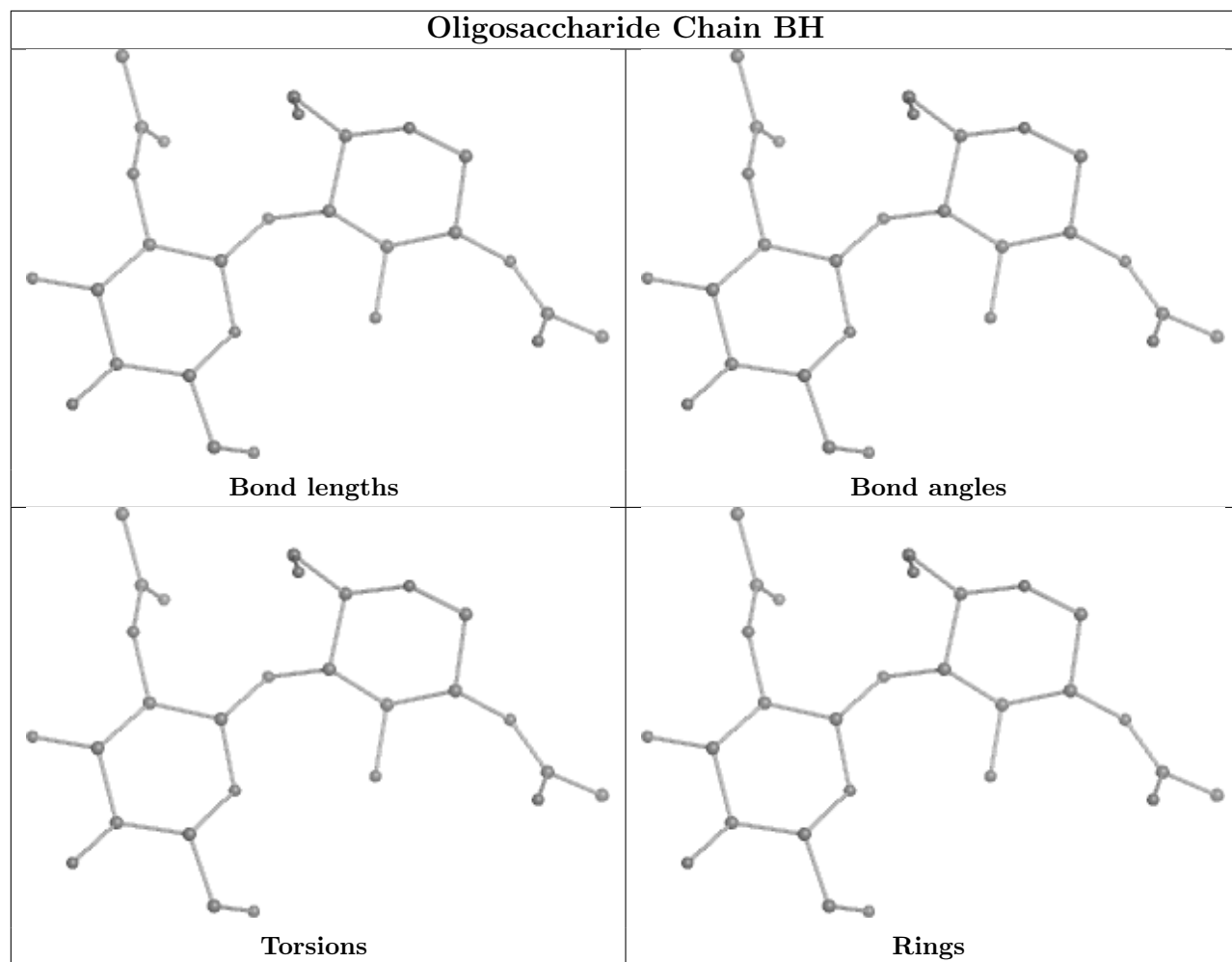


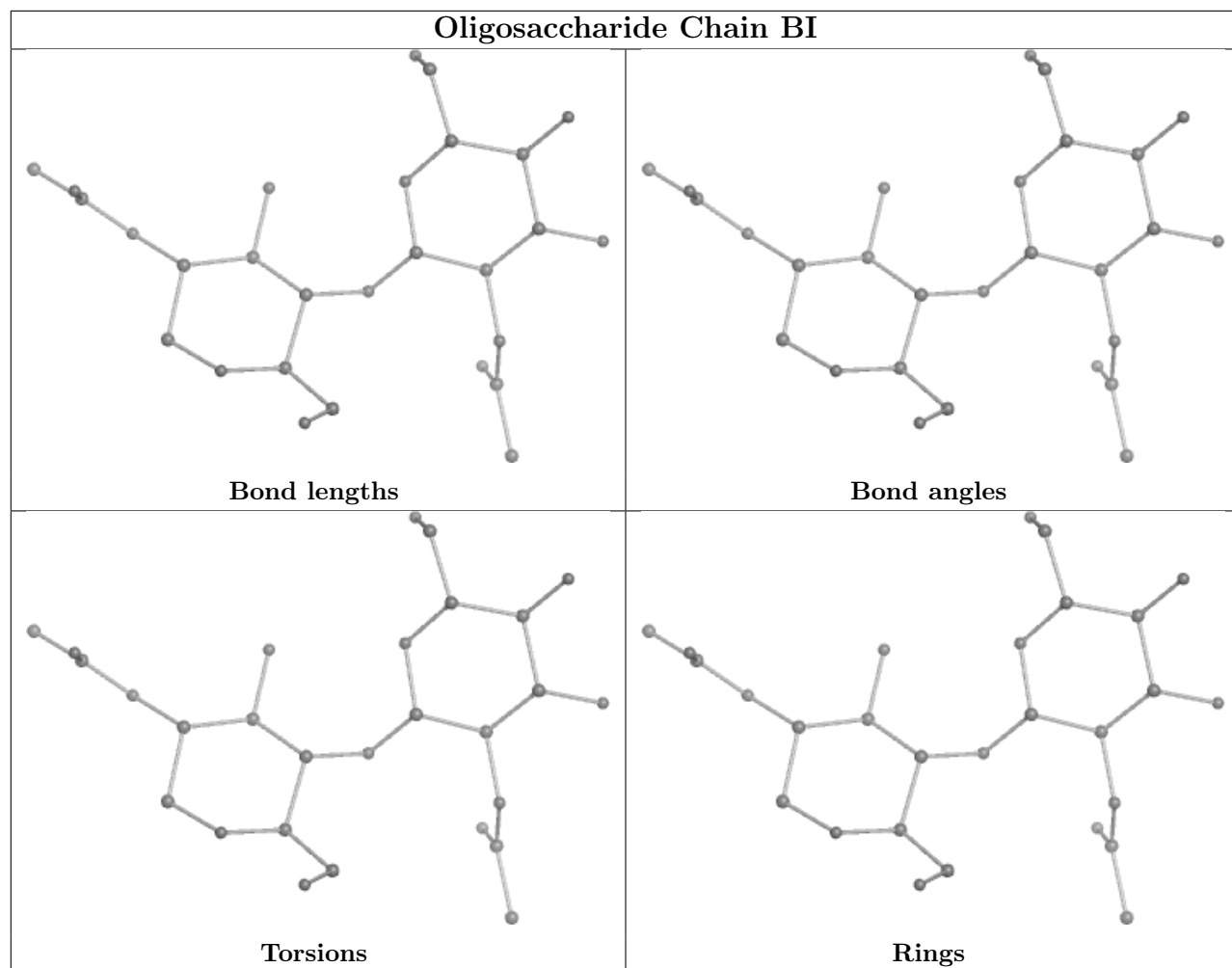


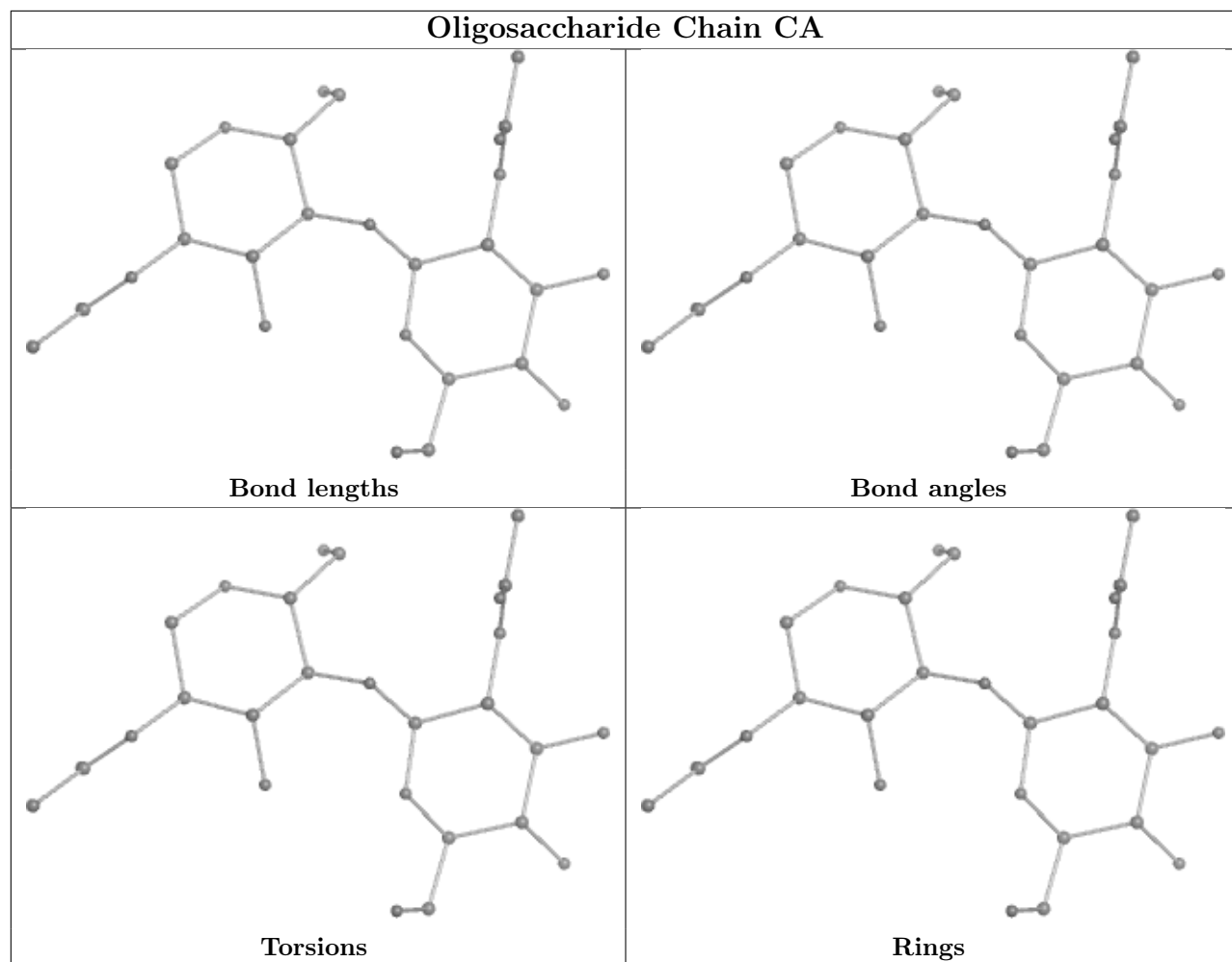
Oligosaccharide Chain BE

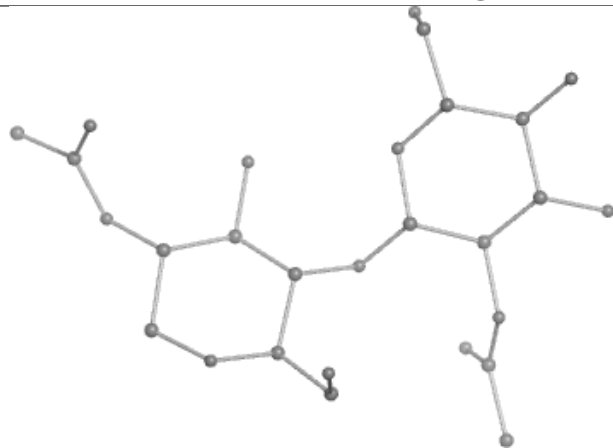
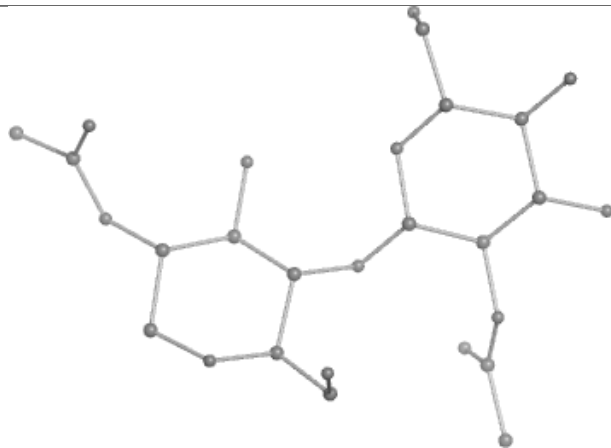
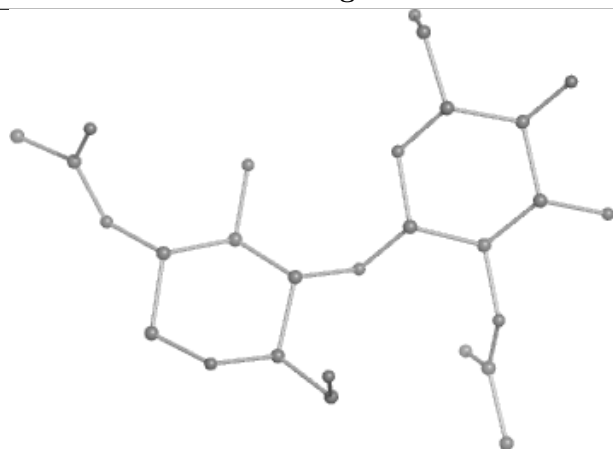
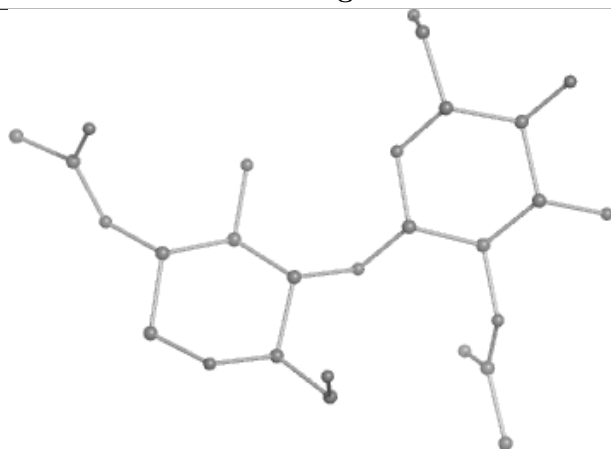




