wwPDB X-ray Structure Validation Summary Report (i)

Jun 18, 2024 – 04:45 PM EDT

PDB ID	:	3X2Q
Title	:	X-ray structure of cyanide-bound bovine heart cytochrome c oxidase in the fully oxidized state at 2.0 angstrom resolution
Authors	:	Yano, N.; Muramoto, K.; Mochizuki, M.; Shinzawa-Itoh, K.; Yamashita, E.; Yoshikawa, S.; Tsukihara, T.
Deposited on	:	2014-12-26
Resolution	:	2.00 Å(reported)

This is a wwPDB X-ray Structure 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/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

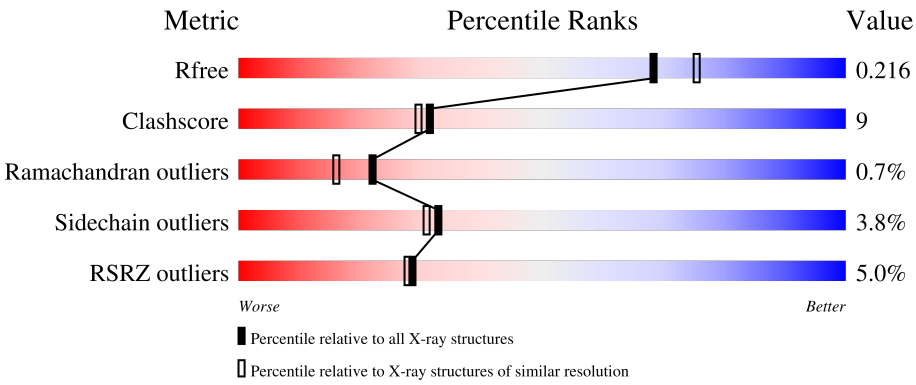
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

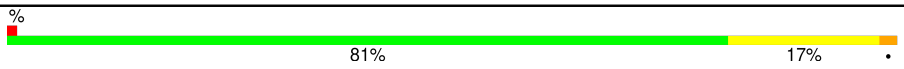
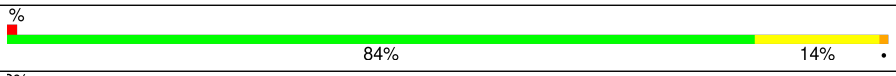
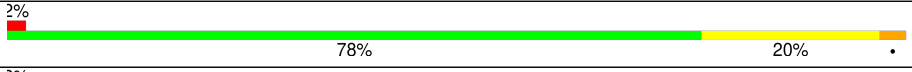
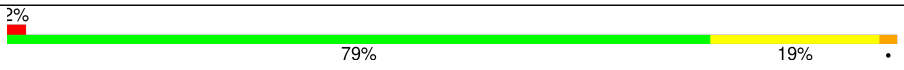
The reported resolution of this entry is 2.00 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	514	
1	N	514	
2	B	227	
2	O	227	

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Mol	Chain	Length	Quality of chain
3	C	261	%, 83%, 16%
3	P	261	2%, 84%, 14%
4	D	147	%, 79%, 16%
4	Q	147	14%, 82%, 12%
5	E	109	2%, 82%, 13%
5	R	109	4%, 86%, 7%
6	F	98	8%, 79%, 18%
6	S	98	10%, 76%, 17%, 7%
7	G	85	19%, 71%, 18%, 11%
7	T	85	20%, 68%, 19%, 12%
8	H	85	9%, 76%, 12%, 7%
8	U	85	11%, 74%, 14%, 7%
9	I	73	4%, 86%, 8%, 5%
9	V	73	11%, 84%, 14%
10	J	59	14%, 90%, 7%
10	W	59	14%, 93%
11	K	56	79%, 9%, 12%
11	X	56	32%, 77%, 9%, 12%
12	L	47	79%, 17%
12	Y	47	2%, 77%, 19%
13	M	46	11%, 74%, 17%, 7%
13	Z	46	17%, 78%, 15%, 7%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
20	PGV	C	307	-	-	-	X
20	PGV	P	302	-	-	-	X
22	CHD	C	304	-	-	-	X
24	CDL	G	103	-	-	X	-
24	CDL	T	102	-	-	X	-
25	PEK	G	104	-	-	-	X
25	PEK	T	101	-	-	X	X
28	DMU	P	301	-	-	-	X
9	SAC	V	1	-	X	-	X

2 Entry composition (i)

There are 29 unique types of molecules in this entry. The entry contains 32060 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called Cytochrome c oxidase subunit 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	514	4051	2708	626	681	36	0	3	0
1	N	514	4051	2708	626	681	36	0	3	0

- Molecule 2 is a protein called Cytochrome c oxidase subunit 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	227	1824	1185	281	340	18	0	0	0
2	O	227	1824	1185	281	340	18	0	0	0

- Molecule 3 is a protein called Cytochrome c oxidase subunit 3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	259	2134	1427	339	353	15	0	3	0
3	P	259	2134	1427	339	353	15	0	3	0

- Molecule 4 is a protein called Cytochrome c oxidase subunit 4 isoform 1, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	D	144	1195	777	196	218	4	0	0	0
4	Q	144	1195	777	196	218	4	0	0	0

- Molecule 5 is a protein called Cytochrome c oxidase subunit 5A, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	E	105	852	544	144	162	2	0	0	0
5	R	105	852	544	144	162	2	0	0	0

- Molecule 6 is a protein called Cytochrome c oxidase subunit 5B, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
6	F	98	748	464	134	145	5	0	0	0
6	S	98	748	464	134	145	5	0	0	0

- Molecule 7 is a protein called Cytochrome c oxidase subunit 6A2, mitochondrial.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	P	S			
7	G	84	675	431	129	113	1	1	0	0	0
7	T	84	675	431	129	113	1	1	0	0	0

- Molecule 8 is a protein called Cytochrome c oxidase subunit 6B1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
8	H	79	662	417	121	119	5	0	0	0
8	U	79	662	417	121	119	5	0	0	0

- Molecule 9 is a protein called Cytochrome c oxidase subunit 6C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
9	I	73	601	390	107	100	4	0	0	0
9	V	73	601	390	107	100	4	0	0	0

- Molecule 10 is a protein called Cytochrome c oxidase subunit 7A1, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
10	J	58	460	297	78	82	3	0	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
10	W	58	460	297	78	82	3	0	0	0

- Molecule 11 is a protein called Cytochrome c oxidase subunit 7B, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
11	K	49	384	250	65	67	2	0	0	0
			Total	C	N	O	S			
11	X	49	384	250	65	67	2	0	0	0

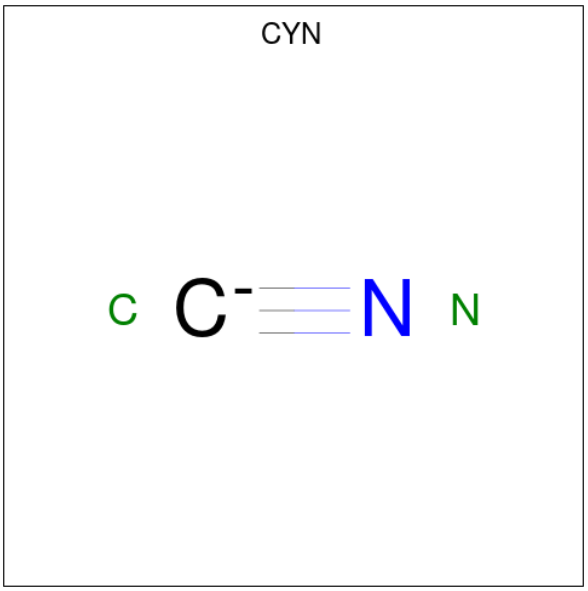
- Molecule 12 is a protein called Cytochrome c oxidase subunit 7C, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
12	L	46	380	254	64	60	2	0	0	0
			Total	C	N	O	S			
12	Y	46	380	254	64	60	2	0	0	0

- Molecule 13 is a protein called Cytochrome c oxidase subunit 8B, mitochondrial.

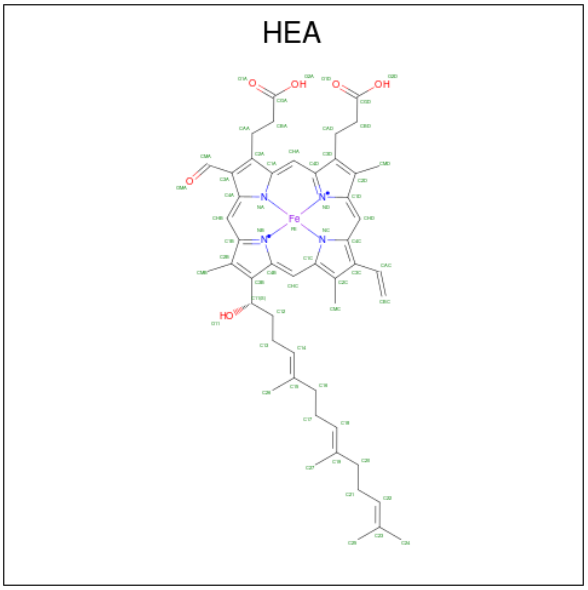
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
13	M	43	335	223	53	59	0	0	0
			Total	C	N	O			
13	Z	43	335	223	53	59	0	0	0

- Molecule 14 is CYANIDE ION (three-letter code: CYN) (formula: CN).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	N		
14	A	1	2	1	1	0	0
			Total	C	N		
14	N	1	2	1	1	0	0

- Molecule 15 is HEME-A (three-letter code: HEA) (formula: $C_{49}H_{56}FeN_4O_6$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	Fe	N	O		
15	A	1	60	49	1	4	6	0	0
			Total	C	Fe	N	O		
15	A	1	60	49	1	4	6	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	Fe	N	O		
15	N	1	60	49	1	4	6	0	0
15	N	1	60	49	1	4	6	0	0

- Molecule 16 is COPPER (II) ION (three-letter code: CU) (formula: Cu).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Cu		
16	A	1	1	1	0	0
16	N	1	1	1	0	0

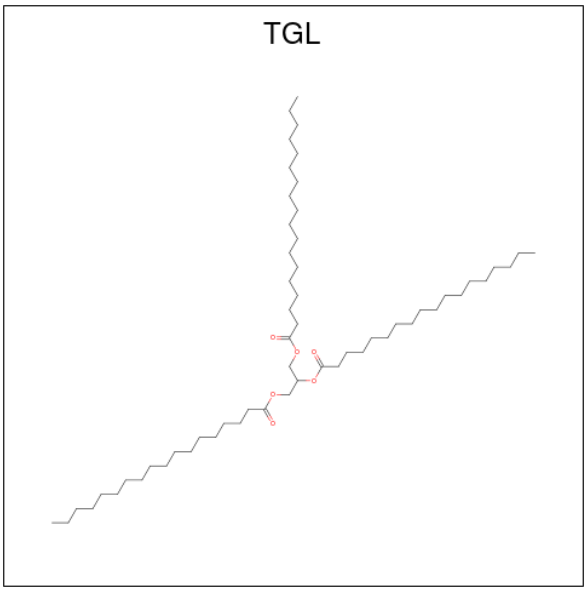
- Molecule 17 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
17	A	1	1	1	0	0
17	N	1	1	1	0	0

- Molecule 18 is SODIUM ION (three-letter code: NA) (formula: Na).

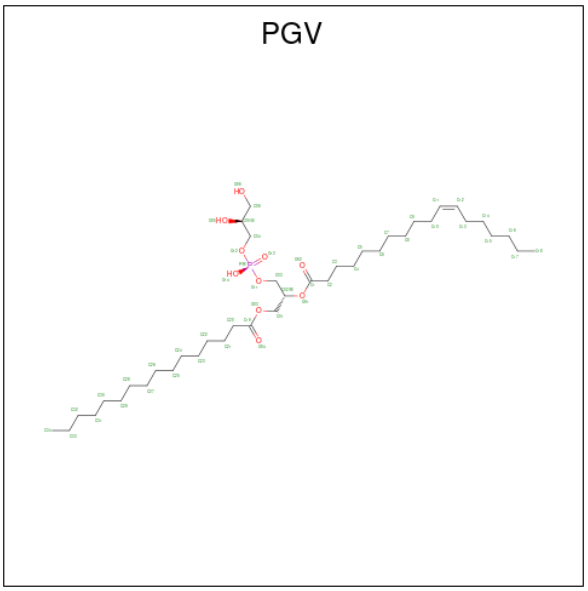
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Na		
18	A	1	1	1	0	0
18	N	1	1	1	0	0

- Molecule 19 is TRISTEAROYLGLYCEROL (three-letter code: TGL) (formula: $C_{57}H_{110}O_6$).



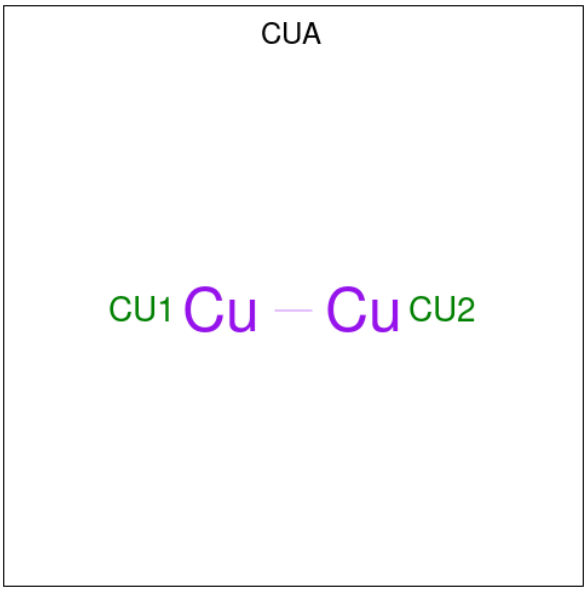
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
19	A	1	63	57	6	0	0
19	D	1	63	57	6	0	0
19	L	1	63	57	6	0	0
19	N	1	63	57	6	0	0
19	N	1	63	57	6	0	0
19	Q	1	63	57	6	0	0

- Molecule 20 is (1R)-2-{[{[(2S)-2,3-DIHYDROXYPROPYL]OXY}(HYDROXY)PHOSPHORYL]OXY}-1-[(PALMITOYLOXY)METHYL]ETHYL (11E)-OCTADEC-11-ENOATE (three-letter code: PGV) (formula: $C_{40}H_{77}O_{10}P$).



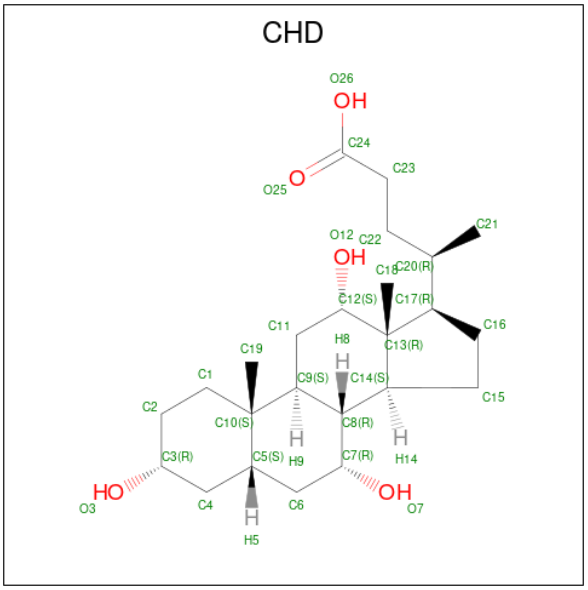
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
20	A	1	51	40	10	1	0	0
			Total	C	O	P		
20	A	1	51	40	10	1	0	0
			Total	C	O	P		
20	C	1	51	40	10	1	0	0
			Total	C	O	P		
20	C	1	51	40	10	1	0	0
			Total	C	O	P		
20	N	1	51	40	10	1	0	0
			Total	C	O	P		
20	N	1	51	40	10	1	0	0
			Total	C	O	P		
20	P	1	51	40	10	1	0	0
			Total	C	O	P		
20	P	1	51	40	10	1	0	0

- Molecule 21 is DINUCLEAR COPPER ION (three-letter code: CUA) (formula: Cu_2).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
21	B	1	Total Cu 2 2	0	0
21	O	1	Total Cu 2 2	0	0

- Molecule 22 is CHOLIC ACID (three-letter code: CHD) (formula: $C_{24}H_{40}O_5$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
22	B	1	Total C O 29 24 5	0	0
22	C	1	Total C O 29 24 5	0	0

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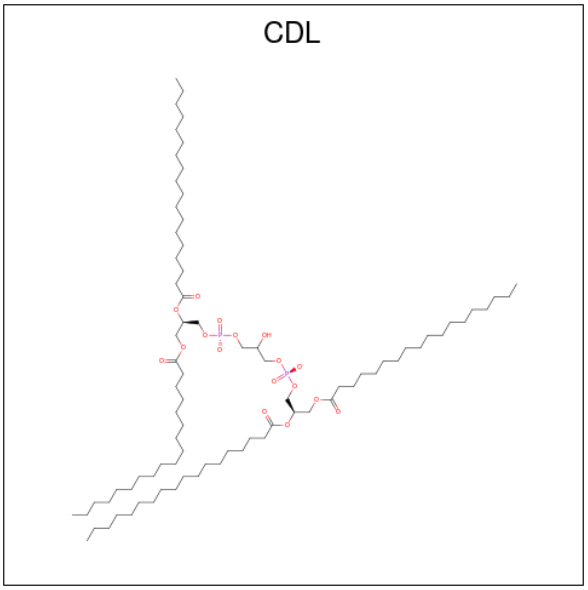
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
22	C	1	29	24	5	0	0
			Total	C	O		
22	O	1	29	24	5	0	0
			Total	C	O		
22	P	1	29	24	5	0	0
			Total	C	O		
22	P	1	29	24	5	0	0

- Molecule 23 is UNKNOWN ATOM OR ION (three-letter code: UNX) (formula: X).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	X		
23	C	1	1	1	0	0
			Total	X		
23	P	1	1	1	0	0

- Molecule 24 is CARDIOLIPIN (three-letter code: CDL) (formula: $C_{81}H_{156}O_{17}P_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
24	C	1	100	81	17	2	0	0
			Total	C	O	P		
24	G	1	100	81	17	2	0	0
			Total	C	O	P		
24	P	1	100	81	17	2	0	0

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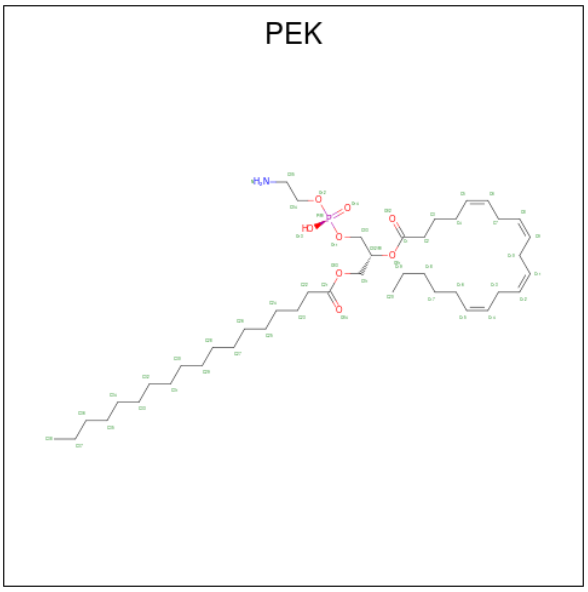
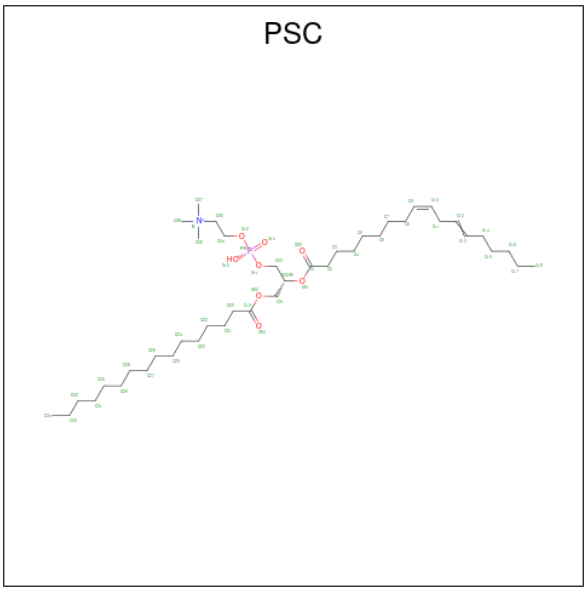
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
24	T	1	100	81	17	2	0	0

- Molecule 25 is (1S)-2-{[(2-AMINOETHOXY)(HYDROXY)PHOSPHORYL]OXY}-1-[(STEAROYLOXY)METHYL]ETHYL (5E,8E,11E,14E)-ICOSA-5,8,11,14-TETRAENOATE (three-letter code: PEK) (formula: $C_{43}H_{78}NO_8P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
25	C	1	53	43	1	8	1	0	0
			Total	C	N	O	P		
25	G	1	53	43	1	8	1	0	0
			Total	C	N	O	P		
25	G	1	53	43	1	8	1	0	0
			Total	C	N	O	P		
25	P	1	53	43	1	8	1	0	0
			Total	C	N	O	P		
25	P	1	53	43	1	8	1	0	0
			Total	C	N	O	P		
25	T	1	53	43	1	8	1	0	0

- Molecule 26 is (7R,17E,20E)-4-HYDROXY-N,N,N-TRIMETHYL-9-OXO-7-[(PALMITOYLOXY)METHYL]-3,5,8-TRIOXA-4-PHOSPHAHEXACOSA-17,20-DIEN-1-AMINIUM 4-OXIDE (three-letter code: PSC) (formula: $C_{42}H_{81}NO_8P$).

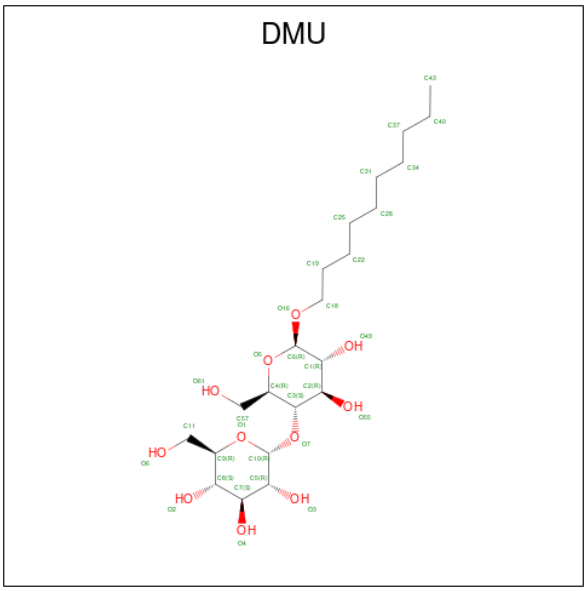


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
26	E	1	52	42	1	8	1	0	0
			Total	C	N	O	P		
26	O	1	52	42	1	8	1	0	0

- Molecule 27 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Zn		
27	F	1	1	1	0	0
			Total	Zn		
27	S	1	1	1	0	0

- Molecule 28 is DECYL-BETA-D-MALTOPYRANOSIDE (three-letter code: DMU) (formula: $C_{22}H_{42}O_{11}$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
28	G	1	33	22	11	0	0
28	M	1	33	22	11	0	0
28	P	1	33	22	11	0	0
28	Z	1	33	22	11	0	0

- Molecule 29 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
29	A	188	188	188	0	0
29	B	121	121	121	0	0
29	C	77	77	77	0	0
29	D	78	78	78	0	0
29	E	58	58	58	0	0
29	F	58	58	58	0	0
29	G	27	27	27	0	0
29	H	34	34	34	0	0

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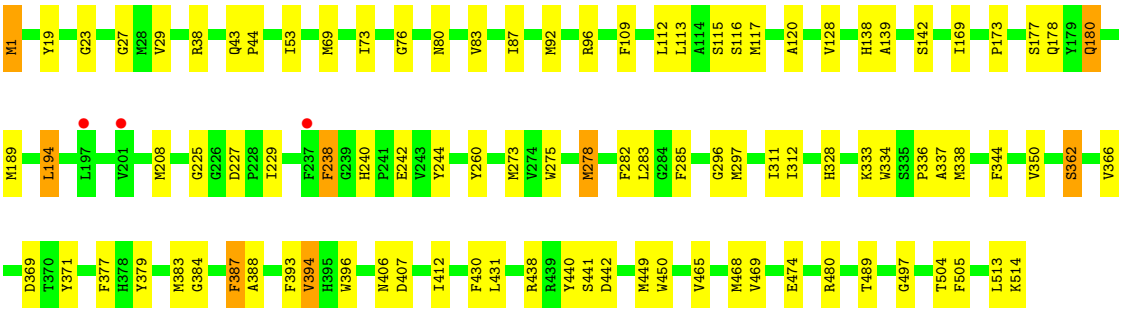
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
29	I	29	Total O 29 29	0	0
29	J	15	Total O 15 15	0	0
29	K	20	Total O 20 20	0	0
29	L	16	Total O 16 16	0	0
29	M	14	Total O 14 14	0	0
29	N	156	Total O 156 156	0	0
29	O	91	Total O 91 91	0	0
29	P	76	Total O 76 76	0	0
29	Q	46	Total O 46 46	0	0
29	R	42	Total O 42 42	0	0
29	S	38	Total O 38 38	0	0
29	T	23	Total O 23 23	0	0
29	U	28	Total O 28 28	0	0
29	V	14	Total O 14 14	0	0
29	W	4	Total O 4 4	0	0
29	X	15	Total O 15 15	0	0
29	Y	11	Total O 11 11	0	0
29	Z	7	Total O 7 7	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

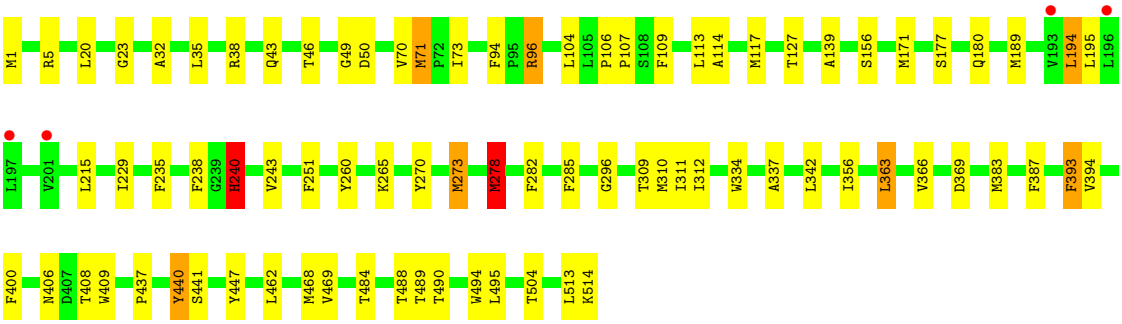
• Molecule 1: Cytochrome c oxidase subunit 1

Chain A:



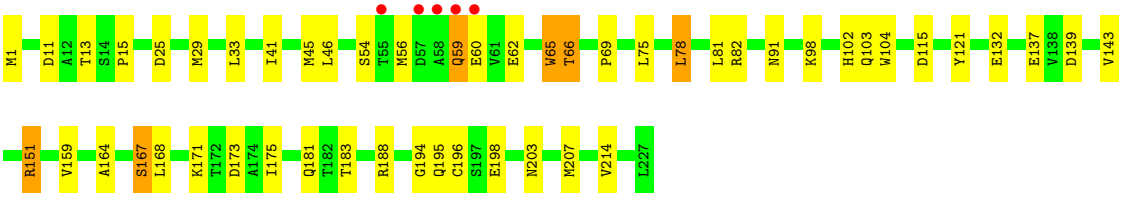
• Molecule 1: Cytochrome c oxidase subunit 1

Chain N:



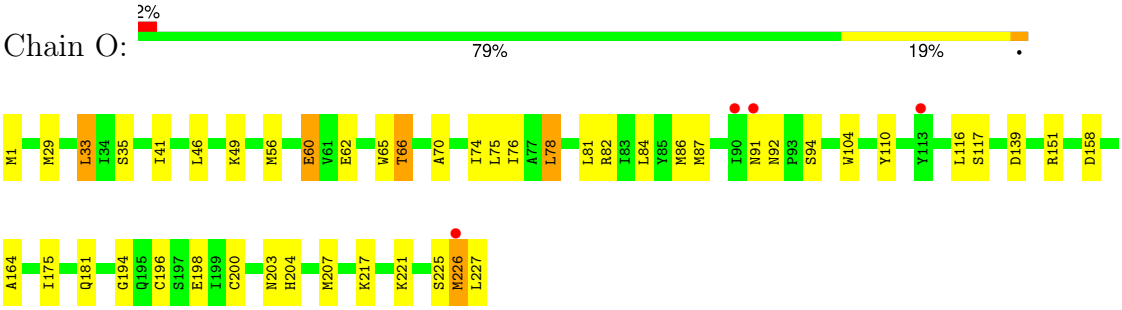
• Molecule 2: Cytochrome c oxidase subunit 2

Chain B:



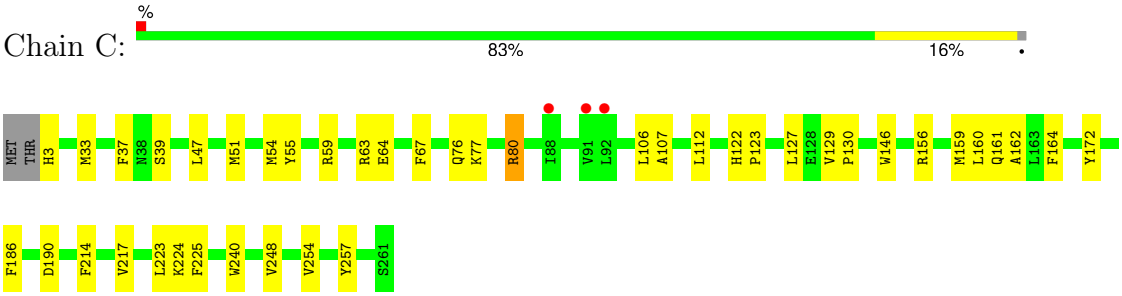
• Molecule 2: Cytochrome c oxidase subunit 2

Chain O:



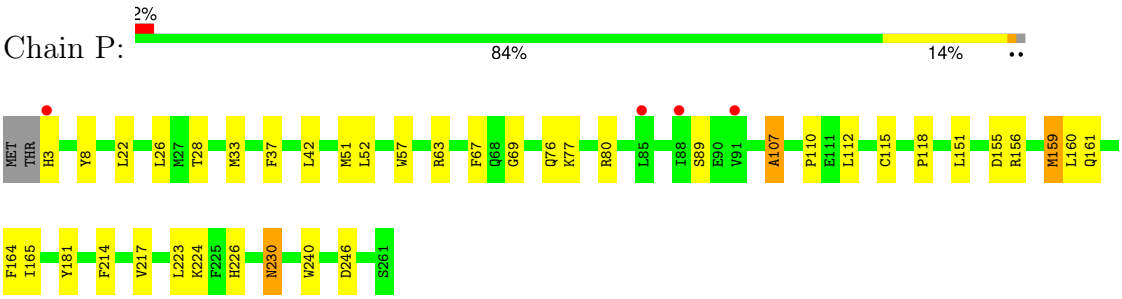
• Molecule 3: Cytochrome c oxidase subunit 3

Chain C:



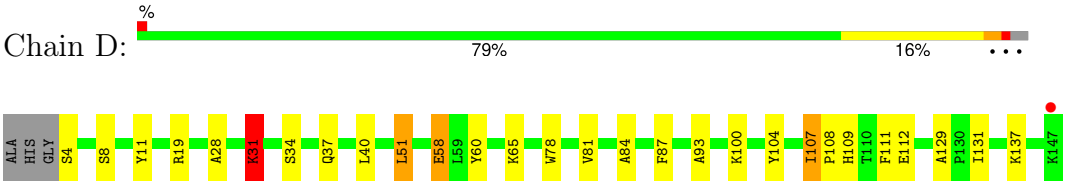
• Molecule 3: Cytochrome c oxidase subunit 3

Chain P:



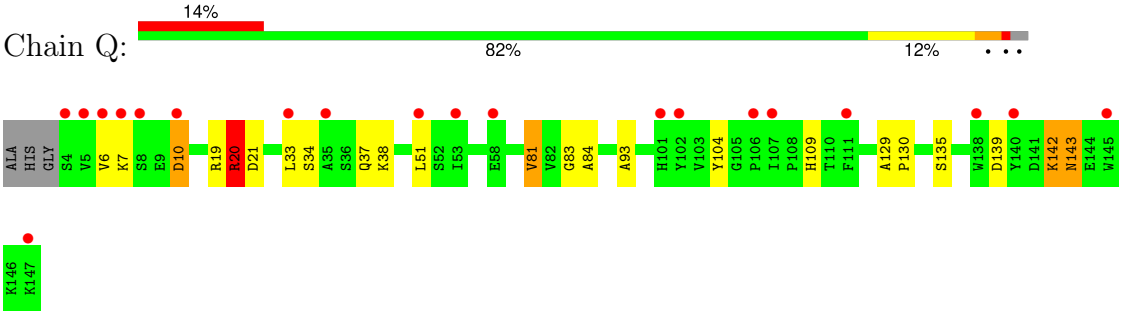
• Molecule 4: Cytochrome c oxidase subunit 4 isoform 1, mitochondrial

Chain D:



• Molecule 4: Cytochrome c oxidase subunit 4 isoform 1, mitochondrial

Chain Q:



• Molecule 5: Cytochrome c oxidase subunit 5A, mitochondrial

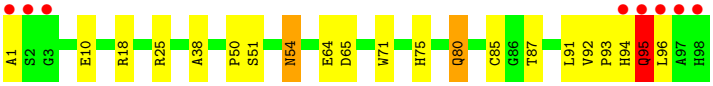
Chain E:

• Molecule 5: Cytochrome c oxidase subunit 5A, mitochondrial

Chain R:

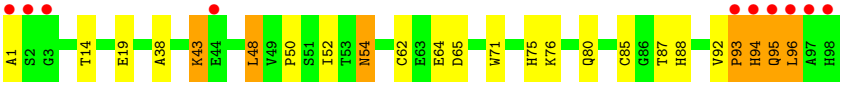
• Molecule 6: Cytochrome c oxidase subunit 5B, mitochondrial

Chain F:



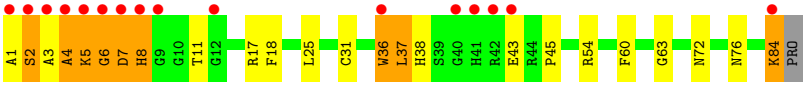
• Molecule 6: Cytochrome c oxidase subunit 5B, mitochondrial

Chain S:



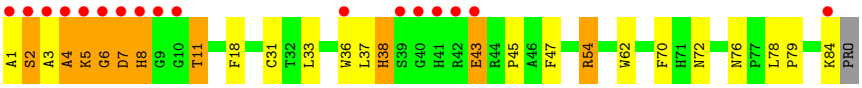
• Molecule 7: Cytochrome c oxidase subunit 6A2, mitochondrial

Chain G:



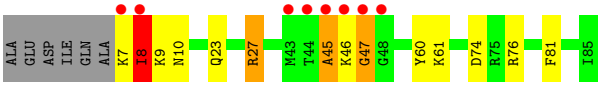
• Molecule 7: Cytochrome c oxidase subunit 6A2, mitochondrial

Chain T:



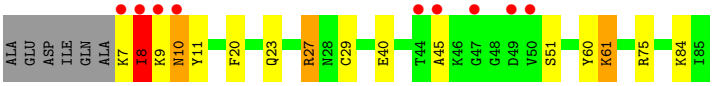
• Molecule 8: Cytochrome c oxidase subunit 6B1

Chain H:



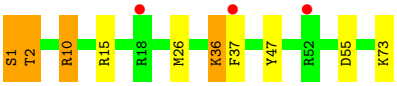
• Molecule 8: Cytochrome c oxidase subunit 6B1

Chain U:



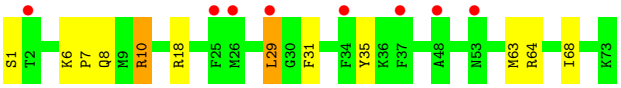
• Molecule 9: Cytochrome c oxidase subunit 6C

Chain I:



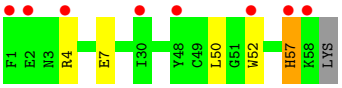
• Molecule 9: Cytochrome c oxidase subunit 6C

Chain V:



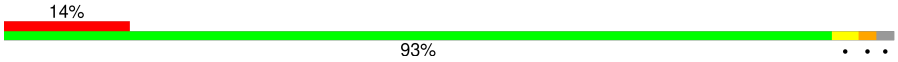
• Molecule 10: Cytochrome c oxidase subunit 7A1, mitochondrial

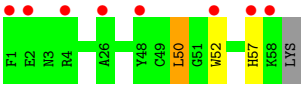
Chain J:



• Molecule 10: Cytochrome c oxidase subunit 7A1, mitochondrial

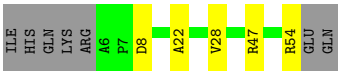
Chain W:





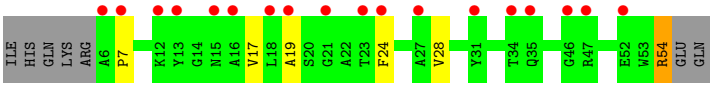
• Molecule 11: Cytochrome c oxidase subunit 7B, mitochondrial

Chain K:



• Molecule 11: Cytochrome c oxidase subunit 7B, mitochondrial

Chain X:

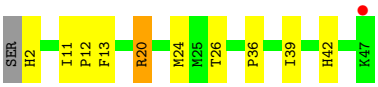


• Molecule 12: Cytochrome c oxidase subunit 7C, mitochondrial

Chain L:

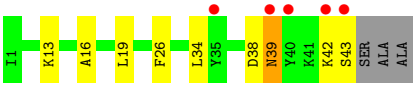
• Molecule 12: Cytochrome c oxidase subunit 7C, mitochondrial

Chain Y:



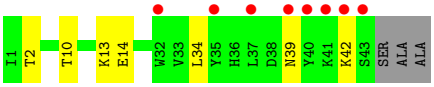
• Molecule 13: Cytochrome c oxidase subunit 8B, mitochondrial

Chain M:



• Molecule 13: Cytochrome c oxidase subunit 8B, mitochondrial

Chain Z:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	183.68Å 206.68Å 178.20Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.00 – 2.00 81.64 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.9 (40.00-2.00) 99.9 (81.64-2.00)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.85 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, R_{free}	0.187 , 0.214 0.189 , 0.216	Depositor DCC
R_{free} test set	22864 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å^2)	31.7	Xtriage
Anisotropy	0.465	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 58.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.004 for l,-k,h	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	32060	wwPDB-VP
Average B, all atoms (Å^2)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.61% of the height of the origin peak. No significant pseudotranslation is detected.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: CUA, FME, TGL, UNX, PEK, CHD, SAC, CU, NA, DMU, CDL, TPO, CYN, MG, PSC, ZN, PGV, HEA

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	1.51	29/4180 (0.7%)	1.15	18/5710 (0.3%)
1	N	1.34	15/4180 (0.4%)	0.99	10/5710 (0.2%)
2	B	1.45	11/1860 (0.6%)	1.16	13/2534 (0.5%)
2	O	1.14	3/1860 (0.2%)	1.01	3/2534 (0.1%)
3	C	1.35	5/2221 (0.2%)	0.96	1/3035 (0.0%)
3	P	1.31	6/2221 (0.3%)	0.93	2/3035 (0.1%)
4	D	1.48	10/1229 (0.8%)	1.14	6/1658 (0.4%)
4	Q	1.03	1/1229 (0.1%)	0.92	3/1658 (0.2%)
5	E	1.27	3/871 (0.3%)	1.11	3/1182 (0.3%)
5	R	1.15	3/871 (0.3%)	0.97	2/1182 (0.2%)
6	F	1.31	0/765	1.08	2/1038 (0.2%)
6	S	1.20	0/765	1.02	0/1038
7	G	1.33	3/690 (0.4%)	1.01	4/937 (0.4%)
7	T	1.31	4/690 (0.6%)	1.07	2/937 (0.2%)
8	H	1.26	1/682 (0.1%)	1.01	3/921 (0.3%)
8	U	1.04	0/682	0.91	1/921 (0.1%)
9	I	1.36	0/605	1.11	2/802 (0.2%)
9	V	1.09	0/605	1.06	3/802 (0.4%)
10	J	1.21	0/471	0.94	0/636
10	W	1.07	0/471	0.92	0/636
11	K	1.38	1/398 (0.3%)	1.11	2/546 (0.4%)
11	X	1.07	1/398 (0.3%)	0.85	0/546
12	L	1.38	3/393 (0.8%)	1.02	1/526 (0.2%)
12	Y	1.16	0/393	0.82	0/526
13	M	1.38	2/345 (0.6%)	1.04	0/470
13	Z	1.05	0/345	0.87	0/470
All	All	1.32	101/29420 (0.3%)	1.03	81/39990 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected

by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	N	0	1
6	F	0	1
6	S	0	1
10	J	0	1
10	W	0	1
All	All	0	6

The worst 5 of 101 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	R	80	GLU	CG-CD	9.50	1.66	1.51
2	B	167	SER	CB-OG	-8.83	1.30	1.42
1	A	371	TYR	CD1-CE1	8.27	1.51	1.39
7	T	36	TRP	CB-CG	8.23	1.65	1.50
5	R	80	GLU	CB-CG	8.14	1.67	1.52

The worst 5 of 81 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	69	MET	CG-SD-CE	-19.27	69.37	100.20
4	D	19	ARG	NE-CZ-NH1	-13.36	113.62	120.30
1	A	96	ARG	NE-CZ-NH2	-11.58	114.51	120.30
4	Q	20	ARG	NE-CZ-NH2	-10.39	115.10	120.30
1	A	278	MET	CG-SD-CE	-9.12	85.61	100.20

There are no chirality outliers.

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	240	HIS	Sidechain
6	F	93	PRO	Peptide
10	J	57	HIS	Peptide
1	N	240	HIS	Sidechain
6	S	93	PRO	Peptide

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4051	0	4029	55	0
1	N	4051	0	4029	56	0
2	B	1824	0	1833	26	0
2	O	1824	0	1833	31	0
3	C	2134	0	2051	31	0
3	P	2134	0	2051	36	0
4	D	1195	0	1183	15	0
4	Q	1195	0	1183	20	0
5	E	852	0	845	11	0
5	R	852	0	845	8	0
6	F	748	0	728	16	0
6	S	748	0	728	29	0
7	G	675	0	643	27	0
7	T	675	0	643	45	0
8	H	662	0	623	7	0
8	U	662	0	623	12	0
9	I	601	0	613	12	0
9	V	601	0	613	10	0
10	J	460	0	459	4	0
10	W	460	0	459	2	0
11	K	384	0	366	2	0
11	X	384	0	366	4	0
12	L	380	0	380	10	0
12	Y	380	0	380	15	0
13	M	335	0	352	2	0
13	Z	335	0	352	2	0
14	A	2	0	0	0	0
14	N	2	0	0	0	0
15	A	120	0	108	9	0
15	N	120	0	108	8	0
16	A	1	0	0	0	0
16	N	1	0	0	0	0
17	A	1	0	0	0	0
17	N	1	0	0	0	0
18	A	1	0	0	1	0
18	N	1	0	0	0	0
19	A	63	0	110	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
19	D	63	0	110	12	0
19	L	63	0	110	14	0
19	N	126	0	220	22	0
19	Q	63	0	110	2	0
20	A	102	0	152	8	0
20	C	102	0	152	5	0
20	N	102	0	152	10	0
20	P	102	0	152	5	0
21	B	2	0	0	0	0
21	O	2	0	0	0	0
22	B	29	0	39	2	0
22	C	58	0	78	6	0
22	O	29	0	39	1	0
22	P	58	0	78	8	0
23	C	1	0	0	0	0
23	P	1	0	0	0	0
24	C	100	0	156	17	0
24	G	100	0	156	26	0
24	P	100	0	156	20	0
24	T	100	0	156	27	0
25	C	53	0	77	6	0
25	G	106	0	154	13	0
25	P	106	0	154	13	0
25	T	53	0	77	22	0
26	E	52	0	80	16	0
26	O	52	0	80	17	0
27	F	1	0	0	0	0
27	S	1	0	0	0	0
28	G	33	0	41	4	0
28	M	33	0	42	0	0
28	P	33	0	42	3	0
28	Z	33	0	42	0	0
29	A	188	0	0	10	0
29	B	121	0	0	3	0
29	C	77	0	0	1	0
29	D	78	0	0	4	0
29	E	58	0	0	2	0
29	F	58	0	0	4	0
29	G	27	0	0	3	0
29	H	34	0	0	0	0
29	I	29	0	0	4	0
29	J	15	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
29	K	20	0	0	1	0
29	L	16	0	0	2	0
29	M	14	0	0	0	0
29	N	156	0	0	3	0
29	O	91	0	0	3	0
29	P	76	0	0	9	0
29	Q	46	0	0	4	0
29	R	42	0	0	1	0
29	S	38	0	0	3	0
29	T	23	0	0	2	0
29	U	28	0	0	3	0
29	V	14	0	0	0	0
29	W	4	0	0	0	0
29	X	15	0	0	1	0
29	Y	11	0	0	0	0
29	Z	7	0	0	0	0
All	All	32060	0	31341	561	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 9.

The worst 5 of 561 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)
25:P:309:PEK:H383	24:T:102:CDL:C27	1.43	1.46
1:A:297:MET:SD	1:A:297:MET:CE	2.04	1.45
25:C:306:PEK:H383	24:G:103:CDL:C27	1.49	1.38
1:A:312[A]:ILE:HD12	29:A:740:HOH:O	1.21	1.31
6:S:43:LYS:H	6:S:43:LYS:CD	1.43	1.26

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	515/514 (100%)	502 (98%)	12 (2%)	1 (0%)	47	44
1	N	515/514 (100%)	501 (97%)	14 (3%)	0	100	100
2	B	225/227 (99%)	216 (96%)	9 (4%)	0	100	100
2	O	225/227 (99%)	218 (97%)	6 (3%)	1 (0%)	34	30
3	C	260/261 (100%)	256 (98%)	4 (2%)	0	100	100
3	P	260/261 (100%)	255 (98%)	5 (2%)	0	100	100
4	D	142/147 (97%)	138 (97%)	4 (3%)	0	100	100
4	Q	142/147 (97%)	132 (93%)	10 (7%)	0	100	100
5	E	103/109 (94%)	102 (99%)	1 (1%)	0	100	100
5	R	103/109 (94%)	103 (100%)	0	0	100	100
6	F	96/98 (98%)	90 (94%)	4 (4%)	2 (2%)	7	2
6	S	96/98 (98%)	91 (95%)	2 (2%)	3 (3%)	4	1
7	G	81/85 (95%)	70 (86%)	6 (7%)	5 (6%)	1	0
7	T	81/85 (95%)	66 (82%)	10 (12%)	5 (6%)	1	0
8	H	77/85 (91%)	70 (91%)	3 (4%)	4 (5%)	2	0
8	U	77/85 (91%)	71 (92%)	2 (3%)	4 (5%)	2	0
9	I	71/73 (97%)	70 (99%)	1 (1%)	0	100	100
9	V	71/73 (97%)	69 (97%)	2 (3%)	0	100	100
10	J	56/59 (95%)	56 (100%)	0	0	100	100
10	W	56/59 (95%)	55 (98%)	1 (2%)	0	100	100
11	K	47/56 (84%)	46 (98%)	1 (2%)	0	100	100
11	X	47/56 (84%)	46 (98%)	1 (2%)	0	100	100
12	L	44/47 (94%)	42 (96%)	2 (4%)	0	100	100
12	Y	44/47 (94%)	42 (96%)	2 (4%)	0	100	100
13	M	41/46 (89%)	41 (100%)	0	0	100	100
13	Z	41/46 (89%)	38 (93%)	3 (7%)	0	100	100
All	All	3516/3614 (97%)	3386 (96%)	105 (3%)	25 (1%)	22	16

5 of 25 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	F	94	HIS
7	G	4	ALA
7	G	7	ASP
8	H	8	ILE
8	H	45	ALA

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	429/426 (101%)	418 (97%)	11 (3%)	46	48
1	N	429/426 (101%)	421 (98%)	8 (2%)	57	61
2	B	210/210 (100%)	198 (94%)	12 (6%)	20	16
2	O	210/210 (100%)	200 (95%)	10 (5%)	25	22
3	C	227/226 (100%)	224 (99%)	3 (1%)	69	74
3	P	227/226 (100%)	223 (98%)	4 (2%)	59	63
4	D	128/129 (99%)	123 (96%)	5 (4%)	32	30
4	Q	128/129 (99%)	122 (95%)	6 (5%)	26	22
5	E	92/95 (97%)	91 (99%)	1 (1%)	73	78
5	R	92/95 (97%)	88 (96%)	4 (4%)	29	26
6	F	81/81 (100%)	77 (95%)	4 (5%)	25	21
6	S	81/81 (100%)	77 (95%)	4 (5%)	25	21
7	G	67/68 (98%)	61 (91%)	6 (9%)	9	6
7	T	67/68 (98%)	61 (91%)	6 (9%)	9	6
8	H	71/75 (95%)	67 (94%)	4 (6%)	21	17
8	U	71/75 (95%)	64 (90%)	7 (10%)	8	4
9	I	57/57 (100%)	54 (95%)	3 (5%)	22	18
9	V	57/57 (100%)	55 (96%)	2 (4%)	36	35
10	J	49/50 (98%)	48 (98%)	1 (2%)	55	58
10	W	49/50 (98%)	48 (98%)	1 (2%)	55	58

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
11	K	39/46 (85%)	38 (97%)	1 (3%)	46	48
11	X	39/46 (85%)	37 (95%)	2 (5%)	24	19
12	L	39/40 (98%)	39 (100%)	0	100	100
12	Y	39/40 (98%)	36 (92%)	3 (8%)	13	8
13	M	37/38 (97%)	32 (86%)	5 (14%)	4	2
13	Z	37/38 (97%)	33 (89%)	4 (11%)	6	3
All	All	3052/3082 (99%)	2935 (96%)	117 (4%)	33	31

5 of 117 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	N	96	ARG
12	Y	2	HIS
2	O	94	SER
11	X	54	ARG
8	U	27	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 41 such sidechains are listed below:

Mol	Chain	Res	Type
2	O	195	GLN
6	S	54	ASN
3	P	50	ASN
4	Q	143	ASN
6	S	94	HIS

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond

length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
1	FME	N	1	1	8,9,10	1.44	1 (12%)	8,9,11	6.15	3 (37%)
1	FME	A	1	1	8,9,10	1.07	0	8,9,11	5.58	3 (37%)
2	FME	B	1	2	8,9,10	2.01	1 (12%)	8,9,11	7.80	4 (50%)
7	TPO	G	11	7	8,10,11	1.77	2 (25%)	10,14,16	1.52	2 (20%)
9	SAC	V	1	9	7,8,9	2.30	2 (28%)	7,9,11	2.19	4 (57%)
7	TPO	T	11	7	8,10,11	2.14	2 (25%)	10,14,16	1.75	1 (10%)
2	FME	O	1	2	8,9,10	0.88	0	8,9,11	4.35	5 (62%)
9	SAC	I	1	9	7,8,9	3.34	2 (28%)	7,9,11	4.02	4 (57%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	FME	N	1	1	-	4/7/9/11	-
1	FME	A	1	1	-	3/7/9/11	-
2	FME	B	1	2	-	1/7/9/11	-
7	TPO	G	11	7	-	4/9/11/13	-
9	SAC	V	1	9	-	4/7/8/10	-
7	TPO	T	11	7	-	4/9/11/13	-
2	FME	O	1	2	-	1/7/9/11	-
9	SAC	I	1	9	-	2/7/8/10	-

The worst 5 of 10 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	I	1	SAC	OAC-C1A	8.16	1.41	1.23
9	V	1	SAC	OAC-C1A	4.50	1.33	1.23
2	B	1	FME	CA-N	4.46	1.53	1.46
9	V	1	SAC	CA-N	3.76	1.52	1.46
7	T	11	TPO	P-O1P	3.45	1.61	1.50

The worst 5 of 26 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	1	FME	CA-N-CN	-20.20	91.75	122.82
1	N	1	FME	CA-N-CN	-16.07	98.11	122.82
1	A	1	FME	CA-N-CN	-15.24	99.38	122.82
2	O	1	FME	CA-N-CN	-10.62	106.50	122.82
9	I	1	SAC	C2A-C1A-N	-7.92	102.98	116.12

There are no chirality outliers.

5 of 23 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	1	FME	O1-CN-N-CA
1	A	1	FME	N-CA-CB-CG
2	B	1	FME	O1-CN-N-CA
7	G	11	TPO	N-CA-CB-CG2
7	G	11	TPO	N-CA-CB-OG1

There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	1	FME	1	0
7	T	11	TPO	1	0
9	I	1	SAC	2	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 54 ligands modelled in this entry, 8 are monoatomic and 2 are unknown - leaving 44 for Mogul analysis.

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	$\#\|Z\| > 2$
15	HEA	A	603	1	58,67,67	1.65	12 (20%)	63,103,103	2.31	24 (38%)
22	CHD	O	302	-	32,32,32	1.10	3 (9%)	51,51,51	1.69	10 (19%)
26	PSC	O	303	-	51,51,51	1.21	3 (5%)	57,59,59	1.34	5 (8%)
21	CUA	B	301	2	0,1,1	-	-	-		
22	CHD	P	307	-	32,32,32	0.81	1 (3%)	51,51,51	2.97	22 (43%)
19	TGL	Q	201	-	62,62,62	1.37	6 (9%)	65,65,65	1.48	9 (13%)
15	HEA	N	602	1	58,67,67	1.56	11 (18%)	63,103,103	2.80	30 (47%)
15	HEA	N	603	1	58,67,67	1.66	12 (20%)	63,103,103	1.99	26 (41%)
20	PGV	P	305	-	50,50,50	0.90	2 (4%)	53,56,56	1.14	5 (9%)
19	TGL	N	609	-	62,62,62	1.35	6 (9%)	65,65,65	1.47	10 (15%)
22	CHD	P	308	-	32,32,32	1.18	3 (9%)	51,51,51	1.85	17 (33%)
26	PSC	E	201	-	51,51,51	1.31	3 (5%)	57,59,59	1.25	4 (7%)
28	DMU	G	101	-	34,34,34	0.86	2 (5%)	45,45,45	2.45	13 (28%)
19	TGL	L	101	-	62,62,62	1.58	7 (11%)	65,65,65	1.68	14 (21%)
20	PGV	A	608	-	50,50,50	0.97	2 (4%)	53,56,56	1.46	5 (9%)
24	CDL	T	102	-	99,99,99	1.45	12 (12%)	105,111,111	1.38	12 (11%)
25	PEK	C	306	-	52,52,52	1.15	2 (3%)	55,57,57	1.20	5 (9%)
19	TGL	D	201	-	62,62,62	1.49	7 (11%)	65,65,65	1.48	14 (21%)
21	CUA	O	301	2	0,1,1	-	-	-		
20	PGV	N	608	-	50,50,50	1.05	3 (6%)	53,56,56	1.30	4 (7%)
24	CDL	C	303	-	99,99,99	1.49	13 (13%)	105,111,111	1.44	12 (11%)
20	PGV	A	609	-	50,50,50	1.24	2 (4%)	53,56,56	1.47	9 (16%)
20	PGV	P	302	-	50,50,50	1.15	2 (4%)	53,56,56	1.25	3 (5%)
15	HEA	A	602	1	58,67,67	1.76	14 (24%)	63,103,103	2.74	27 (42%)
25	PEK	T	101	-	52,52,52	1.22	2 (3%)	55,57,57	1.27	6 (10%)
28	DMU	P	301	-	34,34,34	0.95	1 (2%)	45,45,45	2.39	12 (26%)
24	CDL	G	103	-	99,99,99	1.50	12 (12%)	105,111,111	1.42	17 (16%)
14	CYN	N	601	16	1,1,1	0.23	0	-		
22	CHD	C	304	-	32,32,32	0.77	1 (3%)	51,51,51	2.63	23 (45%)
28	DMU	M	101	-	34,34,34	0.60	0	45,45,45	1.94	12 (26%)
22	CHD	B	302	-	32,32,32	1.11	3 (9%)	51,51,51	1.71	11 (21%)
20	PGV	C	302	-	50,50,50	0.93	3 (6%)	53,56,56	1.10	4 (7%)
28	DMU	Z	101	-	34,34,34	0.65	0	45,45,45	1.89	10 (22%)
25	PEK	G	102	-	52,52,52	0.98	3 (5%)	55,57,57	1.54	8 (14%)
25	PEK	G	104	-	52,52,52	1.13	2 (3%)	55,57,57	1.18	6 (10%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
25	PEK	P	309	-	52,52,52	1.21	2 (3%)	55,57,57	1.20	4 (7%)
19	TGL	N	610	-	62,62,62	1.58	6 (9%)	65,65,65	1.68	15 (23%)
20	PGV	N	607	-	50,50,50	1.03	2 (4%)	53,56,56	1.57	7 (13%)
25	PEK	P	304	-	52,52,52	0.86	3 (5%)	55,57,57	1.67	9 (16%)
19	TGL	A	607	-	62,62,62	1.42	7 (11%)	65,65,65	2.29	16 (24%)
14	CYN	A	601	16	1,1,1	0.22	0	-		
22	CHD	C	305	-	32,32,32	1.24	4 (12%)	51,51,51	1.74	12 (23%)
24	CDL	P	306	-	99,99,99	1.49	12 (12%)	105,111,111	1.40	11 (10%)
20	PGV	C	307	-	50,50,50	1.44	4 (8%)	53,56,56	1.45	8 (15%)

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
15	HEA	A	603	1	-	5/32/76/76	-
22	CHD	O	302	-	-	2/9/74/74	0/4/4/4
26	PSC	O	303	-	-	35/55/55/55	-
22	CHD	P	307	-	-	8/9/74/74	0/4/4/4
19	TGL	Q	201	-	-	36/65/65/65	-
15	HEA	N	602	1	-	7/32/76/76	-
15	HEA	N	603	1	-	4/32/76/76	-
20	PGV	P	305	-	-	16/55/55/55	-
19	TGL	N	609	-	-	33/65/65/65	-
22	CHD	P	308	-	-	1/9/74/74	0/4/4/4
26	PSC	E	201	-	-	36/55/55/55	-
28	DMU	G	101	-	-	12/19/59/59	0/2/2/2
19	TGL	L	101	-	-	36/65/65/65	-
20	PGV	A	608	-	-	10/55/55/55	-
24	CDL	T	102	-	-	54/110/110/110	-
25	PEK	C	306	-	-	31/56/56/56	-
19	TGL	D	201	-	-	39/65/65/65	-
20	PGV	N	608	-	-	13/55/55/55	-
24	CDL	C	303	-	-	67/110/110/110	-
20	PGV	A	609	-	-	32/55/55/55	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
20	PGV	P	302	-	-	33/55/55/55	-
15	HEA	A	602	1	-	5/32/76/76	-
25	PEK	T	101	-	-	36/56/56/56	-
28	DMU	P	301	-	-	7/19/59/59	0/2/2/2
24	CDL	G	103	-	-	56/110/110/110	-
22	CHD	C	304	-	-	5/9/74/74	0/4/4/4
28	DMU	M	101	-	-	7/19/59/59	0/2/2/2
22	CHD	B	302	-	-	2/9/74/74	0/4/4/4
20	PGV	C	302	-	-	16/55/55/55	-
28	DMU	Z	101	-	-	6/19/59/59	0/2/2/2
25	PEK	G	102	-	-	23/56/56/56	-
25	PEK	G	104	-	-	32/56/56/56	-
25	PEK	P	309	-	-	22/56/56/56	-
19	TGL	N	610	-	-	36/65/65/65	-
20	PGV	N	607	-	-	29/55/55/55	-
25	PEK	P	304	-	-	26/56/56/56	-
19	TGL	A	607	-	-	36/65/65/65	-
22	CHD	C	305	-	-	1/9/74/74	0/4/4/4
24	CDL	P	306	-	-	72/110/110/110	-
20	PGV	C	307	-	-	30/55/55/55	-

The worst 5 of 195 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
19	N	610	TGL	OG2-CB1	6.08	1.51	1.34
20	C	307	PGV	O01-C1	6.07	1.51	1.34
19	L	101	TGL	OG2-CB1	5.98	1.51	1.34
20	C	307	PGV	O03-C19	5.86	1.50	1.33
24	P	306	CDL	OA8-CA7	5.44	1.49	1.33

The worst 5 of 471 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
15	N	602	HEA	C17-C18-C19	-10.69	103.15	127.62
15	A	602	HEA	C20-C19-C18	-9.49	99.87	121.17
28	P	301	DMU	O16-C6-C1	9.42	122.58	108.27
19	A	607	TGL	CG2-OG2-CB1	9.15	139.70	117.80
28	G	101	DMU	O1-C9-C11	8.13	126.60	106.44

There are no chirality outliers.

5 of 957 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
15	A	602	HEA	C16-C17-C18-C19
19	A	607	TGL	CB2-CB1-OG2-CG2
19	D	201	TGL	CC2-CC1-OG3-CG3
20	A	609	PGV	C03-O11-P-O12
20	A	609	PGV	C03-O11-P-O13

There are no ring outliers.

37 monomers are involved in 286 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
15	A	603	HEA	2	0
22	O	302	CHD	1	0
26	O	303	PSC	17	0
22	P	307	CHD	7	0
19	Q	201	TGL	2	0
15	N	602	HEA	6	0
15	N	603	HEA	2	0
20	P	305	PGV	3	0
19	N	609	TGL	8	0
22	P	308	CHD	1	0
26	E	201	PSC	16	0
28	G	101	DMU	4	0
19	L	101	TGL	14	0
24	T	102	CDL	27	0
25	C	306	PEK	6	0
19	D	201	TGL	12	0
20	N	608	PGV	1	0
24	C	303	CDL	17	0
20	A	609	PGV	8	0
20	P	302	PGV	2	0
15	A	602	HEA	7	0
25	T	101	PEK	22	0
28	P	301	DMU	3	0
24	G	103	CDL	26	0
22	C	304	CHD	5	0
22	B	302	CHD	2	0
20	C	302	PGV	2	0
25	G	102	PEK	2	0
25	G	104	PEK	11	0
25	P	309	PEK	8	0

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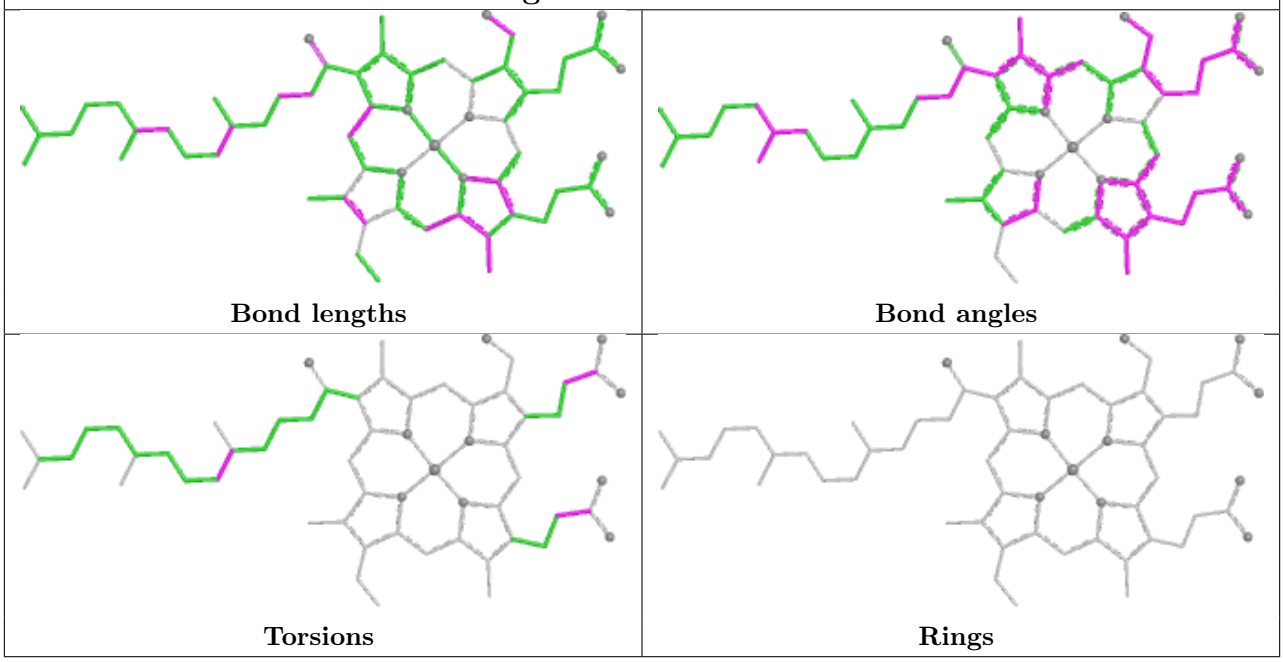
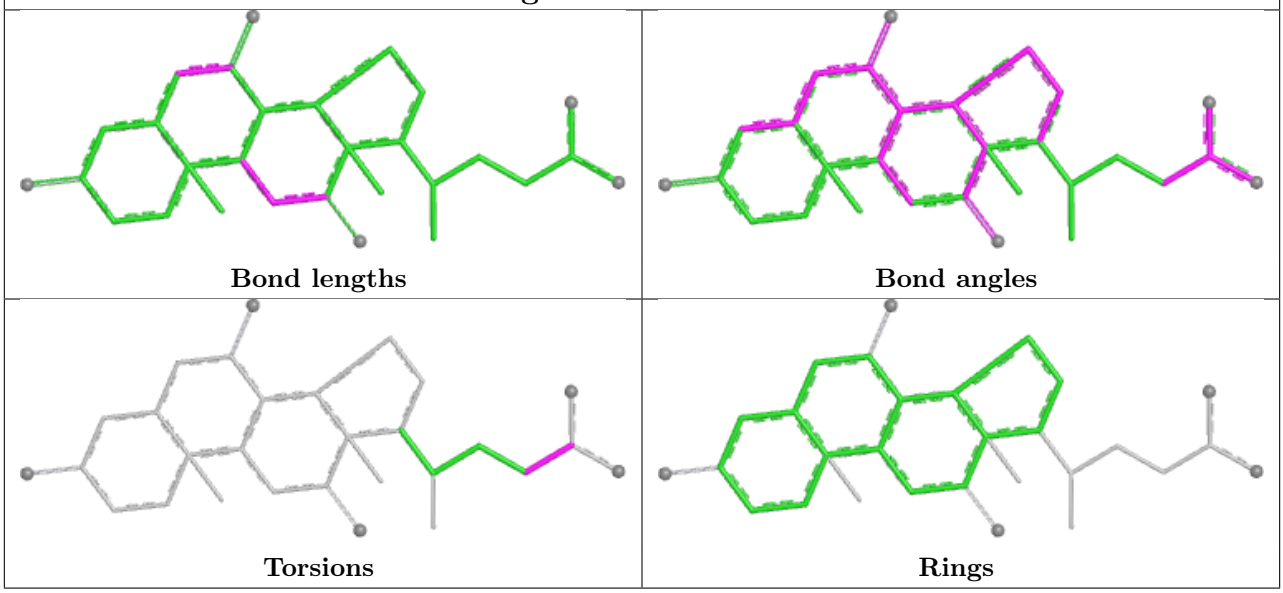
Mol	Chain	Res	Type	Clashes	Symm-Clashes
19	N	610	TGL	14	0
20	N	607	PGV	9	0
25	P	304	PEK	5	0
19	A	607	TGL	6	0
22	C	305	CHD	1	0
24	P	306	CDL	20	0
20	C	307	PGV	3	0

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.

