



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 19, 2020 – 02:04 PM EDT

PDB ID : 6WK9
Title : Crystal structure of Gdx-Clo from Small Multidrug Resistance family of transporters in complex with octylguanidinium
Authors : Kermani, A.A.; Stockbridge, R.B.
Deposited on : 2020-04-15
Resolution : 2.32 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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.14.6
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) : 2.14.6

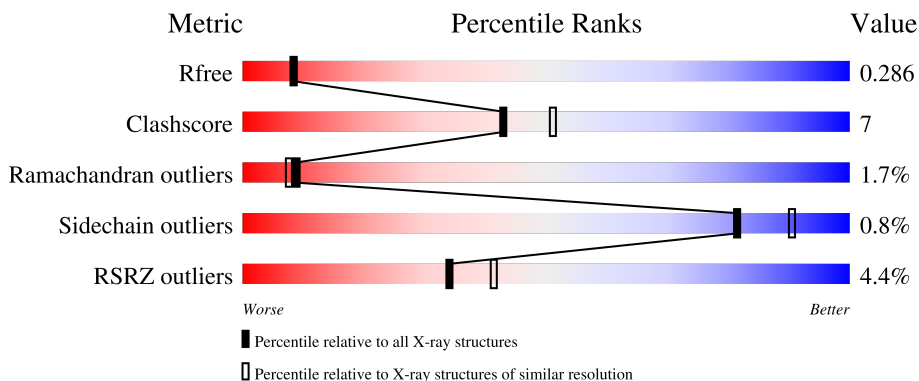
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.32 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.



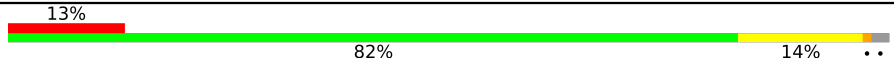


Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5974 (2.34-2.30)
Clashscore	141614	6604 (2.34-2.30)
Ramachandran outliers	138981	6523 (2.34-2.30)
Sidechain outliers	138945	6523 (2.34-2.30)
RSRZ outliers	127900	5855 (2.34-2.30)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	105	 80% 18% ..
1	B	105	 70% 28% ..
1	E	105	 89% 10% ..
1	F	105	 74% 24% ..
2	C	91	 81% 18% ..

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Mol	Chain	Length	Quality of chain
2	D	91	 13% 82% 14% ..
2	G	91	 78% 21% .
2	H	91	 10% 85% 12% ..

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 6262 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.

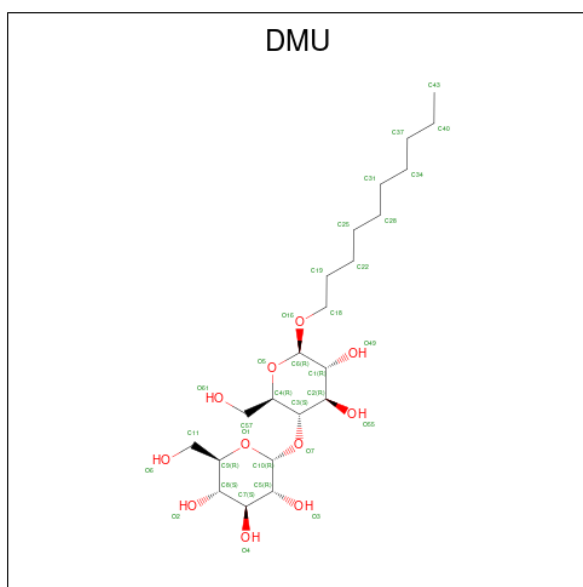
- Molecule 1 is a protein called Multidrug resistance protein, SMR family.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	B	104	792	541	119	127	5	0	0	0
1	A	104	792	541	119	127	5	0	0	0
1	F	104	792	541	119	127	5	0	0	0
1	E	104	792	541	119	127	5	0	0	0

- Molecule 2 is a protein called L10 monobody.

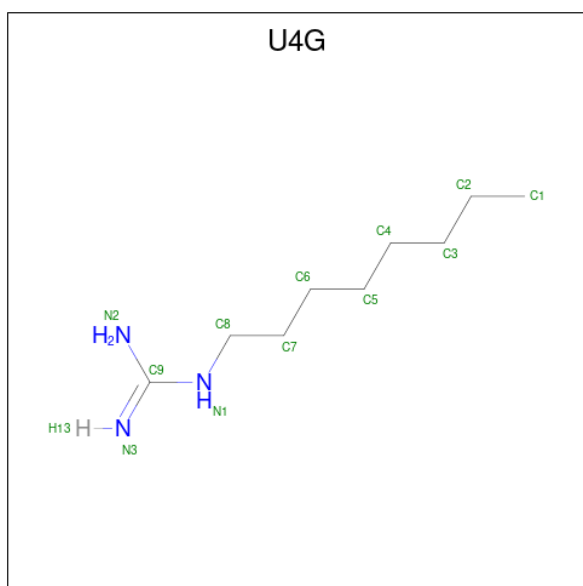
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	C	90	697	451	107	139	0	0	0
2	D	89	691	448	106	137	0	0	0
2	G	90	697	451	107	139	0	0	0
2	H	89	691	448	106	137	0	0	0

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



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			33	22	11		
3	C	1	Total	C	O	0	0
			33	22	11		
3	F	1	Total	C	O	0	0
			33	22	11		
3	G	1	Total	C	O	0	0
			33	22	11		

- Molecule 4 is N-octylguanidine (three-letter code: U4G) (formula: $C_9H_{21}N_3$) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total C N 12 9 3	0	0
4	B	1	Total C N 12 9 3	0	0
4	A	1	Total C N 12 9 3	0	0
4	C	1	Total C N 12 9 3	0	0
4	C	1	Total C N 12 9 3	0	0
4	C	1	Total C N 12 9 3	0	0
4	F	1	Total C N 12 9 3	0	0
4	F	1	Total C N 12 9 3	0	0
4	E	1	Total C N 12 9 3	0	0
4	G	1	Total C N 12 9 3	0	0
4	G	1	Total C N 12 9 3	0	0

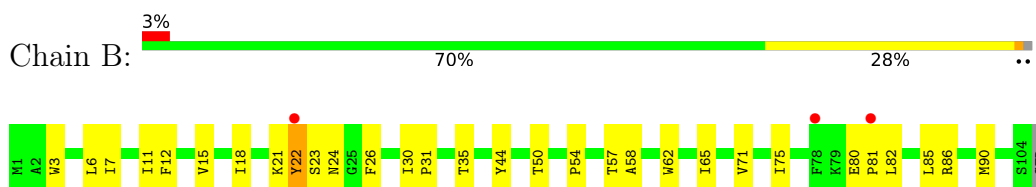
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	10	Total O 10 10	0	0
5	A	1	Total O 1 1	0	0
5	C	10	Total O 10 10	0	0
5	D	6	Total O 6 6	0	0
5	F	10	Total O 10 10	0	0
5	E	1	Total O 1 1	0	0
5	G	11	Total O 11 11	0	0
5	H	5	Total O 5 5	0	0

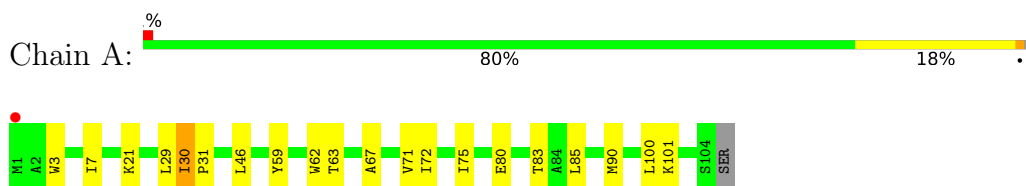
3 Residue-property plots [i](#)

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 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.

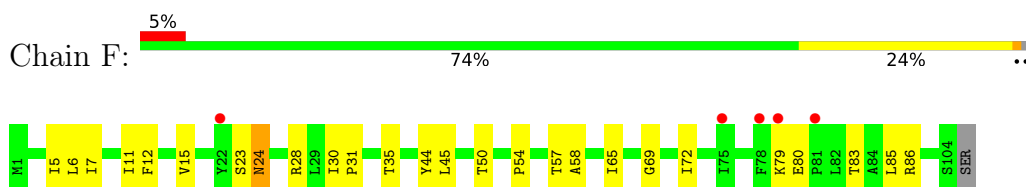
- Molecule 1: Multidrug resistance protein, SMR family



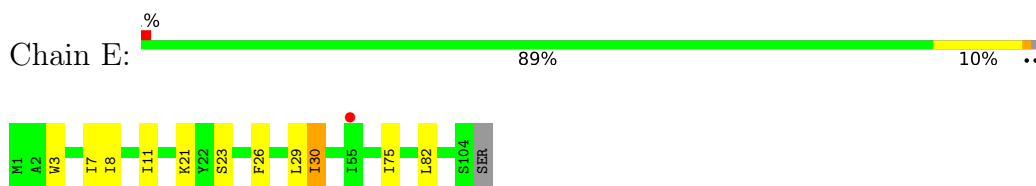
- Molecule 1: Multidrug resistance protein, SMR family



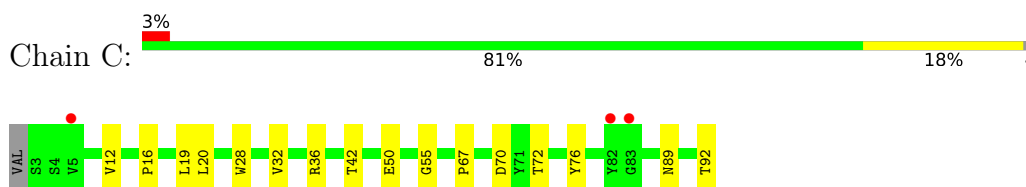
- Molecule 1: Multidrug resistance protein, SMR family



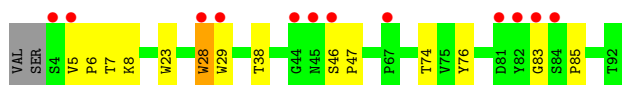
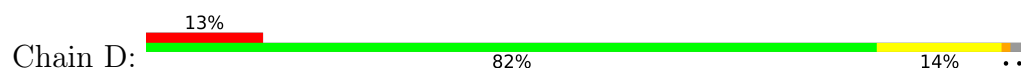
- Molecule 1: Multidrug resistance protein, SMR family



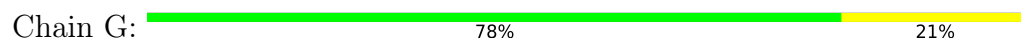
- Molecule 2: L10 monobody



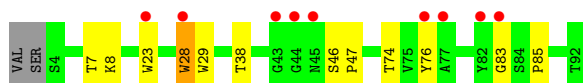
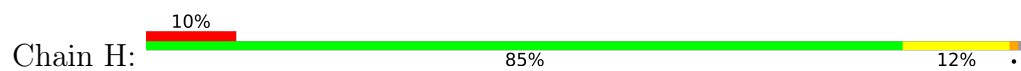
- Molecule 2: L10 monobody



- Molecule 2: L10 monobody



- Molecule 2: L10 monobody



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	51.04Å 75.83Å 109.12Å 92.54° 90.04° 109.63°	Depositor
Resolution (Å)	33.01 – 2.32 33.01 – 2.32	Depositor EDS
% Data completeness (in resolution range)	37.7 (33.01-2.32) 37.7 (33.01-2.32)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.03 (at 2.31Å)	Xtriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, R_{free}	0.246 , 0.286 0.245 , 0.286	Depositor DCC
R_{free} test set	1325 reflections (5.30%)	wwPDB-VP
Wilson B-factor (Å ²)	40.0	Xtriage
Anisotropy	0.075	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 11.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.427 for h,-h-k,-l 0.000 for -h,-k,l 0.000 for -h,h+k,-l	Xtriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	6262	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.73% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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, U4G

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	0/809	0.42	0/1101
1	B	0.24	0/809	0.40	0/1101
1	E	0.23	0/809	0.41	0/1101
1	F	0.26	0/809	0.40	0/1101
2	C	0.24	0/721	0.46	0/996
2	D	0.25	0/715	0.48	0/988
2	G	0.25	0/721	0.48	0/996
2	H	0.25	0/715	0.49	0/988
All	All	0.25	0/6108	0.44	0/8372

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	792	0	873	15	0
1	B	792	0	873	20	0
1	E	792	0	873	6	0
1	F	792	0	873	15	0
2	C	697	0	661	11	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	691	0	656	5	0
2	G	697	0	661	11	0
2	H	691	0	656	5	0
3	B	33	0	42	2	0
3	C	33	0	42	2	0
3	F	33	0	42	1	0
3	G	33	0	42	0	0
4	A	12	0	0	0	0
4	B	24	0	0	0	0
4	C	36	0	0	0	0
4	E	12	0	0	0	0
4	F	24	0	0	0	0
4	G	24	0	0	1	0
5	A	1	0	0	0	0
5	B	10	0	0	0	0
5	C	10	0	0	1	0
5	D	6	0	0	0	0
5	E	1	0	0	0	0
5	F	10	0	0	0	0
5	G	11	0	0	0	0
5	H	5	0	0	0	0
All	All	6262	0	6294	85	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 7.

