



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 28, 2026 – 07:31 PM UTC

PDB ID : 7VU1 / pdb\_00007vu1  
Title : Chitoporin from Escherichia coli complex with chitohexaose  
Authors : Suginta, W.; Soysa, H.S.M.; Amornloetwattana, R.; van den Berg, B.  
Deposited on : 2021-11-01  
Resolution : 1.90 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : 2.0  
EDS : 3.0  
Buster-report : wwPDB partial adaption of 1.1.7 (2018)  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
CCP4 : 9.0.010 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

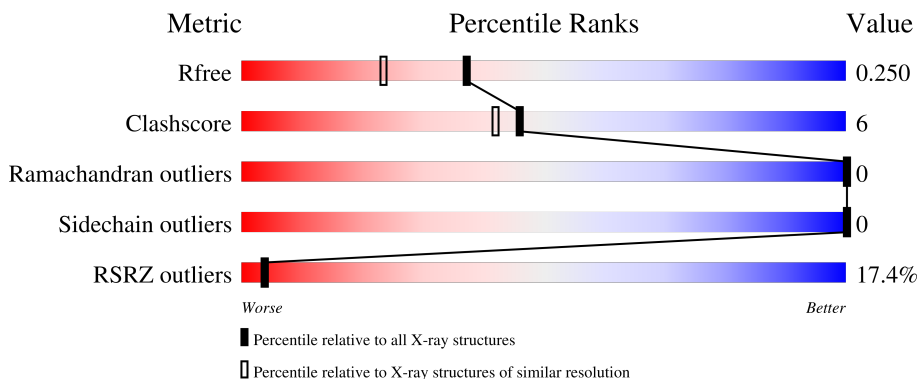
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.90 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	180053	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (1.90-1.90)

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

Mol	Chain	Length	Quality of chain
1	A	436	
1	B	436	
2	C	5	
2	U	5	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	NAG	U	3	-	-	X	-

## 2 Entry composition [i](#)

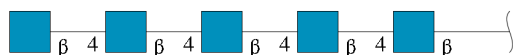
There are 6 unique types of molecules in this entry. The entry contains 14884 atoms, of which 6923 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Chitoporin.

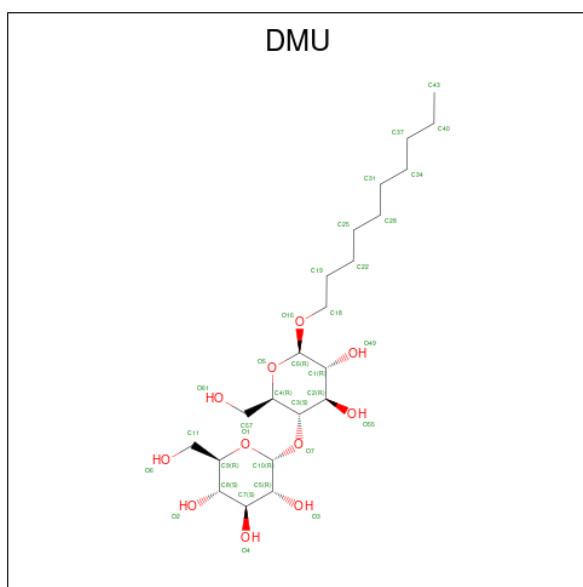
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O				S
1	A	435	6818	2286	3268	569	686	9	0	11	0
1	B	435	6802	2282	3256	569	686	9	0	10	0

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



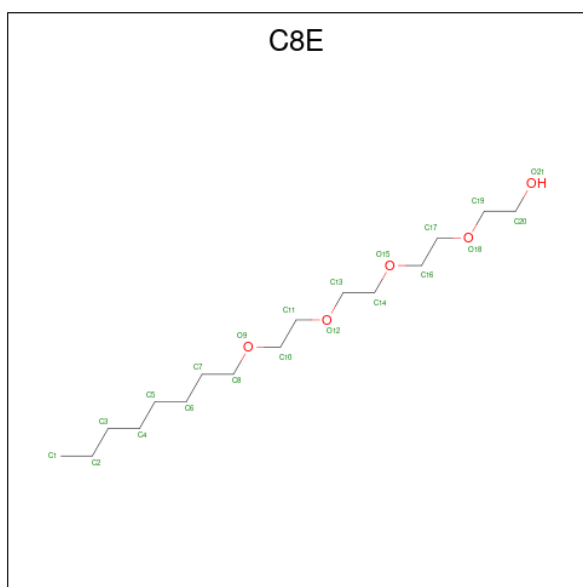
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	H	N	O			
2	U	5	136	40	65	5	26	0	0	0
2	C	5	129	40	58	5	26	0	0	0

- Molecule 3 is DECYL-BETA-D-MALTOPYRANOSIDE (CCD ID: DMU) (formula:  $C_{22}H_{42}O_{11}$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
3	A	1	Total	C	H	O	0	0
			44	12	21	11		
3	A	1	Total	C	H	O	0	0
			62	18	33	11		
3	A	1	Total	C	H	O	0	0
			59	17	31	11		
3	B	1	Total	C	H	O	0	0
			47	13	23	11		
3	B	1	Total	C	H	O	0	0
			62	18	33	11		
3	B	1	Total	C	H	O	0	0
			56	16	29	11		

- Molecule 4 is (HYDROXYETHYLOXY)TRI(ETHYLOXY)OCTANE (CCD ID: C8E) (formula:  $C_{16}H_{34}O_5$ ).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C H 10 6 4	0	0
4	A	1	Total C H 16 8 8	0	0
4	A	1	Total C H 11 5 6	0	0
4	A	1	Total C H O 10 4 4 2	0	0
4	A	1	Total C H 9 5 4	0	0
4	A	1	Total C H 11 5 6	0	0
4	A	1	Total C H O 9 3 4 2	0	0
4	A	1	Total C H 7 5 2	0	0
4	A	1	Total C H 7 5 2	0	0
4	B	1	Total C H O 26 10 14 2	0	0
4	B	1	Total C H O 24 7 13 4	0	0
4	B	1	Total C H 12 6 6	0	0
4	B	1	Total C H 12 6 6	0	0
4	B	1	Total C H 7 5 2	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total C H 12 6 6	0	0
4	B	1	Total C H O 9 3 4 2	0	0
4	B	1	Total C H 12 6 6	0	0
4	B	1	Total C H O 16 4 9 3	0	0

- Molecule 5 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	2	Total Mg 2 2	0	0
5	B	4	Total Mg 4 4	0	0

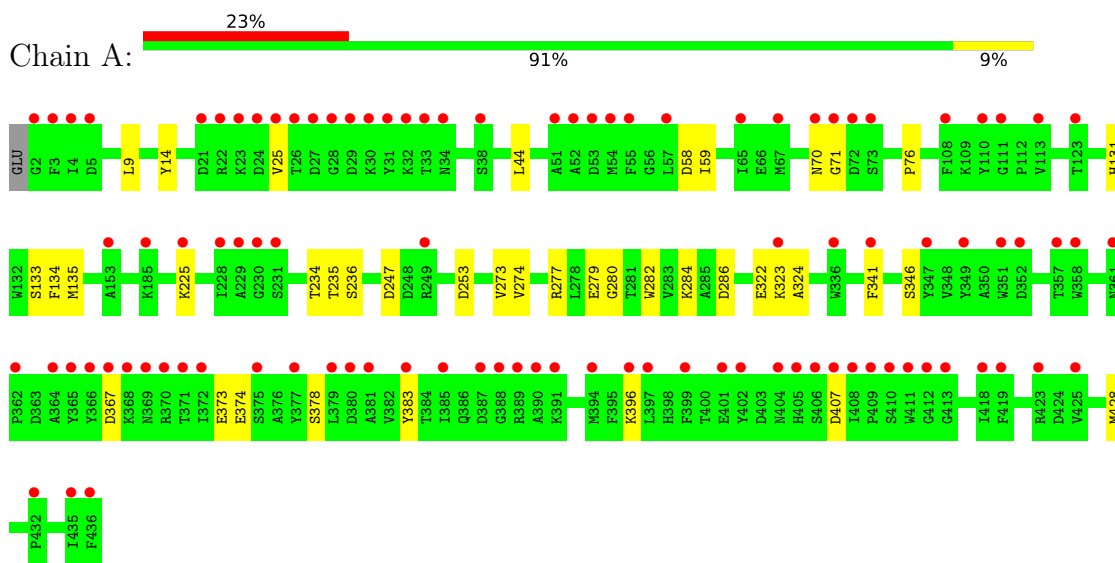
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	204	Total O 204 204	0	0
6	B	239	Total O 239 239	0	0

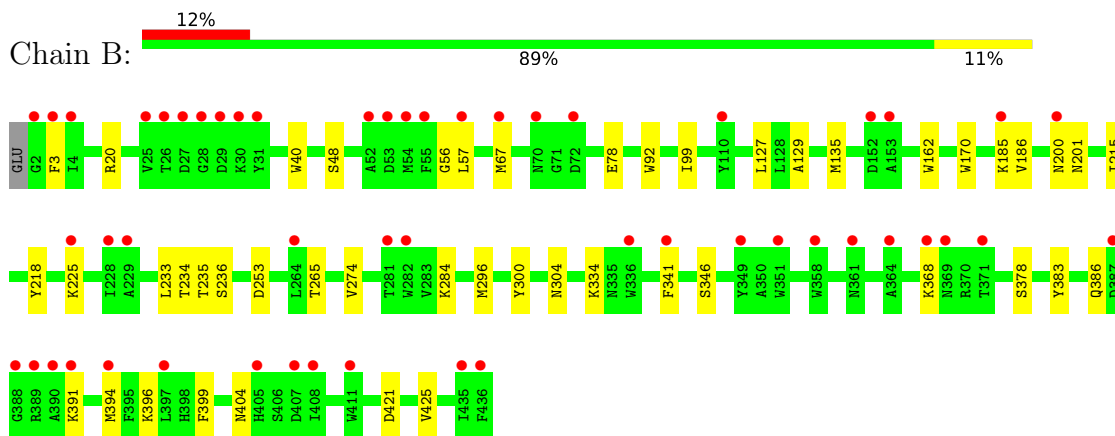
### 3 Residue-property plots

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

- Molecule 1: Chitoporin



- Molecule 1: Chitoporin



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



MAG1  
MAG2  
MAG3  
MAG4  
MAG5

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

Chain C: 

MAG1  
MAG2  
MAG3  
MAG4  
MAG5

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	94.74Å 58.55Å 133.06Å 90.00° 110.71° 90.00°	Depositor
Resolution (Å)	62.34 – 1.90 62.34 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.0 (62.34-1.90) 91.9 (62.34-1.90)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.51 (at 1.90Å)	Xtrriage
Refinement program	PHENIX 1.14_3260	Depositor
R, $R_{free}$	0.209 , 0.248 0.210 , 0.250	Depositor DCC
$R_{free}$ test set	5260 reflections (4.85%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	12.2	Xtrriage
Anisotropy	1.324	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.41 , 57.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.000 for h,-k,-h-l	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	14884	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	41.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 87.32 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 7.1216e-08. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: DMU, C8E, MG, 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	0.49	0/3695	0.65	0/5015
1	B	0.55	1/3688 (0.0%)	0.71	0/5008
All	All	0.52	1/7383 (0.0%)	0.68	0/10023

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	135	MET	SD-CE	-5.52	1.65	1.79

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3550	3268	3284	26	0
1	B	3546	3256	3275	39	0
2	C	71	58	63	10	0
2	U	71	65	63	11	0
3	A	80	85	81	0	0
3	B	80	85	79	3	0
4	A	50	40	70	2	0
4	B	64	66	88	10	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	2	0	0	0	0
5	B	4	0	0	0	0
6	A	204	0	0	3	0
6	B	239	0	0	4	0
All	All	7961	6923	7003	84	0

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

The worst 5 of 84 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)
2:C:5:NAG:H82	2:C:5:NAG:O3	1.74	0.87
1:B:284:LYS:NZ	3:B:503:DMU:O4	2.08	0.86
2:C:2:NAG:C6	2:C:3:NAG:H83	2.16	0.75
2:C:2:NAG:H62	2:C:3:NAG:H83	1.67	0.74
1:B:218:TYR:OH	6:B:601:HOH:O	2.06	0.72

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	444/436 (102%)	425 (96%)	19 (4%)	0	100	100
1	B	443/436 (102%)	427 (96%)	16 (4%)	0	100	100
All	All	887/872 (102%)	852 (96%)	35 (4%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	361/351 (103%)	361 (100%)	0	100	100
1	B	360/351 (103%)	360 (100%)	0	100	100
All	All	721/702 (103%)	721 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	140	GLN
1	B	210	GLN
1	B	386	GLN
1	A	210	GLN
1	A	125	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 5.5 Carbohydrates [i](#)

