



# Full wwPDB X-ray Structure Validation Report ⓘ

Apr 3, 2024 – 03:24 am BST

PDB ID : 8OMZ  
Title : Wide inward-open unliganded UraA in complex with a conformation-selective synthetic nanobody  
Authors : Kuhn, B.T.; Geertsma, E.R.  
Deposited on : 2023-03-31  
Resolution : 3.50 Å (reported)

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

We welcome your comments at [validation@mail.wwpdb.org](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 : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

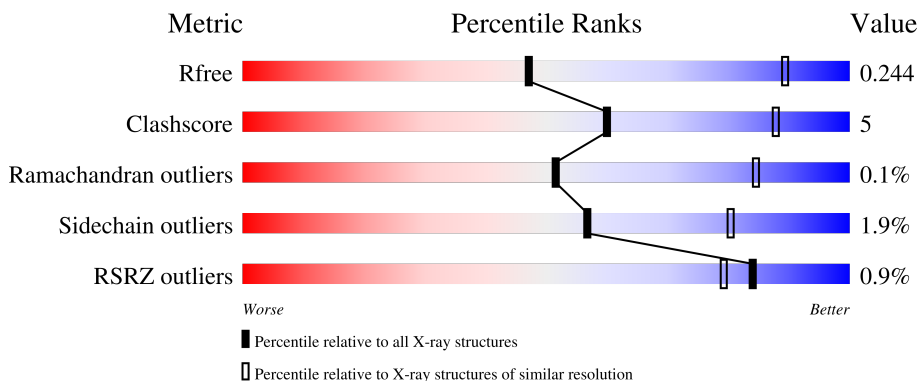
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.50 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	1659 (3.60-3.40)
Clashscore	141614	1036 (3.58-3.42)
Ramachandran outliers	138981	1005 (3.58-3.42)
Sidechain outliers	138945	1006 (3.58-3.42)
RSRZ outliers	127900	1559 (3.60-3.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	437	
1	C	437	
2	B	154	
2	D	154	

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 8347 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called Uracil permease.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	410	3030	2024	481	511	14	0	0	0
1	C	409	3019	2018	477	510	14	0	0	0

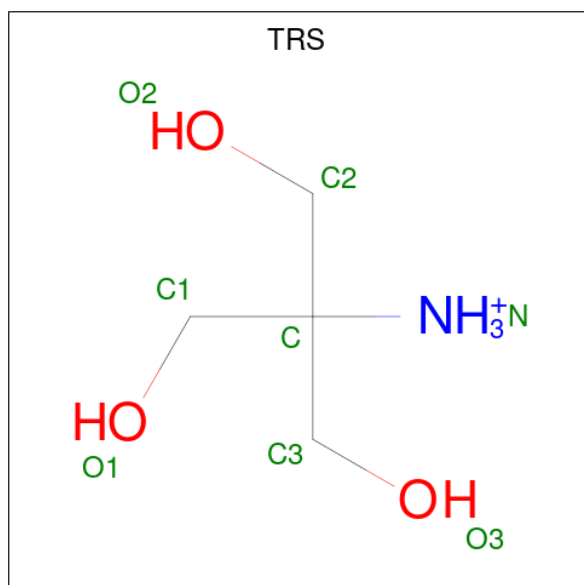
There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	initiating methionine	UNP P0AGM7
A	1	SER	-	expression tag	UNP P0AGM7
A	320	PRO	GLY	engineered mutation	UNP P0AGM7
A	430	ALA	-	expression tag	UNP P0AGM7
A	431	LEU	-	expression tag	UNP P0AGM7
A	432	GLU	-	expression tag	UNP P0AGM7
A	433	VAL	-	expression tag	UNP P0AGM7
A	434	LEU	-	expression tag	UNP P0AGM7
A	435	PHE	-	expression tag	UNP P0AGM7
A	436	GLN	-	expression tag	UNP P0AGM7
C	0	MET	-	initiating methionine	UNP P0AGM7
C	1	SER	-	expression tag	UNP P0AGM7
C	320	PRO	GLY	engineered mutation	UNP P0AGM7
C	430	ALA	-	expression tag	UNP P0AGM7
C	431	LEU	-	expression tag	UNP P0AGM7
C	432	GLU	-	expression tag	UNP P0AGM7
C	433	VAL	-	expression tag	UNP P0AGM7
C	434	LEU	-	expression tag	UNP P0AGM7
C	435	PHE	-	expression tag	UNP P0AGM7
C	436	GLN	-	expression tag	UNP P0AGM7

- Molecule 2 is a protein called Sy45.

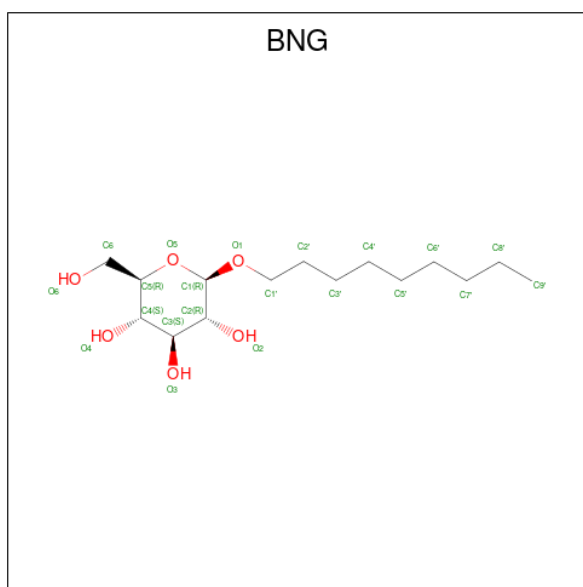
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	127	963	607	164	188	4	0	0	0
2	D	126	957	604	163	186	4	0	0	0

- Molecule 3 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula: C<sub>4</sub>H<sub>12</sub>NO<sub>3</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	8	4	1	3	0	0
3	C	1	8	4	1	3	0	0

- Molecule 4 is nonyl beta-D-glucopyranoside (three-letter code: BNG) (formula: C<sub>15</sub>H<sub>30</sub>O<sub>6</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			21	15	6		
4	A	1	Total	C	O	0	0
			21	15	6		
4	A	1	Total	C	O	0	0
			21	15	6		
4	A	1	Total	C	O	0	0
			21	15	6		
4	A	1	Total	C	O	0	0
			21	15	6		
4	A	1	Total	C	O	0	0
			21	15	6		
4	A	1	Total	C	O	0	0
			21	15	6		
4	C	1	Total	C	O	0	0
			21	15	6		
4	C	1	Total	C	O	0	0
			21	15	6		
4	C	1	Total	C	O	0	0
			21	15	6		

- Molecule 5 is PENTAETHYLENE GLYCOL (three-letter code: 1PE) (formula: C<sub>10</sub>H<sub>22</sub>O<sub>6</sub>).



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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>			<b>ZeroOcc</b>	<b>AltConf</b>
6	B	1	Total	C	O	0	0
			33	22	11		
6	D	1	Total	C	O	0	0
			33	22	11		







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	87.14Å 118.11Å 94.93Å 90.00° 100.42° 90.00°	Depositor
Resolution (Å)	29.53 – 3.50 29.53 – 3.50	Depositor EDS
% Data completeness (in resolution range)	98.3 (29.53-3.50) 98.3 (29.53-3.50)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	6.05 (at 3.47Å)	Xtrriage
Refinement program	PHENIX 1.17.1-3660-000	Depositor
R, $R_{free}$	0.241 , 0.260 0.241 , 0.244	Depositor DCC
$R_{free}$ test set	1142 reflections (4.85%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	76.5	Xtrriage
Anisotropy	0.125	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.26 , 17.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.87	EDS
Total number of atoms	8347	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	67.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.61% of the height of the origin peak. No significant pseudotranslation is detected.*

<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: TRS, BNG, DMU, 1PE

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	0.24	0/3096	0.38	0/4229
1	C	0.24	0/3085	0.39	0/4215
2	B	0.24	0/985	0.41	0/1337
2	D	0.25	0/979	0.42	0/1329
All	All	0.24	0/8145	0.39	0/11110

There are no bond length outliers.

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	3030	0	3261	35	0
1	C	3019	0	3248	26	0
2	B	963	0	921	8	0
2	D	957	0	916	7	0
3	A	8	0	12	0	0
3	C	8	0	12	0	0
4	A	147	0	210	6	0
4	C	84	0	120	6	0
5	A	16	0	22	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	C	16	0	22	2	0
6	A	33	0	42	3	0
6	B	33	0	42	3	0
6	D	33	0	42	0	0
All	All	8347	0	8870	79	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 5.

