



## wwPDB EM Validation Summary Report ⓘ

Nov 21, 2022 – 08:26 PM JST

PDB ID : 7DGQ  
EMDB ID : EMD-30673  
Title : Activity optimized supercomplex state1  
Authors : Jeon, T.J.; Lee, S.G.; Yoo, S.H.; Ryu, J.H.; Kim, D.S.; Hyun, J.K.; Kim, H.M.; Ryu, S.E.  
Deposited on : 2020-11-12  
Resolution : 5.00 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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

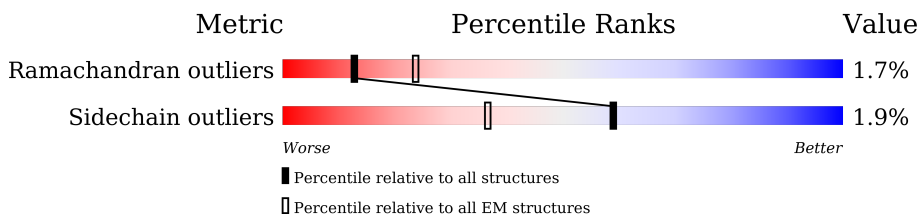
EMDB validation analysis : 0.0.1.dev43  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.31.3

# 1 Overall quality at a glance

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

The reported resolution of this entry is 5.00 Å.

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



| Metric                | Whole archive<br>(#Entries) | EM structures<br>(#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  $\geq 3$ , 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  $\leq 5\%$ . 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   | 3     | 115    | <br>23% 94%      |
| 2   | 1     | 318    | <br>7% 89% 10%   |
| 3   | 9     | 217    | <br>5% 89% 5% 5% |
| 4   | 7     | 175    | <br>11% 88% 10%  |
| 5   | 4     | 459    | <br>5% 95%       |
| 6   | 5     | 98     | <br>5% 93%       |
| 7   | 6     | 606    | <br>5% 99%       |
| 8   | 2     | 347    | <br>5% 95%       |
| 9   | 8     | 444    | <br>5% 93%       |

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| Mol | Chain | Length | Quality of chain         |
|-----|-------|--------|--------------------------|
| 10  | C3    | 514    | 43%<br>92%<br>8%         |
| 11  | C1    | 227    | 29%<br>90%<br>10%        |
| 12  | A9    | 261    | 72%<br>90%<br>10%        |
| 13  | A7    | 169    | 72%<br>80%<br>5%<br>15%  |
| 14  | B4    | 152    | 71%<br>68%<br>28%        |
| 15  | A5    | 129    | 64%<br>70%<br>5%<br>24%  |
| 16  | A6    | 97     | 74%<br>64%<br>22%<br>13% |
| 17  | C0    | 86     | 58%<br>76%<br>12%<br>13% |
| 18  | C2    | 74     | 74%<br>92%<br>7%         |
| 19  | B2    | 80     | 64%<br>61%<br>6%<br>30%  |
| 20  | B3    | 80     | 45%<br>59%<br>39%        |
| 21  | A0    | 63     | 60%<br>71%<br>25%        |
| 22  | A8    | 70     | 46%<br>57%<br>39%        |
| 23  | A     | 704    | 92%<br>6%                |
| 24  | B     | 430    | 9%<br>94%<br>6%          |
| 25  | C     | 228    | 89%<br>9%                |
| 26  | D     | 179    | 78%<br>6%<br>15%         |
| 27  | E     | 176    | 92%<br>7%                |
| 28  | F     | 75     | 36%<br>63%               |
| 29  | G     | 133    | 91%<br>8%                |
| 30  | H     | 105    | 87%<br>5%<br>9%          |
| 31  | I     | 96     | 6%<br>69%<br>26%         |
| 32  | J     | 70     | 96%                      |
| 33  | K     | 98     | 84%<br>14%               |
| 34  | L     | 83     | 5%<br>95%                |

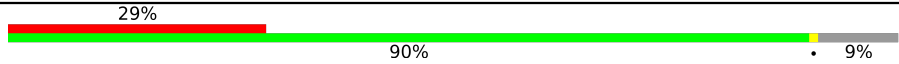
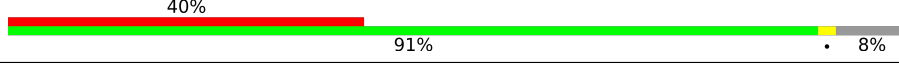
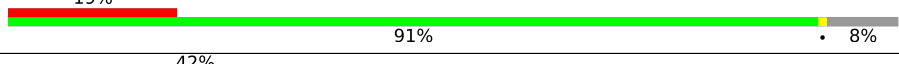
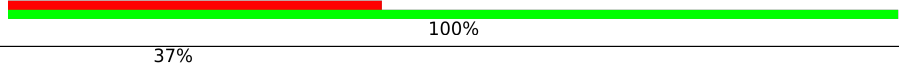
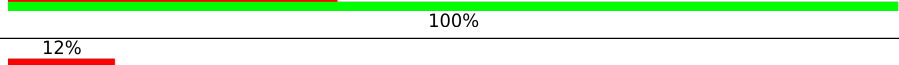
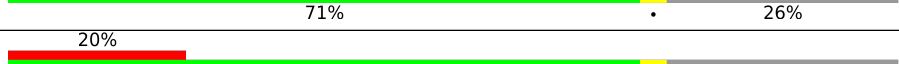

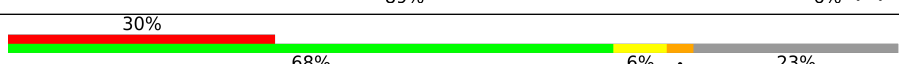
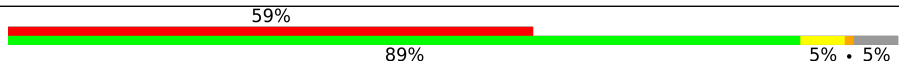
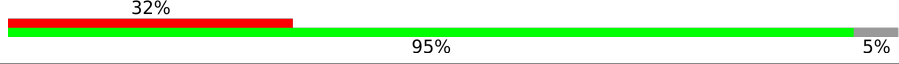
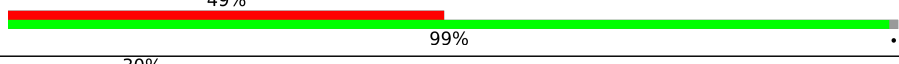
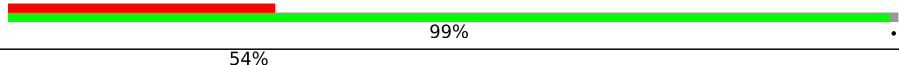
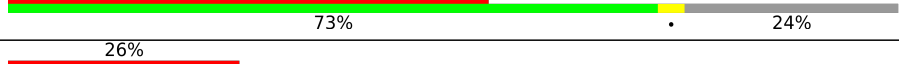

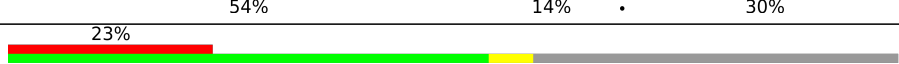
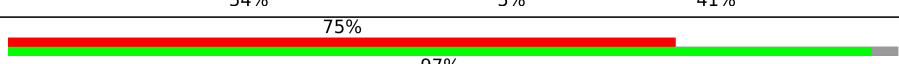
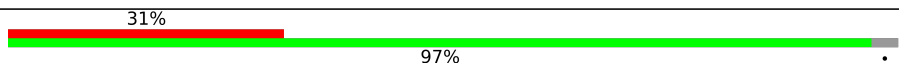



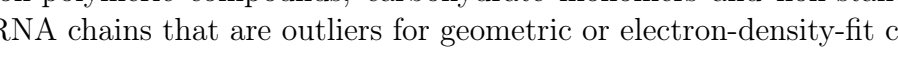
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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 35  | N     | 115    | 96%              |
| 36  | O     | 127    | 87% 10%          |
| 37  | P     | 112    | 77% 20%          |
| 38  | Q     | 171    | 95%              |
| 39  | R     | 345    | 86% 10%          |
| 40  | S     | 320    | 95% 5%           |
| 41  | T     | 140    | 92% 5%           |
| 42  | U     | 145    | 88% 9%           |
| 43  | V     | 143    | 92% 5%           |
| 44  | M     | 86     | 85% 8% 7%        |
| 44  | W     | 86     | 94% 6%           |
| 45  | X     | 57     | 82% 14%          |
| 46  | Y     | 72     | 78% 21%          |
| 47  | Z     | 98     | 72% 24%          |
| 48  | a     | 128    | 88% 11%          |
| 49  | b     | 143    | 94%              |
| 50  | c     | 128    | 70% 30%          |
| 51  | d     | 117    | 87% 9%           |
| 52  | f     | 178    | 91% 6%           |
| 53  | h     | 125    | 64% 33%          |
| 54  | i     | 49     | 78% 22%          |
| 55  | j     | 120    | 90% 6%           |
| 56  | g     | 176    | 95%              |
| 57  | e     | 158    | 77% 9% 11%       |
| 58  | k     | 480    | 91% 7%           |

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| Mol | Chain | Length | Quality of chain   |
|-----|-------|--------|--|
| 58  | w     | 480    |    |
| 59  | l     | 453    |    |
| 59  | x     | 453    |    |
| 60  | m     | 379    |    |
| 60  | y     | 379    |    |
| 61  | o     | 325    |    |
| 61  | z     | 325    |    |
| 62  | A1    | 196    |    |
| 62  | p     | 196    |    |
| 63  | A2    | 111    |    |
| 63  | q     | 111    |   |
| 64  | A3    | 82     |  |
| 64  | r     | 82     |  |
| 65  | B7    | 91     |  |
| 65  | s     | 91     |  |
| 66  | A4    | 56     |  |
| 66  | t     | 56     |  |
| 67  | B6    | 64     |  |
| 67  | u     | 64     |  |
| 68  | B5    | 78     |  |
| 68  | v     | 78     |  |

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 |
|-----|------|-------|-----|-----------|----------|---------|------------------|
| 76  | HEA  | C3    | 602 | X         | -        | -       | -                |
| 76  | HEA  | C3    | 603 | X         | -        | -       | -                |

## 2 Entry composition [i](#)

There are 82 unique types of molecules in this entry. The entry contains 107321 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called NADH-ubiquinone oxidoreductase chain 3.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 1   | 3     | 112      | 882   | 596 | 128 | 151 | 7 | 0       | 0     |

- Molecule 2 is a protein called NADH-ubiquinone oxidoreductase chain 1.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 2   | 1     | 318      | 2503  | 1678 | 385 | 417 | 23 | 0       | 0     |

- Molecule 3 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 3   | 9     | 207      | 1579  | 1006 | 269 | 294 | 10 | 0       | 0     |

- Molecule 4 is a protein called NADH-ubiquinone oxidoreductase chain 6.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 4   | 7     | 172      | 1235  | 835 | 181 | 211 | 8 | 0       | 0     |

- Molecule 5 is a protein called NADH-ubiquinone oxidoreductase chain 4.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 5   | 4     | 458      | 3577  | 2382 | 561 | 599 | 35 | 1       | 0     |

- Molecule 6 is a protein called NADH-ubiquinone oxidoreductase chain 4L.

| Mol | Chain | Residues | Atoms |     |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---------|-------|
|     |       |          | Total | C   | N   | O   | S  |         |       |
| 6   | 5     | 96       | 712   | 464 | 110 | 125 | 13 | 0       | 0     |

- Molecule 7 is a protein called NADH-ubiquinone oxidoreductase chain 5.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 7   | 6     | 606      | 4766  | 3172 | 732 | 820 | 42 | 0       | 0     |

- Molecule 8 is a protein called NADH-ubiquinone oxidoreductase chain 2.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 8   | 2     | 344      | 2681  | 1779 | 413 | 449 | 40 | 0       | 0     |

- Molecule 9 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 1, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 9   | 8     | 427      | 3065  | 1927 | 563 | 559 | 16 | 0       | 0     |

- Molecule 10 is a protein called Cytochrome c oxidase subunit 1.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 10  | C3    | 514      | 4025  | 2690 | 623 | 677 | 35 | 0       | 0     |

- Molecule 11 is a protein called Cytochrome c oxidase subunit 2.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 11  | C1    | 227      | 1822  | 1184 | 281 | 339 | 18 | 0       | 0     |

- Molecule 12 is a protein called Cytochrome c oxidase subunit 3.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 12  | A9    | 261      | 2125  | 1421 | 338 | 353 | 13 | 0       | 0     |

- Molecule 13 is a protein called Cytochrome c oxidase subunit 4 isoform 1, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 13  | A7    | 144      | 1195  | 777 | 196 | 218 | 4 | 0       | 0     |

- Molecule 14 is a protein called Cytochrome c oxidase subunit 5A, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 14  | B4    | 109      | 878   | 558 | 150 | 168 | 2 | 0       | 0     |

- Molecule 15 is a protein called Cytochrome c oxidase subunit 5B, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 15  | A5    | 98       | 748   | 464 | 134 | 145 | 5 | 0       | 0     |

- Molecule 16 is a protein called Cytochrome c oxidase subunit 6A2, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 16  | A6    | 84       | 671   | 431 | 129 | 110 | 1 | 0       | 0     |

- Molecule 17 is a protein called Cytochrome c oxidase subunit 6B1.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 17  | C0    | 75       | 628   | 395 | 114 | 114 | 5 | 0       | 0     |

- Molecule 18 is a protein called Cytochrome c oxidase subunit 6C.

| Mol | Chain | Residues | Atoms |     |     |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|---|---------|-------|
|     |       |          | Total | C   | N   | O  | S |         |       |
| 18  | C2    | 73       | 598   | 388 | 107 | 99 | 4 | 0       | 0     |

- Molecule 19 is a protein called Cytochrome c oxidase subunit 7A1, mitochondrial.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
|     |       |          | Total | C   | N  | O  | S |         |       |
| 19  | B2    | 56       | 441   | 285 | 73 | 80 | 3 | 0       | 0     |

- Molecule 20 is a protein called Cytochrome c oxidase subunit 7B, mitochondrial.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
|     |       |          | Total | C   | N  | O  | S |         |       |
| 20  | B3    | 49       | 384   | 250 | 65 | 67 | 2 | 0       | 0     |

- Molecule 21 is a protein called Cytochrome c oxidase subunit 7C, mitochondrial.



| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
|     |       |          | Total | C   | N  | O  | S |         |       |
| 21  | A0    | 47       | 386   | 257 | 65 | 62 | 2 | 0       | 0     |

- Molecule 22 is a protein called Cytochrome c oxidase subunit 8B, mitochondrial.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
|     |       |          | Total | C   | N  | O  | S |         |       |
| 22  | A8    | 43       | 335   | 223 | 53 | 59 |   | 0       | 0     |

- Molecule 23 is a protein called NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 23  | A     | 688      | 5218  | 3273 | 920 | 988 | 37 | 0       | 0     |

- Molecule 24 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 2, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 24  | B     | 430      | 3422  | 2185 | 588 | 624 | 25 | 0       | 0     |

- Molecule 25 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 3, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
|     |       |          | Total | C    | N   | O   | S |         |       |
| 25  | C     | 208      | 1726  | 1114 | 297 | 312 | 3 | 0       | 0     |

- Molecule 26 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 7, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---------|-------|
|     |       |          | Total | C   | N   | O   | S  |         |       |
| 26  | D     | 152      | 1206  | 772 | 212 | 208 | 14 | 0       | 0     |

- Molecule 27 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 8, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---------|-------|
|     |       |          | Total | C   | N   | O   | S  |         |       |
| 27  | E     | 176      | 1401  | 880 | 243 | 267 | 11 | 0       | 0     |

- Molecule 28 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 3, mitochondrial.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
|     |       |          | Total | C   | N  | O  | S |         |       |
| 28  | F     | 28       | 186   | 118 | 32 | 35 | 1 | 0       | 0     |

- Molecule 29 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 29  | G     | 123      | 985   | 622 | 178 | 182 | 3 | 0       | 0     |

- Molecule 30 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 5.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 30  | H     | 96       | 780   | 494 | 147 | 134 | 5 | 0       | 0     |

- Molecule 31 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial.

| Mol | Chain | Residues | Atoms |     |    |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|-----|---|---------|-------|
|     |       |          | Total | C   | N  | O   | S |         |       |
| 31  | I     | 71       | 535   | 333 | 99 | 100 | 3 | 0       | 0     |

- Molecule 32 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 1.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
|     |       |          | Total | C   | N  | O  | S |         |       |
| 32  | J     | 69       | 530   | 344 | 96 | 88 | 2 | 0       | 0     |

- Molecule 33 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2.

| Mol | Chain | Residues | Atoms |     |     |     | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|
|     |       |          | Total | C   | N   | O   |         |       |
| 33  | K     | 84       | 656   | 412 | 126 | 118 | 0       | 0     |

- Molecule 34 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 3.

| Mol | Chain | Residues | Atoms |     |    |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|-----|---|---------|-------|
| 34  | L     | 80       | Total | C   | N  | O   | S | 0       | 0     |
|     |       |          | 602   | 398 | 97 | 105 | 2 |         |       |

- Molecule 35 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 5.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 35  | N     | 111      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 862   | 559 | 149 | 152 | 2 |         |       |

- Molecule 36 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 6.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 36  | O     | 114      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 925   | 595 | 170 | 156 | 4 |         |       |

- Molecule 37 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 7.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 37  | P     | 90       | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 702   | 445 | 129 | 126 | 2 |         |       |

- Molecule 38 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 8.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 38  | Q     | 168      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1345  | 851 | 242 | 243 | 9 |         |       |

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

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 39  | R     | 309      | Total | C    | N   | O   | S | 0       | 0     |
|     |       |          | 2349  | 1514 | 420 | 412 | 3 |         |       |

- Molecule 40 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
|     |       |          | Total | C    | N   | O   | S |         |       |
| 40  | S     | 319      | 2299  | 1457 | 395 | 438 | 9 | 0       | 0     |

- Molecule 41 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 11.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 41  | T     | 138      | 923   | 584 | 162 | 171 | 6 | 0       | 0     |

- Molecule 42 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 12.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 42  | U     | 132      | 1019  | 659 | 179 | 178 | 3 | 0       | 0     |

- Molecule 43 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 13.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 43  | V     | 138      | 1087  | 699 | 186 | 193 | 9 | 0       | 0     |

- Molecule 44 is a protein called Acyl carrier protein, mitochondrial.

| Mol | Chain | Residues | Atoms |     |    |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|-----|---|---------|-------|
|     |       |          | Total | C   | N  | O   | S |         |       |
| 44  | W     | 86       | 616   | 400 | 98 | 114 | 4 | 0       | 0     |
| 44  | M     | 80       | 642   | 413 | 96 | 128 | 5 | 0       | 0     |

- Molecule 45 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 1.

| Mol | Chain | Residues | Atoms |     |    |    | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---------|-------|
|     |       |          | Total | C   | N  | O  |         |       |
| 45  | X     | 49       | 372   | 243 | 64 | 65 | 0       | 0     |

- Molecule 46 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 2, mitochondrial.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 46  | Y     | 57       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 409   | 277 | 65 | 66 | 1 |         |       |

- Molecule 47 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 3.

| Mol | Chain | Residues | Atoms |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 47  | Z     | 74       | Total | C   | N  | O  | S | 0       | 0     |
|     |       |          | 493   | 320 | 89 | 82 | 2 |         |       |

- Molecule 48 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 4.

| Mol | Chain | Residues | Atoms |     |     |     | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|
| 48  | a     | 114      | Total | C   | N   | O   | 0       | 0     |
|     |       |          | 857   | 550 | 159 | 148 |         |       |

- Molecule 49 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 5, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 49  | b     | 139      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1032  | 672 | 190 | 168 | 2 |         |       |

- Molecule 50 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 6.

| Mol | Chain | Residues | Atoms |     |     |     | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|
| 50  | c     | 90       | Total | C   | N   | O   | 0       | 0     |
|     |       |          | 617   | 391 | 119 | 107 |         |       |

- Molecule 51 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 7.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 51  | d     | 107      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 710   | 447 | 134 | 125 | 4 |         |       |

- Molecule 52 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 9.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 52  | f     | 167      | 1156  | 739 | 205 | 208 | 4 | 0       | 0     |

- Molecule 53 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 11, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 53  | h     | 84       | 658   | 423 | 115 | 118 | 2 | 0       | 0     |

- Molecule 54 is a protein called NADH dehydrogenase [ubiquinone] 1 subunit C1, mitochondrial.

| Mol | Chain | Residues | Atoms |     |    |    | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---------|-------|
|     |       |          | Total | C   | N  | O  |         |       |
| 54  | i     | 38       | 277   | 185 | 46 | 46 | 0       | 0     |

- Molecule 55 is a protein called NADH dehydrogenase [ubiquinone] 1 subunit C2.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 55  | j     | 113      | 892   | 587 | 149 | 153 | 3 | 0       | 0     |

- Molecule 56 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 10.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 56  | g     | 173      | 1351  | 849 | 246 | 248 | 8 | 0       | 0     |

- Molecule 57 is a protein called NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 8, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
|     |       |          | Total | C   | N   | O   | S |         |       |
| 57  | e     | 141      | 864   | 539 | 161 | 160 | 4 | 0       | 0     |

- Molecule 58 is a protein called Cytochrome b-c1 complex subunit 1, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
|     |       |          | Total | C    | N   | O   | S  |         |       |
| 58  | k     | 446      | 3454  | 2159 | 608 | 667 | 20 | 0       | 0     |

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| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
| 58  | w     | 436      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 3385  | 2117 | 599 | 649 | 20 |         |       |

- Molecule 59 is a protein called Cytochrome b-c1 complex subunit 2, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 59  | l     | 419      | Total | C    | N   | O   | S | 0       | 0     |
|     |       |          | 3135  | 1969 | 553 | 606 | 7 |         |       |
| 59  | x     | 419      | Total | C    | N   | O   | S | 0       | 0     |
|     |       |          | 3141  | 1972 | 556 | 606 | 7 |         |       |

- Molecule 60 is a protein called Cytochrome b.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
| 60  | m     | 379      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 3011  | 2018 | 472 | 502 | 19 |         |       |
| 60  | y     | 379      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 3011  | 2018 | 472 | 502 | 19 |         |       |

- Molecule 61 is a protein called Cytochrome c1, heme protein, mitochondrial.

| Mol | Chain | Residues | Atoms |      |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|-------|
| 61  | o     | 241      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 1919  | 1225 | 330 | 349 | 15 |         |       |
| 61  | z     | 241      | Total | C    | N   | O   | S  | 0       | 0     |
|     |       |          | 1906  | 1216 | 329 | 347 | 14 |         |       |

- Molecule 62 is a protein called Cytochrome b-c1 complex subunit Rieske, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 62  | p     | 151      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 938   | 572 | 170 | 194 | 2 |         |       |
| 62  | A1    | 188      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 1117  | 679 | 207 | 229 | 2 |         |       |

- Molecule 63 is a protein called Cytochrome b-c1 complex subunit 7.

| Mol | Chain | Residues | Atoms |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 63  | q     | 106      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 916   | 579 | 167 | 168 | 2 |         |       |
| 63  | A2    | 106      | Total | C   | N   | O   | S | 0       | 0     |
|     |       |          | 907   | 574 | 166 | 165 | 2 |         |       |

- Molecule 64 is a protein called Cytochrome b-c1 complex subunit 8.

| Mol | Chain | Residues | Atoms |     |     |     | AltConf | Trace |   |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|---|
| 64  | r     | 81       | Total | C   | N   | O   | S       | 0     | 0 |
|     |       |          | 682   | 441 | 128 | 112 | 1       |       |   |
| 64  | A3    | 81       | Total | C   | N   | O   | S       | 0     | 0 |
|     |       |          | 676   | 438 | 125 | 112 | 1       |       |   |

- Molecule 65 is a protein called Cytochrome b-c1 complex subunit 6, mitochondrial.

| Mol | Chain | Residues | Atoms |     |     |     | AltConf | Trace |   |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|---|
| 65  | s     | 67       | Total | C   | N   | O   | S       | 0     | 0 |
|     |       |          | 548   | 332 | 99  | 112 | 5       |       |   |
| 65  | B7    | 69       | Total | C   | N   | O   | S       | 0     | 0 |
|     |       |          | 566   | 342 | 101 | 118 | 5       |       |   |

- Molecule 66 is a protein called Cytochrome b-c1 complex subunit 10.

| Mol | Chain | Residues | Atoms |     |    |    | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---------|-------|
| 66  | t     | 33       | Total | C   | N  | O  | 0       | 0     |
|     |       |          | 262   | 174 | 46 | 42 |         |       |
| 66  | A4    | 39       | Total | C   | N  | O  | 0       | 0     |
|     |       |          | 318   | 212 | 56 | 50 |         |       |

- Molecule 67 is a protein called Cytochrome b-c1 complex subunit 9.