All (85) 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:7:ILE:HA	1:B:65:ILE:HD13	1.73	0.71
2:C:36:ARG:HG2	2:C:76:TYR:HB2	1.75	0.67
1:F:7:ILE:HA	1:F:65:ILE:HD13	1.80	0.64
2:G:42:THR:HB	2:G:72:THR:HG23	1.77	0.64
2:G:55:GLY:O	4:G:503:U4G:N3	2.32	0.62
1:F:12:PHE:HA	1:F:15:VAL:HG22	1.82	0.62
2:D:38:THR:OG1	2:D:74:THR:OG1	2.17	0.61
2:H:38:THR:OG1	2:H:74:THR:OG1	2.18	0.60
2:C:36:ARG:NH1	5:C:201:HOH:O	2.35	0.59
1:A:75:ILE:HA	1:A:80:GLU:H	1.67	0.59
2:G:9:LEU:HB2	2:G:86:ILE:HD13	1.84	0.59
1:E:8:ILE:HD13	1:E:11:ILE:HD12	1.86	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:42:THR:HB	2:C:72:THR:HG23	1.86	0.56
1:A:30:ILE:HD13	2:C:28:TRP:HE3	1.71	0.56
1:B:12:PHE:HA	1:B:15:VAL:HG22	1.88	0.55
1:B:23:SER:HB2	1:B:31:PRO:HB2	1.89	0.54
1:B:44:TYR:HD1	3:B:201:DMU:H14	1.73	0.54
1:B:80:GLU:HG2	1:B:81:PRO:HD2	1.90	0.53
2:C:16:PRO:HB3	2:C:67:PRO:HB3	1.91	0.53
2:D:28:TRP:HB3	2:D:29:TRP:CE3	2.45	0.52
1:F:50:THR:O	1:E:21:LYS:NZ	2.36	0.52
2:H:28:TRP:HB3	2:H:29:TRP:CE3	2.45	0.51
1:B:50:THR:O	1:A:21:LYS:NZ	2.38	0.50
1:A:72:ILE:O	1:A:75:ILE:HG13	2.12	0.50
1:F:83:THR:HB	1:F:86:ARG:HG3	1.93	0.49
2:G:20:LEU:HD13	2:G:61:THR:HG22	1.94	0.49
2:C:19:LEU:HD21	2:C:92:THR:HG22	1.94	0.49
1:A:46:LEU:HD21	1:A:59:TYR:HE1	1.77	0.48
1:B:24:ASN:O	1:B:26:PHE:N	2.41	0.48
1:B:54:PRO:HG2	1:B:57:THR:HB	1.94	0.48
2:G:8:LYS:O	2:G:23:TRP:HA	2.13	0.48
1:A:3:TRP:O	1:A:7:ILE:HG12	2.13	0.48
2:G:16:PRO:HB3	2:G:67:PRO:HB3	1.95	0.48
1:B:3:TRP:O	1:B:7:ILE:HG12	2.13	0.48
1:E:3:TRP:O	1:E:7:ILE:HG12	2.13	0.47
1:B:31:PRO:O	1:B:35:THR:HG23	2.14	0.47
1:F:31:PRO:O	1:F:35:THR:HG23	2.14	0.47
1:B:11:ILE:O	1:B:15:VAL:HG13	2.13	0.47
1:A:83:THR:HG22	1:A:85:LEU:H	1.80	0.47
2:C:12:VAL:N	2:C:20:LEU:O	2.48	0.47
3:B:201:DMU:H9	3:C:103:DMU:H10	1.97	0.46
1:F:23:SER:HB2	1:F:31:PRO:HB2	1.97	0.46
1:B:71:VAL:HG13	1:B:86:ARG:HH21	1.80	0.46
1:F:83:THR:HG22	1:F:85:LEU:H	1.81	0.46
1:F:44:TYR:HD1	3:F:201:DMU:H15	1.81	0.46
1:A:46:LEU:HD21	1:A:59:TYR:CE1	2.51	0.46
1:F:54:PRO:HG2	1:F:57:THR:HB	1.98	0.45
1:B:75:ILE:HD13	1:B:82:LEU:HD13	1.97	0.45
1:F:24:ASN:OD1	1:F:28:ARG:NH2	2.50	0.45
1:B:6:LEU:HD11	1:B:58:ALA:HA	1.98	0.45
1:A:63:THR:HG21	1:A:101:LYS:HE3	1.98	0.45
2:C:36:ARG:HD2	2:C:50:GLU:OE2	2.18	0.44
1:B:18:ILE:HA	1:B:21:LYS:HE3	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:6:LEU:HD11	1:F:58:ALA:HA	1.98	0.44
3:C:103:DMU:H11	3:C:103:DMU:H17	1.54	0.44
1:A:29:LEU:O	1:A:30:ILE:HB	2.18	0.44
2:G:70:ASP:HA	2:G:91:ARG:HA	1.98	0.44
1:E:29:LEU:O	1:E:30:ILE:HB	2.18	0.44
1:A:46:LEU:HD22	1:A:62:TRP:CE2	2.53	0.43
2:D:76:TYR:CD1	2:D:85:PRO:HB3	2.53	0.43
1:F:5:ILE:HG23	1:F:45:LEU:HB3	1.99	0.43
2:G:32:VAL:O	2:G:55:GLY:HA3	2.19	0.43
2:H:76:TYR:CD1	2:H:85:PRO:HB3	2.54	0.43
2:C:32:VAL:O	2:C:55:GLY:HA3	2.19	0.43
2:D:8:LYS:O	2:D:23:TRP:HA	2.18	0.43
2:G:4:SER:HB2	2:G:83:GLY:HA3	2.01	0.43
1:B:22:TYR:HD1	1:B:22:TYR:HA	1.68	0.42
1:E:75:ILE:HD13	1:E:82:LEU:HD13	2.01	0.42
1:A:30:ILE:HB	1:A:31:PRO:HD3	2.01	0.42
2:H:8:LYS:O	2:H:23:TRP:HA	2.19	0.42
1:B:6:LEU:HD22	1:B:62:TRP:HB2	2.01	0.42
1:A:67:ALA:O	1:A:71:VAL:HG23	2.20	0.41
2:D:5:VAL:HA	2:D:6:PRO:HA	1.91	0.41
1:E:23:SER:HB3	1:E:26:PHE:HA	2.03	0.41
1:A:29:LEU:H	2:C:32:VAL:HA	1.85	0.41
1:B:90:MET:HG2	1:A:100:LEU:HD11	2.01	0.41
1:F:69:GLY:HA2	1:F:72:ILE:HG22	2.03	0.41
1:B:85:LEU:HA	1:B:85:LEU:HD23	1.89	0.41
1:F:7:ILE:O	1:F:11:ILE:HG12	2.20	0.41
2:G:38:THR:HG23	2:G:48:VAL:HB	2.01	0.41
2:G:72:THR:HG22	2:G:89:ASN:OD1	2.21	0.41
1:B:30:ILE:HB	1:B:31:PRO:HD3	2.03	0.41
2:C:42:THR:HG22	2:C:70:ASP:O	2.20	0.41
1:F:30:ILE:HB	1:F:31:PRO:HD3	2.04	0.40
2:H:28:TRP:HE3	2:H:29:TRP:HB3	1.87	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	102/105 (97%)	99 (97%)	2 (2%)	1 (1%)	15	17
1	B	102/105 (97%)	99 (97%)	3 (3%)	0	100	100
1	E	102/105 (97%)	98 (96%)	3 (3%)	1 (1%)	15	17
1	F	102/105 (97%)	96 (94%)	3 (3%)	3 (3%)	4	2
2	C	88/91 (97%)	84 (96%)	4 (4%)	0	100	100
2	D	87/91 (96%)	76 (87%)	7 (8%)	4 (5%)	2	1
2	G	88/91 (97%)	83 (94%)	5 (6%)	0	100	100
2	H	87/91 (96%)	78 (90%)	5 (6%)	4 (5%)	2	1
All	All	758/784 (97%)	713 (94%)	32 (4%)	13 (2%)	9	7

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	30	ILE
2	D	46	SER
1	E	30	ILE
2	H	46	SER
1	F	24	ASN
2	D	28	TRP
2	D	47	PRO
1	F	79	LYS
2	H	28	TRP
2	H	47	PRO
2	D	83	GLY
2	H	83	GLY
1	F	80	GLU

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	83/84 (99%)	82 (99%)	1 (1%)	71	83
1	B	83/84 (99%)	82 (99%)	1 (1%)	71	83
1	E	83/84 (99%)	83 (100%)	0	100	100
1	F	83/84 (99%)	83 (100%)	0	100	100
2	C	77/78 (99%)	76 (99%)	1 (1%)	69	81
2	D	76/78 (97%)	75 (99%)	1 (1%)	69	81
2	G	77/78 (99%)	77 (100%)	0	100	100
2	H	76/78 (97%)	75 (99%)	1 (1%)	69	81
All	All	638/648 (98%)	633 (99%)	5 (1%)	81	90

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	22	TYR
1	A	90	MET
2	C	89	ASN
2	D	7	THR
2	H	7	THR

Some 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](#)

15 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	U4G	B	203	-	11,11,11	2.07	2 (18%)	10,11,11	0.45	0
3	DMU	C	103	-	34,34,34	1.47	7 (20%)	45,45,45	1.23	4 (8%)
4	U4G	F	203	-	11,11,11	2.08	2 (18%)	10,11,11	0.44	0
4	U4G	C	101	-	11,11,11	2.08	2 (18%)	10,11,11	0.40	0
4	U4G	C	102	-	11,11,11	2.09	2 (18%)	10,11,11	0.36	0
3	DMU	B	201	-	34,34,34	1.50	8 (23%)	45,45,45	1.10	4 (8%)
4	U4G	A	201	-	11,11,11	2.09	2 (18%)	10,11,11	0.41	0
3	DMU	G	501	-	34,34,34	1.52	7 (20%)	45,45,45	1.13	3 (6%)
4	U4G	E	201	-	11,11,11	2.09	2 (18%)	10,11,11	0.39	0
4	U4G	B	202	-	11,11,11	2.09	2 (18%)	10,11,11	0.41	0
4	U4G	G	502	-	11,11,11	2.09	2 (18%)	10,11,11	0.36	0
4	U4G	C	104	-	11,11,11	2.07	2 (18%)	10,11,11	0.37	0
4	U4G	G	503	-	11,11,11	2.08	2 (18%)	10,11,11	0.36	0
4	U4G	F	202	-	11,11,11	2.06	2 (18%)	10,11,11	0.48	0
3	DMU	F	201	-	34,34,34	1.54	9 (26%)	45,45,45	1.11	2 (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
4	U4G	B	203	-	-	2/9/9/9	-
3	DMU	C	103	-	-	9/19/59/59	0/2/2/2
4	U4G	F	203	-	-	4/9/9/9	-
4	U4G	C	101	-	-	2/9/9/9	-
4	U4G	C	102	-	-	4/9/9/9	-
3	DMU	B	201	-	-	8/19/59/59	0/2/2/2
4	U4G	A	201	-	-	2/9/9/9	-
3	DMU	G	501	-	-	8/19/59/59	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	U4G	E	201	-	-	3/9/9/9	-
4	U4G	B	202	-	-	1/9/9/9	-
4	U4G	G	502	-	-	3/9/9/9	-
4	U4G	C	104	-	-	4/9/9/9	-
4	U4G	G	503	-	-	4/9/9/9	-
4	U4G	F	202	-	-	3/9/9/9	-
3	DMU	F	201	-	-	17/19/59/59	0/2/2/2