All (79) 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:C:277:SER:HB3	1:C:282:SER:HB3	1.71	0.73
1:C:60:ILE:HG21	1:C:269:ALA:HB2	1.80	0.63
1:A:277:SER:HB3	1:A:282:SER:HB2	1.81	0.62
1:C:316:LEU:HD12	1:C:322:LEU:HD22	1.82	0.61
1:A:158:THR:HG23	1:A:332:PRO:HG3	1.82	0.61
1:C:248:VAL:HG11	5:C:505:1PE:H121	1.82	0.61
1:A:381:LYS:HB3	1:A:390:LYS:HB2	1.83	0.60
1:A:354:ILE:HG12	6:B:201:DMU:H7	1.82	0.59
1:A:307:GLY:HA3	6:A:510:DMU:H25	1.85	0.59
2:D:48:VAL:HG23	2:D:64:VAL:HG21	1.86	0.58
1:A:57:TYR:HA	1:A:269:ALA:HB1	1.85	0.57
1:A:248:VAL:HG21	5:A:508:1PE:H152	1.87	0.57
2:B:104:SER:HB3	2:B:111:ARG:HD2	1.87	0.56
1:A:166:LEU:HD22	1:A:339:LEU:HD23	1.88	0.55
1:C:114:GLY:HA3	4:C:506:BNG:H3	1.88	0.55
1:A:168:VAL:HG21	1:A:191:VAL:HG11	1.88	0.54
2:D:39:GLN:HB2	2:D:45:ARG:HG2	1.90	0.53
2:D:104:SER:HB2	2:D:111:ARG:HD2	1.91	0.53
1:A:46:VAL:O	1:A:50:ASN:ND2	2.32	0.53
1:C:372:ILE:HG23	1:C:395:ALA:HB1	1.90	0.52
1:C:69:LEU:HB3	1:C:285:ASN:HB3	1.91	0.52
2:B:12:VAL:HG11	2:B:86:LEU:HD13	1.91	0.52
1:A:252:ILE:HD11	5:A:508:1PE:H222	1.90	0.52
5:C:505:1PE:H222	5:C:505:1PE:H252	1.91	0.51
1:C:166:LEU:HD22	1:C:339:LEU:HD23	1.92	0.51
1:A:146:LEU:HD13	4:C:503:BNG:H6'2	1.93	0.50
1:C:35:VAL:HG22	1:C:76:ILE:HD11	1.93	0.49
1:A:243:VAL:HG22	1:A:263:LEU:HD21	1.95	0.49
1:C:70:GLY:O	1:C:285:ASN:HA	2.13	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:6:ILE:HD13	1:C:300:VAL:HG22	1.94	0.48
1:A:261:PRO:HB2	1:A:265:ARG:HD2	1.95	0.48
1:C:270:ASN:HD21	1:C:286:THR:HA	1.78	0.48
1:C:351:ARG:NH1	1:C:355:GLU:OE2	2.47	0.48
2:D:91:THR:HG23	2:D:122:THR:HA	1.93	0.48
1:A:64:LYS:HB2	1:A:261:PRO:HD3	1.95	0.48
2:B:91:THR:HG23	2:B:122:THR:HA	1.96	0.48
1:A:57:TYR:HH	1:A:266:SER:HG	1.58	0.48
1:C:170:VAL:HG21	4:C:503:BNG:H7'1	1.96	0.48
1:A:20:LEU:HD13	1:A:300:VAL:HG11	1.95	0.47
2:D:40:ALA:HB3	2:D:43:LYS:HD3	1.96	0.47
1:A:361:ASN:HA	4:A:502:BNG:H5'1	1.96	0.47
1:A:114:GLY:HA3	4:A:505:BNG:H3	1.97	0.47
1:A:185:ILE:HD12	1:A:341:LEU:HD11	1.97	0.46
1:C:189:VAL:HG23	1:C:337:VAL:HG21	1.97	0.46
1:A:245:HIS:ND1	1:A:287:THR:O	2.48	0.46
1:A:155:ASP:HB3	1:A:158:THR:HB	1.98	0.45
1:A:146:LEU:HD22	4:C:503:BNG:H4'1	1.97	0.45
2:B:35:GLY:HA2	2:B:50:ALA:HA	1.98	0.45
6:A:510:DMU:H12	6:A:510:DMU:H7	1.55	0.45
1:A:246:LEU:HD23	1:A:263:LEU:HD13	1.98	0.45
1:A:404:LEU:HD21	4:A:505:BNG:H8'2	1.98	0.45
2:D:35:GLY:HA2	2:D:50:ALA:HA	1.99	0.44
1:C:120:PHE:HZ	1:C:236:LEU:HB3	1.82	0.44
2:D:23:ALA:HA	2:D:78:THR:HG22	1.99	0.44
1:A:285:ASN:OD1	1:A:285:ASN:N	2.49	0.44
1:C:335:GLY:O	1:C:339:LEU:HB2	2.18	0.43
1:A:63:GLY:HA3	6:A:510:DMU:H13	2.00	0.43
1:A:136:LEU:HB3	1:A:342:TYR:CG	2.54	0.43
1:C:124:ALA:HB2	1:C:368:LEU:HD23	2.00	0.43
2:B:2:VAL:HG11	2:B:31:ILE:HD11	2.01	0.42
1:A:357:LYS:HZ3	6:B:201:DMU:H36	1.84	0.42
1:A:95:ILE:HG23	1:A:275:VAL:HG13	2.02	0.42
1:A:366:LEU:HD22	4:A:502:BNG:H6'2	2.01	0.42
1:C:381:LYS:HB2	1:C:381:LYS:HE2	1.82	0.42
4:A:502:BNG:H1	1:C:378:SER:HB2	2.00	0.41
2:B:62:ASP:OD2	6:B:201:DMU:O2	2.32	0.41
1:A:159:ILE:HB	1:C:175:LEU:HD21	2.00	0.41
4:A:505:BNG:O6	4:A:505:BNG:O4	2.32	0.41
1:A:132:ILE:HD11	1:A:392:MET:HE3	2.01	0.41
1:C:75:PHE:CE2	1:C:238:VAL:HG21	2.56	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:50:ASN:CG	1:C:70:GLY:HA2	2.41	0.41
1:C:89:VAL:HG13	1:C:224:GLU:HG3	2.02	0.41
1:A:338:SER:HB3	1:A:342:TYR:CE2	2.56	0.41
1:C:368:LEU:O	1:C:372:ILE:HG12	2.21	0.41
4:C:503:BNG:H5'1	4:C:503:BNG:H2'2	1.92	0.41
1:C:366:LEU:HD22	4:C:502:BNG:H7'2	2.01	0.41
1:A:236:LEU:HD12	1:A:236:LEU:HA	1.93	0.40
2:B:22:CYS:HB3	2:B:79:VAL:HG12	2.03	0.40
2:B:102:GLY:O	2:B:111:ARG:NH1	2.54	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

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

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	408/437 (93%)	395 (97%)	13 (3%)	0	100	100
1	C	407/437 (93%)	391 (96%)	15 (4%)	1 (0%)	47	81
2	B	125/154 (81%)	120 (96%)	5 (4%)	0	100	100
2	D	124/154 (80%)	120 (97%)	4 (3%)	0	100	100
All	All	1064/1182 (90%)	1026 (96%)	37 (4%)	1 (0%)	51	84

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	385	GLY

### 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	324/348 (93%)	316 (98%)	8 (2%)	47	75
1	C	323/348 (93%)	316 (98%)	7 (2%)	52	78
2	B	98/120 (82%)	98 (100%)	0	100	100
2	D	97/120 (81%)	96 (99%)	1 (1%)	76	88
All	All	842/936 (90%)	826 (98%)	16 (2%)	57	80

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	ARG
1	A	101	PHE
1	A	150	GLU
1	A	197	PHE
1	A	225	TRP
1	A	288	TYR
1	A	301	TYR
1	A	304	TRP
1	C	101	PHE
1	C	109	LYS
1	C	193	TYR
1	C	197	PHE
1	C	225	TRP
1	C	321	LYS
1	C	388	GLU
2	D	76	LYS

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

### 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](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

18 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
4	BNG	A	502	-	21,21,21	0.54	0	26,26,26	1.22	2 (7%)
4	BNG	C	502	-	21,21,21	0.54	0	26,26,26	1.18	2 (7%)
4	BNG	C	503	-	21,21,21	0.55	0	26,26,26	1.22	2 (7%)
4	BNG	A	504	-	21,21,21	0.54	0	26,26,26	1.09	2 (7%)
3	TRS	A	501	-	7,7,7	0.33	0	9,9,9	0.31	0
3	TRS	C	501	-	7,7,7	0.34	0	9,9,9	0.35	0
6	DMU	B	201	-	34,34,34	0.50	0	45,45,45	0.69	0
4	BNG	A	509	-	21,21,21	0.55	0	26,26,26	1.22	2 (7%)
4	BNG	C	504	-	21,21,21	0.53	0	26,26,26	1.17	2 (7%)
6	DMU	A	510	-	34,34,34	0.51	0	45,45,45	0.69	0
6	DMU	D	201	-	34,34,34	0.49	0	45,45,45	0.74	0
5	1PE	A	508	-	15,15,15	0.53	0	14,14,14	0.21	0
5	1PE	C	505	-	15,15,15	0.53	0	14,14,14	0.20	0
4	BNG	A	503	-	21,21,21	0.54	0	26,26,26	1.20	2 (7%)
4	BNG	A	505	-	21,21,21	0.54	0	26,26,26	1.19	2 (7%)
4	BNG	C	506	-	21,21,21	0.55	0	26,26,26	1.17	2 (7%)
4	BNG	A	506	-	21,21,21	0.54	0	26,26,26	1.19	2 (7%)
4	BNG	A	507	-	21,21,21	0.55	0	26,26,26	1.19	2 (7%)

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	BNG	A	502	-	-	2/12/32/32	0/1/1/1
4	BNG	C	502	-	-	0/12/32/32	0/1/1/1
4	BNG	C	503	-	-	0/12/32/32	0/1/1/1
4	BNG	A	504	-	-	4/12/32/32	0/1/1/1
3	TRS	A	501	-	-	0/9/9/9	-
3	TRS	C	501	-	-	0/9/9/9	-
6	DMU	B	201	-	-	11/19/59/59	0/2/2/2
4	BNG	A	509	-	-	6/12/32/32	0/1/1/1
4	BNG	C	504	-	-	4/12/32/32	0/1/1/1
6	DMU	A	510	-	-	11/19/59/59	0/2/2/2
6	DMU	D	201	-	-	6/19/59/59	0/2/2/2
5	1PE	A	508	-	-	9/13/13/13	-
5	1PE	C	505	-	-	8/13/13/13	-
4	BNG	A	503	-	-	5/12/32/32	0/1/1/1
4	BNG	A	505	-	-	3/12/32/32	0/1/1/1
4	BNG	C	506	-	-	2/12/32/32	0/1/1/1
4	BNG	A	506	-	-	3/12/32/32	0/1/1/1
4	BNG	A	507	-	-	1/12/32/32	0/1/1/1

There are no bond length outliers.

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	503	BNG	C1'-O1-C1	-4.41	106.53	113.84
4	A	509	BNG	C1'-O1-C1	-4.34	106.65	113.84
4	A	502	BNG	C1'-O1-C1	-4.28	106.74	113.84
4	A	505	BNG	C1'-O1-C1	-4.19	106.89	113.84
4	A	506	BNG	C1'-O1-C1	-4.15	106.95	113.84
4	A	503	BNG	C1'-O1-C1	-4.14	106.97	113.84
4	C	506	BNG	C1'-O1-C1	-4.11	107.02	113.84
4	A	507	BNG	C1'-O1-C1	-4.08	107.08	113.84
4	C	502	BNG	C1'-O1-C1	-4.04	107.13	113.84
4	C	504	BNG	C1'-O1-C1	-4.02	107.17	113.84
4	A	504	BNG	C1'-O1-C1	-3.68	107.73	113.84
4	A	509	BNG	C1-O5-C5	-3.00	107.80	113.69
4	A	507	BNG	C1-O5-C5	-2.93	107.95	113.69
4	A	502	BNG	C1-O5-C5	-2.89	108.02	113.69
4	A	503	BNG	C1-O5-C5	-2.82	108.16	113.69
4	A	506	BNG	C1-O5-C5	-2.75	108.29	113.69
4	C	502	BNG	C1-O5-C5	-2.74	108.31	113.69

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	505	BNG	C1-O5-C5	-2.72	108.36	113.69
4	C	503	BNG	C1-O5-C5	-2.67	108.45	113.69
4	C	504	BNG	C1-O5-C5	-2.64	108.51	113.69
4	C	506	BNG	C1-O5-C5	-2.61	108.56	113.69
4	A	504	BNG	C1-O5-C5	-2.47	108.83	113.69

There are no chirality outliers.