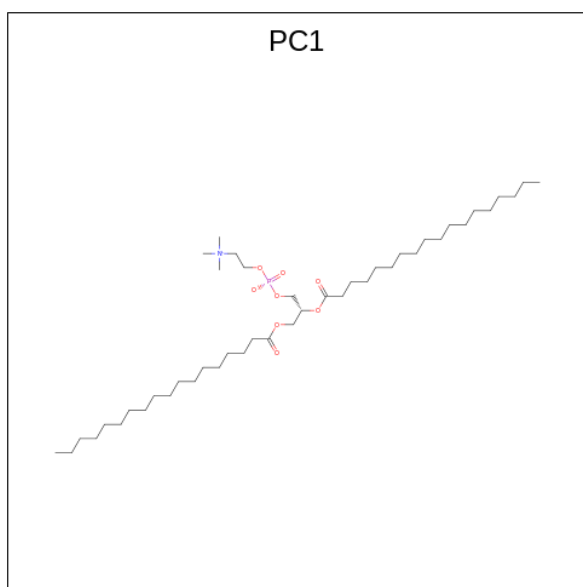
| Mol | Chain | Residues | Atoms |     |    |    | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---------|-------|
| 67  | u     | 62       | Total | C   | N  | O  | 0       | 0     |
|     |       |          | 511   | 335 | 89 | 87 |         |       |
| 67  | B6    | 62       | Total | C   | N  | O  | 0       | 0     |
|     |       |          | 511   | 335 | 89 | 87 |         |       |

- Molecule 68 is a protein called Cytochrome b-c1 complex subunit Rieske, mitochondrial.

| Mol | Chain | Residues | Atoms |    |    |    | AltConf | Trace |
|-----|-------|----------|-------|----|----|----|---------|-------|
| 68  | v     | 18       | Total | C  | N  | O  | 0       | 0     |
|     |       |          | 114   | 70 | 22 | 22 |         |       |
| 68  | B5    | 22       | Total | C  | N  | O  | 0       | 0     |
|     |       |          | 148   | 91 | 30 | 27 |         |       |

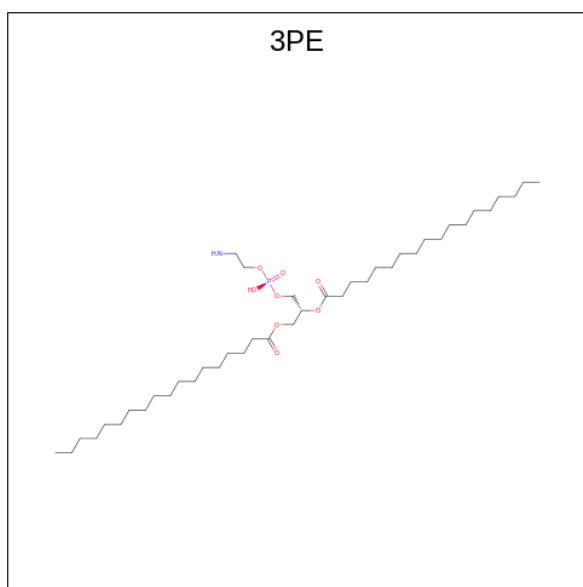
- Molecule 69 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PC1) (formula: C<sub>44</sub>H<sub>88</sub>NO<sub>8</sub>P) (labeled as "Ligand of Interest" by depositor).





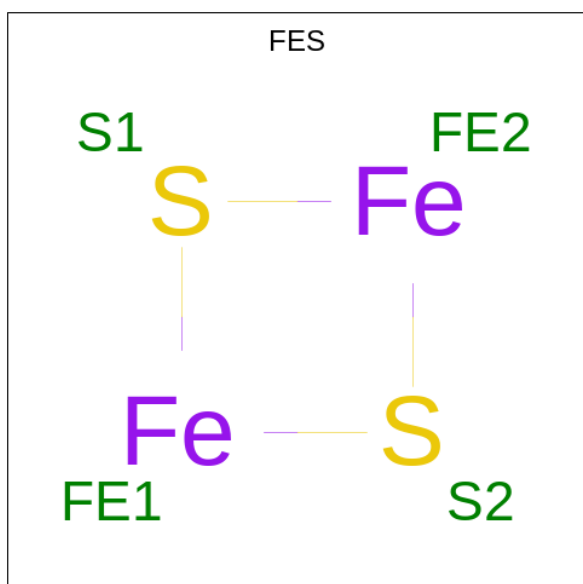
| Mol | Chain | Residues | Atoms |    |   |   |   | AltConf |
|-----|-------|----------|-------|----|---|---|---|---------|
|     |       |          | Total | C  | N | O | P |         |
| 69  | 3     | 1        | 47    | 37 | 1 | 8 | 1 | 0       |
| 69  | 2     | 1        | 46    | 36 | 1 | 8 | 1 | 0       |
| 69  | Q     | 1        | 46    | 36 | 1 | 8 | 1 | 0       |
| 69  | S     | 1        | 47    | 37 | 1 | 8 | 1 | 0       |
| 69  | j     | 1        | 39    | 29 | 1 | 8 | 1 | 0       |

- Molecule 70 is 1,2-Distearoyl-sn-glycerophosphoethanolamine (three-letter code: 3PE) (formula:  $C_{41}H_{82}NO_8P$ ) (labeled as "Ligand of Interest" by depositor).



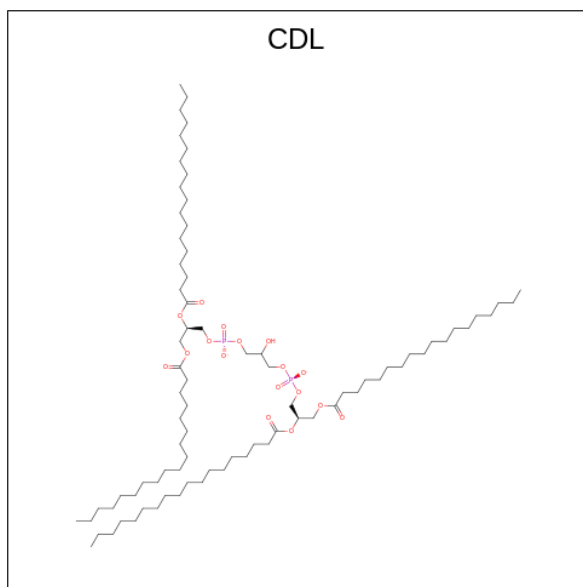
| Mol | Chain | Residues | Atoms |    |   |   |   | AltConf |
|-----|-------|----------|-------|----|---|---|---|---------|
|     |       |          | Total | C  | N | O | P |         |
| 70  | 1     | 1        | 51    | 41 | 1 | 8 | 1 | 0       |
| 70  | 4     | 1        | 41    | 31 | 1 | 8 | 1 | 0       |
| 70  | 2     | 1        | 41    | 31 | 1 | 8 | 1 | 0       |
| 70  | B     | 1        | 51    | 41 | 1 | 8 | 1 | 0       |
| 70  | j     | 1        | 46    | 36 | 1 | 8 | 1 | 0       |

- Molecule 71 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe<sub>2</sub>S<sub>2</sub>).



| Mol | Chain | Residues | Atoms |    |   | AltConf |
|-----|-------|----------|-------|----|---|---------|
| 71  | 9     | 1        | Total | Fe | S | 0       |
|     |       |          | 4     | 2  | 2 |         |
| 71  | A     | 1        | Total | Fe | S | 0       |
|     |       |          | 4     | 2  | 2 |         |
| 71  | m     | 1        | Total | Fe | S | 0       |
|     |       |          | 4     | 2  | 2 |         |

- Molecule 72 is CARDIOLIPIN (three-letter code: CDL) (formula:  $C_{81}H_{156}O_{17}P_2$ ) (labeled as "Ligand of Interest" by depositor).



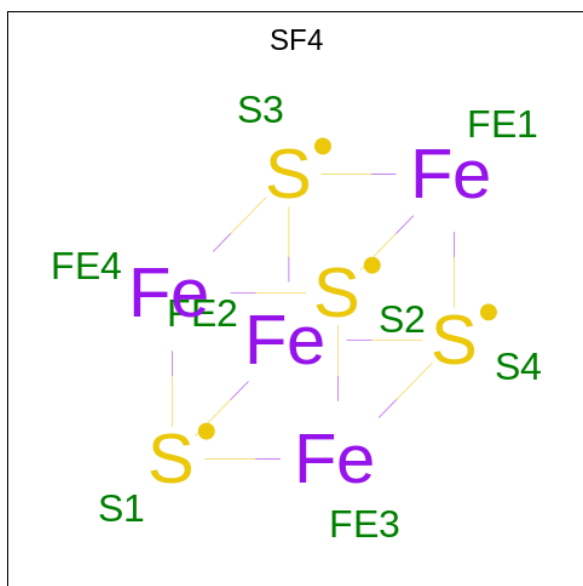
| Mol | Chain | Residues | Atoms |    |    |   | AltConf |
|-----|-------|----------|-------|----|----|---|---------|
| 72  | 6     | 1        | Total | C  | O  | P | 0       |
|     |       |          | 64    | 45 | 17 | 2 |         |
| 72  | J     | 1        | Total | C  | O  | P | 0       |
|     |       |          | 58    | 39 | 17 | 2 |         |
| 72  | b     | 1        | Total | C  | O  | P | 0       |
|     |       |          | 82    | 63 | 17 | 2 |         |

- Molecule 73 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula:  $C_{17}H_{21}N_4O_9P$ ) (labeled as "Ligand of Interest" by depositor).



| Mol | Chain | Residues | Atoms |    |   |   |   | AltConf |
|-----|-------|----------|-------|----|---|---|---|---------|
|     |       |          | Total | C  | N | O | P |         |
| 73  | 8     | 1        | 31    | 17 | 4 | 9 | 1 | 0       |

- Molecule 74 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe<sub>4</sub>S<sub>4</sub>).



| Mol | Chain | Residues | Atoms |    |   | AltConf |
|-----|-------|----------|-------|----|---|---------|
|     |       |          | Total | Fe | S |         |
| 74  | 8     | 1        | 8     | 4  | 4 | 0       |
| 74  | A     | 1        | 16    | 8  | 8 | 0       |
| 74  | A     | 1        | 16    | 8  | 8 | 0       |

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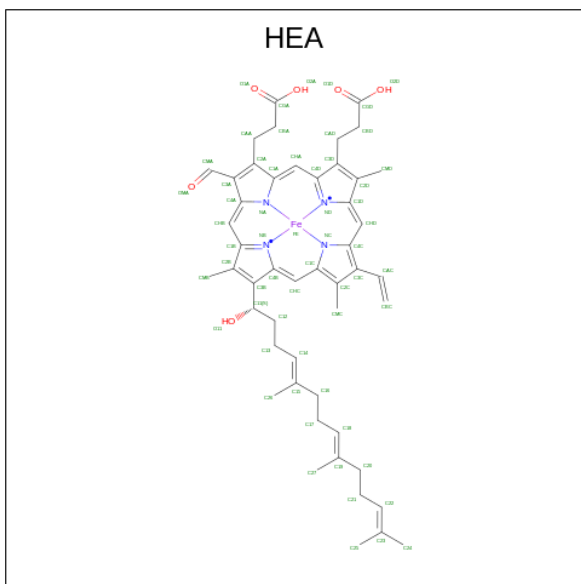
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| Mol | Chain | Residues | Atoms |    |   | AltConf |
|-----|-------|----------|-------|----|---|---------|
| 74  | D     | 1        | Total | Fe | S | 0       |
|     |       |          | 8     | 4  | 4 |         |
| 74  | E     | 1        | Total | Fe | S | 0       |
|     |       |          | 16    | 8  | 8 |         |
| 74  | E     | 1        | Total | Fe | S | 0       |
|     |       |          | 16    | 8  | 8 |         |

- Molecule 75 is COPPER (II) ION (three-letter code: CU) (formula: Cu).

| Mol | Chain | Residues | Atoms |    | AltConf |
|-----|-------|----------|-------|----|---------|
| 75  | C3    | 1        | Total | Cu | 0       |
|     |       |          | 1     | 1  |         |
| 75  | C1    | 2        | Total | Cu | 0       |
|     |       |          | 2     | 2  |         |

- Molecule 76 is HEME-A (three-letter code: HEA) (formula: C<sub>49</sub>H<sub>56</sub>FeN<sub>4</sub>O<sub>6</sub>) (labeled as "Ligand of Interest" by depositor).



| Mol | Chain | Residues | Atoms |    |    |   | AltConf |   |
|-----|-------|----------|-------|----|----|---|---------|---|
| 76  | C3    | 1        | Total | C  | Fe | N | O       | 0 |
|     |       |          | 120   | 98 | 2  | 8 | 12      |   |
| 76  | C3    | 1        | Total | C  | Fe | N | O       | 0 |
|     |       |          | 120   | 98 | 2  | 8 | 12      |   |

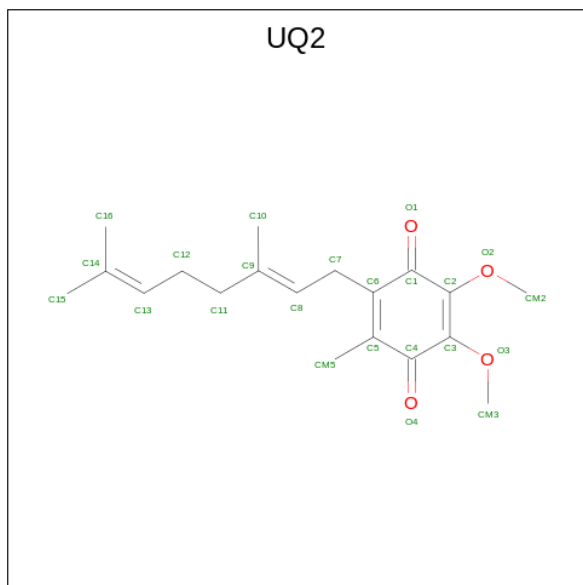
- Molecule 77 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).





| Mol | Chain | Residues | Atoms |    |    |   | AltConf |   |
|-----|-------|----------|-------|----|----|---|---------|---|
| 81  | o     | 1        | Total | C  | Fe | N | O       | 0 |
|     |       |          | 43    | 34 | 1  | 4 | 4       |   |
| 81  | z     | 1        | Total | C  | Fe | N | O       | 0 |
|     |       |          | 43    | 34 | 1  | 4 | 4       |   |

- Molecule 82 is UBIQUINONE-2 (three-letter code: UQ2) (formula:  $C_{19}H_{26}O_4$ ).



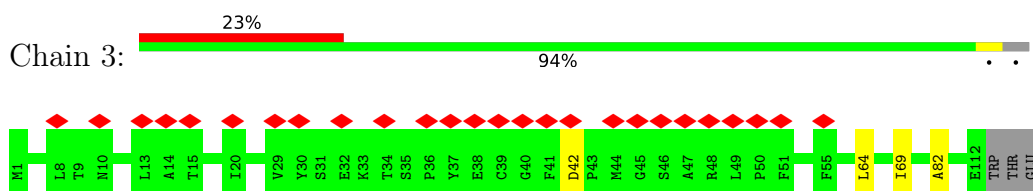
| Mol | Chain | Residues | Atoms |      | AltConf |
|-----|-------|----------|-------|------|---------|
| 82  | A2    | 1        | Total | C O  | 0       |
|     |       |          | 23    | 19 4 |         |



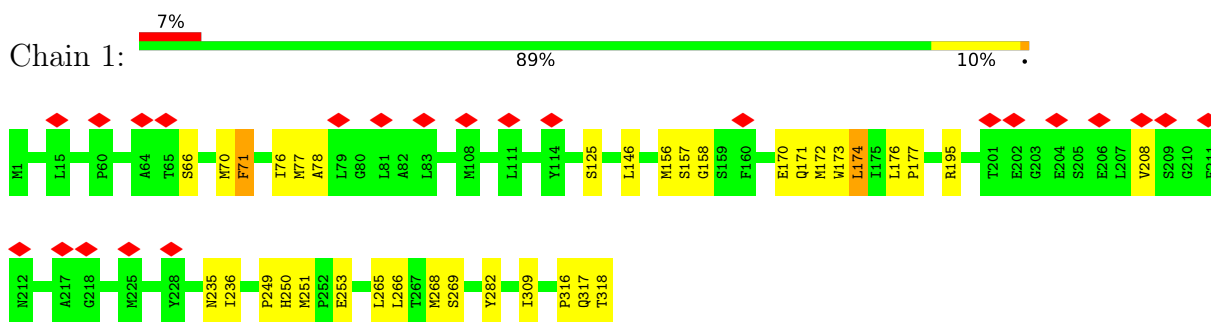
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

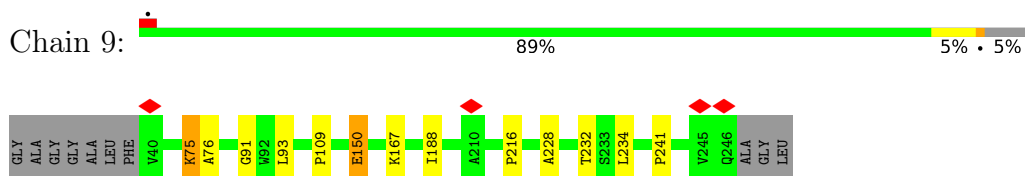
- Molecule 1: NADH-ubiquinone oxidoreductase chain 3



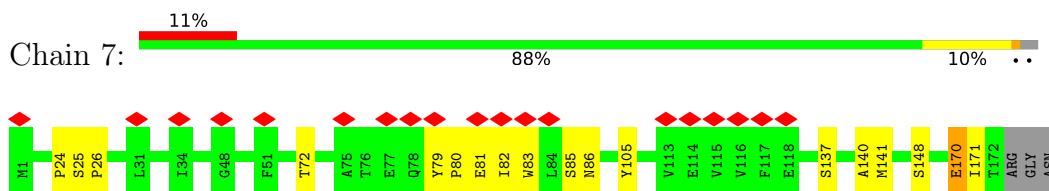
- Molecule 2: NADH-ubiquinone oxidoreductase chain 1



