wwPDB EM Validation Summary Report

Sep 16, 2021 – 03:12 pm BST

PDB ID	:	7O1V
EMDB ID	:	EMD-12697
Title	:	Structure of a Minimal Photosystem I
Authors	:	Nelson, N.; Caspy, I.; Lambrev, P.
Deposited on	:	2021-03-30
Resolution	:	4.31 Å(reported)

This is a wwPDB EM Validation Summary 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/EMValidationReportHelp
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:

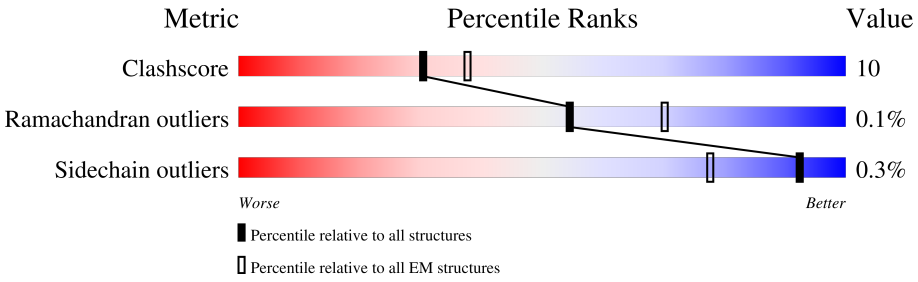
EMDB validation analysis	:	FAILED
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.1

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 4.31 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)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 <=5%

Mol	Chain	Length	Quality of chain
1	A	739	81% 19%
2	B	729	82% 17% .
3	C	80	76% 24%
4	D	141	77% 22% .
5	E	69	81% 19%
6	K	80	88% 12%
7	M	31	81% 19%

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
8	CLA	A	1011	X	-	-	-
8	CLA	A	1012	X	-	-	-
8	CLA	A	1013	X	-	-	-
8	CLA	A	1101	X	-	-	-
8	CLA	A	1102	X	-	-	-
8	CLA	A	1103	X	-	-	-
8	CLA	A	1104	X	-	-	-
8	CLA	A	1105	X	-	-	-
8	CLA	A	1106	X	-	-	-
8	CLA	A	1107	X	-	-	-
8	CLA	A	1108	X	-	-	-
8	CLA	A	1109	X	-	-	-
8	CLA	A	1110	X	-	-	-
8	CLA	A	1111	X	-	-	-
8	CLA	A	1112	X	-	-	-
8	CLA	A	1113	X	-	-	-
8	CLA	A	1114	X	-	-	-
8	CLA	A	1115	X	-	-	-
8	CLA	A	1116	X	-	-	-
8	CLA	A	1117	X	-	-	-
8	CLA	A	1118	X	-	-	-
8	CLA	A	1119	X	-	-	-
8	CLA	A	1120	X	-	-	-
8	CLA	A	1121	X	-	-	-
8	CLA	A	1122	X	-	-	-
8	CLA	A	1123	X	-	-	-
8	CLA	A	1124	X	-	-	-
8	CLA	A	1125	X	-	-	-
8	CLA	A	1126	X	-	-	-
8	CLA	A	1127	X	-	-	-
8	CLA	A	1128	X	-	-	-
8	CLA	A	1129	X	-	-	-
8	CLA	A	1130	X	-	-	-
8	CLA	A	1131	X	-	-	-
8	CLA	A	1132	X	-	-	-
8	CLA	A	1133	X	-	-	-
8	CLA	A	1134	X	-	-	-
8	CLA	A	1135	X	-	-	-
8	CLA	A	1136	X	-	-	-
8	CLA	A	1137	X	-	-	-
8	CLA	A	1138	X	-	-	-
8	CLA	A	1139	X	-	-	-

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
8	CLA	A	1140	X	-	-	-
8	CLA	A	1801	X	-	-	-
8	CLA	B	1021	X	-	-	-
8	CLA	B	1022	X	-	-	-
8	CLA	B	1023	X	-	-	-
8	CLA	B	1201	X	-	-	-
8	CLA	B	1202	X	-	-	-
8	CLA	B	1203	X	-	-	-
8	CLA	B	1204	X	-	-	-
8	CLA	B	1205	X	-	-	-
8	CLA	B	1206	X	-	-	-
8	CLA	B	1207	X	-	-	-
8	CLA	B	1208	X	-	-	-
8	CLA	B	1209	X	-	-	-
8	CLA	B	1210	X	-	-	-
8	CLA	B	1211	X	-	-	-
8	CLA	B	1212	X	-	-	-
8	CLA	B	1213	X	-	-	-
8	CLA	B	1214	X	-	-	-
8	CLA	B	1215	X	-	-	-
8	CLA	B	1216	X	-	-	-
8	CLA	B	1217	X	-	-	-
8	CLA	B	1218	X	-	-	-
8	CLA	B	1219	X	-	-	-
8	CLA	B	1220	X	-	-	-
8	CLA	B	1221	X	-	-	-
8	CLA	B	1222	X	-	-	-
8	CLA	B	1223	X	-	-	-
8	CLA	B	1224	X	-	-	-
8	CLA	B	1225	X	-	-	-
8	CLA	B	1226	X	-	-	-
8	CLA	B	1227	X	-	-	-
8	CLA	B	1228	X	-	-	-
8	CLA	B	1229	X	-	-	-
8	CLA	B	1230	X	-	-	-
8	CLA	B	1231	X	-	-	-
8	CLA	B	1232	X	-	-	-
8	CLA	B	1234	X	-	-	-
8	CLA	B	1235	X	-	-	-
8	CLA	B	1236	X	-	-	-
8	CLA	B	1237	X	-	-	-
8	CLA	B	1238	X	-	-	-

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
8	CLA	B	1239	X	-	-	-
8	CLA	B	1240	X	-	-	-
8	CLA	K	1401	X	-	-	-
8	CLA	K	1402	X	-	-	-

2 Entry composition

There are 15 unique types of molecules in this entry. The entry contains 20914 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Photosystem I P700 chlorophyll a apoprotein A1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	739	Total	C	N	O	S	0	0
			5787	3791	984	985	27		

- Molecule 2 is a protein called Photosystem I P700 chlorophyll a apoprotein A2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	729	Total	C	N	O	S	0	0
			5770	3798	967	990	15		

- Molecule 3 is a protein called Photosystem I iron-sulfur center.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	80	Total	C	N	O	S	0	0
			600	369	103	117	11		

- Molecule 4 is a protein called Photosystem I reaction center subunit II.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	141	Total	C	N	O	S	0	0
			1102	697	190	211	4		

- Molecule 5 is a protein called Photosystem I reaction center subunit IV.

Mol	Chain	Residues	Atoms				AltConf	Trace
5	E	69	Total	C	N	O	0	0
			543	340	96	107		

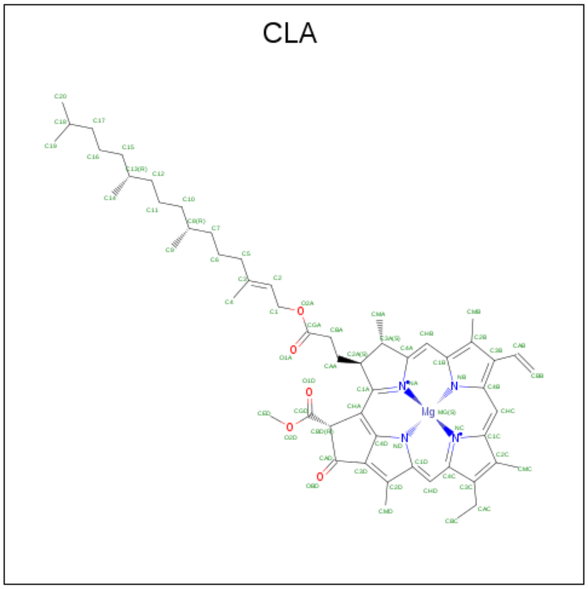
- Molecule 6 is a protein called Photosystem I reaction center subunit PsaK 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	K	80	Total	C	N	O	S	1	0
			579	378	93	102	6		

- Molecule 7 is a protein called Photosystem I reaction center subunit XII.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	M	31	Total 238	C 159	N 36	O 42	S 1	0	0

- Molecule 8 is CHLOROPHYLL A (three-letter code: CLA) (formula: $C_{55}H_{72}MgN_4O_5$).



Mol	Chain	Residues	Atoms					AltConf
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0

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Mol	Chain	Residues	Atoms					AltConf
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	
8	A	1	Total	C	Mg	N	O	0
			2446	2006	44	176	220	

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Mol	Chain	Residues	Atoms					AltConf
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	A	1	Total 2446	C 2006	Mg 44	N 176	O 220	0
8	B	1	Total 2482	C 2062	Mg 42	N 168	O 210	0
8	B	1	Total 2482	C 2062	Mg 42	N 168	O 210	0
8	B	1	Total 2482	C 2062	Mg 42	N 168	O 210	0
8	B	1	Total 2482	C 2062	Mg 42	N 168	O 210	0
8	B	1	Total 2482	C 2062	Mg 42	N 168	O 210	0
8	B	1	Total 2482	C 2062	Mg 42	N 168	O 210	0
8	B	1	Total 2482	C 2062	Mg 42	N 168	O 210	0
8	B	1	Total 2482	C 2062	Mg 42	N 168	O 210	0

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Mol	Chain	Residues	Atoms					AltConf
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	
8	B	1	Total	C	Mg	N	O	0
			2482	2062	42	168	210	

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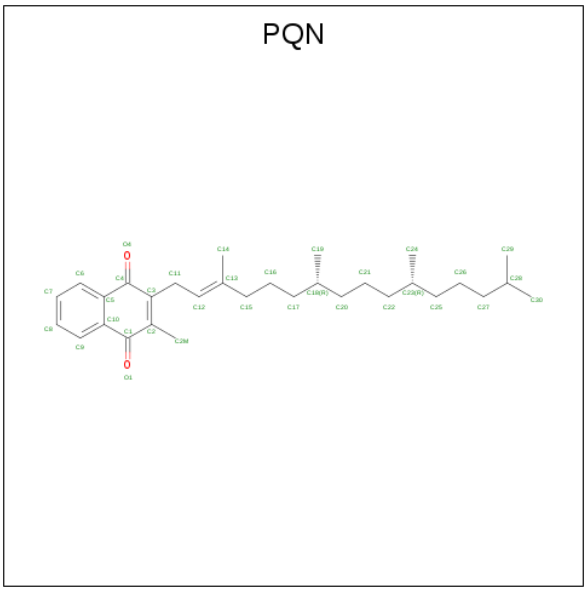
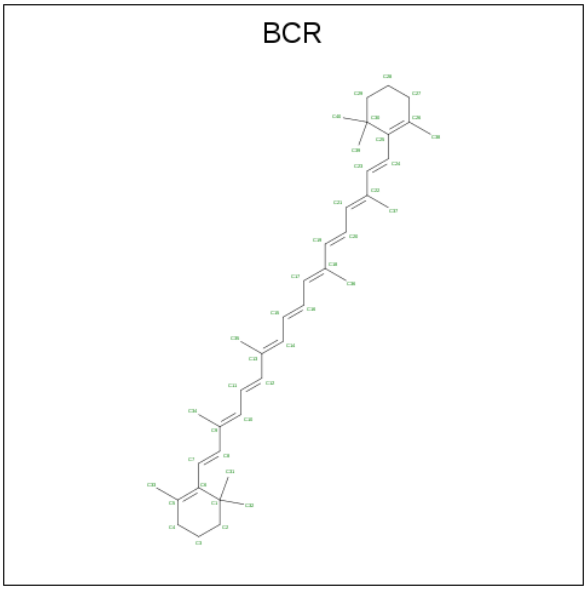
Mol	Chain	Residues	Atoms	AltConf
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	B	1	Total C Mg N O 2482 2062 42 168 210	0
8	K	1	Total C Mg N O 130 110 2 8 10	0
8	K	1	Total C Mg N O 130 110 2 8 10	0

- Molecule 9 is PHYLLOQUINONE (three-letter code: PQN) (formula: $C_{31}H_{46}O_2$).



Mol	Chain	Residues	Atoms			AltConf
9	A	1	Total	C	O	0
			33	31	2	
9	B	1	Total	C	O	0
			33	31	2	

- Molecule 10 is BETA-CAROTENE (three-letter code: BCR) (formula: $C_{40}H_{56}$).



Mol	Chain	Residues	Atoms		AltConf
10	A	1	Total	C	0
			280	280	
10	A	1	Total	C	0
			280	280	

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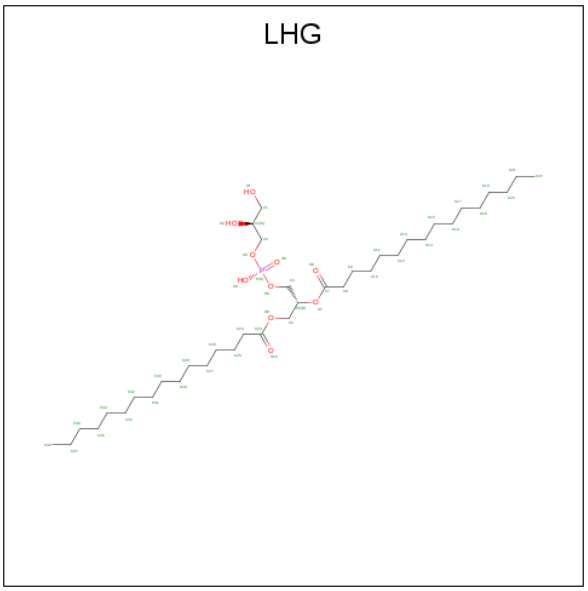
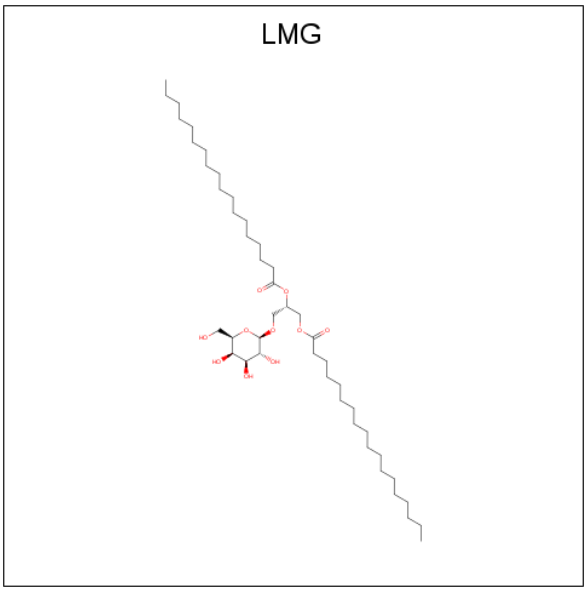
Mol	Chain	Residues	Atoms	AltConf
10	A	1	Total C 280 280	0
10	A	1	Total C 280 280	0
10	A	1	Total C 280 280	0
10	A	1	Total C 280 280	0
10	A	1	Total C 280 280	0
10	B	1	Total C 280 280	0
10	B	1	Total C 280 280	0
10	B	1	Total C 280 280	0
10	B	1	Total C 280 280	0
10	B	1	Total C 280 280	0
10	B	1	Total C 280 280	0
10	B	1	Total C 280 280	0
10	K	1	Total C 40 40	0

- Molecule 11 is 1,2-DIPALMITOYL-PHOSPHATIDYL-GLYCEROLE (three-letter code: LHG) (formula: $C_{38}H_{75}O_{10}P$).



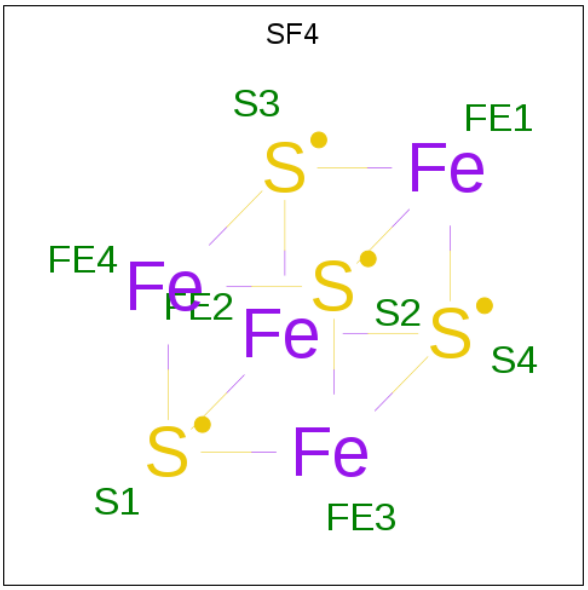
Mol	Chain	Residues	Atoms				AltConf
11	A	1	Total	C	O	P	0
			98	76	20	2	
11	A	1	Total	C	O	P	0
			98	76	20	2	
11	B	1	Total	C	O	P	0
			73	51	20	2	
11	B	1	Total	C	O	P	0
			73	51	20	2	
11	M	1	Total	C	O	P	0
			49	38	10	1	

- Molecule 12 is 1,2-DISTEAROYL-MONOGALACTOSYL-DIGLYCERIDE (three-letter code: LMG) (formula: $C_{45}H_{86}O_{10}$).



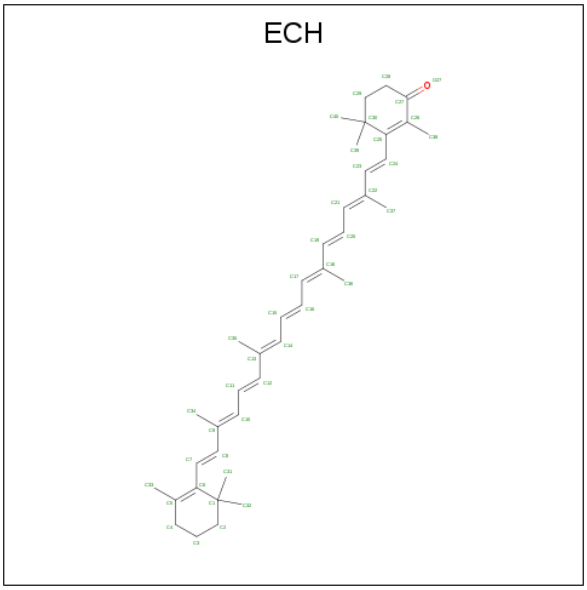
Mol	Chain	Residues	Atoms			AltConf
12	A	1	Total	C	O	0
			50	40	10	
12	B	1	Total	C	O	0
			86	66	20	
12	B	1	Total	C	O	0
			86	66	20	
12	K	1	Total	C	O	0
			55	45	10	

- Molecule 13 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4).



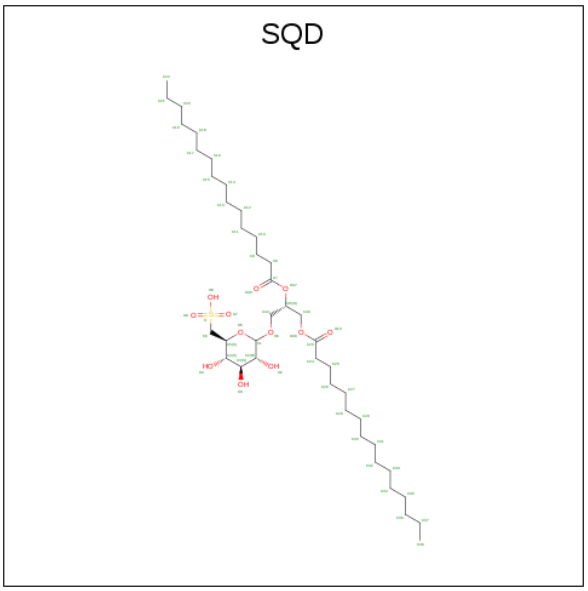
Mol	Chain	Residues	Atoms	AltConf
13	A	1	Total Fe S 8 4 4	0
13	C	1	Total Fe S 16 8 8	0
13	C	1	Total Fe S 16 8 8	0

- Molecule 14 is beta,beta-caroten-4-one (three-letter code: ECH) (formula: $C_{40}H_{54}O$).



Mol	Chain	Residues	Atoms	AltConf
14	B	1	Total C O 41 40 1	0
14	M	1	Total C O 41 40 1	0

- Molecule 15 is 1,2-DI-O-ACYL-3-O-[6-DEOXY-6-SULFO-ALPHA-D-GLUCOPYRANOSYL]-SN-GLYCEROL (three-letter code: SQD) (formula: $C_{41}H_{78}O_{12}S$).



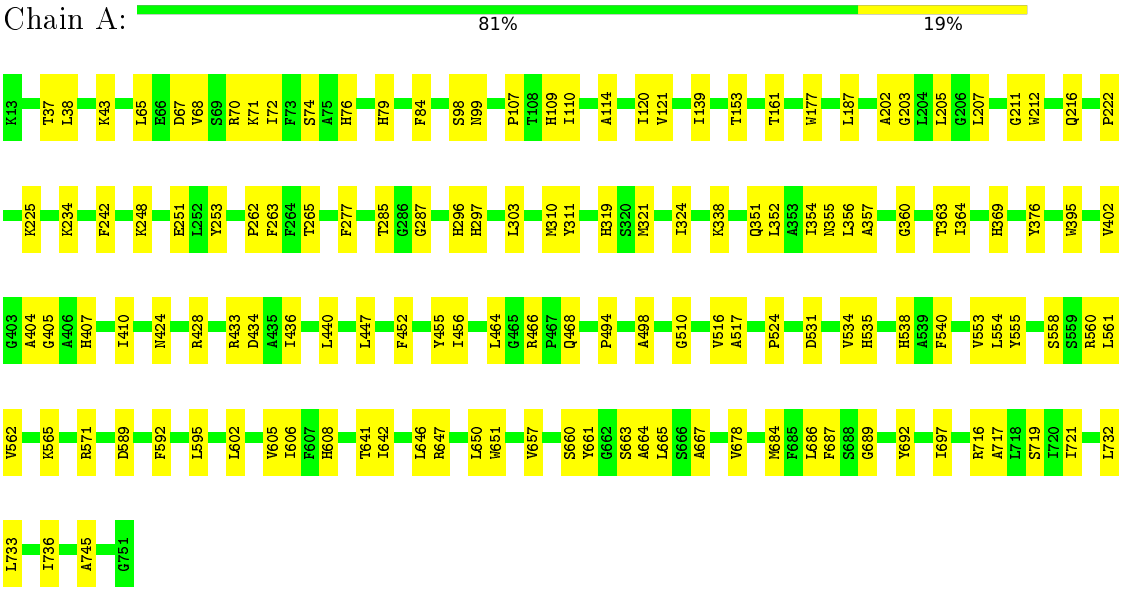
Mol	Chain	Residues	Atoms				AltConf
15	B	1	Total	C	O	S	0
			54	41	12	1	

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. 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. 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.

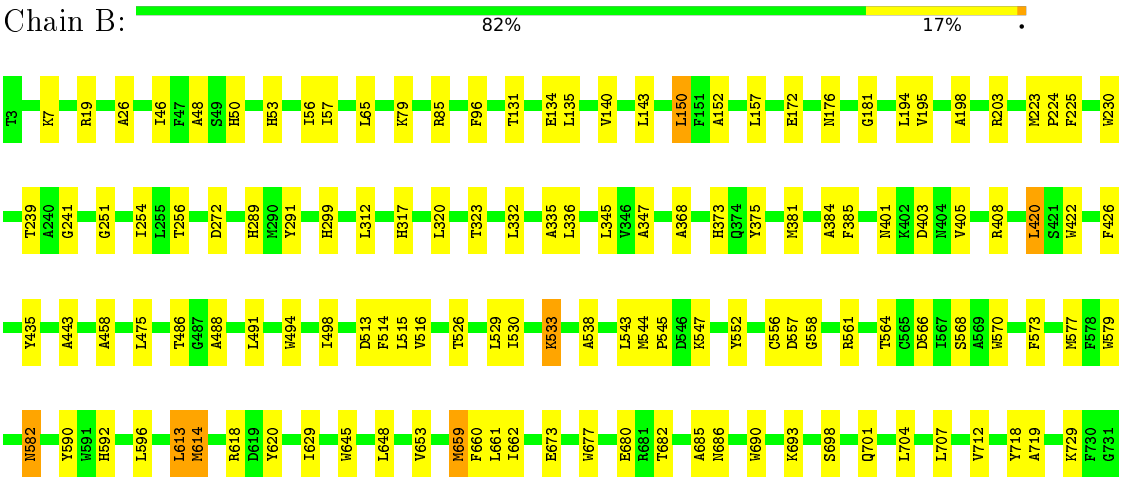
- Molecule 1: Photosystem I P700 chlorophyll a apoprotein A1

Chain A:



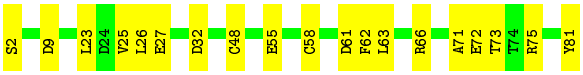
- Molecule 2: Photosystem I P700 chlorophyll a apoprotein A2

Chain B:



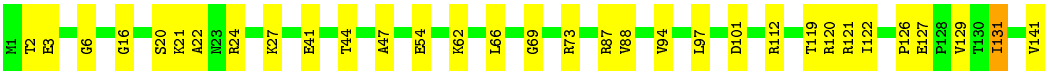
- Molecule 3: Photosystem I iron-sulfur center

Chain C:



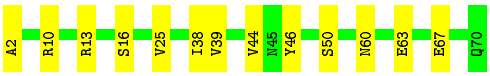
- Molecule 4: Photosystem I reaction center subunit II

Chain D:



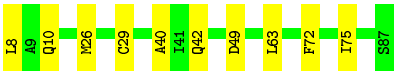
- Molecule 5: Photosystem I reaction center subunit IV

Chain E:



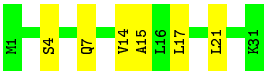
- Molecule 6: Photosystem I reaction center subunit PsaK 2

Chain K:



- Molecule 7: Photosystem I reaction center subunit XII

Chain M:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	74303	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	43.6	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: LHG, BCR, CLA, SF4, ECH, SQD, LMG, PQN

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	0.32	0/5985	0.59	2/8158 (0.0%)
2	B	0.31	0/5981	0.61	9/8178 (0.1%)
3	C	0.33	0/610	0.74	0/826
4	D	0.31	0/1126	0.67	1/1517 (0.1%)
5	E	0.27	0/552	0.59	0/745
6	K	0.30	0/590	0.64	0/797
7	M	0.29	0/241	0.80	1/326 (0.3%)
All	All	0.31	0/15085	0.61	13/20547 (0.1%)

There are no bond length outliers.

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	614	MET	CG-SD-CE	-7.51	88.18	100.20
2	B	150	LEU	CA-CB-CG	6.68	130.68	115.30
7	M	17	LEU	CA-CB-CG	6.57	130.41	115.30
1	A	310	MET	CA-CB-CG	5.86	123.26	113.30
2	B	659	MET	CG-SD-CE	-5.67	91.12	100.20

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	5787	0	5646	114	0
2	B	5770	0	5547	106	0
3	C	600	0	581	17	0
4	D	1102	0	1101	20	0
5	E	543	0	525	10	0
6	K	579	0	601	7	0
7	M	238	0	260	4	0
8	A	2446	0	2250	95	0
8	B	2482	0	2461	109	0
8	K	130	0	142	2	0
9	A	33	0	46	4	0
9	B	33	0	46	1	0
10	A	280	0	370	23	0
10	B	280	0	371	24	0
10	K	40	0	53	4	0
11	A	98	0	148	13	0
11	B	73	0	92	5	0
11	M	49	0	74	1	0
12	A	50	0	73	0	0
12	B	86	0	118	9	0
12	K	55	0	86	0	0
13	A	8	0	0	1	0
13	C	16	0	0	1	0
14	B	41	0	54	6	0
14	M	41	0	54	2	0
15	B	54	0	77	0	0
All	All	20914	0	20776	412	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 10.

The worst 5 of 412 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)
3:C:58:CYS:HB2	13:C:3003:SF4:S4	2.03	0.98
8:B:1220:CLA:HAB	8:B:1227:CLA:HAC1	1.59	0.84
1:A:72:ILE:HG22	1:A:76:HIS:CE1	2.14	0.82
2:B:582:ASN:C	2:B:582:ASN:HD22	1.82	0.82
8:B:1236:CLA:H43	10:B:4010:BCR:H10C	1.61	0.81

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 PDB entries followed by that with respect to all EM entries.

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	737/739 (100%)	693 (94%)	43 (6%)	1 (0%)	51 85
2	B	727/729 (100%)	695 (96%)	32 (4%)	0	100 100
3	C	78/80 (98%)	76 (97%)	2 (3%)	0	100 100
4	D	139/141 (99%)	133 (96%)	6 (4%)	0	100 100
5	E	67/69 (97%)	62 (92%)	5 (8%)	0	100 100
6	K	79/80 (99%)	67 (85%)	12 (15%)	0	100 100
7	M	29/31 (94%)	29 (100%)	0	0	100 100
All	All	1856/1869 (99%)	1755 (95%)	100 (5%)	1 (0%)	54 85

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	107	PRO

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 PDB entries followed by that with respect to all EM entries.

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	593/593 (100%)	593 (100%)	0	100 100
2	B	582/582 (100%)	578 (99%)	4 (1%)	84 90
3	C	68/68 (100%)	68 (100%)	0	100 100
4	D	116/116 (100%)	116 (100%)	0	100 100
5	E	58/58 (100%)	58 (100%)	0	100 100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
6	K	60/60 (100%)	60 (100%)	0	100 100
7	M	25/25 (100%)	25 (100%)	0	100 100
All	All	1502/1502 (100%)	1498 (100%)	4 (0%)	92 95

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	7	LYS
2	B	85	ARG
2	B	533	LYS
2	B	582	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	297	HIS
1	A	608	HIS
2	B	582	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

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

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

120 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	$\#\|Z\| > 2$
8	CLA	B	1203	-	56,73,73	1.30	6 (10%)	55,113,113	1.85	7 (12%)
8	CLA	A	1139	-	37,54,73	1.59	6 (16%)	32,90,113	2.28	6 (18%)
8	CLA	K	1401	-	56,73,73	1.29	7 (12%)	55,113,113	2.00	10 (18%)
8	CLA	A	1120	-	40,57,73	1.54	6 (15%)	34,93,113	2.42	7 (20%)
8	CLA	A	1109	-	51,68,73	1.34	6 (11%)	49,107,113	2.06	10 (20%)
8	CLA	B	1235	-	51,68,73	1.32	5 (9%)	49,107,113	2.13	12 (24%)
8	CLA	A	1105	-	41,58,73	1.51	6 (14%)	37,95,113	2.26	8 (21%)
8	CLA	A	1113	-	33,53,73	1.67	7 (21%)	27,89,113	2.52	8 (29%)
8	CLA	B	1227	-	46,63,73	1.40	6 (13%)	43,101,113	2.01	9 (20%)
8	CLA	B	1237	-	56,73,73	1.29	6 (10%)	55,113,113	2.09	11 (20%)
10	BCR	B	4005	-	41,41,41	1.83	4 (9%)	56,56,56	4.38	15 (26%)
10	BCR	K	4001	-	41,41,41	1.83	4 (9%)	56,56,56	4.26	14 (25%)
8	CLA	A	1111	-	46,63,73	1.42	6 (13%)	43,101,113	2.20	10 (23%)
8	CLA	A	1112	-	41,58,73	1.48	6 (14%)	37,95,113	2.35	9 (24%)
8	CLA	B	1226	-	56,73,73	1.24	6 (10%)	55,113,113	2.12	12 (21%)
8	CLA	B	1230	-	56,73,73	1.31	6 (10%)	55,113,113	2.07	11 (20%)
8	CLA	B	1213	-	56,73,73	1.29	6 (10%)	55,113,113	2.22	13 (23%)
8	CLA	B	1223	-	51,68,73	1.37	6 (11%)	49,107,113	2.11	9 (18%)
8	CLA	B	1234	-	56,73,73	1.26	5 (8%)	55,113,113	2.09	11 (20%)
10	BCR	A	4002	-	41,41,41	1.82	4 (9%)	56,56,56	4.40	17 (30%)
8	CLA	A	1121	-	41,58,73	1.52	6 (14%)	37,95,113	2.41	10 (27%)
8	CLA	A	1124	-	46,63,73	1.43	6 (13%)	43,101,113	2.14	8 (18%)
8	CLA	B	1224	-	53,70,73	1.31	6 (11%)	51,109,113	2.06	12 (23%)
8	CLA	B	1215	-	56,73,73	1.26	5 (8%)	55,113,113	2.09	10 (18%)
8	CLA	A	1801	-	37,54,73	1.58	6 (16%)	32,90,113	2.25	6 (18%)
8	CLA	B	1202	-	56,73,73	1.27	6 (10%)	55,113,113	1.91	9 (16%)
8	CLA	A	1123	-	56,73,73	1.30	5 (8%)	55,113,113	2.14	11 (20%)
10	BCR	B	4011	-	41,41,41	1.88	4 (9%)	56,56,56	4.36	17 (30%)
8	CLA	A	1127	-	56,73,73	1.26	6 (10%)	55,113,113	2.02	14 (25%)
8	CLA	A	1129	-	37,54,73	1.57	6 (16%)	32,90,113	2.28	6 (18%)
8	CLA	B	1240	-	56,73,73	1.30	5 (8%)	55,113,113	2.03	10 (18%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
8	CLA	B	1238	-	56,73,73	1.28	6 (10%)	55,113,113	1.94	10 (18%)
8	CLA	A	1133	-	56,73,73	1.29	6 (10%)	55,113,113	1.92	7 (12%)
8	CLA	B	1211	-	37,54,73	1.56	5 (13%)	32,90,113	2.23	7 (21%)
8	CLA	B	1208	-	33,53,73	1.68	6 (18%)	27,89,113	2.32	7 (25%)
10	BCR	B	4010	-	41,41,41	1.83	4 (9%)	56,56,56	4.41	21 (37%)
10	BCR	B	4004	-	41,41,41	1.85	4 (9%)	56,56,56	4.38	17 (30%)
8	CLA	A	1104	-	56,73,73	1.28	6 (10%)	55,113,113	1.95	10 (18%)
8	CLA	B	1231	-	56,73,73	1.29	6 (10%)	55,113,113	1.93	9 (16%)
12	LMG	A	5002	-	50,50,55	1.03	5 (10%)	58,58,63	1.08	2 (3%)
8	CLA	A	1103	-	51,68,73	1.34	6 (11%)	49,107,113	2.10	11 (22%)
8	CLA	B	1219	-	56,73,73	1.29	6 (10%)	55,113,113	1.94	10 (18%)
10	BCR	A	4003	-	41,41,41	1.79	4 (9%)	56,56,56	3.95	16 (28%)
8	CLA	B	1229	-	56,73,73	1.31	7 (12%)	55,113,113	1.93	9 (16%)
10	BCR	A	4012	-	41,41,41	1.86	4 (9%)	56,56,56	4.35	16 (28%)
8	CLA	K	1402	-	56,73,73	1.30	6 (10%)	55,113,113	1.98	10 (18%)
8	CLA	B	1023	-	51,68,73	1.31	6 (11%)	49,107,113	2.13	11 (22%)
8	CLA	B	1207	-	46,63,73	1.42	6 (13%)	43,101,113	2.11	9 (20%)
10	BCR	A	4001	-	41,41,41	1.87	4 (9%)	56,56,56	4.36	17 (30%)
8	CLA	B	1209	-	56,73,73	1.30	6 (10%)	55,113,113	2.01	8 (14%)
10	BCR	A	4019	-	41,41,41	1.85	4 (9%)	56,56,56	4.40	16 (28%)
8	CLA	A	1013	-	46,63,73	1.33	5 (10%)	43,101,113	2.42	12 (27%)
10	BCR	B	4014	-	41,41,41	1.90	4 (9%)	56,56,56	4.51	18 (32%)
8	CLA	B	1214	-	56,73,73	1.29	6 (10%)	55,113,113	1.99	11 (20%)
8	CLA	B	1217	-	56,73,73	1.29	6 (10%)	55,113,113	1.98	7 (12%)
8	CLA	A	1126	-	51,68,73	1.34	6 (11%)	49,107,113	2.12	10 (20%)
14	ECH	B	4006	-	42,42,42	0.86	1 (2%)	55,58,58	2.19	16 (29%)
8	CLA	B	1228	-	56,73,73	1.31	6 (10%)	55,113,113	1.89	9 (16%)
8	CLA	A	1115	-	37,54,73	1.53	5 (13%)	32,90,113	2.33	7 (21%)
13	SF4	C	3003	3	0,12,12	0.00	-	-		
8	CLA	A	1117	-	56,73,73	1.27	6 (10%)	55,113,113	2.13	12 (21%)
8	CLA	A	1130	-	46,63,73	1.44	6 (13%)	43,101,113	2.14	9 (20%)
10	BCR	A	4007	-	41,41,41	1.82	4 (9%)	56,56,56	4.30	18 (32%)
14	ECH	M	4021	-	42,42,42	0.78	0	55,58,58	2.09	16 (29%)
8	CLA	A	1136	-	56,73,73	1.29	6 (10%)	55,113,113	1.95	9 (16%)
8	CLA	B	1220	-	48,65,73	1.39	6 (12%)	45,103,113	2.19	11 (24%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
8	CLA	A	1108	-	33,53,73	1.71	6 (18%)	27,89,113	2.38	6 (22%)
15	SQD	B	5008	-	53,54,54	0.79	0	62,65,65	0.90	2 (3%)
12	LMG	B	5002	-	55,55,55	1.13	6 (10%)	63,63,63	1.04	3 (4%)
8	CLA	B	1221	-	46,63,73	1.39	5 (10%)	43,101,113	2.24	12 (27%)
8	CLA	B	1201	-	37,54,73	1.59	6 (16%)	32,90,113	2.27	5 (15%)
8	CLA	B	1218	-	41,58,73	1.48	6 (14%)	37,95,113	2.38	10 (27%)
8	CLA	A	1128	-	51,68,73	1.32	6 (11%)	49,107,113	2.14	13 (26%)
8	CLA	A	1137	-	41,58,73	1.51	6 (14%)	37,95,113	2.29	12 (32%)
8	CLA	A	1132	-	41,58,73	1.50	6 (14%)	37,95,113	2.31	8 (21%)
8	CLA	B	1222	-	46,63,73	1.41	6 (13%)	43,101,113	2.24	11 (25%)
8	CLA	A	1102	-	46,63,73	1.43	6 (13%)	43,101,113	2.33	11 (25%)
11	LHG	B	5006	-	23,23,48	0.53	0	26,29,54	1.37	3 (11%)
8	CLA	A	1011	-	51,68,73	1.33	6 (11%)	49,107,113	2.15	10 (20%)
8	CLA	A	1110	-	51,68,73	1.39	6 (11%)	49,107,113	2.12	9 (18%)
8	CLA	B	1021	-	51,68,73	1.30	6 (11%)	49,107,113	2.24	12 (24%)
11	LHG	A	5003	-	48,48,48	0.40	0	51,54,54	1.04	3 (5%)
10	BCR	A	4008	-	41,41,41	1.80	4 (9%)	56,56,56	4.23	14 (25%)
8	CLA	B	1205	-	46,63,73	1.43	6 (13%)	43,101,113	2.30	9 (20%)
11	LHG	M	5001	-	48,48,48	0.40	0	51,54,54	1.05	3 (5%)
8	CLA	A	1012	-	46,63,73	1.45	6 (13%)	43,101,113	2.13	12 (27%)
8	CLA	A	1114	-	33,53,73	1.69	6 (18%)	27,89,113	2.40	6 (22%)
8	CLA	A	1131	-	46,63,73	1.43	6 (13%)	43,101,113	2.19	9 (20%)
8	CLA	B	1210	-	56,73,73	1.29	6 (10%)	55,113,113	2.06	13 (23%)
11	LHG	A	5001	-	48,48,48	0.39	0	51,54,54	1.09	3 (5%)
8	CLA	B	1212	-	33,53,73	1.67	6 (18%)	27,89,113	2.44	7 (25%)
13	SF4	A	3001	1,2	0,12,12	0.00	-	-		
8	CLA	B	1239	-	56,73,73	1.30	6 (10%)	55,113,113	1.99	11 (20%)
8	CLA	B	1204	-	37,54,73	1.58	6 (16%)	32,90,113	2.19	6 (18%)
8	CLA	A	1134	-	37,54,73	1.60	6 (16%)	32,90,113	2.31	6 (18%)
8	CLA	A	1119	-	56,73,73	1.30	6 (10%)	55,113,113	1.92	8 (14%)
8	CLA	A	1138	-	56,73,73	1.30	6 (10%)	55,113,113	2.04	10 (18%)
8	CLA	B	1232	-	41,58,73	1.54	7 (17%)	37,95,113	2.32	9 (24%)
8	CLA	A	1122	-	51,68,73	1.34	6 (11%)	49,107,113	2.18	10 (20%)
8	CLA	B	1225	-	56,73,73	1.26	5 (8%)	55,113,113	2.04	13 (23%)
12	LMG	K	5009	-	55,55,55	1.14	6 (10%)	63,63,63	1.03	2 (3%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
9	PQN	A	2001	-	34,34,34	0.37	0	42,45,45	1.11	5 (11%)
11	LHG	B	5004	-	48,48,48	0.39	0	51,54,54	1.01	3 (5%)
8	CLA	A	1107	-	41,58,73	1.52	6 (14%)	37,95,113	2.35	8 (21%)
8	CLA	A	1116	-	45,62,73	1.45	6 (13%)	41,99,113	2.25	13 (31%)
8	CLA	A	1106	-	51,68,73	1.31	6 (11%)	49,107,113	2.11	11 (22%)
8	CLA	A	1125	-	43,60,73	1.50	5 (11%)	39,97,113	2.39	14 (35%)
8	CLA	A	1101	-	56,73,73	1.30	6 (10%)	55,113,113	1.95	9 (16%)
10	BCR	B	4018	-	41,41,41	1.86	4 (9%)	56,56,56	4.18	18 (32%)
8	CLA	B	1206	-	46,63,73	1.43	6 (13%)	43,101,113	2.35	11 (25%)
8	CLA	B	1236	-	41,58,73	1.50	6 (14%)	37,95,113	2.22	11 (29%)
9	PQN	B	2002	-	34,34,34	0.36	0	42,45,45	1.17	3 (7%)
8	CLA	B	1216	-	46,63,73	1.42	6 (13%)	43,101,113	2.17	10 (23%)
12	LMG	B	5005	-	31,31,55	0.54	0	39,39,63	1.10	2 (5%)
8	CLA	A	1118	-	37,54,73	1.55	6 (16%)	32,90,113	2.33	7 (21%)
8	CLA	A	1135	-	56,73,73	1.27	6 (10%)	55,113,113	2.02	11 (20%)
8	CLA	B	1022	-	51,68,73	1.37	5 (9%)	49,107,113	2.02	10 (20%)
10	BCR	B	4017	-	41,41,41	1.86	5 (12%)	56,56,56	4.52	19 (33%)
13	SF4	C	3002	3	0,12,12	0.00	-	-		
8	CLA	A	1140	-	56,73,73	1.30	6 (10%)	55,113,113	1.95	8 (14%)

