



# Full wwPDB X-ray Structure Validation Report ⓘ

Jul 1, 2021 – 05:07 pm BST

PDB ID : 7BMH  
Title : Crystal structure of a light-driven proton pump LR (Mac) from *Leptosphaeria maculans*  
Authors : Kovalev, K.; Zabelskii, D.; Dmitrieva, N.; Volkov, O.; Shevchenko, V.; Astashkin, R.; Zinovev, E.; Gordeliy, V.  
Deposited on : 2021-01-20  
Resolution : 2.20 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.

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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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.22  
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) : 2.22

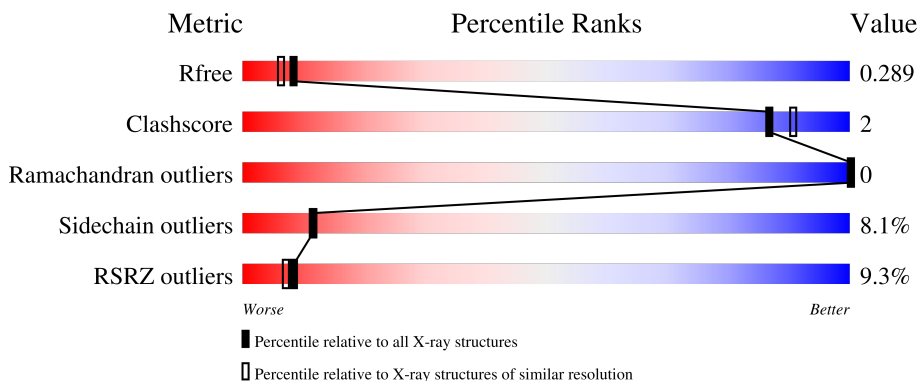
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.20 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	4898 (2.20-2.20)
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

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	324	 8% 69% 6% 24%
1	B	324	 6% 67% 6% 26%

## 2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 4213 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.

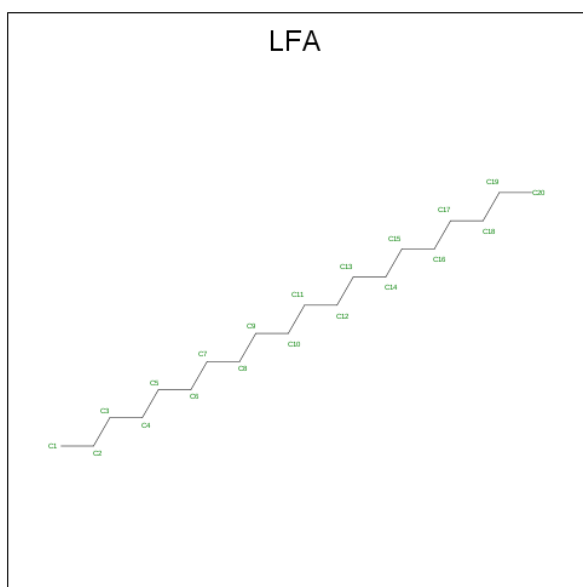
- Molecule 1 is a protein called Opsin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	247	1881	1266	294	315	6	0	0	0
1	B	239	1809	1218	282	303	6	0	0	0

There are 22 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	314	GLY	-	expression tag	UNP Q9HGT7
A	315	THR	-	expression tag	UNP Q9HGT7
A	316	HIS	-	expression tag	UNP Q9HGT7
A	317	HIS	-	expression tag	UNP Q9HGT7
A	318	HIS	-	expression tag	UNP Q9HGT7
A	319	HIS	-	expression tag	UNP Q9HGT7
A	320	HIS	-	expression tag	UNP Q9HGT7
A	321	HIS	-	expression tag	UNP Q9HGT7
A	322	HIS	-	expression tag	UNP Q9HGT7
A	323	HIS	-	expression tag	UNP Q9HGT7
A	324	HIS	-	expression tag	UNP Q9HGT7
B	314	GLY	-	expression tag	UNP Q9HGT7
B	315	THR	-	expression tag	UNP Q9HGT7
B	316	HIS	-	expression tag	UNP Q9HGT7
B	317	HIS	-	expression tag	UNP Q9HGT7
B	318	HIS	-	expression tag	UNP Q9HGT7
B	319	HIS	-	expression tag	UNP Q9HGT7
B	320	HIS	-	expression tag	UNP Q9HGT7
B	321	HIS	-	expression tag	UNP Q9HGT7
B	322	HIS	-	expression tag	UNP Q9HGT7
B	323	HIS	-	expression tag	UNP Q9HGT7
B	324	HIS	-	expression tag	UNP Q9HGT7

- Molecule 2 is EICOSANE (three-letter code: LFA) (formula: C<sub>20</sub>H<sub>42</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C 16 16	0	0
2	A	1	Total C 8 8	0	0
2	A	1	Total C 14 14	0	0
2	A	1	Total C 10 10	0	0
2	A	1	Total C 14 14	0	0
2	A	1	Total C 7 7	0	0
2	A	1	Total C 12 12	0	0
2	A	1	Total C 10 10	0	0
2	A	1	Total C 12 12	0	0
2	A	1	Total C 3 3	0	0
2	A	1	Total C 3 3	0	0
2	A	1	Total C 6 6	0	0
2	A	1	Total C 4 4	0	0
2	A	1	Total C 5 5	0	0

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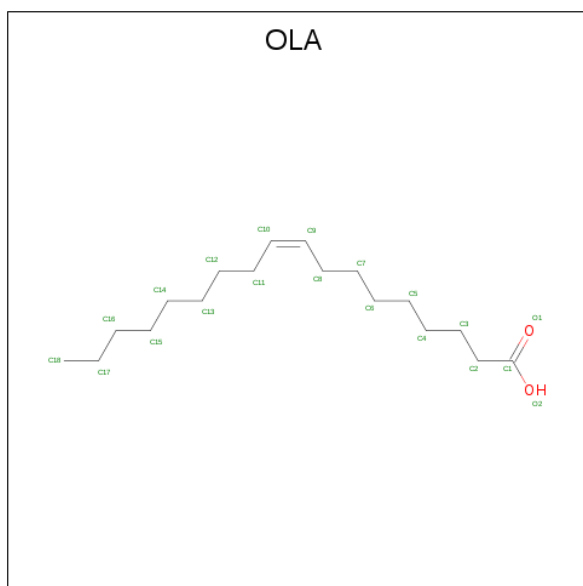
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C 3 3	0	0
2	A	1	Total C 3 3	0	0
2	A	1	Total C 4 4	0	0
2	A	1	Total C 4 4	0	0
2	A	1	Total C 6 6	0	0
2	A	1	Total C 7 7	0	0
2	A	1	Total C 5 5	0	0
2	A	1	Total C 12 12	0	0
2	B	1	Total C 15 15	0	0
2	B	1	Total C 16 16	0	0
2	B	1	Total C 10 10	0	0
2	B	1	Total C 8 8	0	0
2	B	1	Total C 8 8	0	0
2	B	1	Total C 10 10	0	0
2	B	1	Total C 7 7	0	0
2	B	1	Total C 11 11	0	0
2	B	1	Total C 8 8	0	0
2	B	1	Total C 10 10	0	0
2	B	1	Total C 6 6	0	0
2	B	1	Total C 3 3	0	0
2	B	1	Total C 9 9	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total C 7 7	0	0
2	B	1	Total C 3 3	0	0
2	B	1	Total C 4 4	0	0
2	B	1	Total C 3 3	0	0
2	B	1	Total C 7 7	0	0
2	B	1	Total C 7 7	0	0
2	B	1	Total C 9 9	0	0
2	B	1	Total C 7 7	0	0

- Molecule 3 is OLEIC ACID (three-letter code: OLA) (formula:  $C_{18}H_{34}O_2$ ).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 16 14 2	0	0
3	A	1	Total C O 14 12 2	0	0
3	A	1	Total C O 10 8 2	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			16	14	2		
3	B	1	Total	C	O	0	0
			11	9	2		
3	B	1	Total	C	O	0	0
			16	14	2		

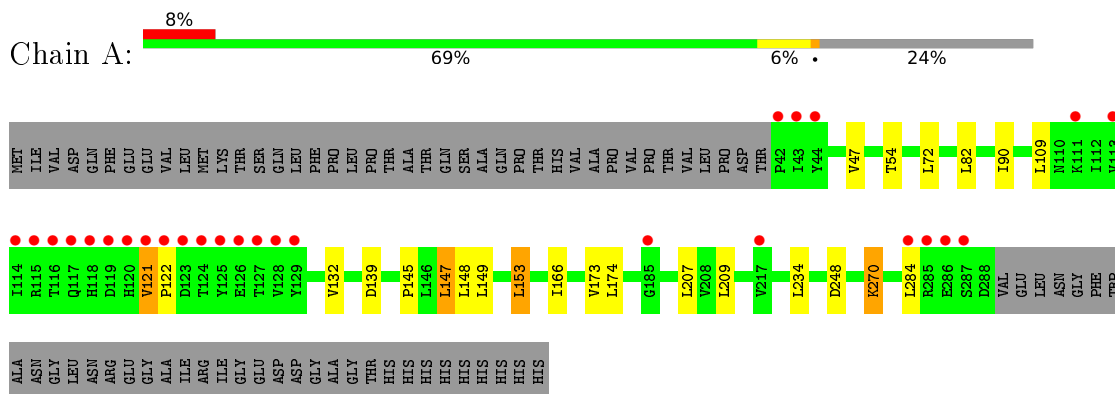
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	50	Total	O	0	1
			51	51		
4	B	52	Total	O	0	1
			53	53		

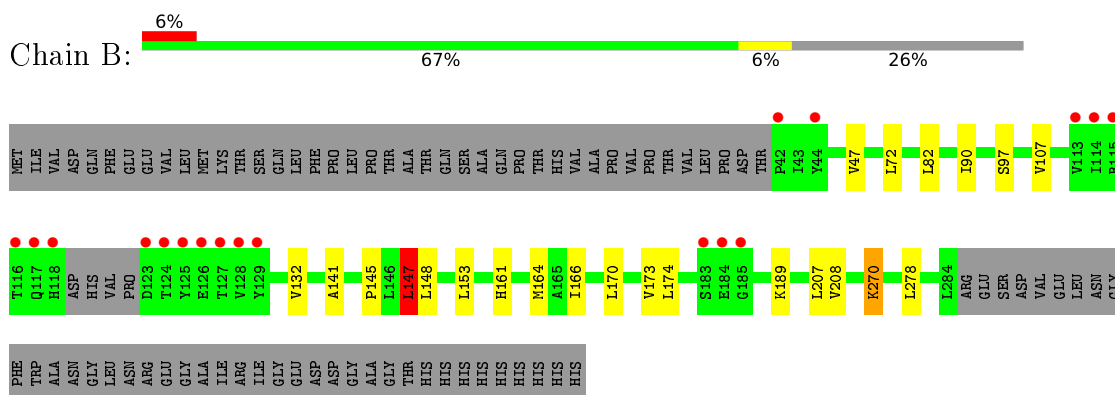
### 3 Residue-property plots [i](#)

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: Opsin



- Molecule 1: Opsin





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	63.54Å 70.78Å 148.02Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	19.92 – 2.20 45.04 – 2.20	Depositor EDS
% Data completeness (in resolution range)	99.2 (19.92-2.20) 82.7 (45.04-2.20)	Depositor EDS
$R_{merge}$	0.17	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.05 (at 2.20Å)	Xtrriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, $R_{free}$	0.236 , 0.285 0.239 , 0.289	Depositor DCC
$R_{free}$ test set	1650 reflections (4.77%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	27.0	Xtrriage
Anisotropy	0.830	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 62.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	4213	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	36.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 49.97 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 6.9188e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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

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

## 5 Model quality [i](#)

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

Bond lengths and bond angles in the following residue types are not validated in this section: LFA, LYR, OLA

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	0.37	0/1904	0.55	1/2614 (0.0%)
1	B	0.35	0/1827	0.55	1/2506 (0.0%)
All	All	0.36	0/3731	0.55	2/5120 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	139	ASP	CB-CG-OD1	5.74	123.46	118.30
1	B	147	LEU	CA-CB-CG	5.39	127.70	115.30

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	1881	0	1877	10	0
1	B	1809	0	1800	7	0
2	A	168	0	308	3	0
2	B	168	0	306	3	0
3	A	40	0	52	0	0
3	B	43	0	58	0	0
4	A	51	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	53	0	0	0	0
All	All	4213	0	4401	18	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 2.