All (75) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	503	BNG	C2-C1-O1-C1'
4	A	503	BNG	O5-C1-O1-C1'
4	A	509	BNG	C2'-C1'-O1-C1
4	C	504	BNG	C2-C1-O1-C1'
4	C	504	BNG	O5-C1-O1-C1'
6	A	510	DMU	O5-C6-O16-C18
6	B	201	DMU	O1-C10-O7-C3
6	D	201	DMU	C1-C6-O16-C18
6	D	201	DMU	O5-C6-O16-C18
4	A	509	BNG	C4-C5-C6-O6
4	A	502	BNG	O5-C5-C6-O6
6	B	201	DMU	O5-C4-C57-O61
4	A	509	BNG	O5-C5-C6-O6
6	A	510	DMU	C2-C3-O7-C10
4	A	503	BNG	O5-C5-C6-O6
6	A	510	DMU	O5-C4-C57-O61
4	A	502	BNG	C4-C5-C6-O6
6	B	201	DMU	O6-C11-C9-O1
4	A	504	BNG	C4-C5-C6-O6
6	A	510	DMU	C3-C4-C57-O61
6	B	201	DMU	C3-C4-C57-O61
6	B	201	DMU	O6-C11-C9-C8
4	A	506	BNG	C4-C5-C6-O6
5	C	505	1PE	OH4-C13-C23-OH3
4	A	506	BNG	O5-C5-C6-O6
4	A	503	BNG	C4-C5-C6-O6
6	A	510	DMU	O6-C11-C9-O1
5	C	505	1PE	OH5-C14-C24-OH4
4	A	505	BNG	O5-C1-O1-C1'
4	A	509	BNG	O5-C1-O1-C1'
4	A	504	BNG	O5-C5-C6-O6
4	A	505	BNG	O5-C5-C6-O6

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Mol	Chain	Res	Type	Atoms
5	A	508	1PE	OH6-C15-C25-OH5
4	A	505	BNG	C2-C1-O1-C1'
4	A	509	BNG	C2-C1-O1-C1'
4	C	506	BNG	C3'-C4'-C5'-C6'
6	A	510	DMU	C28-C31-C34-C37
6	A	510	DMU	C19-C22-C25-C28
4	A	509	BNG	O1-C1'-C2'-C3'
6	A	510	DMU	C18-C19-C22-C25
5	C	505	1PE	OH6-C15-C25-OH5
6	A	510	DMU	C22-C25-C28-C31
4	A	507	BNG	O5-C5-C6-O6
4	C	506	BNG	O5-C5-C6-O6
5	A	508	1PE	OH4-C13-C23-OH3
6	D	201	DMU	C22-C25-C28-C31
5	A	508	1PE	OH5-C14-C24-OH4
6	A	510	DMU	C4-C3-O7-C10
4	C	504	BNG	C2'-C1'-O1-C1
6	D	201	DMU	C19-C18-O16-C6
4	A	504	BNG	C1'-C2'-C3'-C4'
5	C	505	1PE	C24-C14-OH5-C25
6	A	510	DMU	O6-C11-C9-C8
5	C	505	1PE	C14-C24-OH4-C13
6	B	201	DMU	C25-C28-C31-C34
6	D	201	DMU	C28-C31-C34-C37
5	A	508	1PE	C15-C25-OH5-C14
5	A	508	1PE	C16-C26-OH6-C15
4	A	506	BNG	O5-C1-O1-C1'
5	A	508	1PE	C14-C24-OH4-C13
6	B	201	DMU	C19-C22-C25-C28
4	C	504	BNG	C4-C5-C6-O6
6	B	201	DMU	C19-C18-O16-C6
5	A	508	1PE	C12-C22-OH3-C23
6	D	201	DMU	C31-C34-C37-C40
5	C	505	1PE	C12-C22-OH3-C23
6	B	201	DMU	O5-C6-O16-C18
5	A	508	1PE	C23-C13-OH4-C24
4	A	504	BNG	C2'-C3'-C4'-C5'
5	A	508	1PE	C24-C14-OH5-C25
4	A	503	BNG	C1'-C2'-C3'-C4'
6	B	201	DMU	C1-C6-O16-C18
5	C	505	1PE	C23-C13-OH4-C24
6	B	201	DMU	C28-C31-C34-C37

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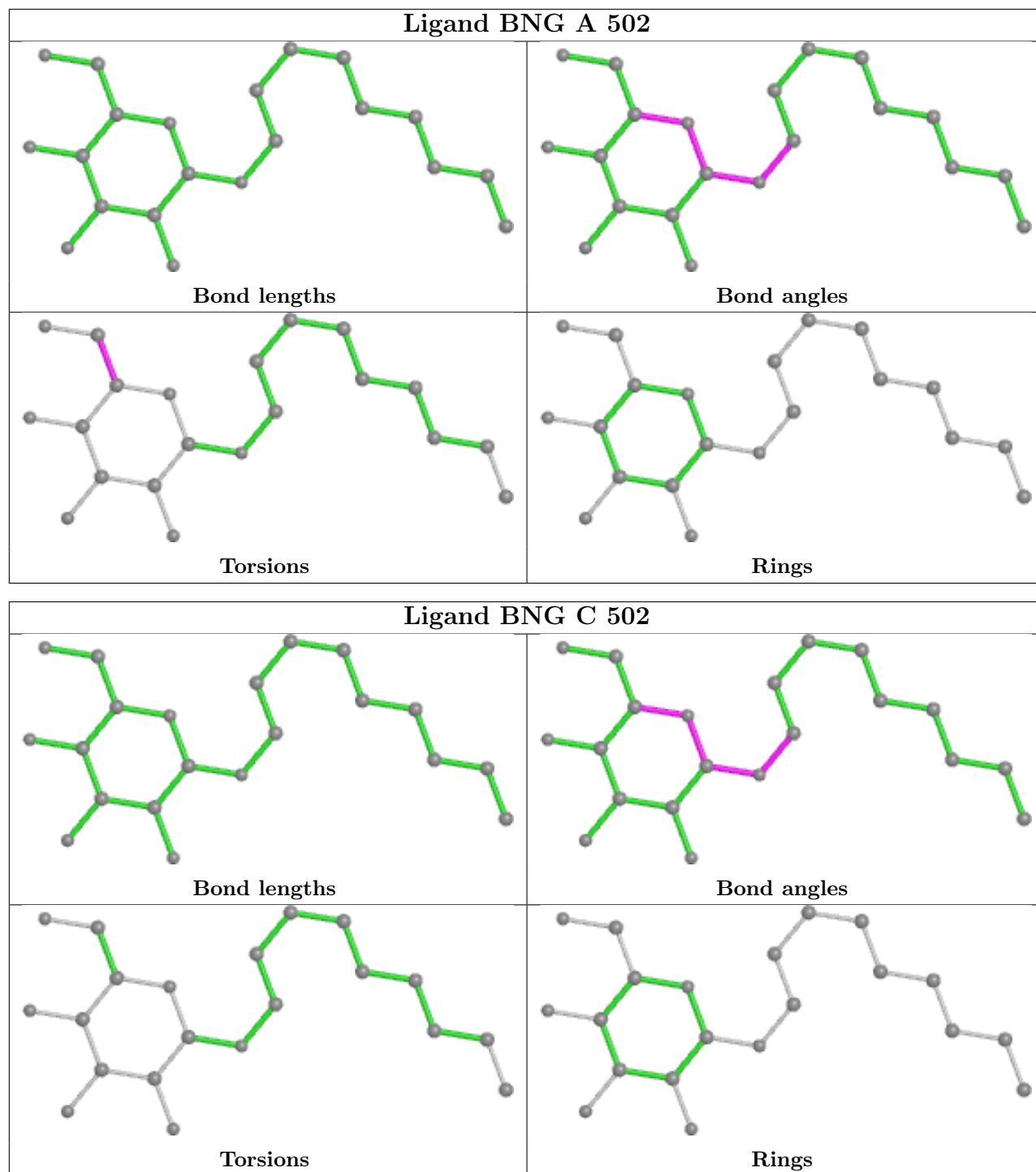
Mol	Chain	Res	Type	Atoms
5	C	505	1PE	OH7-C16-C26-OH6

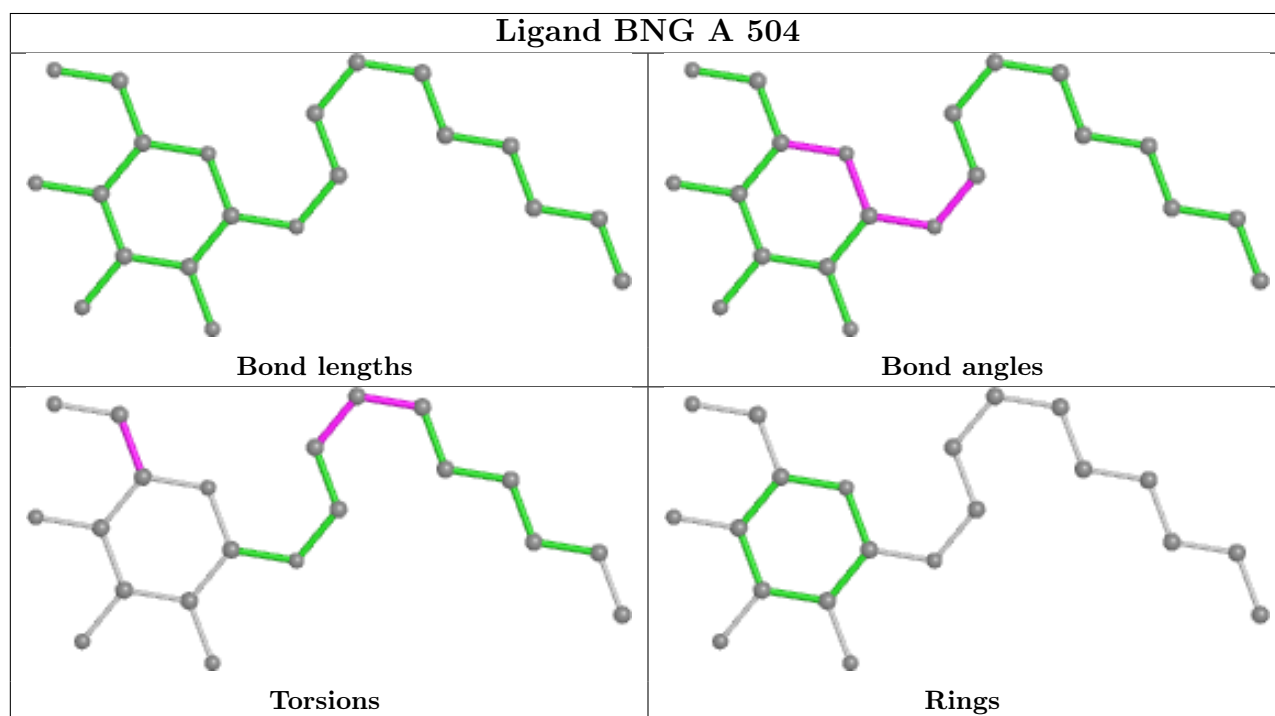
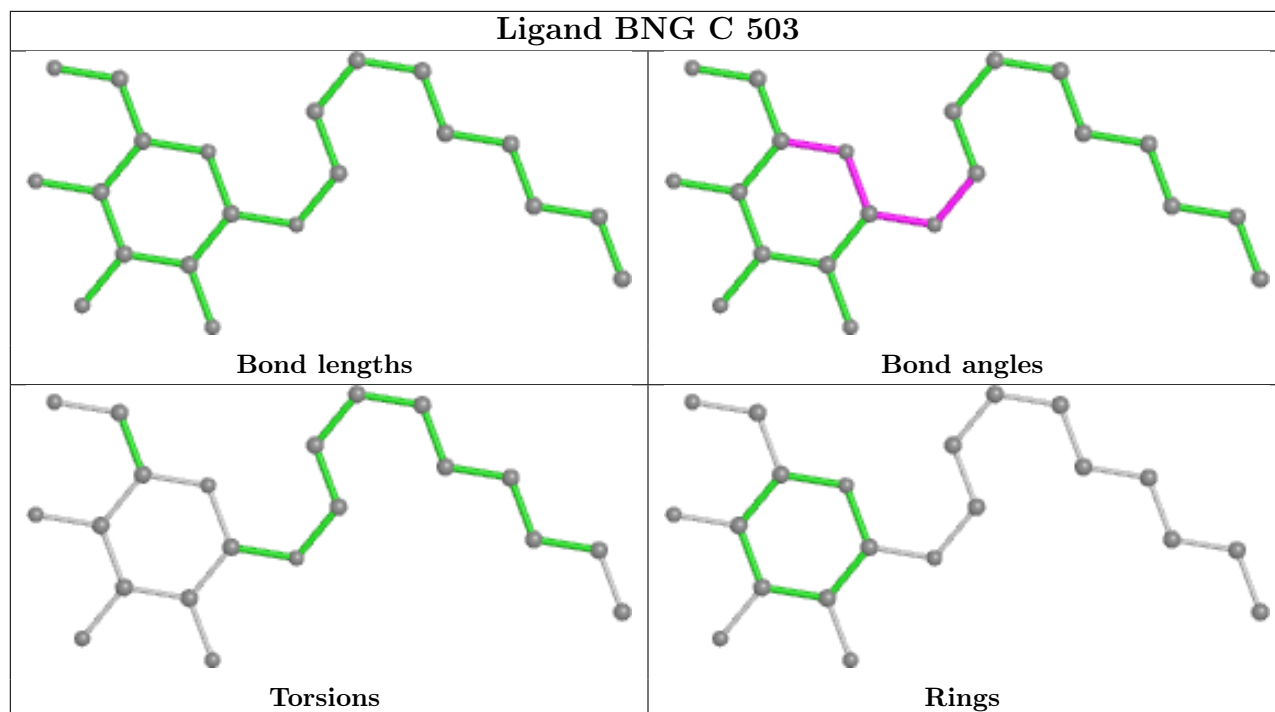
There are no ring outliers.

