Full wwPDB EM Validation Report ⓘ

Nov 19, 2022 – 08:35 am GMT

PDB ID	:	5LNK
EMDB ID	:	EMD-4093
Title	:	Entire ovine respiratory complex I
Authors	:	Fiedorczuk, K.; Letts, J.A.; Kaszuba, K.; Sazanov, L.A.
Deposited on	:	2016-08-04
Resolution	:	3.90 Å(reported)
Based on initial model	:	4HEA

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/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:

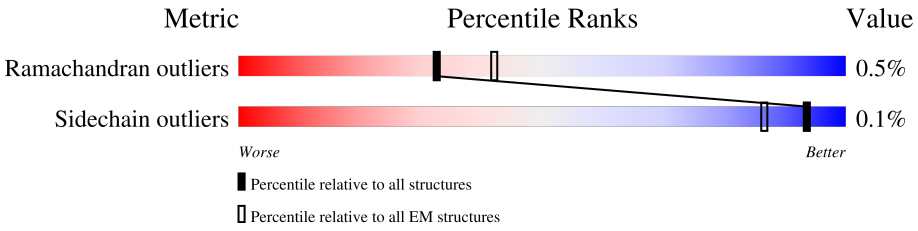
EMDB validation analysis	:	0.0.1.dev43
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.2

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.90 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)
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	1	445	15% 97%
2	2	217	19% 97%
3	3	704	12% 98%
4	4	412	14% 93% 6%
5	5	228	6% 91% 9%
6	6	179	13% 86% 13%
7	9	176	11% 98%
8	H	318	13% 98%
9	N	347	5% 99%

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Mol	Chain	Length	Quality of chain
10	A	115	16% 97%
11	M	459	6% 100%
12	K	98	11% 88% 12%
13	L	599	26% 98%
14	J	175	46% 99%
15	a	75	12% 55% 45%
16	b	96	22% 99%
17	c	133	9% 92% 8%
18	d	338	25% 93% 7%
19	e	98	17% 84% 14%
20	f	115	12% 97%
21	g	127	14% 90% 10%
22	h	112	28% 84% 15%
23	i	145	65% 97%
24	X	88	23% 100%
24	j	88	39% 97%
25	k	320	67% 98%
26	l	105	12% 90% 10%
27	m	83	16% 96%
28	n	97	22% 72% 24%
29	o	120	18% 99%
30	p	128	36% 86% 12%
31	q	143	19% 96%
32	r	127	20% 71% 27%
33	s	136	30% 85% 13%

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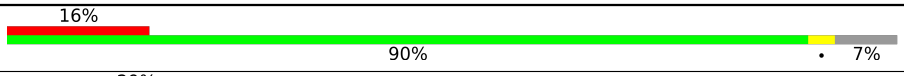
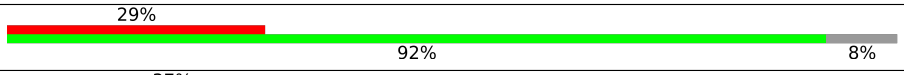
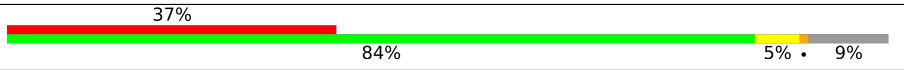
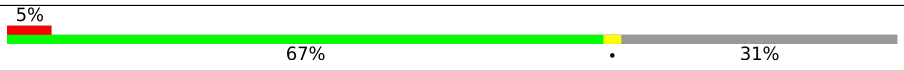
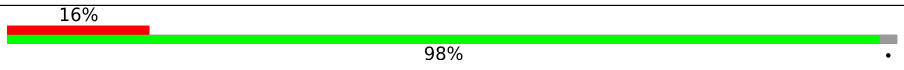
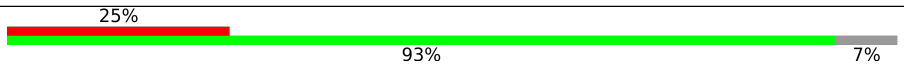
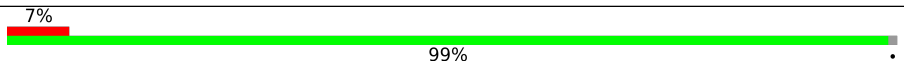
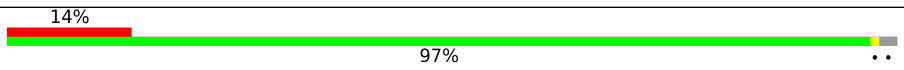
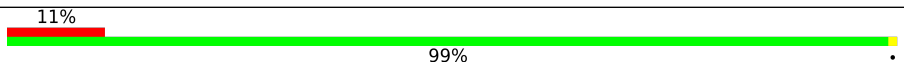
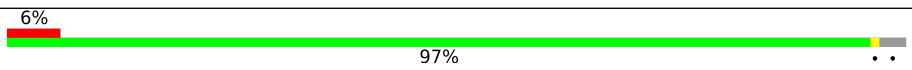
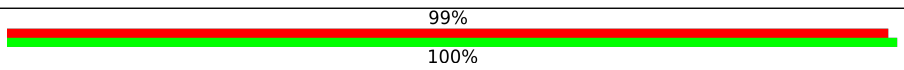
Mol	Chain	Length	Quality of chain
34	t	178	
35	u	72	
36	v	158	
37	w	125	
38	x	49	
39	y	57	
40	z	70	
41	Z	175	
42	Y	171	
43	W	143	
44	V	119	

2 Entry composition (i)

There are 54 unique types of molecules in this entry. The entry contains 63760 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 Mitochondrial complex I, 51 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	1	432	3328	2097	596	615	20	0	0

- Molecule 2 is a protein called Mitochondrial complex I, 24 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	2	214	1655	1056	279	310	10	0	0

- Molecule 3 is a protein called Mitochondrial complex I, 75 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	3	688	5275	3301	922	1011	41	0	0

- Molecule 4 is a protein called Mitochondrial complex I, 49 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	4	387	3098	1974	535	565	24	0	0

- Molecule 5 is a protein called Mitochondrial complex I, 30 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	5	208	1726	1112	296	315	3	0	0

- Molecule 6 is a protein called Mitochondrial complex I, PSST subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	6	155	1241	792	224	211	14	0	0

- Molecule 7 is a protein called Mitochondrial complex I, TYKY subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	9	176	Total	C	N	O	S	0	0
			1414	889	243	270	12		

- Molecule 8 is a protein called Mitochondrial complex I, ND1 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	318	Total	C	N	O	S	0	0
			2528	1704	384	421	19		

- Molecule 9 is a protein called Mitochondrial complex I, ND2 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	N	347	Total	C	N	O	S	0	0
			2723	1808	416	459	40		

- Molecule 10 is a protein called Mitochondrial complex I, ND3 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	A	115	Total	C	N	O	S	0	0
			922	621	133	161	7		

- Molecule 11 is a protein called Mitochondrial complex I, ND4 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	M	459	Total	C	N	O	S	0	0
			3645	2428	571	606	40		

- Molecule 12 is a protein called Mitochondrial complex I, ND4L subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	K	86	Total	C	N	O	S	0	0
			649	428	96	111	14		

- Molecule 13 is a protein called Mitochondrial complex I, ND5 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	L	599	Total	C	N	O	S	0	0
			4456	2926	714	777	39		

- Molecule 14 is a protein called Mitochondrial complex I, ND6 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	J	175	Total	C	N	O	S	0	0
			1188	780	184	214	10		

- Molecule 15 is a protein called Mitochondrial complex I, 10 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	a	41	Total	C	N	O	S	0	0
			343	213	61	68	1		

- Molecule 16 is a protein called Mitochondrial complex I, 13 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	b	95	Total	C	N	O	S	0	0
			737	451	139	144	3		

- Molecule 17 is a protein called Mitochondrial complex I, 18 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	c	123	Total	C	N	O	S	0	0
			1000	631	178	188	3		

- Molecule 18 is a protein called Mitochondrial complex I, 39 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	d	314	Total	C	N	O	S	0	0
			2473	1585	448	435	5		

- Molecule 19 is a protein called Mitochondrial complex I, B8 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	e	84	Total	C	N	O	S	0	0
			677	425	126	124	2		

- Molecule 20 is a protein called Mitochondrial complex I, B13 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	f	112	Total	C	N	O	S	0	0
			909	589	152	166	2		

- Molecule 21 is a protein called Mitochondrial complex I, B14 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	g	114	Total	C	N	O	S	0	0
			969	619	180	166	4		

- Molecule 22 is a protein called Mitochondrial complex I, B14.5a subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	h	95	Total	C	N	O	S	0	0
			757	473	144	137	3		

- Molecule 23 is a protein called Mitochondrial complex I, B17.2 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	i	144	Total	C	N	O	S	0	0
			1200	772	214	209	5		

- Molecule 24 is a protein called Acyl carrier protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	j	85	Total	C	N	O	S	0	0
			684	442	101	136	5		
24	X	88	Total	C	N	O	S	0	0
			707	454	104	144	5		

- Molecule 25 is a protein called Mitochondrial complex I, 42 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	k	320	Total	C	N	O	S	0	0
			2268	1430	394	435	9		

- Molecule 26 is a protein called Mitochondrial complex I, 15 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	l	95	Total	C	N	O	S	0	0
			792	503	146	137	6		

- Molecule 27 is a protein called Mitochondrial complex I, B9 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	m	80	Total	C	N	O	S	0	0
			626	411	103	110	2		

- Molecule 28 is a protein called Mitochondrial complex I, B12 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	n	74	Total	C	N	O	S	0	0
			578	378	100	98	2		

- Molecule 29 is a protein called Mitochondrial complex I, B14.5b subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	o	120	Total	C	N	O	S	0	0
			1004	652	175	172	5		

- Molecule 30 is a protein called Mitochondrial complex I, B15 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	p	112	Total	C	N	O	S	0	0
			841	526	162	152	1		

- Molecule 31 is a protein called Mitochondrial complex I, B16.6 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	q	140	Total	C	N	O	S	0	0
			1151	739	202	201	9		

- Molecule 32 is a protein called Mitochondrial complex I, B17 subunit.

Mol	Chain	Residues	Atoms				AltConf	Trace
32	r	93	Total	C	N	O	0	0
			752	491	131	130		

- Molecule 33 is a protein called Mitochondrial complex I, B18 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	s	118	Total	C	N	O	S	0	0
			988	616	187	176	9		

- Molecule 34 is a protein called Mitochondrial complex I, B22 subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	t	166	Total	C	N	O	S	0	0
			1434	916	265	247	6		

- Molecule 35 is a protein called Mitochondrial complex I, AGGG subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	u	66	Total	C	N	O	S	0	0
			563	372	94	96	1		

- Molecule 36 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 8, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	v	143	Total	C	N	O	S	0	0
			861	544	155	158	4		

- Molecule 37 is a protein called Mitochondrial complex I, ESSS subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	w	86	Total	C	N	O	S	0	0
			715	462	119	130	4		

- Molecule 38 is a protein called Mitochondrial complex I, KFYI subunit.

Mol	Chain	Residues	Atoms				AltConf	Trace
38	x	48	Total	C	N	O	0	0
			403	266	69	68		

- Molecule 39 is a protein called Mitochondrial complex I, MNLL subunit.

Mol	Chain	Residues	Atoms				AltConf	Trace
39	y	53	Total	C	N	O	0	0
			457	301	80	76		

- Molecule 40 is a protein called Mitochondrial complex I, MWFE subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	z	69	Total	C	N	O	S	0	0
			568	364	105	95	4		

- Molecule 41 is a protein called Mitochondrial complex I, PDSW subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	Z	171	Total	C	N	O	S	0	0
			1441	905	266	262	8		

- Molecule 42 is a protein called Mitochondrial complex I, PGIV subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	Y	171	Total	C	N	O	S	0	0
			1403	889	253	251	10		

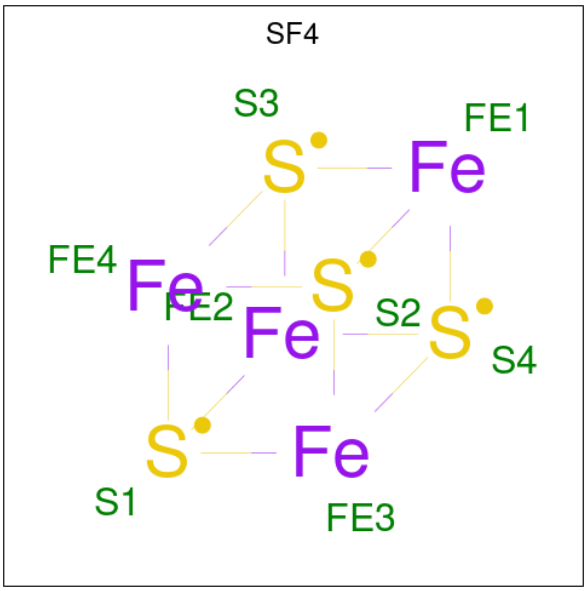
- Molecule 43 is a protein called Mitochondrial complex I, SGDH subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	W	139	Total	C	N	O	S	0	0
			1155	761	194	198	2		

- Molecule 44 is a protein called Mitochondrial complex I, B14.7 subunit.

Mol	Chain	Residues	Atoms				AltConf	Trace
44	V	119	Total	C	N	O	0	0
			595	357	119	119		

- Molecule 45 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4).



Mol	Chain	Residues	Atoms			AltConf
45	1	1	Total	Fe	S	0
			8	4	4	
45	3	1	Total	Fe	S	0
			16	8	8	
45	3	1	Total	Fe	S	0
			16	8	8	
45	6	1	Total	Fe	S	0
			8	4	4	

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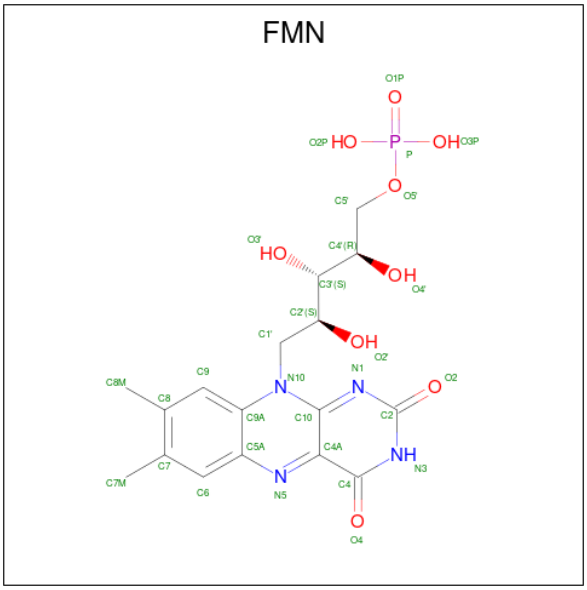
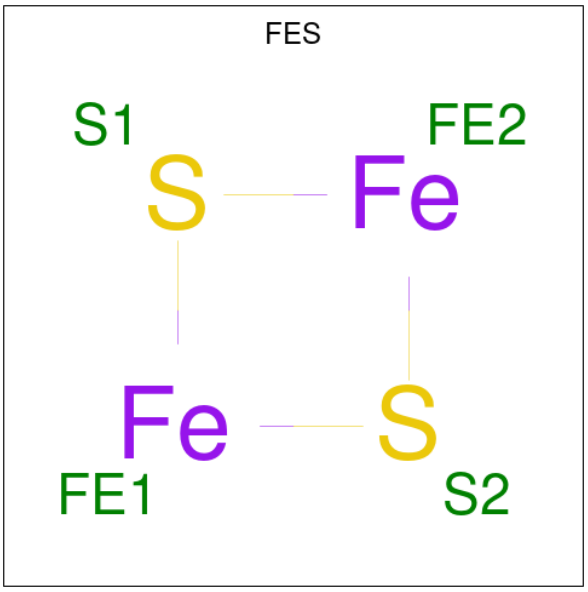
Mol	Chain	Residues	Atoms	AltConf
45	9	1	Total Fe S 16 8 8	0
45	9	1	Total Fe S 16 8 8	0

- Molecule 46 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: $C_{17}H_{21}N_4O_9P$).



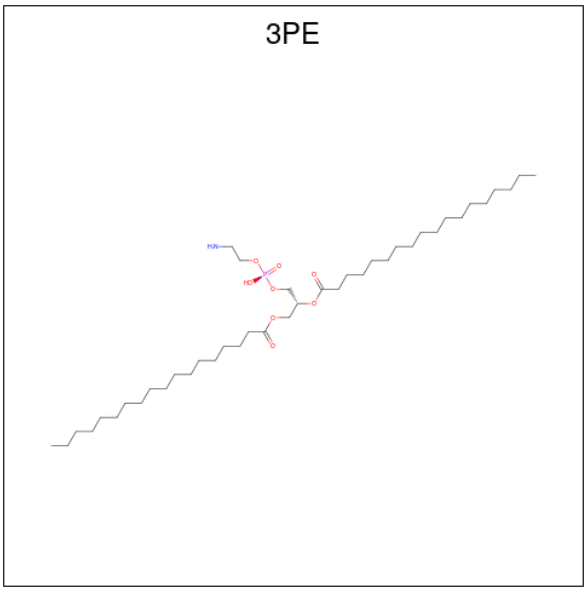
Mol	Chain	Residues	Atoms	AltConf
46	1	1	Total C N O P 31 17 4 9 1	0

- Molecule 47 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2).



Mol	Chain	Residues	Atoms			AltConf
47	2	1	Total	Fe	S	0
			4	2	2	
47	3	1	Total	Fe	S	0
			4	2	2	

- Molecule 48 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOETHANOLAMINE (three-letter code: 3PE) (formula: $C_{41}H_{82}NO_8P$).



Mol	Chain	Residues	Atoms					AltConf
48	9	1	Total	C	N	O	P	0
			51	41	1	8	1	

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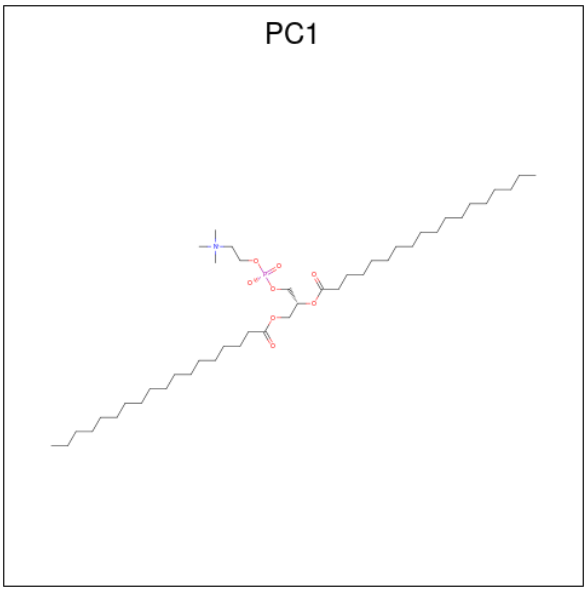
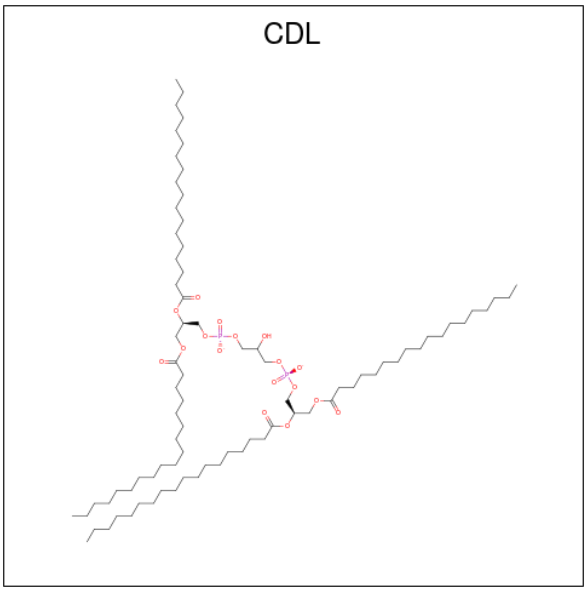
Mol	Chain	Residues	Atoms					AltConf
48	J	1	Total	C	N	O	P	0
			51	41	1	8	1	
48	o	1	Total	C	N	O	P	0
			87	67	2	16	2	
48	o	1	Total	C	N	O	P	0
			87	67	2	16	2	

- Molecule 49 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PC1) (formula: $C_{44}H_{88}NO_8P$).