10 monosaccharides are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the

expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
2	NAG	C	1	2	15,15,15	0.63	0	21,21,21	1.12	2 (9%)
2	NAG	C	2	2	14,14,15	1.34	1 (7%)	17,19,21	2.06	4 (23%)
2	NAG	C	3	2	14,14,15	0.81	0	17,19,21	2.58	5 (29%)
2	NAG	C	4	2	14,14,15	0.52	0	17,19,21	0.94	2 (11%)
2	NAG	C	5	2	14,14,15	1.14	2 (14%)	17,19,21	1.76	4 (23%)
2	NAG	U	1	2	15,15,15	0.31	0	21,21,21	0.50	0
2	NAG	U	2	2	14,14,15	0.24	0	17,19,21	1.11	1 (5%)
2	NAG	U	3	2	14,14,15	0.42	0	17,19,21	1.00	2 (11%)
2	NAG	U	4	2,5	14,14,15	0.35	0	17,19,21	0.97	1 (5%)
2	NAG	U	5	2	14,14,15	1.97	2 (14%)	17,19,21	1.93	6 (35%)

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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	C	1	2	-	0/6/26/26	0/1/1/1
2	NAG	C	2	2	-	5/6/23/26	0/1/1/1
2	NAG	C	3	2	-	4/6/23/26	0/1/1/1
2	NAG	C	4	2	-	0/6/23/26	0/1/1/1
2	NAG	C	5	2	-	5/6/23/26	0/1/1/1
2	NAG	U	1	2	-	0/6/26/26	0/1/1/1
2	NAG	U	2	2	-	2/6/23/26	0/1/1/1
2	NAG	U	3	2	-	4/6/23/26	0/1/1/1
2	NAG	U	4	2,5	-	2/6/23/26	0/1/1/1
2	NAG	U	5	2	-	3/6/23/26	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	U	5	NAG	O5-C1	-5.48	1.34	1.43
2	C	2	NAG	O5-C1	-4.72	1.35	1.43
2	U	5	NAG	C1-C2	4.65	1.58	1.52
2	C	5	NAG	C1-C2	3.43	1.57	1.52
2	C	5	NAG	O5-C1	-2.44	1.39	1.43

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	3	NAG	C2-N2-C7	8.19	133.87	122.90
2	C	2	NAG	C2-N2-C7	6.08	131.05	122.90
2	C	5	NAG	C2-N2-C7	4.85	129.41	122.90
2	U	5	NAG	C1-O5-C5	-4.35	106.36	112.19
2	C	3	NAG	C1-O5-C5	4.25	117.88	112.19

There are no chirality outliers.

5 of 25 torsion outliers are listed below:

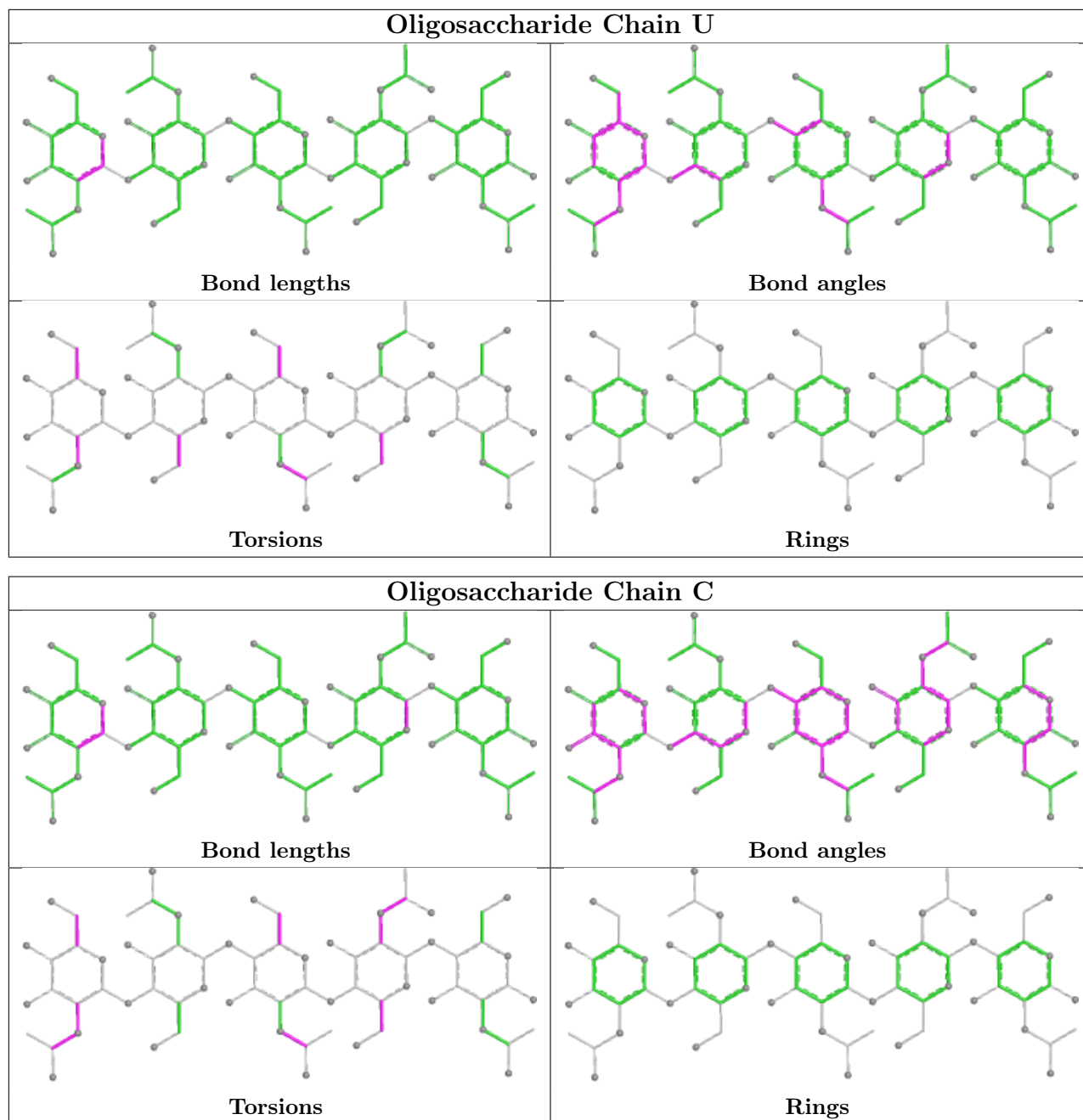
Mol	Chain	Res	Type	Atoms
2	U	5	NAG	C3-C2-N2-C7
2	C	2	NAG	C8-C7-N2-C2
2	C	3	NAG	C8-C7-N2-C2
2	U	5	NAG	O5-C5-C6-O6
2	C	5	NAG	C4-C5-C6-O6

There are no ring outliers.

9 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	2	NAG	5	0
2	C	3	NAG	3	0
2	C	5	NAG	2	0
2	U	3	NAG	7	0
2	U	4	NAG	2	0
2	U	5	NAG	2	0
2	U	2	NAG	4	0
2	C	1	NAG	3	0
2	U	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.



## 5.6 Ligand geometry [i](#)

Of 30 ligands modelled in this entry, 6 are monoatomic - leaving 24 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	C8E	B	510	-	4,4,20	0.42	0	3,3,19	0.21	0
4	C8E	A	510	-	4,4,20	0.36	0	3,3,19	0.51	0
3	DMU	B	502	-	30,30,34	1.52	6 (20%)	41,41,45	1.17	3 (7%)
4	C8E	A	509	-	4,4,20	0.33	0	3,3,19	0.29	0
4	C8E	A	507	5	5,5,20	0.39	0	4,4,19	0.33	0
4	C8E	B	512	-	6,6,20	0.40	0	5,5,19	0.30	0
4	C8E	A	512	-	4,4,20	0.35	0	3,3,19	0.39	0
3	DMU	B	501	-	25,25,34	1.61	6 (24%)	36,36,45	1.17	2 (5%)
4	C8E	B	508	-	4,4,20	0.30	0	3,3,19	0.35	0
4	C8E	B	506	-	5,5,20	0.29	0	4,4,19	0.41	0
3	DMU	A	503	-	29,29,34	1.63	6 (20%)	40,40,45	1.05	1 (2%)
4	C8E	B	505	-	10,10,20	0.44	0	9,9,19	0.27	0
4	C8E	A	506	-	4,4,20	0.31	0	3,3,19	0.29	0
3	DMU	B	503	-	28,28,34	1.63	6 (21%)	39,39,45	1.24	5 (12%)
4	C8E	B	511	-	5,5,20	0.27	0	4,4,19	0.46	0
4	C8E	A	511	-	4,4,20	0.28	0	3,3,19	0.39	0
4	C8E	B	504	-	11,11,20	0.32	0	10,10,19	0.40	0
4	C8E	A	504	-	5,5,20	0.35	0	4,4,19	0.29	0
4	C8E	B	507	-	5,5,20	0.26	0	4,4,19	0.42	0
3	DMU	A	502	-	30,30,34	1.55	6 (20%)	41,41,45	1.21	4 (9%)
3	DMU	A	501	-	24,24,34	1.62	5 (20%)	35,35,45	0.91	1 (2%)
4	C8E	B	509	-	5,5,20	0.26	0	4,4,19	0.43	0
4	C8E	A	508	-	4,4,20	0.32	0	3,3,19	0.33	0
4	C8E	A	505	-	7,7,20	0.32	0	6,6,19	0.36	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	C8E	B	510	-	-	0/2/2/18	-
4	C8E	A	510	-	-	1/2/2/18	-
3	DMU	B	502	-	-	0/15/55/59	0/2/2/2
4	C8E	A	509	-	-	2/2/2/18	-
4	C8E	A	507	5	-	3/3/3/18	-
4	C8E	B	512	-	-	2/4/4/18	-
4	C8E	A	512	-	-	1/2/2/18	-
3	DMU	B	501	-	-	0/10/50/59	0/2/2/2
4	C8E	B	508	-	-	0/2/2/18	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	C8E	B	506	-	-	3/3/3/18	-
3	DMU	A	503	-	-	4/14/54/59	0/2/2/2
4	C8E	B	505	-	-	6/8/8/18	-
4	C8E	A	506	-	-	1/2/2/18	-
3	DMU	B	503	-	-	2/13/53/59	0/2/2/2
4	C8E	B	511	-	-	1/3/3/18	-
4	C8E	A	511	-	-	1/2/2/18	-
4	C8E	B	504	-	-	7/9/9/18	-
4	C8E	A	504	-	-	2/3/3/18	-
4	C8E	B	507	-	-	2/3/3/18	-
3	DMU	A	502	-	-	0/15/55/59	0/2/2/2
3	DMU	A	501	-	-	0/8/48/59	0/2/2/2
4	C8E	B	509	-	-	2/3/3/18	-
4	C8E	A	508	-	-	0/2/2/18	-
4	C8E	A	505	-	-	5/5/5/18	-

The worst 5 of 35 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	503	DMU	O1-C9	4.01	1.54	1.44
3	A	503	DMU	O1-C9	3.95	1.54	1.44
3	A	502	DMU	O1-C9	3.88	1.53	1.44
3	B	502	DMU	O1-C9	3.79	1.53	1.44
3	A	501	DMU	O1-C9	3.39	1.52	1.44

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	501	DMU	O16-C6-C1	3.85	112.58	108.14
3	A	502	DMU	C10-O7-C3	-2.97	110.95	117.98
3	B	502	DMU	O49-C1-C6	-2.92	103.12	110.08
3	A	502	DMU	O49-C1-C6	-2.86	103.26	110.08
3	A	502	DMU	C7-C8-C9	2.58	114.91	110.23

There are no chirality outliers.