All (53) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	102	U4G	C9-N1	6.32	1.45	1.33
4	B	202	U4G	C9-N1	6.30	1.45	1.33
4	A	201	U4G	C9-N1	6.29	1.45	1.33
4	G	502	U4G	C9-N1	6.29	1.45	1.33
4	E	201	U4G	C9-N1	6.29	1.45	1.33
4	G	503	U4G	C9-N1	6.28	1.45	1.33
4	C	101	U4G	C9-N1	6.27	1.45	1.33
4	F	203	U4G	C9-N1	6.25	1.45	1.33
4	C	104	U4G	C9-N1	6.23	1.45	1.33
4	B	203	U4G	C9-N1	6.20	1.45	1.33
4	F	202	U4G	C9-N1	6.18	1.45	1.33
3	F	201	DMU	O1-C9	3.97	1.54	1.44
3	B	201	DMU	O1-C9	3.90	1.53	1.44
3	G	501	DMU	O1-C9	3.77	1.53	1.44
3	C	103	DMU	O1-C9	3.64	1.53	1.44
3	B	201	DMU	C11-C9	-3.08	1.41	1.51
3	C	103	DMU	C11-C9	-3.02	1.41	1.51
3	G	501	DMU	C11-C9	-3.01	1.41	1.51
3	F	201	DMU	C11-C9	-2.99	1.41	1.51
3	G	501	DMU	O4-C7	2.81	1.49	1.43
3	F	201	DMU	O4-C7	2.77	1.49	1.43
3	B	201	DMU	O4-C7	2.77	1.49	1.43
3	C	103	DMU	O4-C7	2.72	1.49	1.43
3	G	501	DMU	C7-C5	-2.70	1.45	1.52
3	F	201	DMU	C7-C5	-2.67	1.45	1.52
3	B	201	DMU	C7-C5	-2.60	1.45	1.52
3	C	103	DMU	C7-C5	-2.56	1.45	1.52
3	G	501	DMU	O5-C6	2.48	1.48	1.41
4	C	101	U4G	C9-N2	-2.26	1.25	1.34
4	B	203	U4G	C9-N2	-2.25	1.25	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	F	202	U4G	C9-N2	-2.24	1.25	1.34
3	C	103	DMU	O3-C5	2.24	1.48	1.43
3	C	103	DMU	O5-C6	2.24	1.47	1.41
4	G	503	U4G	C9-N2	-2.23	1.25	1.34
4	G	502	U4G	C9-N2	-2.22	1.25	1.34
4	A	201	U4G	C9-N2	-2.22	1.25	1.34
4	B	202	U4G	C9-N2	-2.22	1.25	1.34
4	C	102	U4G	C9-N2	-2.22	1.25	1.34
4	C	104	U4G	C9-N2	-2.22	1.25	1.34
3	B	201	DMU	O5-C6	2.21	1.47	1.41
3	F	201	DMU	O3-C5	2.21	1.48	1.43
4	E	201	U4G	C9-N2	-2.21	1.25	1.34
4	F	203	U4G	C9-N2	-2.20	1.25	1.34
3	B	201	DMU	O3-C5	2.18	1.48	1.43
3	F	201	DMU	C8-C9	2.18	1.57	1.53
3	G	501	DMU	O5-C4	2.17	1.49	1.44
3	F	201	DMU	O5-C4	2.15	1.49	1.44
3	G	501	DMU	O3-C5	2.15	1.48	1.43
3	F	201	DMU	O5-C6	2.15	1.47	1.41
3	C	103	DMU	O1-C10	2.10	1.47	1.41
3	F	201	DMU	O1-C10	2.04	1.47	1.41
3	B	201	DMU	O1-C10	2.03	1.47	1.41
3	B	201	DMU	C8-C9	2.03	1.57	1.53

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	103	DMU	C10-O7-C3	-4.04	107.97	117.96
3	F	201	DMU	O5-C4-C3	3.79	117.74	109.75
3	G	501	DMU	C10-O7-C3	-2.85	110.91	117.96
3	B	201	DMU	C10-O7-C3	-2.84	110.92	117.96
3	B	201	DMU	C6-C1-C2	2.78	115.79	110.00
3	C	103	DMU	C8-C7-C5	2.66	115.47	110.82
3	G	501	DMU	O5-C4-C3	2.54	115.11	109.75
3	C	103	DMU	C1-C2-C3	2.41	115.19	109.68
3	F	201	DMU	C6-O5-C4	2.22	118.06	113.69
3	C	103	DMU	C7-C8-C9	2.12	114.02	110.24
3	B	201	DMU	O5-C6-C1	2.11	114.82	110.35
3	G	501	DMU	C10-C5-C7	2.08	114.32	110.00
3	B	201	DMU	C1-C2-C3	2.01	114.28	109.68

There are no chirality outliers.

All (74) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	201	DMU	C1-C6-O16-C18
3	F	201	DMU	C1-C6-O16-C18
3	F	201	DMU	O5-C6-O16-C18
3	F	201	DMU	C19-C18-O16-C6
3	F	201	DMU	O1-C10-O7-C3
3	F	201	DMU	C5-C10-O7-C3
3	F	201	DMU	O5-C4-C57-O61
3	C	103	DMU	O5-C4-C57-O61
3	F	201	DMU	O6-C11-C9-O1
3	F	201	DMU	C3-C4-C57-O61
3	B	201	DMU	O6-C11-C9-O1
3	B	201	DMU	O5-C6-O16-C18
3	B	201	DMU	O6-C11-C9-C8
3	G	501	DMU	O6-C11-C9-O1
4	G	502	U4G	C6-C7-C8-N1
3	F	201	DMU	O16-C18-C19-C22
3	G	501	DMU	C19-C22-C25-C28
3	C	103	DMU	C22-C25-C28-C31
3	C	103	DMU	C3-C4-C57-O61
3	G	501	DMU	O6-C11-C9-C8
4	B	203	U4G	C2-C3-C4-C5
4	G	503	U4G	C4-C5-C6-C7
3	F	201	DMU	O6-C11-C9-C8
4	G	502	U4G	C4-C5-C6-C7
4	G	503	U4G	C2-C3-C4-C5
4	C	102	U4G	C3-C4-C5-C6
4	C	101	U4G	C6-C7-C8-N1
4	E	201	U4G	C4-C5-C6-C7
3	B	201	DMU	C22-C25-C28-C31
3	F	201	DMU	C22-C25-C28-C31
3	F	201	DMU	C4-C3-O7-C10
3	C	103	DMU	C28-C31-C34-C37
4	F	203	U4G	C5-C6-C7-C8
4	A	201	U4G	C4-C5-C6-C7
4	A	201	U4G	C3-C4-C5-C6
3	F	201	DMU	C31-C34-C37-C40
3	F	201	DMU	C2-C3-O7-C10
4	F	202	U4G	C1-C2-C3-C4
3	C	103	DMU	O6-C11-C9-O1
4	F	202	U4G	C4-C5-C6-C7
4	C	104	U4G	C2-C3-C4-C5
4	F	202	U4G	C2-C3-C4-C5

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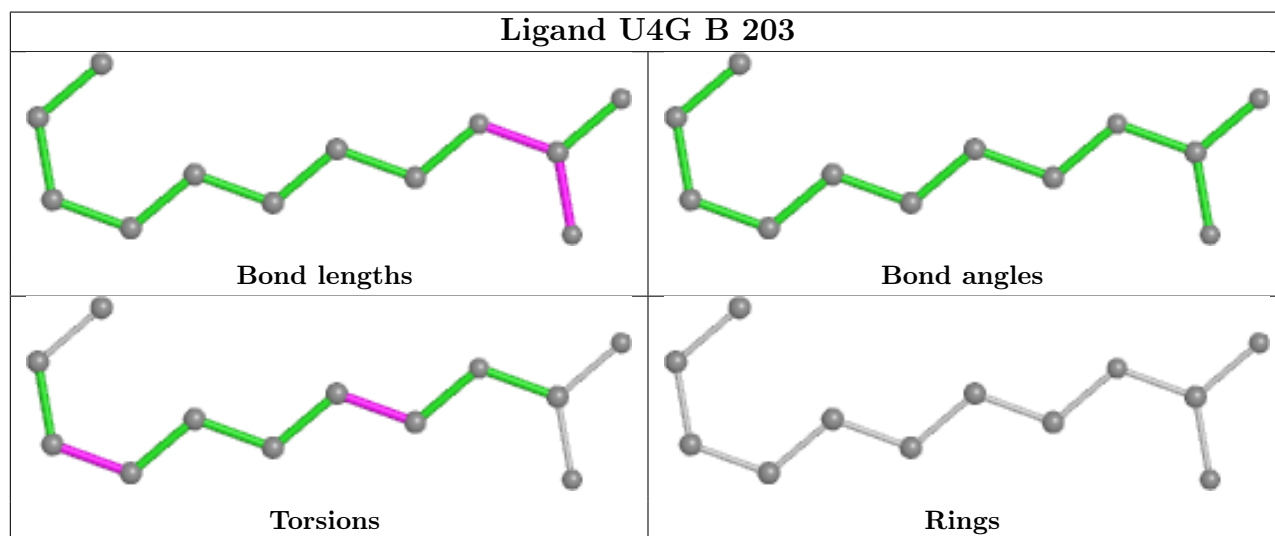
Mol	Chain	Res	Type	Atoms
4	G	502	U4G	C5-C6-C7-C8
4	C	104	U4G	C1-C2-C3-C4
3	G	501	DMU	C3-C4-C57-O61
3	G	501	DMU	O1-C10-O7-C3
3	G	501	DMU	C5-C10-O7-C3
4	B	202	U4G	C6-C7-C8-N1
3	F	201	DMU	C25-C28-C31-C34
3	B	201	DMU	C25-C28-C31-C34
3	F	201	DMU	C18-C19-C22-C25
3	C	103	DMU	C25-C28-C31-C34
3	G	501	DMU	C34-C37-C40-C43
4	C	101	U4G	C3-C4-C5-C6
4	E	201	U4G	C6-C7-C8-N1
4	C	104	U4G	C4-C5-C6-C7
3	B	201	DMU	C28-C31-C34-C37
4	B	203	U4G	C6-C7-C8-N1
4	C	102	U4G	C1-C2-C3-C4
4	F	203	U4G	C6-C7-C8-N1
4	C	102	U4G	C7-C8-N1-C9
4	C	104	U4G	C7-C8-N1-C9
4	G	503	U4G	C6-C7-C8-N1
3	B	201	DMU	C34-C37-C40-C43
3	G	501	DMU	C1-C6-O16-C18
4	G	503	U4G	C1-C2-C3-C4
4	F	203	U4G	C7-C8-N1-C9
3	C	103	DMU	C34-C37-C40-C43
3	C	103	DMU	C31-C34-C37-C40
4	C	102	U4G	C2-C3-C4-C5
4	E	201	U4G	C3-C4-C5-C6
4	F	203	U4G	C4-C5-C6-C7
3	C	103	DMU	C19-C18-O16-C6
3	F	201	DMU	C19-C22-C25-C28

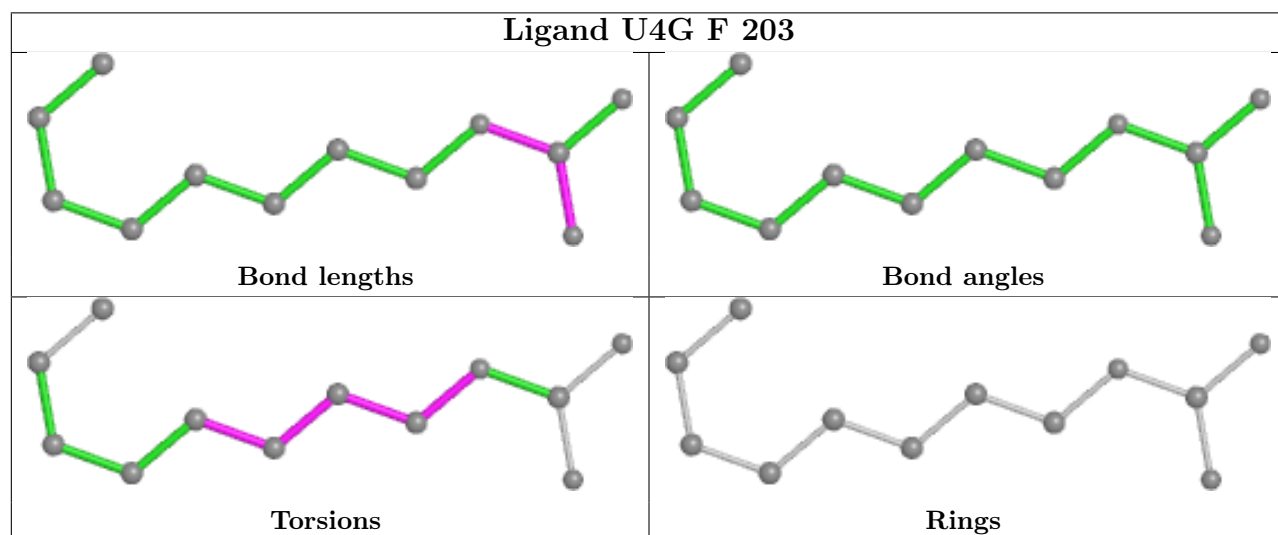
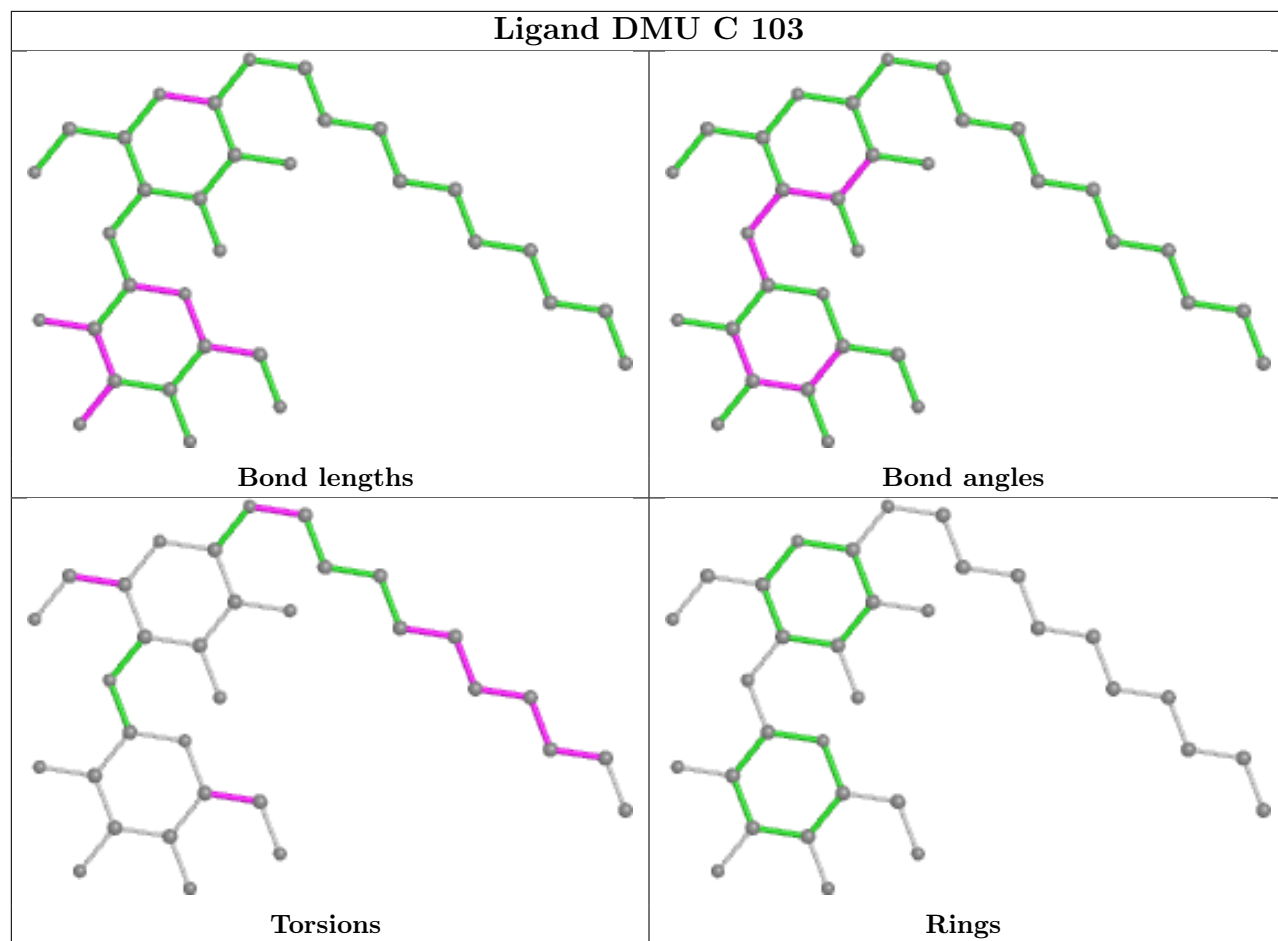
There are no ring outliers.