Mol	Chain	Residues	Atoms					AltConf
49	N	1	Total	C	N	O	P	0
			46	36	1	8	1	
49	A	1	Total	C	N	O	P	0
			47	37	1	8	1	
49	M	1	Total	C	N	O	P	0
			46	36	1	8	1	
49	o	1	Total	C	N	O	P	0
			39	29	1	8	1	

- Molecule 50 is CARDIOLIPIN (three-letter code: CDL) (formula: $C_{81}H_{156}O_{17}P_2$).

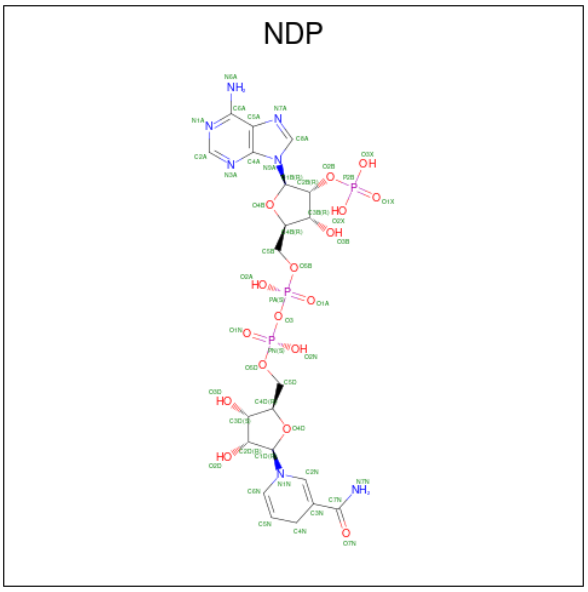


Mol	Chain	Residues	Atoms				AltConf
50	M	1	Total	C	O	P	0
			82	63	17	2	
50	L	1	Total	C	O	P	0
			84	65	17	2	
50	J	1	Total	C	O	P	0
			79	60	17	2	
50	i	1	Total	C	O	P	0
			58	39	17	2	

- Molecule 51 is ZINC ION (three-letter code: ZN) (formula: Zn).

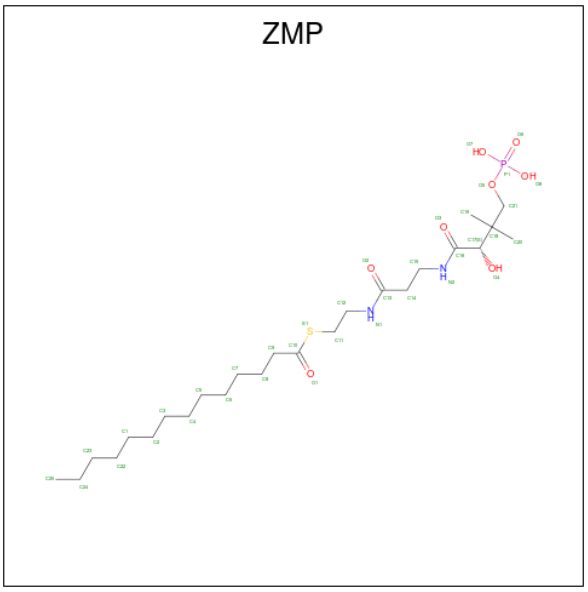
Mol	Chain	Residues	Atoms		AltConf
51	b	1	Total	Zn	0
			1	1	

- Molecule 52 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$).



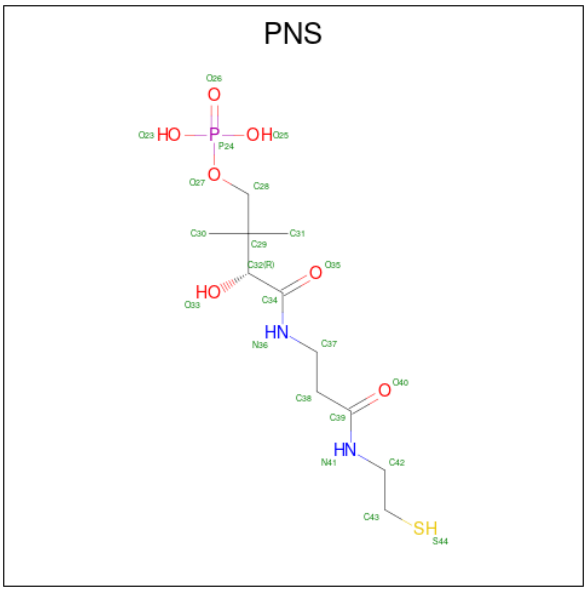
Mol	Chain	Residues	Atoms					AltConf
52	d	1	Total	C	N	O	P	0
			48	21	7	17	3	

- Molecule 53 is S-[2-({N-[(2S)-2-hydroxy-3,3-dimethyl-4-(phosphonooxy)butanoyl]-beta-alanyl}amino)ethyl] tetradecanethioate (three-letter code: ZMP) (formula: $C_{25}H_{49}N_2O_8PS$).



Mol	Chain	Residues	Atoms						AltConf
53	j	1	Total	C	N	O	P	S	0
			34	23	2	7	1	1	

- Molecule 54 is 4'-PHOSPHOPANTETHEINE (three-letter code: PNS) (formula: $C_{11}H_{23}N_2O_7PS$).



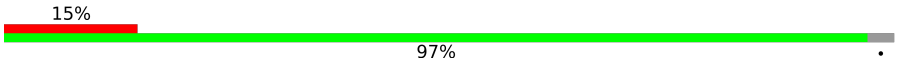
Mol	Chain	Residues	Atoms						AltConf
54	X	1	Total	C	N	O	P	S	0
			21	11	2	6	1	1	

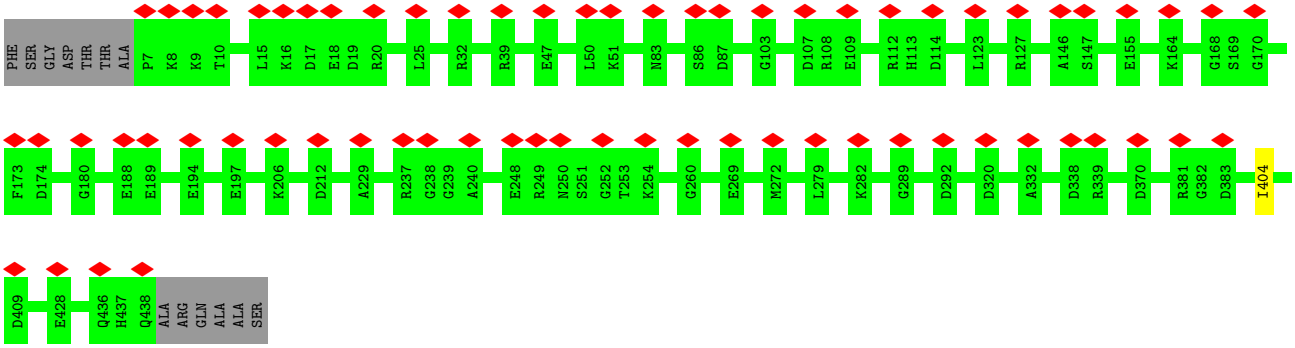
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry 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: Mitochondrial complex I, 51 kDa subunit

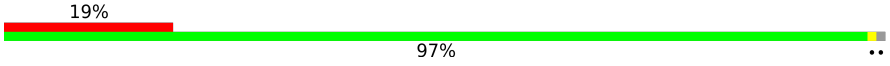
Chain 1:

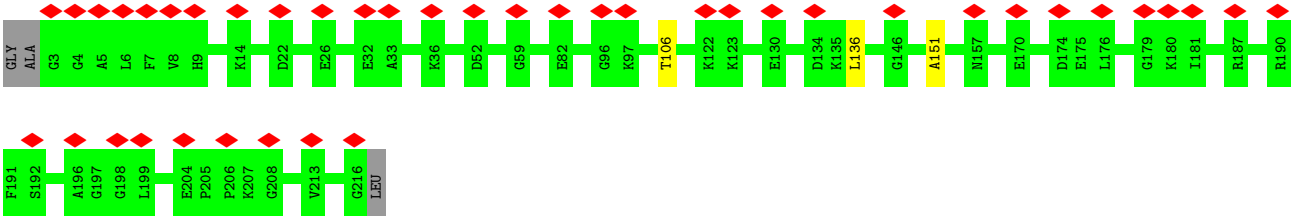




• Molecule 2: Mitochondrial complex I, 24 kDa subunit

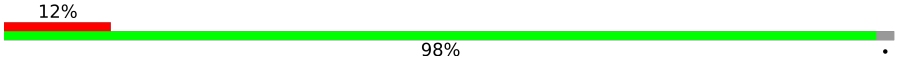
Chain 2:

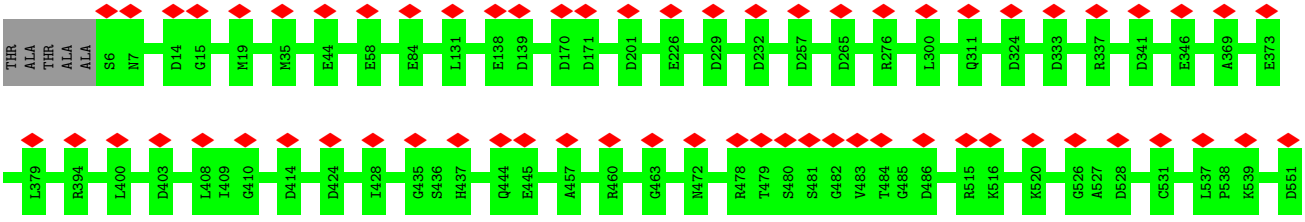


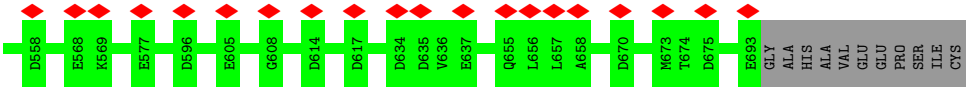


• Molecule 3: Mitochondrial complex I, 75 kDa subunit

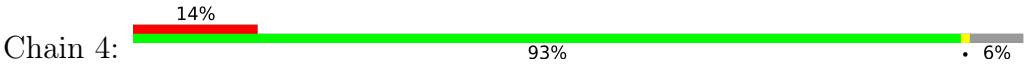
Chain 3:

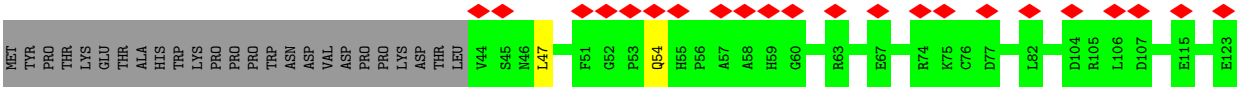


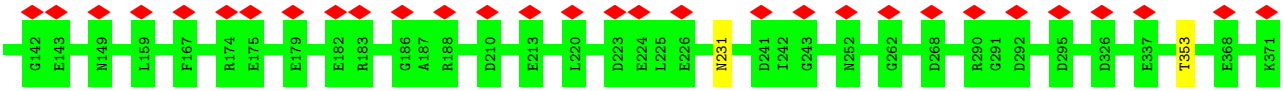


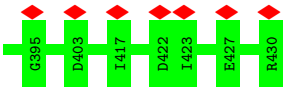


• Molecule 4: Mitochondrial complex I, 49 kDa subunit

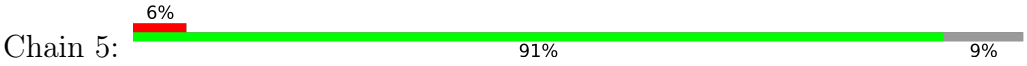


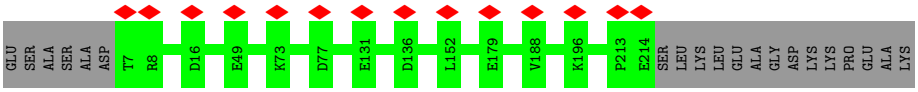




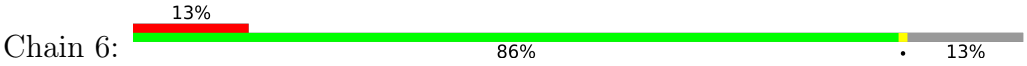


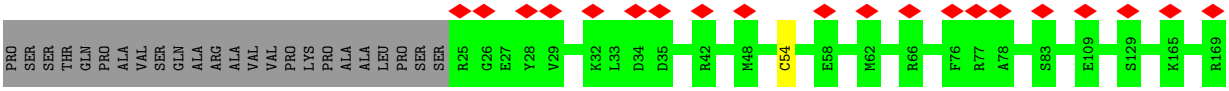
• Molecule 5: Mitochondrial complex I, 30 kDa subunit

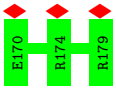




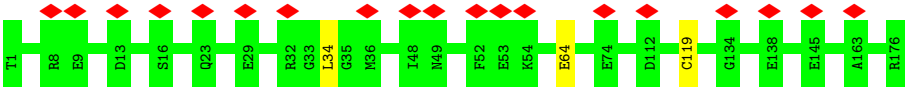
• Molecule 6: Mitochondrial complex I, PSST subunit



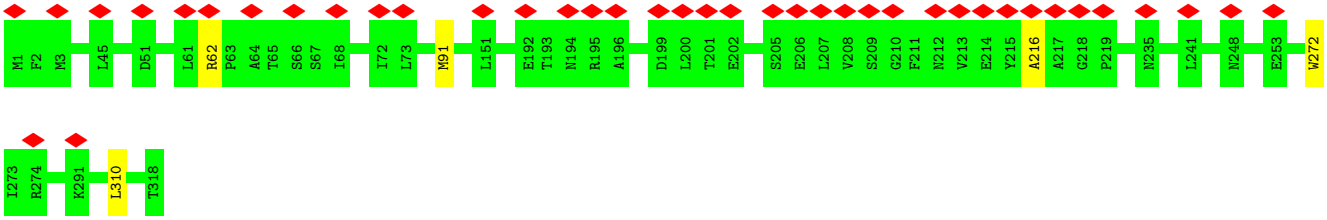




• Molecule 7: Mitochondrial complex I, TYKY subunit

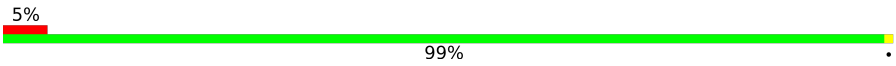


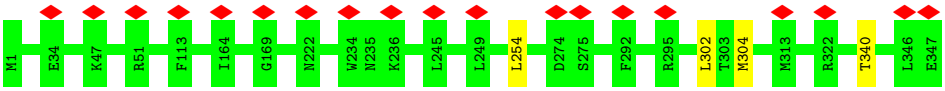
• Molecule 8: Mitochondrial complex I, ND1 subunit



• Molecule 9: Mitochondrial complex I, ND2 subunit

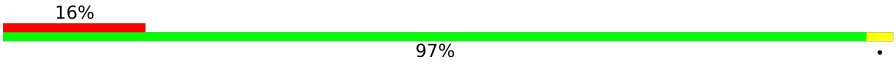
Chain N:

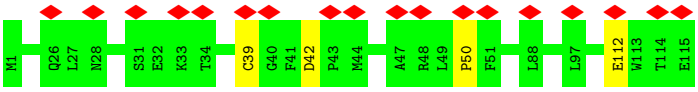




• Molecule 10: Mitochondrial complex I, ND3 subunit

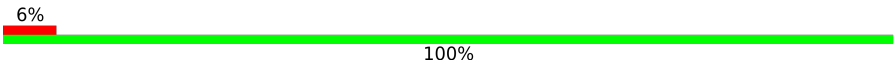
Chain A:

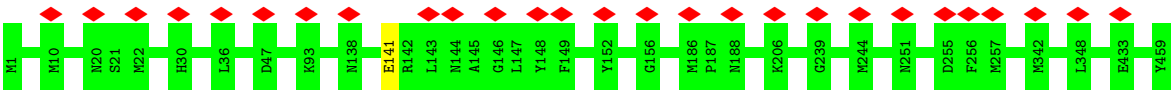




• Molecule 11: Mitochondrial complex I, ND4 subunit

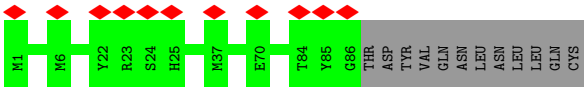
Chain M:





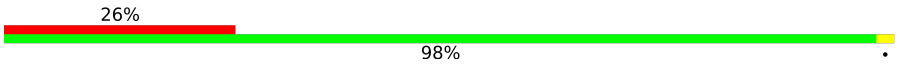
• Molecule 12: Mitochondrial complex I, ND4L subunit

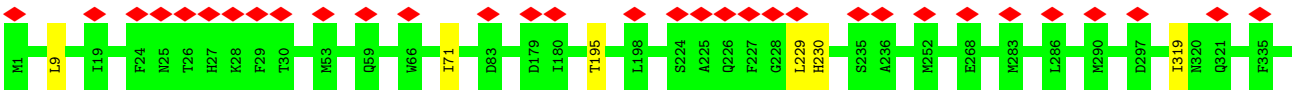
Chain K:

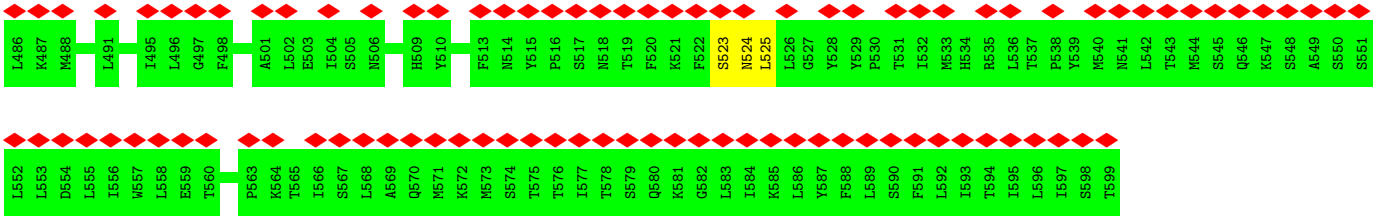


• Molecule 13: Mitochondrial complex I, ND5 subunit

Chain L:

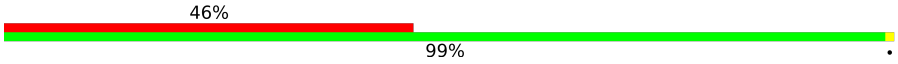


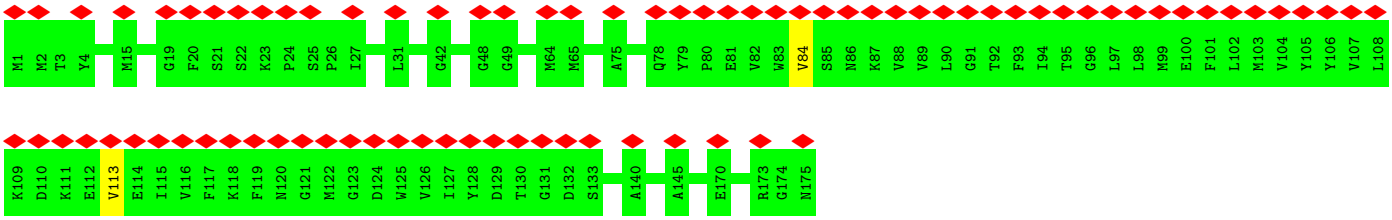




• Molecule 14: Mitochondrial complex I, ND6 subunit

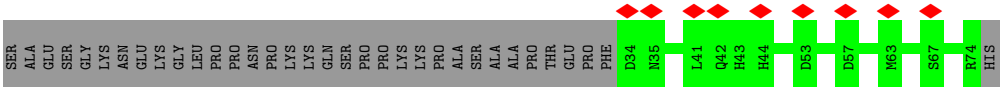
Chain J:





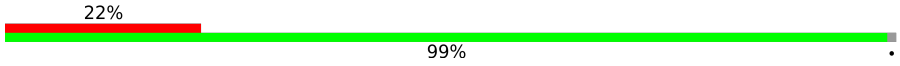
• Molecule 15: Mitochondrial complex I, 10 kDa subunit

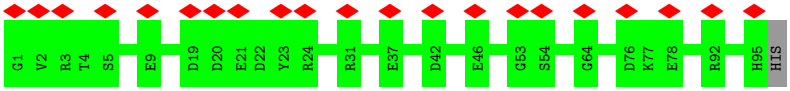
Chain a:



• Molecule 16: Mitochondrial complex I, 13 kDa subunit

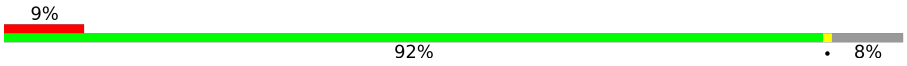
Chain b:

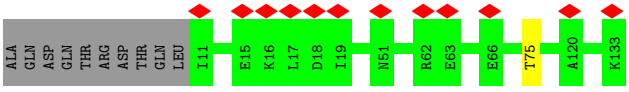




• Molecule 17: Mitochondrial complex I, 18 kDa subunit

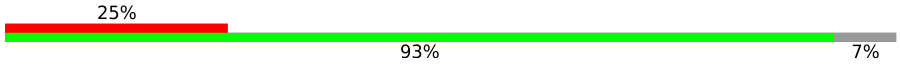
Chain c:

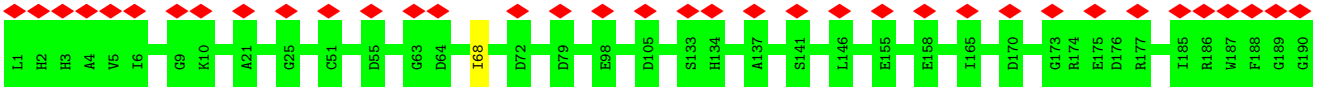


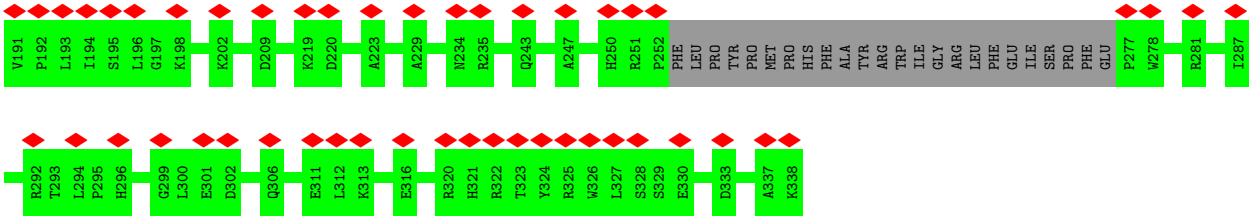


• Molecule 18: Mitochondrial complex I, 39 kDa subunit

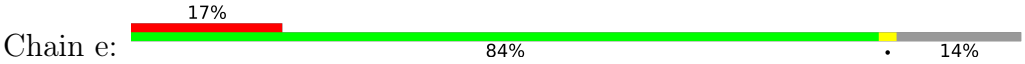
Chain d:

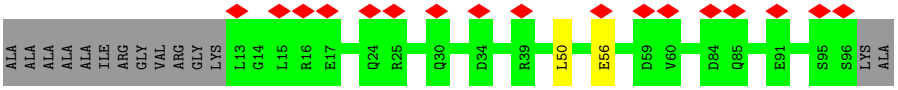




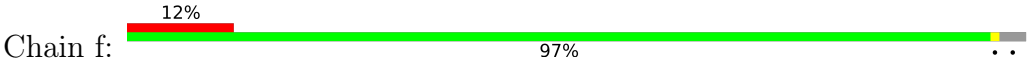


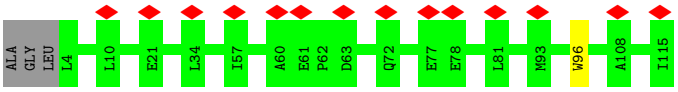
• Molecule 19: Mitochondrial complex I, B8 subunit



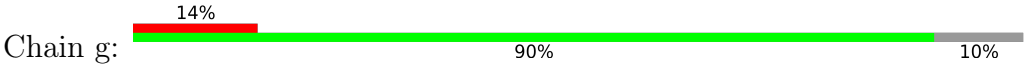


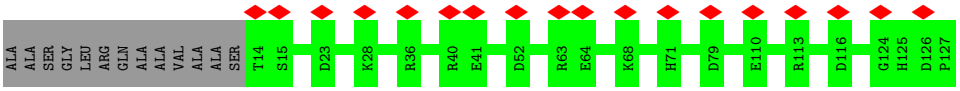
• Molecule 20: Mitochondrial complex I, B13 subunit



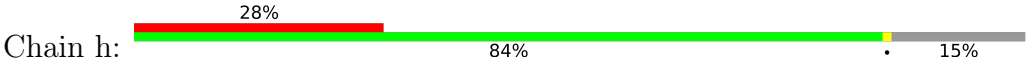


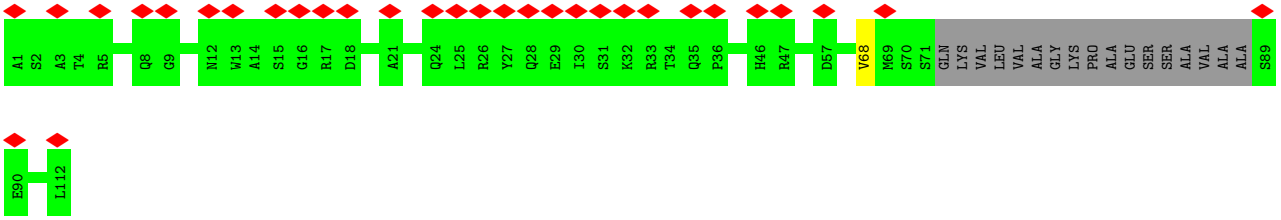
• Molecule 21: Mitochondrial complex I, B14 subunit



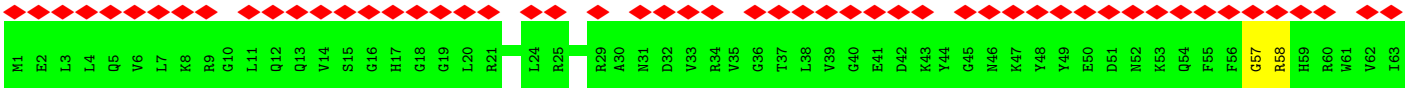


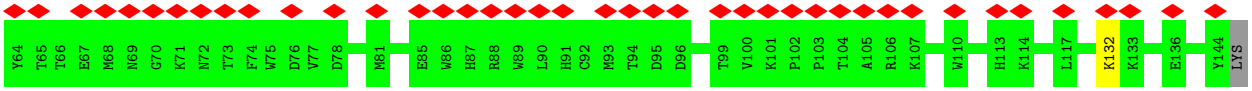
• Molecule 22: Mitochondrial complex I, B14.5a subunit





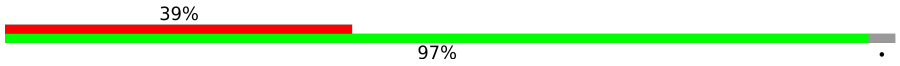
• Molecule 23: Mitochondrial complex I, B17.2 subunit

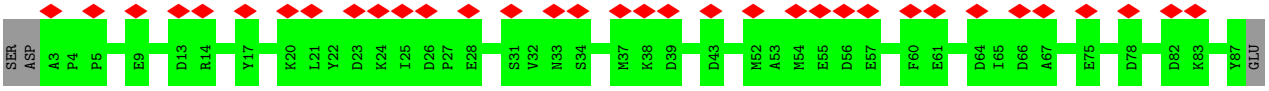




• Molecule 24: Acyl carrier protein

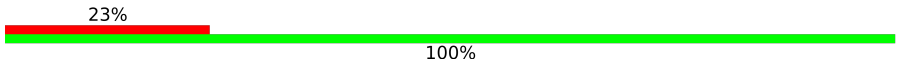
Chain j:

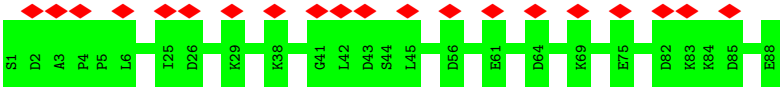




• Molecule 24: Acyl carrier protein

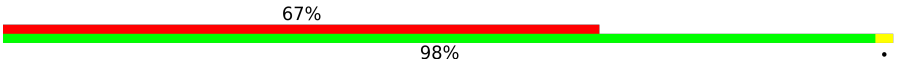
Chain X:

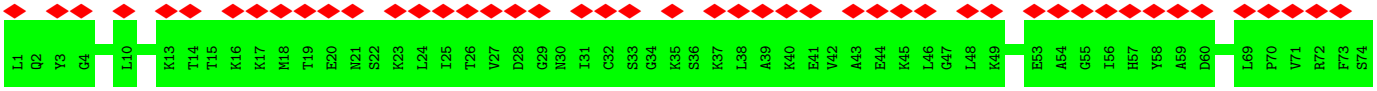


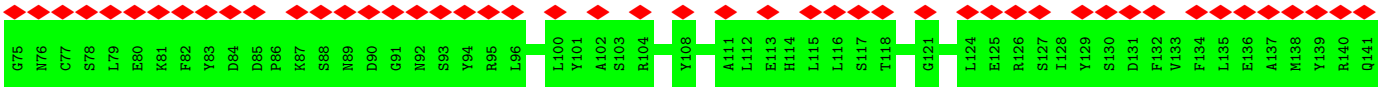


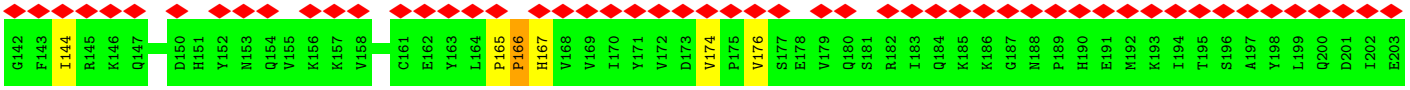
• Molecule 25: Mitochondrial complex I, 42 kDa subunit

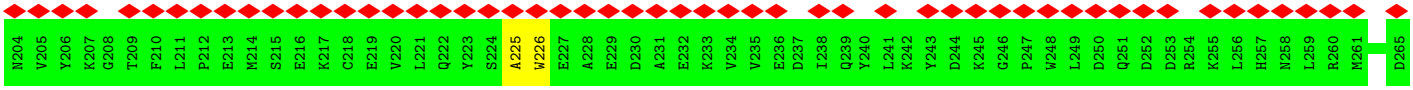
Chain k:

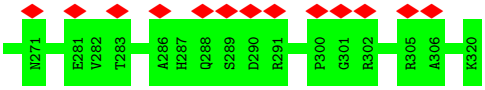






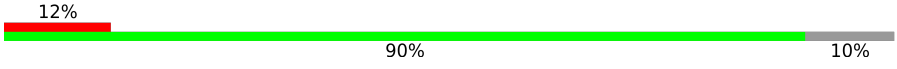


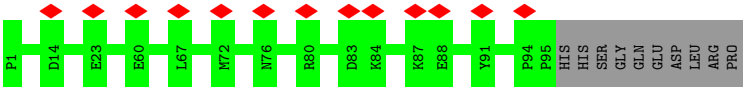




• Molecule 26: Mitochondrial complex I, 15 kDa subunit

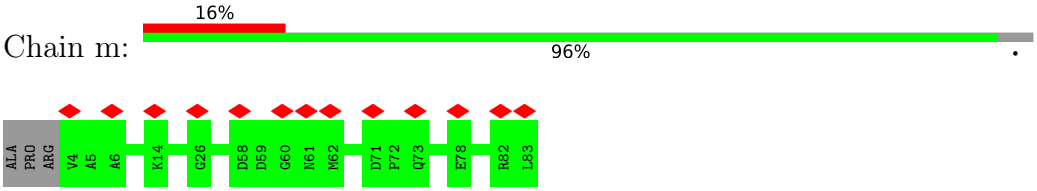
Chain l:





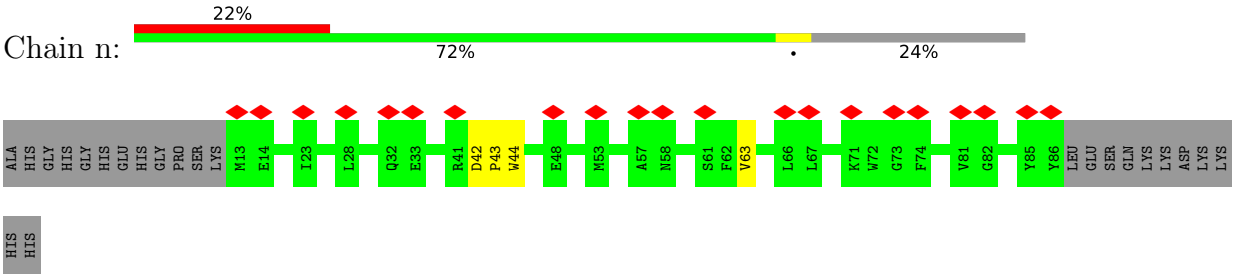
• Molecule 27: Mitochondrial complex I, B9 subunit

Chain m:



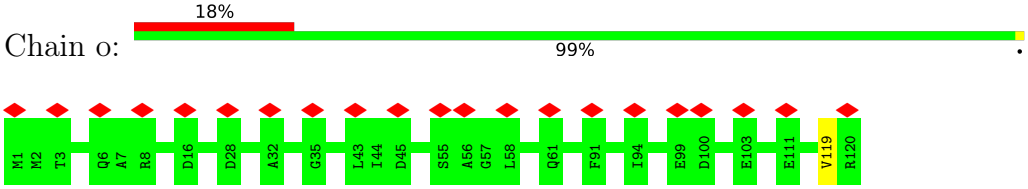
• Molecule 28: Mitochondrial complex I, B12 subunit

Chain n:



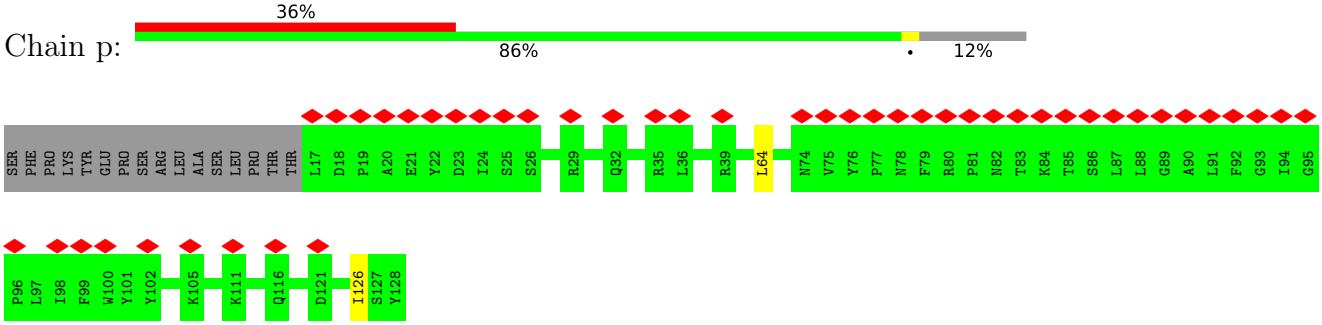
• Molecule 29: Mitochondrial complex I, B14.5b subunit

Chain o:



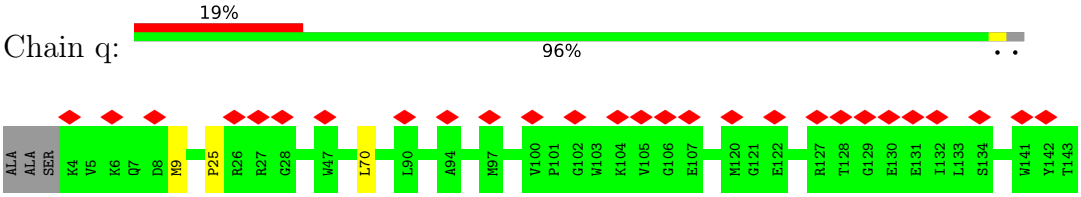
• Molecule 30: Mitochondrial complex I, B15 subunit

Chain p:



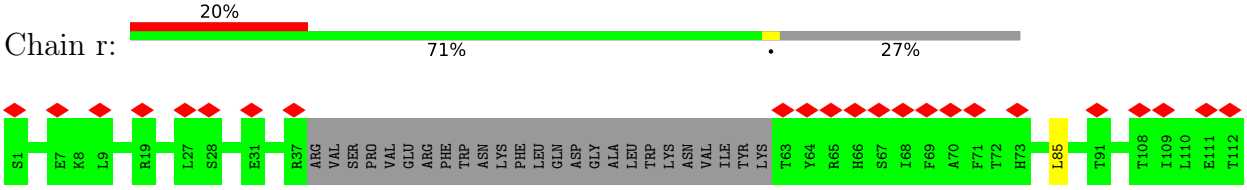
• Molecule 31: Mitochondrial complex I, B16.6 subunit

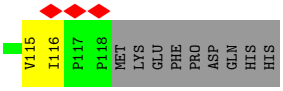
Chain q:



• Molecule 32: Mitochondrial complex I, B17 subunit

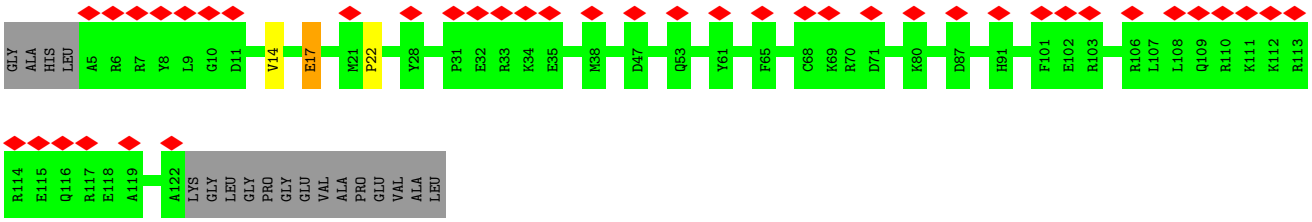
Chain r:





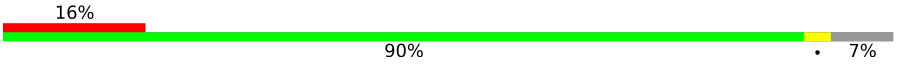
• Molecule 33: Mitochondrial complex I, B18 subunit

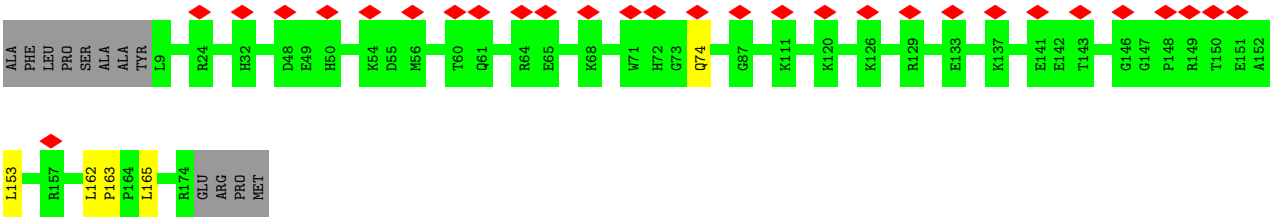
Chain s:



• Molecule 34: Mitochondrial complex I, B22 subunit

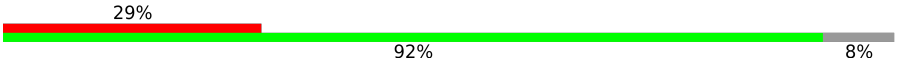
Chain t:

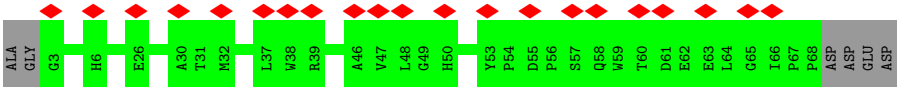




• Molecule 35: Mitochondrial complex I, AGGG subunit

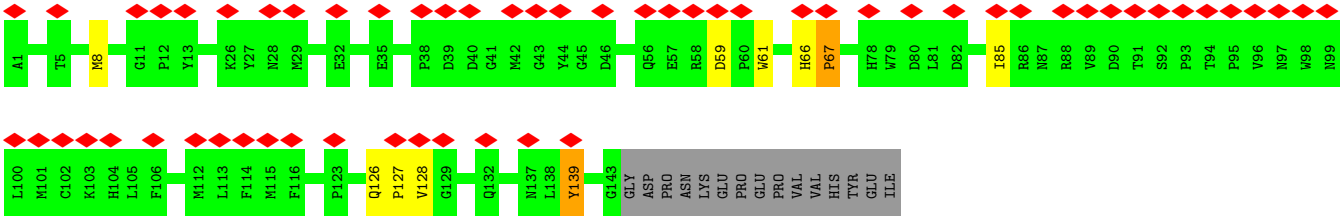
Chain u:





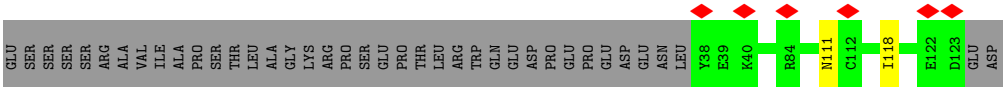
• Molecule 36: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 8, mitochondrial

Chain v:

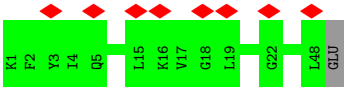


• Molecule 37: Mitochondrial complex I, ESSS subunit

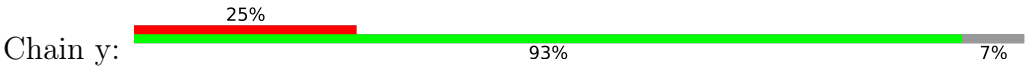
Chain w:

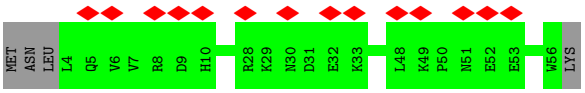


• Molecule 38: Mitochondrial complex I, KFYI subunit

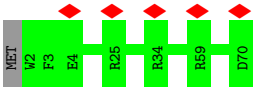


• Molecule 39: Mitochondrial complex I, MNLL subunit

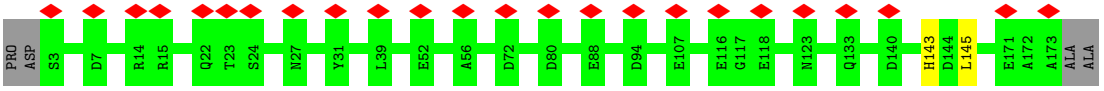




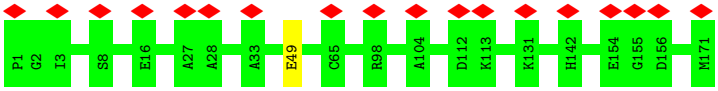
• Molecule 40: Mitochondrial complex I, MWFE subunit



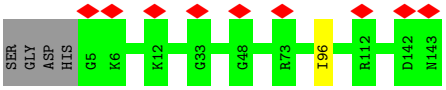
• Molecule 41: Mitochondrial complex I, PDSW subunit



• Molecule 42: Mitochondrial complex I, PGIV subunit

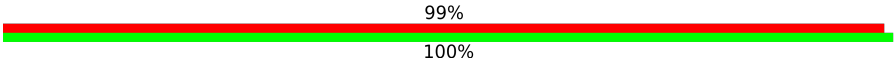


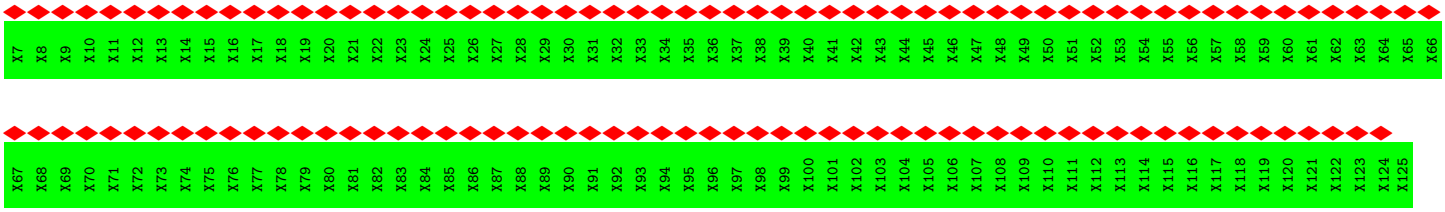
• Molecule 43: Mitochondrial complex I, SGDH subunit



• Molecule 44: Mitochondrial complex I, B14.7 subunit

Chain V:


99%
100%


X7 X8 X9 X10 X11 X12 X13 X14 X15 X16 X17 X18 X19 X20 X21 X22 X23 X24 X25 X26 X27 X28 X29 X30 X31 X32 X33 X34 X35 X36 X37 X38 X39 X40 X41 X42 X43 X44 X45 X46 X47 X48 X49 X50 X51 X52 X53 X54 X55 X56 X57 X58 X59 X60 X61 X62 X63 X64 X65 X66
X67 X68 X69 X70 X71 X72 X73 X74 X75 X76 X77 X78 X79 X80 X81 X82 X83 X84 X85 X86 X87 X88 X89 X90 X91 X92 X93 X94 X95 X96 X97 X98 X99 X100 X101 X102 X103 X104 X105 X106 X107 X108 X109 X110 X111 X112 X113 X114 X115 X116 X117 X118 X119 X120 X121 X122 X123 X124 X125

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	82000	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 ($e^-/Å^2$)	26	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	3500	Depositor
Magnification	100720	Depositor
Image detector	FEI FALCON II (4k x 4k)	Depositor
Maximum map value	1.314	Depositor
Minimum map value	-0.549	Depositor
Average map value	0.009	Depositor
Map value standard deviation	0.051	Depositor
Recommended contour level	0.15	Depositor
Map size (Å)	179.31, 195.99, 290.51	wwPDB
Map dimensions	209, 141, 129	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.39, 1.39, 1.3900001	Depositor

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: CDL, SF4, PNS, ZN, FMN, PC1, NDP, ZMP, 3PE, FES

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	1	0.34	0/3403	0.52	0/4597
2	2	0.35	0/1695	0.59	1/2305 (0.0%)
3	3	0.34	0/5362	0.53	0/7266
4	4	0.41	0/3172	0.57	1/4288 (0.0%)
5	5	0.40	0/1776	0.52	0/2417
6	6	0.42	0/1272	0.54	0/1720
7	9	0.45	1/1445 (0.1%)	0.64	1/1956 (0.1%)
8	H	0.43	0/2603	0.63	1/3561 (0.0%)
9	N	0.42	1/2787 (0.0%)	0.62	0/3795
10	A	0.42	1/947 (0.1%)	0.61	0/1296
11	M	0.38	0/3739	0.62	0/5095
12	K	0.36	0/658	0.62	0/888
13	L	0.37	0/4563	0.64	3/6227 (0.0%)
14	J	0.41	0/1212	0.57	0/1652
15	a	0.29	0/352	0.53	0/476
16	b	0.38	0/749	0.50	0/1009
17	c	0.36	0/1023	0.56	0/1382
18	d	0.33	0/2532	0.59	0/3430
19	e	0.47	1/688 (0.1%)	0.53	0/927
20	f	0.32	0/929	0.51	0/1260
21	g	0.34	0/993	0.49	0/1336
22	h	0.33	0/775	0.61	0/1048
23	i	0.32	0/1241	0.54	0/1687
24	X	0.32	0/719	0.55	0/971
24	j	0.30	0/696	0.53	0/940
25	k	0.34	1/2309 (0.0%)	0.56	0/3141
26	l	0.36	0/811	0.57	0/1085
27	m	0.34	0/647	0.49	0/890
28	n	0.34	0/595	0.66	0/805
29	o	0.38	0/1035	0.55	0/1398
30	p	0.30	0/855	0.54	1/1155 (0.1%)
31	q	0.36	0/1180	0.63	1/1590 (0.1%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
32	r	0.37	0/774	0.62	1/1058 (0.1%)
33	s	0.32	0/1011	0.58	0/1356
34	t	0.41	1/1483 (0.1%)	0.56	1/2006 (0.0%)
35	u	0.35	0/590	0.59	0/809
36	v	0.30	0/877	0.65	0/1208
37	w	0.38	0/737	0.57	0/999
38	x	0.31	0/416	0.46	0/564
39	y	0.34	0/470	0.47	0/636
40	z	0.38	0/583	0.55	0/785
41	Z	0.38	0/1475	0.55	0/1989
42	Y	0.39	0/1440	0.68	0/1942
43	W	0.39	0/1188	0.54	0/1607
All	All	0.37	6/63807 (0.0%)	0.58	11/86552 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	2	0	1
4	4	0	1
7	9	0	1
8	H	0	3
9	N	0	3
10	A	0	2
13	L	0	6
17	c	0	1
19	e	0	1
20	f	0	1
23	i	0	1
25	k	0	3
29	o	0	1
31	q	0	2
33	s	0	2
34	t	0	1
36	v	0	7
42	Y	0	1
All	All	0	38

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
19	e	50	LEU	C-N	-9.90	1.15	1.34
34	t	163	PRO	C-N	9.08	1.51	1.34
25	k	174	VAL	C-N	-8.55	1.18	1.34
9	N	304	MET	C-N	-7.74	1.16	1.34
10	A	42	ASP	C-N	5.94	1.45	1.34
7	9	119	CYS	CB-SG	-5.03	1.73	1.81

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
34	t	74	GLN	C-N-CA	-6.59	105.21	121.70
4	4	47	LEU	CA-CB-CG	6.59	130.45	115.30
7	9	34	LEU	CA-CB-CG	-6.21	101.03	115.30
13	L	9	LEU	CA-CB-CG	6.18	129.52	115.30
30	p	64	LEU	CA-CB-CG	5.77	128.57	115.30
13	L	229	LEU	CA-CB-CG	5.60	128.18	115.30
8	H	310	LEU	CB-CG-CD2	-5.49	101.67	111.00
32	r	85	LEU	CA-CB-CG	-5.40	102.88	115.30
13	L	386	LEU	CA-CB-CG	5.36	127.64	115.30
2	2	136	LEU	CA-CB-CG	5.24	127.35	115.30
31	q	70	LEU	CB-CG-CD2	-5.02	102.47	111.00

There are no chirality outliers.

All (38) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	2	151	ALA	Peptide
4	4	54	GLN	Peptide
7	9	64	GLU	Peptide
10	A	112	GLU	Peptide
10	A	39	CYS	Peptide
8	H	216	ALA	Peptide
8	H	272	TRP	Peptide
8	H	62	ARG	Peptide
13	L	195	THR	Peptide
13	L	230	HIS	Peptide
13	L	350	LEU	Peptide
13	L	523	SER	Peptide
13	L	524	ASN	Peptide
13	L	525	LEU	Peptide
9	N	254	LEU	Peptide
9	N	302	LEU	Peptide

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Mol	Chain	Res	Type	Group
9	N	340	THR	Peptide
42	Y	49	GLU	Peptide
17	c	75	THR	Peptide
19	e	56	GLU	Peptide
20	f	96	TRP	Peptide
23	i	57	GLY	Peptide
25	k	165	PRO	Peptide
25	k	166	PRO	Peptide
25	k	225	ALA	Peptide
29	o	119	VAL	Peptide
31	q	25	PRO	Peptide
31	q	9	MET	Peptide
33	s	17	GLU	Peptide
33	s	22	PRO	Peptide
34	t	162	LEU	Peptide
36	v	126	GLN	Peptide
36	v	127	PRO	Peptide
36	v	128	VAL	Peptide
36	v	139	TYR	Peptide
36	v	61	TRP	Peptide
36	v	67	PRO	Peptide
36	v	8	MET	Peptide

5.2 Too-close contacts

Due to software issues we are unable to calculate clashes - this section is therefore empty.

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	1	430/445 (97%)	405 (94%)	24 (6%)	1 (0%)	47 79
2	2	212/217 (98%)	189 (89%)	22 (10%)	1 (0%)	29 67

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	3	686/704 (97%)	616 (90%)	70 (10%)	0	100	100
4	4	385/412 (93%)	337 (88%)	46 (12%)	2 (0%)	29	67
5	5	206/228 (90%)	183 (89%)	23 (11%)	0	100	100
6	6	153/179 (86%)	138 (90%)	15 (10%)	0	100	100
7	9	174/176 (99%)	150 (86%)	24 (14%)	0	100	100
8	H	316/318 (99%)	278 (88%)	37 (12%)	1 (0%)	41	75
9	N	345/347 (99%)	315 (91%)	30 (9%)	0	100	100
10	A	113/115 (98%)	97 (86%)	15 (13%)	1 (1%)	17	54
11	M	457/459 (100%)	392 (86%)	64 (14%)	1 (0%)	47	79
12	K	84/98 (86%)	72 (86%)	12 (14%)	0	100	100
13	L	597/599 (100%)	518 (87%)	75 (13%)	4 (1%)	22	60
14	J	173/175 (99%)	142 (82%)	29 (17%)	2 (1%)	13	49
15	a	39/75 (52%)	33 (85%)	6 (15%)	0	100	100
16	b	93/96 (97%)	90 (97%)	3 (3%)	0	100	100
17	c	121/133 (91%)	109 (90%)	12 (10%)	0	100	100
18	d	310/338 (92%)	253 (82%)	56 (18%)	1 (0%)	41	75
19	e	82/98 (84%)	74 (90%)	8 (10%)	0	100	100
20	f	110/115 (96%)	95 (86%)	15 (14%)	0	100	100
21	g	112/127 (88%)	102 (91%)	10 (9%)	0	100	100
22	h	91/112 (81%)	73 (80%)	17 (19%)	1 (1%)	14	51
23	i	142/145 (98%)	116 (82%)	24 (17%)	2 (1%)	11	46
24	X	86/88 (98%)	77 (90%)	9 (10%)	0	100	100
24	j	83/88 (94%)	70 (84%)	13 (16%)	0	100	100
25	k	318/320 (99%)	263 (83%)	50 (16%)	5 (2%)	9	44
26	l	93/105 (89%)	83 (89%)	10 (11%)	0	100	100
27	m	78/83 (94%)	72 (92%)	6 (8%)	0	100	100
28	n	72/97 (74%)	50 (69%)	18 (25%)	4 (6%)	2	21
29	o	118/120 (98%)	105 (89%)	13 (11%)	0	100	100
30	p	110/128 (86%)	83 (76%)	26 (24%)	1 (1%)	17	54
31	q	138/143 (96%)	126 (91%)	12 (9%)	0	100	100
32	r	89/127 (70%)	75 (84%)	12 (14%)	2 (2%)	6	38

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
33	s	116/136 (85%)	93 (80%)	21 (18%)	2 (2%)	9 43
34	t	164/178 (92%)	142 (87%)	22 (13%)	0	100 100
35	u	64/72 (89%)	58 (91%)	6 (9%)	0	100 100
36	v	141/158 (89%)	103 (73%)	33 (23%)	5 (4%)	3 30
37	w	84/125 (67%)	67 (80%)	15 (18%)	2 (2%)	6 37
38	x	46/49 (94%)	45 (98%)	1 (2%)	0	100 100
39	y	51/57 (90%)	50 (98%)	1 (2%)	0	100 100
40	z	67/70 (96%)	62 (92%)	5 (8%)	0	100 100
41	Z	169/175 (97%)	147 (87%)	21 (12%)	1 (1%)	25 63
42	Y	169/171 (99%)	137 (81%)	32 (19%)	0	100 100
43	W	137/143 (96%)	115 (84%)	21 (15%)	1 (1%)	22 60
All	All	7824/8344 (94%)	6800 (87%)	984 (13%)	40 (0%)	32 67

All (40) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	2	106	THR
28	n	63	VAL
33	s	14	VAL
13	L	71	ILE
13	L	319	ILE
22	h	68	VAL
23	i	58	ARG
37	w	111	ASN
11	M	141	GLU
13	L	384	PRO
14	J	84	VAL
28	n	43	PRO
28	n	44	TRP
30	p	126	ILE
36	v	59	ASP
36	v	85	ILE
14	J	113	VAL
36	v	139	TYR
4	4	231	ASN
8	H	91	MET
25	k	144	ILE
25	k	167	HIS

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Mol	Chain	Res	Type
25	k	226	TRP
32	r	115	VAL
36	v	66	HIS
36	v	67	PRO
37	w	118	ILE
41	Z	143	HIS
4	4	353	THR
23	i	132	LYS
33	s	17	GLU
10	A	50	PRO
25	k	166	PRO
1	1	404	ILE
13	L	347	ILE
28	n	42	ASP
43	W	96	ILE
18	d	68	ILE
25	k	176	VAL
32	r	116	ILE