5 of 45 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	503	DMU	O6-C11-C9-C8

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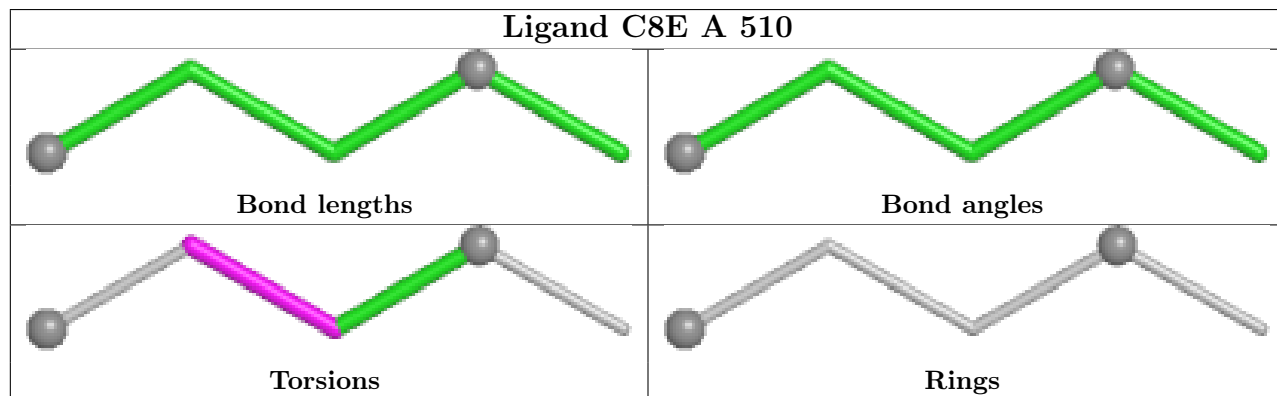
Mol	Chain	Res	Type	Atoms
3	B	503	DMU	O6-C11-C9-O1
4	B	505	C8E	O12-C13-C14-O15
3	A	503	DMU	O6-C11-C9-C8
4	B	504	C8E	C6-C7-C8-O9

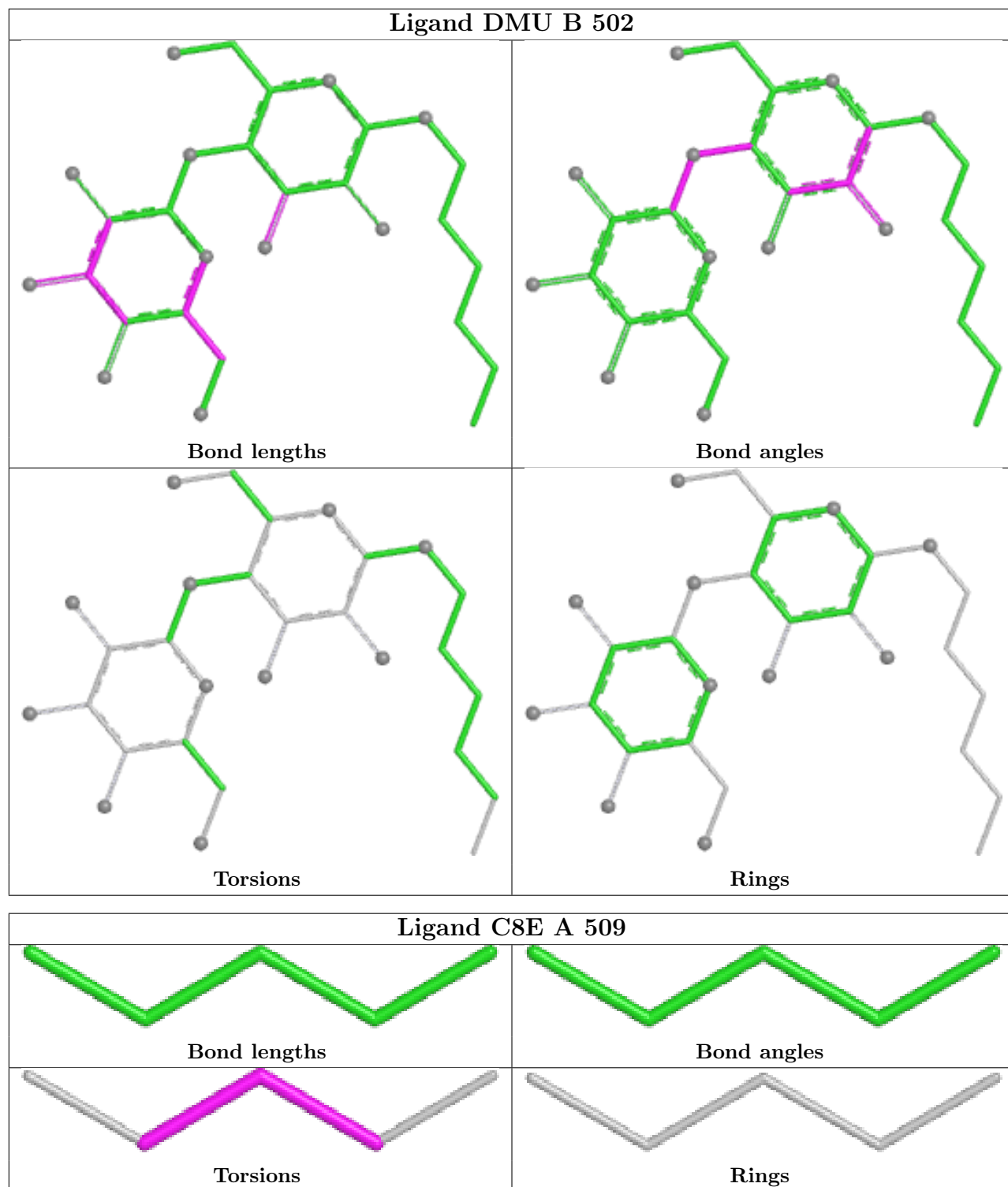
There are no ring outliers.

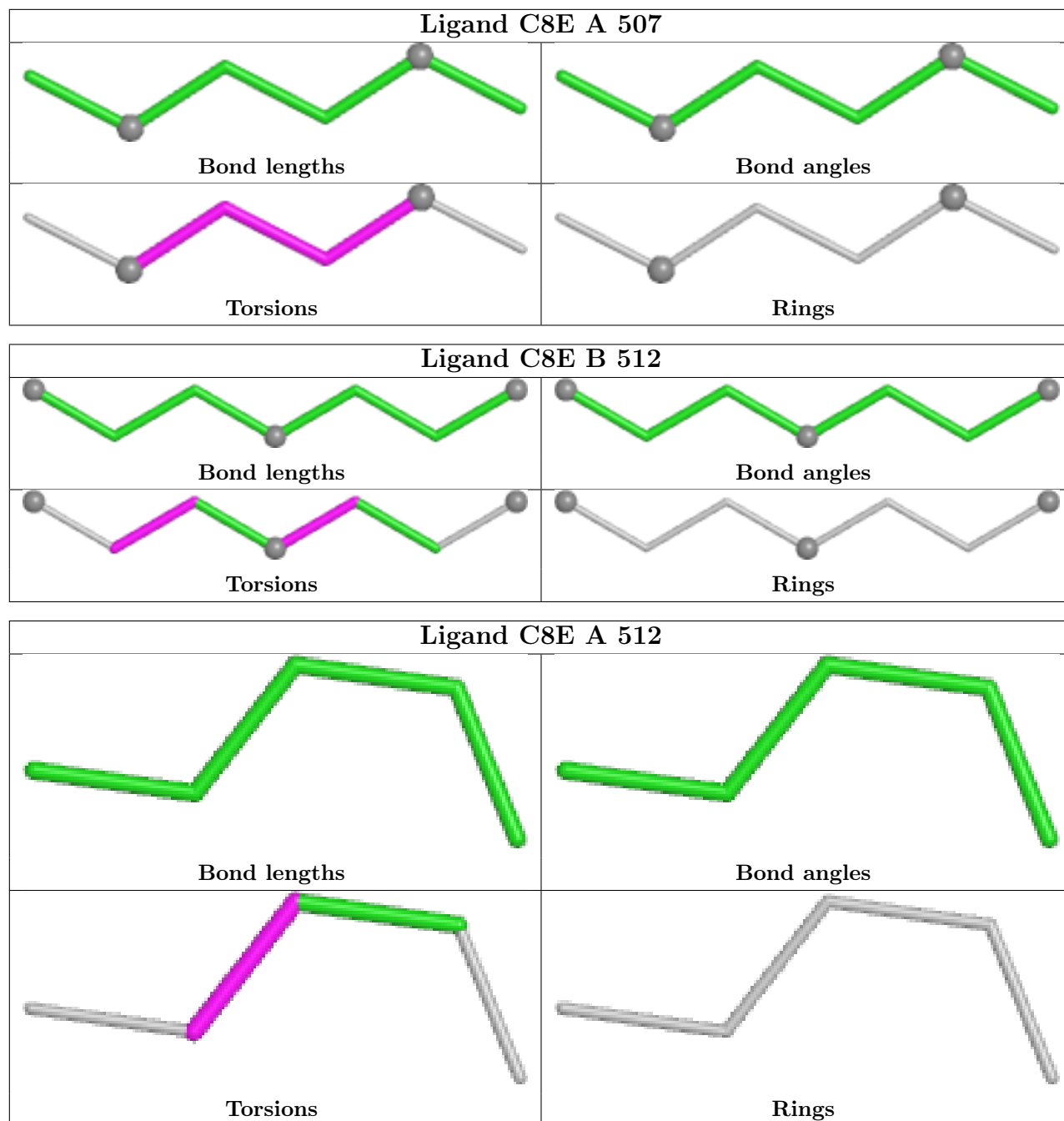
7 monomers are involved in 14 short contacts:

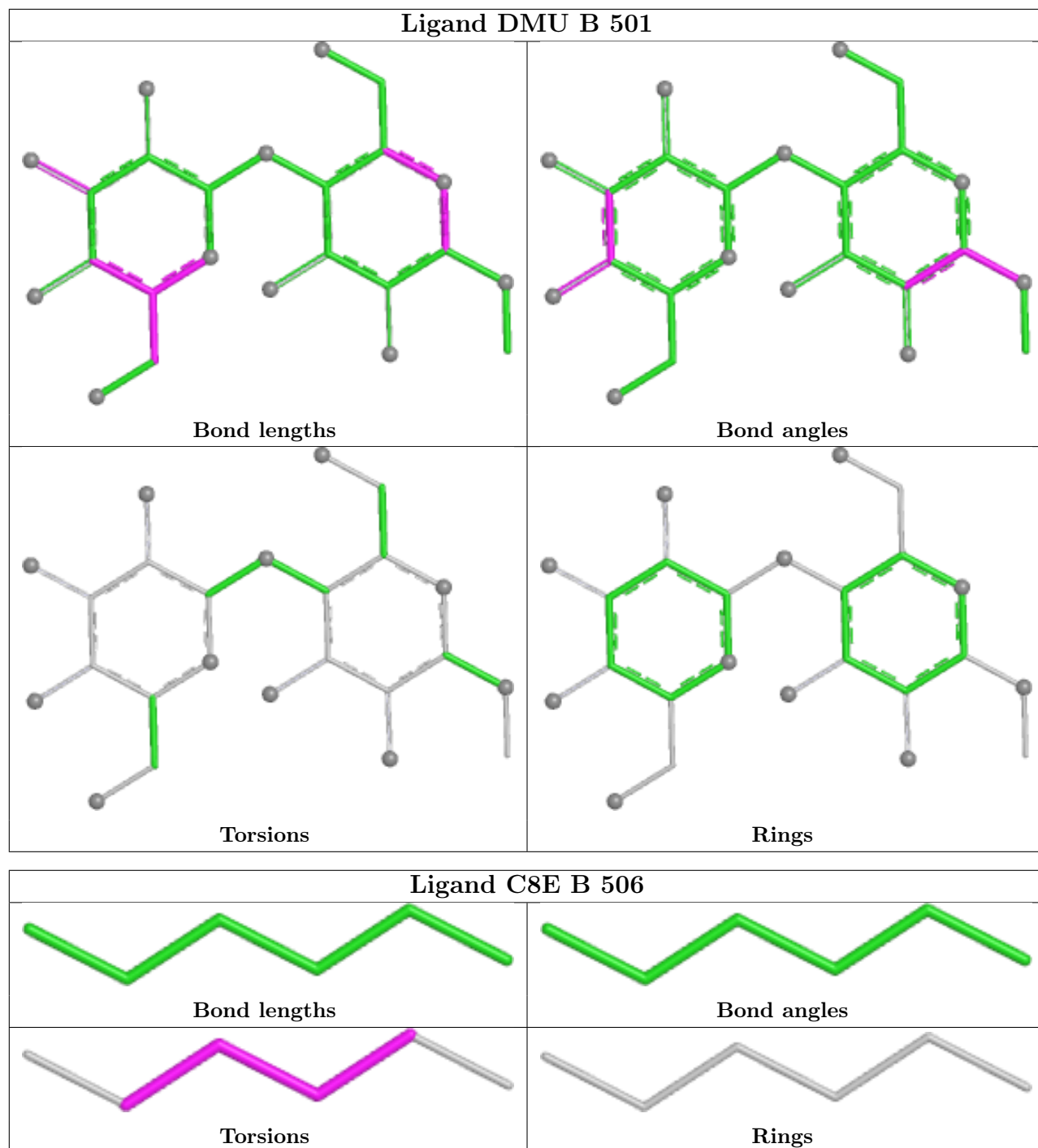
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	510	C8E	1	0
4	A	507	C8E	1	0
4	B	505	C8E	1	0
3	B	503	DMU	3	0
4	B	511	C8E	7	0
4	B	504	C8E	1	0
4	B	509	C8E	1	0