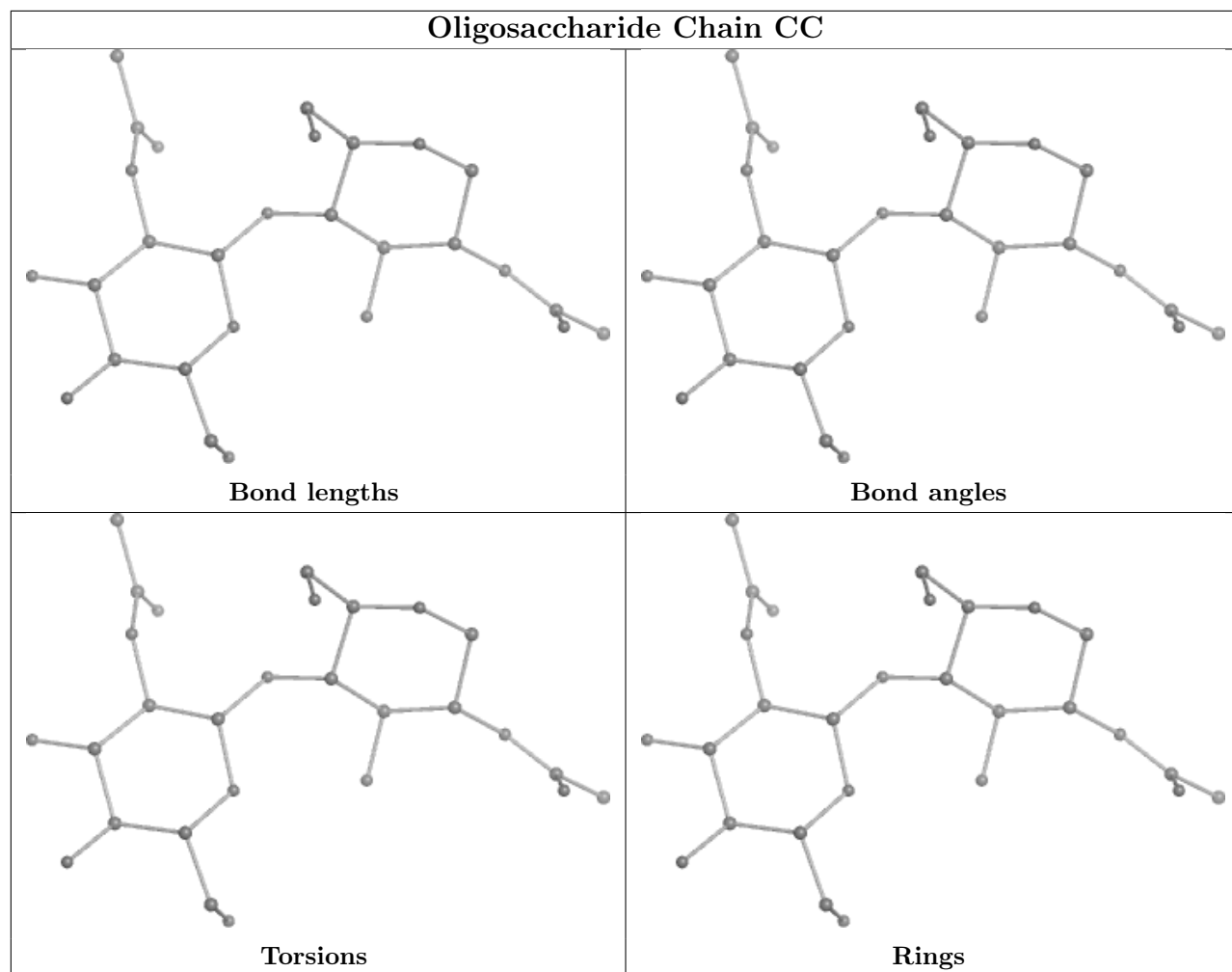




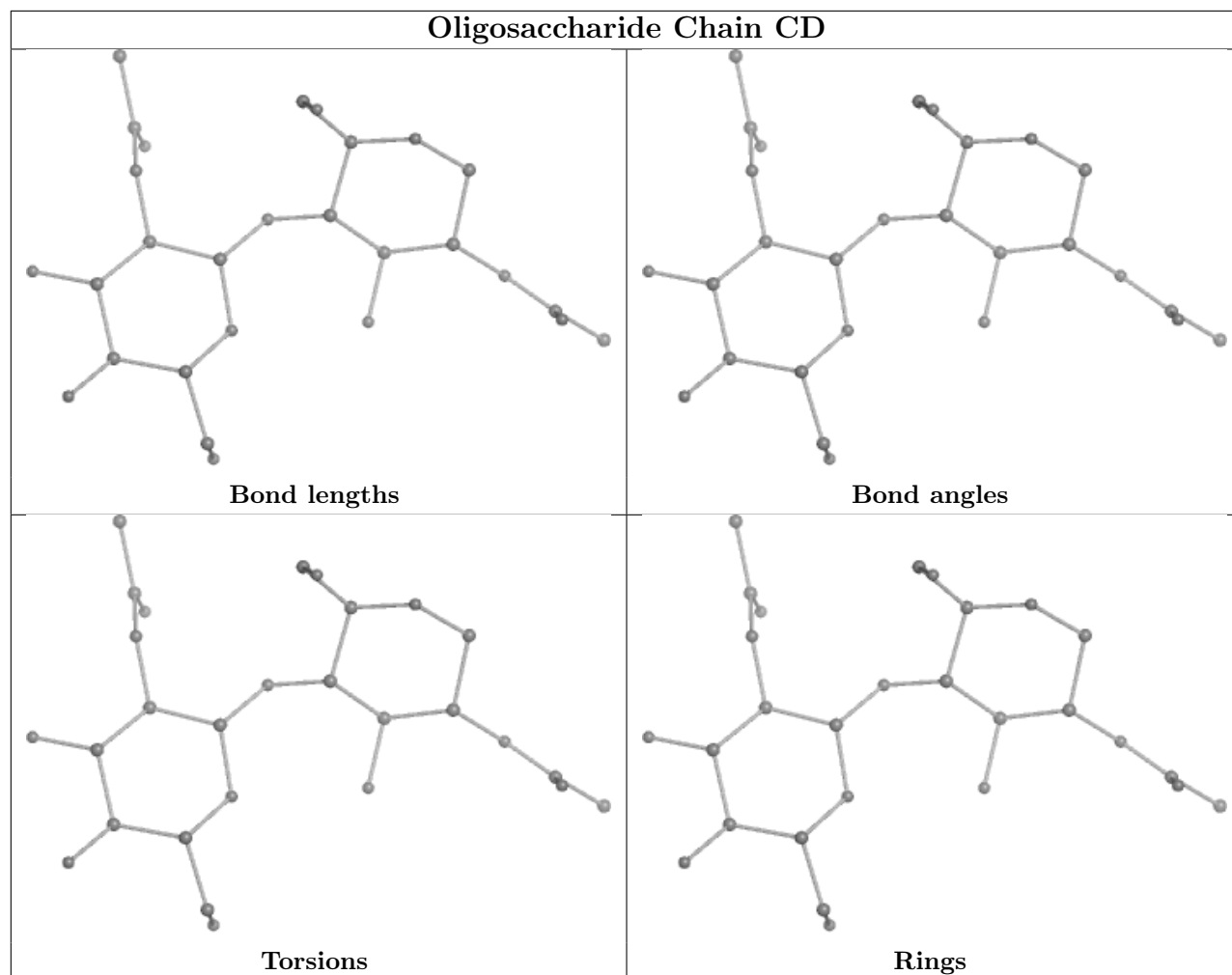
Oligosaccharide Chain CA

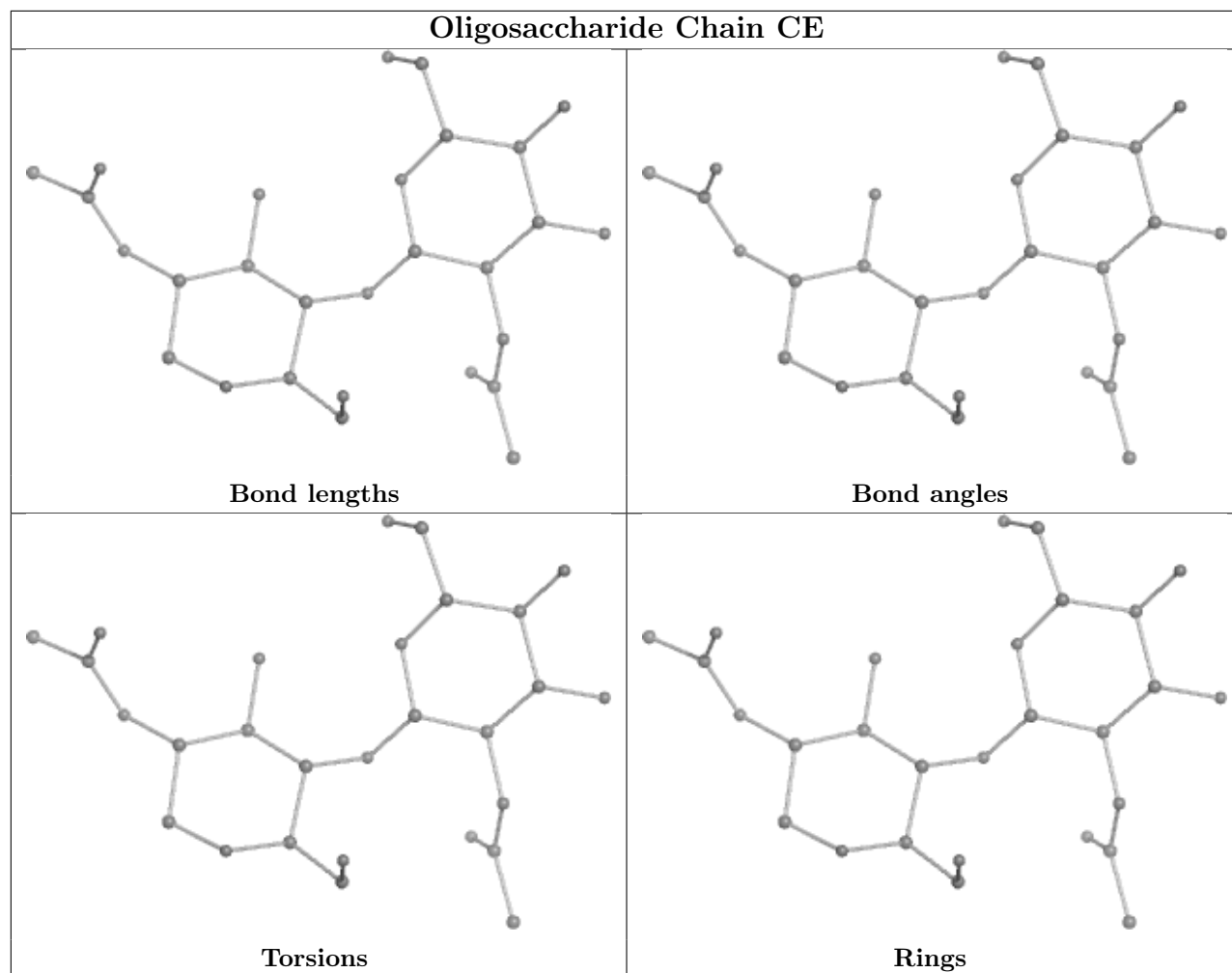
Oligosaccharide Chain CB**Bond lengths****Bond angles****Torsions****Rings**

