W O R L D W I D E
wwPDB
P R O T E I N   D A T A   B A N K

wwPDB X-ray Structure Validation Summary Report (i)

Jun 13, 2024 – 12:06 AM EDT

PDB ID	:	1KB9
Title	:	YEAST CYTOCHROME BC1 COMPLEX
Authors	:	Lange, C.; Nett, J.H.; Trumpower, B.L.; Hunte, C.
Deposited on	:	2001-11-05
Resolution	:	2.30 Å(reported)

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

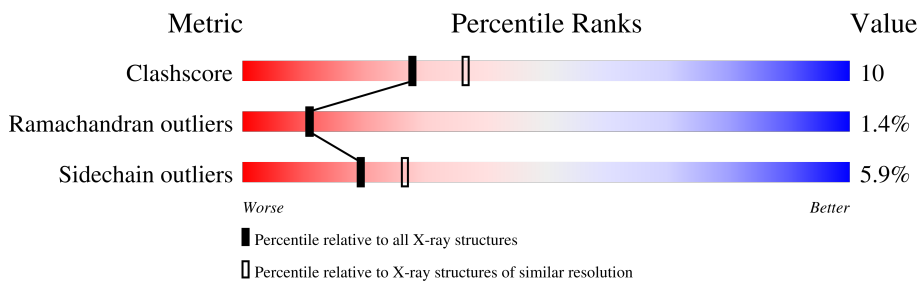|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

1   Overall quality at a glance   ⓘ

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

The reported resolution of this entry is 2.30 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	Percentile Ranks	Value
Clashscore		10
Ramachandran outliers		1.4%
Sidechain outliers		5.9%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

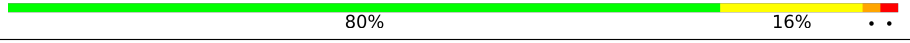| Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)

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

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	431	72% 26% •
2	B	352	63% 32% •
3	C	385	84% 14% •
4	D	246	84% 15% •
5	E	185	79% 20% •
6	F	74	78% 20% •
7	G	125	86% 12% •
8	H	93	74% 22% •

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WORLDWIDE
wwPDB
PROTEIN DATA BANK

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Mol	Chain	Length	Quality of chain
9	I	55	80% ... 16% ..
10	J	127	75% ... 20% ... 6%
11	K	107	64% ... 33% ..

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
15	SMA	C	505	X	-	-	-

2 Entry composition ⓘ

There are 21 unique types of molecules in this entry. The entry contains 18040 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX CORE PROTEIN I.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	431	Total 3343	C 2109	N 576	O 652	S 6	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	153	ASP	GLU	CONFLICT	UNP P07256

- Molecule 2 is a protein called UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX CORE PROTEIN 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	352	Total 2734	C 1747	N 453	O 533	S 1	0	0	0

- Molecule 3 is a protein called CYTOCHROME B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	385	Total 3088	C 2080	N 484	O 503	S 21	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	270	VAL	ASP	CONFLICT	UNP P00163

- Molecule 4 is a protein called CYTOCHROME C1, HEME PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	246	Total 1940	C 1237	N 334	O 360	S 9	0	0	0

- Molecule 5 is a protein called UBIQUINOL-CYTOCHROME C REDUCTASE IRON-SULFUR SUBUNIT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	E	185	Total 1410	C 893	N 242	O 265	S 10	0	0	0

- Molecule 6 is a protein called UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX 17 KD PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
6	F	74	Total 623	C 391	N 108	O 122	S 2	0	0	0

- Molecule 7 is a protein called UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX 14 KD PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
7	G	125	Total 1011	C 648	N 172	O 189	S 2	0	0	0

- Molecule 8 is a protein called UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX UBIQUINONE-BINDING PROTEIN QP-C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
8	H	93	Total 772	C 510	N 131	O 129	S 2	98	0	0

- Molecule 9 is a protein called UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX 7.3 KD PROTEIN.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
9	I	55	Total 449	C 298	N 75	O 76	0	0	0

- Molecule 10 is a protein called HEAVY CHAIN (VH) OF FV-FRAGMENT.

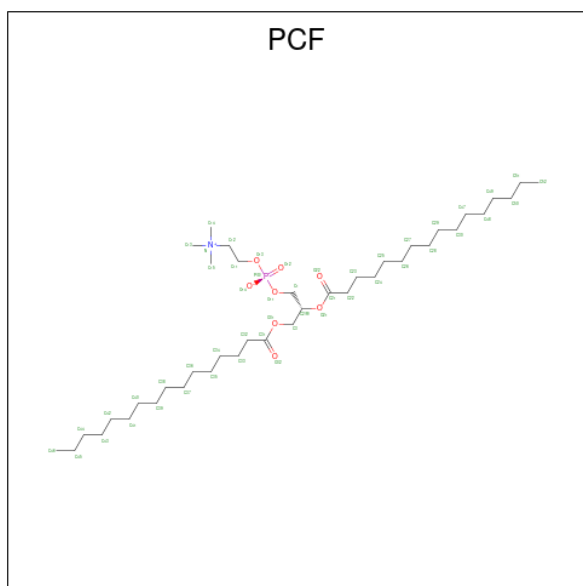| Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
10	J	127	Total 1015	C 644	N 167	O 201	S 3	0	0	0

- Molecule 11 is a protein called LIGHT CHAIN (VL) OF FV-FRAGMENT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
11	K	107	842	536	141	163	2	0	0	0

- Molecule 12 is 1,2-DIACYL-SN-GLYCERO-3-PHOSHOCHOLINE (three-letter code: PCF) (formula: $C_{40}H_{80}NO_8P$).
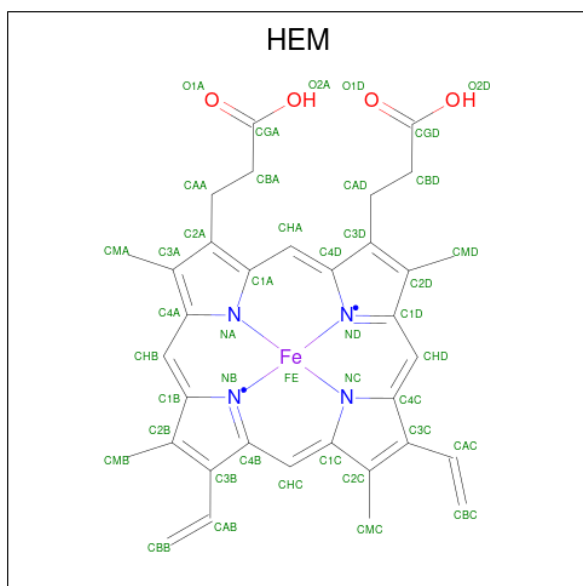

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
12	A	1	37	27	1	8	1	0	0

- Molecule 13 is UNDECYL-MALTOSIDE (three-letter code: UMQ) (formula: $C_{23}H_{44}O_{11}$).
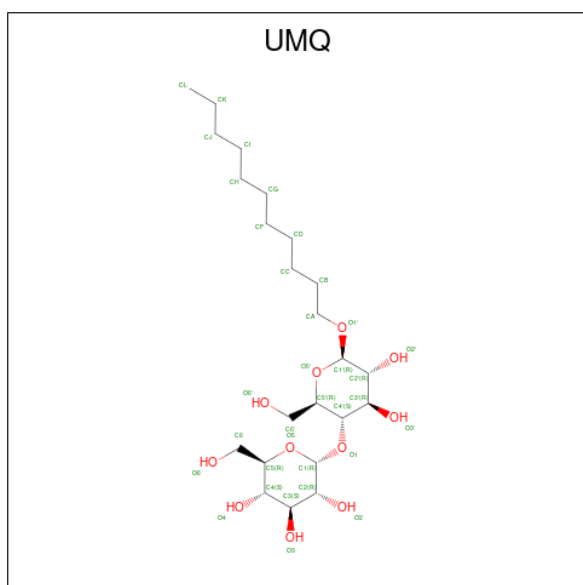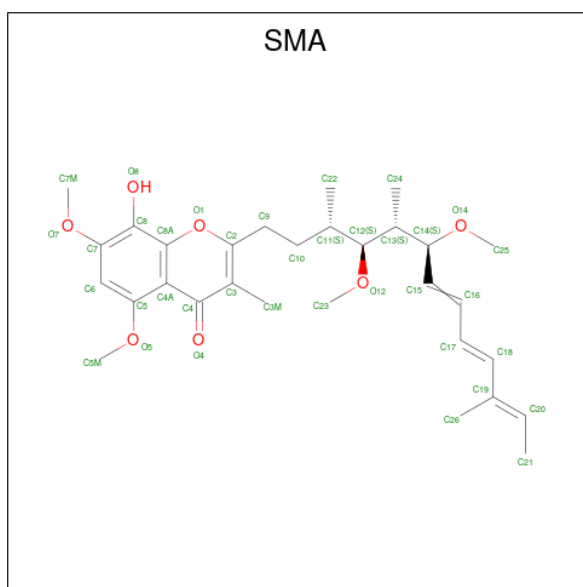
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
13	A	1	Total 34	C 23	O 11	0	0