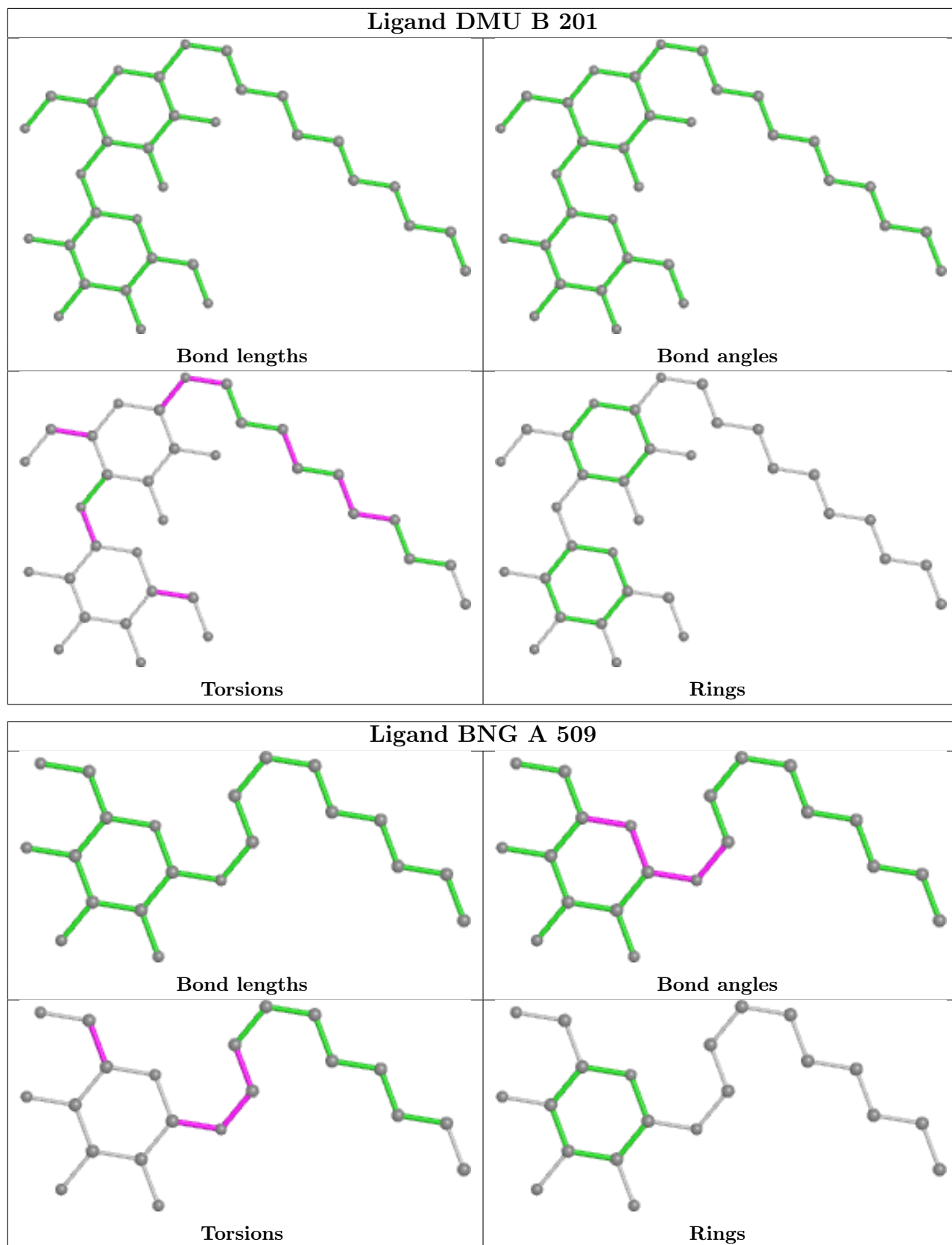
9 monomers are involved in 22 short contacts:

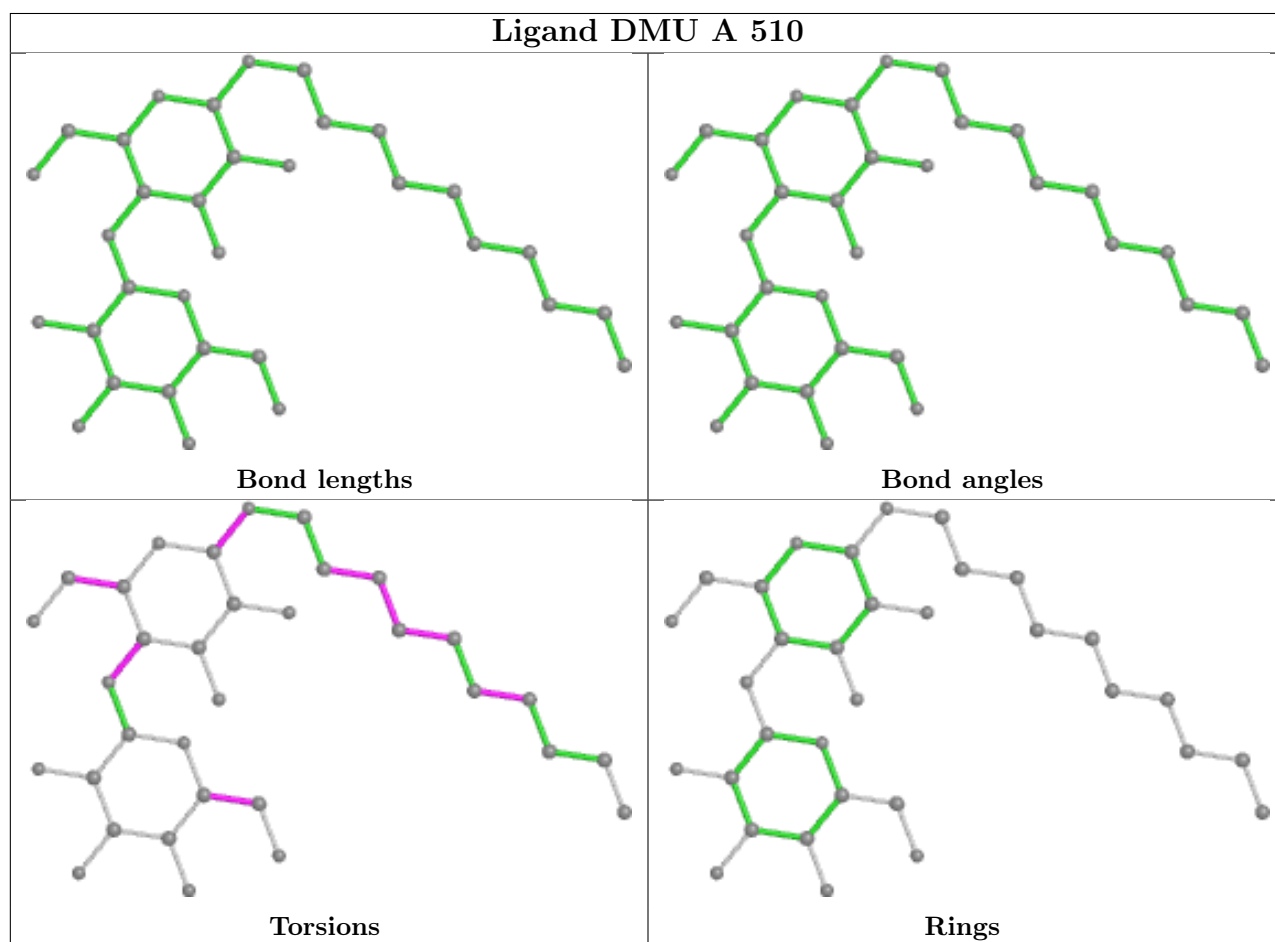
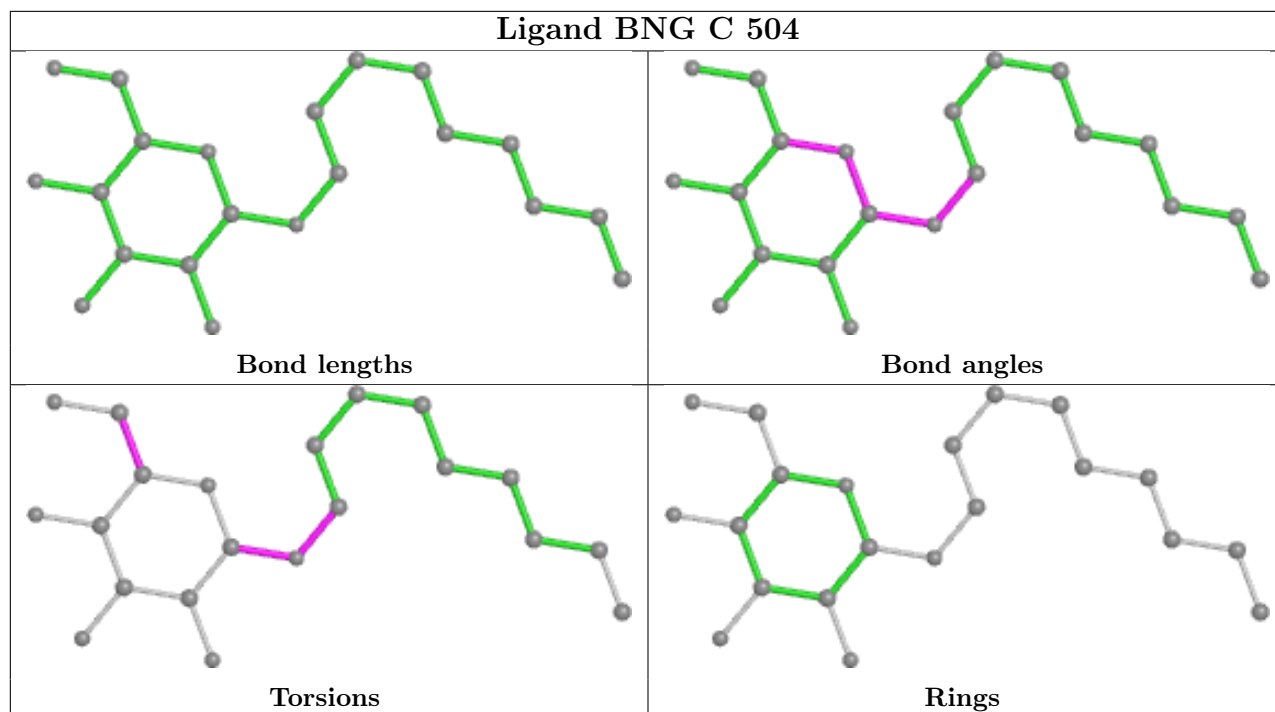
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	502	BNG	3	0
4	C	502	BNG	1	0
4	C	503	BNG	4	0
6	B	201	DMU	3	0
6	A	510	DMU	3	0
5	A	508	1PE	2	0
5	C	505	1PE	2	0
4	A	505	BNG	3	0
4	C	506	BNG	1	0