All (18) 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:A:90:ILE:HD13	1:A:147:LEU:HD13	1.69	0.74
1:B:270:LYR:H9	1:B:270:LYR:H183	1.69	0.74
1:B:90:ILE:HD13	1:B:147:LEU:HD13	1.70	0.72
1:B:72:LEU:HD21	2:B:410:LFA:H162	1.83	0.60
1:A:72:LEU:HD23	2:A:422:LFA:H41	1.85	0.58
1:A:121:VAL:HG12	1:A:122:PRO:HD2	1.93	0.50
2:A:416:LFA:H31	2:A:417:LFA:H11	1.94	0.49
1:A:270:LYR:C9	1:A:270:LYR:H192	2.43	0.48
1:A:270:LYR:H9	1:A:270:LYR:H183	1.95	0.47
1:A:270:LYR:H192	1:A:270:LYR:H9	1.97	0.46
1:B:161:HIS:HA	1:B:164:MET:HE2	1.99	0.45
1:B:145:PRO:HB3	1:B:166:ILE:HG23	1.99	0.44
1:A:54:THR:HG23	2:A:406:LFA:H152	1.99	0.43
1:B:141:ALA:CB	2:B:412:LFA:H31	2.49	0.42
1:A:149:LEU:HG	1:A:153:LEU:HD22	2.02	0.42
1:A:109:LEU:HD12	1:A:109:LEU:HA	1.79	0.41
1:A:145:PRO:HB3	1:A:166:ILE:HG23	2.03	0.40
1:B:208:VAL:HG11	2:B:424:LFA:H162	2.03	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	244/324 (75%)	239 (98%)	5 (2%)	0	100	100
1	B	234/324 (72%)	232 (99%)	2 (1%)	0	100	100
All	All	478/648 (74%)	471 (98%)	7 (2%)	0	100	100

There are no Ramachandran outliers to report.

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

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	177/259 (68%)	163 (92%)	14 (8%)	12	12
1	B	167/259 (64%)	153 (92%)	14 (8%)	11	11
All	All	344/518 (66%)	316 (92%)	28 (8%)	11	12

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	47	VAL
1	A	82	LEU
1	A	121	VAL
1	A	132	VAL
1	A	147	LEU
1	A	148	LEU
1	A	153	LEU
1	A	173	VAL
1	A	174	LEU
1	A	207	LEU
1	A	209	LEU
1	A	234	LEU
1	A	248	ASP
1	A	284	LEU
1	B	47	VAL
1	B	82	LEU
1	B	97	SER
1	B	107	VAL

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Mol	Chain	Res	Type
1	B	132	VAL
1	B	147	LEU
1	B	148	LEU
1	B	153	LEU
1	B	170	LEU
1	B	173	VAL
1	B	174	LEU
1	B	189	LYS
1	B	207	LEU
1	B	278	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	161	HIS
1	A	210	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
1	LYR	A	270	1	27,29,30	1.22	4 (14%)	30,37,39	1.31	2 (6%)
1	LYR	B	270	1	27,29,30	1.32	4 (14%)	30,37,39	1.40	3 (10%)

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
1	LYR	A	270	1	-	2/22/40/42	0/1/1/1
1	LYR	B	270	1	-	1/22/40/42	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	270	LYR	C7-C80	3.37	1.40	1.35
1	A	270	LYR	C7-C80	3.09	1.39	1.35
1	B	270	LYR	O-C	2.95	1.31	1.19
1	A	270	LYR	C9-C80	-2.64	1.40	1.45
1	A	270	LYR	C4-C3	-2.36	1.46	1.50
1	B	270	LYR	C4-C3	-2.25	1.46	1.50
1	B	270	LYR	C9-C80	-2.24	1.41	1.45
1	A	270	LYR	C16-C15	-2.05	1.47	1.52

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	270	LYR	C8-C80-C7	-4.48	116.65	122.92
1	A	270	LYR	C8-C80-C7	-4.21	117.02	122.92
1	B	270	LYR	C1-NZ-CE	3.54	118.93	113.33
1	B	270	LYR	C9-C80-C7	2.10	122.17	118.94
1	A	270	LYR	C6-C7-C80	2.08	130.28	127.31

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	270	LYR	CD-CE-NZ-C1
1	B	270	LYR	CD-CE-NZ-C1
1	A	270	LYR	C1-C2-C3-C4

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	270	LYR	3	0
1	B	270	LYR	1	0

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

49 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	$\# Z  > 2$
2	LFA	B	424	-	6,6,19	0.32	0	5,5,18	0.63	0
2	LFA	B	408	-	6,6,19	0.35	0	5,5,18	0.67	0
3	OLA	B	413	-	7,10,19	0.19	0	6,10,19	0.11	0
2	LFA	A	409	-	9,9,19	0.32	0	8,8,18	0.78	0
2	LFA	A	417	-	4,4,19	0.30	0	3,3,18	0.61	0
2	LFA	B	402	-	14,14,19	0.28	0	13,13,18	0.93	0
2	LFA	B	416	-	8,8,19	0.32	0	7,7,18	0.74	0
2	LFA	A	411	-	2,2,19	0.36	0	0,1,18	0.00	-
2	LFA	B	419	-	3,3,19	0.43	0	2,2,18	0.68	0
2	LFA	B	422	-	6,6,19	0.36	0	5,5,18	0.55	0
2	LFA	B	403	-	15,15,19	0.32	0	14,14,18	0.94	0
2	LFA	A	410	-	11,11,19	0.37	0	10,10,18	0.67	0
2	LFA	B	410	-	7,7,19	0.35	0	6,6,18	0.61	0
2	LFA	B	405	-	7,7,19	0.30	0	6,6,18	0.80	0
2	LFA	A	415	-	5,5,19	0.35	0	4,4,18	0.44	0
2	LFA	A	406	-	13,13,19	0.31	0	12,12,18	0.88	0
2	LFA	B	418	-	2,2,19	0.36	0	0,1,18	0.00	-
2	LFA	B	412	-	5,5,19	0.35	0	4,4,18	0.55	0
2	LFA	B	417	-	6,6,19	0.33	0	5,5,18	0.65	0
3	OLA	A	412	-	10,13,19	0.26	0	8,13,19	0.23	0
2	LFA	B	423	-	8,8,19	0.38	0	7,7,18	0.68	0
2	LFA	B	404	-	9,9,19	0.33	0	8,8,18	0.70	0
2	LFA	A	416	-	3,3,19	0.39	0	2,2,18	0.78	0
2	LFA	A	405	-	9,9,19	0.31	0	8,8,18	0.85	0
2	LFA	A	425	-	11,11,19	0.39	0	10,10,18	0.68	0
2	LFA	A	422	-	5,5,19	0.35	0	4,4,18	0.53	0
2	LFA	A	408	-	11,11,19	0.34	0	10,10,18	0.73	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	LFA	A	414	-	2,2,19	0.32	0	0,1,18	0.00	-
3	OLA	B	401	-	12,15,19	0.30	0	11,15,19	0.16	0
2	LFA	A	423	-	6,6,19	0.35	0	5,5,18	0.59	0
2	LFA	B	409	-	10,10,19	0.34	0	9,9,18	0.87	0
2	LFA	A	418	-	2,2,19	0.42	0	0,1,18	0.00	-
2	LFA	A	404	-	13,13,19	0.32	0	12,12,18	0.90	0
2	LFA	A	403	-	7,7,19	0.36	0	6,6,18	0.82	0
2	LFA	B	406	-	7,7,19	0.34	0	6,6,18	0.74	0
2	LFA	B	411	-	9,9,19	0.29	0	8,8,18	0.79	0
2	LFA	B	421	-	6,6,19	0.32	0	5,5,18	0.65	0
3	OLA	A	413	-	6,9,19	0.19	0	5,9,19	0.21	0
3	OLA	B	414	-	12,15,19	0.31	0	11,15,19	0.26	0
3	OLA	A	402	-	12,15,19	0.33	0	11,15,19	0.36	0
2	LFA	A	421	-	3,3,19	0.43	0	2,2,18	0.73	0
2	LFA	A	401	-	15,15,19	0.36	0	14,14,18	0.85	0
2	LFA	A	420	-	3,3,19	0.43	0	2,2,18	0.66	0
2	LFA	B	420	-	2,2,19	0.42	0	0,1,18	0.00	-
2	LFA	A	424	-	4,4,19	0.39	0	3,3,18	0.48	0
2	LFA	B	415	-	2,2,19	0.33	0	0,1,18	0.00	-
2	LFA	B	407	-	9,9,19	0.30	0	8,8,18	0.96	0
2	LFA	A	419	-	2,2,19	0.31	0	0,1,18	0.00	-
2	LFA	A	407	-	6,6,19	0.33	0	5,5,18	0.54	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	LFA	B	424	-	-	1/4/4/17	-
2	LFA	B	408	-	-	3/4/4/17	-
3	OLA	B	413	-	-	2/6/8/17	-
2	LFA	A	409	-	-	3/7/7/17	-
2	LFA	A	417	-	-	0/2/2/17	-
2	LFA	B	402	-	-	9/12/12/17	-
2	LFA	B	416	-	-	2/6/6/17	-
2	LFA	B	419	-	-	0/1/1/17	-
2	LFA	B	422	-	-	1/4/4/17	-
2	LFA	B	403	-	-	6/13/13/17	-
2	LFA	A	410	-	-	5/9/9/17	-
2	LFA	B	410	-	-	4/5/5/17	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	LFA	B	405	-	-	3/5/5/17	-
2	LFA	A	415	-	-	1/3/3/17	-
2	LFA	A	406	-	-	6/11/11/17	-
2	LFA	B	412	-	-	1/3/3/17	-
2	LFA	B	417	-	-	2/4/4/17	-
3	OLA	A	412	-	-	3/9/11/17	-
2	LFA	B	423	-	-	0/6/6/17	-
2	LFA	B	404	-	-	3/7/7/17	-
2	LFA	A	416	-	-	0/1/1/17	-
2	LFA	A	405	-	-	3/7/7/17	-
2	LFA	A	425	-	-	3/9/9/17	-
2	LFA	A	422	-	-	1/3/3/17	-
2	LFA	A	408	-	-	3/9/9/17	-
3	OLA	B	401	-	-	1/11/13/17	-
2	LFA	A	423	-	-	1/4/4/17	-
2	LFA	B	409	-	-	4/8/8/17	-
2	LFA	A	404	-	-	5/11/11/17	-
2	LFA	A	403	-	-	1/5/5/17	-
2	LFA	B	406	-	-	0/5/5/17	-
2	LFA	B	411	-	-	5/7/7/17	-
2	LFA	B	421	-	-	1/4/4/17	-
3	OLA	A	413	-	-	0/5/7/17	-
3	OLA	B	414	-	-	3/11/13/17	-
3	OLA	A	402	-	-	1/11/13/17	-
2	LFA	A	421	-	-	1/1/1/17	-
2	LFA	A	401	-	-	6/13/13/17	-
2	LFA	A	420	-	-	0/1/1/17	-
2	LFA	A	424	-	-	0/2/2/17	-
2	LFA	B	407	-	-	2/7/7/17	-
2	LFA	A	407	-	-	2/4/4/17	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (98) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	402	LFA	C7-C8-C9-C10