- Molecule 14 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
14	C	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
14	C	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
14	D	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

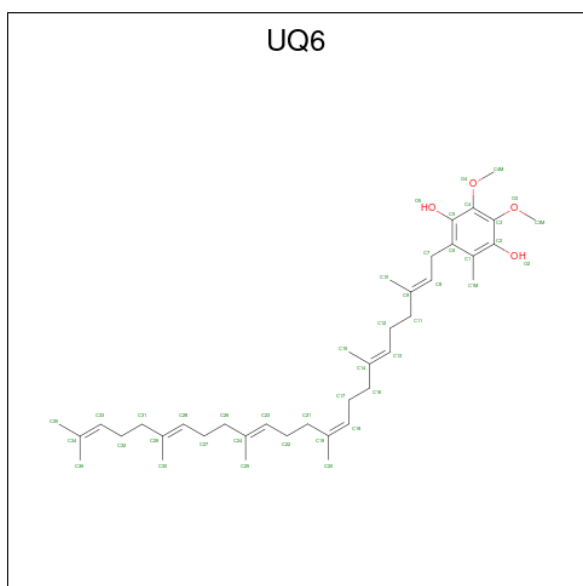- Molecule 15 is STIGMATELLIN A (three-letter code: SMA) (formula: $C_{30}H_{42}O_7$).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
15	C	1	Total	C	O	0	0
			37	30	7		

- Molecule 16 is 5-(3,7,11,15,19,23-HEXAMETHYL-TETRACOSA-2,6,10,14,18,22-HEX AENYL)-2,3-DIMETHOXY-6-METHYL-BENZENE-1,4-DIOL (three-letter code: UQ6) (formula: $C_{39}H_{60}O_4$).

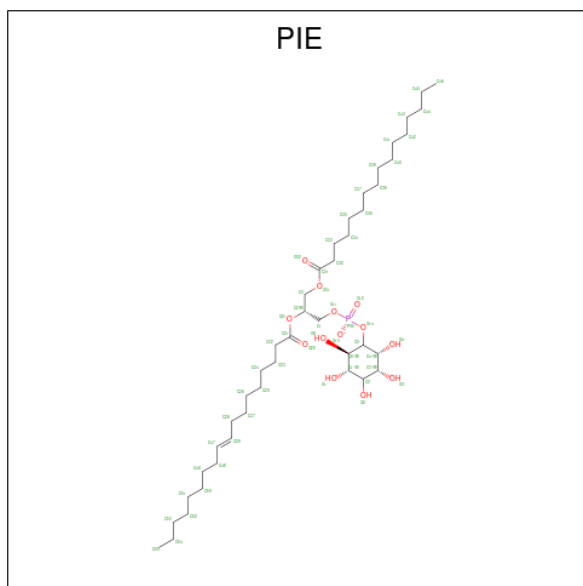| Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
16	C	1	Total	C	O	0	0
			43	39	4		

- Molecule 17 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOINOSITOL (three-letter code:

PIE) (formula: $C_{43}H_{80}O_{13}P$).

PIE

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
17	C	1	49	35	13	1	0	0

- Molecule 18 is DI-PALMITOYL-3-SN-PHOSPHATIDYLETHANOLAMINE (three-letter code: PEF) (formula: $C_{37}H_{74}NO_8P$).

PEF

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
18	C	1	45	35	1	8	1	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
18	C	1	38	28	1	8	1	0	0

- Molecule 19 is CARDIOLIPIN (three-letter code: CDL) (formula: $C_{81}H_{156}O_{17}P_2$).

CDL

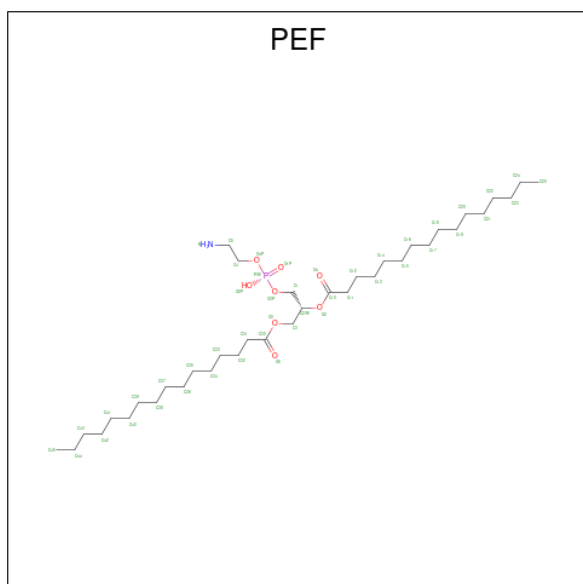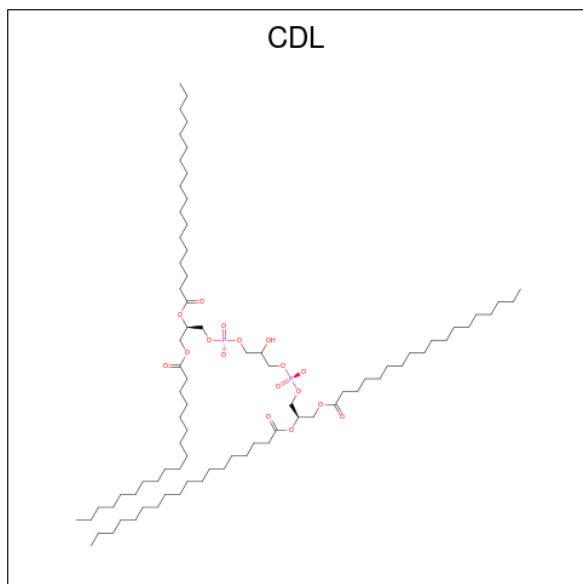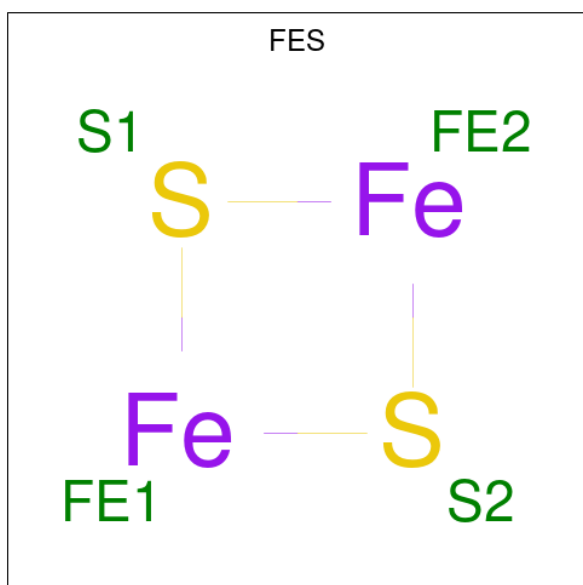| Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
19	C	1	76	57	17	2	0	0

- Molecule 20 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2).

FES

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
20	E	1	Total 4	Fe 2	S 2	0	0

- Molecule 21 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
21	A	45	Total 45	O 45	0	0
21	B	9	Total 9	O 9	0	0
21	C	106	Total 106	O 106	0	0
21	D	67	Total 67	O 67	0	0
21	E	28	Total 28	O 28	0	0
21	F	7	Total 7	O 7	0	0
21	G	36	Total 36	O 36	0	0
21	H	14	Total 14	O 14	0	0
21	I	2	Total 2	O 2	0	0
21	J	5	Total 5	O 5	0	0
21	K	2	Total 2	O 2	0	0

3 Residue-property plots ⓘ

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

Note EDS was not executed.

