



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 3, 2024 – 03:49 am BST

PDB ID : 8001
Title : Wide inward-open liganded UraA in complex with a conformation-selective synthetic nanobody
Authors : Kuhn, B.T.; Geertsma, E.R.
Deposited on : 2023-04-04
Resolution : 3.70 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 types of validation reports are described at

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

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

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

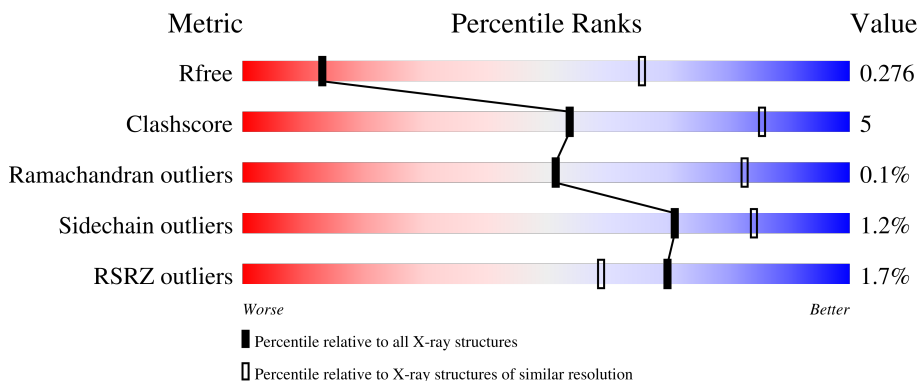
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.70 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	1049 (3.88-3.52)
Clashscore	141614	1027 (3.86-3.54)
Ramachandran outliers	138981	1069 (3.88-3.52)
Sidechain outliers	138945	1065 (3.88-3.52)
RSRZ outliers	127900	1578 (3.90-3.50)

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 ≥ 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	

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
5	URA	A	504	-	X	-	-
5	URA	C	504	-	X	-	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 8154 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	409	3019	2018	477	510	14	0	0	0
1	C	408	3008	2012	473	509	14	0	0	0

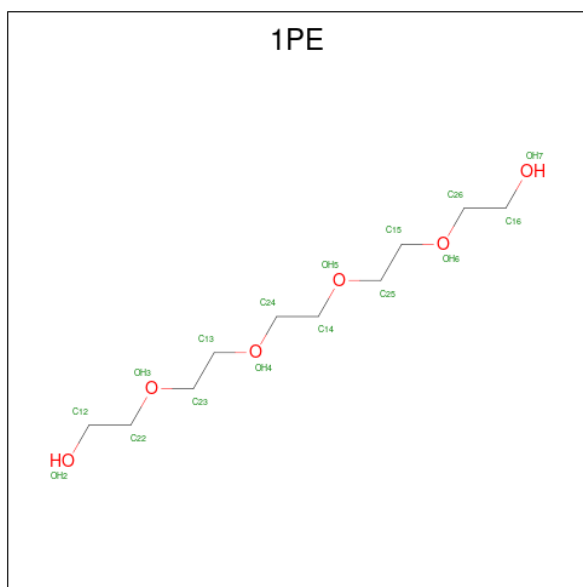
There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	initiating methionine	UNP P0AGM8
A	1	SER	-	expression tag	UNP P0AGM8
A	320	PRO	GLY	engineered mutation	UNP P0AGM8
A	430	ALA	-	expression tag	UNP P0AGM8
A	431	LEU	-	expression tag	UNP P0AGM8
A	432	GLU	-	expression tag	UNP P0AGM8
A	433	VAL	-	expression tag	UNP P0AGM8
A	434	LEU	-	expression tag	UNP P0AGM8
A	435	PHE	-	expression tag	UNP P0AGM8
A	436	GLN	-	expression tag	UNP P0AGM8
C	0	MET	-	initiating methionine	UNP P0AGM8
C	1	SER	-	expression tag	UNP P0AGM8
C	320	PRO	GLY	engineered mutation	UNP P0AGM8
C	430	ALA	-	expression tag	UNP P0AGM8
C	431	LEU	-	expression tag	UNP P0AGM8
C	432	GLU	-	expression tag	UNP P0AGM8
C	433	VAL	-	expression tag	UNP P0AGM8
C	434	LEU	-	expression tag	UNP P0AGM8
C	435	PHE	-	expression tag	UNP P0AGM8
C	436	GLN	-	expression tag	UNP P0AGM8

- Molecule 2 is a protein called Sy45.

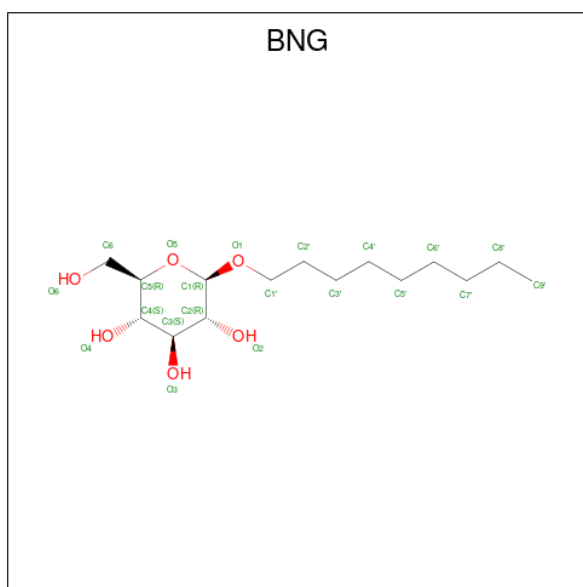
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	125	Total	C	N	O	S	0	0	0
			951	601	162	184	4			
2	D	126	Total	C	N	O	S	0	0	0
			957	604	163	186	4			

- Molecule 3 is PENTAETHYLENE GLYCOL (three-letter code: 1PE) (formula: $C_{10}H_{22}O_6$).



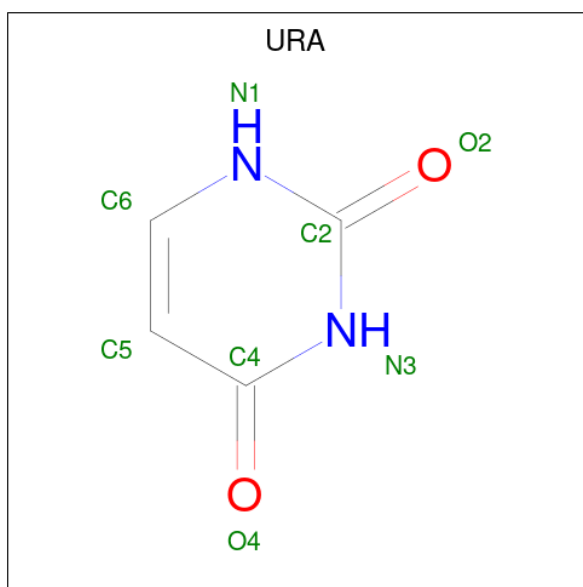
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			16	10	6		
3	D	1	Total	C	O	0	0
			16	10	6		

- Molecule 4 is nonyl beta-D-glucopyranoside (three-letter code: BNG) (formula: $C_{15}H_{30}O_6$).



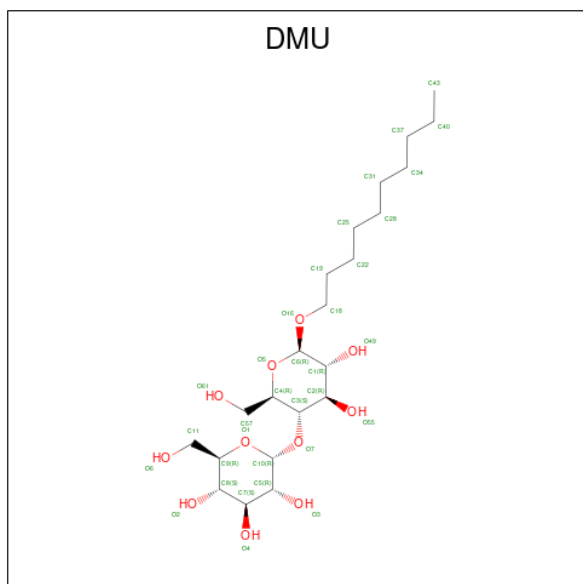
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			21	15	6		
4	A	1	Total	C	O	0	0
			21	15	6		
4	C	1	Total	C	O	0	0
			21	15	6		
4	C	1	Total	C	O	0	0
			21	15	6		
4	C	1	Total	C	O	0	0
			21	15	6		

- Molecule 5 is URACIL (three-letter code: URA) (formula: $C_4H_4N_2O_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	A	1	8	4	2	2	0	0
5	C	1	8	4	2	2	0	0

- Molecule 6 is DECYL-BETA-D-MALTOPYRANOSIDE (three-letter code: DMU) (formula: $C_{22}H_{42}O_{11}$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	B	1	33	22	11	0	0

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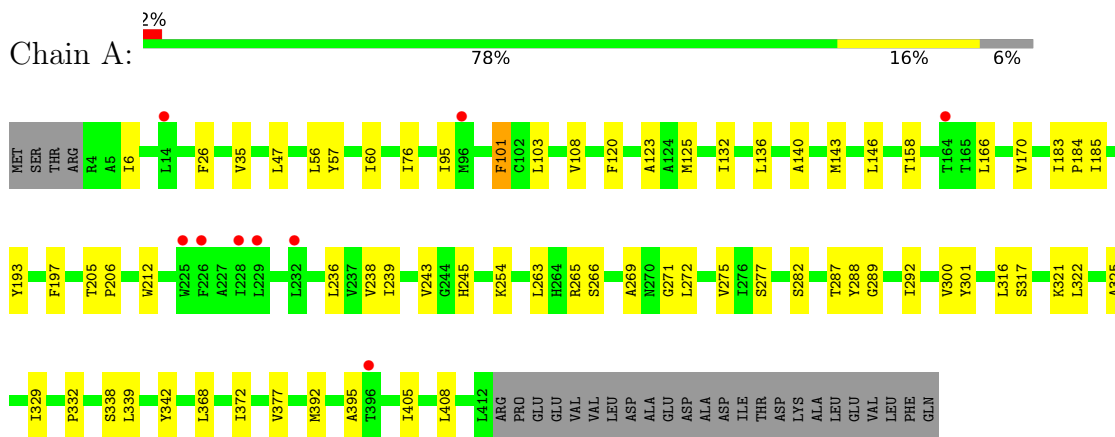
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	D	1	33	22	11	0	0