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
8	CLA	B	1203	-	1/1/15/20	16/37/115/115	-
8	CLA	A	1139	-	1/1/11/20	6/15/93/115	-
8	CLA	K	1401	-	1/1/15/20	16/37/115/115	-
8	CLA	A	1120	-	1/1/11/20	8/18/96/115	-
8	CLA	A	1109	-	1/1/14/20	14/31/109/115	-
8	CLA	B	1235	-	1/1/14/20	16/31/109/115	-
8	CLA	A	1105	-	1/1/12/20	7/19/97/115	-
8	CLA	A	1113	-	1/1/11/20	4/11/91/115	-
8	CLA	B	1227	-	1/1/13/20	14/25/103/115	-
8	CLA	B	1237	-	1/1/15/20	16/37/115/115	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
10	BCR	B	4005	-	-	8/29/63/63	0/2/2/2
10	BCR	K	4001	-	-	8/29/63/63	0/2/2/2
8	CLA	A	1111	-	1/1/13/20	12/25/103/115	-
8	CLA	A	1112	-	1/1/12/20	11/19/97/115	-
8	CLA	B	1226	-	1/1/15/20	15/37/115/115	-
8	CLA	B	1230	-	1/1/15/20	18/37/115/115	-
8	CLA	B	1213	-	1/1/15/20	12/37/115/115	-
8	CLA	B	1223	-	1/1/14/20	15/31/109/115	-
8	CLA	B	1234	-	1/1/15/20	21/37/115/115	-
10	BCR	A	4002	-	-	11/29/63/63	0/2/2/2
8	CLA	A	1121	-	1/1/12/20	7/19/97/115	-
8	CLA	A	1124	-	1/1/13/20	5/25/103/115	-
8	CLA	B	1224	-	1/1/14/20	19/34/112/115	-
8	CLA	B	1215	-	1/1/15/20	21/37/115/115	-
8	CLA	A	1801	-	1/1/11/20	6/15/93/115	-
8	CLA	B	1202	-	1/1/15/20	15/37/115/115	-
8	CLA	A	1123	-	1/1/15/20	24/37/115/115	-
10	BCR	B	4011	-	-	16/29/63/63	0/2/2/2
8	CLA	A	1127	-	1/1/15/20	22/37/115/115	-
8	CLA	A	1129	-	1/1/11/20	7/15/93/115	-
8	CLA	B	1240	-	1/1/15/20	17/37/115/115	-
8	CLA	B	1238	-	1/1/15/20	17/37/115/115	-
8	CLA	A	1133	-	1/1/15/20	15/37/115/115	-
8	CLA	B	1211	-	1/1/11/20	3/15/93/115	-
8	CLA	B	1208	-	1/1/11/20	3/11/91/115	-
10	BCR	B	4010	-	-	12/29/63/63	0/2/2/2
10	BCR	B	4004	-	-	12/29/63/63	0/2/2/2
8	CLA	A	1104	-	1/1/15/20	18/37/115/115	-
8	CLA	B	1231	-	1/1/15/20	12/37/115/115	-
12	LMG	A	5002	-	-	19/45/65/70	0/1/1/1
8	CLA	A	1103	-	1/1/14/20	16/31/109/115	-
8	CLA	B	1219	-	1/1/15/20	20/37/115/115	-
10	BCR	A	4003	-	-	13/29/63/63	0/2/2/2
8	CLA	B	1229	-	1/1/15/20	16/37/115/115	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
10	BCR	A	4012	-	-	11/29/63/63	0/2/2/2
8	CLA	K	1402	-	1/1/15/20	18/37/115/115	-
8	CLA	B	1023	-	1/1/14/20	13/31/109/115	-
8	CLA	B	1207	-	1/1/13/20	7/25/103/115	-
10	BCR	A	4001	-	-	11/29/63/63	0/2/2/2
8	CLA	B	1209	-	1/1/15/20	23/37/115/115	-
10	BCR	A	4019	-	-	9/29/63/63	0/2/2/2
8	CLA	A	1013	-	1/1/13/20	13/25/103/115	-
10	BCR	B	4014	-	-	12/29/63/63	0/2/2/2
8	CLA	B	1214	-	1/1/15/20	16/37/115/115	-
8	CLA	B	1217	-	1/1/15/20	17/37/115/115	-
8	CLA	A	1126	-	1/1/14/20	18/31/109/115	-
14	ECH	B	4006	-	-	10/29/66/66	0/2/2/2
8	CLA	B	1228	-	1/1/15/20	21/37/115/115	-
8	CLA	A	1115	-	1/1/11/20	6/15/93/115	-
13	SF4	C	3003	3	-	-	0/6/5/5
8	CLA	A	1117	-	1/1/15/20	20/37/115/115	-
8	CLA	A	1130	-	1/1/13/20	11/25/103/115	-
10	BCR	A	4007	-	-	7/29/63/63	0/2/2/2
14	ECH	M	4021	-	-	17/29/66/66	0/2/2/2
8	CLA	A	1136	-	1/1/15/20	17/37/115/115	-
8	CLA	B	1220	-	1/1/13/20	9/28/106/115	-
8	CLA	A	1108	-	1/1/11/20	7/11/91/115	-
15	SQD	B	5008	-	-	10/49/69/69	0/1/1/1
12	LMG	B	5002	-	-	13/50/70/70	0/1/1/1
8	CLA	B	1221	-	1/1/13/20	9/25/103/115	-
8	CLA	B	1201	-	1/1/11/20	13/15/93/115	-
8	CLA	B	1218	-	1/1/12/20	10/19/97/115	-
8	CLA	A	1128	-	1/1/14/20	15/31/109/115	-
8	CLA	A	1137	-	1/1/12/20	8/19/97/115	-
8	CLA	A	1132	-	1/1/12/20	8/19/97/115	-
8	CLA	B	1222	-	1/1/13/20	7/25/103/115	-
8	CLA	A	1102	-	1/1/13/20	7/25/103/115	-
11	LHG	B	5006	-	-	17/28/28/53	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	CLA	A	1011	-	1/1/14/20	16/31/109/115	-
8	CLA	A	1110	-	1/1/14/20	16/31/109/115	-
8	CLA	B	1021	-	1/1/14/20	20/31/109/115	-
11	LHG	A	5003	-	-	29/53/53/53	-
10	BCR	A	4008	-	-	17/29/63/63	0/2/2/2
8	CLA	B	1205	-	1/1/13/20	10/25/103/115	-
11	LHG	M	5001	-	-	34/53/53/53	-
8	CLA	A	1012	-	1/1/13/20	10/25/103/115	-
8	CLA	A	1114	-	1/1/11/20	5/11/91/115	-
8	CLA	A	1131	-	1/1/13/20	13/25/103/115	-
8	CLA	B	1210	-	1/1/15/20	23/37/115/115	-
11	LHG	A	5001	-	-	30/53/53/53	-
8	CLA	B	1212	-	1/1/11/20	5/11/91/115	-
13	SF4	A	3001	1,2	-	-	0/6/5/5
8	CLA	B	1239	-	1/1/15/20	12/37/115/115	-
8	CLA	B	1204	-	1/1/11/20	6/15/93/115	-
8	CLA	A	1134	-	1/1/11/20	11/15/93/115	-
8	CLA	A	1119	-	1/1/15/20	14/37/115/115	-
8	CLA	A	1138	-	1/1/15/20	17/37/115/115	-
8	CLA	B	1232	-	1/1/12/20	9/19/97/115	-
8	CLA	A	1122	-	1/1/14/20	14/31/109/115	-
8	CLA	B	1225	-	1/1/15/20	13/37/115/115	-
12	LMG	K	5009	-	-	16/50/70/70	0/1/1/1
9	PQN	A	2001	-	-	8/23/43/43	0/2/2/2
11	LHG	B	5004	-	-	28/53/53/53	-
8	CLA	A	1107	-	1/1/12/20	4/19/97/115	-
8	CLA	A	1116	-	1/1/12/20	12/24/102/115	-
8	CLA	A	1106	-	1/1/14/20	13/31/109/115	-
8	CLA	A	1125	-	1/1/12/20	9/22/100/115	-
8	CLA	A	1101	-	1/1/15/20	15/37/115/115	-
10	BCR	B	4018	-	-	9/29/63/63	0/2/2/2
8	CLA	B	1206	-	1/1/13/20	9/25/103/115	-
8	CLA	B	1236	-	1/1/12/20	10/19/97/115	-
9	PQN	B	2002	-	-	9/23/43/43	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	CLA	B	1216	-	1/1/13/20	15/25/103/115	-
12	LMG	B	5005	-	-	6/26/46/70	0/1/1/1
8	CLA	A	1118	-	1/1/11/20	8/15/93/115	-
8	CLA	A	1135	-	1/1/15/20	17/37/115/115	-
8	CLA	B	1022	-	1/1/14/20	12/31/109/115	-
10	BCR	B	4017	-	-	10/29/63/63	0/2/2/2
13	SF4	C	3002	3	-	-	0/6/5/5
8	CLA	A	1140	-	1/1/15/20	14/37/115/115	-

The worst 5 of 599 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	B	4014	BCR	C10-C9	7.60	1.45	1.35
10	B	4011	BCR	C10-C9	7.41	1.45	1.35
10	A	4012	BCR	C10-C9	7.35	1.45	1.35
10	A	4019	BCR	C10-C9	7.23	1.45	1.35
10	B	4018	BCR	C10-C9	7.23	1.45	1.35

The worst 5 of 1164 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
10	B	4017	BCR	C10-C11-C12	18.17	179.92	123.22
10	A	4008	BCR	C10-C11-C12	17.82	178.84	123.22
10	A	4001	BCR	C10-C11-C12	17.71	178.50	123.22
10	B	4011	BCR	C10-C11-C12	17.58	178.09	123.22
10	A	4019	BCR	C10-C11-C12	17.52	177.90	123.22

5 of 88 chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
8	A	1011	CLA	ND
8	A	1012	CLA	ND
8	A	1101	CLA	ND
8	A	1102	CLA	ND
8	A	1103	CLA	ND

5 of 1541 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	A	1011	CLA	C2A-CAA-CBA-CGA

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Mol	Chain	Res	Type	Atoms
8	A	1011	CLA	CHA-CBD-CGD-O1D
8	A	1011	CLA	CHA-CBD-CGD-O2D
8	A	1011	CLA	CBD-CGD-O2D-CED
8	A	1101	CLA	CHA-CBD-CGD-O1D

There are no ring outliers.

104 monomers are involved in 248 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	1203	CLA	1	0
8	A	1139	CLA	1	0
8	K	1401	CLA	1	0
8	A	1120	CLA	1	0
8	A	1109	CLA	6	0
8	B	1235	CLA	5	0
8	A	1105	CLA	2	0
8	B	1227	CLA	9	0
10	B	4005	BCR	3	0
10	K	4001	BCR	4	0
8	A	1111	CLA	2	0
8	A	1112	CLA	5	0
8	B	1226	CLA	4	0
8	B	1230	CLA	3	0
8	B	1213	CLA	4	0
8	B	1223	CLA	2	0
8	B	1234	CLA	5	0
10	A	4002	BCR	5	0
8	A	1124	CLA	4	0
8	B	1224	CLA	4	0
8	B	1215	CLA	4	0
8	B	1202	CLA	6	0
8	A	1123	CLA	1	0
10	B	4011	BCR	2	0
8	A	1127	CLA	5	0
8	A	1129	CLA	2	0
8	B	1240	CLA	1	0
8	B	1238	CLA	3	0
8	A	1133	CLA	3	0
8	B	1211	CLA	2	0
8	B	1208	CLA	1	0
10	B	4010	BCR	4	0
10	B	4004	BCR	4	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	A	1104	CLA	1	0
8	B	1231	CLA	4	0
8	A	1103	CLA	5	0
8	B	1219	CLA	4	0
10	A	4003	BCR	2	0
8	B	1229	CLA	4	0
10	A	4012	BCR	3	0
8	K	1402	CLA	1	0
8	B	1023	CLA	1	0
10	A	4001	BCR	3	0
8	B	1209	CLA	1	0
10	A	4019	BCR	2	0
8	A	1013	CLA	3	0
10	B	4014	BCR	3	0
8	B	1214	CLA	5	0
8	B	1217	CLA	4	0
8	A	1126	CLA	6	0
14	B	4006	ECH	6	0
8	B	1228	CLA	3	0
8	A	1115	CLA	1	0
13	C	3003	SF4	1	0
8	A	1117	CLA	5	0
8	A	1130	CLA	1	0
10	A	4007	BCR	3	0
14	M	4021	ECH	2	0
8	A	1136	CLA	3	0
8	B	1220	CLA	3	0
8	A	1108	CLA	1	0
12	B	5002	LMG	9	0
8	B	1221	CLA	4	0
8	B	1218	CLA	1	0
8	A	1128	CLA	4	0
8	A	1137	CLA	1	0
8	A	1132	CLA	2	0
8	B	1222	CLA	4	0
8	A	1102	CLA	2	0
8	A	1011	CLA	2	0
8	B	1021	CLA	6	0
11	A	5003	LHG	4	0
10	A	4008	BCR	5	0
8	B	1205	CLA	4	0
11	M	5001	LHG	1	0

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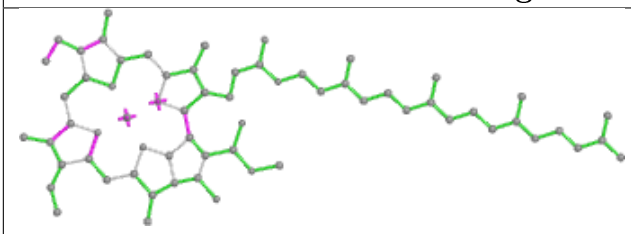
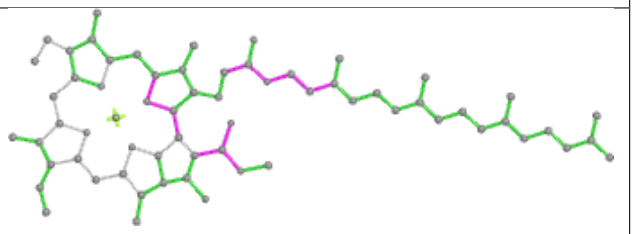
Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	A	1012	CLA	4	0
8	A	1131	CLA	1	0
8	B	1210	CLA	3	0
11	A	5001	LHG	9	0
8	B	1212	CLA	1	0
13	A	3001	SF4	1	0
8	B	1239	CLA	4	0
8	B	1204	CLA	2	0
8	A	1119	CLA	2	0
8	A	1138	CLA	4	0
8	B	1232	CLA	2	0
8	A	1122	CLA	3	0
8	B	1225	CLA	6	0
9	A	2001	PQN	4	0
11	B	5004	LHG	5	0
8	A	1107	CLA	2	0
8	A	1116	CLA	4	0
8	A	1106	CLA	4	0
8	A	1101	CLA	1	0
10	B	4018	BCR	4	0
8	B	1206	CLA	2	0
8	B	1236	CLA	4	0
9	B	2002	PQN	1	0
8	B	1216	CLA	5	0
8	A	1118	CLA	2	0
8	A	1135	CLA	2	0
8	B	1022	CLA	3	0
10	B	4017	BCR	5	0
8	A	1140	CLA	5	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 then 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.

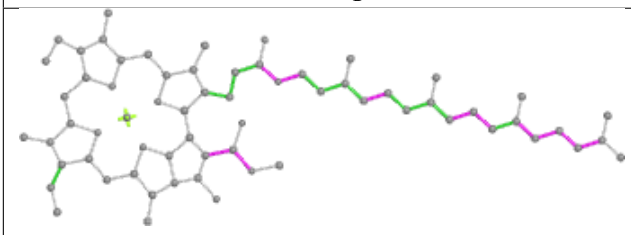
Ligand CLA B 1203



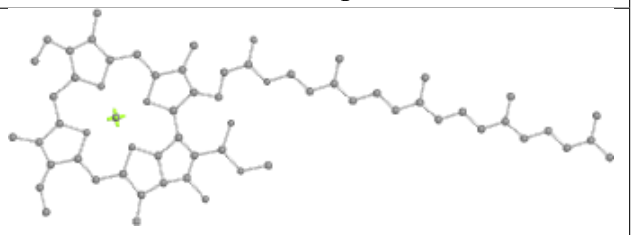
Bond lengths



Bond angles

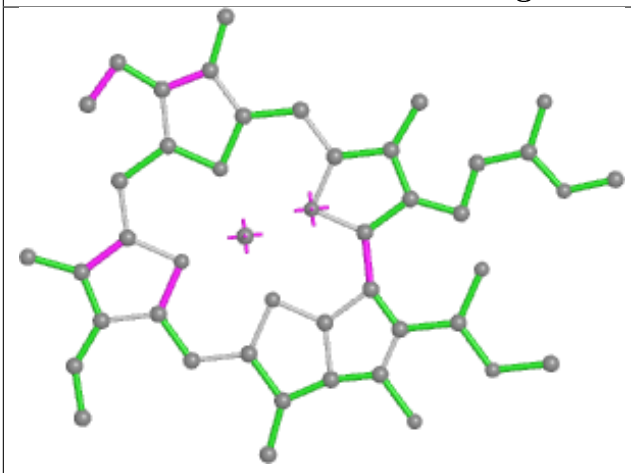


Torsions

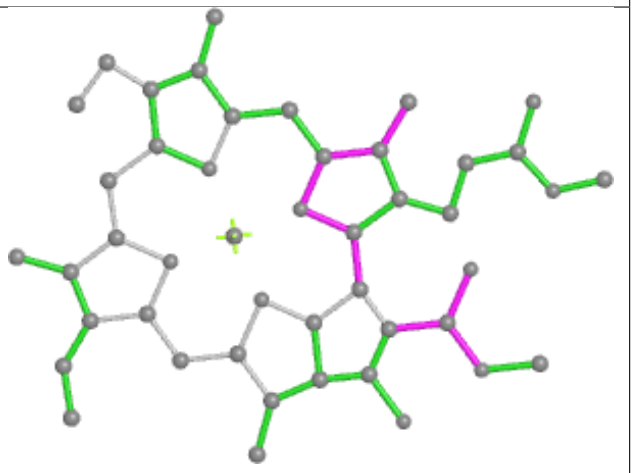


Rings

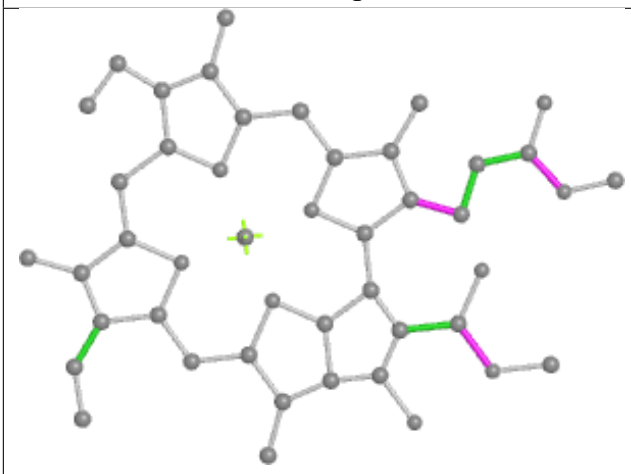
Ligand CLA A 1139



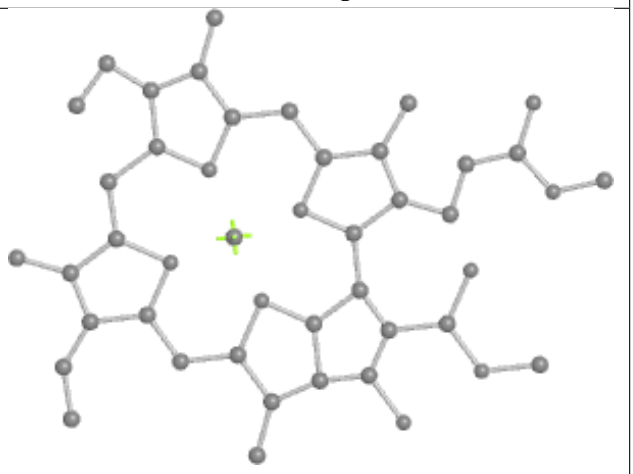
Bond lengths



Bond angles

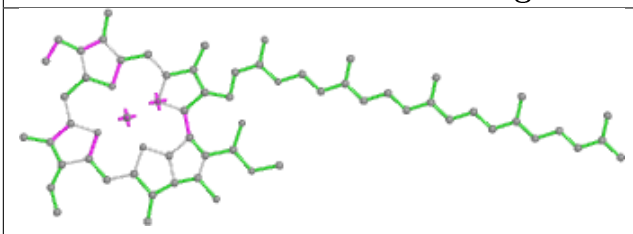


Torsions

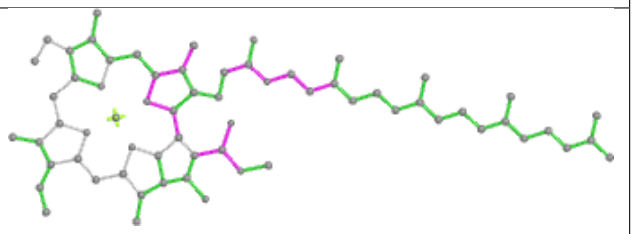


Rings

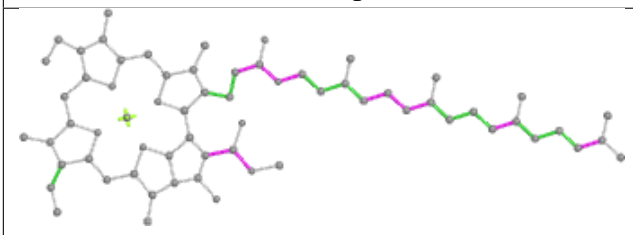
Ligand CLA K 1401



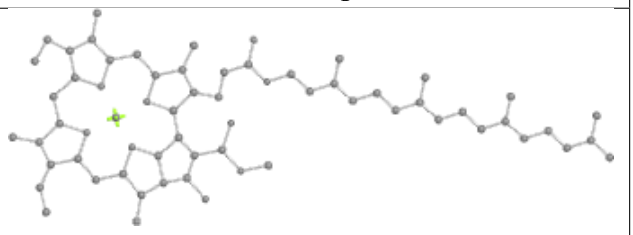
Bond lengths



Bond angles

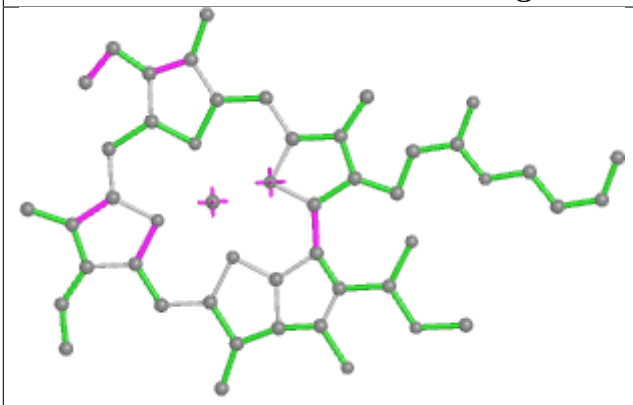


Torsions

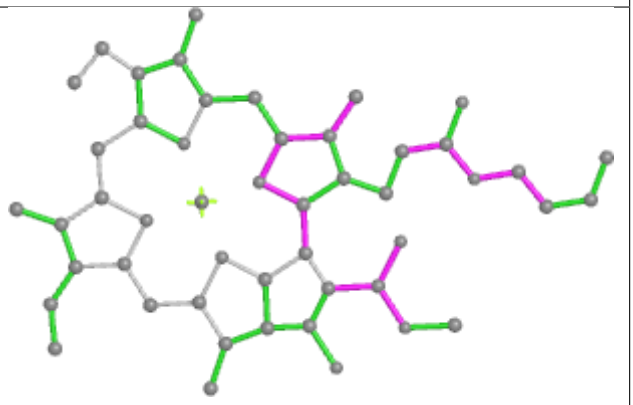


Rings

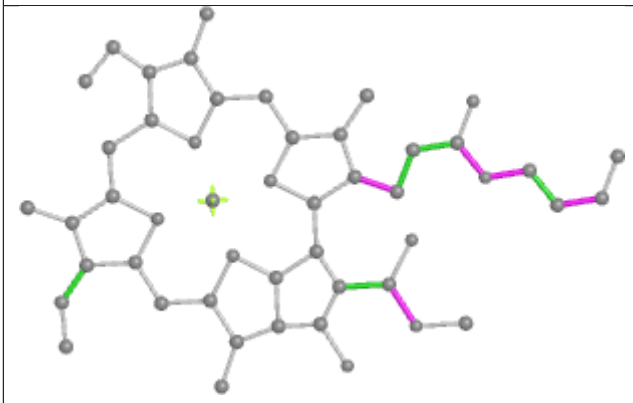
Ligand CLA A 1120



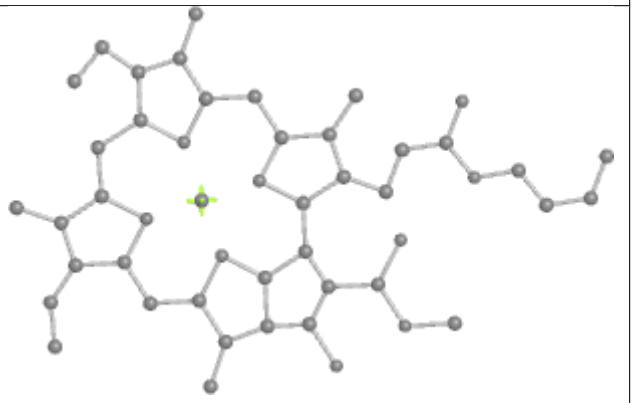
Bond lengths



Bond angles

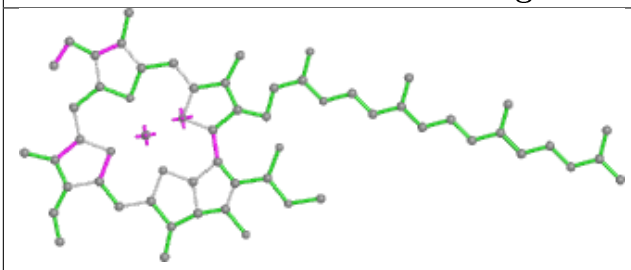


Torsions

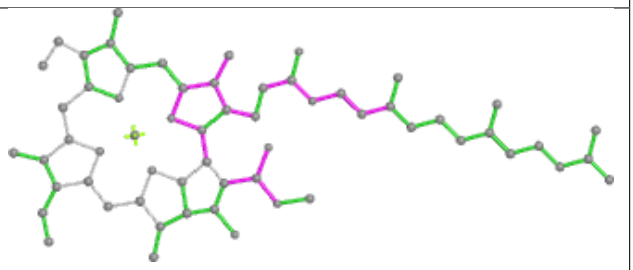


Rings

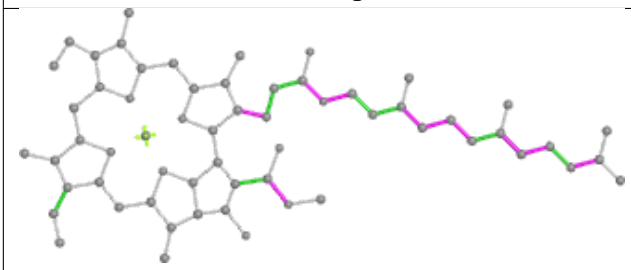
Ligand CLA A 1109



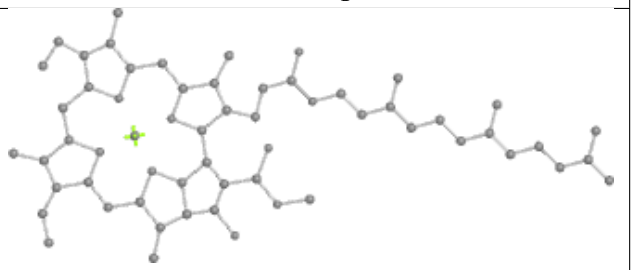
Bond lengths



Bond angles

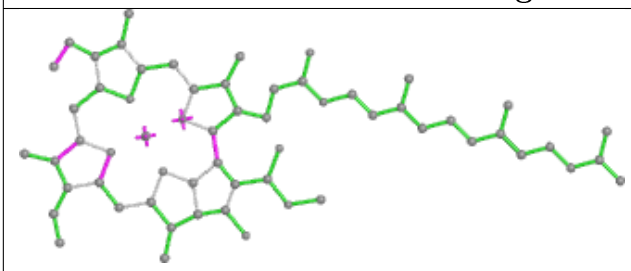


Torsions

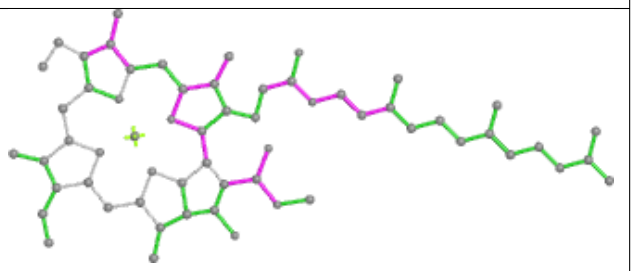


Rings

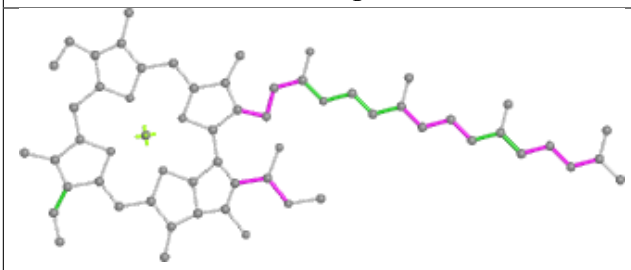
Ligand CLA B 1235



Bond lengths



Bond angles



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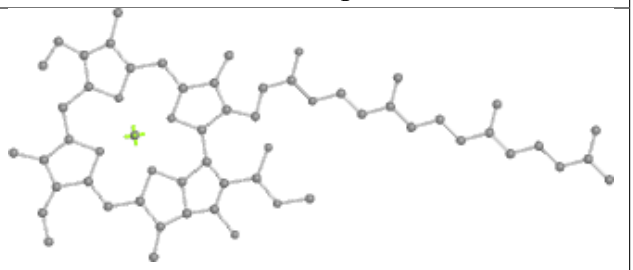
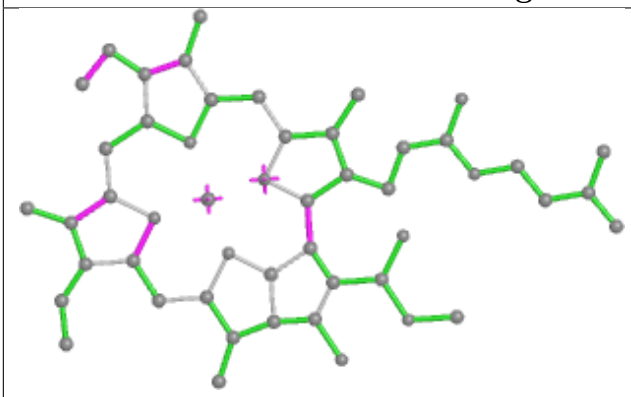
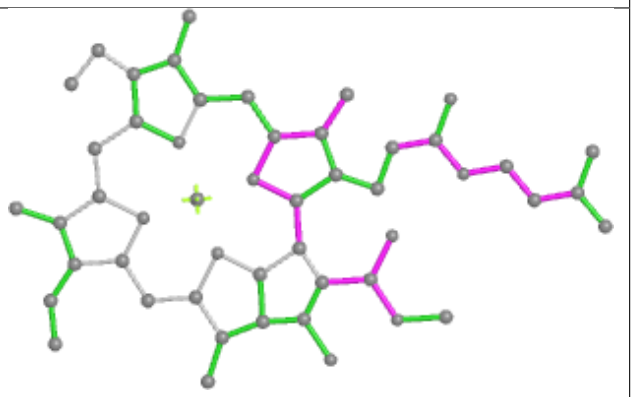
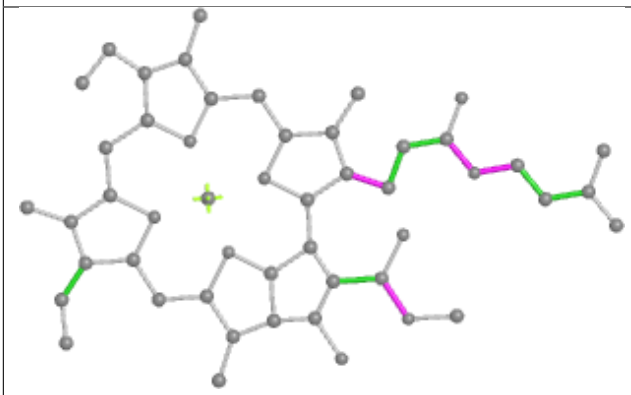
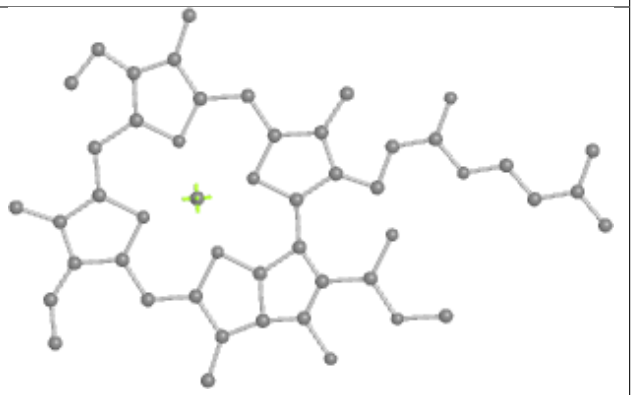
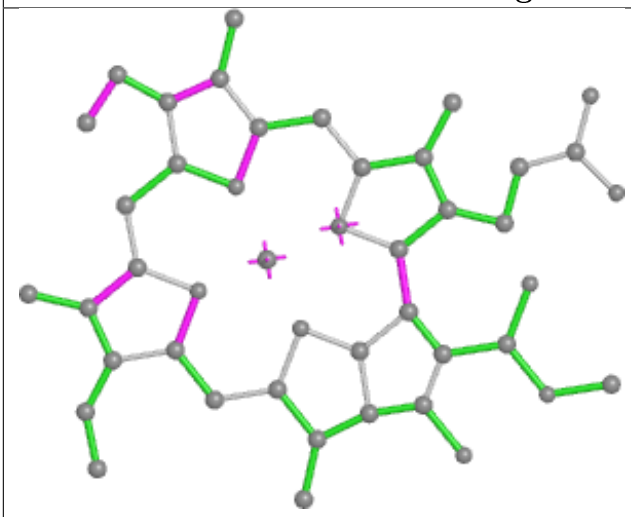


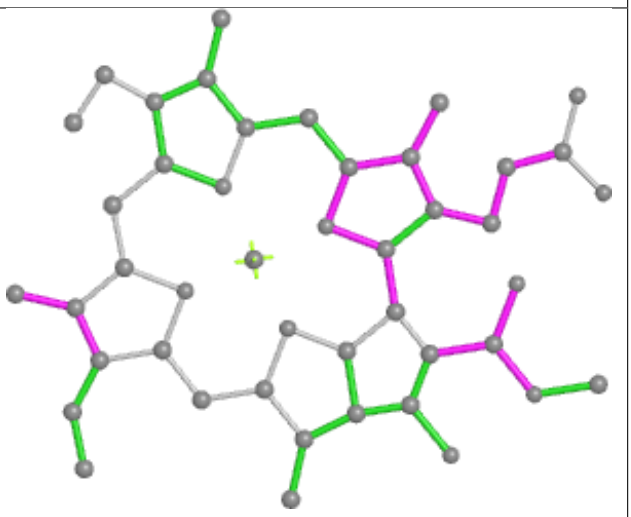
Rings

Ligand CLA A 1105	
	
Bond lengths	**Bond angles**
	
Torsions	**Rings**

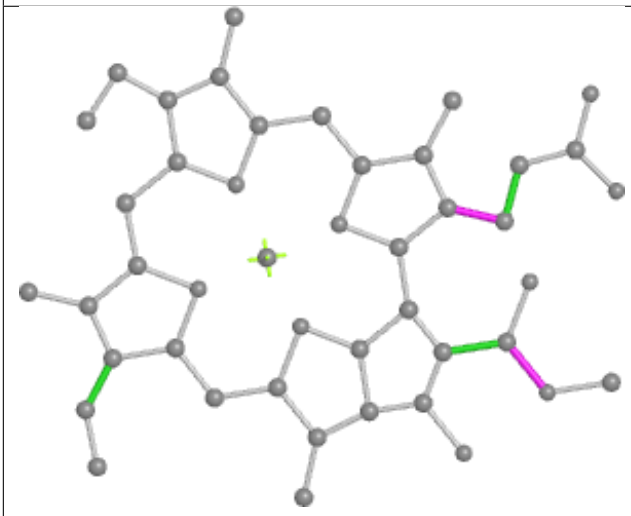
Ligand CLA A 1113



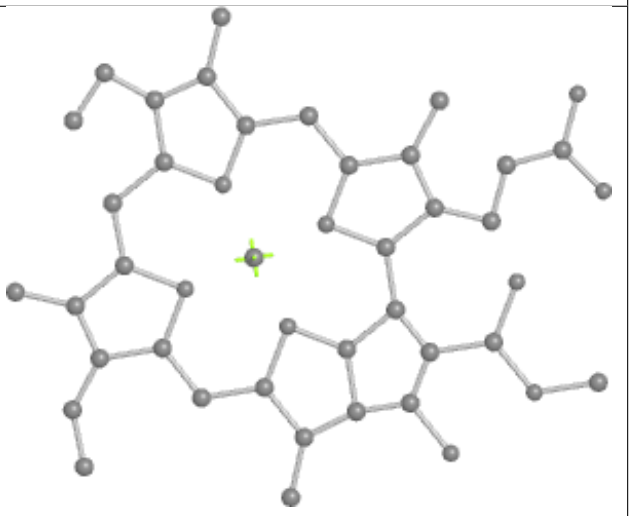
Bond lengths



Bond angles

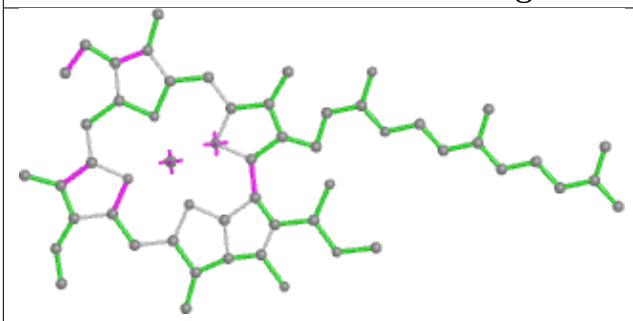


Torsions

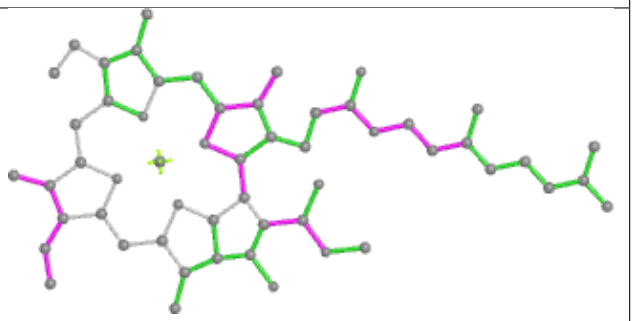


Rings

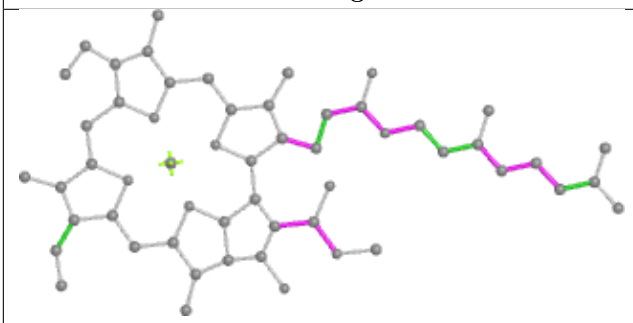
Ligand CLA B 1227



Bond lengths



Bond angles



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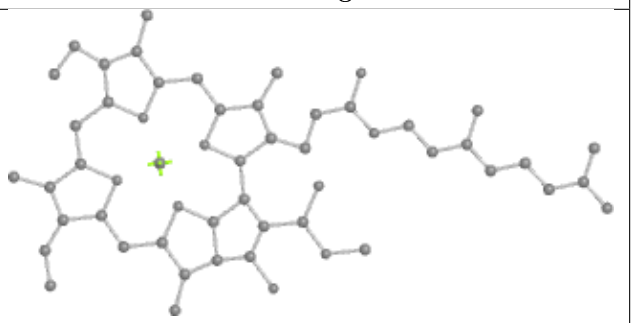
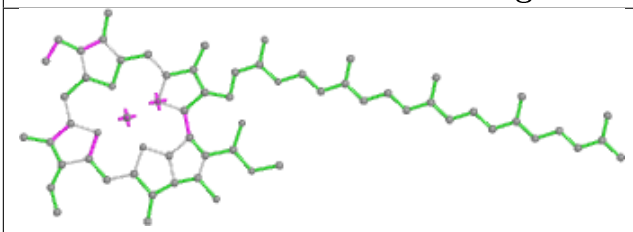
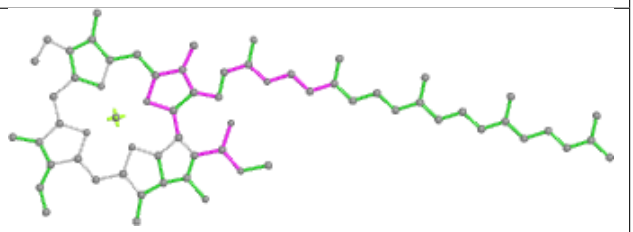