• Molecule 1: UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX CORE PROTEIN I
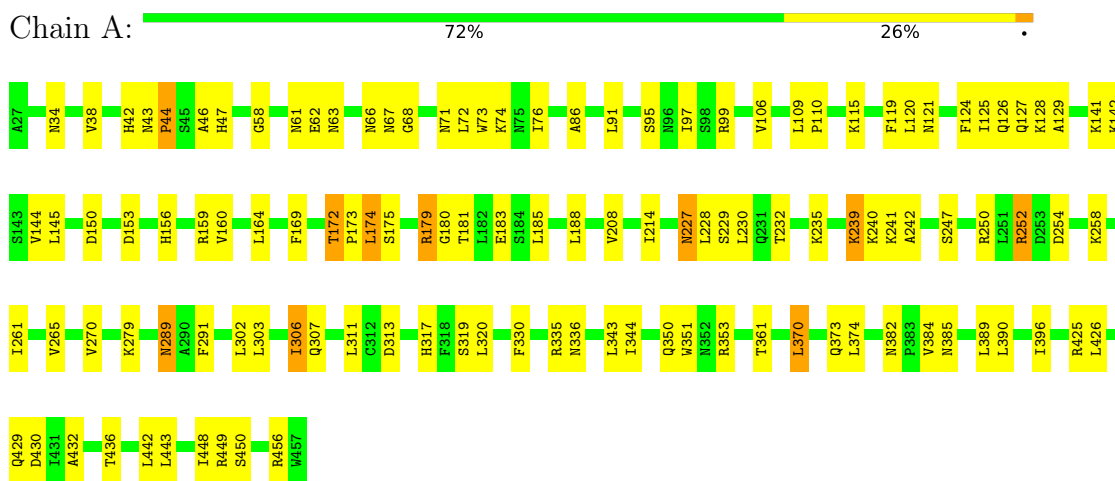
Chain A:

• Molecule 2: UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX CORE PROTEIN 2

Chain B:

• Molecule 3: CYTOCHROME B

Chain C:

M1 R4 N14 S15 Y16 I17 I18 Q22 S25 I26 N27 Y28 W29 L35 L38 C39 L40 I44 N57 I58 V72 H73 N74 R79 F89 K99 Y106 W114 L150 N173 P174 L182 H183 Y184 L185 N208 P209 L210 G214 R218

H222 S223 L230 M237 L238 H253 P254 D255 K288 V292 V304 T308 V312 V313 K319 K323 F329 N332 L335 L336 G337 Q338 I339 V346 P347 L350 A355 L377 R382 K385
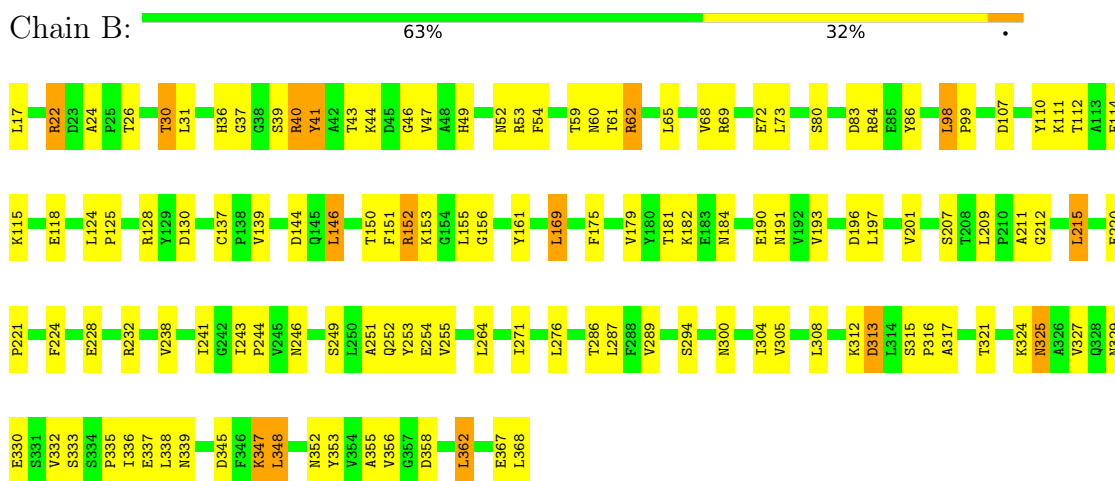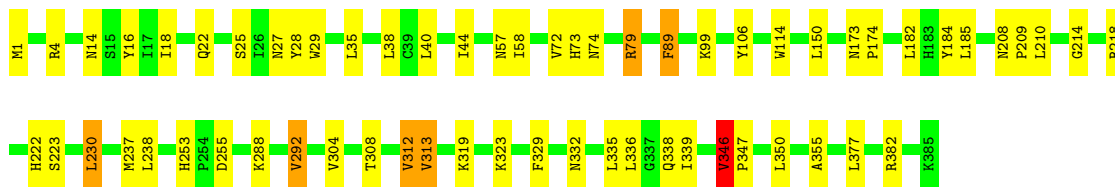
• Molecule 4: CYTOCHROME C1, HEME PROTEIN

Chain D:

84%   15%

M62 H67 G68 L69 Y74 H78 Y94 Q95 V96 R109 V110 A111 W112 R113 T121 E124 V125 M128 Y134 R147 P148 L151 Y154 I155 P156 S178 P203 V206 A207 L208 P209 I223 A224 M225 A226 R227 T244 M247 V251 N256

H263 K267 S279 L280 L283 W286 P304 P305 K306 P307
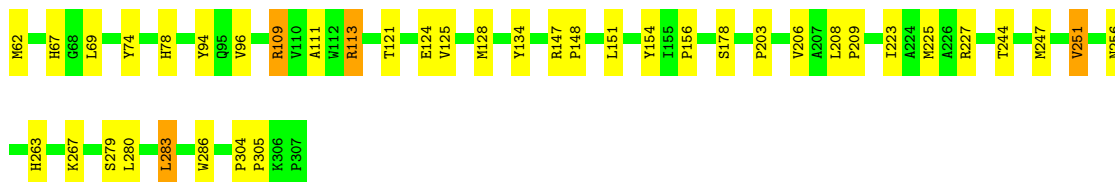
• Molecule 5: UBIQUINOL-CYTOCHROME C REDUCTASE IRON-SULFUR SUBUNIT

Chain E:

79%   20%

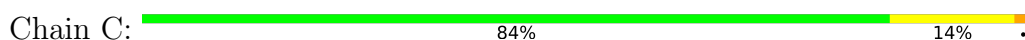K31 N38 F39 D40 L43 K44 E45 N46 G52 Y55 A56 Y57 F58 M59 K72 T85 M91 A92 K93 P102 L103 V107 P115 I118 R119 H120 E125 A129 R146 D149 P150 Q151 I158 G168 D172 W176 H181 H184 Y185

D186 I187 R190 I191 A196 I202 K211 G215
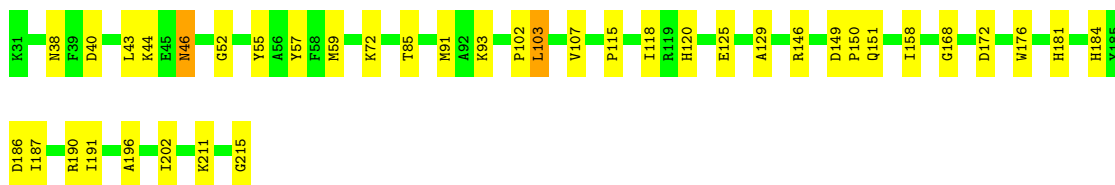
• Molecule 6: UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX 17 KD PROTEIN

Chain F:

78%   20%

V74 T75 D76 Q77 L78 R82 K86 G91 L94 V95 E99 E100 C101 V105 L117 L130 A139 L142 K147

• Molecule 7: UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX 14 KD PROTEIN