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.

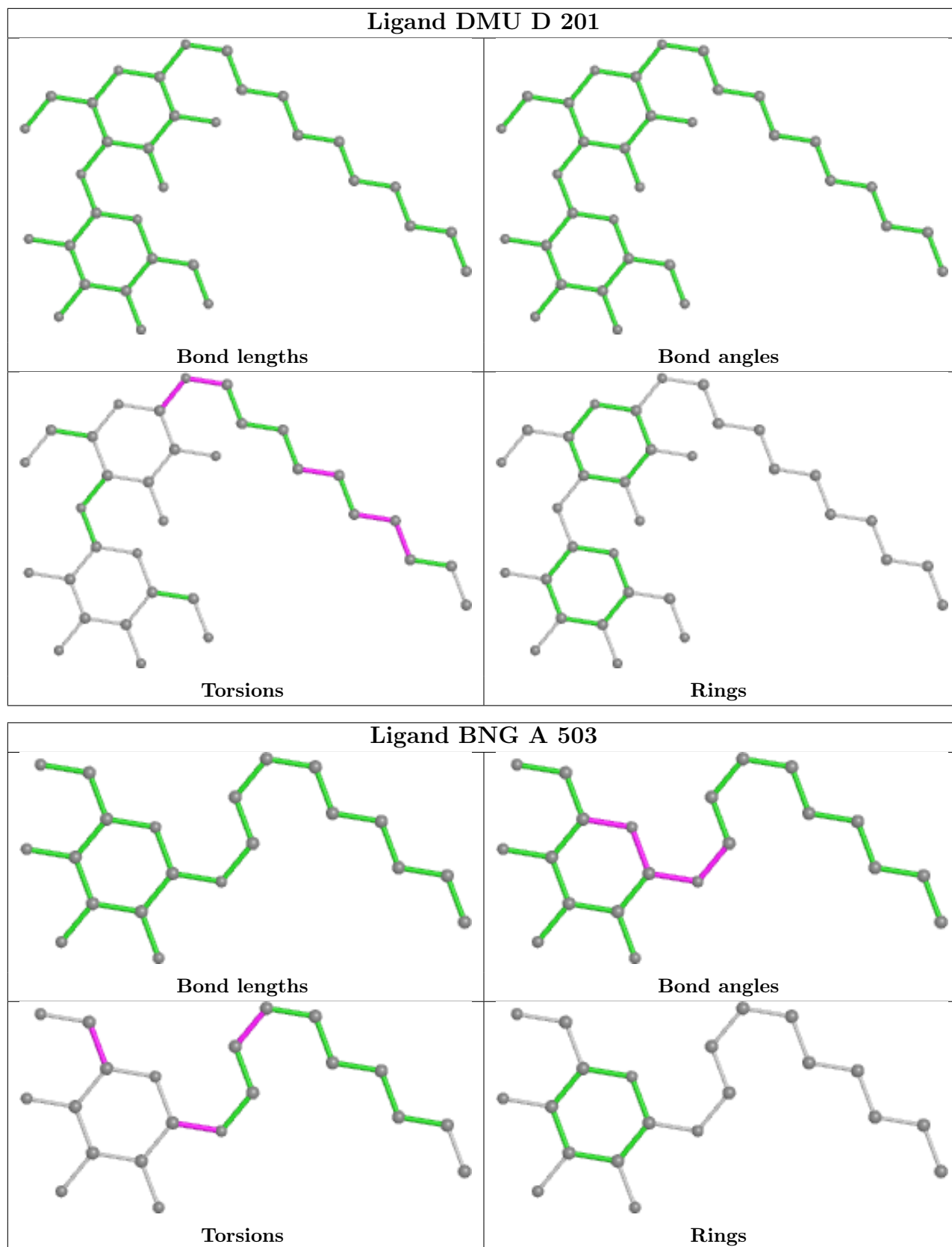


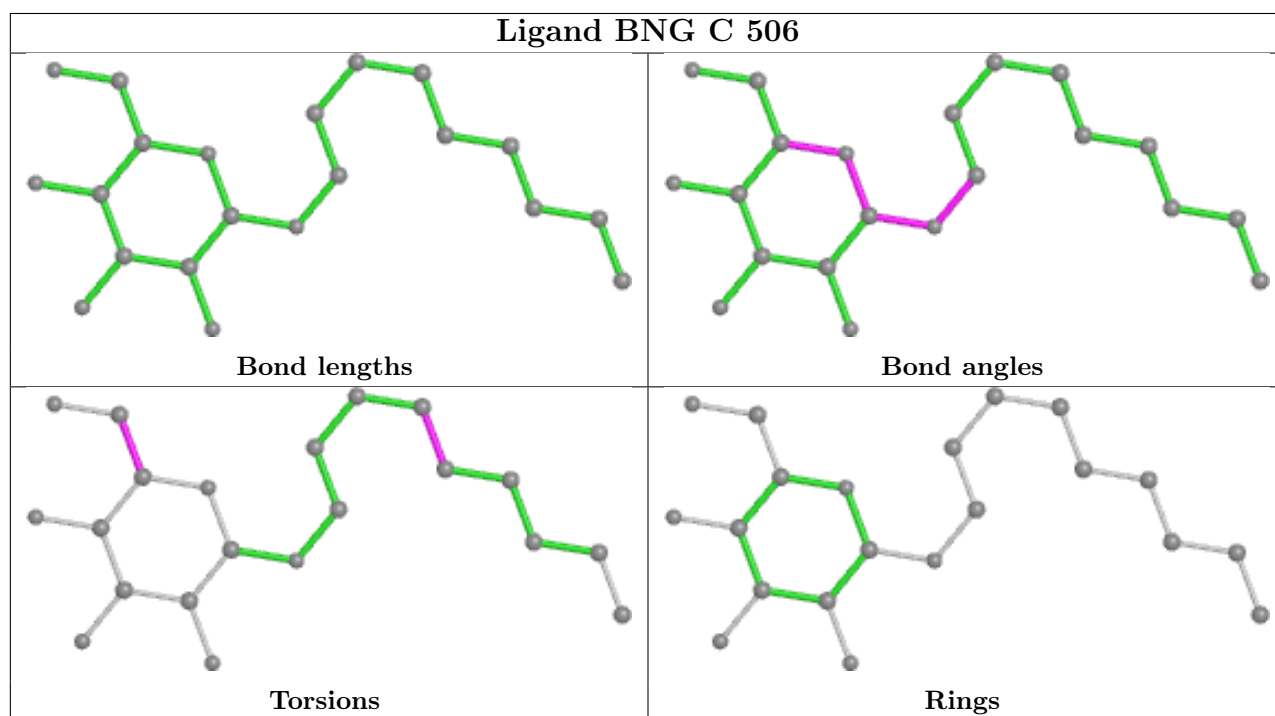
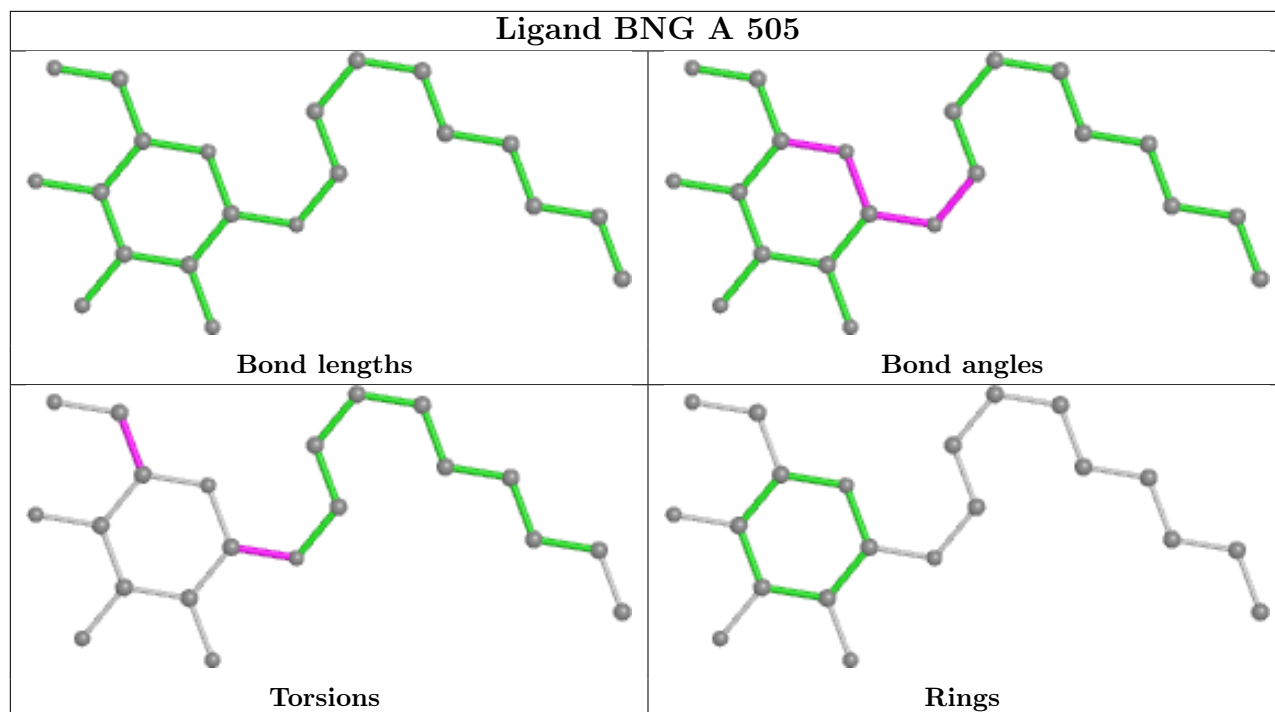


