wwPDB EM Validation Summary Report

Jun 22, 2023 – 10:36 AM JST

PDB ID	:	7W0R
EMDB ID	:	EMD-32248
Title	:	Active state CI from Q10-NADH dataset, Subclass 1
Authors	:	Gu, J.K.; Yang, M.J.
Deposited on	:	2021-11-18
Resolution	:	2.80 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

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

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

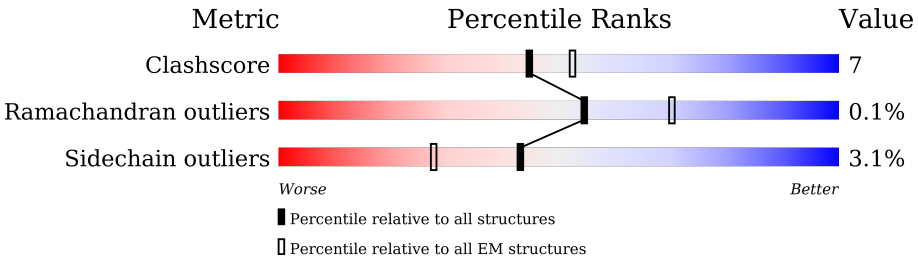
EMDB validation analysis	:	0.0.1.dev50
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.33

1 Overall quality at a glance

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

The reported resolution of this entry is 2.80 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	433	82% 18%
2	B	176	87% 13%
3	C	156	78% 20%
4	E	115	84% 16%
5	F	86	6% 70% 27%
6	G	88	35% 76% 23%
6	X	88	6% 77% 22%
7	H	112	78% 22%

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Mol	Chain	Length	Quality of chain
8	I	112	72% 12% 13%
9	J	342	83% 17%
10	K	43	7% 70% 30%
11	L	125	6% 82% 18%
12	M	690	83% 17%
13	N	144	7% 83% 15%
14	O	217	82% 17%
15	P	208	86% 14%
16	Q	430	85% 15%
17	S	70	90% 10%
18	T	96	88% 12%
19	U	83	5% 88% 12%
20	V	140	87% 13%
21	W	142	6% 81% 18%
22	Y	67	18% 90% 10%
23	Z	80	18% 88% 11%
24	a	138	99%
25	b	126	6% 75% 22%
26	c	156	99%
27	d	175	7% 98%
28	e	104	10% 96%
29	f	49	31% 96%
30	g	121	99%
31	h	105	5% 97%
32	i	347	98%

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Mol	Chain	Length	Quality of chain
33	j	115	96%
34	k	98	95% 5%
35	l	606	98%
36	m	175	13% 97%
37	n	56	21% 91% 9%
38	o	128	97%
39	p	178	5% 97%
40	r	459	98%
41	s	318	97%
42	u	171	96%
43	v	124	12% 97%
44	w	320	97%

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
45	SF4	A	501	-	-	X	-
45	SF4	C	301	-	-	X	-

2 Entry composition (i)

There are 57 unique types of molecules in this entry. The entry contains 68233 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 1, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	433	3330	2103	593	614	20	0	0

- Molecule 2 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 8, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	176	1412	887	243	269	13	0	0

- Molecule 3 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 7, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	156	1248	794	227	213	14	0	0

- Molecule 4 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	E	115	967	617	179	166	5	0	0

- Molecule 5 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	F	86	687	432	129	124	2	0	0

- Molecule 6 is a protein called Acyl carrier protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	G	88	Total	C	N	O	S	0	0
			690	446	102	137	5		
6	X	88	Total	C	N	O	S	0	0
			704	454	104	141	5		

- Molecule 7 is a protein called Complex I subunit B13.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	H	112	Total	C	N	O	S	0	0
			910	588	154	165	3		

- Molecule 8 is a protein called Complex I-B14.5a.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	I	97	Total	C	N	O	S	0	0
			780	491	147	139	3		

- Molecule 9 is a protein called NADH dehydrogenase ubiquinone 1 alpha subcomplex subunit 9, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	J	342	Total	C	N	O	S	0	0
			2751	1783	481	478	9		

- Molecule 10 is a protein called Complex I-9kD.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	K	43	Total	C	N	O	S	0	0
			366	228	68	69	1		

- Molecule 11 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	L	125	Total	C	N	O	S	0	0
			1016	642	181	190	3		

- Molecule 12 is a protein called NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	M	690	Total	C	N	O	S	0	0
			5296	3320	923	1014	39		

- Molecule 13 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 12.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	N	144	Total	C	N	O	S	0	0
			1204	770	218	212	4		

- Molecule 14 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	O	217	Total	C	N	O	S	0	0
			1671	1065	281	315	10		

- Molecule 15 is a protein called Complex I-30kD.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	P	208	Total	C	N	O	S	0	0
			1738	1124	298	314	2		

- Molecule 16 is a protein called Complex I-49kD.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	Q	430	Total	C	N	O	S	0	0
			3459	2212	594	629	24		

- Molecule 17 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	S	70	Total	C	N	O	S	0	0
			566	364	103	94	5		

- Molecule 18 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	T	96	Total	C	N	O	S	0	0
			741	452	140	146	3		

- Molecule 19 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	U	83	Total	C	N	O	S	0	0
			643	417	110	115	1		

- Molecule 20 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 11.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	V	140	Total	C	N	O	S	0	0
			1021	651	174	190	6		

- Molecule 21 is a protein called Complex I-B16.6.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	W	142	Total	C	N	O	S	0	0
			1167	752	200	206	9		

- Molecule 22 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	Y	67	Total	C	N	O	S	0	0
			584	385	95	103	1		

- Molecule 23 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	Z	80	Total	C	N	O	S	0	0
			641	418	108	114	1		

- Molecule 24 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 5, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	a	138	Total	C	N	O	S	0	0
			1151	754	195	199	3		

- Molecule 25 is a protein called Complex I-B17.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	b	98	Total	C	N	O	S	0	0
			819	537	144	137	1		

- Molecule 26 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 8, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	c	156	Total	C	N	O	S	0	0
			1315	853	213	241	8		

- Molecule 27 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 10.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	d	175	Total	C	N	O	S	0	0
			1461	916	265	272	8		

- Molecule 28 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 11, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	e	104	Total	C	N	O	S	0	0
			867	553	142	168	4		

- Molecule 29 is a protein called NADH dehydrogenase [ubiquinone] 1 subunit C1, mitochondrial.

Mol	Chain	Residues	Atoms				AltConf	Trace
29	f	49	Total	C	N	O	0	0
			378	246	65	67		

- Molecule 30 is a protein called NADH dehydrogenase [ubiquinone] 1 subunit C2.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	g	121	Total	C	N	O	S	0	0
			1000	650	173	171	6		

- Molecule 31 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	h	105	Total	C	N	O	S	0	0
			867	550	161	150	6		

- Molecule 32 is a protein called NADH-ubiquinone oxidoreductase chain 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	i	347	Total	C	N	O	S	0	0
			2710	1782	420	462	46		

- Molecule 33 is a protein called NADH-ubiquinone oxidoreductase chain 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	j	115	Total	C	N	O	S	0	0
			914	615	134	158	7		

- Molecule 34 is a protein called NADH-ubiquinone oxidoreductase chain 4L.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	k	98	Total	C	N	O	S	0	0
			748	493	113	128	14		

- Molecule 35 is a protein called NADH-ubiquinone oxidoreductase chain 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	l	606	Total	C	N	O	S	0	0
			4800	3182	744	823	51		

- Molecule 36 is a protein called NADH-ubiquinone oxidoreductase chain 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	m	175	Total	C	N	O	S	0	0
			1295	864	188	230	13		

- Molecule 37 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	n	56	Total	C	N	O	S	0	0
			479	311	88	79	1		

- Molecule 38 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 4.

Mol	Chain	Residues	Atoms				AltConf	Trace
38	o	128	Total	C	N	O	0	0
			1062	691	182	189		

- Molecule 39 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 9.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	p	178	Total	C	N	O	S	0	0
			1530	980	279	263	8		

- Molecule 40 is a protein called NADH-ubiquinone oxidoreductase chain 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	r	459	Total	C	N	O	S	0	0
			3631	2412	572	609	38		

- Molecule 41 is a protein called NADH-ubiquinone oxidoreductase chain 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	s	318	Total	C	N	O	S	0	0
			2508	1678	385	424	21		

- Molecule 42 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	u	171	Total	C	N	O	S	0	0
			1398	887	250	251	10		

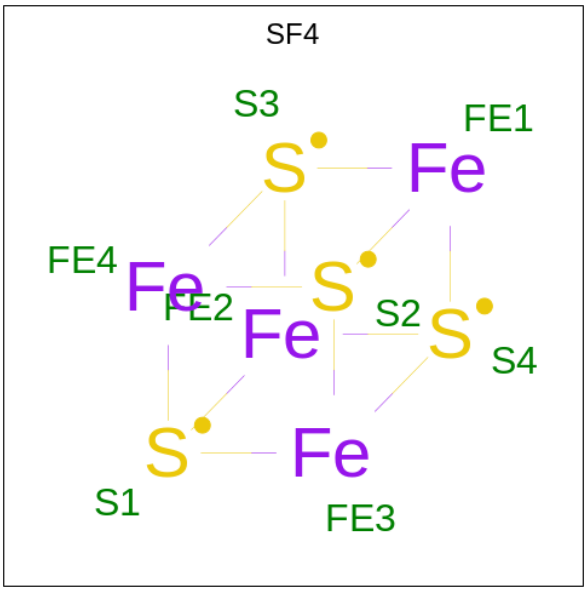
- Molecule 43 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	v	124	Total	C	N	O	S	0	0
			1059	658	202	189	10		

- Molecule 44 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10, mitochondrial.

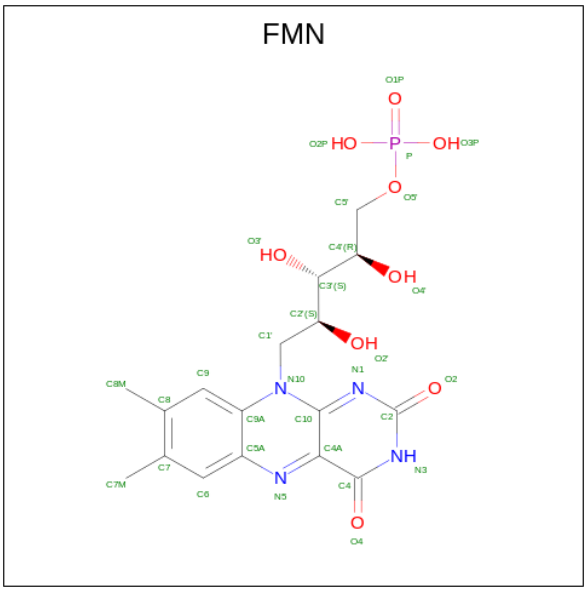
Mol	Chain	Residues	Atoms					AltConf	Trace
44	w	320	Total	C	N	O	S	0	0
			2582	1643	438	491	10		

- Molecule 45 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4) (labeled as "Ligand of Interest" by depositor).



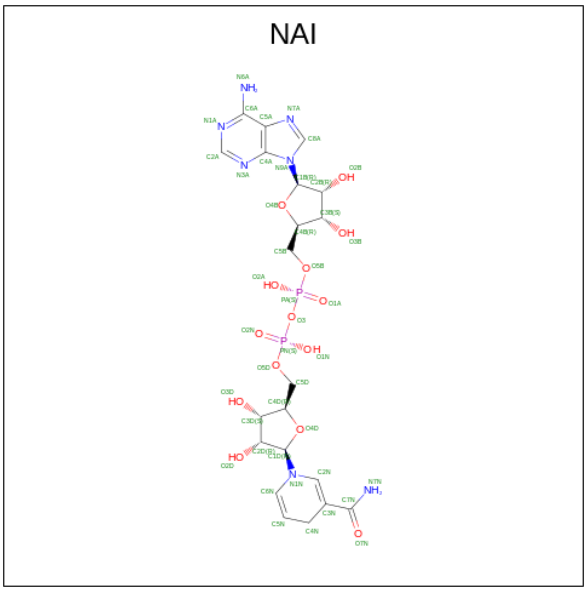
Mol	Chain	Residues	Atoms			AltConf
45	A	1	Total	Fe	S	0
			8	4	4	
45	B	1	Total	Fe	S	0
			8	4	4	
45	B	1	Total	Fe	S	0
			8	4	4	
45	C	1	Total	Fe	S	0
			8	4	4	
45	M	1	Total	Fe	S	0
			8	4	4	
45	M	1	Total	Fe	S	0
			8	4	4	

- Molecule 46 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: $C_{17}H_{21}N_4O_9P$) (labeled as "Ligand of Interest" by depositor).



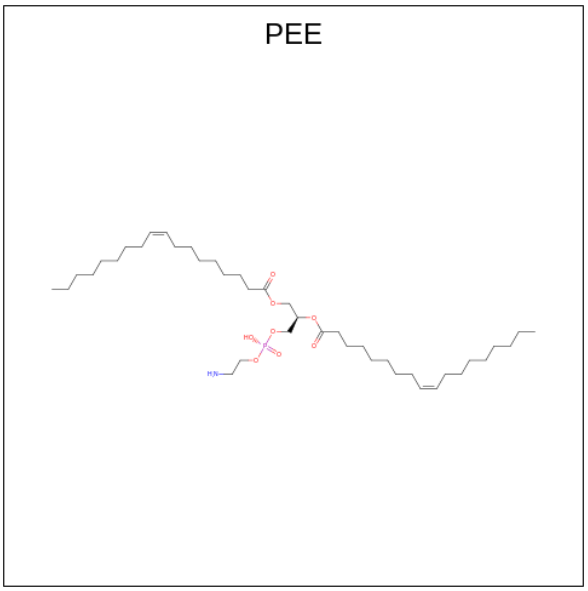
Mol	Chain	Residues	Atoms					AltConf
46	A	1	Total	C	N	O	P	0
			31	17	4	9	1	

- Molecule 47 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (three-letter code: NAI) (formula: $C_{21}H_{29}N_7O_{14}P_2$) (labeled as "Ligand of Interest" by depositor).



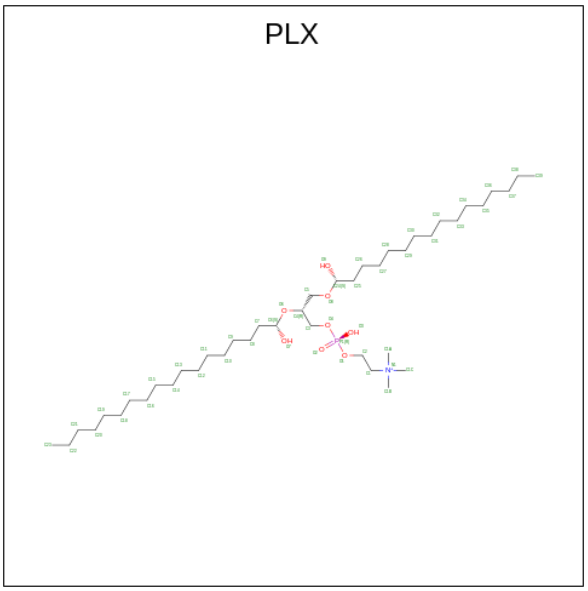
Mol	Chain	Residues	Atoms					AltConf
47	A	1	Total	C	N	O	P	0
			44	21	7	14	2	

- Molecule 48 is 1,2-dioleoyl-sn-glycero-3-phosphoethanolamine (three-letter code: PEE) (formula: $C_{41}H_{78}NO_8P$) (labeled as "Ligand of Interest" by depositor).



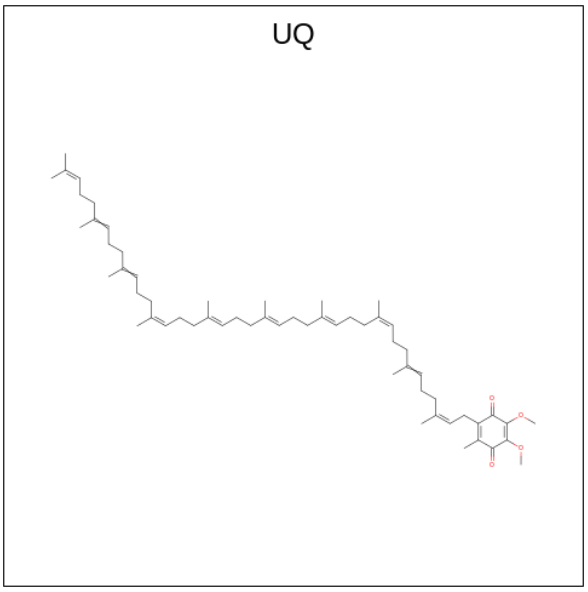
Mol	Chain	Residues	Atoms					AltConf
48	B	1	Total	C	N	O	P	0
			51	41	1	8	1	
48	C	1	Total	C	N	O	P	0
			47	37	1	8	1	
48	V	1	Total	C	N	O	P	0
			40	30	1	8	1	
48	W	1	Total	C	N	O	P	0
			41	31	1	8	1	
48	i	1	Total	C	N	O	P	0
			47	37	1	8	1	
48	j	1	Total	C	N	O	P	0
			51	41	1	8	1	
48	j	1	Total	C	N	O	P	0
			41	31	1	8	1	
48	l	1	Total	C	N	O	P	0
			51	41	1	8	1	
48	l	1	Total	C	N	O	P	0
			46	36	1	8	1	
48	r	1	Total	C	N	O	P	0
			51	41	1	8	1	

- Molecule 49 is (9R,11S)-9-({[(1S)-1-HYDROXYHEXADECYL]OXY}METHYL)-2,2-DIMETHYL-5,7,10-TRIOXA-2LAMBDA 5 -AZA-6LAMBDA 5 -PHOSPHAOCTACOSANE-6,6,11-TRIOL (three-letter code: PLX) (formula: $C_{42}H_{89}NO_8P$) (labeled as "Ligand of Interest" by depositor).



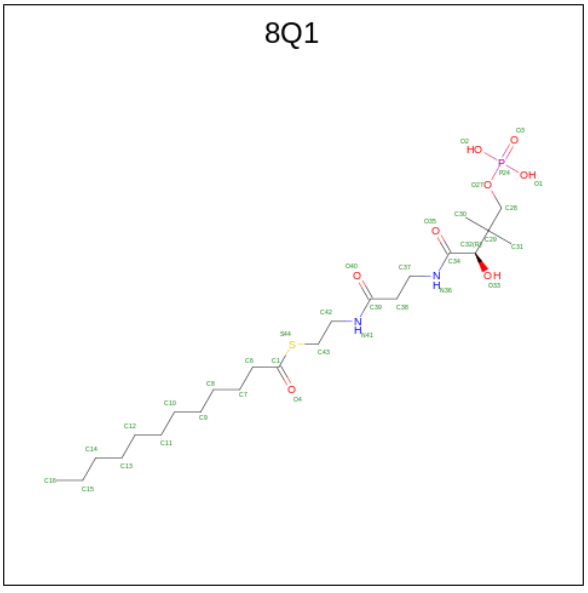
Mol	Chain	Residues	Atoms					AltConf
49	C	1	Total	C	N	O	P	0
			52	42	1	8	1	
49	J	1	Total	C	N	O	P	0
			52	42	1	8	1	
49	a	1	Total	C	N	O	P	0
			52	42	1	8	1	
49	g	1	Total	C	N	O	P	0
			52	42	1	8	1	
49	j	1	Total	C	N	O	P	0
			52	42	1	8	1	
49	r	1	Total	C	N	O	P	0
			52	42	1	8	1	
49	r	1	Total	C	N	O	P	0
			52	42	1	8	1	

- Molecule 50 is Coenzyme Q10, (2Z,6E,10Z,14E,18E,22E,26Z)-isomer (three-letter code: UQ) (formula: $C_{59}H_{90}O_4$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			AltConf
50	C	1	Total	C	O	0
			38	34	4	
50	J	1	Total	C	O	0
			33	29	4	

- Molecule 51 is S-[2-({N-[(2R)-2-hydroxy-3,3-dimethyl-4-(phosphonooxy)butanoyl]-beta -alanyl}amino)ethyl] dodecanethioate (three-letter code: 8Q1) (formula: $C_{23}H_{45}N_2O_8PS$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
51	G	1	Total	C	N	O	P	S	0
			35	23	2	8	1	1	

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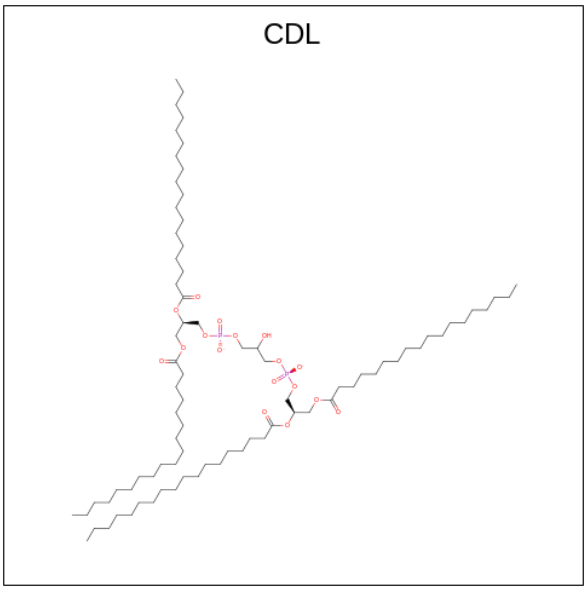
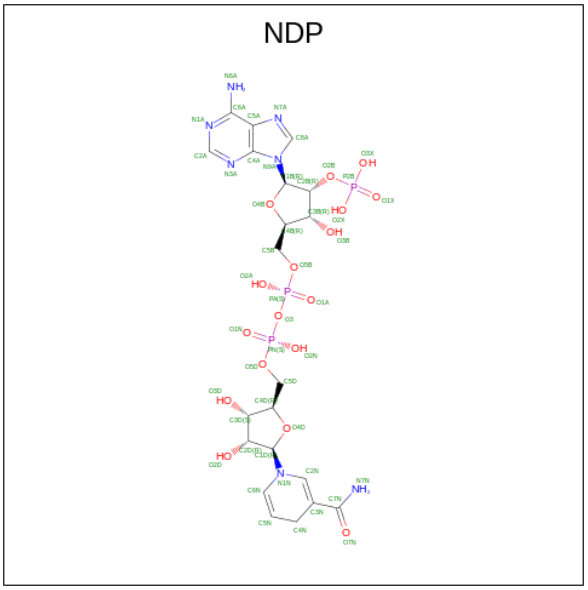
Mol	Chain	Residues	Atoms						AltConf
51	X	1	Total	C	N	O	P	S	0
			35	23	2	8	1	1	

- Molecule 52 is CARDIOLIPIN (three-letter code: CDL) (formula: $C_{81}H_{156}O_{17}P_2$) (labeled as "Ligand of Interest" by depositor).



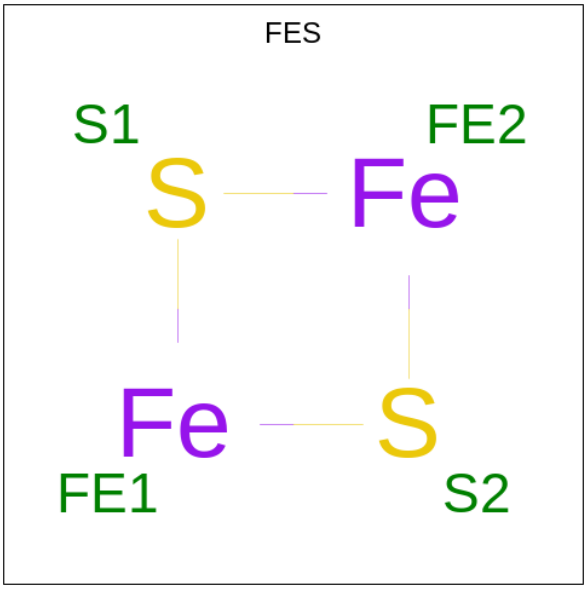
Mol	Chain	Residues	Atoms				AltConf
52	I	1	Total	C	O	P	0
			51	32	17	2	
52	V	1	Total	C	O	P	0
			94	75	17	2	
52	a	1	Total	C	O	P	0
			100	81	17	2	
52	k	1	Total	C	O	P	0
			100	81	17	2	
52	l	1	Total	C	O	P	0
			99	80	17	2	
52	l	1	Total	C	O	P	0
			100	81	17	2	
52	o	1	Total	C	O	P	0
			100	81	17	2	
52	r	1	Total	C	O	P	0
			100	81	17	2	
52	s	1	Total	C	O	P	0
			89	70	17	2	
52	u	1	Total	C	O	P	0
			55	36	17	2	

- Molecule 53 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
53	J	1	48	21	7	17	3	0

- Molecule 54 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	AltConf
54	M	1	Total Fe S 4 2 2	0
54	O	1	Total Fe S 4 2 2	0

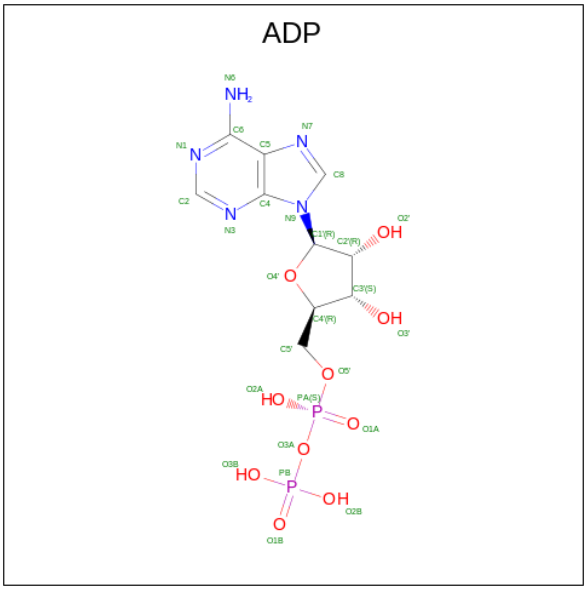
- Molecule 55 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	AltConf
55	M	1	Total Mg 1 1	0

- Molecule 56 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	AltConf
56	T	1	Total Zn 1 1	0

- Molecule 57 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).