Oligosaccharide Chain CC

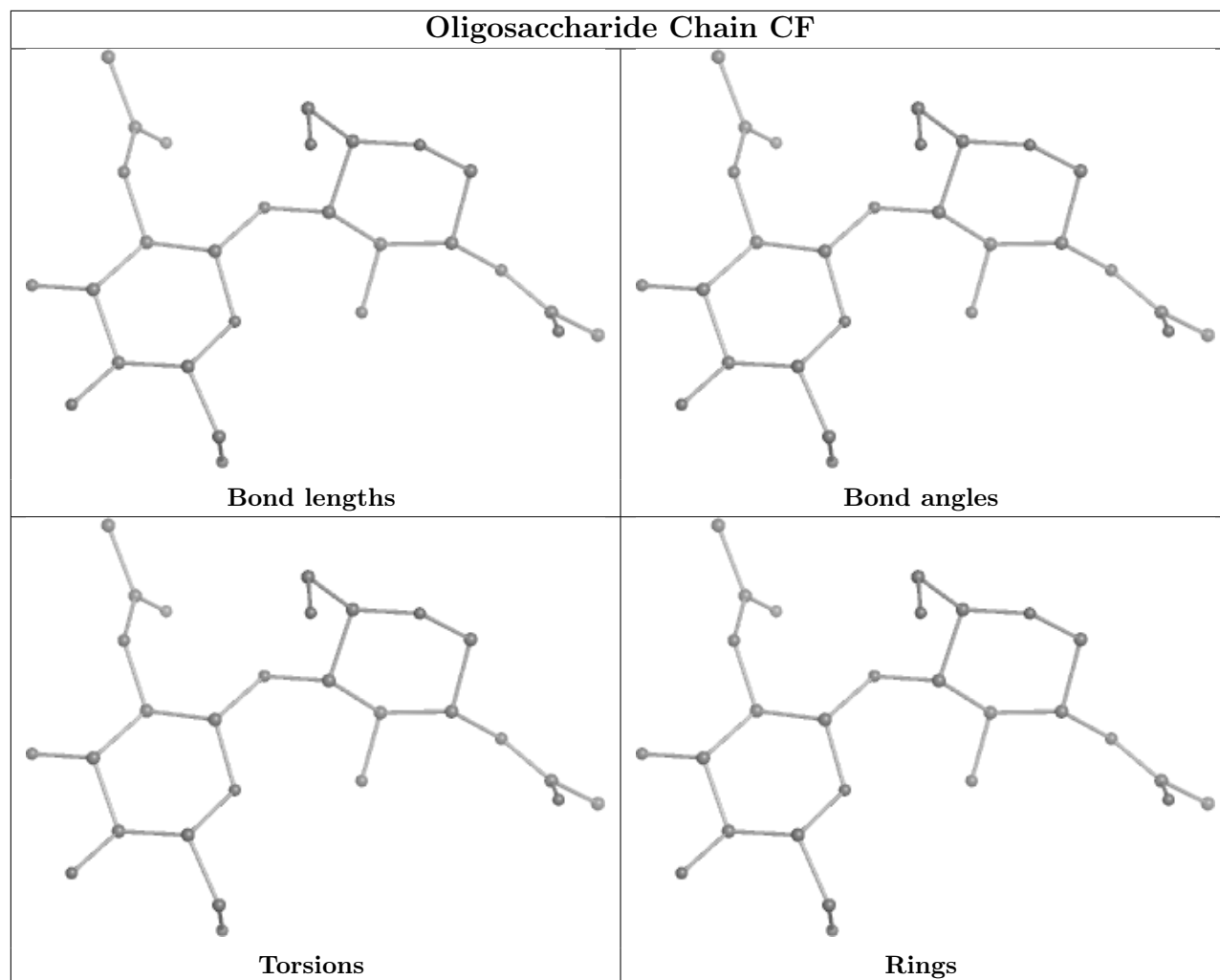


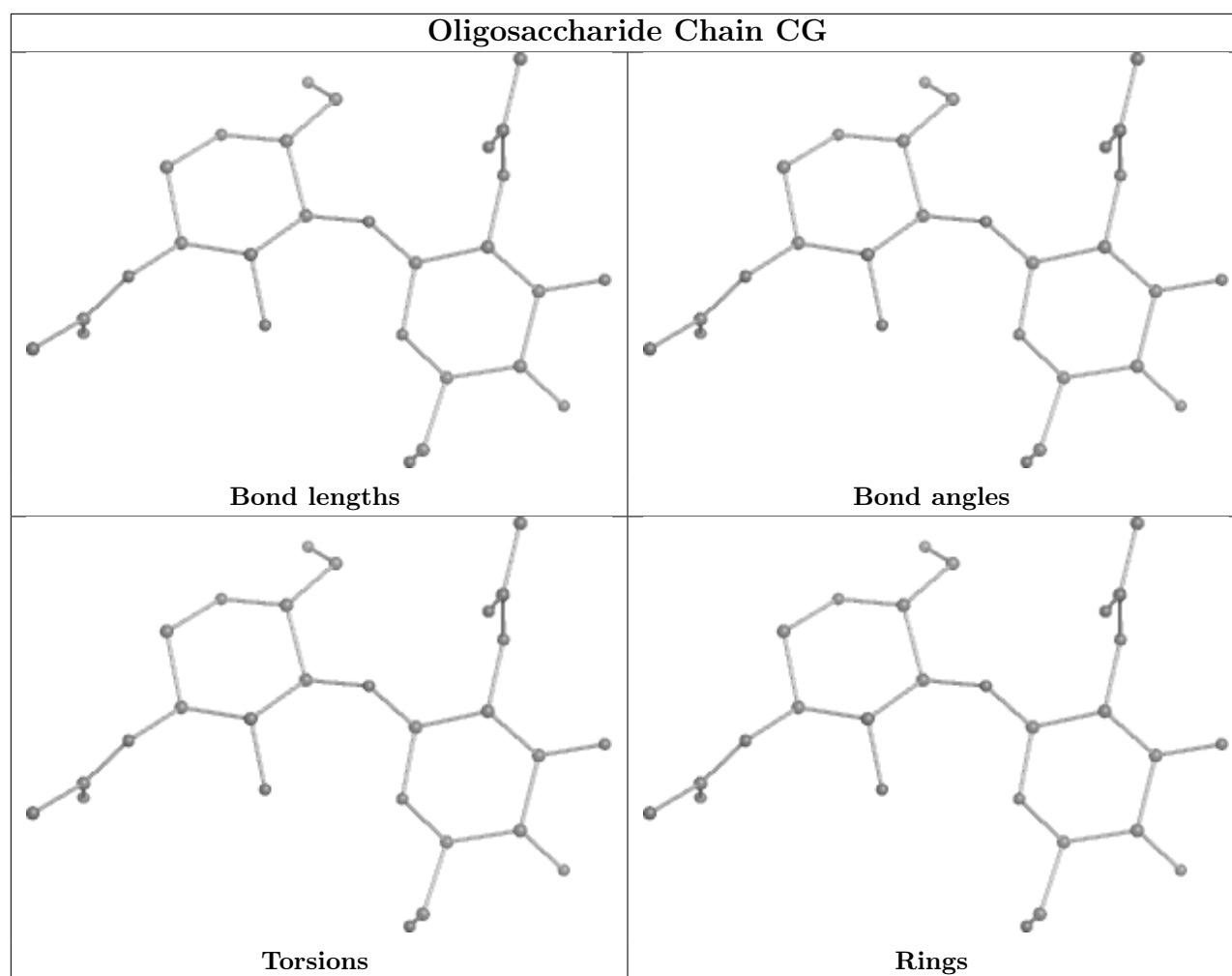
Oligosaccharide Chain CD





Oligosaccharide Chain CF





5.6 Ligand geometry [i](#)

34 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	$\# Z > 2$
5	NAG	C	1410	1	14,14,15	0.29	0	17,19,21	0.60	0
5	NAG	C	1403	1	14,14,15	0.64	1 (7%)	17,19,21	0.48	0
5	NAG	A	1201	1	14,14,15	0.25	0	17,19,21	0.48	0
5	NAG	A	1202	1	14,14,15	0.35	0	17,19,21	0.58	1 (5%)
5	NAG	B	1406	1	14,14,15	0.29	0	17,19,21	0.60	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	NAG	C	1408	1	14,14,15	0.42	0	17,19,21	0.65	1 (5%)
5	NAG	A	1203	1	14,14,15	0.36	0	17,19,21	0.59	0
5	NAG	C	1405	-	14,14,15	0.24	0	17,19,21	0.54	0
8	KZ0	G	101	3	9,9,12	1.04	0	12,12,15	3.86	7 (58%)
5	NAG	A	1206	1	14,14,15	0.32	0	17,19,21	0.57	0
5	NAG	B	1404	1	14,14,15	0.29	0	17,19,21	0.55	0
5	NAG	C	1401	1	14,14,15	0.36	0	17,19,21	0.60	1 (5%)
5	NAG	C	1402	1	14,14,15	0.24	0	17,19,21	0.46	0
5	NAG	C	1404	-	14,14,15	0.41	0	17,19,21	0.46	0
6	STE	C	1411	-	19,19,19	0.56	0	19,19,19	0.55	0
5	NAG	A	1205	1	14,14,15	0.32	0	17,19,21	0.46	0
5	NAG	A	1207	1	14,14,15	0.31	0	17,19,21	0.49	0
5	NAG	A	1204	1	14,14,15	0.37	0	17,19,21	0.45	0
5	NAG	B	1403	1	14,14,15	0.26	0	17,19,21	0.44	0
5	NAG	B	1402	1	14,14,15	0.54	0	17,19,21	0.70	1 (5%)
8	KZ0	H	101	3	9,9,12	1.04	0	12,12,15	3.87	7 (58%)
5	NAG	B	1401	1	14,14,15	0.37	0	17,19,21	0.65	1 (5%)
7	R06	E	101	2	15,15,18	1.89	3 (20%)	21,21,24	0.88	0
5	NAG	B	1407	1	14,14,15	0.34	0	17,19,21	0.45	0
5	NAG	C	1409	1	14,14,15	0.33	0	17,19,21	0.46	0
5	NAG	A	1208	1	14,14,15	0.36	0	17,19,21	0.58	1 (5%)
6	STE	A	1209	-	19,19,19	0.59	0	19,19,19	0.57	0
5	NAG	C	1407	1	14,14,15	0.32	0	17,19,21	0.53	0
7	R06	F	101	2	15,15,18	1.88	3 (20%)	21,21,24	1.00	1 (4%)
6	STE	B	1408	-	19,19,19	0.58	0	19,19,19	0.51	0
8	KZ0	I	101	3	9,9,12	1.04	0	12,12,15	3.84	7 (58%)
5	NAG	C	1406	1	14,14,15	0.30	0	17,19,21	0.53	0
5	NAG	B	1405	1	14,14,15	0.31	0	17,19,21	0.63	0
7	R06	D	101	2	15,15,18	1.89	3 (20%)	21,21,24	0.99	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
5	NAG	C	1410	1	-	2/6/23/26	0/1/1/1
5	NAG	C	1403	1	-	2/6/23/26	0/1/1/1
5	NAG	A	1201	1	-	0/6/23/26	0/1/1/1
5	NAG	A	1202	1	-	0/6/23/26	0/1/1/1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	B	1406	1	-	2/6/23/26	0/1/1/1
5	NAG	C	1408	1	-	2/6/23/26	0/1/1/1
5	NAG	A	1203	1	-	2/6/23/26	0/1/1/1
5	NAG	C	1405	-	-	0/6/23/26	0/1/1/1
8	KZ0	G	101	3	-	-	0/1/1/1
5	NAG	A	1206	1	-	0/6/23/26	0/1/1/1
5	NAG	B	1404	1	-	2/6/23/26	0/1/1/1
5	NAG	C	1401	1	-	0/6/23/26	0/1/1/1
5	NAG	C	1402	1	-	0/6/23/26	0/1/1/1
5	NAG	C	1404	-	-	2/6/23/26	0/1/1/1
6	STE	C	1411	-	-	6/17/17/17	-
5	NAG	A	1205	1	-	2/6/23/26	0/1/1/1
5	NAG	A	1207	1	-	0/6/23/26	0/1/1/1
5	NAG	A	1204	1	-	2/6/23/26	0/1/1/1
5	NAG	B	1403	1	-	0/6/23/26	0/1/1/1
5	NAG	B	1402	1	-	2/6/23/26	0/1/1/1
8	KZ0	H	101	3	-	-	0/1/1/1
5	NAG	B	1401	1	-	4/6/23/26	0/1/1/1
7	R06	E	101	2	-	0/12/24/30	0/0/1/1
5	NAG	B	1407	1	-	2/6/23/26	0/1/1/1
5	NAG	C	1409	1	-	2/6/23/26	0/1/1/1
5	NAG	A	1208	1	-	1/6/23/26	0/1/1/1
6	STE	A	1209	-	-	5/17/17/17	-
5	NAG	C	1407	1	-	2/6/23/26	0/1/1/1
7	R06	F	101	2	-	0/12/24/30	0/0/1/1
6	STE	B	1408	-	-	5/17/17/17	-
8	KZ0	I	101	3	-	-	0/1/1/1
5	NAG	C	1406	1	-	4/6/23/26	0/1/1/1
5	NAG	B	1405	1	-	2/6/23/26	0/1/1/1
7	R06	D	101	2	-	0/12/24/30	0/0/1/1

The worst 5 of 10 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	D	101	R06	C2-N1	3.45	1.45	1.35
7	E	101	R06	C2-N1	3.42	1.45	1.35
7	F	101	R06	C2-N1	3.41	1.45	1.35
7	F	101	R06	C7-N3	3.36	1.45	1.35
7	E	101	R06	C7-N3	3.36	1.45	1.35

The worst 5 of 29 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	H	101	KZ0	C2-N-C1	6.82	120.14	115.13
8	G	101	KZ0	C2-N-C1	6.78	120.11	115.13
8	I	101	KZ0	C2-N-C1	6.73	120.07	115.13
8	H	101	KZ0	C3-N1-C2	6.66	120.02	115.13
8	G	101	KZ0	C3-N1-C2	6.54	119.93	115.13

There are no chirality outliers.

5 of 53 torsion outliers are listed below:

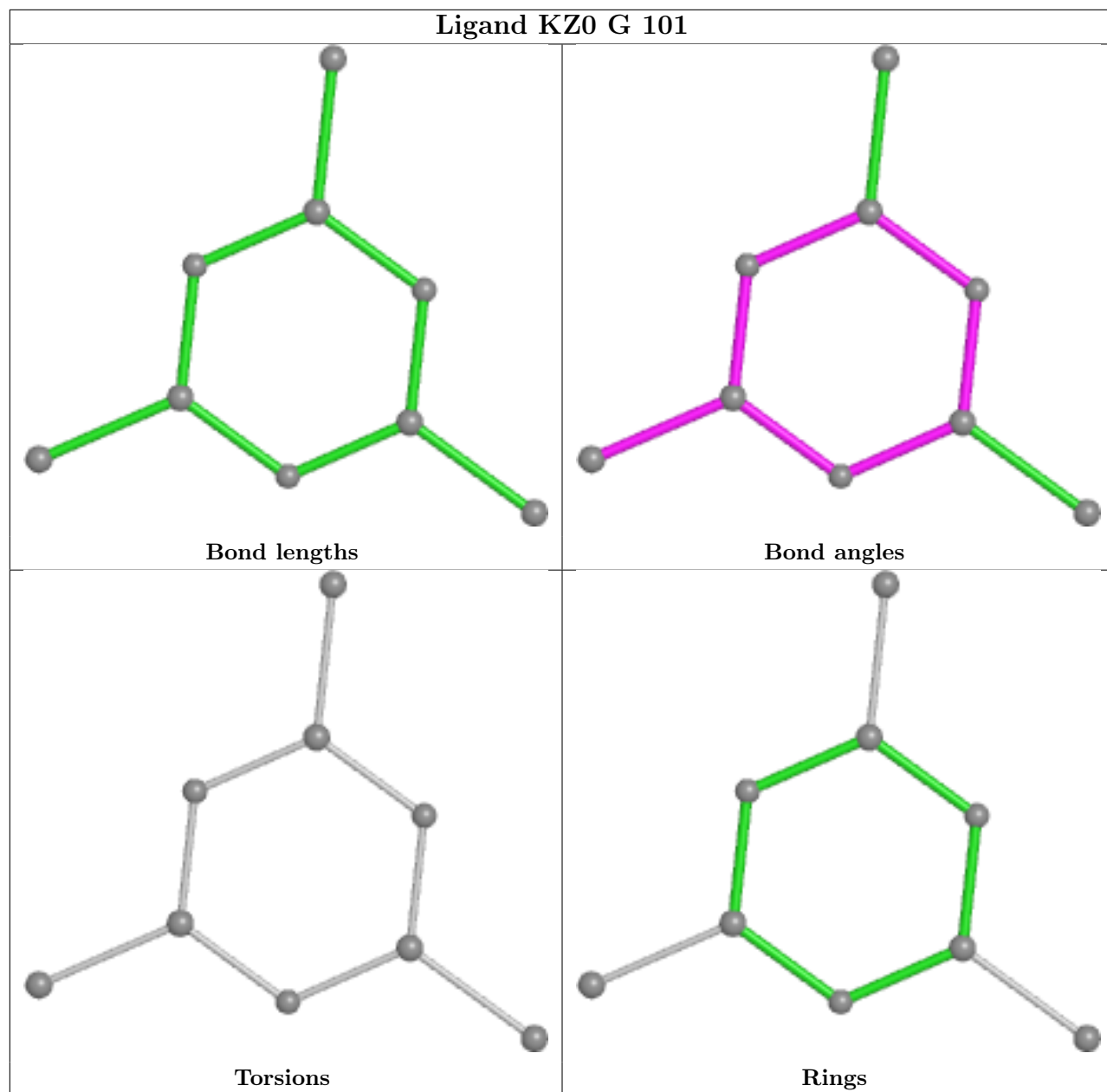
Mol	Chain	Res	Type	Atoms
5	A	1205	NAG	O5-C5-C6-O6
5	C	1403	NAG	O5-C5-C6-O6
5	B	1407	NAG	O5-C5-C6-O6
5	C	1409	NAG	O5-C5-C6-O6
5	B	1402	NAG	O5-C5-C6-O6