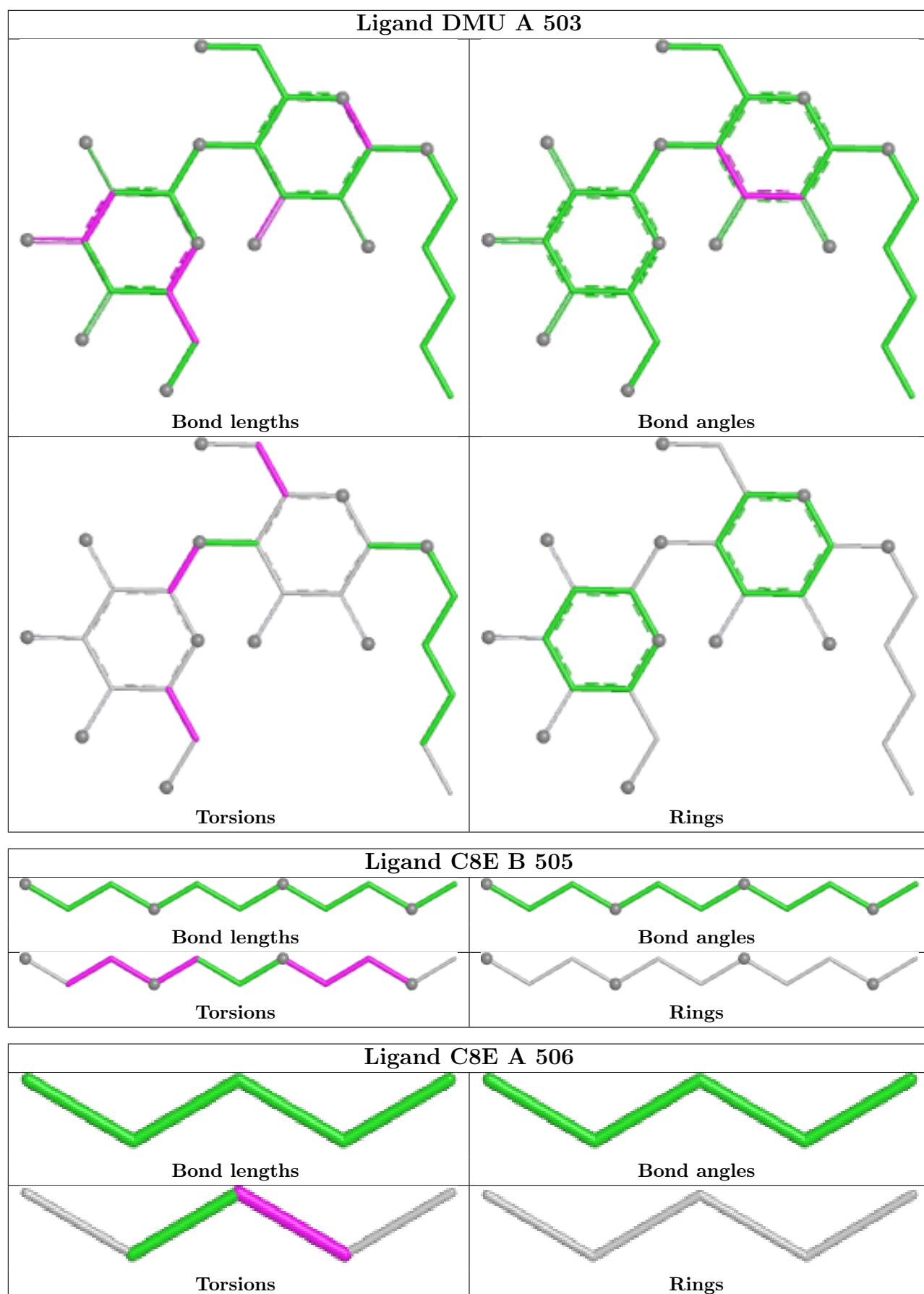
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