- Molecule 3: NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial

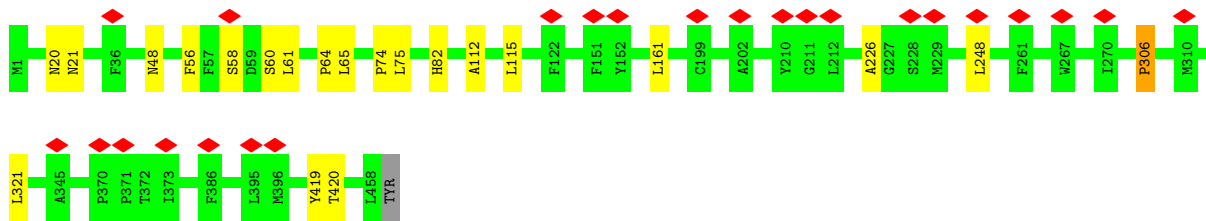


- Molecule 4: NADH-ubiquinone oxidoreductase chain 6

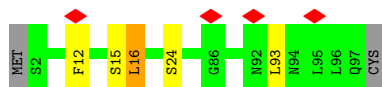


- Molecule 5: NADH-ubiquinone oxidoreductase chain 4

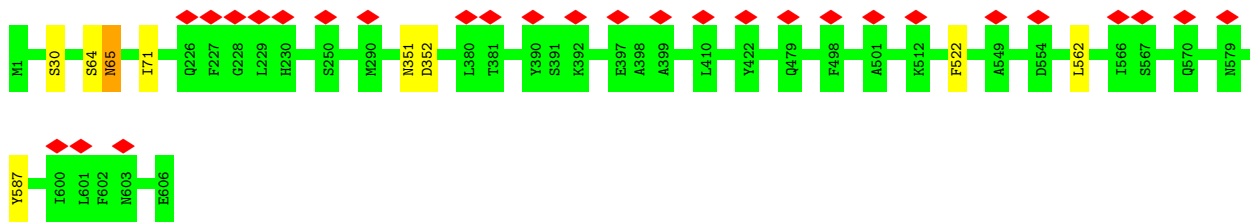




- Molecule 6: NADH-ubiquinone oxidoreductase chain 4L



- Molecule 7: NADH-ubiquinone oxidoreductase chain 5



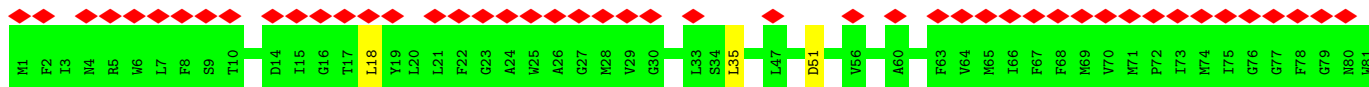
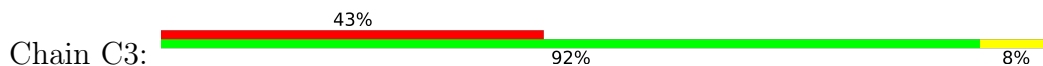
- Molecule 8: NADH-ubiquinone oxidoreductase chain 2

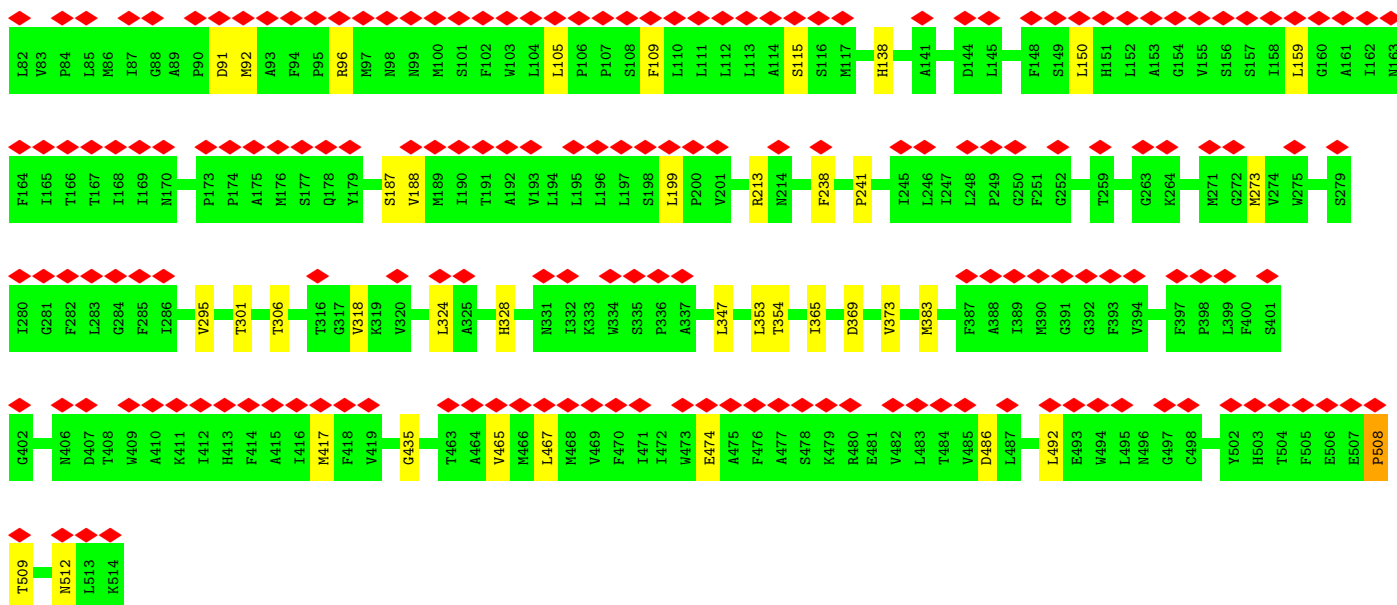


- Molecule 9: NADH dehydrogenase [ubiquinone] flavoprotein 1, mitochondrial

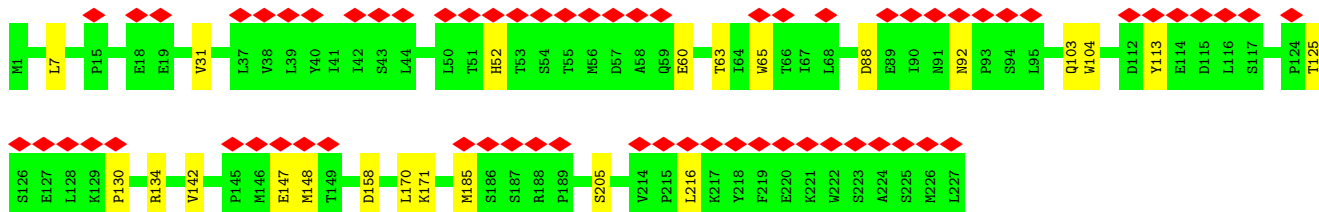
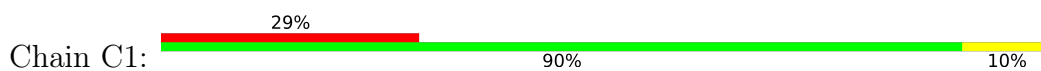


- Molecule 10: Cytochrome c oxidase subunit 1

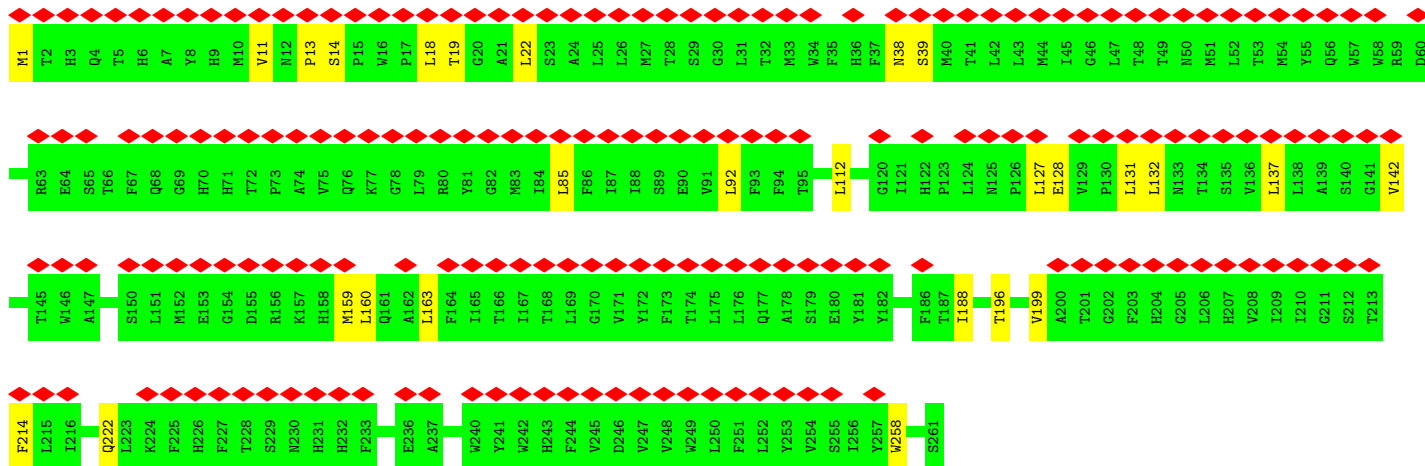
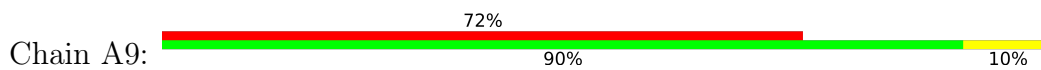




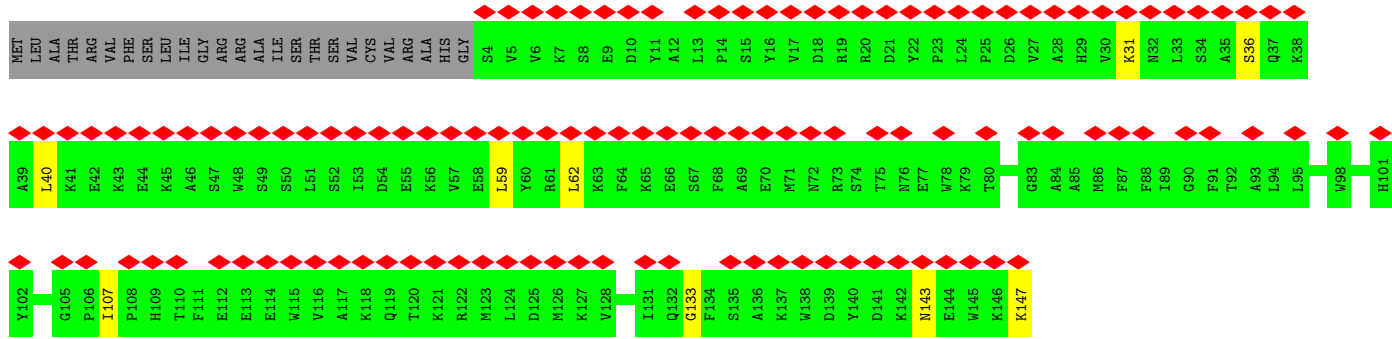
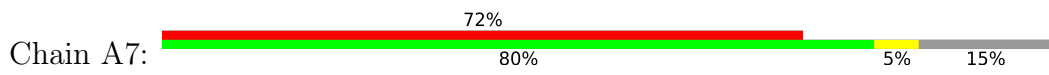
• Molecule 11: Cytochrome c oxidase subunit 2



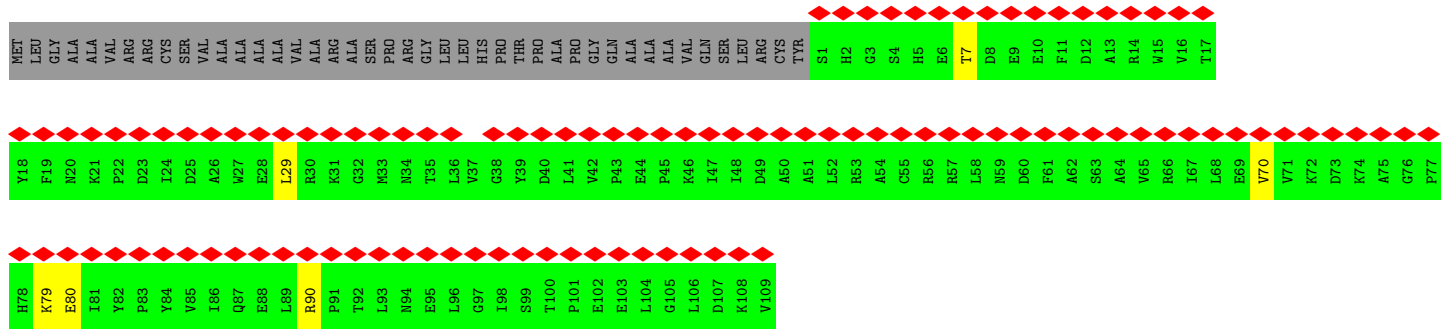
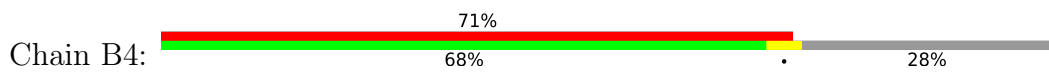
• Molecule 12: Cytochrome c oxidase subunit 3



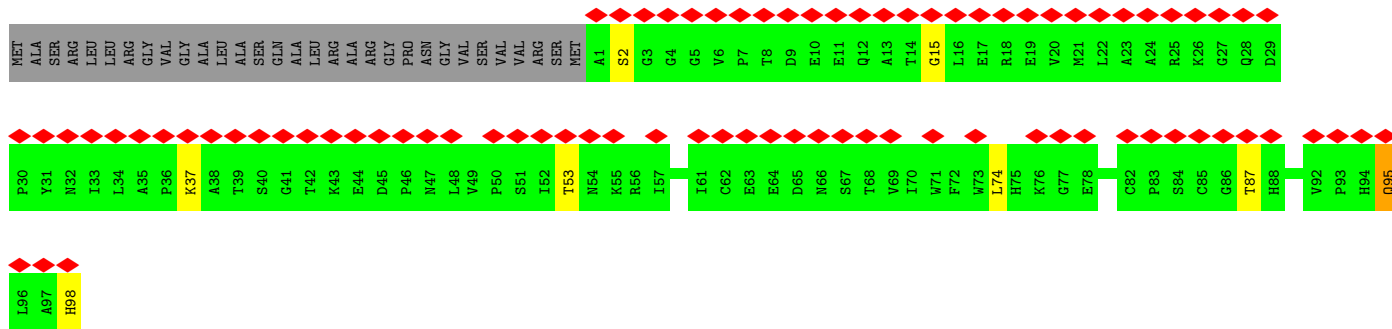
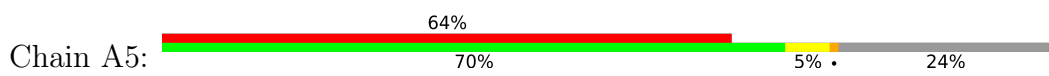
• Molecule 13: Cytochrome c oxidase subunit 4 isoform 1, mitochondrial



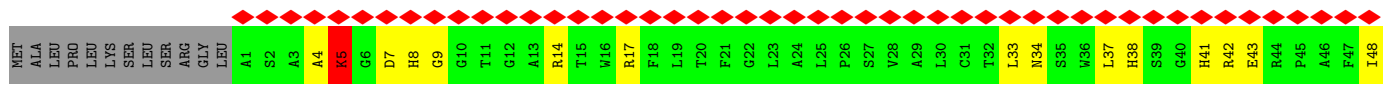
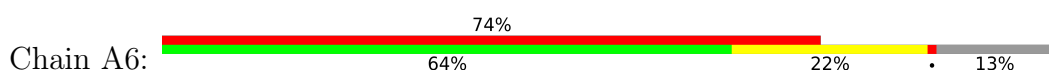
• Molecule 14: Cytochrome c oxidase subunit 5A, mitochondrial

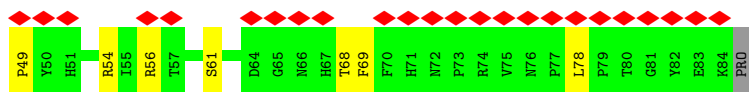


• Molecule 15: Cytochrome c oxidase subunit 5B, mitochondrial

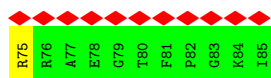
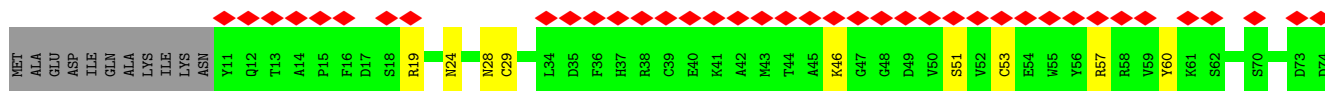
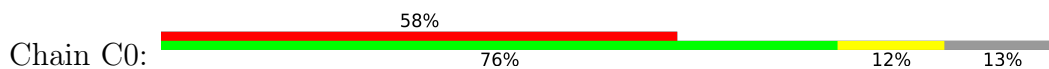


• Molecule 16: Cytochrome c oxidase subunit 6A2, mitochondrial

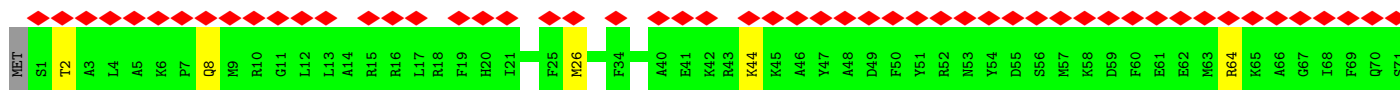
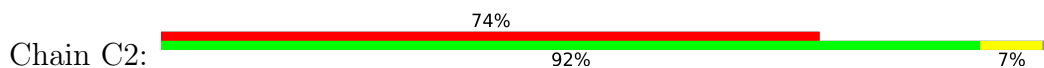




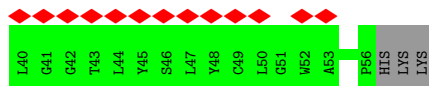
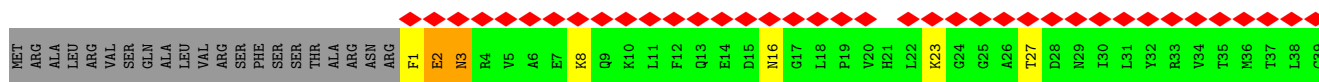
- Molecule 17: Cytochrome c oxidase subunit 6B1



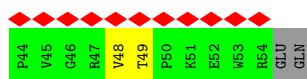
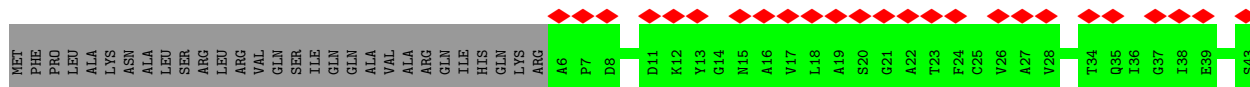
- Molecule 18: Cytochrome c oxidase subunit 6C



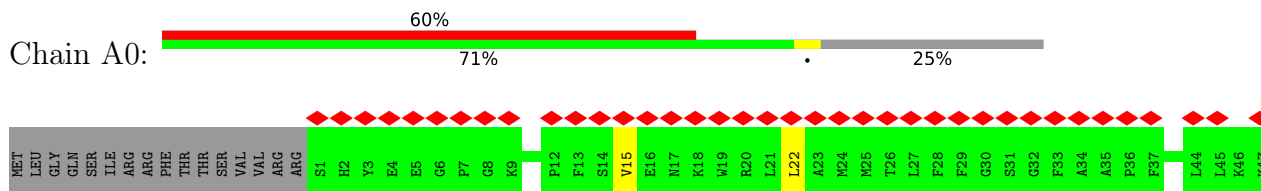
- Molecule 19: Cytochrome c oxidase subunit 7A1, mitochondrial



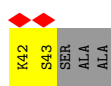
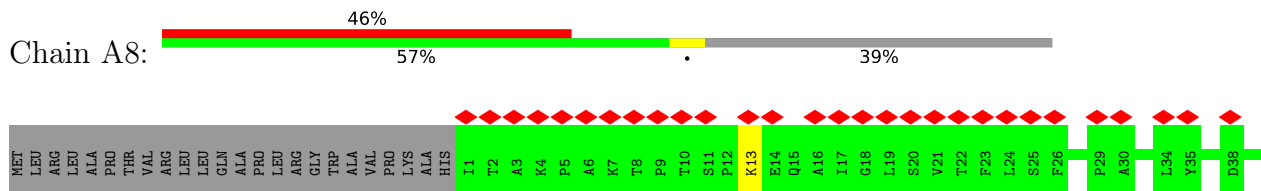
- Molecule 20: Cytochrome c oxidase subunit 7B, mitochondrial



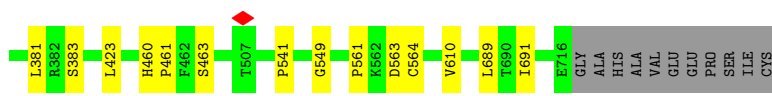
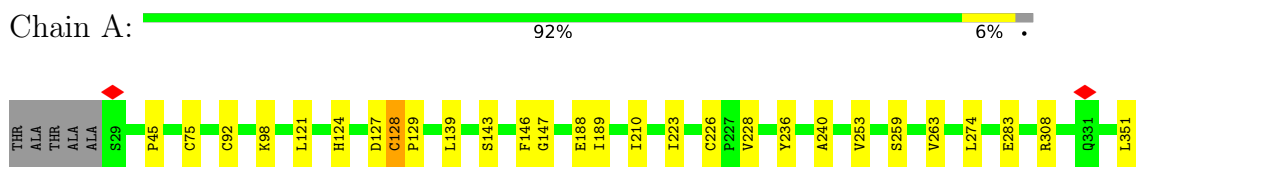
- Molecule 21: Cytochrome c oxidase subunit 7C, mitochondrial



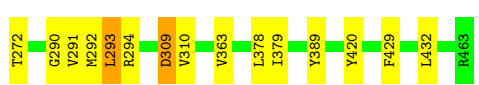
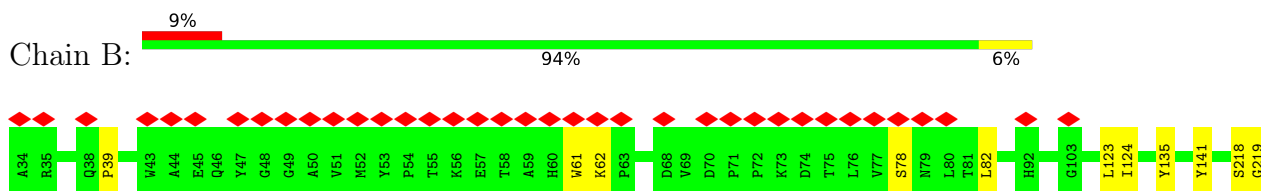
• Molecule 22: Cytochrome c oxidase subunit 8B, mitochondrial