5.3.2 Protein sidechains

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	1	346/354 (98%)	346 (100%)	0	100	100
2	2	182/183 (100%)	182 (100%)	0	100	100
3	3	578/588 (98%)	578 (100%)	0	100	100
4	4	334/358 (93%)	334 (100%)	0	100	100
5	5	189/204 (93%)	189 (100%)	0	100	100
6	6	131/150 (87%)	130 (99%)	1 (1%)	81	89
7	9	151/151 (100%)	151 (100%)	0	100	100
8	H	278/278 (100%)	278 (100%)	0	100	100
9	N	315/315 (100%)	315 (100%)	0	100	100
10	A	103/103 (100%)	103 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
11	M	412/412 (100%)	412 (100%)	0	100	100
12	K	75/87 (86%)	75 (100%)	0	100	100
13	L	445/532 (84%)	445 (100%)	0	100	100
14	J	101/144 (70%)	101 (100%)	0	100	100
15	a	40/68 (59%)	40 (100%)	0	100	100
16	b	79/80 (99%)	79 (100%)	0	100	100
17	c	110/119 (92%)	110 (100%)	0	100	100
18	d	257/292 (88%)	257 (100%)	0	100	100
19	e	75/81 (93%)	75 (100%)	0	100	100
20	f	100/101 (99%)	100 (100%)	0	100	100
21	g	107/113 (95%)	107 (100%)	0	100	100
22	h	83/94 (88%)	83 (100%)	0	100	100
23	i	130/131 (99%)	130 (100%)	0	100	100
24	X	81/81 (100%)	81 (100%)	0	100	100
24	j	78/81 (96%)	78 (100%)	0	100	100
25	k	199/284 (70%)	199 (100%)	0	100	100
26	l	85/94 (90%)	85 (100%)	0	100	100
27	m	69/71 (97%)	69 (100%)	0	100	100
28	n	53/75 (71%)	53 (100%)	0	100	100
29	o	107/107 (100%)	107 (100%)	0	100	100
30	p	71/114 (62%)	71 (100%)	0	100	100
31	q	120/121 (99%)	120 (100%)	0	100	100
32	r	80/121 (66%)	80 (100%)	0	100	100
33	s	100/119 (84%)	100 (100%)	0	100	100
34	t	151/160 (94%)	149 (99%)	2 (1%)	69	82
35	u	58/62 (94%)	58 (100%)	0	100	100
36	v	38/142 (27%)	38 (100%)	0	100	100
37	w	77/112 (69%)	77 (100%)	0	100	100
38	x	43/44 (98%)	43 (100%)	0	100	100
39	y	49/53 (92%)	49 (100%)	0	100	100
40	z	58/59 (98%)	58 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
41	Z	155/157 (99%)	154 (99%)	1 (1%)	86 91
42	Y	154/154 (100%)	154 (100%)	0	100 100
43	W	122/125 (98%)	122 (100%)	0	100 100
All	All	6569/7274 (90%)	6565 (100%)	4 (0%)	93 97

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

Mol	Chain	Res	Type
6	6	54	CYS
34	t	153	LEU
34	t	165	LEU
41	Z	145	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (80) such sidechains are listed below:

Mol	Chain	Res	Type
1	1	150	GLN
1	1	293	ASN
1	1	361	GLN
1	1	431	GLN
2	2	99	HIS
2	2	214	GLN
3	3	36	GLN
3	3	255	HIS
3	3	259	ASN
3	3	581	GLN
4	4	149	ASN
4	4	157	HIS
4	4	200	HIS
4	4	266	GLN
4	4	347	HIS
5	5	88	ASN
7	9	157	ASN
8	H	169	GLN
8	H	194	ASN
8	H	317	GLN
9	N	63	GLN
9	N	134	GLN
9	N	309	ASN
9	N	310	ASN

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Mol	Chain	Res	Type
10	A	10	ASN
10	A	80	GLN
10	A	108	GLN
11	M	44	GLN
11	M	319	HIS
11	M	366	ASN
13	L	27	HIS
13	L	115	ASN
13	L	226	GLN
13	L	270	ASN
13	L	405	ASN
13	L	479	GLN
16	b	13	HIS
17	c	44	ASN
18	d	8	HIS
18	d	36	ASN
18	d	37	HIS
18	d	89	ASN
18	d	148	ASN
18	d	203	GLN
18	d	250	HIS
19	e	24	GLN
20	f	82	GLN
22	h	50	ASN
23	i	31	ASN
23	i	72	ASN
25	k	50	HIS
25	k	184	GLN
25	k	200	GLN
26	l	15	HIS
26	l	24	GLN
26	l	26	HIS
27	m	45	ASN
27	m	70	GLN
28	n	20	GLN
29	o	59	HIS
29	o	79	GLN
30	p	125	ASN
32	r	25	GLN
32	r	82	HIS
32	r	88	HIS
33	s	42	GLN

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Mol	Chain	Res	Type
33	s	60	HIS
34	t	17	GLN
34	t	25	HIS
34	t	168	HIS
35	u	16	GLN
35	u	21	GLN
36	v	104	HIS
37	w	45	HIS
37	w	111	ASN
37	w	119	GLN
39	y	30	ASN
41	Z	99	GLN
41	Z	139	GLN
43	W	135	HIS

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 25 ligands modelled in this entry, 1 is monoatomic - leaving 24 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	$\#\|Z\|>2$
50	CDL	i	201	-	57,57,99	0.38	0	63,69,111	0.39	0
52	NDP	d	401	-	45,52,52	0.59	0	53,80,80	0.64	1 (1%)
45	SF4	9	503	7	0,12,12	-	-	-		
45	SF4	6	300	6	0,12,12	-	-	-		
48	3PE	9	501	-	50,50,50	0.31	0	53,55,55	0.41	0
48	3PE	J	301	-	50,50,50	0.31	0	53,55,55	0.33	0
50	CDL	J	300	-	78,78,99	0.34	0	84,90,111	0.38	0
49	PC1	M	501	-	45,45,53	0.31	0	51,53,61	0.35	0
48	3PE	o	202	-	40,40,50	0.36	0	43,45,55	0.36	0
47	FES	3	803	3	0,4,4	-	-	-		
48	3PE	o	203	-	45,45,50	0.34	0	48,50,55	0.39	0
46	FMN	1	501	-	33,33,33	0.26	0	48,50,50	0.47	0
45	SF4	1	500	1	0,12,12	-	-	-		
45	SF4	9	502	7	0,12,12	-	-	-		
45	SF4	3	801	3	0,12,12	-	-	-		
45	SF4	3	802	3	0,12,12	-	-	-		
50	CDL	M	502	-	81,81,99	0.33	0	87,93,111	0.37	0
49	PC1	A	200	-	46,46,53	0.32	0	52,54,61	0.34	0
49	PC1	N	401	-	45,45,53	0.32	0	51,53,61	0.35	0
53	ZMP	j	101	24	27,33,36	0.72	2 (7%)	32,40,45	1.11	1 (3%)
47	FES	2	300	2	0,4,4	-	-	-		
49	PC1	o	201	-	38,38,53	0.34	0	44,46,61	0.34	0
50	CDL	L	601	-	83,83,99	0.32	0	89,95,111	0.41	0
54	PNS	X	401	24	13,20,21	0.51	0	18,26,29	0.90	1 (5%)

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
50	CDL	i	201	-	-	15/68/68/110	-
52	NDP	d	401	-	-	8/30/77/77	0/5/5/5
45	SF4	9	503	7	-	-	0/6/5/5
45	SF4	6	300	6	-	-	0/6/5/5
48	3PE	9	501	-	-	14/54/54/54	-
48	3PE	J	301	-	-	7/54/54/54	-
50	CDL	J	300	-	-	18/89/89/110	-
49	PC1	M	501	-	-	13/49/49/57	-
48	3PE	o	202	-	-	8/44/44/54	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
47	FES	3	803	3	-	-	0/1/1/1
48	3PE	o	203	-	-	11/49/49/54	-
46	FMN	1	501	-	-	7/18/18/18	0/3/3/3
45	SF4	1	500	1	-	-	0/6/5/5
45	SF4	9	502	7	-	-	0/6/5/5
45	SF4	3	801	3	-	-	0/6/5/5
45	SF4	3	802	3	-	-	0/6/5/5
50	CDL	M	502	-	-	22/92/92/110	-
49	PC1	A	200	-	-	18/50/50/57	-
49	PC1	N	401	-	-	10/49/49/57	-
53	ZMP	j	101	24	-	9/38/40/43	-
47	FES	2	300	2	-	-	0/1/1/1
49	PC1	o	201	-	-	10/42/42/57	-
50	CDL	L	601	-	-	24/94/94/110	-
54	PNS	X	401	24	-	7/24/26/27	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
53	j	101	ZMP	C10-S1	-2.23	1.70	1.76
53	j	101	ZMP	C9-C10	2.07	1.53	1.50

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
53	j	101	ZMP	O1-C10-C9	-2.78	120.71	123.99
52	d	401	NDP	C5A-C6A-N6A	2.34	123.91	120.35
54	X	401	PNS	C37-C38-C39	-2.22	108.66	112.36

There are no chirality outliers.

All (201) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
46	1	501	FMN	C5'-O5'-P-O1P
46	1	501	FMN	C5'-O5'-P-O2P
48	9	501	3PE	C11-O13-P-O14
48	9	501	3PE	O13-C11-C12-N
48	J	301	3PE	C1-O11-P-O14
48	o	202	3PE	C11-O13-P-O12

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Mol	Chain	Res	Type	Atoms
48	o	202	3PE	C11-O13-P-O14
48	o	202	3PE	O13-C11-C12-N
48	o	203	3PE	C1-O11-P-O12
48	o	203	3PE	O13-C11-C12-N
49	N	401	PC1	C1-O11-P-O12
49	A	200	PC1	C1-O11-P-O12
49	M	501	PC1	C12-C11-O13-P
49	o	201	PC1	C1-O11-P-O12
50	M	502	CDL	CA3-OA5-PA1-OA3
50	M	502	CDL	CB2-OB2-PB2-OB3
50	M	502	CDL	CB2-OB2-PB2-OB4
50	M	502	CDL	CB2-OB2-PB2-OB5
50	M	502	CDL	CB3-OB5-PB2-OB4
50	L	601	CDL	CB2-C1-CA2-OA2
50	L	601	CDL	CA3-OA5-PA1-OA3
50	J	300	CDL	CA2-OA2-PA1-OA3
50	J	300	CDL	CA2-OA2-PA1-OA4
50	J	300	CDL	CA2-OA2-PA1-OA5
50	J	300	CDL	CA3-OA5-PA1-OA4
50	J	300	CDL	CB3-OB5-PB2-OB3
50	J	300	CDL	CB3-OB5-PB2-OB4
50	i	201	CDL	CA3-OA5-PA1-OA3
50	i	201	CDL	CA3-OA5-PA1-OA4
50	i	201	CDL	OA6-CA4-CA6-OA8
52	d	401	NDP	C1B-C2B-O2B-P2B
52	d	401	NDP	C2B-O2B-P2B-O1X
52	d	401	NDP	C2B-O2B-P2B-O3X
53	j	101	ZMP	S1-C11-C12-N1
54	X	401	PNS	N36-C37-C38-C39
49	o	201	PC1	C11-C12-N-C13
50	L	601	CDL	O1-C1-CA2-OA2
46	1	501	FMN	O3'-C3'-C4'-C5'
46	1	501	FMN	C2'-C3'-C4'-C5'
49	M	501	PC1	C11-C12-N-C15
49	M	501	PC1	C11-C12-N-C14
48	9	501	3PE	C21-C22-C23-C24
50	M	502	CDL	CA5-C11-C12-C13
50	L	601	CDL	C15-C16-C17-C18
48	9	501	3PE	C11-O13-P-O11
48	o	202	3PE	C11-O13-P-O11
49	M	501	PC1	C11-O13-P-O11
50	M	502	CDL	CA3-OA5-PA1-OA2

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Mol	Chain	Res	Type	Atoms
50	M	502	CDL	CB3-OB5-PB2-OB2
50	L	601	CDL	CA3-OA5-PA1-OA2
50	L	601	CDL	CB2-OB2-PB2-OB5
50	J	300	CDL	CB3-OB5-PB2-OB2
50	i	201	CDL	CA3-OA5-PA1-OA2
50	L	601	CDL	C61-C62-C63-C64
49	o	201	PC1	C11-C12-N-C14
46	1	501	FMN	O3'-C3'-C4'-O4'
46	1	501	FMN	C2'-C3'-C4'-O4'
49	A	200	PC1	C3C-C3D-C3E-C3F
53	j	101	ZMP	C1-C2-C3-C4
49	o	201	PC1	C11-C12-N-C15
48	J	301	3PE	O13-C11-C12-N
48	o	203	3PE	C37-C38-C39-C3A
49	M	501	PC1	C11-C12-N-C13
48	o	202	3PE	C31-C32-C33-C34
48	J	301	3PE	C37-C38-C39-C3A
50	M	502	CDL	C79-C80-C81-C82
49	A	200	PC1	C34-C35-C36-C37
49	o	201	PC1	C3C-C3D-C3E-C3F
50	M	502	CDL	C72-C73-C74-C75
53	j	101	ZMP	C2-C3-C4-C5
48	J	301	3PE	C1-O11-P-O13
50	J	300	CDL	CA3-OA5-PA1-OA2
53	j	101	ZMP	C5-C6-C7-C8
49	A	200	PC1	O11-C1-C2-C3
48	o	202	3PE	C28-C29-C2A-C2B
50	i	201	CDL	CA3-CA4-CA6-OA8
49	N	401	PC1	O31-C31-C32-C33
50	M	502	CDL	C52-C53-C54-C55
53	j	101	ZMP	C2-C1-C22-C23
49	A	200	PC1	C37-C38-C39-C3A
50	i	201	CDL	CB5-C51-C52-C53
50	i	201	CDL	OB5-CB3-CB4-OB6
49	M	501	PC1	C21-C22-C23-C24
49	M	501	PC1	C22-C23-C24-C25
50	M	502	CDL	OB5-CB3-CB4-CB6
50	M	502	CDL	CB5-C51-C52-C53
49	N	401	PC1	C1-O11-P-O13
49	A	200	PC1	C11-O13-P-O11
48	9	501	3PE	O11-C1-C2-O21
50	L	601	CDL	OB5-CB3-CB4-OB6

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Mol	Chain	Res	Type	Atoms
48	J	301	3PE	C23-C24-C25-C26
46	1	501	FMN	C4'-C5'-O5'-P
50	J	300	CDL	C1-CA2-OA2-PA1
49	A	200	PC1	C11-C12-N-C15
50	L	601	CDL	C52-C51-CB5-OB6
53	j	101	ZMP	O1-C10-S1-C11
50	i	201	CDL	OB5-CB3-CB4-CB6
53	j	101	ZMP	C9-C10-S1-C11
50	i	201	CDL	CB3-CB4-CB6-OB8
48	o	203	3PE	O11-C1-C2-O21
49	A	200	PC1	O11-C1-C2-O21
50	M	502	CDL	OB5-CB3-CB4-OB6
50	J	300	CDL	OB5-CB3-CB4-OB6
50	L	601	CDL	C59-C60-C61-C62
50	L	601	CDL	C17-C18-C19-C20
48	9	501	3PE	C34-C35-C36-C37
52	d	401	NDP	PN-O3-PA-O2A
48	o	203	3PE	C1-O11-P-O13
49	o	201	PC1	C1-O11-P-O13
52	d	401	NDP	O4D-C1D-N1N-C6N
50	i	201	CDL	C1-CB2-OB2-PB2
48	9	501	3PE	C11-O13-P-O12
48	o	203	3PE	C1-O11-P-O14
49	N	401	PC1	C1-O11-P-O14
49	A	200	PC1	C11-C12-N-C14
49	M	501	PC1	C11-O13-P-O12
49	M	501	PC1	C11-O13-P-O14
49	o	201	PC1	C1-O11-P-O14
50	M	502	CDL	CA3-OA5-PA1-OA4
50	M	502	CDL	CB3-OB5-PB2-OB3
50	L	601	CDL	CA3-OA5-PA1-OA4
50	L	601	CDL	CB2-OB2-PB2-OB3
50	J	300	CDL	CA3-OA5-PA1-OA3
48	9	501	3PE	C38-C39-C3A-C3B
48	o	203	3PE	O11-C1-C2-C3
50	L	601	CDL	OB5-CB3-CB4-CB6
50	J	300	CDL	OB5-CB3-CB4-CB6
49	A	200	PC1	C12-C11-O13-P
48	9	501	3PE	C2F-C2G-C2H-C2I
48	o	202	3PE	C29-C2A-C2B-C2C
49	N	401	PC1	O13-C11-C12-N
49	A	200	PC1	O13-C11-C12-N

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Mol	Chain	Res	Type	Atoms
49	M	501	PC1	O13-C11-C12-N
49	o	201	PC1	O13-C11-C12-N
50	L	601	CDL	C12-C13-C14-C15
49	N	401	PC1	C2-C1-O11-P
50	M	502	CDL	CA4-CA3-OA5-PA1
50	M	502	CDL	C51-C52-C53-C54
54	X	401	PNS	O33-C32-C34-O35
50	M	502	CDL	C64-C65-C66-C67
48	9	501	3PE	C37-C38-C39-C3A
49	N	401	PC1	C3-C2-O21-C21
48	o	202	3PE	O31-C31-C32-C33
50	J	300	CDL	C38-C39-C40-C41
50	M	502	CDL	C57-C58-C59-C60
50	i	201	CDL	CA2-OA2-PA1-OA5
50	L	601	CDL	C53-C54-C55-C56
50	L	601	CDL	C1-CA2-OA2-PA1
49	A	200	PC1	C3B-C3C-C3D-C3E
48	9	501	3PE	C2E-C2F-C2G-C2H
50	i	201	CDL	OB6-CB4-CB6-OB8
50	L	601	CDL	C51-C52-C53-C54
49	A	200	PC1	C11-C12-N-C13
49	N	401	PC1	O32-C31-C32-C33
54	X	401	PNS	C29-C32-C34-N36
48	9	501	3PE	C1-C2-O21-C21
50	J	300	CDL	CB6-CB4-OB6-CB5
49	o	201	PC1	C3B-C3C-C3D-C3E
53	j	101	ZMP	C12-C11-S1-C10
49	A	200	PC1	C38-C39-C3A-C3B
49	o	201	PC1	C3A-C3B-C3C-C3D
49	N	401	PC1	C36-C37-C38-C39
50	L	601	CDL	C54-C55-C56-C57
50	M	502	CDL	C58-C59-C60-C61
50	L	601	CDL	C72-C71-CB7-OB8
54	X	401	PNS	O33-C32-C34-N36
48	J	301	3PE	C24-C25-C26-C27
48	J	301	3PE	C2D-C2E-C2F-C2G
49	M	501	PC1	O21-C21-C22-C23
48	o	203	3PE	C24-C25-C26-C27
50	L	601	CDL	CB3-CB4-OB6-CB5
50	L	601	CDL	CB6-CB4-OB6-CB5
48	o	203	3PE	C21-C22-C23-C24
50	i	201	CDL	C32-C31-CA7-OA8