Rings

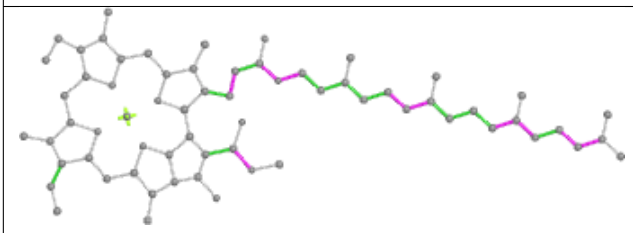
Ligand CLA B 1237



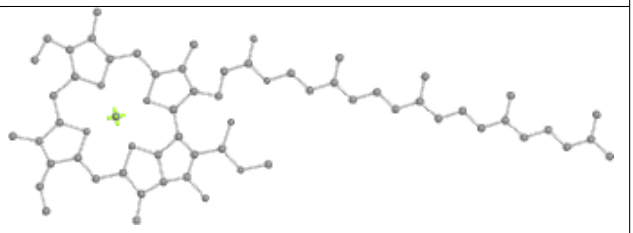
Bond lengths



Bond angles

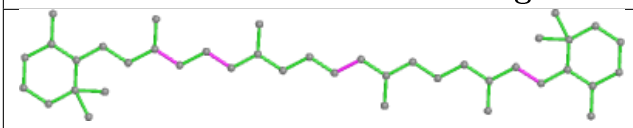


Torsions

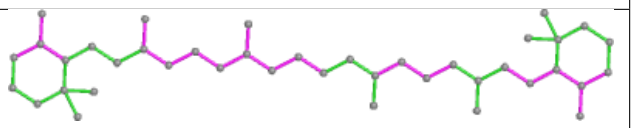


Rings

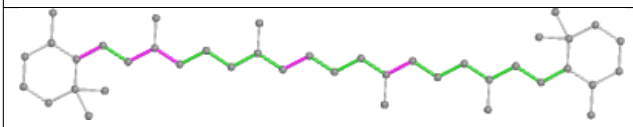
Ligand BCR B 4005



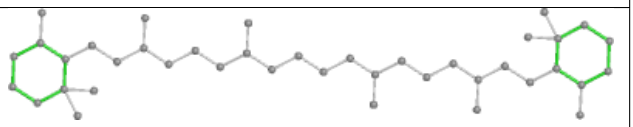
Bond lengths



Bond angles

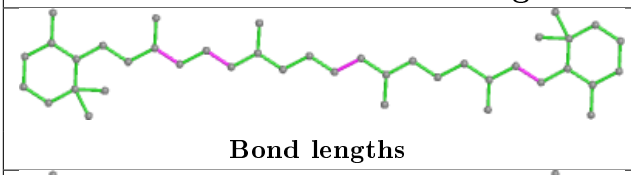


Torsions

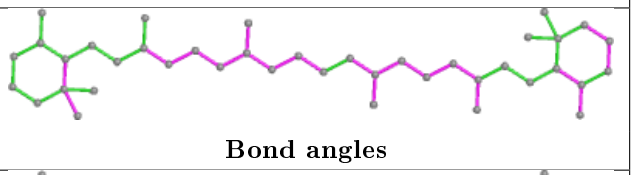


Rings

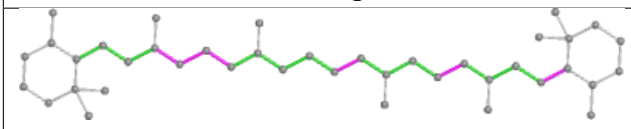
Ligand BCR K 4001



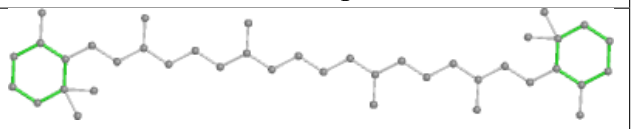
Bond lengths



Bond angles

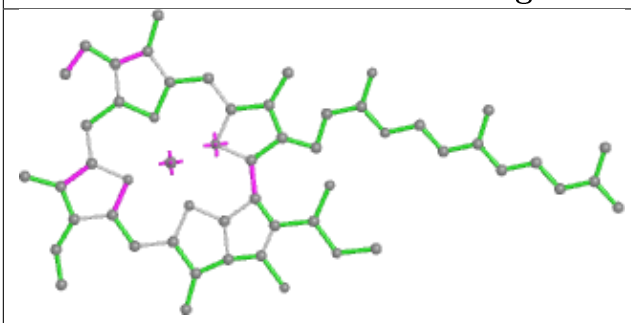


Torsions

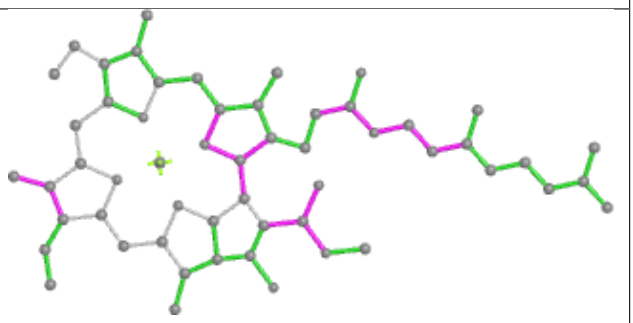


Rings

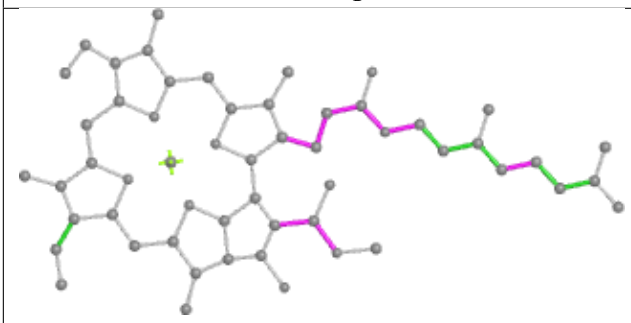
Ligand CLA A 1111



Bond lengths



Bond angles



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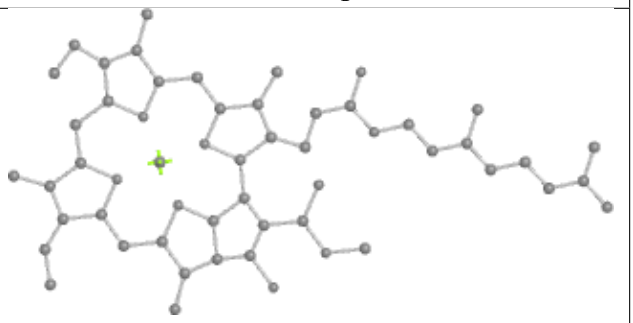
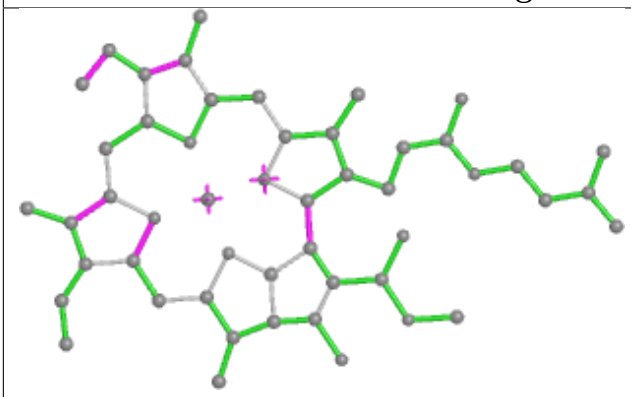
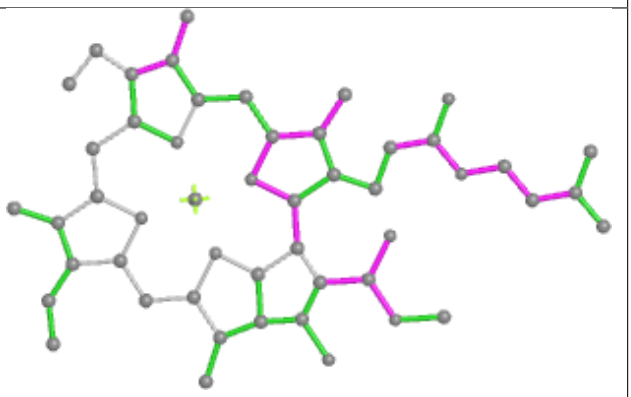
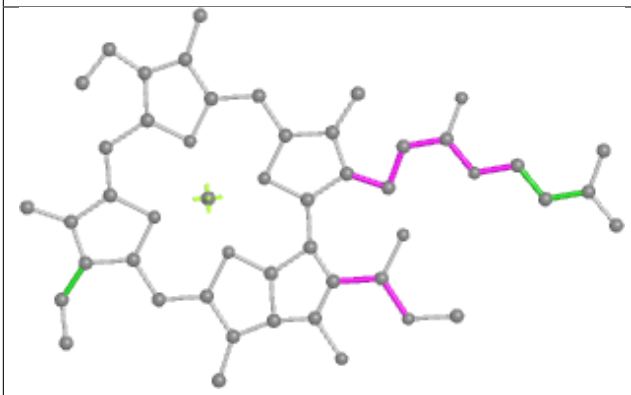
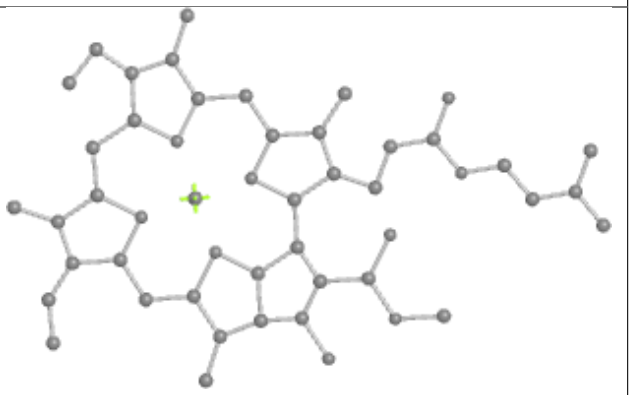
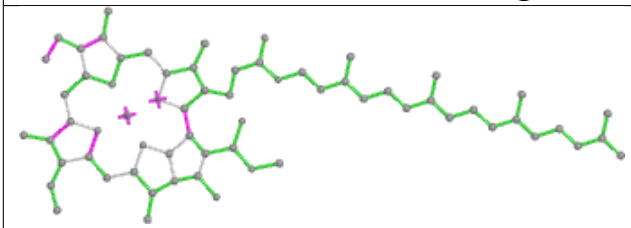
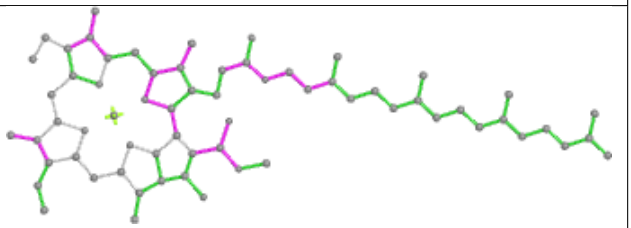
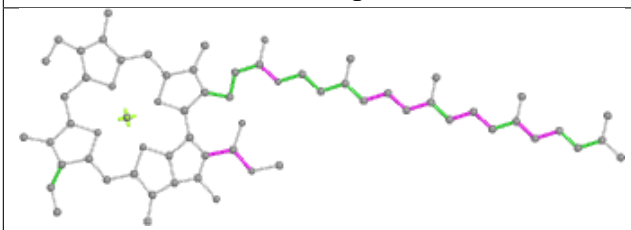
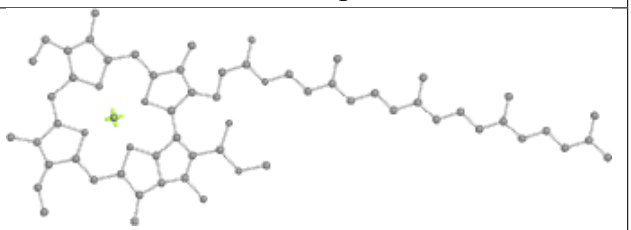
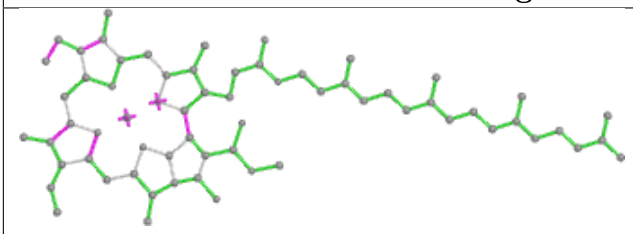


Rings

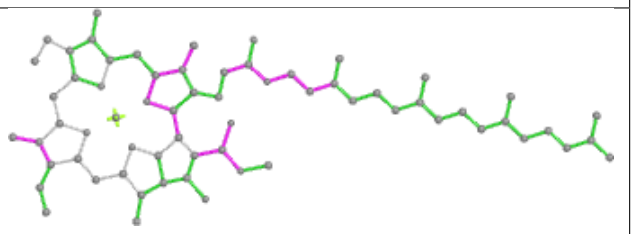
Ligand CLA A 1112	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand CLA B 1226	
 Bond lengths	 Bond angles
 Torsions	 Rings

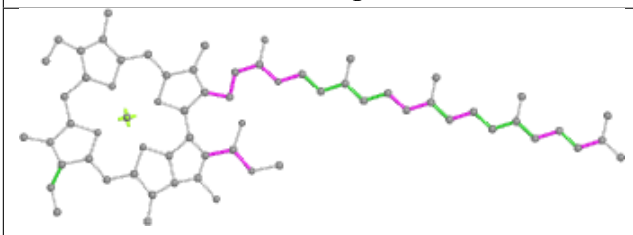
Ligand CLA B 1230



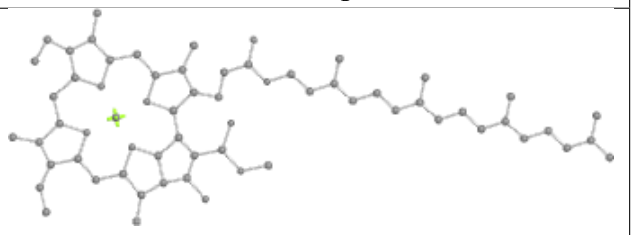
Bond lengths



Bond angles

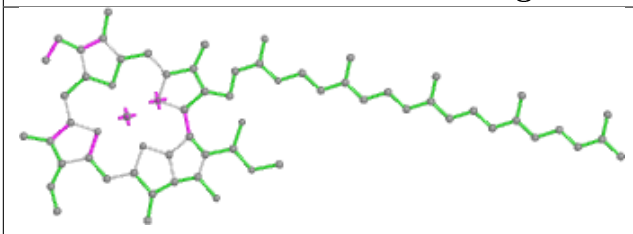


Torsions

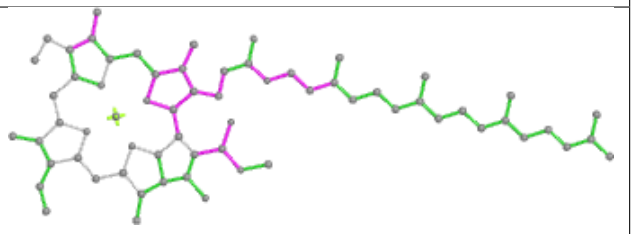


Rings

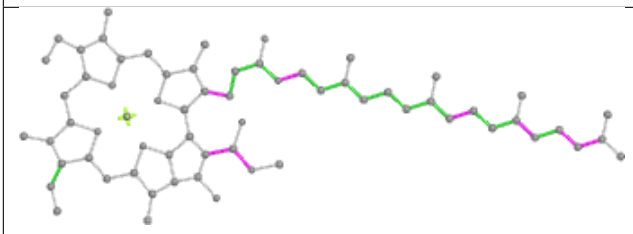
Ligand CLA B 1213



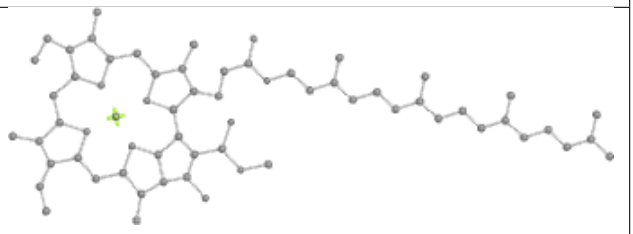
Bond lengths



Bond angles

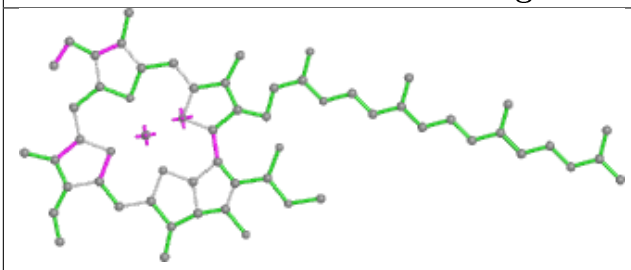


Torsions

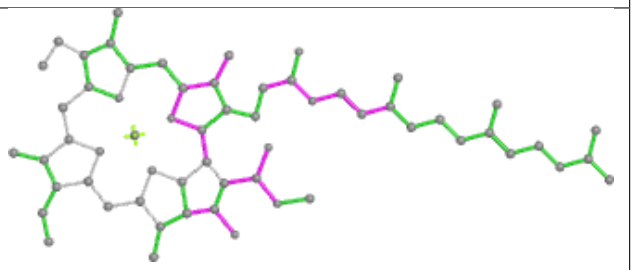


Rings

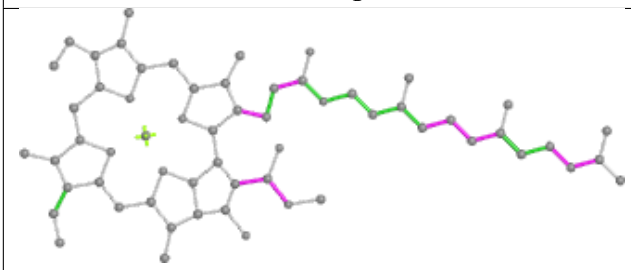
Ligand CLA B 1223



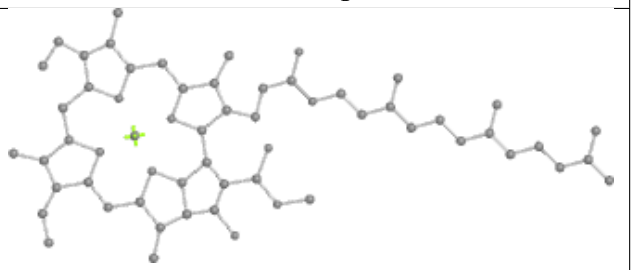
Bond lengths



Bond angles

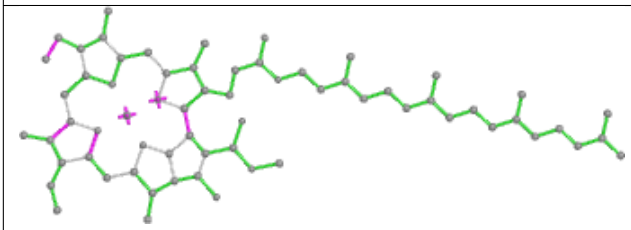


Torsions

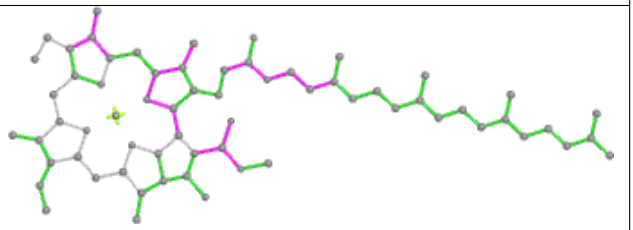


Rings

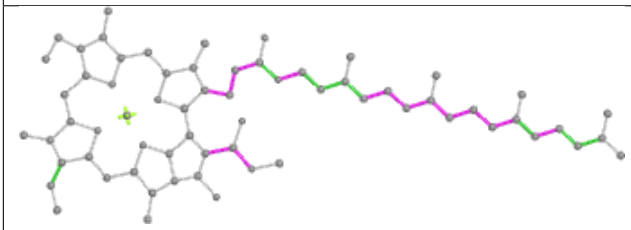
Ligand CLA B 1234



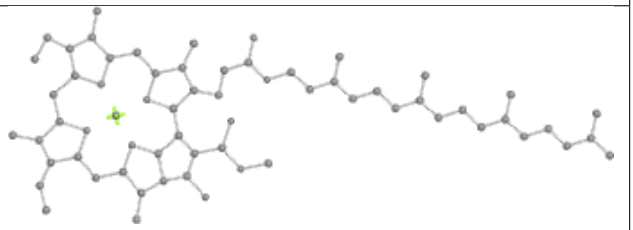
Bond lengths



Bond angles

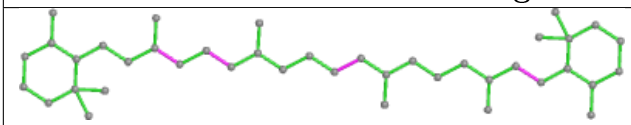


Torsions

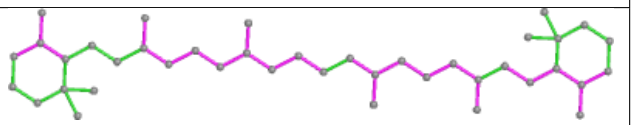


Rings

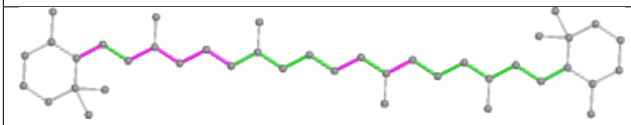
Ligand BCR A 4002



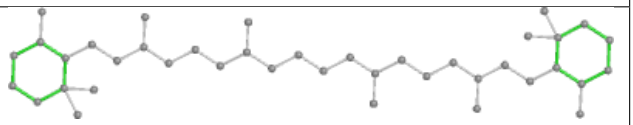
Bond lengths



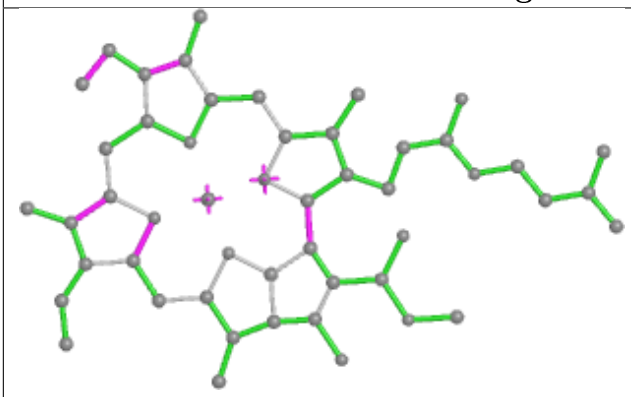
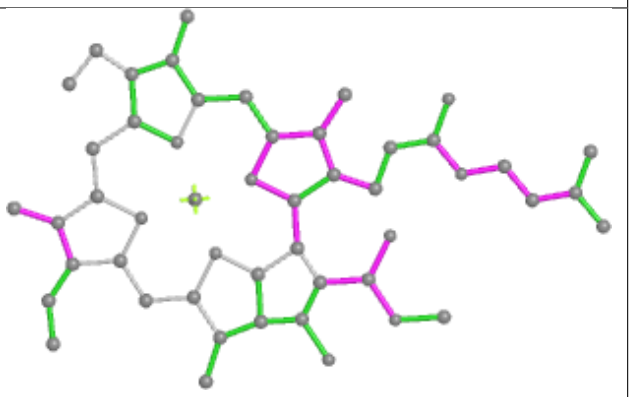
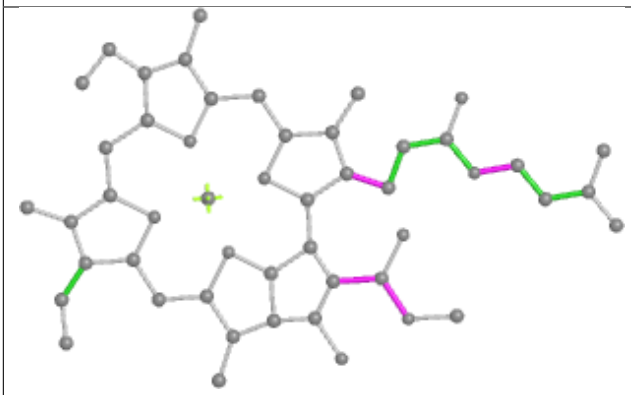
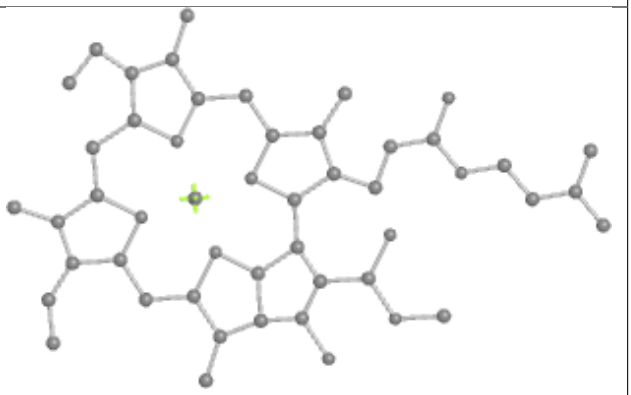
Bond angles

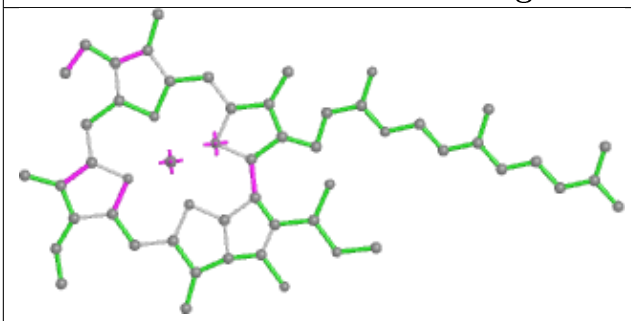
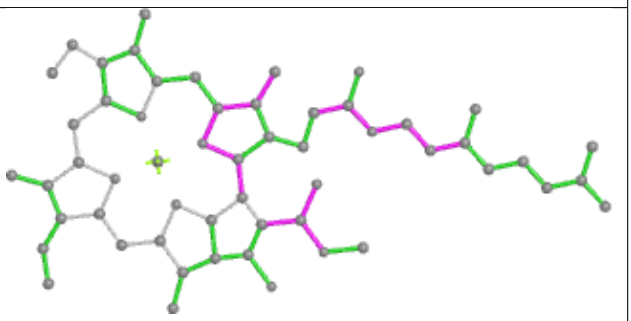
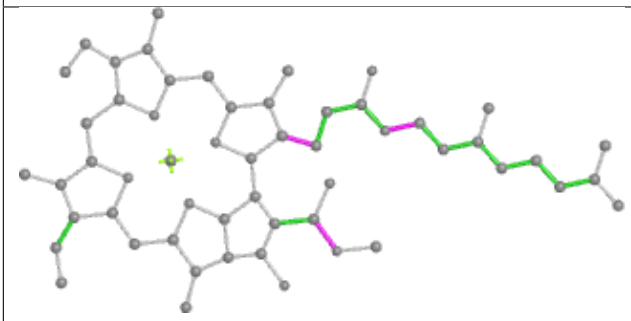
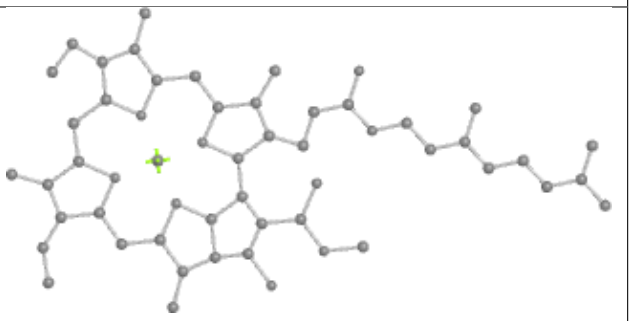


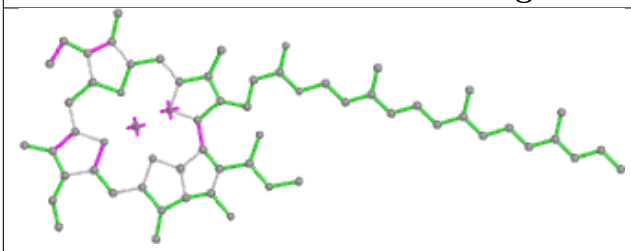
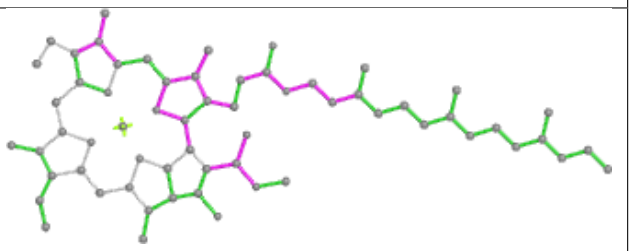
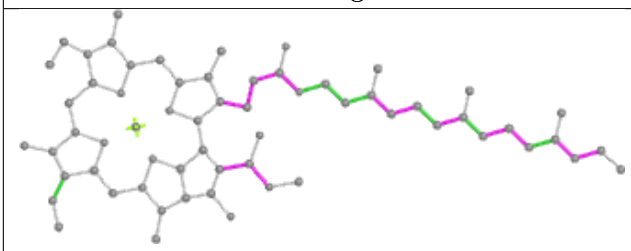
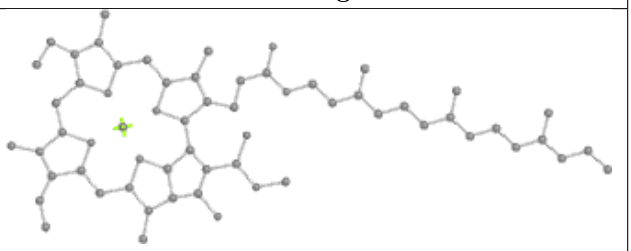
Torsions

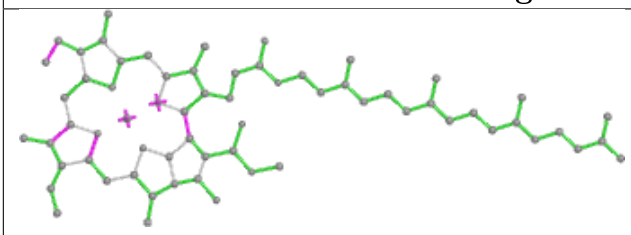
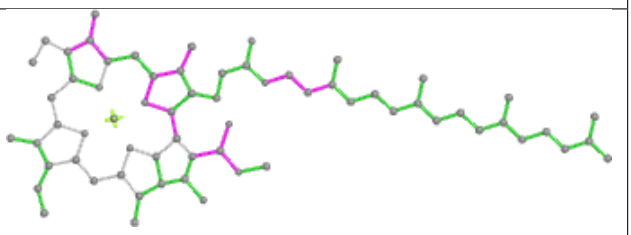
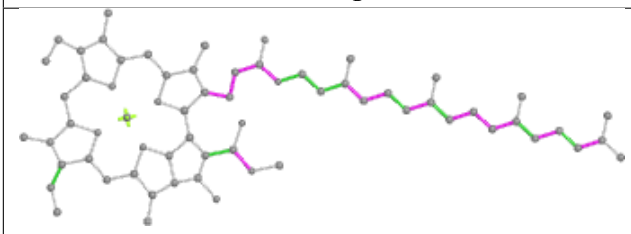
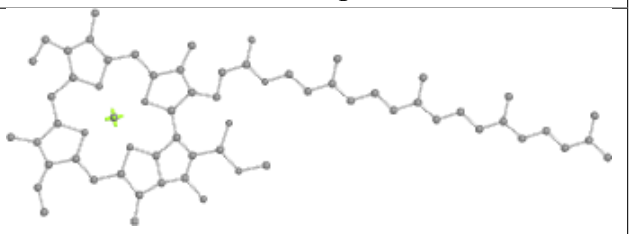


Rings

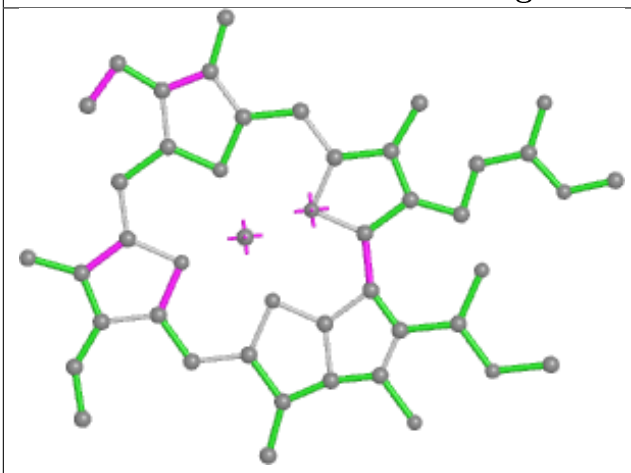
Ligand CLA A 1121	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand CLA A 1124	
 Bond lengths	 Bond angles
 Torsions	 Rings

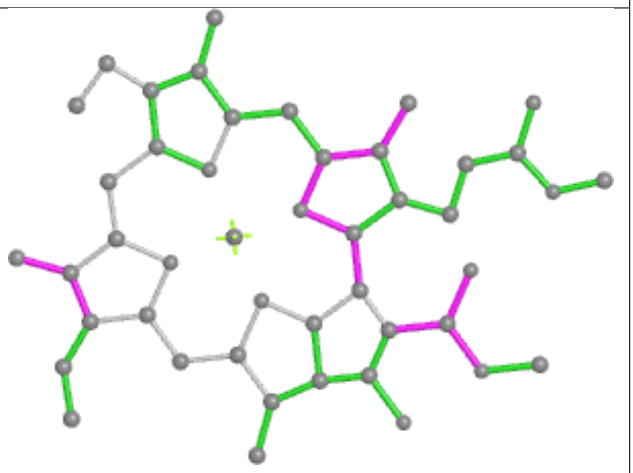
Ligand CLA B 1224	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand CLA B 1215	
 Bond lengths	 Bond angles
 Torsions	 Rings