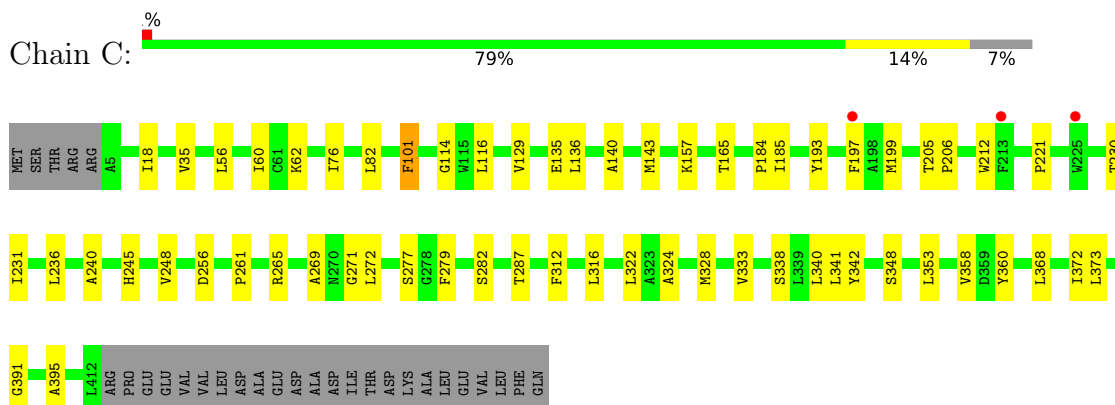
3 Residue-property plots [i](#)

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.

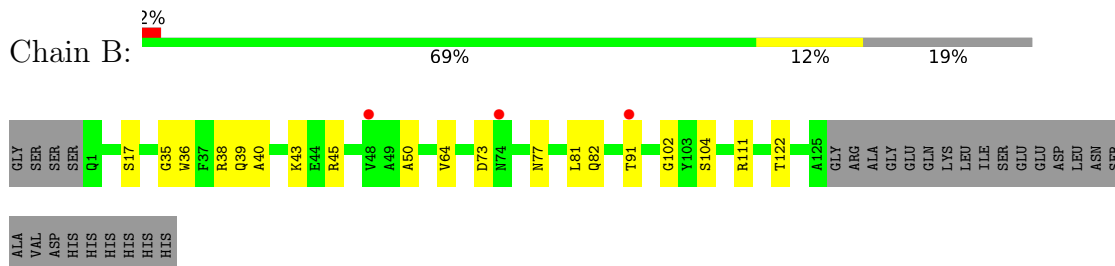
- Molecule 1: Uracil permease




- Molecule 1: Uracil permease



- Molecule 2: Sy45



● Molecule 2: Sy45

Chain D: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	86.25Å 116.82Å 94.30Å 90.00° 100.48° 90.00°	Depositor
Resolution (Å)	49.42 – 3.70 49.42 – 3.70	Depositor EDS
% Data completeness (in resolution range)	97.9 (49.42-3.70) 98.0 (49.42-3.70)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.87 (at 3.67Å)	Xtrriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, R_{free}	0.271 , 0.294 0.272 , 0.276	Depositor DCC
R_{free} test set	988 reflections (5.10%)	wwPDB-VP
Wilson B-factor (Å ²)	50.8	Xtrriage
Anisotropy	0.102	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.23 , 1.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.74	EDS
Total number of atoms	8154	wwPDB-VP
Average B, all atoms (Å ²)	52.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.00% 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, URA, 1PE, BNG

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	0/3085	0.40	0/4215
1	C	0.24	0/3074	0.40	0/4201
2	B	0.24	0/973	0.42	0/1321
2	D	0.25	0/979	0.43	0/1329
All	All	0.24	0/8111	0.40	0/11066

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	3019	0	3248	39	0
1	C	3008	0	3235	34	0
2	B	951	0	911	10	0
2	D	957	0	916	5	0
3	A	16	0	22	0	0
3	D	16	0	22	2	0
4	A	42	0	60	2	0
4	C	63	0	90	4	0
5	A	8	0	3	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	C	8	0	3	0	0
6	B	33	0	42	0	0
6	D	33	0	42	3	0
All	All	8154	0	8594	89	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 (89) 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:HB2	1:C:282:SER:HB3	1.69	0.73
1:C:157:LYS:HD2	1:C:199:MET:HB3	1.72	0.70
1:A:158:THR:HG23	1:A:332:PRO:HG3	1.78	0.64
1:A:277:SER:HB3	1:A:282:SER:HB3	1.79	0.64
1:A:184:PRO:HD2	1:A:185:ILE:HD12	1.81	0.63
1:A:108:VAL:HG11	1:A:263:LEU:HD23	1.80	0.62
1:C:184:PRO:HD2	1:C:185:ILE:HD12	1.81	0.62
1:C:82:LEU:HD11	1:C:230:THR:HG21	1.84	0.59
2:B:40:ALA:HB3	2:B:43:LYS:HB2	1.85	0.59
1:A:35:VAL:HG22	1:A:76:ILE:HD11	1.87	0.57
1:C:261:PRO:HB2	1:C:265:ARG:HD3	1.86	0.57
1:C:316:LEU:HD12	1:C:322:LEU:HD22	1.87	0.57
1:C:129:VAL:HG22	4:C:501:BNG:H6'2	1.86	0.57
1:A:103:LEU:C	1:A:103:LEU:HD13	2.24	0.57
1:A:245:HIS:ND1	1:A:287:THR:O	2.37	0.57
1:A:6:ILE:HD13	1:A:300:VAL:HG22	1.87	0.56
1:C:221:PRO:HG3	1:C:279:PHE:HA	1.87	0.56
1:A:57:TYR:HH	1:A:266:SER:HG	1.52	0.56
1:A:405:ILE:HD13	1:A:408:LEU:HD21	1.89	0.55
1:C:248:VAL:HG11	3:D:202:1PE:H132	1.89	0.54
2:B:91:THR:HG23	2:B:122:THR:HA	1.89	0.54
1:C:35:VAL:HG22	1:C:76:ILE:HD11	1.88	0.54
1:A:26:PHE:HB3	1:A:183:ILE:HD12	1.90	0.54
1:A:132:ILE:HG12	1:A:392:MET:HG3	1.91	0.52
2:B:104:SER:HB3	2:B:111:ARG:HD2	1.92	0.52
1:C:372:ILE:HG23	1:C:395:ALA:HB1	1.92	0.51
1:A:123:ALA:HB3	1:A:368:LEU:HD23	1.92	0.51
1:C:373:LEU:HD12	6:D:201:DMU:H25	1.91	0.51
1:A:120:PHE:HB3	1:A:125:MET:HB2	1.93	0.51
1:C:60:ILE:HD11	1:C:269:ALA:HB2	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:82:LEU:HD22	1:C:231:ILE:HD11	1.91	0.51
1:A:56:LEU:HD21	1:A:272:LEU:HD22	1.93	0.50
1:A:170:VAL:HG13	4:A:503:BNG:H5'2	1.94	0.50
1:C:116:LEU:HD21	1:C:240:ALA:HA	1.94	0.49
1:A:316:LEU:HG	1:A:322:LEU:HD22	1.94	0.49
1:A:146:LEU:HD13	4:C:502:BNG:H6'2	1.95	0.49
2:D:15:GLY:N	2:D:86:LEU:O	2.46	0.49
1:A:47:LEU:HD12	1:A:317:SER:HB3	1.95	0.48
1:C:135:GLU:OE2	1:C:391:GLY:HA3	2.13	0.48
1:C:56:LEU:HD21	1:C:272:LEU:HD22	1.94	0.48
2:D:86:LEU:HB3	2:D:123:VAL:HG11	1.94	0.48
1:C:245:HIS:ND1	1:C:287:THR:O	2.47	0.48
2:D:48:VAL:HG23	2:D:64:VAL:HG21	1.96	0.47
2:B:39:GLN:HB2	2:B:45:ARG:HG2	1.96	0.47
1:C:185:ILE:HG12	1:C:341:LEU:HD11	1.95	0.47
1:A:338:SER:HB3	1:A:342:TYR:CE2	2.49	0.47
1:C:368:LEU:O	1:C:372:ILE:HG12	2.14	0.47
1:C:114:GLY:HA3	4:C:503:BNG:H3	1.97	0.46
2:B:36:TRP:CG	2:B:81:LEU:HD22	2.50	0.46
1:A:236:LEU:HD12	1:A:236:LEU:HA	1.83	0.46
1:A:136:LEU:HB3	1:A:342:TYR:CG	2.50	0.46
1:A:101:PHE:CE2	1:A:239:ILE:HG22	2.51	0.46
1:C:348:SER:HB3	4:C:501:BNG:H3	1.98	0.45
2:B:35:GLY:HA2	2:B:50:ALA:HA	1.98	0.45
1:A:57:TYR:HA	1:A:269:ALA:HB1	1.99	0.45
1:A:372:ILE:HG23	1:A:395:ALA:HB1	1.98	0.45
1:C:136:LEU:HB3	1:C:342:TYR:CG	2.52	0.44
1:A:140:ALA:HA	1:A:143:MET:HE2	1.99	0.44
1:C:140:ALA:HA	1:C:143:MET:HE2	2.00	0.44
1:A:212:TRP:CE2	1:A:321:LYS:HE3	2.53	0.44
2:B:102:GLY:O	2:B:111:ARG:NH1	2.51	0.44
1:C:324:ALA:O	1:C:328:MET:HG2	2.17	0.44
2:B:17:SER:OG	2:B:82:GLN:NE2	2.51	0.43
2:B:73:ASP:O	2:B:77:ASN:N	2.52	0.43
1:A:289:GLY:HA2	1:A:292:ILE:HD12	1.99	0.43
3:D:202:1PE:H121	3:D:202:1PE:H231	1.61	0.43
1:C:353:LEU:O	1:C:358:VAL:HG22	2.17	0.43
1:C:338:SER:HB3	1:C:342:TYR:CE2	2.53	0.43
1:A:101:PHE:HZ	1:A:238:VAL:HG12	1.82	0.42
2:B:38:ARG:HH22	2:B:64:VAL:HG13	1.84	0.42
1:C:101:PHE:HB3	1:C:271:GLY:HA3	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:325:ALA:O	1:A:329:ILE:HG13	2.18	0.42
1:A:205:THR:HB	1:A:206:PRO:HD3	2.01	0.42
1:C:18:ILE:HD12	1:C:312:PHE:HZ	1.84	0.42
1:C:205:THR:HB	1:C:206:PRO:HD3	2.01	0.42
1:A:243:VAL:HG22	1:A:263:LEU:HD21	2.02	0.42
1:C:62:LYS:HE2	1:C:261:PRO:HB3	2.02	0.42
1:C:360:TYR:HE2	6:D:201:DMU:H11	1.84	0.41
1:A:377:VAL:HG21	6:D:201:DMU:H15	2.02	0.41
1:A:60:ILE:O	1:A:265:ARG:NH2	2.44	0.41
1:A:166:LEU:HD22	1:A:339:LEU:HD23	2.03	0.41
1:A:254:LYS:HD3	1:A:254:LYS:HA	1.95	0.41
1:C:165:THR:HG21	1:C:333:VAL:HG23	2.03	0.41
1:A:101:PHE:HB3	1:A:271:GLY:HA3	2.02	0.41
1:A:125:MET:SD	4:A:502:BNG:H4'2	2.61	0.41
1:C:236:LEU:HD12	1:C:236:LEU:HA	1.86	0.41
1:A:95:ILE:HG23	1:A:275:VAL:HG13	2.02	0.41
2:D:73:ASP:O	2:D:77:ASN:N	2.54	0.41
2:D:40:ALA:HB3	2:D:43:LYS:HB2	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	407/437 (93%)	398 (98%)	9 (2%)	0	100	100
1	C	406/437 (93%)	399 (98%)	6 (2%)	1 (0%)	47	78
2	B	123/154 (80%)	118 (96%)	5 (4%)	0	100	100
2	D	124/154 (80%)	119 (96%)	5 (4%)	0	100	100
All	All	1060/1182 (90%)	1034 (98%)	25 (2%)	1 (0%)	51	83