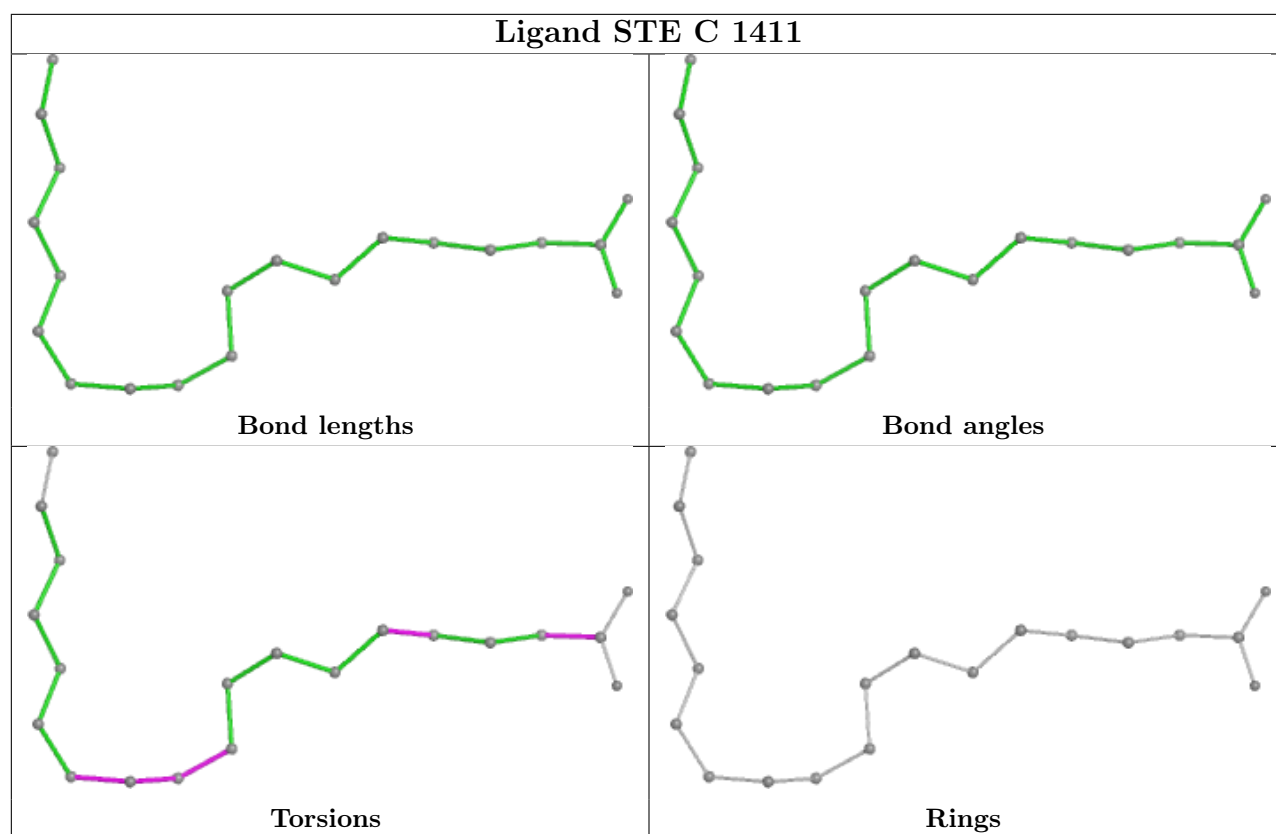
There are no ring outliers.

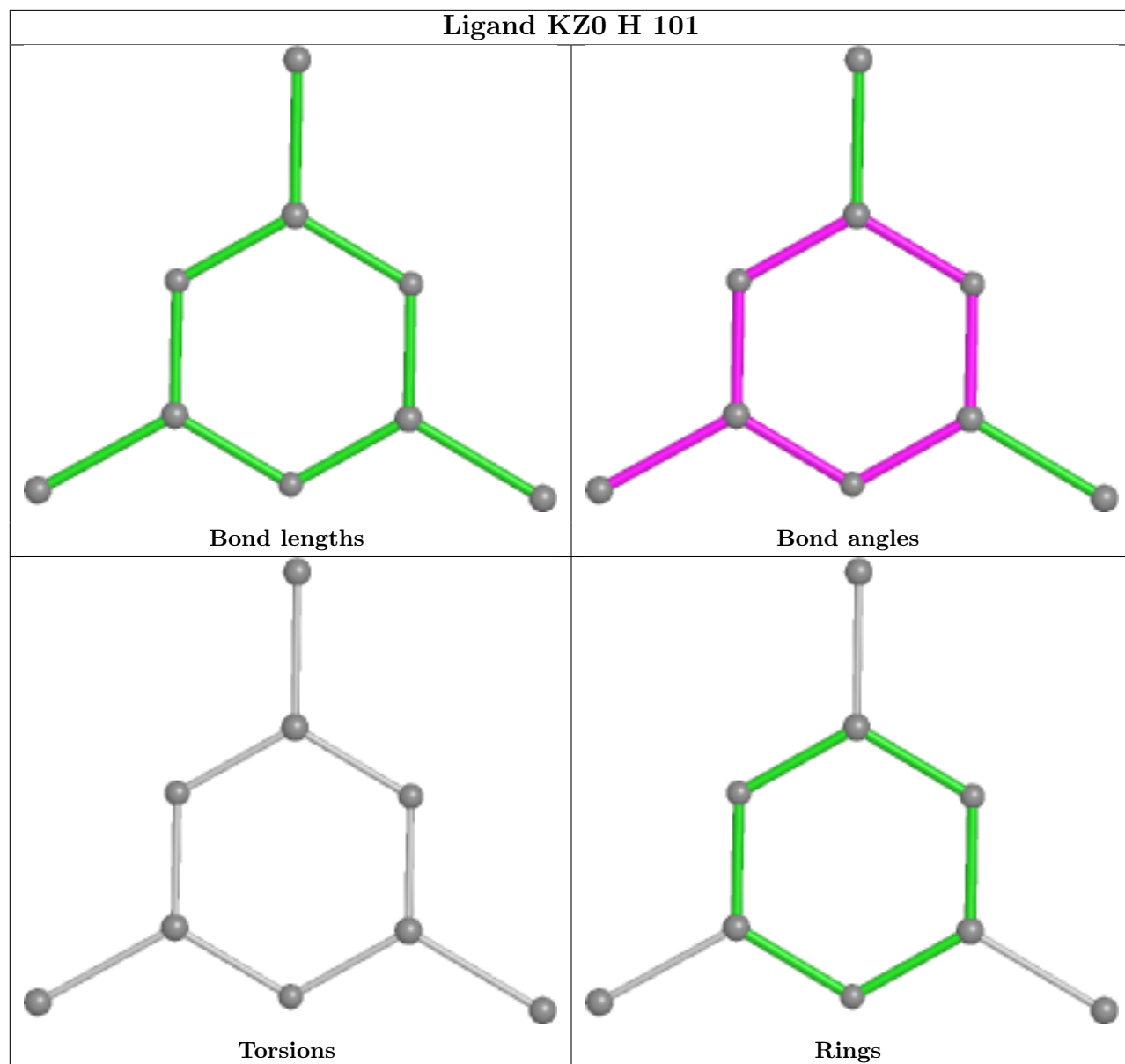
2 monomers are involved in 2 short contacts:

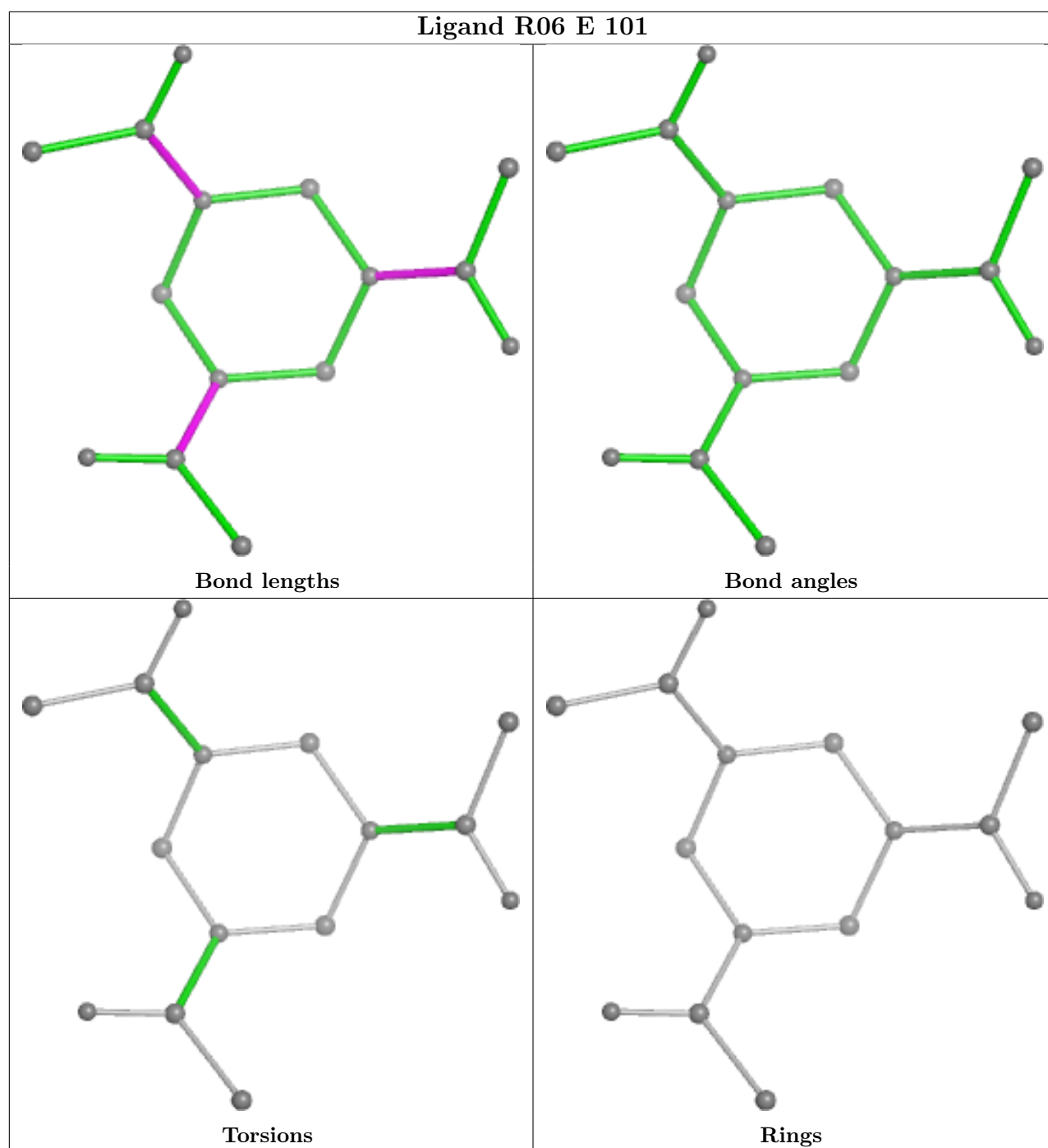
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	1402	NAG	1	0
6	B	1408	STE	1	0