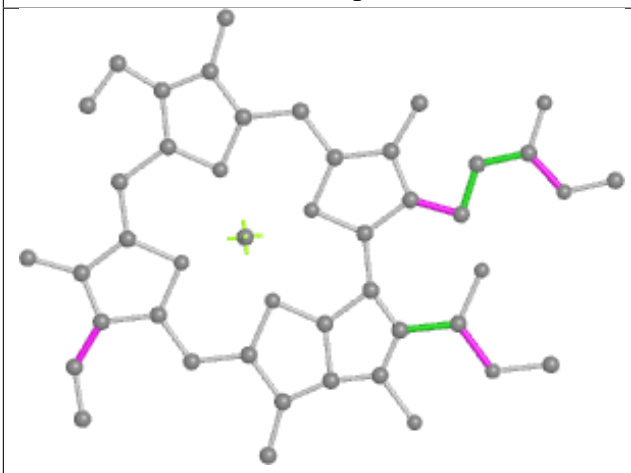
Ligand CLA A 1801



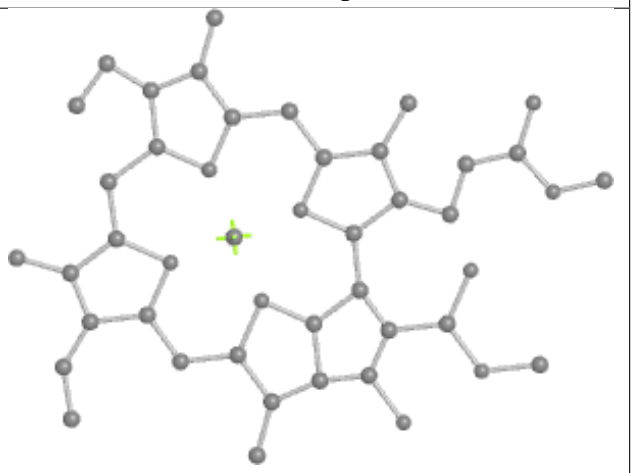
Bond lengths



Bond angles

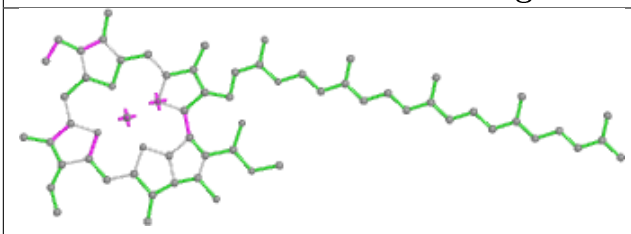


Torsions

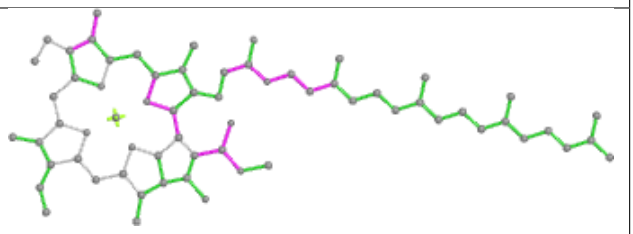


Rings

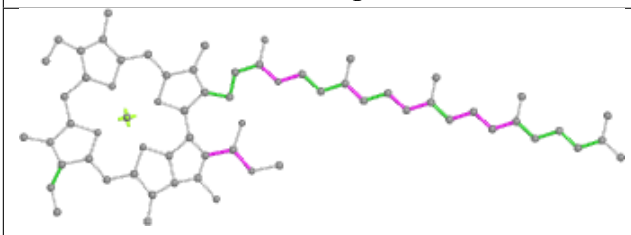
Ligand CLA B 1202



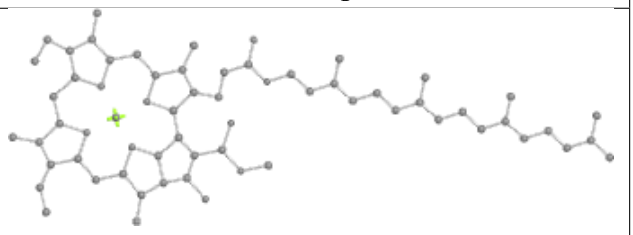
Bond lengths



Bond angles

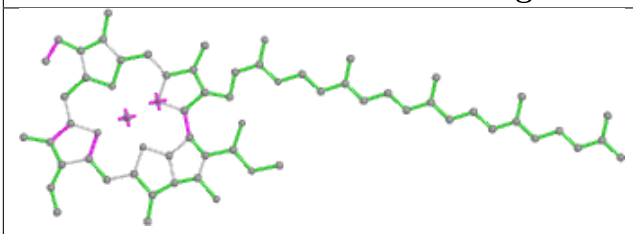


Torsions

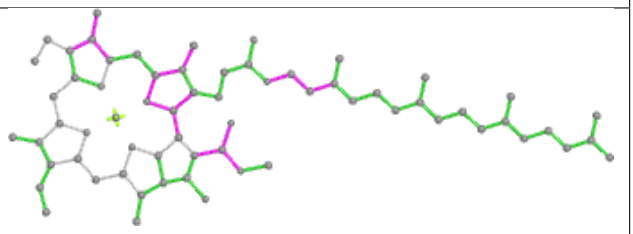


Rings

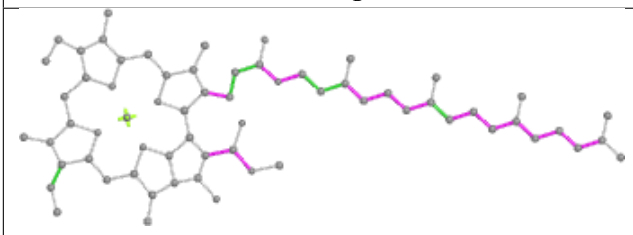
Ligand CLA A 1123



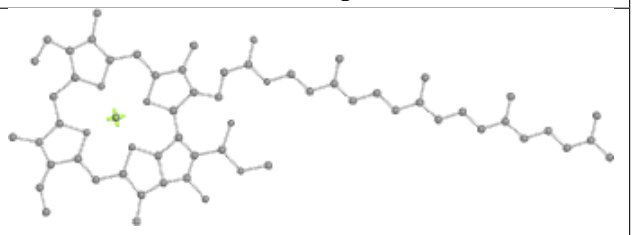
Bond lengths



Bond angles

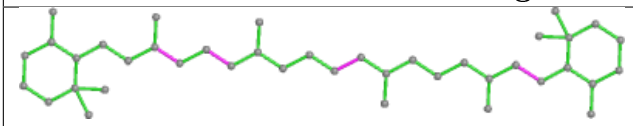


Torsions

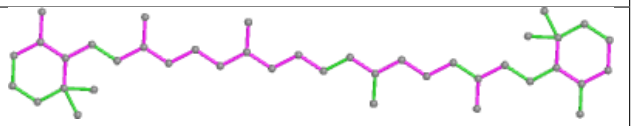


Rings

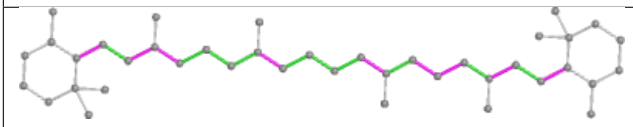
Ligand BCR B 4011



Bond lengths



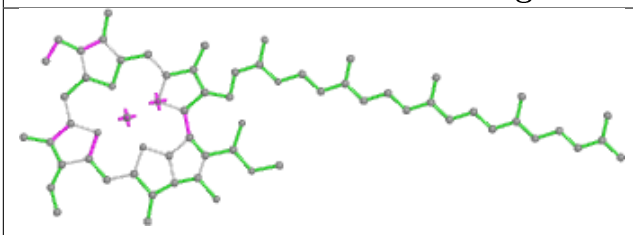
Bond angles



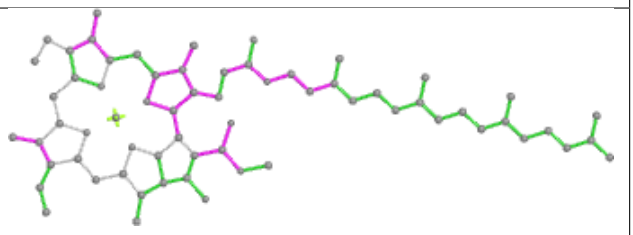
Torsions

Rings

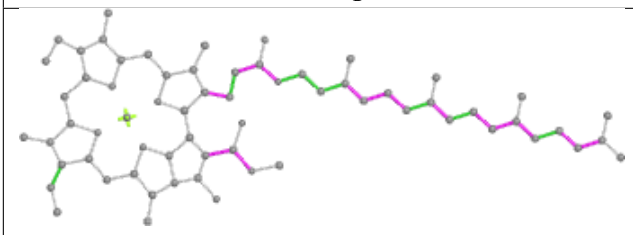
Ligand CLA A 1127



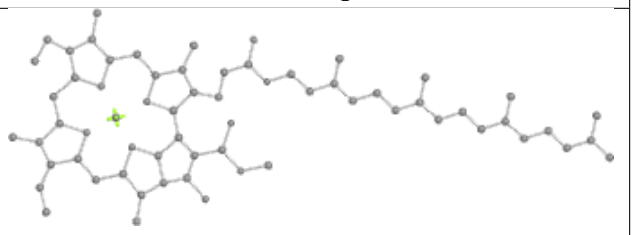
Bond lengths



Bond angles

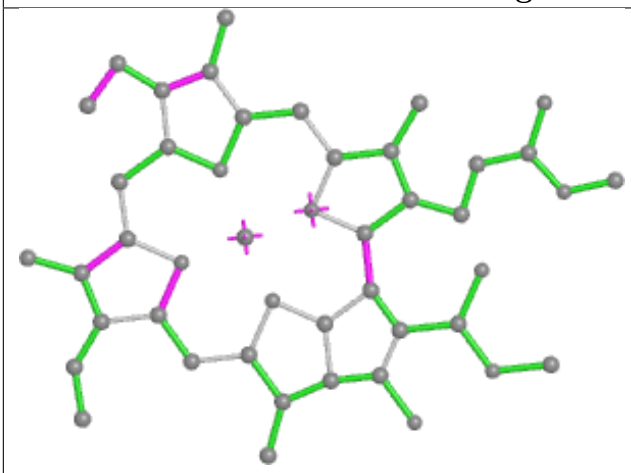


Torsions

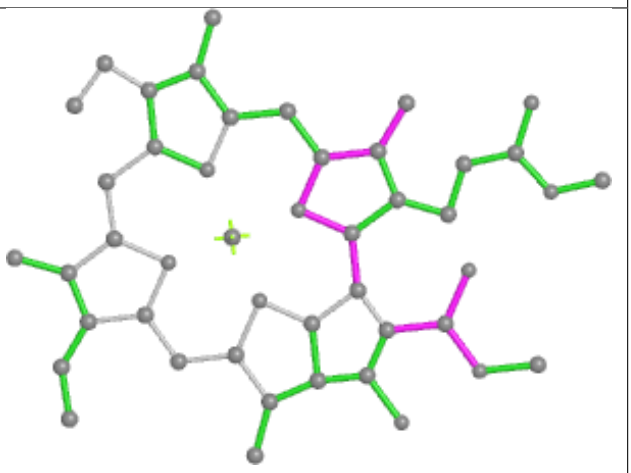


Rings

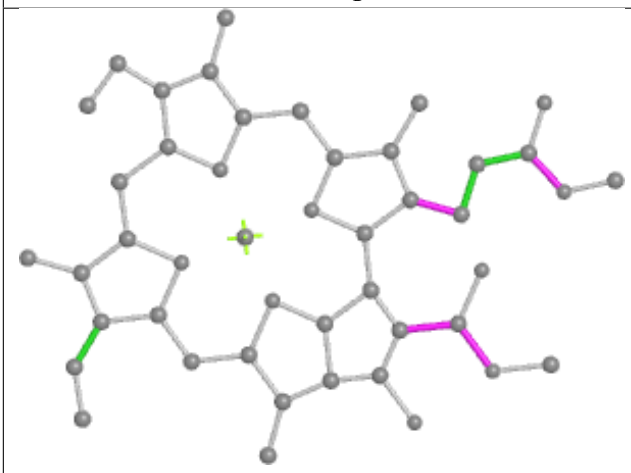
Ligand CLA A 1129



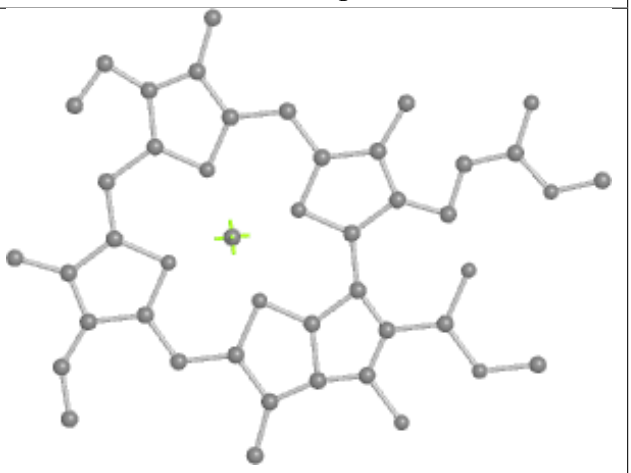
Bond lengths



Bond angles

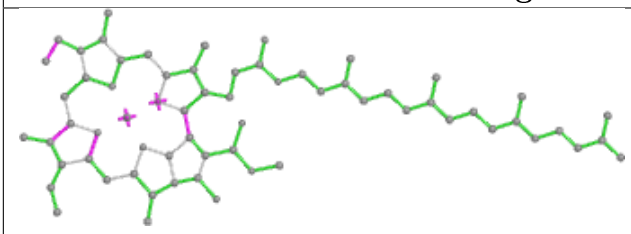


Torsions

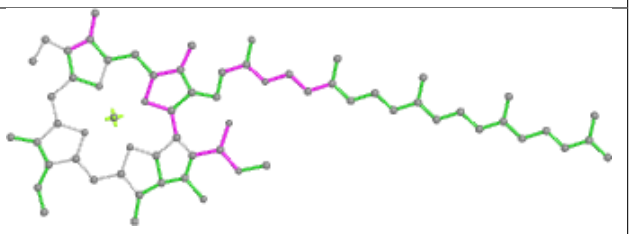


Rings

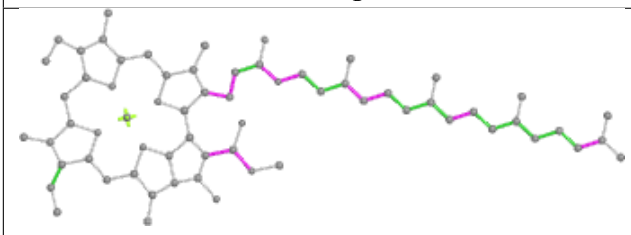
Ligand CLA B 1240



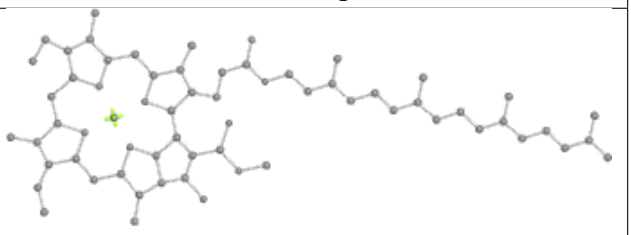
Bond lengths



Bond angles

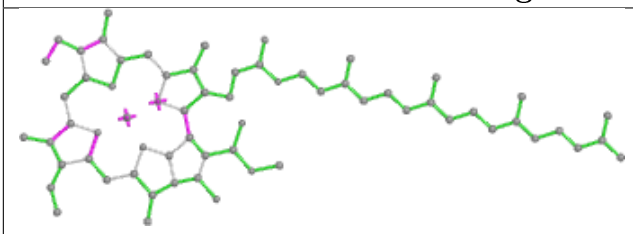


Torsions

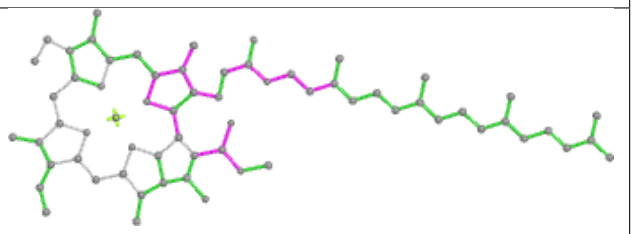


Rings

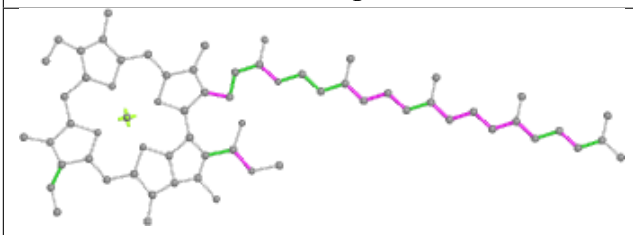
Ligand CLA B 1238



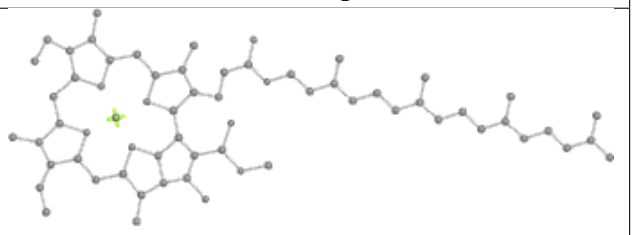
Bond lengths



Bond angles

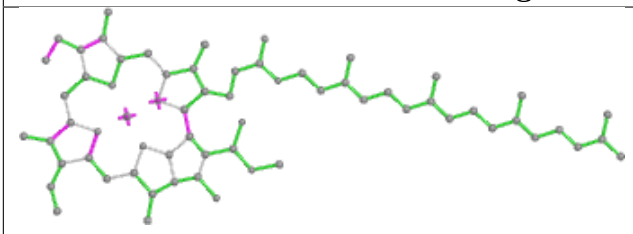


Torsions

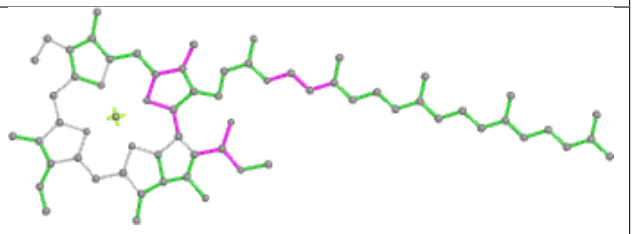


Rings

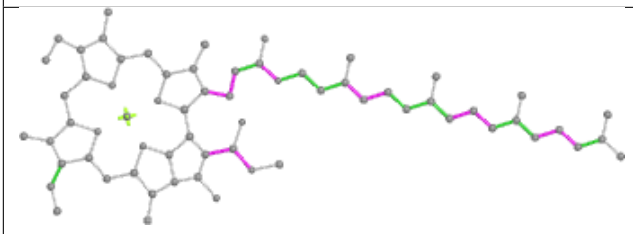
Ligand CLA A 1133



Bond lengths



Bond angles



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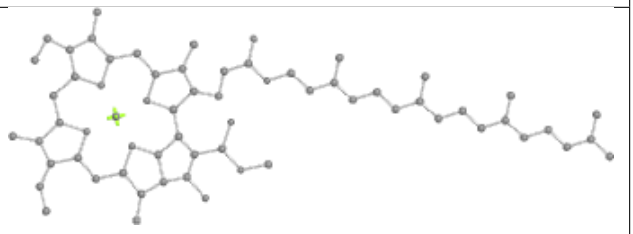
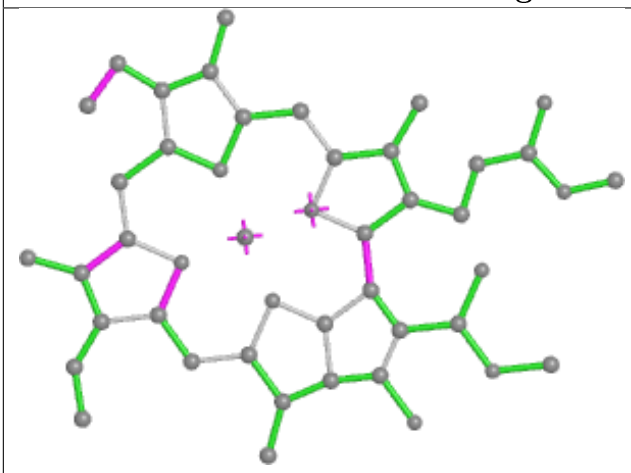
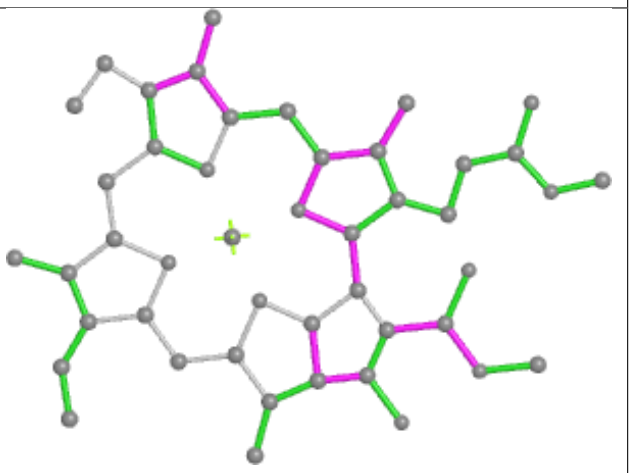


Rings

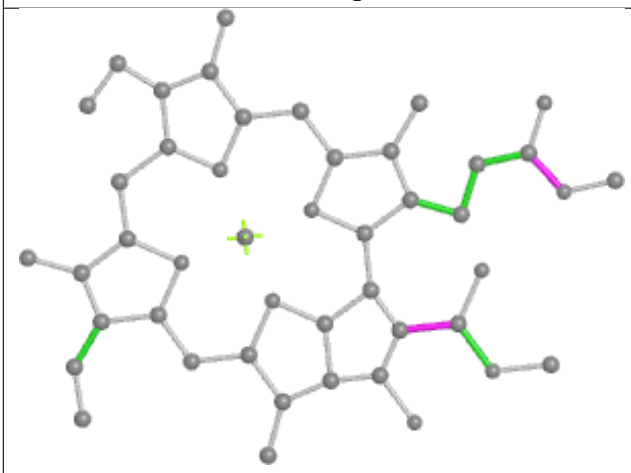
Ligand CLA B 1211



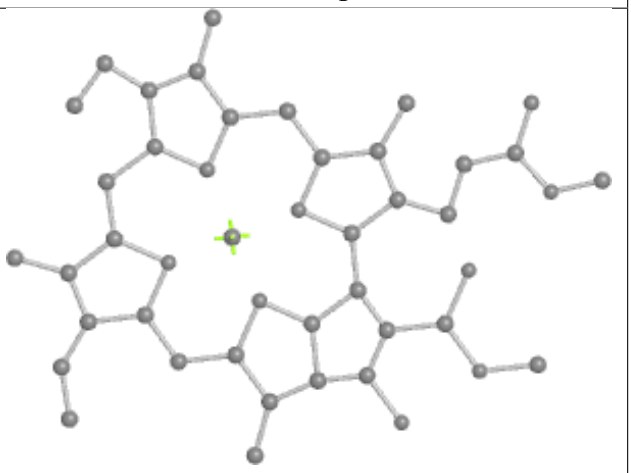
Bond lengths



Bond angles

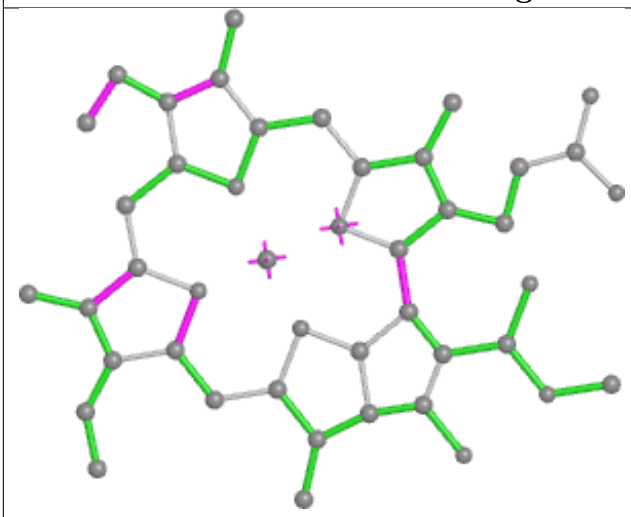


Torsions

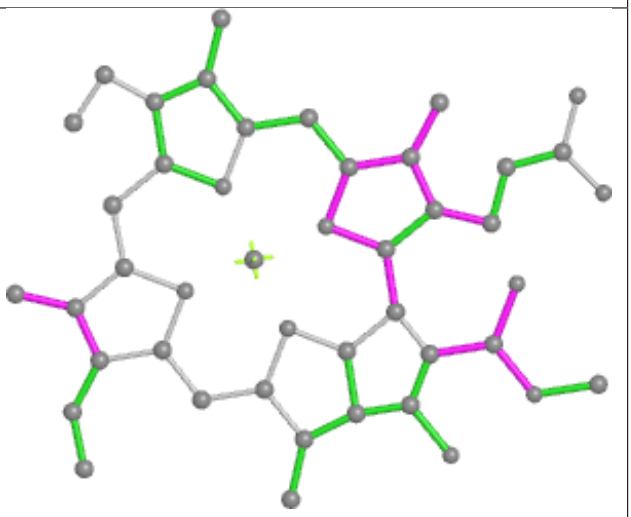


Rings

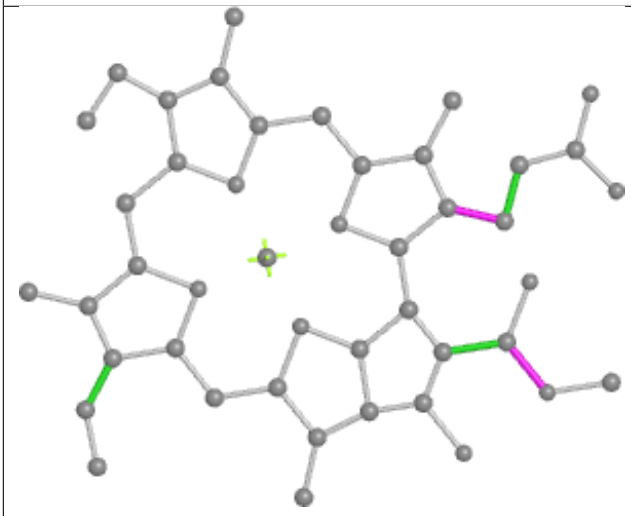
Ligand CLA B 1208



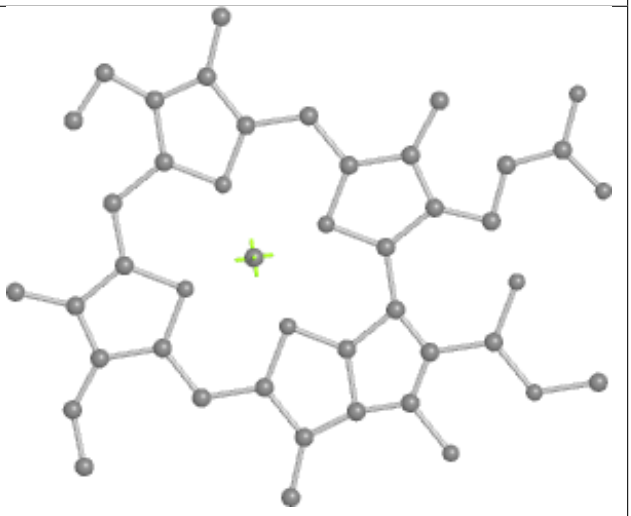
Bond lengths



Bond angles

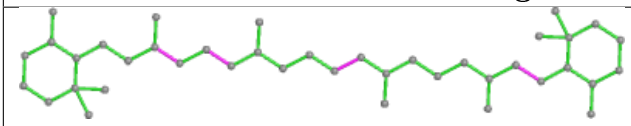


Torsions

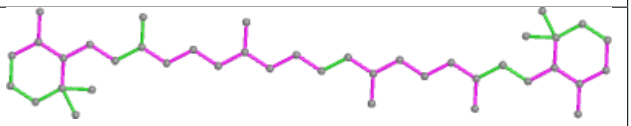


Rings

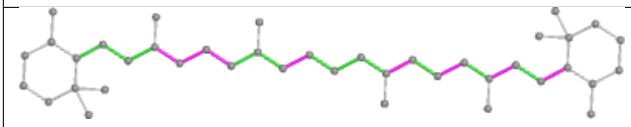
Ligand BCR B 4010



Bond lengths



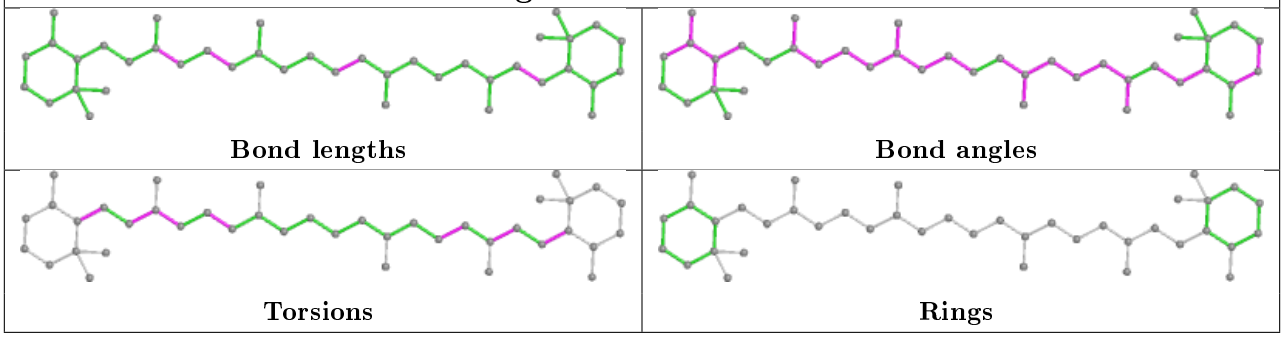
Bond angles



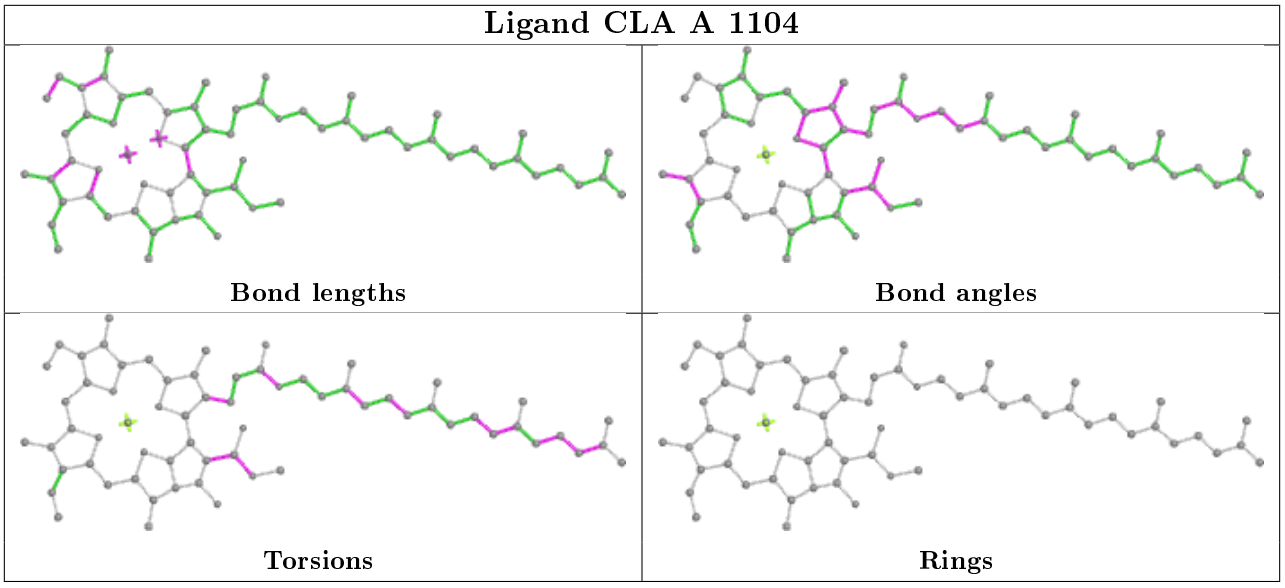
Torsions

Rings

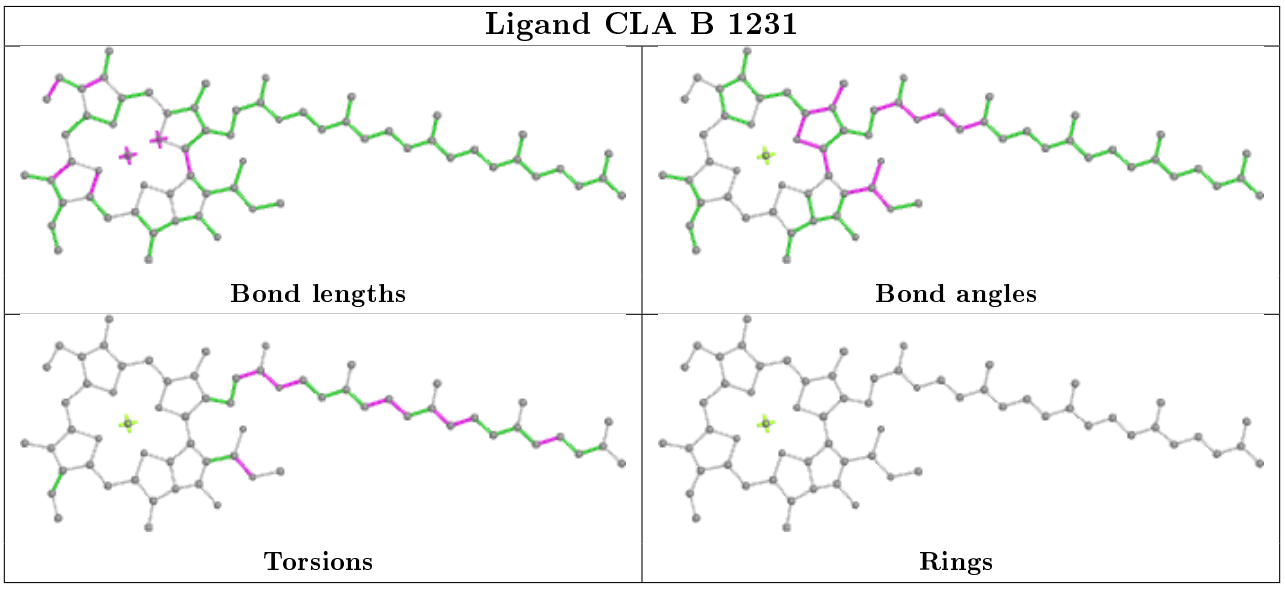
Ligand BCR B 4004



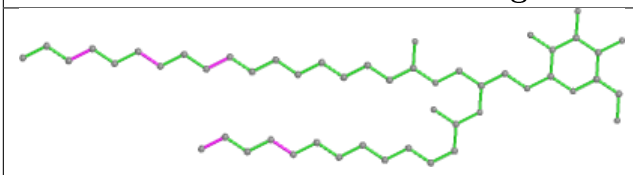
Ligand CLA A 1104

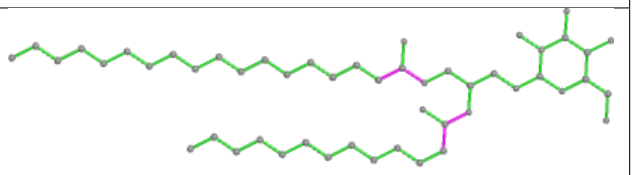


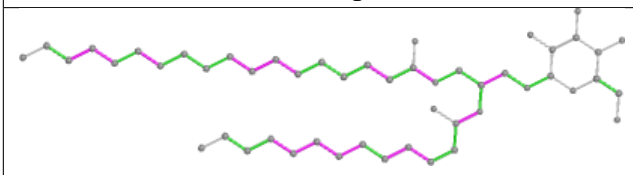
Ligand CLA B 1231

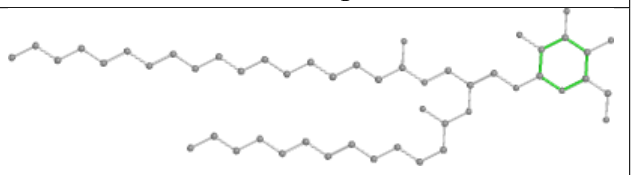


Ligand LMG A 5002

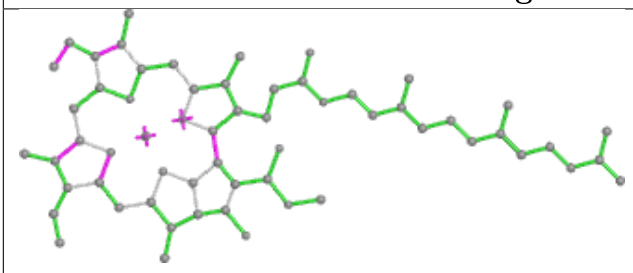

Bond lengths

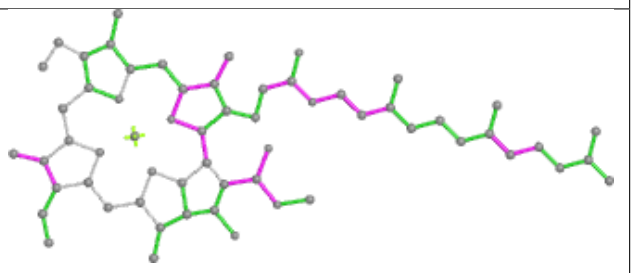

Bond angles

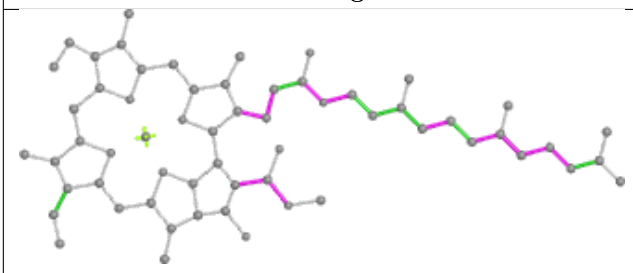

Torsions

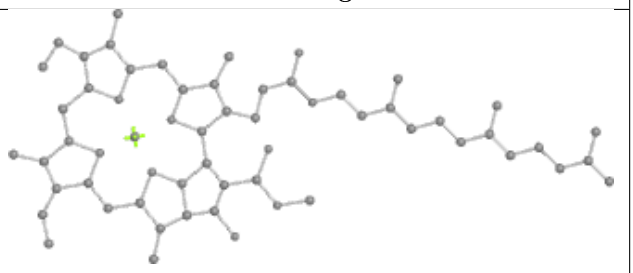

Rings

Ligand CLA A 1103

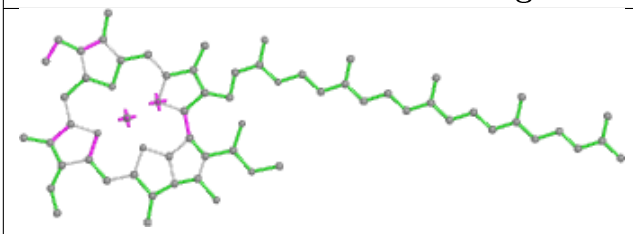

Bond lengths

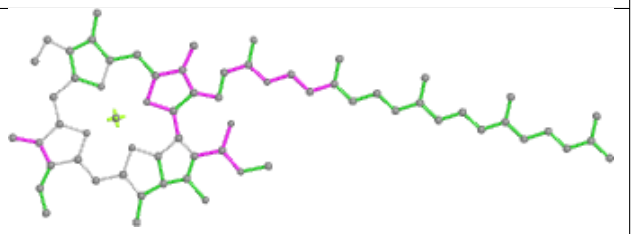

Bond angles

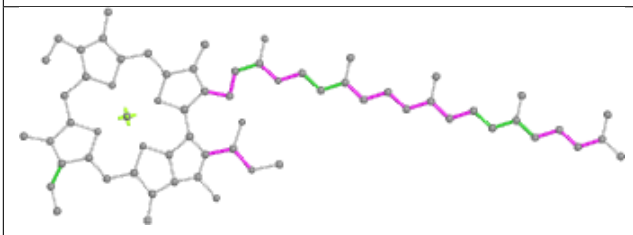

Torsions

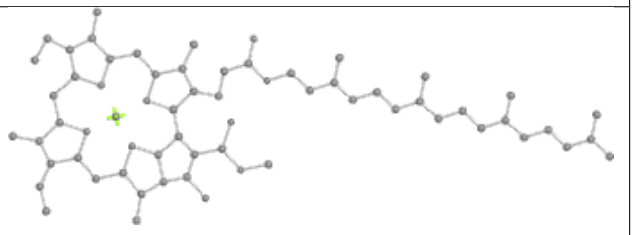

Rings

Ligand CLA B 1219

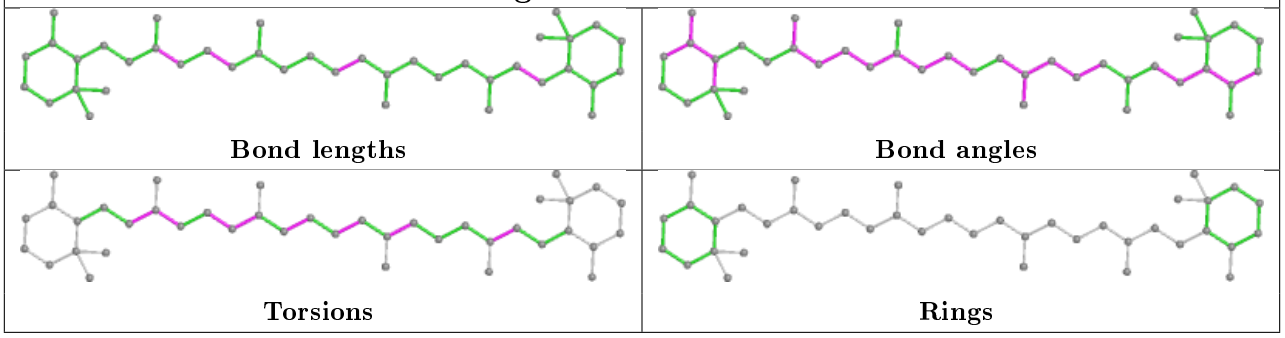

Bond lengths


Bond angles

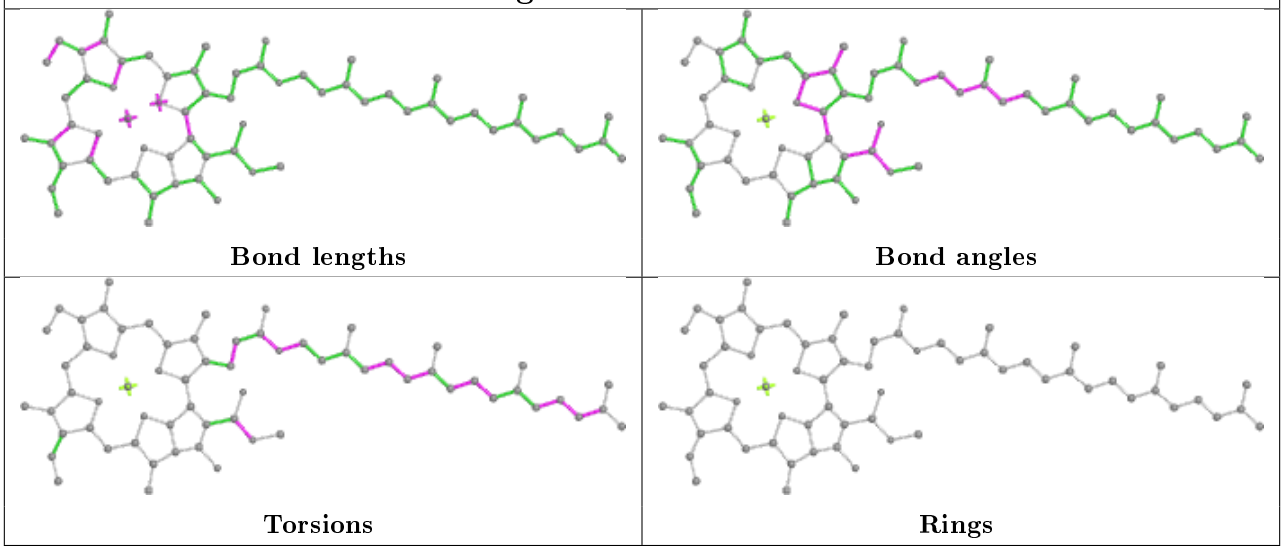

Torsions


Rings

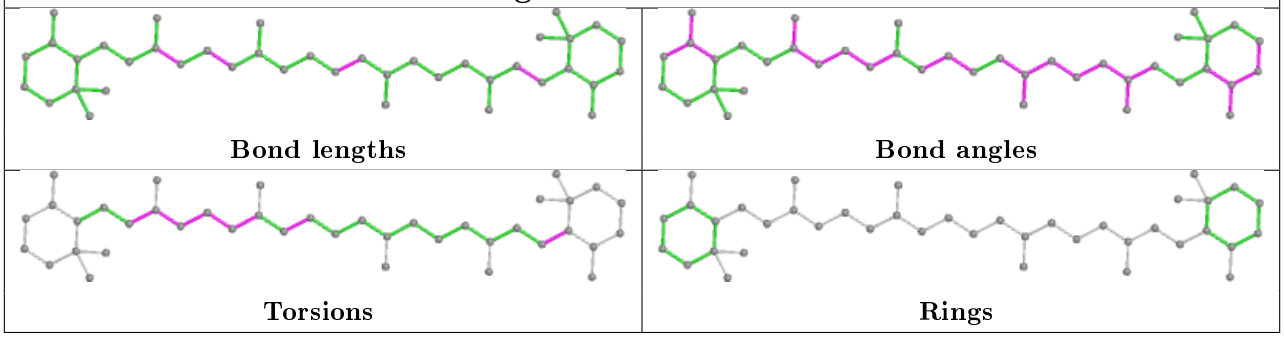
Ligand BCR A 4003

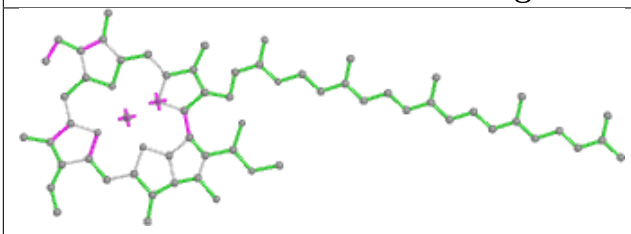
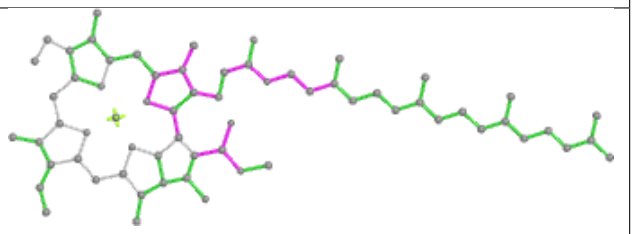
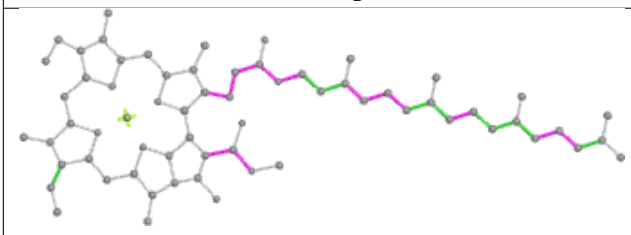
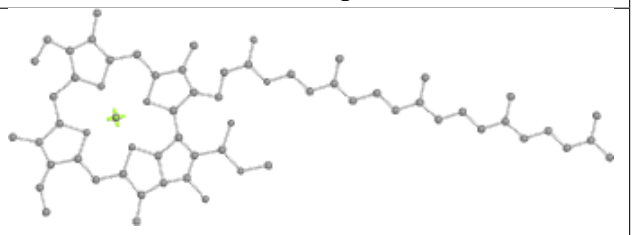


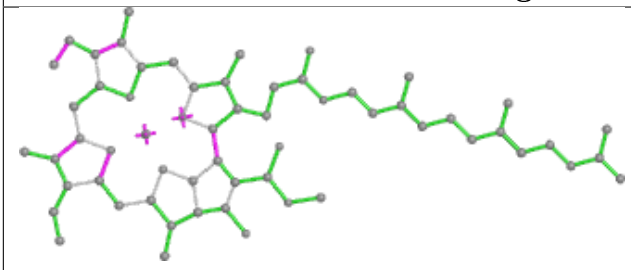
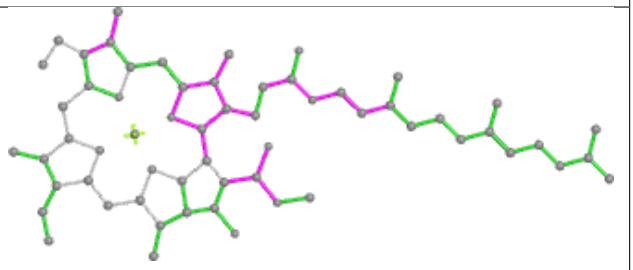
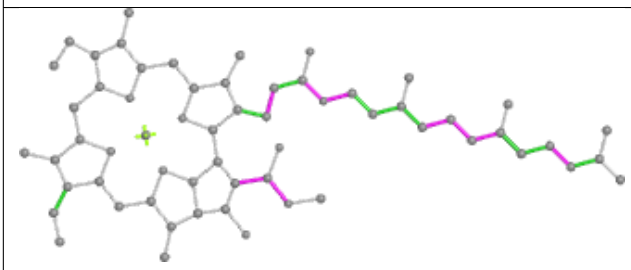
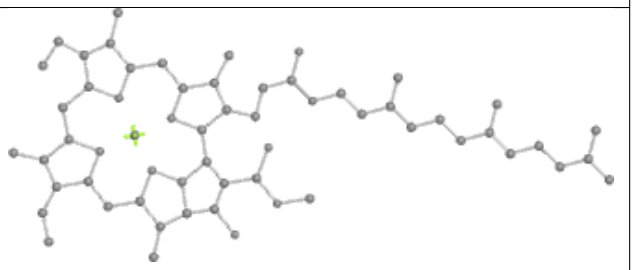
Ligand CLA B 1229



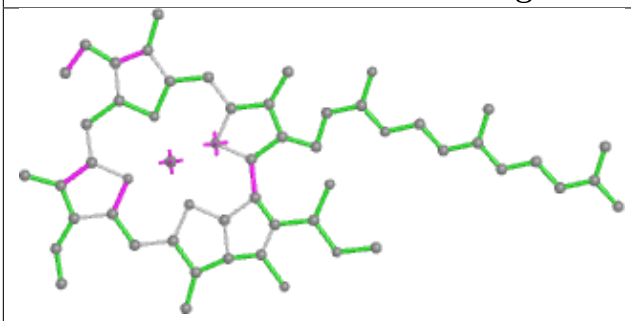
Ligand BCR A 4012



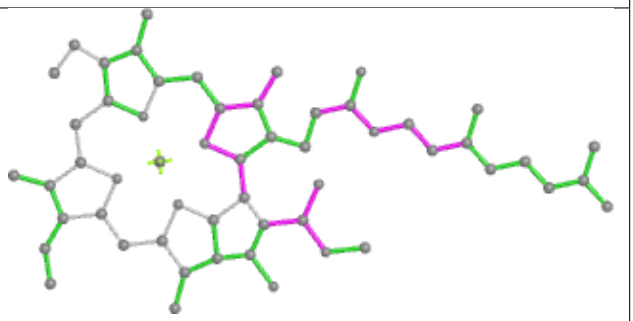
Ligand CLA K 1402	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand CLA B 1023	
 Bond lengths	 Bond angles
 Torsions	 Rings