Chain G:

86%   12%

Q3 S4 F5 I15 L16 L21 Q31 L43 L48 N53 M56 R71 R77 A78 H79 H85 H86 L87 L88 L120 I123 K127

• Molecule 8: UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX UBIQUINONE-BINDING PROTEIN QP-C

Chain H:

74%   22%

G2 M16 V29 S30 P31 K35 P36 L37 Q38 F41 V45 R51 F52 Q55 F56 L60 I61 P62 I65 Y68 W69 W70 N77 E88 L89 N93 V94
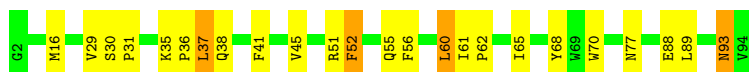
• Molecule 9: UBIQUINOL-CYTOCHROME C REDUCTASE COMPLEX 7.3 KD PROTEIN

Chain I:

80%　　　　　　16%

S4 S5 L6 Y7 K8 T9 K12 R13 N14 V18 A23 V27 F28 Q29 L48 A58

• Molecule 10: HEAVY CHAIN (VH) OF FV-FRAGMENT

Chain J:

75%　　　　　　20%　　　6%

E1 E6 S7 L11 T21 V24 I29 G32 Y33 W37 I38 L46 E47 W48 V49 G50 Y51 N54 D57 N61 P62 S63 L68 N77 Q78 F79 T87 T88 E89 C96 A97 R98 S99 M109 Q114 R125 H126 P127

• Molecule 11: LIGHT CHAIN (VL) OF FV-FRAGMENT

Chain K:

64%　　　　　　33%

D1 I2 E3 L4 T5 Q6 G16 D17 R18 I21 S22 C23 R24 Q27 D28 I29 N30 N31 F32 L33 N34 W35 Y36 Q37 Q38 L47 I48 Y49 Y50 T51 H55 V58 G68 T69 D70 Y71 E79 P80 E81 D82 I83 A84 C88 Q89 I92 K93 K107
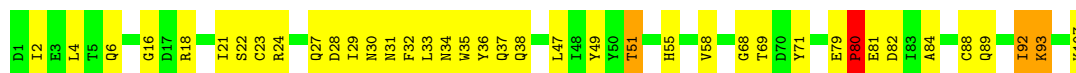
4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	214.47Å 163.92Å 147.28Å 90.00° 117.50° 90.00°	Depositor
Resolution (Å)	14.96 – 2.30	Depositor
% Data completeness (in resolution range)	84.7 (14.96-2.30)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.218 , 0.249	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	18040	wwPDB-VP
Average B, all atoms (Å^2)	69.0	wwPDB-VP

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: SMA, CDL, HEM, PCF, PIE, UQ6, FES, UMQ, PEF

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$|Z|$>5	RMSZ	#$|Z|$>5
1	A	0.34	0/3404	0.58	0/4614
2	B	0.31	0/2780	0.57	0/3764
3	C	0.45	0/3190	0.65	2/4353 (0.0%)
4	D	0.35	0/2001	0.60	0/2726
5	E	0.34	0/1443	0.61	0/1957
6	F	0.33	0/637	0.51	0/858
7	G	0.35	0/1031	0.62	1/1397 (0.1%)
8	H	0.39	0/803	0.52	0/1088
9	I	0.40	0/462	0.48	0/622
10	J	0.33	0/1043	0.61	1/1422 (0.1%)
11	K	0.31	0/863	0.53	0/1172
All	All	0.36	0/17657	0.59	4/23973 (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
4	D	0	1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
10	J	32	GLY	N-CA-C	5.55	126.98	113.10
3	C	79	ARG	NE-CZ-NH1	-5.46	117.57	120.30
7	G	71	ARG	NE-CZ-NH1	-5.33	117.63	120.30
3	C	346	VAL	N-CA-C	5.12	124.83	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
4	D	94	TYR	Sidechain

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3343	0	3321	72	0
2	B	2734	0	2774	80	0
3	C	3088	0	3125	40	0
4	D	1940	0	1862	22	0
5	E	1410	0	1386	30	0
6	F	623	0	581	11	0
7	G	1011	0	1026	14	0
8	H	772	0	736	16	0
9	I	449	0	445	9	0
10	J	1015	0	959	25	0
11	K	842	0	820	24	0
12	A	37	0	48	9	0
13	A	34	0	44	4	0
14	C	86	0	60	4	0
14	D	43	0	30	0	0
15	C	37	0	40	4	0
16	C	43	0	58	11	0
17	C	49	0	58	2	0
18	C	83	0	118	3	0
19	C	76	0	99	5	0
20	E	4	0	0	1	0
21	A	45	0	0	0	0
21	B	9	0	0	0	0
21	C	106	0	0	1	0
21	D	67	0	0	1	0
21	E	28	0	0	0	0
21	F	7	0	0	0	0
21	G	36	0	0	2	0
21	H	14	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
21	I	2	0	0	0	0
21	J	5	0	0	0	0
21	K	2	0	0	0	0
All	All	18040	0	17590	348	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 10.

The worst 5 of 348 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:F:77:GLN:H	6:F:77:GLN:HE21	1.03	1.01
11:K:31:ASN:HD22	11:K:51:THR:HG21	1.31	0.95
16:C:506:UQ6:H103	16:C:506:UQ6:H1M1	1.51	0.92
2:B:347:LYS:H	2:B:347:LYS:HD3	1.37	0.88
1:A:317:HIS:HE1	1:A:351:TRP:HE1	1.25	0.85

There are no symmetry-related clashes.

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 X-ray entries followed by that with respect to entries of similar resolution.

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	429/431 (100%)	397 (92%)	28 (6%)	4 (1%)	17	20
2	B	350/352 (99%)	311 (89%)	31 (9%)	8 (2%)	6	5
3	C	383/385 (100%)	369 (96%)	12 (3%)	2 (0%)	29	35
4	D	244/246 (99%)	237 (97%)	7 (3%)	0	100	100
5	E	183/185 (99%)	171 (93%)	9 (5%)	3 (2%)	9	9
6	F	72/74 (97%)	69 (96%)	3 (4%)	0	100	100
7	G	123/125 (98%)	121 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles		
8	H	91/93 (98%)	79 (87%)	7 (8%)	5 (6%)	2	1	
9	I	53/55 (96%)	50 (94%)	1 (2%)	2 (4%)	3	1	
10	J	125/127 (98%)	111 (89%)	12 (10%)	2 (2%)	9	9	
11	K	105/107 (98%)	89 (85%)	11 (10%)	5 (5%)	2	1	
All	All	2158/2180 (99%)	2004 (93%)	123 (6%)	31 (1%)	11	11	

5 of 31 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	335	PRO
3	C	223	SER
5	E	103	LEU
8	H	93	ASN
2	B	153	LYS

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 X-ray entries followed by that with respect to entries of similar resolution.

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	370/370 (100%)	342 (92%)	28 (8%)	13	16
2	B	301/301 (100%)	278 (92%)	23 (8%)	13	16
3	C	338/338 (100%)	320 (95%)	18 (5%)	22	31
4	D	204/204 (100%)	197 (97%)	7 (3%)	37	51
5	E	151/151 (100%)	148 (98%)	3 (2%)	55	72
6	F	67/67 (100%)	63 (94%)	4 (6%)	19	26
7	G	109/109 (100%)	104 (95%)	5 (5%)	27	38
8	H	77/77 (100%)	73 (95%)	4 (5%)	23	32
9	I	45/45 (100%)	41 (91%)	4 (9%)	9	11
10	J	112/112 (100%)	104 (93%)	8 (7%)	14	19
11	K	93/93 (100%)	86 (92%)	7 (8%)	13	17
All	All	1867/1867 (100%)	1756 (94%)	111 (6%)	19	27

5 of 111 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	C	182	LEU
11	K	107	LYS
4	D	113	ARG
11	K	93	LYS
10	J	57	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 60 such sidechains are listed below:

Mol	Chain	Res	Type
3	C	14	ASN
11	K	31	ASN
4	D	78	HIS
10	J	114	GLN
11	K	91	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 ⓘ