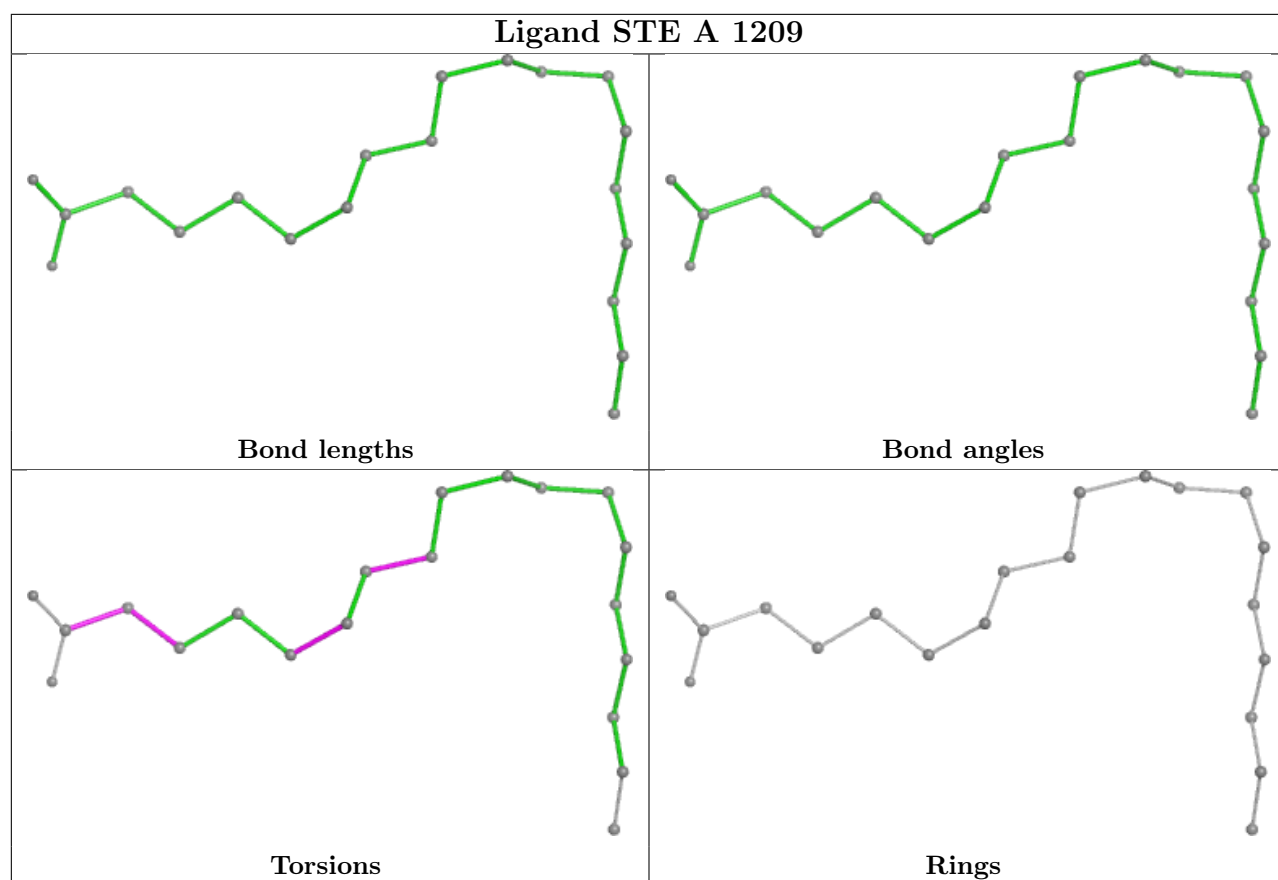
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