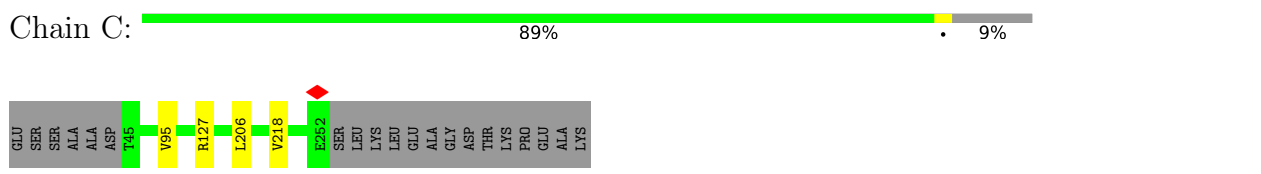
• Molecule 23: NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial



• Molecule 24: NADH dehydrogenase [ubiquinone] iron-sulfur protein 2, mitochondrial

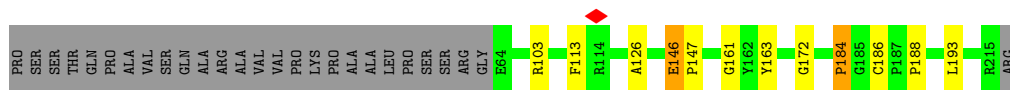


• Molecule 25: NADH dehydrogenase [ubiquinone] iron-sulfur protein 3, mitochondrial



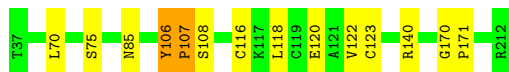
• Molecule 26: NADH dehydrogenase [ubiquinone] iron-sulfur protein 7, mitochondrial





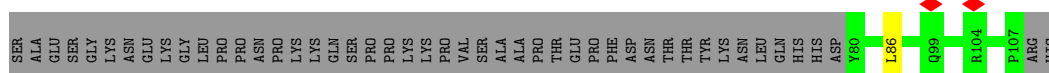
- Molecule 27: NADH dehydrogenase [ubiquinone] iron-sulfur protein 8, mitochondrial

Chain E: 92% 7%



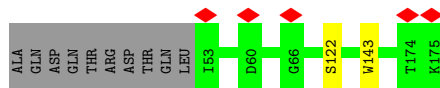
- Molecule 28: NADH dehydrogenase [ubiquinone] flavoprotein 3, mitochondrial

Chain F: 36% 63%



- Molecule 29: NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial

Chain G: 91% 8%



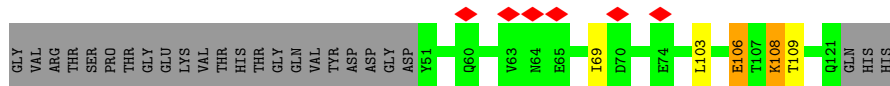
- Molecule 30: NADH dehydrogenase [ubiquinone] iron-sulfur protein 5

Chain H: 87% 5% 9%



- Molecule 31: NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial

Chain I: 6% 69% 26%




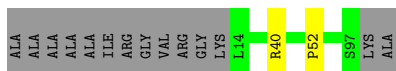
- Molecule 32: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 1

Chain J: 96%



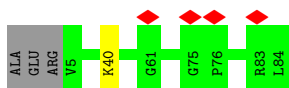
- Molecule 33: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2

Chain K:  84% 14%



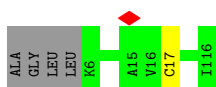
- Molecule 34: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 3

Chain L:  5% 95%




- Molecule 35: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 5

Chain N:  96%




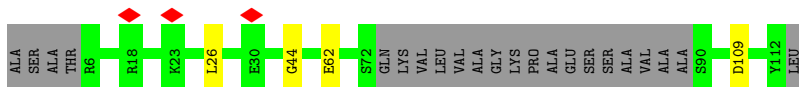
- Molecule 36: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 6

Chain O:  87% 10%



- Molecule 37: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 7

Chain P:  77% 20%




- Molecule 38: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 8

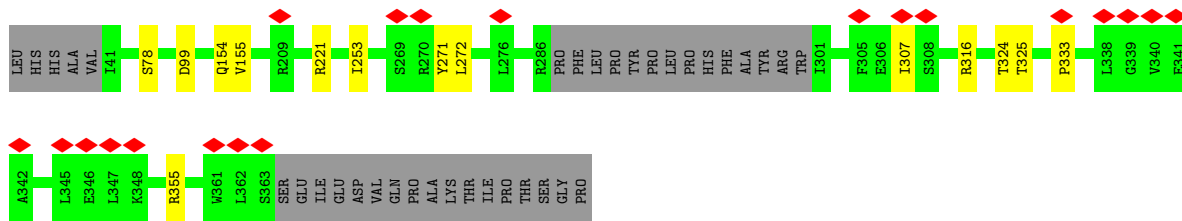
Chain Q:  95%



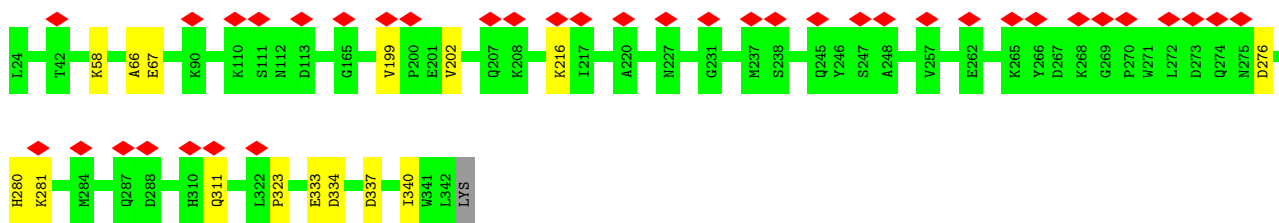
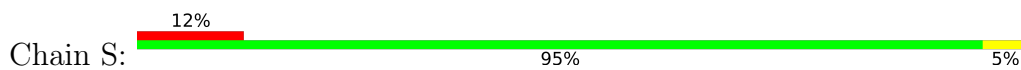
- Molecule 39: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 9, mitochondrial

Chain R:  6% 86% 10%

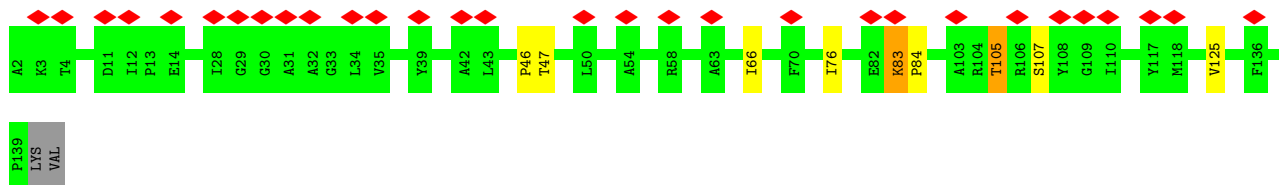




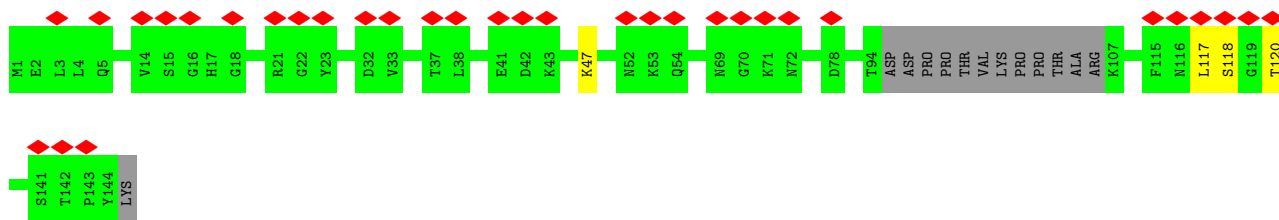
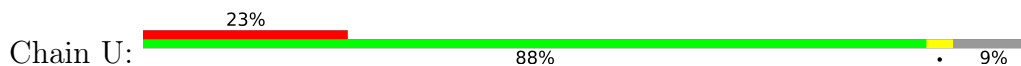
- Molecule 40: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10, mitochondrial



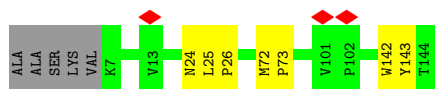
- Molecule 41: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 11



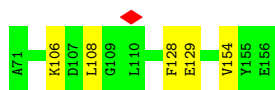
- Molecule 42: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 12



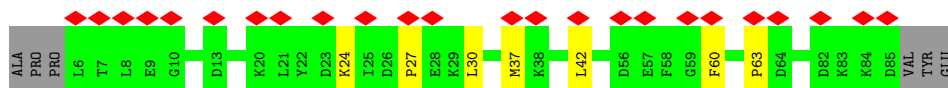
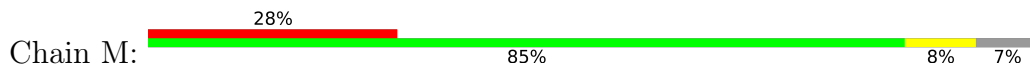
- Molecule 43: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 13



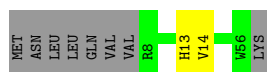
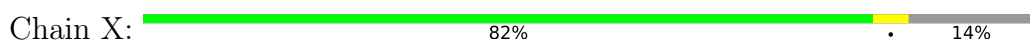
- Molecule 44: Acyl carrier protein, mitochondrial



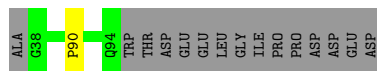
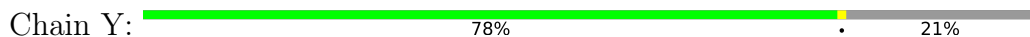
- Molecule 44: Acyl carrier protein, mitochondrial



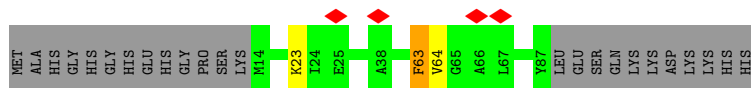
- Molecule 45: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 1



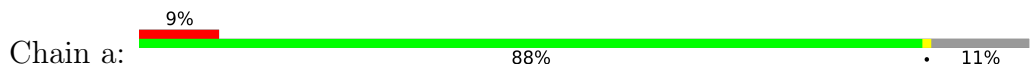
- Molecule 46: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 2, mitochondrial



- Molecule 47: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 3



- Molecule 48: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 4

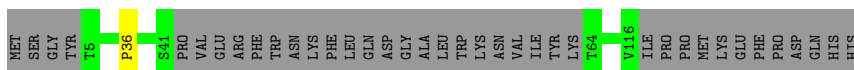


- Molecule 49: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 5, mitochondrial





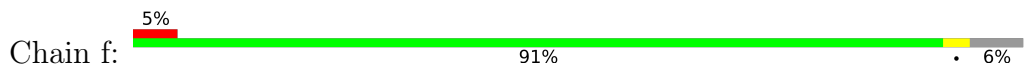
- Molecule 50: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 6



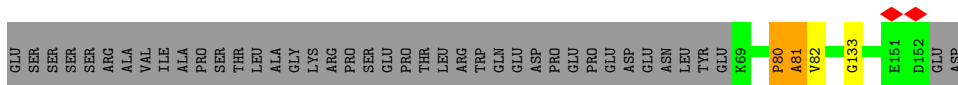
- Molecule 51: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 7



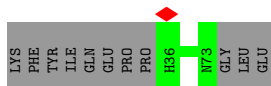
- Molecule 52: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 9



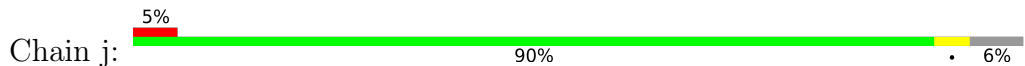
- Molecule 53: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 11, mitochondrial



- Molecule 54: NADH dehydrogenase [ubiquinone] 1 subunit C1, mitochondrial

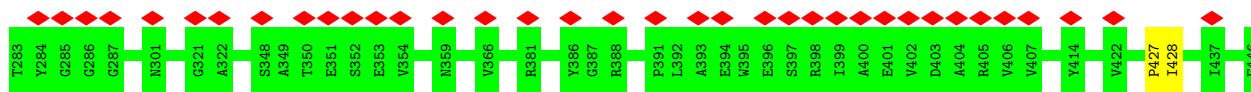


- Molecule 55: NADH dehydrogenase [ubiquinone] 1 subunit C2

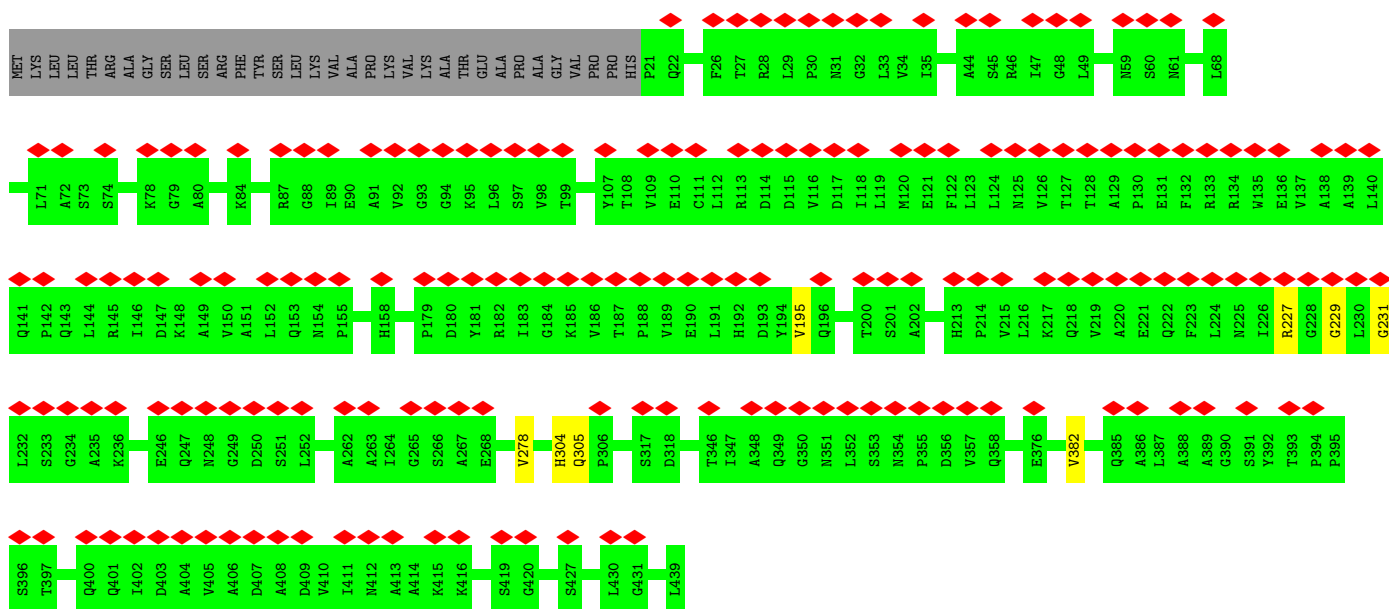
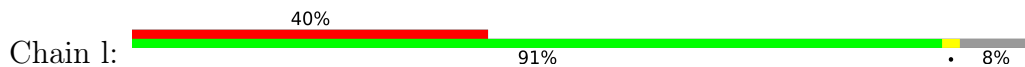


- Molecule 56: NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 10

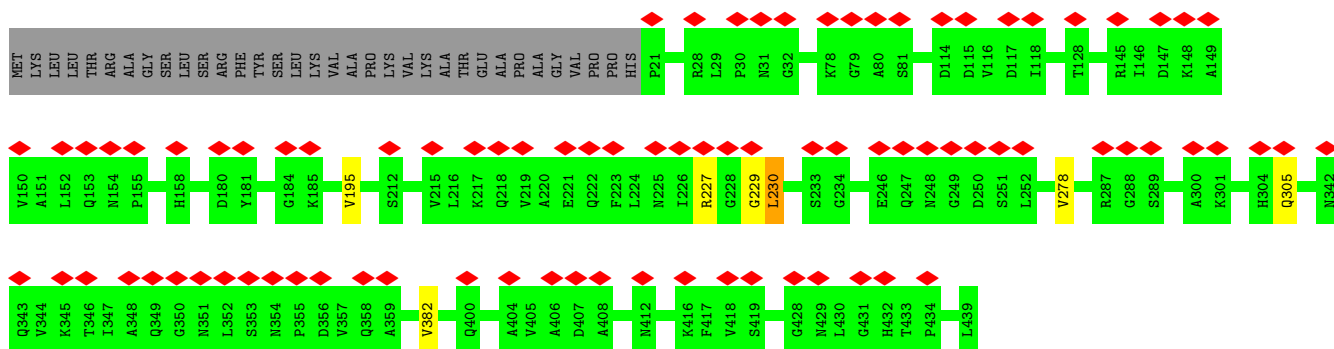
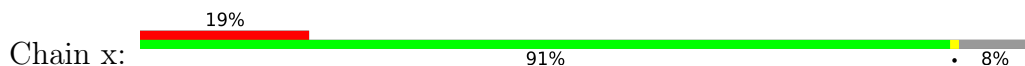




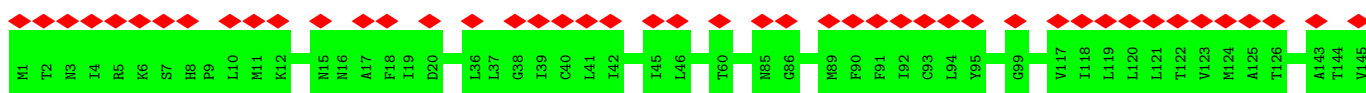
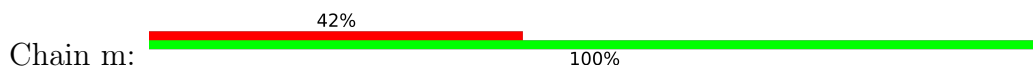
• Molecule 59: Cytochrome b-c1 complex subunit 2, mitochondrial