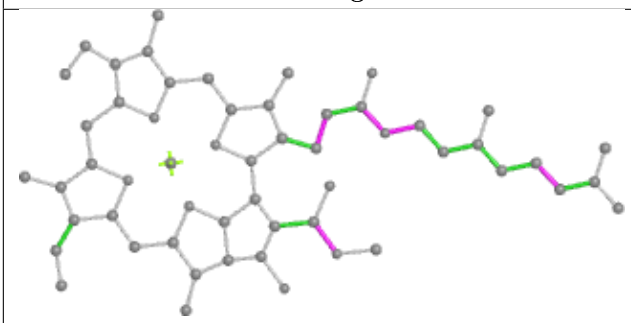
Ligand CLA B 1207



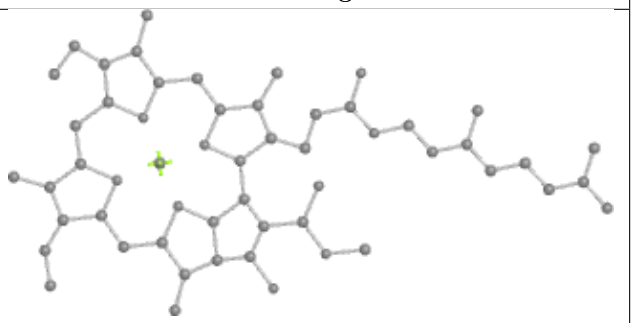
Bond lengths



Bond angles

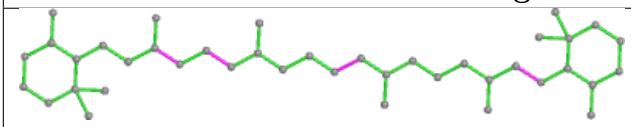


Torsions

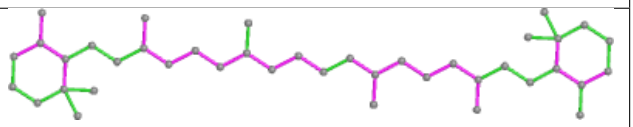


Rings

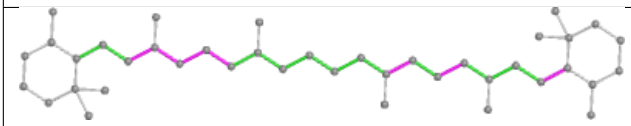
Ligand BCR A 4001



Bond lengths



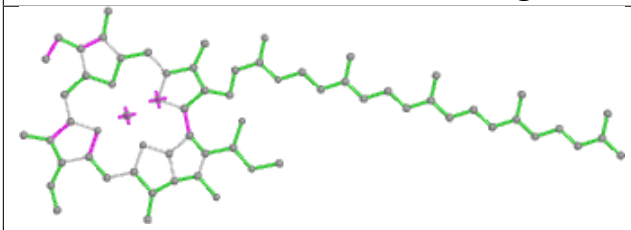
Bond angles



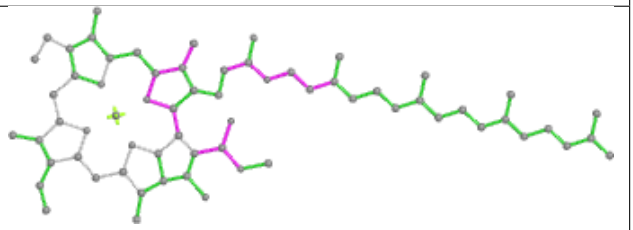
Torsions

Rings

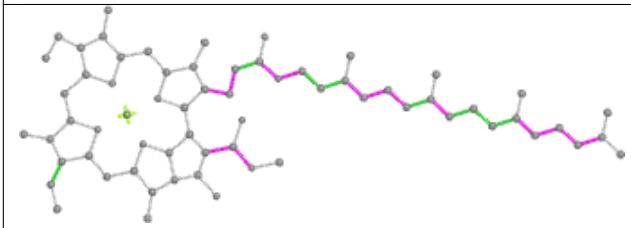
Ligand CLA B 1209



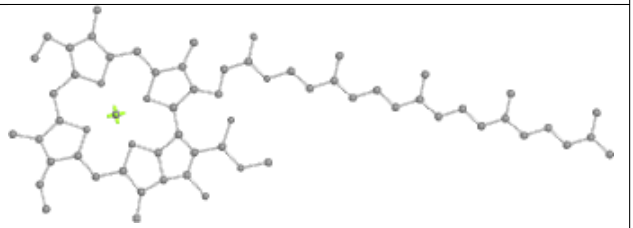
Bond lengths



Bond angles

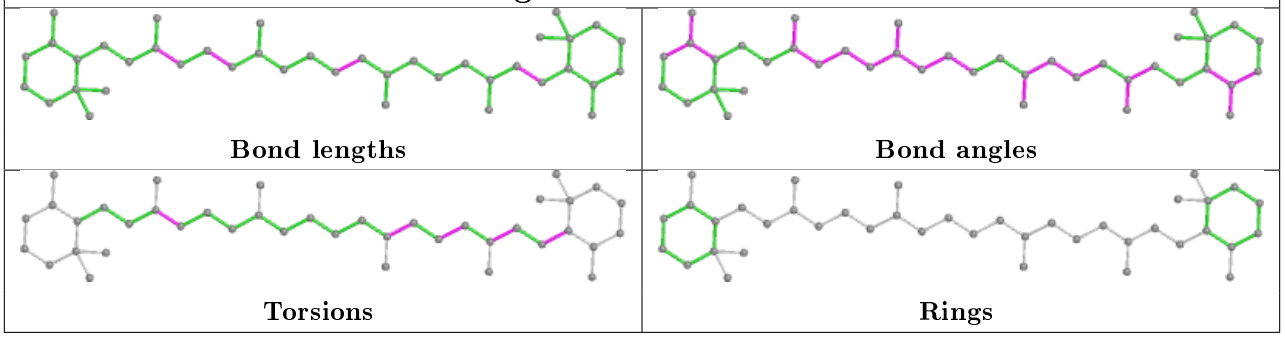


Torsions

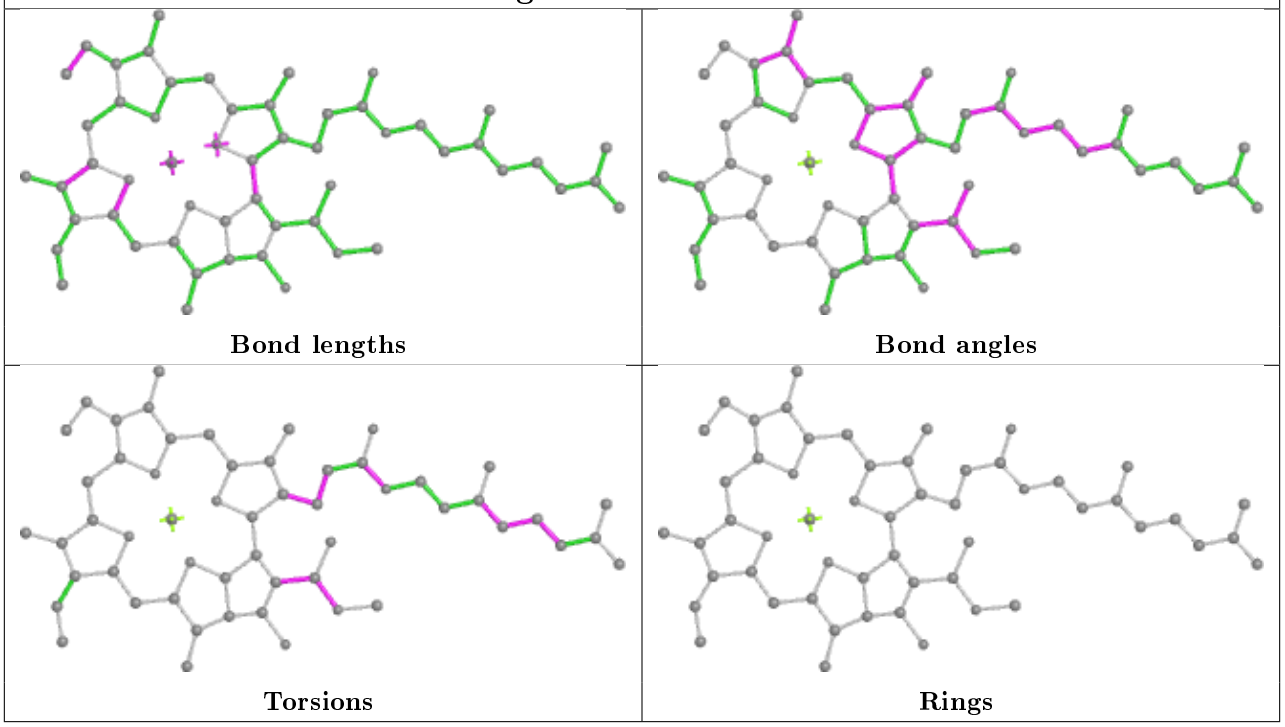


Rings

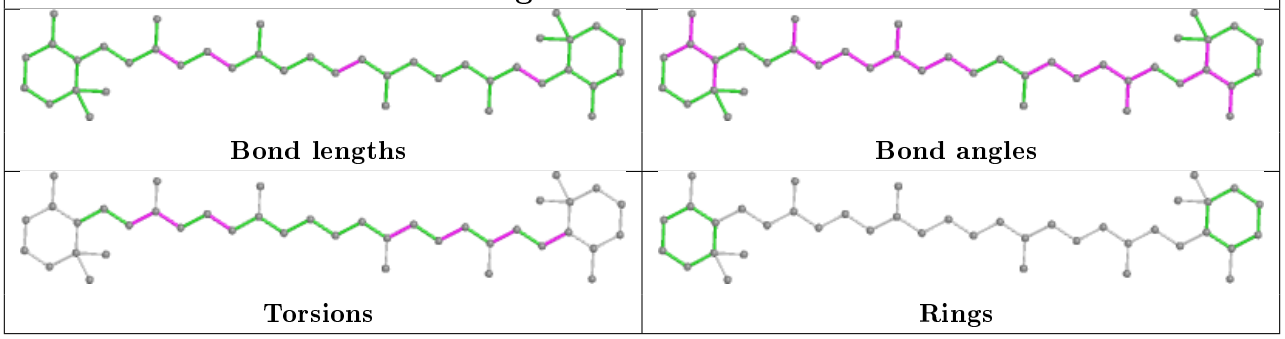
Ligand BCR A 4019



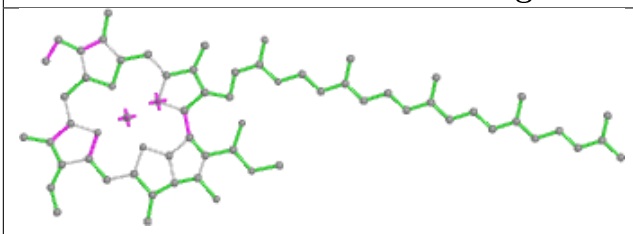
Ligand CLA A 1013



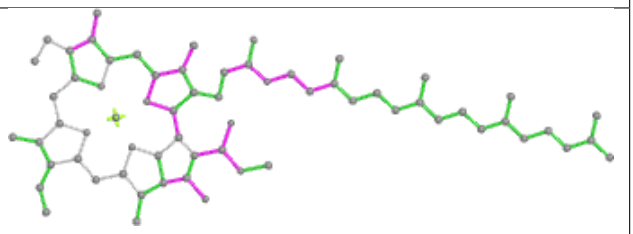
Ligand BCR B 4014



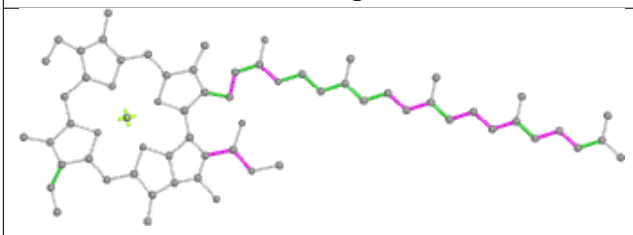
Ligand CLA B 1214



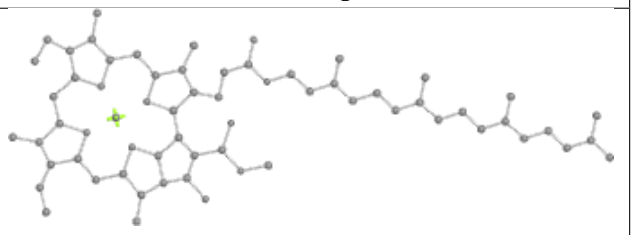
Bond lengths



Bond angles

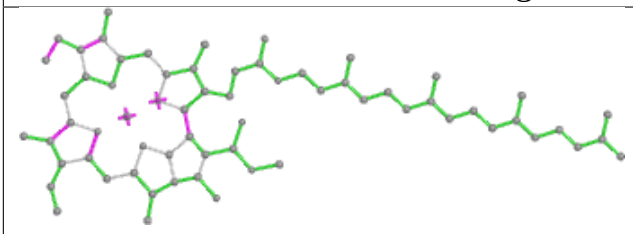


Torsions

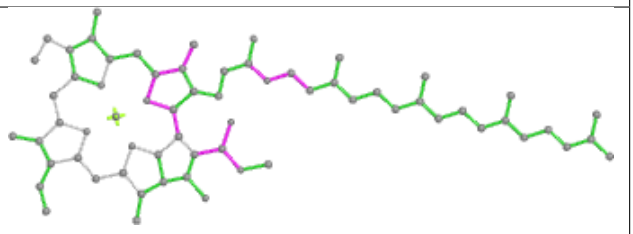


Rings

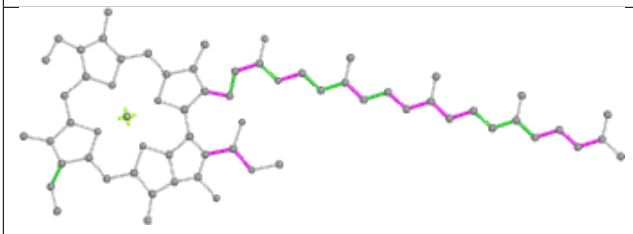
Ligand CLA B 1217



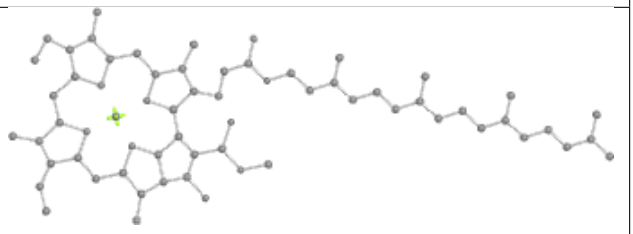
Bond lengths



Bond angles

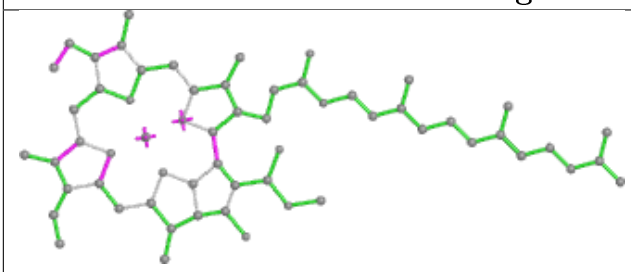


Torsions

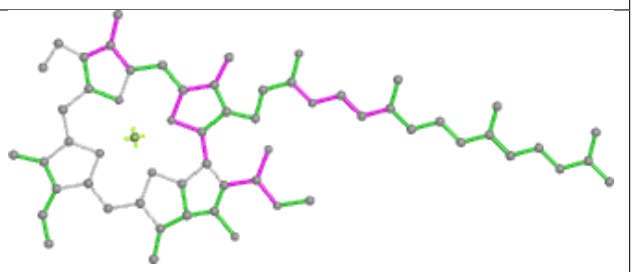


Rings

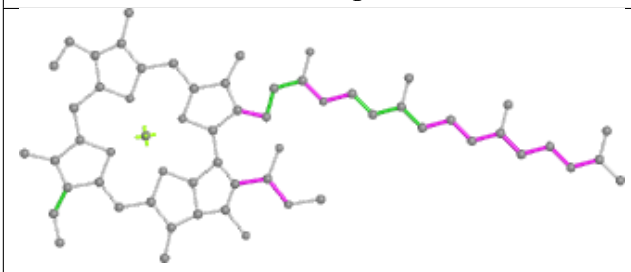
Ligand CLA A 1126



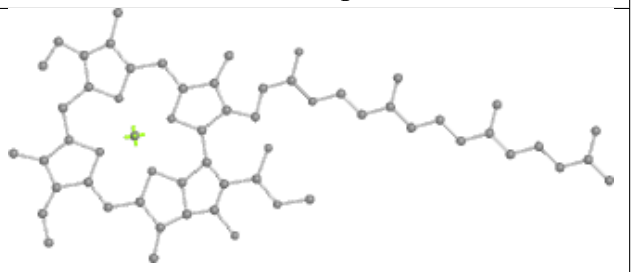
Bond lengths



Bond angles

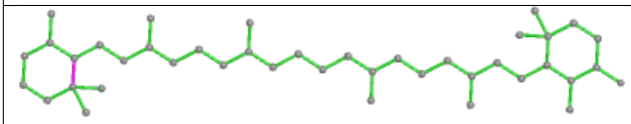


Torsions

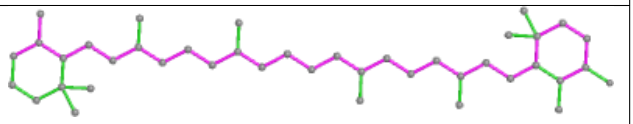


Rings

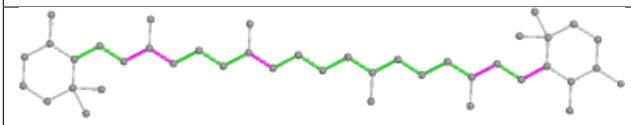
Ligand ECH B 4006



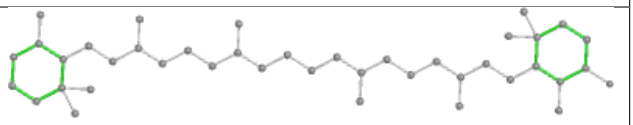
Bond lengths



Bond angles

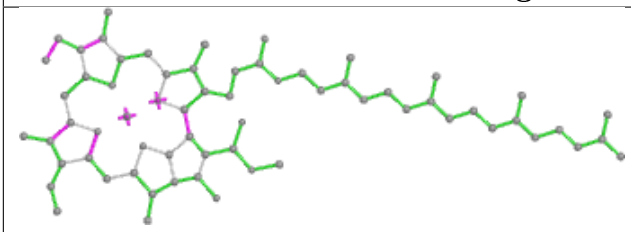


Torsions

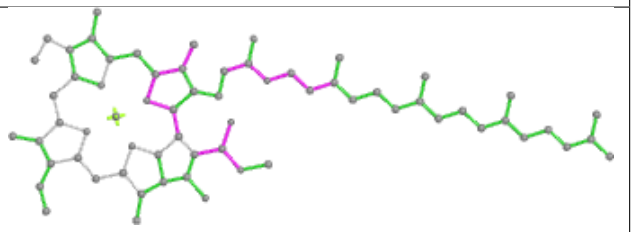


Rings

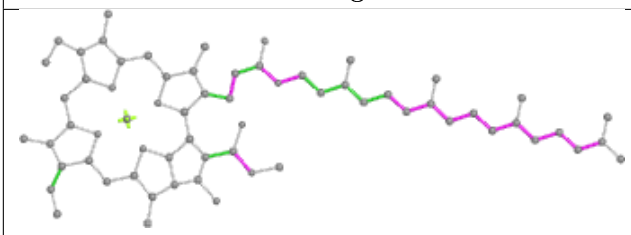
Ligand CLA B 1228



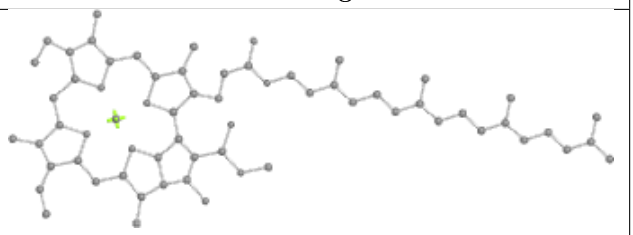
Bond lengths



Bond angles

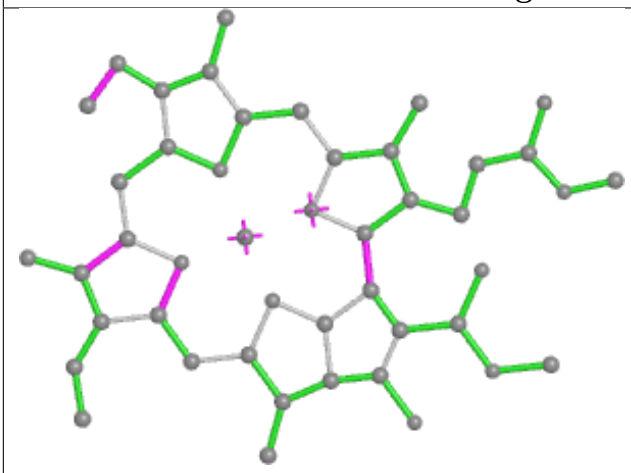


Torsions

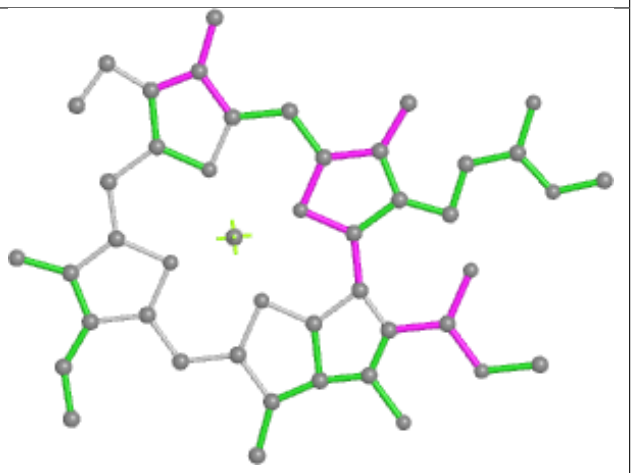


Rings

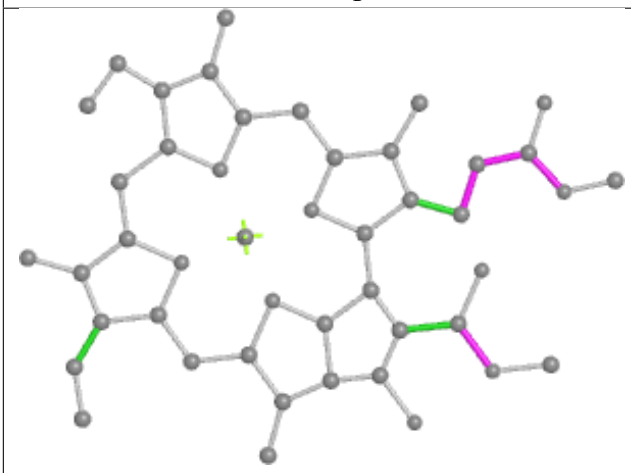
Ligand CLA A 1115



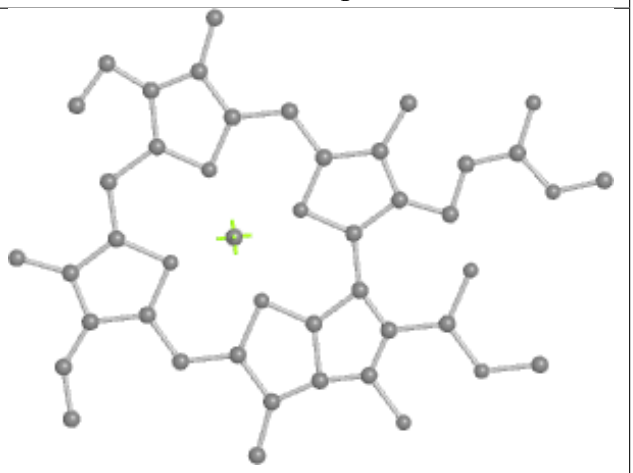
Bond lengths



Bond angles

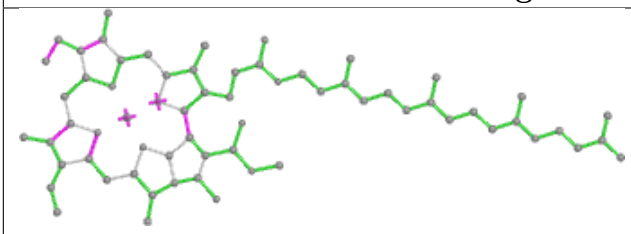


Torsions

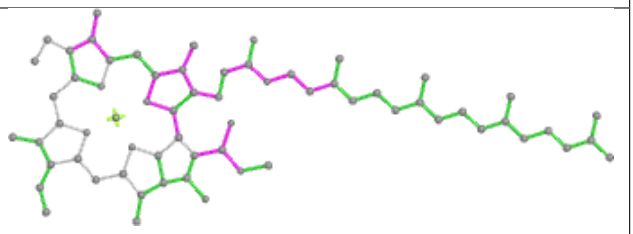


Rings

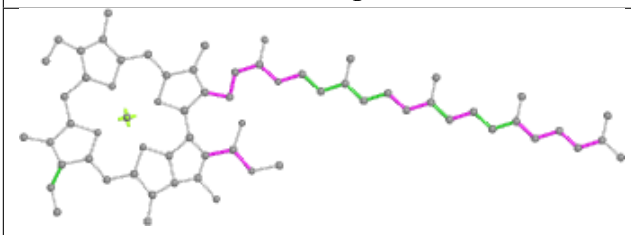
Ligand CLA A 1117



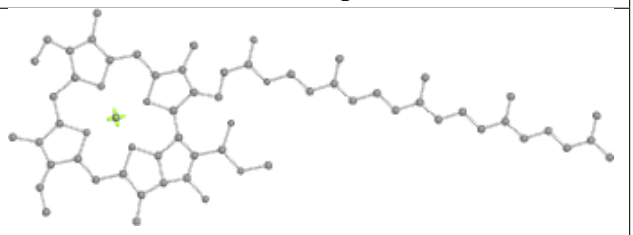
Bond lengths



Bond angles

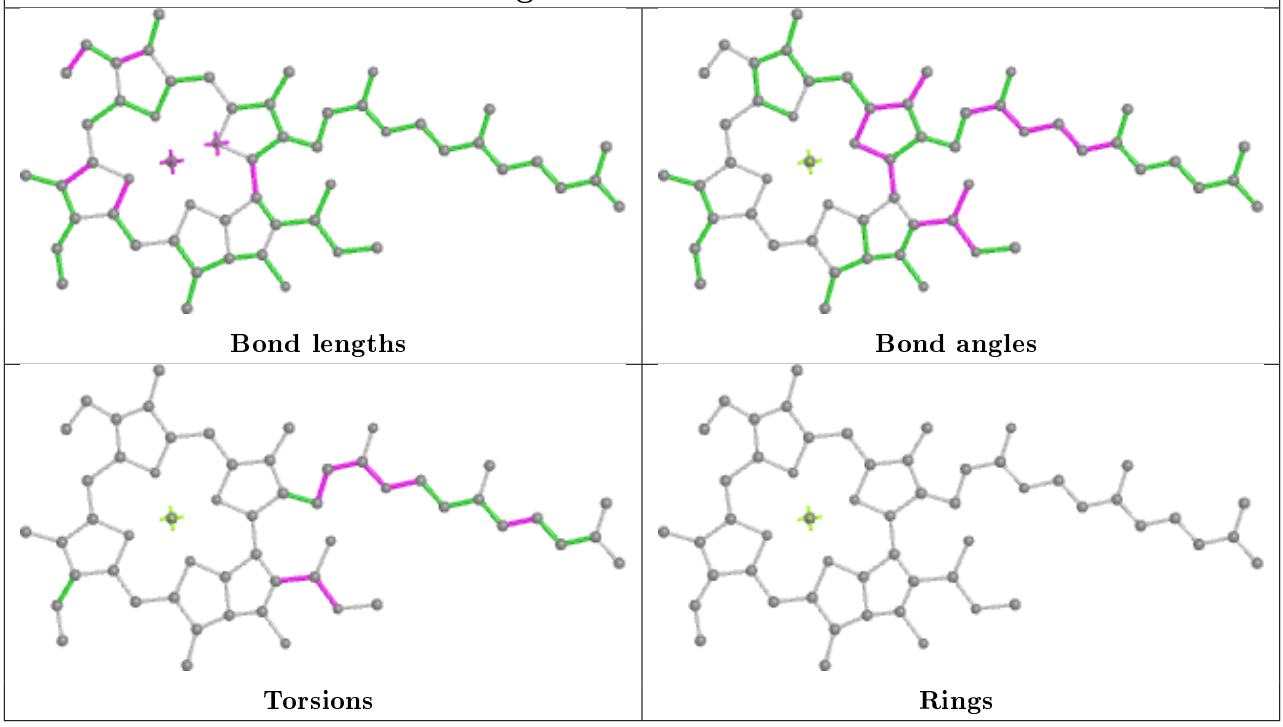


Torsions

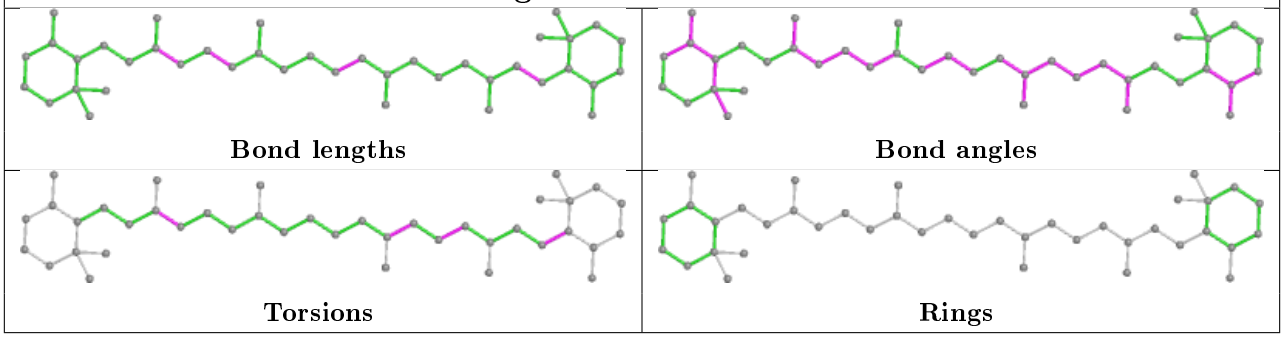


Rings

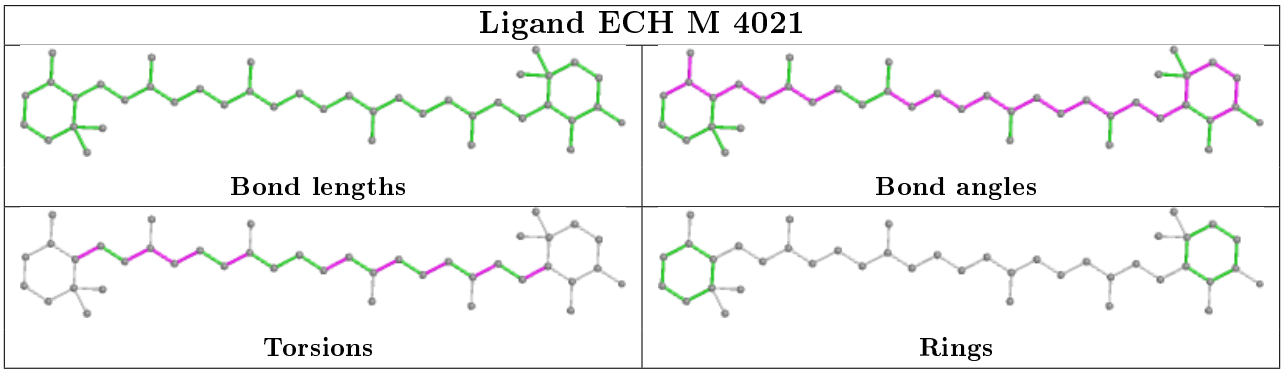
Ligand CLA A 1130



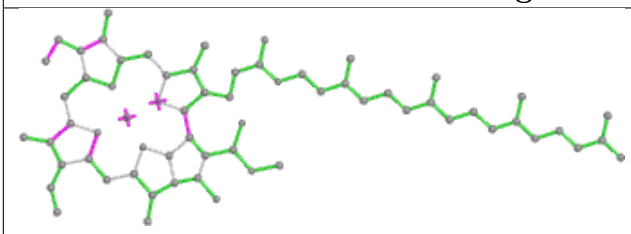
Ligand BCR A 4007



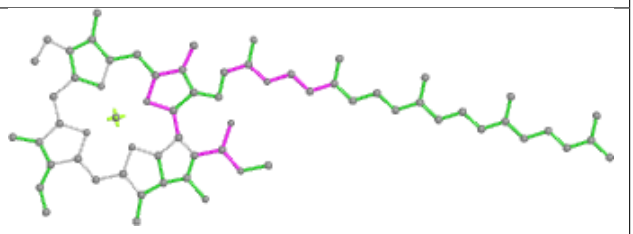
Ligand ECH M 4021



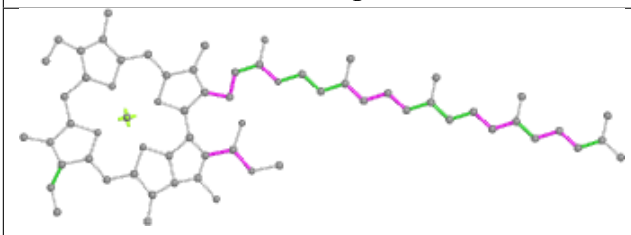
Ligand CLA A 1136



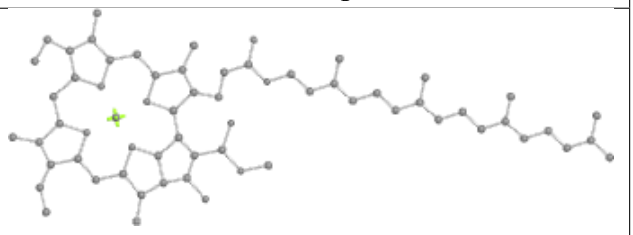
Bond lengths



Bond angles

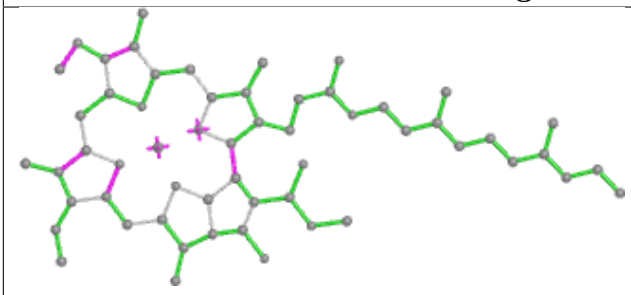


Torsions

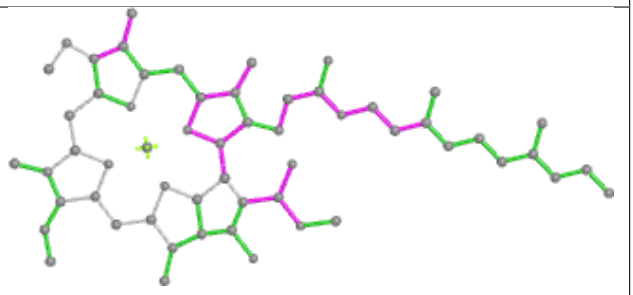


Rings

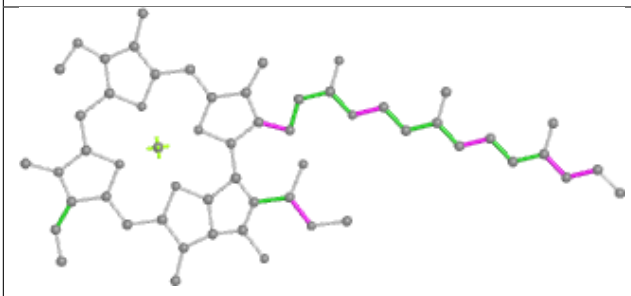
Ligand CLA B 1220



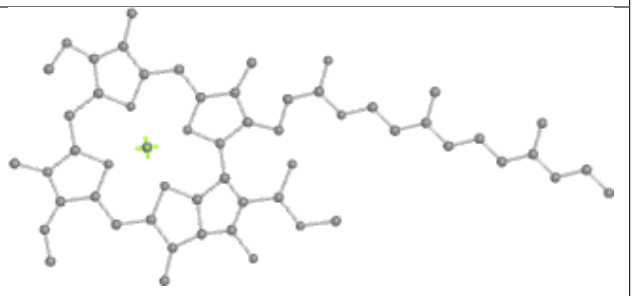
Bond lengths



Bond angles

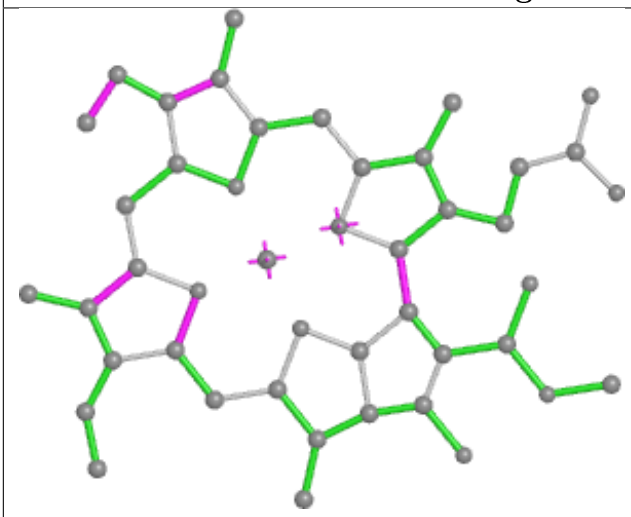


Torsions

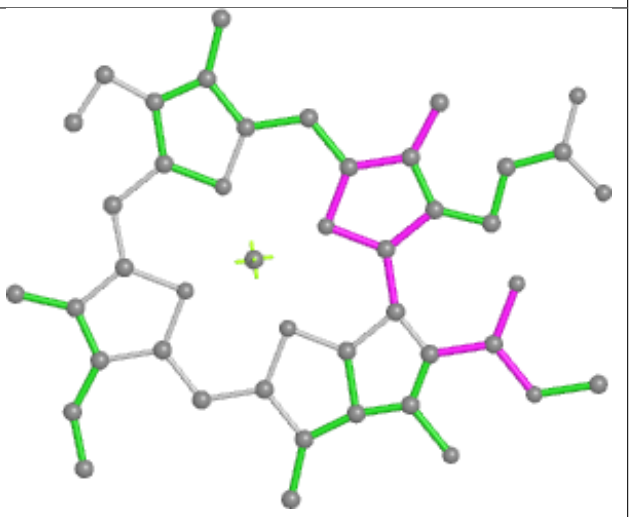


Rings

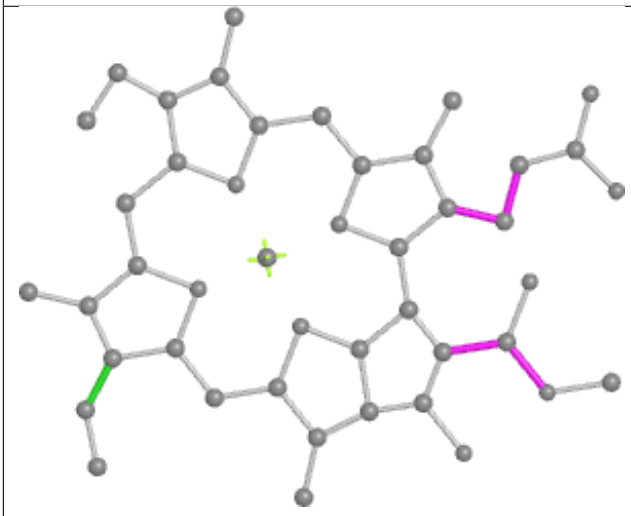
Ligand CLA A 1108



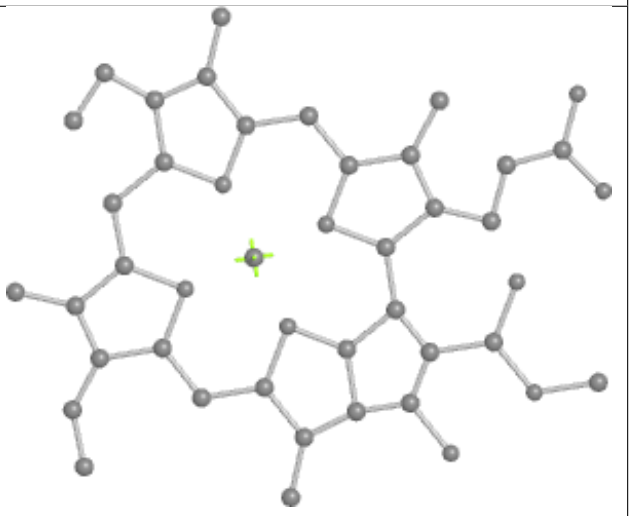
Bond lengths



Bond angles

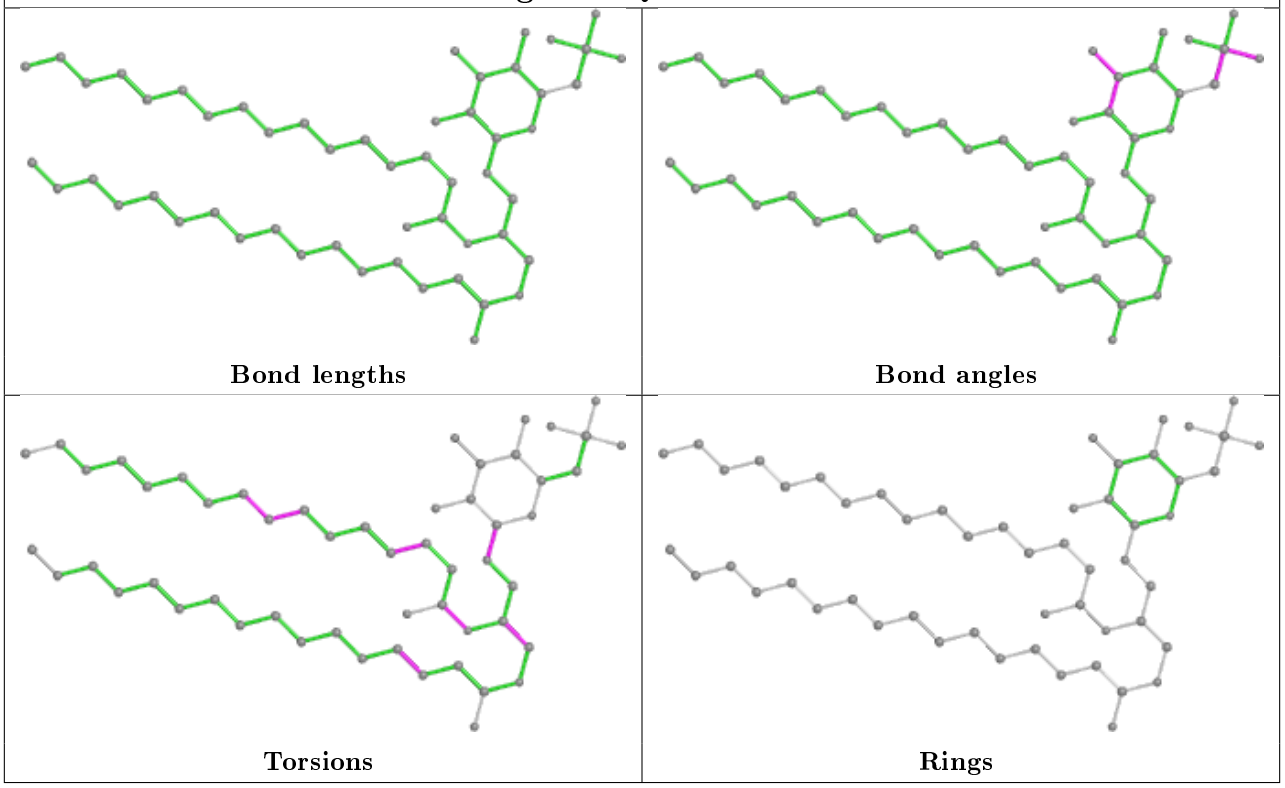


Torsions

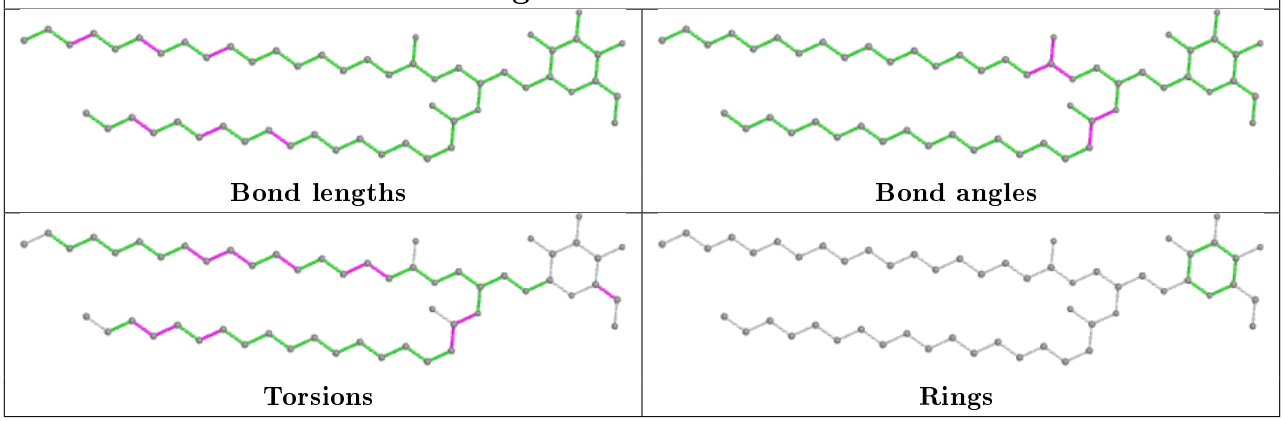


Rings

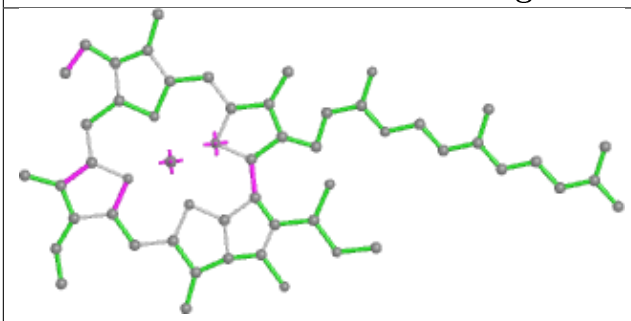
Ligand SQD B 5008



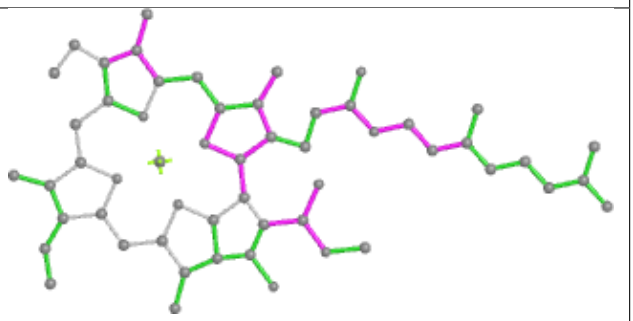
Ligand LMG B 5002



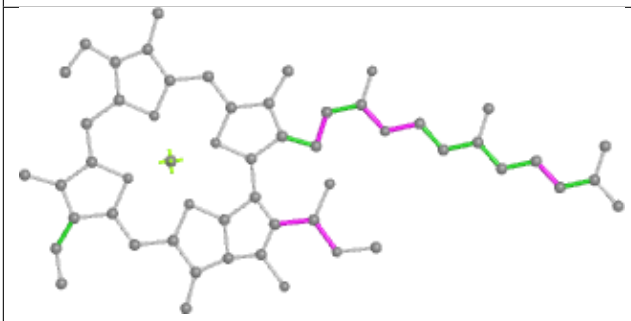
Ligand CLA B 1221



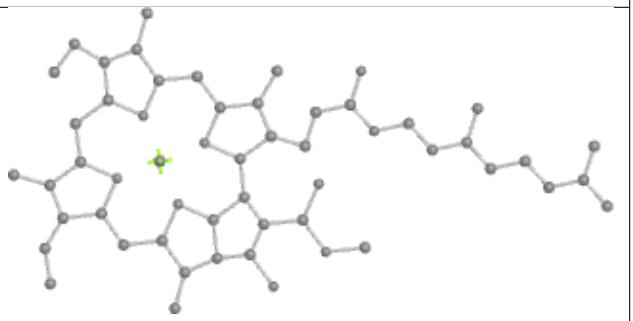
Bond lengths



Bond angles

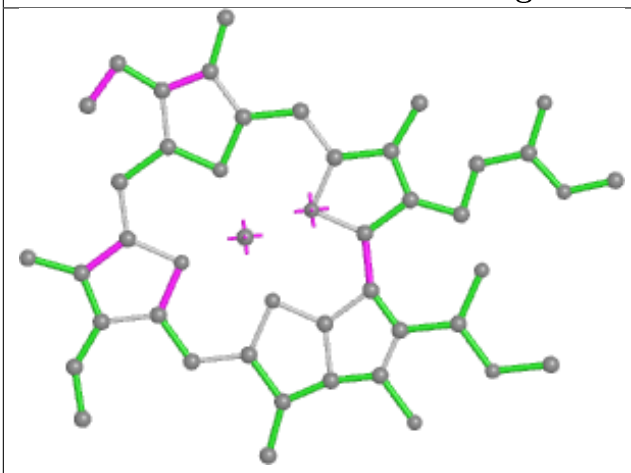