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	256	ASP

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	323/348 (93%)	318 (98%)	5 (2%)	65	81
1	C	322/348 (92%)	317 (98%)	5 (2%)	62	80
2	B	96/120 (80%)	96 (100%)	0	100	100
2	D	97/120 (81%)	97 (100%)	0	100	100
All	All	838/936 (90%)	828 (99%)	10 (1%)	71	84

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	101	PHE
1	A	193	TYR
1	A	197	PHE
1	A	288	TYR
1	A	301	TYR
1	C	101	PHE
1	C	193	TYR
1	C	197	PHE
1	C	212	TRP
1	C	340	LEU

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](#)

11 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
3	1PE	D	202	-	15,15,15	0.53	0	14,14,14	0.21	0
5	URA	A	504	-	8,8,8	1.72	2 (25%)	9,10,10	3.11	6 (66%)
4	BNG	C	501	-	21,21,21	0.55	0	26,26,26	1.17	2 (7%)
4	BNG	A	503	-	21,21,21	0.55	0	26,26,26	1.14	2 (7%)
6	DMU	B	201	-	34,34,34	0.48	0	45,45,45	0.81	0
6	DMU	D	201	-	34,34,34	0.48	0	45,45,45	0.72	0
4	BNG	C	503	-	21,21,21	0.54	0	26,26,26	1.15	2 (7%)
5	URA	C	504	-	8,8,8	1.72	2 (25%)	9,10,10	3.12	6 (66%)
4	BNG	A	502	-	21,21,21	0.54	0	26,26,26	1.32	2 (7%)
3	1PE	A	501	-	15,15,15	0.53	0	14,14,14	0.22	0
4	BNG	C	502	-	21,21,21	0.55	0	26,26,26	1.06	1 (3%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	1PE	D	202	-	-	10/13/13/13	-
5	URA	A	504	-	-	-	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	BNG	C	501	-	-	4/12/32/32	0/1/1/1
4	BNG	A	503	-	-	5/12/32/32	0/1/1/1
6	DMU	B	201	-	-	4/19/59/59	0/2/2/2
6	DMU	D	201	-	-	7/19/59/59	0/2/2/2
4	BNG	C	503	-	-	5/12/32/32	0/1/1/1
5	URA	C	504	-	-	-	0/1/1/1
4	BNG	A	502	-	-	5/12/32/32	0/1/1/1
3	1PE	A	501	-	-	6/13/13/13	-
4	BNG	C	502	-	-	5/12/32/32	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	504	URA	C4-N3	-2.63	1.33	1.38
5	A	504	URA	C4-N3	-2.61	1.33	1.38
5	A	504	URA	C5-C4	-2.11	1.39	1.43
5	C	504	URA	C5-C4	-2.10	1.39	1.43

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	504	URA	C4-N3-C2	-5.19	120.56	125.70
5	A	504	URA	C4-N3-C2	-5.16	120.58	125.70
5	C	504	URA	N1-C2-N3	4.73	120.49	115.13
5	A	504	URA	N1-C2-N3	4.69	120.45	115.13
4	A	502	BNG	C1'-O1-C1	-4.58	106.25	113.84
4	C	503	BNG	C1'-O1-C1	-3.98	107.23	113.84
4	C	501	BNG	C1'-O1-C1	-3.92	107.34	113.84
4	A	503	BNG	C1'-O1-C1	-3.72	107.67	113.84
5	A	504	URA	C5-C4-N3	3.53	120.12	114.84
5	C	504	URA	C5-C4-N3	3.52	120.11	114.84
4	A	502	BNG	C1-O5-C5	-3.31	107.19	113.69
4	C	502	BNG	C1'-O1-C1	-3.25	108.45	113.84
5	A	504	URA	O4-C4-C5	-3.14	119.64	125.16
5	C	504	URA	O4-C4-C5	-3.11	119.69	125.16
4	A	503	BNG	C1-O5-C5	-2.89	108.01	113.69
5	C	504	URA	O2-C2-N1	-2.81	119.70	122.79
5	A	504	URA	O2-C2-N1	-2.80	119.71	122.79
4	C	501	BNG	C1-O5-C5	-2.67	108.45	113.69
4	C	503	BNG	C1-O5-C5	-2.47	108.84	113.69

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	504	URA	C6-N1-C2	-2.14	121.09	122.40
5	C	504	URA	C6-N1-C2	-2.12	121.10	122.40

There are no chirality outliers.

All (51) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	502	BNG	C2-C1-O1-C1'
4	A	502	BNG	O5-C1-O1-C1'
4	C	501	BNG	C2-C1-O1-C1'
4	C	501	BNG	O5-C1-O1-C1'
4	C	502	BNG	C2-C1-O1-C1'
4	C	502	BNG	O5-C1-O1-C1'
4	C	503	BNG	C2-C1-O1-C1'
6	D	201	DMU	O5-C6-O16-C18
6	B	201	DMU	O6-C11-C9-O1
4	A	503	BNG	C4-C5-C6-O6
6	D	201	DMU	O6-C11-C9-O1
4	A	502	BNG	O5-C5-C6-O6
4	C	502	BNG	O5-C5-C6-O6
4	C	503	BNG	C4-C5-C6-O6
4	C	503	BNG	O5-C5-C6-O6
6	B	201	DMU	O6-C11-C9-C8
4	A	503	BNG	O5-C1-O1-C1'
4	C	503	BNG	O5-C1-O1-C1'
4	C	502	BNG	C4-C5-C6-O6
3	A	501	1PE	OH6-C15-C25-OH5
4	A	503	BNG	O5-C5-C6-O6
6	D	201	DMU	O5-C4-C57-O61
6	D	201	DMU	O6-C11-C9-C8
3	D	202	1PE	C24-C14-OH5-C25
4	C	502	BNG	C2'-C3'-C4'-C5'
3	D	202	1PE	OH5-C14-C24-OH4
3	A	501	1PE	OH5-C14-C24-OH4
3	D	202	1PE	C12-C22-OH3-C23
4	A	502	BNG	C4-C5-C6-O6
6	B	201	DMU	C28-C31-C34-C37
6	D	201	DMU	C28-C31-C34-C37
3	D	202	1PE	OH6-C15-C25-OH5
3	D	202	1PE	C23-C13-OH4-C24
4	C	501	BNG	C4'-C5'-C6'-C7'
4	C	501	BNG	C3'-C4'-C5'-C6'