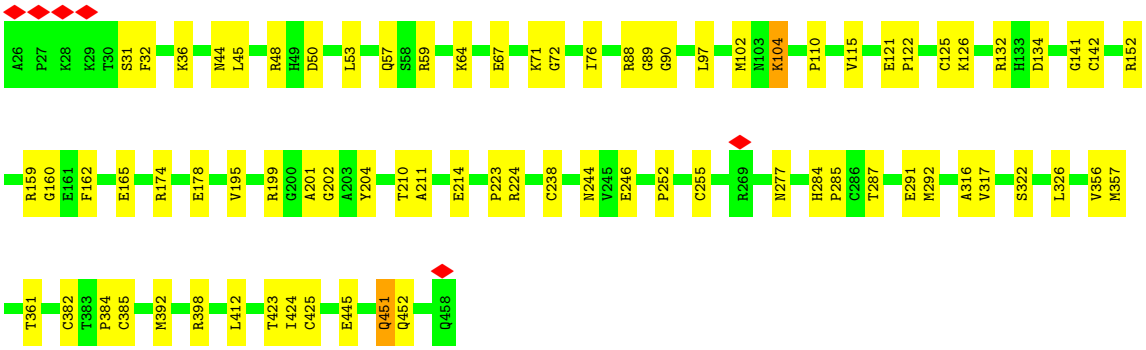
Mol	Chain	Residues	Atoms	AltConf
57	w	1	Total C N O P 27 10 5 10 2	0

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 atom inclusion in map 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 diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). 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: NADH dehydrogenase [ubiquinone] flavoprotein 1, mitochondrial

Chain A:



• Molecule 2: NADH dehydrogenase [ubiquinone] iron-sulfur protein 8, mitochondrial

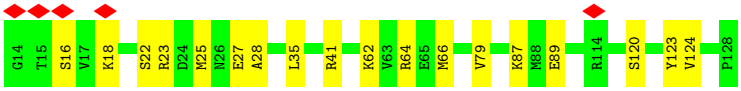
Chain B:

• Molecule 3: NADH dehydrogenase [ubiquinone] iron-sulfur protein 7, mitochondrial

Chain C:

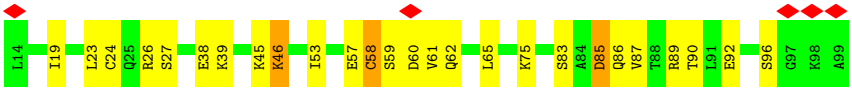
• Molecule 4: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 6

Chain E:



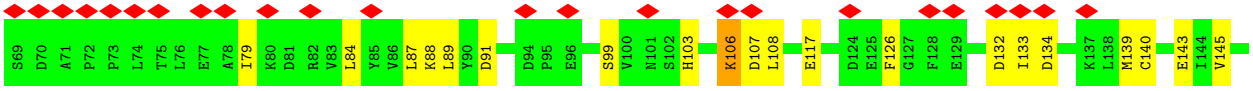
• Molecule 5: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2

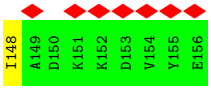
Chain F:



• Molecule 6: Acyl carrier protein

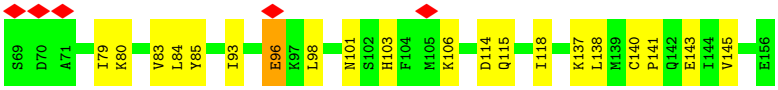
Chain G:





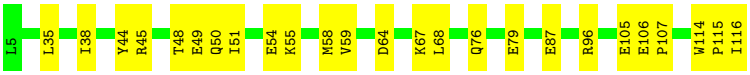
• Molecule 6: Acyl carrier protein

Chain X:



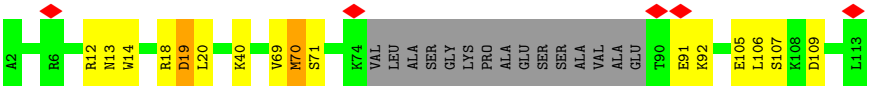
• Molecule 7: Complex I subunit B13

Chain H:



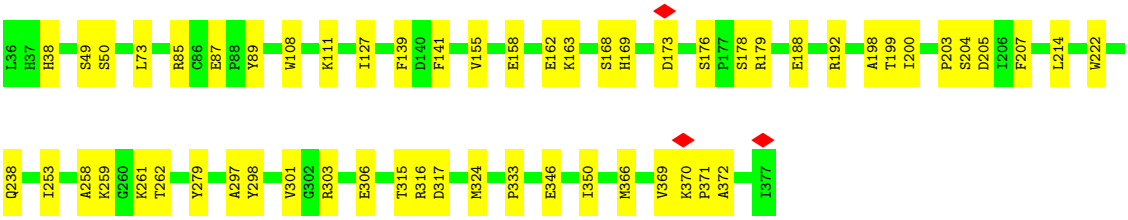
• Molecule 8: Complex I-B14.5a

Chain I:

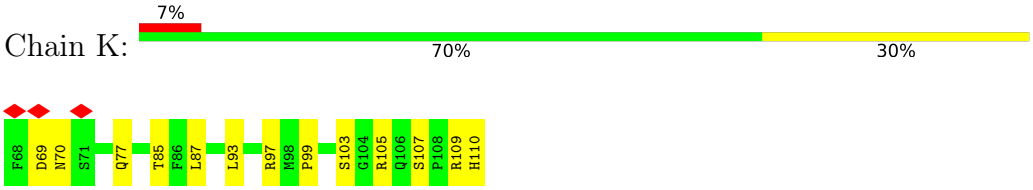


• Molecule 9: NADH dehydrogenase ubiquinone 1 alpha subcomplex subunit 9, mitochondrial

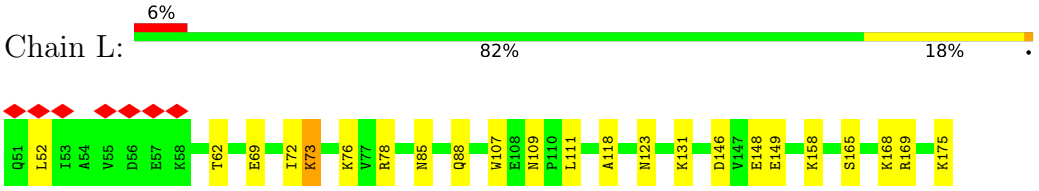
Chain J:



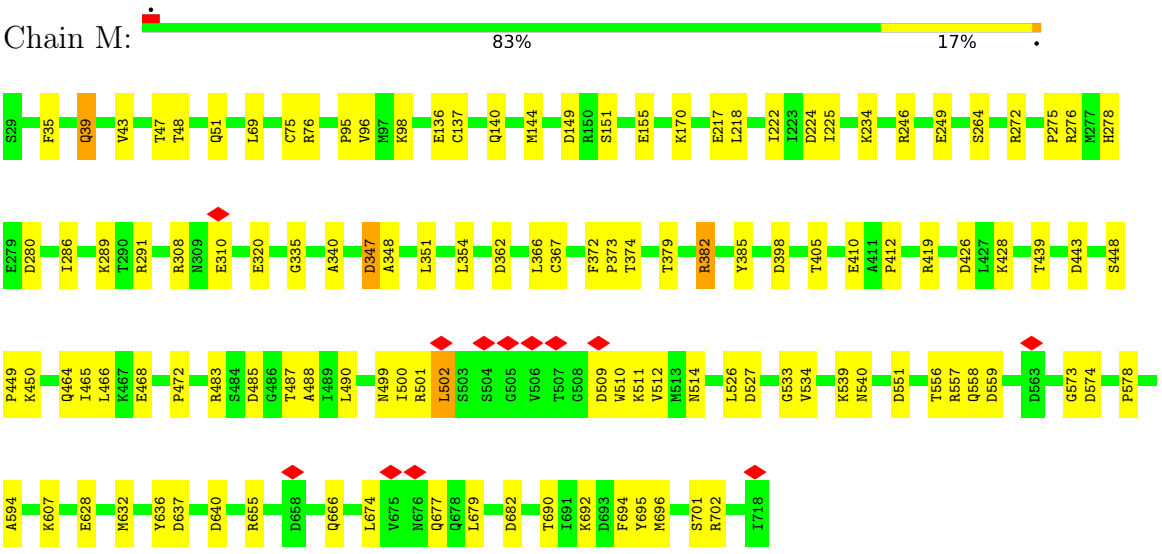
• Molecule 10: Complex I-9kD



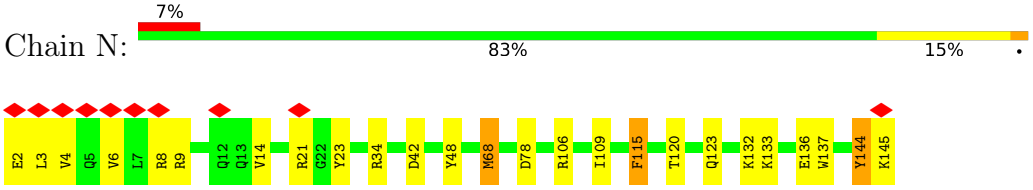
• Molecule 11: NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial



• Molecule 12: NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial

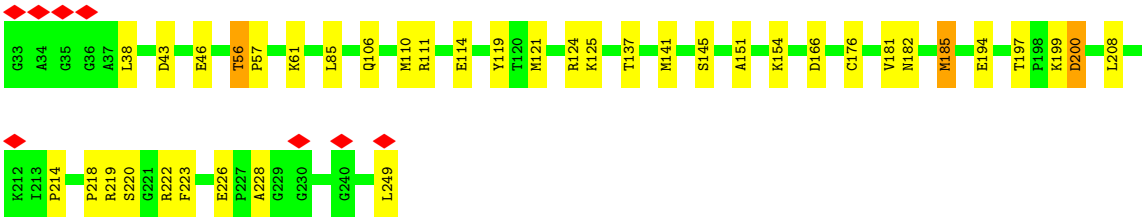


• Molecule 13: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 12



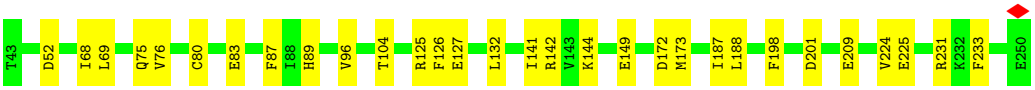
• Molecule 14: NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial

Chain O:



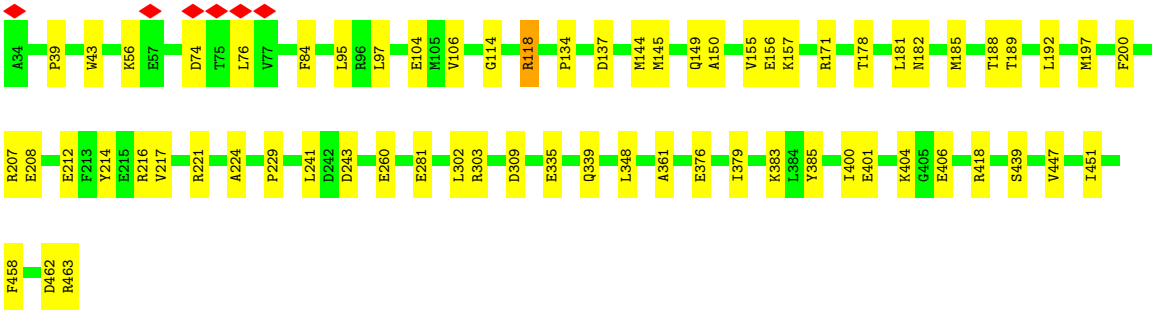
• Molecule 15: Complex I-30kD

Chain P:



• Molecule 16: Complex I-49kD

Chain Q:

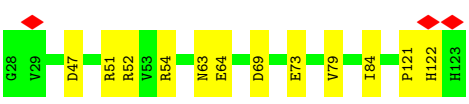


• Molecule 17: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 1

Chain S:

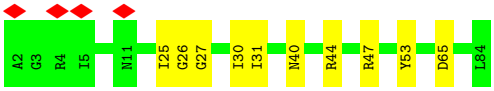
• Molecule 18: NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial

Chain T:



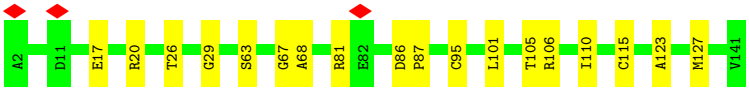
• Molecule 19: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 3

Chain U:



• Molecule 20: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 11

Chain V:

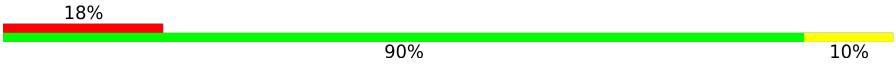


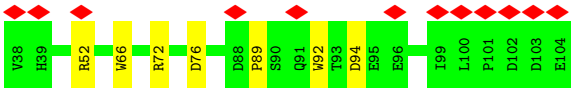
• Molecule 21: Complex I-B16.6

Chain W:

• Molecule 22: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 2, mitochondrial

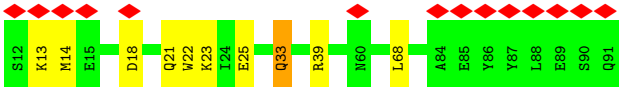
Chain Y:





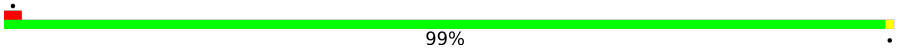
• Molecule 23: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 3

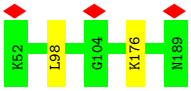
Chain Z:



• Molecule 24: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 5, mitochondrial

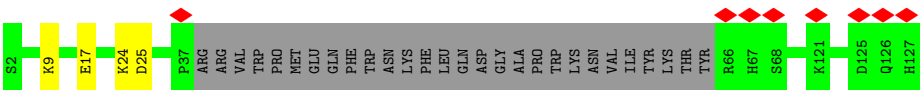
Chain a:





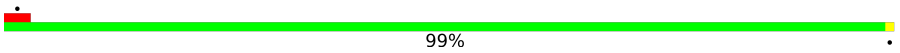
• Molecule 25: Complex I-B17

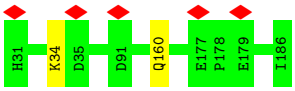
Chain b:



• Molecule 26: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 8, mitochondrial

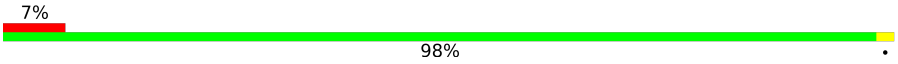
Chain c:





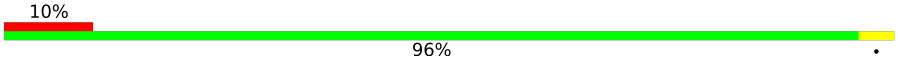
• Molecule 27: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 10

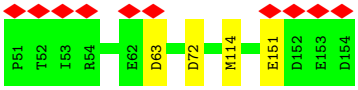
Chain d:



• Molecule 28: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 11, mitochondrial

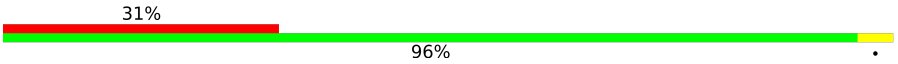
Chain e:

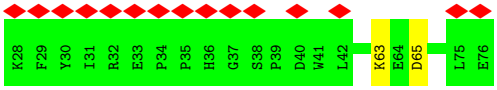




• Molecule 29: NADH dehydrogenase [ubiquinone] 1 subunit C1, mitochondrial

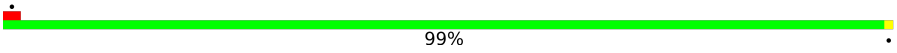
Chain f:

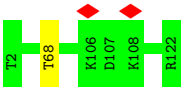




• Molecule 30: NADH dehydrogenase [ubiquinone] 1 subunit C2

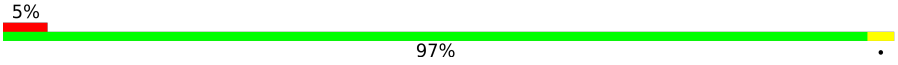
Chain g:

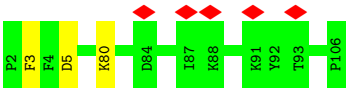




• Molecule 31: NADH dehydrogenase [ubiquinone] iron-sulfur protein 5

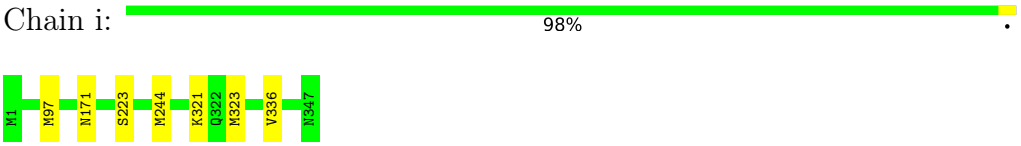
Chain h:





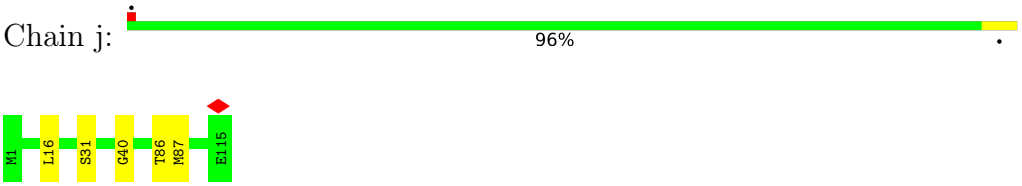
• Molecule 32: NADH-ubiquinone oxidoreductase chain 2

Chain i:



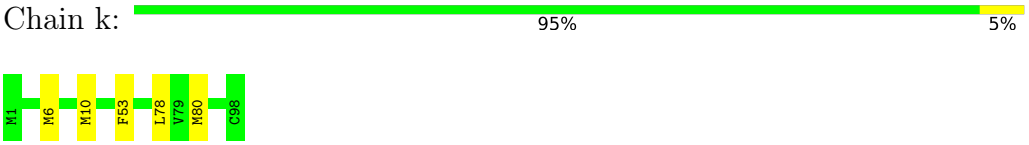
• Molecule 33: NADH-ubiquinone oxidoreductase chain 3

Chain j:



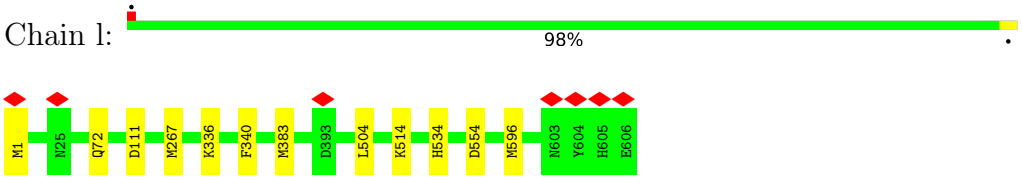
• Molecule 34: NADH-ubiquinone oxidoreductase chain 4L

Chain k:



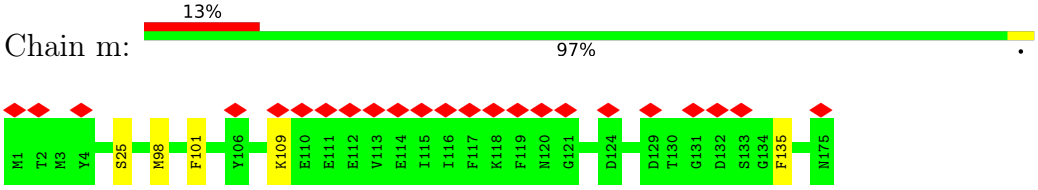
• Molecule 35: NADH-ubiquinone oxidoreductase chain 5

Chain l:



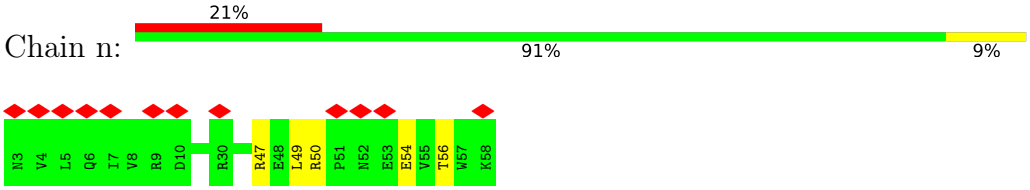
• Molecule 36: NADH-ubiquinone oxidoreductase chain 6

Chain m:



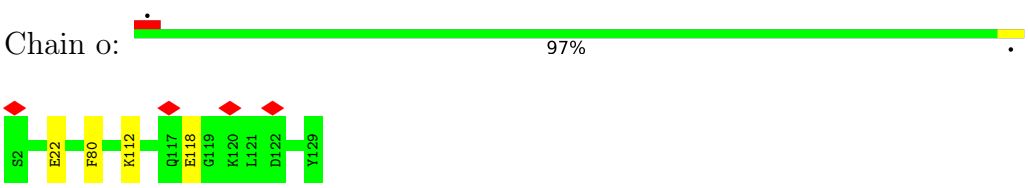
• Molecule 37: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 1

Chain n:



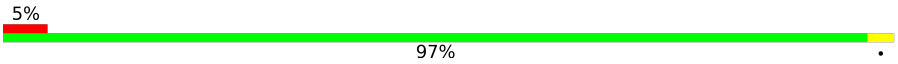
• Molecule 38: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 4

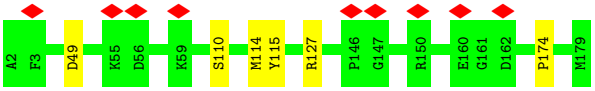
Chain o:



• Molecule 39: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 9

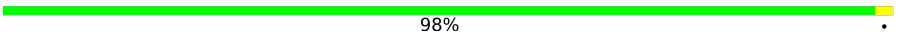
Chain p:





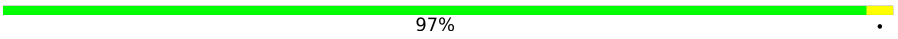
• Molecule 40: NADH-ubiquinone oxidoreductase chain 4

Chain r:



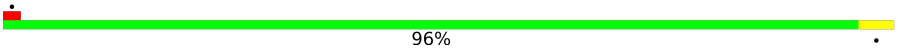
• Molecule 41: NADH-ubiquinone oxidoreductase chain 1

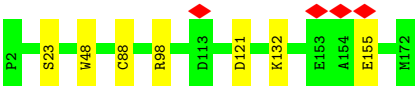
Chain s:



• Molecule 42: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 8

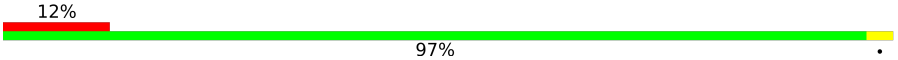
Chain u:

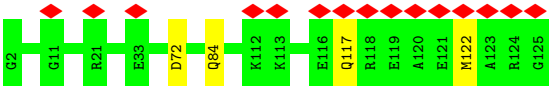




• Molecule 43: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 7

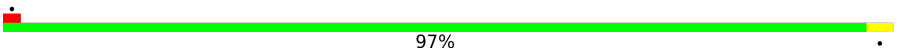
Chain v:

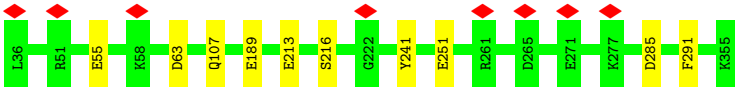




• Molecule 44: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10, mitochondrial

Chain w:





4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	124399	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1300	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.202	Depositor
Minimum map value	-0.103	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.007	Depositor
Recommended contour level	0.0291	Depositor
Map size (Å)	333.002, 333.002, 333.002	wwPDB
Map dimensions	310, 310, 310	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.0742, 1.0742, 1.0742	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NDP, NAI, 8Q1, PLX, ADP, UQ, 2MR, FES, PEE, MG, SF4, FMN, ZN, CDL