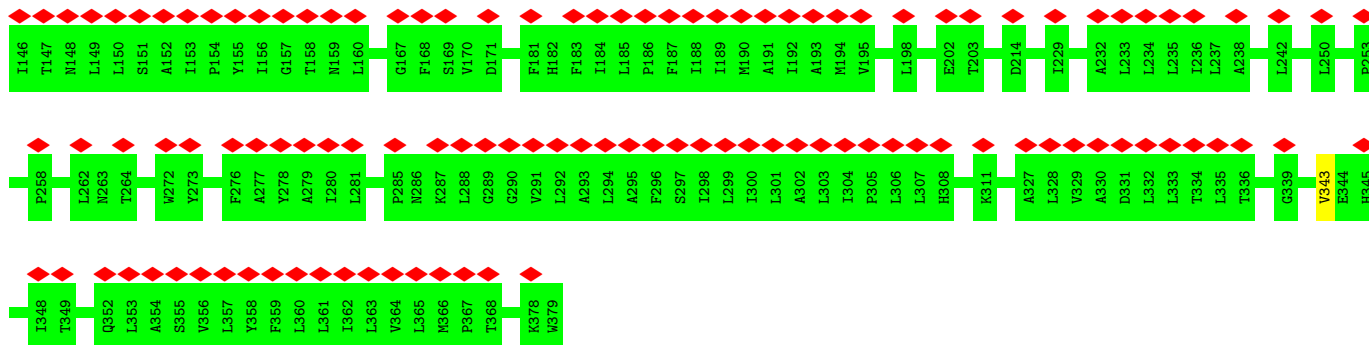


• Molecule 59: Cytochrome b-c1 complex subunit 2, mitochondrial

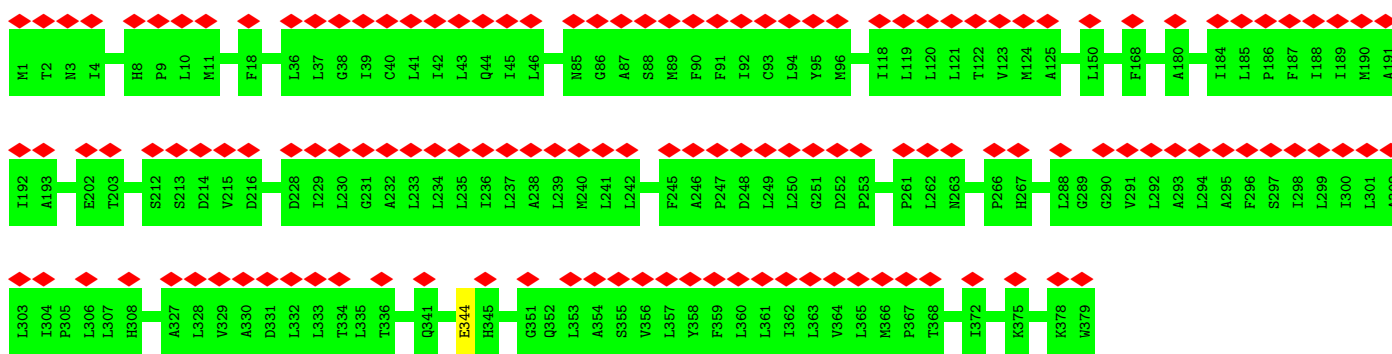


• Molecule 60: Cytochrome b

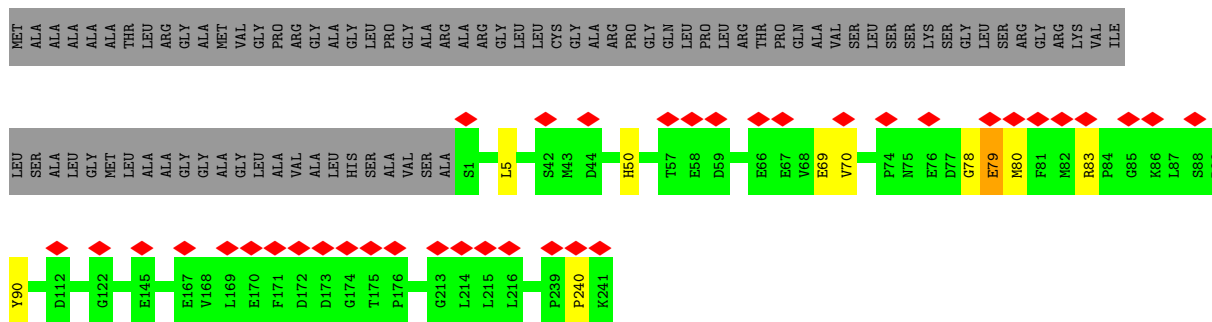




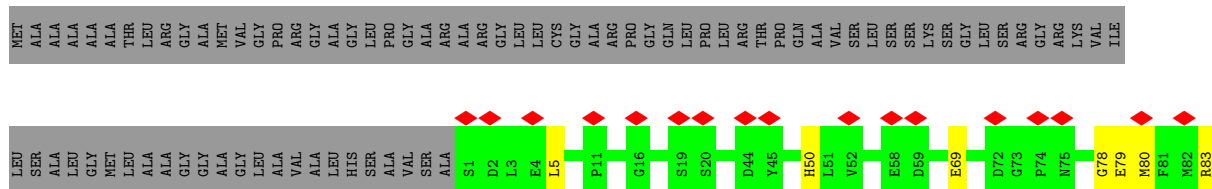
• Molecule 60: Cytochrome b

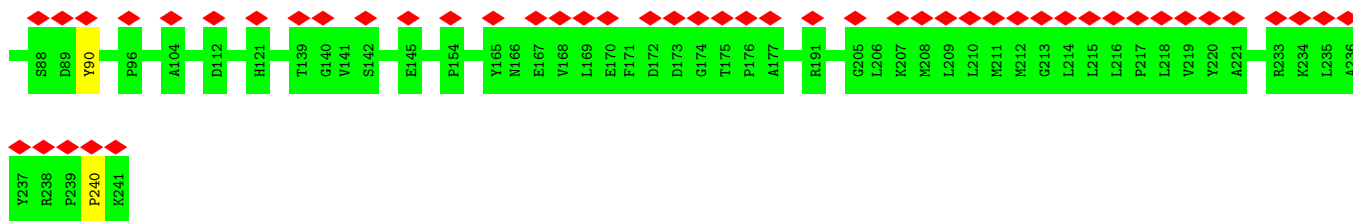


• Molecule 61: Cytochrome c1, heme protein, mitochondrial

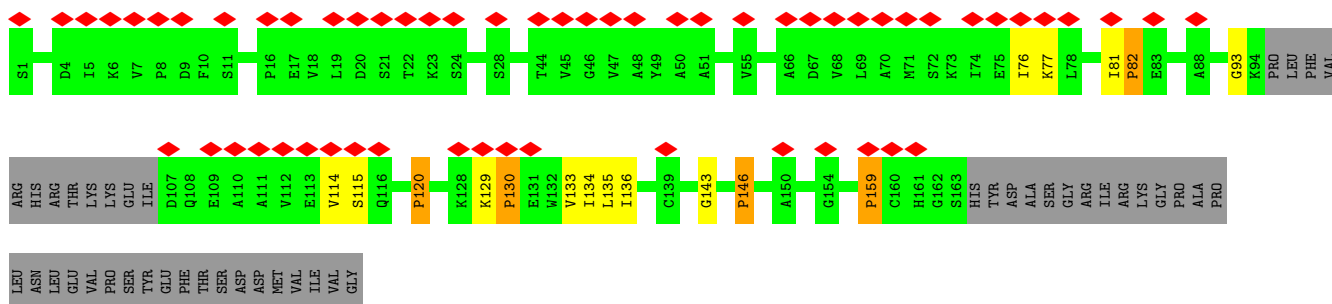


• Molecule 61: Cytochrome c1, heme protein, mitochondrial

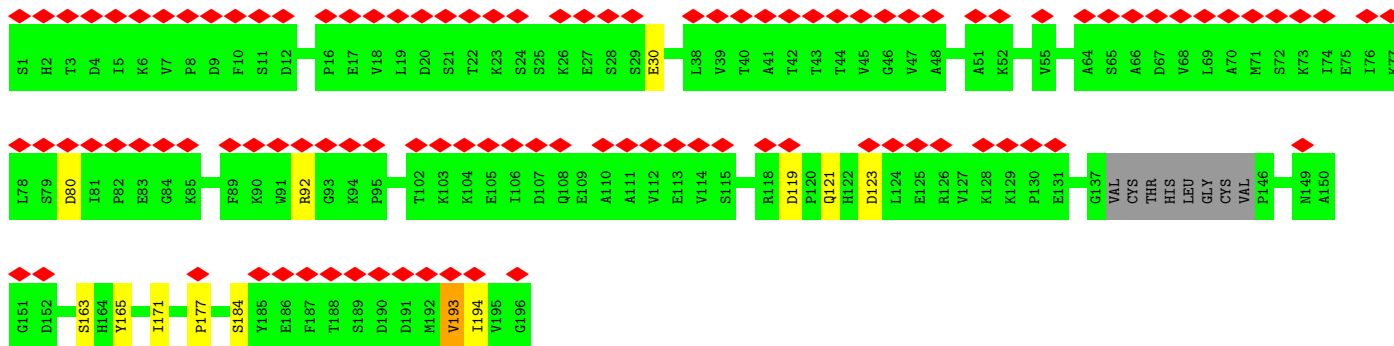
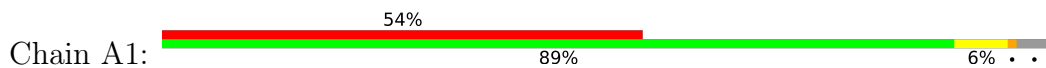




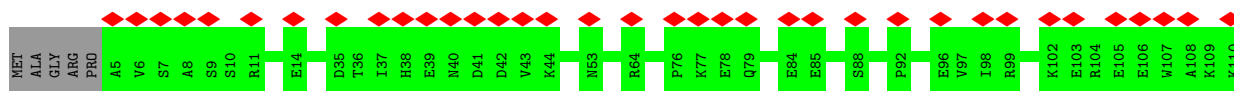
• Molecule 62: Cytochrome b-c1 complex subunit Rieske, mitochondrial



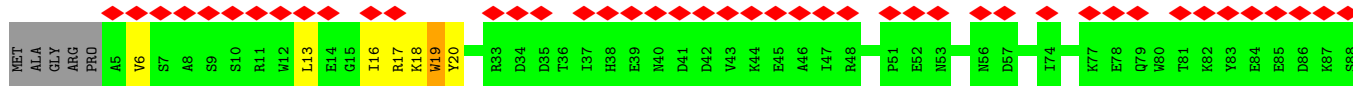
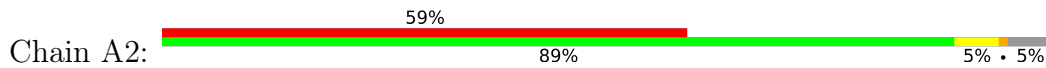
• Molecule 62: Cytochrome b-c1 complex subunit Rieske, mitochondrial

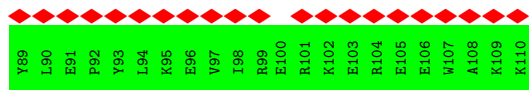


• Molecule 63: Cytochrome b-c1 complex subunit 7

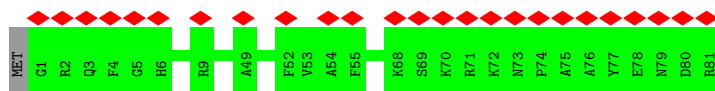


• Molecule 63: Cytochrome b-c1 complex subunit 7

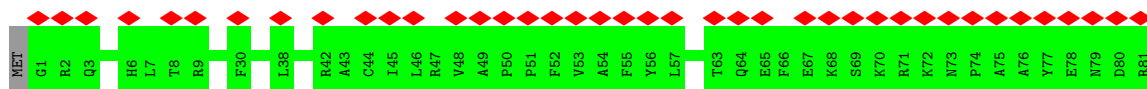




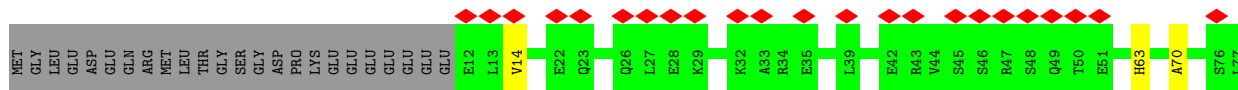
• Molecule 64: Cytochrome b-c1 complex subunit 8



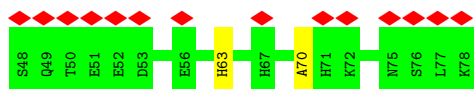
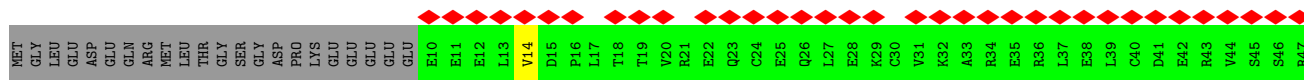
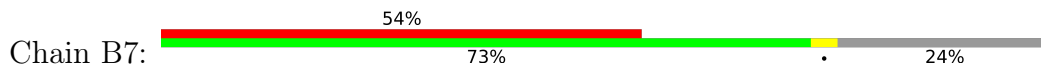
• Molecule 64: Cytochrome b-c1 complex subunit 8



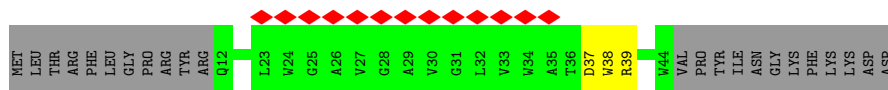
• Molecule 65: Cytochrome b-c1 complex subunit 6, mitochondrial



• Molecule 65: Cytochrome b-c1 complex subunit 6, mitochondrial

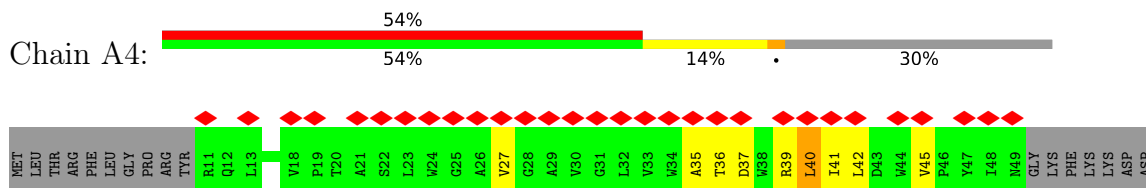


• Molecule 66: Cytochrome b-c1 complex subunit 10

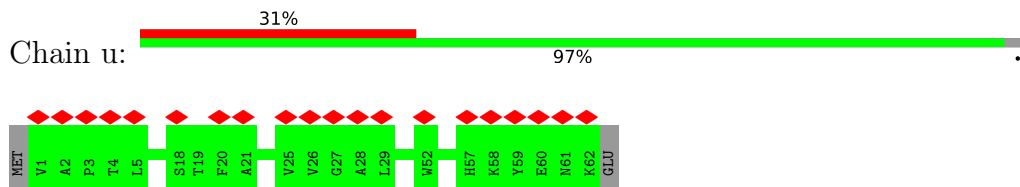


• Molecule 66: Cytochrome b-c1 complex subunit 10

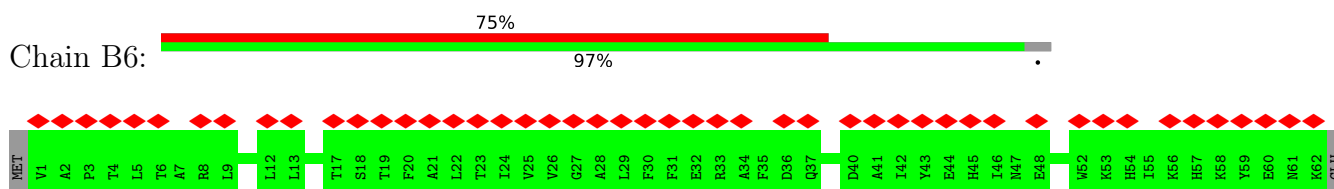




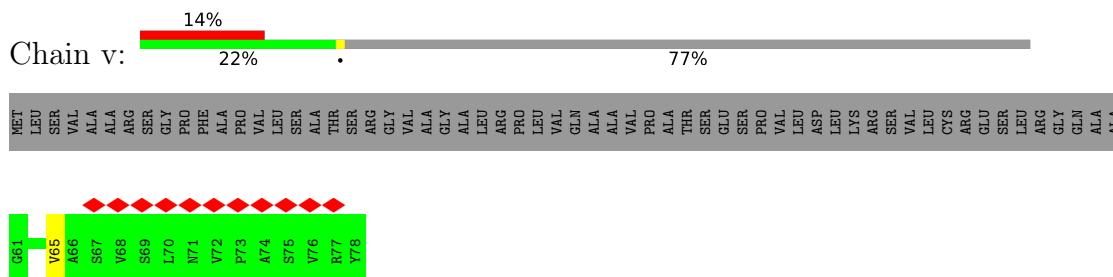
- Molecule 67: Cytochrome b-c1 complex subunit 9



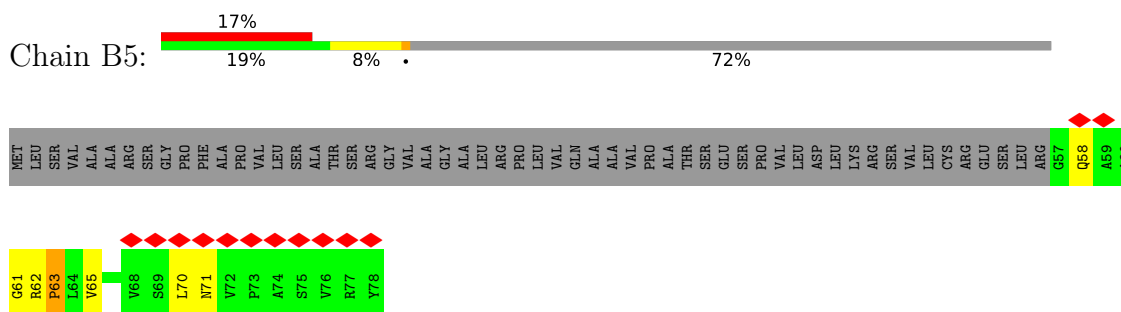
- Molecule 67: Cytochrome b-c1 complex subunit 9



- Molecule 68: Cytochrome b-c1 complex subunit Rieske, mitochondrial



- Molecule 68: Cytochrome b-c1 complex subunit Rieske, mitochondrial



## 4 Experimental information

| Property                             | Value                     | Source    |
|--------------------------------------|---------------------------|-----------|
| EM reconstruction method             | SINGLE PARTICLE           | Depositor |
| Imposed symmetry                     | POINT, C1                 | Depositor |
| Number of particles used             | 48729                     | Depositor |
| Resolution determination method      | FSC 0.143 CUT-OFF         | Depositor |
| CTF correction method                | NONE                      | Depositor |
| Microscope                           | FEI TITAN KRIOS           | Depositor |
| Voltage (kV)                         | 300                       | Depositor |
| Electron dose ( $e^-/\text{\AA}^2$ ) | 35                        | Depositor |
| Minimum defocus (nm)                 | Not provided              |           |
| Maximum defocus (nm)                 | Not provided              |           |
| Magnification                        | Not provided              |           |
| Image detector                       | FEI FALCON II (4k x 4k)   | Depositor |
| Maximum map value                    | 0.398                     | Depositor |
| Minimum map value                    | -0.037                    | Depositor |
| Average map value                    | 0.005                     | Depositor |
| Map value standard deviation         | 0.019                     | Depositor |
| Recommended contour level            | 0.07                      | Depositor |
| Map size ( $\text{\AA}$ )            | 391.244, 391.244, 391.244 | wwPDB     |
| Map dimensions                       | 280, 280, 280             | wwPDB     |
| Map angles ( $^\circ$ )              | 90.0, 90.0, 90.0          | wwPDB     |
| Pixel spacing ( $\text{\AA}$ )       | 1.3973, 1.3973, 1.3973    | 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: HEC, NAP, PC1, FMN, SF4, CU, HEM, FES, 3PE, CDL, ZN, UQ2, MG, HEA

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

| Mol | Chain | Bond lengths |               | Bond angles |                |
|-----|-------|--------------|---------------|-------------|----------------|
|     |       | RMSZ         | # Z  >5       | RMSZ        | # Z  >5        |
| 1   | 3     | 0.53         | 0/905         | 0.77        | 1/1237 (0.1%)  |
| 2   | 1     | 0.64         | 0/2575        | 0.83        | 3/3518 (0.1%)  |
| 3   | 9     | 0.50         | 0/1618        | 0.62        | 0/2207         |
| 4   | 7     | 0.61         | 0/1267        | 0.77        | 1/1731 (0.1%)  |
| 5   | 4     | 0.61         | 1/3674 (0.0%) | 0.80        | 4/5020 (0.1%)  |
| 6   | 5     | 0.62         | 0/721         | 0.84        | 2/977 (0.2%)   |
| 7   | 6     | 0.46         | 0/4893        | 0.65        | 1/6661 (0.0%)  |
| 8   | 2     | 0.72         | 1/2749 (0.0%) | 0.85        | 0/3744         |
| 9   | 8     | 0.50         | 0/3136        | 0.64        | 1/4258 (0.0%)  |
| 10  | C3    | 0.60         | 0/4164        | 0.76        | 1/5688 (0.0%)  |
| 11  | C1    | 0.57         | 0/1868        | 0.79        | 0/2544         |
| 12  | A9    | 0.56         | 0/2212        | 0.68        | 0/3025         |
| 13  | A7    | 0.57         | 0/1229        | 0.65        | 1/1658 (0.1%)  |
| 14  | B4    | 0.50         | 0/898         | 0.66        | 0/1218         |
| 15  | A5    | 0.56         | 0/765         | 0.81        | 0/1038         |
| 16  | A6    | 0.54         | 0/698         | 0.73        | 1/950 (0.1%)   |
| 17  | C0    | 0.55         | 0/648         | 0.73        | 0/877          |
| 18  | C2    | 0.60         | 0/611         | 0.64        | 0/810          |
| 19  | B2    | 0.61         | 0/451         | 0.72        | 0/610          |
| 20  | B3    | 0.57         | 0/398         | 0.66        | 0/546          |
| 21  | A0    | 0.63         | 0/399         | 0.62        | 0/534          |
| 22  | A8    | 0.51         | 0/345         | 0.65        | 0/470          |
| 23  | A     | 0.70         | 5/5304 (0.1%) | 0.82        | 7/7193 (0.1%)  |
| 24  | B     | 0.92         | 1/3512 (0.0%) | 0.92        | 12/4763 (0.3%) |
| 25  | C     | 0.85         | 0/1777        | 0.79        | 1/2420 (0.0%)  |
| 26  | D     | 0.98         | 2/1237 (0.2%) | 0.88        | 2/1676 (0.1%)  |
| 27  | E     | 0.96         | 4/1431 (0.3%) | 0.98        | 7/1938 (0.4%)  |
| 28  | F     | 0.33         | 0/191         | 0.82        | 0/262          |
| 29  | G     | 0.78         | 0/1008        | 0.80        | 0/1363         |
| 30  | H     | 0.55         | 0/800         | 0.73        | 0/1076         |
| 31  | I     | 0.56         | 0/543         | 0.86        | 0/729          |
| 32  | J     | 0.60         | 0/545         | 0.61        | 0/740          |

| Mol | Chain | Bond lengths |               | Bond angles |               |
|-----|-------|--------------|---------------|-------------|---------------|
|     |       | RMSZ         | # Z  >5       | RMSZ        | # Z  >5       |
| 33  | K     | 0.44         | 0/667         | 0.58        | 0/900         |
| 34  | L     | 0.47         | 0/623         | 0.60        | 0/862         |
| 35  | N     | 0.50         | 0/882         | 0.66        | 0/1203        |
| 36  | O     | 0.54         | 0/948         | 0.67        | 0/1279        |
| 37  | P     | 0.51         | 0/723         | 0.73        | 1/985 (0.1%)  |
| 38  | Q     | 0.48         | 0/1381        | 0.66        | 0/1869        |
| 39  | R     | 0.53         | 1/2407 (0.0%) | 0.70        | 0/3269        |
| 40  | S     | 0.39         | 0/2348        | 0.66        | 0/3198        |
| 41  | T     | 0.51         | 0/938         | 0.61        | 0/1278        |
| 42  | U     | 0.48         | 0/1053        | 0.72        | 1/1439 (0.1%) |
| 43  | V     | 0.58         | 1/1115 (0.1%) | 0.67        | 0/1508        |
| 44  | M     | 0.46         | 0/651         | 0.69        | 1/876 (0.1%)  |
| 44  | W     | 0.39         | 0/624         | 0.58        | 0/847         |
| 45  | X     | 0.37         | 0/383         | 0.57        | 0/523         |
| 46  | Y     | 0.40         | 0/428         | 0.59        | 0/592         |
| 47  | Z     | 0.38         | 0/506         | 0.57        | 0/688         |
| 48  | a     | 0.50         | 0/878         | 0.60        | 0/1195        |
| 49  | b     | 0.52         | 0/1058        | 0.68        | 0/1434        |
| 50  | c     | 0.36         | 0/632         | 0.73        | 2/871 (0.2%)  |
| 51  | d     | 0.51         | 1/726 (0.1%)  | 0.53        | 0/992         |
| 52  | f     | 0.38         | 0/1191        | 0.55        | 0/1639        |
| 53  | h     | 0.50         | 0/679         | 0.65        | 0/926         |
| 54  | i     | 0.39         | 0/286         | 0.52        | 0/392         |
| 55  | j     | 0.55         | 0/922         | 0.68        | 1/1254 (0.1%) |
| 56  | g     | 0.49         | 0/1380        | 0.61        | 1/1872 (0.1%) |
| 57  | e     | 0.38         | 0/888         | 0.72        | 1/1234 (0.1%) |
| 58  | k     | 0.48         | 0/3527        | 0.61        | 1/4787 (0.0%) |
| 58  | w     | 0.48         | 0/3455        | 0.59        | 0/4685        |
| 59  | l     | 0.43         | 0/3192        | 0.57        | 0/4329        |
| 59  | x     | 0.43         | 0/3198        | 0.58        | 1/4336 (0.0%) |
| 60  | m     | 0.56         | 0/3108        | 0.60        | 0/4252        |
| 60  | y     | 0.56         | 0/3108        | 0.60        | 0/4252        |
| 61  | o     | 0.51         | 0/1978        | 0.62        | 4/2684 (0.1%) |
| 61  | z     | 0.53         | 0/1965        | 0.61        | 2/2669 (0.1%) |
| 62  | A1    | 0.39         | 0/1124        | 0.69        | 0/1538        |
| 62  | p     | 0.41         | 0/945         | 0.84        | 5/1288 (0.4%) |
| 63  | A2    | 0.48         | 0/926         | 0.54        | 0/1243        |
| 63  | q     | 0.50         | 0/935         | 0.53        | 0/1253        |
| 64  | A3    | 0.48         | 0/698         | 0.59        | 0/944         |
| 64  | r     | 0.47         | 0/704         | 0.58        | 0/951         |
| 65  | B7    | 0.43         | 0/571         | 0.64        | 0/765         |
| 65  | s     | 0.43         | 0/553         | 0.63        | 0/741         |
| 66  | A4    | 0.47         | 0/330         | 0.67        | 0/457         |

| Mol | Chain | Bond lengths |                  | Bond angles |                  |
|-----|-------|--------------|------------------|-------------|------------------|
|     |       | RMSZ         | # Z  >5          | RMSZ        | # Z  >5          |
| 66  | t     | 0.42         | 0/272            | 0.52        | 0/377            |
| 67  | B6    | 0.41         | 0/524            | 0.50        | 0/707            |
| 67  | u     | 0.42         | 0/524            | 0.51        | 0/707            |
| 68  | B5    | 0.45         | 0/149            | 1.11        | 1/203 (0.5%)     |
| 68  | v     | 0.33         | 0/114            | 0.87        | 0/156            |
| All | All   | 0.57         | 17/108789 (0.0%) | 0.70        | 67/147930 (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 |
|-----|-------|---------------------|---------------------|
| 1   | 3     | 0                   | 2                   |
| 2   | 1     | 0                   | 3                   |
| 3   | 9     | 0                   | 6                   |
| 4   | 7     | 0                   | 6                   |
| 5   | 4     | 0                   | 9                   |
| 6   | 5     | 0                   | 4                   |
| 7   | 6     | 0                   | 5                   |
| 8   | 2     | 0                   | 10                  |
| 9   | 8     | 0                   | 8                   |
| 23  | A     | 0                   | 16                  |
| 24  | B     | 0                   | 4                   |
| 26  | D     | 0                   | 6                   |
| 27  | E     | 0                   | 5                   |
| 30  | H     | 0                   | 2                   |
| 31  | I     | 0                   | 1                   |
| 33  | K     | 0                   | 1                   |
| 34  | L     | 0                   | 1                   |
| 35  | N     | 0                   | 1                   |
| 36  | O     | 0                   | 1                   |
| 37  | P     | 0                   | 3                   |
| 38  | Q     | 0                   | 2                   |
| 39  | R     | 0                   | 8                   |
| 40  | S     | 0                   | 4                   |
| 41  | T     | 0                   | 2                   |
| 42  | U     | 0                   | 3                   |
| 43  | V     | 0                   | 3                   |
| 44  | M     | 0                   | 3                   |
| 44  | W     | 0                   | 2                   |
| 47  | Z     | 0                   | 2                   |