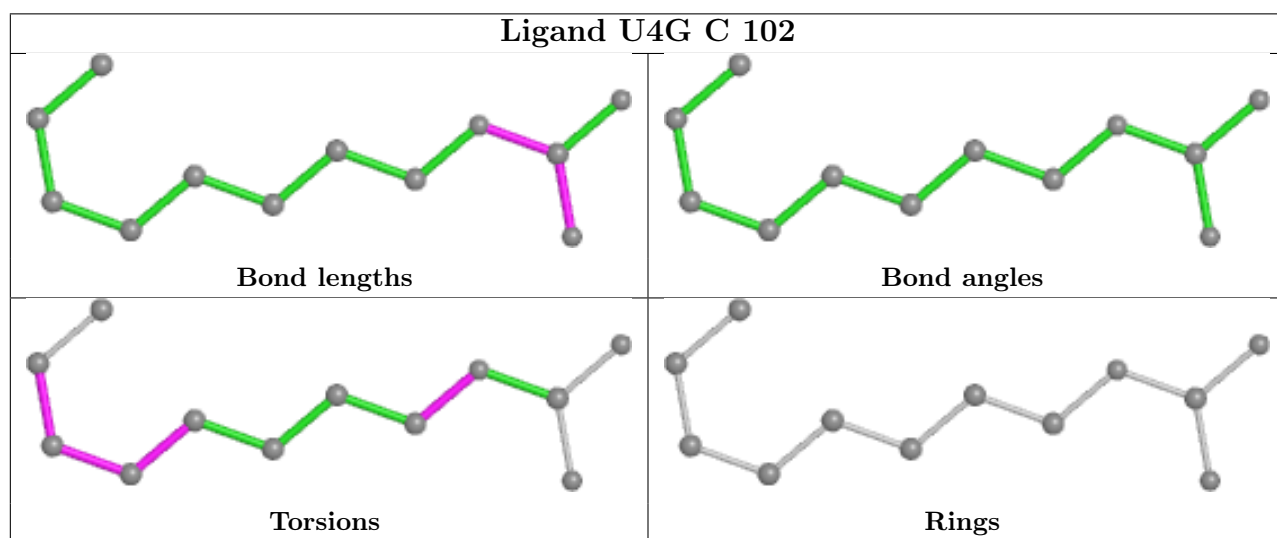
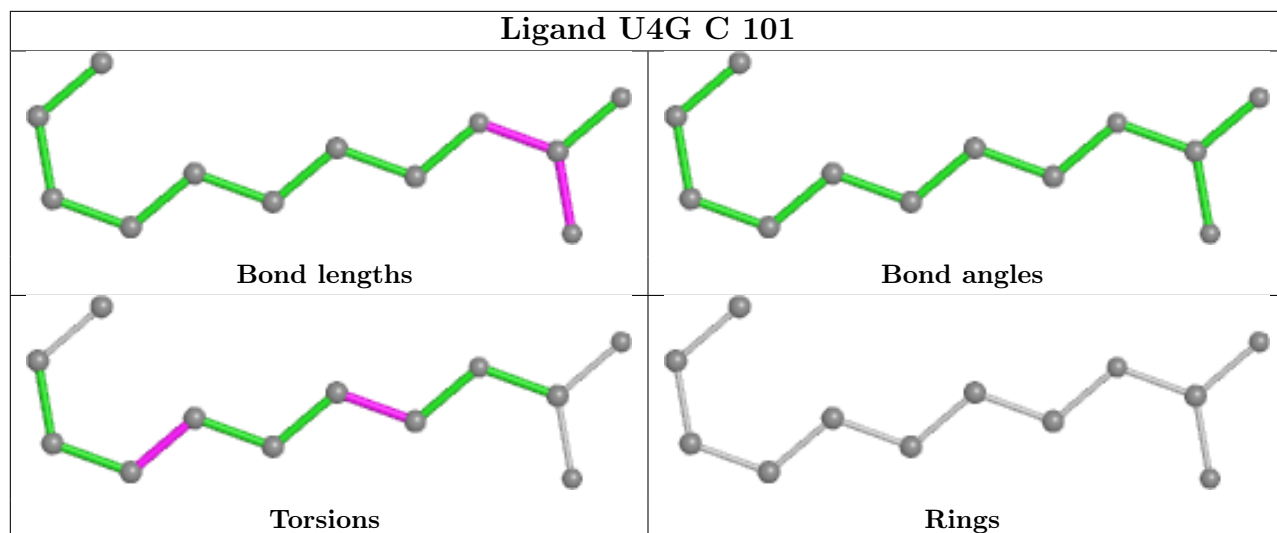
4 monomers are involved in 5 short contacts:

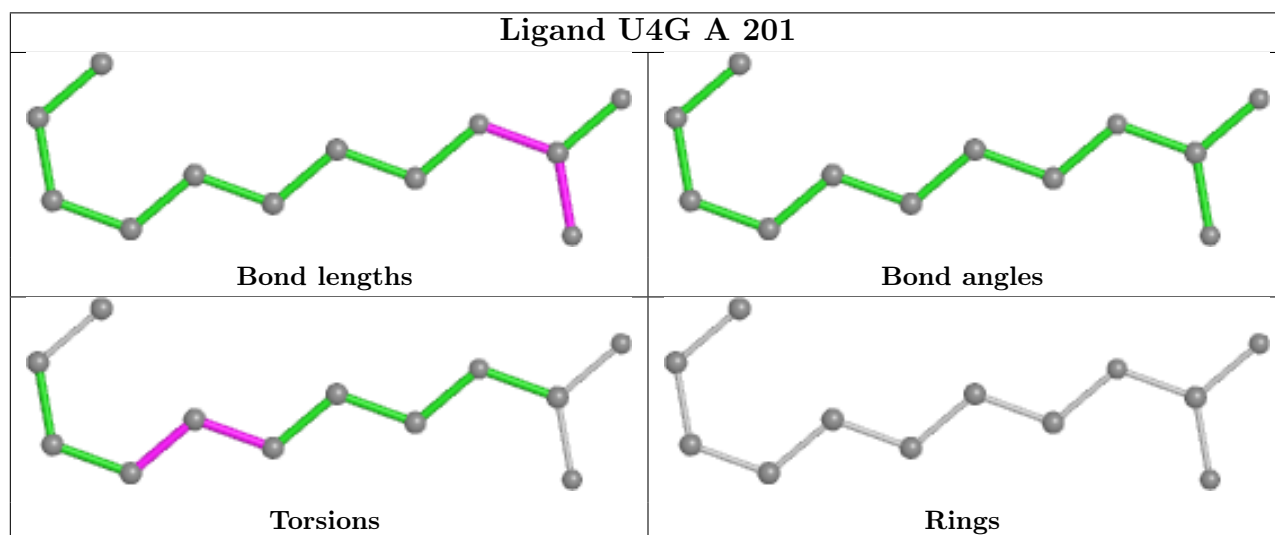
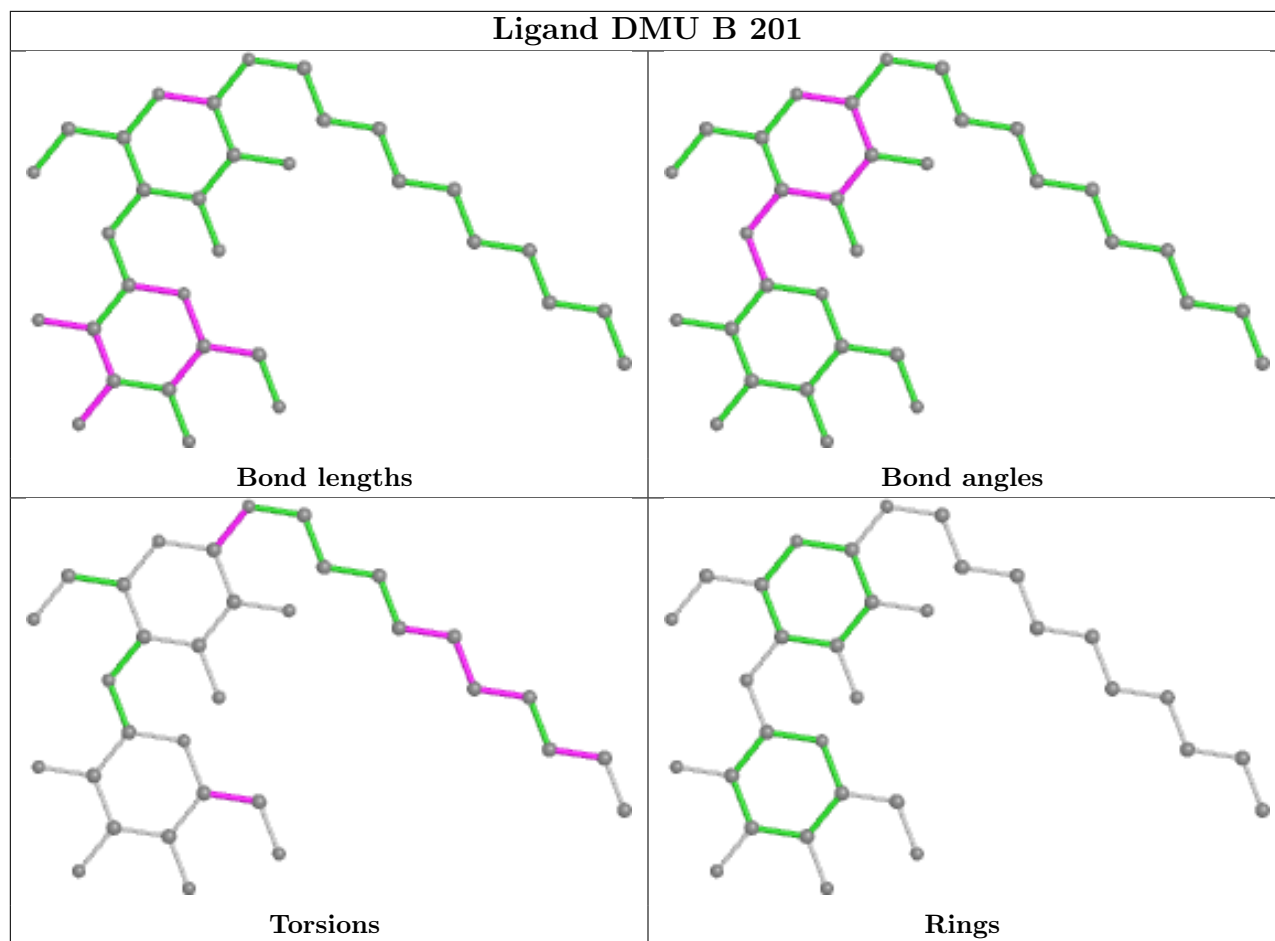
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	103	DMU	2	0
3	B	201	DMU	2	0
4	G	503	U4G	1	0
3	F	201	DMU	1	0