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>Atoms</b>
2	B	404	LFA	C6-C7-C8-C9
2	B	409	LFA	C7-C8-C9-C10
2	B	409	LFA	C5-C6-C7-C8
2	B	411	LFA	C2-C3-C4-C5
2	B	416	LFA	C14-C15-C16-C17
2	A	404	LFA	C12-C13-C14-C15
2	B	402	LFA	C9-C10-C11-C12
2	B	409	LFA	C6-C7-C8-C9
2	A	401	LFA	C12-C13-C14-C15
2	B	410	LFA	C15-C16-C17-C18
2	A	404	LFA	C14-C15-C16-C17
2	A	406	LFA	C11-C10-C9-C8
2	A	406	LFA	C12-C13-C14-C15
2	B	411	LFA	C3-C4-C5-C6
2	B	412	LFA	C2-C3-C4-C5
2	A	405	LFA	C12-C13-C14-C15
2	A	408	LFA	C14-C15-C16-C17
2	B	403	LFA	C7-C8-C9-C10
2	A	410	LFA	C4-C5-C6-C7
3	B	413	OLA	C3-C4-C5-C6
2	B	405	LFA	C3-C4-C5-C6
2	A	404	LFA	C11-C12-C13-C14
2	B	408	LFA	C15-C16-C17-C18
2	A	408	LFA	C9-C10-C11-C12
2	A	410	LFA	C1-C2-C3-C4
2	B	410	LFA	C14-C15-C16-C17
2	A	410	LFA	C9-C10-C11-C12
2	B	405	LFA	C1-C2-C3-C4
2	B	402	LFA	C12-C13-C14-C15
2	B	404	LFA	C7-C8-C9-C10
2	B	402	LFA	C11-C12-C13-C14
2	B	411	LFA	C1-C2-C3-C4
2	A	408	LFA	C15-C16-C17-C18
2	B	402	LFA	C3-C4-C5-C6
2	A	409	LFA	C7-C8-C9-C10
2	B	410	LFA	C12-C13-C14-C15
2	B	411	LFA	C4-C5-C6-C7
2	A	405	LFA	C14-C15-C16-C17
2	A	407	LFA	C15-C16-C17-C18
2	A	406	LFA	C7-C8-C9-C10
2	A	425	LFA	C4-C5-C6-C7
2	B	404	LFA	C3-C4-C5-C6

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Mol	Chain	Res	Type	Atoms
2	A	406	LFA	C9-C10-C11-C12
3	A	412	OLA	C2-C3-C4-C5
2	A	410	LFA	C6-C7-C8-C9
2	B	411	LFA	C7-C8-C9-C10
2	B	403	LFA	C10-C11-C12-C13
2	B	417	LFA	C15-C16-C17-C18
2	B	410	LFA	C16-C17-C18-C19
3	A	412	OLA	C9-C10-C11-C12
2	B	402	LFA	C4-C5-C6-C7
2	B	417	LFA	C16-C17-C18-C19
2	A	423	LFA	C1-C2-C3-C4
2	A	405	LFA	C15-C16-C17-C18
2	B	421	LFA	C4-C5-C6-C7
2	B	408	LFA	C16-C17-C18-C19
2	A	401	LFA	C5-C6-C7-C8
2	A	409	LFA	C5-C6-C7-C8
2	B	409	LFA	C2-C3-C4-C5
2	A	406	LFA	C13-C14-C15-C16
2	B	402	LFA	C11-C10-C9-C8
2	B	405	LFA	C2-C3-C4-C5
2	B	407	LFA	C4-C5-C6-C7
2	B	403	LFA	C6-C7-C8-C9
2	A	401	LFA	C3-C4-C5-C6
2	A	421	LFA	C16-C17-C18-C19
3	A	402	OLA	C9-C10-C11-C12
2	A	404	LFA	C9-C10-C11-C12
2	A	401	LFA	C11-C12-C13-C14
3	B	413	OLA	C2-C3-C4-C5
2	B	403	LFA	C11-C12-C13-C14
2	A	401	LFA	C7-C8-C9-C10
3	A	412	OLA	C4-C5-C6-C7
2	A	425	LFA	C7-C8-C9-C10
2	B	402	LFA	C5-C6-C7-C8
2	A	415	LFA	C1-C2-C3-C4
2	B	424	LFA	C16-C17-C18-C19
2	A	410	LFA	C5-C6-C7-C8
3	B	414	OLA	C6-C7-C8-C9
2	B	402	LFA	C10-C11-C12-C13
2	B	403	LFA	C11-C10-C9-C8
2	A	403	LFA	C17-C18-C19-C20
2	A	409	LFA	C2-C3-C4-C5
3	B	414	OLA	C3-C4-C5-C6

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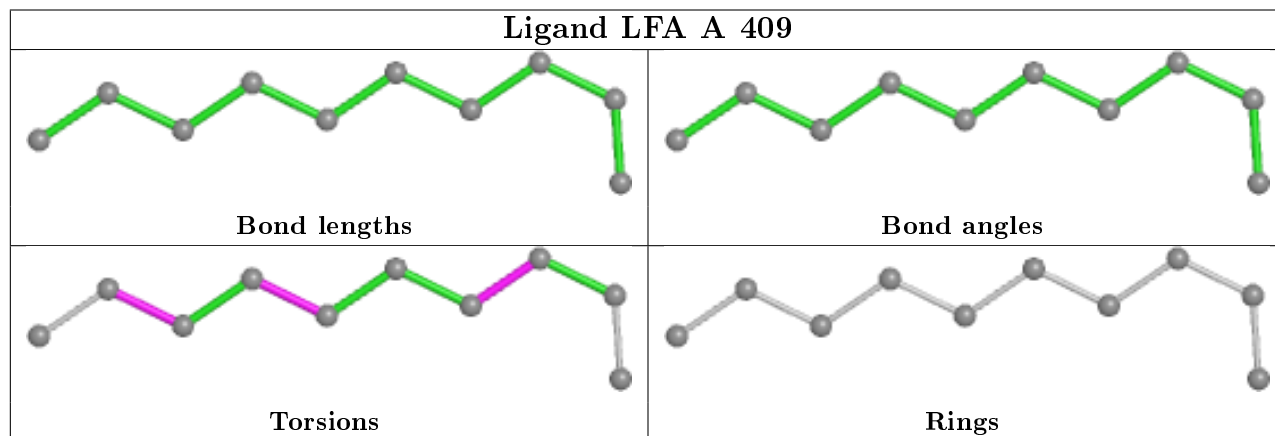
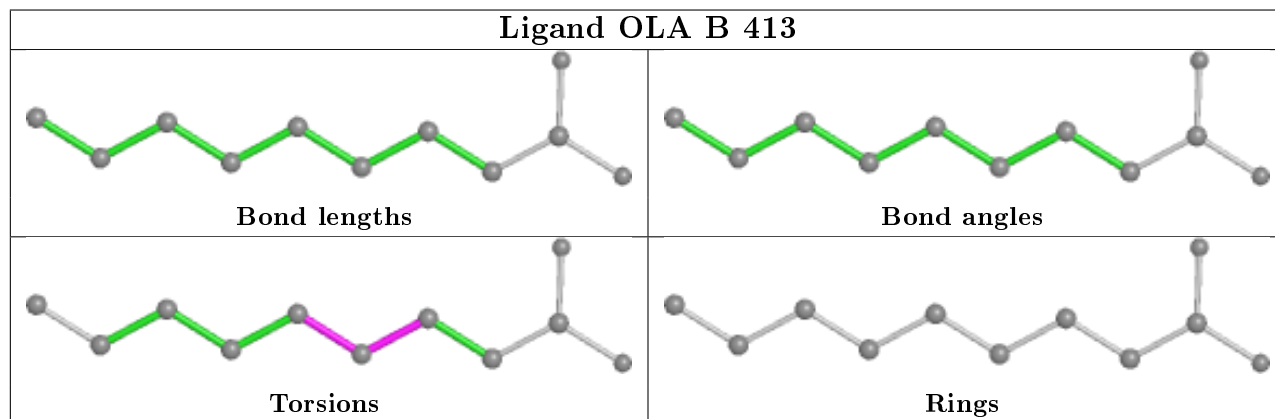
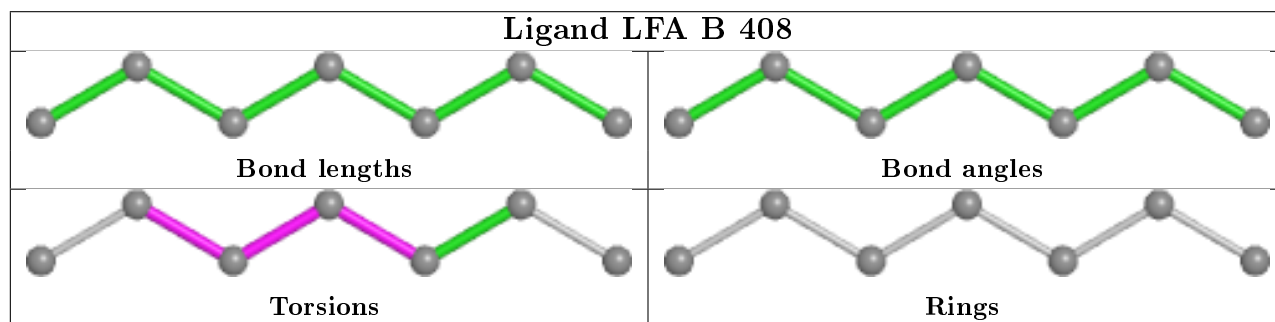
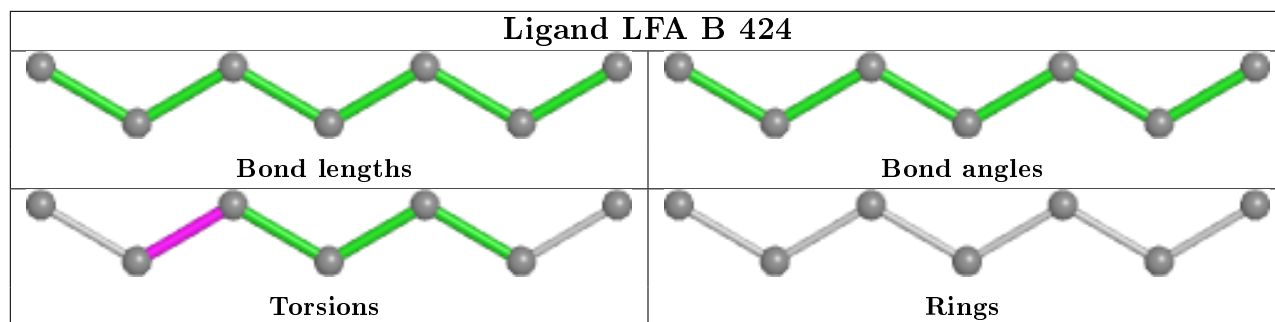
Mol	Chain	Res	Type	Atoms
2	B	416	LFA	C15-C16-C17-C18
2	B	403	LFA	C9-C10-C11-C12
3	B	414	OLA	C11-C10-C9-C8
2	A	422	LFA	C1-C2-C3-C4
2	A	401	LFA	C10-C11-C12-C13
2	B	422	LFA	C16-C17-C18-C19
2	A	425	LFA	C3-C4-C5-C6
2	B	407	LFA	C6-C7-C8-C9
3	B	401	OLA	C1-C2-C3-C4
2	B	408	LFA	C17-C18-C19-C20
2	A	404	LFA	C10-C11-C12-C13
2	A	407	LFA	C16-C17-C18-C19
2	A	406	LFA	C16-C17-C18-C19