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| Mol | Chain | #Chirality outliers | #Planarity outliers |
|-----|-------|---------------------|---------------------|
| 48  | a     | 0                   | 1                   |
| 49  | b     | 0                   | 4                   |
| 51  | d     | 0                   | 1                   |
| 52  | f     | 0                   | 3                   |
| 53  | h     | 0                   | 3                   |
| 55  | j     | 0                   | 4                   |
| 56  | g     | 0                   | 2                   |
| 57  | e     | 0                   | 7                   |
| 58  | k     | 0                   | 6                   |
| 58  | w     | 0                   | 2                   |
| 59  | l     | 0                   | 4                   |
| 59  | x     | 0                   | 3                   |
| 60  | y     | 0                   | 1                   |
| 61  | o     | 0                   | 6                   |
| 61  | z     | 0                   | 6                   |
| 62  | A1    | 0                   | 8                   |
| 62  | p     | 0                   | 5                   |
| 68  | B5    | 0                   | 4                   |
| All | All   | 0                   | 193                 |

The worst 5 of 17 bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms  | Z     | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|--------|-------|-------------|----------|
| 51  | d     | 74  | PHE  | C-N    | 9.73  | 1.52        | 1.34     |
| 23  | A     | 240 | ALA  | C-N    | 8.07  | 1.52        | 1.34     |
| 24  | B     | 135 | TYR  | CE1-CZ | -7.42 | 1.28        | 1.38     |
| 43  | V     | 25  | LEU  | C-N    | -7.23 | 1.20        | 1.34     |
| 27  | E     | 123 | CYS  | CB-SG  | -6.97 | 1.70        | 1.82     |

The worst 5 of 67 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms     | Z     | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-----------|-------|-------------|----------|
| 4   | 7     | 80  | PRO  | CA-N-CD   | -8.63 | 99.42       | 111.50   |
| 27  | E     | 140 | ARG  | CG-CD-NE  | 8.46  | 129.57      | 111.80   |
| 27  | E     | 170 | GLY  | C-N-CD    | -8.04 | 102.91      | 120.60   |
| 23  | A     | 139 | LEU  | CA-CB-CG  | -8.03 | 96.84       | 115.30   |
| 27  | E     | 118 | LEU  | CB-CG-CD2 | -7.90 | 97.57       | 111.00   |

There are no chirality outliers.

5 of 193 planarity outliers are listed below:

| Mol | Chain | Res | Type | Group     |
|-----|-------|-----|------|-----------|
| 2   | 1     | 125 | SER  | Peptide   |
| 2   | 1     | 195 | ARG  | Peptide   |
| 2   | 1     | 66  | SER  | Mainchain |
| 1   | 3     | 42  | ASP  | Peptide   |
| 1   | 3     | 69  | ILE  | Peptide   |

## 5.2 Too-close contacts [i](#)

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

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

| Mol | Chain | Analysed       | Favoured  | Allowed  | Outliers | Percentiles |     |
|-----|-------|----------------|-----------|----------|----------|-------------|-----|
| 1   | 3     | 110/115 (96%)  | 93 (84%)  | 16 (14%) | 1 (1%)   | 17          | 56  |
| 2   | 1     | 316/318 (99%)  | 254 (80%) | 49 (16%) | 13 (4%)  | 3           | 25  |
| 3   | 9     | 205/217 (94%)  | 167 (82%) | 31 (15%) | 7 (3%)   | 3           | 29  |
| 4   | 7     | 170/175 (97%)  | 133 (78%) | 27 (16%) | 10 (6%)  | 1           | 19  |
| 5   | 4     | 457/459 (100%) | 392 (86%) | 57 (12%) | 8 (2%)   | 8           | 41  |
| 6   | 5     | 94/98 (96%)    | 78 (83%)  | 16 (17%) | 0        | 100         | 100 |
| 7   | 6     | 604/606 (100%) | 519 (86%) | 82 (14%) | 3 (0%)   | 29          | 68  |
| 8   | 2     | 342/347 (99%)  | 284 (83%) | 56 (16%) | 2 (1%)   | 25          | 65  |
| 9   | 8     | 425/444 (96%)  | 349 (82%) | 69 (16%) | 7 (2%)   | 9           | 44  |
| 10  | C3    | 512/514 (100%) | 479 (94%) | 29 (6%)  | 4 (1%)   | 19          | 60  |
| 11  | C1    | 225/227 (99%)  | 203 (90%) | 19 (8%)  | 3 (1%)   | 12          | 48  |
| 12  | A9    | 259/261 (99%)  | 249 (96%) | 10 (4%)  | 0        | 100         | 100 |
| 13  | A7    | 142/169 (84%)  | 135 (95%) | 7 (5%)   | 0        | 100         | 100 |
| 14  | B4    | 107/152 (70%)  | 104 (97%) | 3 (3%)   | 0        | 100         | 100 |
| 15  | A5    | 96/129 (74%)   | 86 (90%)  | 6 (6%)   | 4 (4%)   | 3           | 25  |

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| Mol | Chain | Analysed       | Favoured  | Allowed   | Outliers | Percentiles |     |
|-----|-------|----------------|-----------|-----------|----------|-------------|-----|
| 16  | A6    | 82/97 (84%)    | 67 (82%)  | 10 (12%)  | 5 (6%)   | 1           | 18  |
| 17  | C0    | 73/86 (85%)    | 64 (88%)  | 8 (11%)   | 1 (1%)   | 11          | 46  |
| 18  | C2    | 71/74 (96%)    | 65 (92%)  | 6 (8%)    | 0        | 100         | 100 |
| 19  | B2    | 54/80 (68%)    | 48 (89%)  | 4 (7%)    | 2 (4%)   | 3           | 27  |
| 20  | B3    | 47/80 (59%)    | 41 (87%)  | 6 (13%)   | 0        | 100         | 100 |
| 21  | A0    | 45/63 (71%)    | 42 (93%)  | 3 (7%)    | 0        | 100         | 100 |
| 22  | A8    | 41/70 (59%)    | 39 (95%)  | 2 (5%)    | 0        | 100         | 100 |
| 23  | A     | 686/704 (97%)  | 560 (82%) | 112 (16%) | 14 (2%)  | 7           | 39  |
| 24  | B     | 428/430 (100%) | 344 (80%) | 77 (18%)  | 7 (2%)   | 9           | 44  |
| 25  | C     | 206/228 (90%)  | 172 (84%) | 32 (16%)  | 2 (1%)   | 15          | 54  |
| 26  | D     | 150/179 (84%)  | 122 (81%) | 24 (16%)  | 4 (3%)   | 5           | 33  |
| 27  | E     | 174/176 (99%)  | 148 (85%) | 23 (13%)  | 3 (2%)   | 9           | 43  |
| 28  | F     | 26/75 (35%)    | 18 (69%)  | 7 (27%)   | 1 (4%)   | 3           | 26  |
| 29  | G     | 121/133 (91%)  | 102 (84%) | 18 (15%)  | 1 (1%)   | 19          | 60  |
| 30  | H     | 94/105 (90%)   | 70 (74%)  | 21 (22%)  | 3 (3%)   | 4           | 30  |
| 31  | I     | 69/96 (72%)    | 58 (84%)  | 8 (12%)   | 3 (4%)   | 2           | 24  |
| 32  | J     | 67/70 (96%)    | 60 (90%)  | 5 (8%)    | 2 (3%)   | 4           | 31  |
| 33  | K     | 82/98 (84%)    | 66 (80%)  | 15 (18%)  | 1 (1%)   | 13          | 50  |
| 34  | L     | 78/83 (94%)    | 67 (86%)  | 11 (14%)  | 0        | 100         | 100 |
| 35  | N     | 109/115 (95%)  | 96 (88%)  | 13 (12%)  | 0        | 100         | 100 |
| 36  | O     | 112/127 (88%)  | 97 (87%)  | 12 (11%)  | 3 (3%)   | 5           | 33  |
| 37  | P     | 86/112 (77%)   | 64 (74%)  | 22 (26%)  | 0        | 100         | 100 |
| 38  | Q     | 166/171 (97%)  | 115 (69%) | 48 (29%)  | 3 (2%)   | 8           | 41  |
| 39  | R     | 305/345 (88%)  | 240 (79%) | 60 (20%)  | 5 (2%)   | 9           | 44  |
| 40  | S     | 317/320 (99%)  | 239 (75%) | 67 (21%)  | 11 (4%)  | 3           | 28  |
| 41  | T     | 136/140 (97%)  | 115 (85%) | 12 (9%)   | 9 (7%)   | 1           | 17  |
| 42  | U     | 128/145 (88%)  | 98 (77%)  | 30 (23%)  | 0        | 100         | 100 |
| 43  | V     | 136/143 (95%)  | 111 (82%) | 22 (16%)  | 3 (2%)   | 6           | 37  |
| 44  | M     | 78/86 (91%)    | 56 (72%)  | 19 (24%)  | 3 (4%)   | 3           | 26  |
| 44  | W     | 84/86 (98%)    | 68 (81%)  | 15 (18%)  | 1 (1%)   | 13          | 50  |
| 45  | X     | 47/57 (82%)    | 37 (79%)  | 8 (17%)   | 2 (4%)   | 2           | 24  |

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| Mol | Chain | Analysed       | Favoured  | Allowed  | Outliers | Percentiles |     |
|-----|-------|----------------|-----------|----------|----------|-------------|-----|
| 46  | Y     | 55/72 (76%)    | 44 (80%)  | 10 (18%) | 1 (2%)   | 8           | 41  |
| 47  | Z     | 72/98 (74%)    | 54 (75%)  | 16 (22%) | 2 (3%)   | 5           | 32  |
| 48  | a     | 112/128 (88%)  | 93 (83%)  | 19 (17%) | 0        | 100         | 100 |
| 49  | b     | 137/143 (96%)  | 106 (77%) | 30 (22%) | 1 (1%)   | 22          | 62  |
| 50  | c     | 86/128 (67%)   | 66 (77%)  | 20 (23%) | 0        | 100         | 100 |
| 51  | d     | 105/117 (90%)  | 89 (85%)  | 13 (12%) | 3 (3%)   | 4           | 31  |
| 52  | f     | 165/178 (93%)  | 129 (78%) | 34 (21%) | 2 (1%)   | 13          | 50  |
| 53  | h     | 82/125 (66%)   | 56 (68%)  | 23 (28%) | 3 (4%)   | 3           | 27  |
| 54  | i     | 36/49 (74%)    | 33 (92%)  | 3 (8%)   | 0        | 100         | 100 |
| 55  | j     | 111/120 (92%)  | 96 (86%)  | 15 (14%) | 0        | 100         | 100 |
| 56  | g     | 171/176 (97%)  | 142 (83%) | 27 (16%) | 2 (1%)   | 13          | 50  |
| 57  | e     | 139/158 (88%)  | 80 (58%)  | 47 (34%) | 12 (9%)  | 1           | 12  |
| 58  | k     | 444/480 (92%)  | 405 (91%) | 35 (8%)  | 4 (1%)   | 17          | 56  |
| 58  | w     | 432/480 (90%)  | 400 (93%) | 29 (7%)  | 3 (1%)   | 22          | 62  |
| 59  | l     | 417/453 (92%)  | 384 (92%) | 29 (7%)  | 4 (1%)   | 15          | 54  |
| 59  | x     | 417/453 (92%)  | 384 (92%) | 29 (7%)  | 4 (1%)   | 15          | 54  |
| 60  | m     | 377/379 (100%) | 341 (90%) | 35 (9%)  | 1 (0%)   | 41          | 76  |
| 60  | y     | 377/379 (100%) | 341 (90%) | 36 (10%) | 0        | 100         | 100 |
| 61  | o     | 239/325 (74%)  | 204 (85%) | 34 (14%) | 1 (0%)   | 34          | 72  |
| 61  | z     | 239/325 (74%)  | 205 (86%) | 32 (13%) | 2 (1%)   | 19          | 60  |
| 62  | A1    | 184/196 (94%)  | 137 (74%) | 41 (22%) | 6 (3%)   | 4           | 29  |
| 62  | p     | 147/196 (75%)  | 100 (68%) | 35 (24%) | 12 (8%)  | 1           | 13  |
| 63  | A2    | 104/111 (94%)  | 91 (88%)  | 8 (8%)   | 5 (5%)   | 2           | 23  |
| 63  | q     | 104/111 (94%)  | 96 (92%)  | 8 (8%)   | 0        | 100         | 100 |
| 64  | A3    | 79/82 (96%)    | 72 (91%)  | 7 (9%)   | 0        | 100         | 100 |
| 64  | r     | 79/82 (96%)    | 72 (91%)  | 7 (9%)   | 0        | 100         | 100 |
| 65  | B7    | 67/91 (74%)    | 57 (85%)  | 7 (10%)  | 3 (4%)   | 2           | 24  |
| 65  | s     | 65/91 (71%)    | 55 (85%)  | 7 (11%)  | 3 (5%)   | 2           | 23  |
| 66  | A4    | 37/56 (66%)    | 23 (62%)  | 8 (22%)  | 6 (16%)  | 0           | 3   |
| 66  | t     | 31/56 (55%)    | 24 (77%)  | 7 (23%)  | 0        | 100         | 100 |
| 67  | B6    | 60/64 (94%)    | 55 (92%)  | 5 (8%)   | 0        | 100         | 100 |

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| Mol | Chain | Analysed          | Favoured    | Allowed    | Outliers | Percentiles |     |
|-----|-------|-------------------|-------------|------------|----------|-------------|-----|
| 67  | u     | 60/64 (94%)       | 55 (92%)    | 5 (8%)     | 0        | 100         | 100 |
| 68  | B5    | 20/78 (26%)       | 10 (50%)    | 8 (40%)    | 2 (10%)  | 0           | 10  |
| 68  | v     | 16/78 (20%)       | 8 (50%)     | 7 (44%)    | 1 (6%)   | 1           | 18  |
| All | All   | 13628/15127 (90%) | 11521 (84%) | 1873 (14%) | 234 (2%) | 13          | 43  |

5 of 234 Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 2   | 1     | 170 | GLU  |
| 2   | 1     | 174 | LEU  |
| 2   | 1     | 268 | MET  |
| 4   | 7     | 79  | TYR  |
| 4   | 7     | 82  | ILE  |

### 5.3.2 Protein sidechains [i](#)

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

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

| Mol | Chain | Analysed       | Rotameric  | Outliers | Percentiles |     |
|-----|-------|----------------|------------|----------|-------------|-----|
| 1   | 3     | 96/101 (95%)   | 96 (100%)  | 0        | 100         | 100 |
| 2   | 1     | 274/275 (100%) | 256 (93%)  | 18 (7%)  | 16          | 43  |
| 3   | 9     | 170/183 (93%)  | 168 (99%)  | 2 (1%)   | 71          | 84  |
| 4   | 7     | 115/142 (81%)  | 113 (98%)  | 2 (2%)   | 60          | 78  |
| 5   | 4     | 389/413 (94%)  | 389 (100%) | 0        | 100         | 100 |
| 6   | 5     | 80/86 (93%)    | 80 (100%)  | 0        | 100         | 100 |
| 7   | 6     | 524/534 (98%)  | 523 (100%) | 1 (0%)   | 93          | 96  |
| 8   | 2     | 304/316 (96%)  | 302 (99%)  | 2 (1%)   | 84          | 90  |
| 9   | 8     | 270/353 (76%)  | 270 (100%) | 0        | 100         | 100 |
| 10  | C3    | 427/427 (100%) | 389 (91%)  | 38 (9%)  | 9           | 33  |
| 11  | C1    | 211/211 (100%) | 191 (90%)  | 20 (10%) | 8           | 29  |
| 12  | A9    | 226/226 (100%) | 199 (88%)  | 27 (12%) | 5           | 22  |
| 13  | A7    | 128/148 (86%)  | 120 (94%)  | 8 (6%)   | 18          | 44  |

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| Mol | Chain | Analysed      | Rotameric  | Outliers | Percentiles |     |
|-----|-------|---------------|------------|----------|-------------|-----|
| 14  | B4    | 95/123 (77%)  | 89 (94%)   | 6 (6%)   | 18          | 44  |
| 15  | A5    | 81/103 (79%)  | 76 (94%)   | 5 (6%)   | 18          | 45  |
| 16  | A6    | 68/79 (86%)   | 50 (74%)   | 18 (26%) | 0           | 4   |
| 17  | C0    | 67/76 (88%)   | 58 (87%)   | 9 (13%)  | 4           | 19  |
| 18  | C2    | 58/59 (98%)   | 53 (91%)   | 5 (9%)   | 10          | 35  |
| 19  | B2    | 47/68 (69%)   | 40 (85%)   | 7 (15%)  | 3           | 16  |
| 20  | B3    | 39/66 (59%)   | 37 (95%)   | 2 (5%)   | 24          | 50  |
| 21  | A0    | 40/55 (73%)   | 38 (95%)   | 2 (5%)   | 24          | 50  |
| 22  | A8    | 37/57 (65%)   | 34 (92%)   | 3 (8%)   | 11          | 37  |
| 23  | A     | 560/588 (95%) | 558 (100%) | 2 (0%)   | 91          | 94  |
| 24  | B     | 363/371 (98%) | 357 (98%)  | 6 (2%)   | 60          | 78  |
| 25  | C     | 188/204 (92%) | 187 (100%) | 1 (0%)   | 88          | 93  |
| 26  | D     | 127/150 (85%) | 126 (99%)  | 1 (1%)   | 81          | 89  |
| 27  | E     | 148/151 (98%) | 148 (100%) | 0        | 100         | 100 |
| 28  | F     | 14/69 (20%)   | 14 (100%)  | 0        | 100         | 100 |
| 29  | G     | 106/119 (89%) | 105 (99%)  | 1 (1%)   | 78          | 88  |
| 30  | H     | 80/95 (84%)   | 80 (100%)  | 0        | 100         | 100 |
| 31  | I     | 54/79 (68%)   | 51 (94%)   | 3 (6%)   | 21          | 48  |
| 32  | J     | 50/59 (85%)   | 50 (100%)  | 0        | 100         | 100 |
| 33  | K     | 67/81 (83%)   | 67 (100%)  | 0        | 100         | 100 |
| 34  | L     | 63/71 (89%)   | 63 (100%)  | 0        | 100         | 100 |
| 35  | N     | 88/101 (87%)  | 88 (100%)  | 0        | 100         | 100 |
| 36  | O     | 95/113 (84%)  | 95 (100%)  | 0        | 100         | 100 |
| 37  | P     | 73/96 (76%)   | 73 (100%)  | 0        | 100         | 100 |
| 38  | Q     | 142/154 (92%) | 142 (100%) | 0        | 100         | 100 |
| 39  | R     | 230/298 (77%) | 230 (100%) | 0        | 100         | 100 |
| 40  | S     | 205/283 (72%) | 205 (100%) | 0        | 100         | 100 |
| 41  | T     | 76/101 (75%)  | 76 (100%)  | 0        | 100         | 100 |
| 42  | U     | 95/131 (72%)  | 95 (100%)  | 0        | 100         | 100 |
| 43  | V     | 106/120 (88%) | 106 (100%) | 0        | 100         | 100 |
| 44  | M     | 73/79 (92%)   | 73 (100%)  | 0        | 100         | 100 |