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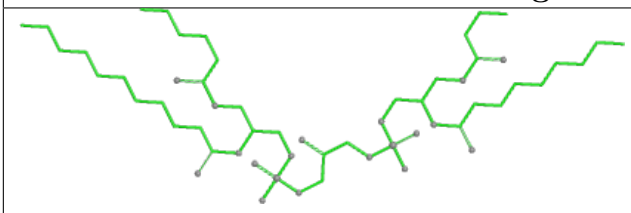
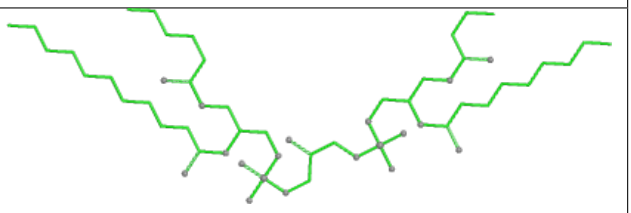
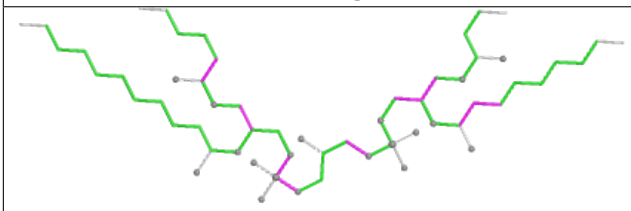
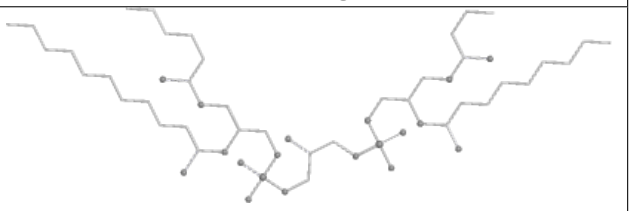
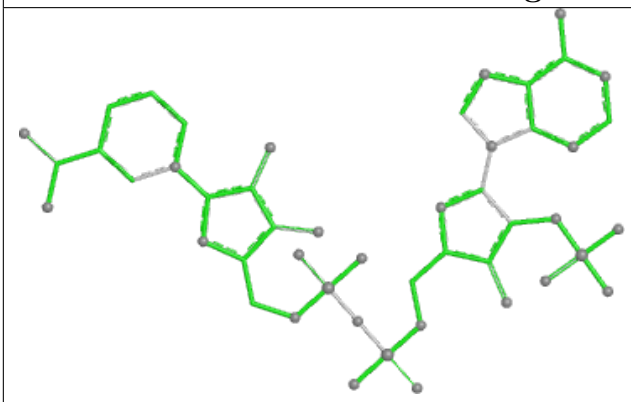
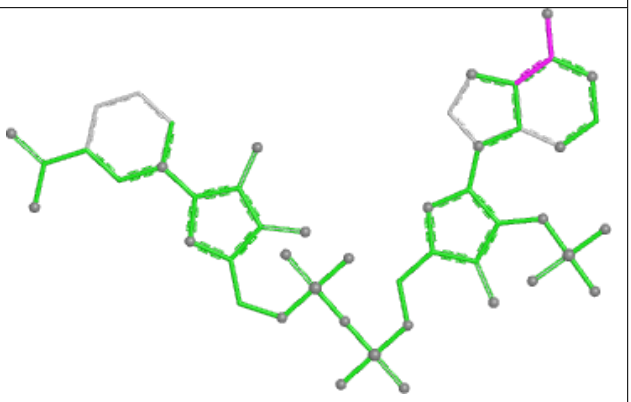
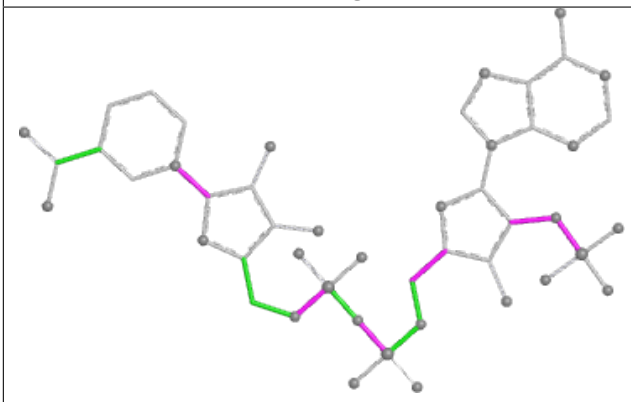
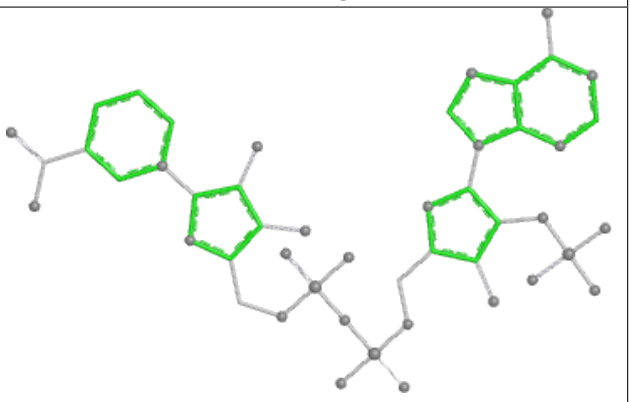
Mol	Chain	Res	Type	Atoms
49	N	401	PC1	C34-C35-C36-C37
54	X	401	PNS	C37-C38-C39-O40
53	j	101	ZMP	C6-C7-C8-C9
50	J	300	CDL	OA6-CA4-CA6-OA8
49	A	200	PC1	O21-C21-C22-C23
50	J	300	CDL	C19-C20-C21-C22
50	M	502	CDL	C1-CA2-OA2-PA1
50	J	300	CDL	C12-C11-CA5-OA6
52	d	401	NDP	O4B-C4B-C5B-O5B
49	A	200	PC1	C3D-C3E-C3F-C3G
49	M	501	PC1	O22-C21-C22-C23
50	i	201	CDL	C32-C31-CA7-OA9
50	L	601	CDL	C72-C71-CB7-OB9
49	A	200	PC1	C1-O11-P-O14
52	d	401	NDP	C5D-O5D-PN-O1N
49	A	200	PC1	O22-C21-C22-C23
50	J	300	CDL	C12-C11-CA5-OA7
50	L	601	CDL	C52-C51-CB5-OB7
48	o	203	3PE	C12-C11-O13-P
54	X	401	PNS	C29-C32-C34-O35
48	9	501	3PE	O21-C21-C22-C23
49	M	501	PC1	O31-C31-C32-C33
52	d	401	NDP	C3B-C2B-O2B-P2B
48	9	501	3PE	O31-C31-C32-C33
50	i	201	CDL	C52-C51-CB5-OB6
48	o	203	3PE	C34-C35-C36-C37
54	X	401	PNS	C37-C38-C39-N41

There are no ring outliers.

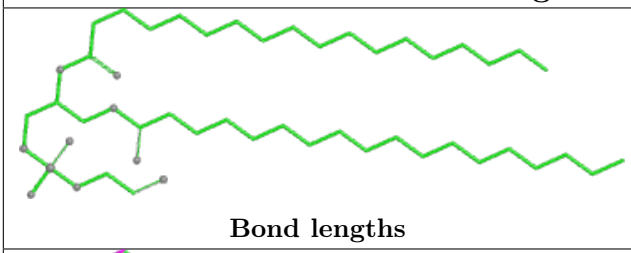
No monomer is involved in short contacts.

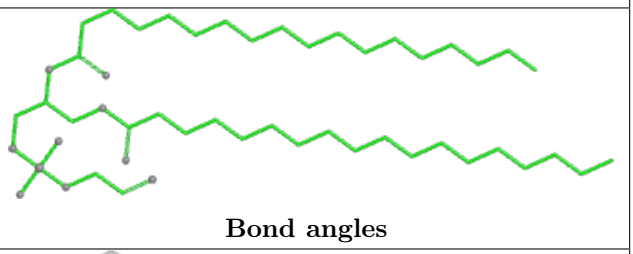
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

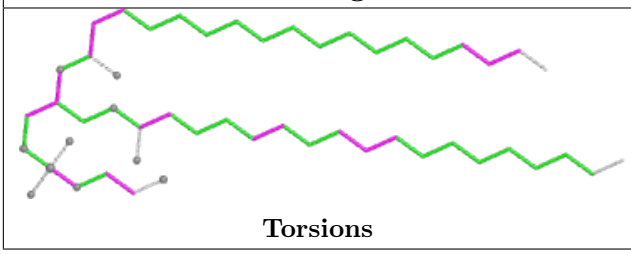
Ligand CDL i 201	
 Bond lengths	 Bond angles
 Torsions	 Rings

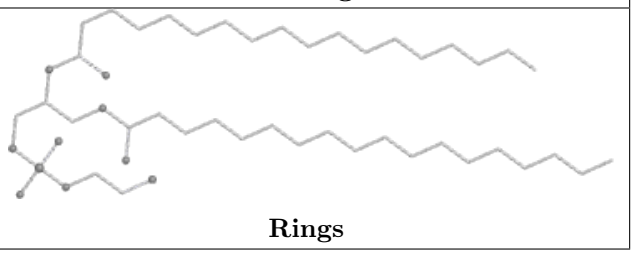
Ligand NDP d 401	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand 3PE 9 501

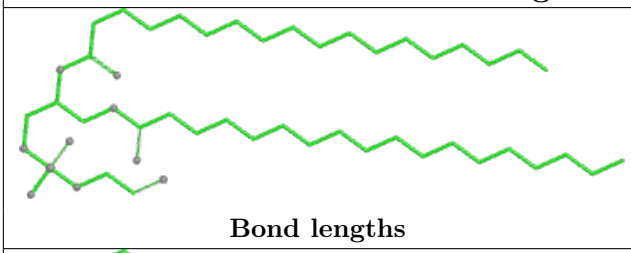

Bond lengths


Bond angles


Torsions


Rings

Ligand 3PE J 301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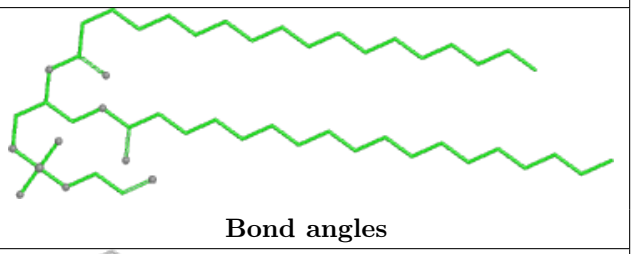
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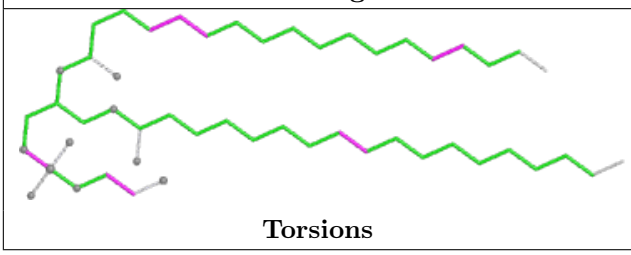
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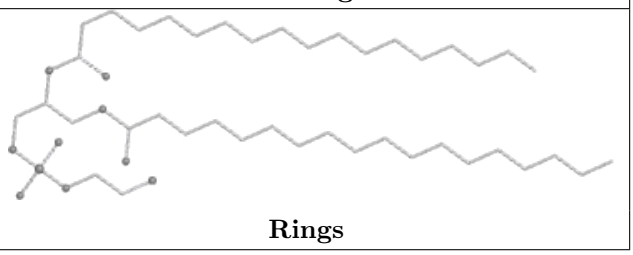
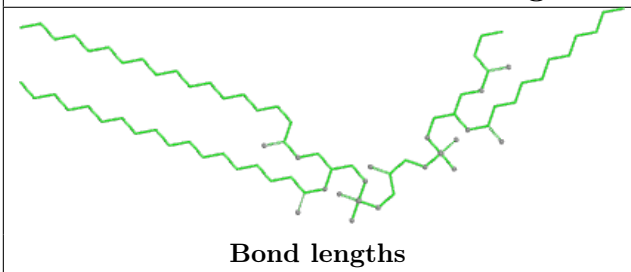

Rings

Ligand CDL J 300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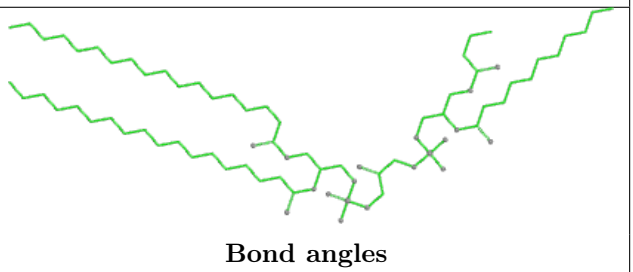
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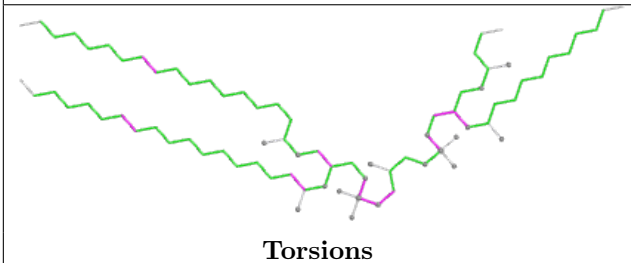
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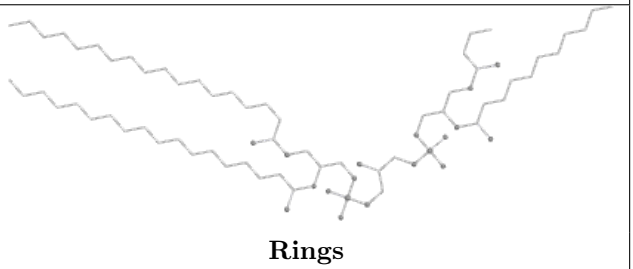
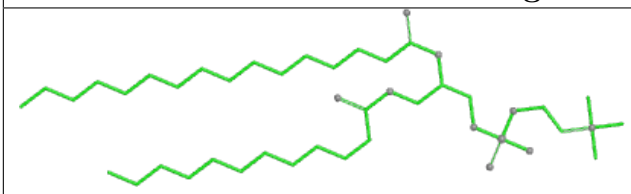

Rings

Ligand PC1 M 501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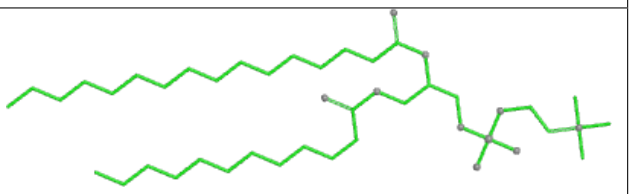
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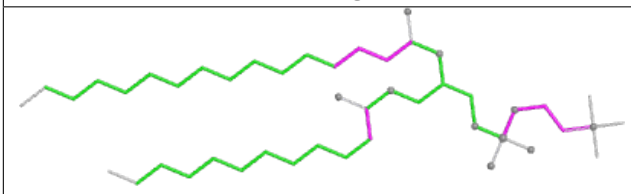
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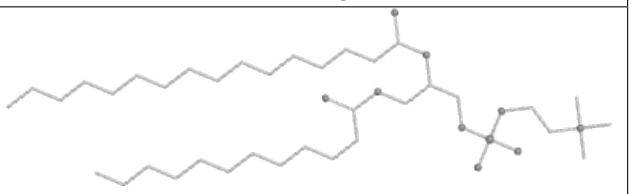
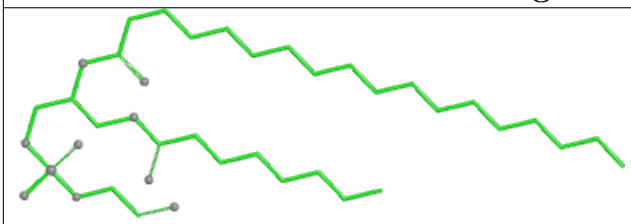

Rings

Ligand 3PE o 202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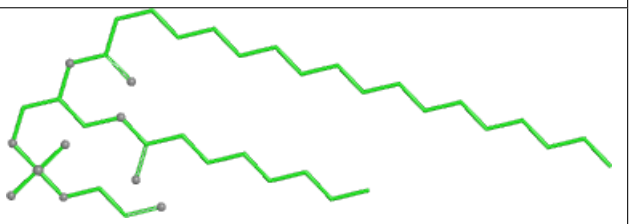
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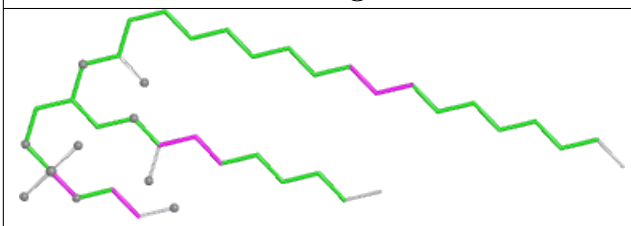
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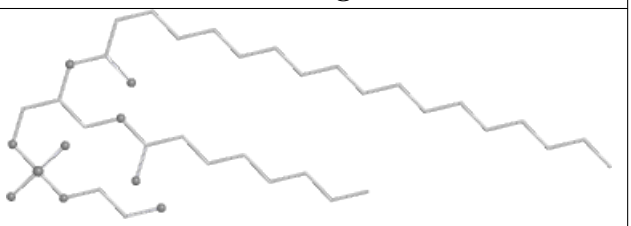
Rings

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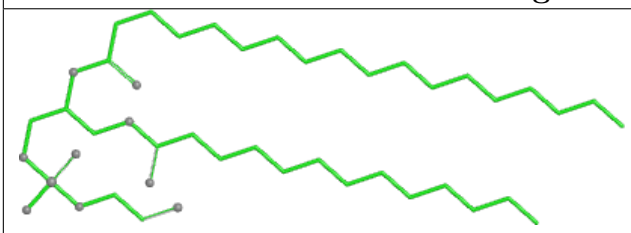
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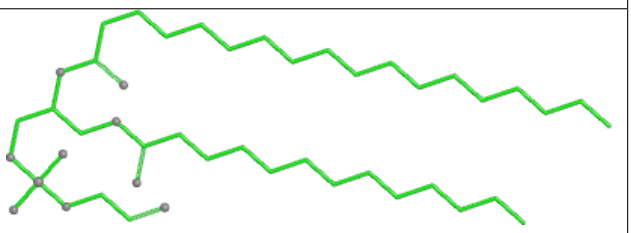
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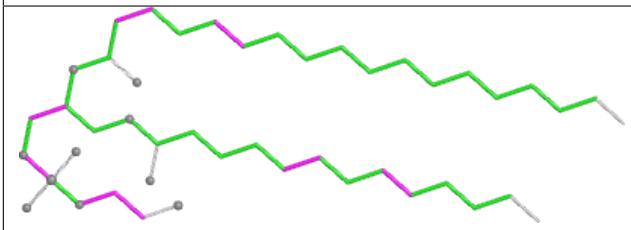
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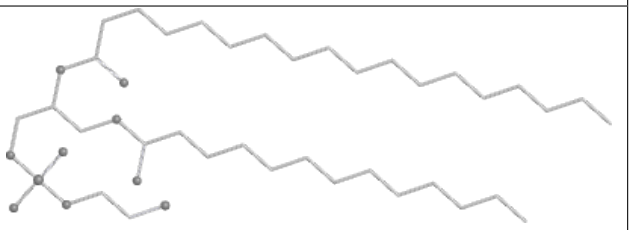
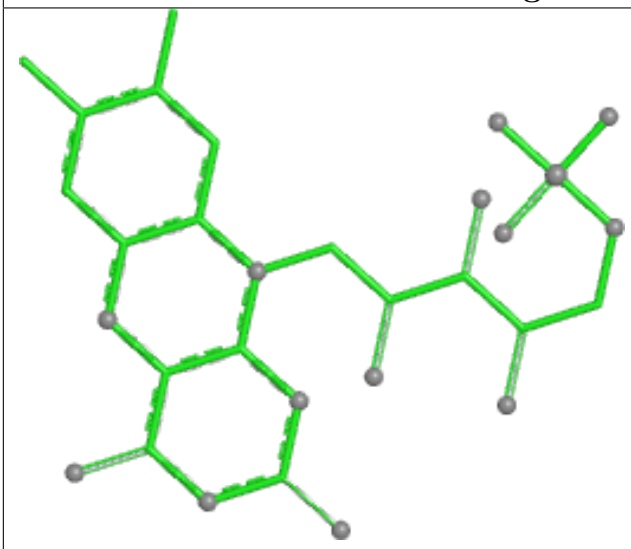
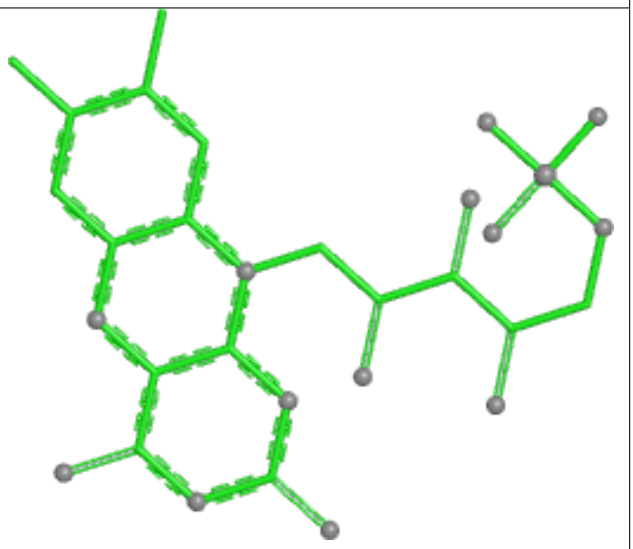