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$\|Z\|>5$	RMSZ	#$\|Z\|>5$
1	A	0.28	0/3406	0.51	0/4603
2	B	0.34	0/1443	0.53	0/1952
3	C	0.34	0/1279	0.52	0/1730
4	E	0.28	0/991	0.51	0/1335
5	F	0.33	0/698	0.62	1/940 (0.1%)
6	G	0.29	0/702	0.51	0/952
6	X	0.28	0/716	0.46	0/968
7	H	0.28	0/929	0.47	0/1258
8	I	0.30	0/798	0.55	0/1079
9	J	0.29	0/2828	0.49	0/3834
10	K	0.28	0/377	0.49	0/509
11	L	0.29	0/1039	0.50	0/1403
12	M	0.29	0/5384	0.52	1/7295 (0.0%)
13	N	0.30	0/1245	0.51	0/1694
14	O	0.28	0/1711	0.48	0/2328
15	P	0.32	0/1789	0.52	0/2436
16	Q	0.32	0/3538	0.51	0/4796
17	S	0.29	0/581	0.53	0/781
18	T	0.31	0/755	0.54	0/1018
19	U	0.27	0/664	0.46	0/912
20	V	0.28	0/1042	0.47	0/1411
21	W	0.29	0/1198	0.50	0/1617
22	Y	0.27	0/610	0.45	0/836
23	Z	0.27	0/660	0.46	0/892
24	a	0.31	0/1184	0.50	0/1603
25	b	0.29	0/844	0.53	0/1149
26	c	0.31	0/1371	0.50	0/1875
27	d	0.28	0/1494	0.51	0/2015
28	e	0.28	0/891	0.50	0/1210
29	f	0.29	0/386	0.47	0/523
30	g	0.31	0/1031	0.48	0/1394
31	h	0.28	0/889	0.51	0/1190

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\|>5$	RMSZ	$\#\|Z\|>5$
32	i	0.29	0/2773	0.48	0/3768
33	j	0.29	0/938	0.47	0/1281
34	k	0.29	0/759	0.46	0/1029
35	l	0.29	0/4929	0.46	0/6704
36	m	0.30	0/1328	0.45	0/1804
37	n	0.26	0/491	0.52	0/663
38	o	0.29	0/1092	0.50	0/1481
39	p	0.29	0/1586	0.49	0/2150
40	r	0.29	0/3723	0.48	0/5078
41	s	0.30	0/2581	0.47	0/3529
42	u	0.29	0/1436	0.52	0/1938
43	v	0.27	0/1083	0.54	0/1448
44	w	0.28	0/2642	0.48	0/3580
All	All	0.29	0/67834	0.50	2/91991 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	F	58	CYS	CA-CB-SG	7.09	126.77	114.00
12	M	502	LEU	CA-CB-CG	5.26	127.40	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3330	0	3292	54	0
2	B	1412	0	1363	17	0
3	C	1248	0	1254	23	0
4	E	967	0	971	8	0
5	F	687	0	700	16	0
6	G	690	0	669	13	0
6	X	704	0	695	11	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	H	910	0	950	15	0
8	I	780	0	808	14	0
9	J	2751	0	2773	31	0
10	K	366	0	338	11	0
11	L	1016	0	1016	15	0
12	M	5296	0	5326	68	0
13	N	1204	0	1162	15	0
14	O	1671	0	1673	26	0
15	P	1738	0	1693	20	0
16	Q	3459	0	3396	38	0
17	S	566	0	561	5	0
18	T	741	0	702	7	0
19	U	643	0	642	7	0
20	V	1021	0	1027	11	0
21	W	1167	0	1155	17	0
22	Y	584	0	529	4	0
23	Z	641	0	620	8	0
24	a	1151	0	1164	0	0
25	b	819	0	835	0	0
26	c	1315	0	1208	0	0
27	d	1461	0	1429	0	0
28	e	867	0	817	0	0
29	f	378	0	356	0	0
30	g	1000	0	994	0	0
31	h	867	0	873	0	0
32	i	2710	0	2874	0	0
33	j	914	0	951	0	0
34	k	748	0	799	0	0
35	l	4800	0	4939	0	0
36	m	1295	0	1263	0	0
37	n	479	0	486	0	0
38	o	1062	0	1072	0	0
39	p	1530	0	1466	0	0
40	r	3631	0	3839	0	0
41	s	2508	0	2607	0	0
42	u	1398	0	1374	0	0
43	v	1059	0	1029	0	0
44	w	2582	0	2531	0	0
45	A	8	0	0	2	0
45	B	16	0	0	0	0
45	C	8	0	0	2	0
45	M	16	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
46	A	31	0	19	3	0
47	A	44	0	27	6	0
48	B	51	0	82	4	0
48	C	47	0	71	2	0
48	V	40	0	54	3	0
48	W	41	0	59	1	0
48	i	47	0	71	0	0
48	j	92	0	141	0	0
48	l	97	0	151	0	0
48	r	51	0	82	0	0
49	C	52	0	88	4	0
49	J	52	0	88	2	0
49	a	52	0	88	0	0
49	g	52	0	88	0	0
49	j	52	0	88	0	0
49	r	104	0	176	0	0
50	C	38	0	47	5	0
50	J	33	0	39	6	0
51	G	35	0	0	0	0
51	X	35	0	0	0	0
52	I	51	0	46	1	0
52	V	94	0	138	3	0
52	a	100	0	156	0	0
52	k	100	0	156	0	0
52	l	199	0	307	0	0
52	o	100	0	156	0	0
52	r	100	0	156	0	0
52	s	89	0	125	0	0
52	u	55	0	54	0	0
53	J	48	0	24	1	0
54	M	4	0	0	0	0
54	O	4	0	0	0	0
55	M	1	0	0	0	0
56	T	1	0	0	0	0
57	w	27	0	11	0	0
All	All	68233	0	69009	419	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

The worst 5 of 419 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)
20:V:95:CYS:SG	20:V:115:CYS:SG	1.39	1.39
47:A:503:NAI:C1B	47:A:503:NAI:O4B	1.63	1.22
53:J:401:NDP:O4D	53:J:401:NDP:C4D	1.68	1.12
20:V:110:ILE:HD13	48:V:202:PEE:H49	1.51	0.90
2:B:63:TRP:HB3	2:B:66:LEU:HD12	1.66	0.77

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	431/433 (100%)	420 (97%)	11 (3%)	0	100	100
2	B	174/176 (99%)	169 (97%)	5 (3%)	0	100	100
3	C	154/156 (99%)	148 (96%)	6 (4%)	0	100	100
4	E	113/115 (98%)	109 (96%)	4 (4%)	0	100	100
5	F	84/86 (98%)	78 (93%)	6 (7%)	0	100	100
6	G	86/88 (98%)	81 (94%)	4 (5%)	1 (1%)	13	39
6	X	86/88 (98%)	83 (96%)	3 (4%)	0	100	100
7	H	110/112 (98%)	104 (94%)	6 (6%)	0	100	100
8	I	93/112 (83%)	83 (89%)	10 (11%)	0	100	100
9	J	340/342 (99%)	325 (96%)	14 (4%)	1 (0%)	41	72
10	K	41/43 (95%)	39 (95%)	2 (5%)	0	100	100
11	L	123/125 (98%)	120 (98%)	3 (2%)	0	100	100
12	M	688/690 (100%)	666 (97%)	22 (3%)	0	100	100
13	N	142/144 (99%)	139 (98%)	3 (2%)	0	100	100
14	O	215/217 (99%)	205 (95%)	10 (5%)	0	100	100
15	P	206/208 (99%)	199 (97%)	7 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
16	Q	427/430 (99%)	412 (96%)	15 (4%)	0	100	100
17	S	68/70 (97%)	62 (91%)	6 (9%)	0	100	100
18	T	94/96 (98%)	91 (97%)	3 (3%)	0	100	100
19	U	81/83 (98%)	80 (99%)	1 (1%)	0	100	100
20	V	138/140 (99%)	136 (99%)	2 (1%)	0	100	100
21	W	140/142 (99%)	133 (95%)	7 (5%)	0	100	100
22	Y	65/67 (97%)	62 (95%)	3 (5%)	0	100	100
23	Z	78/80 (98%)	75 (96%)	3 (4%)	0	100	100
24	a	136/138 (99%)	133 (98%)	3 (2%)	0	100	100
25	b	94/126 (75%)	88 (94%)	6 (6%)	0	100	100
26	c	154/156 (99%)	143 (93%)	11 (7%)	0	100	100
27	d	173/175 (99%)	172 (99%)	1 (1%)	0	100	100
28	e	102/104 (98%)	94 (92%)	8 (8%)	0	100	100
29	f	47/49 (96%)	44 (94%)	3 (6%)	0	100	100
30	g	119/121 (98%)	114 (96%)	5 (4%)	0	100	100
31	h	103/105 (98%)	98 (95%)	5 (5%)	0	100	100
32	i	345/347 (99%)	329 (95%)	16 (5%)	0	100	100
33	j	113/115 (98%)	109 (96%)	3 (3%)	1 (1%)	17	46
34	k	96/98 (98%)	93 (97%)	3 (3%)	0	100	100
35	l	604/606 (100%)	578 (96%)	26 (4%)	0	100	100
36	m	173/175 (99%)	161 (93%)	11 (6%)	1 (1%)	25	56
37	n	54/56 (96%)	54 (100%)	0	0	100	100
38	o	126/128 (98%)	121 (96%)	5 (4%)	0	100	100
39	p	176/178 (99%)	169 (96%)	6 (3%)	1 (1%)	25	56
40	r	457/459 (100%)	450 (98%)	7 (2%)	0	100	100
41	s	316/318 (99%)	304 (96%)	11 (4%)	1 (0%)	41	72
42	u	169/171 (99%)	165 (98%)	4 (2%)	0	100	100
43	v	122/124 (98%)	117 (96%)	5 (4%)	0	100	100
44	w	318/320 (99%)	306 (96%)	12 (4%)	0	100	100
All	All	8174/8312 (98%)	7861 (96%)	307 (4%)	6 (0%)	54	81

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	G	133	ILE
9	J	38	HIS
41	s	208	VAL
36	m	25	SER
39	p	174	PRO

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	346/346 (100%)	339 (98%)	7 (2%)	55	84
2	B	151/151 (100%)	146 (97%)	5 (3%)	38	72
3	C	132/132 (100%)	126 (96%)	6 (4%)	27	60
4	E	106/107 (99%)	101 (95%)	5 (5%)	26	59
5	F	75/76 (99%)	69 (92%)	6 (8%)	12	34
6	G	75/81 (93%)	69 (92%)	6 (8%)	12	34
6	X	79/81 (98%)	76 (96%)	3 (4%)	33	67
7	H	99/99 (100%)	98 (99%)	1 (1%)	76	93
8	I	87/97 (90%)	83 (95%)	4 (5%)	27	60
9	J	296/296 (100%)	289 (98%)	7 (2%)	49	81
10	K	42/42 (100%)	40 (95%)	2 (5%)	25	58
11	L	113/113 (100%)	107 (95%)	6 (5%)	22	54
12	M	580/580 (100%)	561 (97%)	19 (3%)	38	72
13	N	130/130 (100%)	125 (96%)	5 (4%)	33	67
14	O	183/183 (100%)	172 (94%)	11 (6%)	19	48
15	P	190/190 (100%)	187 (98%)	3 (2%)	62	88
16	Q	370/370 (100%)	362 (98%)	8 (2%)	52	83
17	S	57/58 (98%)	57 (100%)	0	100	100
18	T	79/79 (100%)	78 (99%)	1 (1%)	69	91
19	U	69/69 (100%)	68 (99%)	1 (1%)	67	90

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
20	V	101/101 (100%)	100 (99%)	1 (1%)	76 93
21	W	122/123 (99%)	116 (95%)	6 (5%)	25 57
22	Y	62/62 (100%)	61 (98%)	1 (2%)	62 88
23	Z	62/62 (100%)	59 (95%)	3 (5%)	25 58
24	a	121/121 (100%)	119 (98%)	2 (2%)	60 87
25	b	90/119 (76%)	86 (96%)	4 (4%)	28 61
26	c	141/141 (100%)	139 (99%)	2 (1%)	67 90
27	d	155/155 (100%)	151 (97%)	4 (3%)	46 79
28	e	96/96 (100%)	92 (96%)	4 (4%)	30 63
29	f	36/45 (80%)	34 (94%)	2 (6%)	21 51
30	g	108/108 (100%)	107 (99%)	1 (1%)	78 94
31	h	93/93 (100%)	90 (97%)	3 (3%)	39 73
32	i	311/311 (100%)	304 (98%)	7 (2%)	50 82
33	j	100/100 (100%)	96 (96%)	4 (4%)	31 65
34	k	85/85 (100%)	80 (94%)	5 (6%)	19 49
35	l	537/540 (99%)	525 (98%)	12 (2%)	52 83
36	m	130/141 (92%)	126 (97%)	4 (3%)	40 74
37	n	53/53 (100%)	48 (91%)	5 (9%)	8 26
38	o	113/113 (100%)	109 (96%)	4 (4%)	36 70
39	p	158/159 (99%)	153 (97%)	5 (3%)	39 73
40	r	410/410 (100%)	402 (98%)	8 (2%)	55 84
41	s	275/275 (100%)	266 (97%)	9 (3%)	38 72
42	u	153/153 (100%)	146 (95%)	7 (5%)	27 60
43	v	111/111 (100%)	107 (96%)	4 (4%)	35 69
44	w	281/283 (99%)	271 (96%)	10 (4%)	35 69
All	All	7163/7240 (99%)	6940 (97%)	223 (3%)	43 74

5 of 223 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
23	Z	33	GLN
44	w	285	ASP
32	i	321	LYS

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Mol	Chain	Res	Type
44	w	241	TYR
41	s	282	TYR

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

Mol	Chain	Res	Type
40	r	81	GLN
44	w	235	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue is 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	$\#\|Z\| > 2$
16	2MR	Q	118	16	10,12,13	2.01	2 (20%)	5,13,15	6.30	3 (60%)

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
16	2MR	Q	118	16	-	3/10/13/15	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
16	Q	118	2MR	CZ-NE	5.53	1.46	1.34
16	Q	118	2MR	CQ2-NH2	-2.10	1.41	1.45

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
16	Q	118	2MR	NE-CZ-NH2	12.93	131.33	119.48
16	Q	118	2MR	CD-NE-CZ	4.65	132.12	123.41
16	Q	118	2MR	CQ2-NH2-CZ	2.87	130.21	123.86

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
16	Q	118	2MR	NE-CD-CG-CB
16	Q	118	2MR	CA-CB-CG-CD
16	Q	118	2MR	CG-CD-NE-CZ

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
16	Q	118	2MR	1	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 45 ligands modelled in this entry, 2 are monoatomic - leaving 43 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	$\#\|Z\|>2$
48	PEE	V	202	-	39,39,50	1.31	6 (15%)	41,44,55	1.04	2 (4%)
52	CDL	r	504	-	99,99,99	1.07	8 (8%)	105,111,111	0.90	4 (3%)
49	PLX	r	502	-	51,51,51	1.14	3 (5%)	55,59,59	0.63	1 (1%)
49	PLX	j	203	-	51,51,51	1.14	4 (7%)	55,59,59	0.64	1 (1%)
48	PEE	B	303	-	50,50,50	1.16	6 (12%)	53,55,55	1.04	2 (3%)
48	PEE	l	703	-	50,50,50	1.16	6 (12%)	53,55,55	0.94	2 (3%)
45	SF4	M	801	12	0,12,12	-	-	-		
49	PLX	C	303	-	51,51,51	1.14	4 (7%)	55,59,59	0.65	1 (1%)
48	PEE	W	201	-	40,40,50	1.15	5 (12%)	43,45,55	0.93	2 (4%)
47	NAI	A	503	-	42,48,48	4.92	18 (42%)	47,73,73	1.33	7 (14%)
45	SF4	C	301	3	0,12,12	-	-	-		
52	CDL	o	201	-	99,99,99	1.08	8 (8%)	105,111,111	0.87	4 (3%)
46	FMN	A	502	-	33,33,33	1.10	2 (6%)	48,50,50	1.30	9 (18%)
49	PLX	a	202	-	51,51,51	1.15	4 (7%)	55,59,59	0.57	1 (1%)
54	FES	O	301	14	0,4,4	-	-	-		
50	UQ	J	402	-	33,33,63	3.47	10 (30%)	40,43,79	2.69	14 (35%)
51	8Q1	G	201	6	31,34,34	1.67	5 (16%)	40,43,43	1.73	6 (15%)
54	FES	M	803	12	0,4,4	-	-	-		
52	CDL	l	702	-	99,99,99	1.08	8 (8%)	105,111,111	0.87	4 (3%)
52	CDL	u	201	-	54,54,99	1.36	9 (16%)	60,66,111	1.09	4 (6%)
49	PLX	J	403	-	51,51,51	1.13	3 (5%)	55,59,59	0.61	1 (1%)
52	CDL	I	201	-	50,50,99	1.39	8 (16%)	56,62,111	1.11	4 (7%)
45	SF4	B	301	2	0,12,12	-	-	-		
52	CDL	l	701	-	98,98,99	1.09	8 (8%)	104,110,111	0.90	4 (3%)
53	NDP	J	401	-	45,52,52	4.55	19 (42%)	53,80,80	1.99	7 (13%)
52	CDL	s	401	-	88,88,99	1.13	7 (7%)	94,100,111	0.94	4 (4%)
52	CDL	k	101	-	99,99,99	1.08	8 (8%)	105,111,111	0.86	4 (3%)
48	PEE	C	302	-	46,46,50	1.20	6 (13%)	49,51,55	1.00	2 (4%)
48	PEE	l	704	-	45,45,50	1.21	6 (13%)	48,50,55	0.99	2 (4%)
48	PEE	j	202	-	40,40,50	1.14	5 (12%)	43,45,55	1.12	3 (6%)
52	CDL	a	201	-	99,99,99	1.08	8 (8%)	105,111,111	0.85	4 (3%)
45	SF4	B	302	2	0,12,12	-	-	-		
48	PEE	r	501	-	50,50,50	1.15	6 (12%)	53,55,55	1.02	2 (3%)
51	8Q1	X	201	6	31,34,34	1.69	6 (19%)	40,43,43	1.60	6 (15%)
45	SF4	M	802	12	0,12,12	-	-	-		
52	CDL	V	201	-	93,93,99	1.10	9 (9%)	99,105,111	0.89	4 (4%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
49	PLX	r	503	-	51,51,51	1.13	3 (5%)	55,59,59	0.60	1 (1%)
45	SF4	A	501	1	0,12,12	-	-	-		
57	ADP	w	401	-	24,29,29	3.12	6 (25%)	29,45,45	1.46	5 (17%)
48	PEE	i	401	-	46,46,50	1.19	6 (13%)	49,51,55	1.02	2 (4%)
49	PLX	g	201	-	51,51,51	1.13	3 (5%)	55,59,59	0.66	1 (1%)
50	UQ	C	304	-	38,38,63	3.51	11 (28%)	46,49,79	2.93	17 (36%)
48	PEE	j	201	-	50,50,50	1.15	6 (12%)	53,55,55	0.95	2 (3%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
48	PEE	V	202	-	-	26/43/43/54	-
52	CDL	r	504	-	-	64/110/110/110	-
49	PLX	r	502	-	-	32/55/55/55	-
49	PLX	j	203	-	-	26/55/55/55	-
48	PEE	B	303	-	-	27/54/54/54	-
48	PEE	l	703	-	-	31/54/54/54	-
45	SF4	M	801	12	-	-	0/6/5/5
49	PLX	C	303	-	-	31/55/55/55	-
48	PEE	W	201	-	-	19/44/44/54	-
47	NAI	A	503	-	-	8/25/72/72	0/5/5/5
52	CDL	o	201	-	-	65/110/110/110	-
45	SF4	C	301	3	-	-	0/6/5/5
49	PLX	a	202	-	-	30/55/55/55	-
46	FMN	A	502	-	-	4/18/18/18	0/3/3/3
54	FES	O	301	14	-	-	0/1/1/1
50	UQ	J	402	-	-	10/27/51/87	0/1/1/1
51	8Q1	G	201	6	-	12/41/41/41	-
54	FES	M	803	12	-	-	0/1/1/1
52	CDL	l	702	-	-	58/110/110/110	-
52	CDL	u	201	-	-	36/65/65/110	-
49	PLX	J	403	-	-	34/55/55/55	-
52	CDL	I	201	-	-	30/61/61/110	-
45	SF4	B	301	2	-	-	0/6/5/5

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
52	CDL	l	701	-	-	64/109/109/110	-
53	NDP	J	401	-	-	11/30/77/77	0/4/5/5
52	CDL	s	401	-	-	49/99/99/110	-
52	CDL	k	101	-	-	62/110/110/110	-
48	PEE	C	302	-	-	28/50/50/54	-
48	PEE	l	704	-	-	29/49/49/54	-
48	PEE	j	202	-	-	20/44/44/54	-
52	CDL	a	201	-	-	50/110/110/110	-
45	SF4	B	302	2	-	-	0/6/5/5
48	PEE	r	501	-	-	32/54/54/54	-
51	8Q1	X	201	6	-	16/41/41/41	-
52	CDL	V	201	-	-	59/104/104/110	-
45	SF4	M	802	12	-	-	0/6/5/5
49	PLX	r	503	-	-	30/55/55/55	-
57	ADP	w	401	-	-	4/12/32/32	0/3/3/3
45	SF4	A	501	1	-	-	0/6/5/5
48	PEE	i	401	-	-	20/50/50/54	-
49	PLX	g	201	-	-	32/55/55/55	-
50	UQ	C	304	-	-	13/33/57/87	0/1/1/1
48	PEE	j	201	-	-	26/54/54/54	-

The worst 5 of 240 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
47	A	503	NAI	O4B-C1B	16.17	1.63	1.41
47	A	503	NAI	C2B-C1B	-15.34	1.30	1.53
53	J	401	NDP	C3B-C2B	-12.96	1.24	1.52
53	J	401	NDP	C6N-C5N	12.22	1.55	1.33
53	J	401	NDP	O4D-C4D	10.68	1.68	1.45

The worst 5 of 139 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
50	C	304	UQ	C7-C8-C9	-8.36	112.88	126.79
50	J	402	UQ	C7-C8-C9	-7.88	113.67	126.79
53	J	401	NDP	C3N-C2N-N1N	-7.79	111.98	123.10
51	G	201	8Q1	C6-C1-S44	7.09	121.72	113.46
53	J	401	NDP	C1D-N1N-C2N	-6.95	109.53	121.11

There are no chirality outliers.

5 of 1088 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
46	A	502	FMN	N10-C1'-C2'-O2'
46	A	502	FMN	N10-C1'-C2'-C3'
47	A	503	NAI	C5B-O5B-PA-O3
48	B	303	PEE	C11-C10-O2-C2
48	B	303	PEE	O4-C10-O2-C2

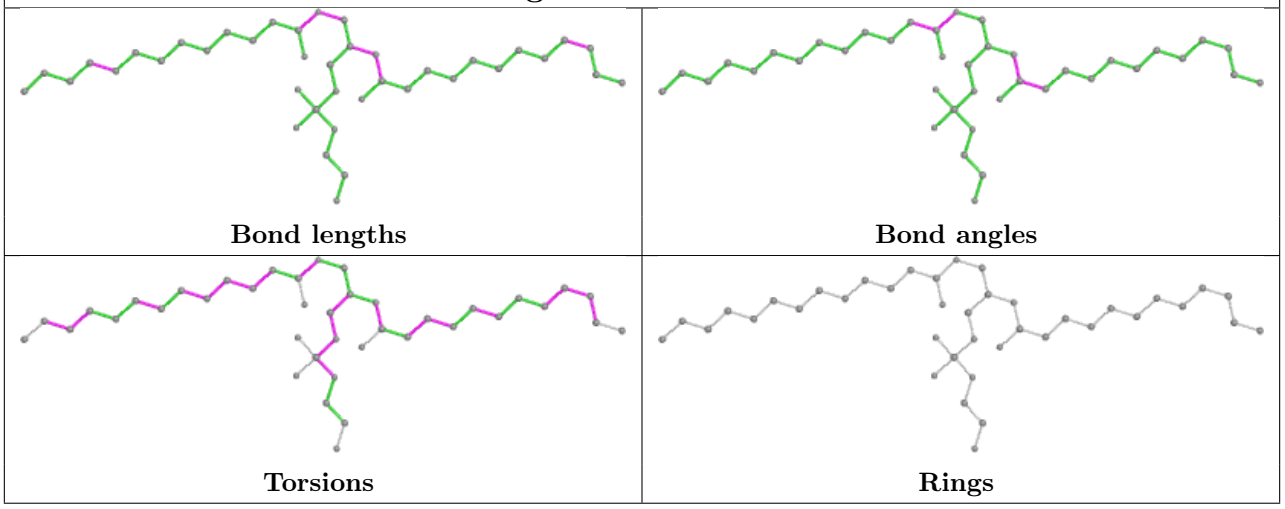
There are no ring outliers.