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| Mol | Chain | Analysed       | Rotameric  | Outliers | Percentiles |     |
|-----|-------|----------------|------------|----------|-------------|-----|
| 44  | W     | 57/79 (72%)    | 55 (96%)   | 2 (4%)   | 36          | 59  |
| 45  | X     | 32/54 (59%)    | 32 (100%)  | 0        | 100         | 100 |
| 46  | Y     | 29/62 (47%)    | 29 (100%)  | 0        | 100         | 100 |
| 47  | Z     | 28/76 (37%)    | 28 (100%)  | 0        | 100         | 100 |
| 48  | a     | 70/114 (61%)   | 70 (100%)  | 0        | 100         | 100 |
| 49  | b     | 85/124 (68%)   | 85 (100%)  | 0        | 100         | 100 |
| 50  | c     | 45/122 (37%)   | 45 (100%)  | 0        | 100         | 100 |
| 51  | d     | 43/107 (40%)   | 43 (100%)  | 0        | 100         | 100 |
| 52  | f     | 80/160 (50%)   | 80 (100%)  | 0        | 100         | 100 |
| 53  | h     | 63/112 (56%)   | 63 (100%)  | 0        | 100         | 100 |
| 54  | i     | 23/45 (51%)    | 23 (100%)  | 0        | 100         | 100 |
| 55  | j     | 88/106 (83%)   | 88 (100%)  | 0        | 100         | 100 |
| 56  | g     | 130/157 (83%)  | 130 (100%) | 0        | 100         | 100 |
| 57  | e     | 44/141 (31%)   | 41 (93%)   | 3 (7%)   | 16          | 42  |
| 58  | k     | 369/394 (94%)  | 369 (100%) | 0        | 100         | 100 |
| 58  | w     | 362/394 (92%)  | 362 (100%) | 0        | 100         | 100 |
| 59  | l     | 327/355 (92%)  | 327 (100%) | 0        | 100         | 100 |
| 59  | x     | 328/355 (92%)  | 328 (100%) | 0        | 100         | 100 |
| 60  | m     | 327/327 (100%) | 327 (100%) | 0        | 100         | 100 |
| 60  | y     | 327/327 (100%) | 327 (100%) | 0        | 100         | 100 |
| 61  | o     | 206/257 (80%)  | 206 (100%) | 0        | 100         | 100 |
| 61  | z     | 202/257 (79%)  | 202 (100%) | 0        | 100         | 100 |
| 62  | A1    | 64/168 (38%)   | 64 (100%)  | 0        | 100         | 100 |
| 62  | p     | 65/168 (39%)   | 65 (100%)  | 0        | 100         | 100 |
| 63  | A2    | 93/99 (94%)    | 90 (97%)   | 3 (3%)   | 39          | 61  |
| 63  | q     | 96/99 (97%)    | 96 (100%)  | 0        | 100         | 100 |
| 64  | A3    | 70/72 (97%)    | 70 (100%)  | 0        | 100         | 100 |
| 64  | r     | 71/72 (99%)    | 71 (100%)  | 0        | 100         | 100 |
| 65  | B7    | 66/85 (78%)    | 66 (100%)  | 0        | 100         | 100 |
| 65  | s     | 64/85 (75%)    | 64 (100%)  | 0        | 100         | 100 |
| 66  | A4    | 31/46 (67%)    | 27 (87%)   | 4 (13%)  | 4           | 20  |

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| Mol | Chain | Analysed          | Rotameric   | Outliers | Percentiles |     |
|-----|-------|-------------------|-------------|----------|-------------|-----|
| 66  | t     | 24/46 (52%)       | 21 (88%)    | 3 (12%)  | 4           | 21  |
| 67  | B6    | 52/54 (96%)       | 52 (100%)   | 0        | 100         | 100 |
| 67  | u     | 52/54 (96%)       | 52 (100%)   | 0        | 100         | 100 |
| 68  | B5    | 15/60 (25%)       | 14 (93%)    | 1 (7%)   | 16          | 42  |
| 68  | v     | 11/60 (18%)       | 11 (100%)   | 0        | 100         | 100 |
| All | All   | 10788/12907 (84%) | 10583 (98%) | 205 (2%) | 59          | 75  |

5 of 205 residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 13  | A7    | 107 | ILE  |
| 16  | A6    | 56  | ARG  |
| 63  | A2    | 19  | TRP  |
| 14  | B4    | 29  | LEU  |
| 16  | A6    | 7   | ASP  |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 156 such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 59  | l     | 297 | GLN  |
| 59  | x     | 297 | GLN  |
| 60  | m     | 32  | ASN  |
| 64  | r     | 79  | ASN  |
| 60  | y     | 341 | GLN  |

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 39 ligands modelled in this entry, 6 are monoatomic - leaving 33 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 |
| 69  | PC1  | 2     | 402 | -    | 45,45,53     | 1.02 | 2 (4%)   | 51,53,61    | 0.99 | 2 (3%)   |
| 73  | FMN  | 8     | 501 | -    | 33,33,33     | 1.19 | 2 (6%)   | 48,50,50    | 1.62 | 12 (25%) |
| 81  | HEC  | z     | 301 | 61   | 32,50,50     | 2.42 | 5 (15%)  | 24,82,82    | 1.79 | 6 (25%)  |
| 69  | PC1  | S     | 401 | -    | 46,46,53     | 1.03 | 4 (8%)   | 52,54,61    | 1.07 | 2 (3%)   |
| 74  | SF4  | D     | 301 | 26   | 0,12,12      | -    | -        | -           | -    | -        |
| 70  | 3PE  | 2     | 401 | -    | 40,40,50     | 0.93 | 3 (7%)   | 43,45,55    | 1.08 | 2 (4%)   |
| 74  | SF4  | A     | 802 | -    | 0,12,12      | -    | -        | -           | -    | -        |
| 81  | HEC  | o     | 301 | 61   | 32,50,50     | 2.41 | 5 (15%)  | 24,82,82    | 1.80 | 6 (25%)  |
| 70  | 3PE  | 4     | 501 | -    | 40,40,50     | 0.90 | 3 (7%)   | 43,45,55    | 1.38 | 2 (4%)   |
| 74  | SF4  | 8     | 502 | -    | 0,12,12      | -    | -        | -           | -    | -        |
| 76  | HEA  | C3    | 603 | 10   | 57,67,67     | 1.47 | 6 (10%)  | 61,103,103  | 1.45 | 11 (18%) |
| 80  | HEM  | y     | 402 | 60   | 41,50,50     | 1.80 | 13 (31%) | 45,82,82    | 1.29 | 5 (11%)  |
| 70  | 3PE  | B     | 501 | -    | 50,50,50     | 0.87 | 2 (4%)   | 53,55,55    | 1.34 | 4 (7%)   |
| 79  | NAP  | R     | 601 | -    | 45,52,52     | 4.71 | 18 (40%) | 56,80,80    | 1.90 | 7 (12%)  |
| 71  | FES  | m     | 403 | -    | 0,4,4        | -    | -        | -           | -    | -        |
| 74  | SF4  | E     | 301 | 27   | 0,12,12      | -    | -        | -           | -    | -        |
| 70  | 3PE  | j     | 202 | -    | 45,45,50     | 0.89 | 3 (6%)   | 48,50,55    | 1.08 | 2 (4%)   |
| 76  | HEA  | C3    | 602 | 10   | 57,67,67     | 1.24 | 6 (10%)  | 61,103,103  | 1.47 | 12 (19%) |
| 80  | HEM  | m     | 402 | 60   | 41,50,50     | 1.81 | 13 (31%) | 45,82,82    | 1.29 | 5 (11%)  |
| 71  | FES  | 9     | 301 | -    | 0,4,4        | -    | -        | -           | -    | -        |
| 80  | HEM  | m     | 401 | 60   | 41,50,50     | 1.79 | 13 (31%) | 45,82,82    | 1.60 | 6 (13%)  |
| 72  | CDL  | 6     | 701 | -    | 63,63,99     | 1.07 | 7 (11%)  | 69,75,111   | 1.26 | 4 (5%)   |
| 71  | FES  | A     | 803 | 23   | 0,4,4        | -    | -        | -           | -    | -        |
| 72  | CDL  | b     | 201 | -    | 81,81,99     | 0.97 | 6 (7%)   | 87,93,111   | 1.15 | 4 (4%)   |
| 72  | CDL  | J     | 101 | -    | 57,57,99     | 1.16 | 7 (12%)  | 63,69,111   | 1.19 | 5 (7%)   |
| 82  | UQ2  | A2    | 201 | -    | 23,23,23     | 1.80 | 2 (8%)   | 28,31,31    | 1.44 | 5 (17%)  |
| 69  | PC1  | 3     | 200 | -    | 46,46,53     | 0.98 | 3 (6%)   | 52,54,61    | 1.08 | 2 (3%)   |

| Mol | Type | Chain | Res | Link | Bond lengths |      |          | Bond angles |      |          |
|-----|------|-------|-----|------|--------------|------|----------|-------------|------|----------|
|     |      |       |     |      | Counts       | RMSZ | # Z  > 2 | Counts      | RMSZ | # Z  > 2 |
| 80  | HEM  | y     | 401 | 60   | 41,50,50     | 1.79 | 13 (31%) | 45,82,82    | 1.59 | 6 (13%)  |
| 70  | 3PE  | 1     | 401 | -    | 50,50,50     | 0.86 | 3 (6%)   | 53,55,55    | 1.13 | 2 (3%)   |
| 69  | PC1  | Q     | 201 | -    | 45,45,53     | 1.06 | 3 (6%)   | 51,53,61    | 1.13 | 2 (3%)   |
| 69  | PC1  | j     | 201 | -    | 38,38,53     | 1.15 | 6 (15%)  | 44,46,61    | 1.06 | 2 (4%)   |
| 74  | SF4  | A     | 801 | 23   | 0,12,12      | -    | -        | -           | -    | -        |
| 74  | SF4  | E     | 302 | 27   | 0,12,12      | -    | -        | -           | -    | -        |

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   |
|-----|------|-------|-----|------|----------|--------------|---------|
| 69  | PC1  | 2     | 402 | -    | -        | 30/49/49/57  | -       |
| 73  | FMN  | 8     | 501 | -    | -        | 9/18/18/18   | 0/3/3/3 |
| 81  | HEC  | z     | 301 | 61   | -        | 2/10/54/54   | -       |
| 69  | PC1  | S     | 401 | -    | -        | 30/50/50/57  | -       |
| 74  | SF4  | D     | 301 | 26   | -        | -            | 0/6/5/5 |
| 70  | 3PE  | 2     | 401 | -    | -        | 24/44/44/54  | -       |
| 74  | SF4  | A     | 802 | -    | -        | -            | 0/6/5/5 |
| 81  | HEC  | o     | 301 | 61   | -        | 2/10/54/54   | -       |
| 70  | 3PE  | 4     | 501 | -    | -        | 25/44/44/54  | -       |
| 80  | HEM  | y     | 402 | 60   | -        | 1/12/54/54   | -       |
| 76  | HEA  | C3    | 603 | 10   | 3/3/7/16 | 5/32/76/76   | -       |
| 74  | SF4  | 8     | 502 | -    | -        | -            | 0/6/5/5 |
| 70  | 3PE  | B     | 501 | -    | -        | 28/54/54/54  | -       |
| 79  | NAP  | R     | 601 | -    | -        | 14/31/67/67  | 0/5/5/5 |
| 71  | FES  | m     | 403 | -    | -        | -            | 0/1/1/1 |
| 74  | SF4  | E     | 301 | 27   | -        | -            | 0/6/5/5 |
| 70  | 3PE  | j     | 202 | -    | -        | 20/49/49/54  | -       |
| 80  | HEM  | m     | 402 | 60   | -        | 1/12/54/54   | -       |
| 71  | FES  | 9     | 301 | -    | -        | -            | 0/1/1/1 |
| 74  | SF4  | E     | 302 | 27   | -        | -            | 0/6/5/5 |
| 80  | HEM  | m     | 401 | 60   | -        | 3/12/54/54   | -       |
| 72  | CDL  | 6     | 701 | -    | -        | 34/74/74/110 | -       |
| 71  | FES  | A     | 803 | 23   | -        | -            | 0/1/1/1 |
| 72  | CDL  | b     | 201 | -    | -        | 41/92/92/110 | -       |
| 72  | CDL  | J     | 101 | -    | -        | 24/68/68/110 | -       |

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| Mol | Type | Chain | Res | Link | Chirals  | Torsions    | Rings   |
|-----|------|-------|-----|------|----------|-------------|---------|
| 82  | UQ2  | A2    | 201 | -    | -        | 7/15/39/39  | 0/1/1/1 |
| 69  | PC1  | 3     | 200 | -    | -        | 23/50/50/57 | -       |
| 80  | HEM  | y     | 401 | 60   | -        | 3/12/54/54  | -       |
| 70  | 3PE  | 1     | 401 | -    | -        | 15/54/54/54 | -       |
| 69  | PC1  | Q     | 201 | -    | -        | 23/49/49/57 | -       |
| 69  | PC1  | j     | 201 | -    | -        | 21/42/42/57 | -       |
| 74  | SF4  | A     | 801 | 23   | -        | -           | 0/6/5/5 |
| 76  | HEA  | C3    | 602 | 10   | 3/3/7/16 | 7/32/76/76  | -       |

The worst 5 of 148 bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms   | Z      | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|---------|--------|-------------|----------|
| 79  | R     | 601 | NAP  | C2D-C1D | -15.67 | 1.30        | 1.53     |
| 79  | R     | 601 | NAP  | O4D-C1D | 15.35  | 1.62        | 1.41     |
| 79  | R     | 601 | NAP  | O4B-C1B | 14.97  | 1.62        | 1.41     |
| 81  | z     | 301 | HEC  | C3C-C2C | -8.23  | 1.32        | 1.40     |
| 81  | o     | 301 | HEC  | C3C-C2C | -8.10  | 1.32        | 1.40     |

The worst 5 of 116 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-------------|-------|-------------|----------|
| 79  | R     | 601 | NAP  | C5A-C6A-N6A | 7.65  | 131.97      | 120.35   |
| 79  | R     | 601 | NAP  | N3A-C2A-N1A | -6.41 | 118.65      | 128.68   |
| 79  | R     | 601 | NAP  | N6A-C6A-N1A | -5.96 | 106.19      | 118.57   |
| 80  | m     | 401 | HEM  | C4B-CHC-C1C | -5.91 | 114.75      | 122.56   |
| 80  | y     | 401 | HEM  | C4B-CHC-C1C | -5.87 | 114.81      | 122.56   |

5 of 6 chirality outliers are listed below:

| Mol | Chain | Res | Type | Atom |
|-----|-------|-----|------|------|
| 76  | C3    | 602 | HEA  | NA   |
| 76  | C3    | 602 | HEA  | ND   |
| 76  | C3    | 602 | HEA  | NB   |
| 76  | C3    | 603 | HEA  | NA   |
| 76  | C3    | 603 | HEA  | ND   |

5 of 392 torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms          |
|-----|-------|-----|------|----------------|
| 69  | 3     | 200 | PC1  | C22-C21-O21-C2 |

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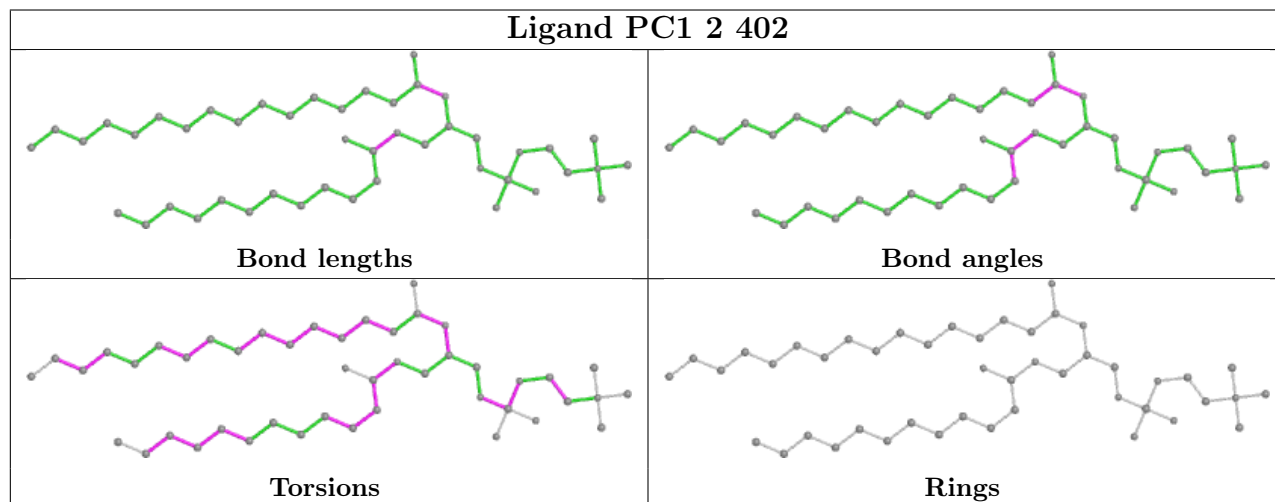
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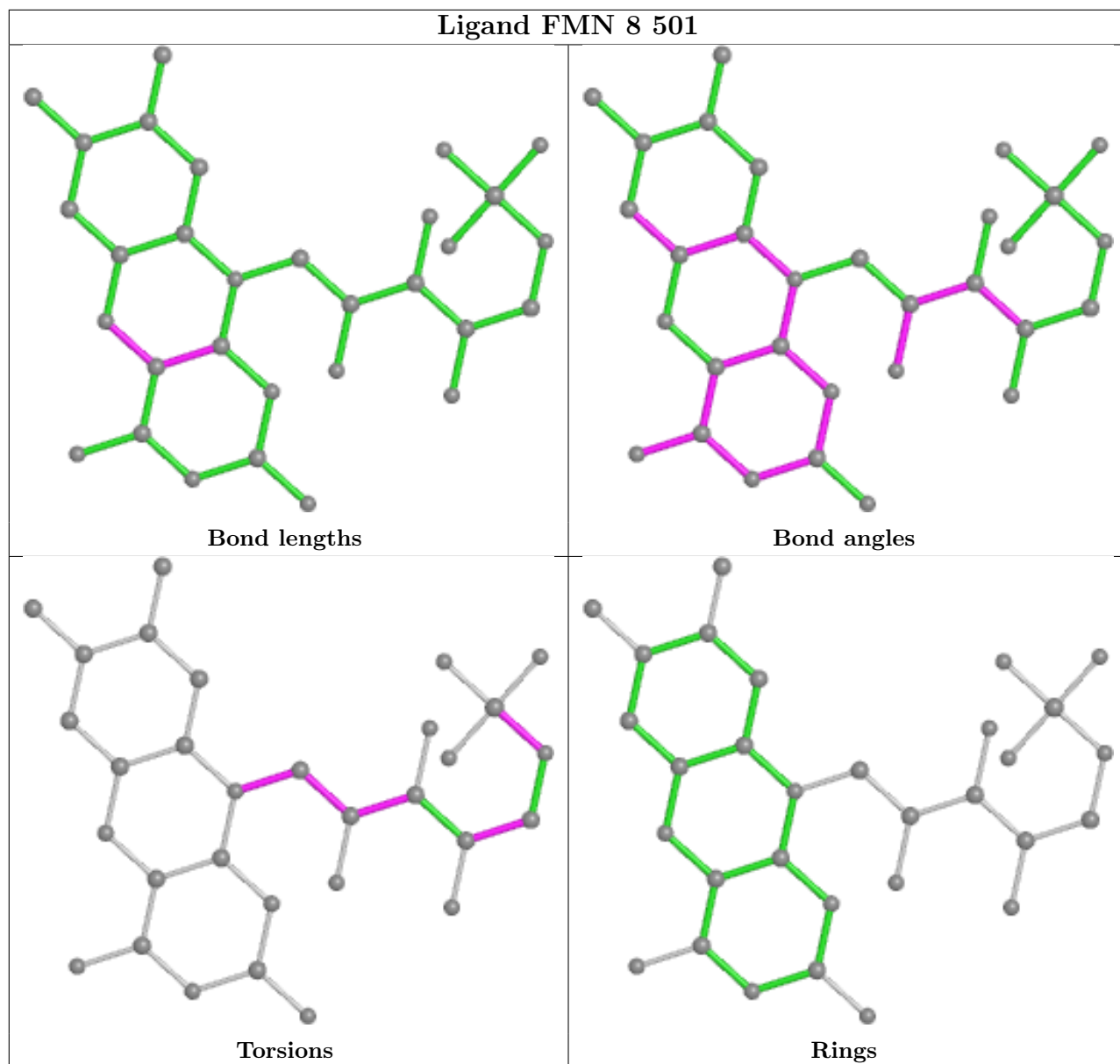
| Mol | Chain | Res | Type | Atoms         |
|-----|-------|-----|------|---------------|
| 69  | 2     | 402 | PC1  | C1-O11-P-O12  |
| 69  | 2     | 402 | PC1  | C1-O11-P-O14  |
| 69  | Q     | 201 | PC1  | C11-O13-P-O12 |
| 69  | Q     | 201 | PC1  | C1-O11-P-O12  |