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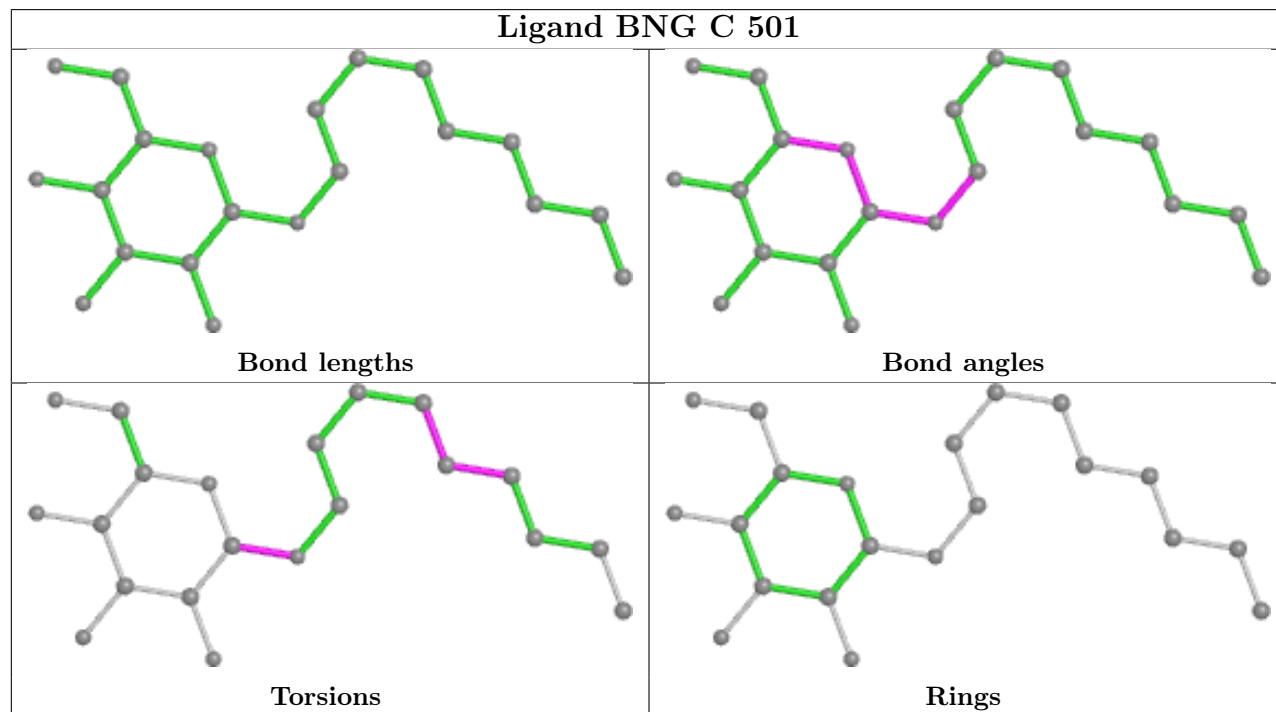
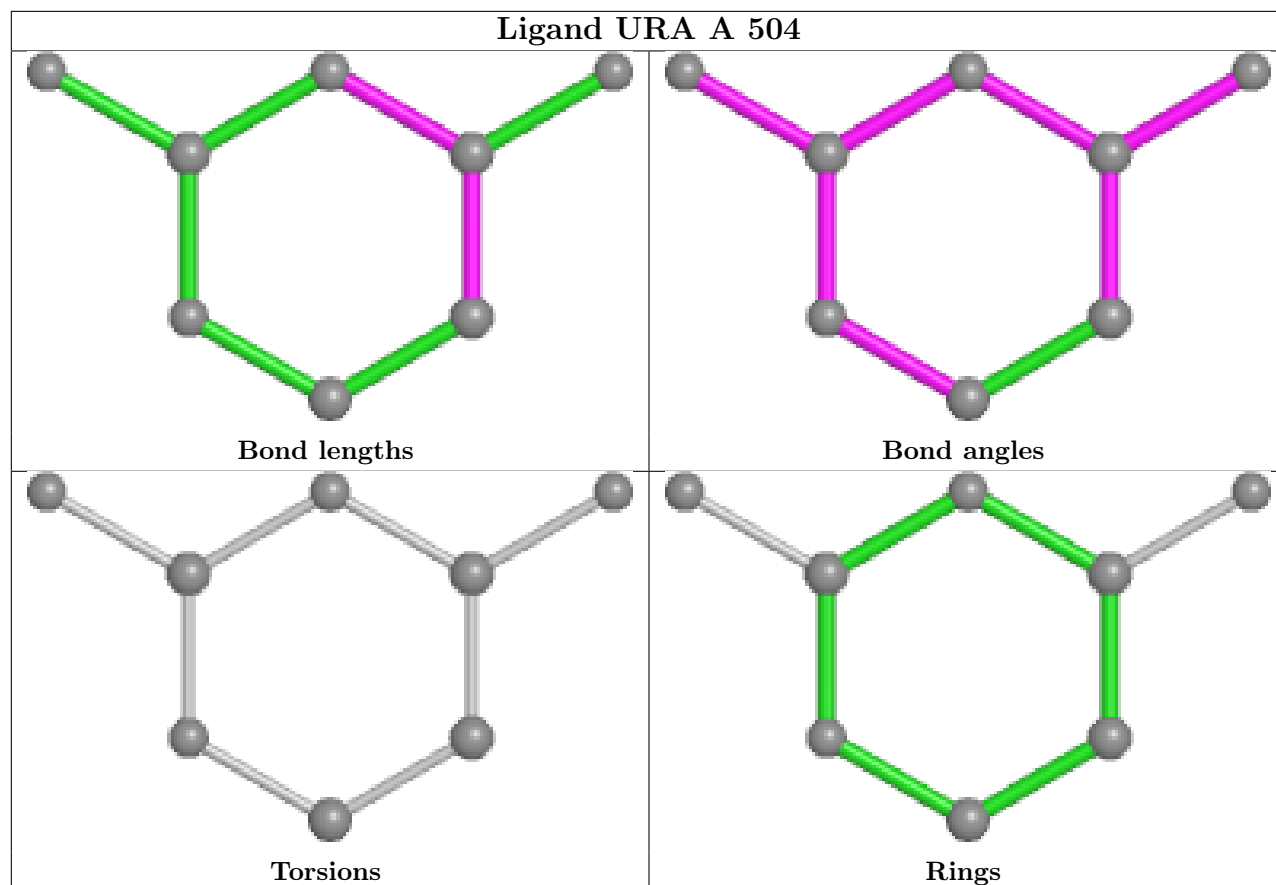
Mol	Chain	Res	Type	Atoms
3	D	202	1PE	OH7-C16-C26-OH6
4	A	502	BNG	O1-C1'-C2'-C3'
4	C	503	BNG	C2'-C3'-C4'-C5'
6	D	201	DMU	C3-C4-C57-O61
3	D	202	1PE	C25-C15-OH6-C26
3	A	501	1PE	C25-C15-OH6-C26
3	D	202	1PE	C15-C25-OH5-C14
4	A	503	BNG	C2'-C3'-C4'-C5'
3	D	202	1PE	C14-C24-OH4-C13
3	A	501	1PE	C14-C24-OH4-C13
4	A	503	BNG	C3'-C4'-C5'-C6'
6	B	201	DMU	C18-C19-C22-C25
3	A	501	1PE	C12-C22-OH3-C23
3	D	202	1PE	OH4-C13-C23-OH3
3	A	501	1PE	OH4-C13-C23-OH3
6	D	201	DMU	C18-C19-C22-C25