15 monomers are involved in 44 short contacts:

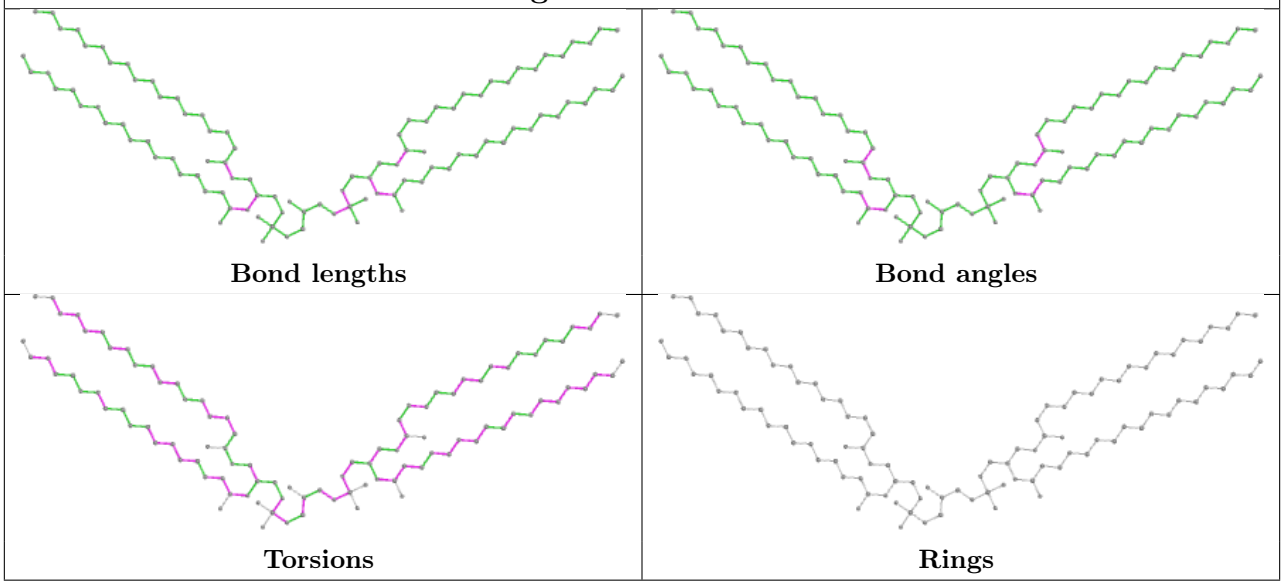
Mol	Chain	Res	Type	Clashes	Symm-Clashes
48	V	202	PEE	3	0
48	B	303	PEE	4	0
49	C	303	PLX	4	0
48	W	201	PEE	1	0
47	A	503	NAI	6	0
45	C	301	SF4	2	0
46	A	502	FMN	3	0
50	J	402	UQ	6	0
49	J	403	PLX	2	0
52	I	201	CDL	1	0
53	J	401	NDP	1	0
48	C	302	PEE	2	0
52	V	201	CDL	3	0
45	A	501	SF4	2	0
50	C	304	UQ	5	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

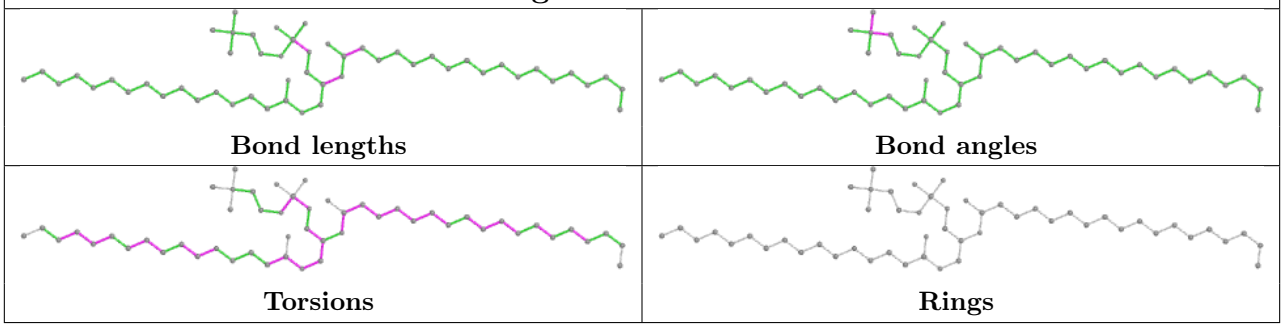
Ligand PEE V 202



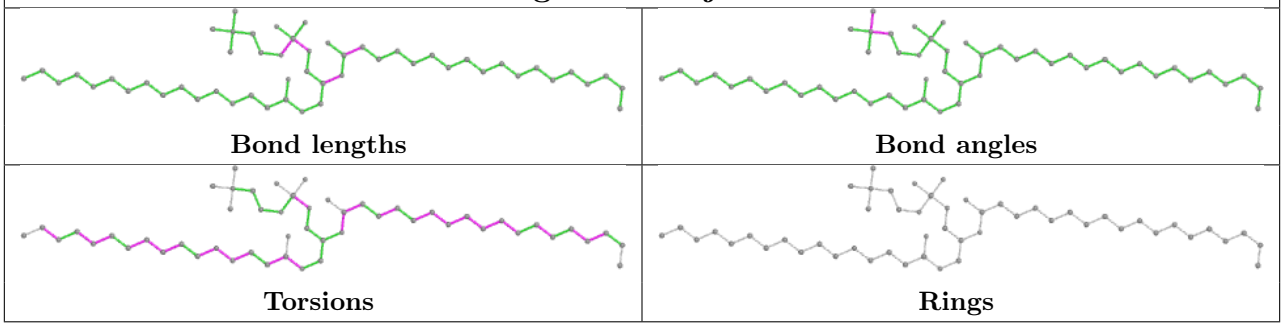
Ligand CDL r 504



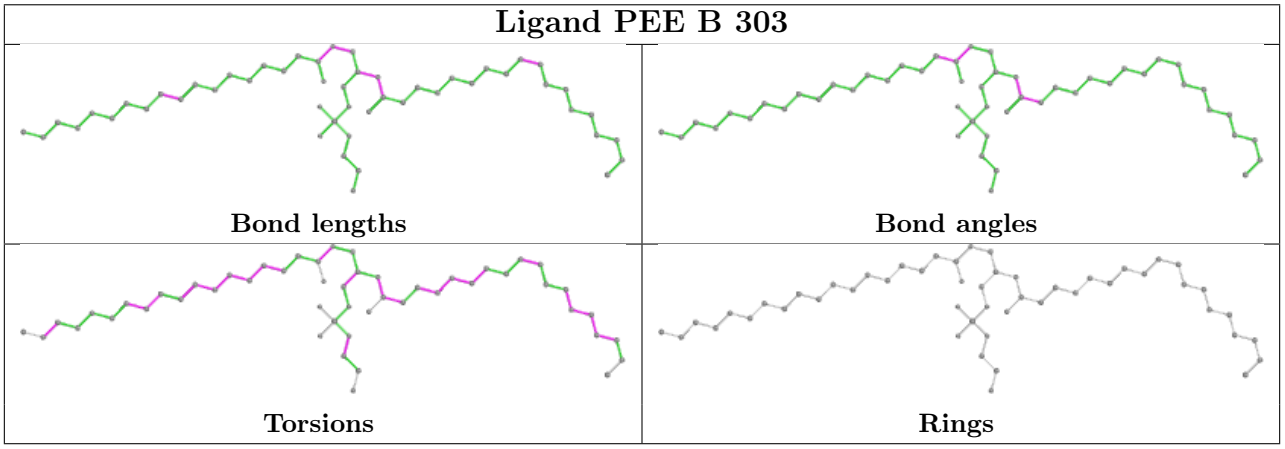
Ligand PLX r 502



Ligand PLX j 203



Ligand PEE B 303



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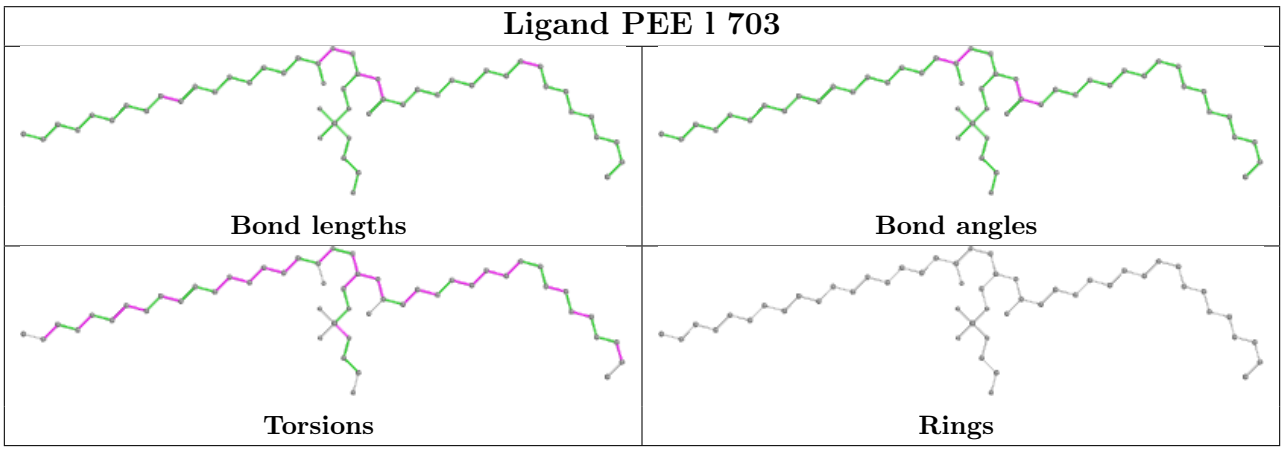

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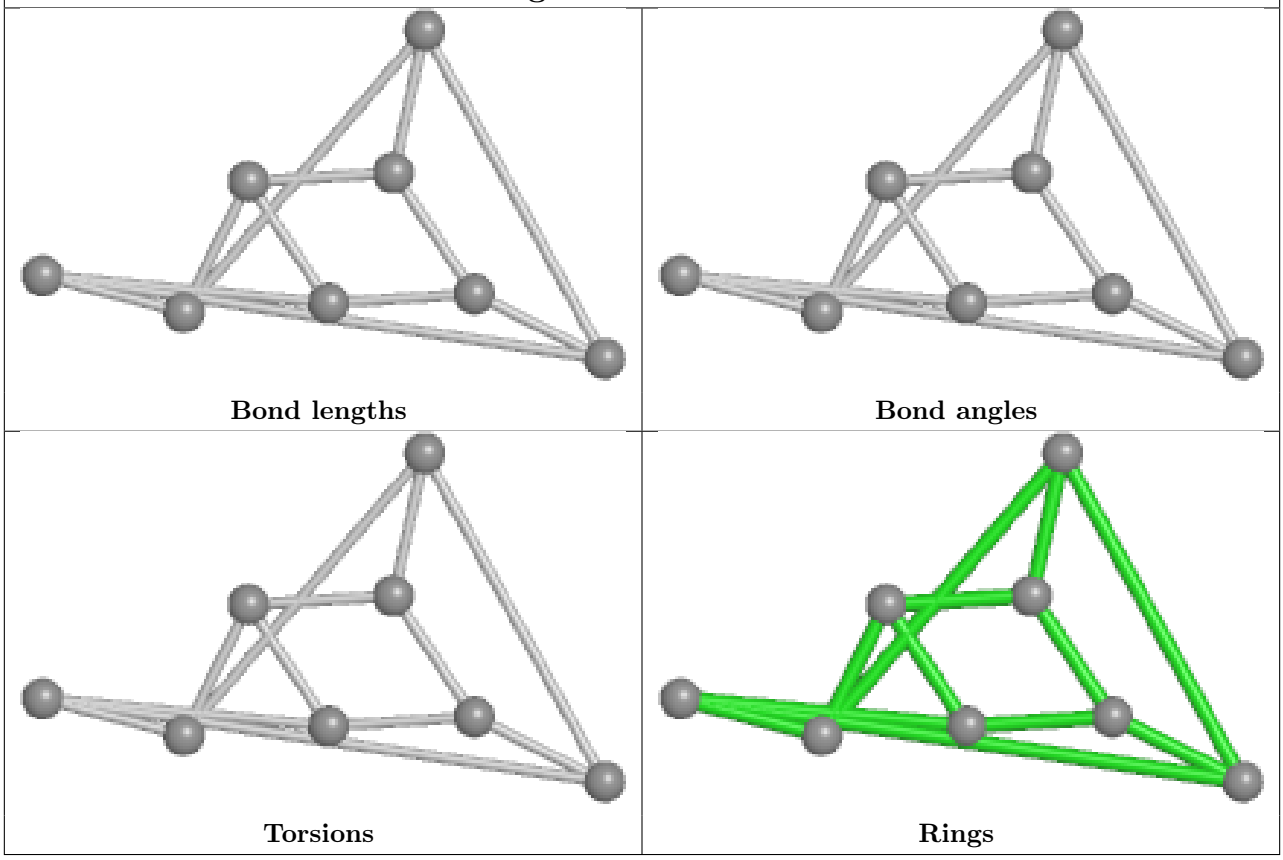

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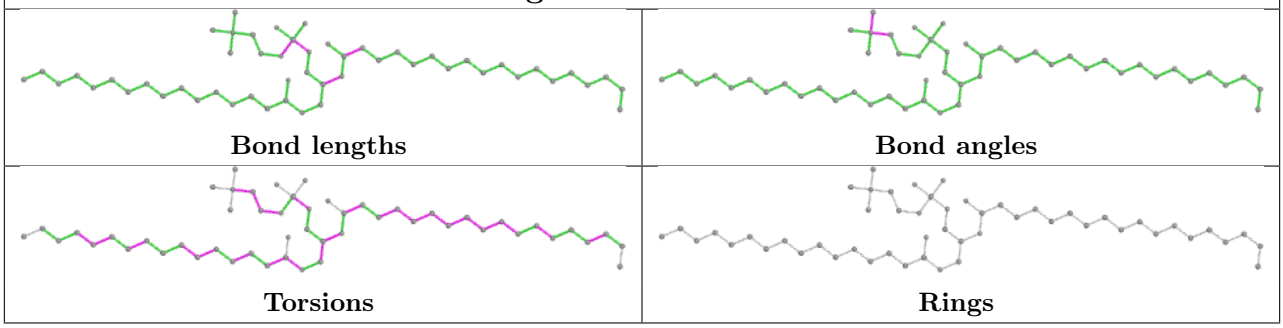

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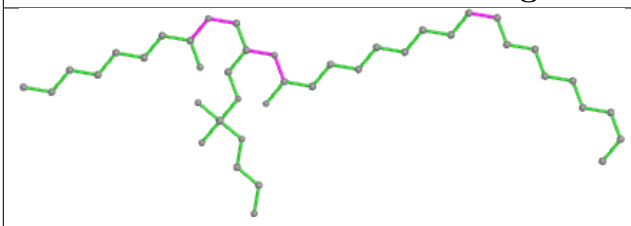
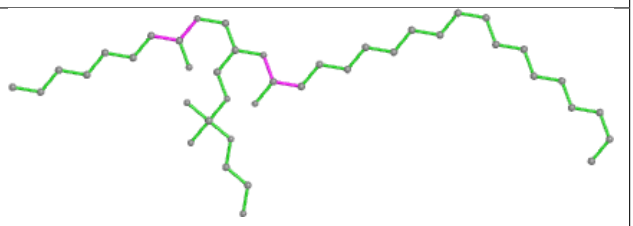
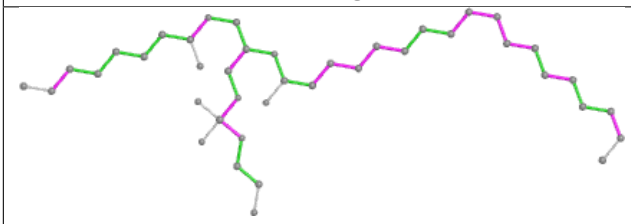