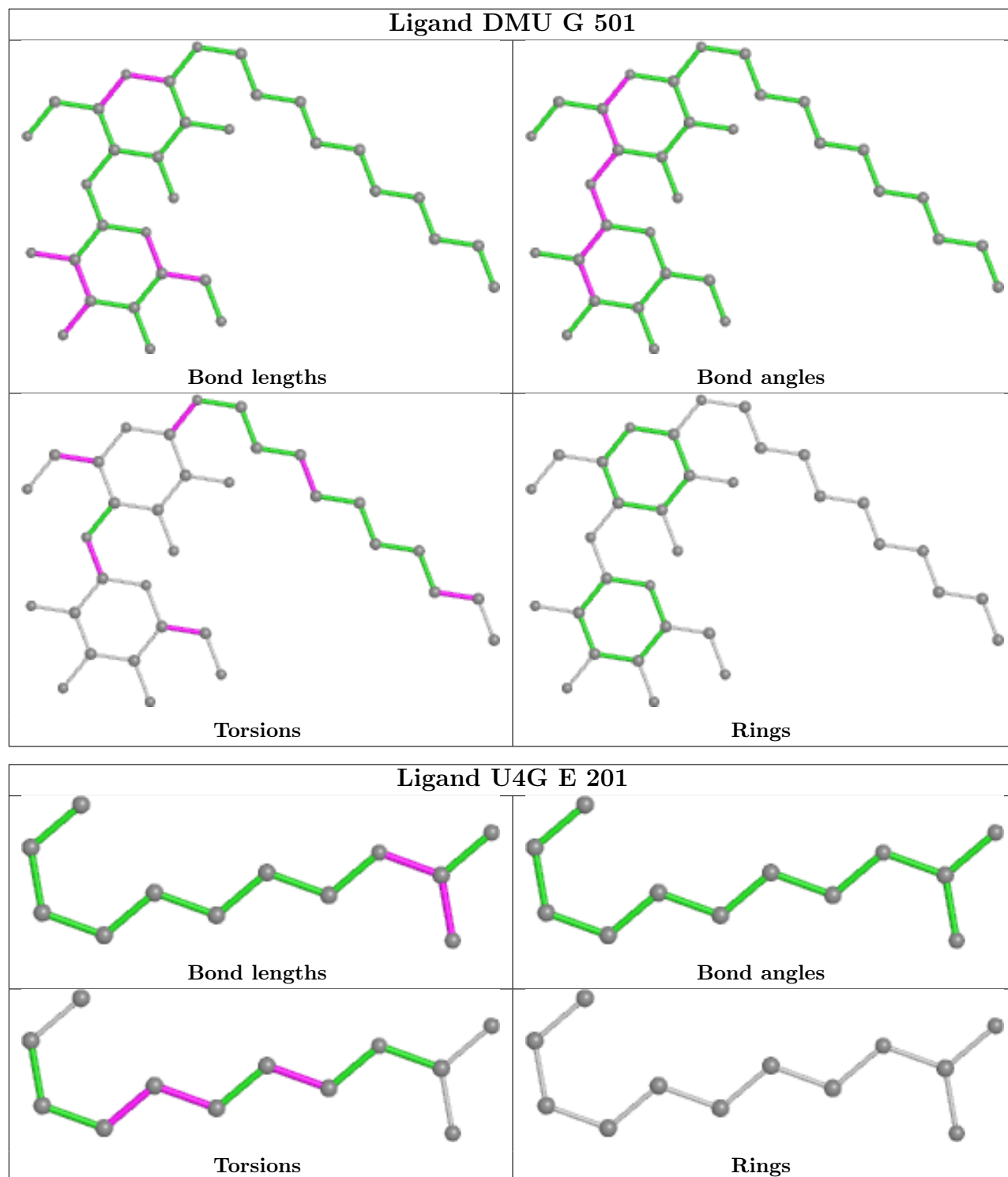
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

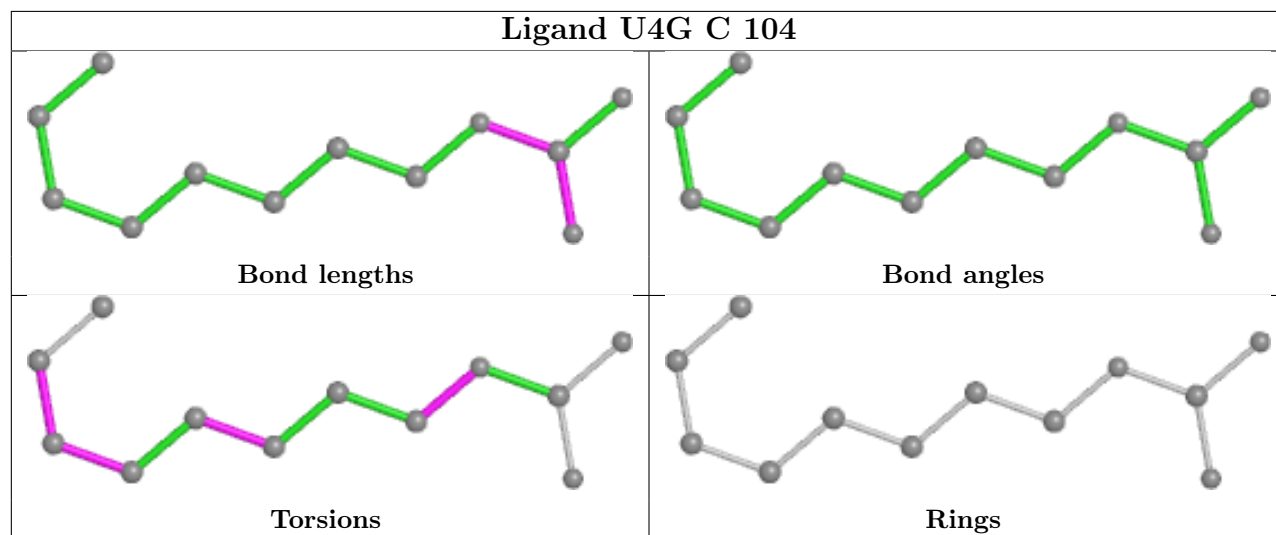
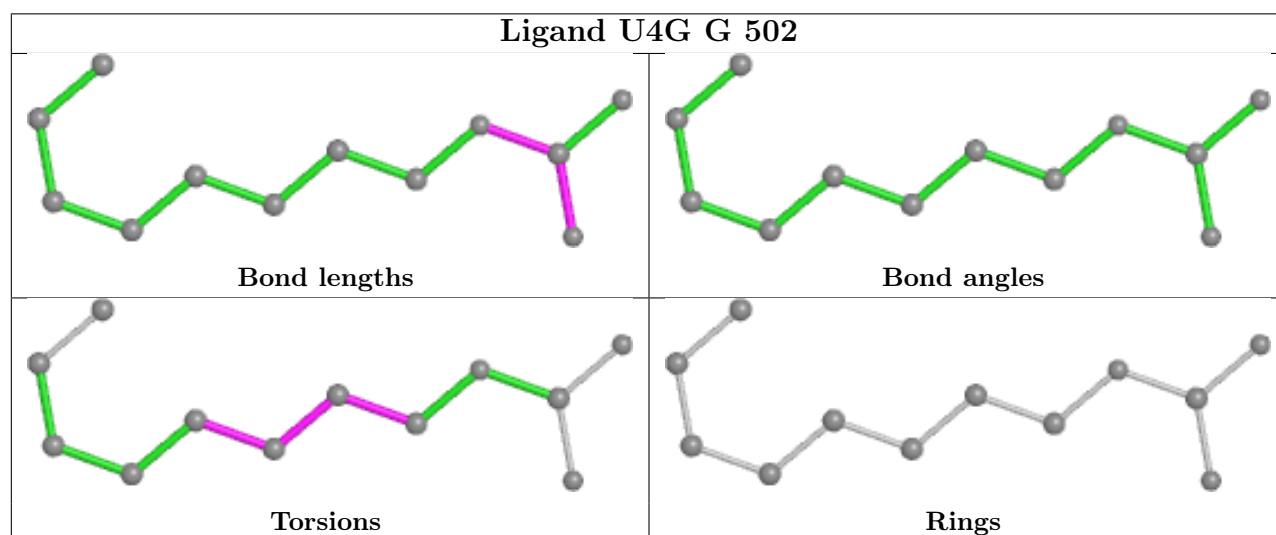
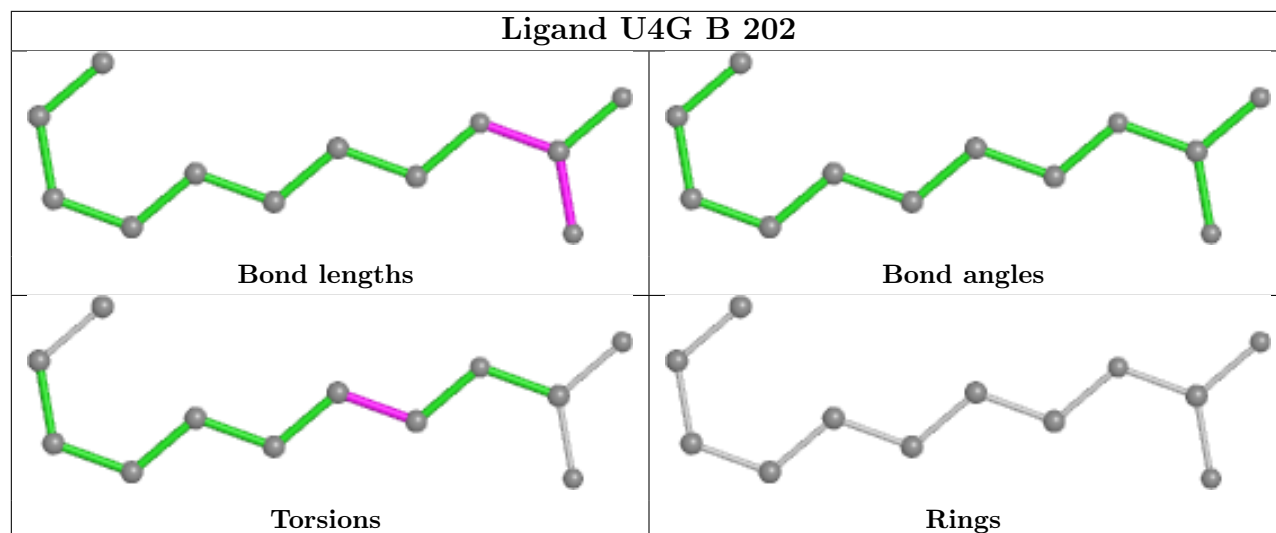


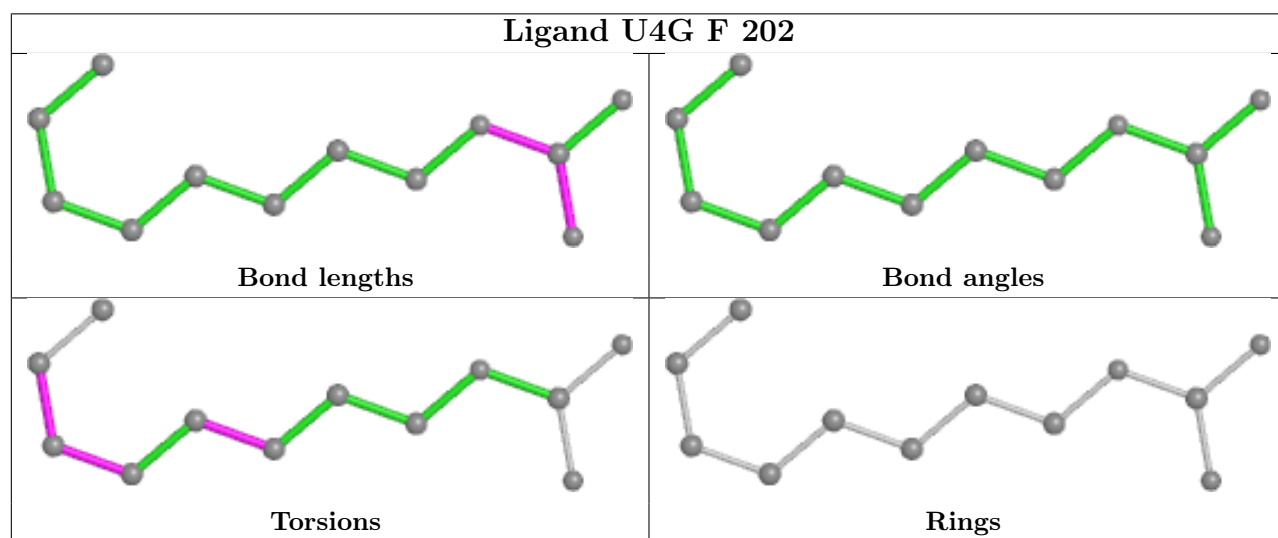
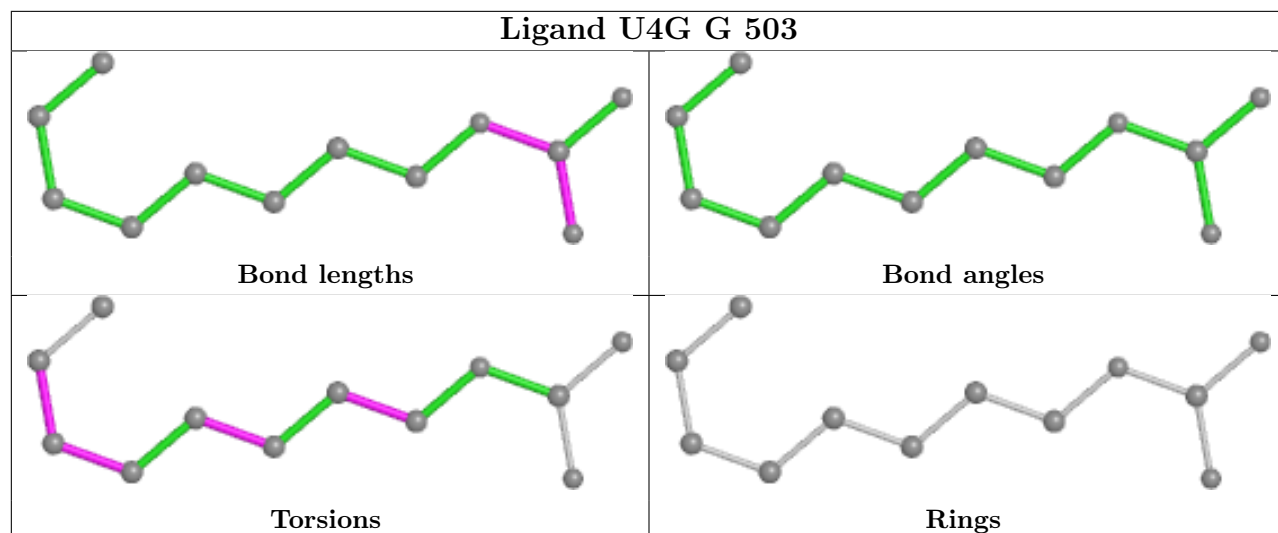