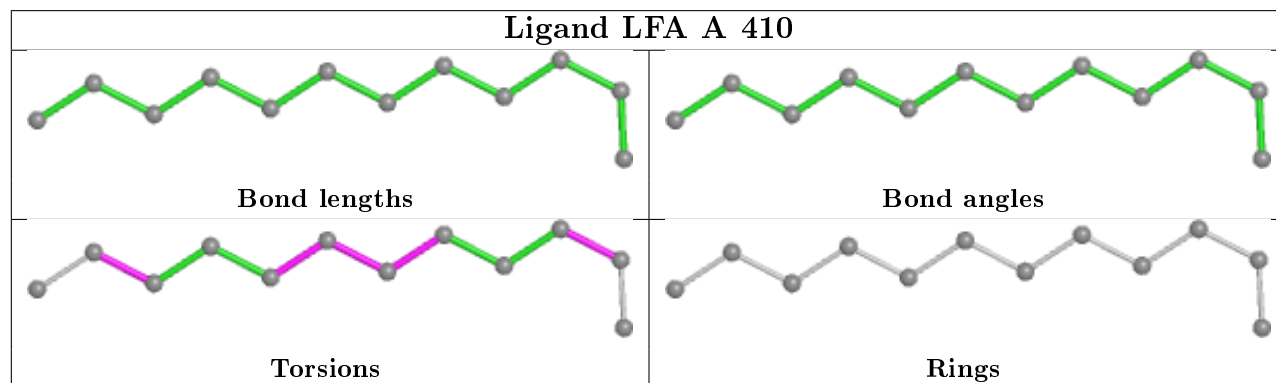
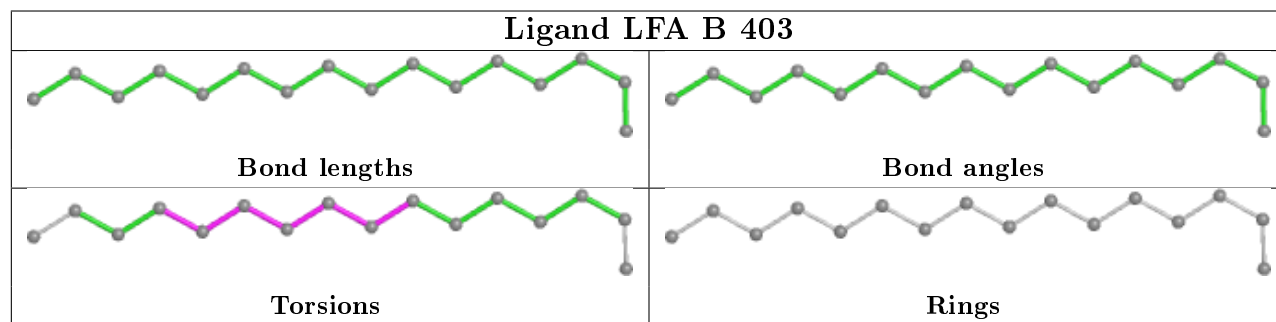
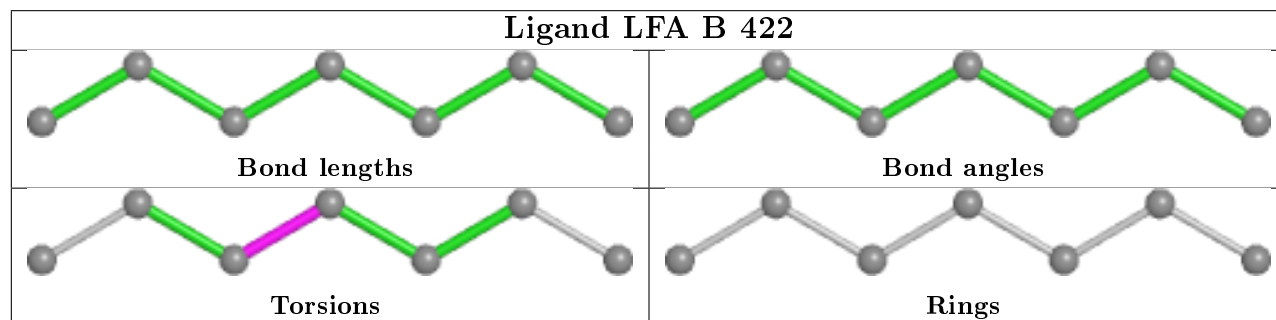
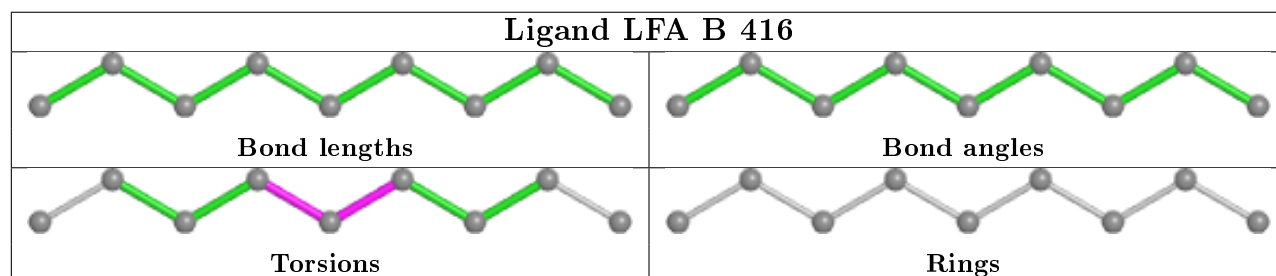
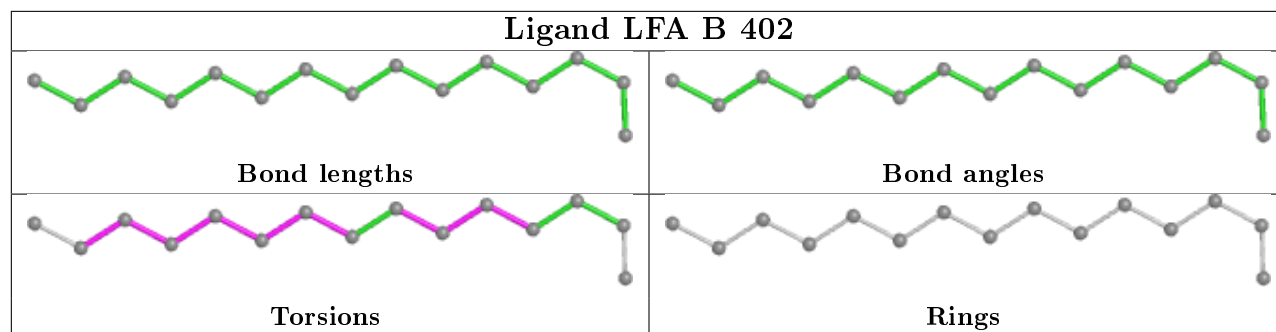
There are no ring outliers.