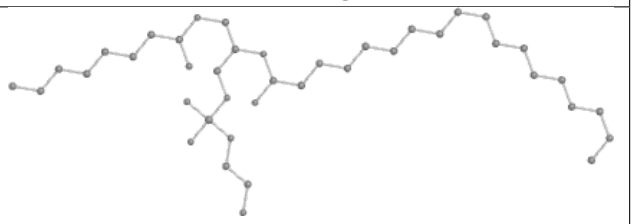
Bond lengths



Bond angles

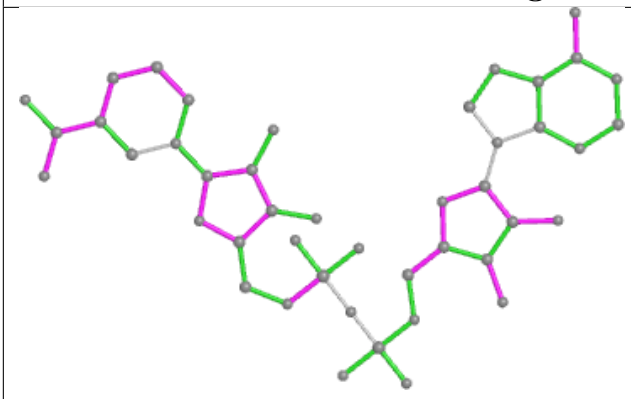


Torsions

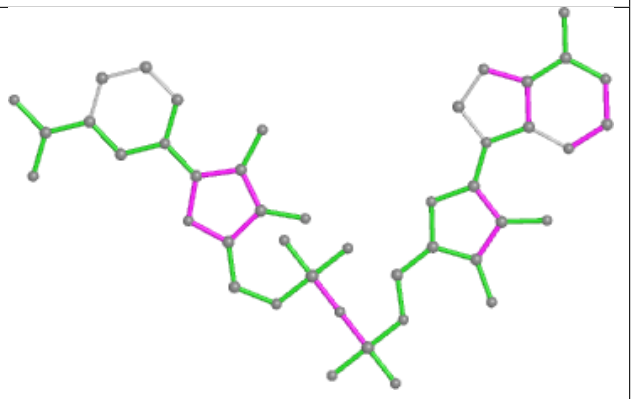


Rings

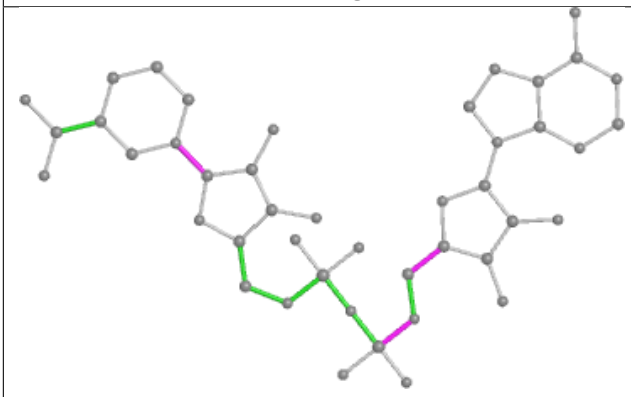
Ligand NAI A 503



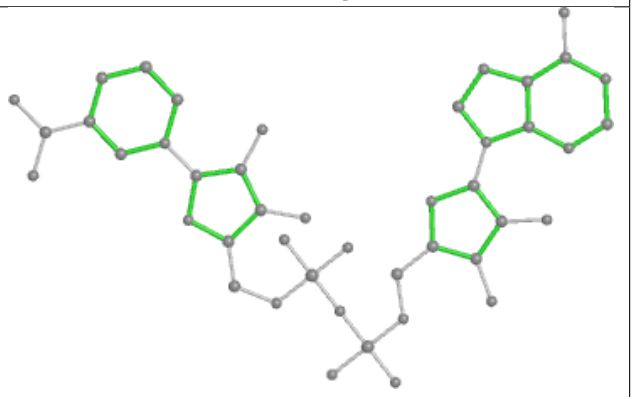
Bond lengths



Bond angles

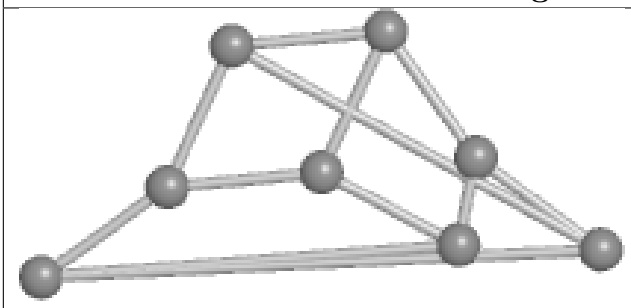


Torsions

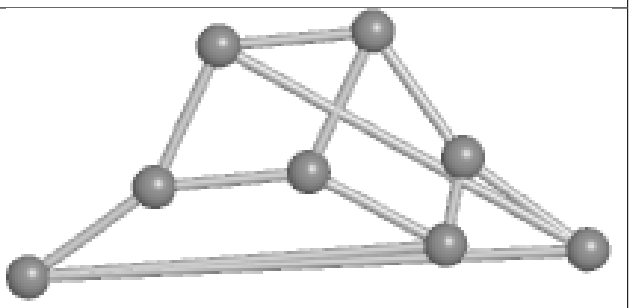


Rings

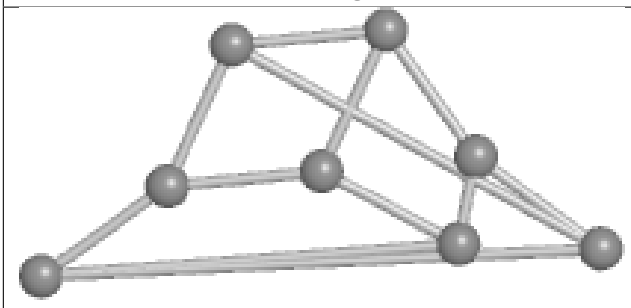
Ligand SF4 C 301



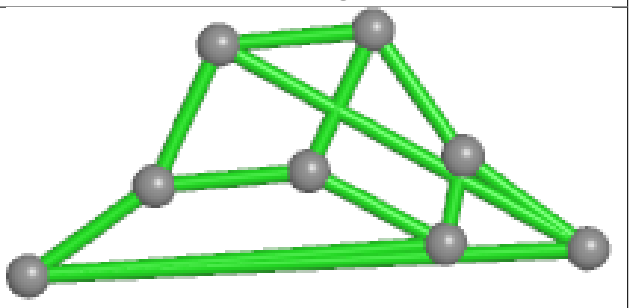
Bond lengths



Bond angles

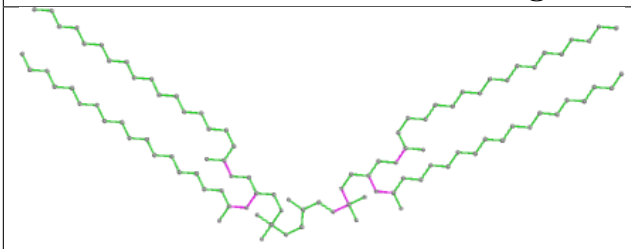


Torsions

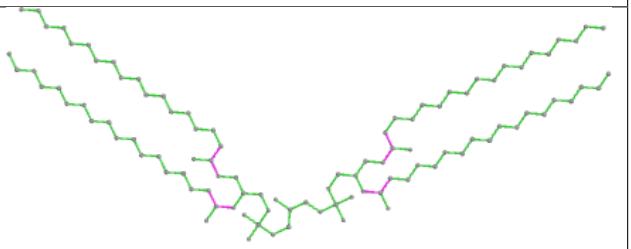


Rings

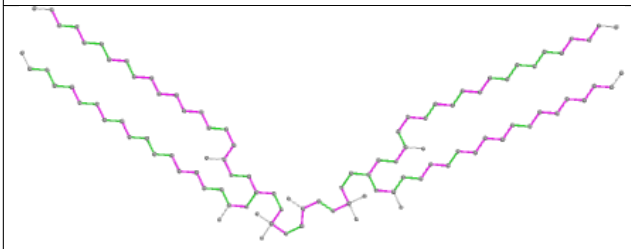
Ligand CDL o 201



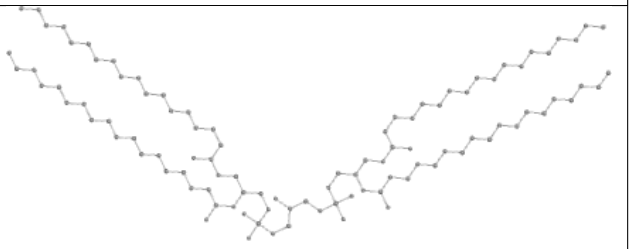
Bond lengths



Bond angles

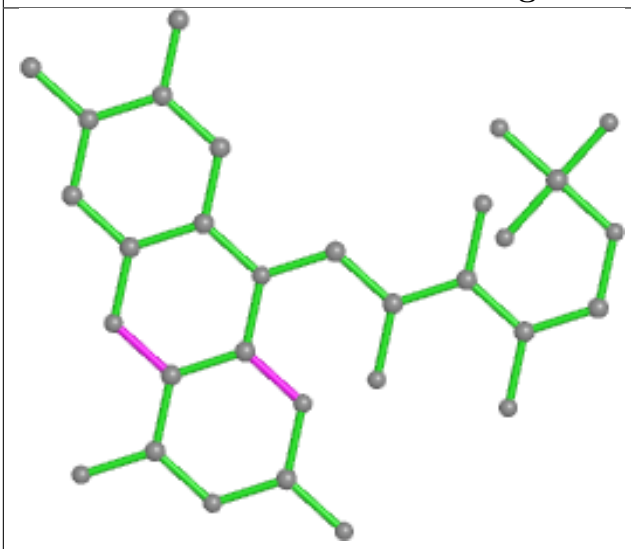


Torsions

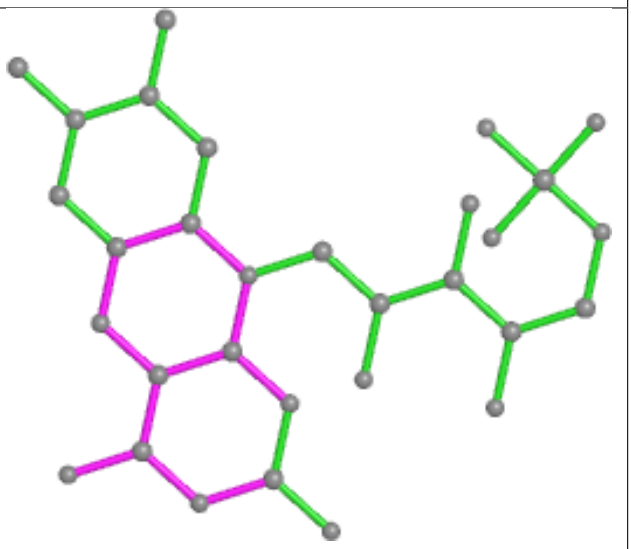


Rings

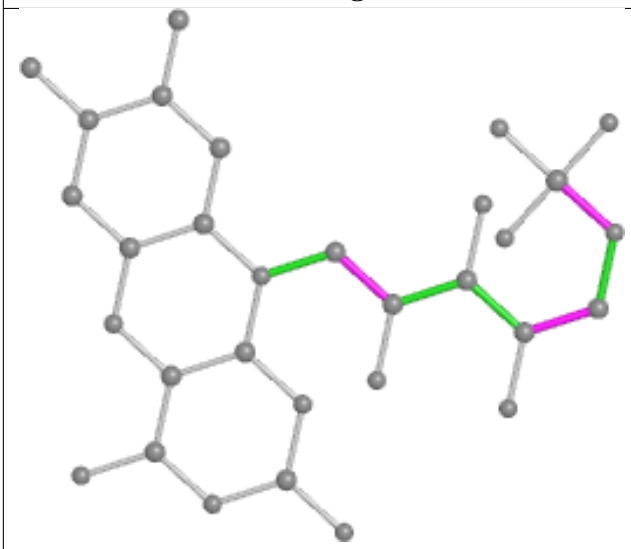
Ligand FMN A 502



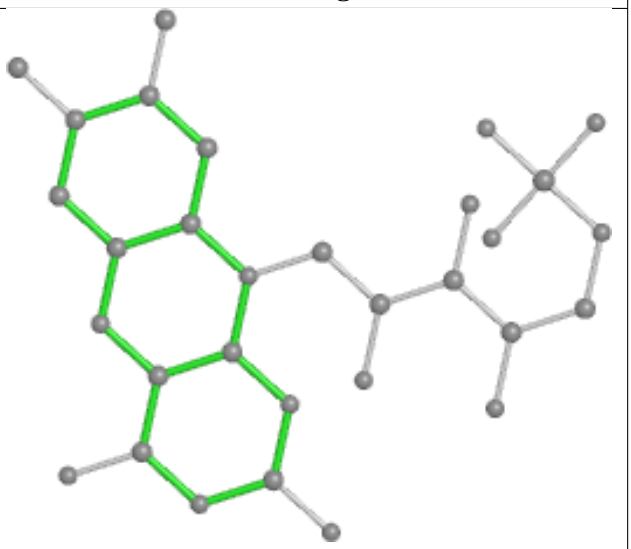
Bond lengths



Bond angles

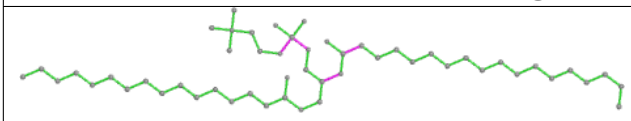


Torsions

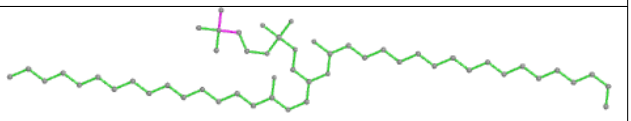


Rings

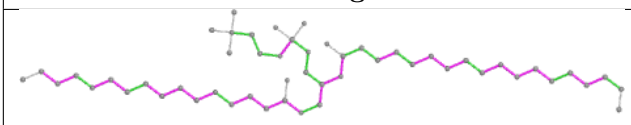
Ligand PLX a 202



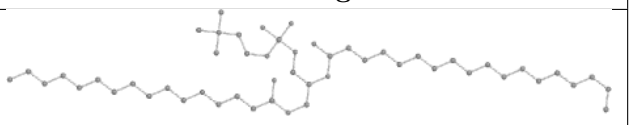
Bond lengths



Bond angles

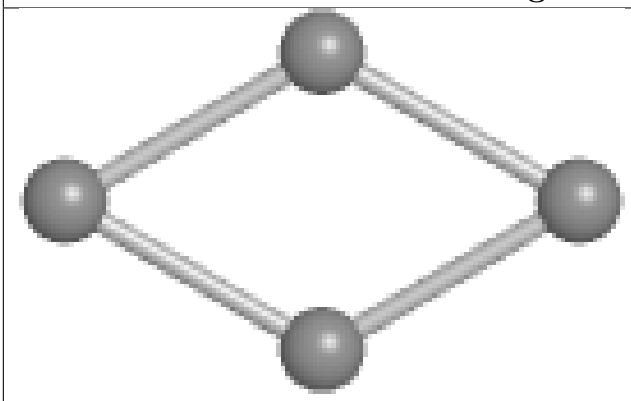


Torsions



Rings

Ligand FES O 301



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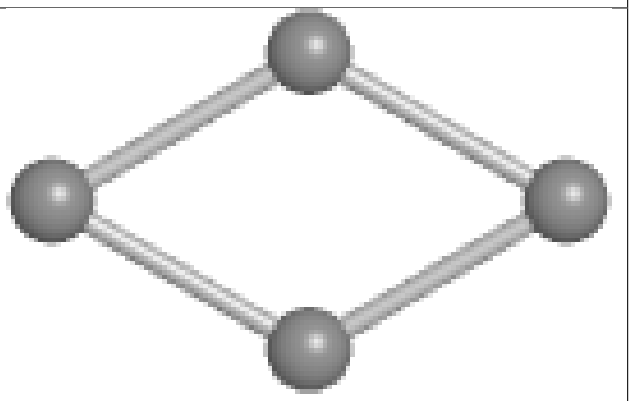
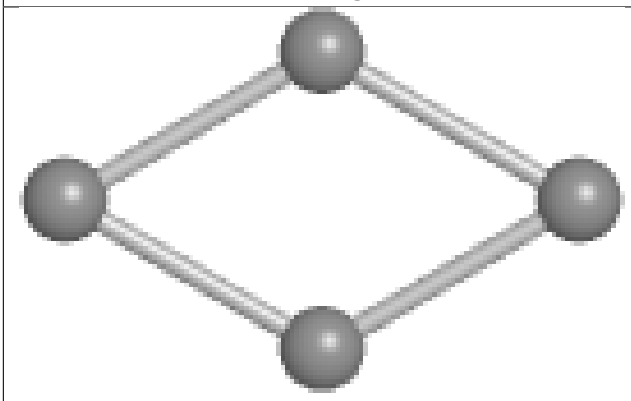
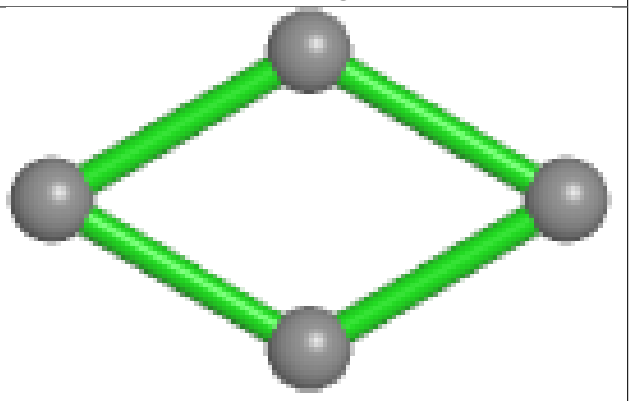


Bond angles

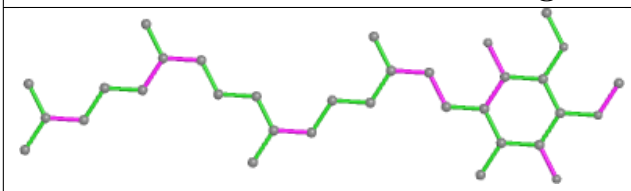


Torsions



Rings

Ligand UQ J 402



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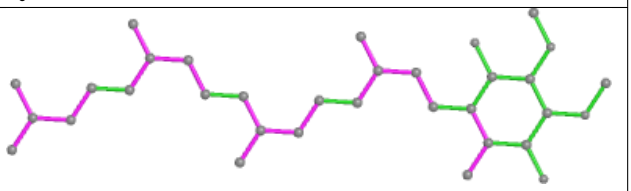
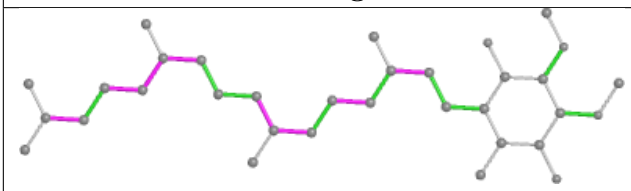
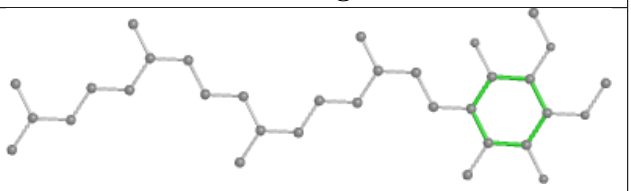


Bond angles

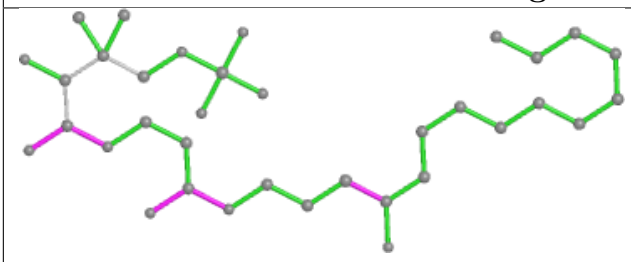


Torsions

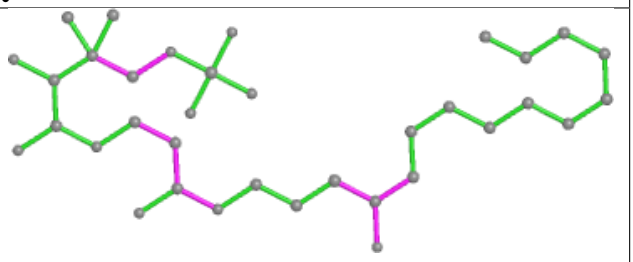


Rings

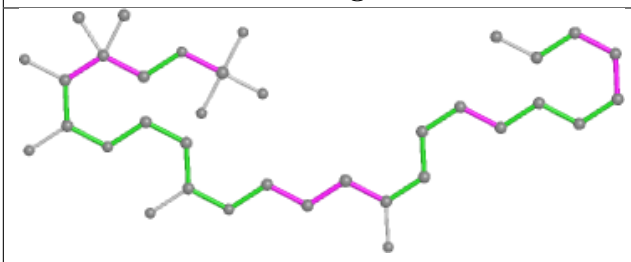
Ligand 8Q1 G 201



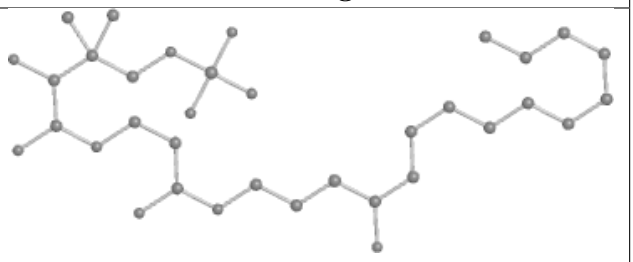
Bond lengths



Bond angles

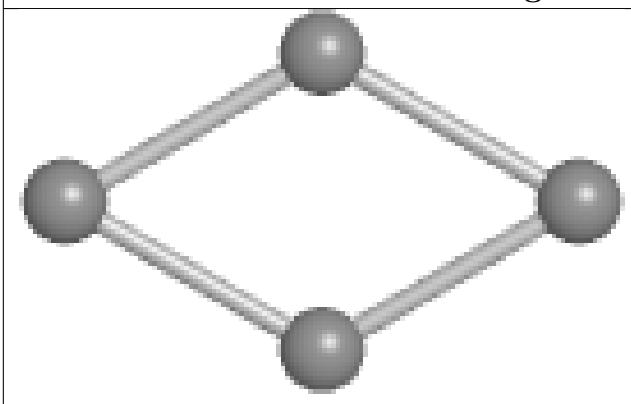


Torsions

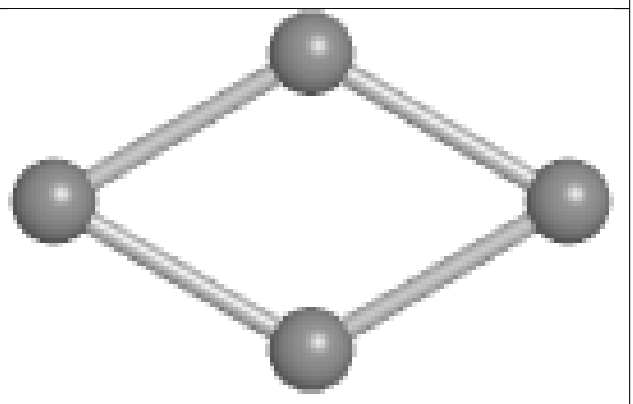


Rings

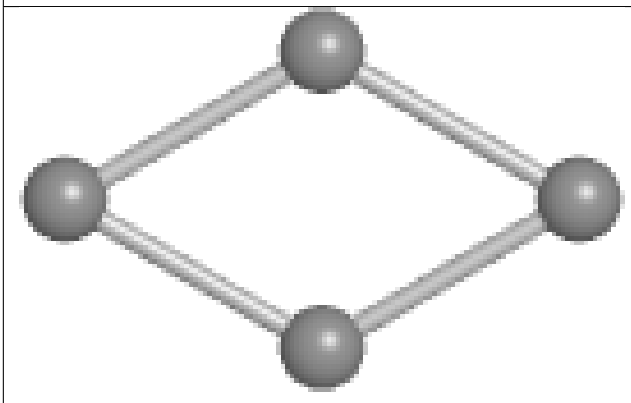
Ligand FES M 803



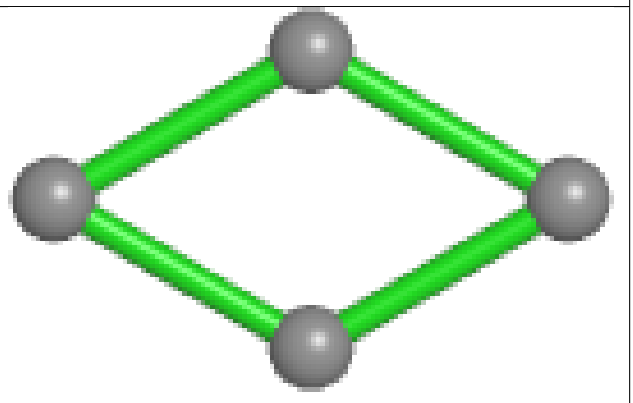
Bond lengths



Bond angles

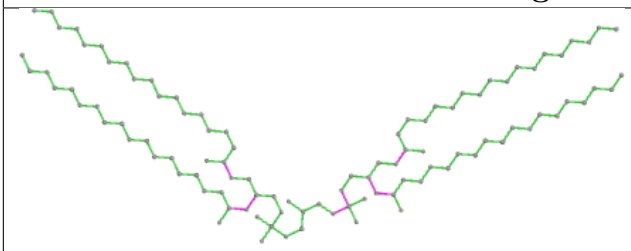


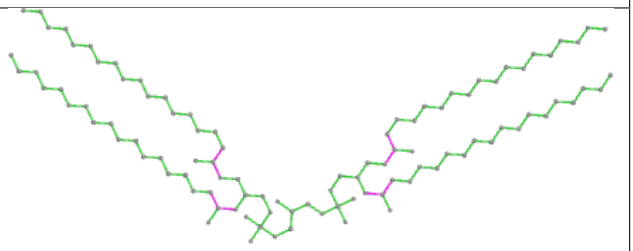
Torsions

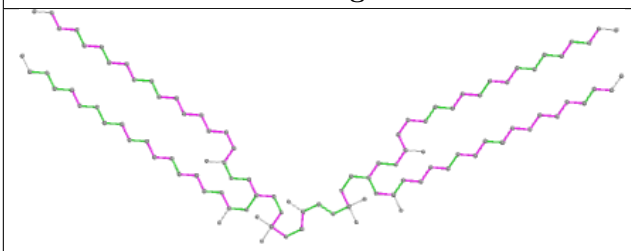


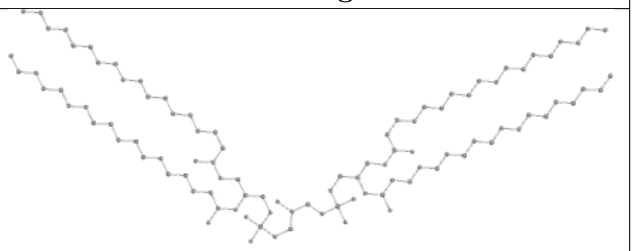
Rings

Ligand CDL l 702

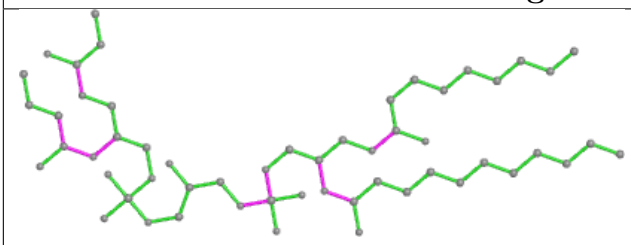

Bond lengths

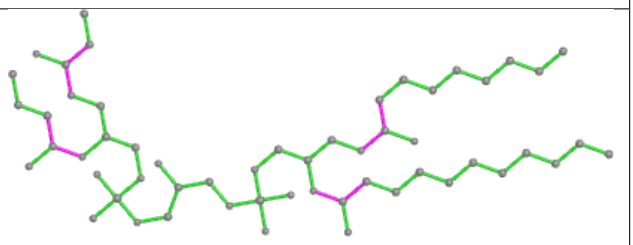

Bond angles

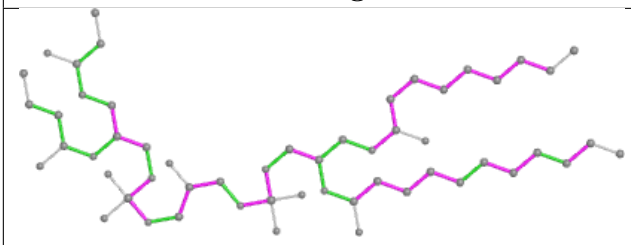

Torsions


Rings

Ligand CDL u 201


Bond lengths


Bond angles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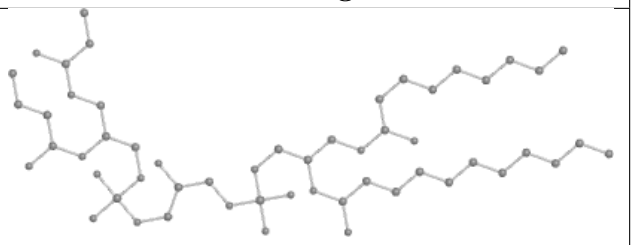
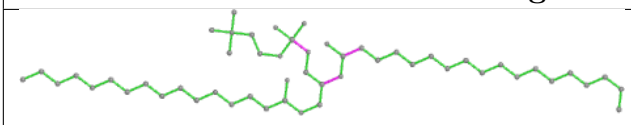
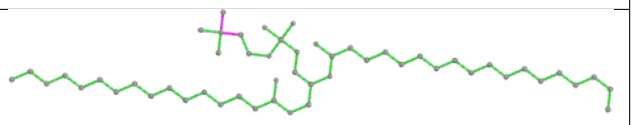
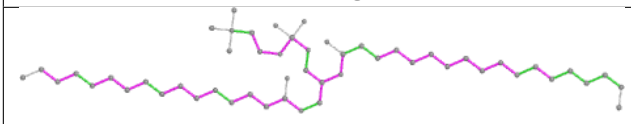
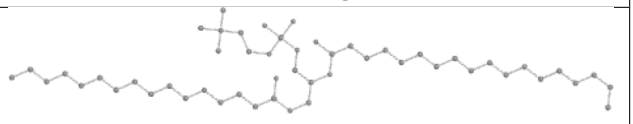

Rings

Ligand PLX J 403

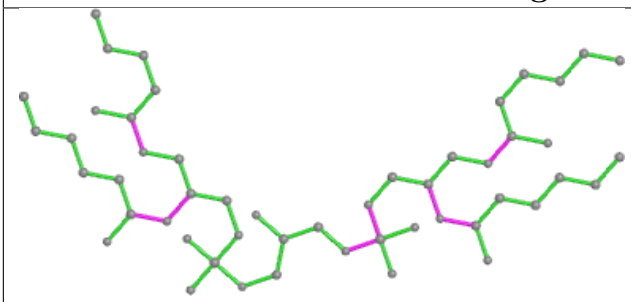

Bond lengths


Bond angles

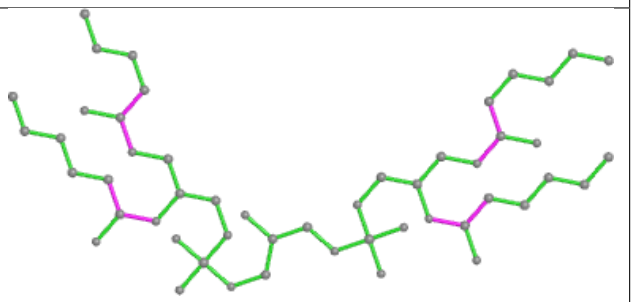

Torsions


Rings

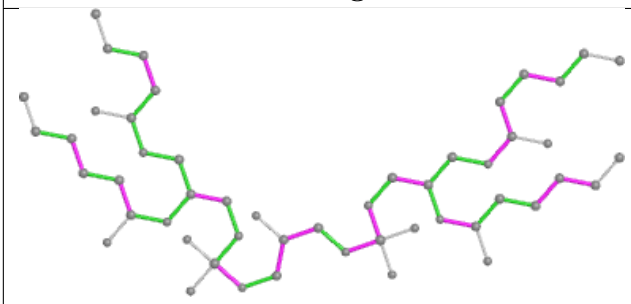
Ligand CDL I 201



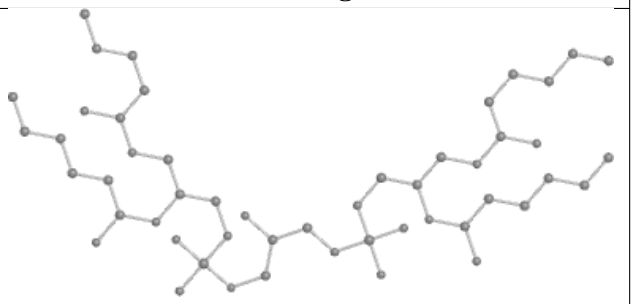
Bond lengths



Bond angles

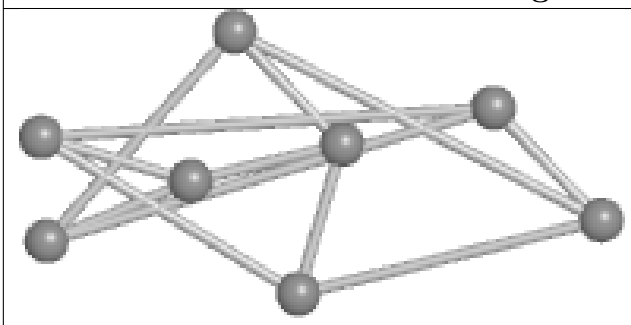


Torsions



Rings

Ligand SF4 B 301



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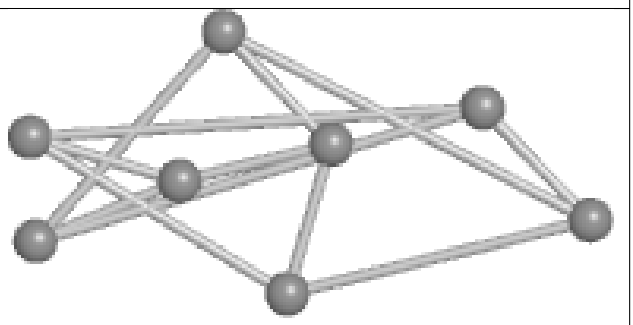
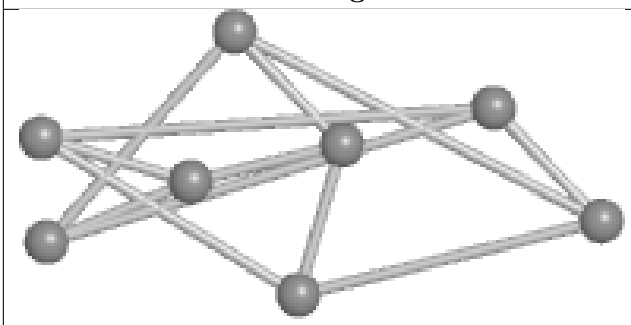
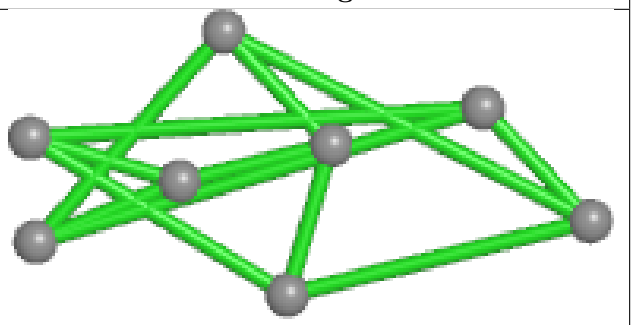