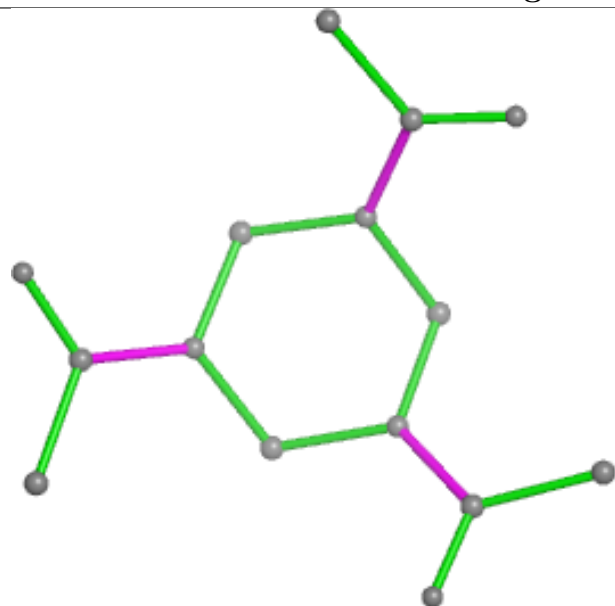




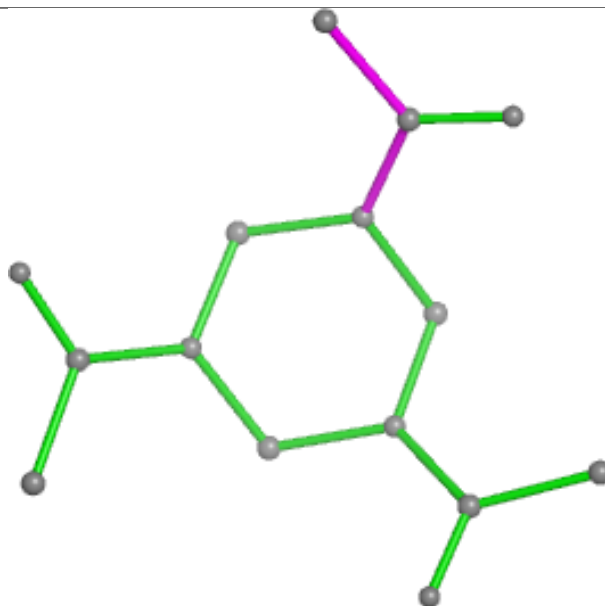




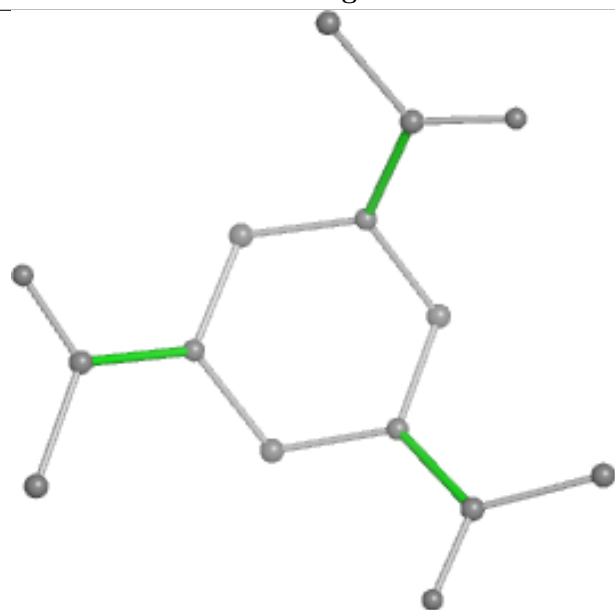
Ligand R06 F 101



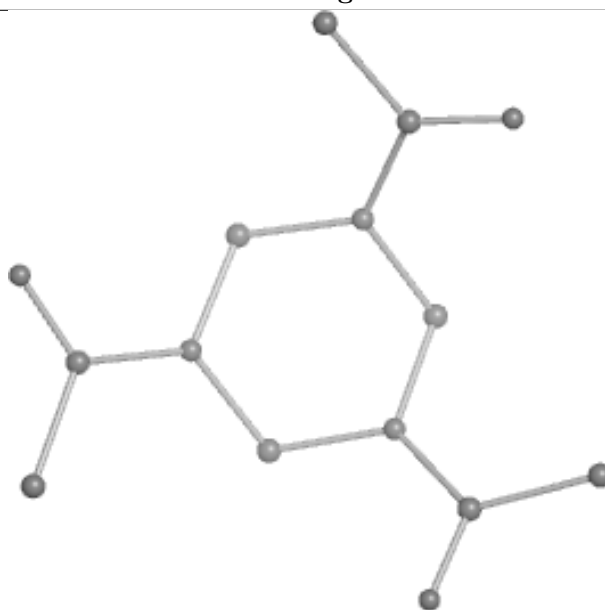
Bond lengths



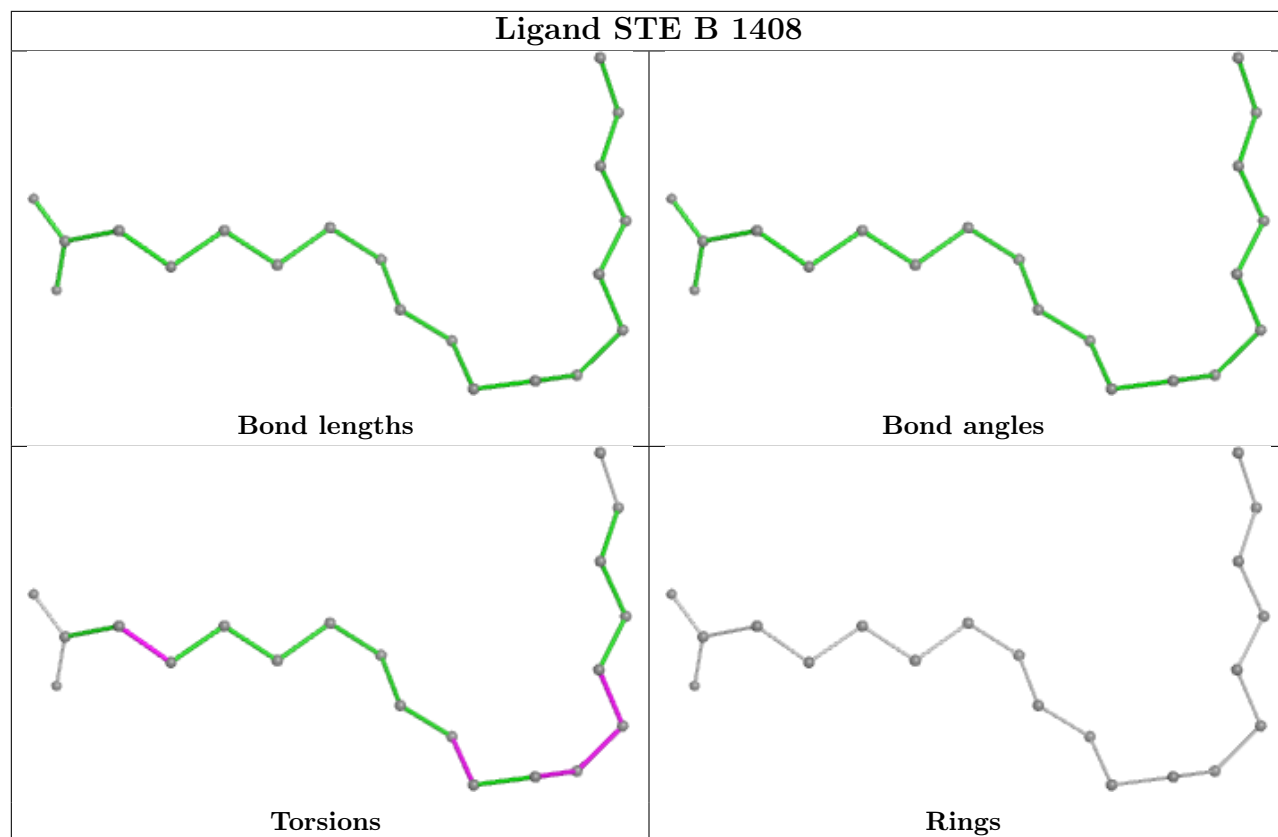
Bond angles

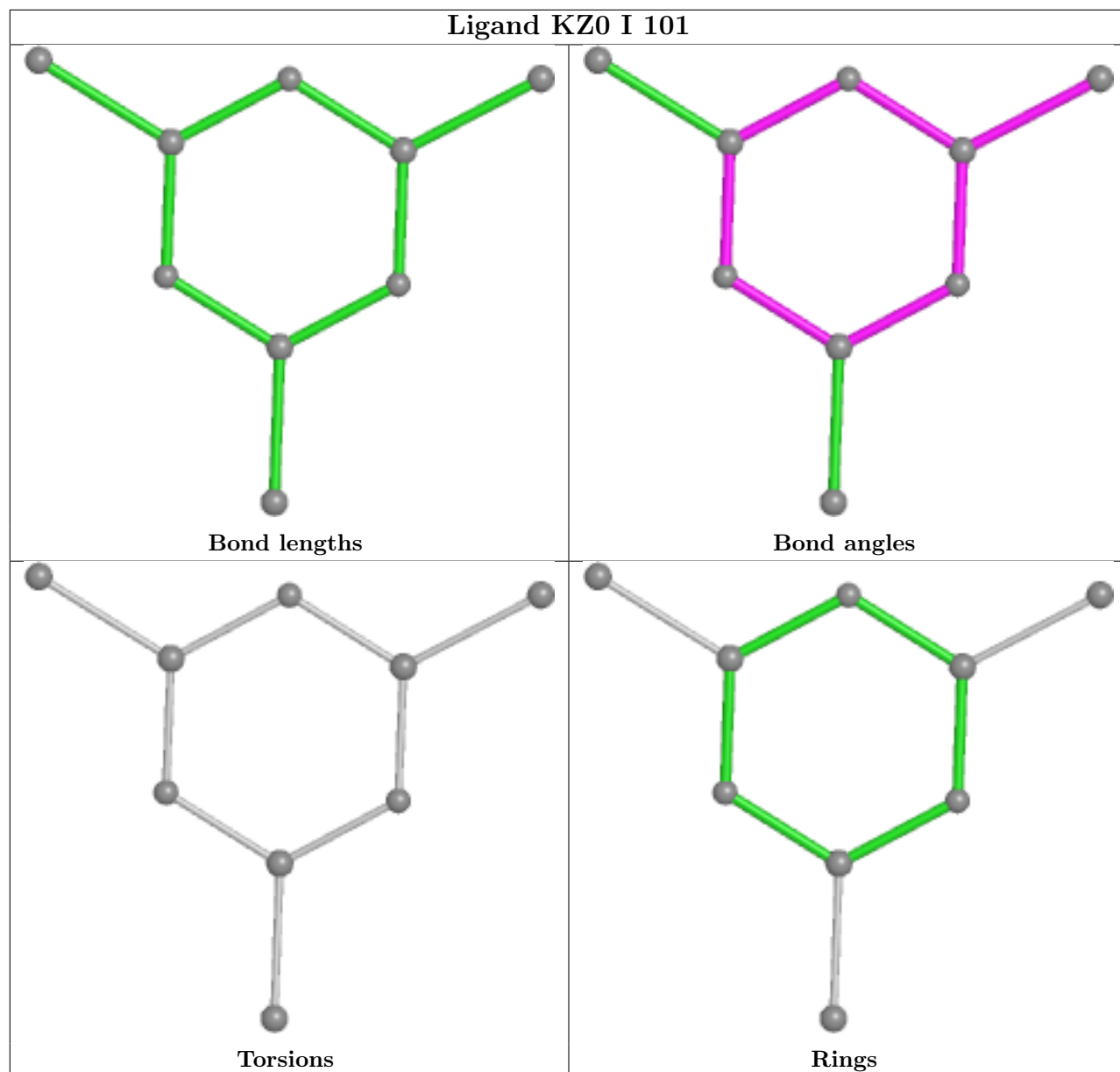


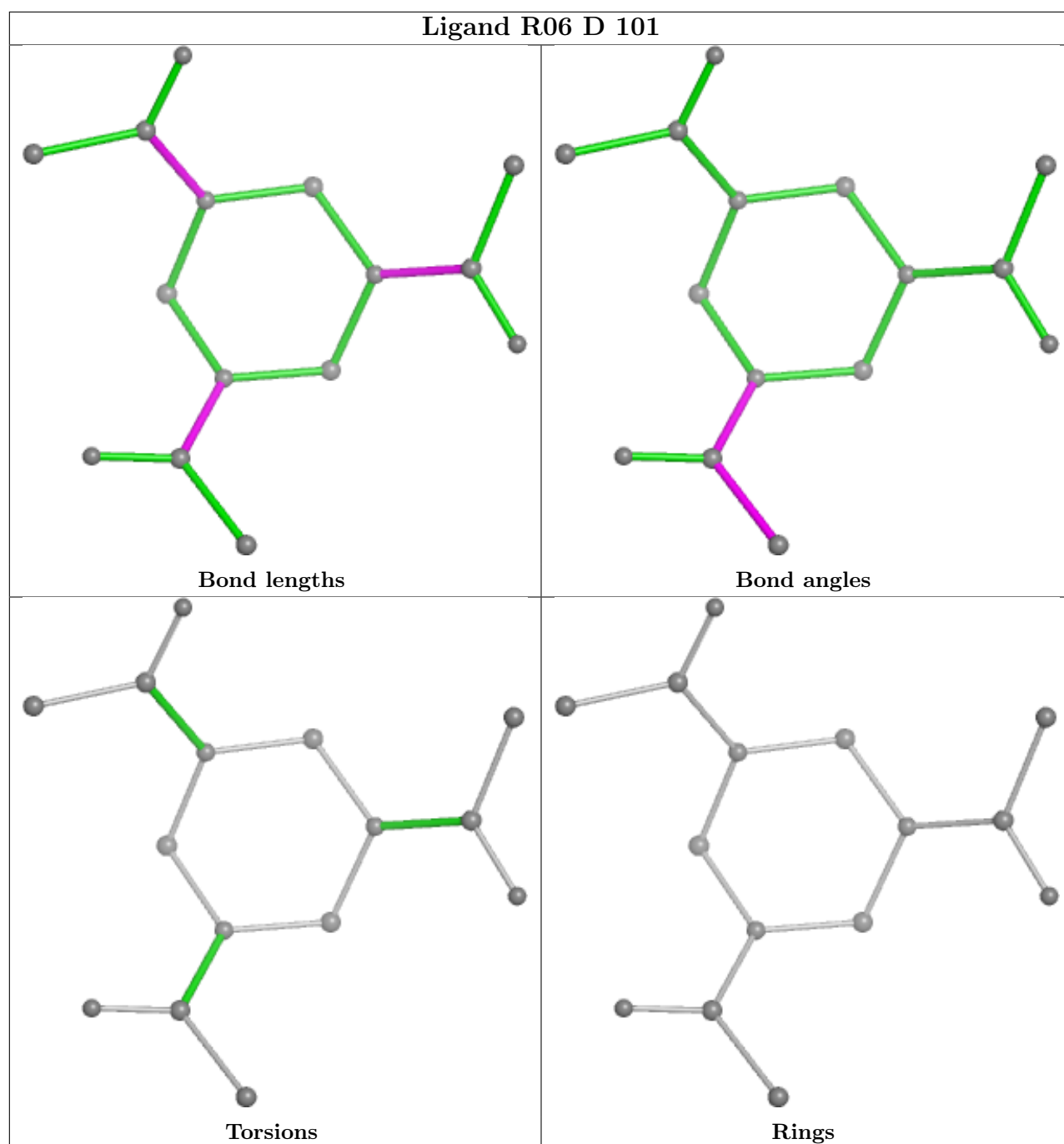
Torsions



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.

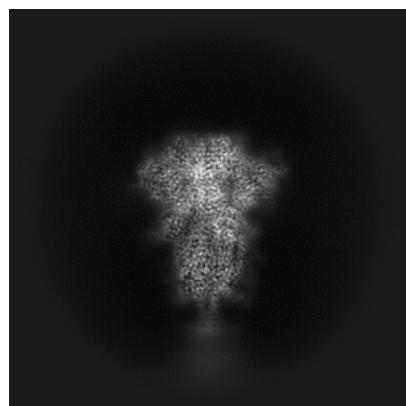
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-51660. These allow visual inspection of the internal detail of the map and identification of artifacts.

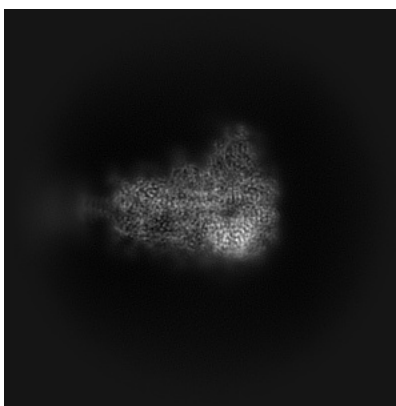
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

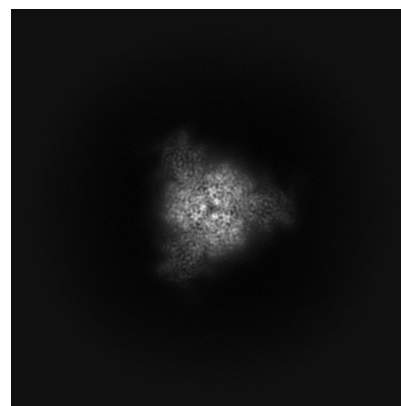
6.1.1 Primary map



X

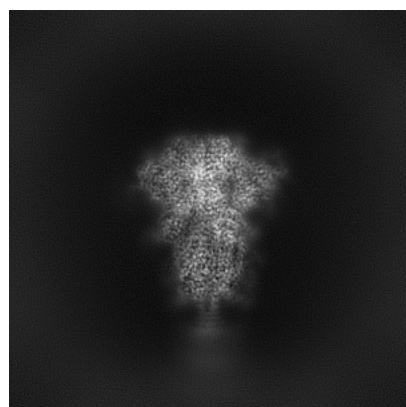


Y

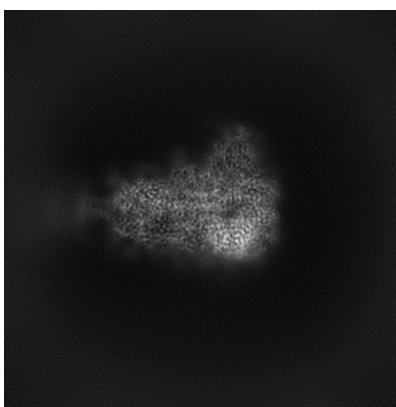


Z

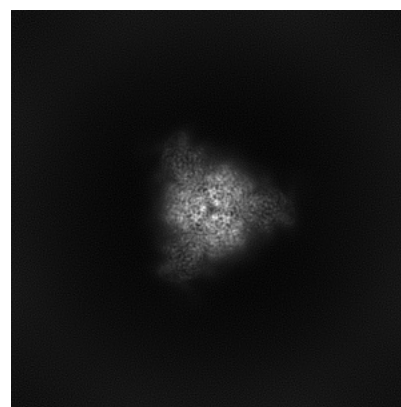
6.1.2 Raw map



X



Y

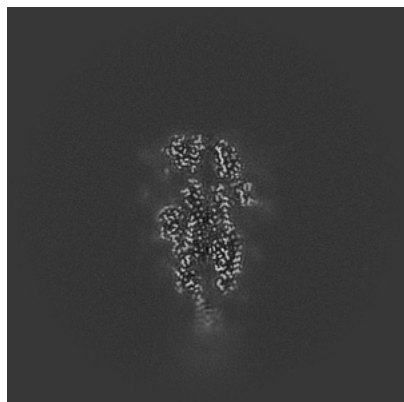


Z

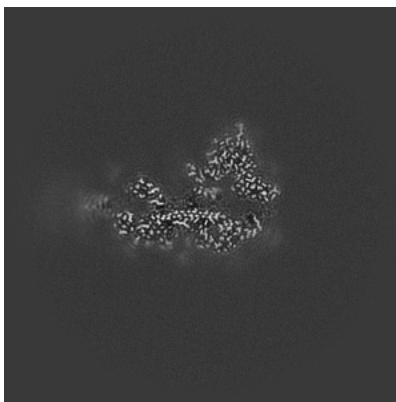
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

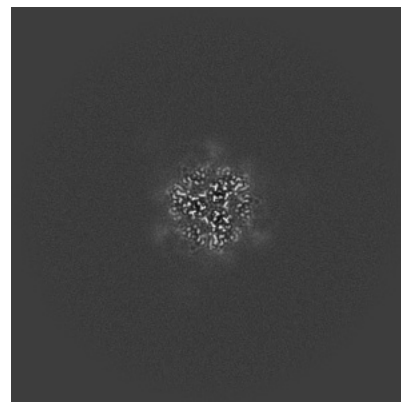
6.2.1 Primary map



X Index: 200

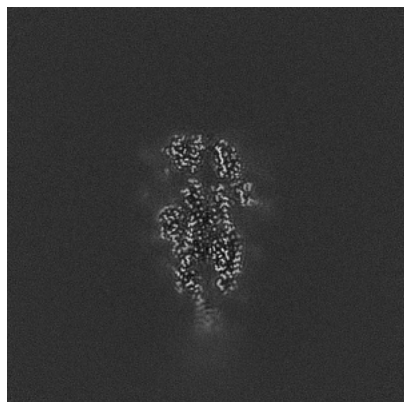


Y Index: 200

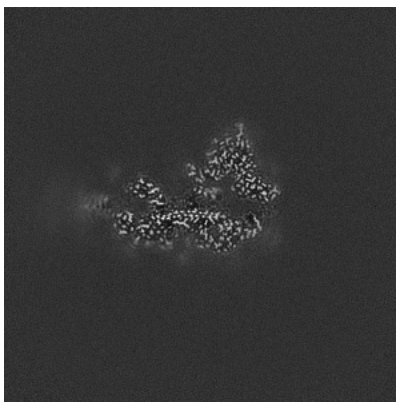


Z Index: 200

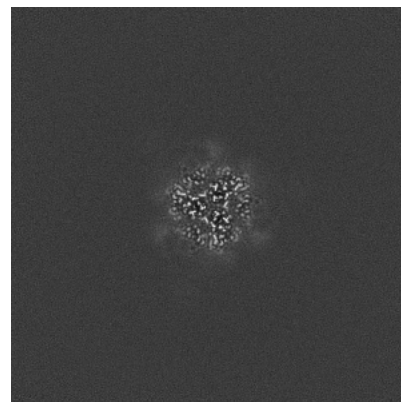
6.2.2 Raw map



X Index: 200



Y Index: 200

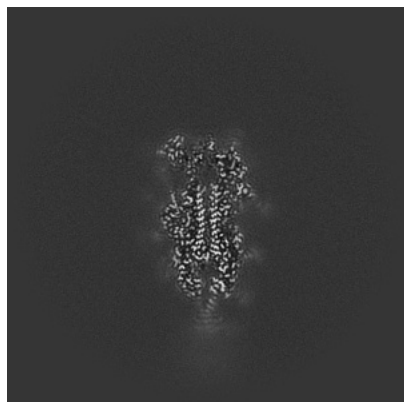


Z Index: 200

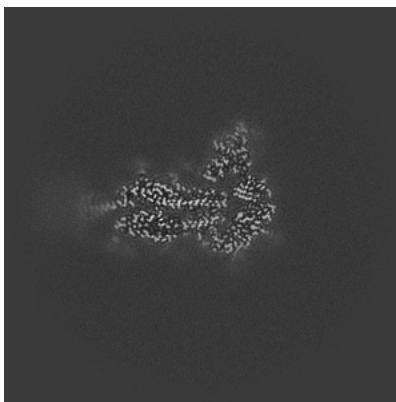
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

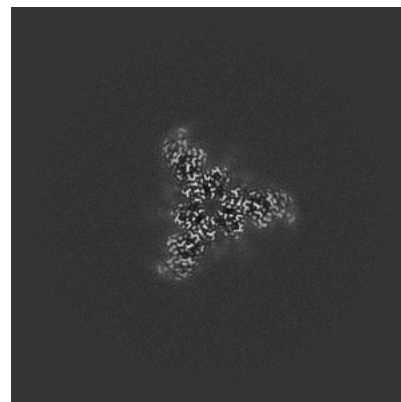
6.3.1 Primary map



X Index: 205

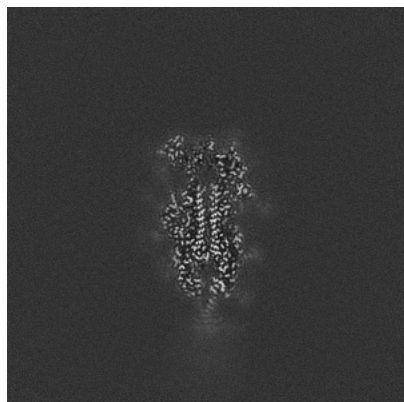


Y Index: 192

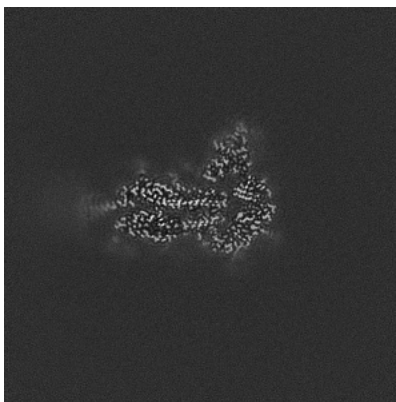


Z Index: 239

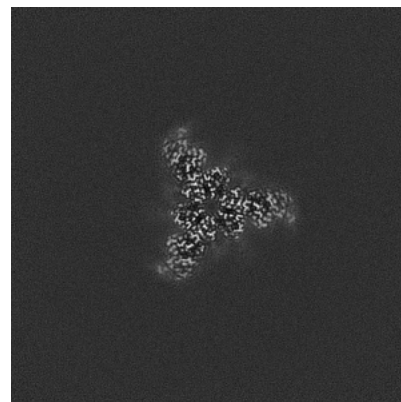
6.3.2 Raw map



X Index: 205



Y Index: 192

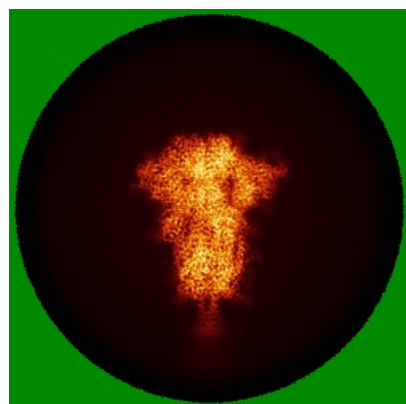


Z Index: 239

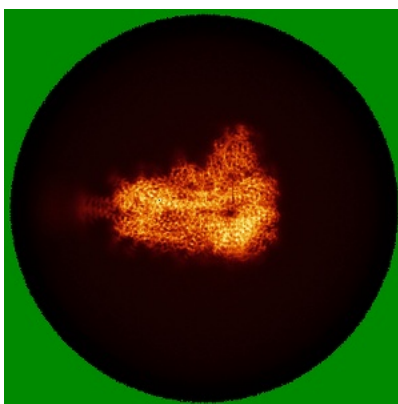
The images above show the largest variance slices of the map in three orthogonal directions.