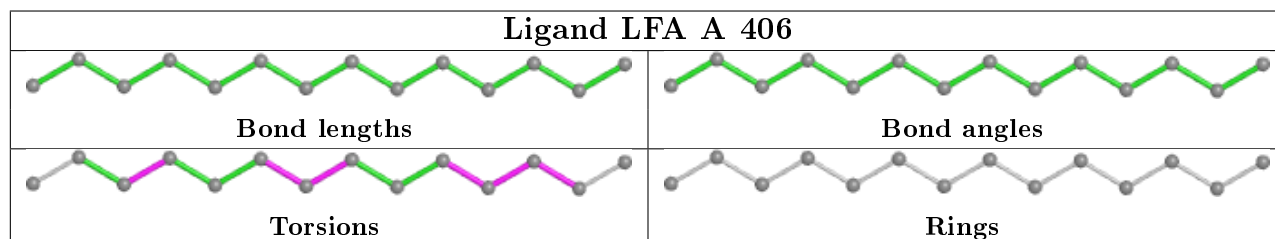
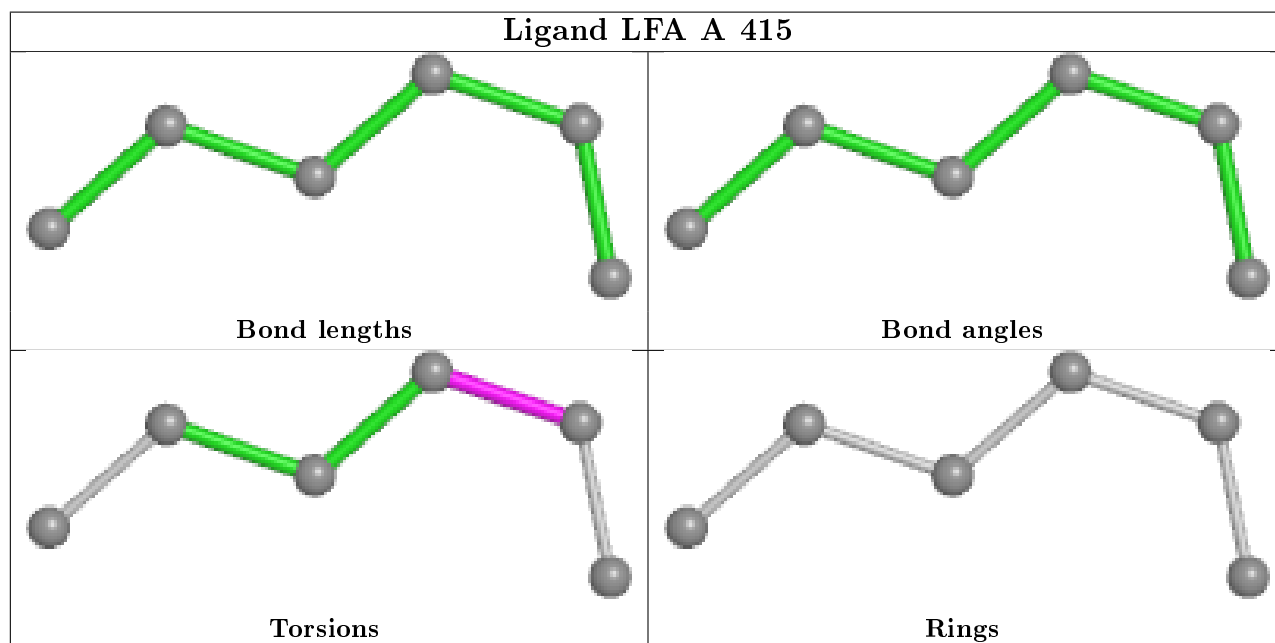
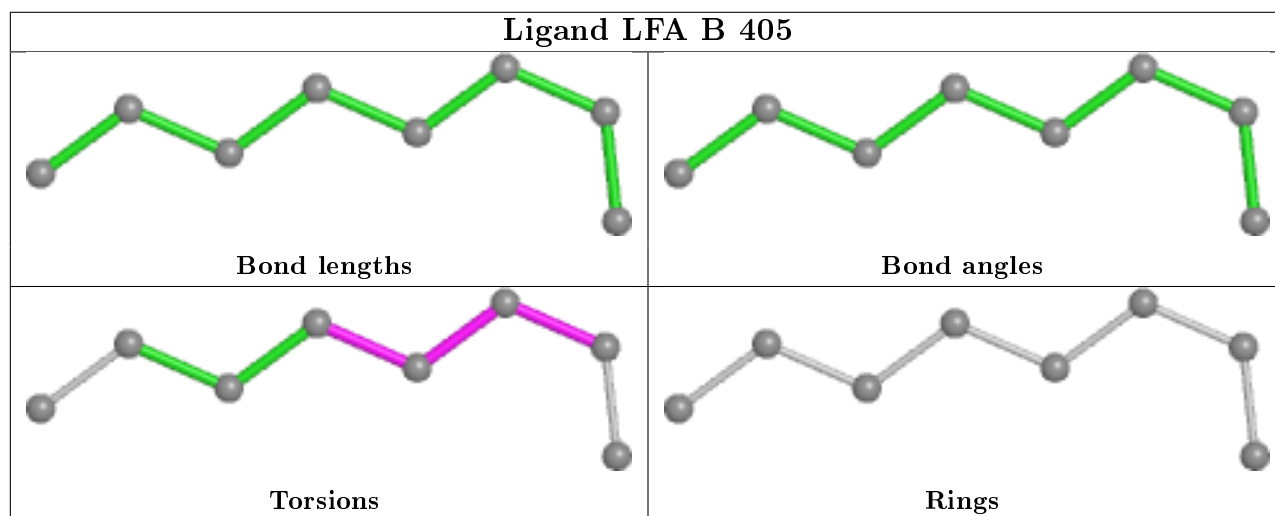
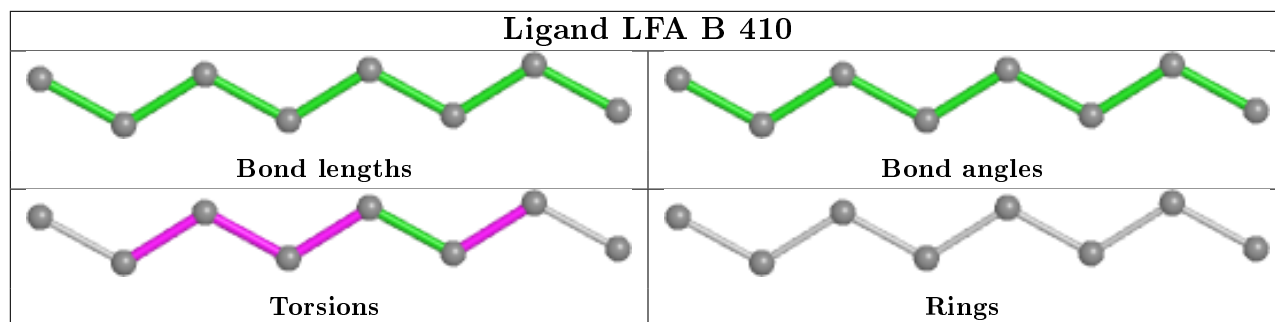
7 monomers are involved in 6 short contacts:

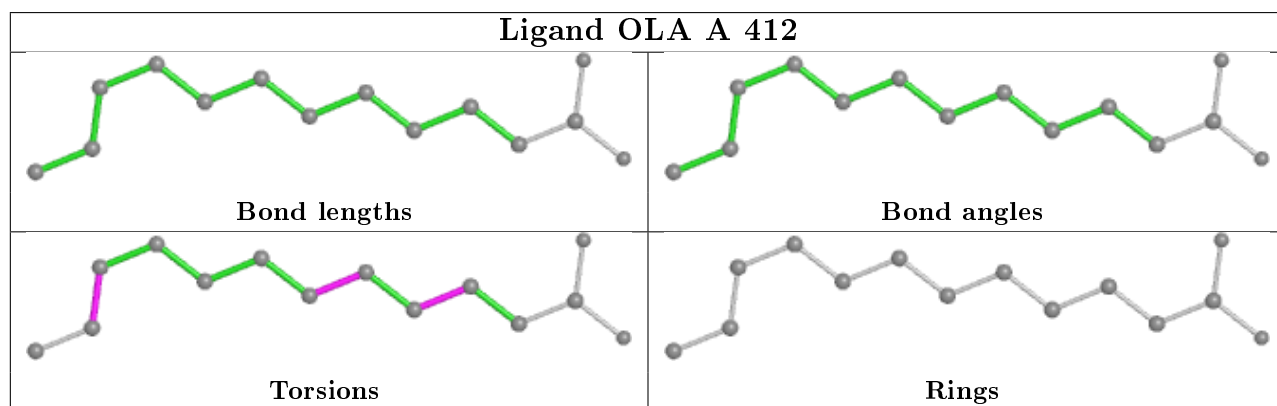
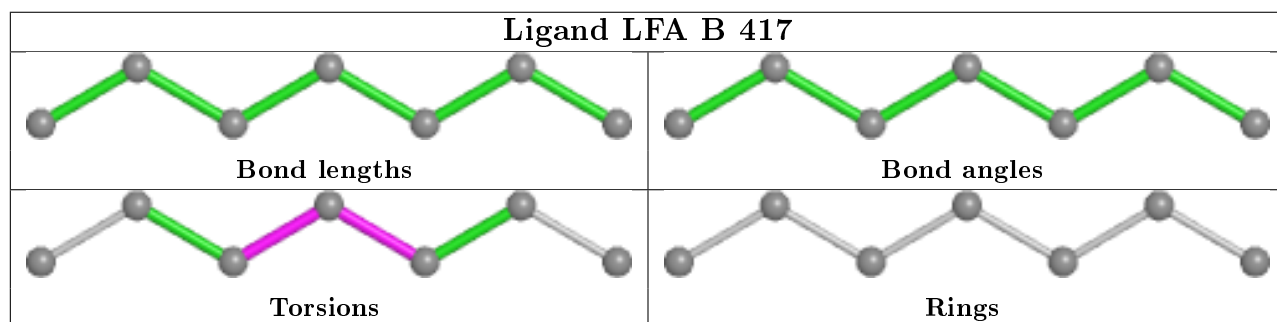
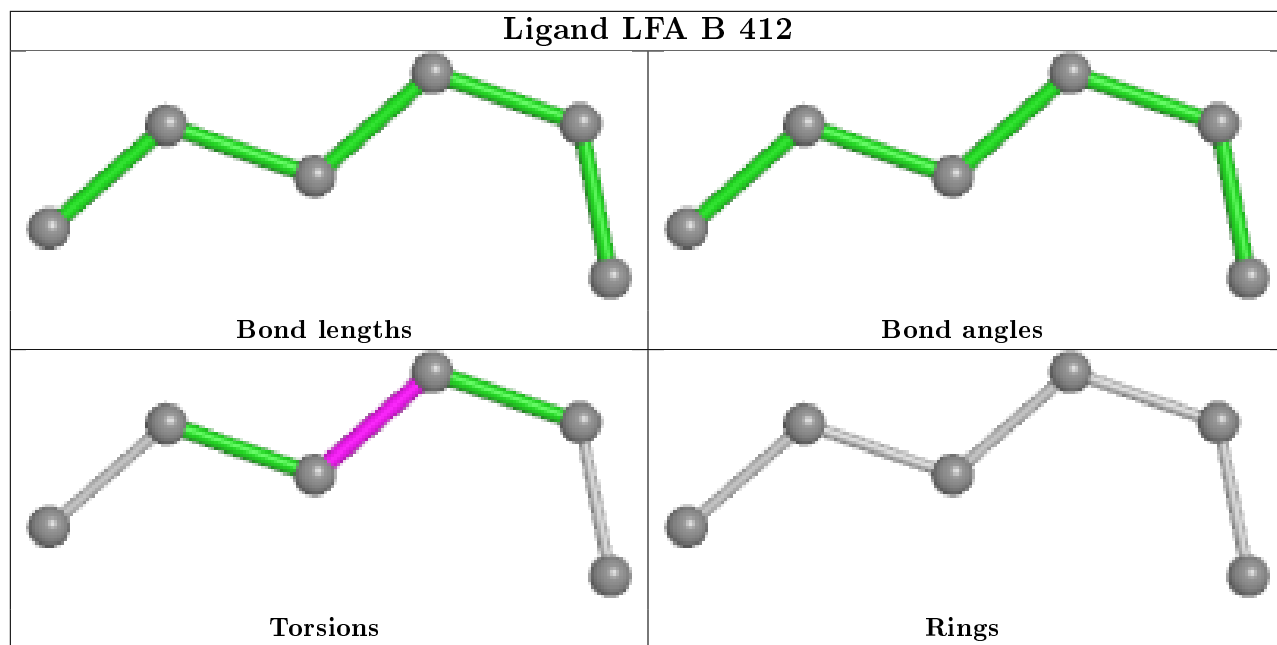
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	424	LFA	1	0
2	A	417	LFA	1	0
2	B	410	LFA	1	0
2	A	406	LFA	1	0
2	B	412	LFA	1	0
2	A	416	LFA	1	0
2	A	422	LFA	1	0

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.