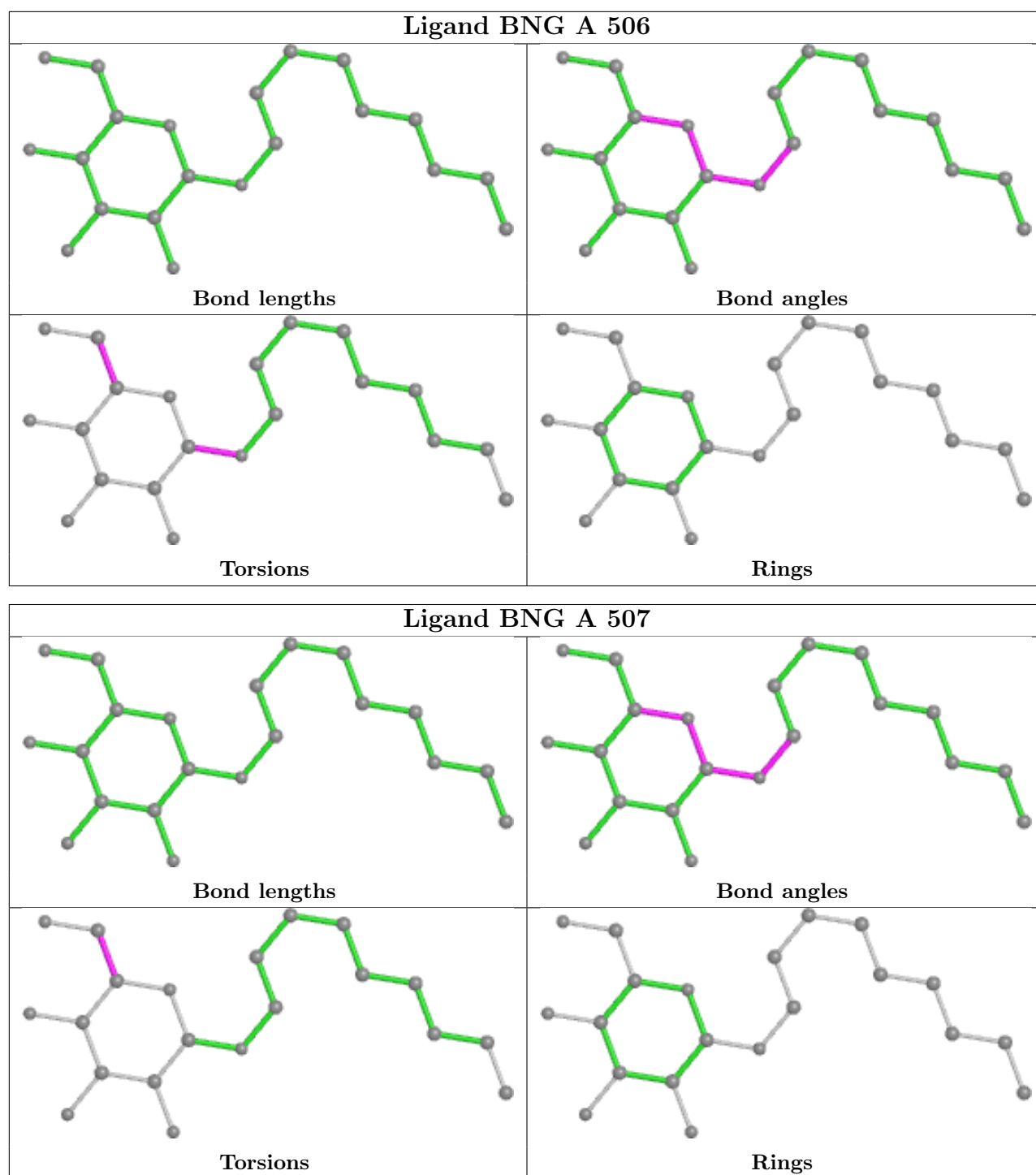












## 5.7 Other polymers [i](#)

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	410/437 (93%)	-0.43	5 (1%) 79 73	37, 61, 98, 129	0
1	C	409/437 (93%)	-0.39	4 (0%) 82 77	38, 65, 102, 143	0
2	B	127/154 (82%)	-0.44	0 100 100	46, 66, 94, 109	0
2	D	126/154 (81%)	-0.42	1 (0%) 86 81	50, 65, 92, 120	0
All	All	1072/1182 (90%)	-0.42	10 (0%) 84 79	37, 64, 101, 143	0

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	150	GLU	3.9
1	A	149	ALA	2.8
1	C	150	GLU	2.5
2	D	74	ASN	2.5
1	A	16	GLN	2.3
1	C	155	ASP	2.3
1	A	213	PHE	2.2
1	C	199	MET	2.1
1	C	388	GLU	2.1
1	A	151	GLY	2.0

### 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](#)

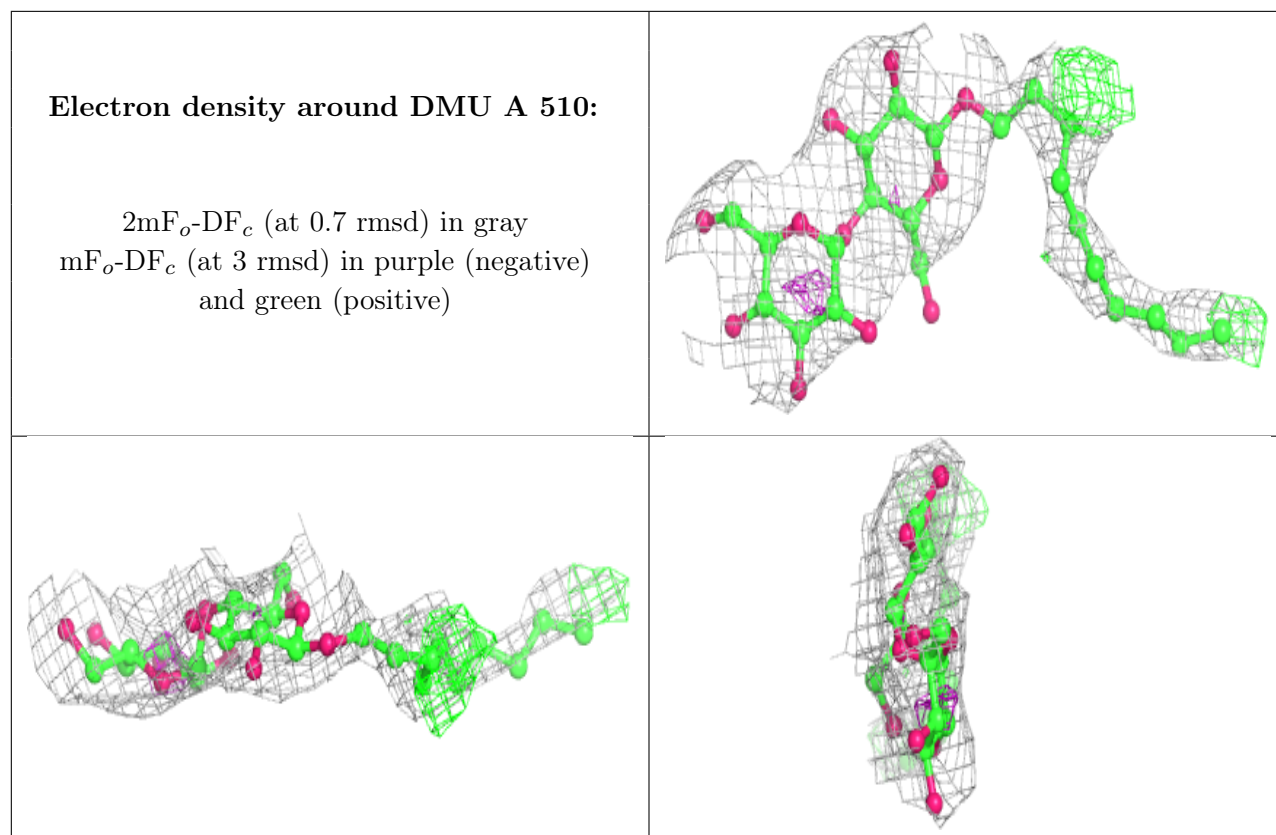
There are no monosaccharides in this entry.

## 6.4 Ligands

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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.