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

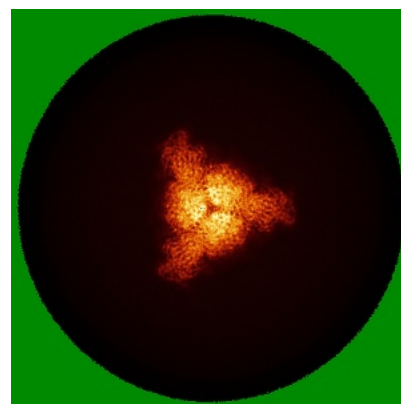
6.4.1 Primary map



X

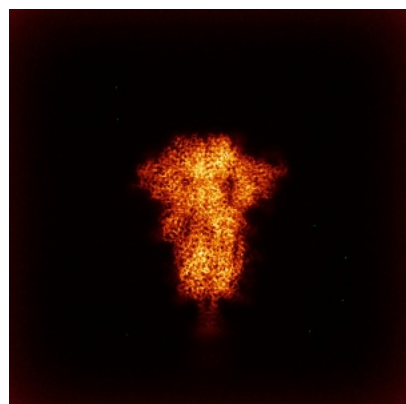


Y

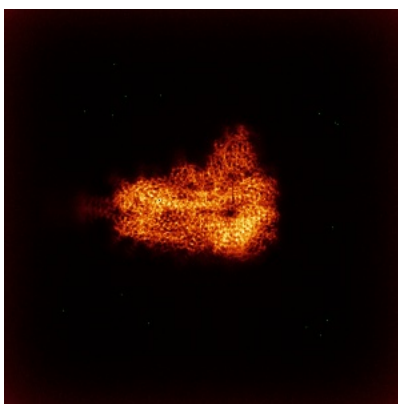


Z

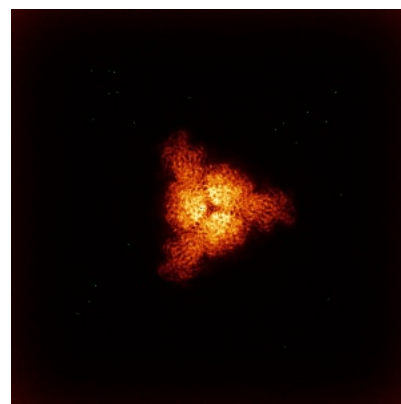
6.4.2 Raw map



X



Y



Z

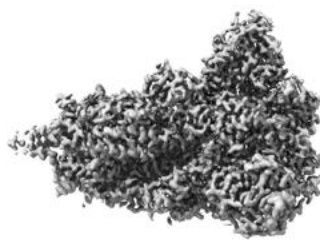
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.15. 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



X



Y



Z

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.

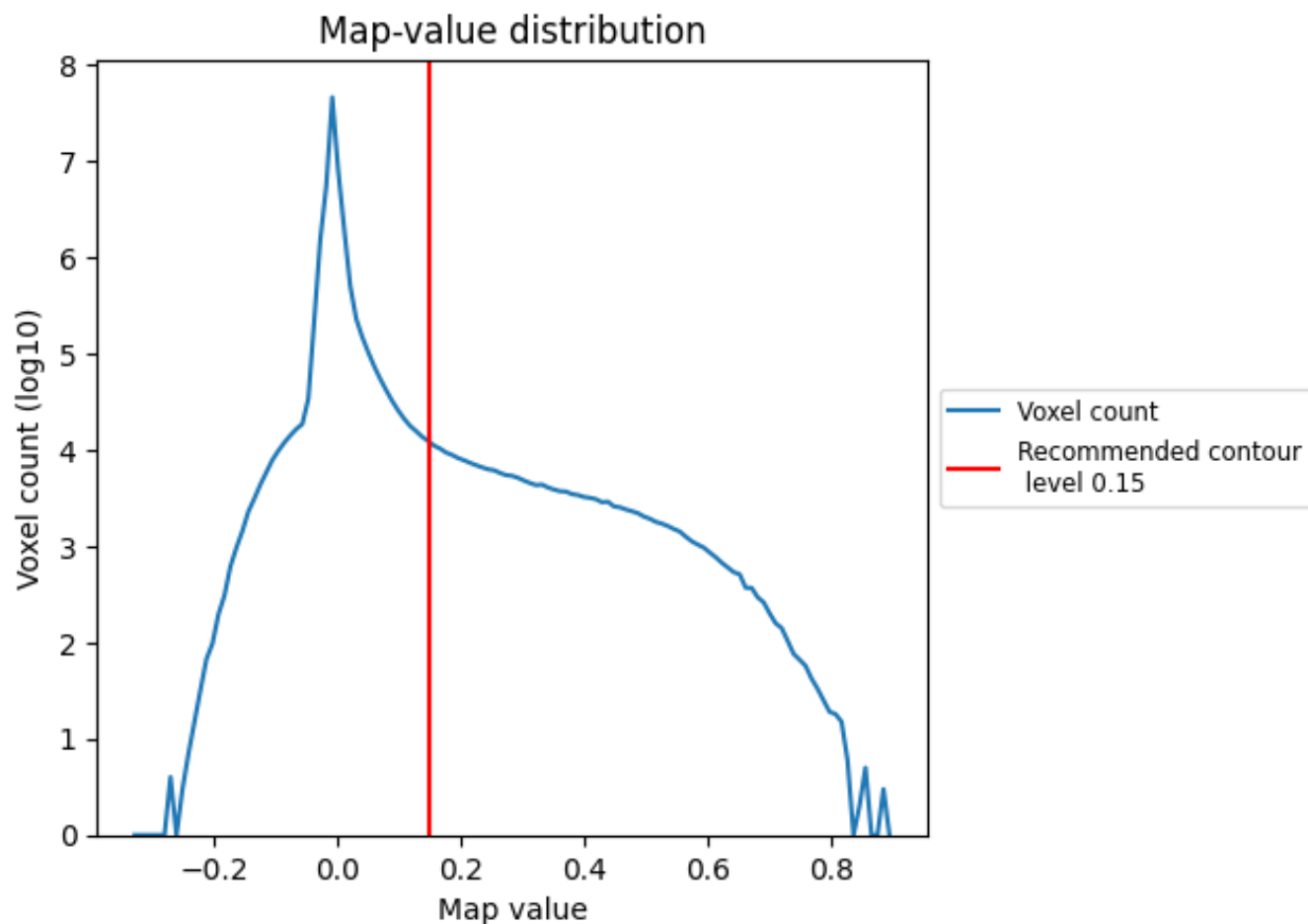
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

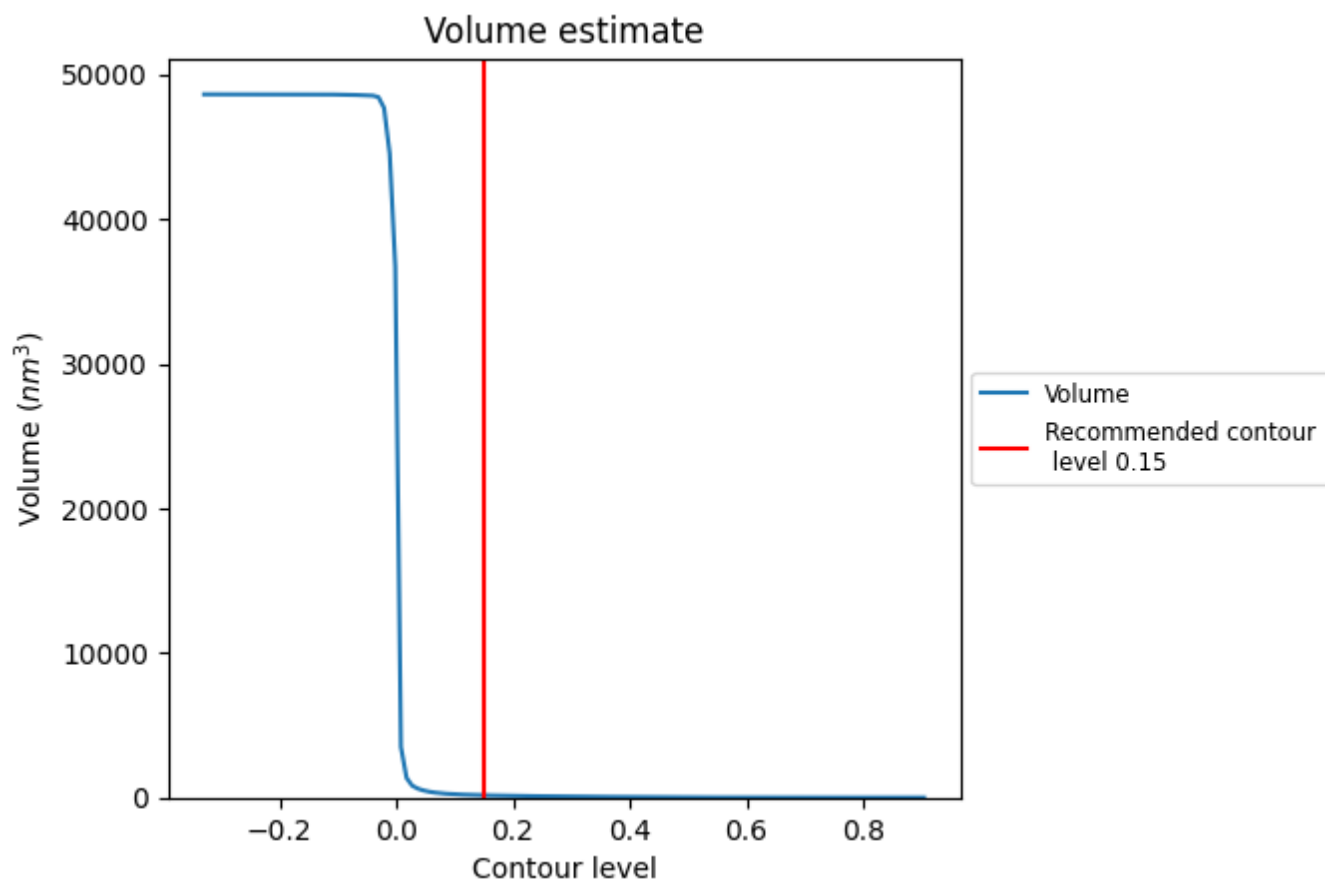
This section contains the results of statistical analysis of the map.

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.

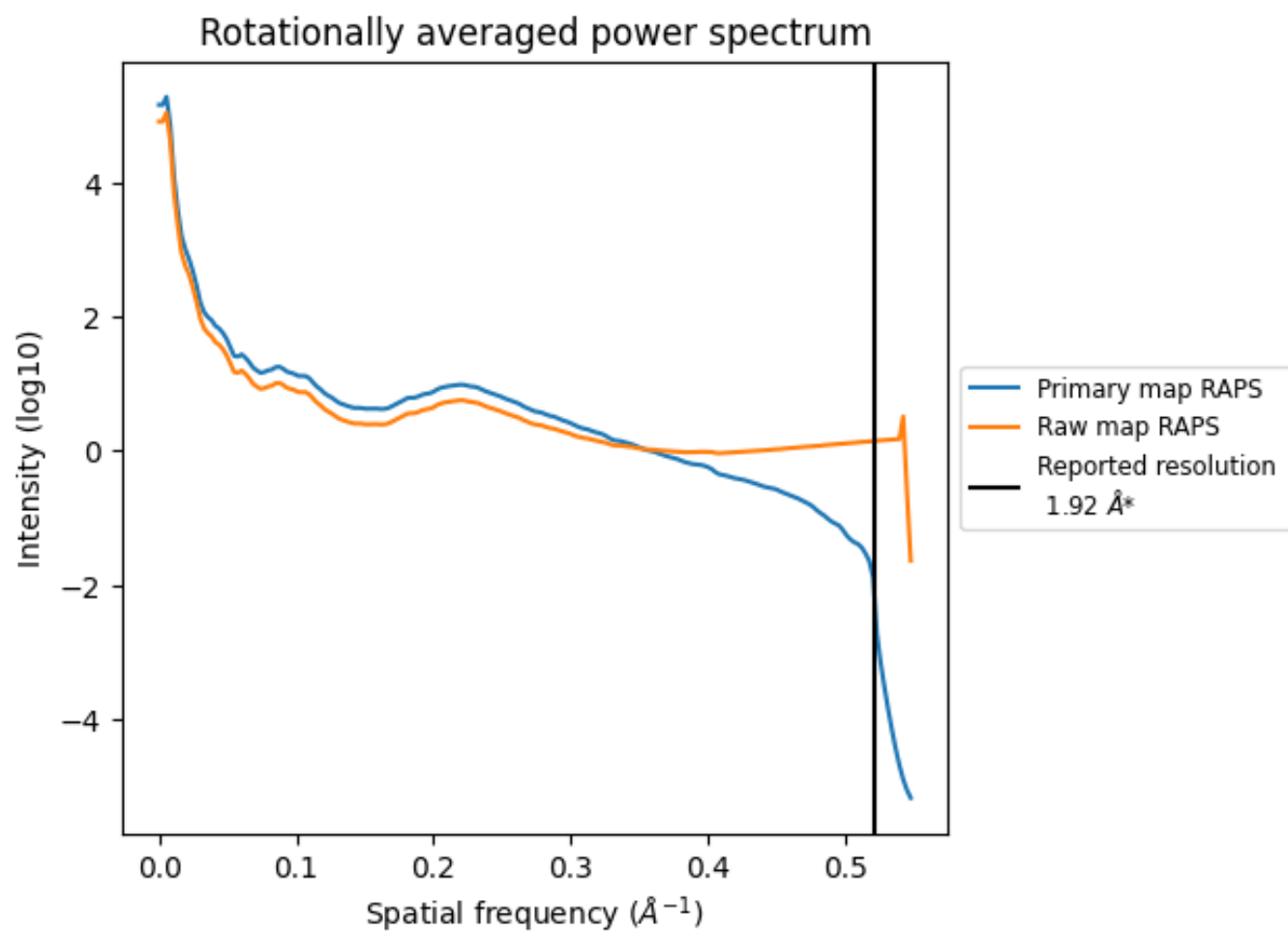
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 158 nm³; this corresponds to an approximate mass of 143 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 ⓘ