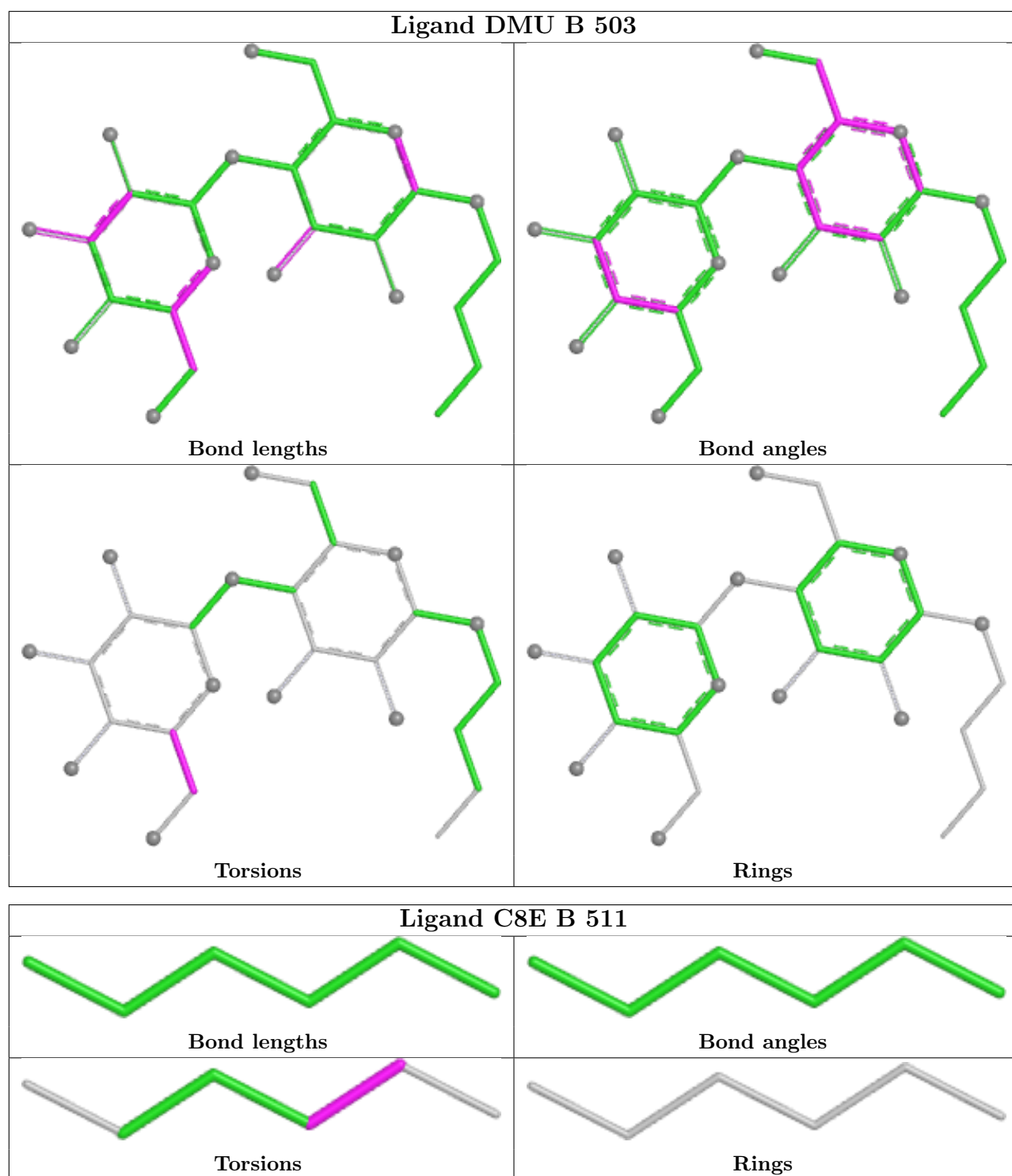


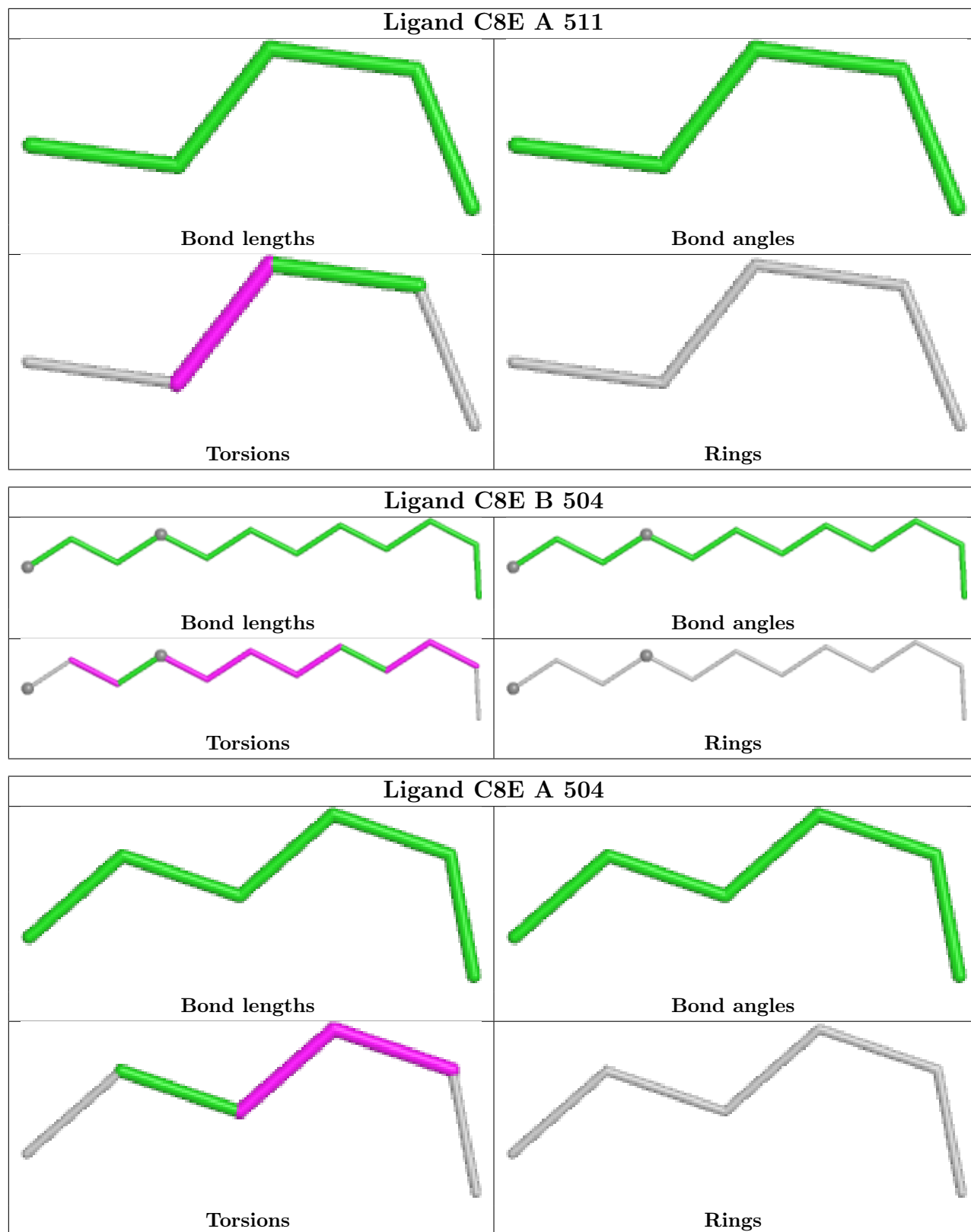


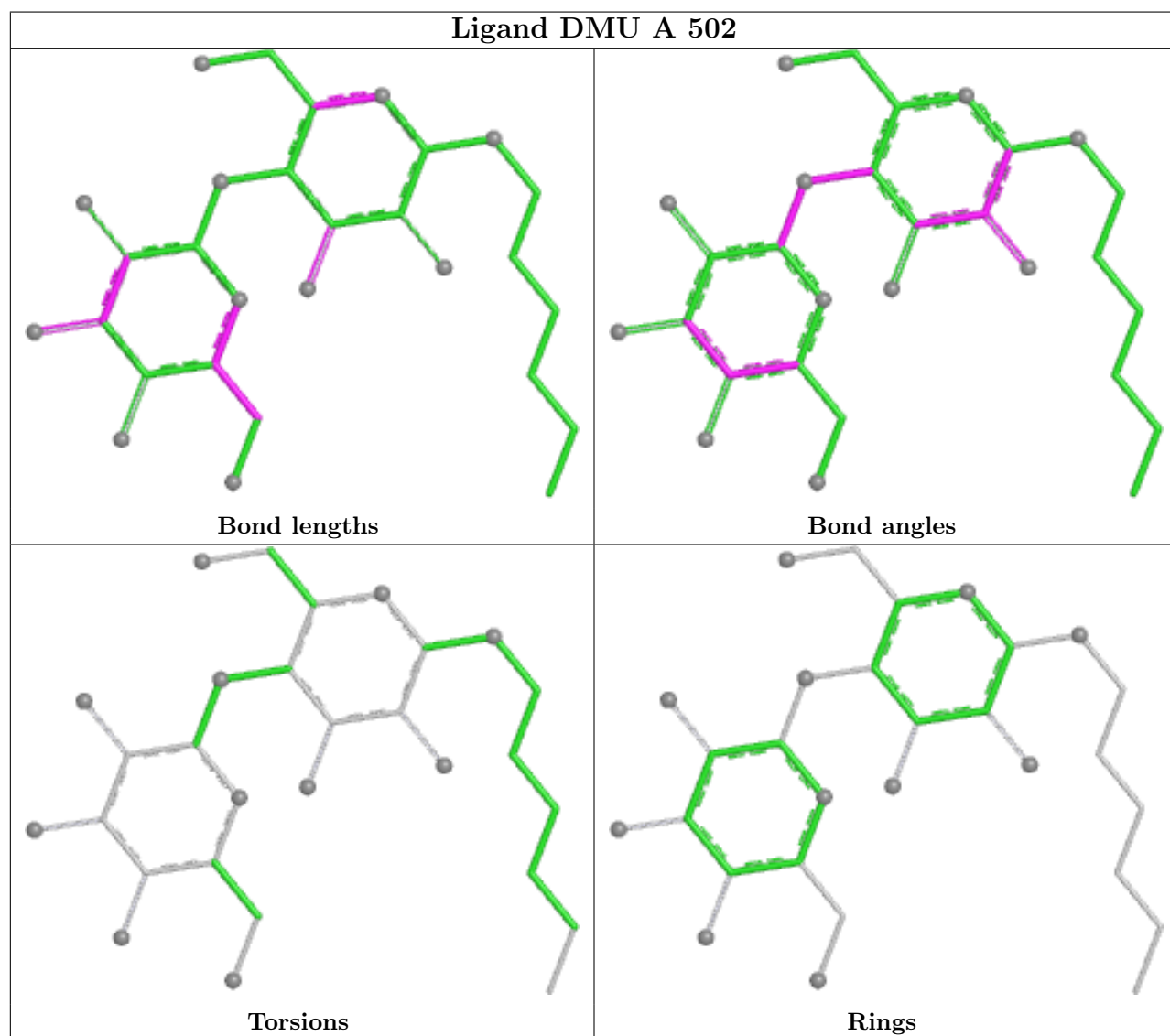
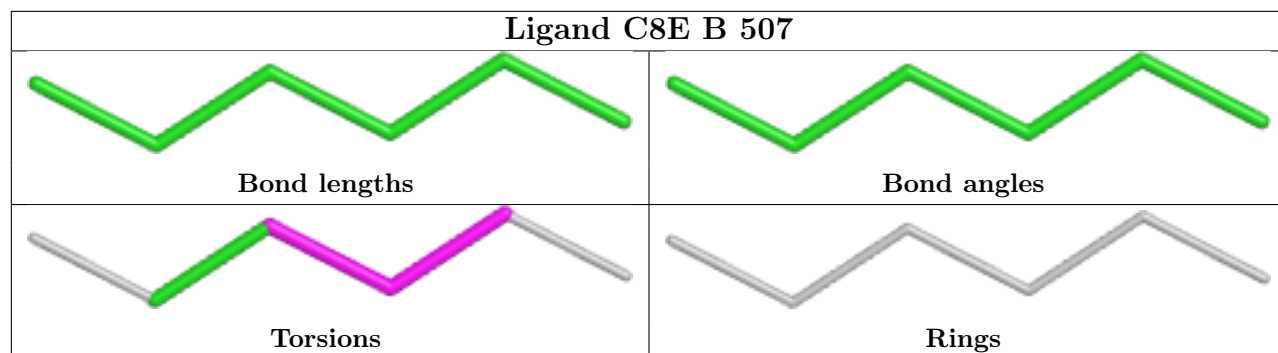


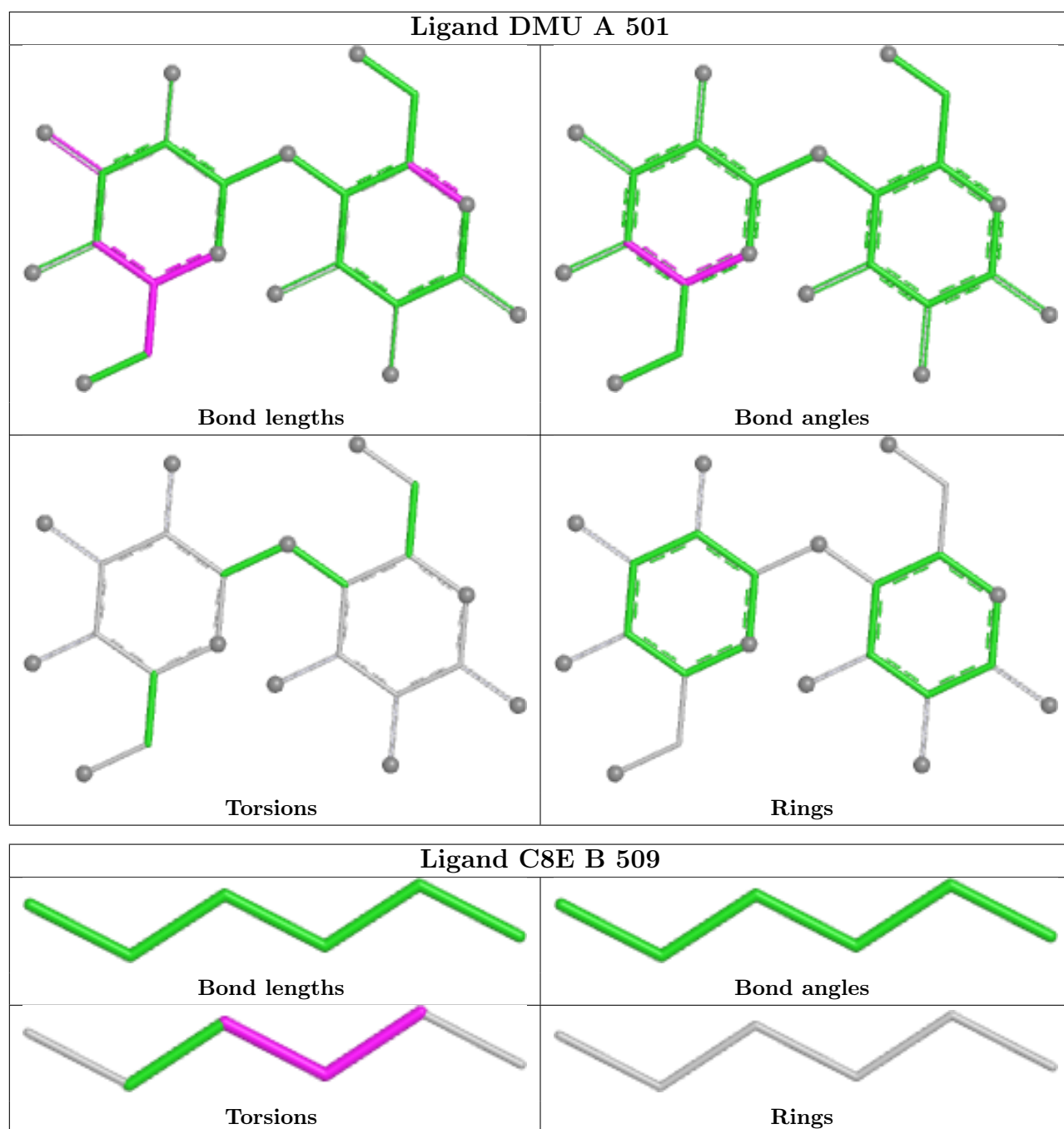


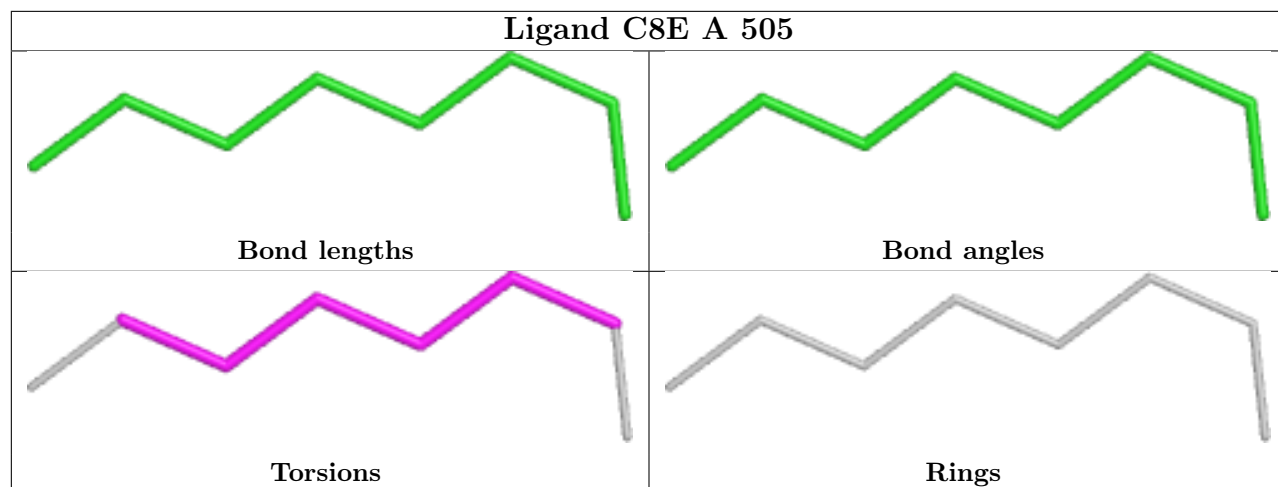












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	435/436 (99%)	1.13	99 (22%) 2 2	20, 38, 71, 101	11 (2%)
1	B	435/436 (99%)	0.82	52 (11%) 9 9	18, 35, 63, 95	10 (2%)
All	All	870/872 (99%)	0.97	151 (17%) 4 4	18, 37, 66, 101	21 (2%)

The worst 5 of 151 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	4	ILE	5.8
1	A	369	ASN	5.1
1	A	371	THR	4.8
1	A	28	GLY	4.7
1	A	31	TYR	4.6

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

### 6.3 Carbohydrates [i](#)

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

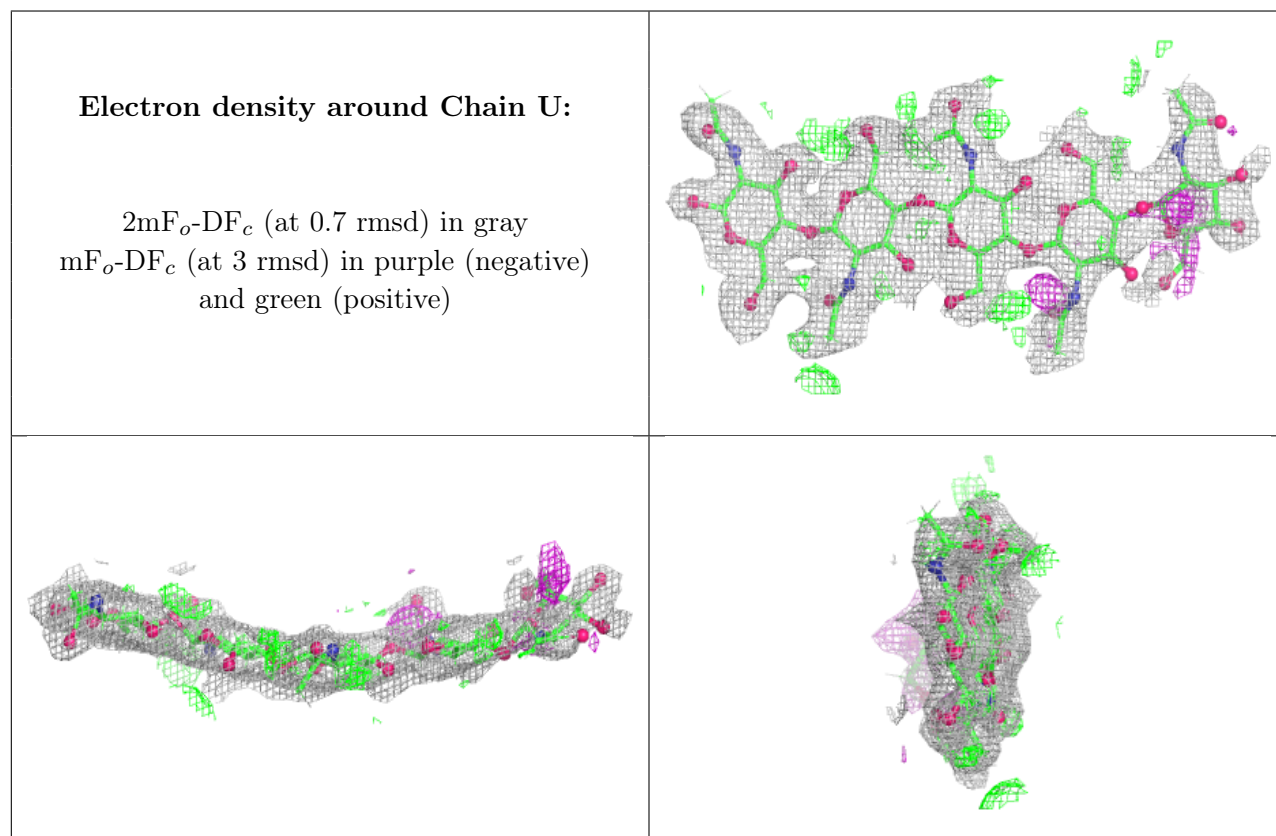
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	NAG	U	1	15/15	-	-	53,64,73,87	0
2	NAG	U	2	14/15	-	-	49,61,74,76	0
2	NAG	U	3	14/15	-	-	42,56,70,71	0
2	NAG	U	4	14/15	-	-	52,63,74,86	0
2	NAG	U	5	14/15	-	-	62,75,91,93	0