Bond angles

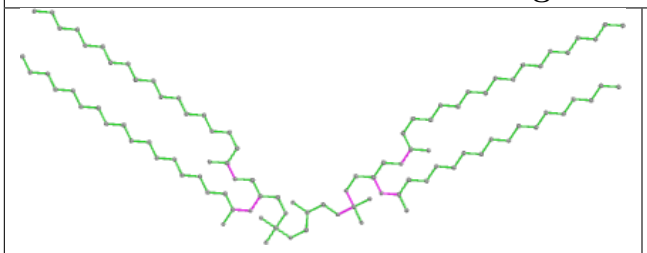


Torsions

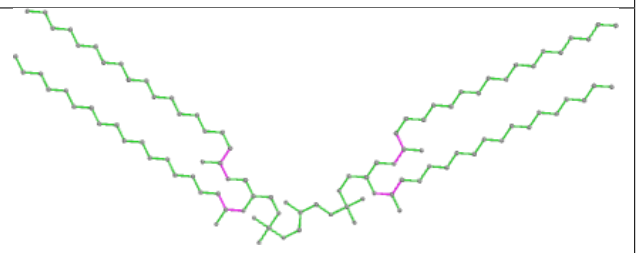


Rings

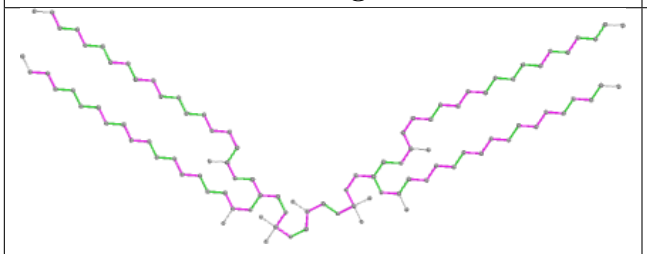
Ligand CDL l 701



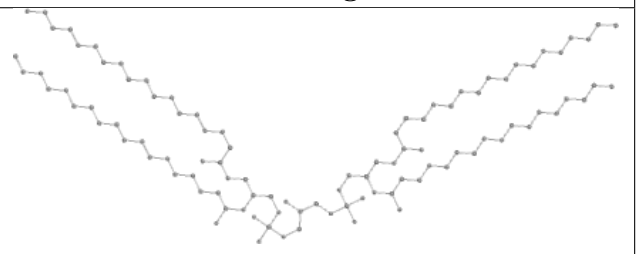
Bond lengths



Bond angles

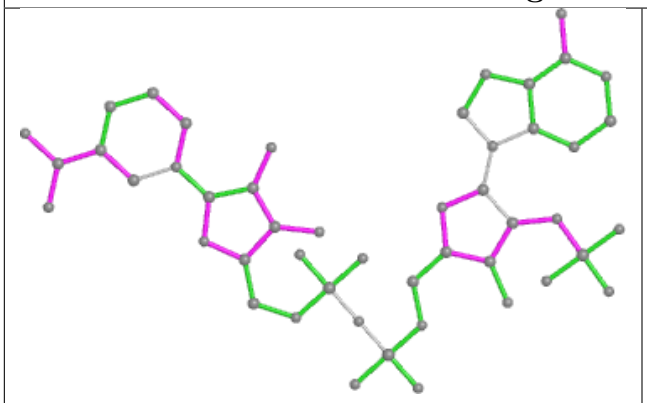


Torsions

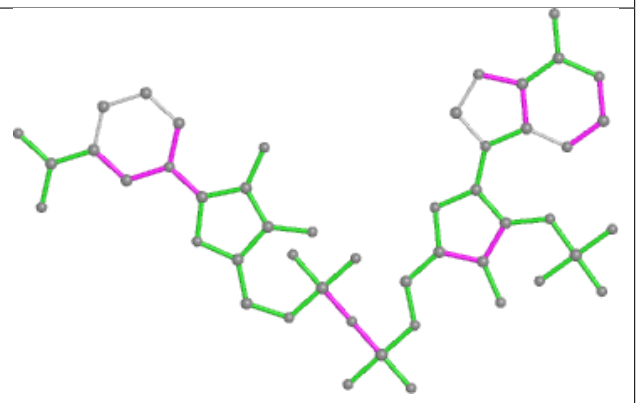


Rings

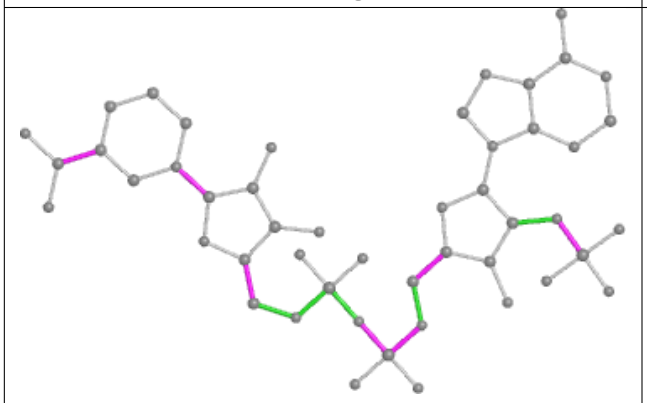
Ligand NDP J 401



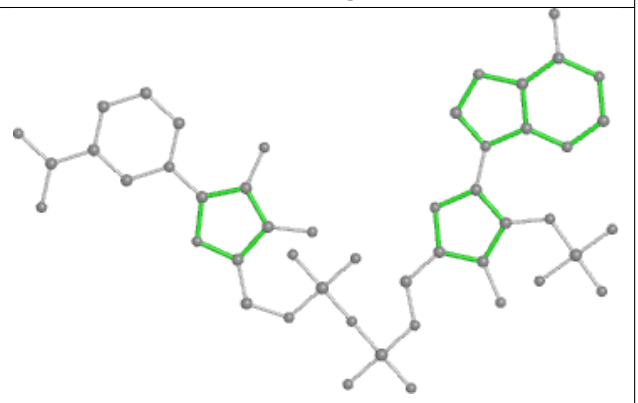
Bond lengths



Bond angles

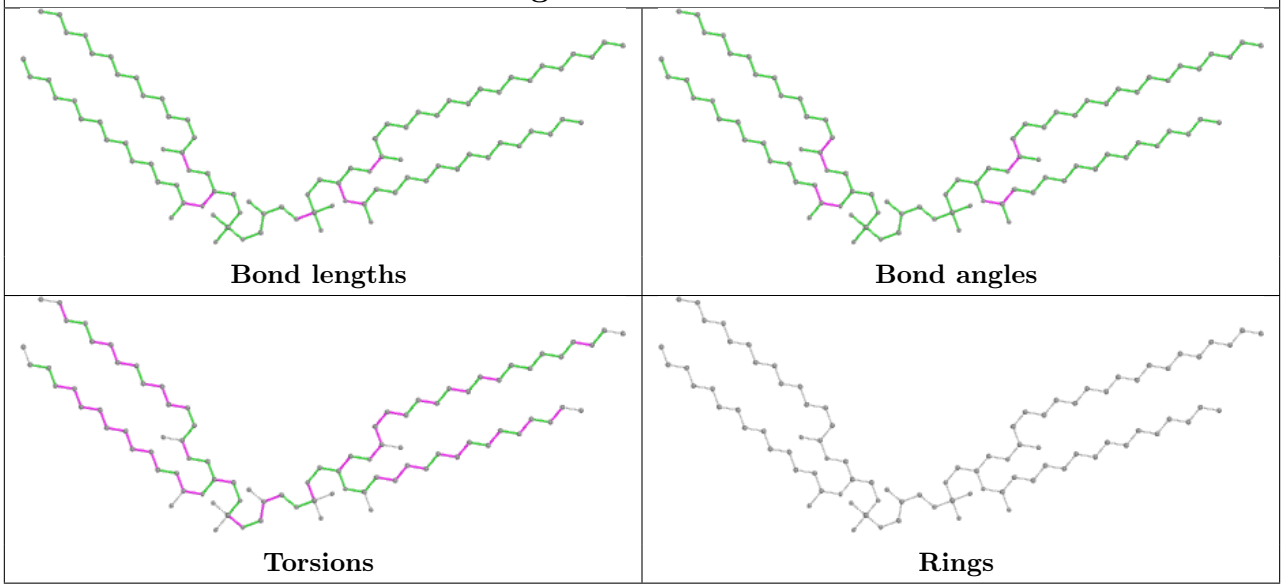


Torsions

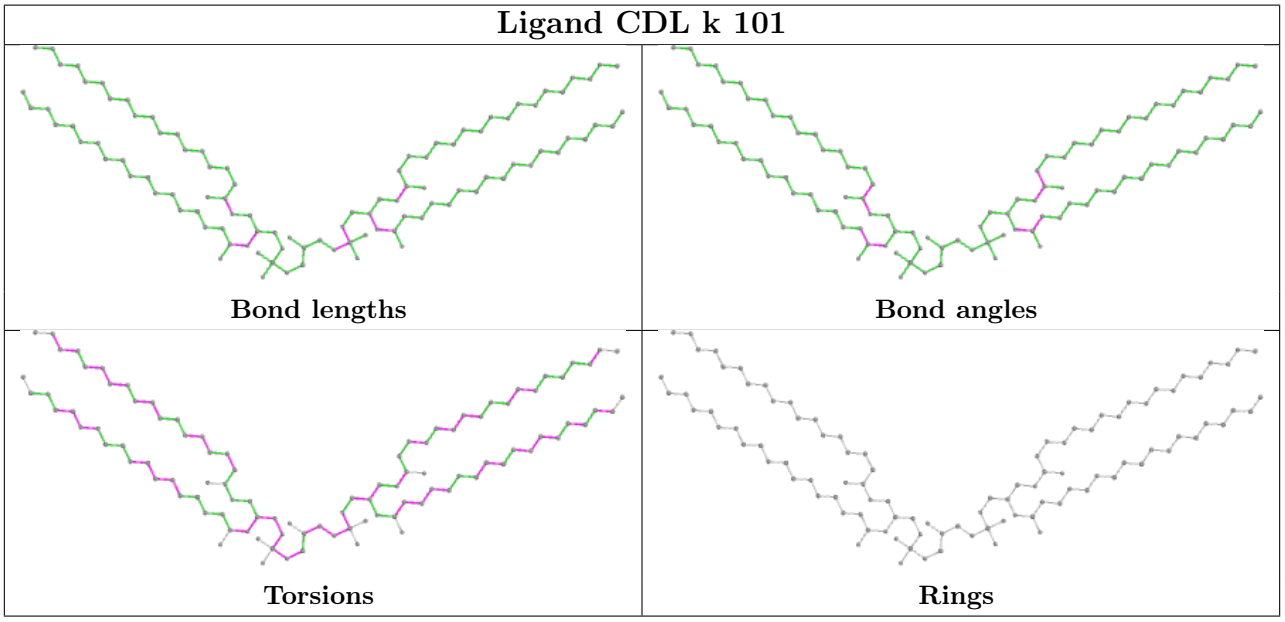


Rings

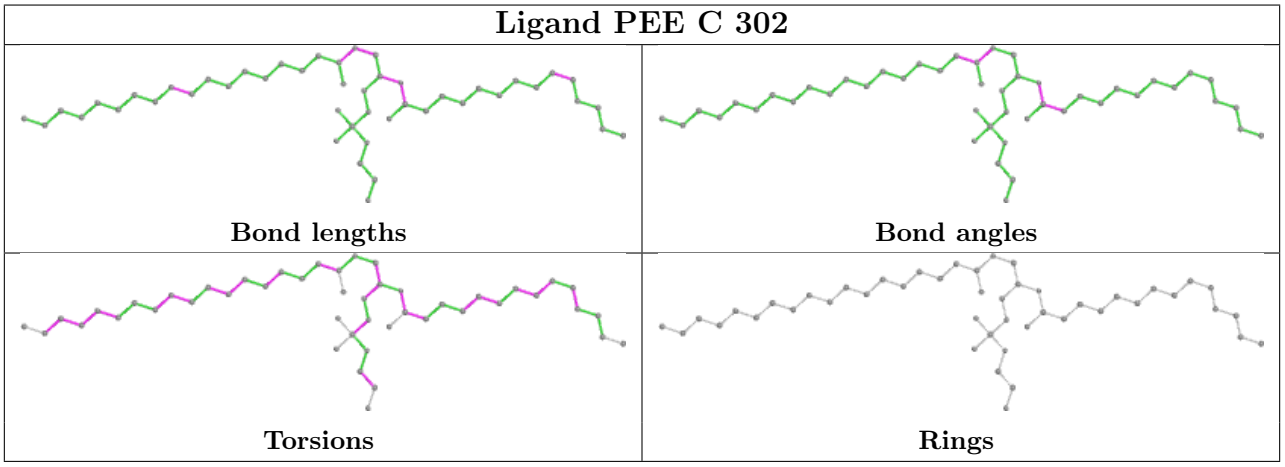
Ligand CDL s 401



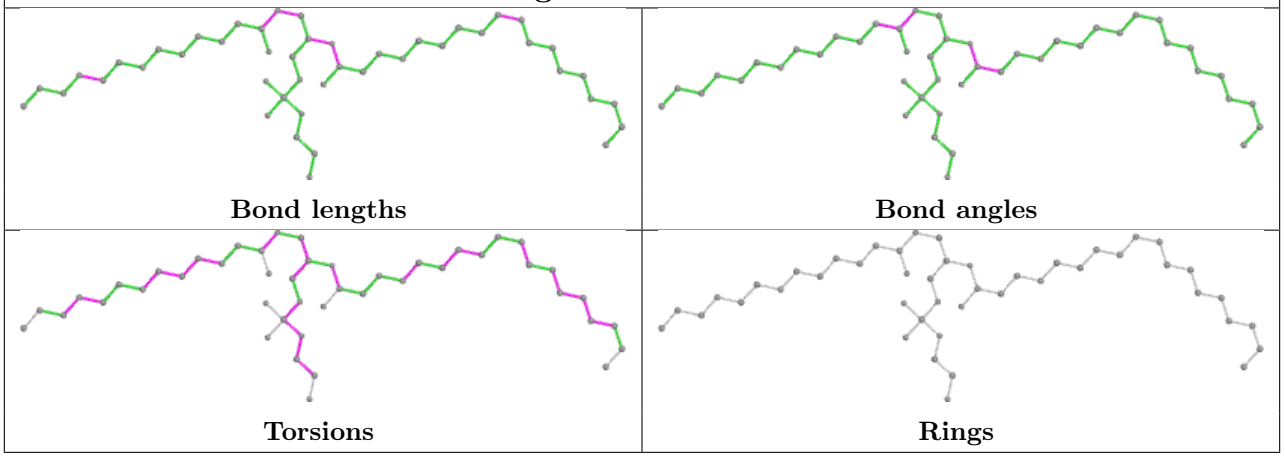
Ligand CDL k 101



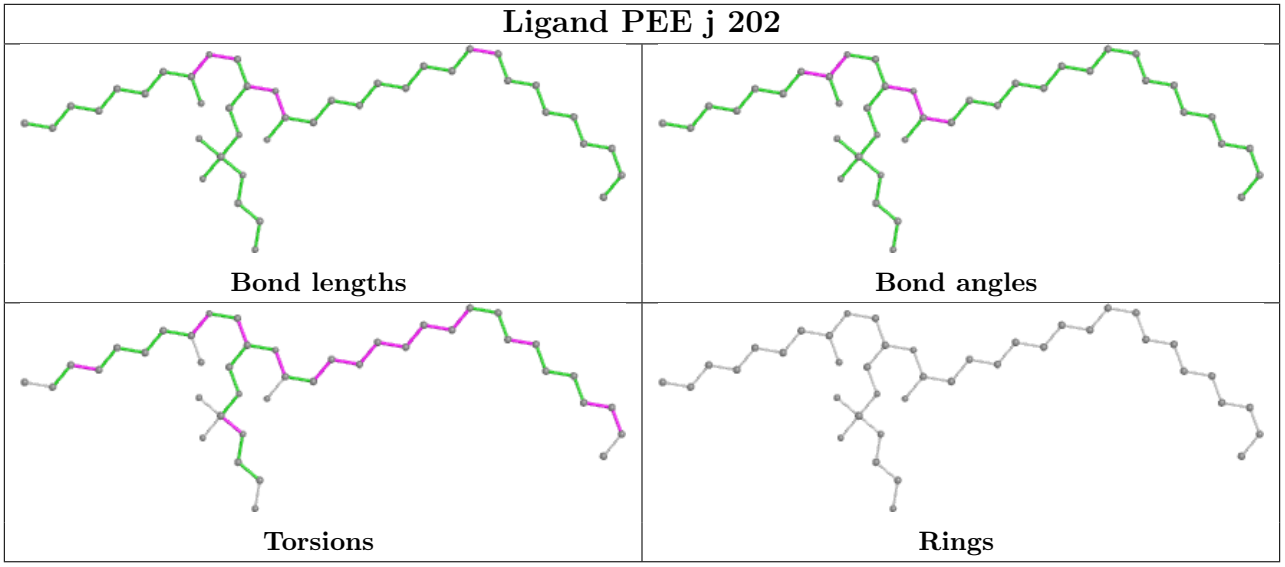
Ligand PEE C 302



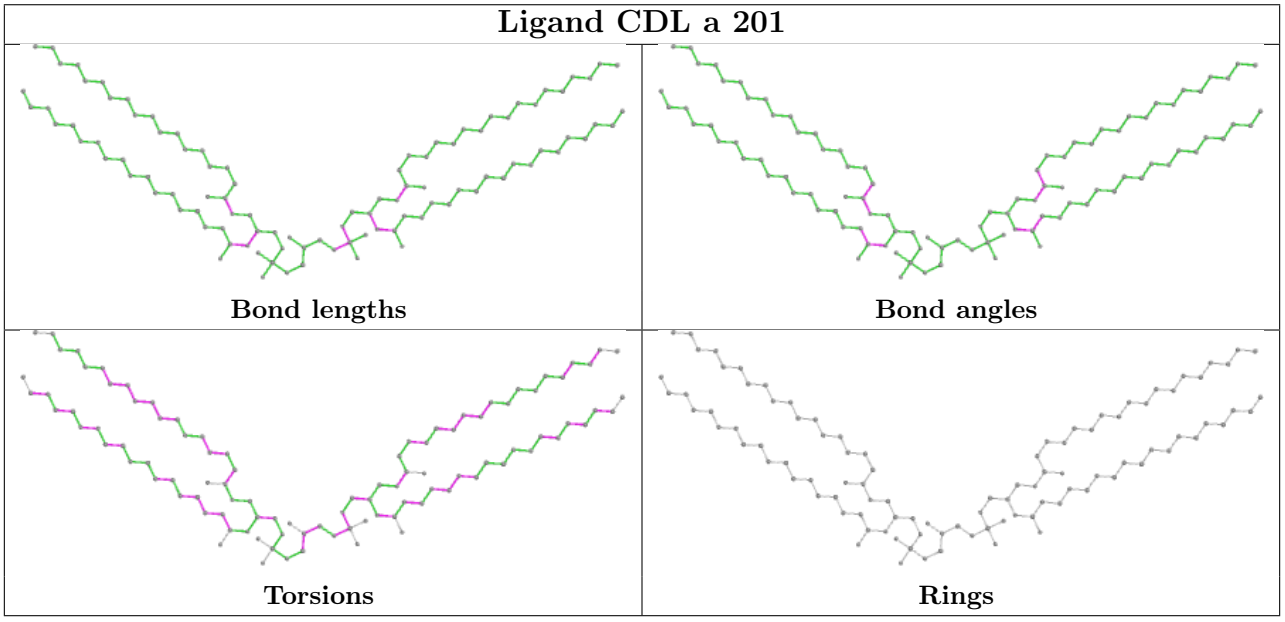
Ligand PEE l 704



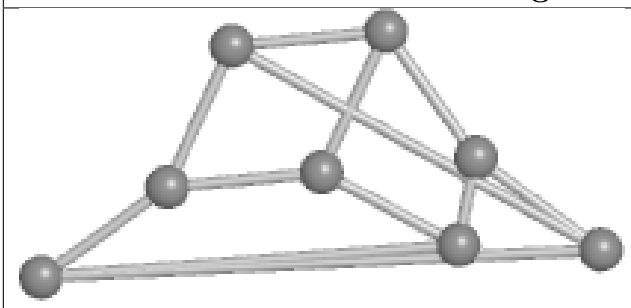
Ligand PEE j 202



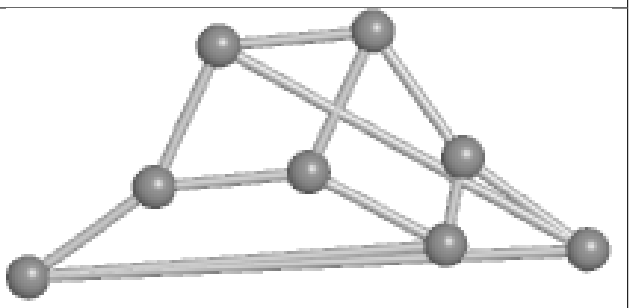
Ligand CDL a 201



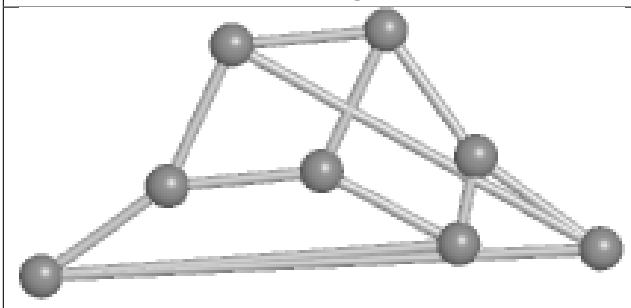
Ligand SF4 B 302



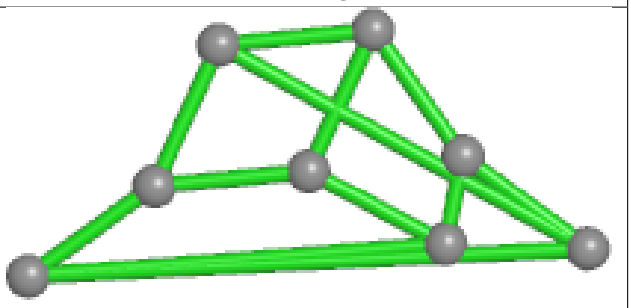
Bond lengths



Bond angles

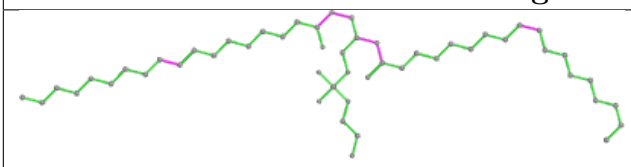


Torsions

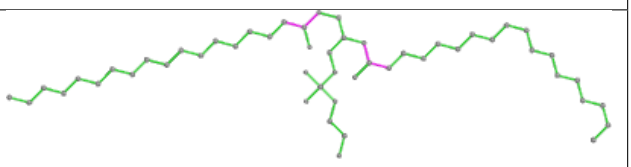


Rings

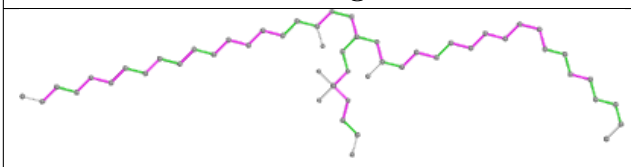
Ligand PEE r 501



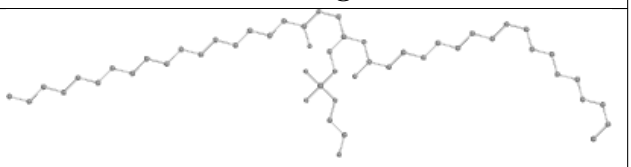
Bond lengths



Bond angles

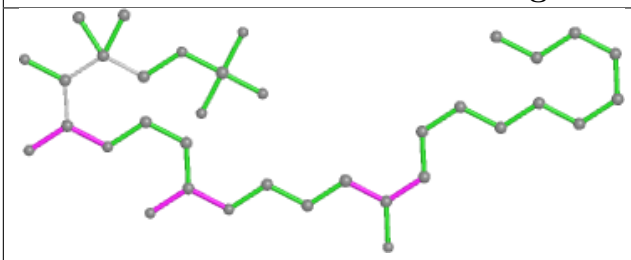


Torsions

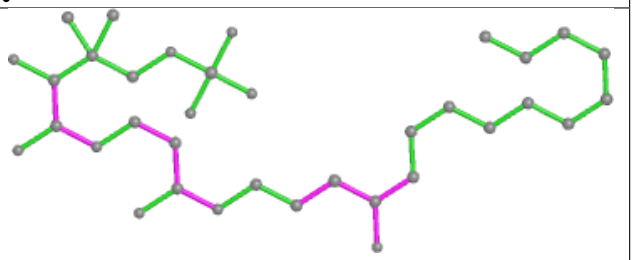


Rings

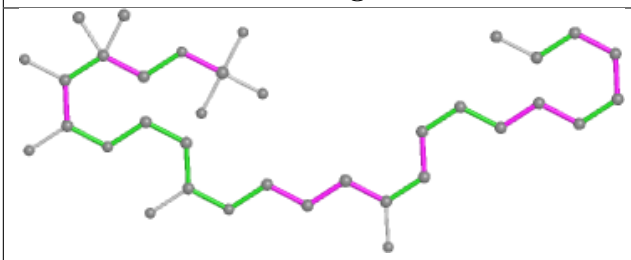
Ligand 8Q1 X 201



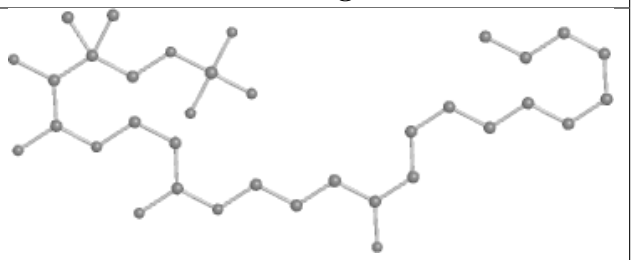
Bond lengths



Bond angles

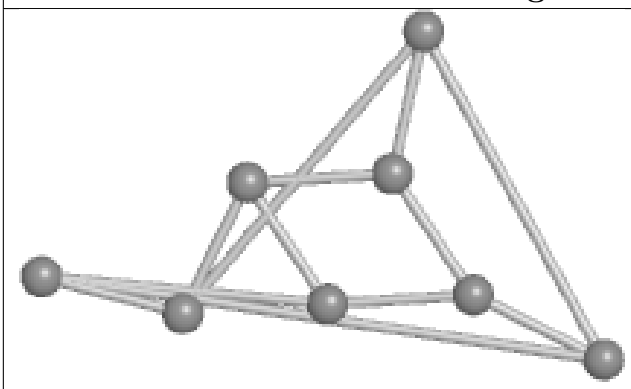


Torsions

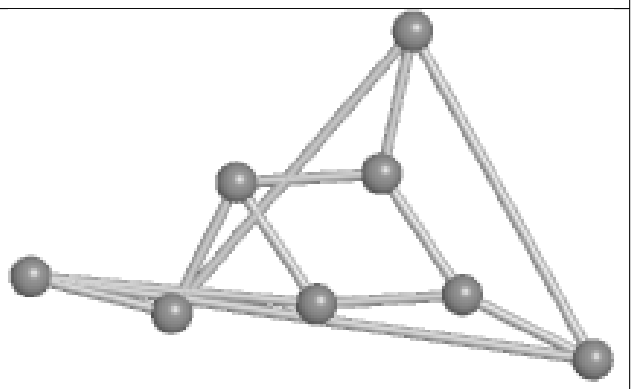


Rings

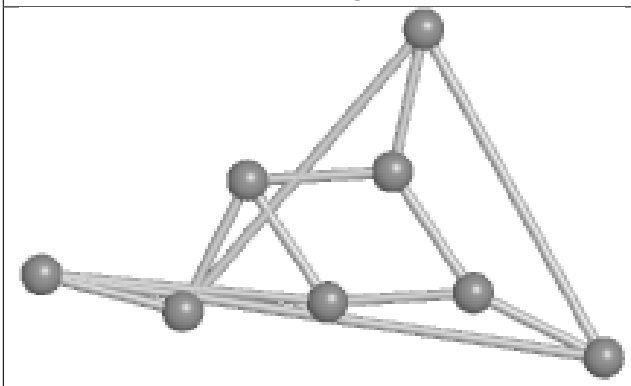