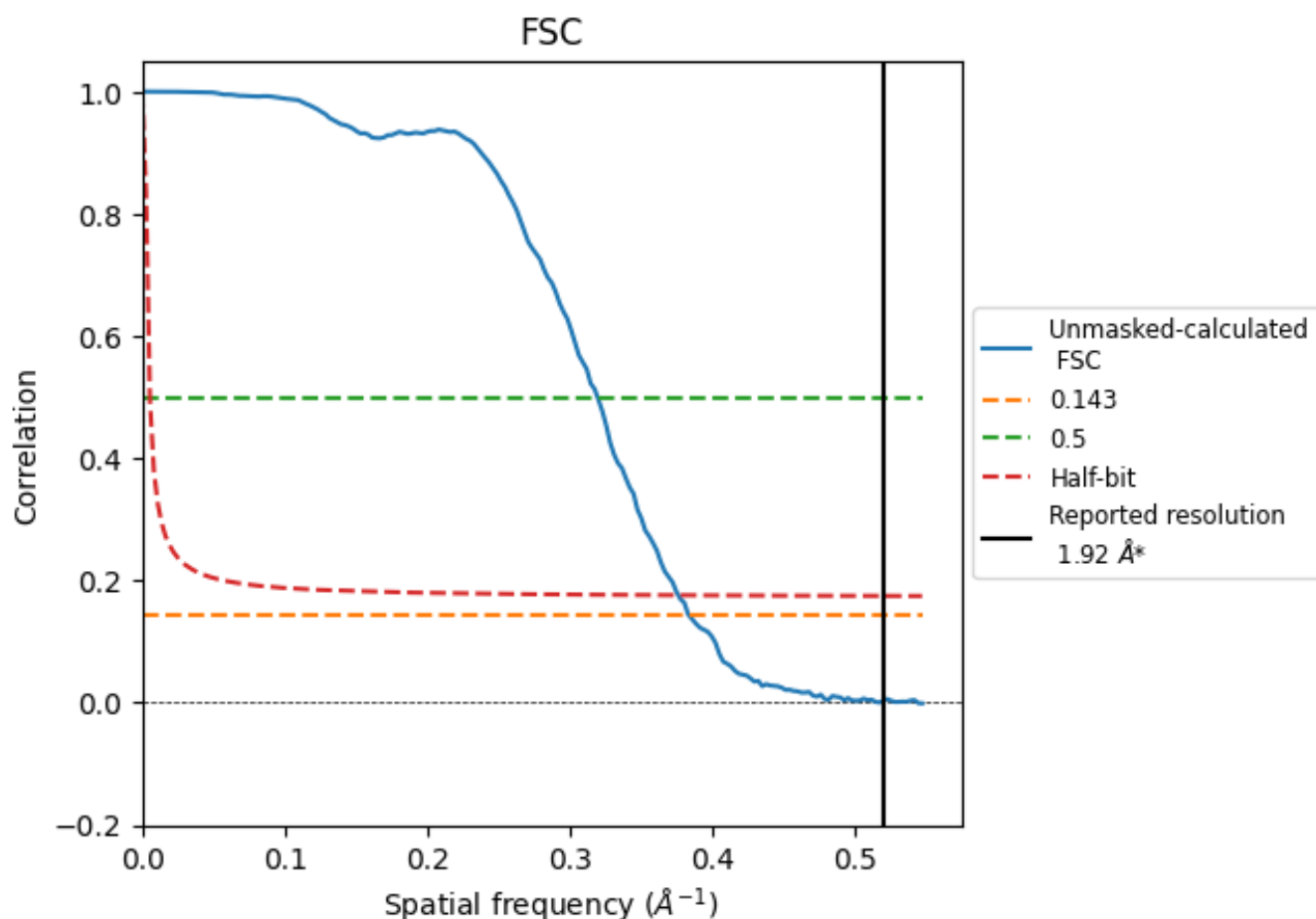


*Reported resolution corresponds to spatial frequency of 0.521 Å⁻¹

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 0.521 Å⁻¹

8.2 Resolution estimates [i](#)

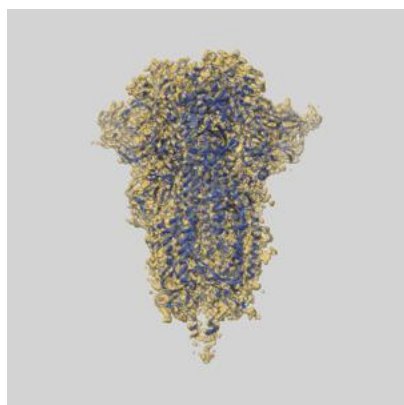
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	1.92	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	2.60	3.13	2.66

*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 2.60 differs from the reported value 1.92 by more than 10 %

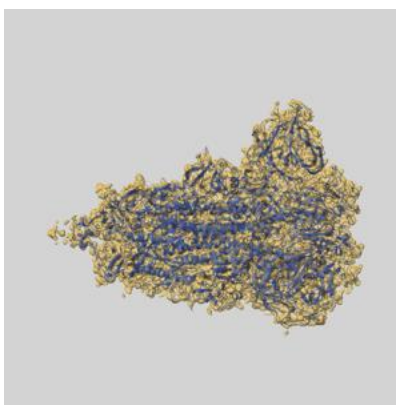
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-51660 and PDB model 9GXG. Per-residue inclusion information can be found in section [3](#) on page [11](#).

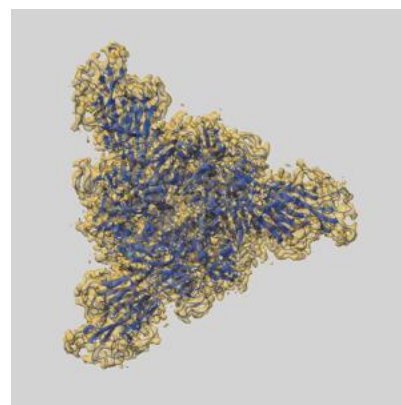
9.1 Map-model overlay [i](#)



X



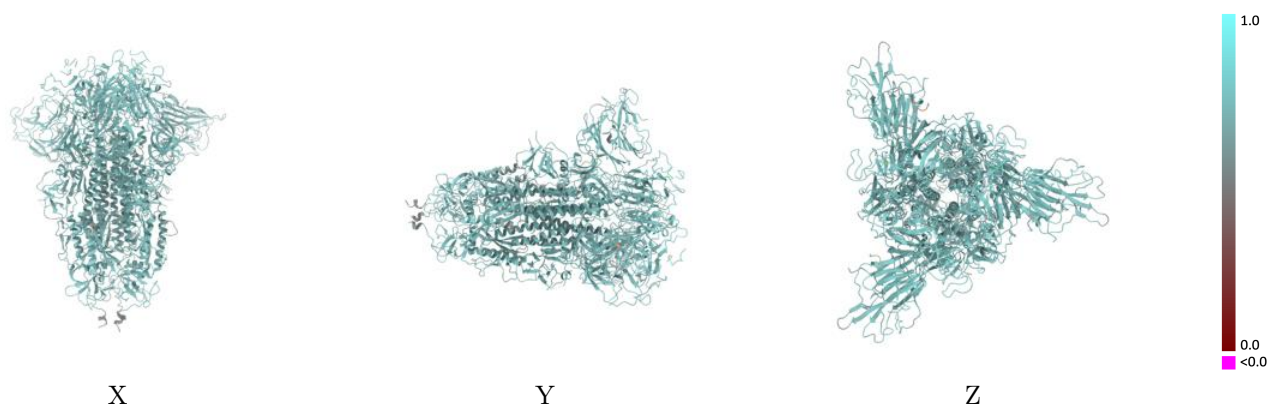
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.15 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](#)



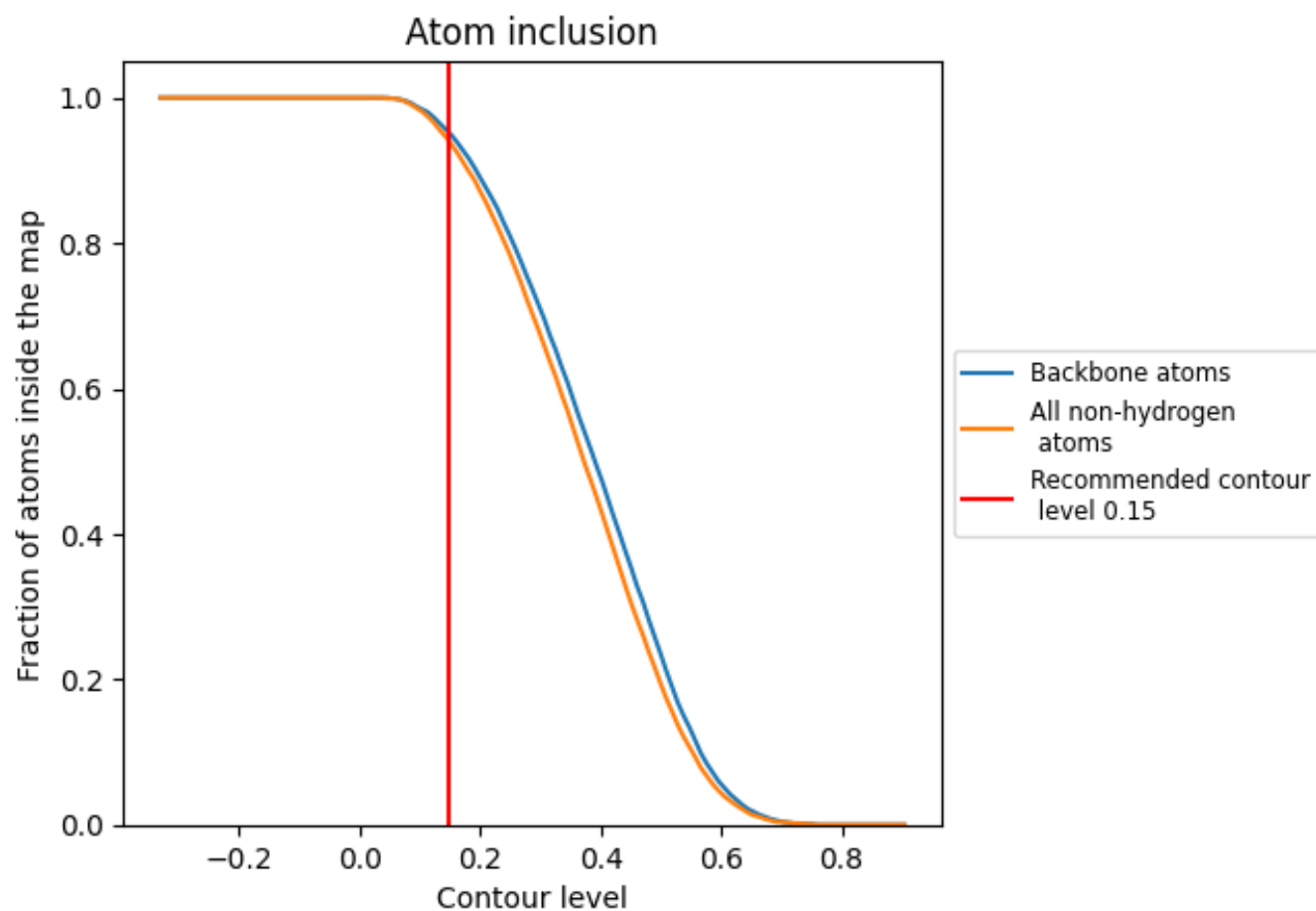
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.15).





































































9.4 Atom inclusion [i](#)



At the recommended contour level, 95% of all backbone atoms, 94% 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 (0.15) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9400	 0.6910
A	 0.9480	 0.6950
AA	 0.5360	 0.5940
AB	 0.7860	 0.6310
AC	 0.7500	 0.6360
AD	 0.6070	 0.6120
AE	 0.6070	 0.4590
AF	 0.7860	 0.6110
AG	 0.7140	 0.5710
AH	 0.5000	 0.4930
B	 0.9480	 0.6940
BA	 0.4640	 0.5440
BB	 0.5000	 0.4050
BC	 0.6070	 0.6000
BD	 0.7860	 0.6120
BE	 0.5710	 0.6180
BF	 0.5000	 0.5060
BG	 0.7140	 0.5810
BH	 0.7500	 0.6450
BI	 0.7860	 0.6120
C	 0.9460	 0.6940
CA	 0.5360	 0.5360
CB	 0.6430	 0.6070
CC	 0.7140	 0.5830
CD	 0.7860	 0.6040
CE	 0.7500	 0.6360
CF	 0.7860	 0.6330
CG	 0.6430	 0.6100
D	 0.9380	 0.6650
E	 0.9470	 0.6800
F	 0.9470	 0.6730
G	 0.9720	 0.6920
H	 0.9720	 0.6910
I	 0.9910	 0.6980