Torsions

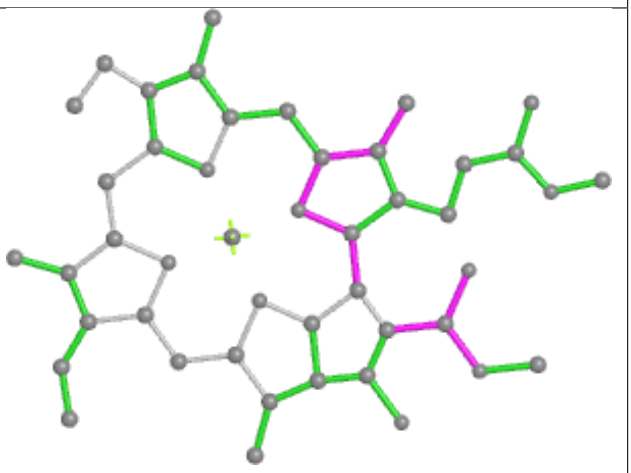


Rings

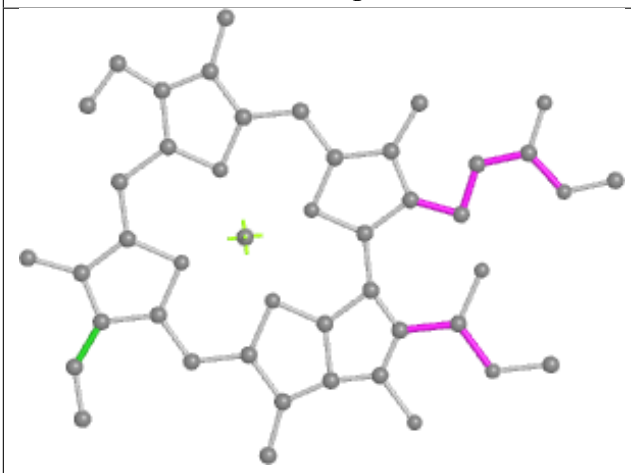
Ligand CLA B 1201



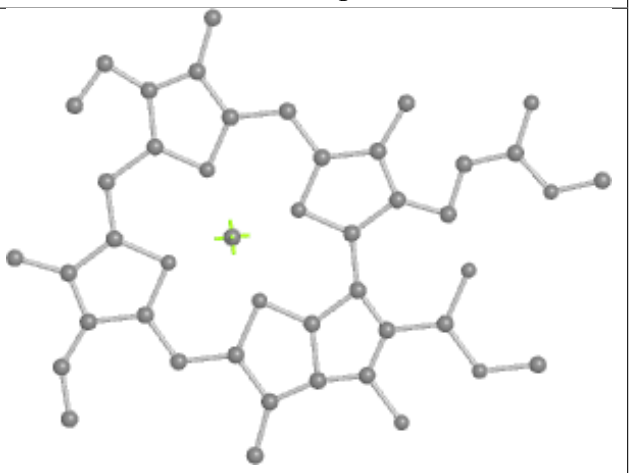
Bond lengths



Bond angles

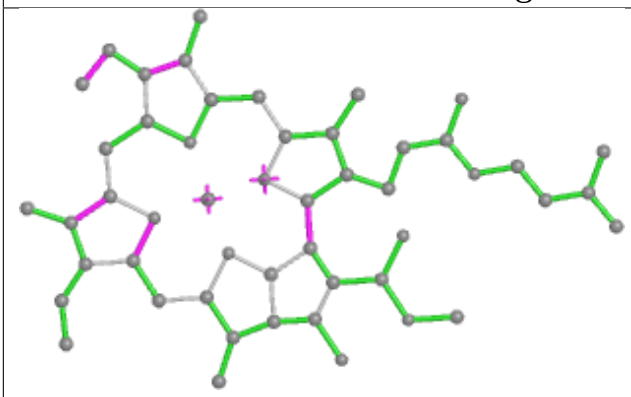


Torsions

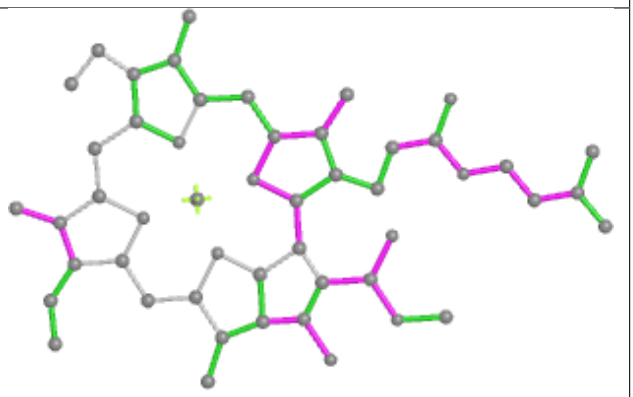


Rings

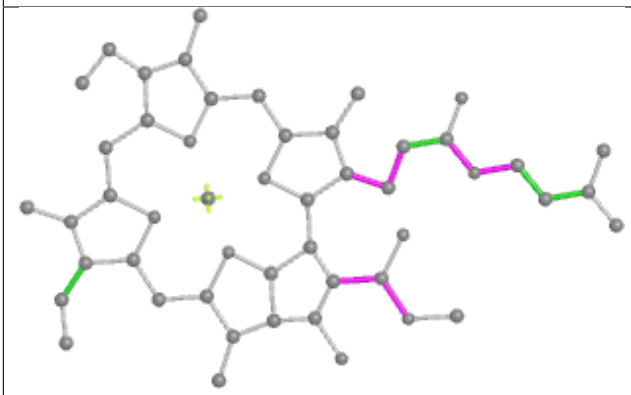
Ligand CLA B 1218



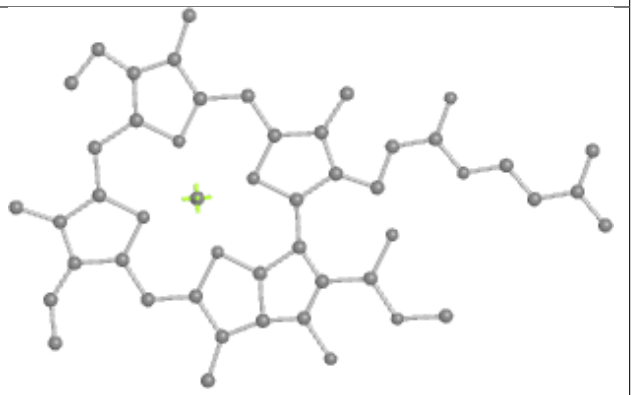
Bond lengths



Bond angles

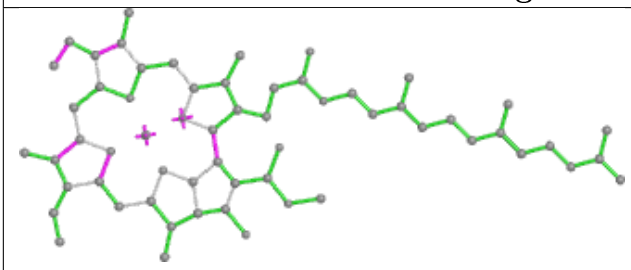


Torsions

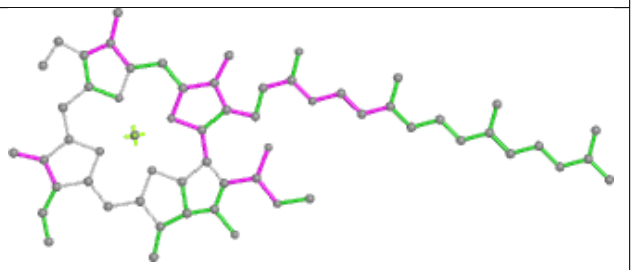


Rings

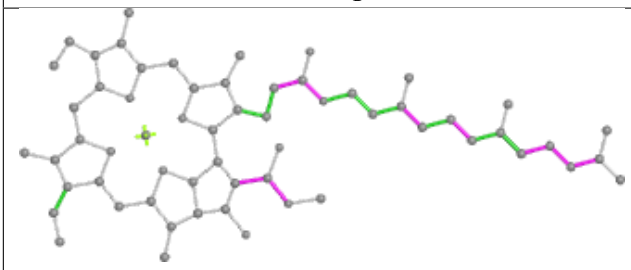
Ligand CLA A 1128



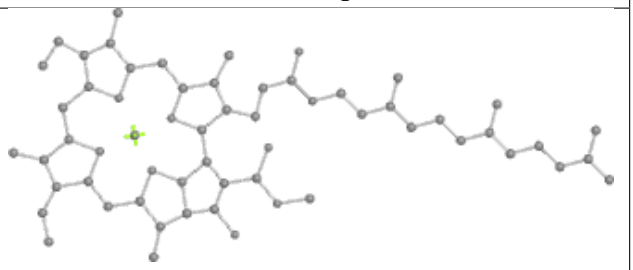
Bond lengths



Bond angles

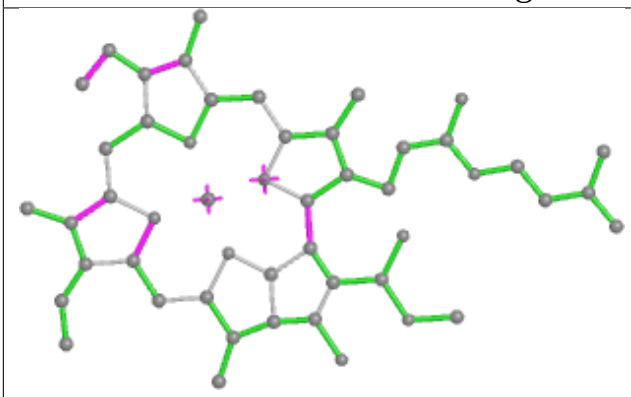


Torsions

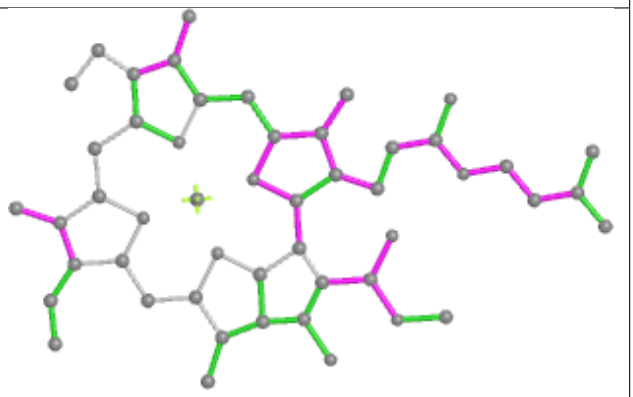


Rings

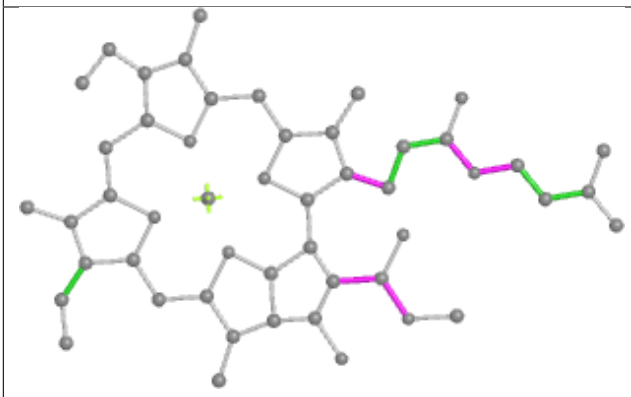
Ligand CLA A 1137



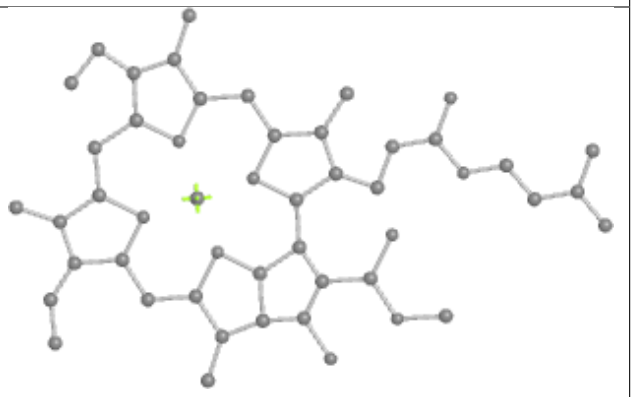
Bond lengths



Bond angles

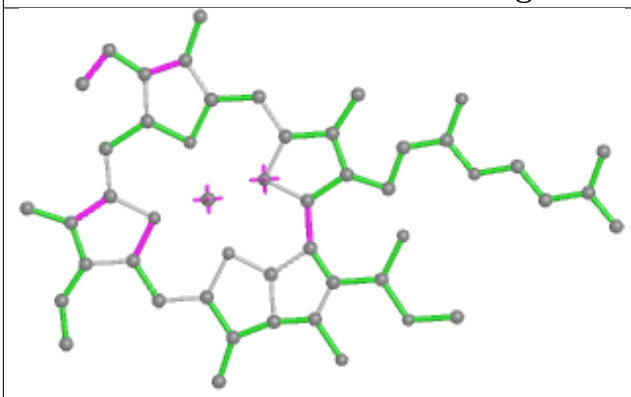


Torsions

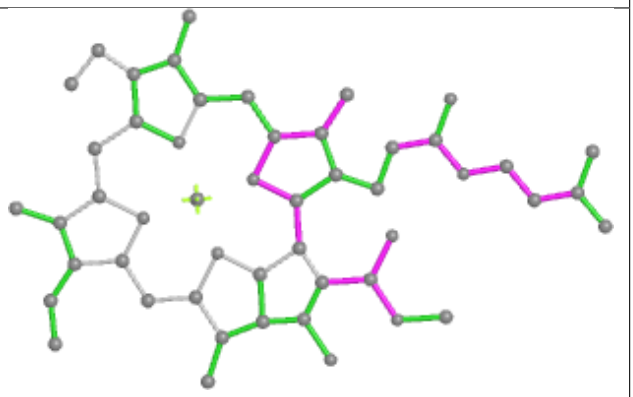


Rings

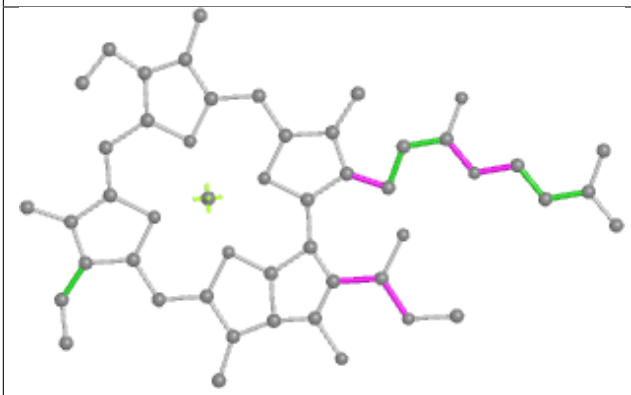
Ligand CLA A 1132



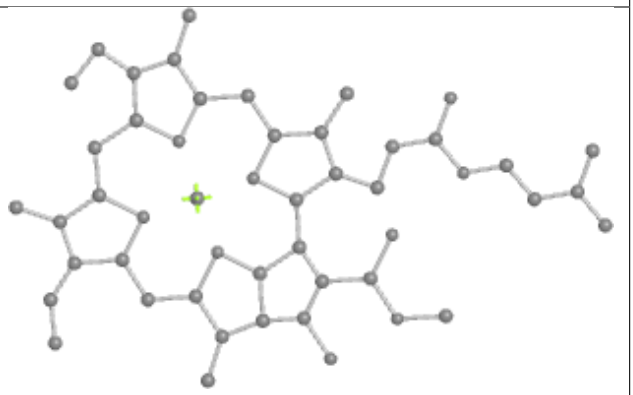
Bond lengths



Bond angles

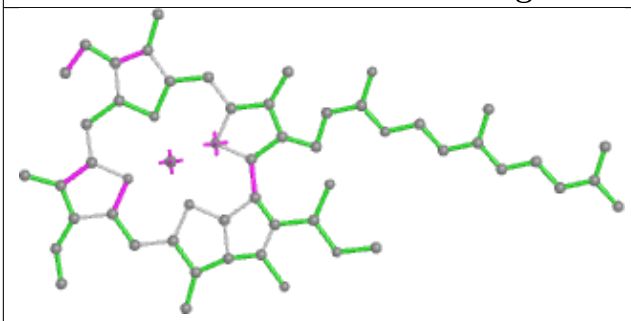


Torsions

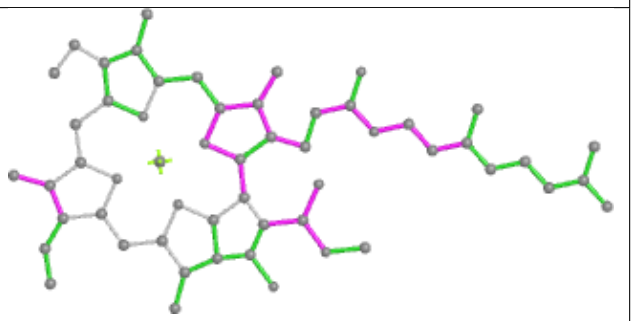


Rings

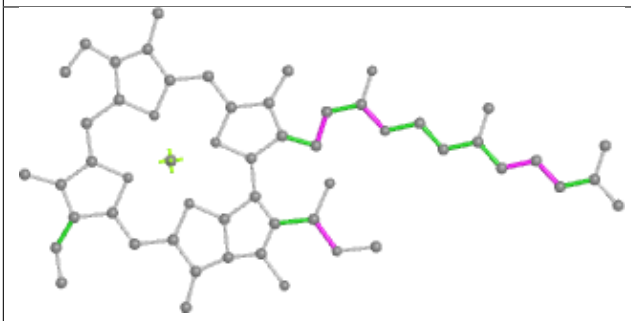
Ligand CLA B 1222



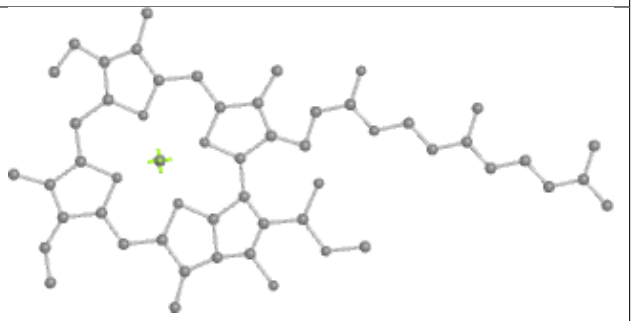
Bond lengths



Bond angles

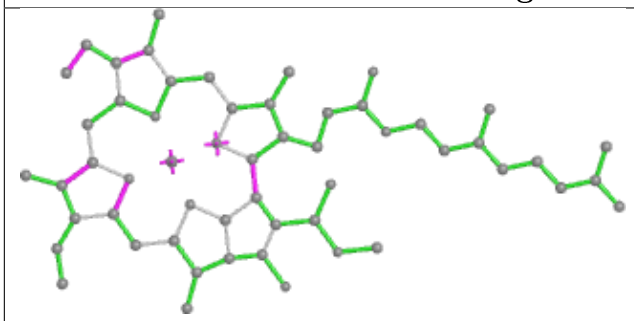


Torsions

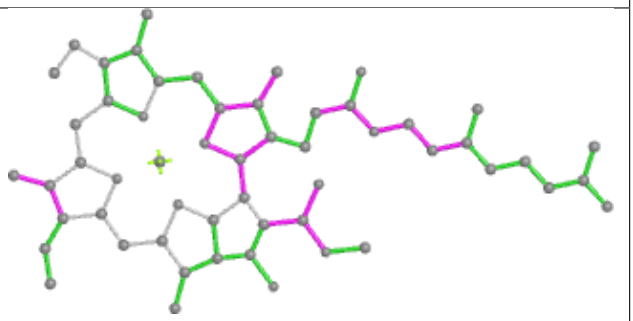


Rings

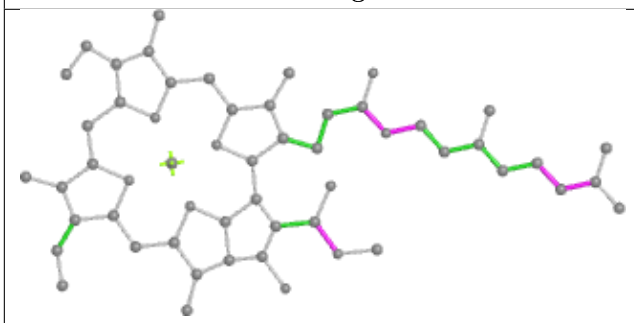
Ligand CLA A 1102



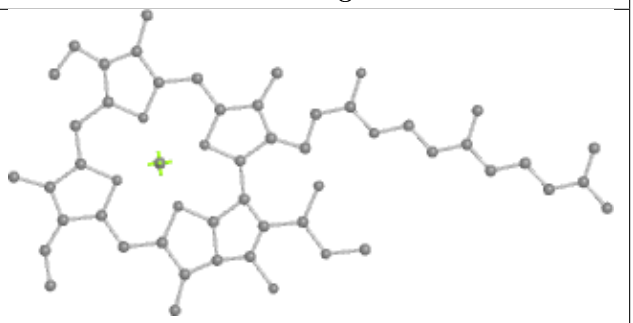
Bond lengths



Bond angles

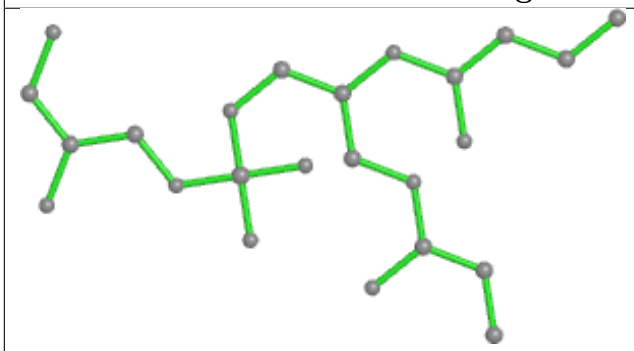


Torsions

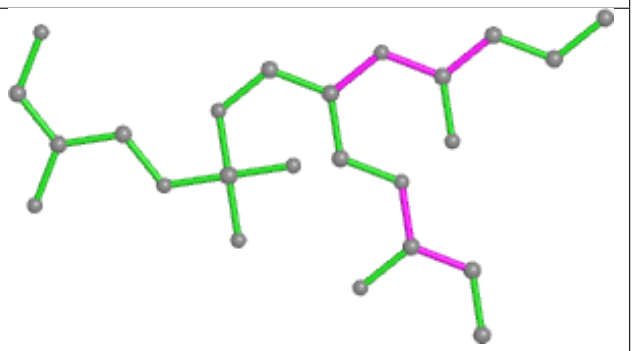


Rings

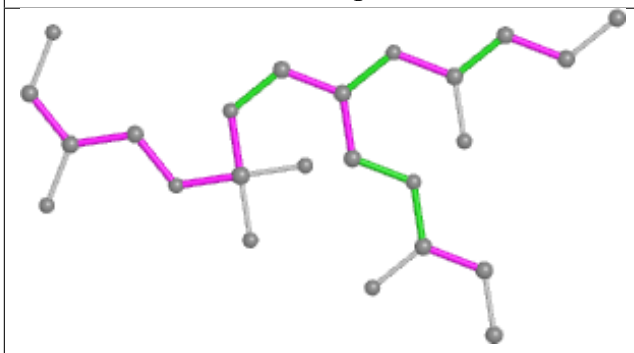
Ligand LHG B 5006



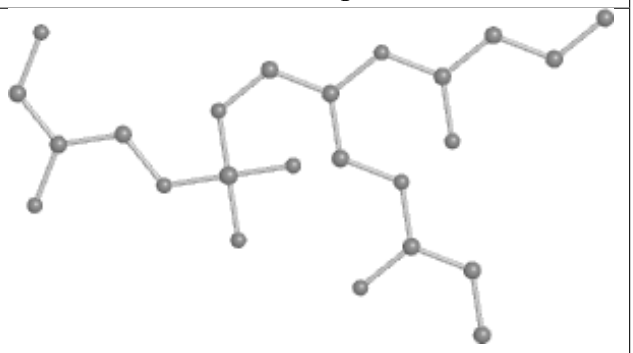
Bond lengths



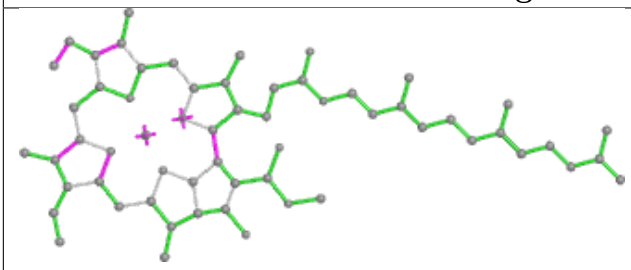
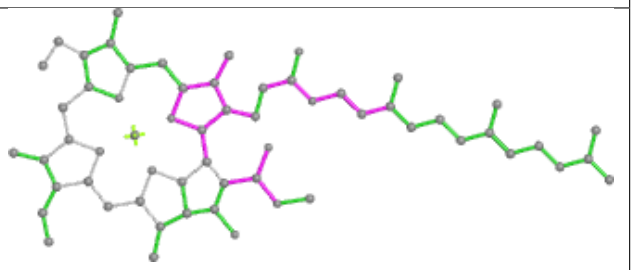
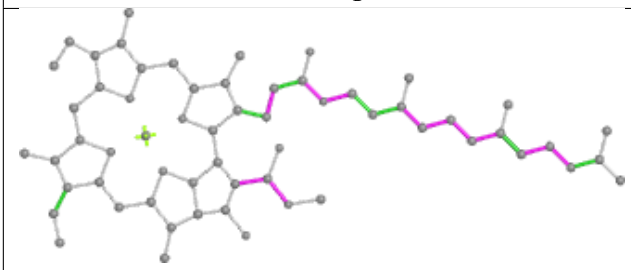
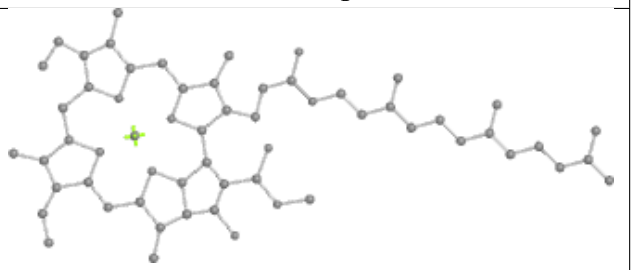
Bond angles

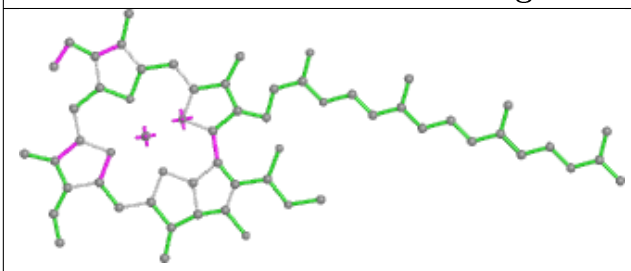
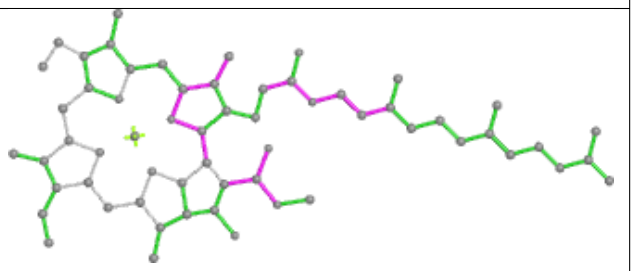
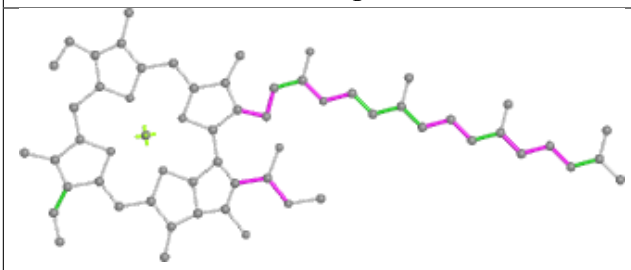
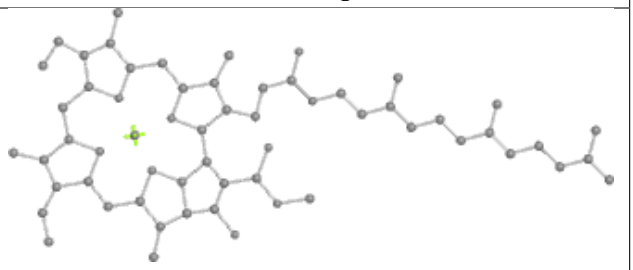


Torsions

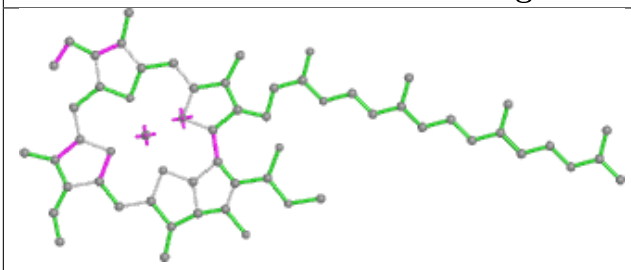


Rings

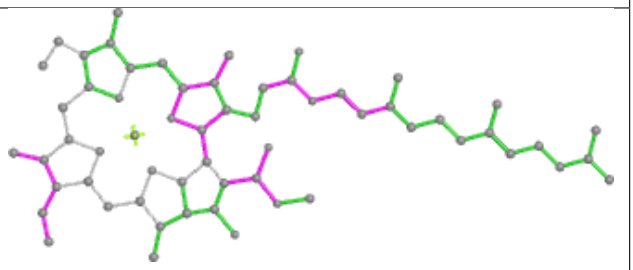
Ligand CLA A 1011	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand CLA A 1110	
 Bond lengths	 Bond angles
 Torsions	 Rings

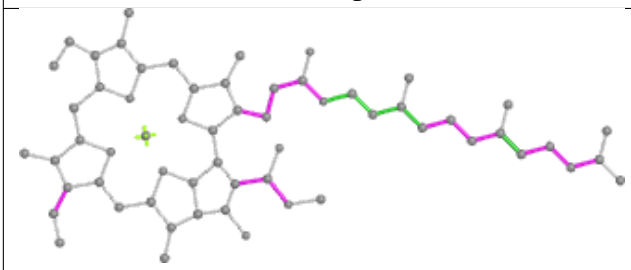
Ligand CLA B 1021



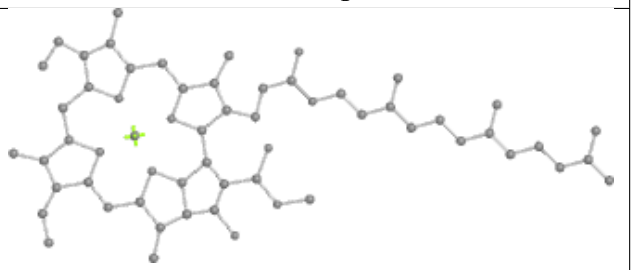
Bond lengths



Bond angles

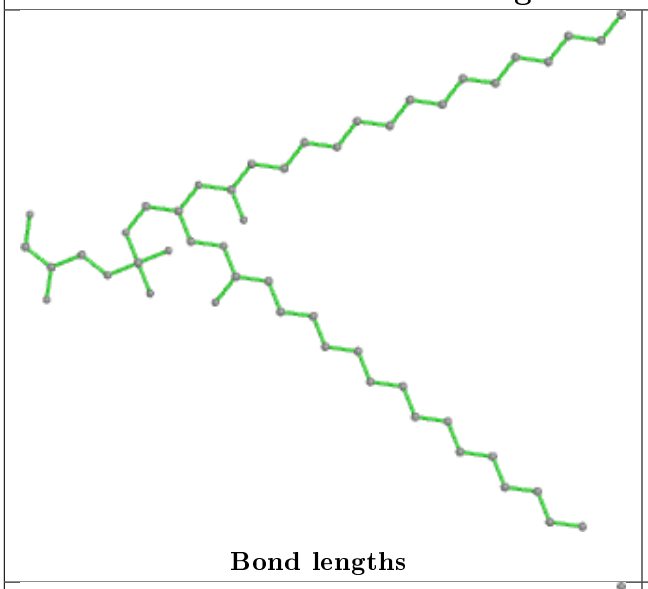


Torsions

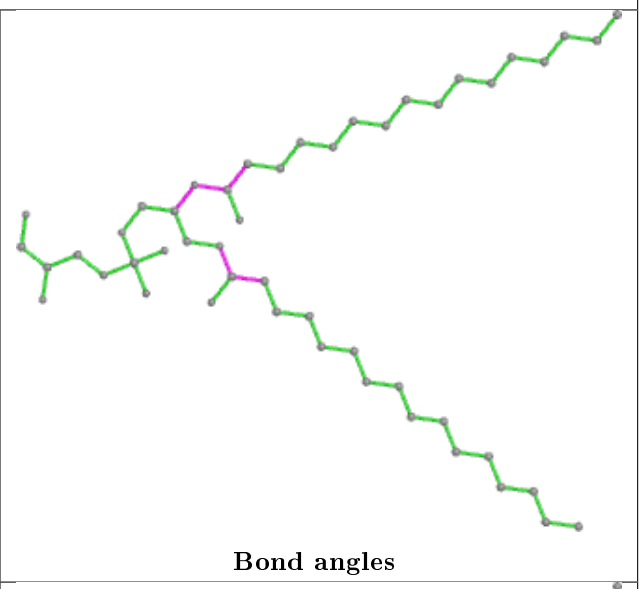


Rings

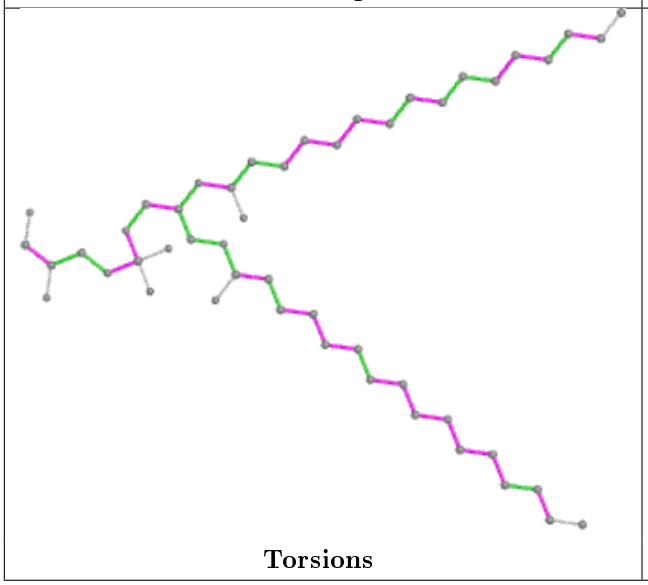
Ligand LHG A 5003



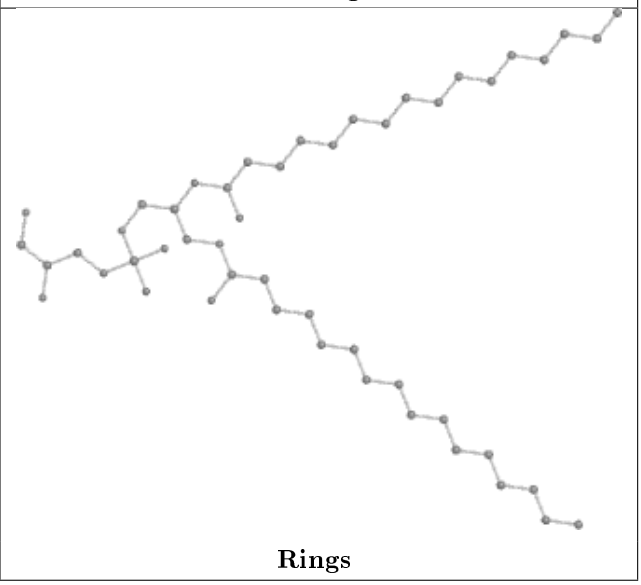
Bond lengths



Bond angles

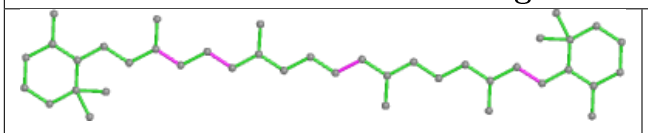


Torsions

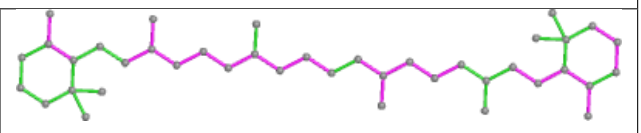


Rings

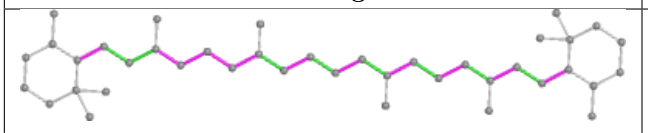
Ligand BCR A 4008



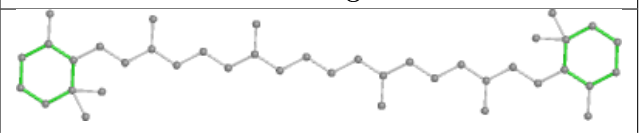
Bond lengths



Bond angles

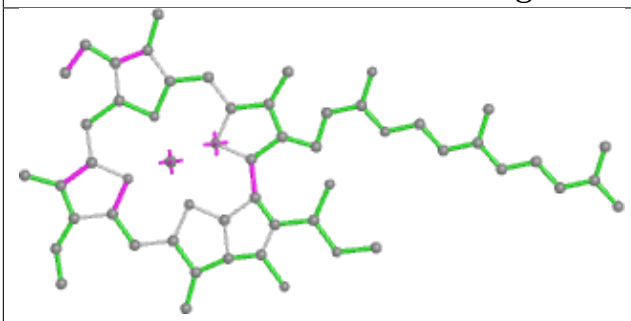


Torsions

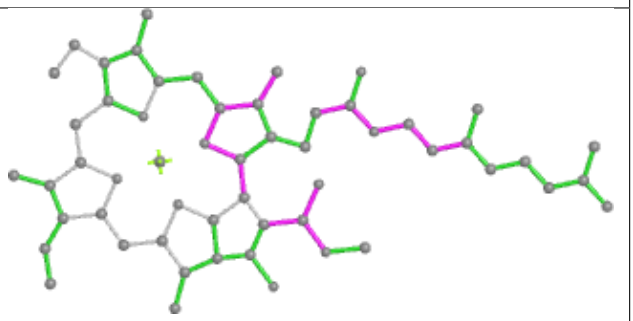


Rings

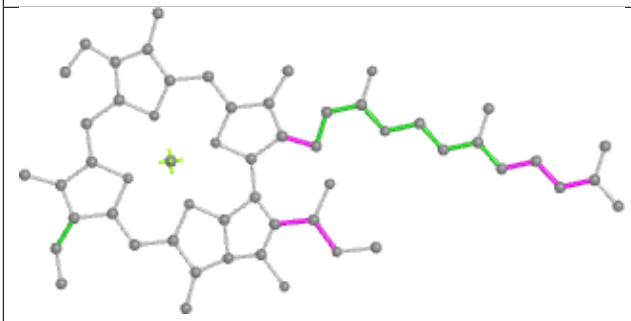
Ligand CLA B 1205



Bond lengths



Bond angles



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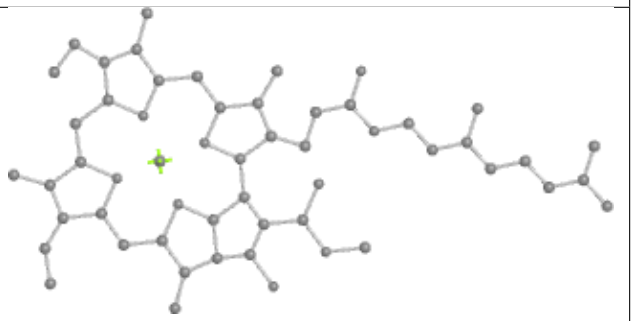
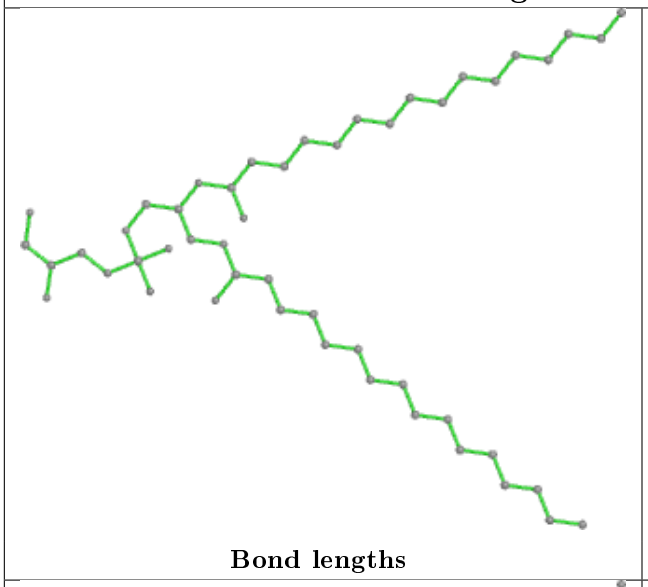
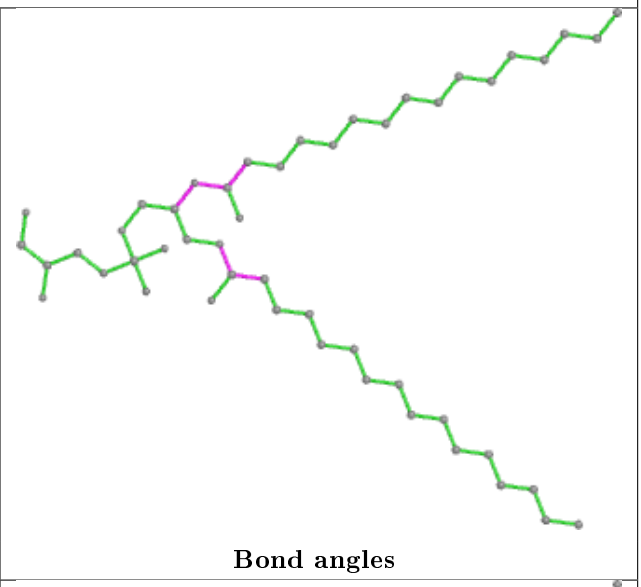


Rings

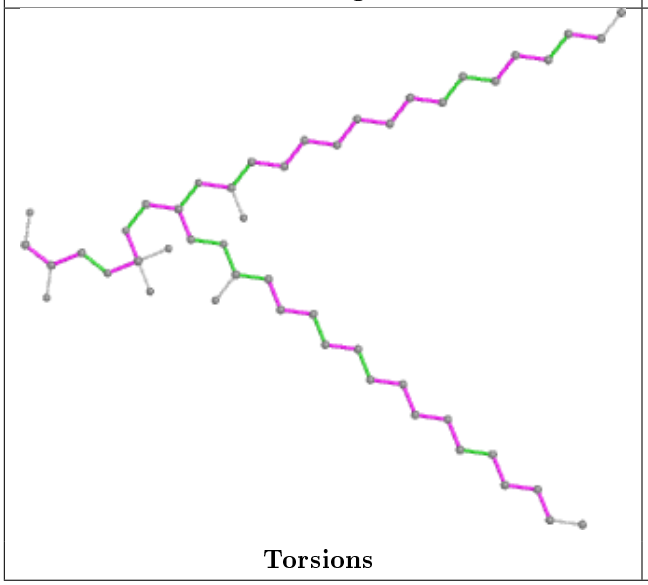
Ligand LHG M 5001



Bond lengths



Bond angles



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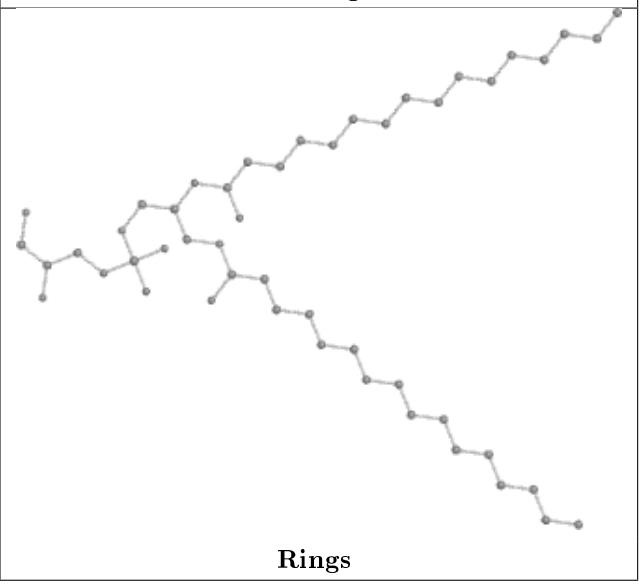
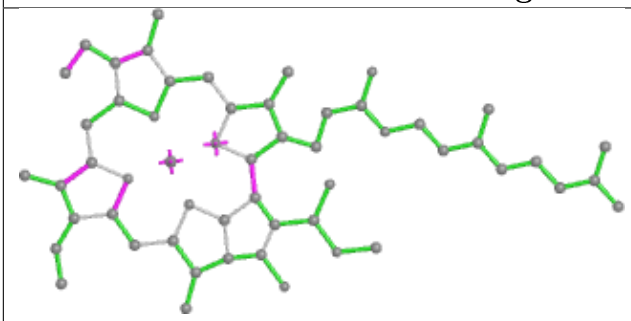
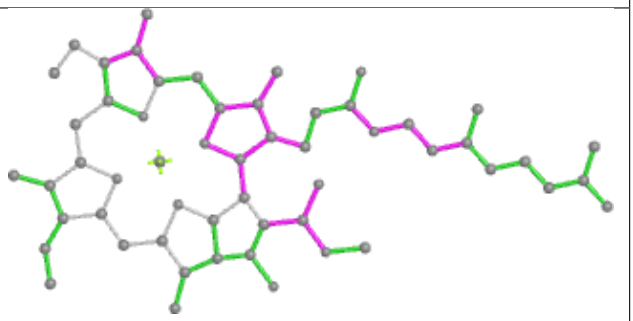