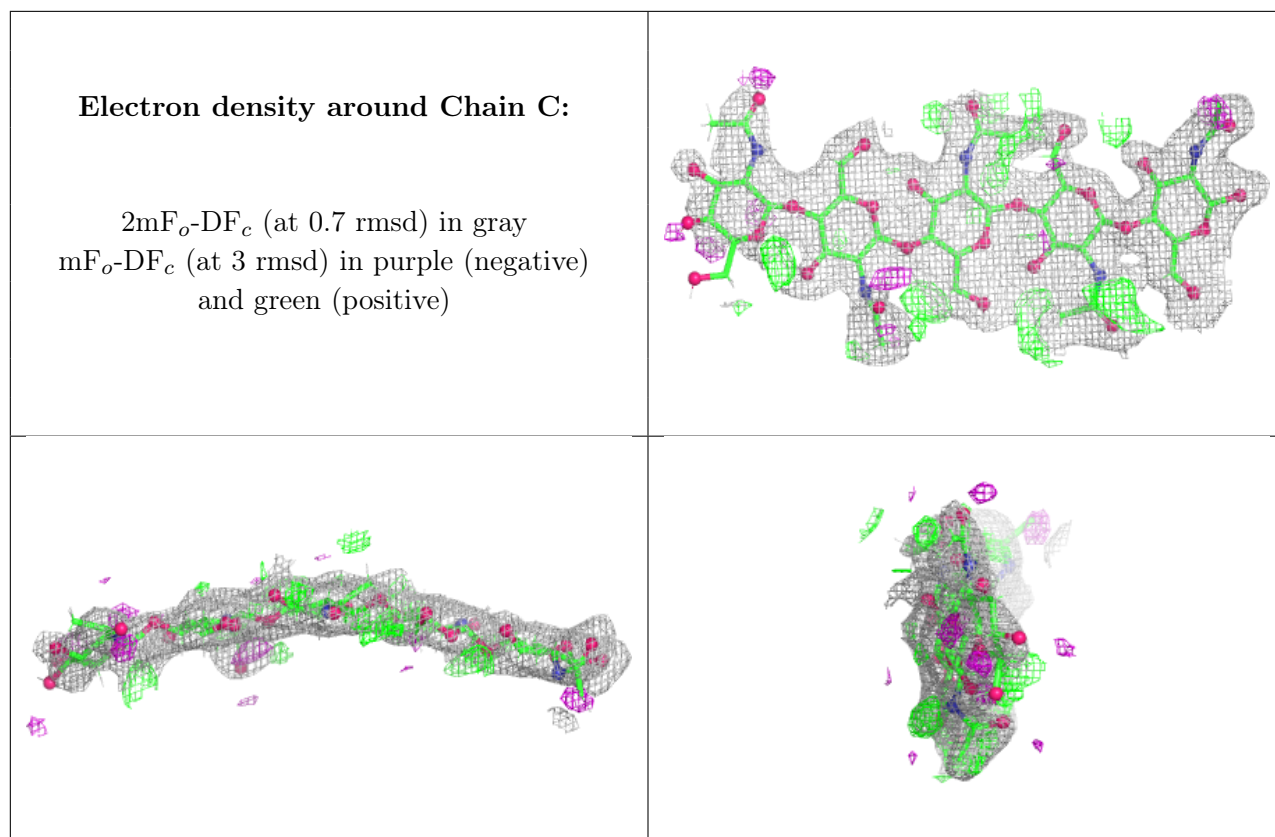
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	NAG	C	5	14/15	0.74	0.28	70,85,103,107	0
2	NAG	C	4	14/15	0.78	0.21	56,70,77,84	0
2	NAG	C	2	14/15	0.82	0.20	50,62,80,80	0
2	NAG	C	3	14/15	0.83	0.18	43,64,72,76	0
2	NAG	C	1	15/15	0.86	0.15	58,70,82,85	0

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





## 6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	C8E	A	505	8/21	0.68	0.40	59,74,92,92	0
4	C8E	B	510	5/21	0.68	0.32	61,67,81,81	0
3	DMU	A	503	28/33	0.75	0.19	47,85,110,114	0
4	C8E	A	512	5/21	0.76	0.34	51,56,77,77	0
4	C8E	B	505	11/21	0.77	0.22	49,64,79,82	0
4	C8E	A	507	6/21	0.77	0.26	40,48,58,61	0
4	C8E	A	508	5/21	0.78	0.35	53,62,88,88	0
4	C8E	B	508	5/21	0.78	0.34	46,54,65,65	0
3	DMU	B	503	27/33	0.78	0.20	48,77,98,118	0
4	C8E	A	506	5/21	0.79	0.29	46,68,81,81	0
4	C8E	B	509	6/21	0.80	0.28	41,61,89,89	0
4	C8E	B	512	7/21	0.80	0.18	50,68,78,88	0
4	C8E	B	511	6/21	0.81	0.23	35,43,53,53	0
4	C8E	A	510	5/21	0.82	0.25	48,58,73,74	0

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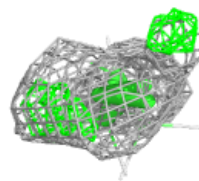
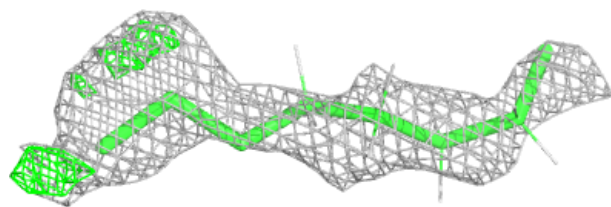
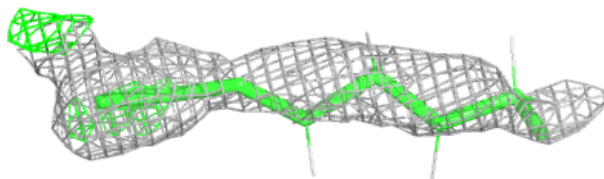
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	C8E	A	509	5/21	0.82	0.26	46,60,66,66	0
4	C8E	B	506	6/21	0.83	0.23	46,53,62,62	0
4	C8E	B	504	12/21	0.83	0.21	45,61,73,74	0
4	C8E	A	504	6/21	0.83	0.24	38,54,70,70	0
4	C8E	B	507	6/21	0.87	0.21	43,56,64,64	0
5	MG	B	513	1/1	0.88	0.09	30,30,30,30	0
5	MG	B	516	1/1	0.88	0.14	44,44,44,44	0
4	C8E	A	511	5/21	0.90	0.20	37,43,54,63	0
3	DMU	B	501	24/33	0.91	0.12	24,48,66,79	0
3	DMU	A	501	23/33	0.91	0.12	30,53,68,75	0
5	MG	A	513	1/1	0.92	0.08	32,32,32,32	0
3	DMU	A	502	29/33	0.94	0.10	27,40,55,64	0
3	DMU	B	502	29/33	0.94	0.10	24,36,47,59	0
5	MG	B	515	1/1	0.97	0.10	46,46,46,46	0
5	MG	B	514	1/1	0.97	0.07	34,34,34,34	0
5	MG	A	514	1/1	0.98	0.21	41,41,41,41	0

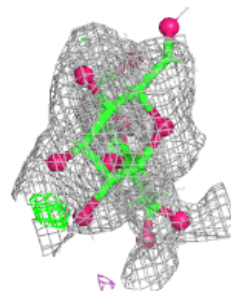
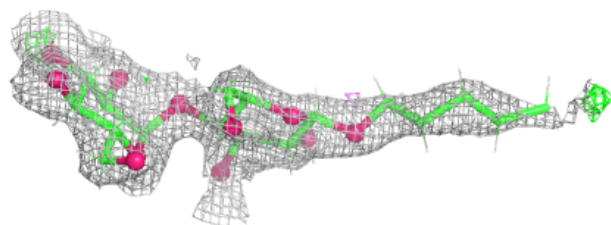
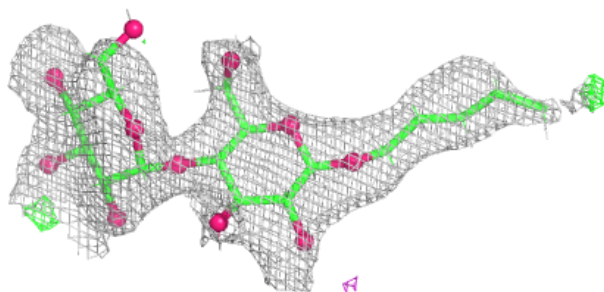
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around C8E A 505:**

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

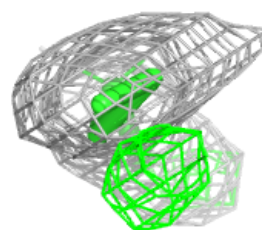
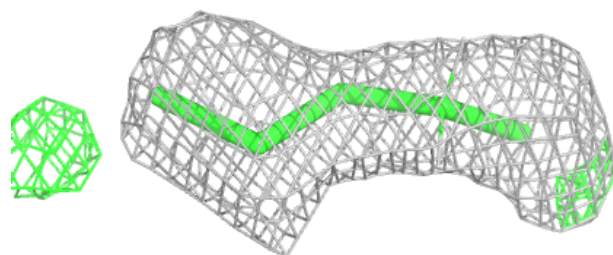
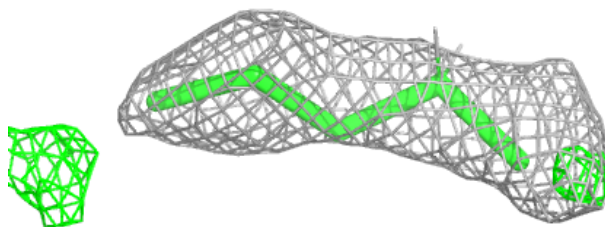
**Electron density around DMU A 503:**

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

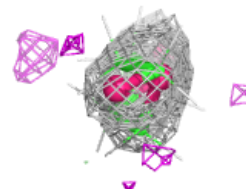
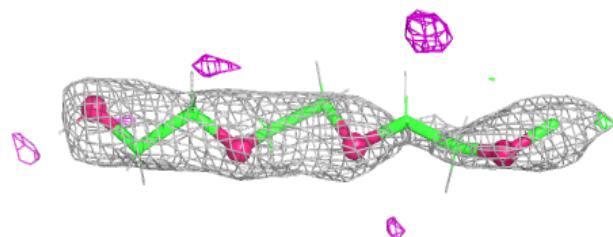
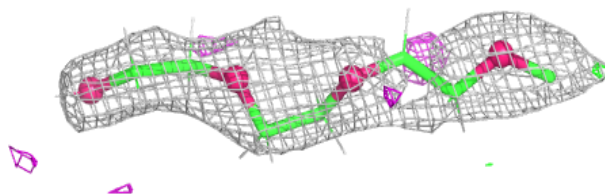