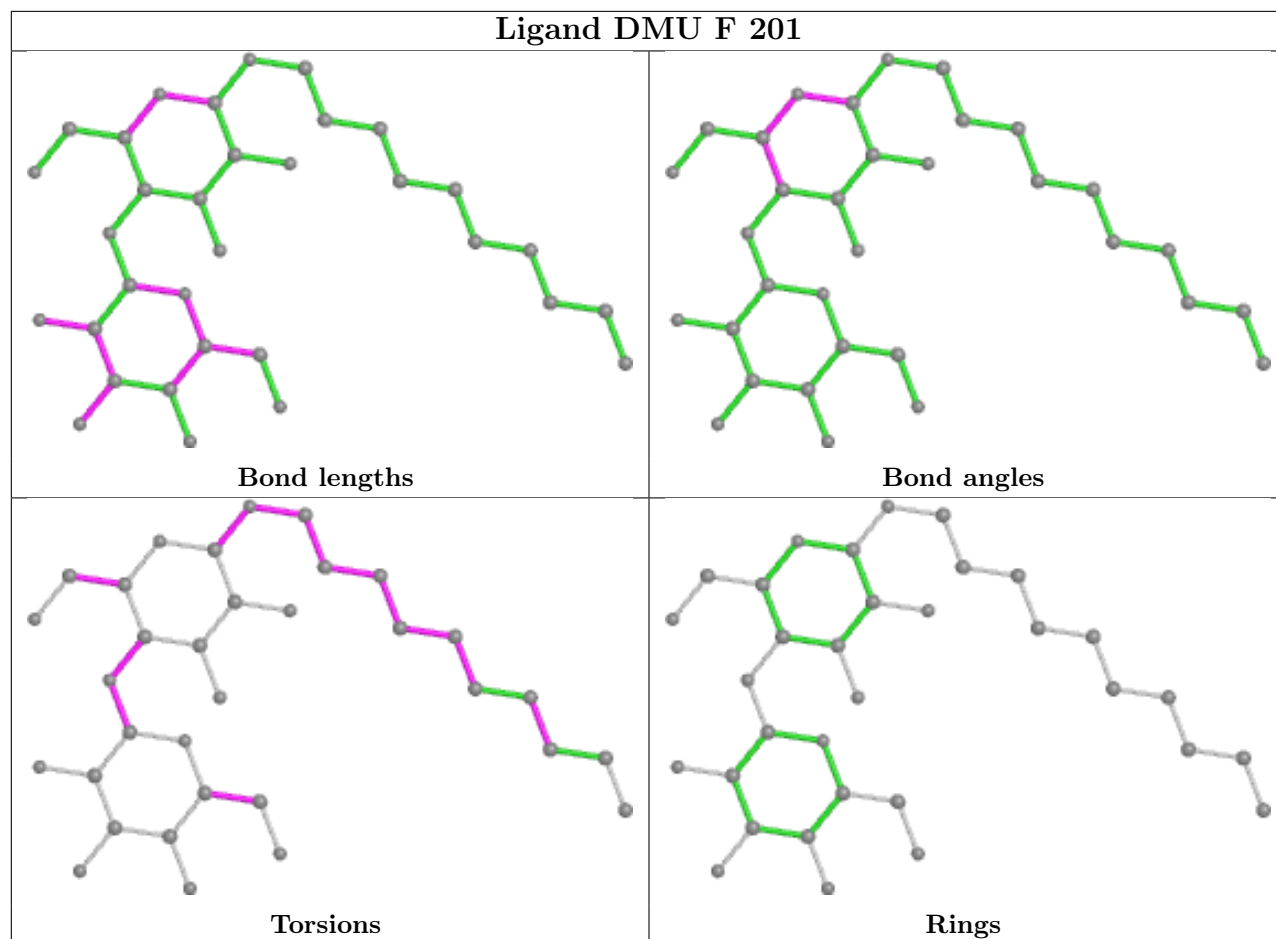












5.7 Other polymers [i](#)

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

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	104/105 (99%)	0.07	1 (0%) 82 86	18, 27, 59, 68	0
1	B	104/105 (99%)	0.34	3 (2%) 51 59	11, 27, 53, 72	0
1	E	104/105 (99%)	-0.02	1 (0%) 82 86	20, 29, 56, 71	0
1	F	104/105 (99%)	0.42	5 (4%) 30 38	17, 29, 56, 78	0
2	C	90/91 (98%)	0.22	3 (3%) 46 53	12, 28, 63, 72	0
2	D	89/91 (97%)	0.48	12 (13%) 3 4	16, 38, 65, 80	0
2	G	90/91 (98%)	0.04	0 100 100	13, 29, 58, 66	0
2	H	89/91 (97%)	0.53	9 (10%) 7 10	16, 38, 65, 80	0
All	All	774/784 (98%)	0.26	34 (4%) 34 41	11, 29, 62, 80	0

All (34) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	22	TYR	9.7
1	F	78	PHE	8.0
2	H	83	GLY	6.6
2	H	44	GLY	5.5
2	D	45	ASN	4.7
2	D	44	GLY	4.6
1	A	1	MET	4.3
1	B	78	PHE	4.1
1	F	79	LYS	4.1
2	C	82	TYR	4.0
2	D	83	GLY	3.8
2	H	77	ALA	3.7
2	D	81	ASP	3.4
1	F	81	PRO	3.2
2	H	45	ASN	3.1
2	C	5	VAL	3.1

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Mol	Chain	Res	Type	RSRZ
2	D	5	VAL	3.1
2	C	83	GLY	3.0
2	D	84	SER	2.9
2	D	4	SER	2.9
2	D	82	TYR	2.8
2	H	76	TYR	2.8
2	D	29	TRP	2.7
1	F	75	ILE	2.7
2	H	23	TRP	2.4
2	H	82	TYR	2.3
2	H	43	GLY	2.3
1	B	22	TYR	2.3
2	D	46	SER	2.2
1	B	81	PRO	2.2
2	H	28	TRP	2.2
1	E	55	ILE	2.1
2	D	67	PRO	2.1
2	D	28	TRP	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 [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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

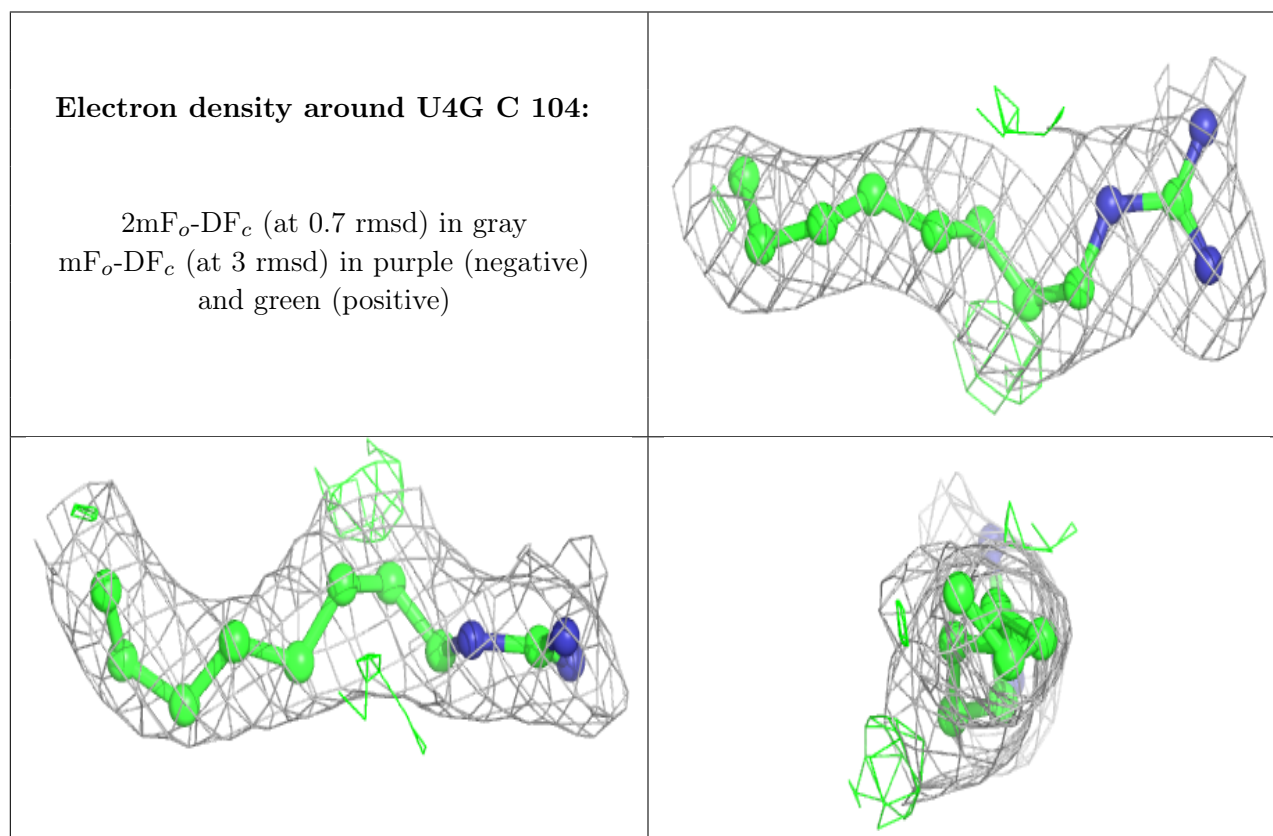
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	U4G	C	104	12/12	0.80	0.17	33,52,66,68	0
3	DMU	G	501	33/33	0.82	0.22	32,73,97,105	0
3	DMU	C	103	33/33	0.83	0.18	18,64,75,80	0
3	DMU	F	201	33/33	0.83	0.23	21,56,84,104	0
4	U4G	C	102	12/12	0.85	0.13	32,43,52,52	0

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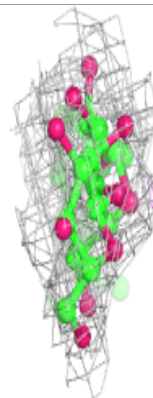
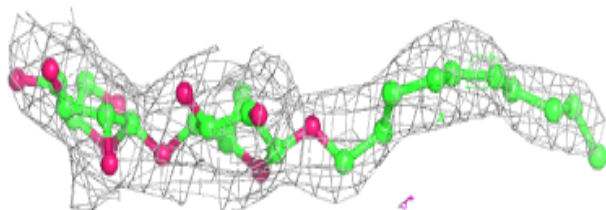
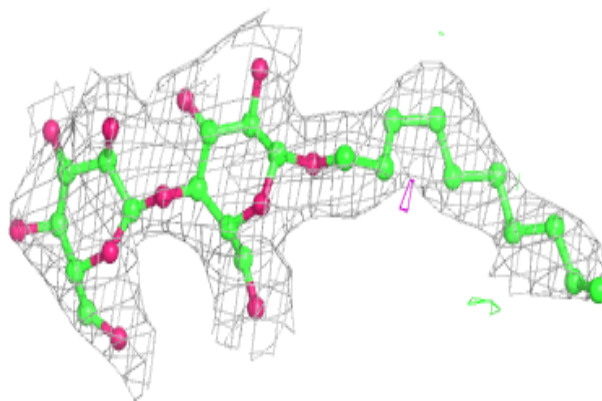
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	DMU	B	201	33/33	0.88	0.18	27,52,68,84	0
4	U4G	B	203	12/12	0.90	0.31	25,33,57,67	0
4	U4G	B	202	12/12	0.90	0.14	22,34,41,47	0
4	U4G	E	201	12/12	0.91	0.25	20,35,47,62	0
4	U4G	A	201	12/12	0.93	0.29	27,47,53,58	0
4	U4G	G	503	12/12	0.93	0.15	20,44,48,48	0
4	U4G	C	101	12/12	0.93	0.20	38,44,65,73	0
4	U4G	G	502	12/12	0.94	0.10	22,31,39,45	0
4	U4G	F	202	12/12	0.94	0.17	17,27,46,50	0
4	U4G	F	203	12/12	0.94	0.14	30,44,52,53	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.