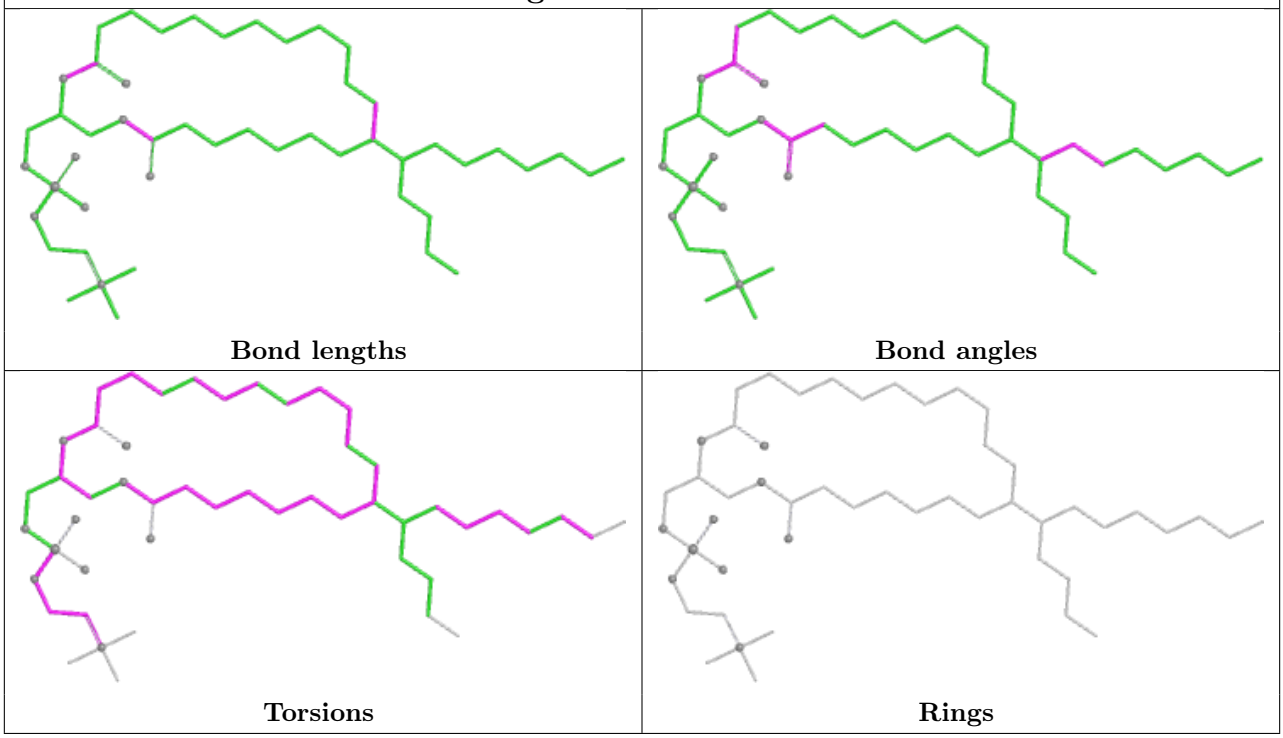
Ligand HEA A 603



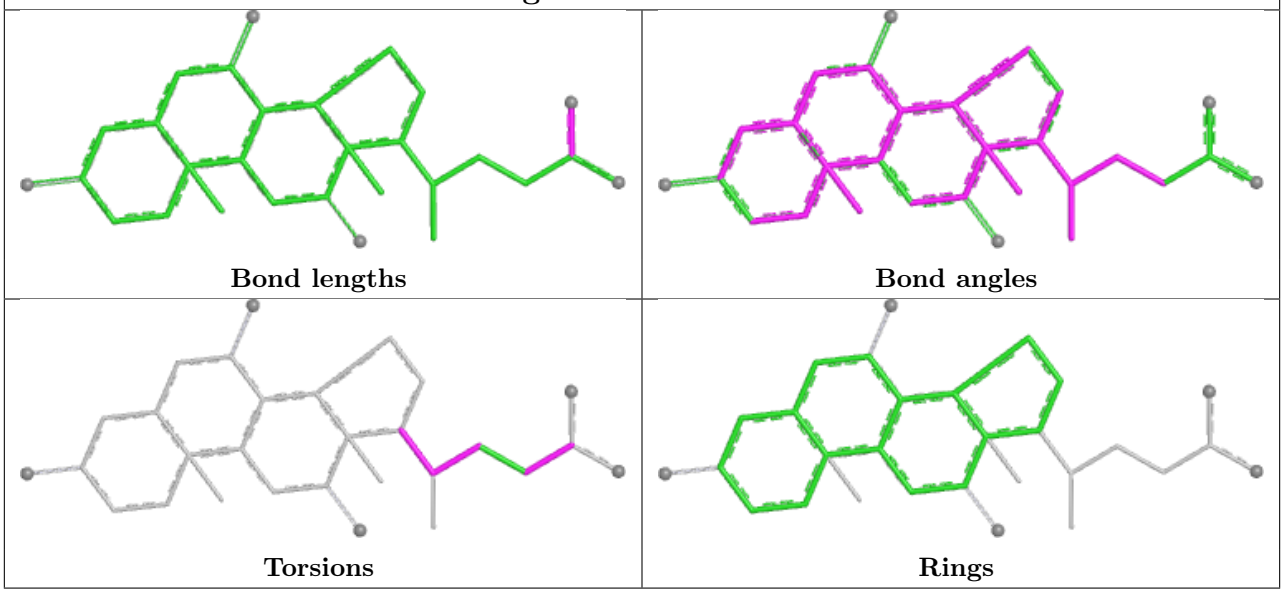
Ligand CHD O 302



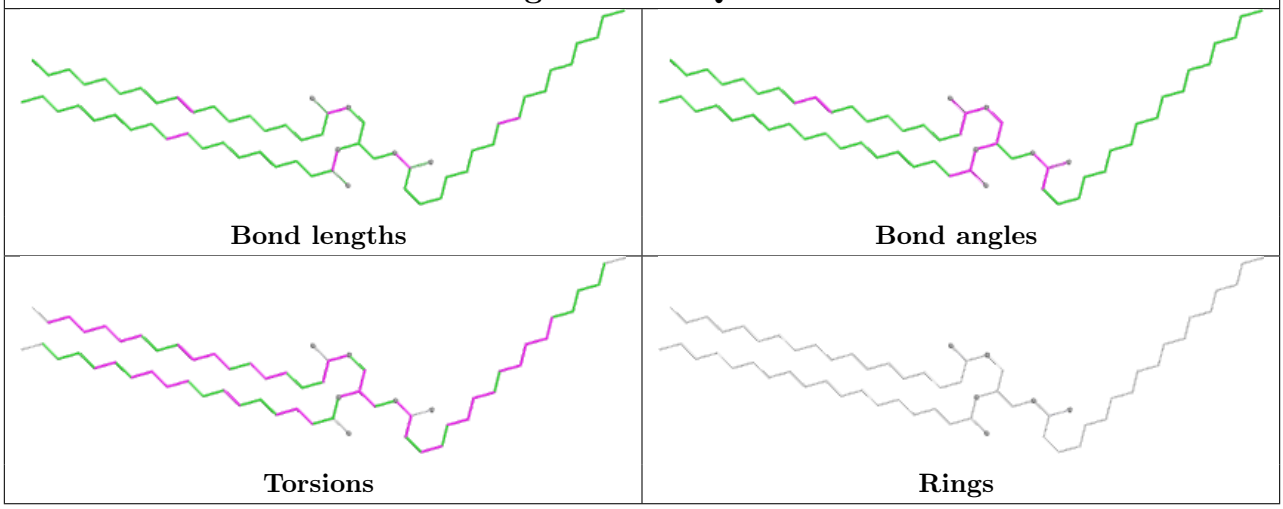
Ligand PSC O 303



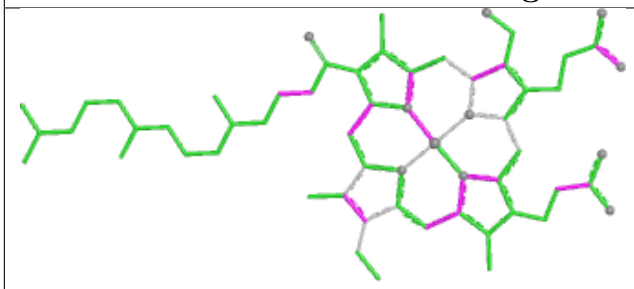
Ligand CHD P 307



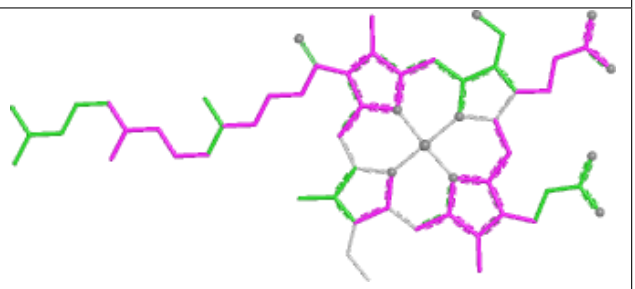
Ligand TGL Q 201



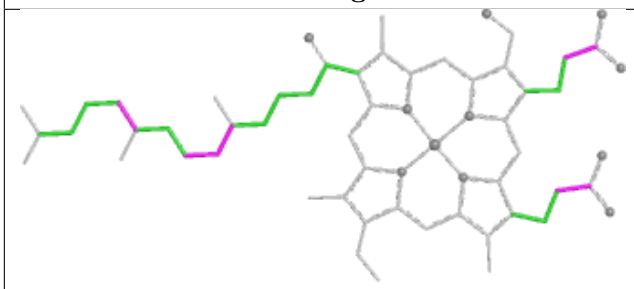
Ligand HEA N 602



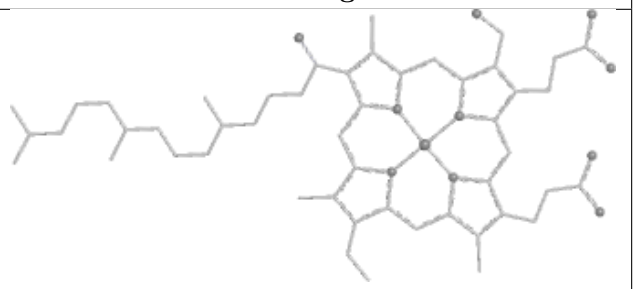
Bond lengths



Bond angles

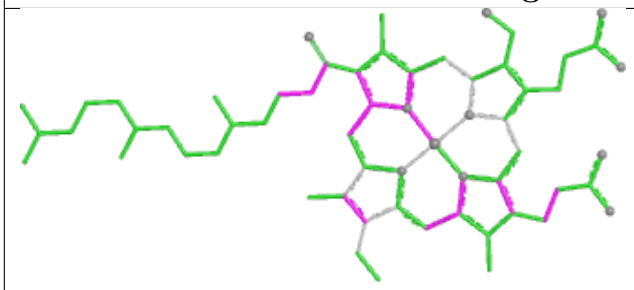


Torsions

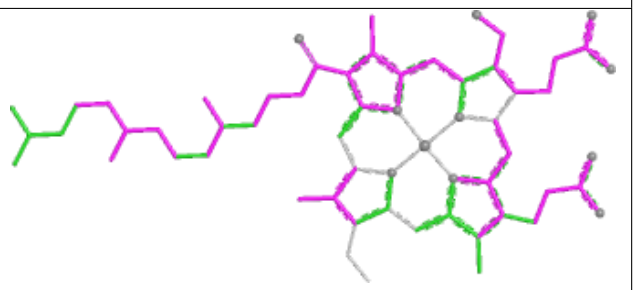


Rings

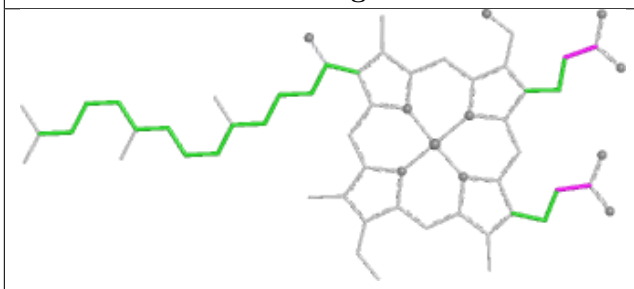
Ligand HEA N 603



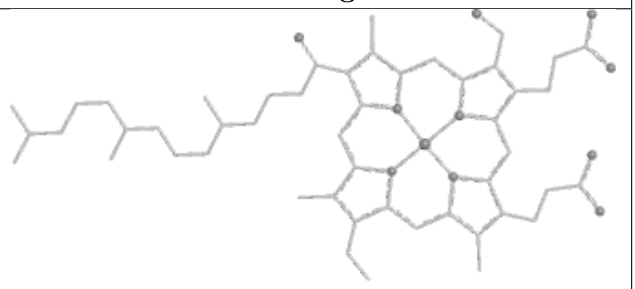
Bond lengths



Bond angles

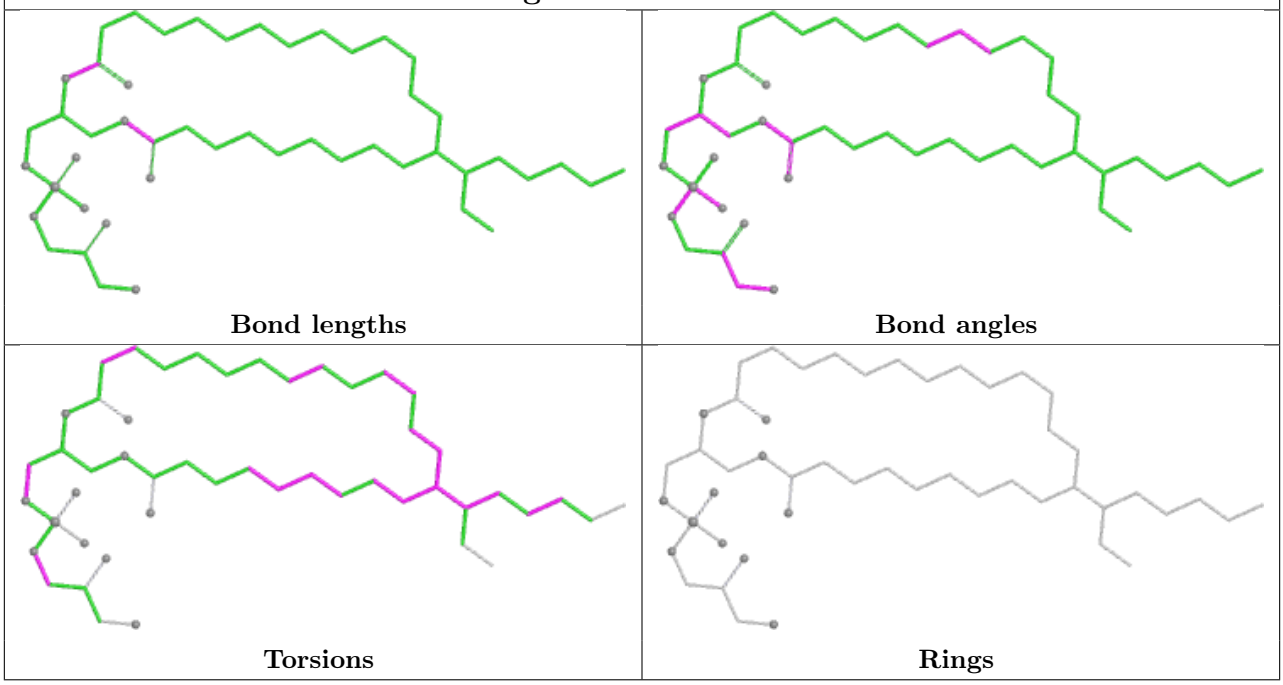


Torsions

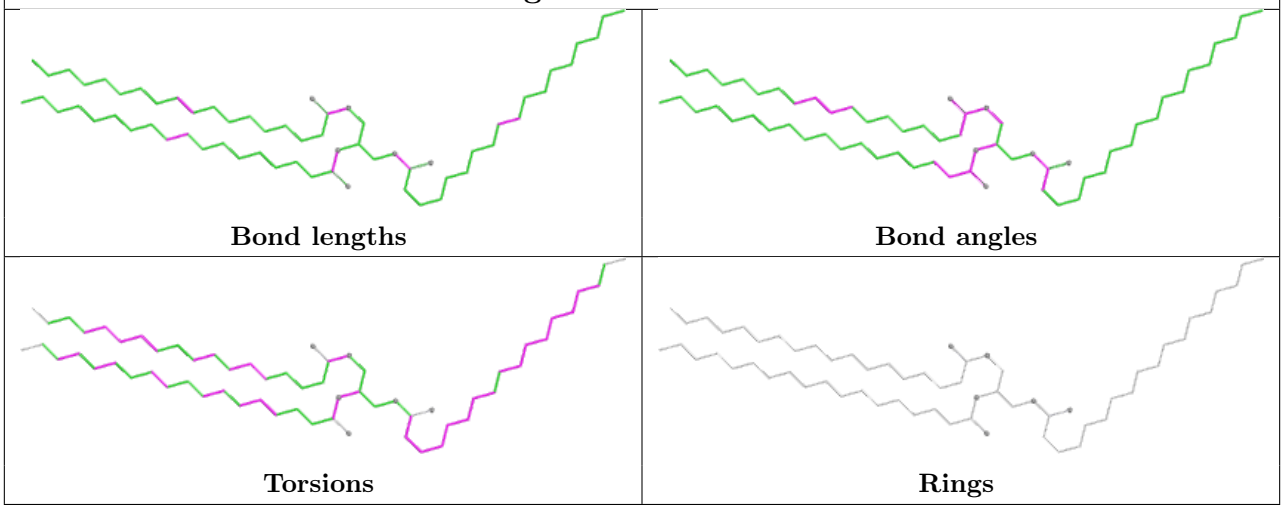


Rings

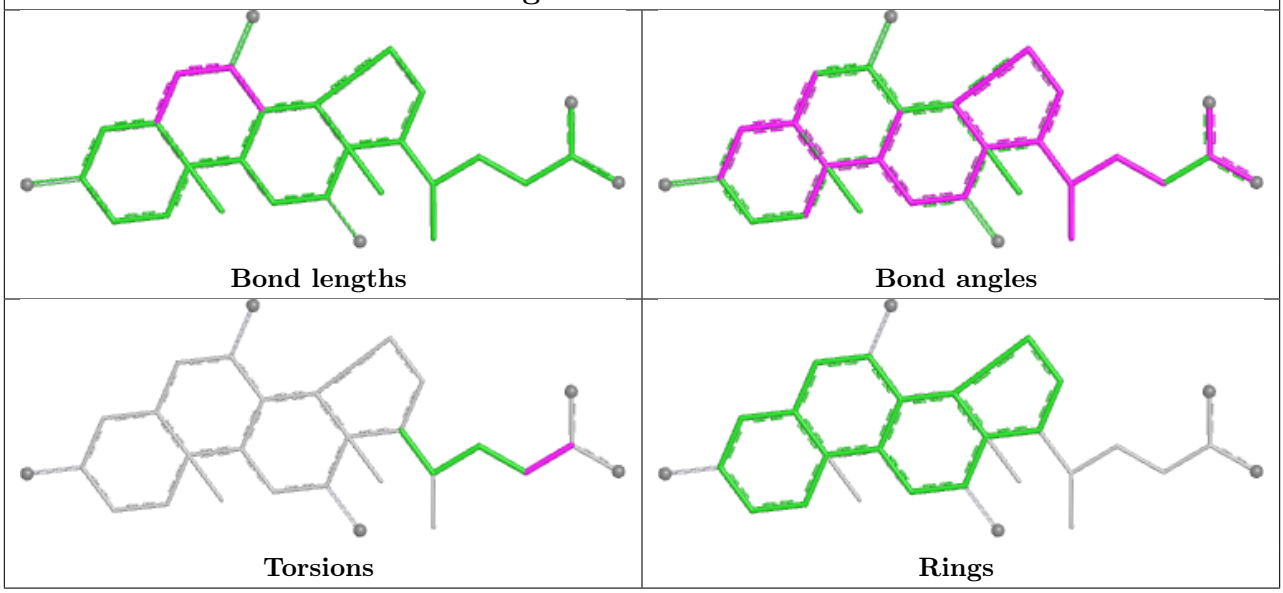
Ligand PGV P 305



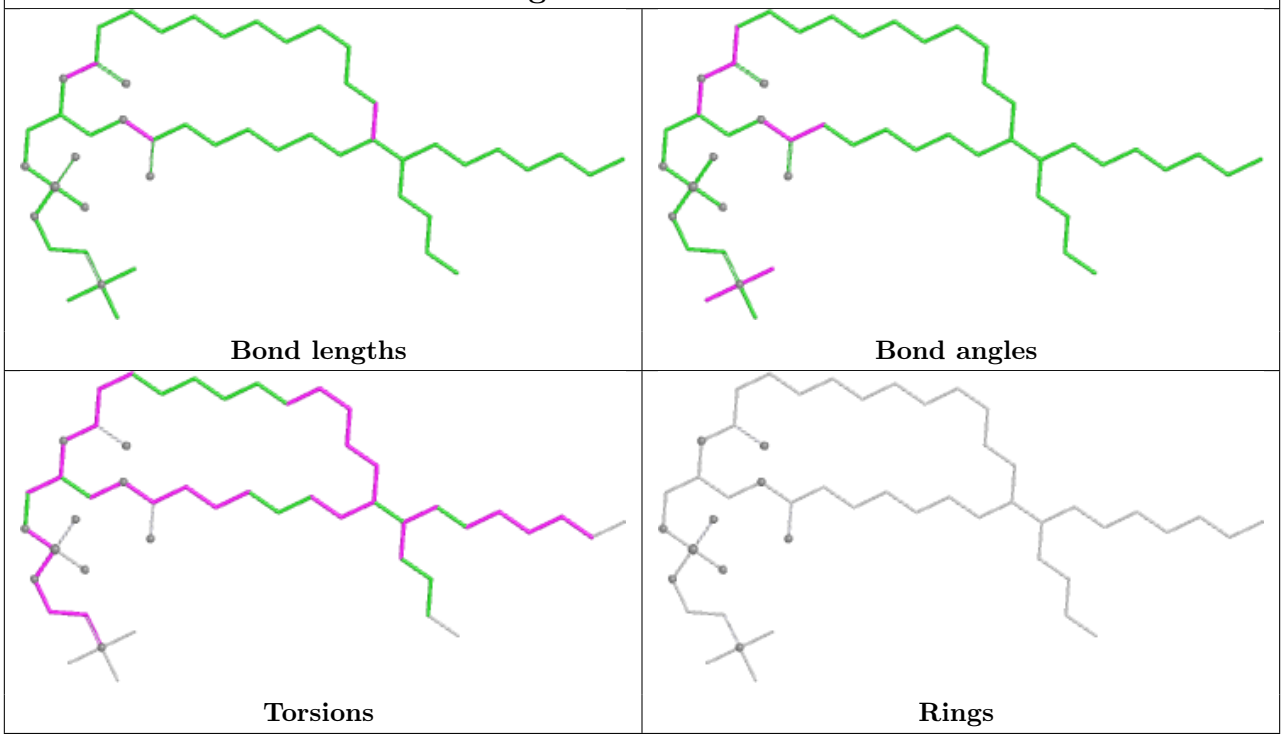
Ligand TGL N 609



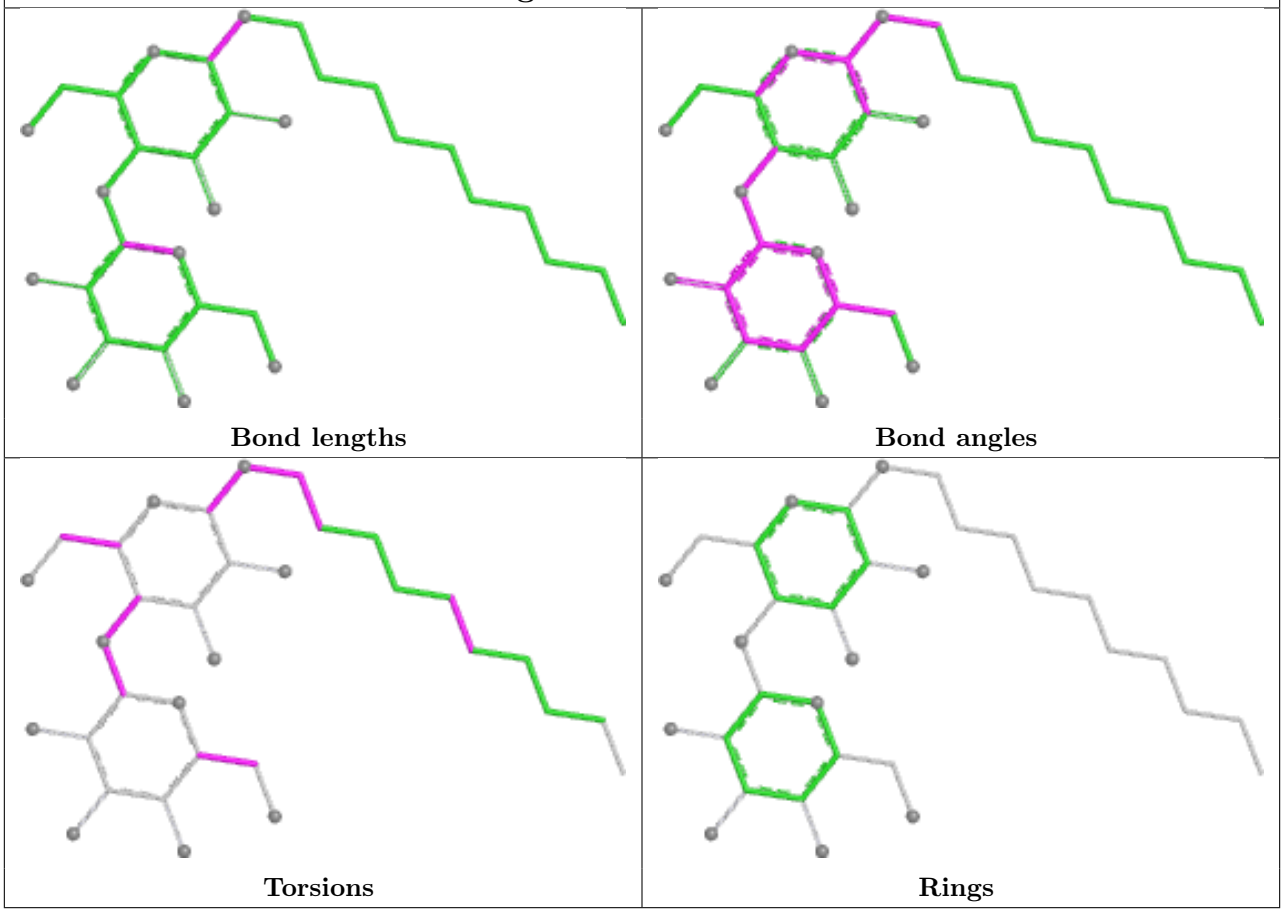
Ligand CHD P 308



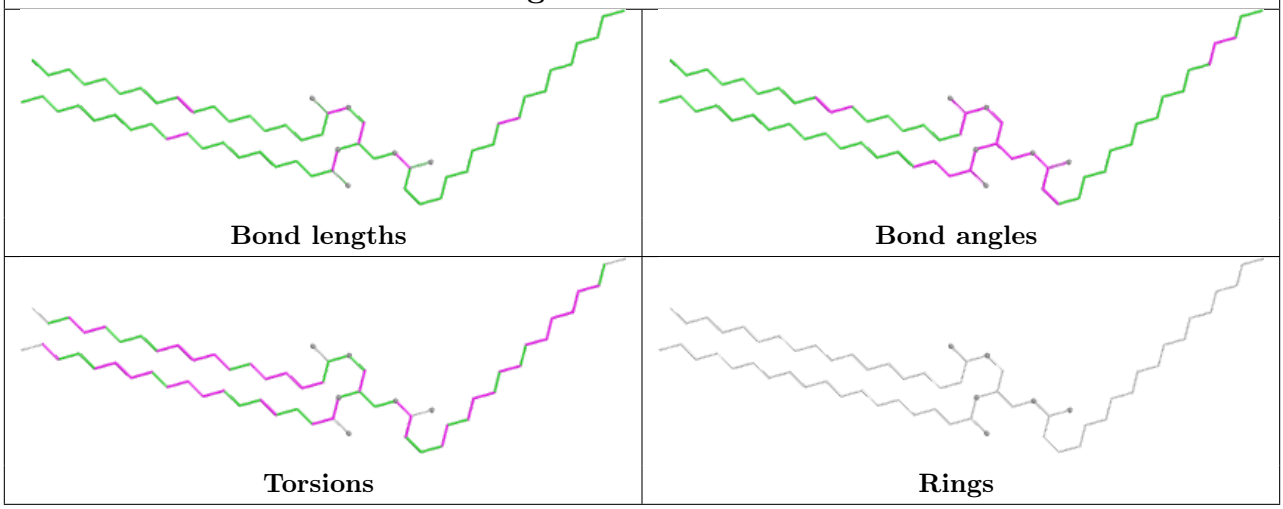