**Electron density around C8E A 512:**

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and green (positive)

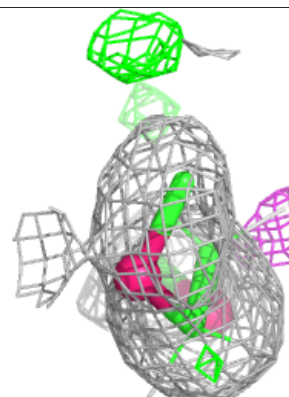
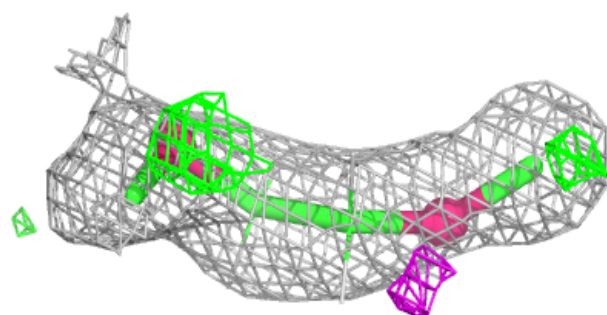
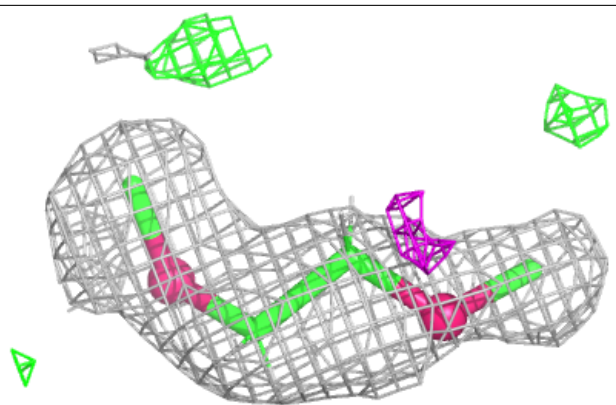
**Electron density around C8E B 505:**

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and green (positive)



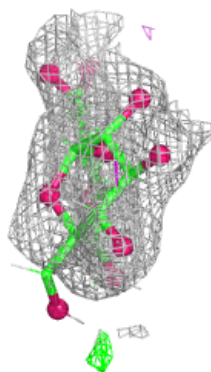
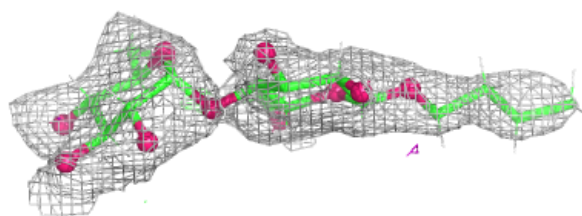
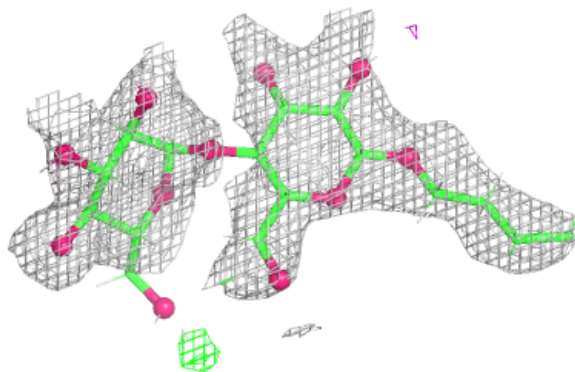
**Electron density around C8E A 507:**

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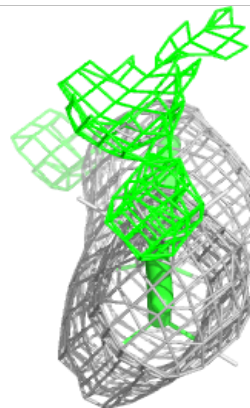
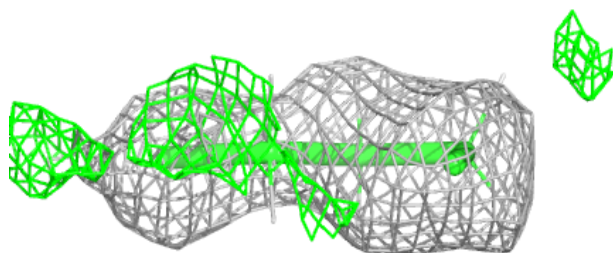
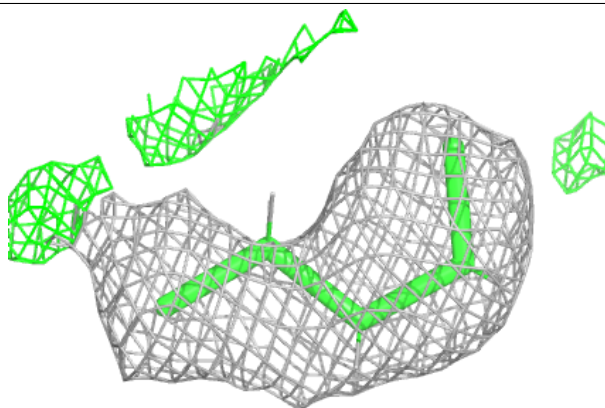


**Electron density around DMU B 503:**

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and green (positive)

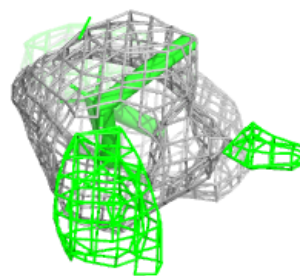
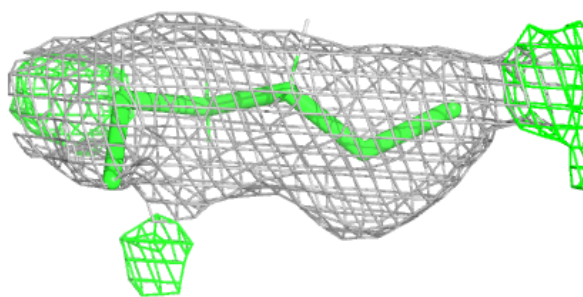
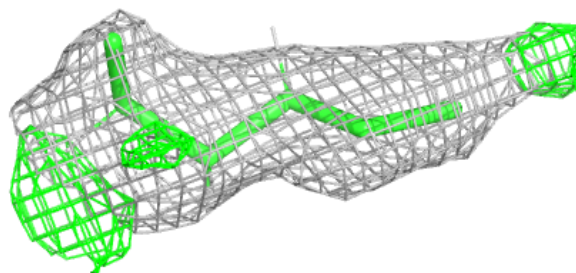
**Electron density around C8E A 506:**

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and green (positive)

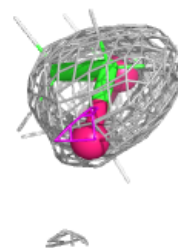
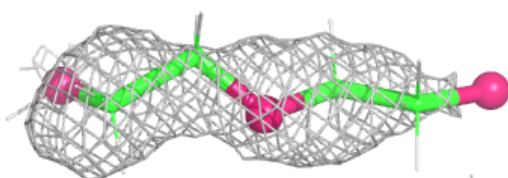
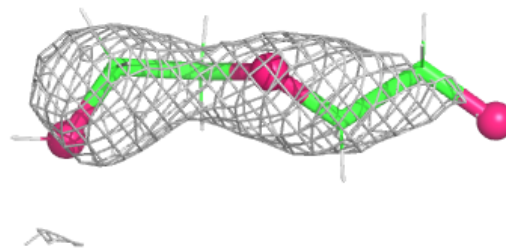


**Electron density around C8E B 509:**

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

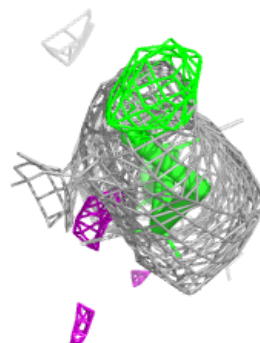
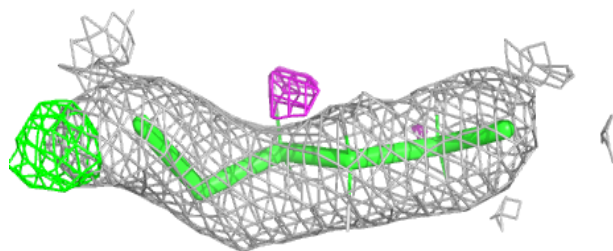
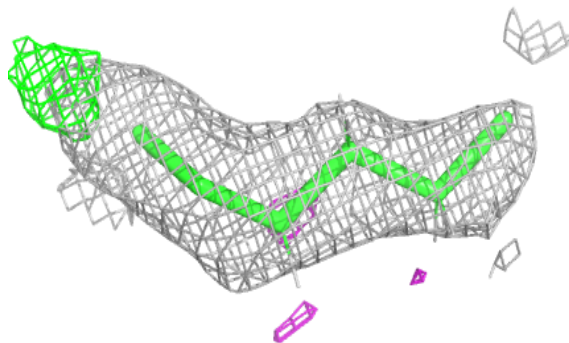
**Electron density around C8E B 512:**

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

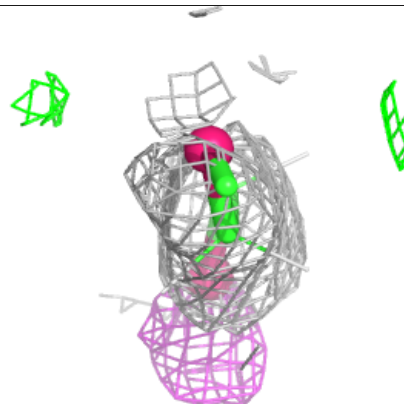
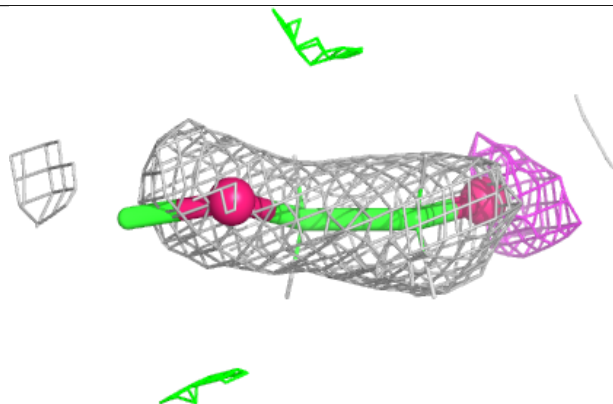
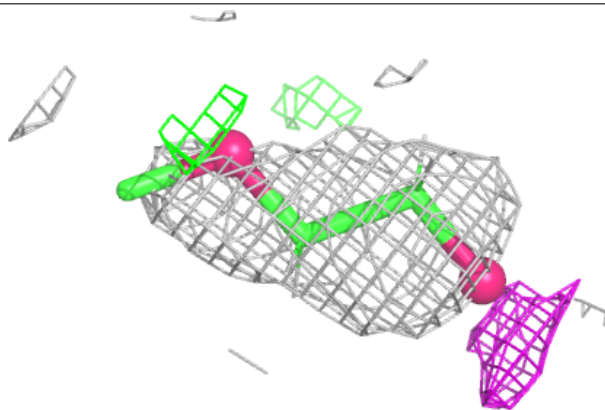


**Electron density around C8E B 511:**

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

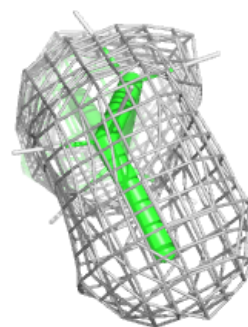
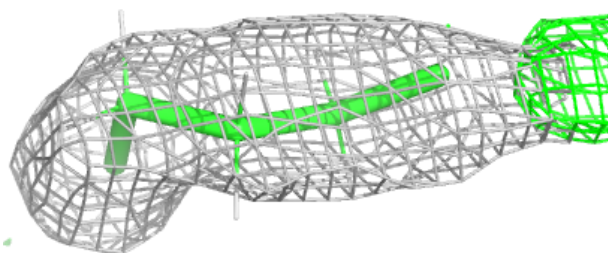
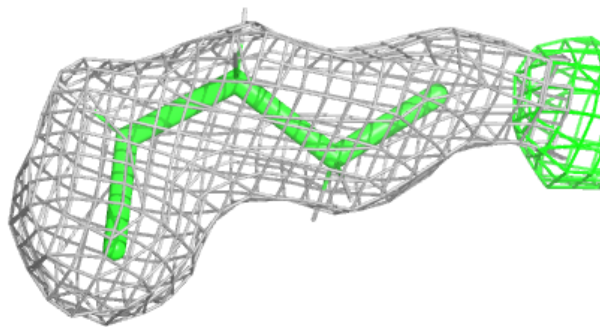
**Electron density around C8E A 510:**