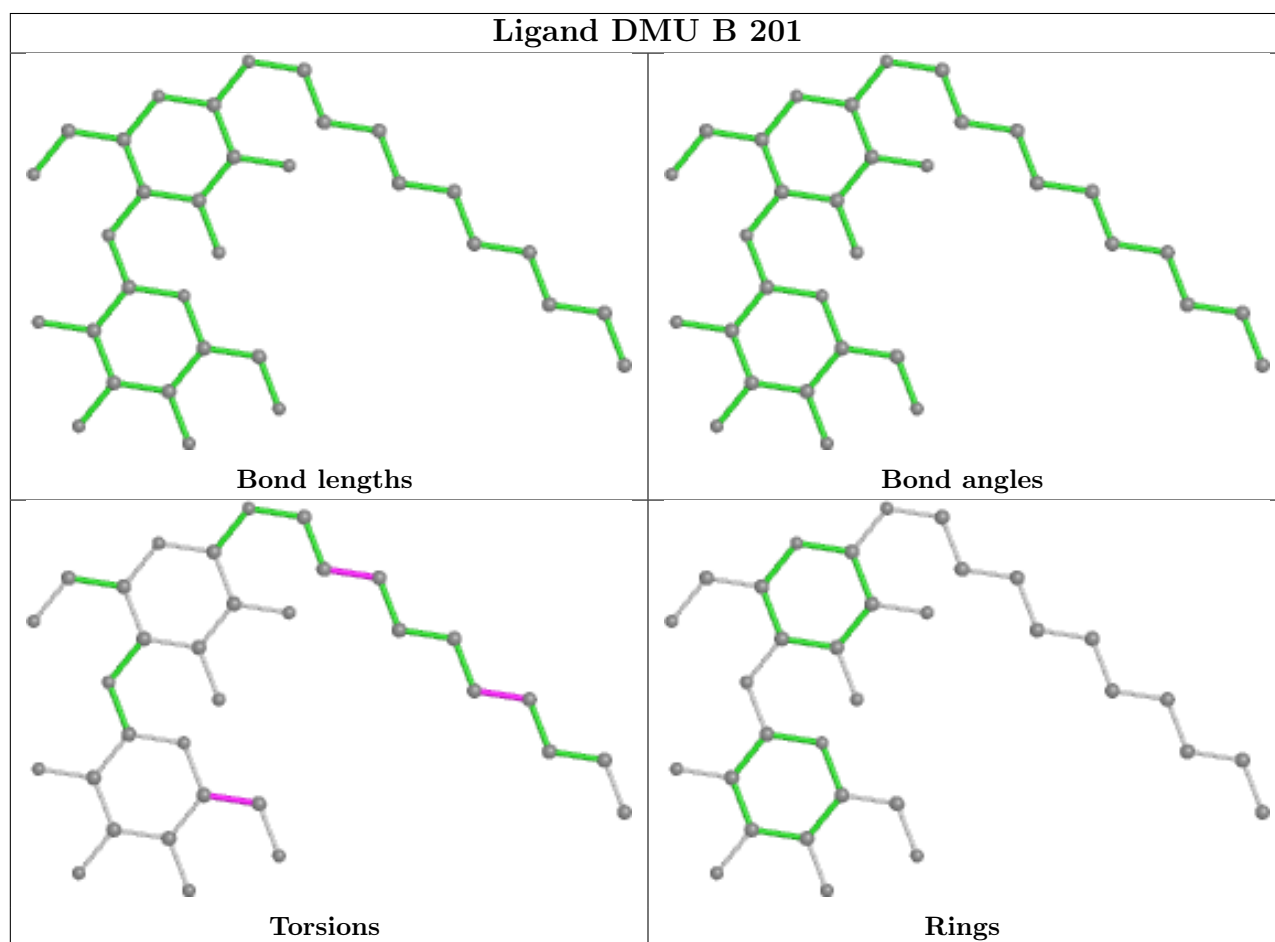
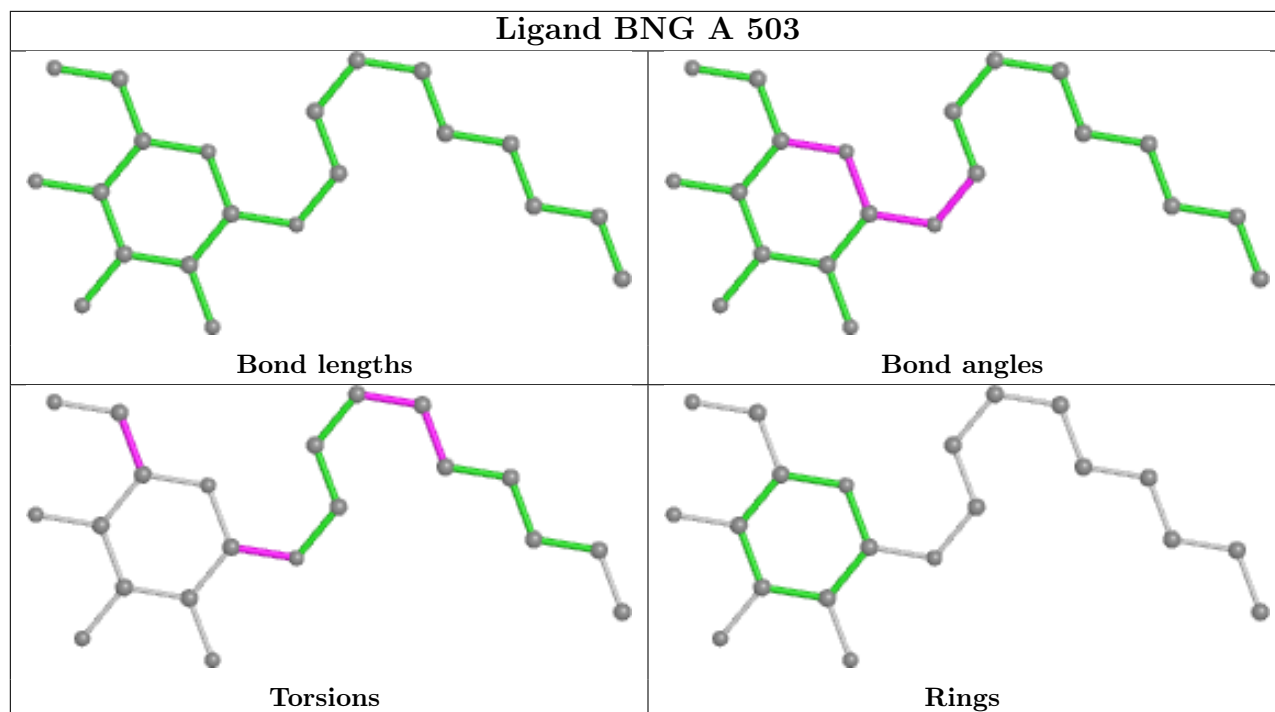
There are no ring outliers.

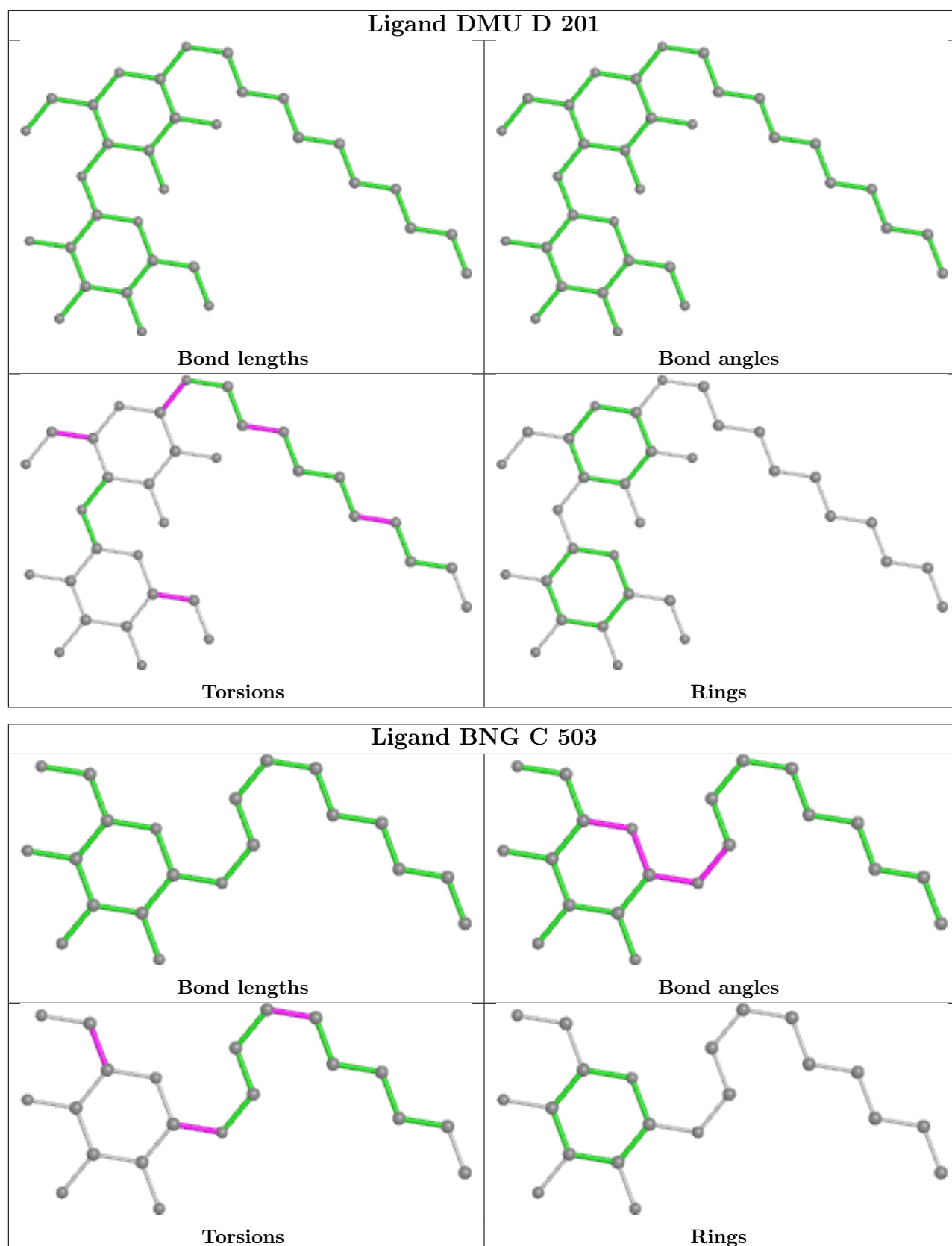
7 monomers are involved in 11 short contacts:

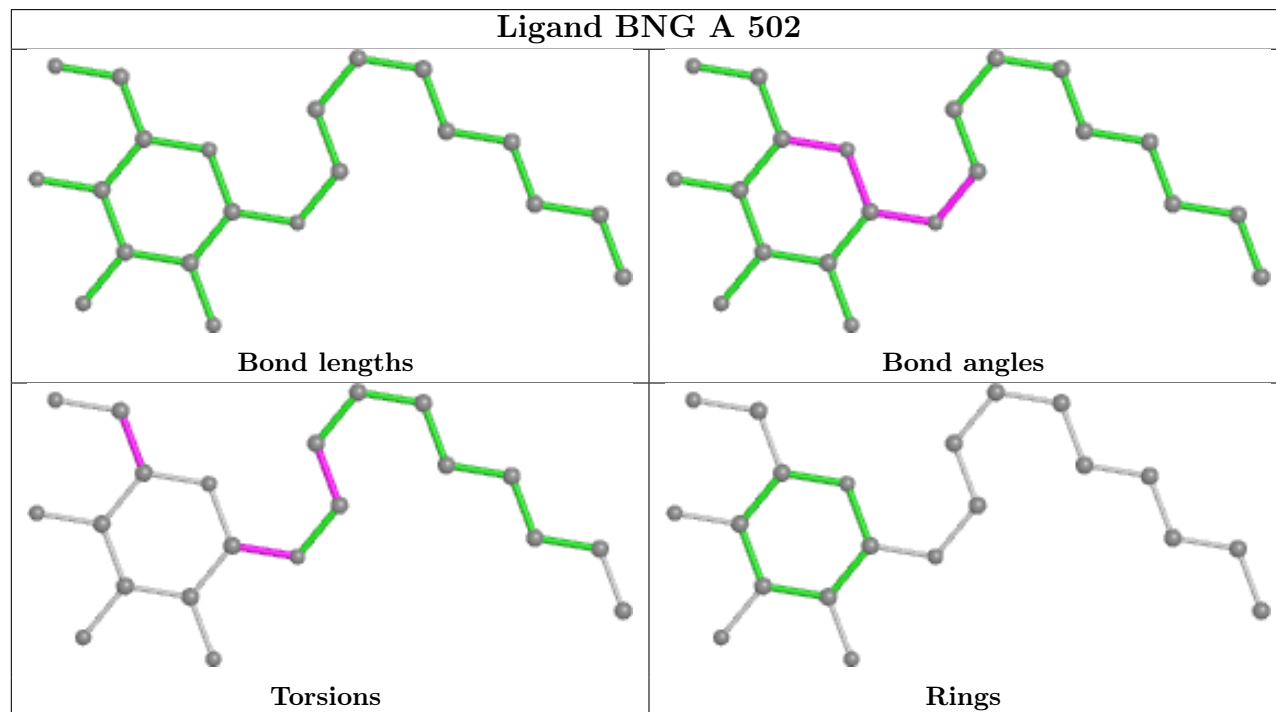
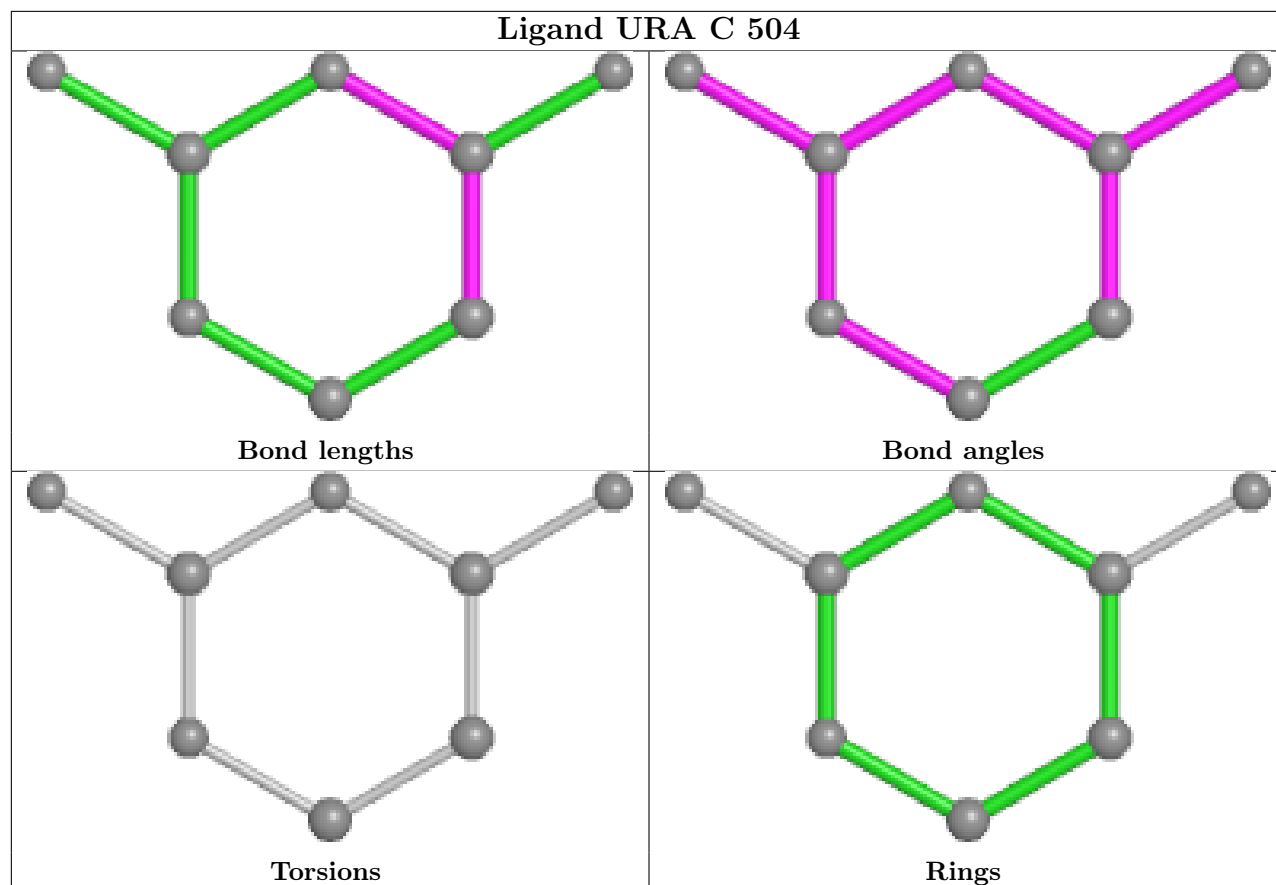
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	202	1PE	2	0
4	C	501	BNG	2	0
4	A	503	BNG	1	0
6	D	201	DMU	3	0
4	C	503	BNG	1	0
4	A	502	BNG	1	0
4	C	502	BNG	1	0

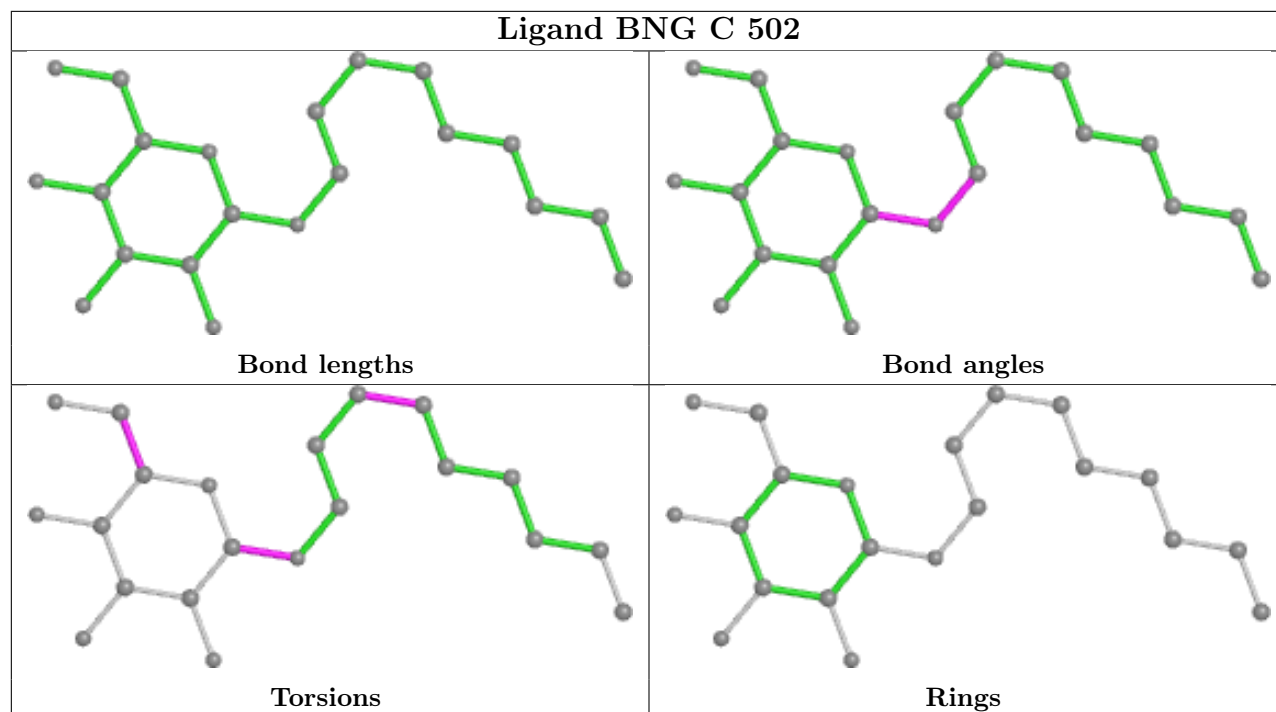
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

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	409/437 (93%)	0.04	9 (2%) 62 50	27, 50, 73, 90	0
1	C	408/437 (93%)	-0.03	3 (0%) 87 81	28, 53, 73, 101	0
2	B	125/154 (81%)	0.35	3 (2%) 59 47	36, 51, 62, 75	0
2	D	126/154 (81%)	0.24	3 (2%) 59 47	36, 50, 65, 81	0
All	All	1068/1182 (90%)	0.07	18 (1%) 70 59	27, 51, 71, 101	0

All (18) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	225	TRP	3.8
2	B	74	ASN	2.5
1	C	213	PHE	2.5
1	A	226	PHE	2.4
2	D	44	GLU	2.3
2	B	48	VAL	2.3
1	A	96	MET	2.3
1	A	228	ILE	2.2
1	A	14	LEU	2.2
1	A	232	LEU	2.2
1	A	229	LEU	2.1
1	C	225	TRP	2.1
1	A	164	THR	2.1
2	B	91	THR	2.1
2	D	48	VAL	2.0
1	A	396	THR	2.0
2	D	68	PHE	2.0
1	C	197	PHE	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](#)