Ligand PSC E 201



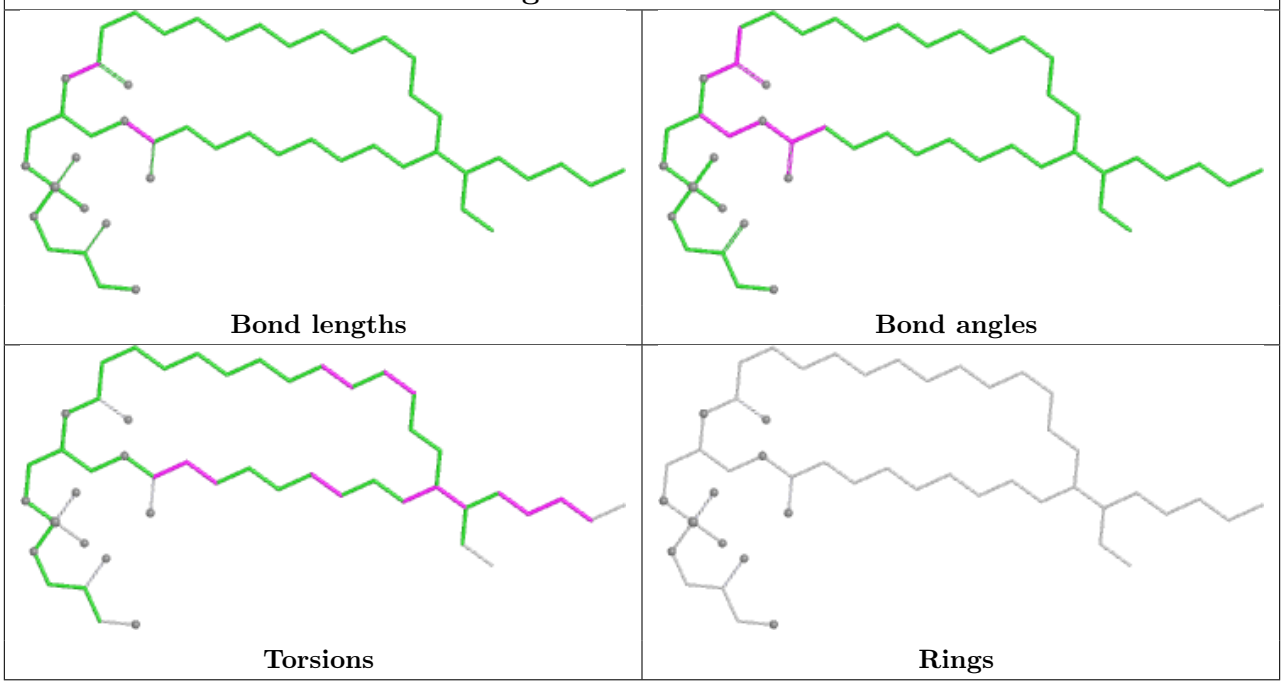
Ligand DMU G 101



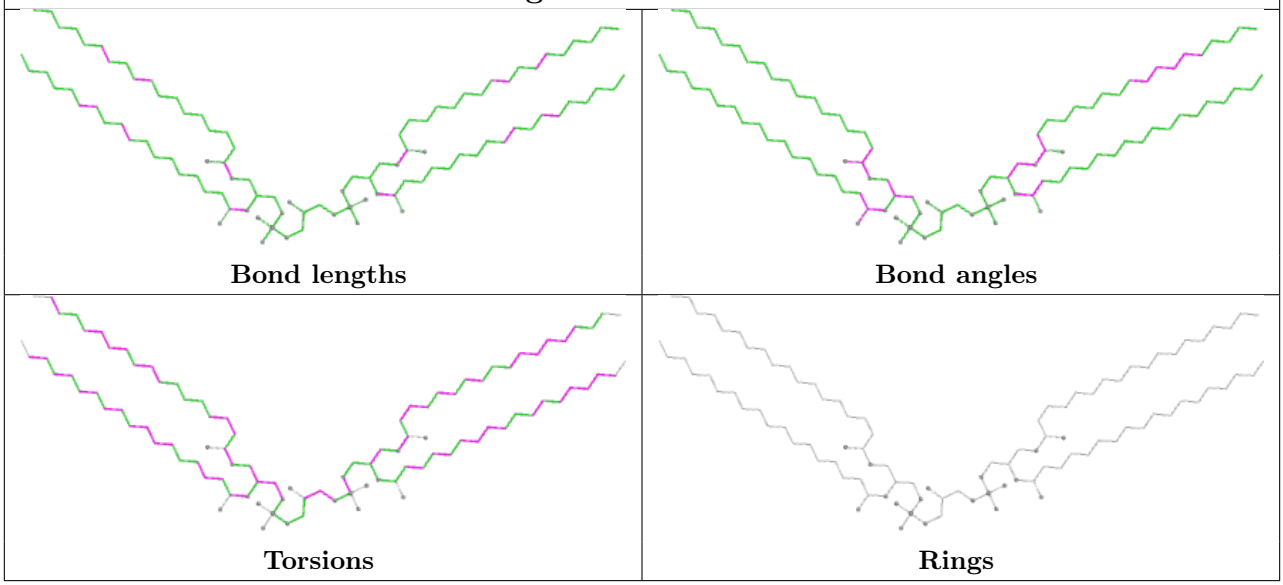
Ligand TGL L 101



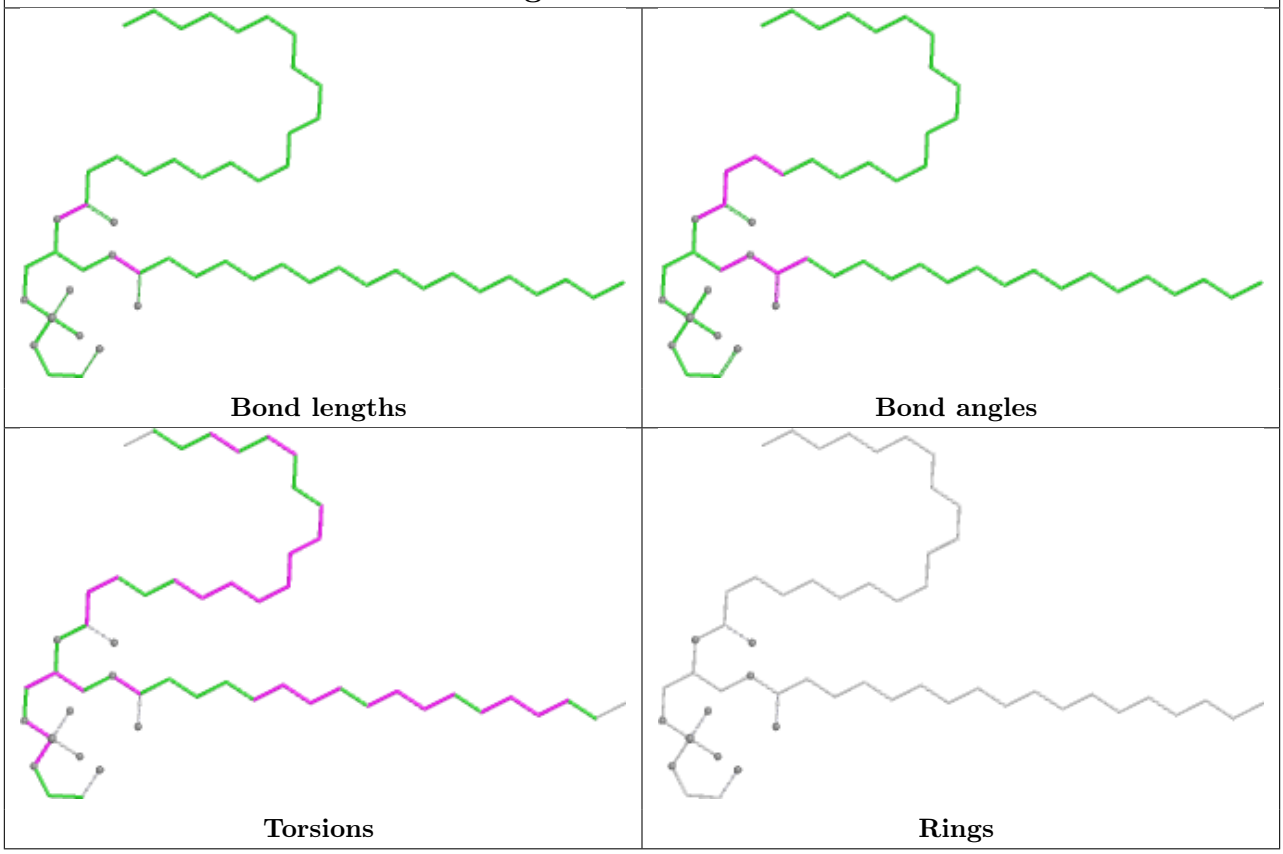
Ligand PGV A 608



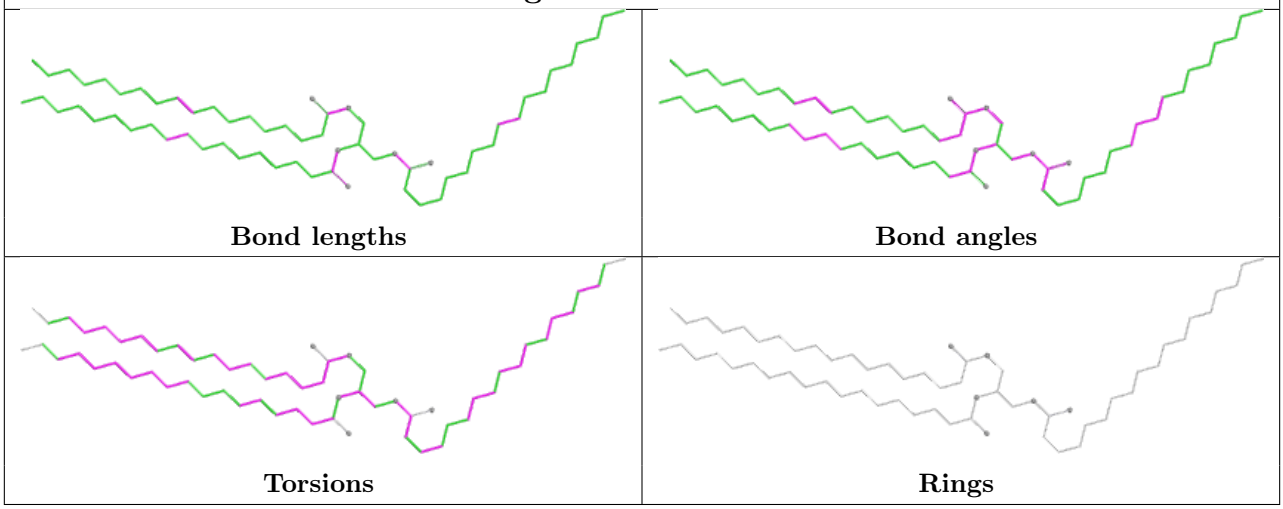
Ligand CDL T 102



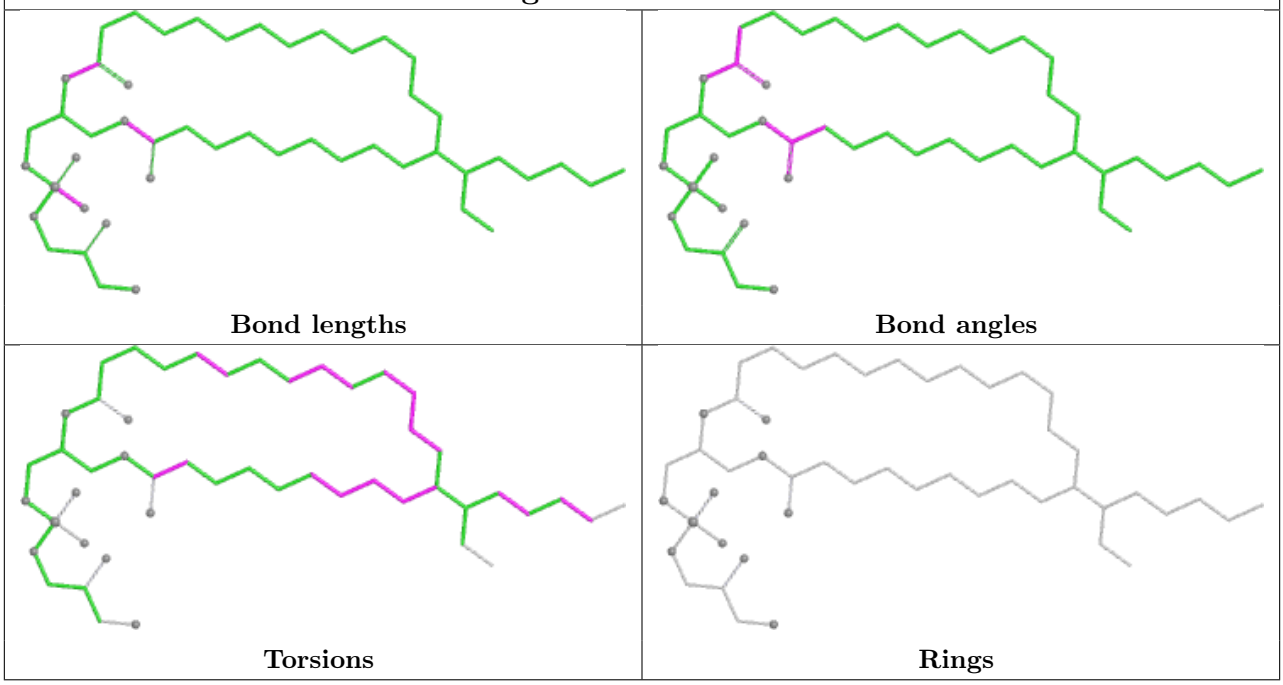
Ligand PEK C 306



Ligand TGL D 201



Ligand PGV N 608



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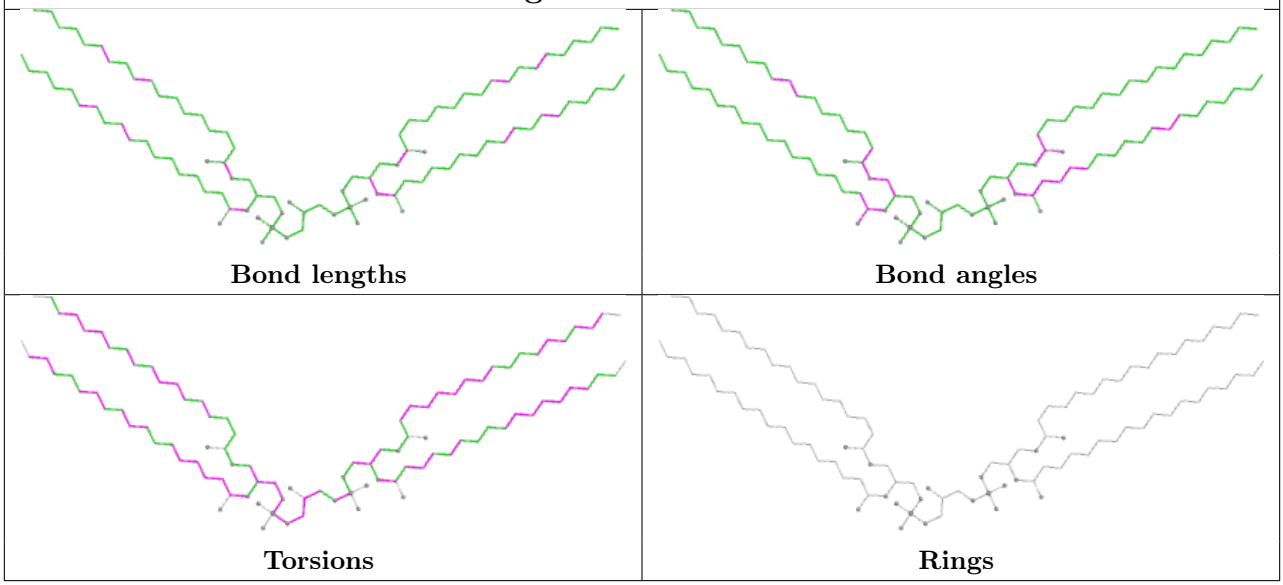

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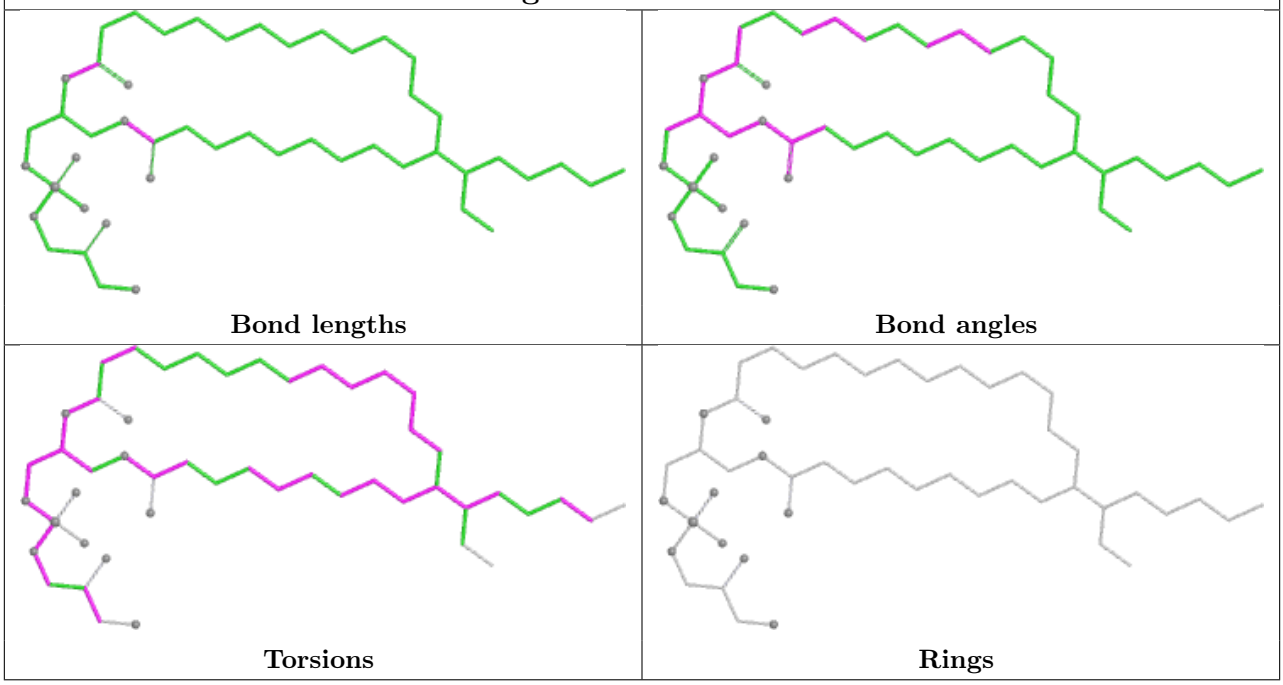

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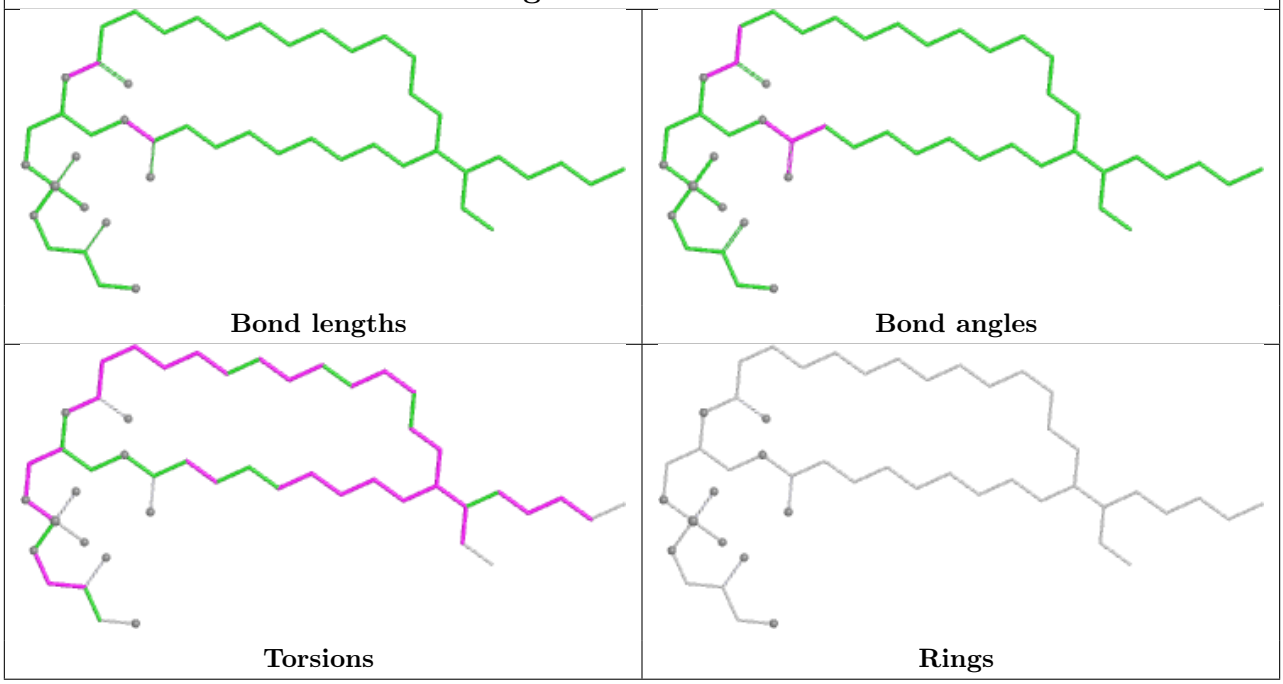
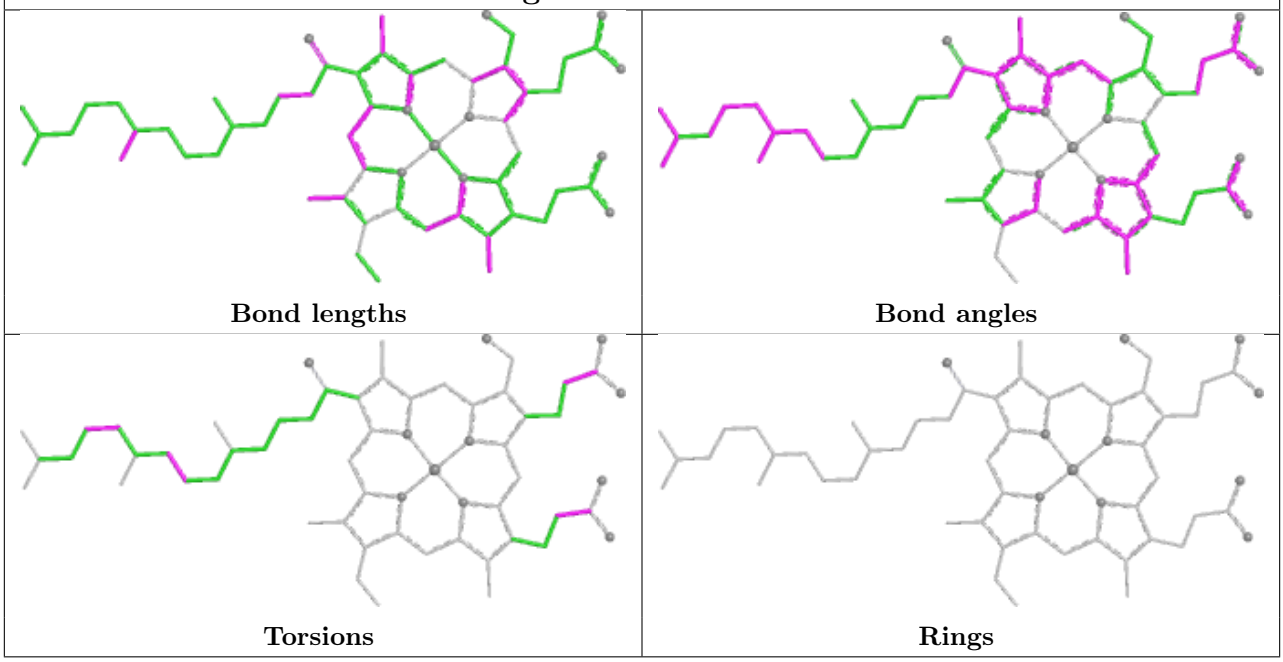


Ligand HEA A 602



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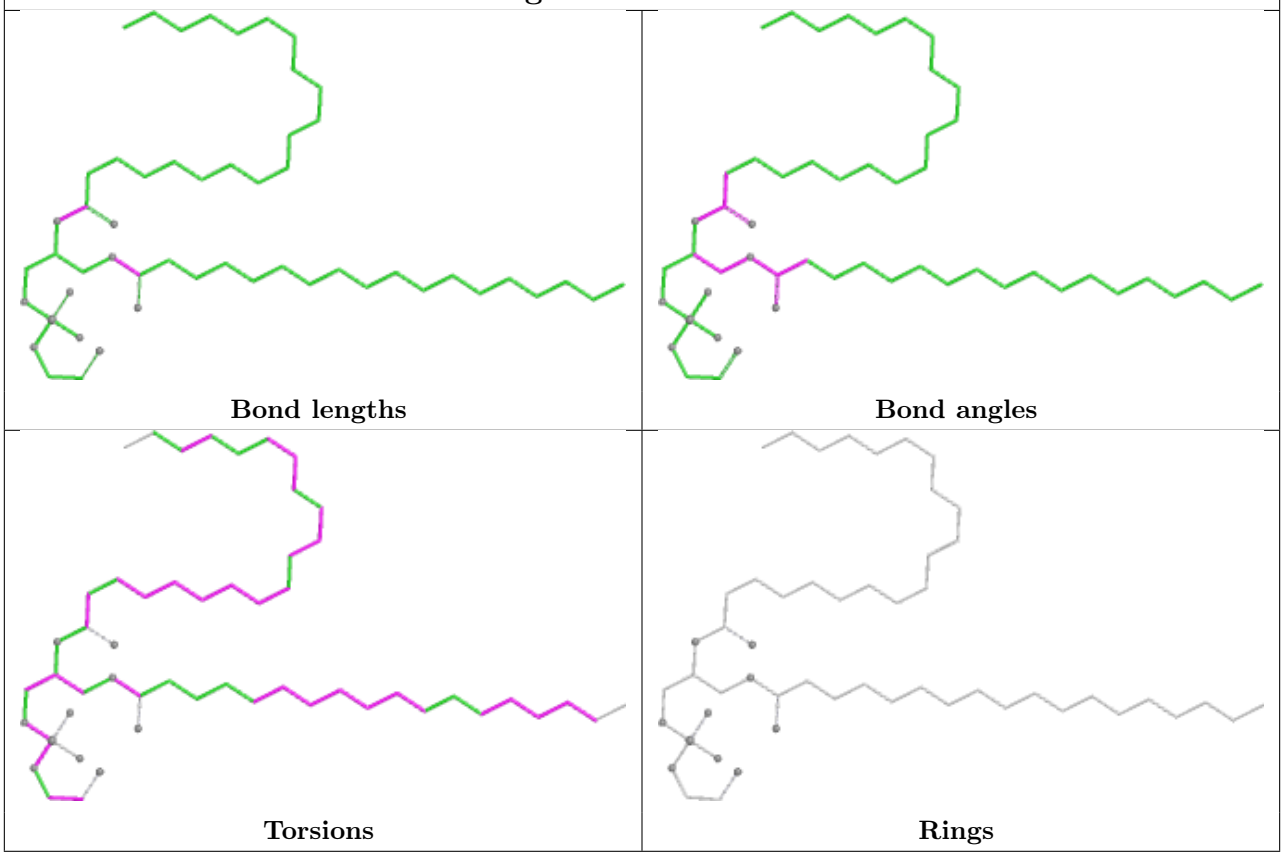

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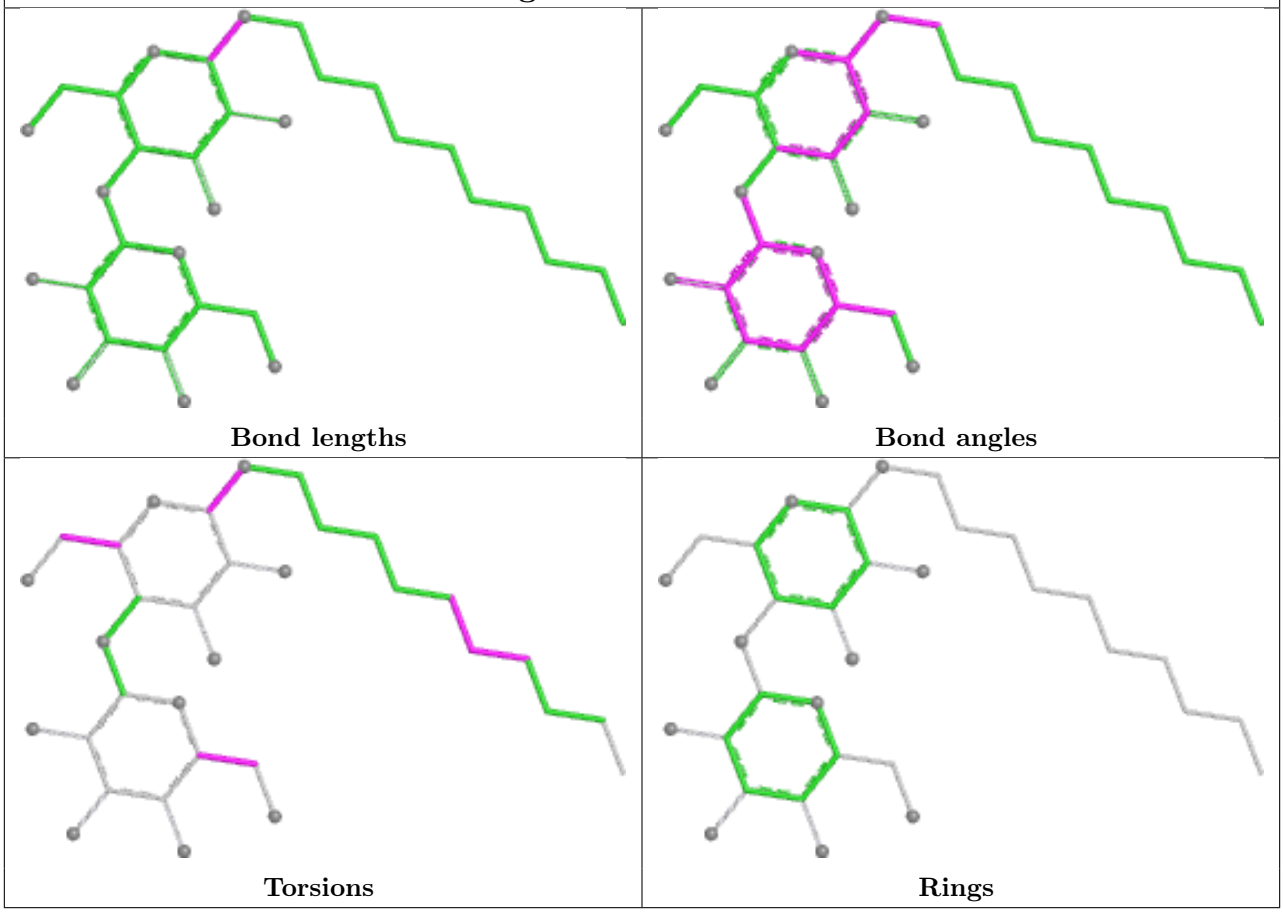
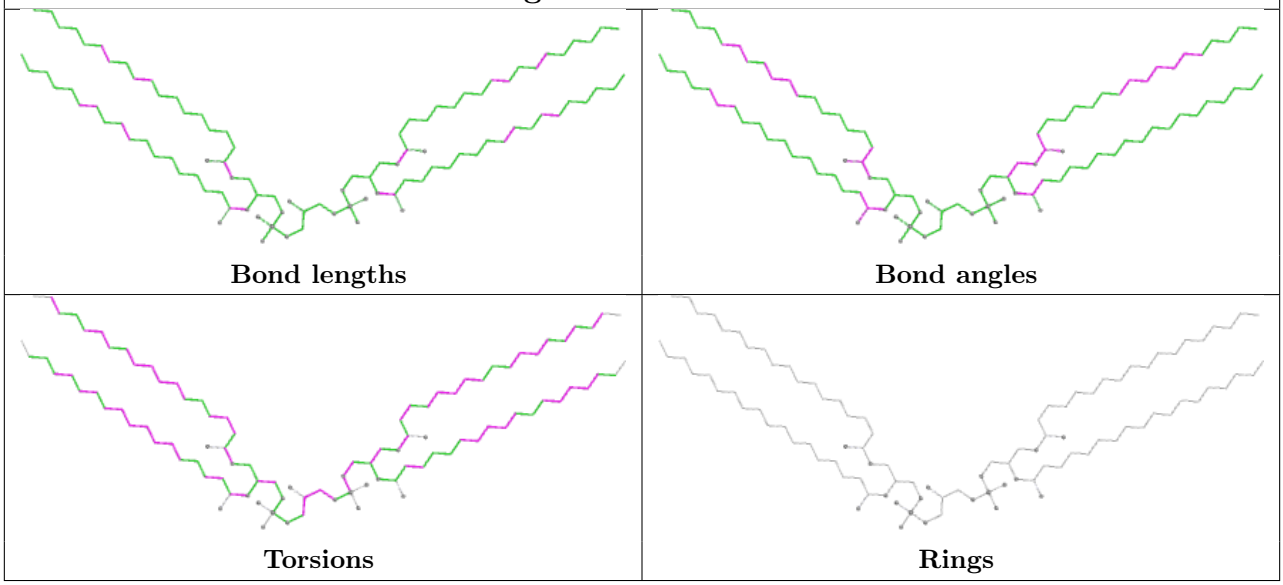
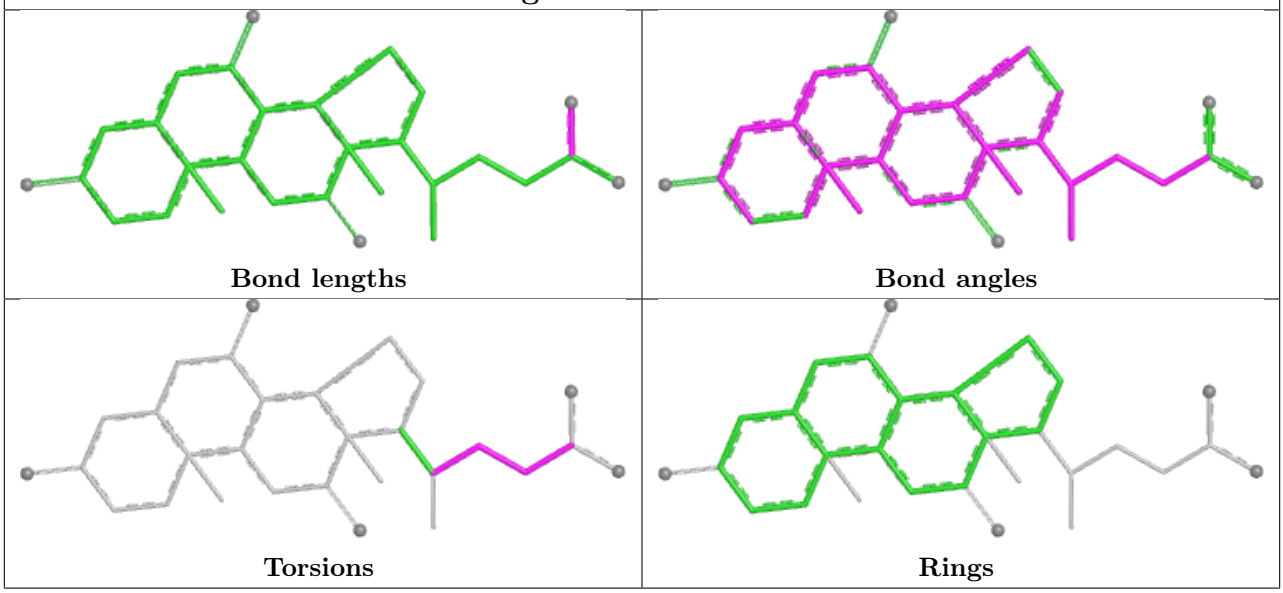