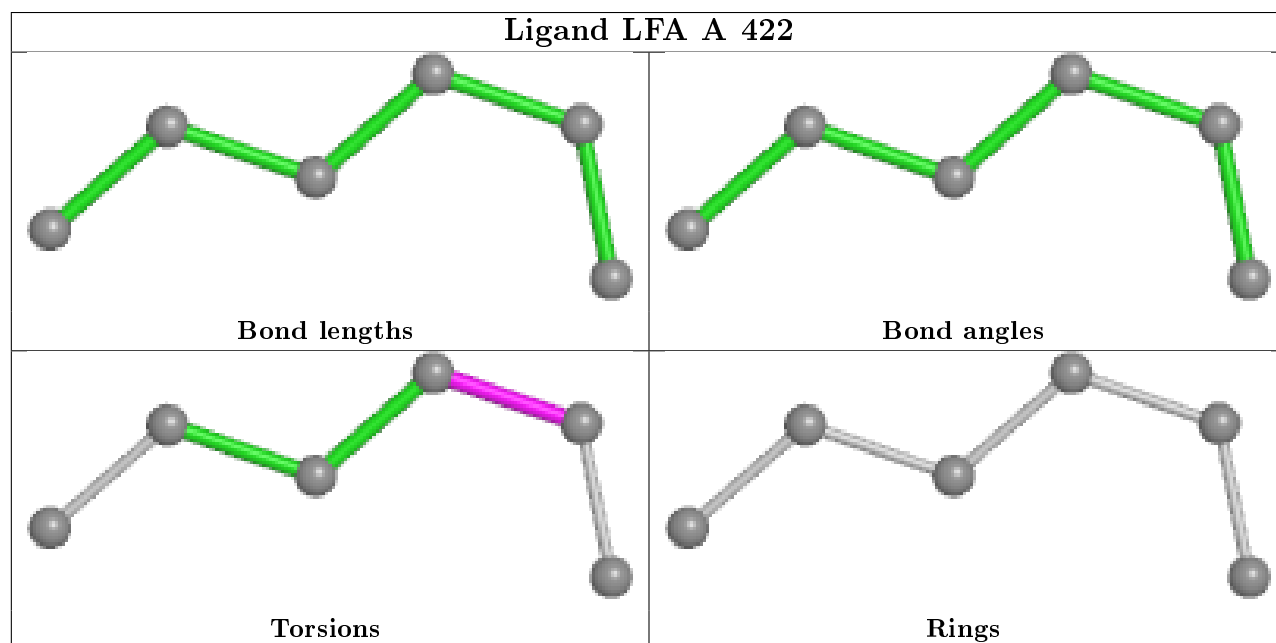
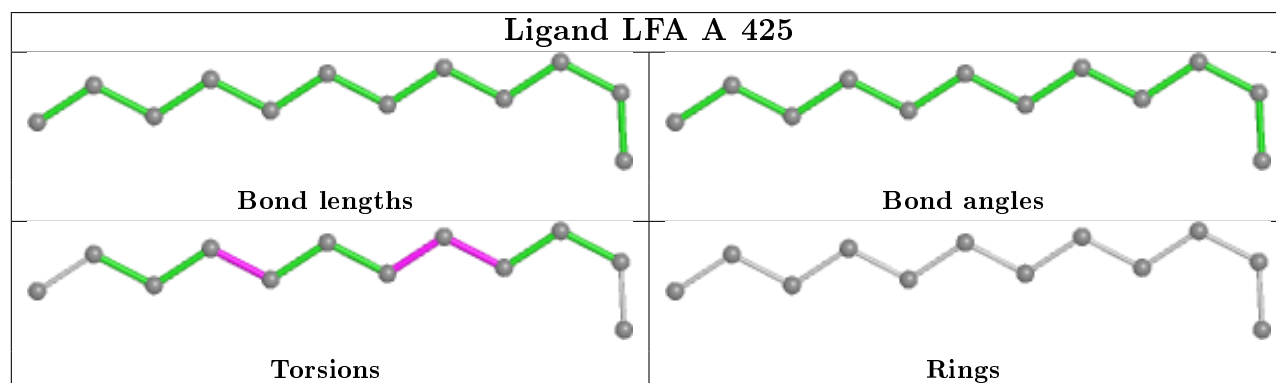
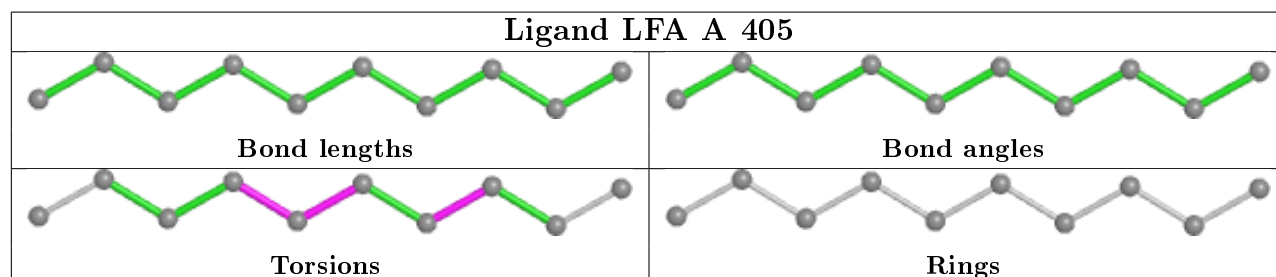
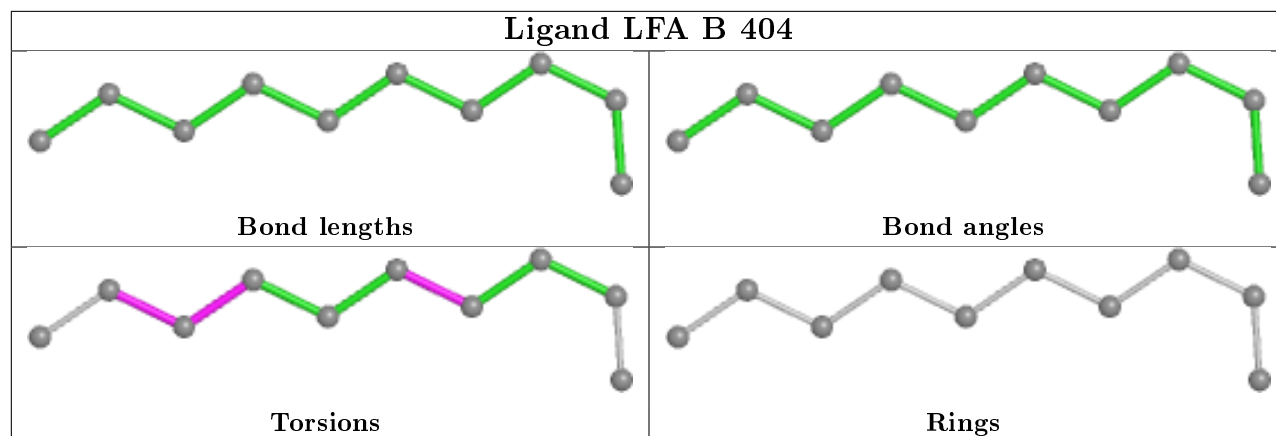


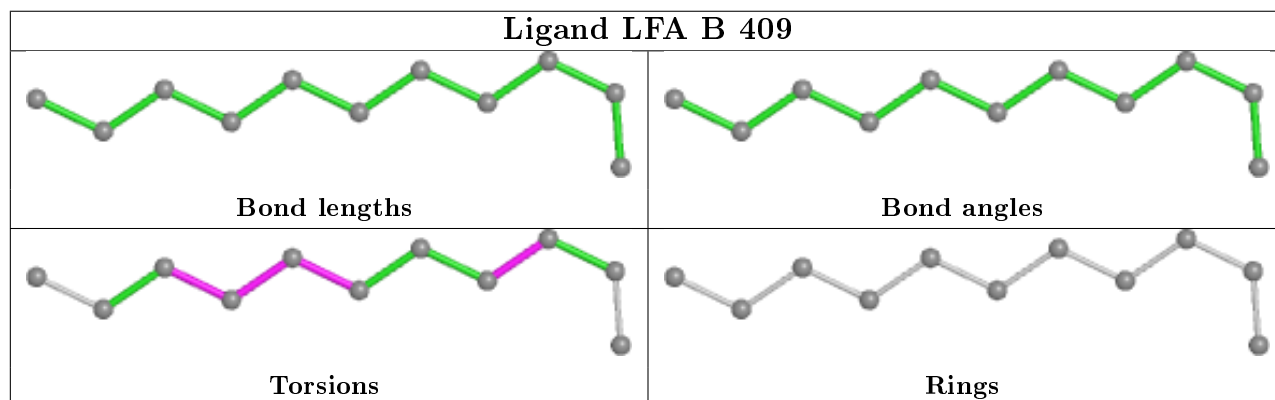
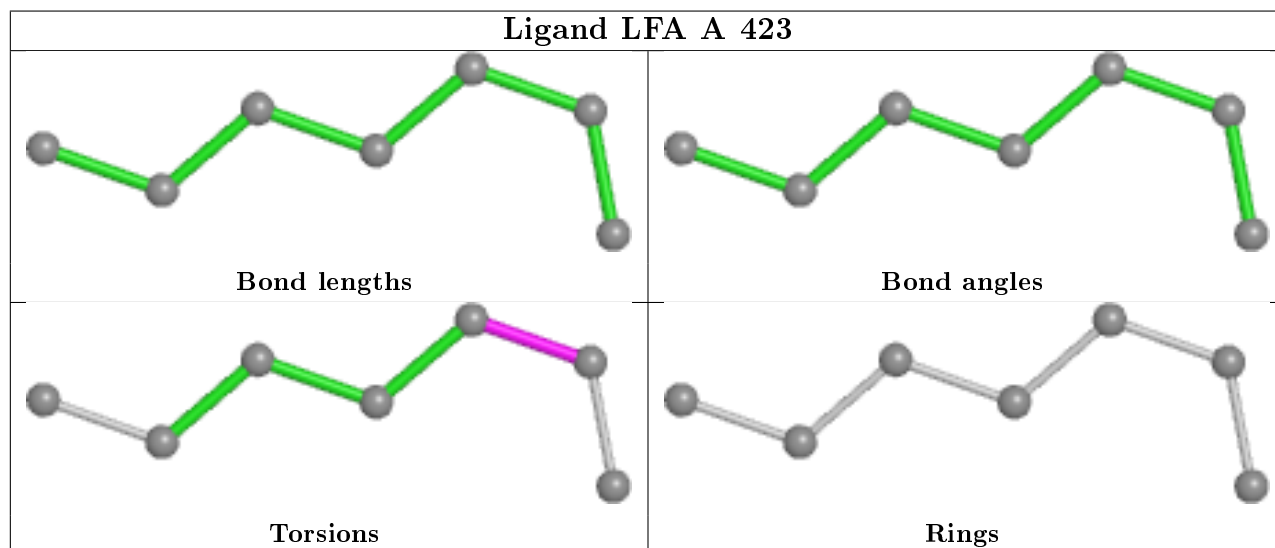
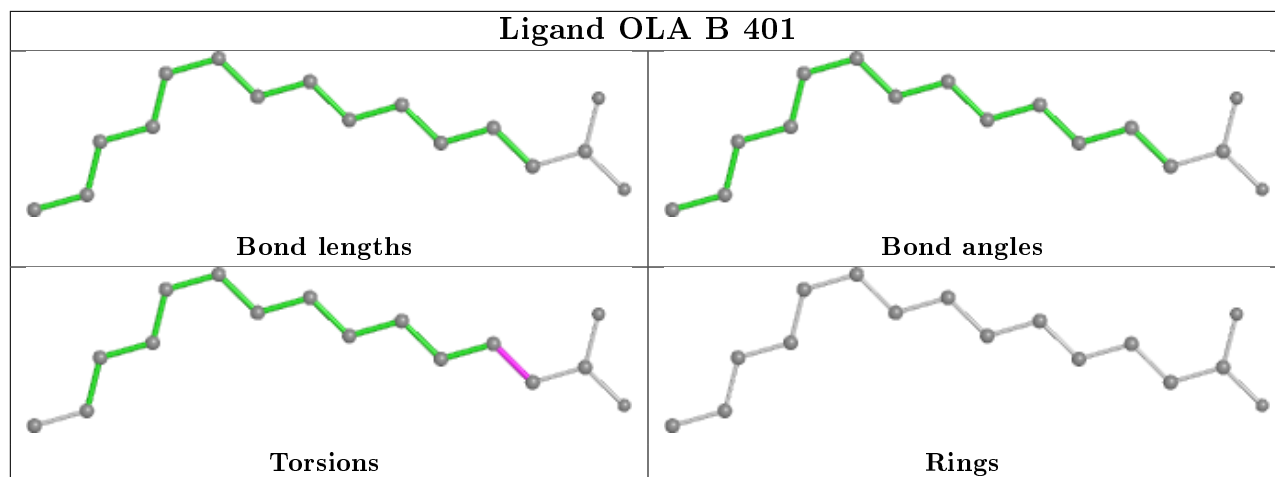
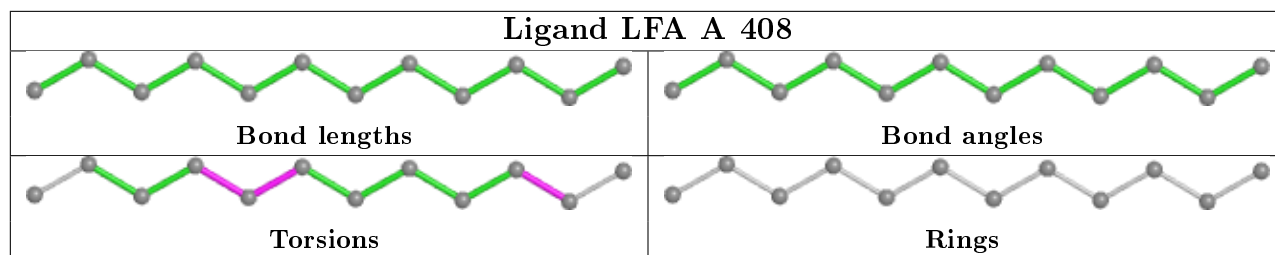