Rings

Ligand FMN 1 501



Bond lengths



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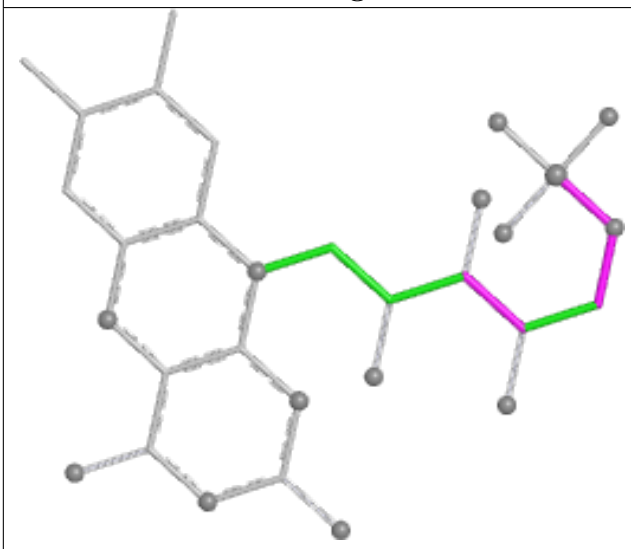

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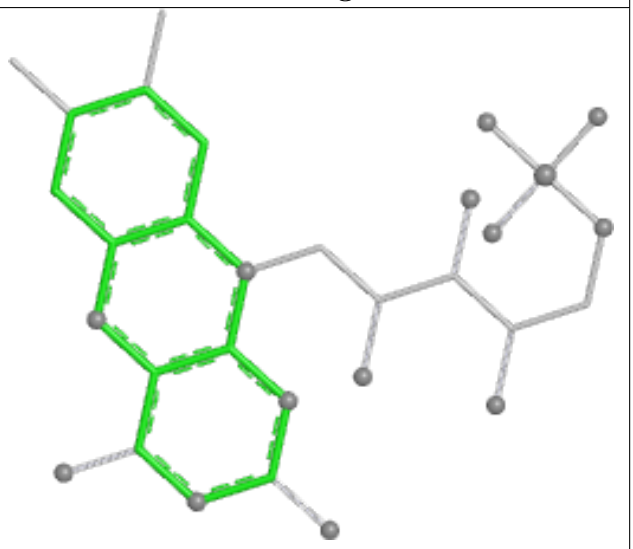
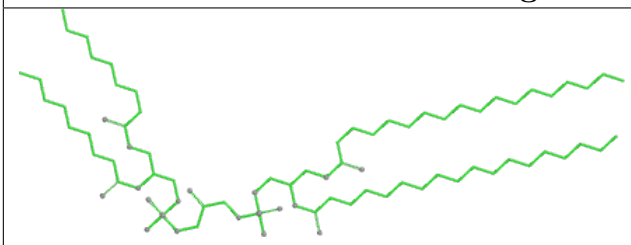


Rings

Ligand CDL M 502



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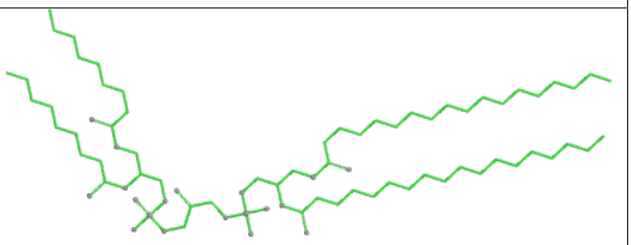

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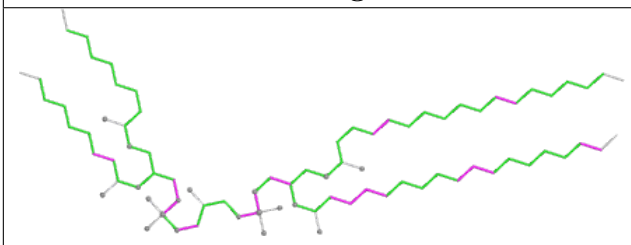

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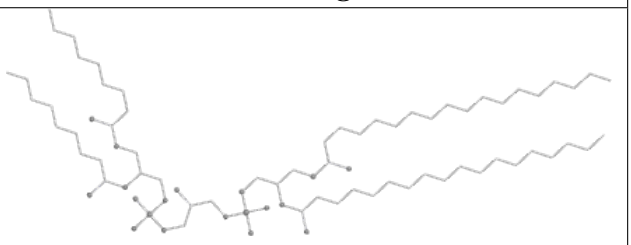
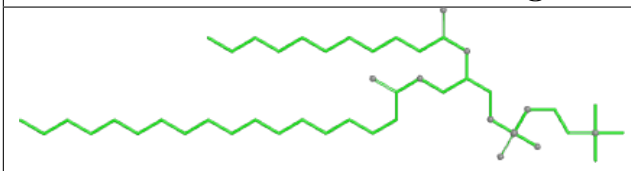
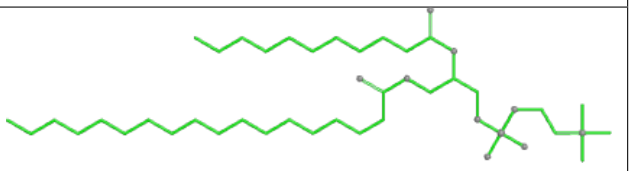


Rings

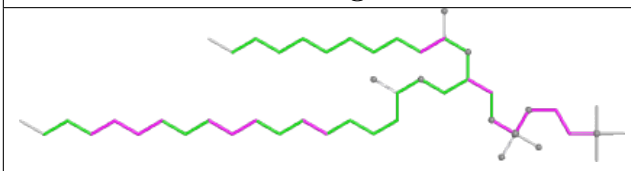
Ligand PC1 A 200



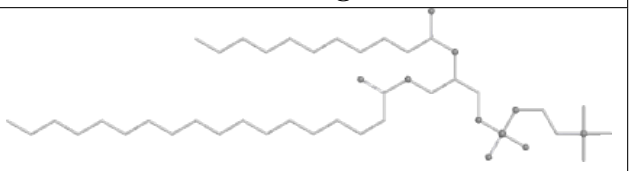
Bond lengths



Bond angles

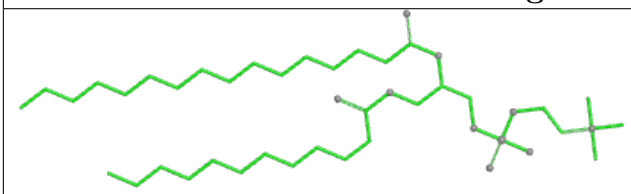


Torsions

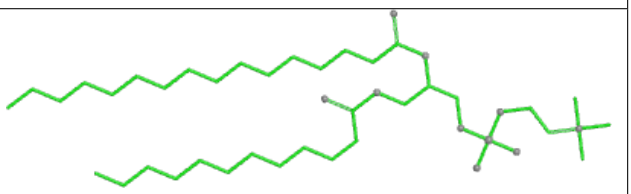


Rings

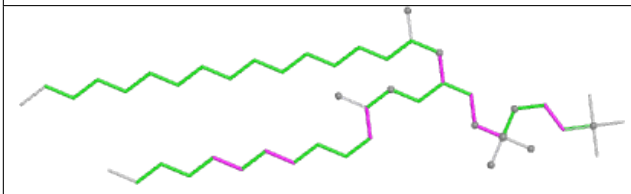
Ligand PC1 N 401



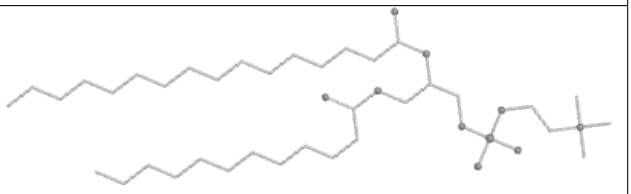
Bond lengths



Bond angles

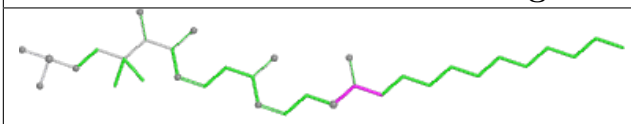


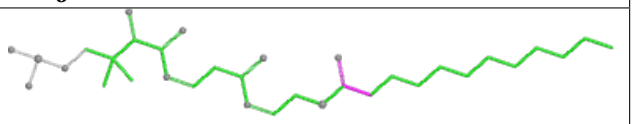
Torsions

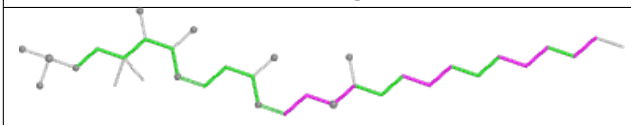


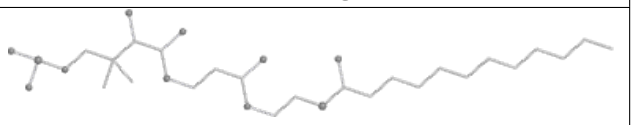
Rings

Ligand ZMP j 101

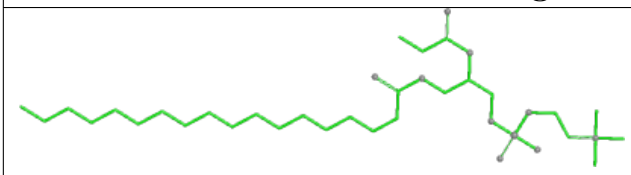

Bond lengths

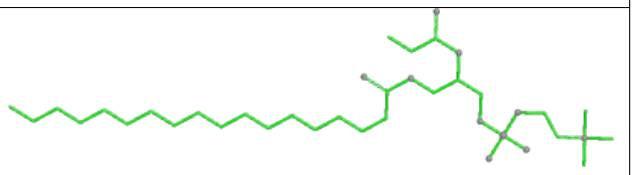

Bond angles

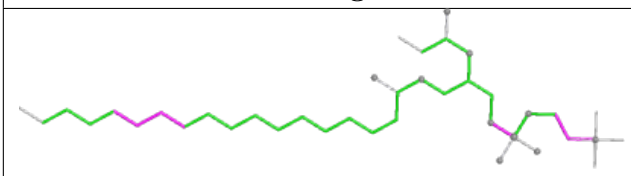

Torsions

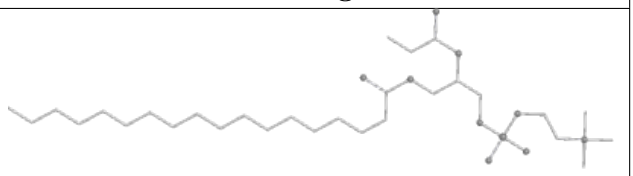

Rings

Ligand PC1 o 201

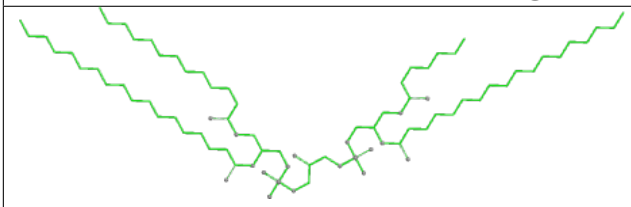

Bond lengths

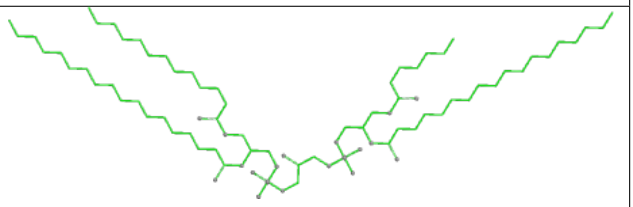

Bond angles

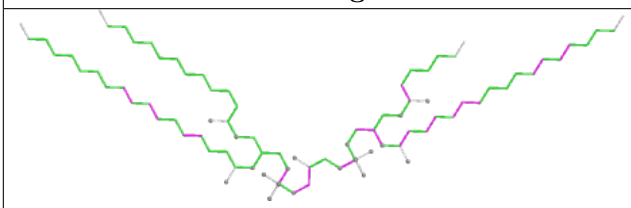

Torsions

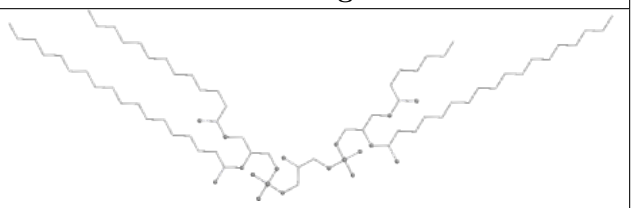

Rings

Ligand CDL L 601

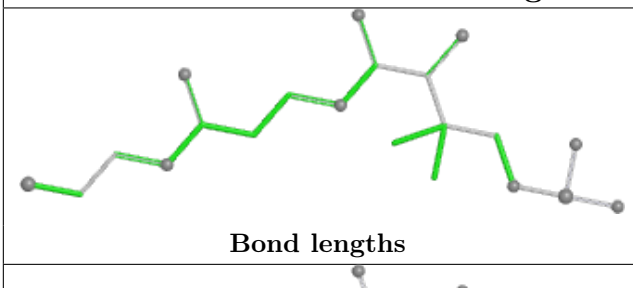

Bond lengths

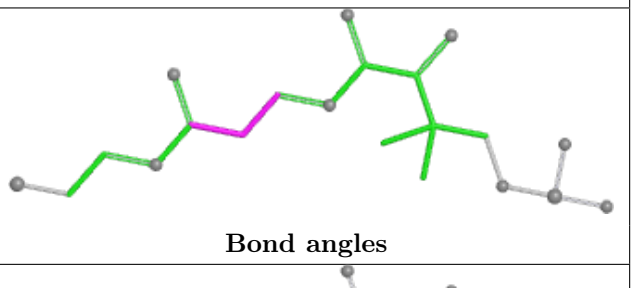

Bond angles

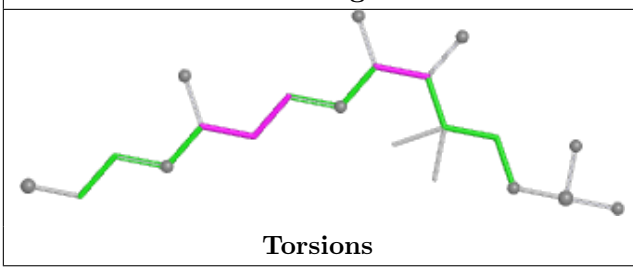

Torsions

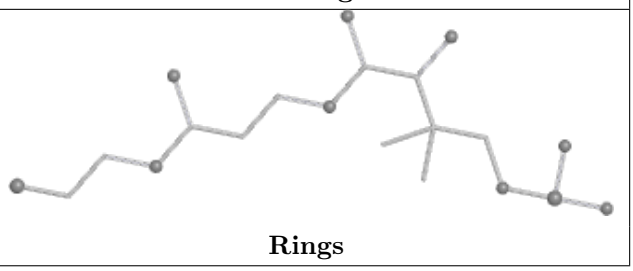

Rings

Ligand PNS X 401


Bond lengths


Bond angles


Torsions


Rings

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

The following chains have linkage breaks:

Mol	Chain	Number of breaks
25	k	1
9	N	1
19	e	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	k	174:VAL	C	175:PRO	N	1.18
1	N	304:MET	C	305:PHE	N	1.16
1	e	50:LEU	C	51:PRO	N	1.15

6 Map visualisation

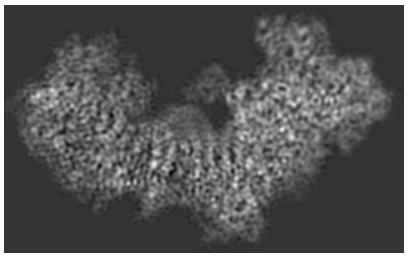
This section contains visualisations of the EMDB entry EMD-4093. These allow visual inspection of the internal detail of the map and identification of artifacts.

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.

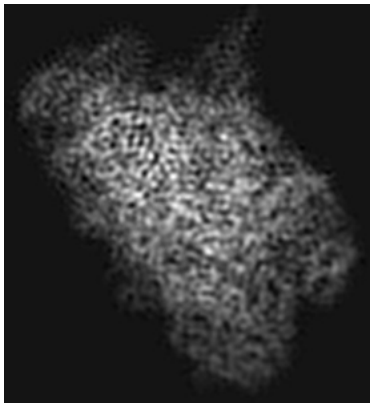
6.1 Orthogonal projections

6.1.1 Primary map

X



Y

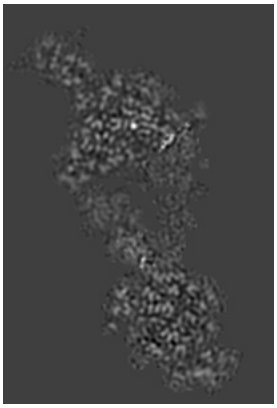


Z

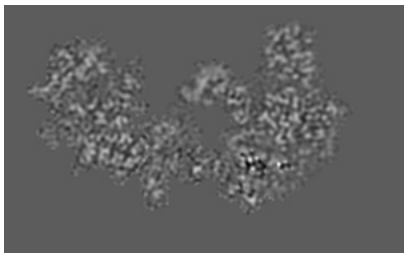
The images above show the map projected in three orthogonal directions.