12 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
14	HEM	D	503	4	41,50,50	1.43	4 (9%)	45,82,82	1.08	3 (6%)
18	PEF	C	513	-	37,37,46	0.71	0	40,42,51	0.97	1 (2%)
14	HEM	C	502	3	41,50,50	1.28	7 (17%)	45,82,82	1.06	3 (6%)
18	PEF	C	510	-	44,44,46	0.71	0	47,49,51	1.07	2 (4%)
13	UMQ	A	521	-	35,35,35	0.95	1 (2%)	46,46,46	1.45	7 (15%)
12	PCF	A	514	-	36,36,49	1.59	1 (2%)	42,44,57	1.27	2 (4%)
19	CDL	C	511	-	75,75,99	1.06	5 (6%)	81,87,111	1.13	5 (6%)
20	FES	E	504	5	0,4,4	-	-	-		
15	SMA	C	505	-	38,38,38	1.54	7 (18%)	48,52,52	2.01	11 (22%)
14	HEM	C	501	3	41,50,50	1.47	7 (17%)	45,82,82	1.08	1 (2%)
16	UQ6	C	506	-	43,43,43	2.46	14 (32%)	51,55,55	2.06	19 (37%)
17	PIE	C	508	-	49,49,57	2.15	9 (18%)	59,61,69	1.66	8 (13%)

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
14	HEM	D	503	4	-	4/12/54/54	-
18	PEF	C	513	-	-	13/41/41/50	-
14	HEM	C	502	3	-	4/12/54/54	-
18	PEF	C	510	-	-	24/48/48/50	-
13	UMQ	A	521	-	-	5/20/60/60	0/2/2/2
12	PCF	A	514	-	-	15/40/40/53	-
19	CDL	C	511	-	-	38/86/86/110	-
20	FES	E	504	5	-	-	0/1/1/1
15	SMA	C	505	-	2/2/5/10	21/34/34/34	0/2/2/2
14	HEM	C	501	3	-	5/12/54/54	-
16	UQ6	C	506	-	-	14/39/39/39	0/1/1/1
17	PIE	C	508	-	-	16/44/68/76	0/1/1/1

The worst 5 of 55 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
17	C	508	PIE	P-O14	-11.15	1.31	1.60
12	A	514	PCF	O13-C11	-8.51	1.09	1.44

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
16	C	506	UQ6	C7-C6	6.75	1.59	1.51
16	C	506	UQ6	O5-C5	-5.62	1.23	1.37
16	C	506	UQ6	O2-C2	-5.40	1.24	1.37

The worst 5 of 62 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
17	C	508	PIE	P-O14-C5'	7.43	146.45	119.41
16	C	506	UQ6	C3M-O3-C3	6.82	133.47	114.78
15	C	505	SMA	C26-C19-C18	-6.21	108.28	118.08
15	C	505	SMA	O14-C14-C15	5.85	129.90	111.05
12	A	514	PCF	C3-C2-C1	-5.63	98.47	111.79

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
15	C	505	SMA	C12
15	C	505	SMA	C14

5 of 159 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
12	A	514	PCF	C11-O13-P-O12
15	C	505	SMA	C11-C12-C13-C24
15	C	505	SMA	O12-C12-C13-C14
15	C	505	SMA	O12-C12-C13-C24
15	C	505	SMA	C15-C14-O14-C25

There are no ring outliers.

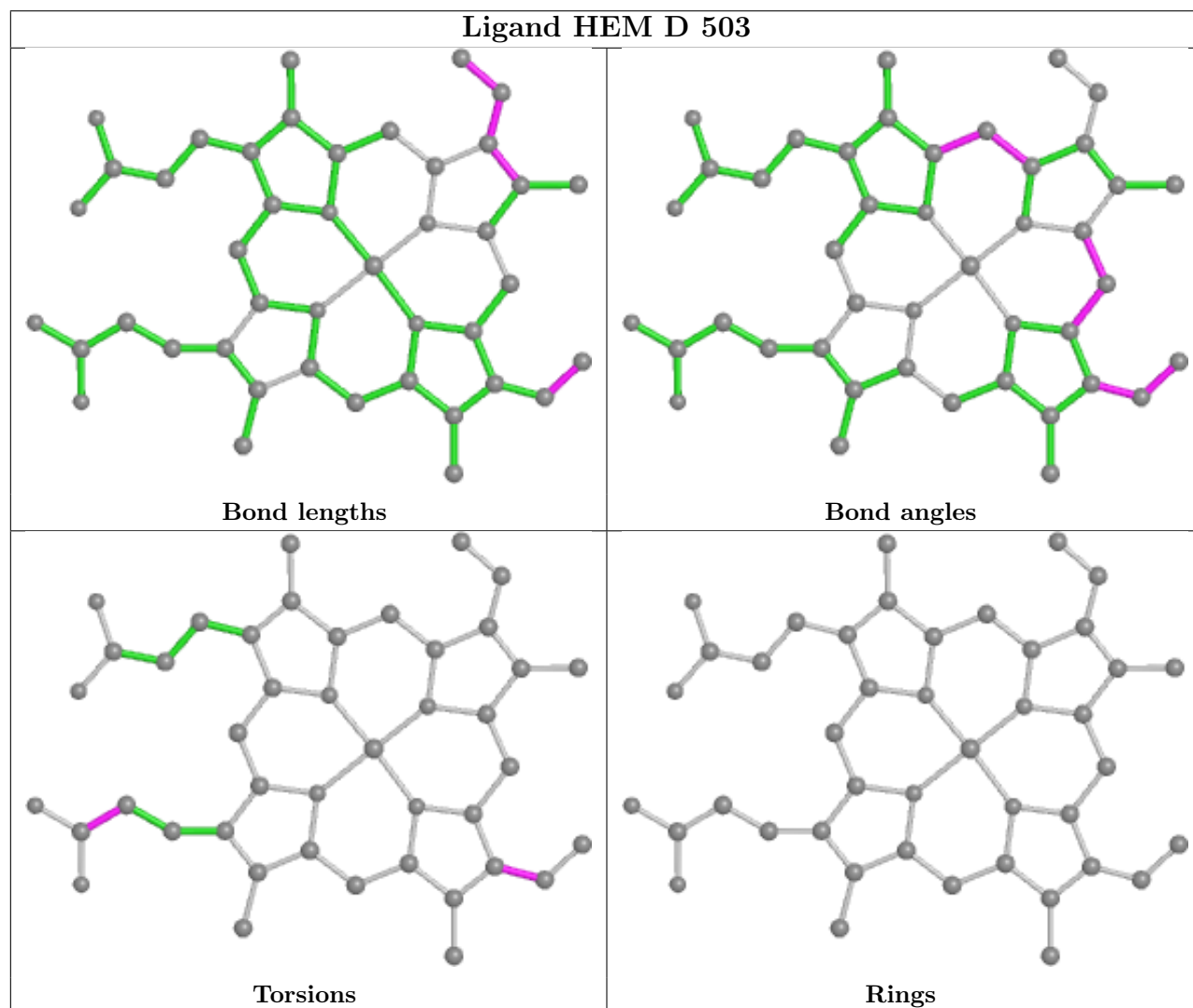10 monomers are involved in 39 short contacts:

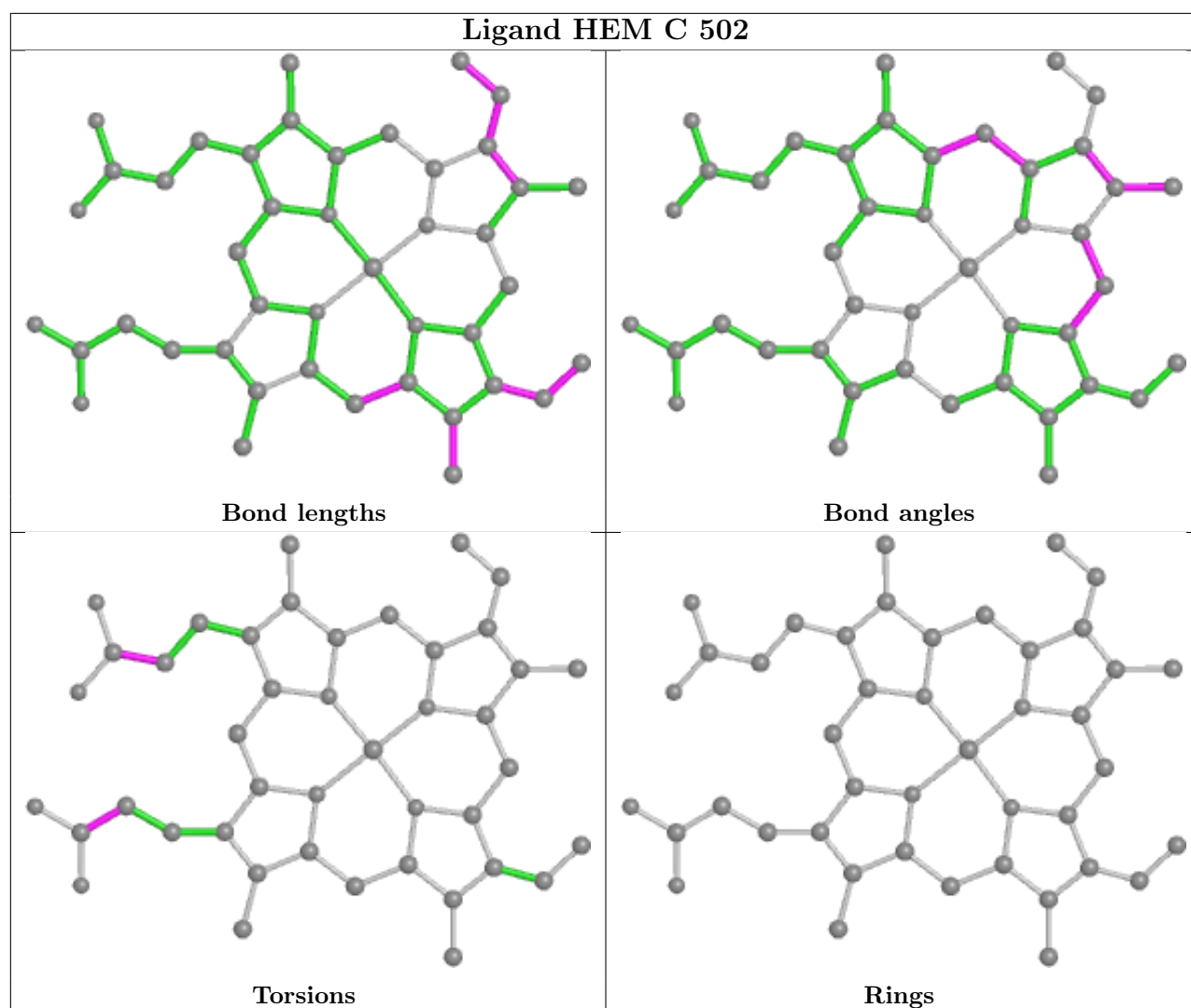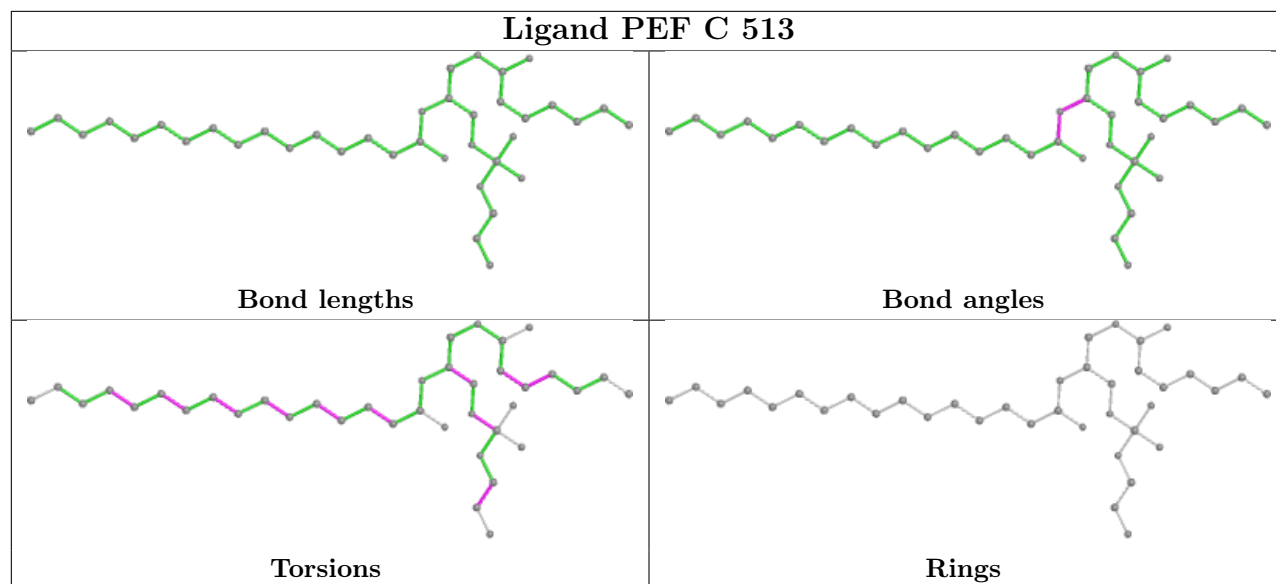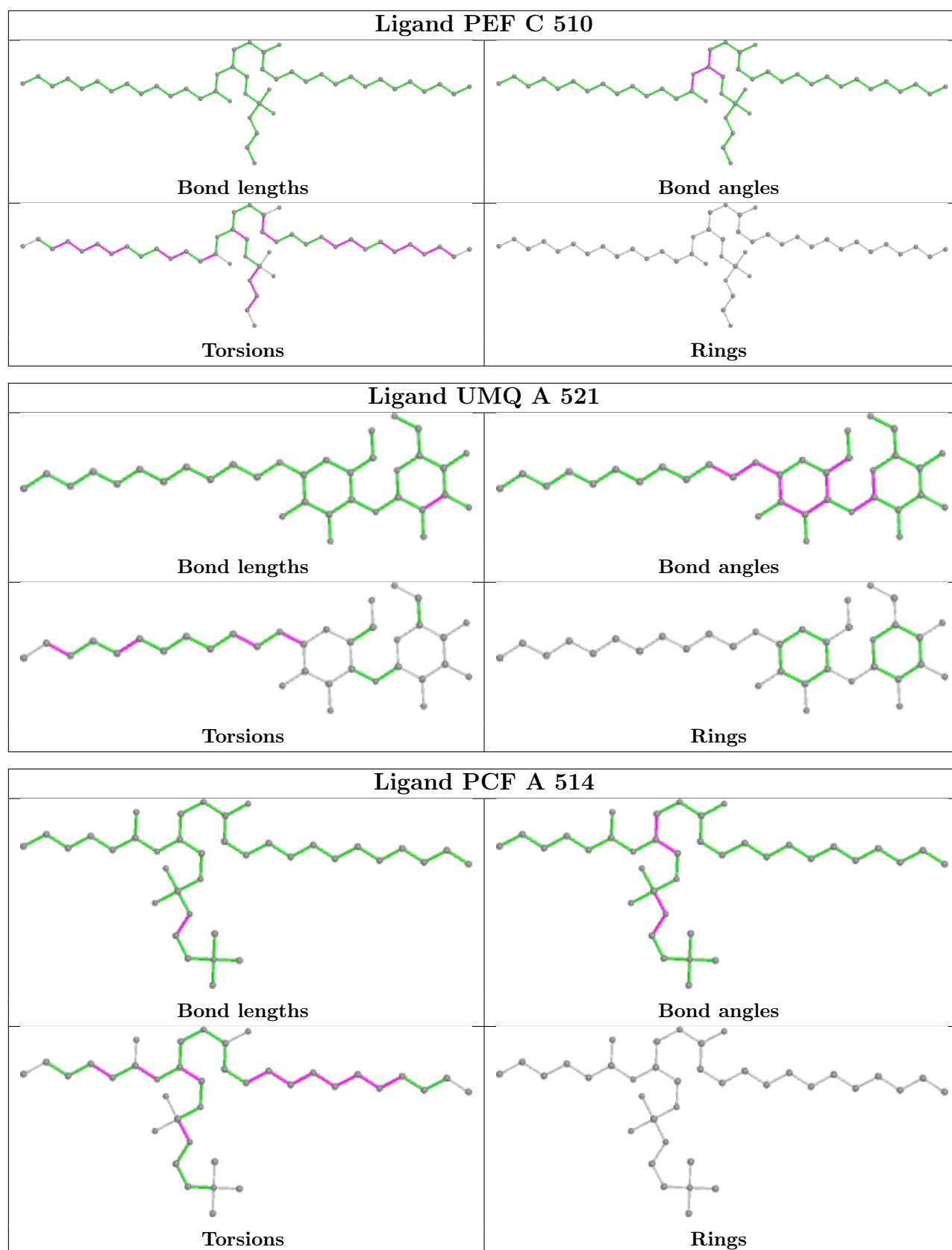| Mol	Chain	Res	Type	Clashes	Symm-Clashes
14	C	502	HEM	1	0
18	C	510	PEF	3	0
13	A	521	UMQ	4	0
12	A	514	PCF	9	0
19	C	511	CDL	5	0
20	E	504	FES	1	0
15	C	505	SMA	4	0
14	C	501	HEM	3	0
16	C	506	UQ6	11	0