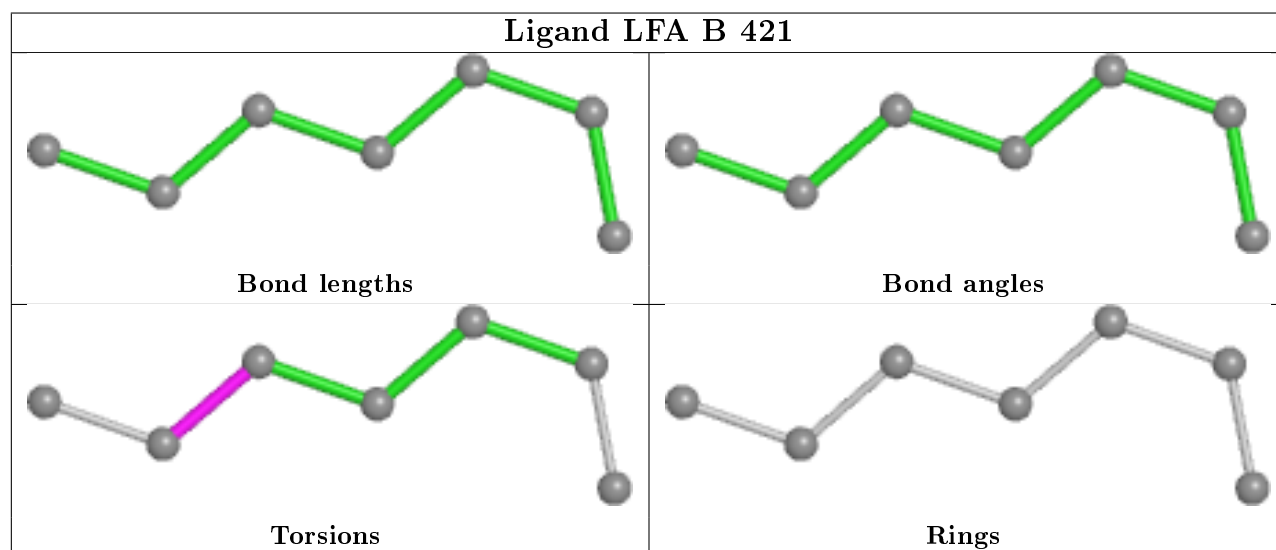
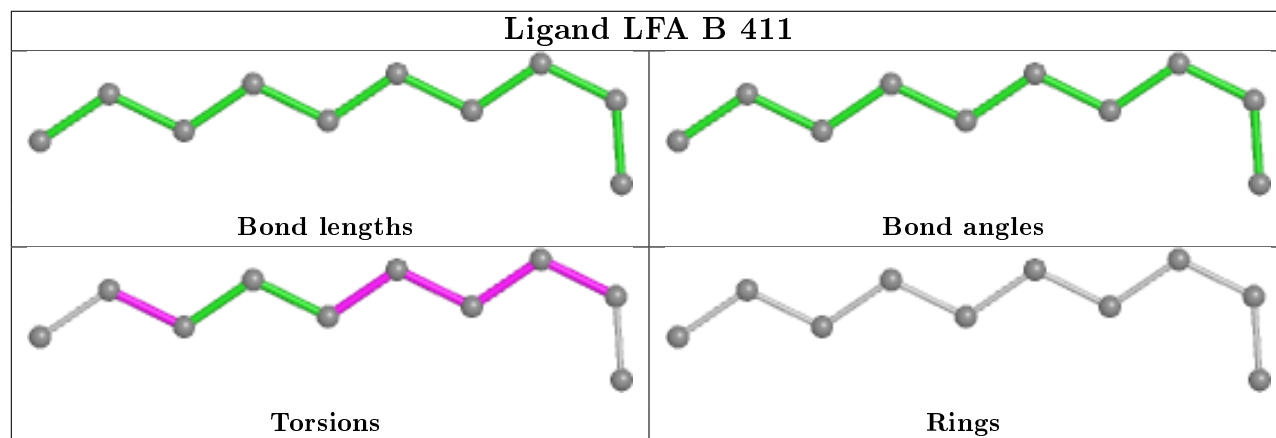
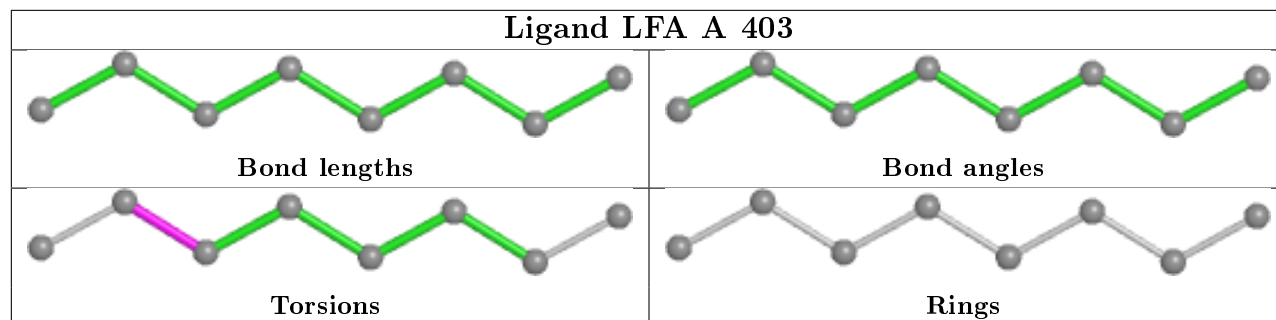
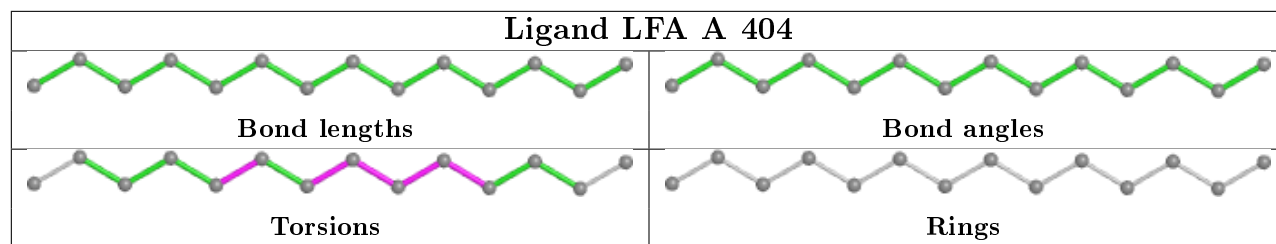