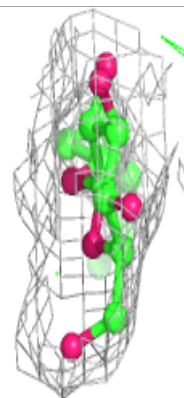
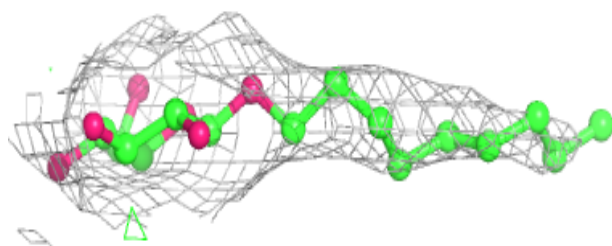
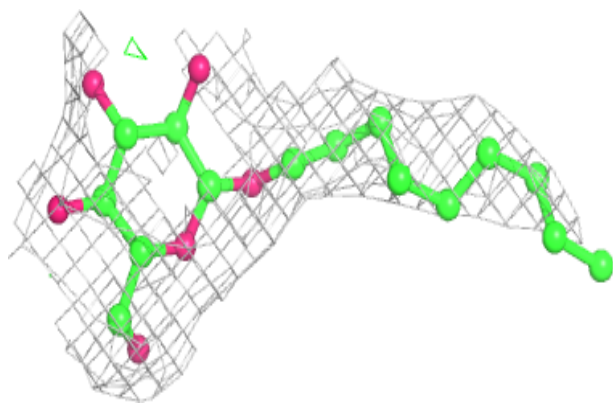
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	BNG	C	502	21/21	0.80	0.34	18,44,63,71	0
4	BNG	A	503	21/21	0.82	0.33	20,55,78,92	0
3	1PE	A	501	16/16	0.82	0.40	44,46,52,53	0
4	BNG	C	503	21/21	0.82	0.32	27,57,74,91	0
3	1PE	D	202	16/16	0.86	0.26	45,46,53,53	0
4	BNG	A	502	21/21	0.87	0.35	23,43,58,72	0
4	BNG	C	501	21/21	0.87	0.35	14,44,69,85	0
6	DMU	D	201	33/33	0.90	0.23	28,46,69,96	0
6	DMU	B	201	33/33	0.92	0.22	16,41,59,96	0
5	URA	A	504	8/8	0.94	0.21	25,33,46,47	0
5	URA	C	504	8/8	0.97	0.14	36,38,44,45	0

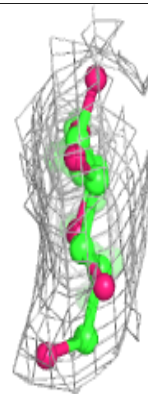
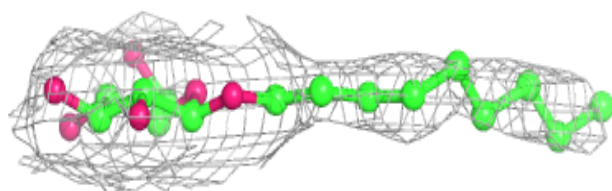
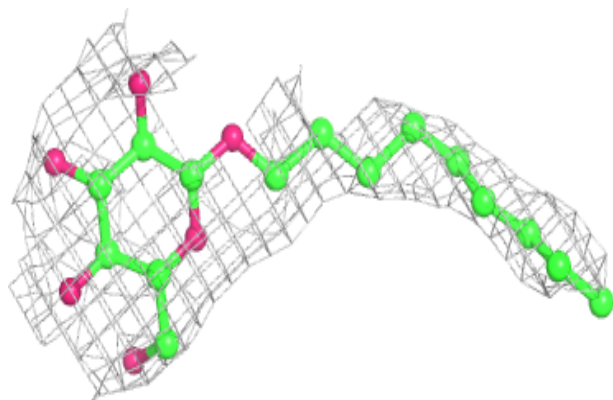
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around BNG 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)

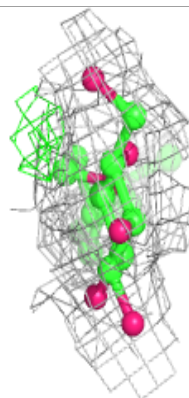
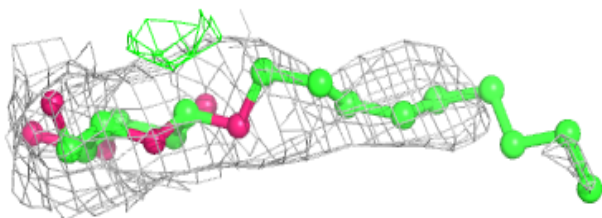
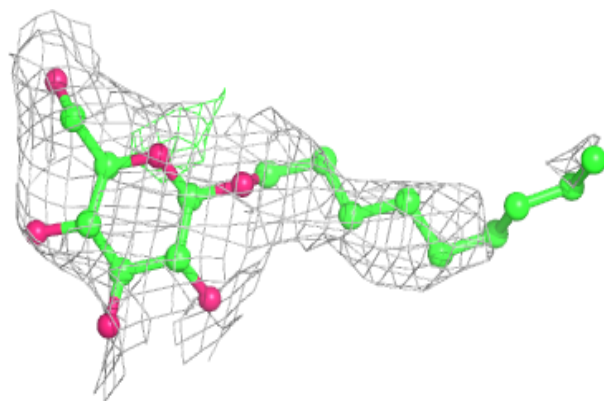
**Electron density around BNG A 503:**

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

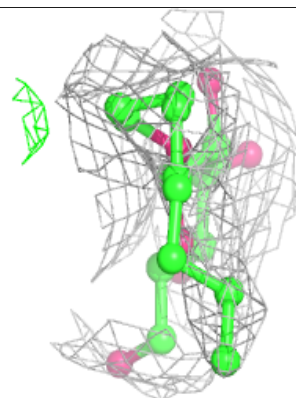
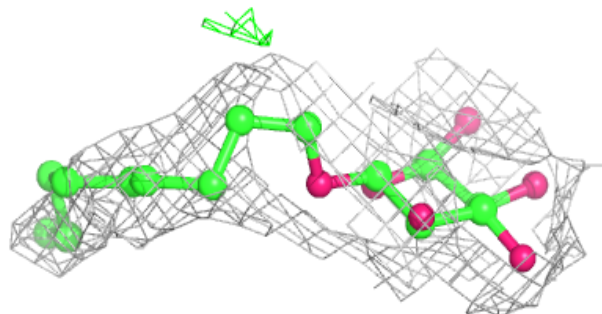
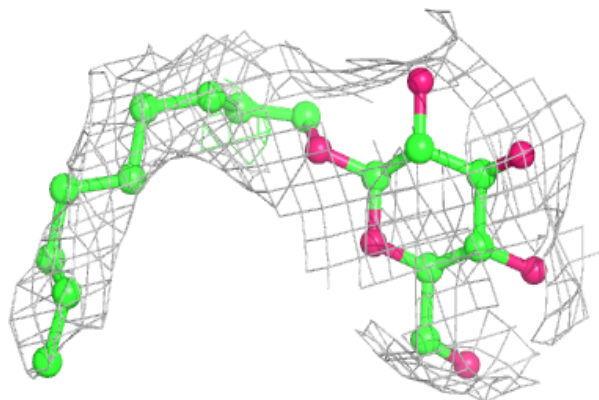


Electron density around BNG C 503:

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

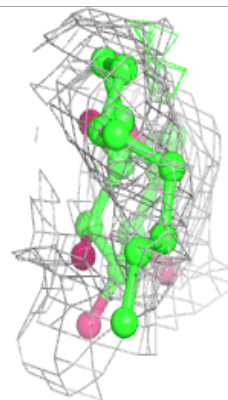
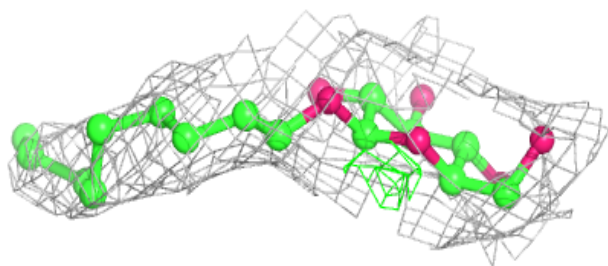
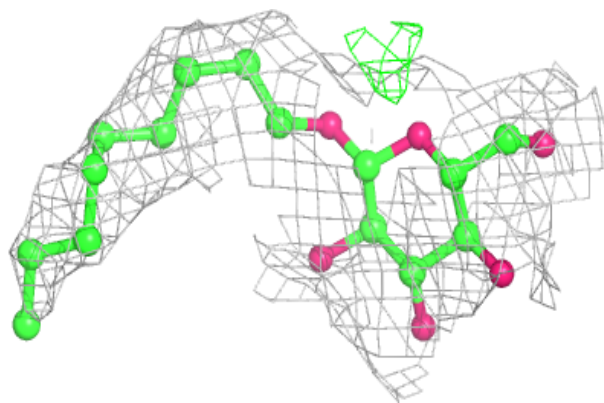
**Electron density around BNG A 502:**

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

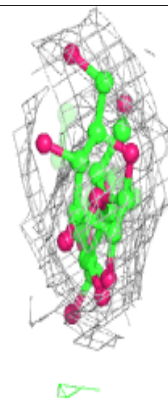
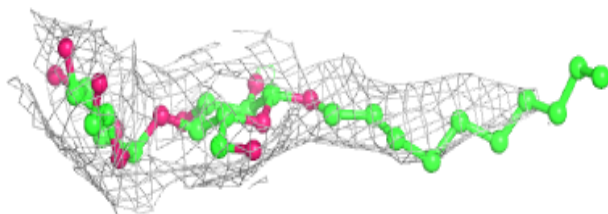
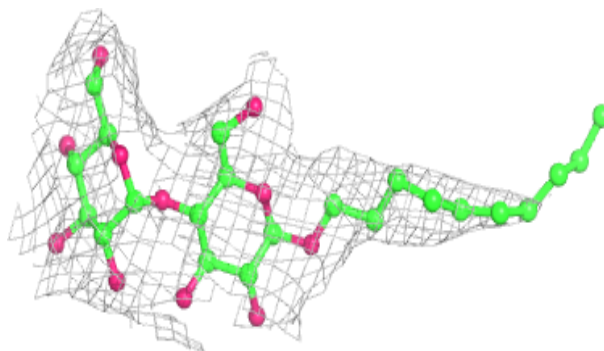