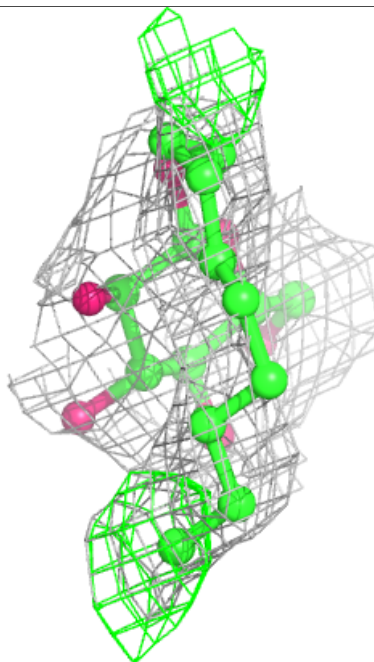
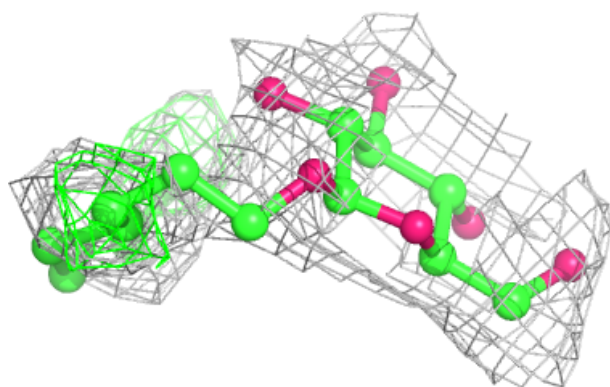
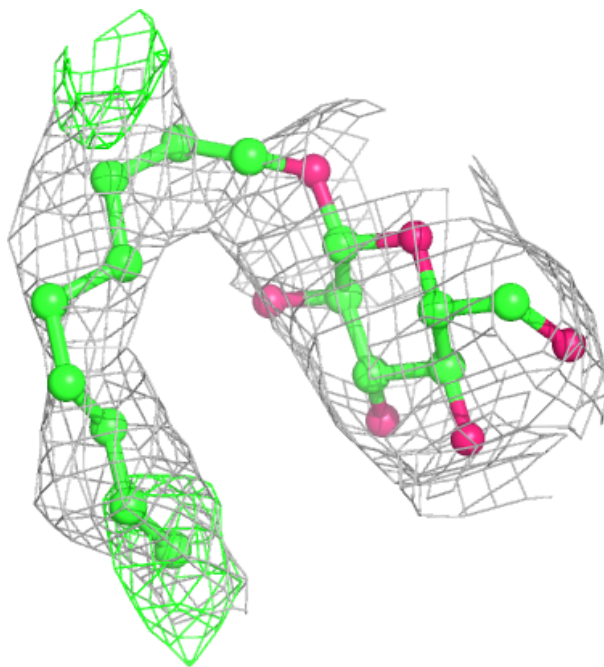
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
6	DMU	A	510	33/33	0.68	0.39	93,97,98,99	0
4	BNG	A	509	21/21	0.74	0.34	94,101,102,104	0
5	1PE	C	505	16/16	0.75	0.37	61,62,69,69	0
4	BNG	A	505	21/21	0.80	0.34	52,79,89,91	0
4	BNG	C	506	21/21	0.81	0.44	82,84,84,85	0
5	1PE	A	508	16/16	0.82	0.30	69,71,77,78	0
4	BNG	A	507	21/21	0.84	0.56	41,59,95,101	0
4	BNG	A	506	21/21	0.87	0.33	63,95,118,124	0
4	BNG	C	503	21/21	0.87	0.27	37,66,83,87	0
4	BNG	A	504	21/21	0.89	0.27	40,59,74,77	0
4	BNG	C	504	21/21	0.89	0.25	36,60,81,93	0
4	BNG	A	503	21/21	0.91	0.22	34,61,86,98	0
6	DMU	D	201	33/33	0.91	0.33	32,52,76,102	0
6	DMU	B	201	33/33	0.92	0.29	34,53,78,86	0
4	BNG	A	502	21/21	0.94	0.32	39,47,85,97	0
3	TRS	C	501	8/8	0.95	0.23	41,41,42,46	0
4	BNG	C	502	21/21	0.95	0.26	42,58,81,93	0
3	TRS	A	501	8/8	0.96	0.17	37,46,50,71	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.



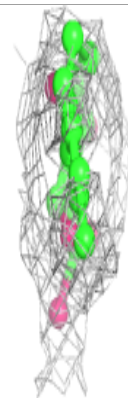
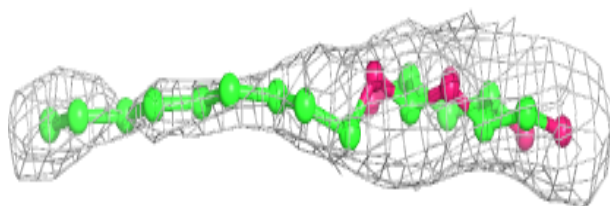
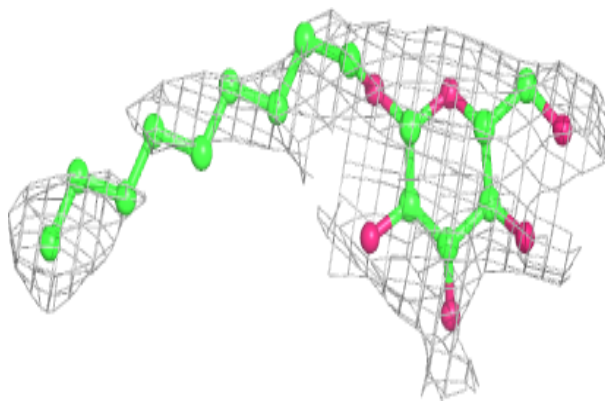
**Electron density around BNG A 509:**

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

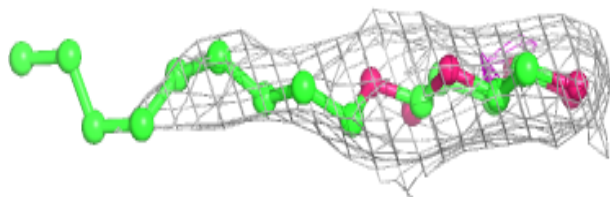
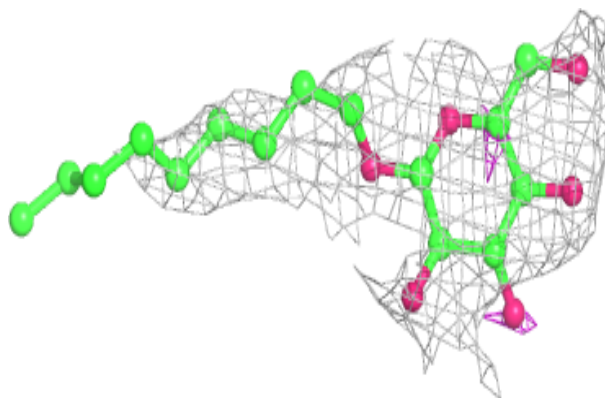


**Electron density around BNG A 505:**

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

**Electron density around BNG C 506:**

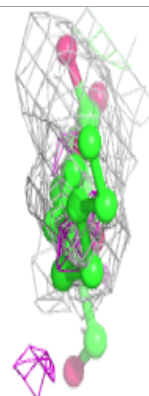
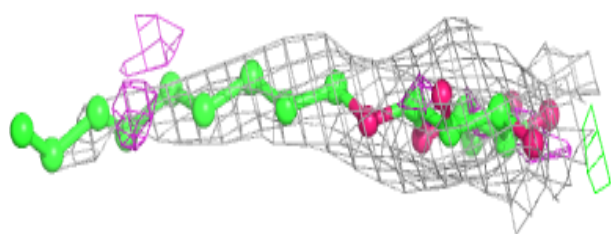
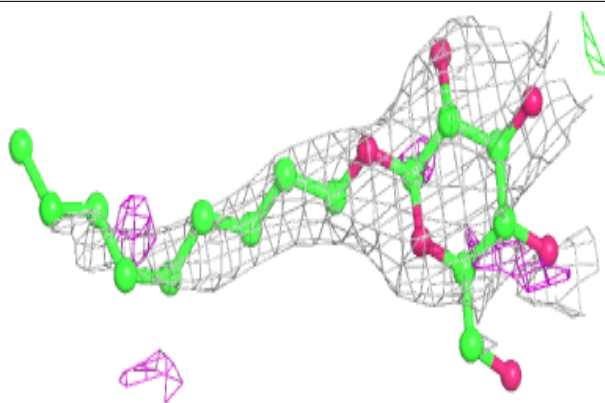
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



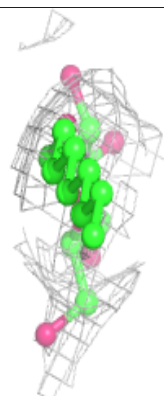
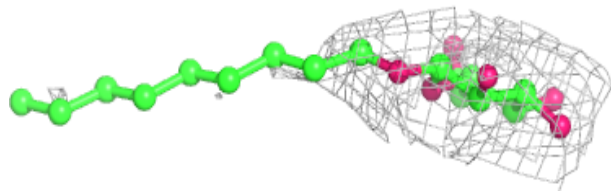
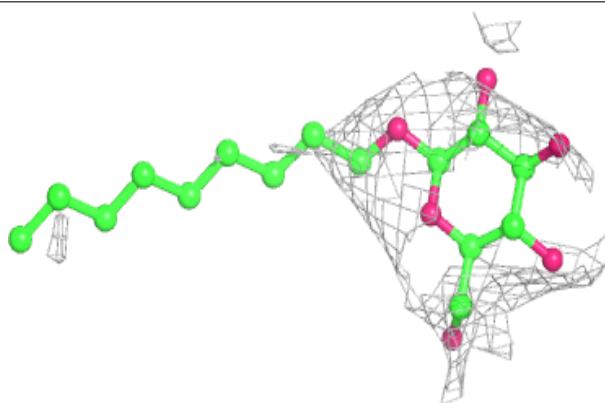


**Electron density around BNG A 507:**

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

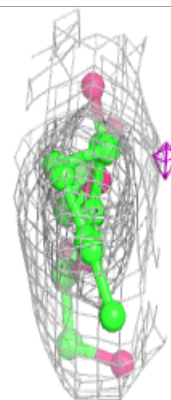
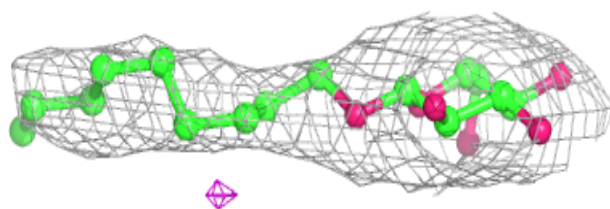
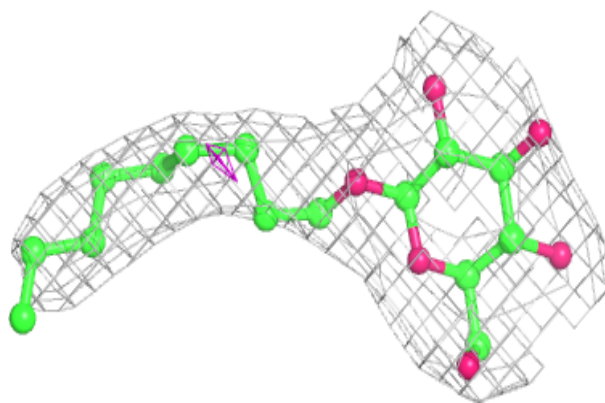
**Electron density around BNG A 506:**