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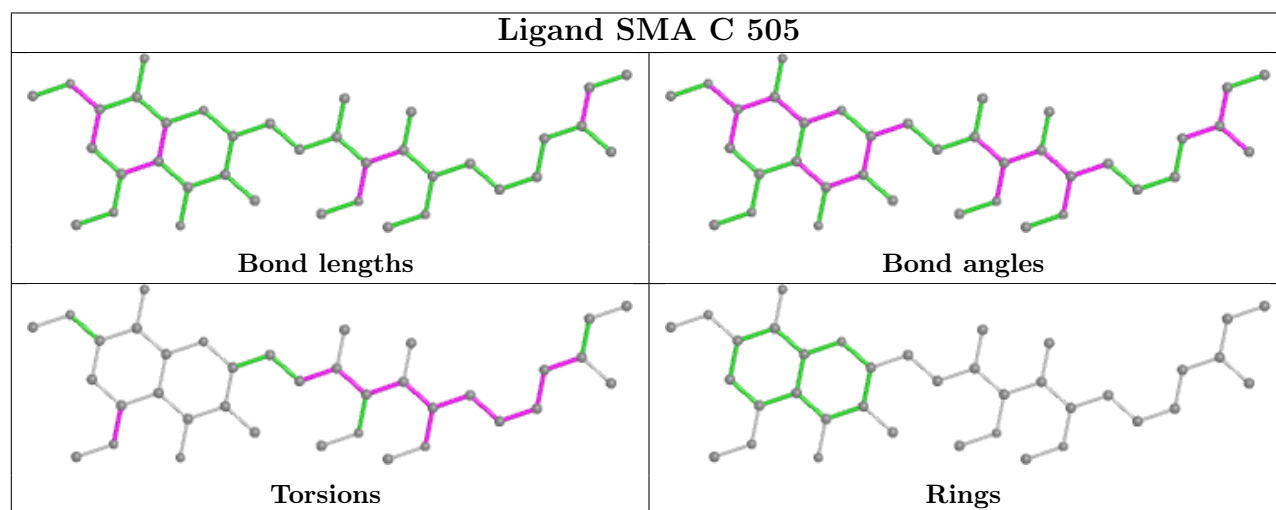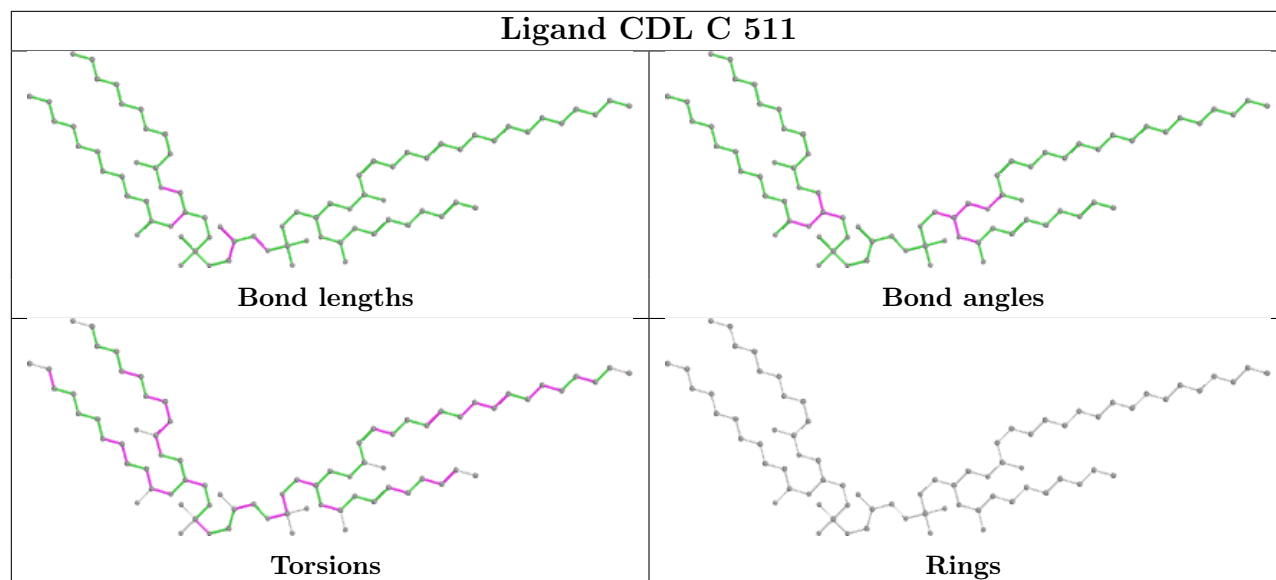
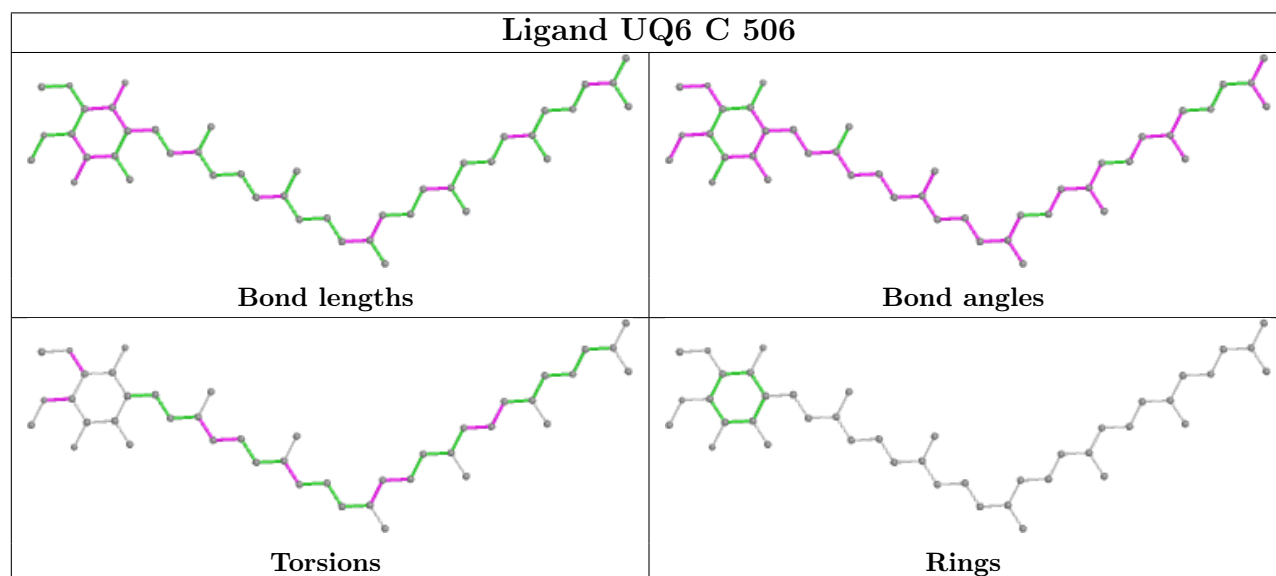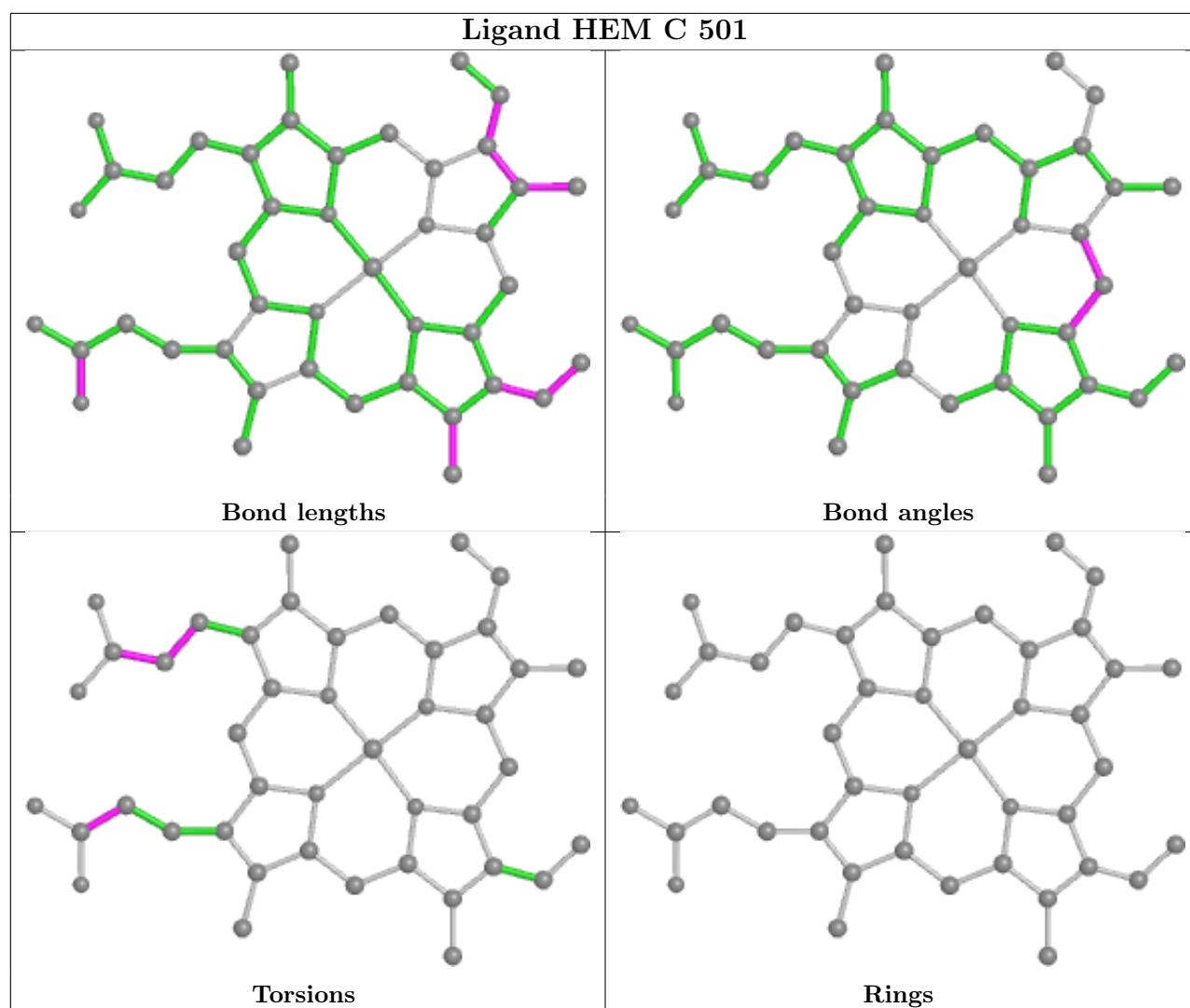| Mol	Chain	Res	Type	Clashes	Symm-Clashes
17	C	508	PIE	2	0