Ligand SF4 M 802



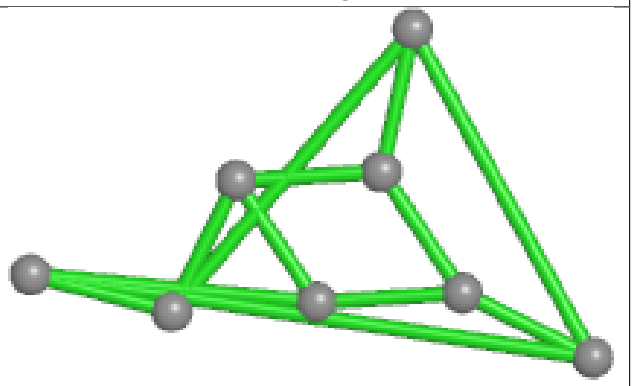
Bond lengths



Bond angles

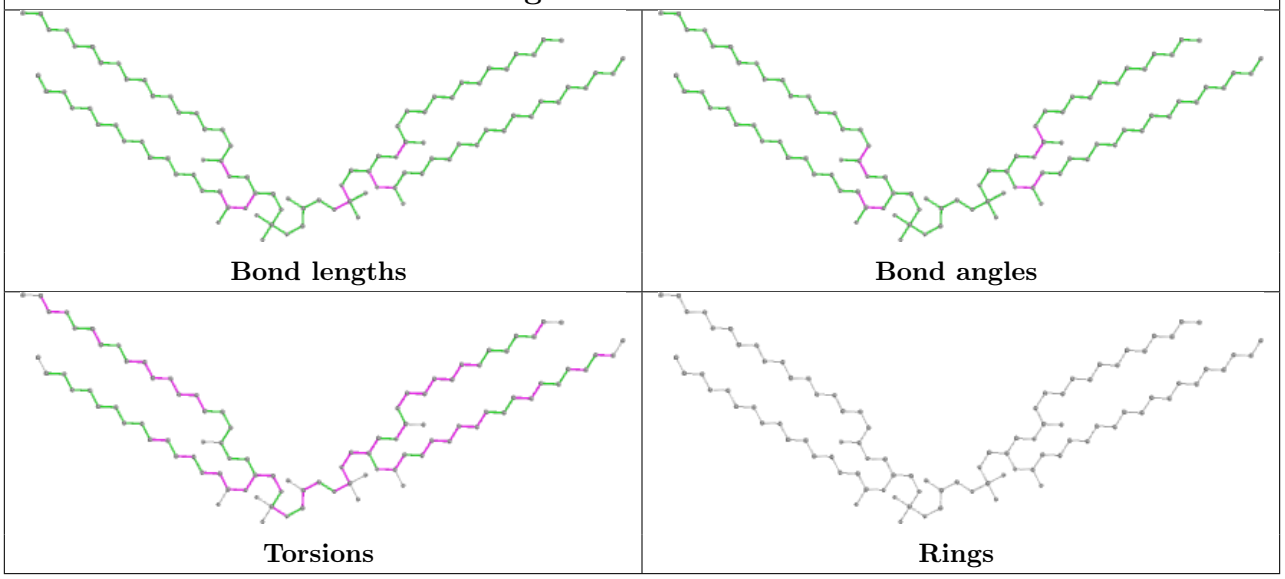


Torsions

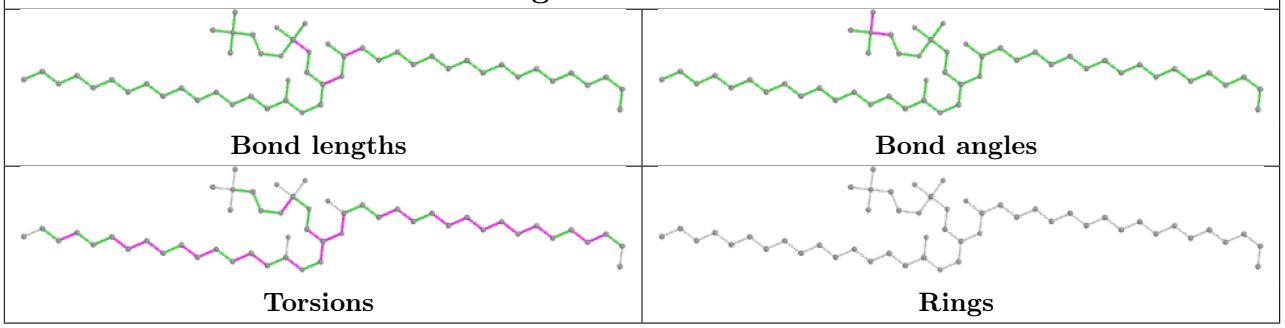


Rings

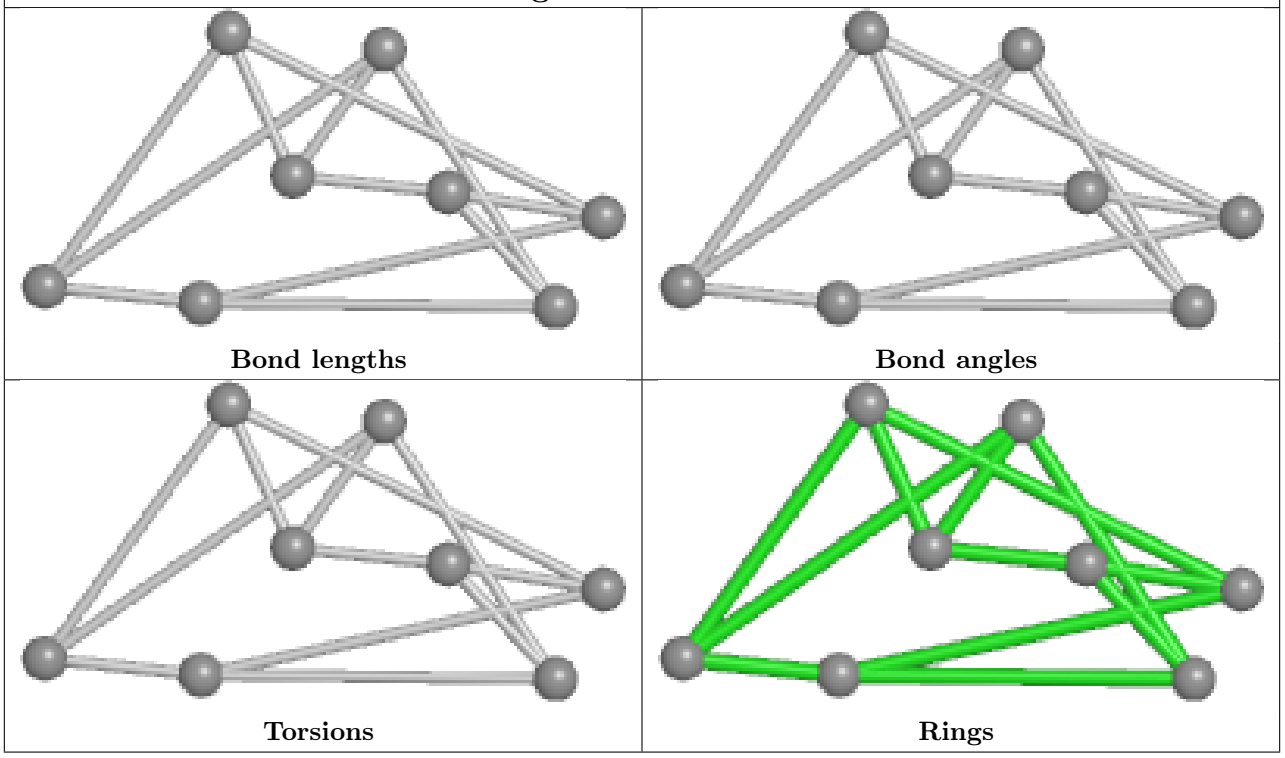
Ligand CDL V 201



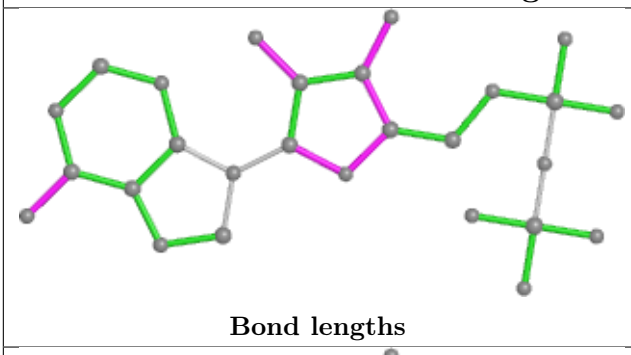
Ligand PLX r 503

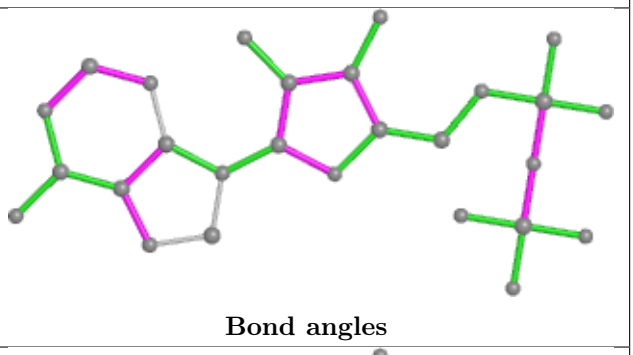


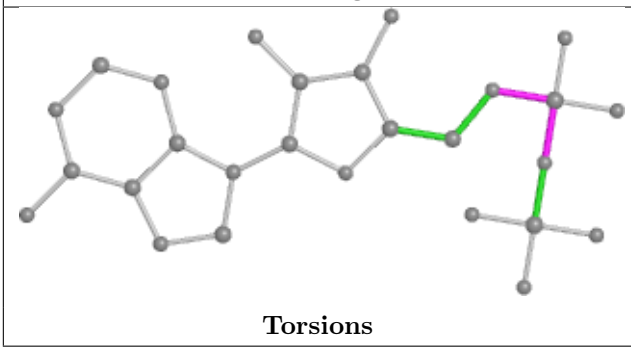
Ligand SF4 A 501

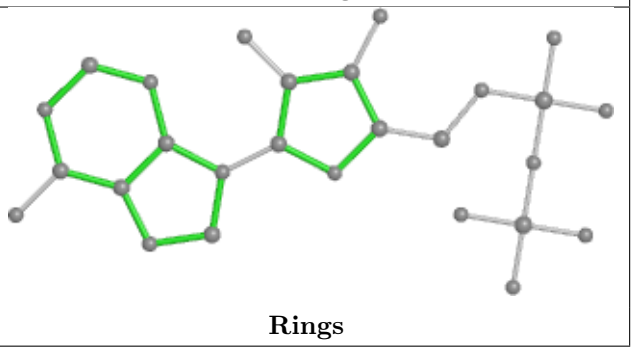


Ligand ADP w 401

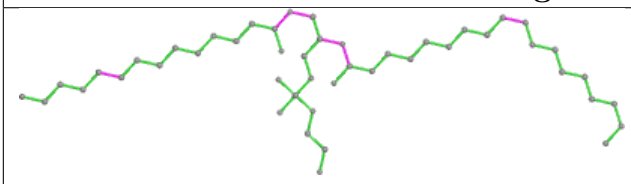

Bond lengths

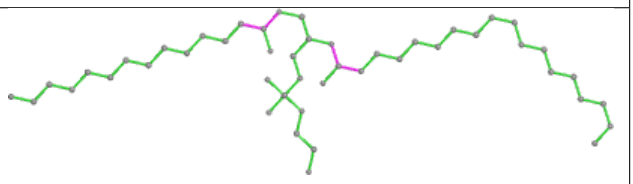

Bond angles

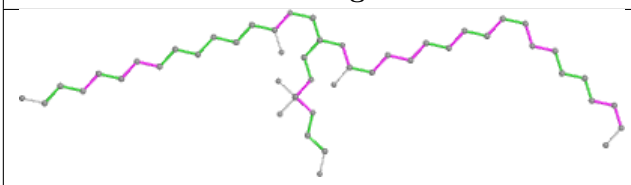

Torsions

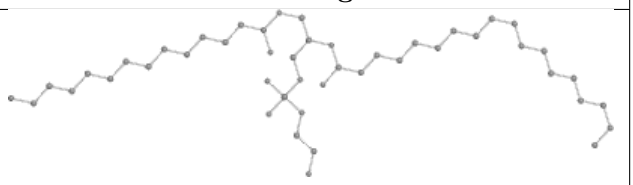

Rings

Ligand PEE i 401

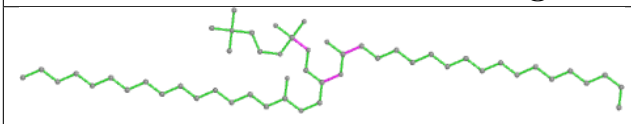

Bond lengths

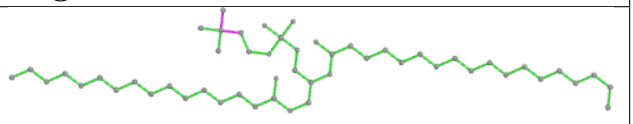

Bond angles

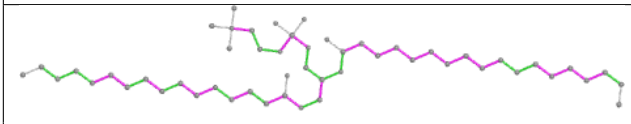

Torsions

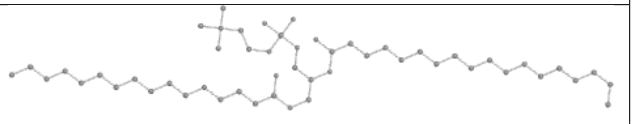

Rings

Ligand PLX g 201

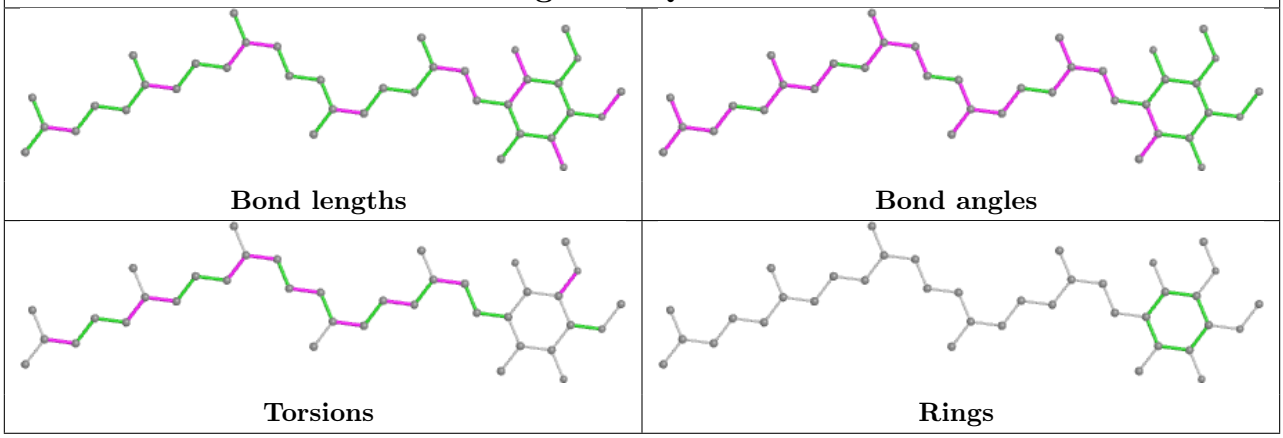

Bond lengths


Bond angles

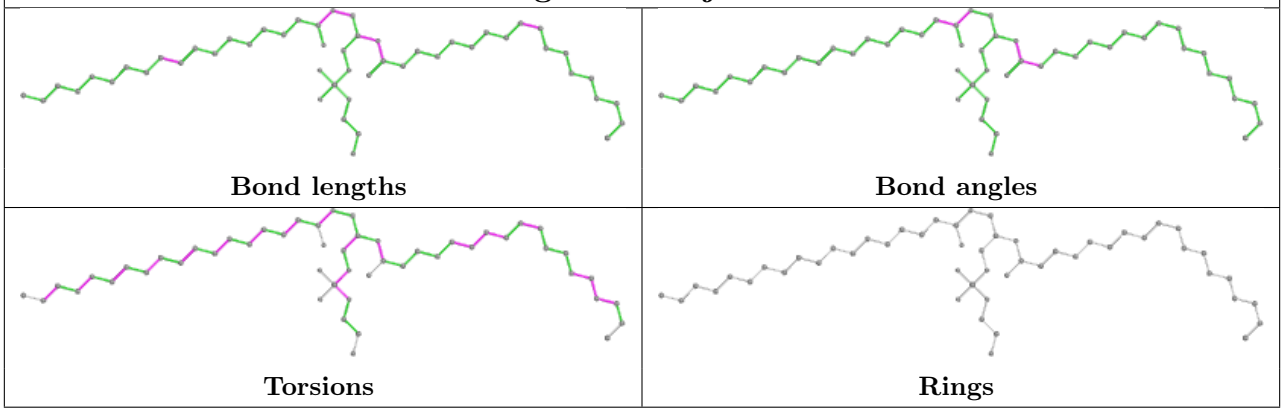

Torsions


Rings

Ligand UQ C 304



Ligand PEE j 201



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.

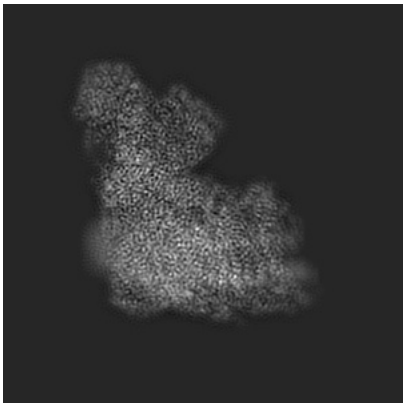
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-32248. These allow visual inspection of the internal detail of the map and identification of artifacts.

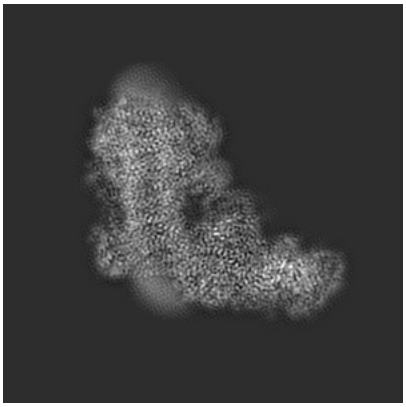
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

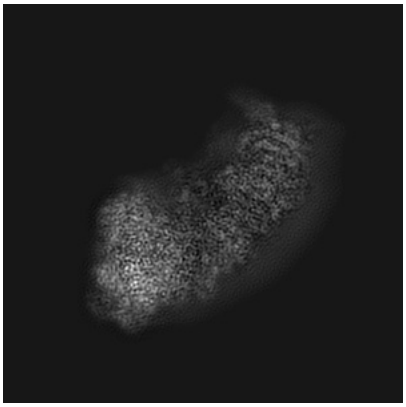
6.1.1 Primary map



X



Y

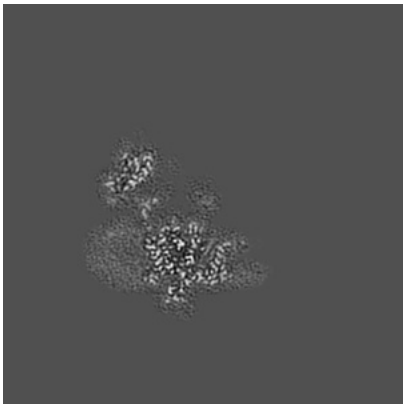


Z

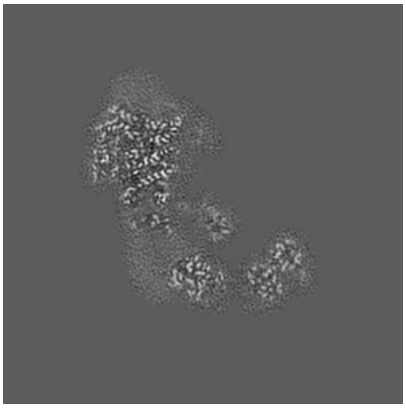
The images above show the map projected in three orthogonal directions.