Rings

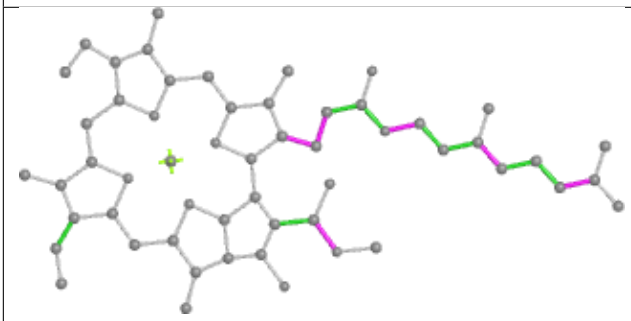
Ligand CLA A 1012



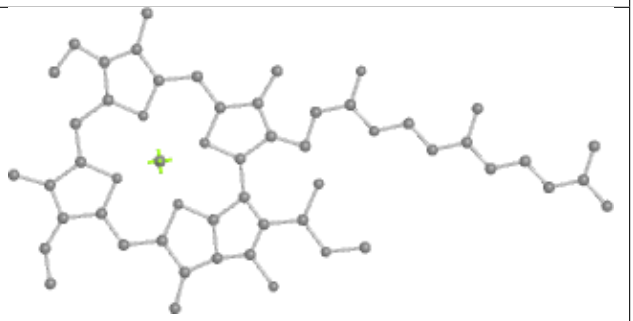
Bond lengths



Bond angles

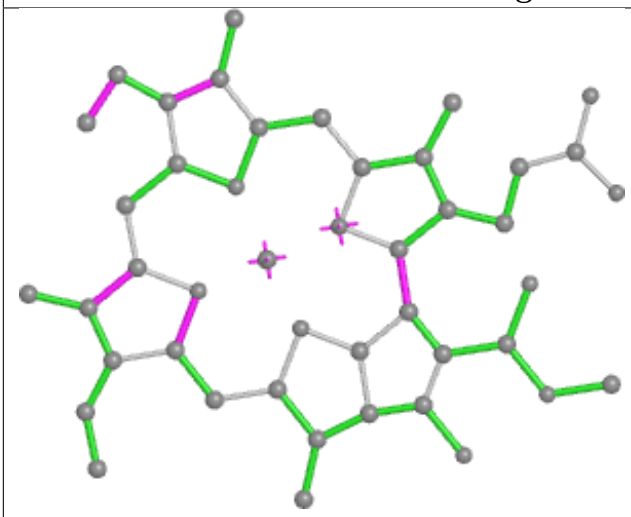


Torsions

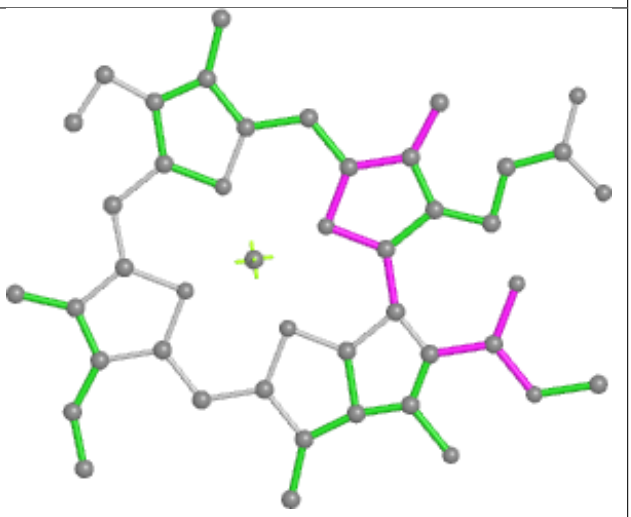


Rings

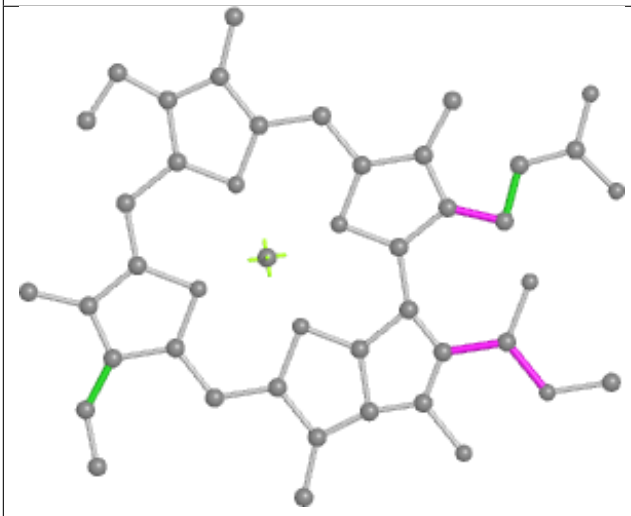
Ligand CLA A 1114



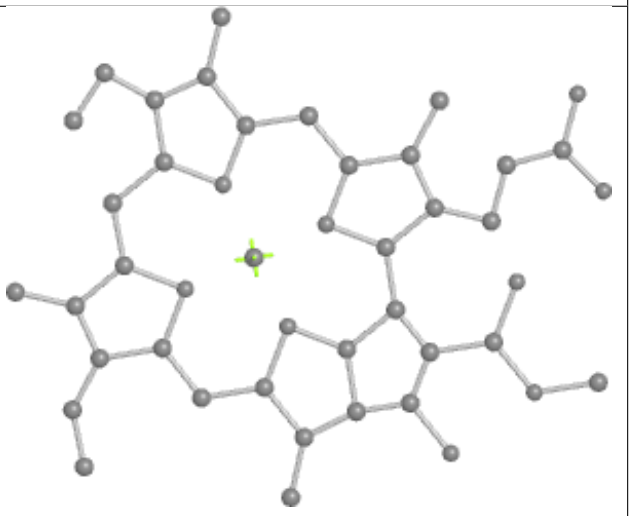
Bond lengths



Bond angles

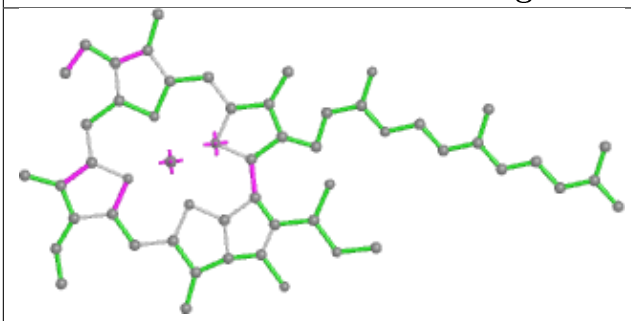


Torsions

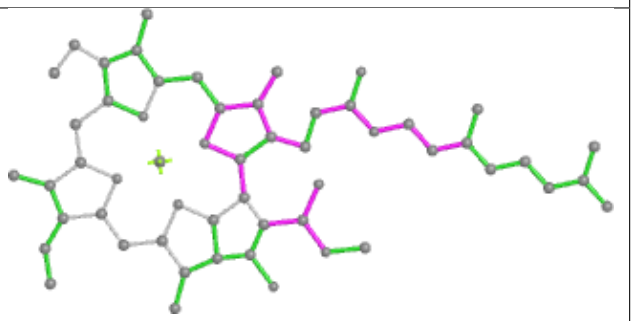


Rings

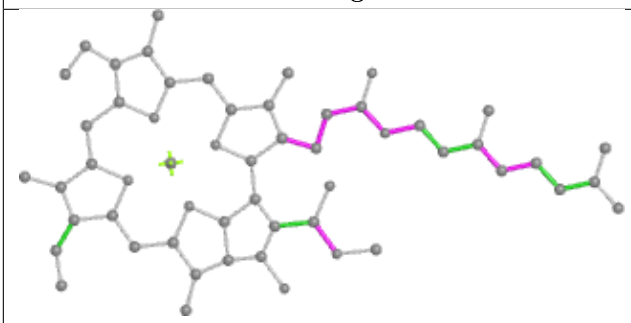
Ligand CLA A 1131



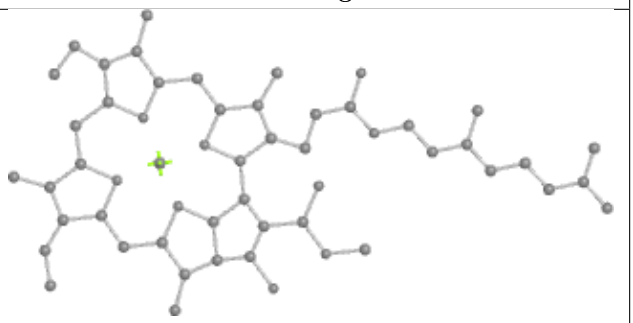
Bond lengths



Bond angles

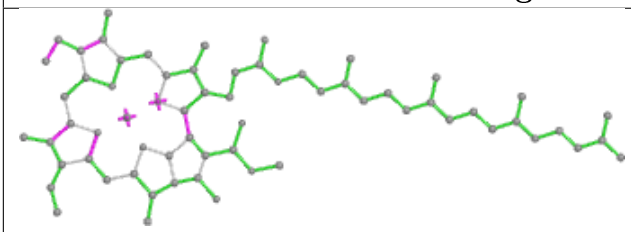


Torsions

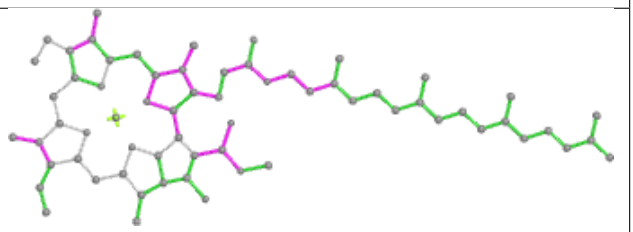


Rings

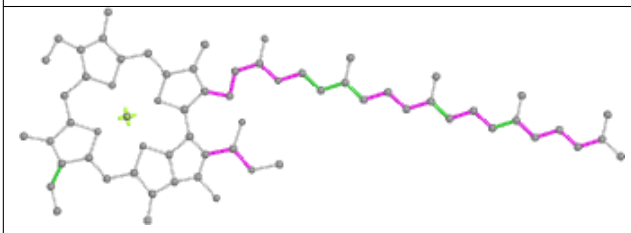
Ligand CLA B 1210



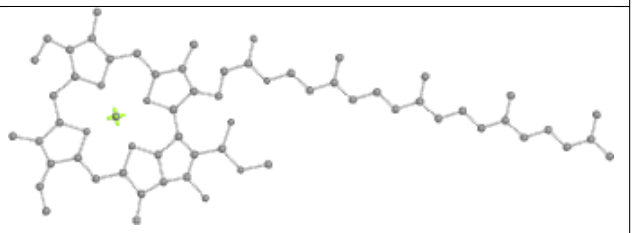
Bond lengths



Bond angles

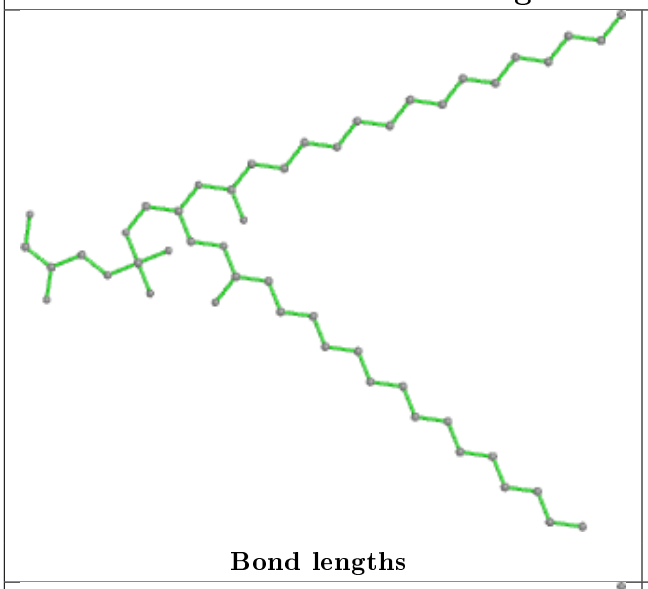


Torsions

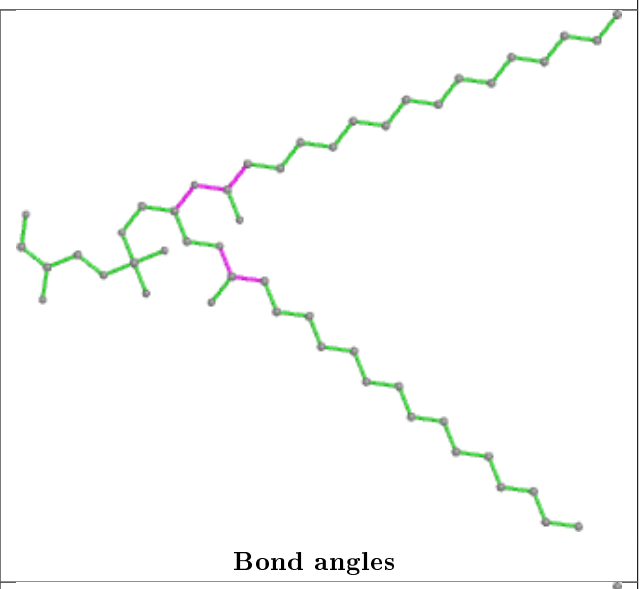


Rings

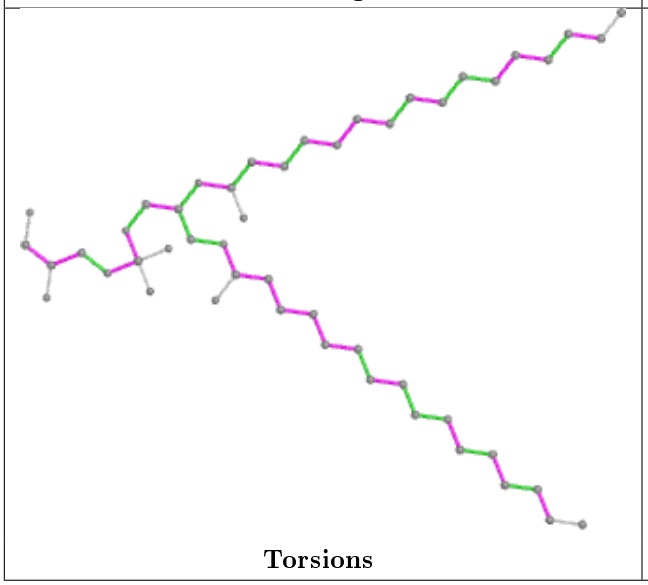
Ligand LHG A 5001



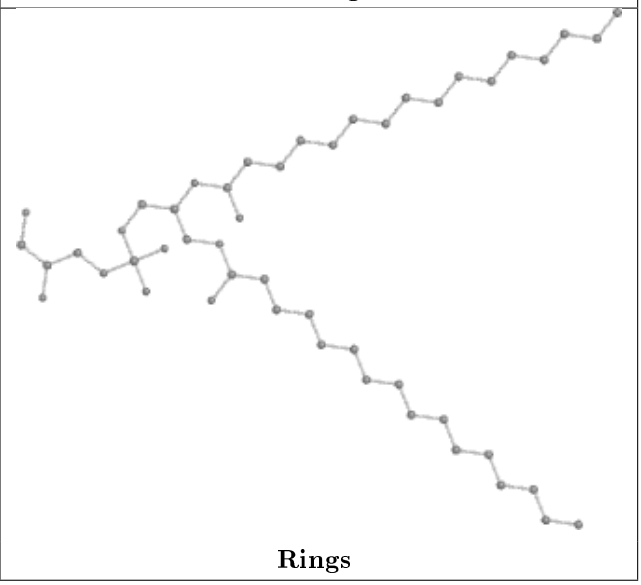
Bond lengths



Bond angles

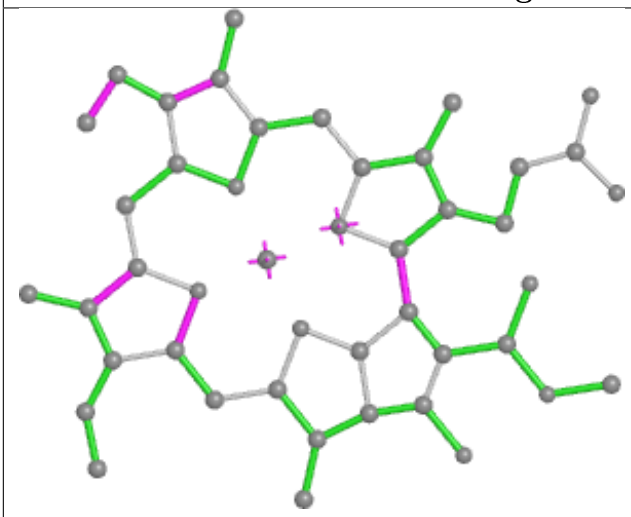


Torsions

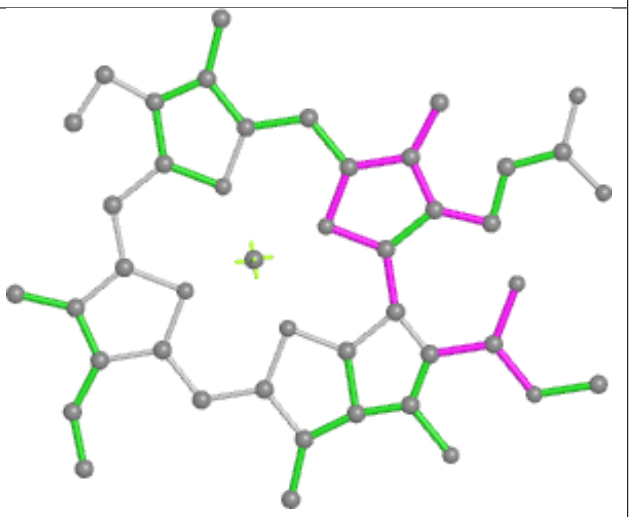


Rings

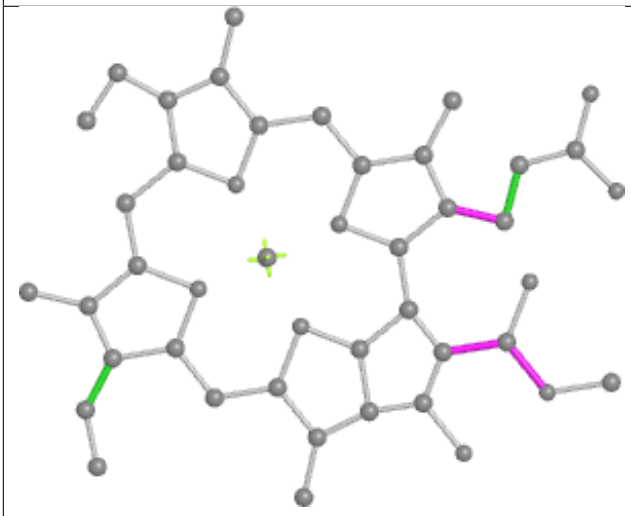
Ligand CLA B 1212



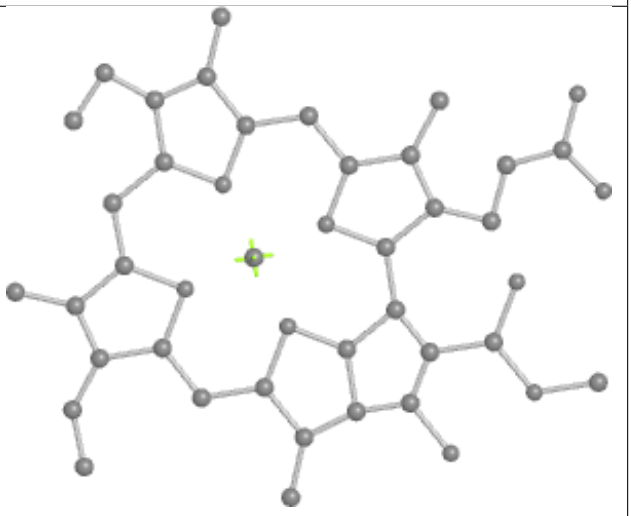
Bond lengths



Bond angles

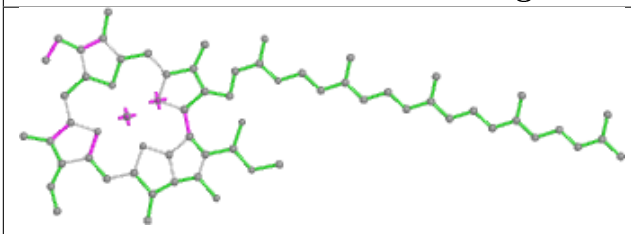


Torsions

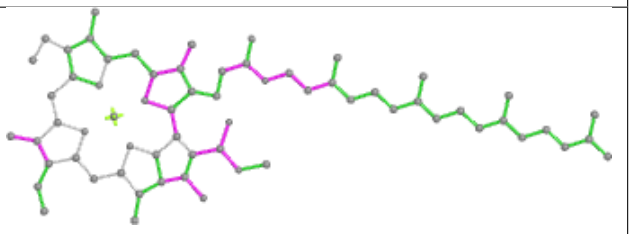


Rings

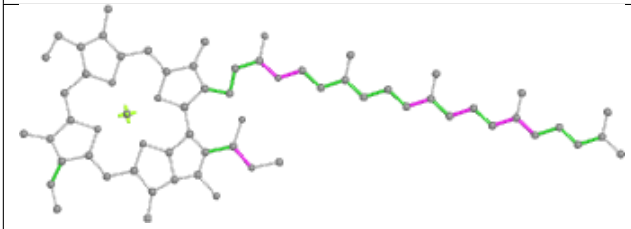
Ligand CLA B 1239



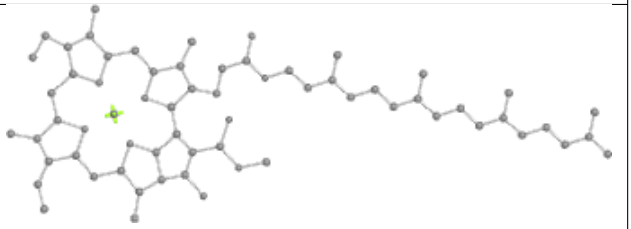
Bond lengths



Bond angles

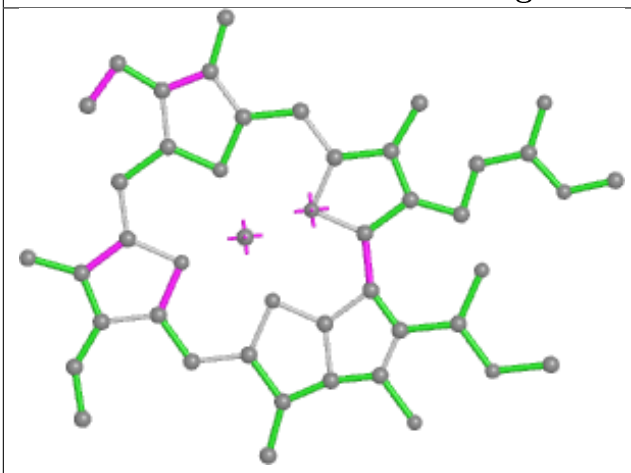


Torsions

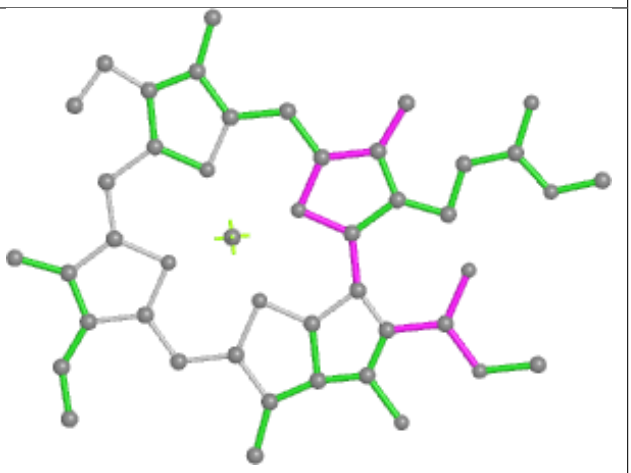


Rings

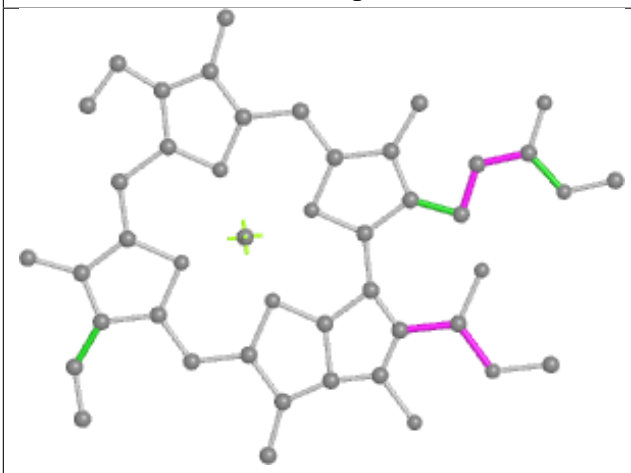
Ligand CLA B 1204



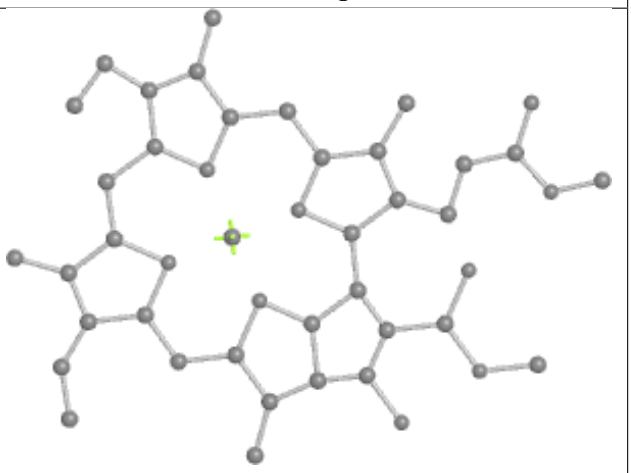
Bond lengths



Bond angles

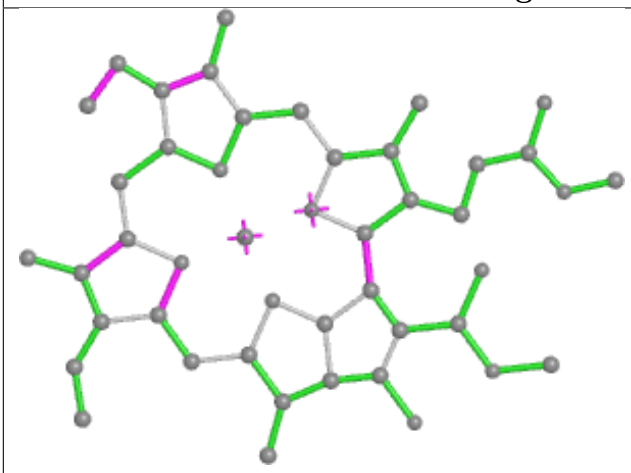


Torsions



Rings

Ligand CLA A 1134



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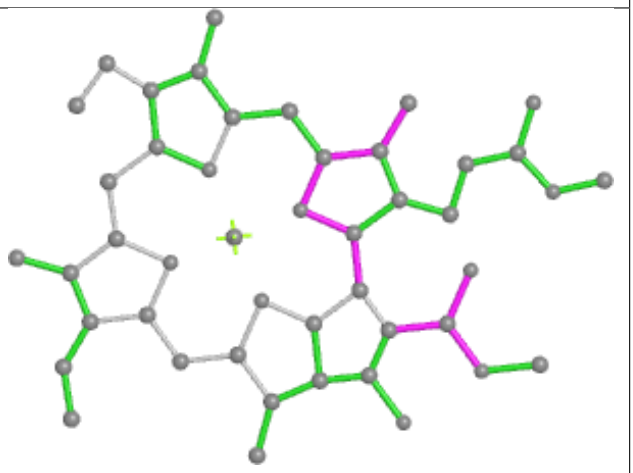
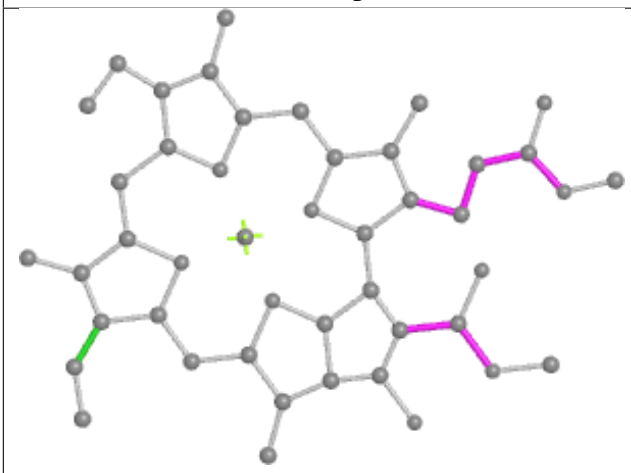
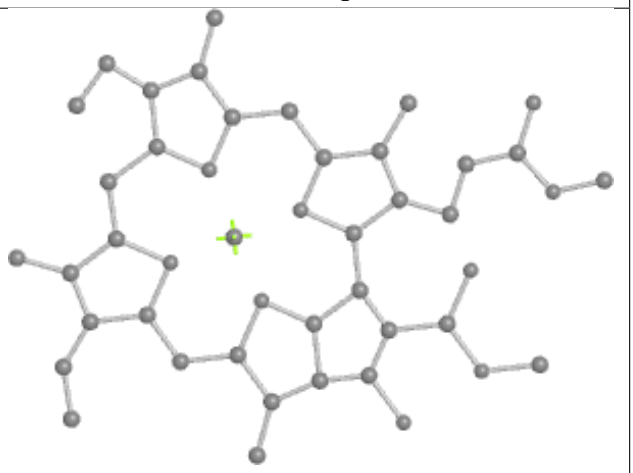


Bond angles

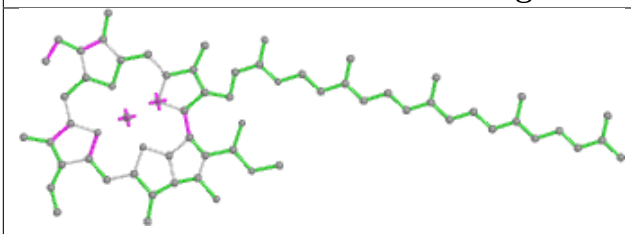


Torsions

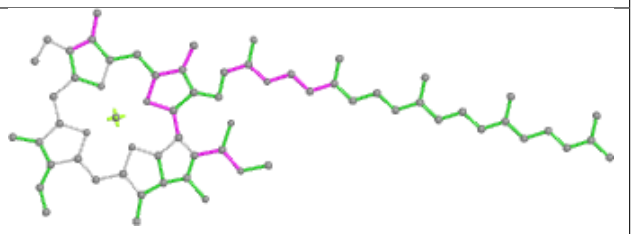


Rings

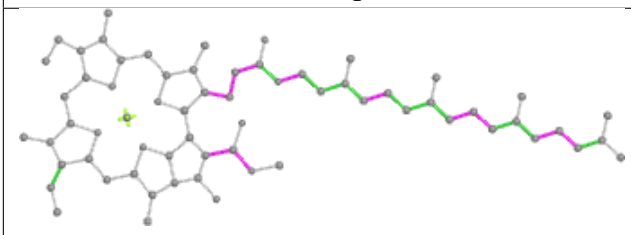
Ligand CLA A 1119



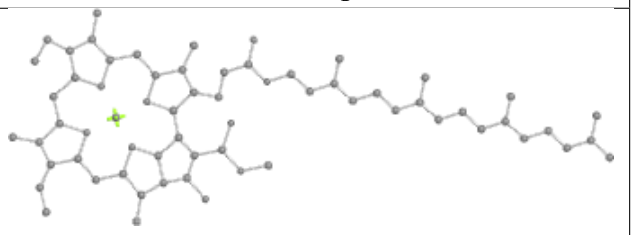
Bond lengths



Bond angles

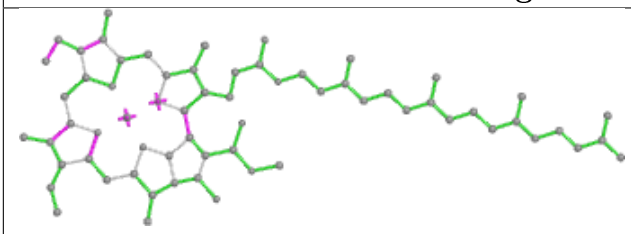


Torsions

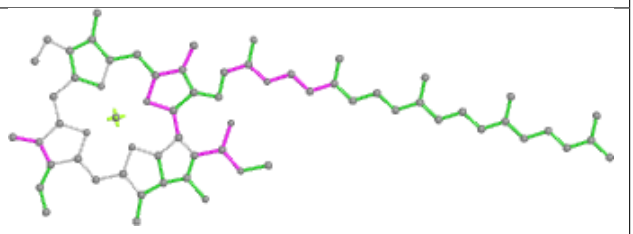


Rings

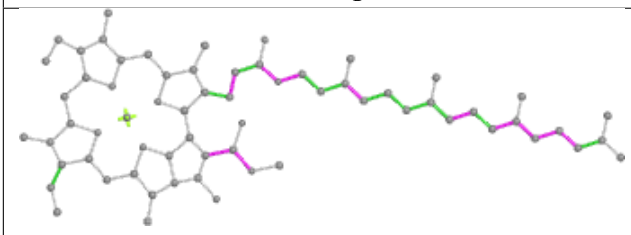
Ligand CLA A 1138



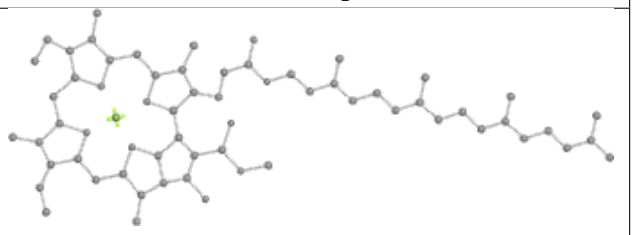
Bond lengths



Bond angles

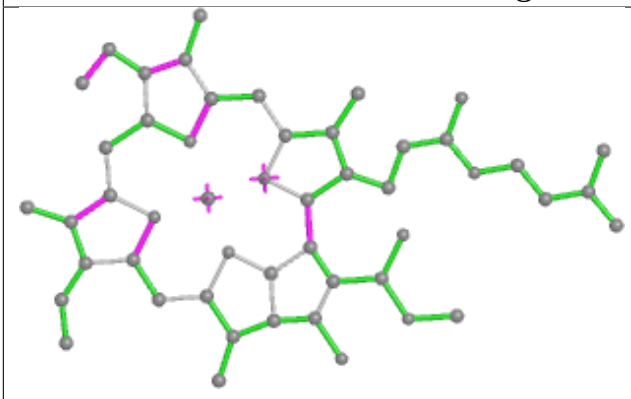


Torsions

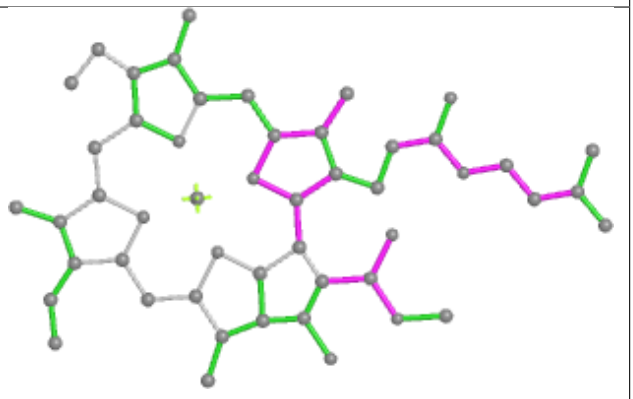


Rings

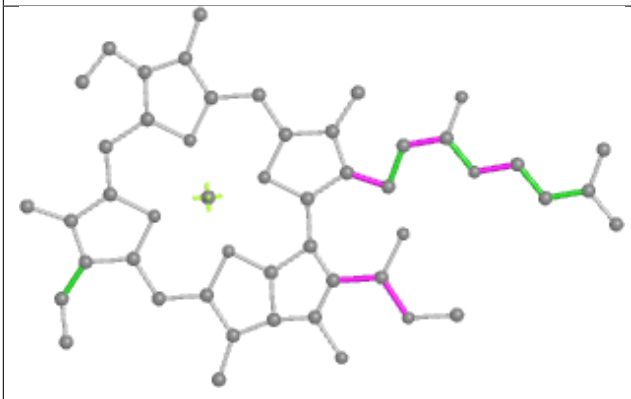
Ligand CLA B 1232



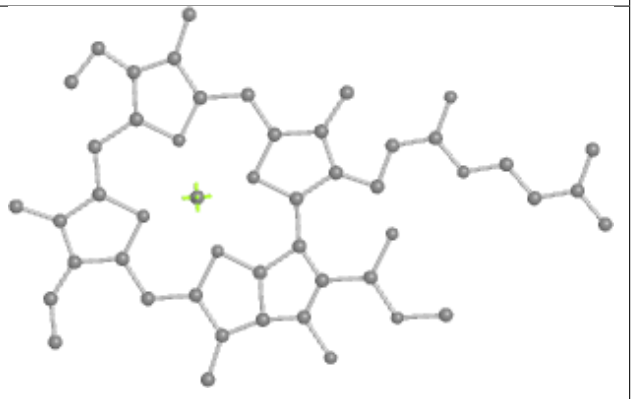
Bond lengths



Bond angles

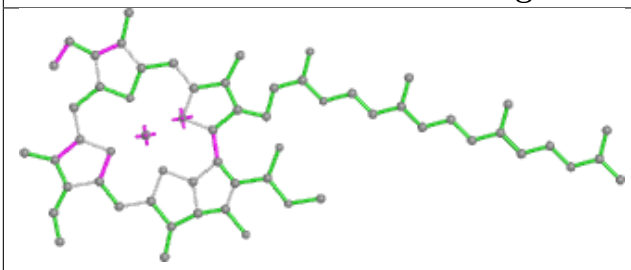


Torsions

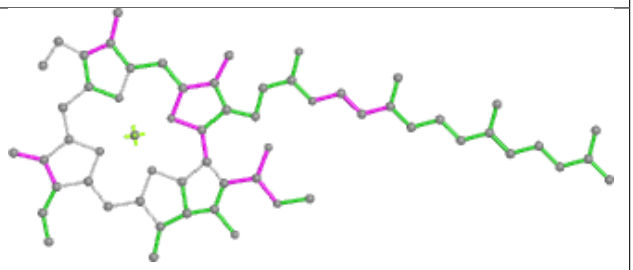


Rings

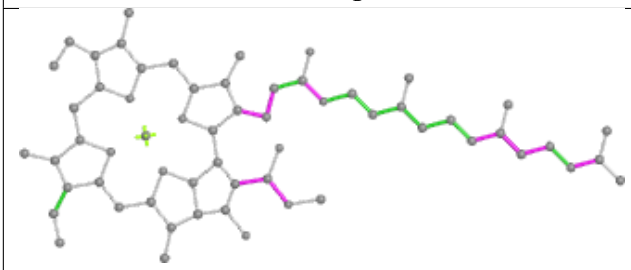
Ligand CLA A 1122



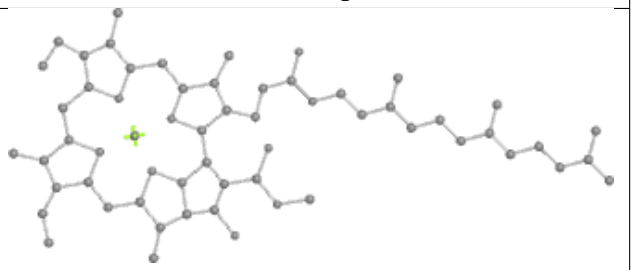
Bond lengths



Bond angles

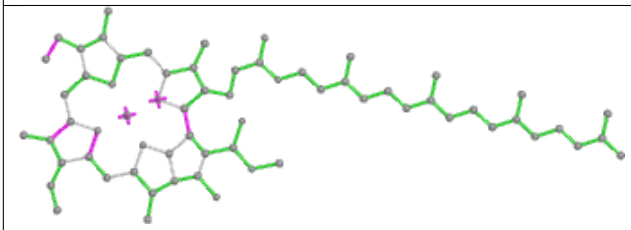


Torsions

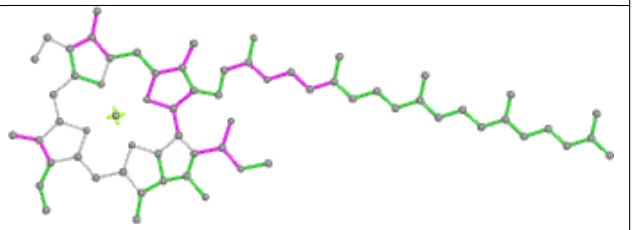


Rings

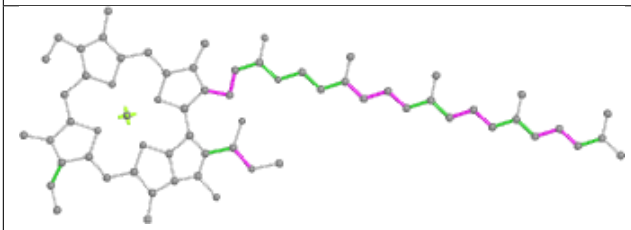
Ligand CLA B 1225



Bond lengths



Bond angles



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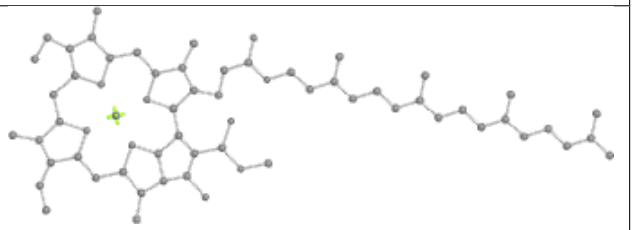
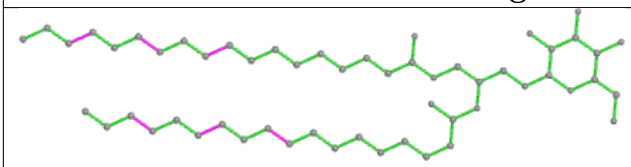
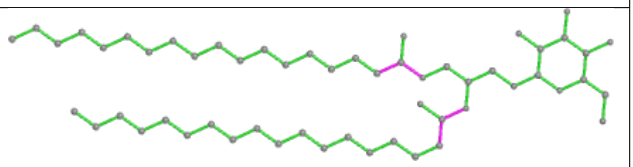