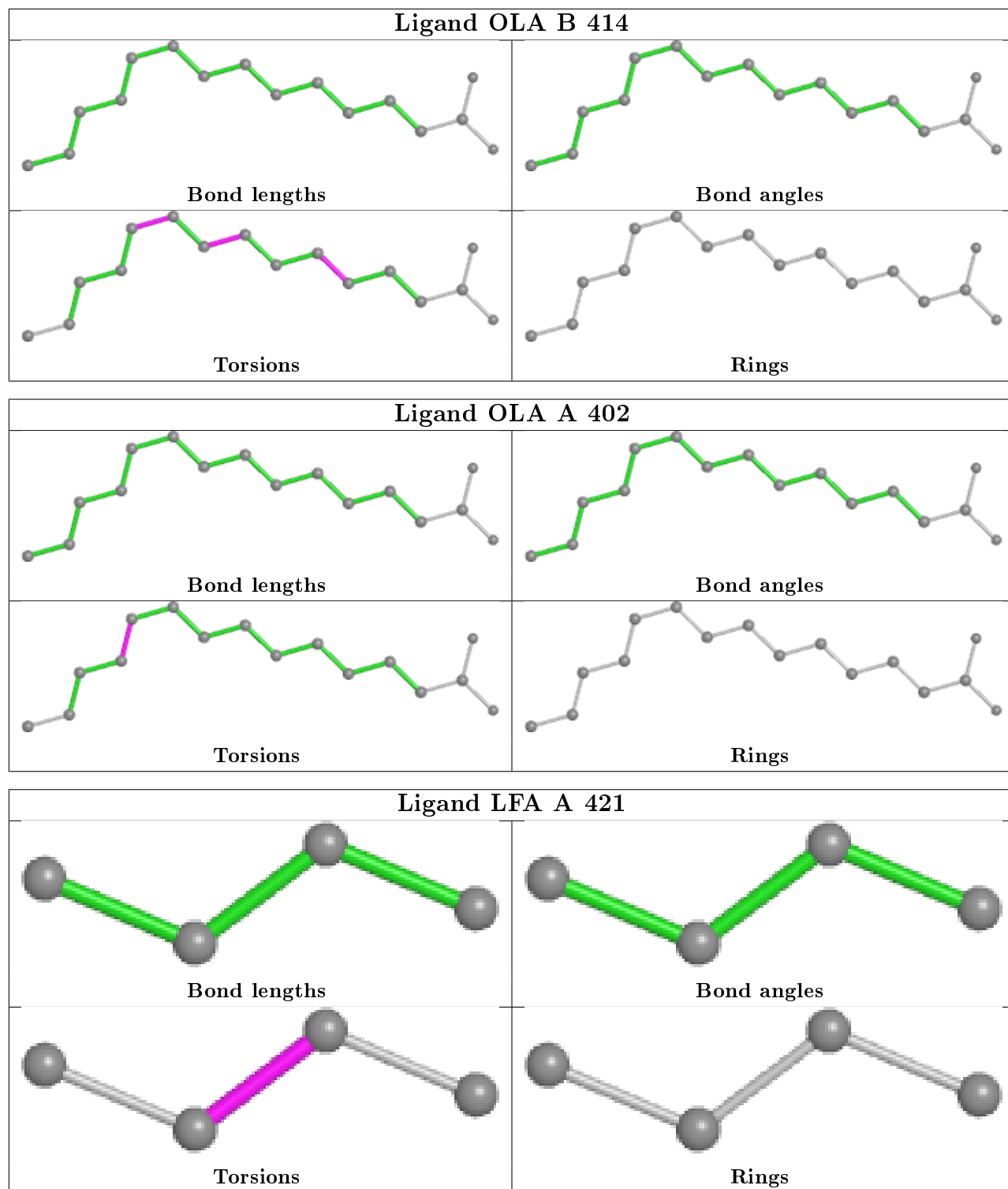


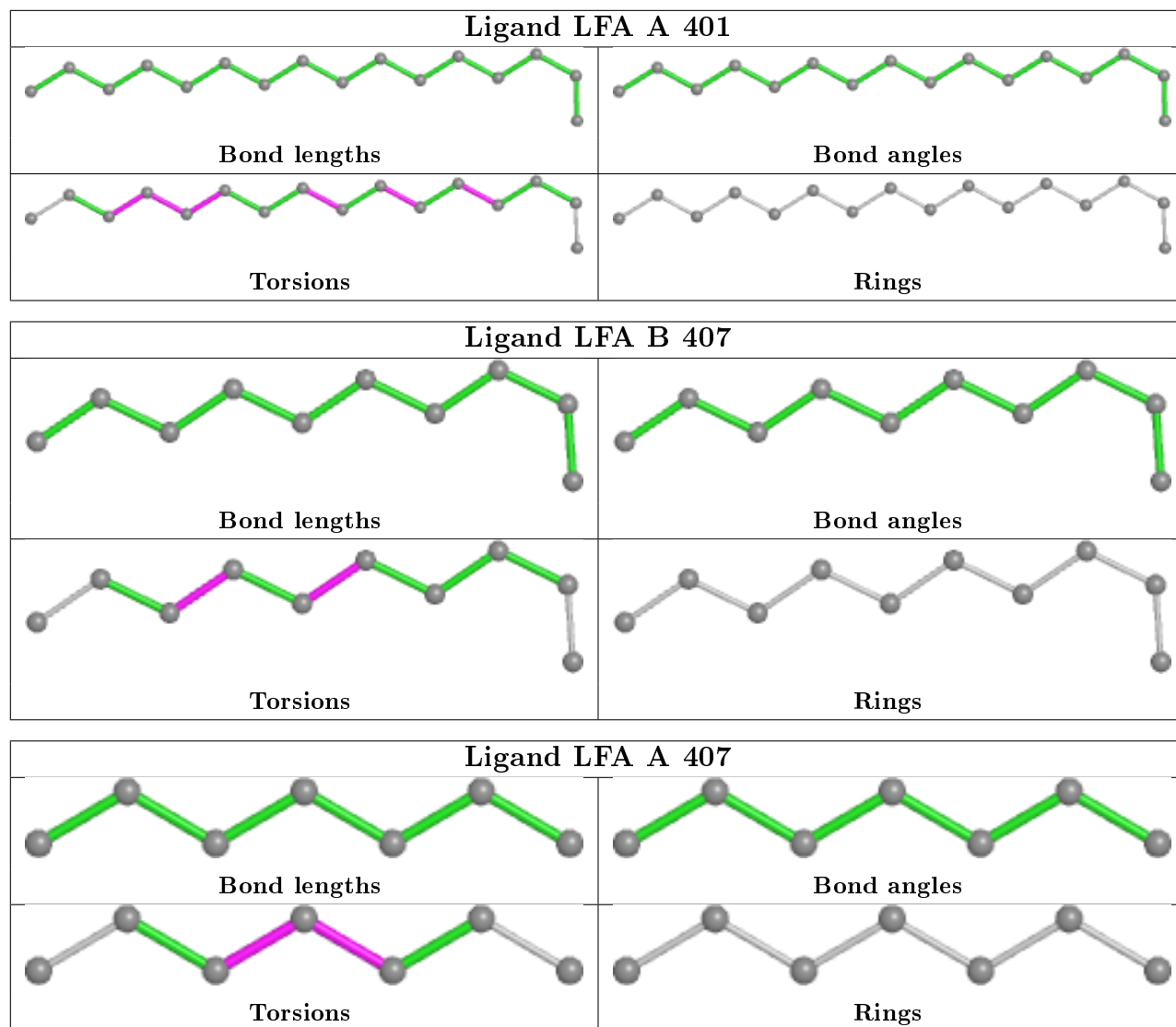












## 5.7 Other polymers [\(i\)](#)

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, 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	246/324 (75%)	0.38	27 (10%) <b>5</b> <b>4</b>	23, 31, 70, 97	0
1	B	238/324 (73%)	0.16	18 (7%) <b>13</b> <b>12</b>	23, 30, 63, 108	0
All	All	484/648 (74%)	0.27	45 (9%) <b>8</b> <b>7</b>	23, 30, 67, 108	0

All (45) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	123	ASP	9.5
1	A	125	TYR	9.0
1	B	116	THR	8.3
1	A	116	THR	8.2
1	B	125	TYR	7.1
1	A	286	GLU	6.5
1	A	119	ASP	5.9
1	A	121	VAL	5.9
1	A	113	VAL	5.9
1	A	287	SER	5.8
1	A	124	THR	5.7
1	A	123	ASP	5.6
1	A	118	HIS	5.6
1	A	42	PRO	5.5
1	A	122	PRO	5.2
1	B	127	THR	5.2
1	B	126	GLU	5.1
1	A	120	HIS	5.1
1	B	117	GLN	4.7
1	B	124	THR	4.6
1	A	126	GLU	4.5
1	B	115	ARG	4.3
1	A	44	TYR	4.3
1	B	44	TYR	4.0

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Mol	Chain	Res	Type	RSRZ
1	A	115	ARG	3.9
1	B	113	VAL	3.7
1	A	117	GLN	3.7
1	B	114	ILE	3.6
1	B	42	PRO	3.5
1	A	114	ILE	3.2
1	B	185	GLY	3.2
1	A	185	GLY	3.1
1	A	127	THR	3.0
1	B	184	GLU	3.0
1	B	118	HIS	2.9
1	A	284	LEU	2.7
1	A	128	VAL	2.7
1	B	129	TYR	2.7
1	A	43	ILE	2.5
1	B	128	VAL	2.5
1	A	129	TYR	2.4
1	A	285	ARG	2.4
1	A	111	LYS	2.3
1	B	183	SER	2.2
1	A	217	VAL	2.1

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
1	LYR	A	270	29/30	0.87	0.15	21,28,32,34	0
1	LYR	B	270	29/30	0.91	0.14	22,26,32,33	0

## 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, 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
3	OLA	A	412	14/20	0.56	0.23	38,45,53,66	0
2	LFA	A	423	7/20	0.61	0.20	51,51,55,60	0
2	LFA	B	423	9/20	0.63	0.25	43,49,54,56	0
2	LFA	A	410	12/20	0.65	0.27	38,47,53,56	0
2	LFA	B	409	11/20	0.66	0.25	33,41,51,52	0
2	LFA	B	424	7/20	0.66	0.32	39,45,50,53	0
2	LFA	B	410	8/20	0.66	0.23	31,44,49,51	0
2	LFA	B	412	6/20	0.67	0.32	34,45,47,50	0
2	LFA	A	416	4/20	0.68	0.39	43,45,47,47	0
3	OLA	A	413	10/20	0.68	0.23	44,50,62,63	0
3	OLA	B	414	16/20	0.68	0.22	34,43,53,60	0
2	LFA	A	415	6/20	0.70	0.21	33,38,42,43	0
2	LFA	A	420	4/20	0.71	0.30	40,43,47,51	0
2	LFA	A	422	6/20	0.73	0.27	41,45,50,52	0
3	OLA	B	413	11/20	0.74	0.19	45,47,59,65	0
2	LFA	B	417	7/20	0.75	0.26	32,38,41,49	0
2	LFA	B	419	4/20	0.75	0.23	33,34,44,45	0
2	LFA	B	422	7/20	0.75	0.34	44,52,56,56	0
2	LFA	A	424	5/20	0.76	0.19	28,31,43,50	0
2	LFA	B	421	7/20	0.78	0.26	49,50,55,55	0
3	OLA	B	401	16/20	0.78	0.24	25,33,51,56	0
2	LFA	B	416	9/20	0.79	0.23	33,39,43,44	0
2	LFA	B	407	10/20	0.79	0.21	30,32,42,43	0
2	LFA	A	401	16/20	0.79	0.24	32,43,48,58	0
2	LFA	A	409	10/20	0.80	0.18	43,45,50,53	0
2	LFA	B	403	16/20	0.80	0.18	43,49,55,57	0
2	LFA	B	406	8/20	0.82	0.19	34,42,49,49	0
2	LFA	A	419	3/20	0.82	0.39	34,34,46,50	0
2	LFA	B	408	7/20	0.82	0.18	39,40,46,49	0
2	LFA	A	403	8/20	0.82	0.21	30,36,46,46	0
2	LFA	A	408	12/20	0.82	0.17	32,42,53,58	0
2	LFA	B	404	10/20	0.82	0.26	37,48,51,52	0
3	OLA	A	402	16/20	0.83	0.20	22,36,47,50	0
2	LFA	B	420	3/20	0.83	0.35	33,33,35,36	0
2	LFA	A	404	14/20	0.83	0.21	44,47,52,55	0
2	LFA	A	407	7/20	0.83	0.25	35,41,44,48	0
2	LFA	B	405	8/20	0.83	0.21	33,39,40,45	0
2	LFA	B	402	15/20	0.83	0.32	39,47,58,61	0
2	LFA	A	406	14/20	0.84	0.20	32,41,47,48	0
2	LFA	A	414	3/20	0.84	0.21	35,35,36,44	0
2	LFA	B	411	10/20	0.84	0.18	36,45,47,48	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	LFA	A	418	3/20	0.85	0.19	31,31,35,39	0
2	LFA	A	425	12/20	0.86	0.19	31,38,49,52	0
2	LFA	A	405	10/20	0.86	0.21	31,47,51,54	0
2	LFA	B	415	3/20	0.87	0.27	32,32,32,40	0
2	LFA	A	417	5/20	0.89	0.25	38,39,41,49	0
2	LFA	A	411	3/20	0.89	0.37	24,24,31,34	0
2	LFA	B	418	3/20	0.89	0.32	33,33,40,42	0
2	LFA	A	421	4/20	0.91	0.14	31,39,40,40	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.