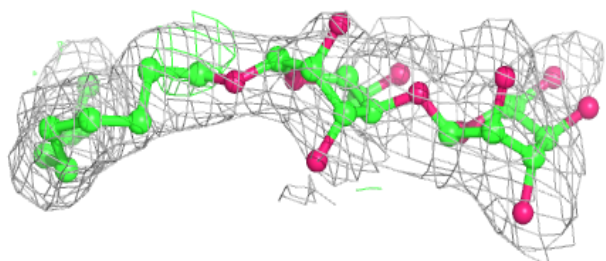
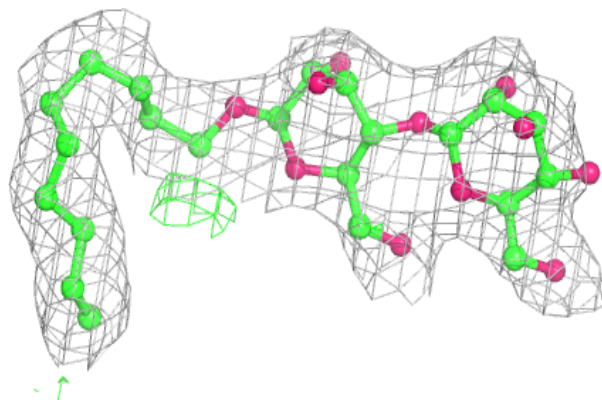


Electron density around DMU G 501:

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

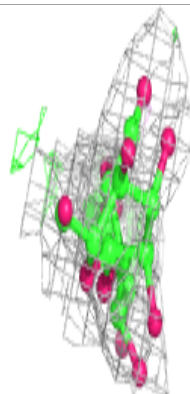
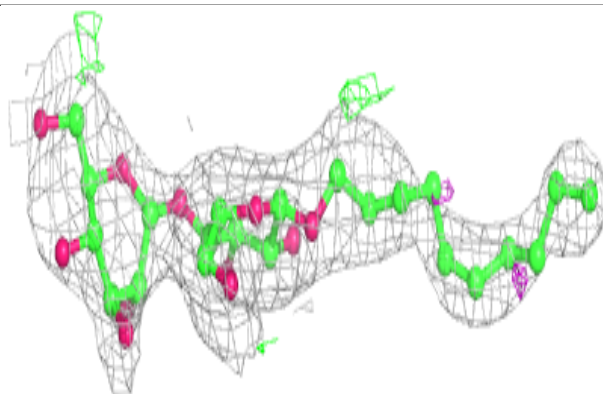
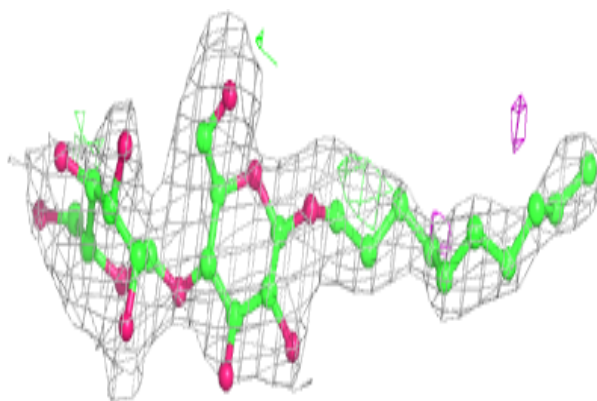
**Electron density around DMU C 103:**

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

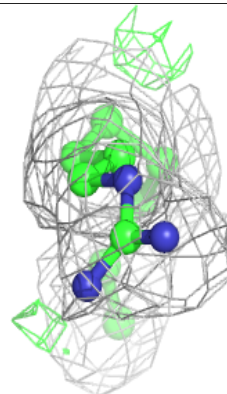
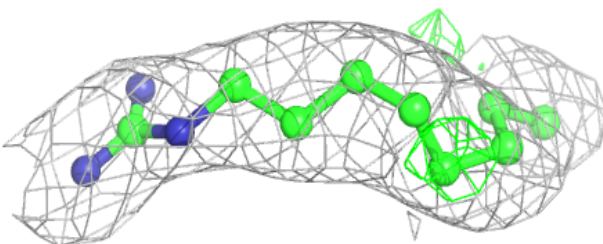
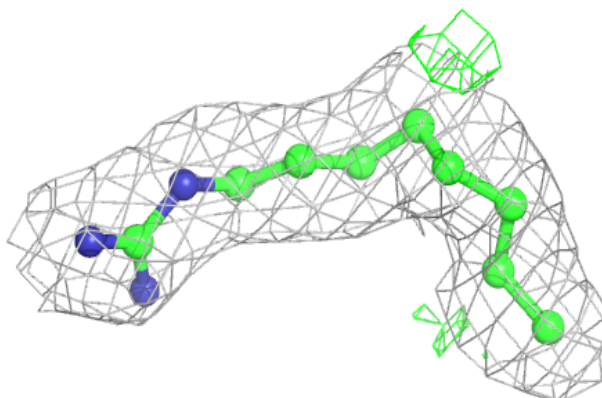


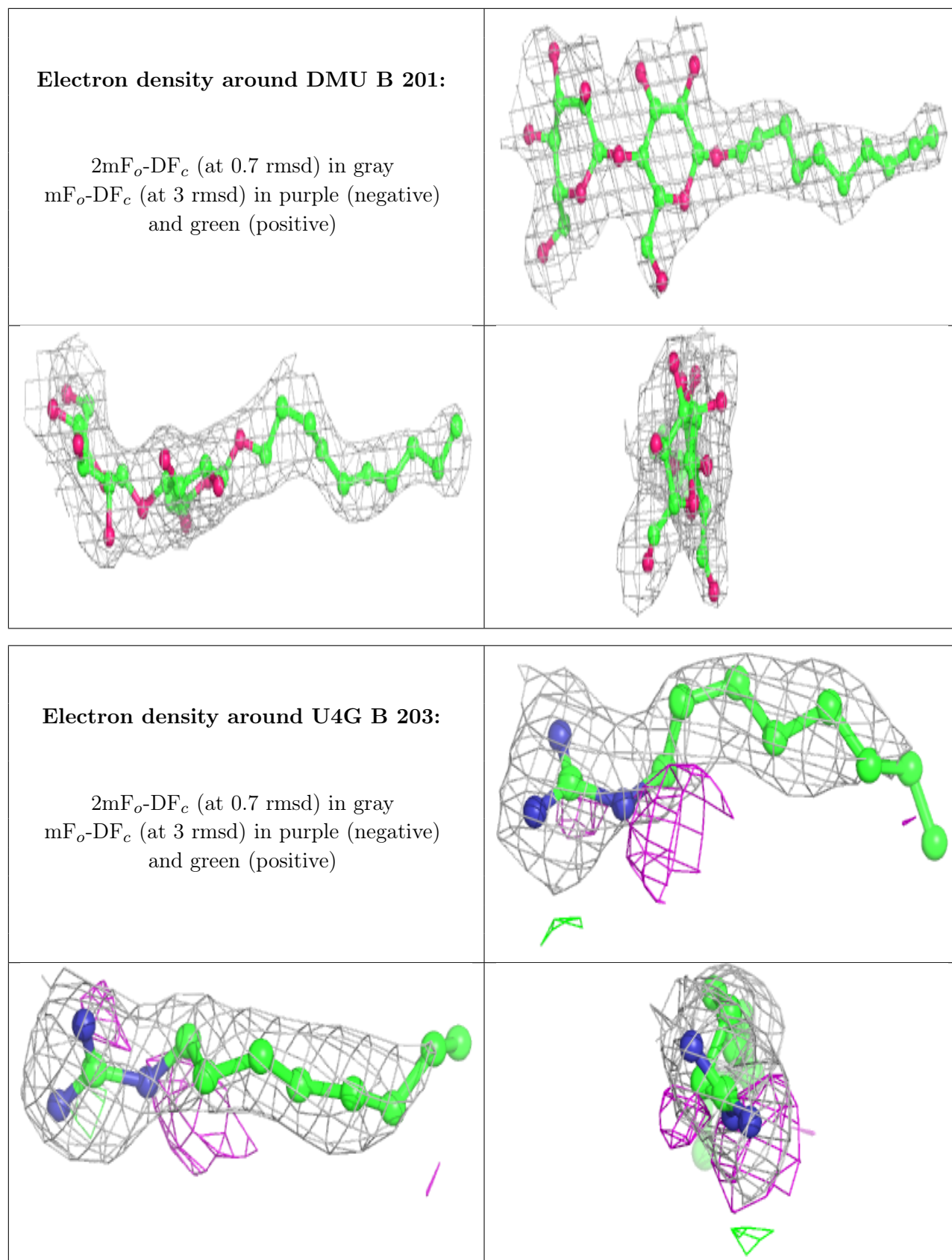
Electron density around DMU F 201:

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

**Electron density around U4G C 102:**

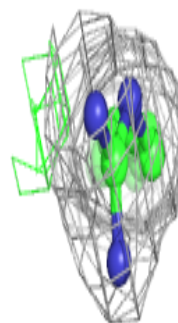
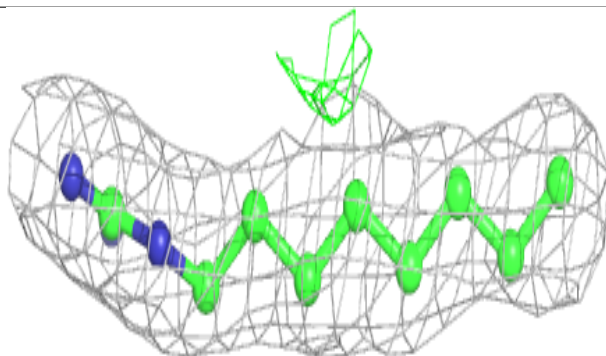
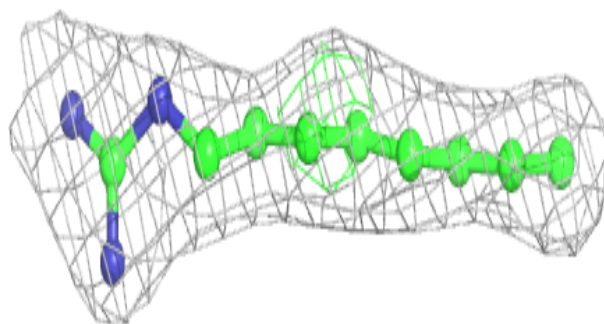
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



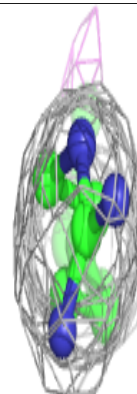
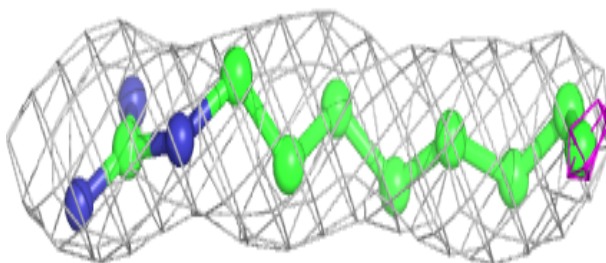
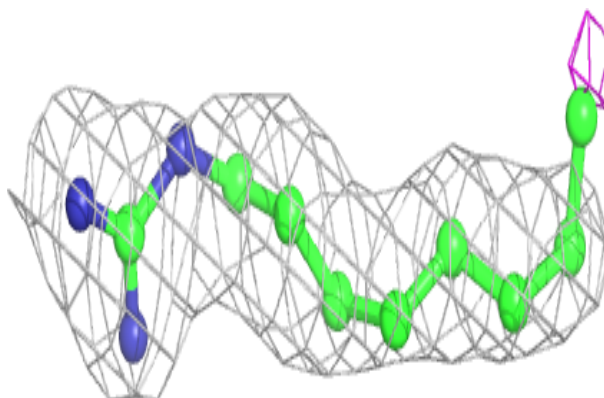


Electron density around U4G B 202:

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

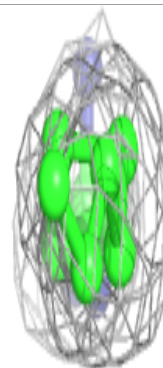
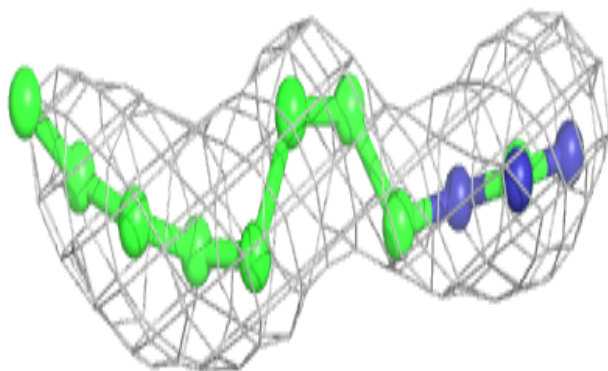
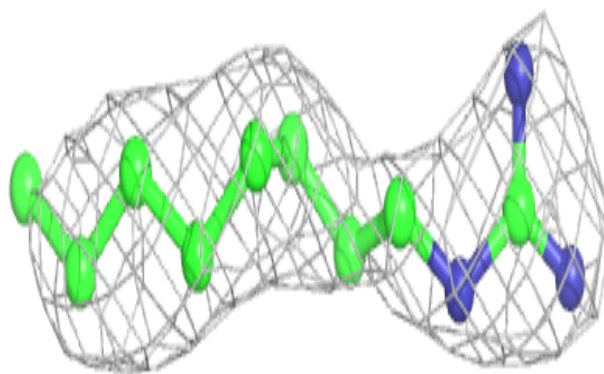
**Electron density around U4G E 201:**

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

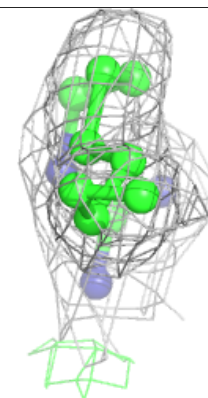
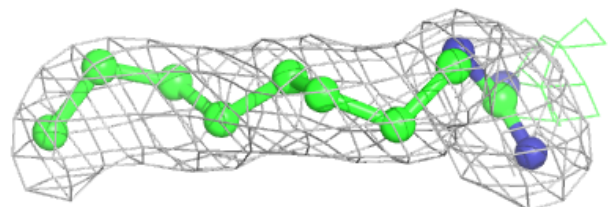
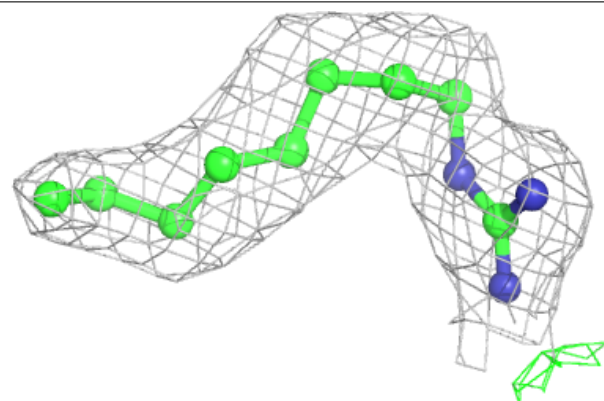


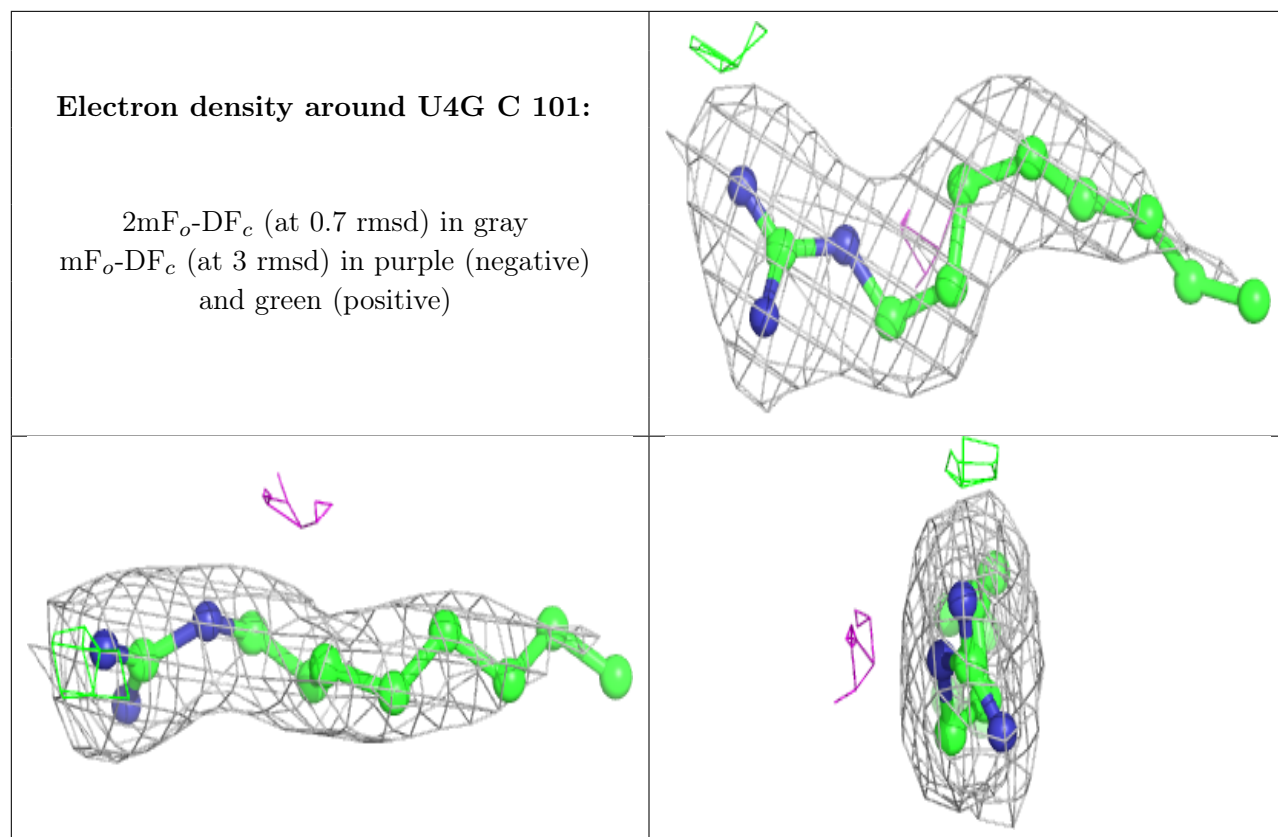
Electron density around U4G A 201:

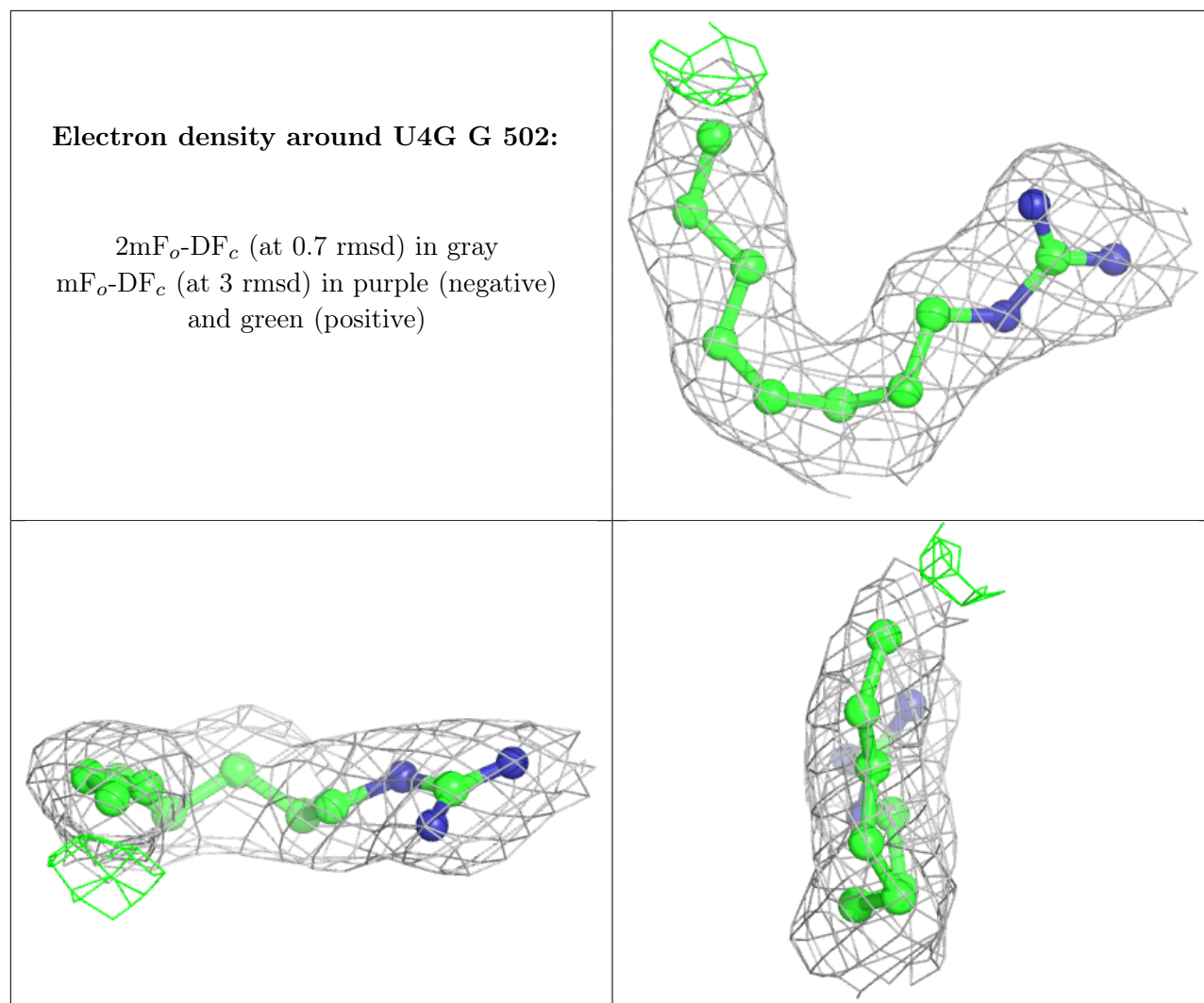
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around U4G G 503:**

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

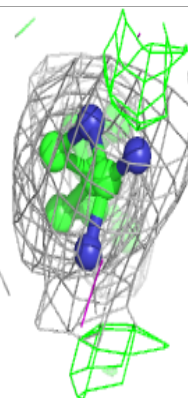
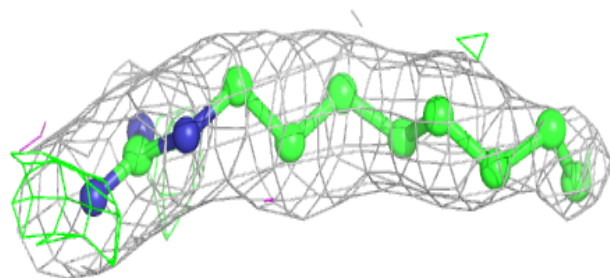
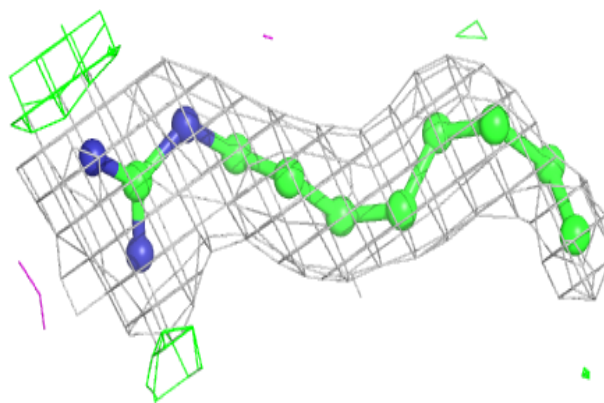




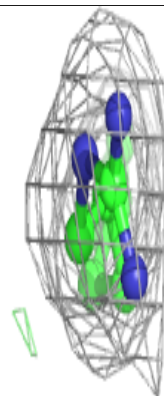
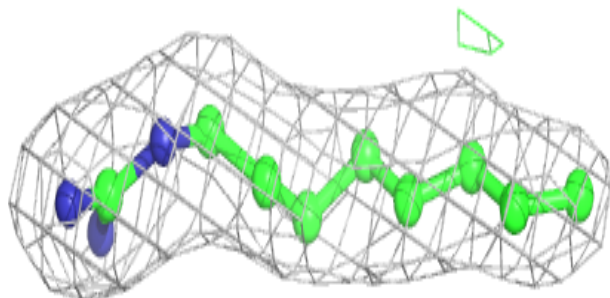
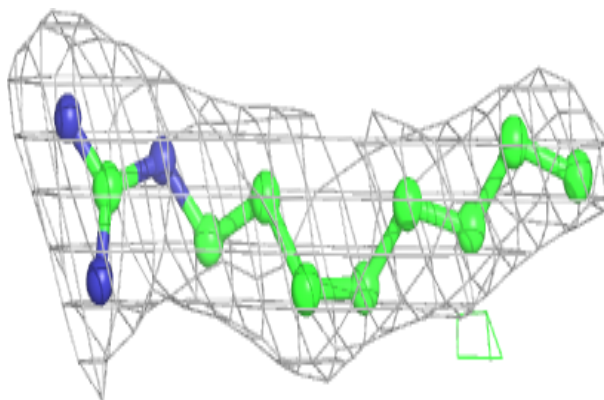


Electron density around U4G F 202:

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

**Electron density around U4G F 203:**

$2mF_o-DF_c$ (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.