Rings

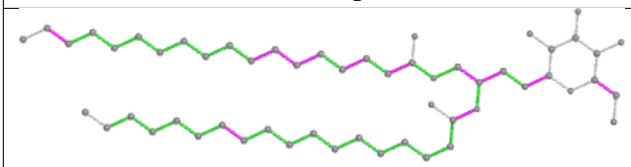
Ligand LMG K 5009



Bond lengths



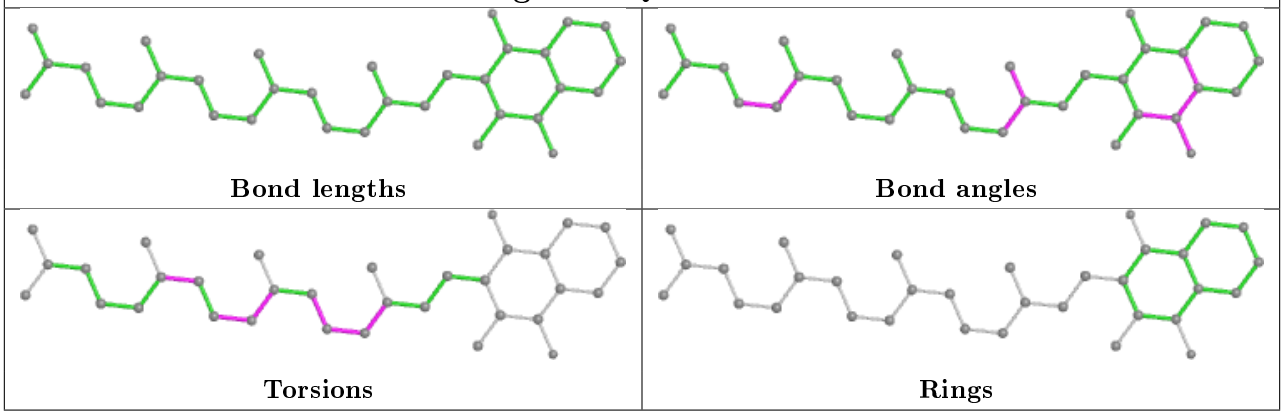
Bond angles



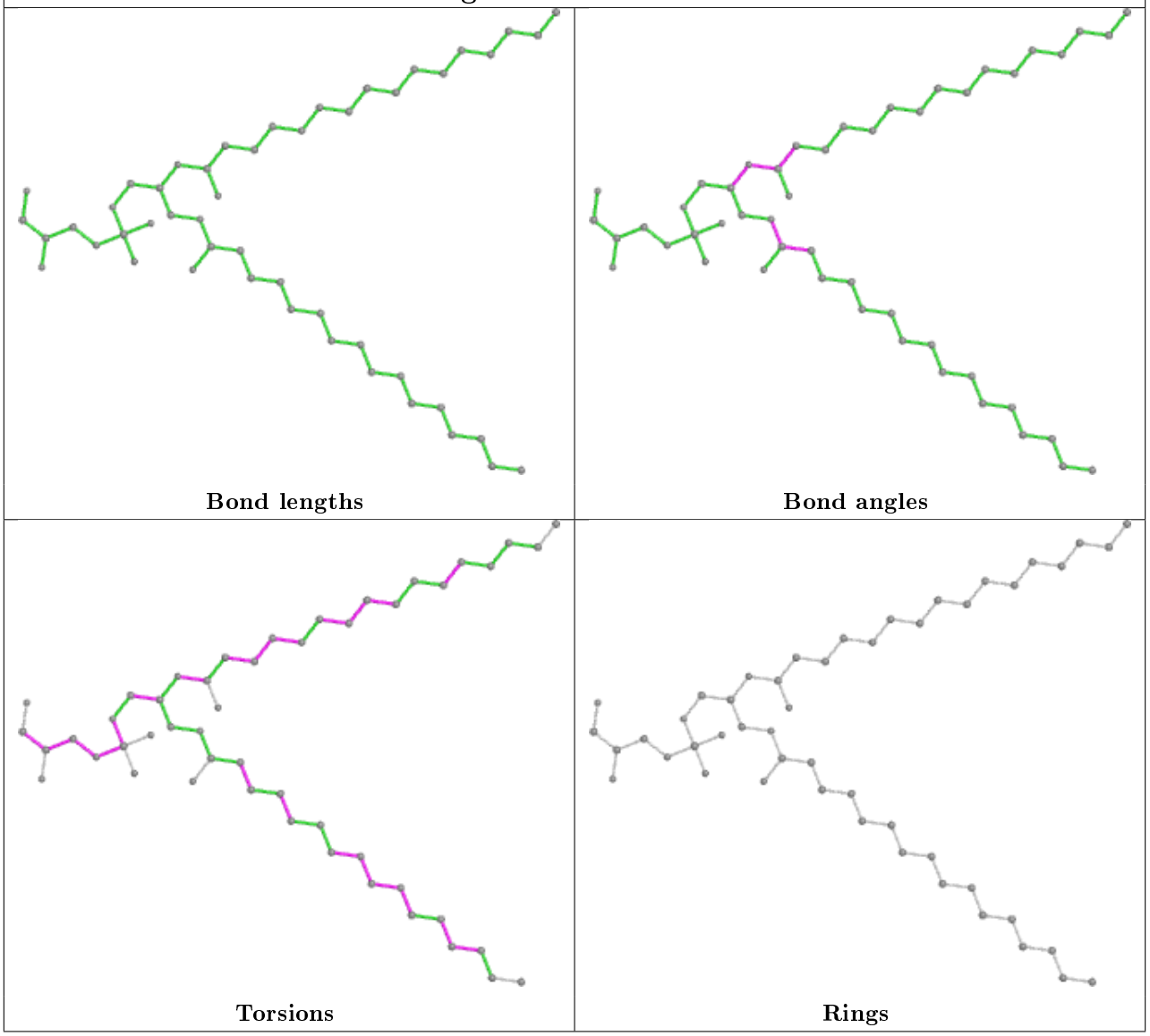
Torsions

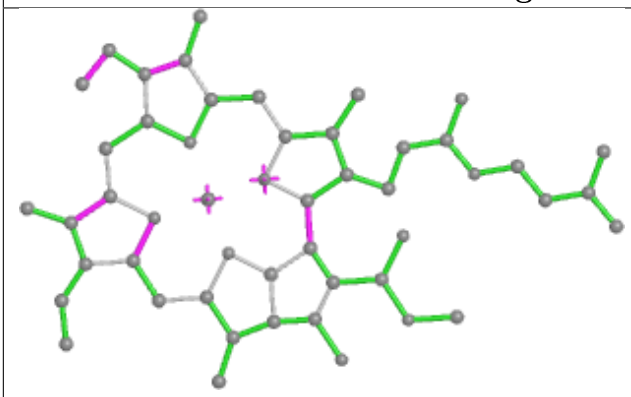
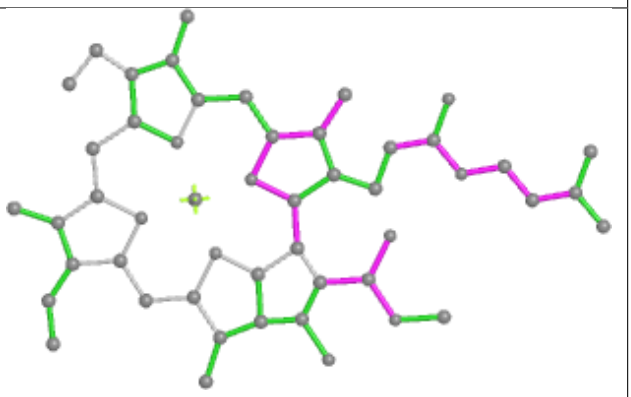
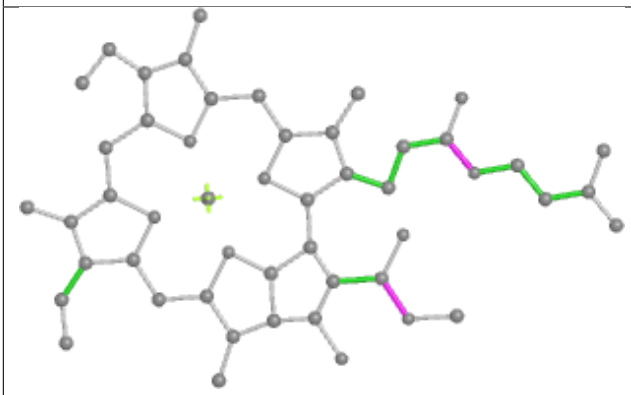
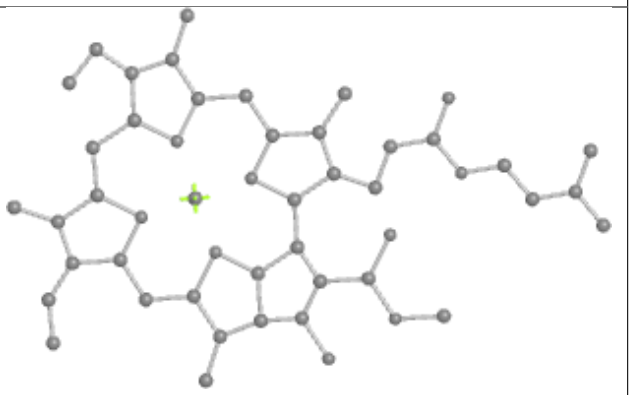
Rings

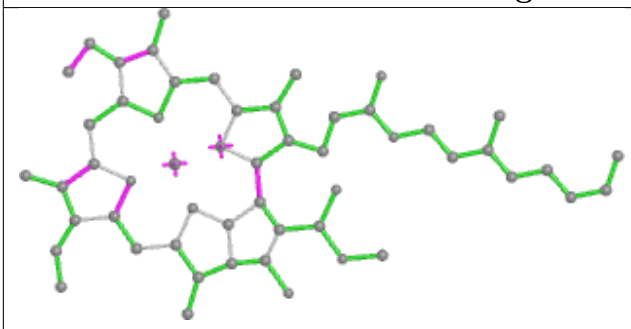
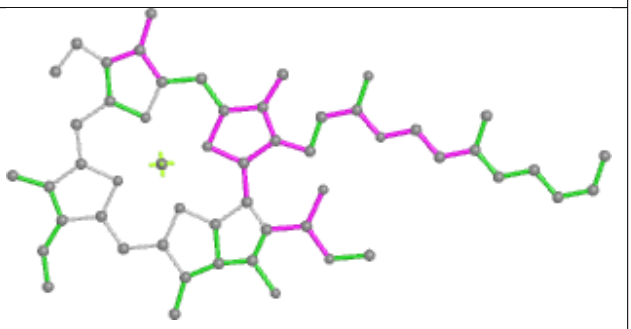
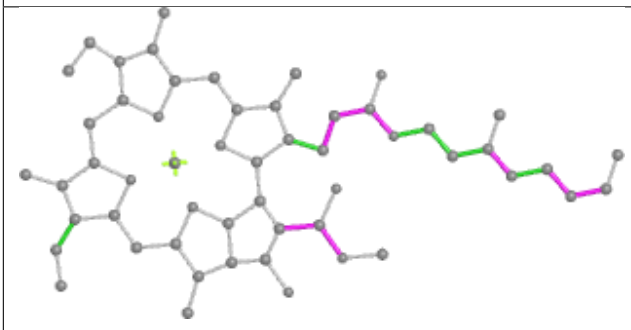
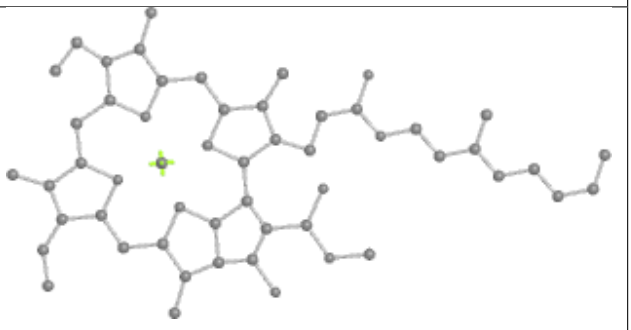
Ligand PQN A 2001



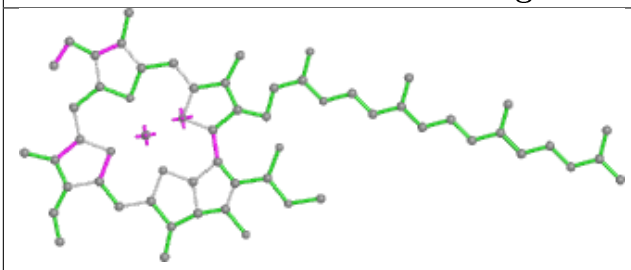
Ligand LHG B 5004



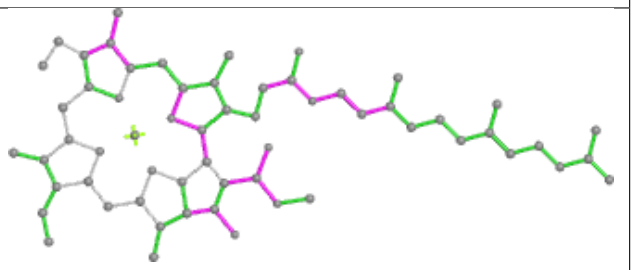
Ligand CLA A 1107	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand CLA A 1116	
 Bond lengths	 Bond angles
 Torsions	 Rings

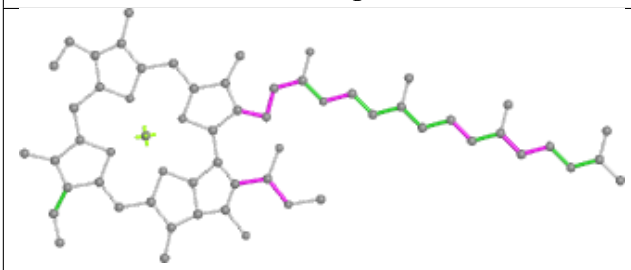
Ligand CLA A 1106



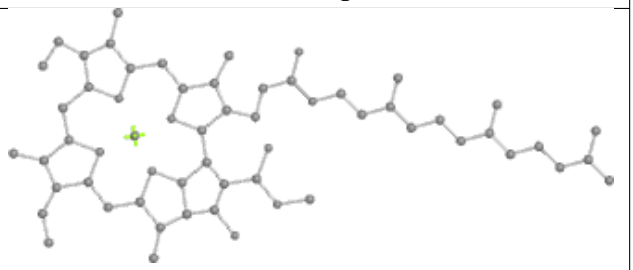
Bond lengths



Bond angles

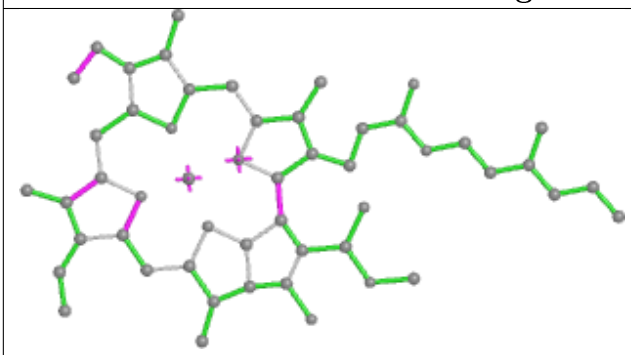


Torsions



Rings

Ligand CLA A 1125



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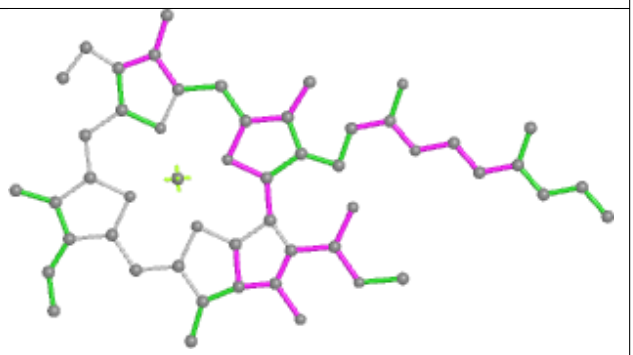
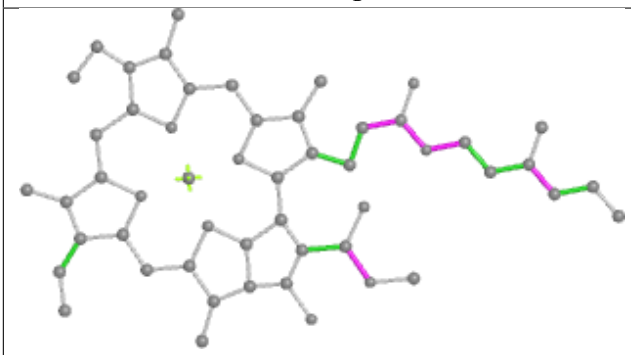


Bond angles



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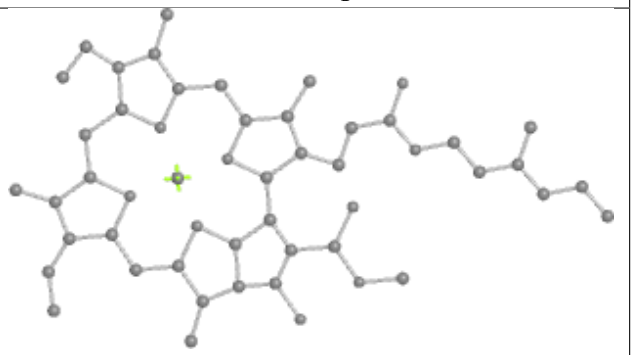
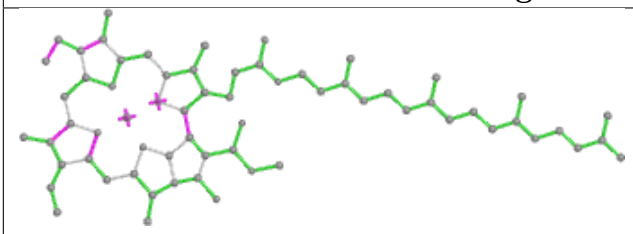
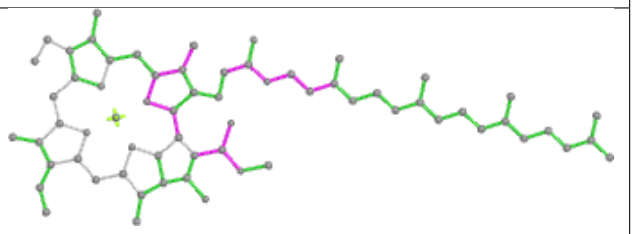


Rings

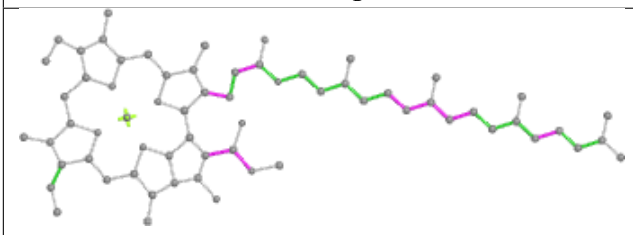
Ligand CLA A 1101



Bond lengths



Bond angles



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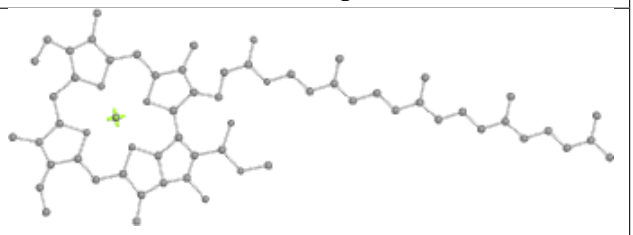
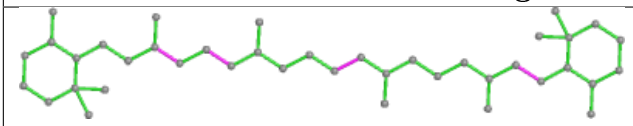
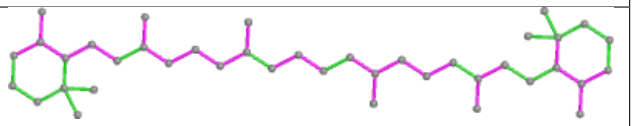


Rings

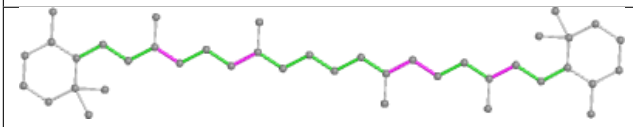
Ligand BCR B 4018



Bond lengths



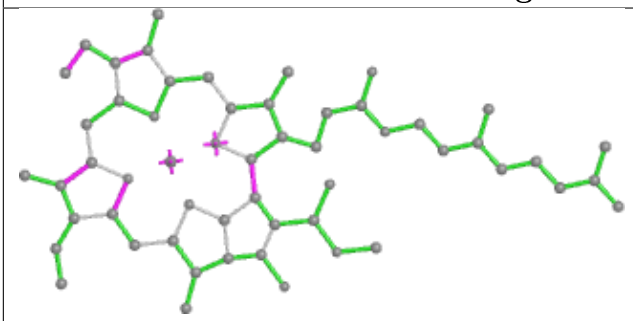
Bond angles



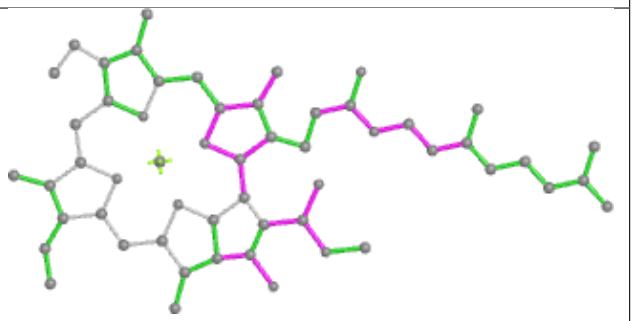
Torsions

Rings

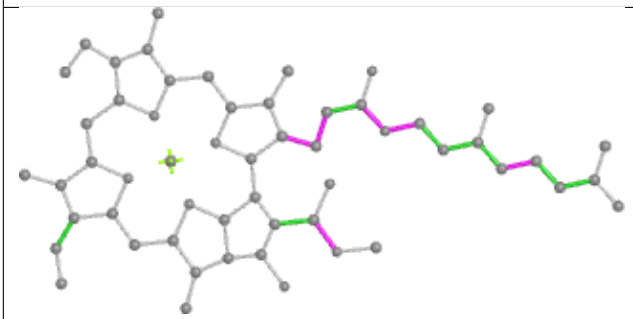
Ligand CLA B 1206



Bond lengths



Bond angles



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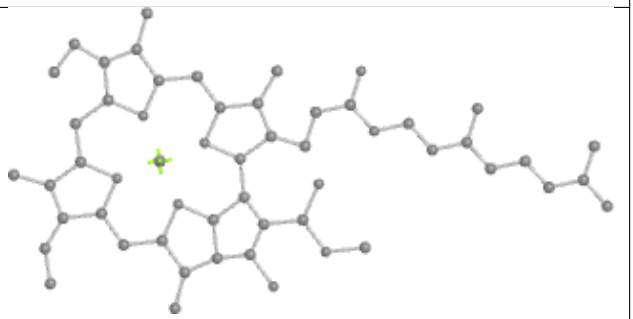
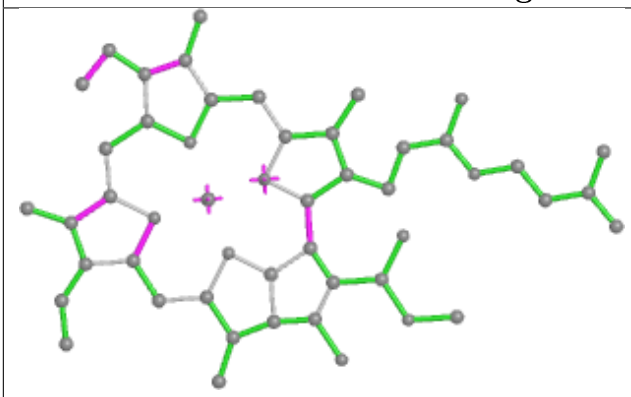
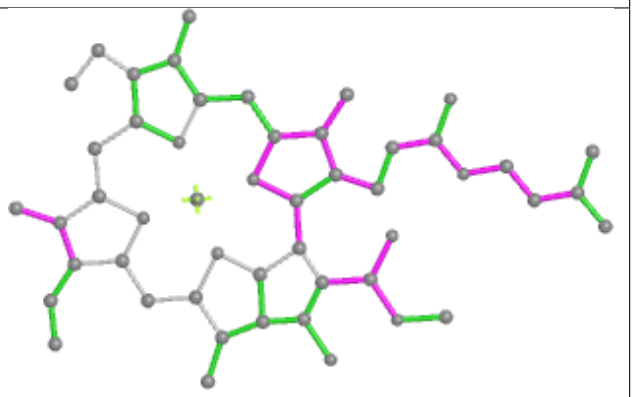


Rings

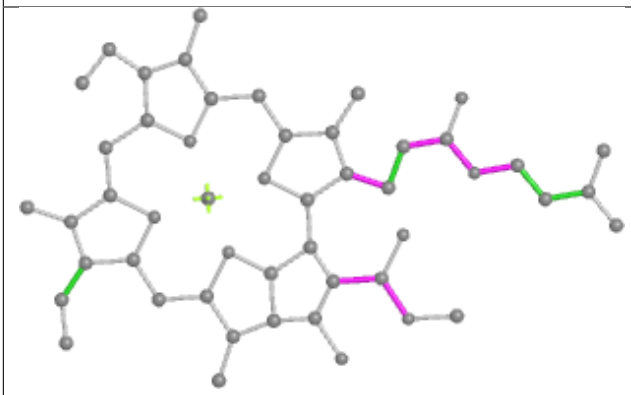
Ligand CLA B 1236



Bond lengths



Bond angles



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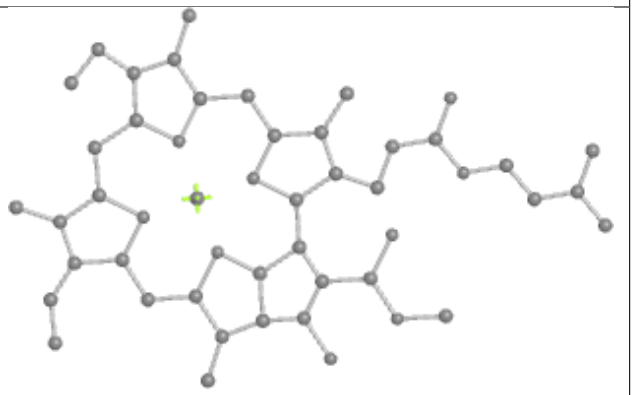
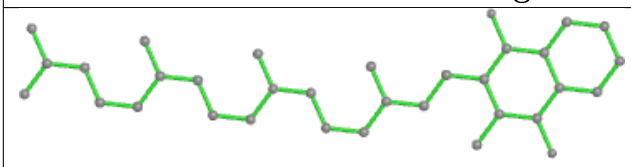
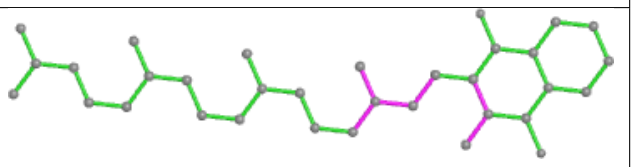


Rings

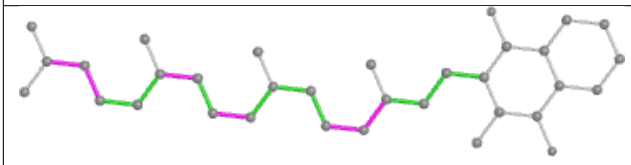
Ligand PQN B 2002



Bond lengths



Bond angles



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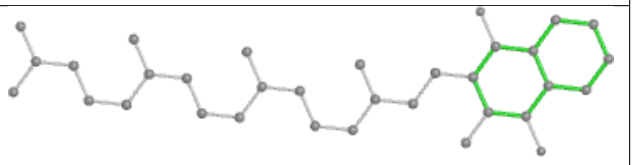
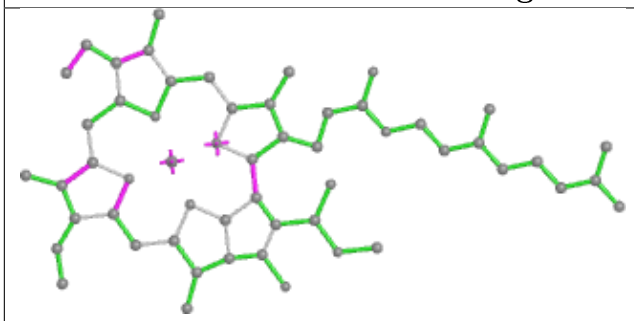


Rings

Ligand CLA B 1216



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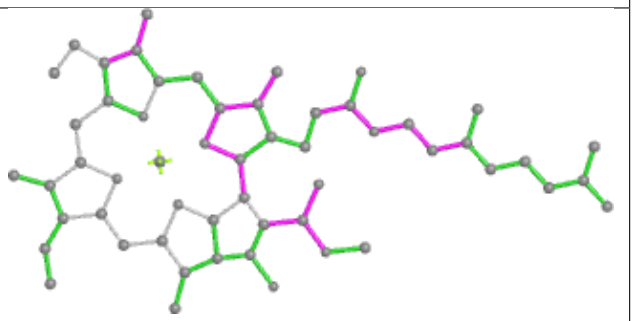
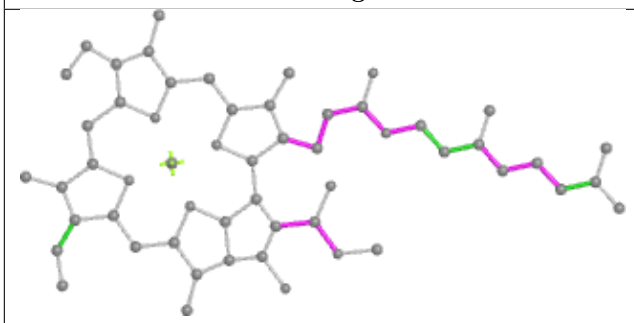


Bond angles



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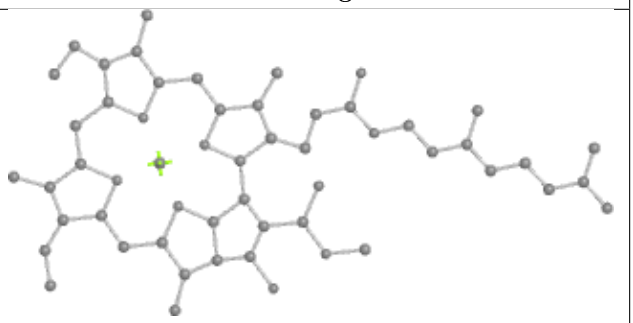
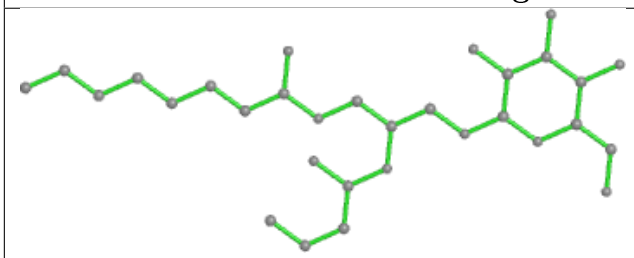
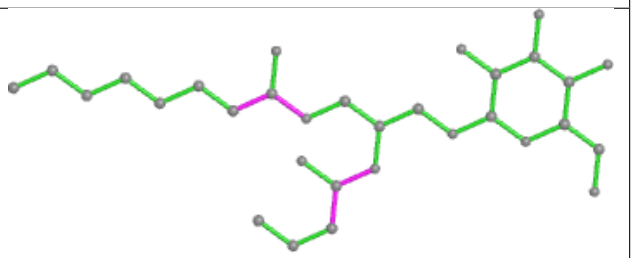


Rings

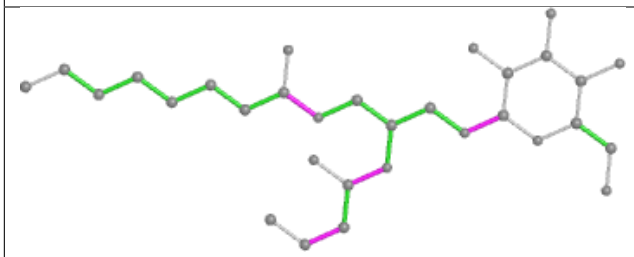
Ligand LMG B 5005



Bond lengths



Bond angles



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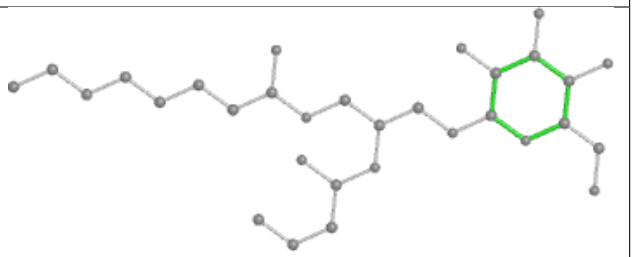
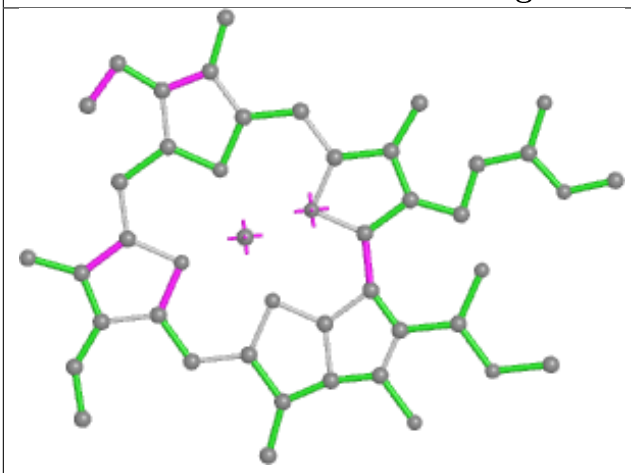
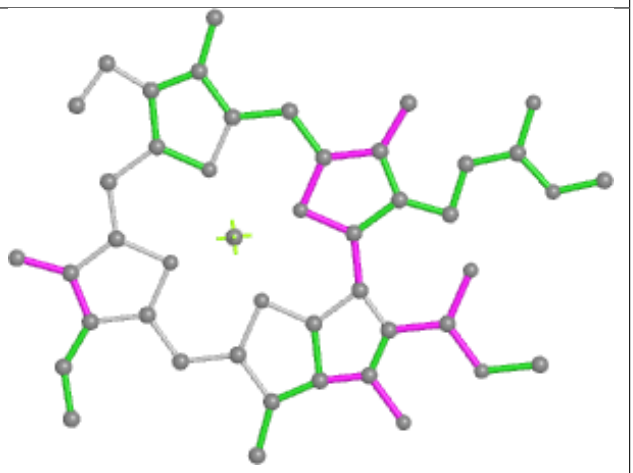


Rings

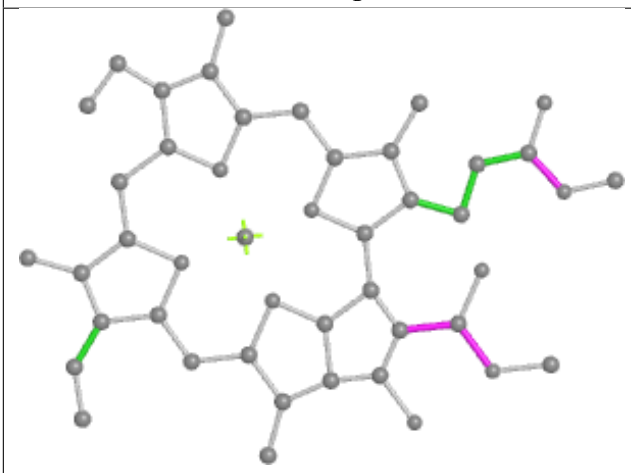
Ligand CLA A 1118



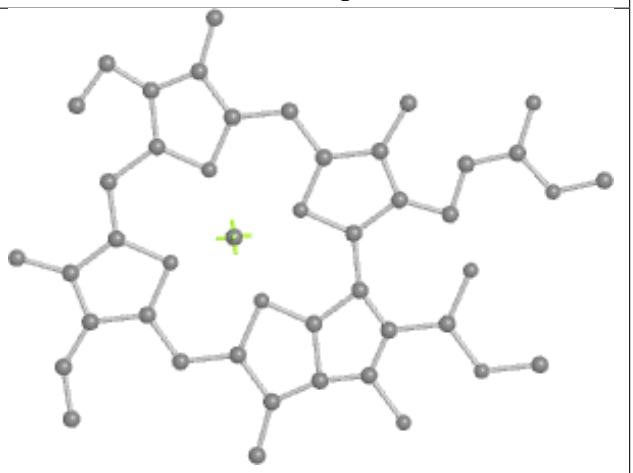
Bond lengths



Bond angles

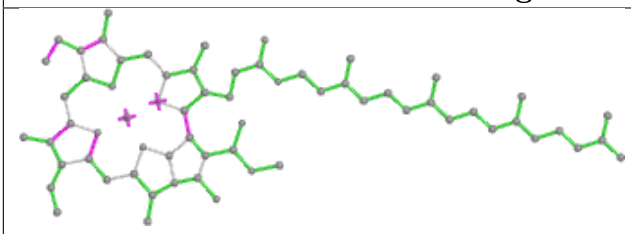


Torsions

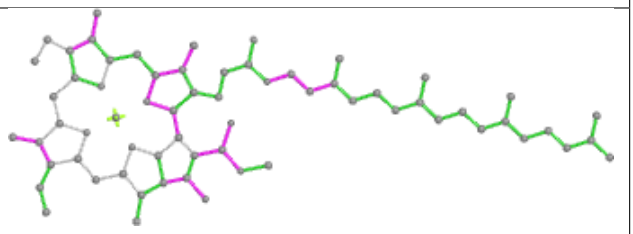


Rings

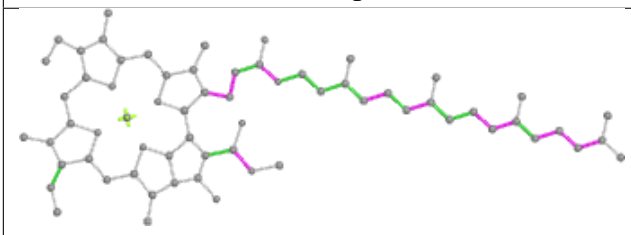
Ligand CLA A 1135



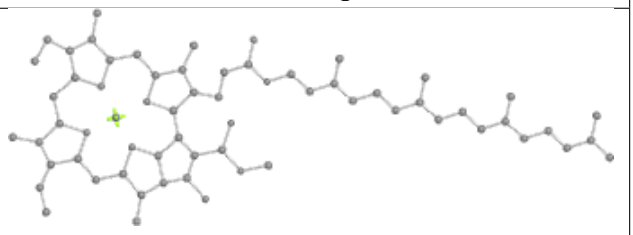
Bond lengths



Bond angles

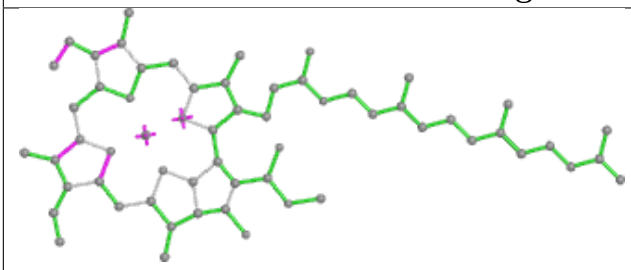


Torsions

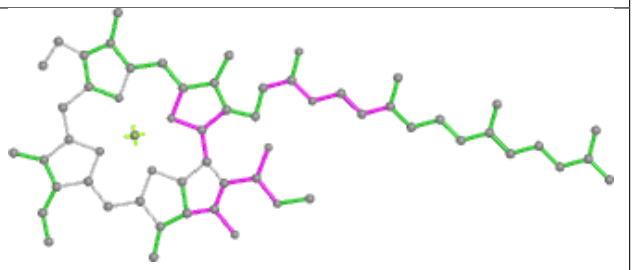


Rings

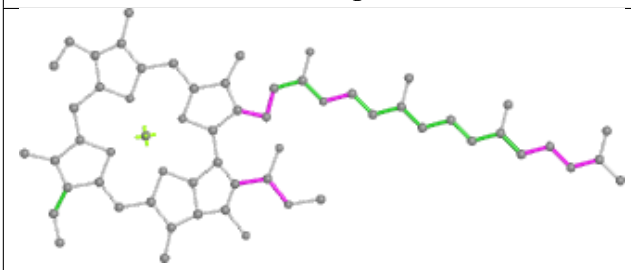
Ligand CLA B 1022



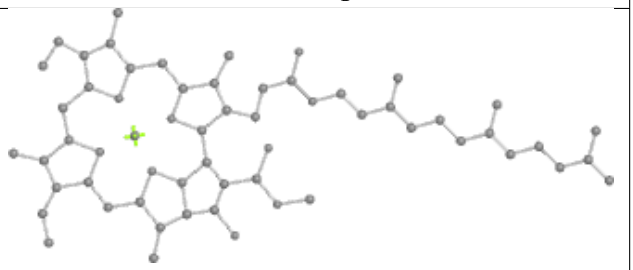
Bond lengths



Bond angles

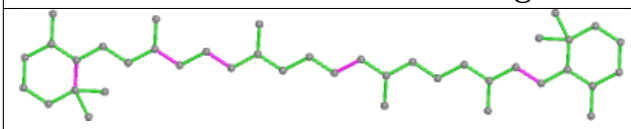


Torsions

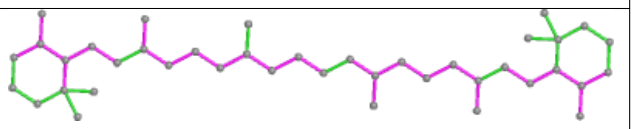


Rings

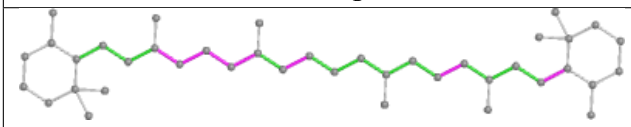
Ligand BCR B 4017



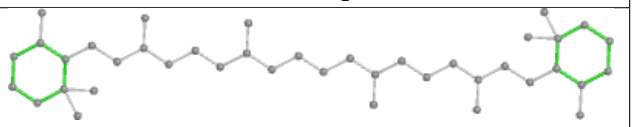
Bond lengths



Bond angles

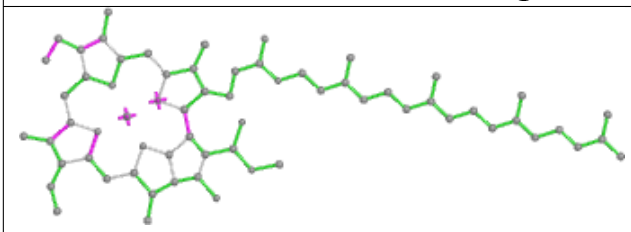


Torsions

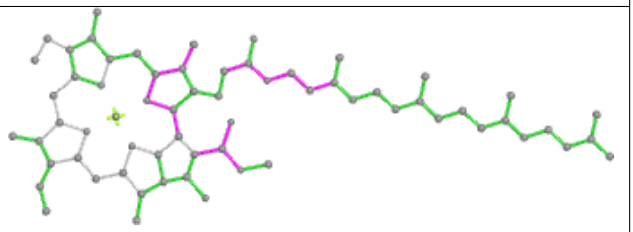


Rings

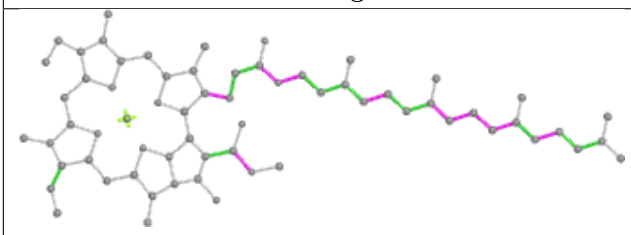
Ligand CLA A 1140



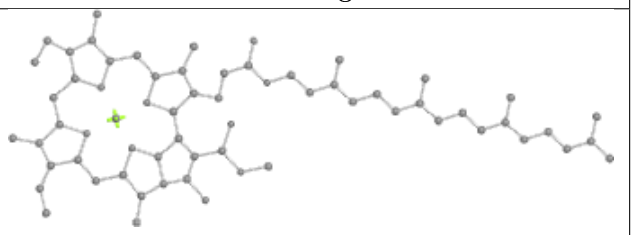
Bond lengths



Bond angles



Torsions



Rings

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.