6.2 Central slices

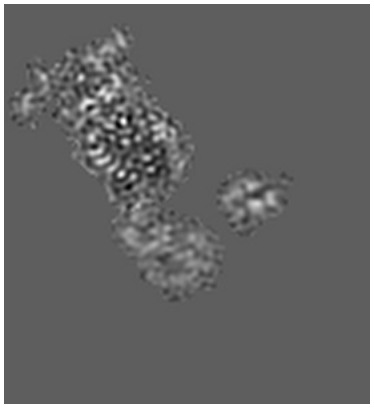
6.2.1 Primary map



X Index: 64



Y Index: 70

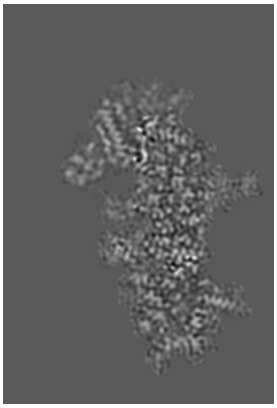


Z Index: 104

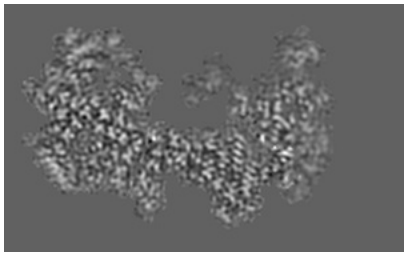
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

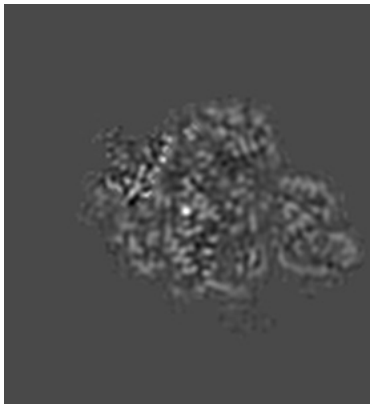
6.3.1 Primary map



X Index: 46



Y Index: 80

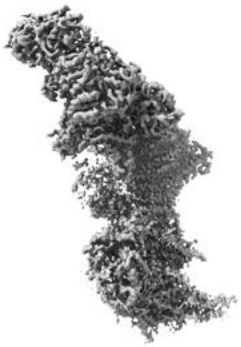


Z Index: 145

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

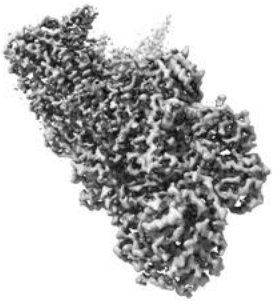
6.4 Orthogonal surface views (i)

6.4.1 Primary map



X

Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.15. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

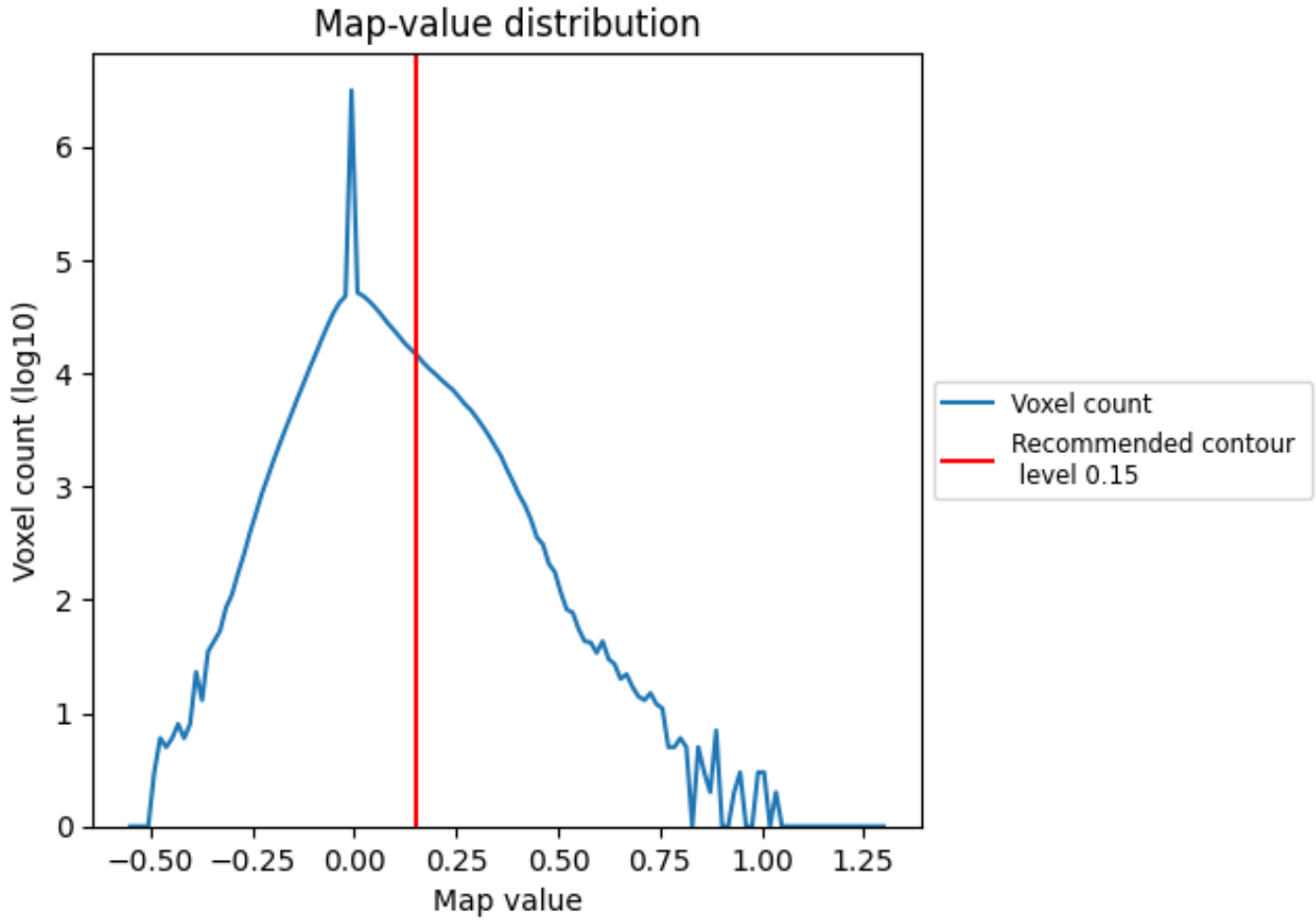
6.5 Mask visualisation (i)

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

7 Map analysis

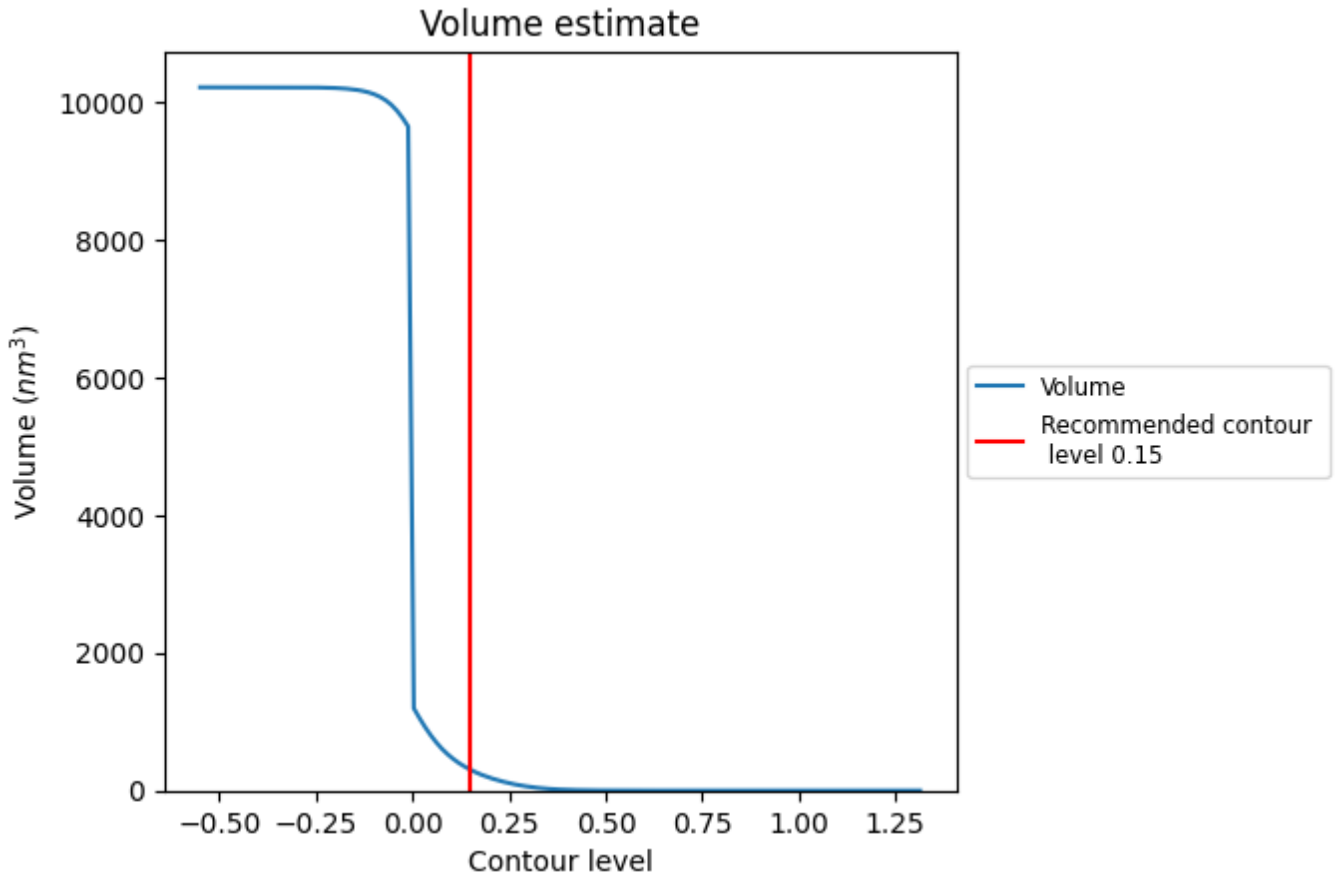
This section contains the results of statistical analysis of the map.

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



The volume at the recommended contour level is 304 nm^3; this corresponds to an approximate mass of 275 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

This section was not generated. The rotationally averaged power spectrum is only generated for cubic maps.

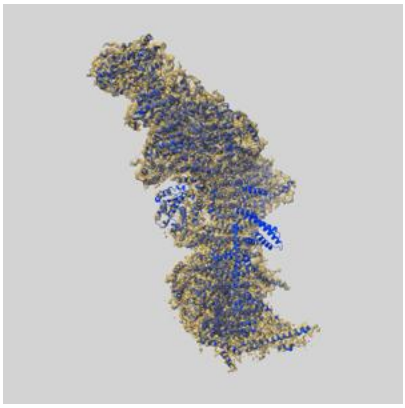
8 Fourier-Shell correlation

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

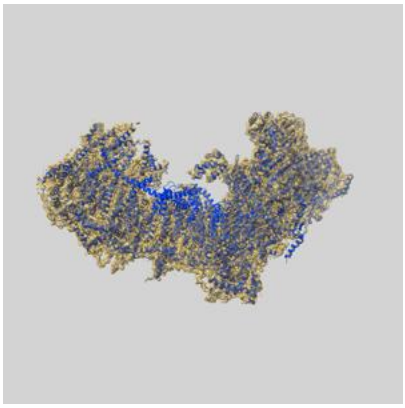
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-4093 and PDB model 5LNK. Per-residue inclusion information can be found in section 3 on page 18.

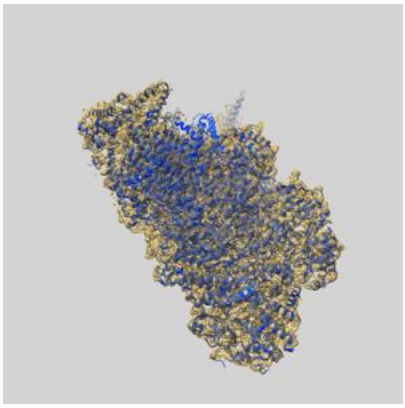
9.1 Map-model overlay



X



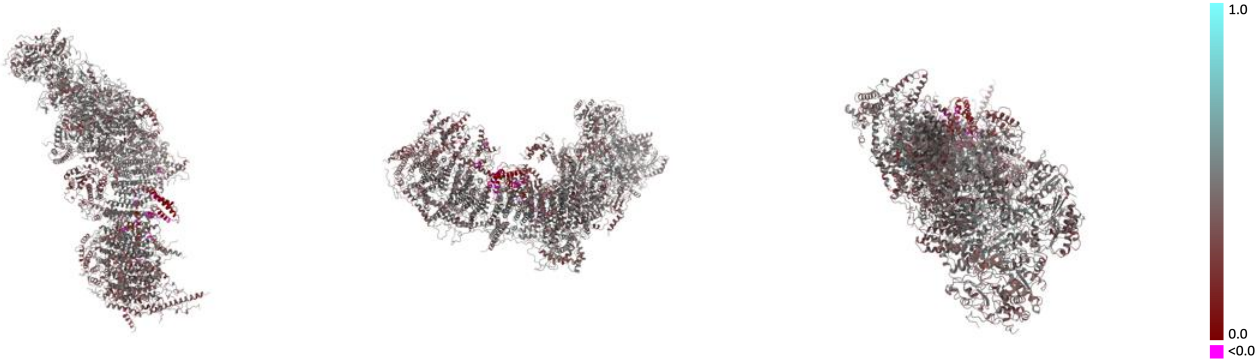
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.15 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.

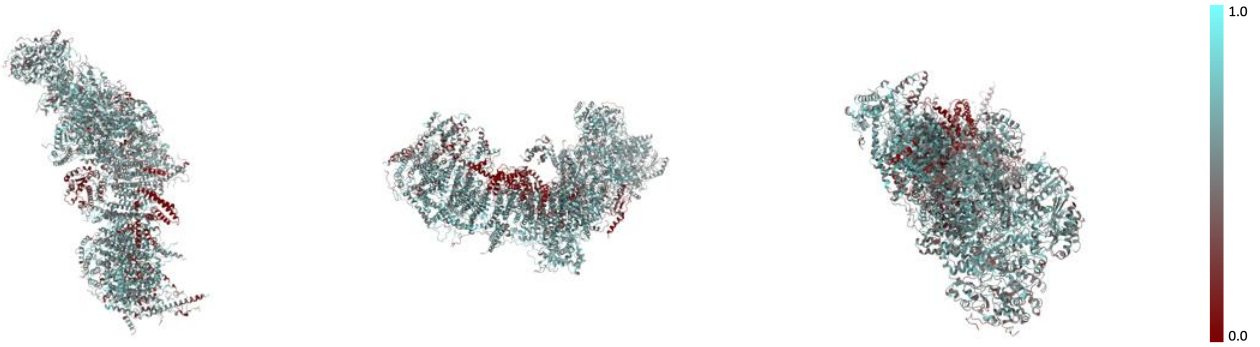
9.2 Q-score mapped to coordinate model



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.

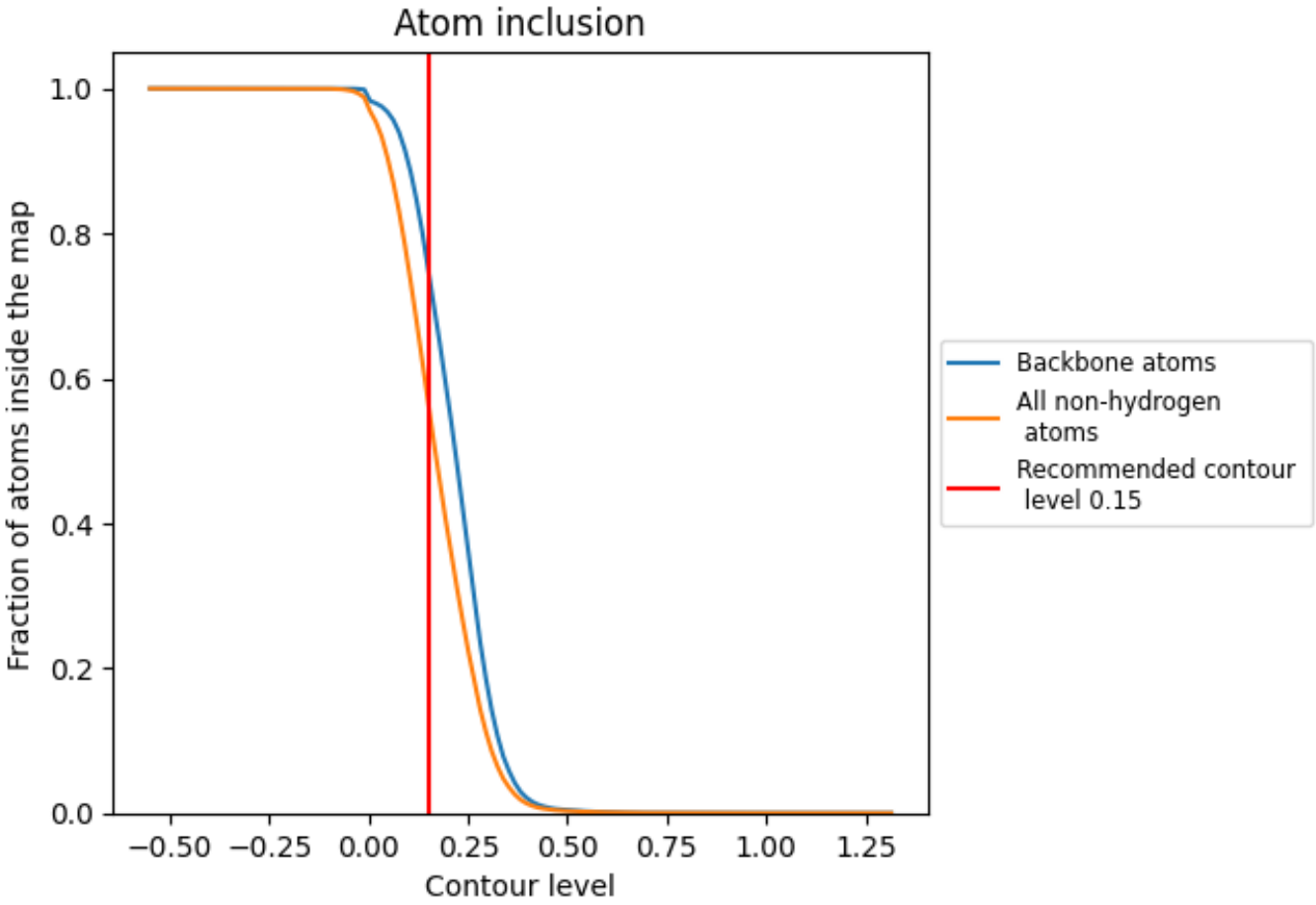
9.3 Atom inclusion mapped to coordinate model



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 (0.15).

9.4 Atom inclusion (i)



At the recommended contour level, 75% of all backbone atoms, 56% 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 (0.15) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5639	0.4080
1	0.5678	0.4170
2	0.5520	0.4100
3	0.5973	0.4350
4	0.5966	0.4320
5	0.6409	0.4560
6	0.6284	0.4200
9	0.6449	0.4310
A	0.5474	0.4270
H	0.6255	0.4320
J	0.4003	0.4110
K	0.5823	0.4330
L	0.5524	0.3890
M	0.6443	0.4460
N	0.6544	0.4480
V	0.0118	0.0190
W	0.6679	0.4390
X	0.5332	0.3640
Y	0.6240	0.4060
Z	0.6263	0.4120
a	0.5210	0.4050
b	0.5780	0.4570
c	0.5967	0.4570
d	0.5276	0.3940
e	0.5790	0.3900
f	0.5915	0.3920
g	0.5777	0.4250
h	0.4938	0.4070
i	0.3366	0.3900
j	0.4761	0.3610
k	0.3008	0.3100
l	0.6184	0.4400
m	0.6010	0.4360
n	0.5550	0.3680
o	0.5795	0.4420

Continued on next page...

Continued from previous page...

Chain	Atom inclusion	Q-score
p	0.4728	0.3660
q	0.5878	0.4050
r	0.5363	0.3660
s	0.5210	0.3630
t	0.6033	0.3700
u	0.5420	0.3750
v	0.4936	0.3360
w	0.6351	0.4340
x	0.5863	0.3870
y	0.5113	0.3860
z	0.6550	0.4260