6.2 Central slices

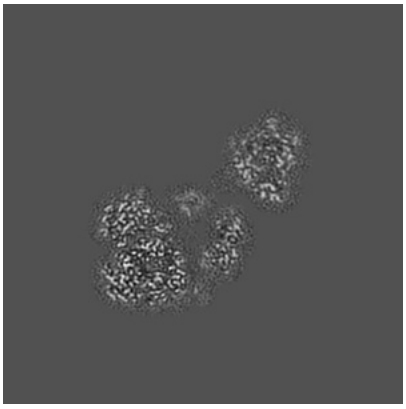
6.2.1 Primary map



X Index: 155



Y Index: 155

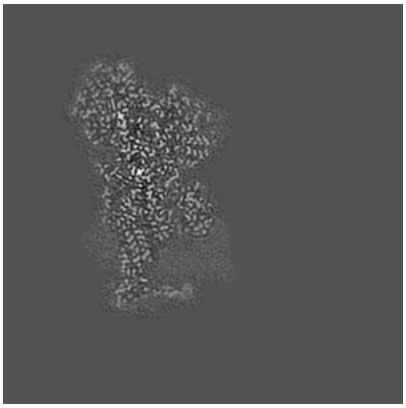


Z Index: 155

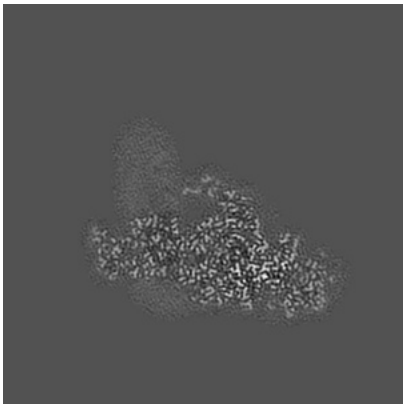
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

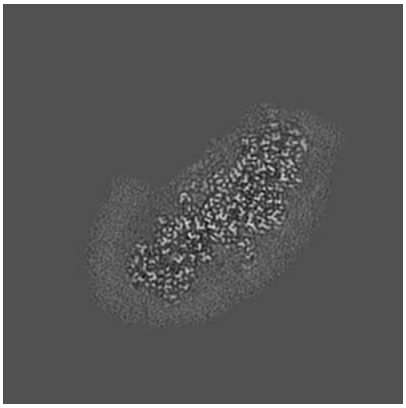
6.3.1 Primary map



X Index: 102



Y Index: 101

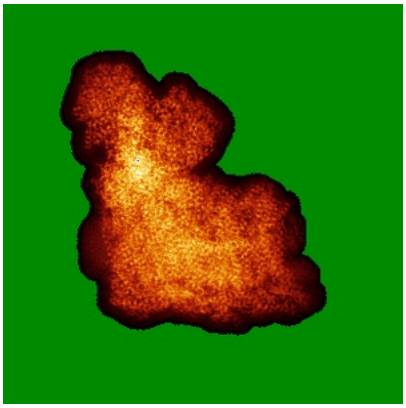


Z Index: 122

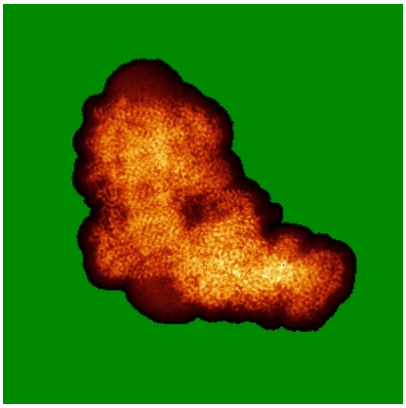
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

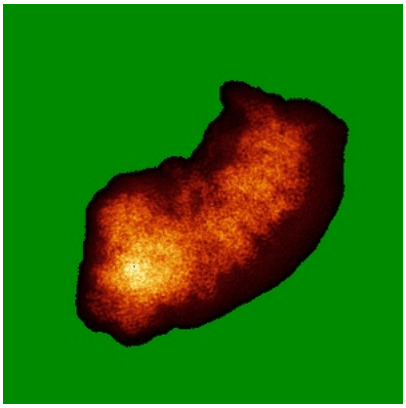
6.4.1 Primary map



X



Y

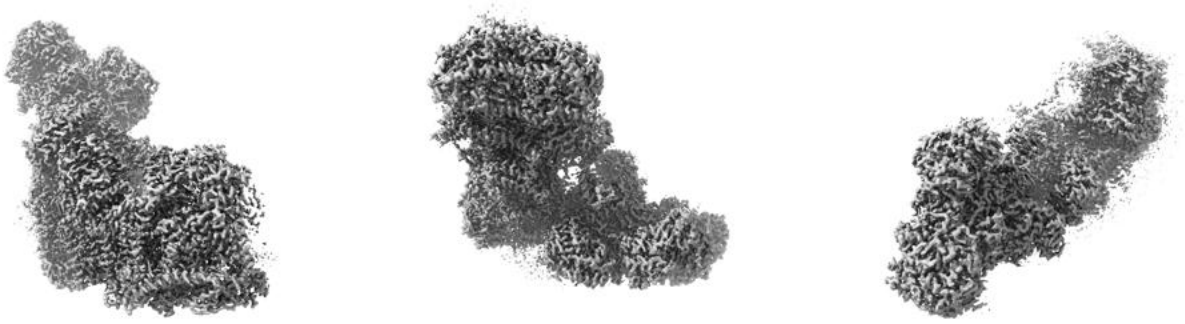


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views (i)

6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.0291. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

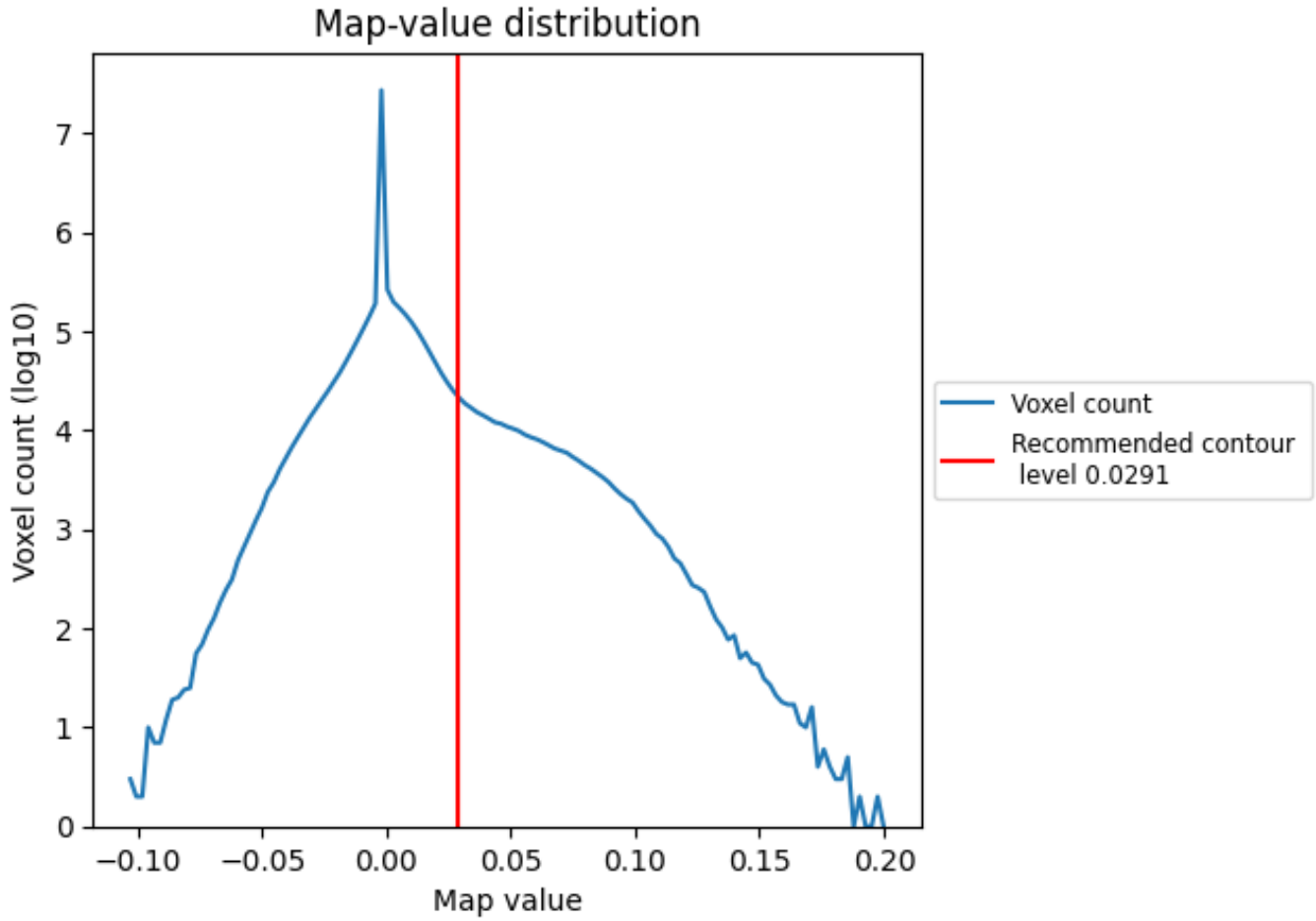
6.6 Mask visualisation (i)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis

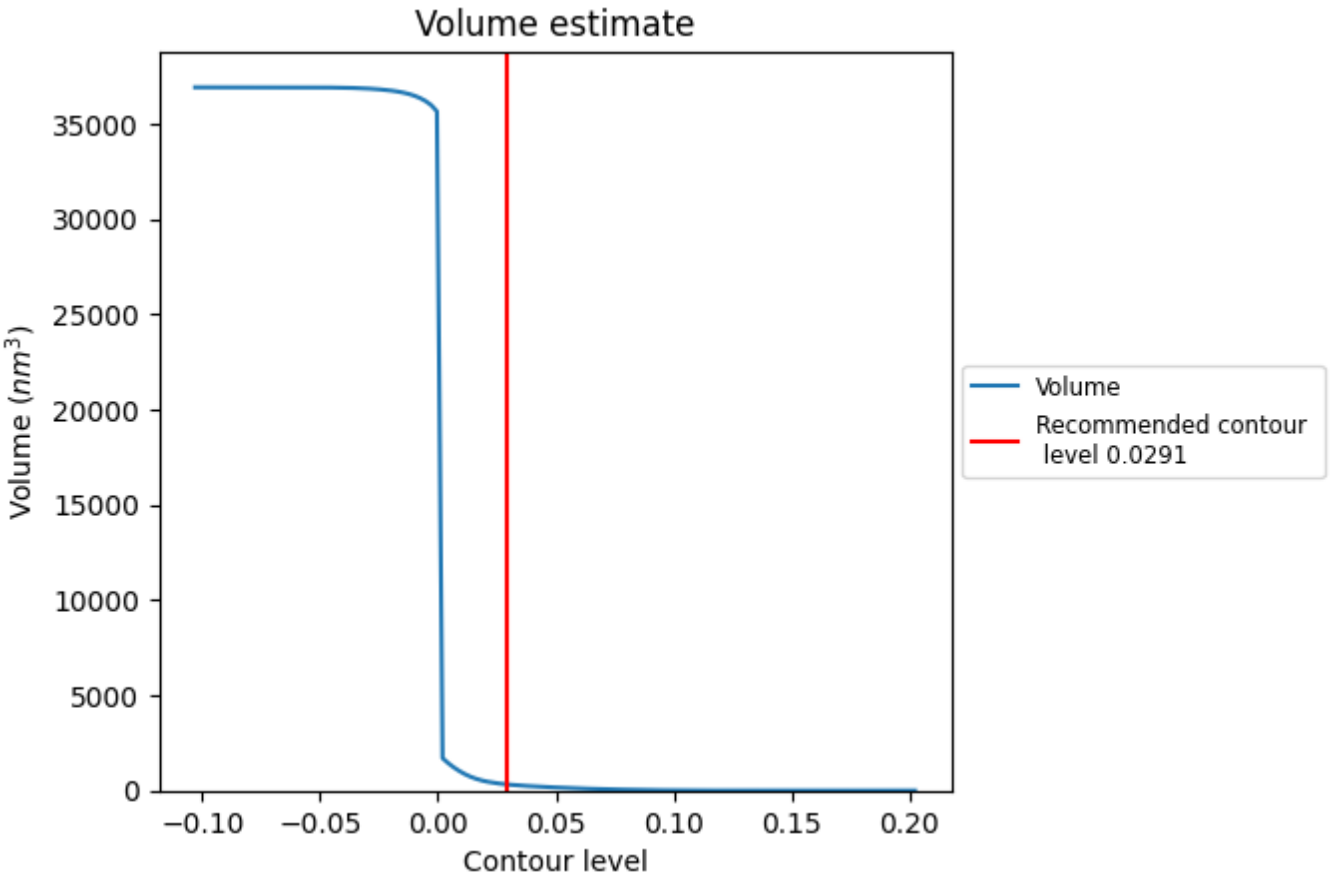
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

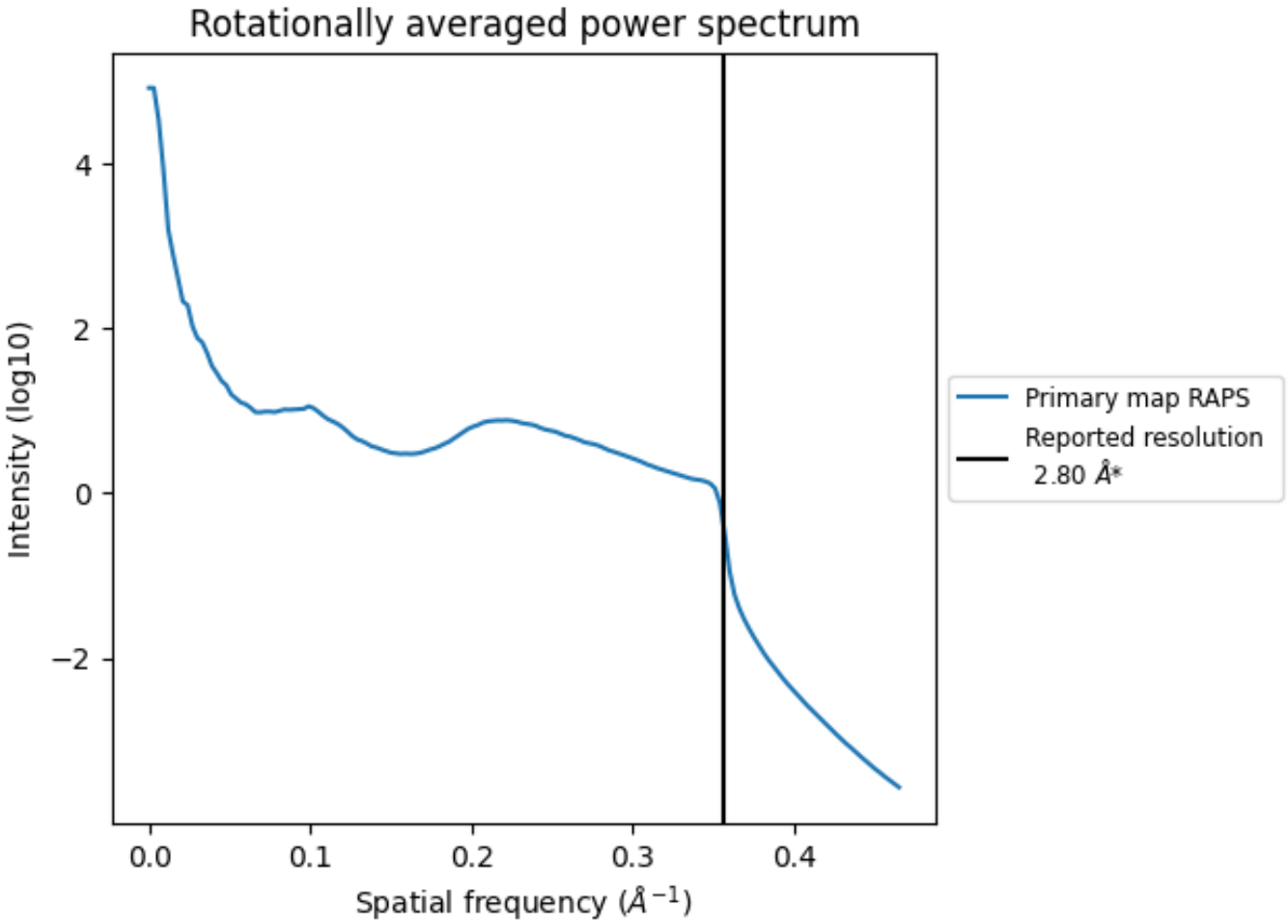
7.2 Volume estimate (i)



The volume at the recommended contour level is 326 nm^3; this corresponds to an approximate mass of 294 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum (i)



*Reported resolution corresponds to spatial frequency of 0.357 $Å^{-1}$

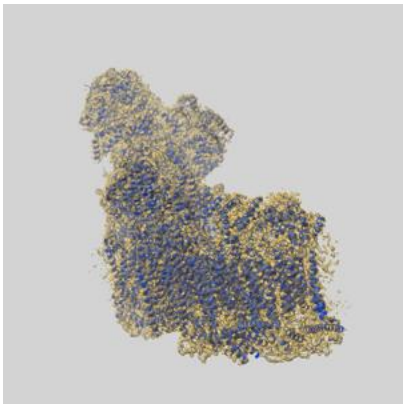
8 Fourier-Shell correlation (i)

This section was not generated. No FSC curve or half-maps provided.

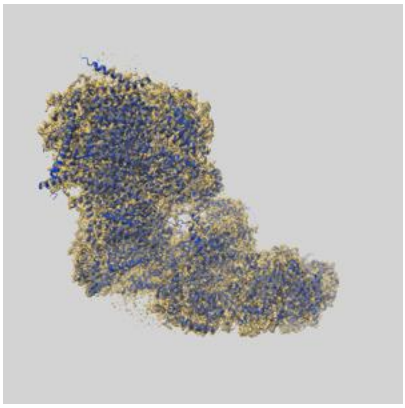
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-32248 and PDB model 7W0R. Per-residue inclusion information can be found in section 3 on page 20.

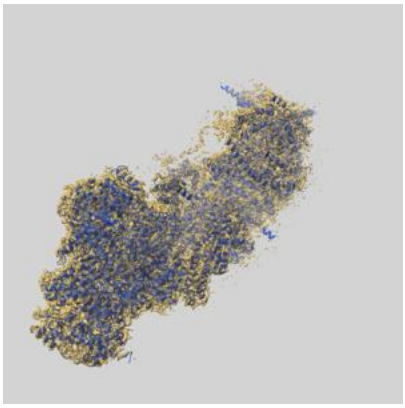
9.1 Map-model overlay



X



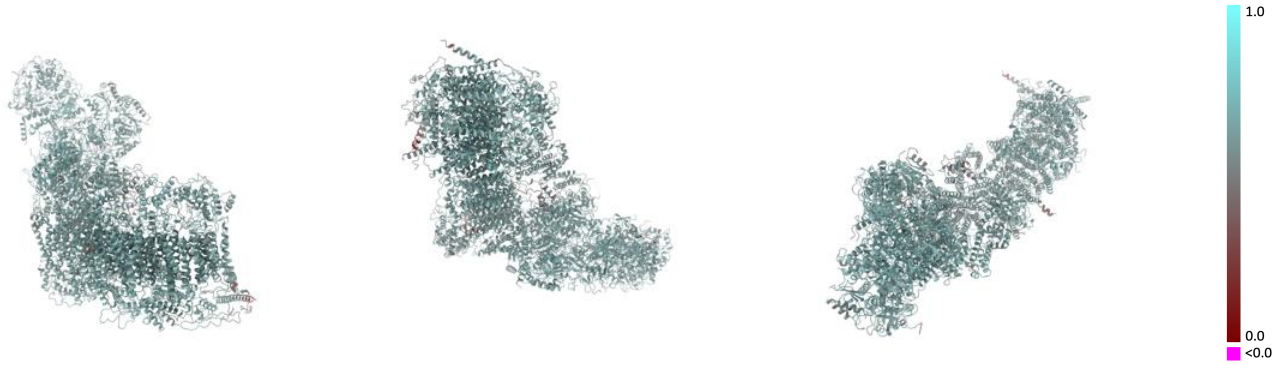
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.0291 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

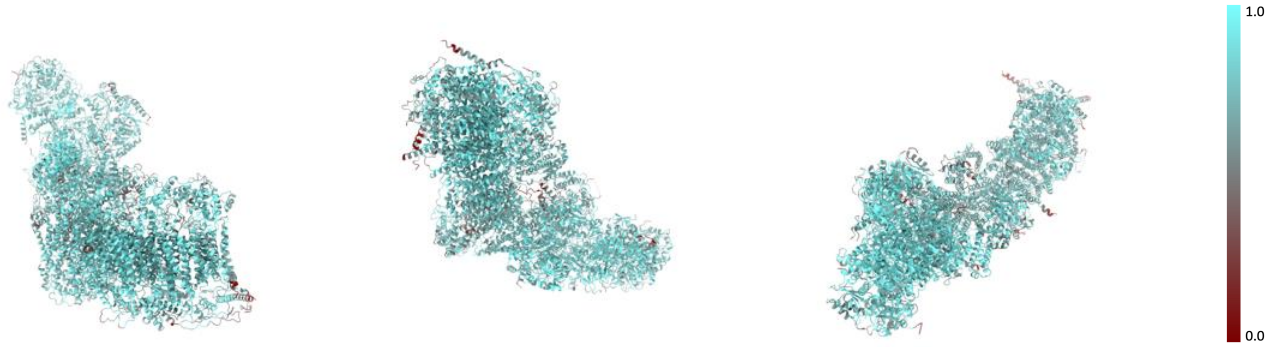
9.2 Q-score mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

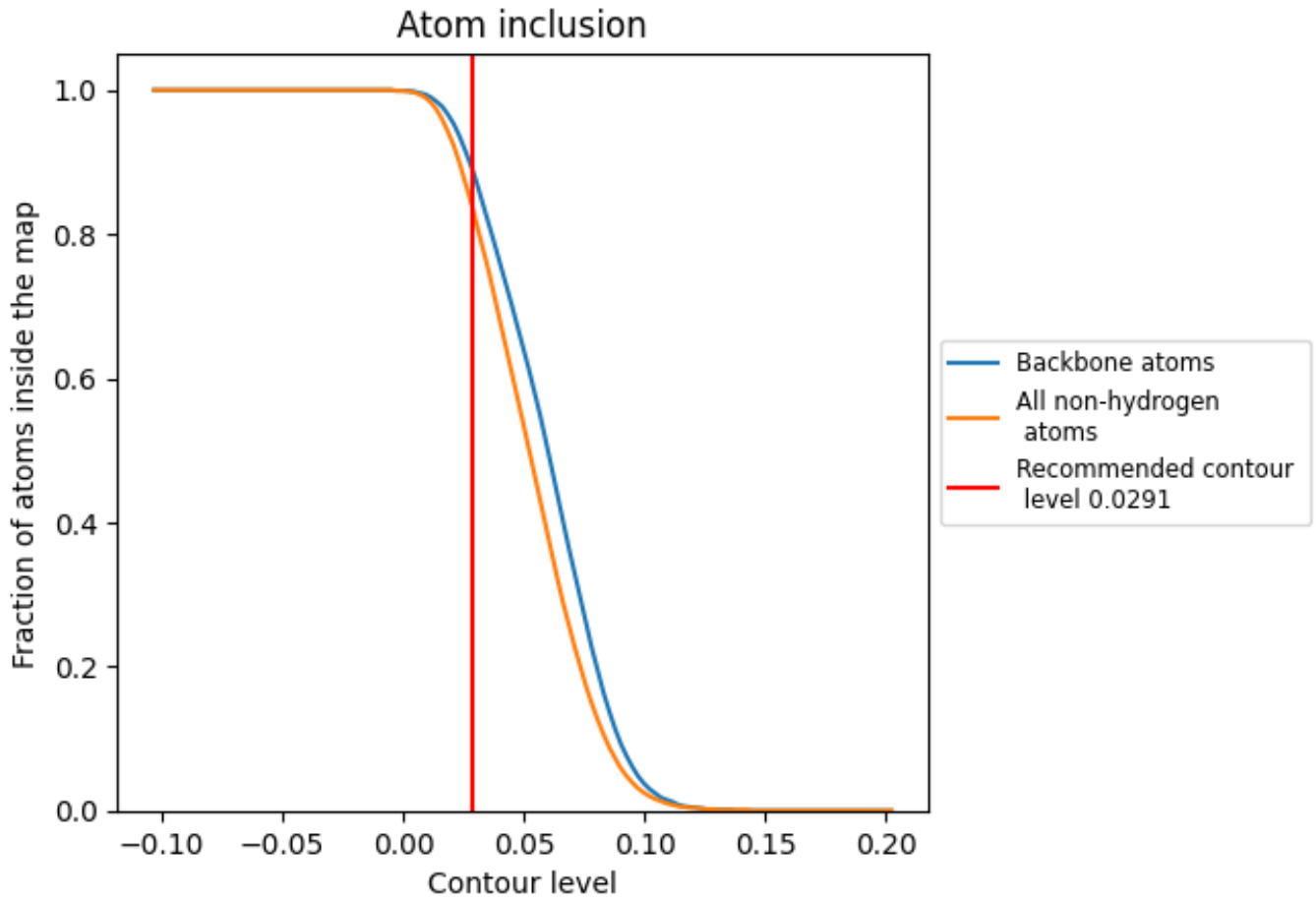
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.0291).

9.4 Atom inclusion (i)



At the recommended contour level, 89% of all backbone atoms, 83% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.0291) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8340	0.6160
A	0.8330	0.6120
B	0.9350	0.6480
C	0.8960	0.6430
E	0.8530	0.6290
F	0.7190	0.5620
G	0.5240	0.4870
H	0.8530	0.6120
I	0.7840	0.6130
J	0.8610	0.6230
K	0.7720	0.6080
L	0.8700	0.6390
M	0.8790	0.6280
N	0.8340	0.6230
O	0.8050	0.5940
P	0.9420	0.6530
Q	0.9240	0.6480
S	0.8860	0.6250
T	0.8620	0.6310
U	0.7820	0.5940
V	0.7410	0.5980
W	0.8170	0.6070
X	0.7380	0.5930
Y	0.6980	0.5540
Z	0.6420	0.5440
a	0.8170	0.6220
b	0.7710	0.5910
c	0.8140	0.6110
d	0.7700	0.5950
e	0.7770	0.6000
f	0.6350	0.5580
g	0.8440	0.6200
h	0.8180	0.5990
i	0.9140	0.6380
j	0.8100	0.6240

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Chain	Atom inclusion	Q-score
k	0.8170	0.6210
l	0.8340	0.6190
m	0.7730	0.5880
n	0.6830	0.5730
o	0.7620	0.6050
p	0.8050	0.6060
r	0.8760	0.6310
s	0.9010	0.6380
u	0.8060	0.6010
v	0.6840	0.5550
w	0.8200	0.6070