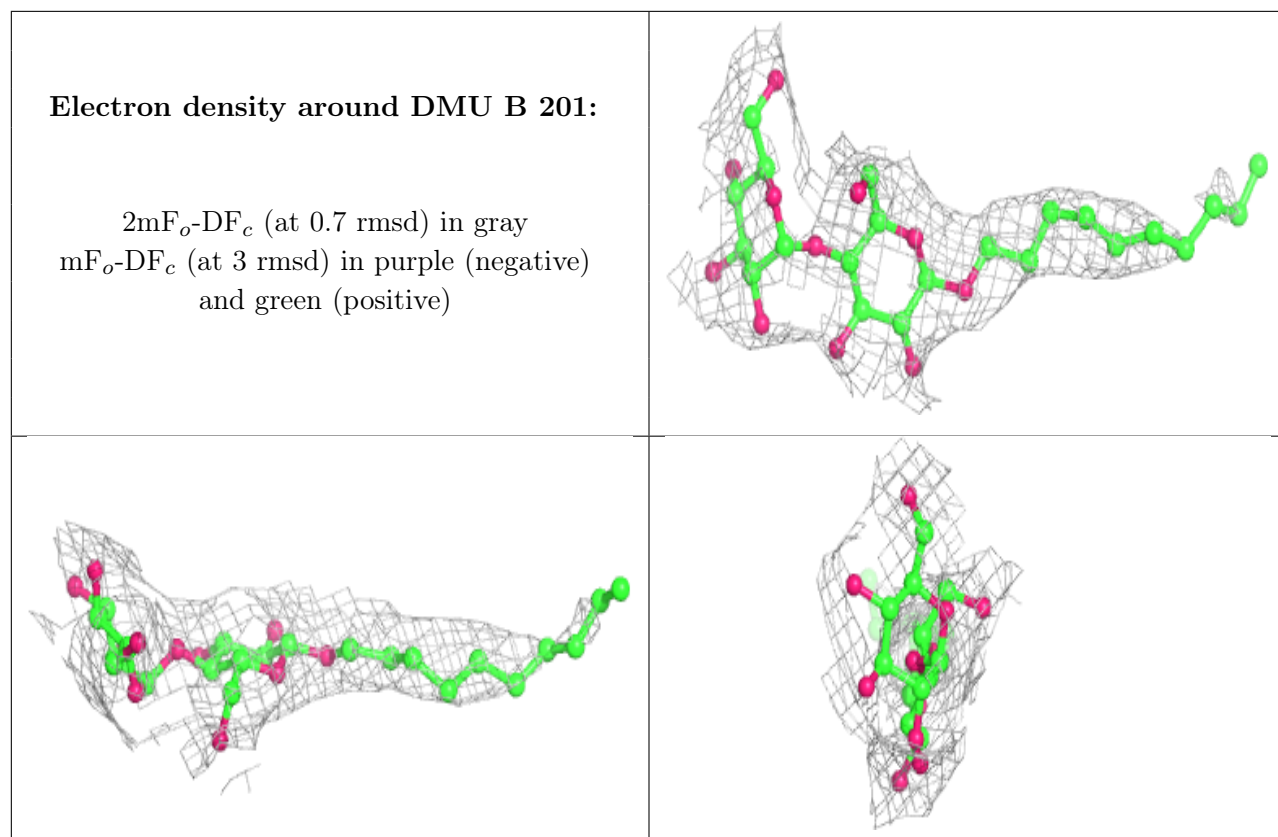
Electron density around BNG C 501:

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

**Electron density around DMU D 201:**

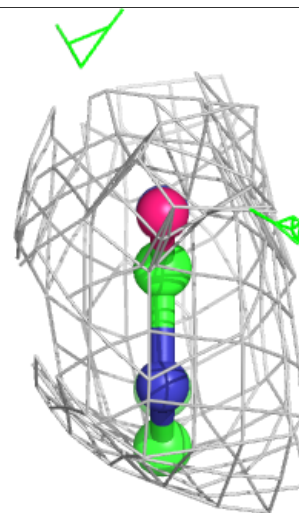
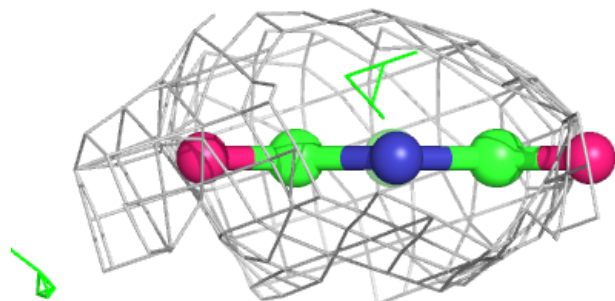
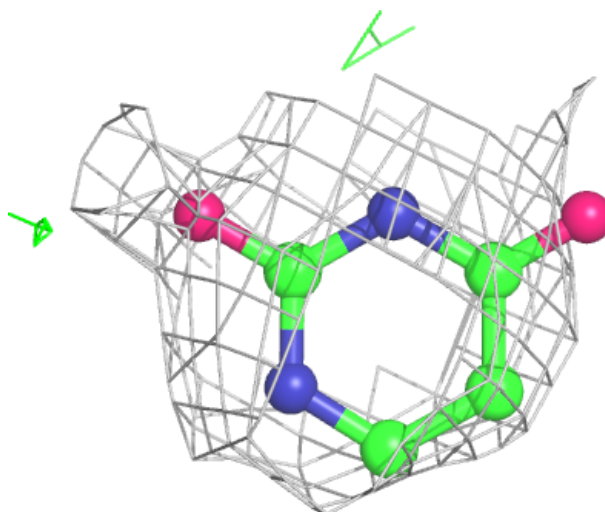
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

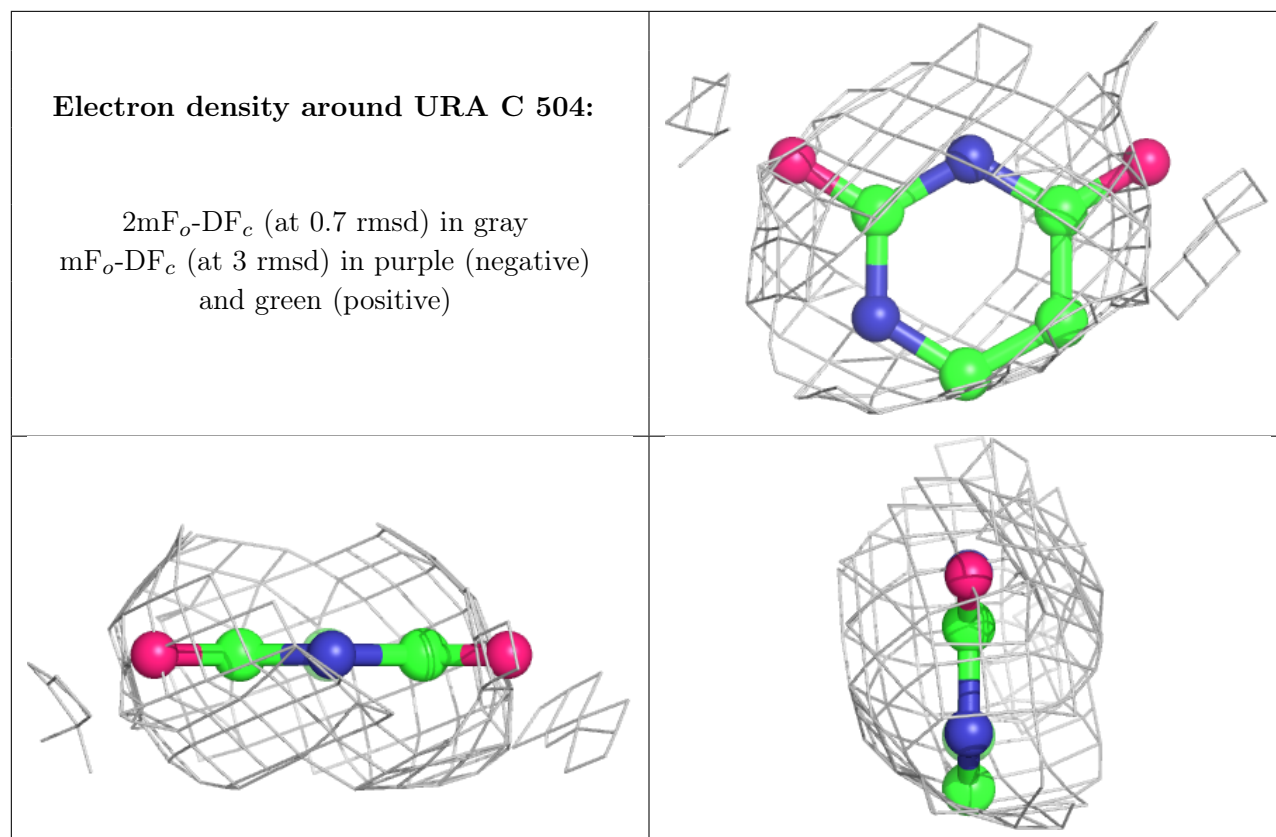




Electron density around URA A 504:

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





6.5 Other polymers [i](#)

There are no such residues in this entry.