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

Ligand HEM D 503

Bond lengths Bond angles

Torsions Rings

Ligand PEF C 513

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM C 502

Bond lengths

Bond angles

Torsions

Rings

Ligand PEF C 510

Bond lengths

Bond angles

Torsions

Rings

Ligand UMQ A 521

Bond lengths

Bond angles

Torsions

Rings

Ligand PCF A 514

Bond lengths

Bond angles

Torsions

Rings

Ligand CDL C 511

Bond lengths

Bond angles

Torsions

Rings

Ligand SMA C 505

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM C 501

Bond lengths

Bond angles

Torsions

Rings

Ligand UQ6 C 506

Bond lengths

Bond angles

Torsions

Rings

Ligand PIE C 508
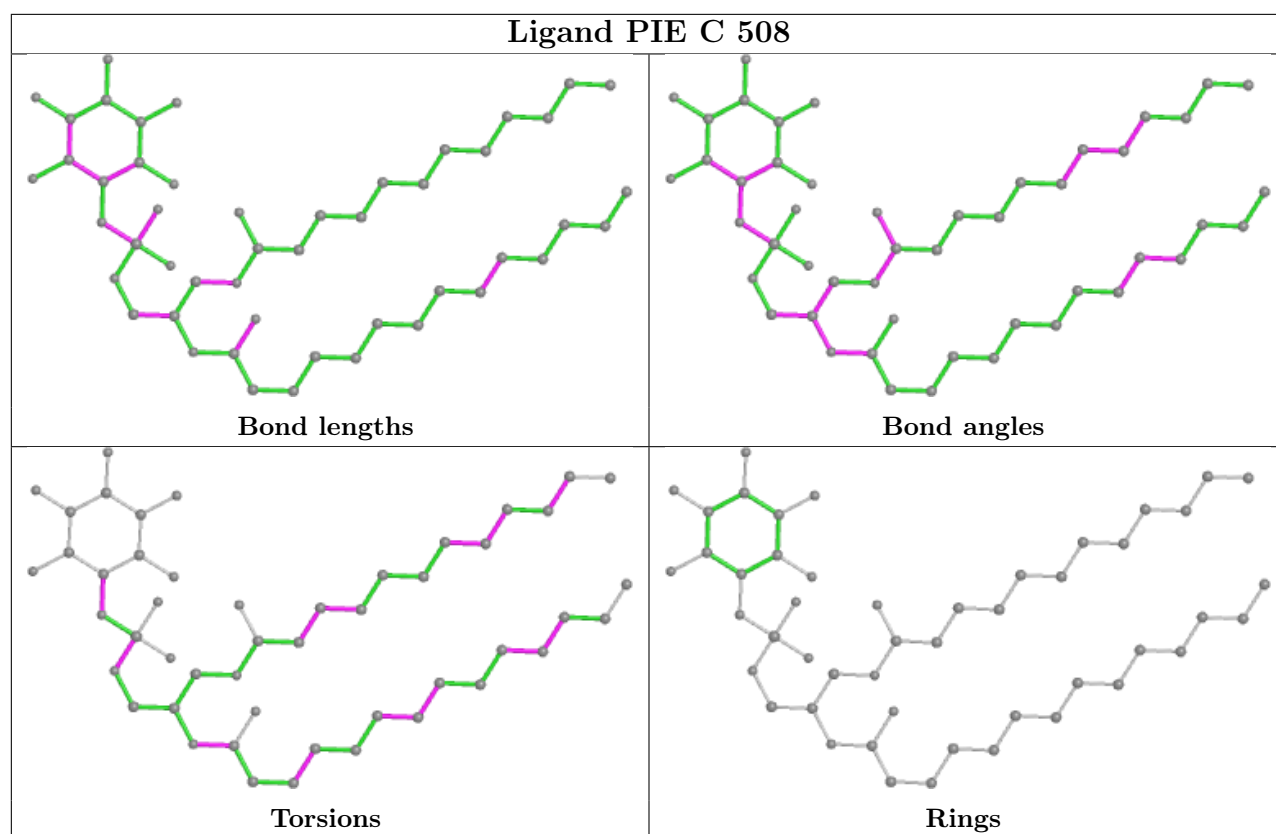

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section is therefore empty.

6.4 Ligands ⓘ

EDS was not executed - this section is therefore empty.

6.5 Other polymers ⓘ

EDS was not executed - this section is therefore empty.