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

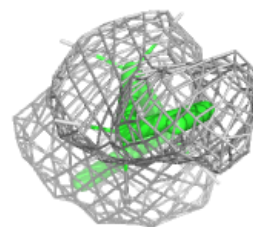
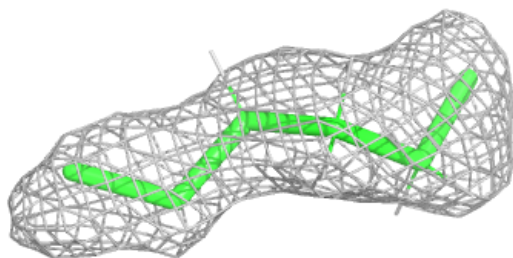
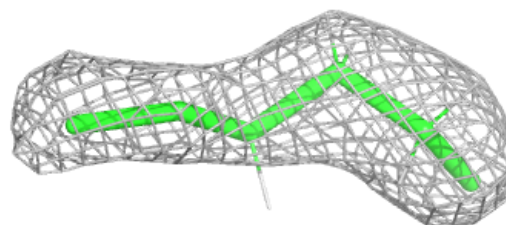


**Electron density around C8E A 509:**

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

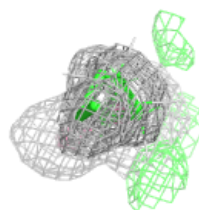
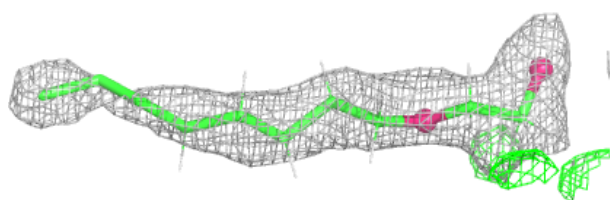
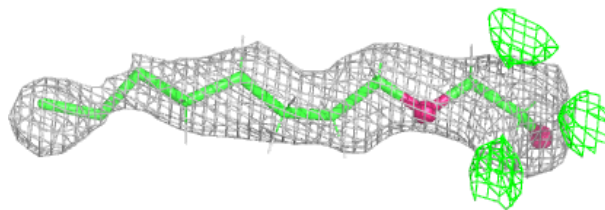
**Electron density around C8E B 506:**

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

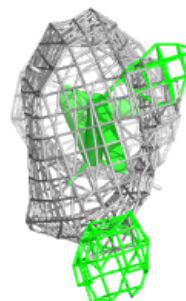
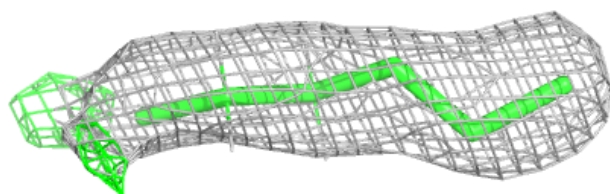
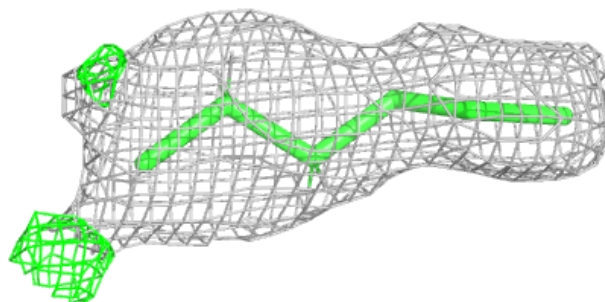


**Electron density around C8E B 504:**

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

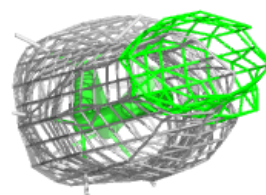
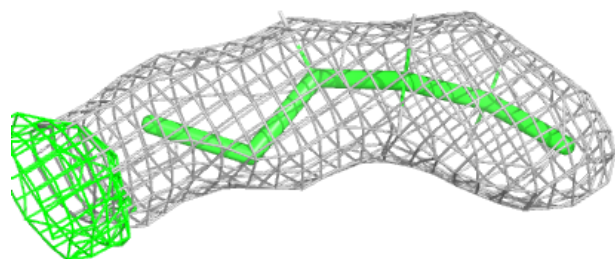
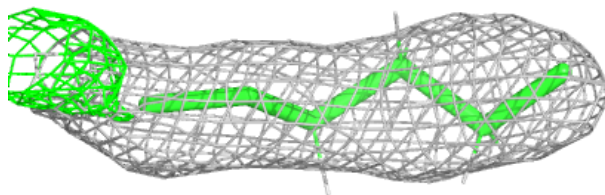
**Electron density around C8E A 504:**

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

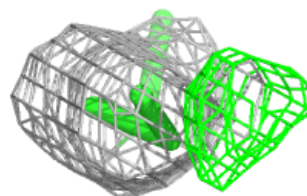
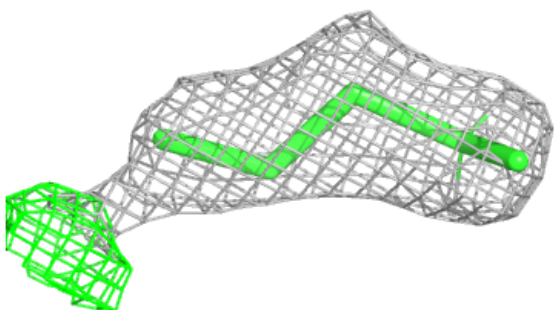
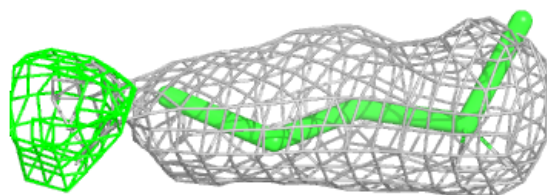


**Electron density around C8E B 507:**

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

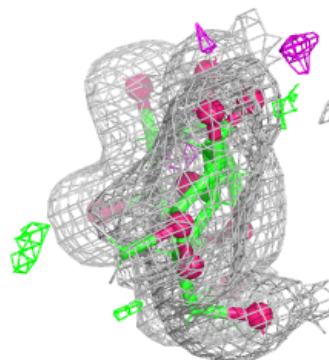
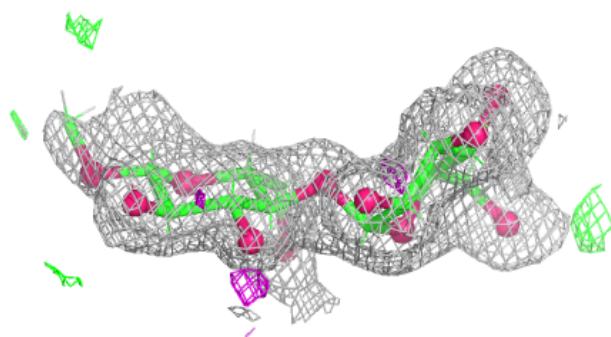
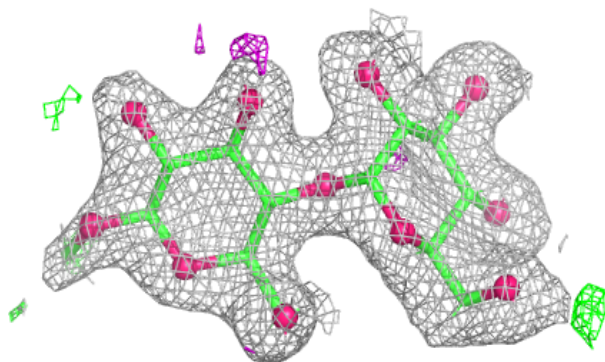
**Electron density around C8E A 511:**

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

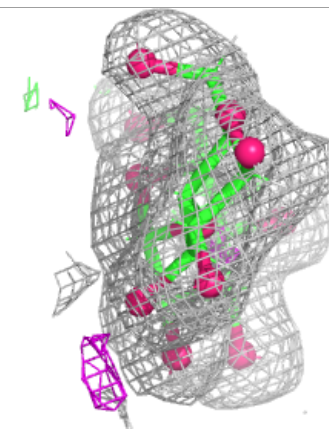
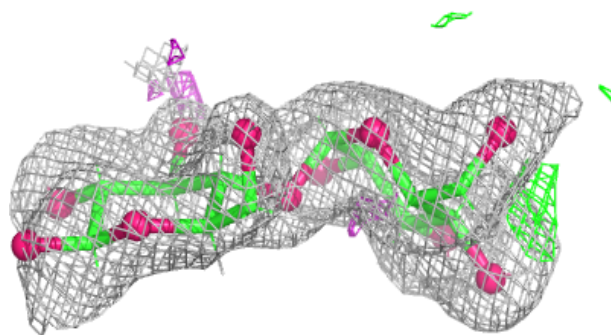
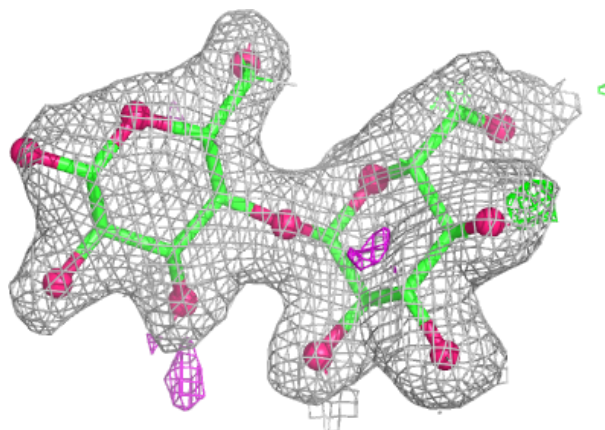


**Electron density around DMU B 501:**

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

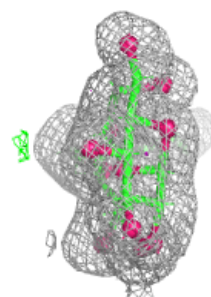
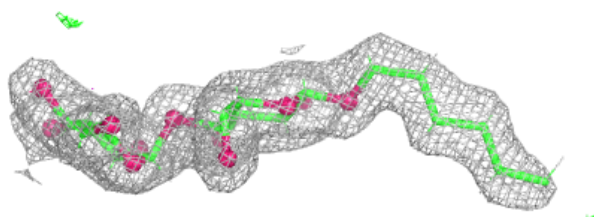
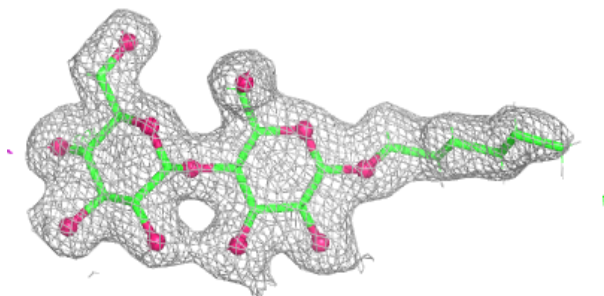
**Electron density around DMU A 501:**

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

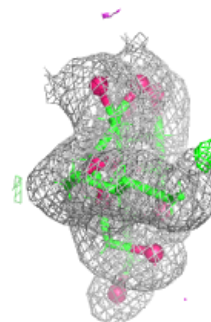
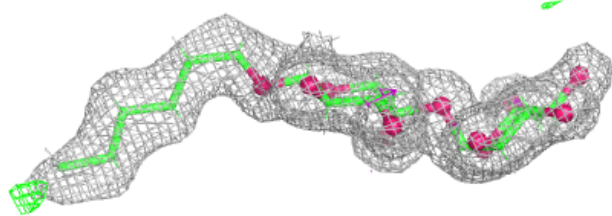
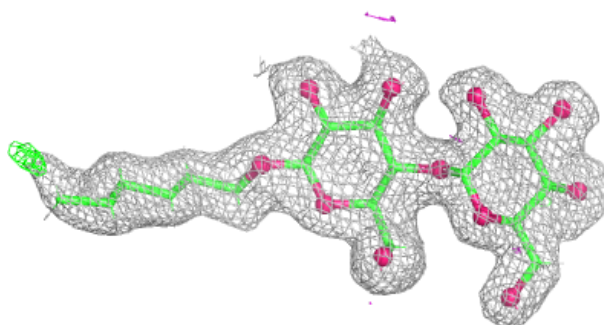


**Electron density around DMU A 502:**

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

**Electron density around DMU B 502:**

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



## 6.5 Other polymers [i](#)

There are no such residues in this entry.