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

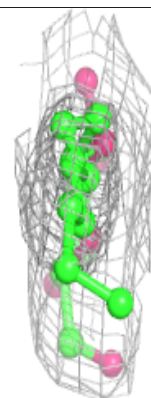
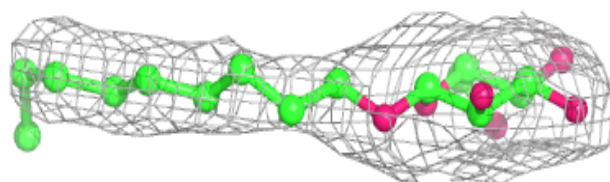
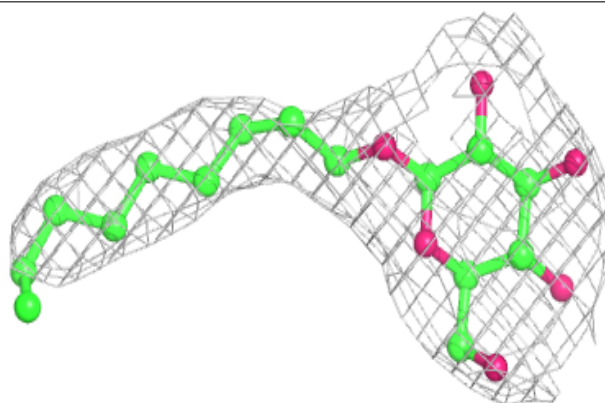


**Electron density around BNG C 503:**

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

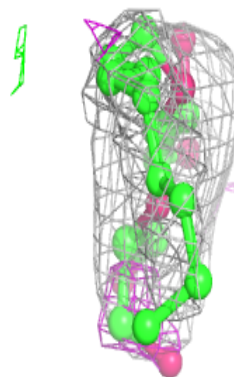
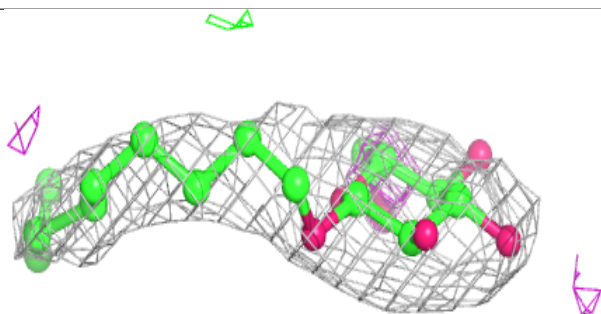
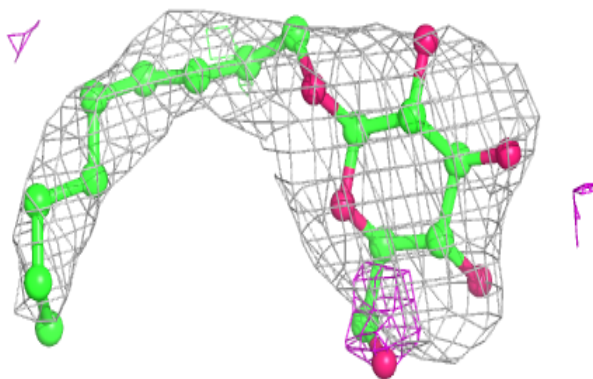
**Electron density around BNG A 504:**

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

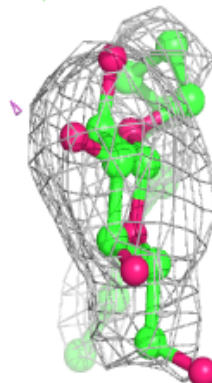
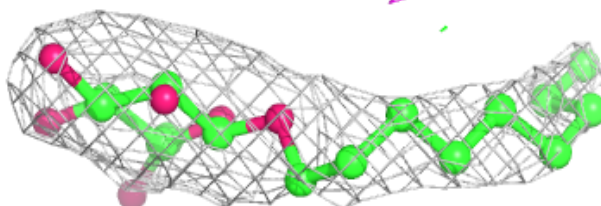
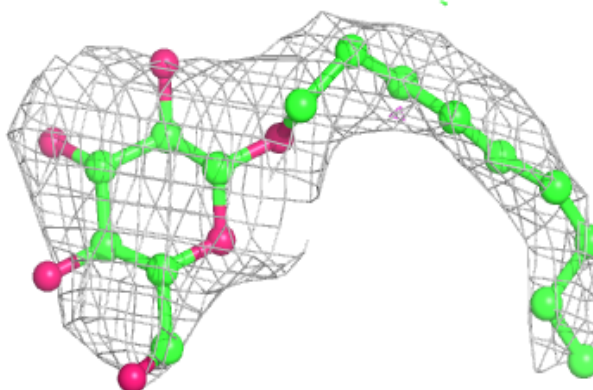


**Electron density around BNG C 504:**

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

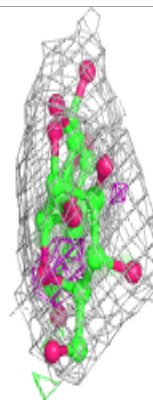
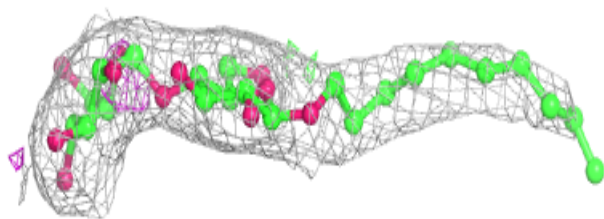
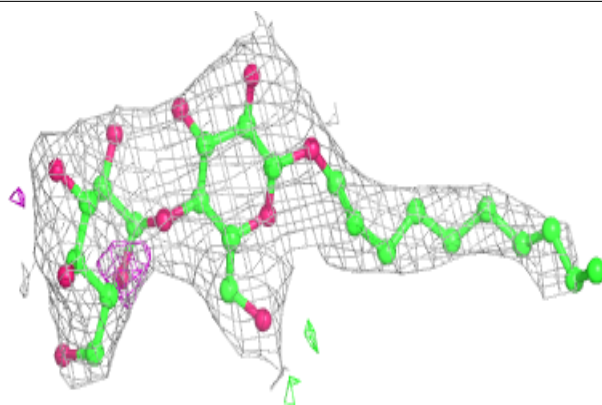
**Electron density around BNG A 503:**

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

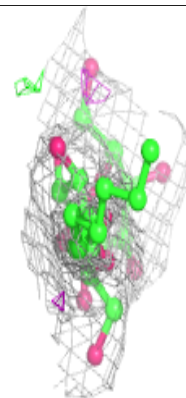
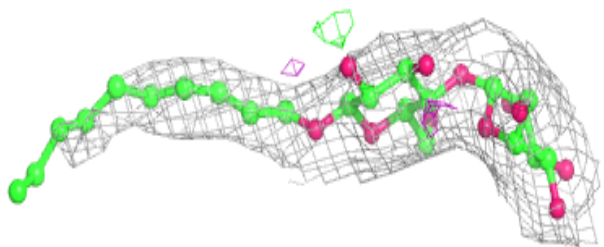
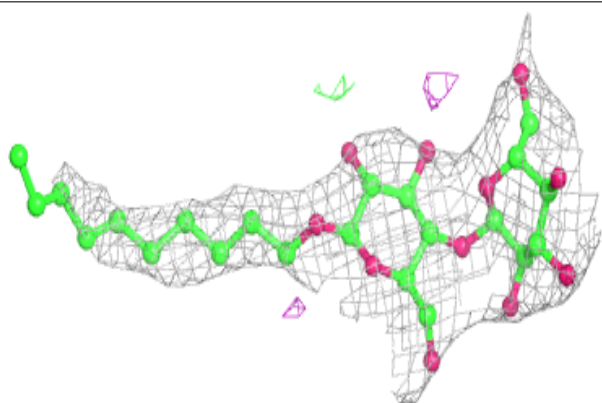


**Electron density around DMU D 201:**

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

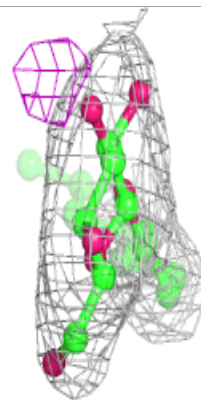
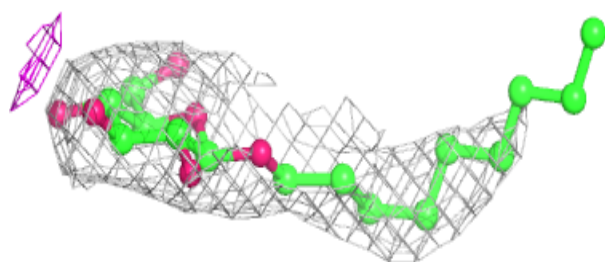
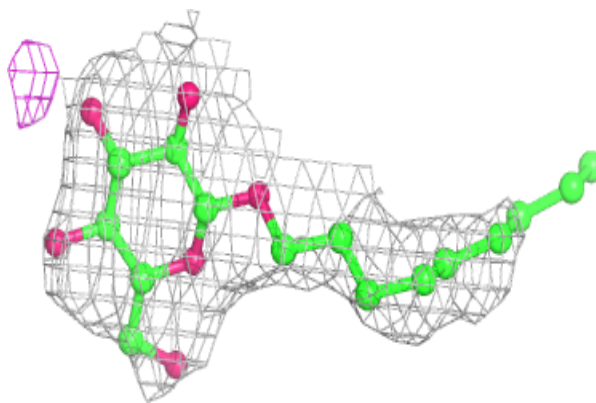
**Electron density around DMU B 201:**

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

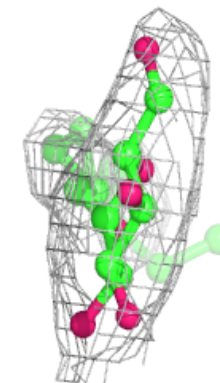
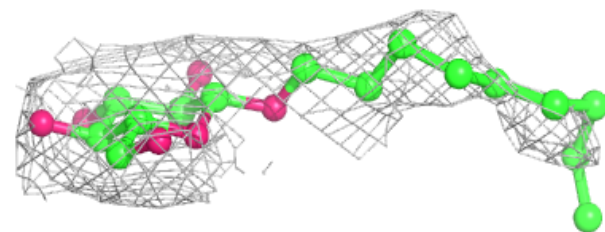
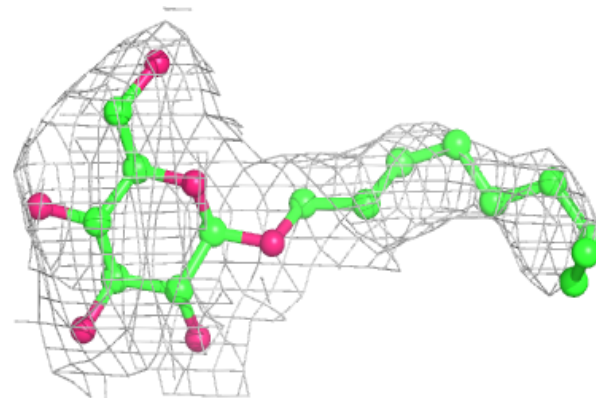


**Electron density around BNG A 502:**

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

**Electron density around BNG C 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.