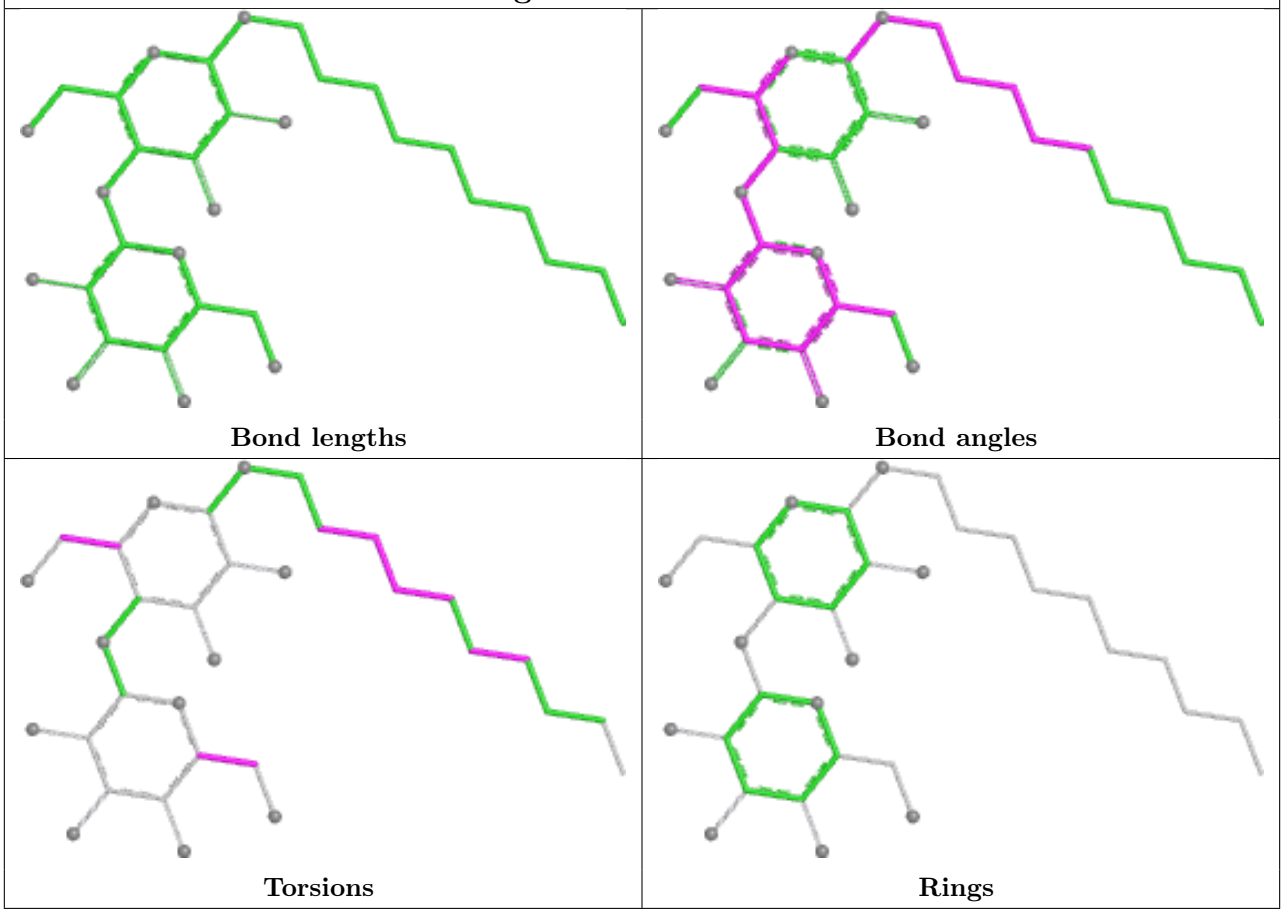
Ligand CDL G 103



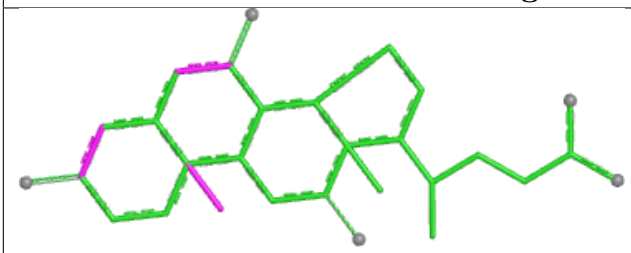
Ligand CHD C 304



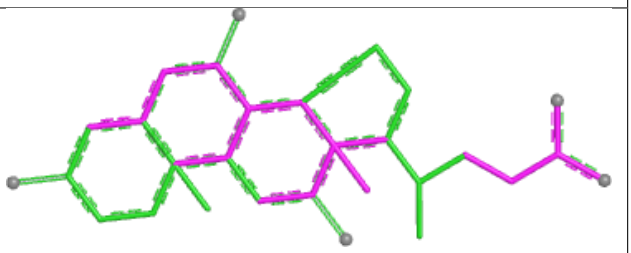
Ligand DMU M 101



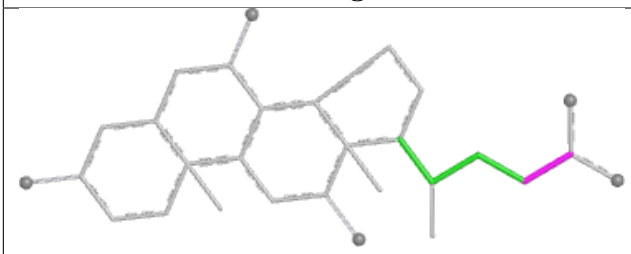
Ligand CHD B 302



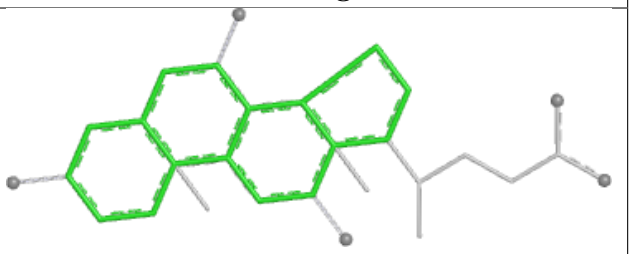
Bond lengths



Bond angles

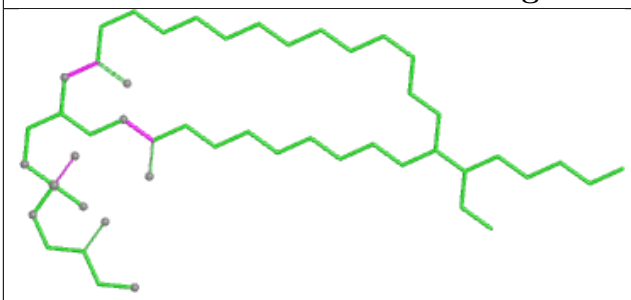


Torsions



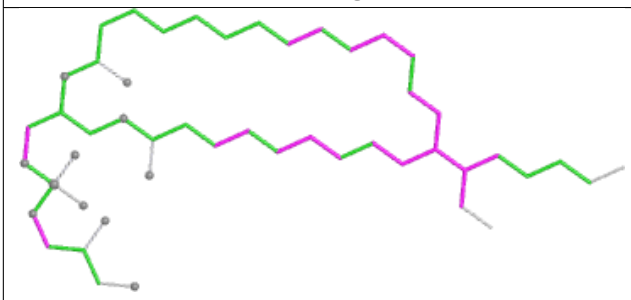
Rings

Ligand PGV C 302

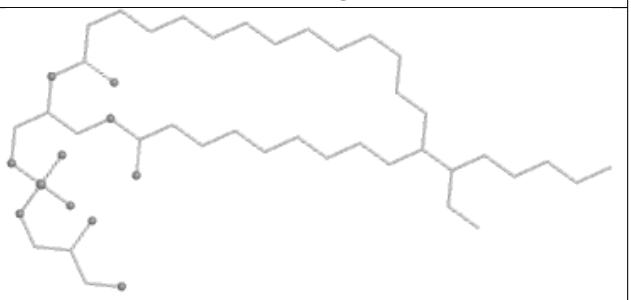


Bond lengths

Bond angles

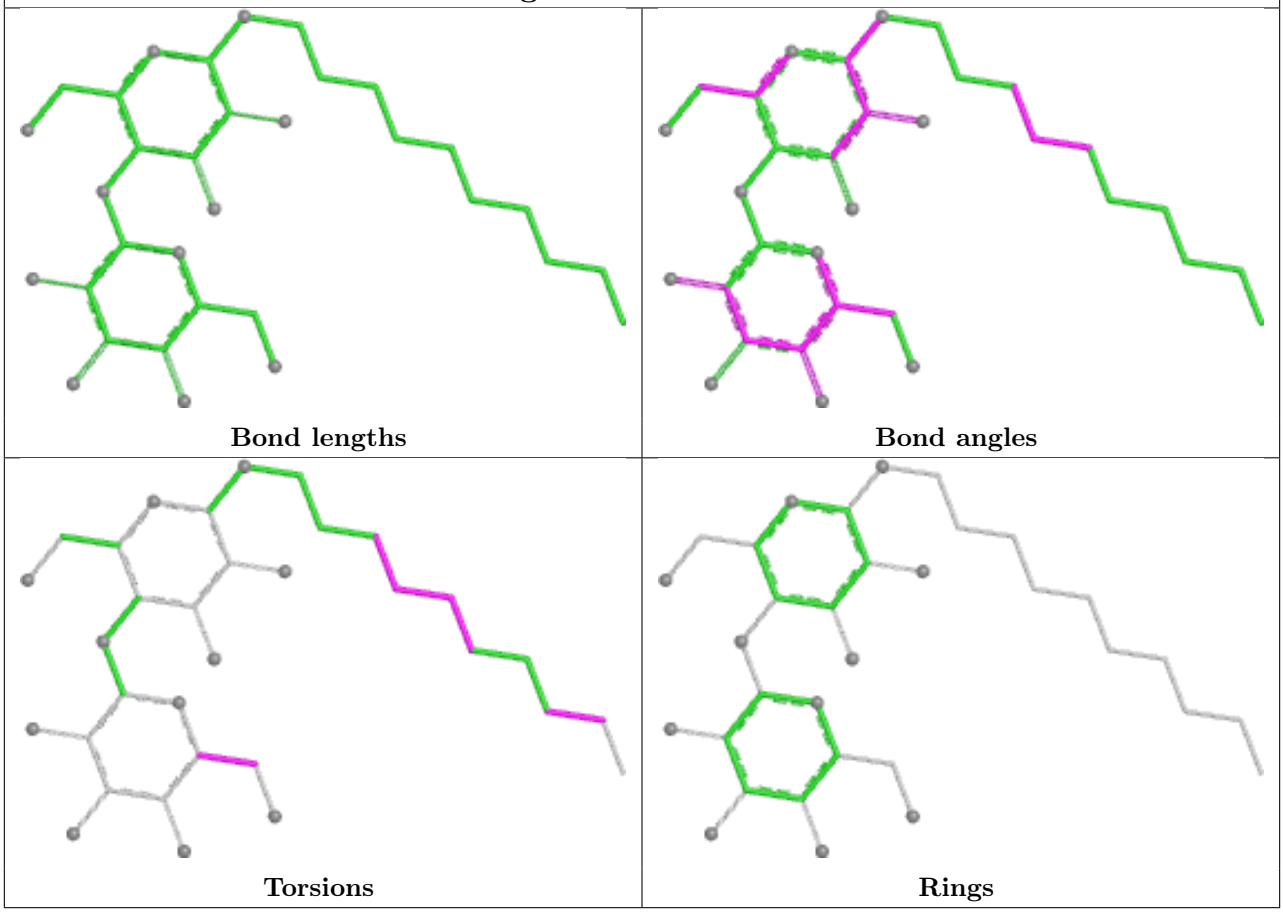


Torsions

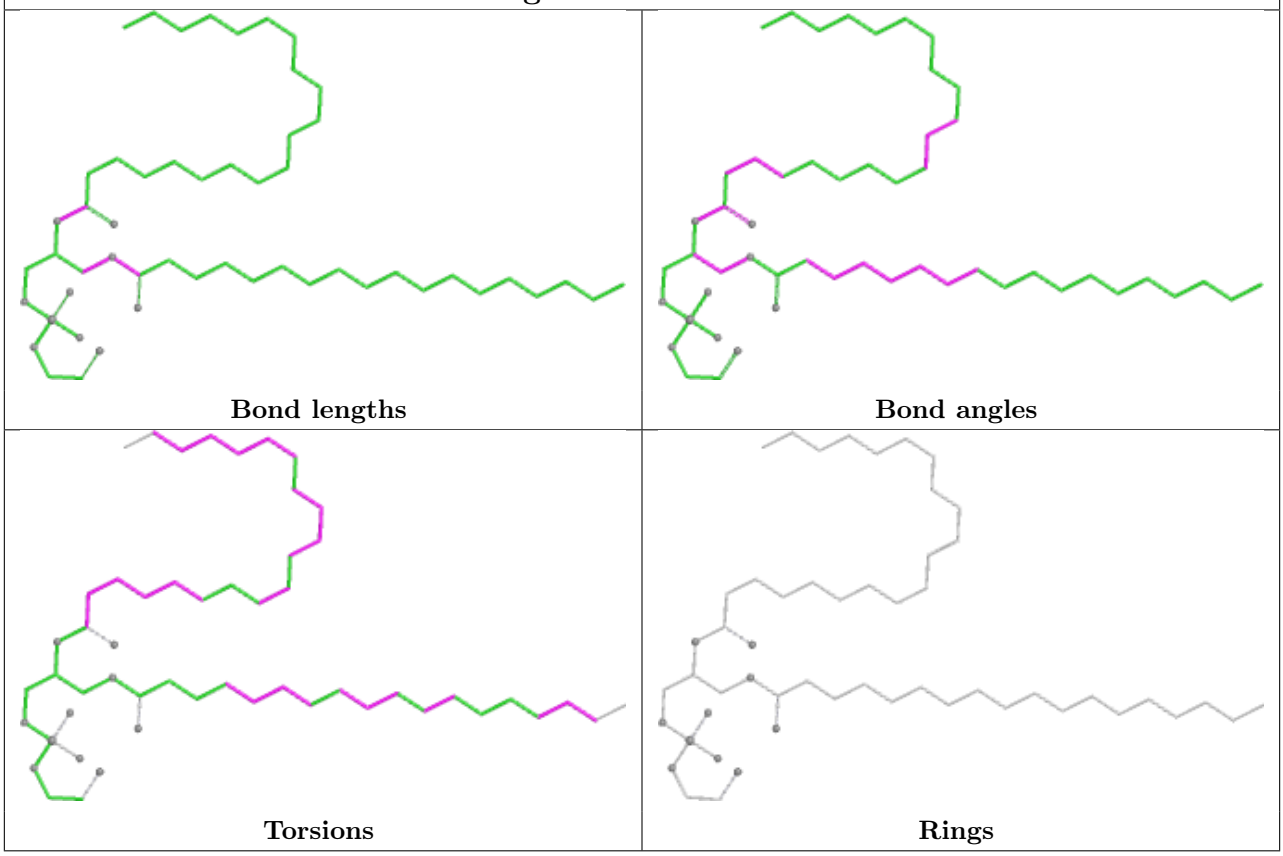


Rings

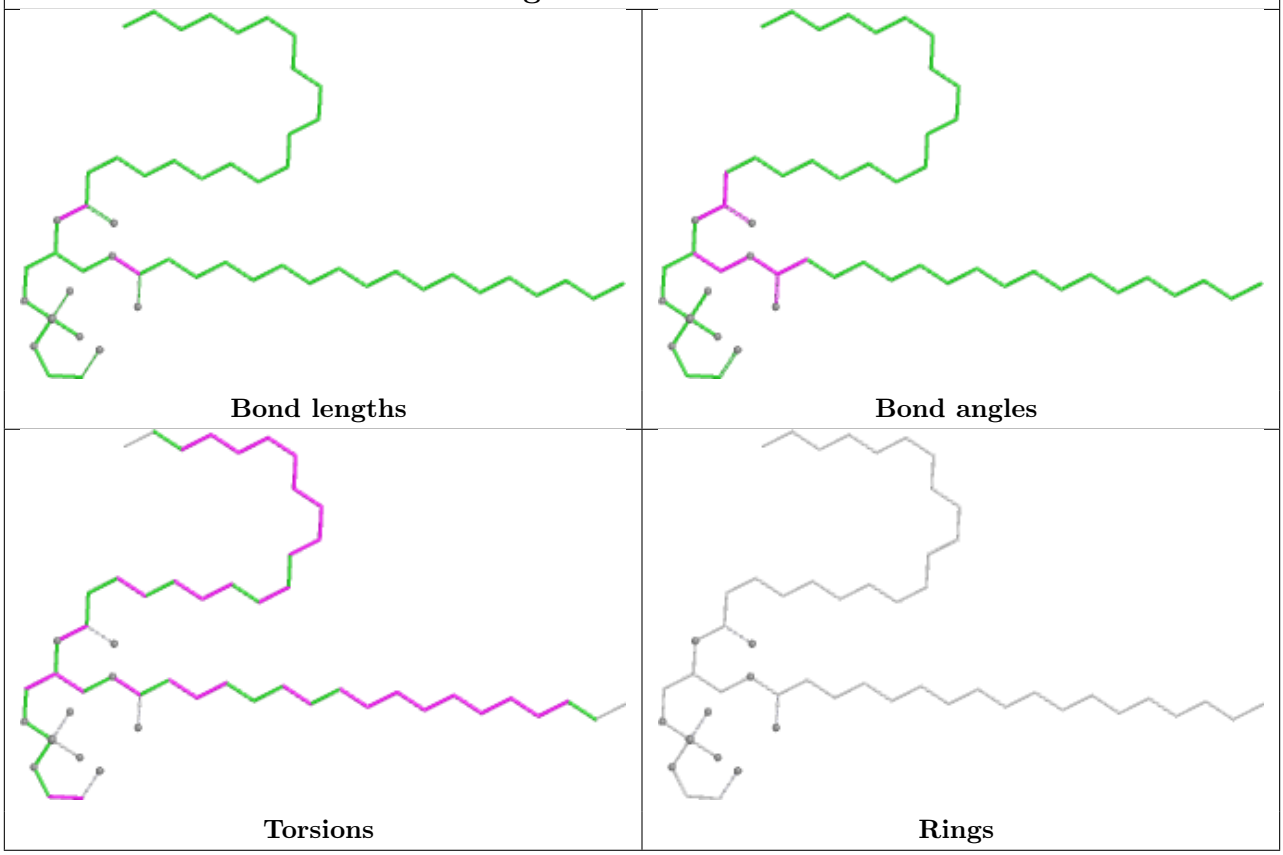
Ligand DMU Z 101



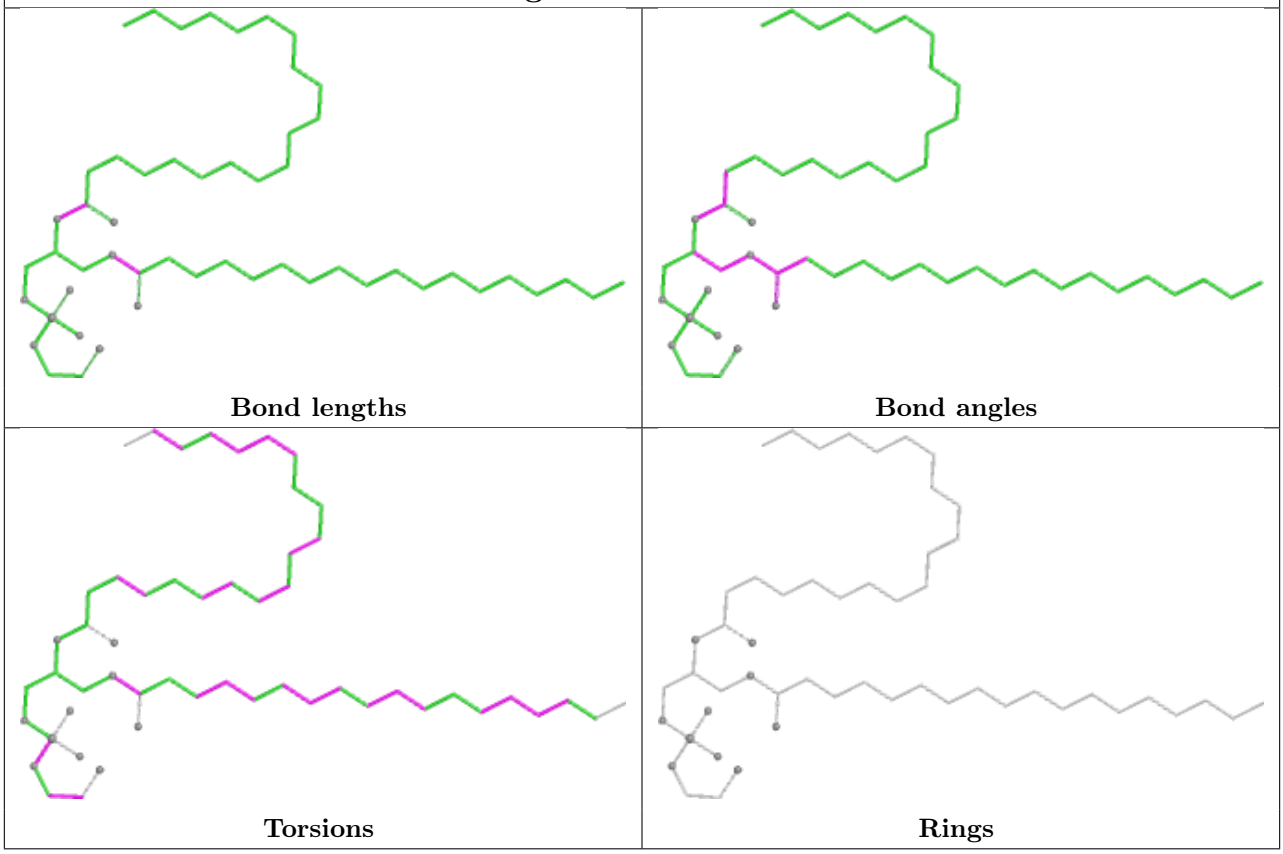
Ligand PEK G 102



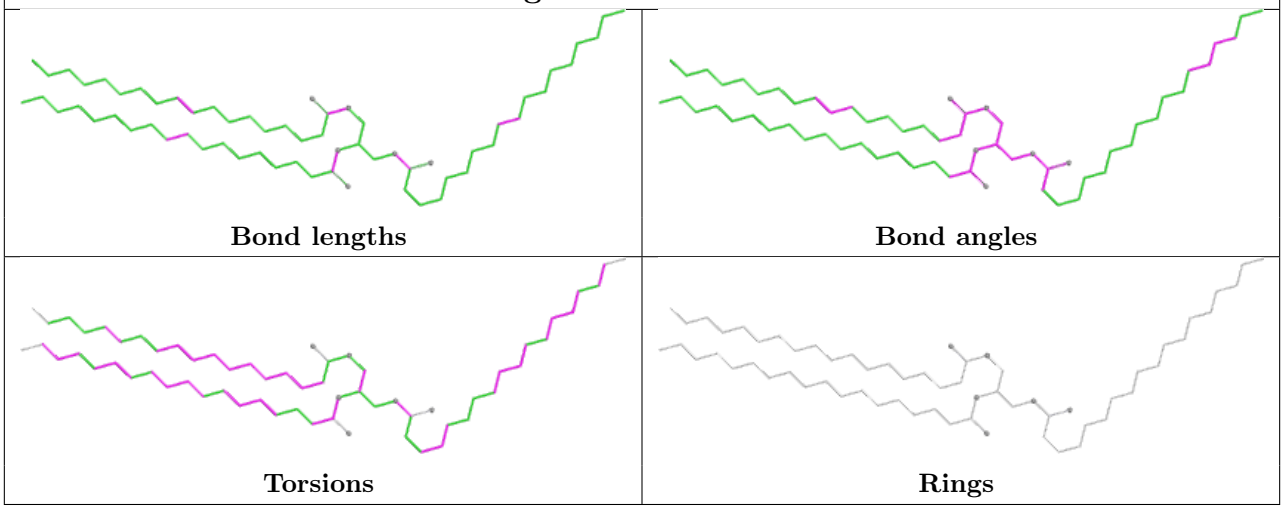
Ligand PEK G 104



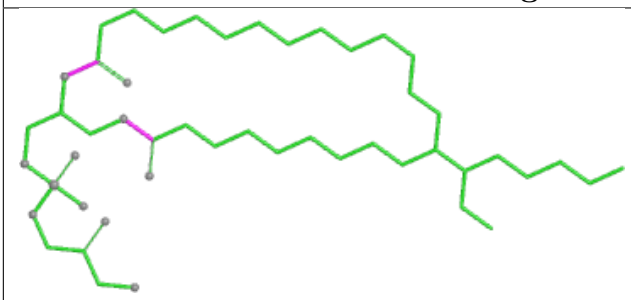
Ligand PEK P 309



Ligand TGL N 610

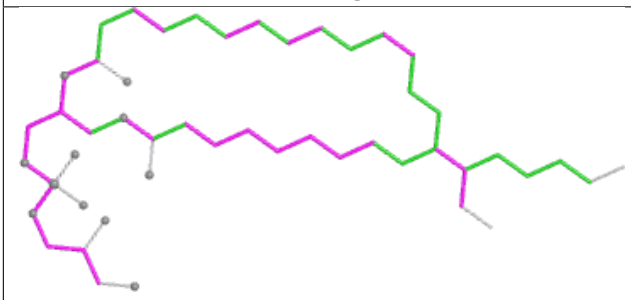


Ligand PGV N 607

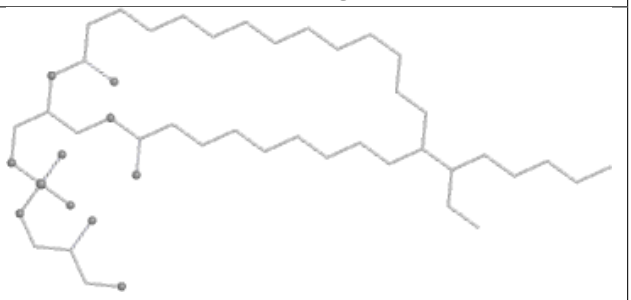


Bond lengths

Bond angles

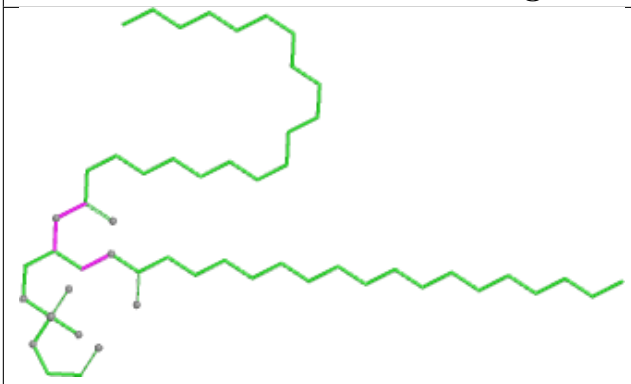


Torsions

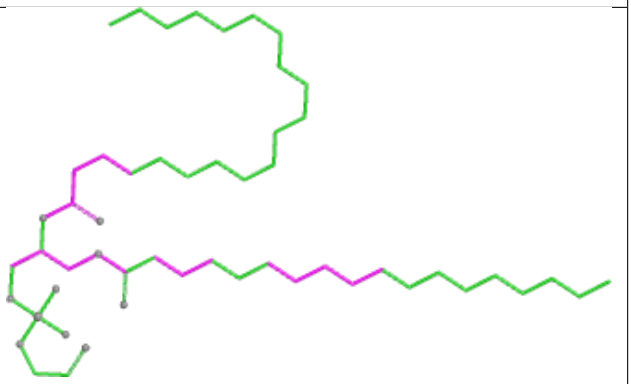


Rings

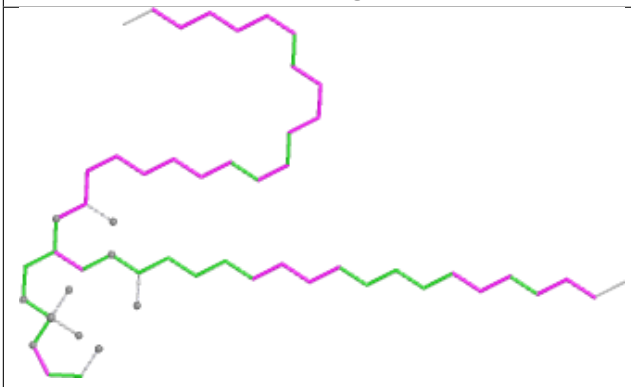
Ligand PEK P 304



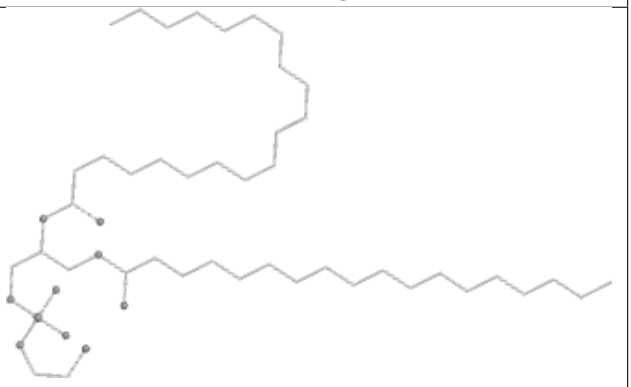
Bond lengths



Bond angles

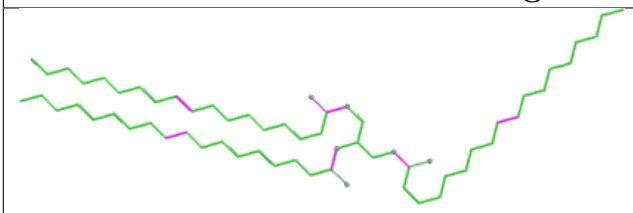


Torsions

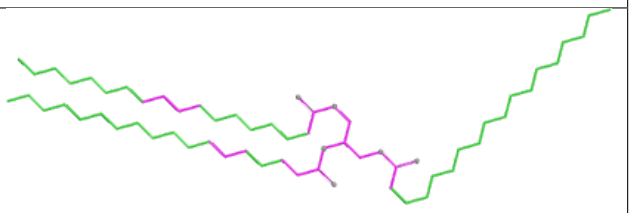


Rings

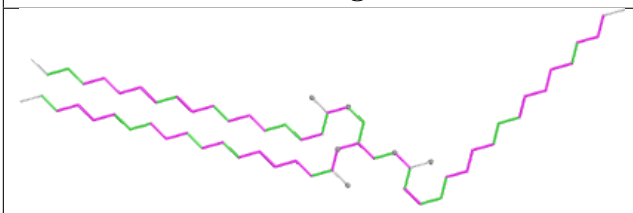
Ligand TGL A 607



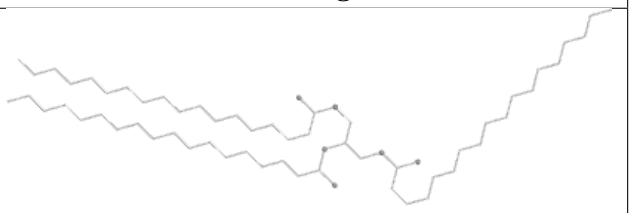
Bond lengths



Bond angles

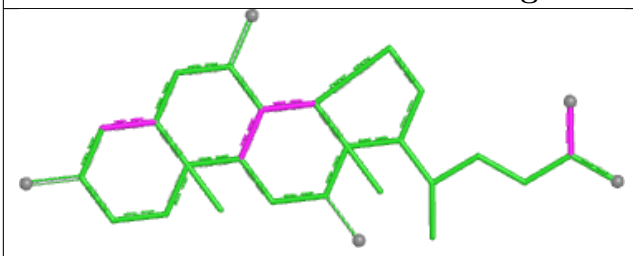


Torsions

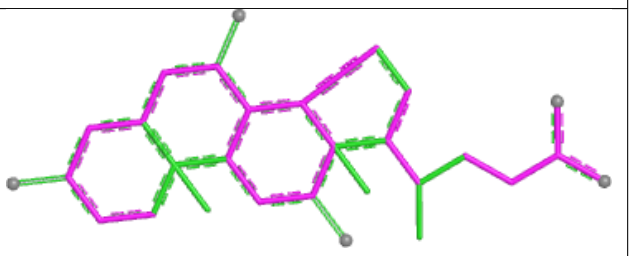


Rings

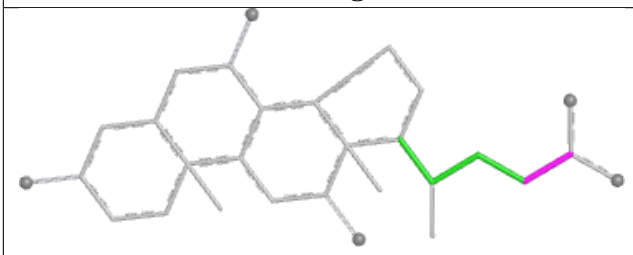
Ligand CHD C 305



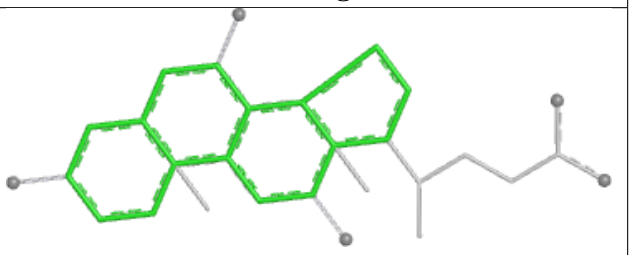
Bond lengths



Bond angles

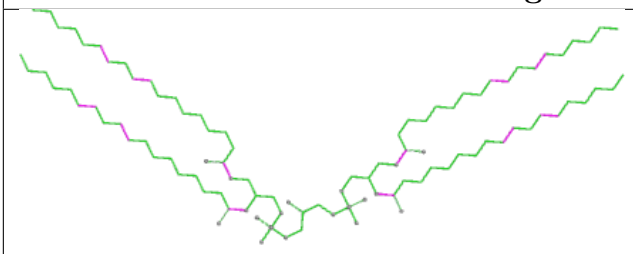


Torsions

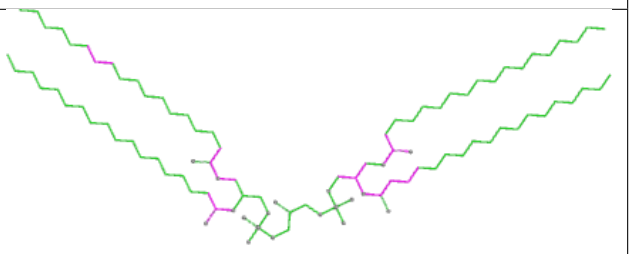


Rings

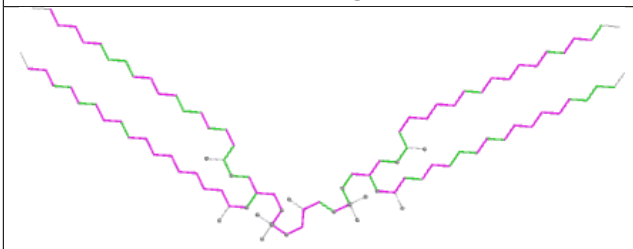
Ligand CDL P 306



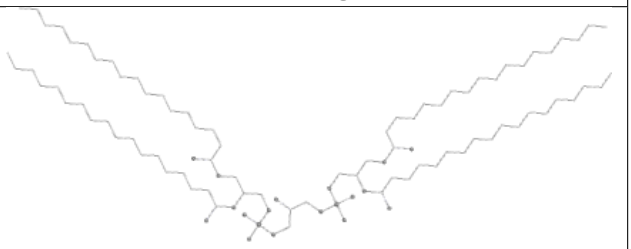
Bond lengths



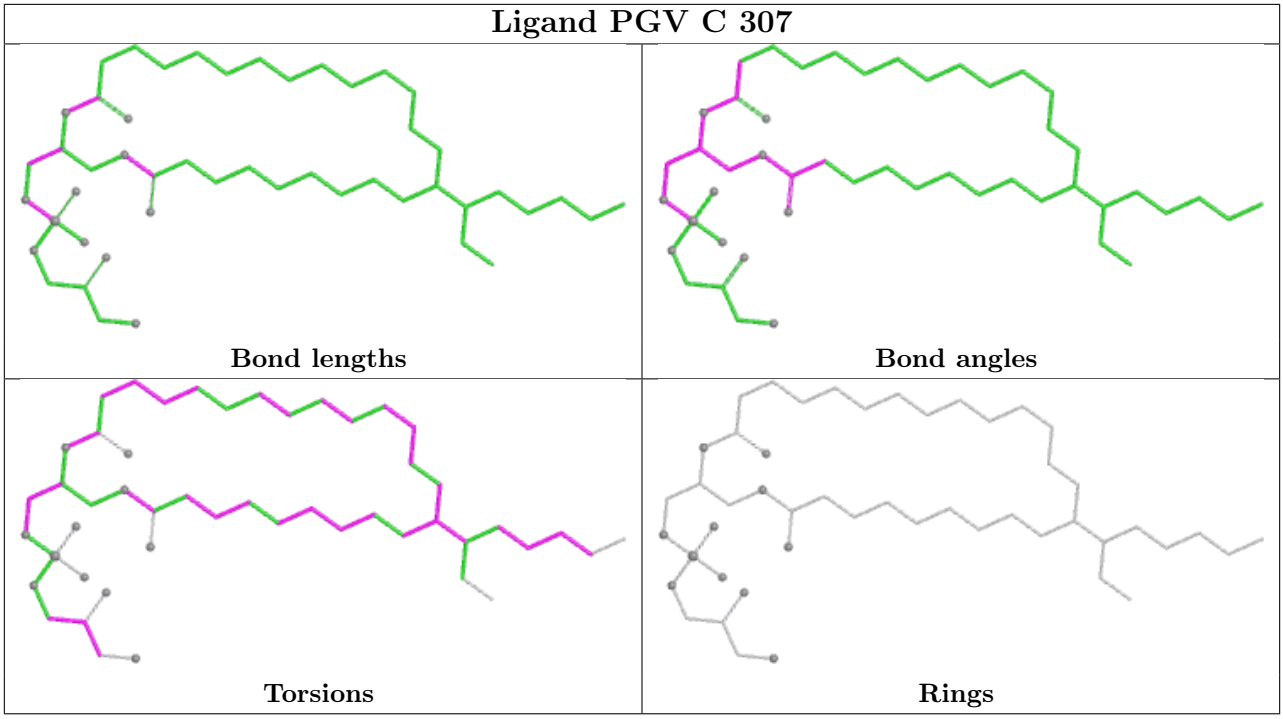
Bond angles



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.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	513/514 (99%)	-0.06	3 (0%)	89	88	21, 27, 35, 67	0
1	N	513/514 (99%)	-0.06	4 (0%)	86	85	26, 35, 47, 76	0
2	B	226/227 (99%)	-0.39	5 (2%)	62	60	24, 33, 55, 80	0
2	O	226/227 (99%)	-0.17	4 (1%)	68	66	34, 45, 69, 94	0
3	C	259/261 (99%)	-0.27	3 (1%)	79	78	25, 33, 44, 64	0
3	P	259/261 (99%)	-0.21	4 (1%)	73	72	29, 37, 49, 69	0
4	D	144/147 (97%)	-0.44	1 (0%)	87	87	28, 36, 52, 69	0
4	Q	144/147 (97%)	1.08	20 (13%)	2	2	41, 58, 83, 130	0
5	E	105/109 (96%)	-0.20	2 (1%)	66	65	28, 36, 59, 99	0
5	R	105/109 (96%)	0.23	4 (3%)	40	39	36, 47, 66, 104	0
6	F	98/98 (100%)	0.71	8 (8%)	11	11	29, 39, 97, 134	0
6	S	98/98 (100%)	0.71	10 (10%)	6	6	31, 45, 103, 128	0
7	G	83/85 (97%)	1.02	16 (19%)	1	0	31, 39, 110, 123	0
7	T	83/85 (97%)	0.98	17 (20%)	1	0	32, 47, 104, 119	0
8	H	79/85 (92%)	0.14	8 (10%)	7	6	30, 40, 88, 113	0
8	U	79/85 (92%)	0.45	9 (11%)	5	4	39, 50, 97, 125	0
9	I	72/73 (98%)	0.16	3 (4%)	36	35	34, 44, 65, 71	0
9	V	72/73 (98%)	0.70	8 (11%)	5	4	35, 60, 75, 102	0
10	J	58/59 (98%)	0.62	8 (13%)	2	2	33, 43, 72, 103	0
10	W	58/59 (98%)	0.70	8 (13%)	2	2	41, 52, 85, 125	0
11	K	49/56 (87%)	-0.29	0	100	100	34, 40, 52, 57	0
11	X	49/56 (87%)	1.52	18 (36%)	0	0	47, 59, 76, 84	0
12	L	46/47 (97%)	-0.32	0	100	100	28, 33, 55, 83	0
12	Y	46/47 (97%)	-0.05	1 (2%)	62	60	38, 50, 74, 97	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
13	M	43/46 (93%)	0.18	5 (11%)	4	4	29, 34, 90, 114	0
13	Z	43/46 (93%)	0.53	8 (18%)	1	1	46, 54, 122, 136	0
All	All	3550/3614 (98%)	0.10	177 (4%)	28	28	21, 38, 72, 136	0

The worst 5 of 177 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	Q	5	VAL	25.4
4	Q	6	VAL	23.8
6	S	97	ALA	17.3
6	F	97	ALA	14.6
6	S	96	LEU	13.8

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
9	SAC	V	1	9/10	0.24	0.59	113,117,118,119	0
7	TPO	G	11	11/12	0.53	0.39	83,91,111,114	0
7	TPO	T	11	11/12	0.55	0.36	87,95,113,113	0
9	SAC	I	1	9/10	0.80	0.18	68,71,73,74	0
1	FME	A	1	10/11	0.93	0.14	44,53,74,81	0
1	FME	N	1	10/11	0.95	0.17	52,58,75,76	0
2	FME	B	1	10/11	0.97	0.12	32,34,43,59	0
2	FME	O	1	10/11	0.98	0.14	45,47,58,65	0

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column

labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
28	DMU	P	301	33/33	0.32	0.44	132,165,171,171	0
25	PEK	C	306	53/53	0.48	0.30	53,92,130,133	0
25	PEK	T	101	53/53	0.52	0.49	62,105,129,130	0
28	DMU	G	101	33/33	0.53	0.29	103,146,153,154	0
25	PEK	P	309	53/53	0.55	0.36	47,97,125,127	0
24	CDL	G	103	100/100	0.57	0.37	73,101,133,138	0
25	PEK	G	104	53/53	0.58	0.50	60,112,135,137	0
26	PSC	O	303	52/52	0.58	0.34	57,105,133,136	0
24	CDL	T	102	100/100	0.61	0.35	68,101,133,137	0
20	PGV	P	302	51/51	0.64	0.43	74,105,119,121	0
20	PGV	C	307	51/51	0.65	0.41	62,90,111,112	0
19	TGL	N	610	63/63	0.66	0.32	57,80,98,100	0
24	CDL	P	306	100/100	0.67	0.37	57,103,125,132	0
22	CHD	C	304	29/29	0.70	0.48	92,125,126,127	0
19	TGL	Q	201	63/63	0.71	0.25	64,87,97,100	0
22	CHD	P	307	29/29	0.71	0.37	91,121,122,124	0
20	PGV	N	607	51/51	0.72	0.32	54,92,119,123	0
23	UNX	C	301	1/1	0.73	0.24	38,38,38,38	0
20	PGV	A	609	51/51	0.73	0.28	34,78,100,106	0
26	PSC	E	201	52/52	0.73	0.34	53,106,127,129	0
24	CDL	C	303	100/100	0.74	0.39	44,96,128,130	0
19	TGL	D	201	63/63	0.75	0.22	46,69,82,83	0
19	TGL	L	101	63/63	0.77	0.27	38,61,82,85	0
28	DMU	Z	101	33/33	0.81	0.30	57,70,87,91	0
19	TGL	N	609	63/63	0.83	0.22	57,84,100,103	0
19	TGL	A	607	63/63	0.84	0.21	49,77,97,100	0
17	MG	N	605	1/1	0.85	0.15	39,39,39,39	0
18	NA	N	606	1/1	0.85	0.33	53,53,53,53	0
18	NA	A	606	1/1	0.87	0.29	45,45,45,45	0
22	CHD	C	305	29/29	0.90	0.15	37,44,47,48	0
28	DMU	M	101	33/33	0.91	0.16	43,49,68,70	0
22	CHD	P	308	29/29	0.92	0.13	41,47,50,50	0
23	UNX	P	303	1/1	0.92	0.30	35,35,35,35	0
25	PEK	P	304	53/53	0.93	0.17	38,60,93,95	0
20	PGV	P	305	51/51	0.95	0.14	31,47,86,89	0
25	PEK	G	102	53/53	0.95	0.14	29,50,79,81	0
20	PGV	A	608	51/51	0.96	0.13	24,41,65,70	0
20	PGV	C	302	51/51	0.96	0.12	26,37,79,82	0
20	PGV	N	608	51/51	0.96	0.14	30,49,74,76	0
22	CHD	B	302	29/29	0.97	0.09	33,37,42,53	0
17	MG	A	605	1/1	0.97	0.13	27,27,27,27	0

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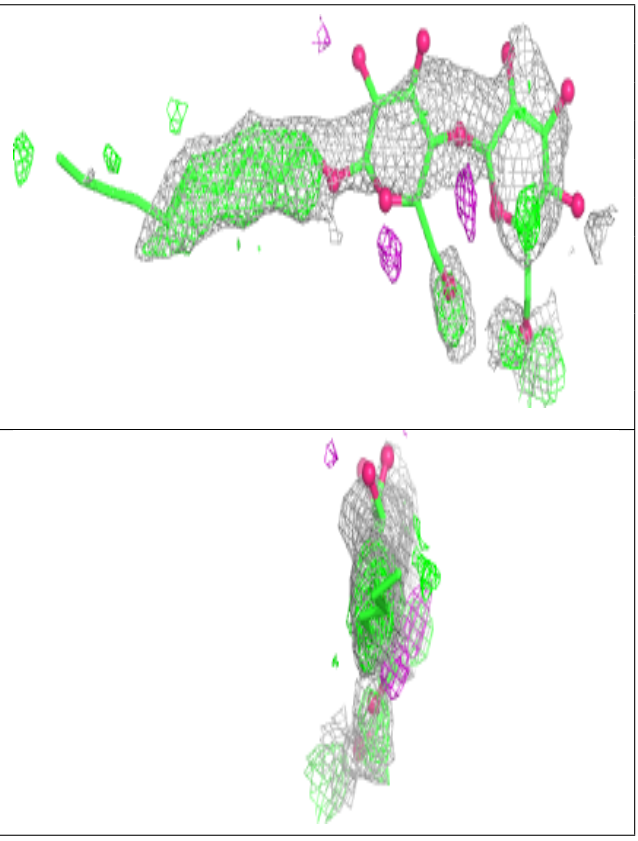
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
15	HEA	N	602	60/60	0.97	0.10	15,31,57,63	0
22	CHD	O	302	29/29	0.97	0.10	33,37,43,45	0
15	HEA	A	602	60/60	0.98	0.13	17,23,51,55	0
14	CYN	N	601	2/2	0.99	0.15	30,30,30,31	0
15	HEA	N	603	60/60	0.99	0.13	25,30,39,42	0
14	CYN	A	601	2/2	0.99	0.15	20,20,20,24	0
15	HEA	A	603	60/60	0.99	0.12	18,23,33,35	0
21	CUA	B	301	2/2	0.99	0.13	26,26,26,27	0
21	CUA	O	301	2/2	0.99	0.10	38,38,38,38	0
16	CU	A	604	1/1	1.00	0.13	25,25,25,25	0
16	CU	N	604	1/1	1.00	0.13	30,30,30,30	0
27	ZN	F	101	1/1	1.00	0.09	35,35,35,35	0
27	ZN	S	101	1/1	1.00	0.08	40,40,40,40	0

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

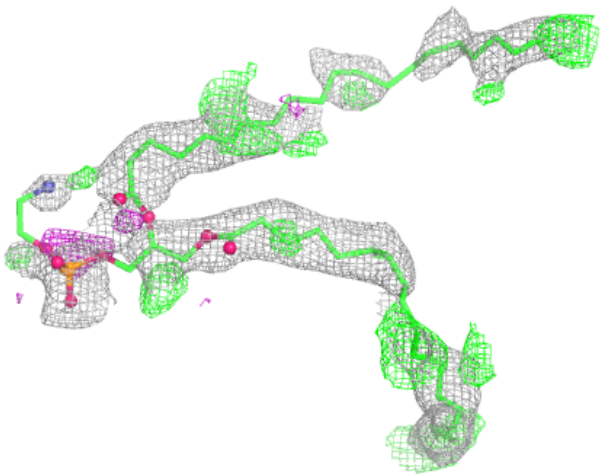
Electron density around DMU P 301:

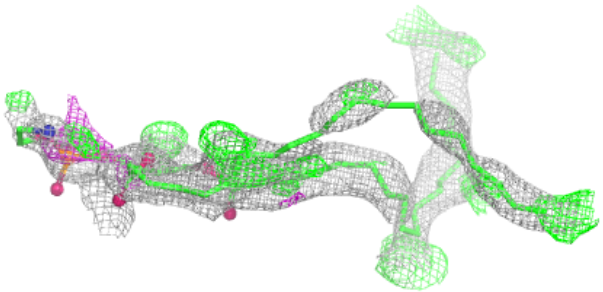
2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative) and green (positive)

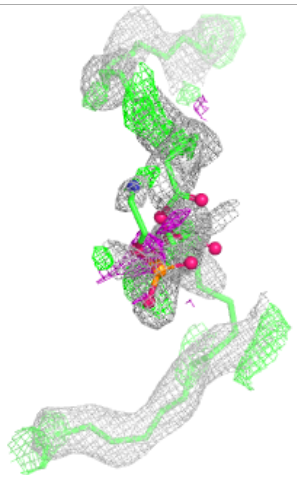


Electron density around PEK C 306:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

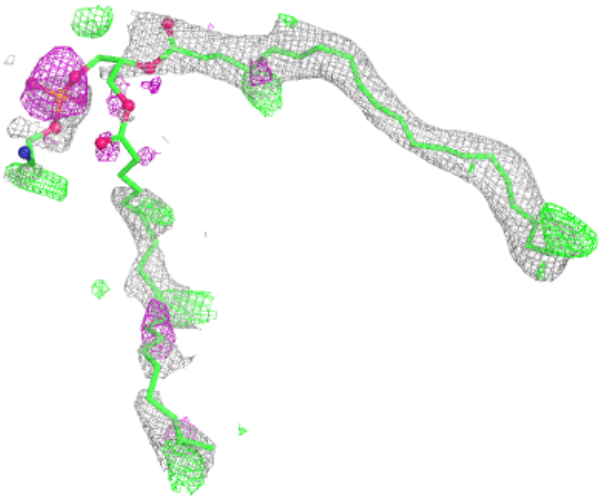


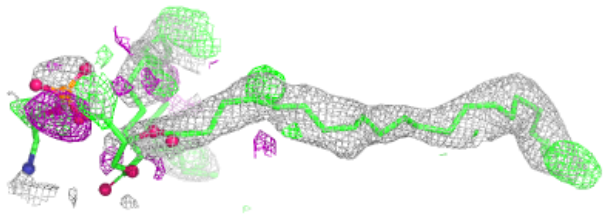


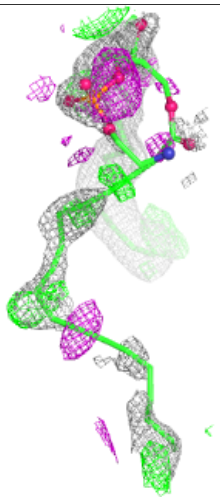


Electron density around PEK T 101:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

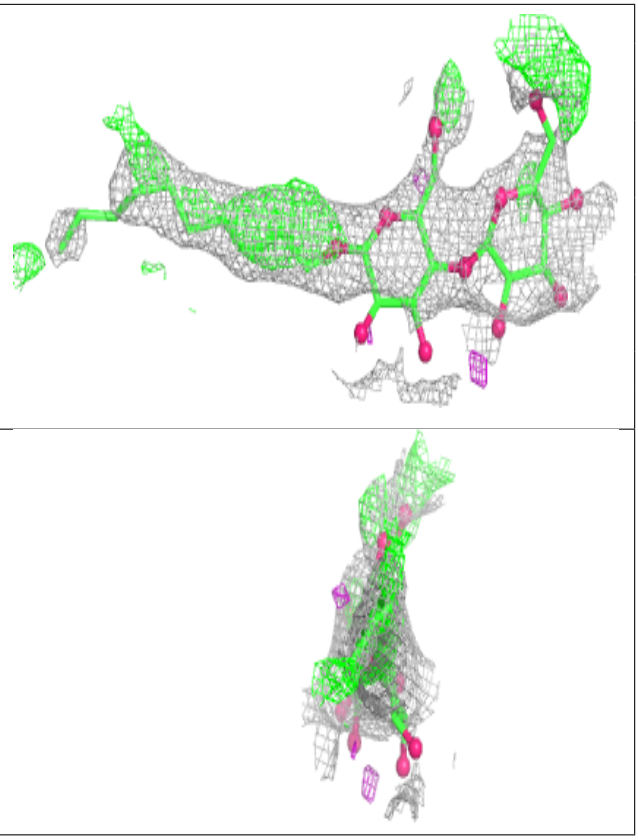






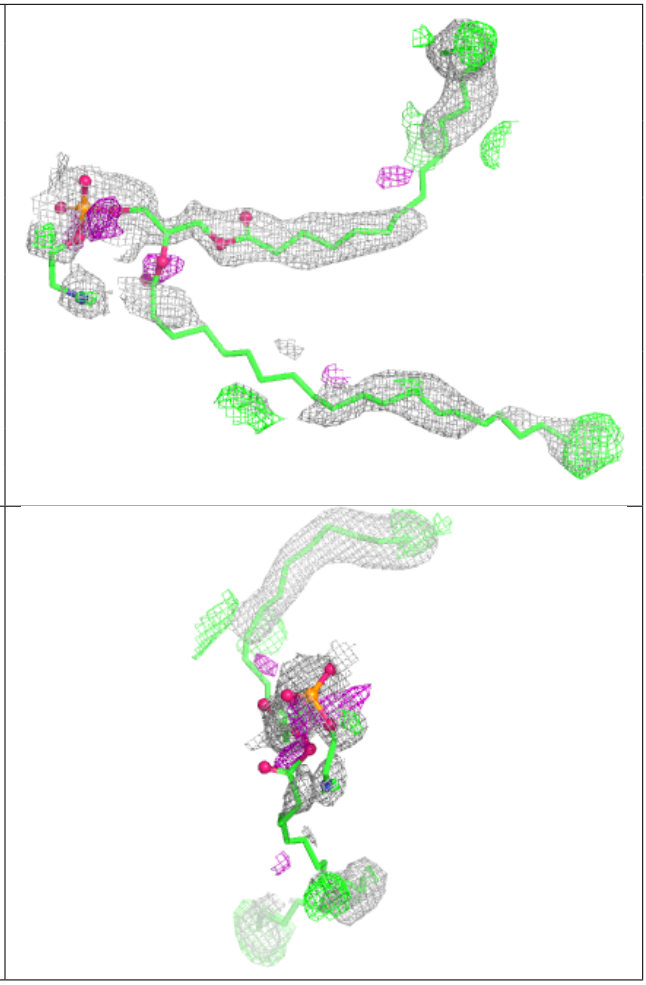
Electron density around DMU G 101:

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



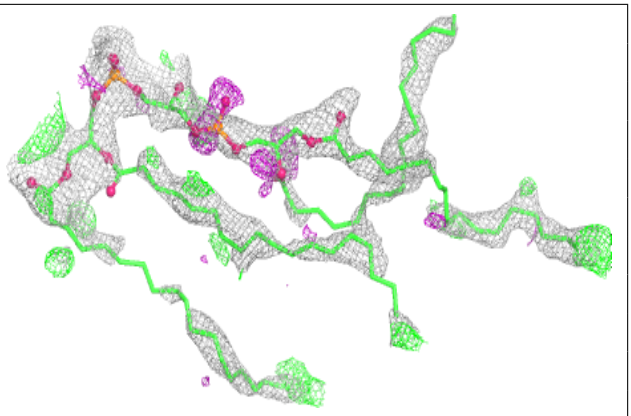
Electron density around PEK P 309:

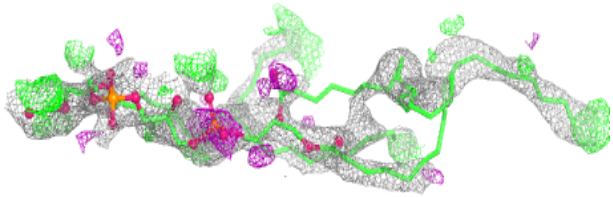
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

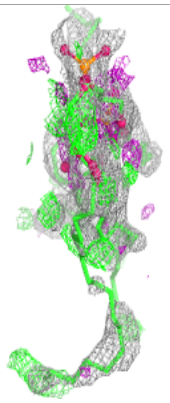


Electron density around CDL G 103:

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

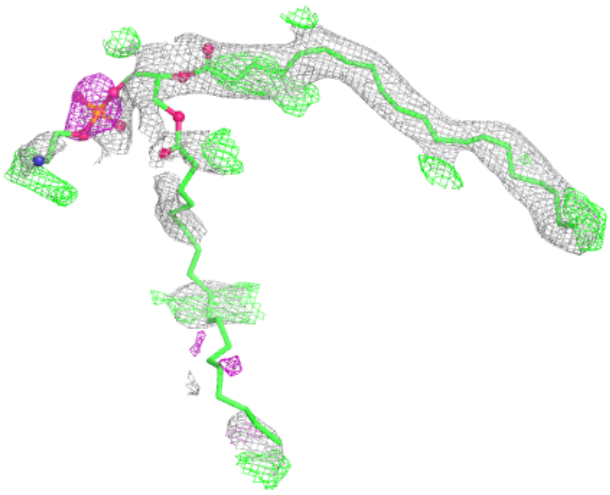


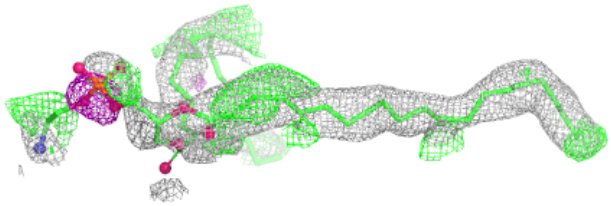




Electron density around PEK G 104:

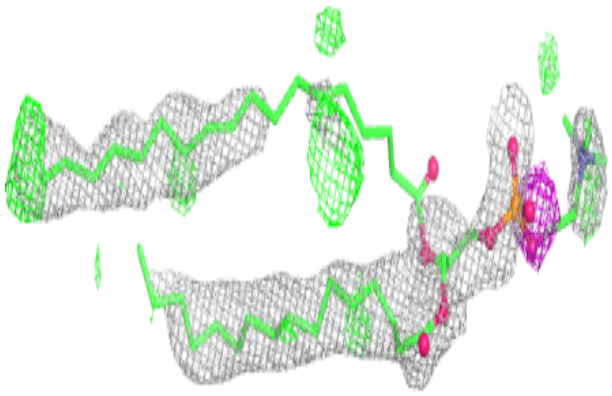
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

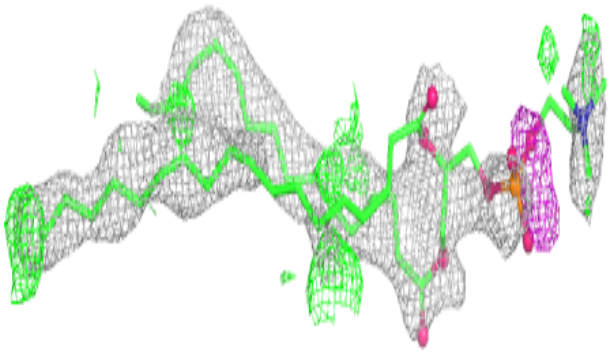


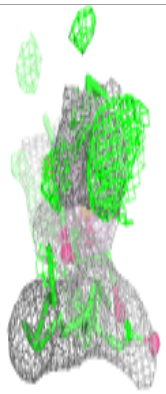


Electron density around PSC O 303:

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

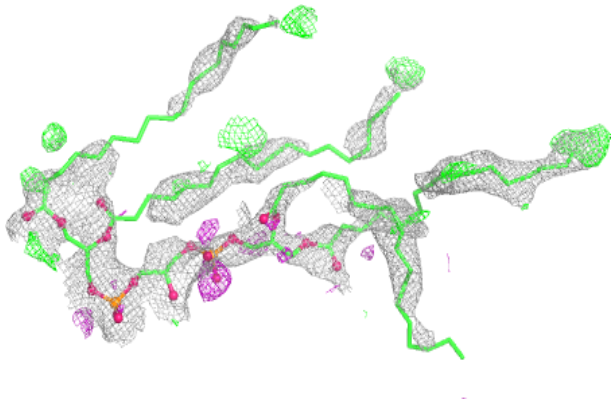


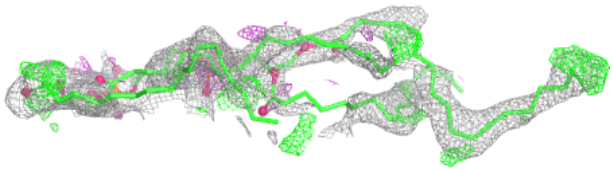


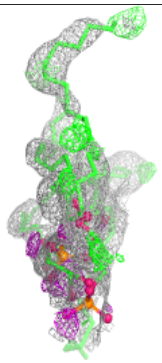


Electron density around CDL T 102:

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

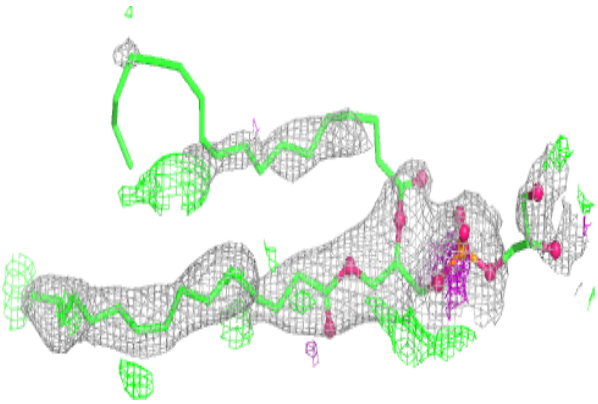


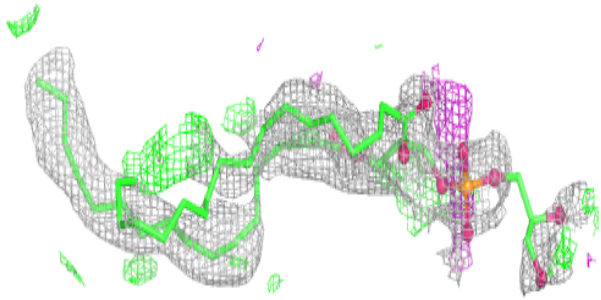


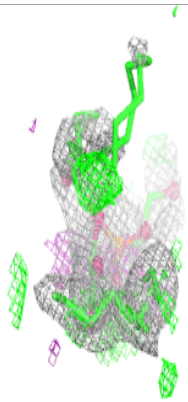


Electron density around PGV P 302:

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

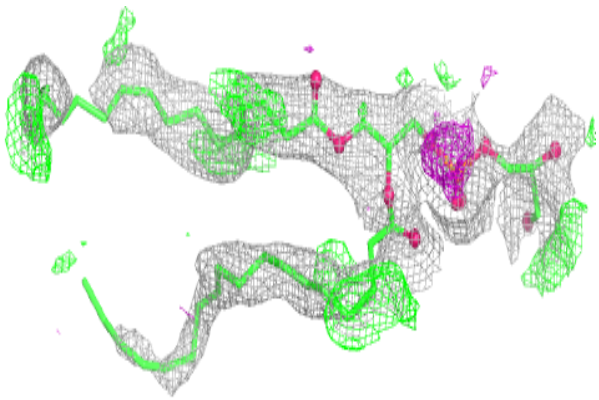


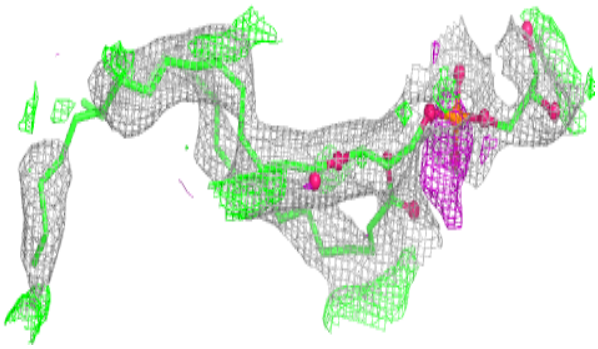


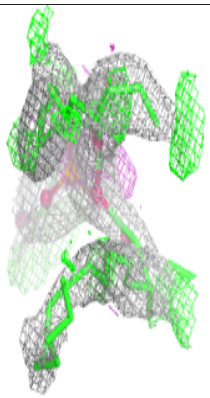


Electron density around PGV C 307:

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

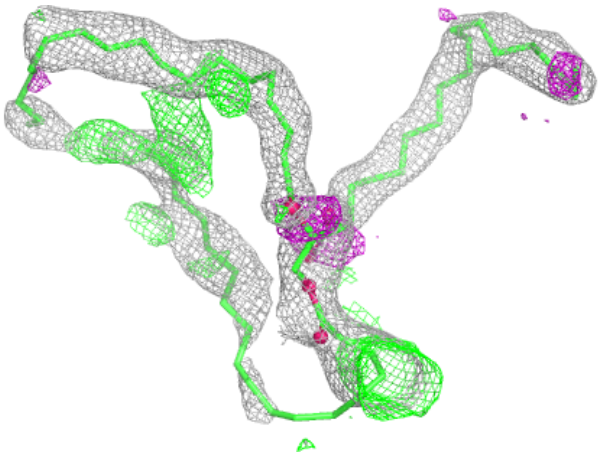


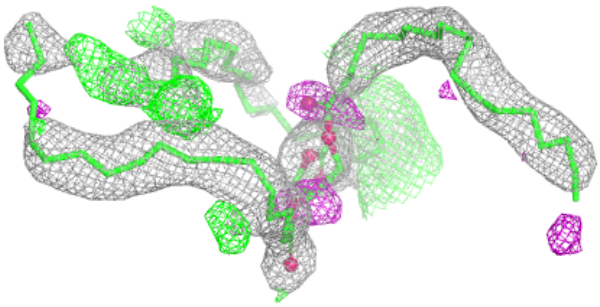


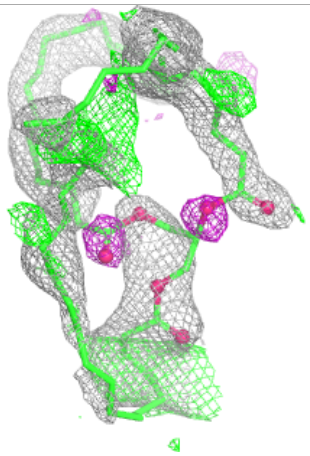


Electron density around TGL N 610:

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

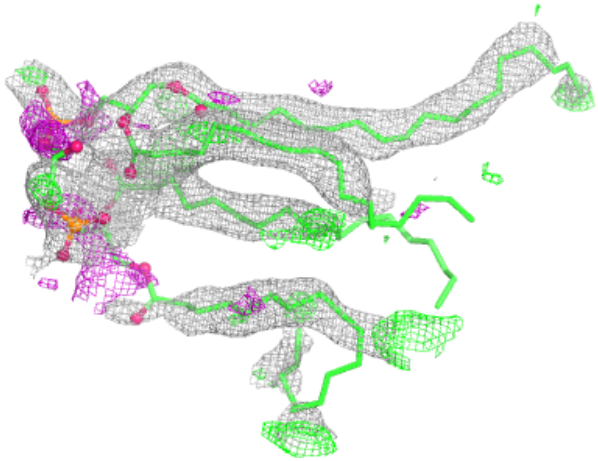


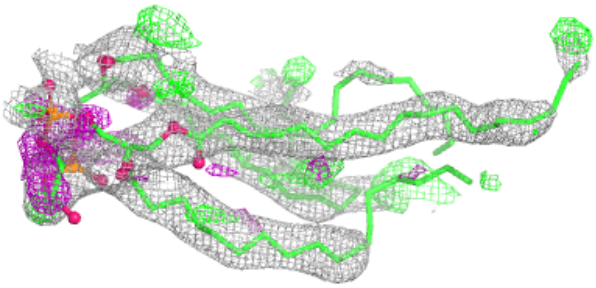


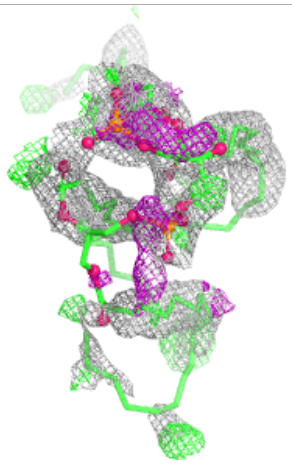


Electron density around CDL P 306:

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

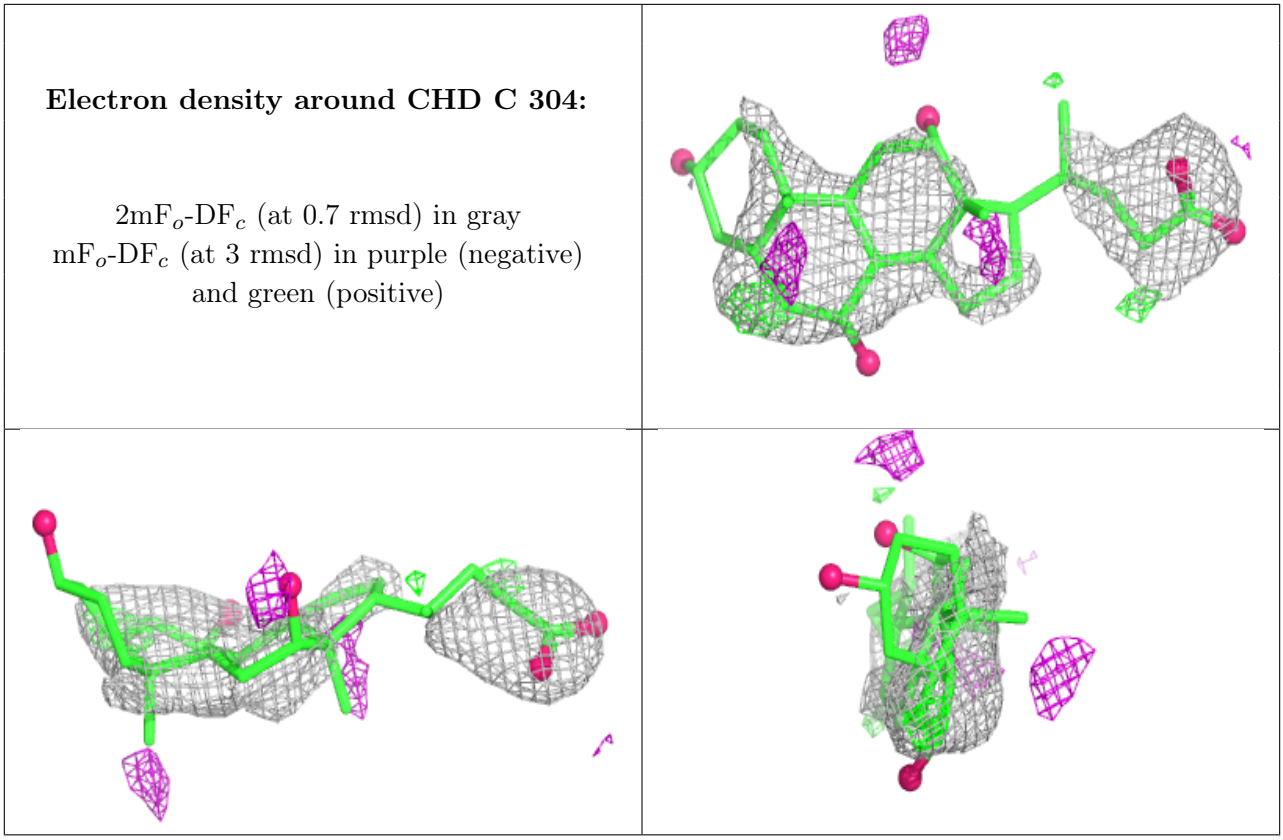






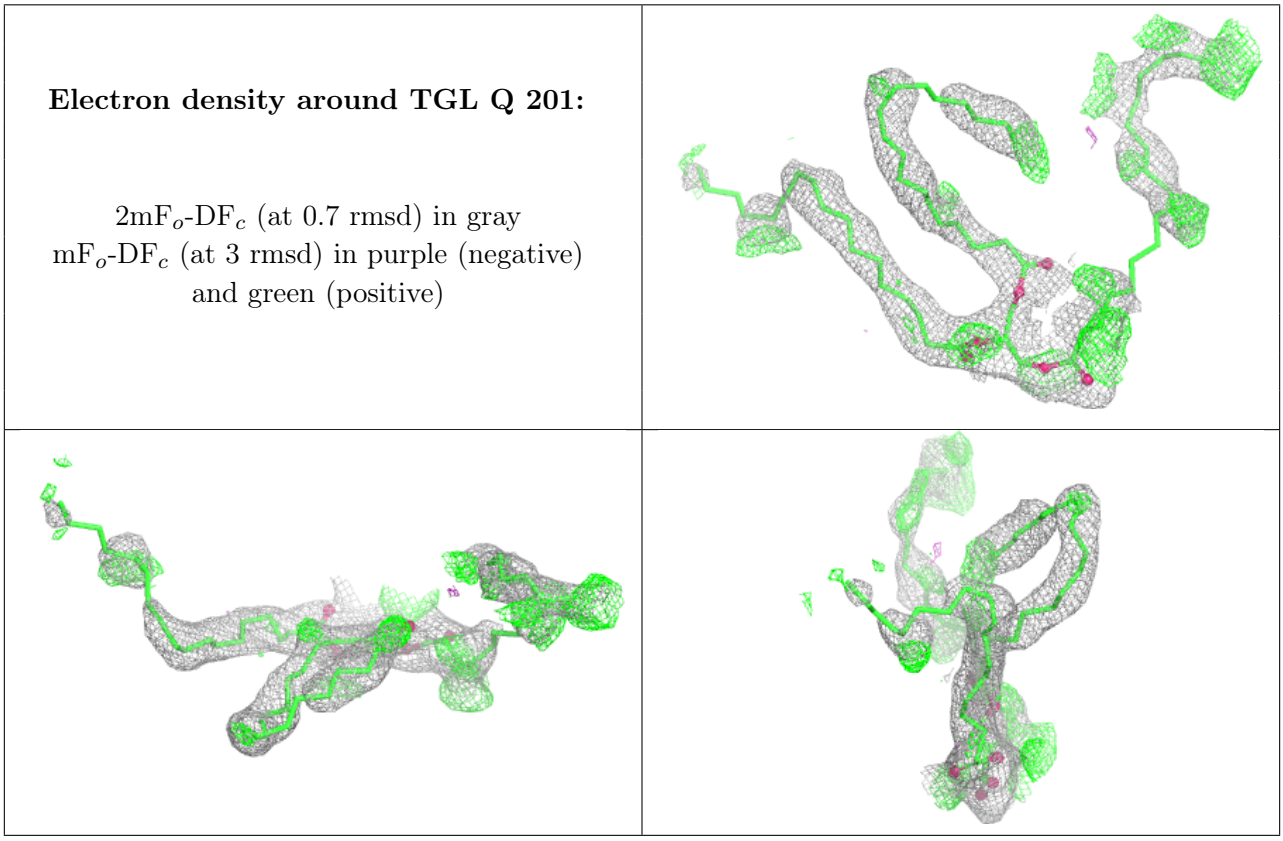
Electron density around CHD C 304:

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



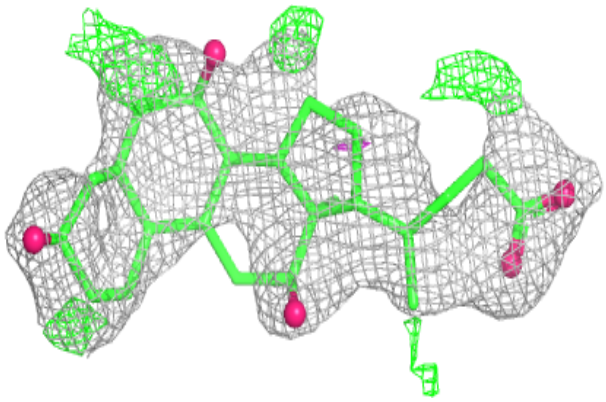
Electron density around TGL Q 201:

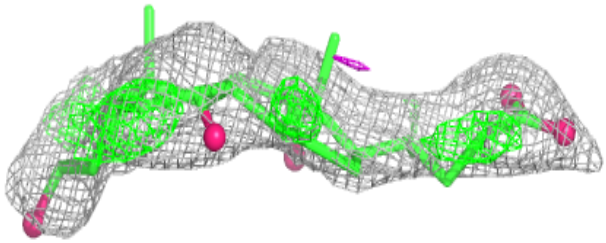
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

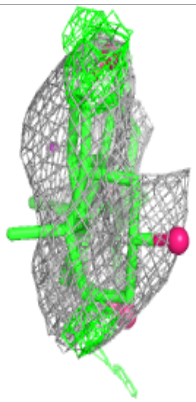


Electron density around CHD P 307:

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

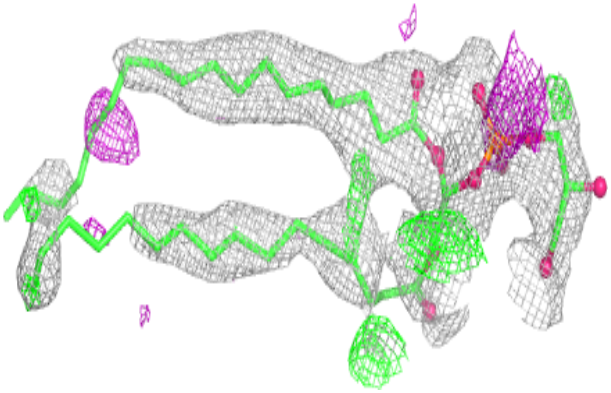


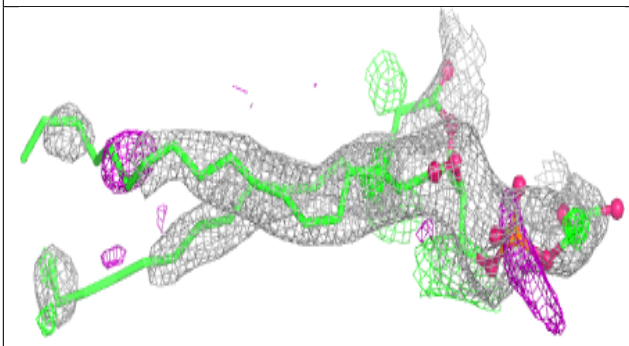


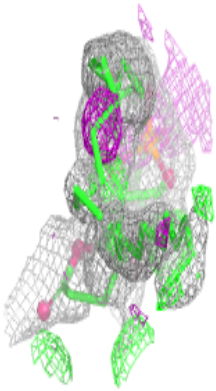


Electron density around PGV N 607:

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

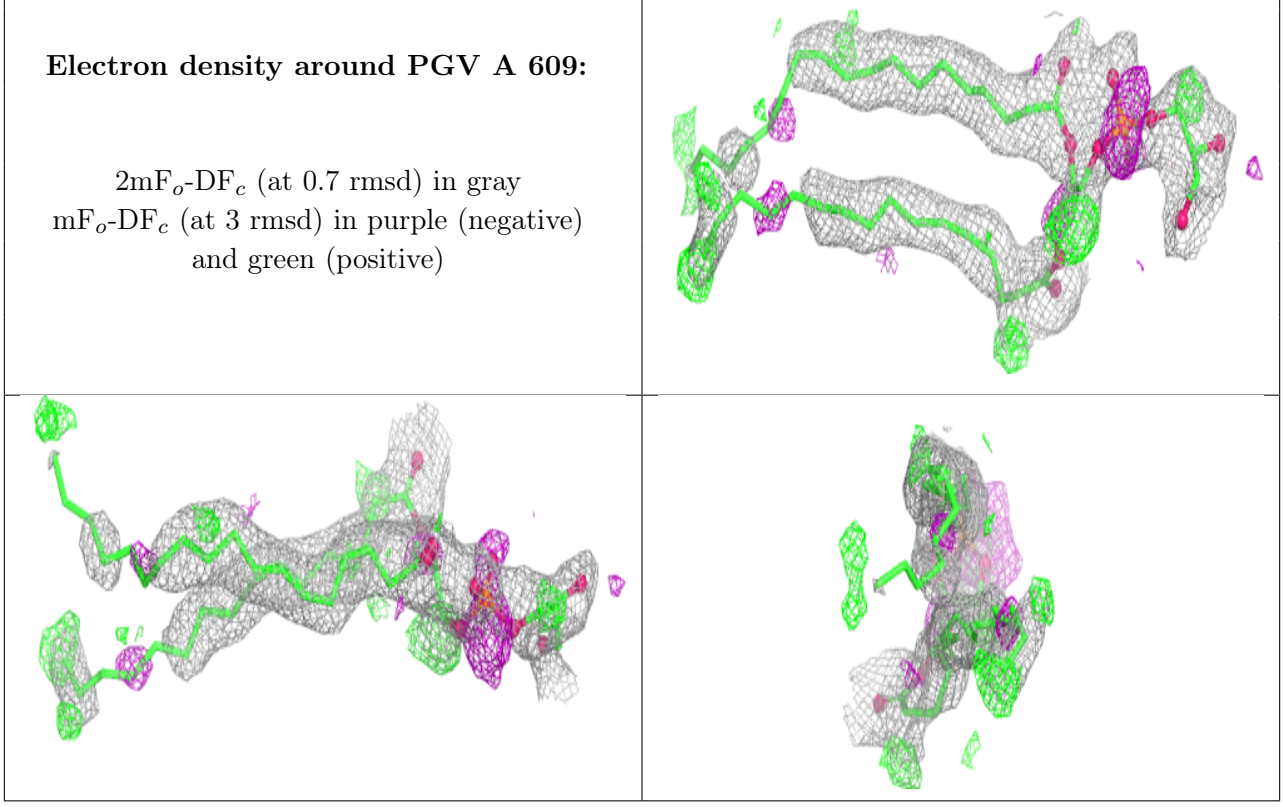






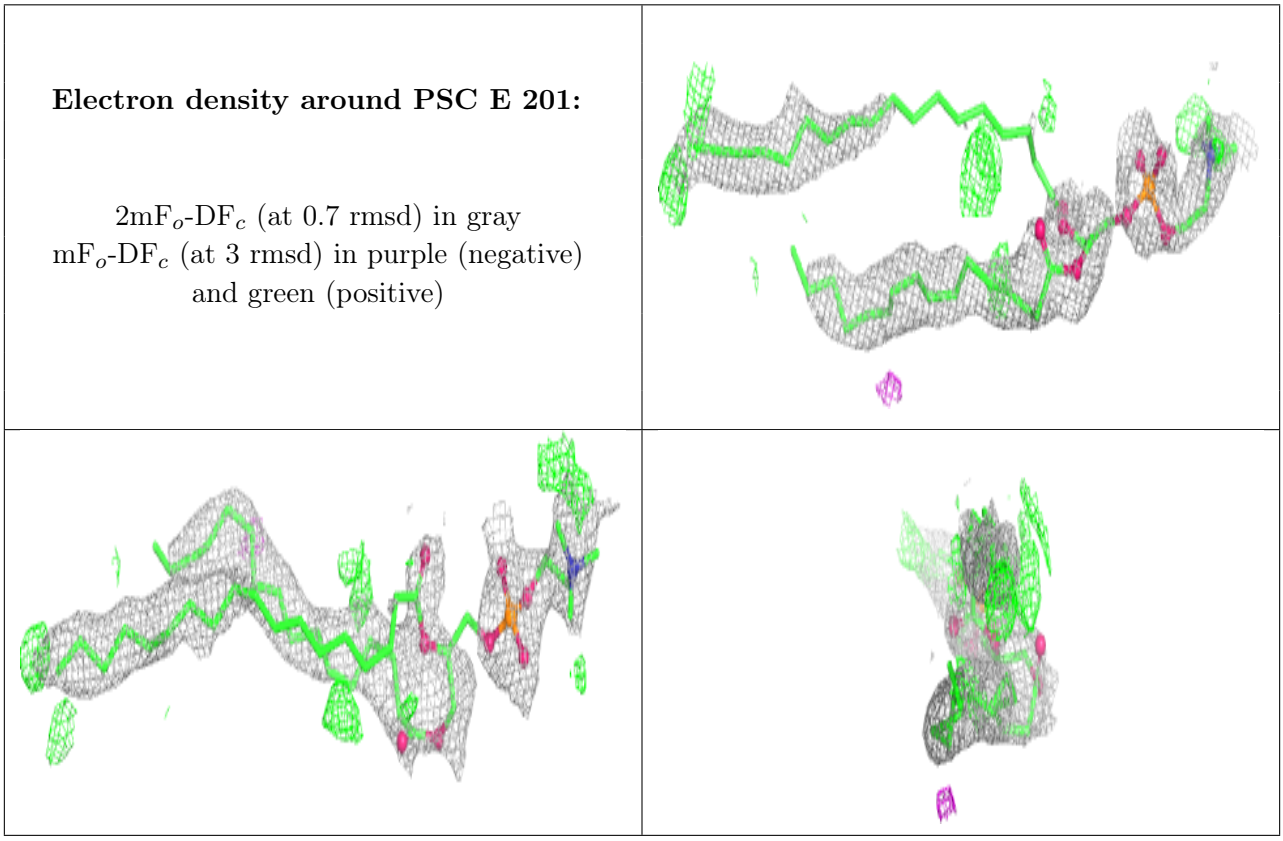
Electron density around PGV A 609:

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



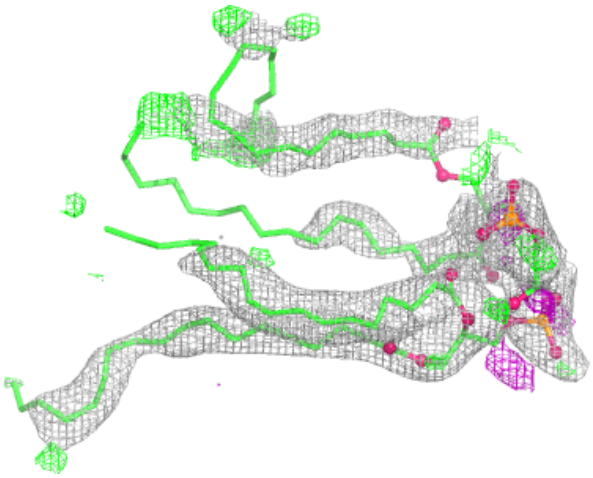
Electron density around PSC E 201:

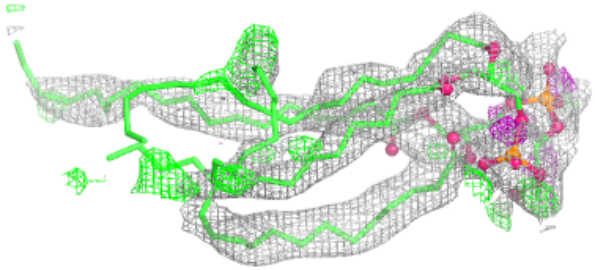
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

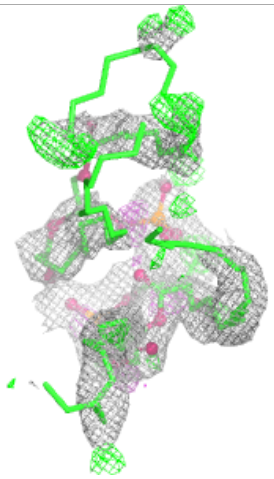


Electron density around CDL C 303:

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

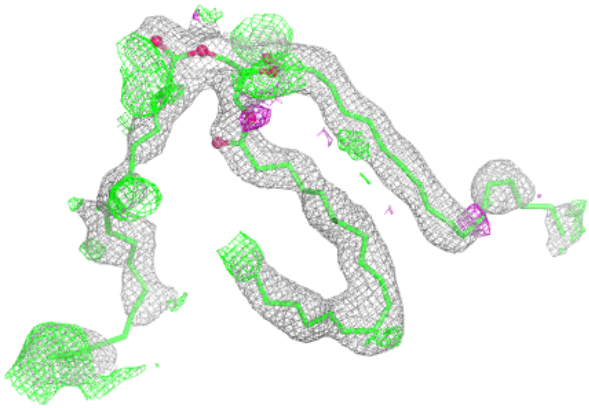


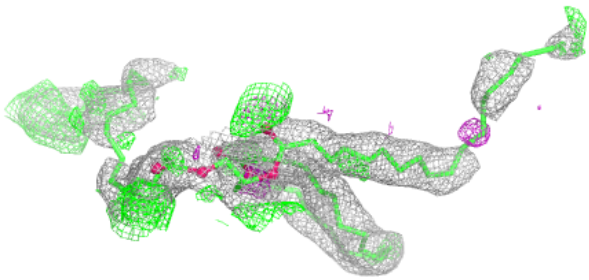


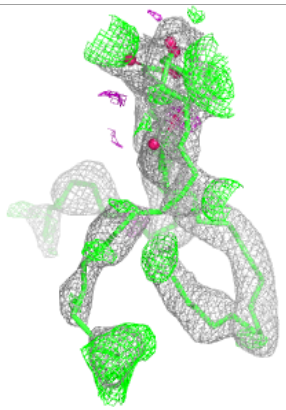


Electron density around TGL D 201:

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

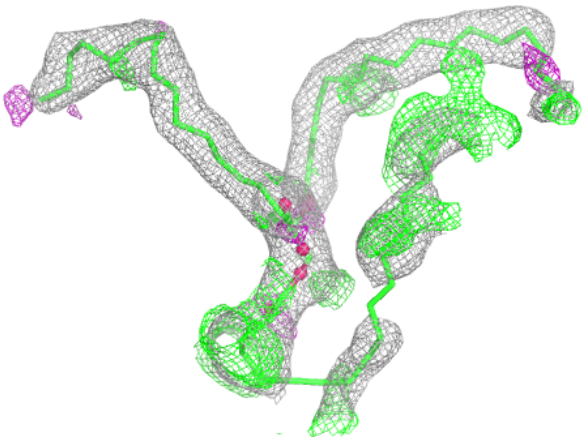


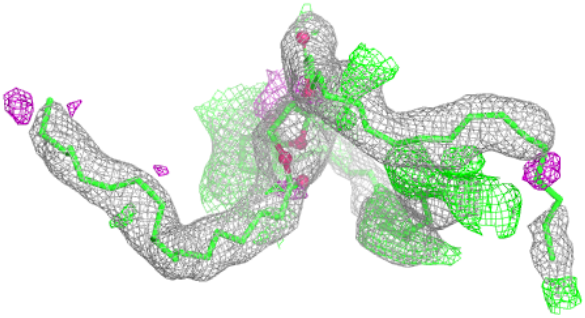


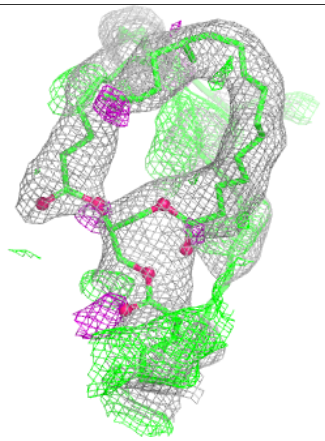


Electron density around TGL L 101:

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

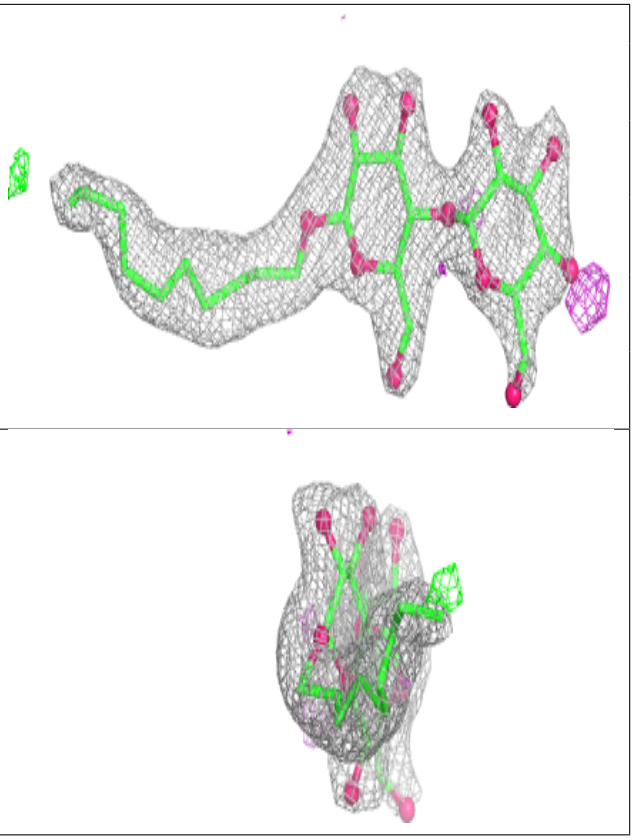






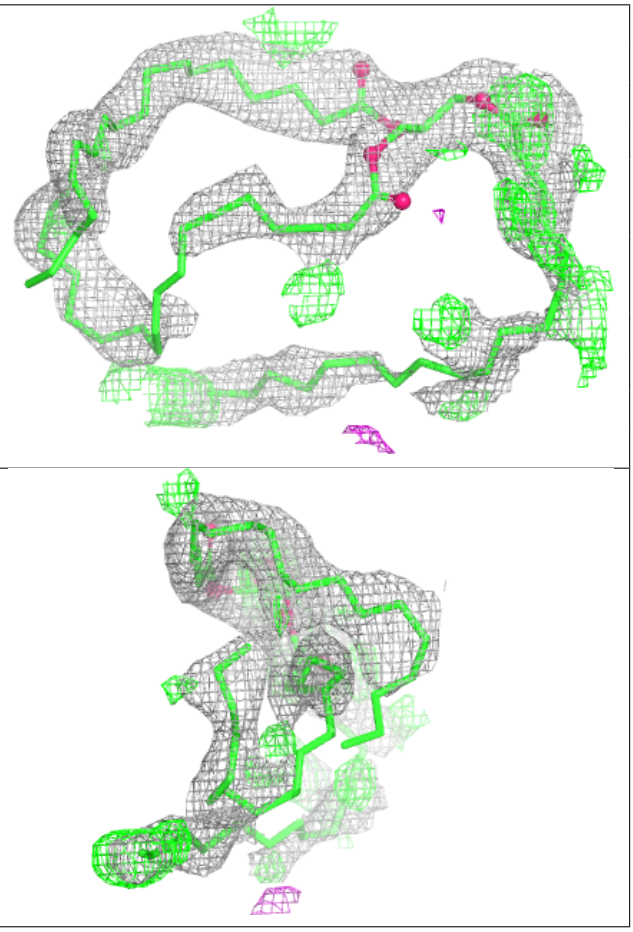
Electron density around DMU Z 101:

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



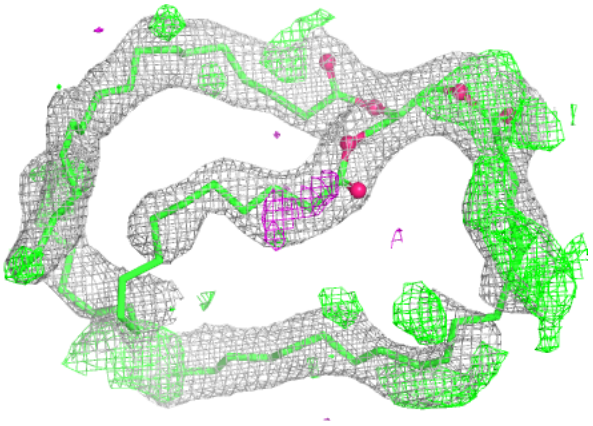
Electron density around TGL N 609:

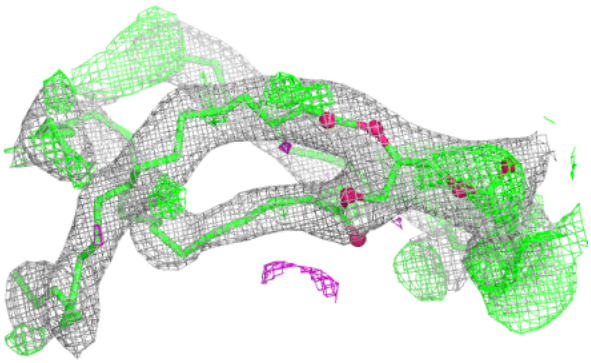
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

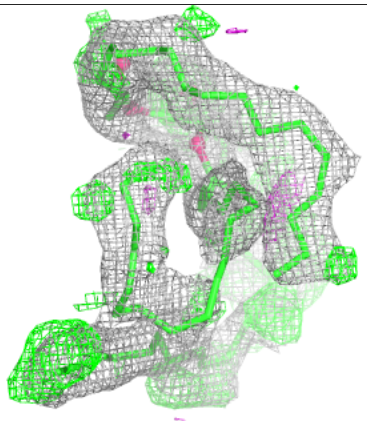


Electron density around TGL A 607:

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

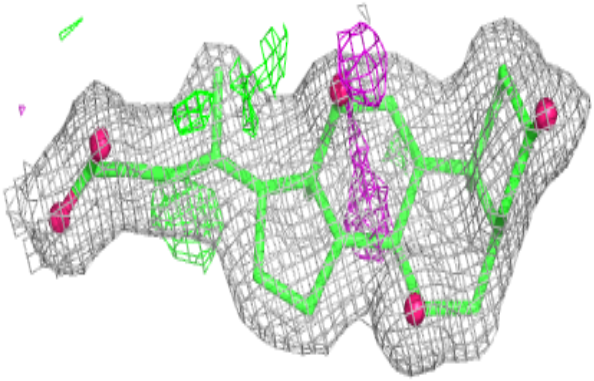


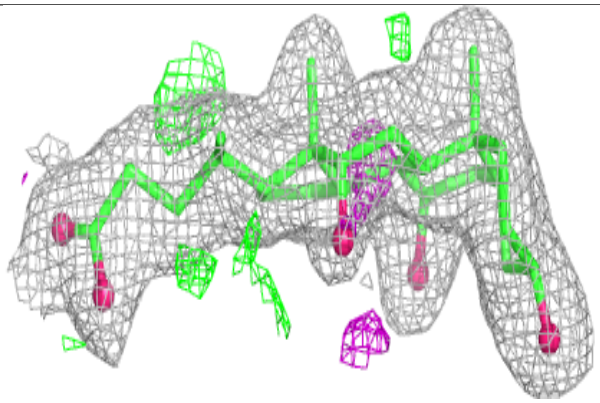


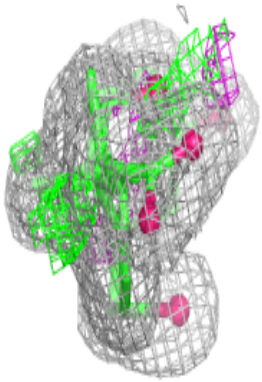


Electron density around CHD C 305:

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

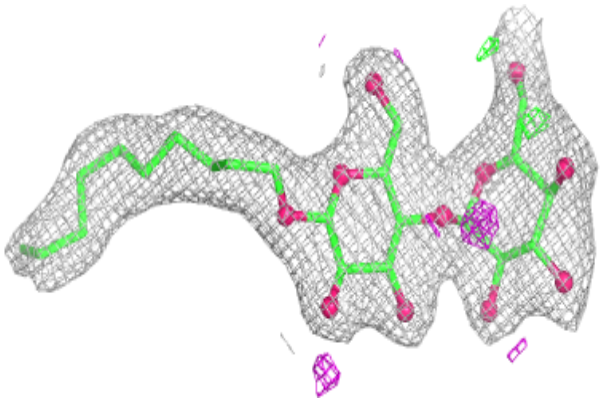


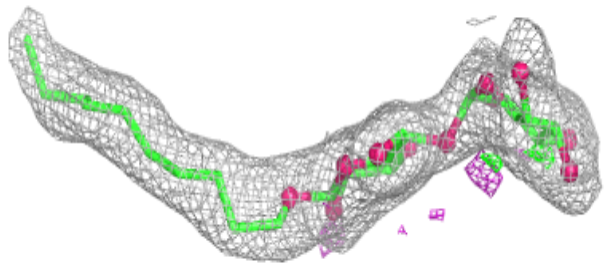


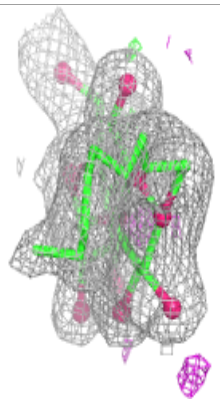


Electron density around DMU M 101:

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

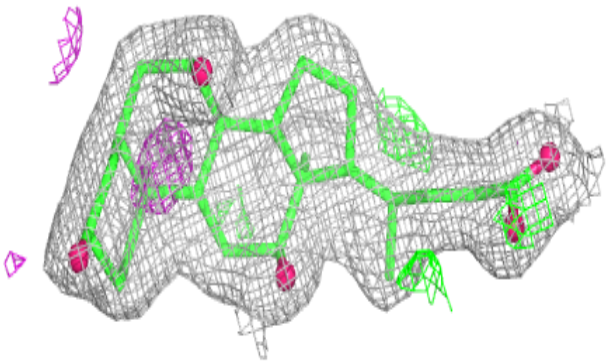


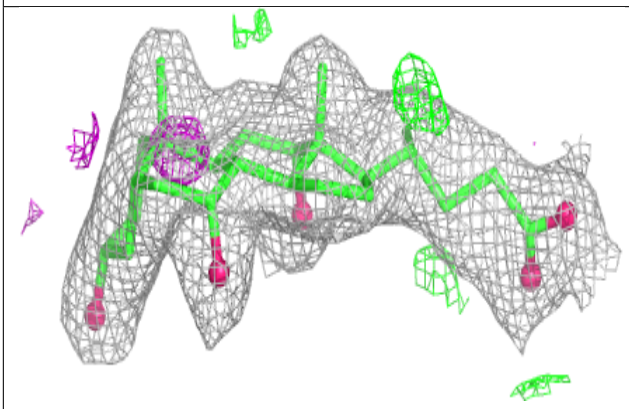


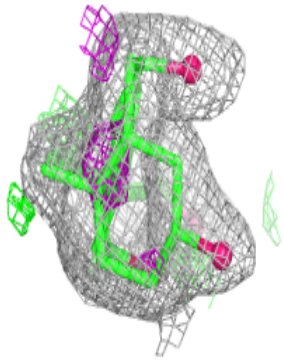


Electron density around CHD P 308:

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

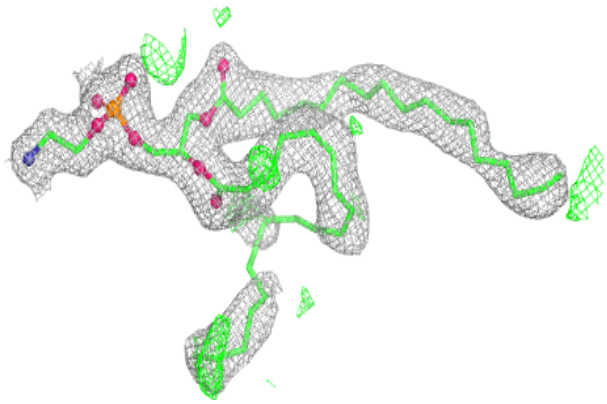


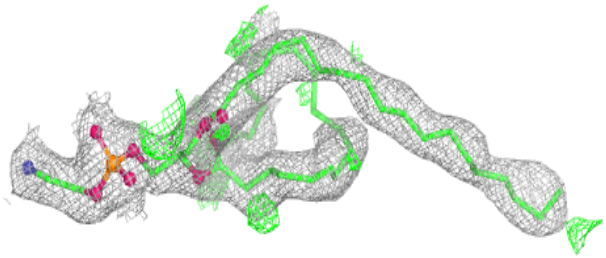


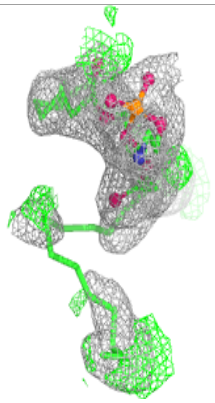


Electron density around PEK P 304:

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

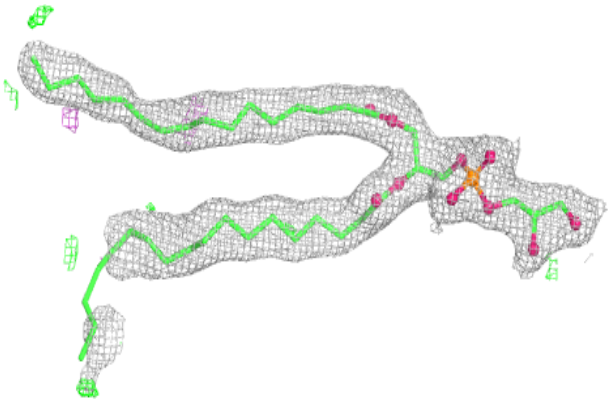


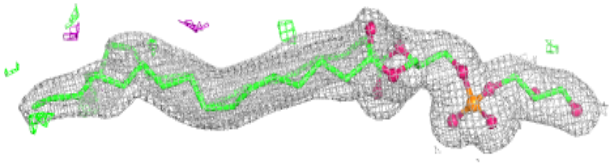




Electron density around PGV P 305:

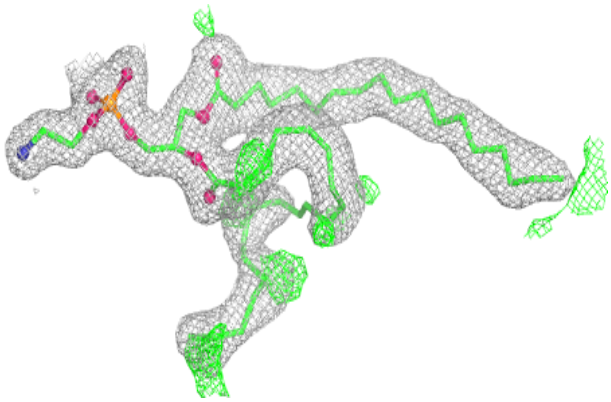
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

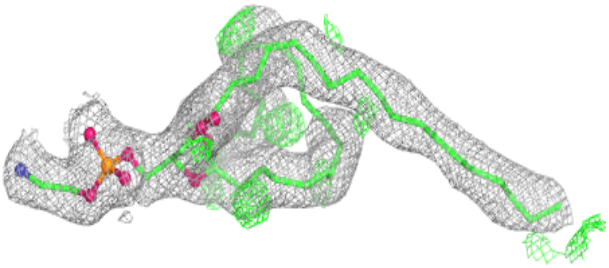


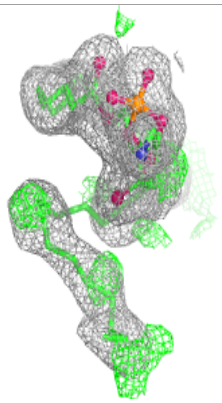


Electron density around PEK G 102:

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

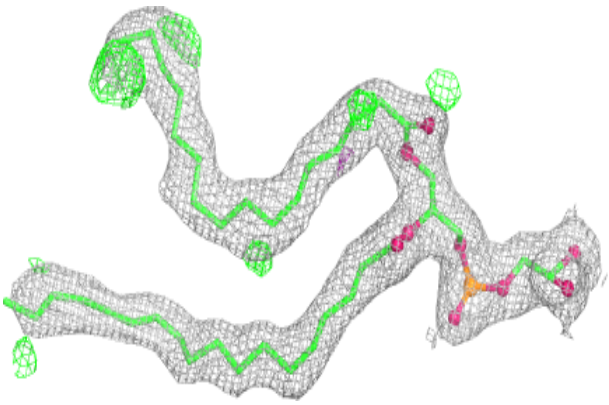


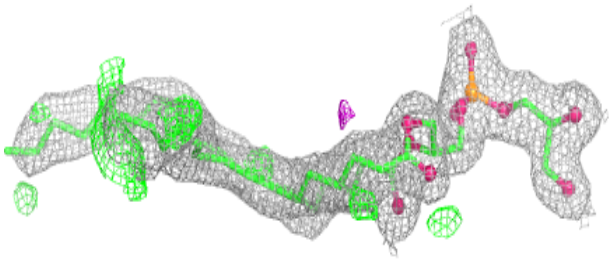


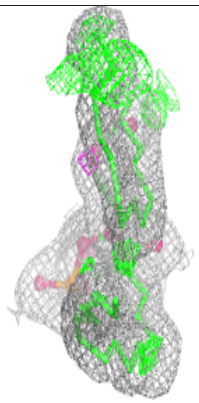


Electron density around PGV A 608:

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

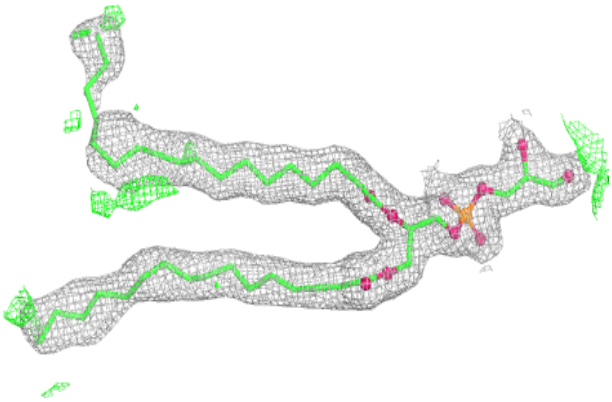


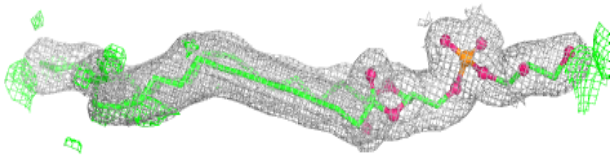


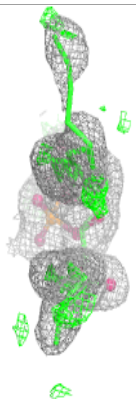


Electron density around PGV C 302:

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

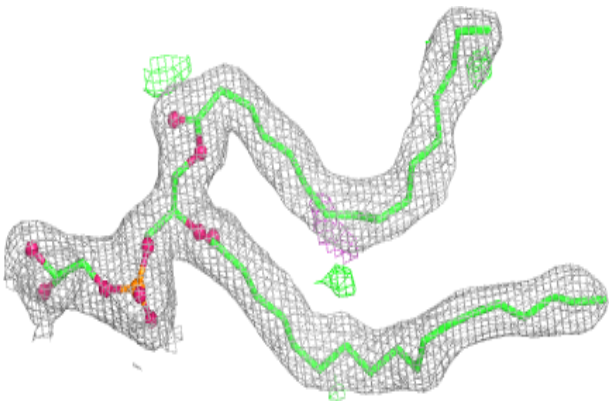


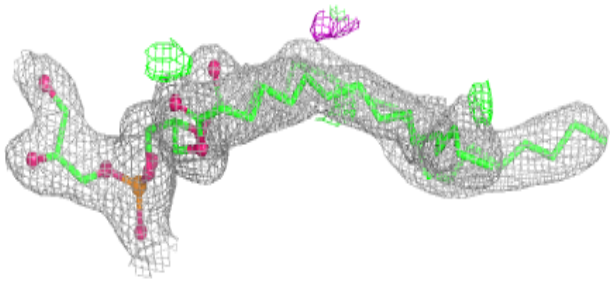


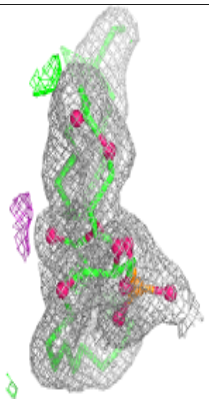


Electron density around PGV N 608:

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

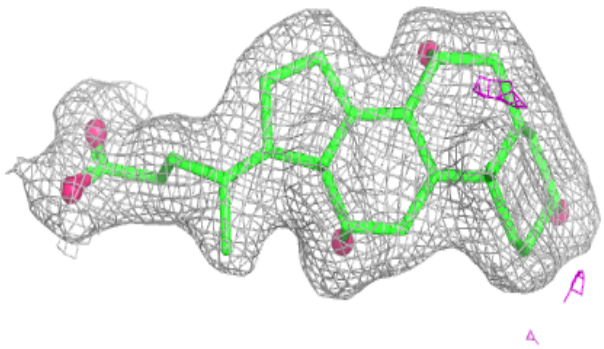


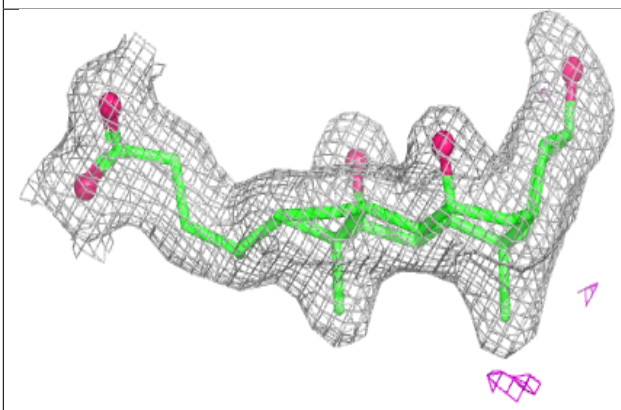


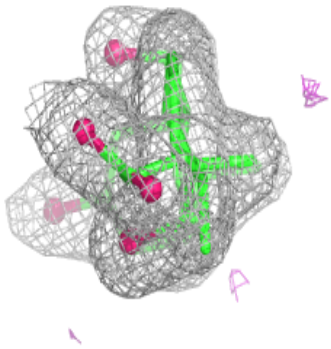


Electron density around CHD B 302:

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

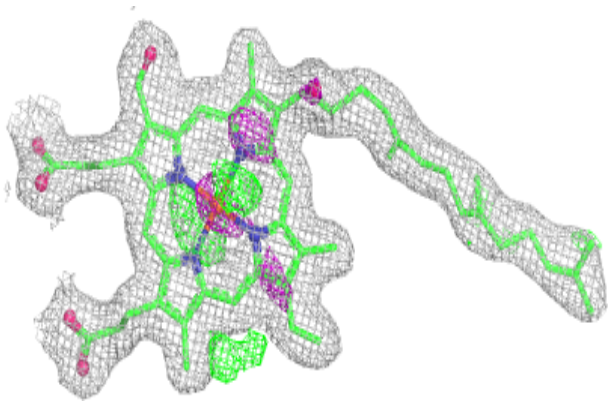


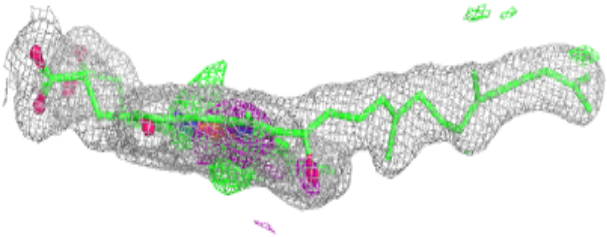


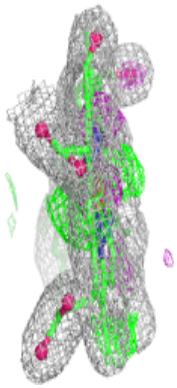


Electron density around HEA N 602:

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

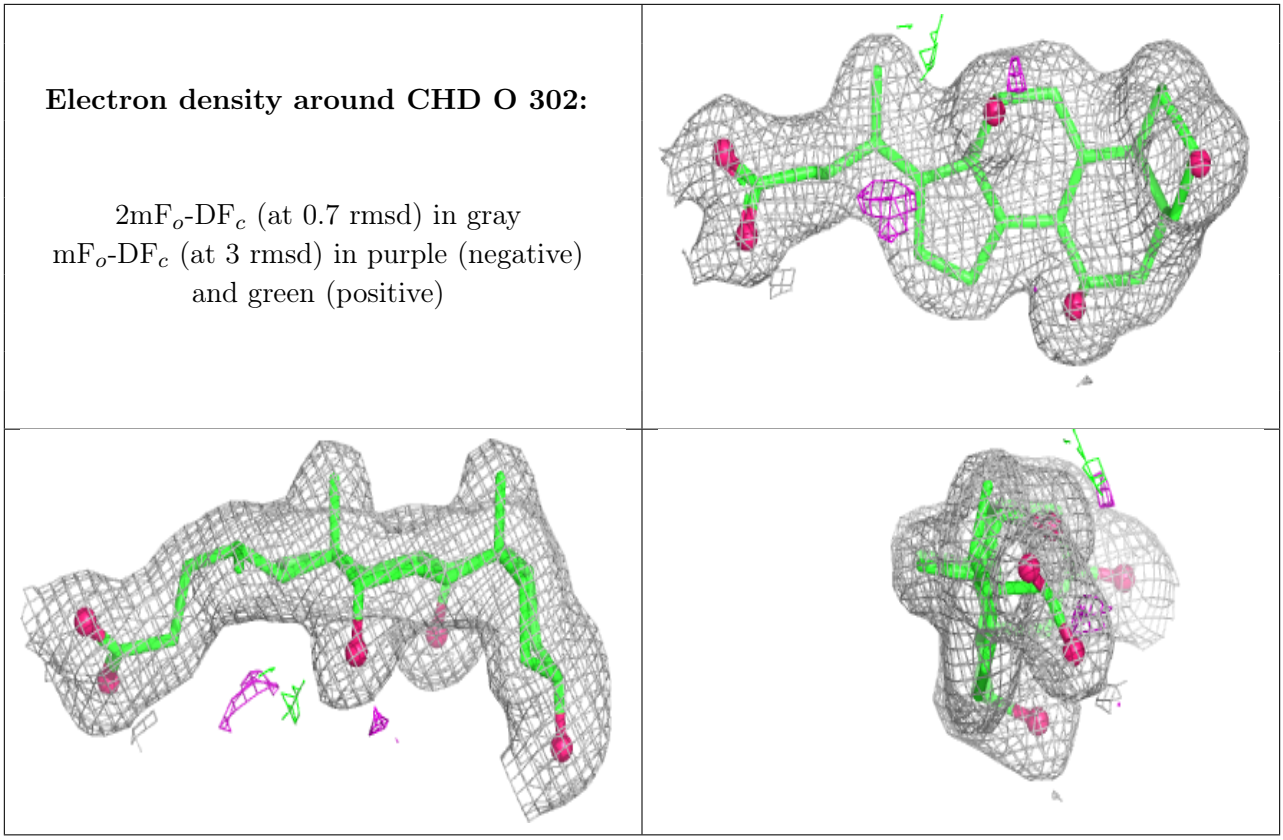






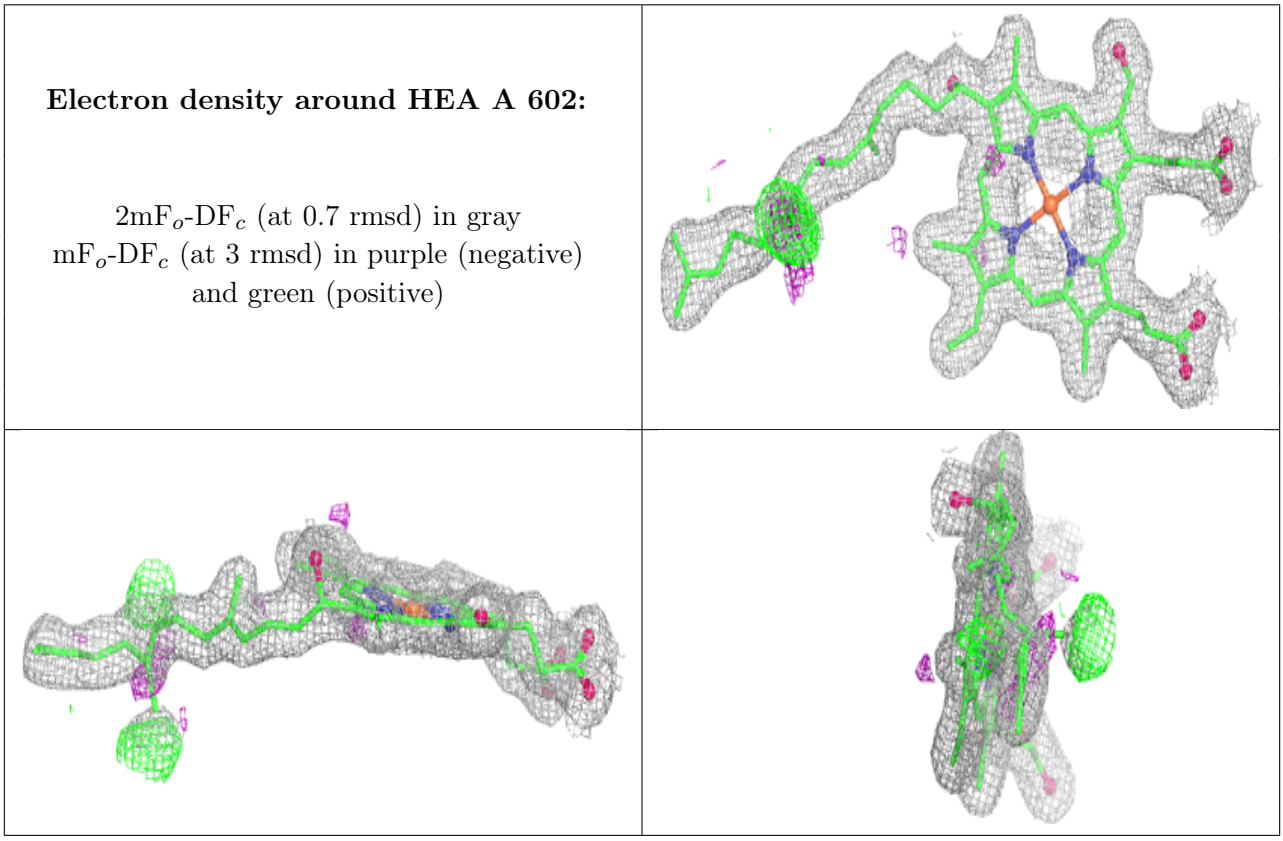
Electron density around CHD O 302:

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



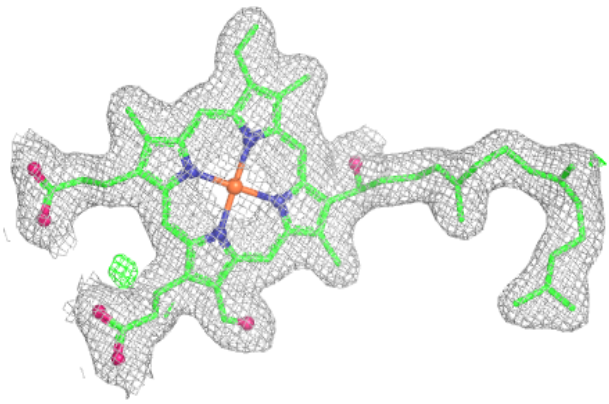
Electron density around HEA A 602:

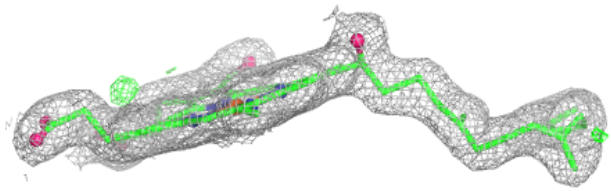
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

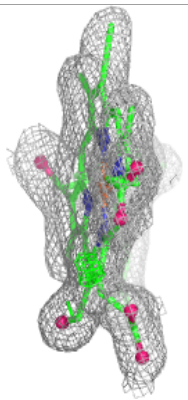


Electron density around HEA N 603:

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

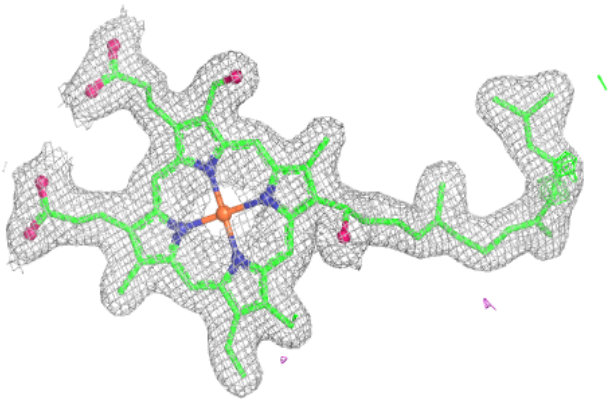


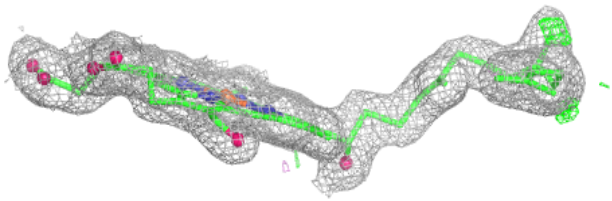


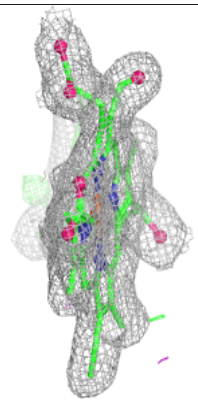


Electron density around HEA A 603:

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







6.5 Other polymers (i)

There are no such residues in this entry.