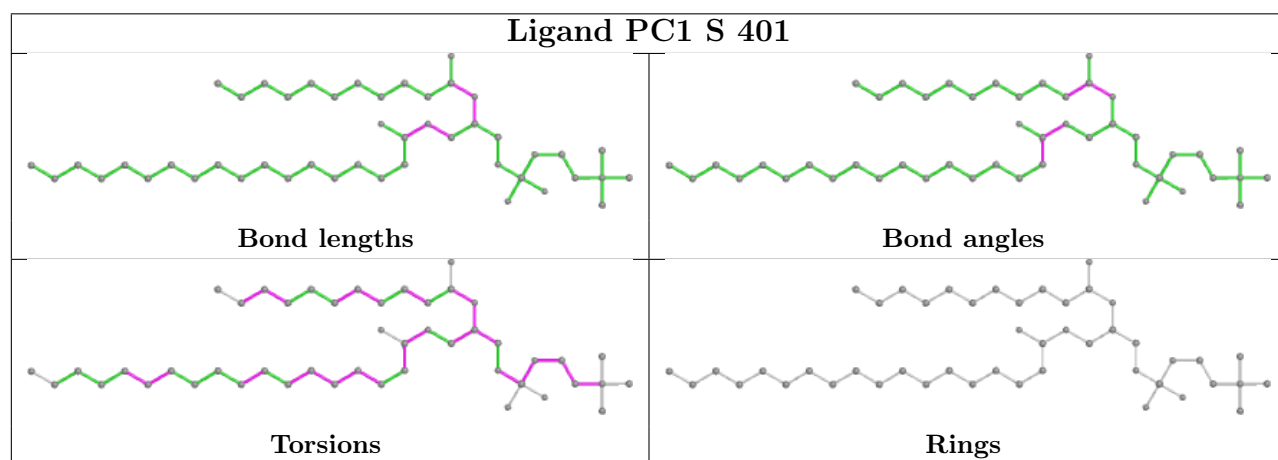
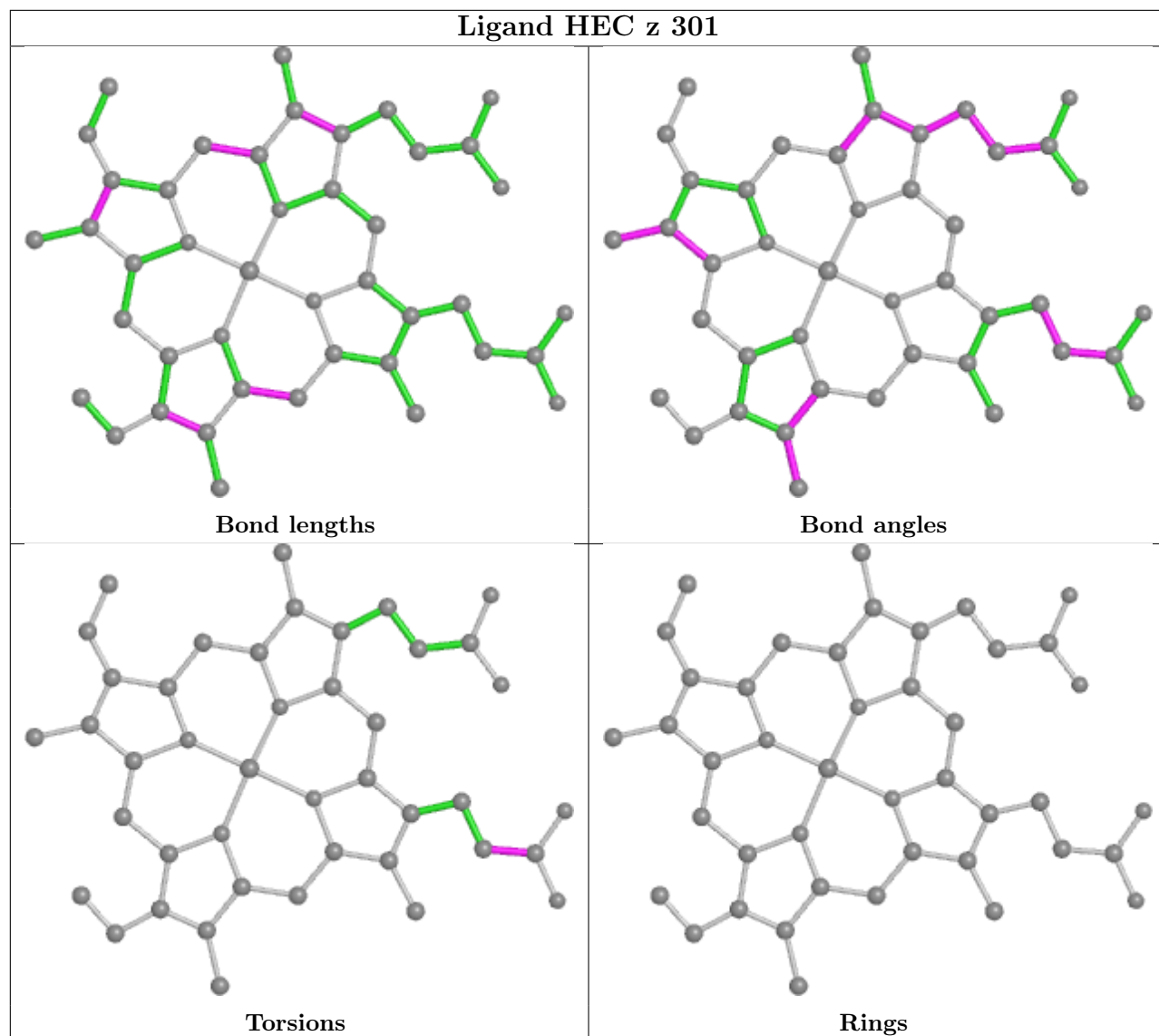
There are no ring outliers.

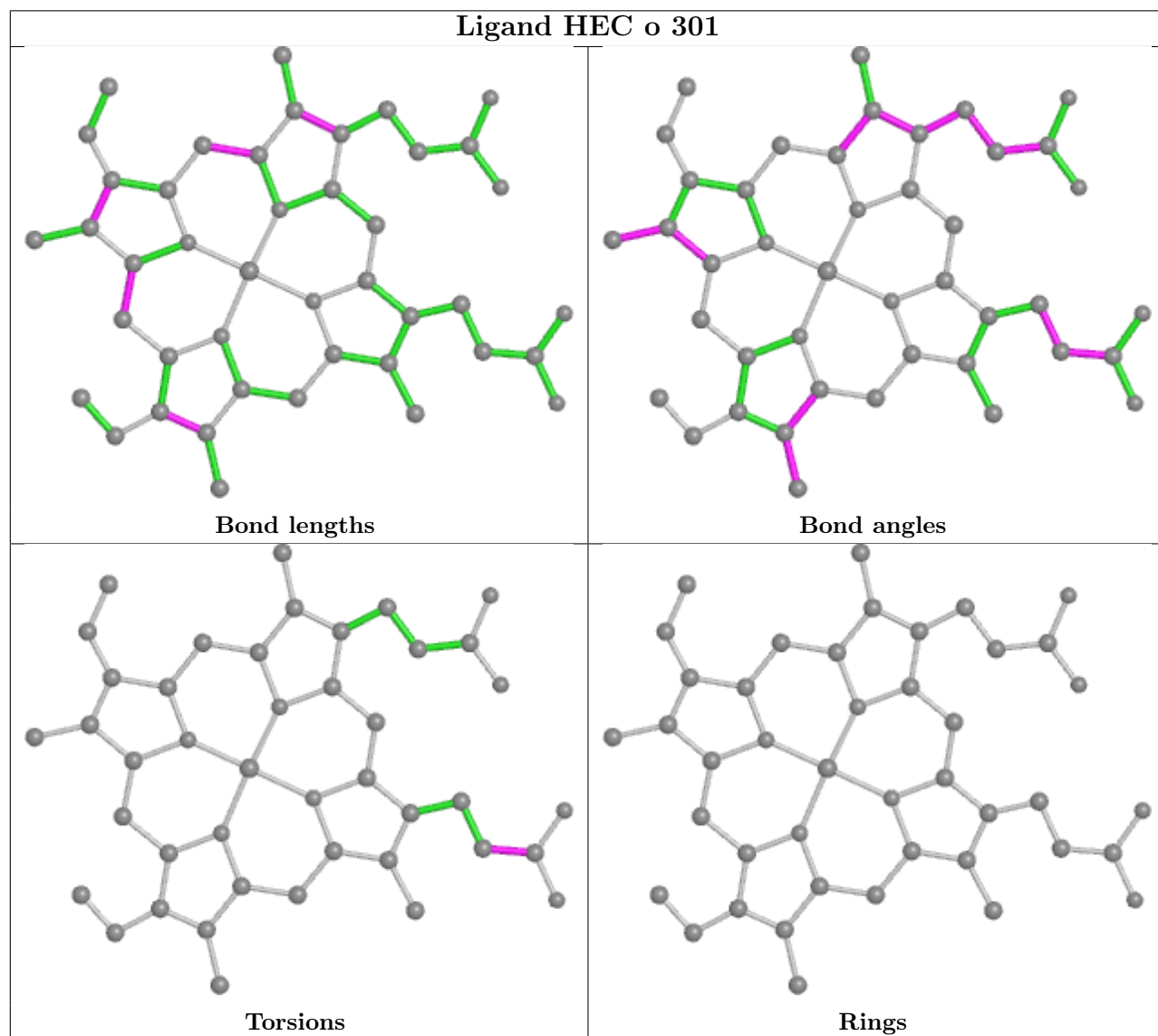
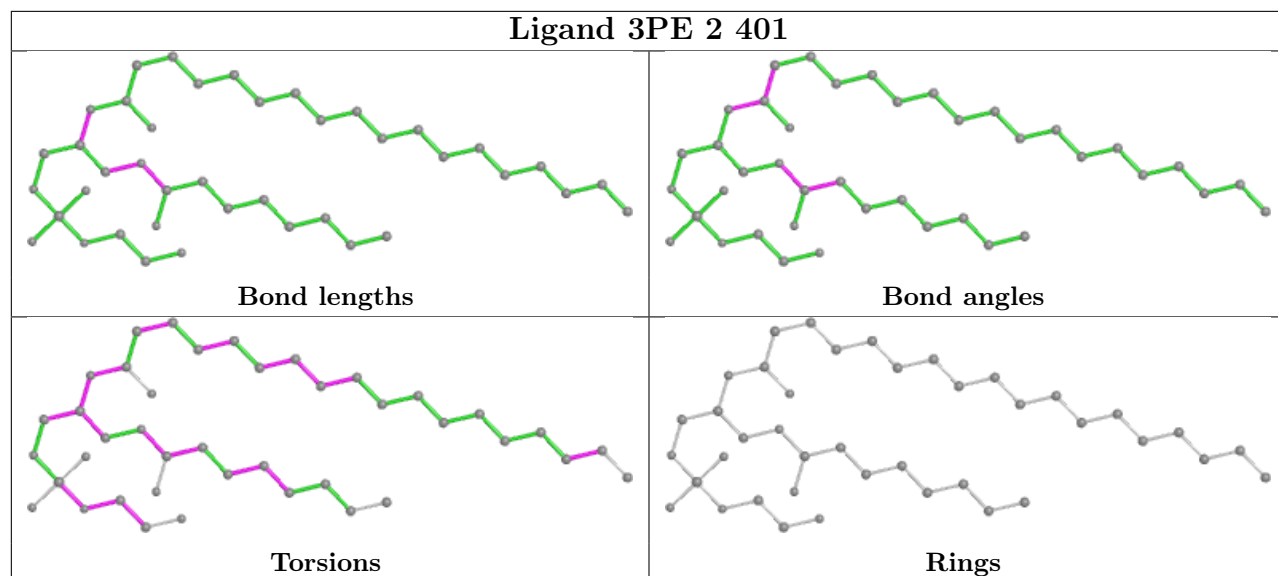
No monomer is involved in short contacts.

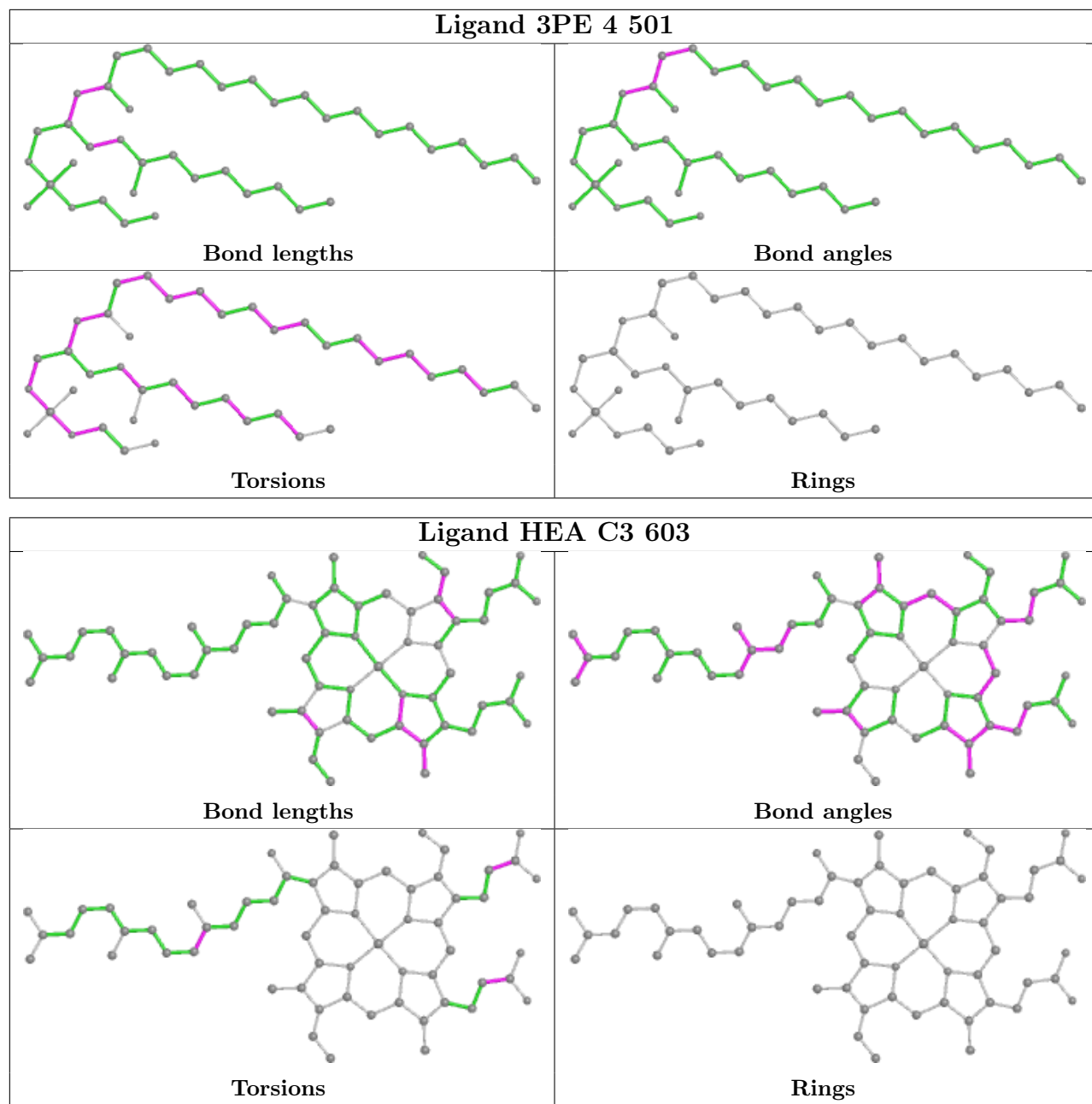
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

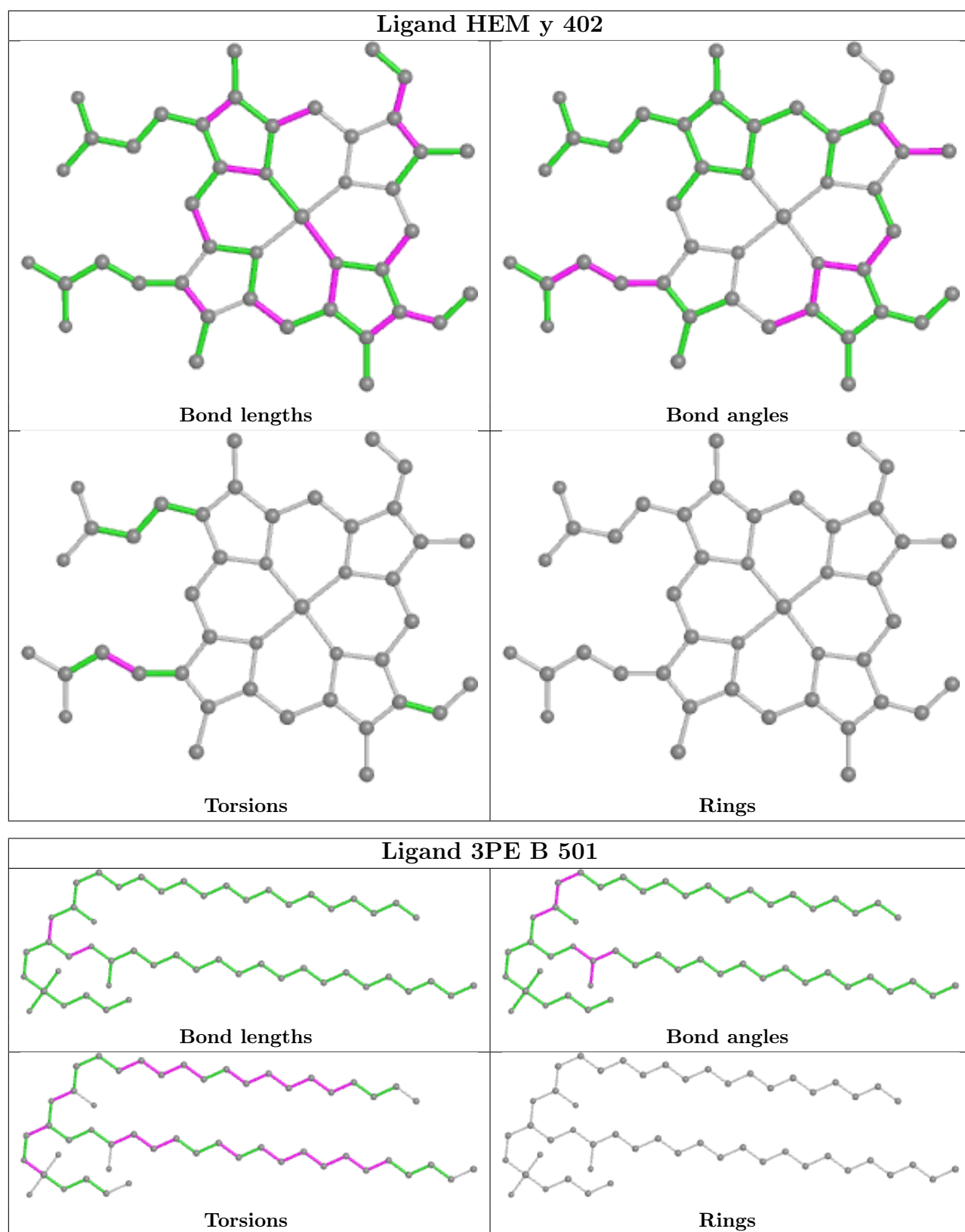


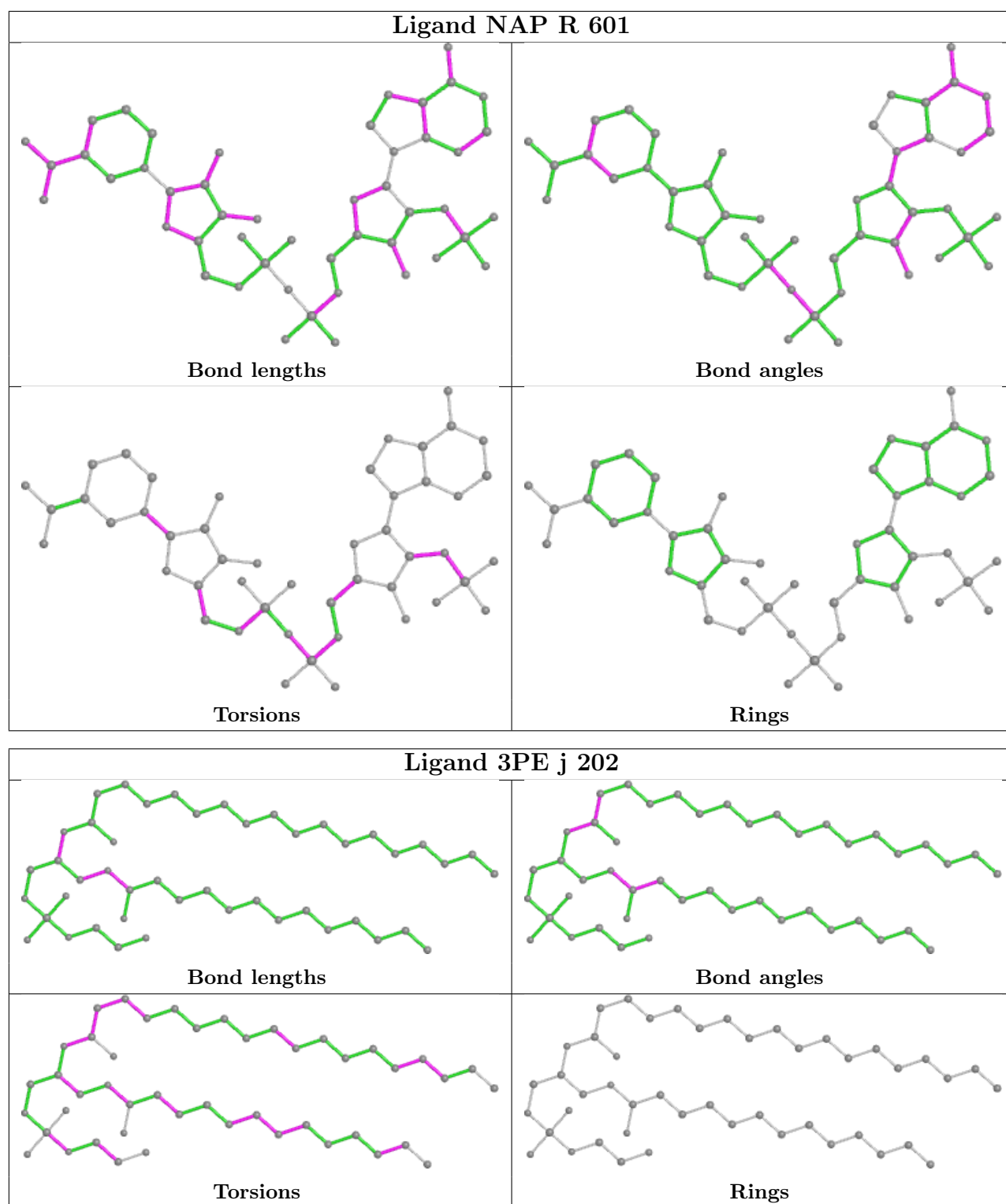


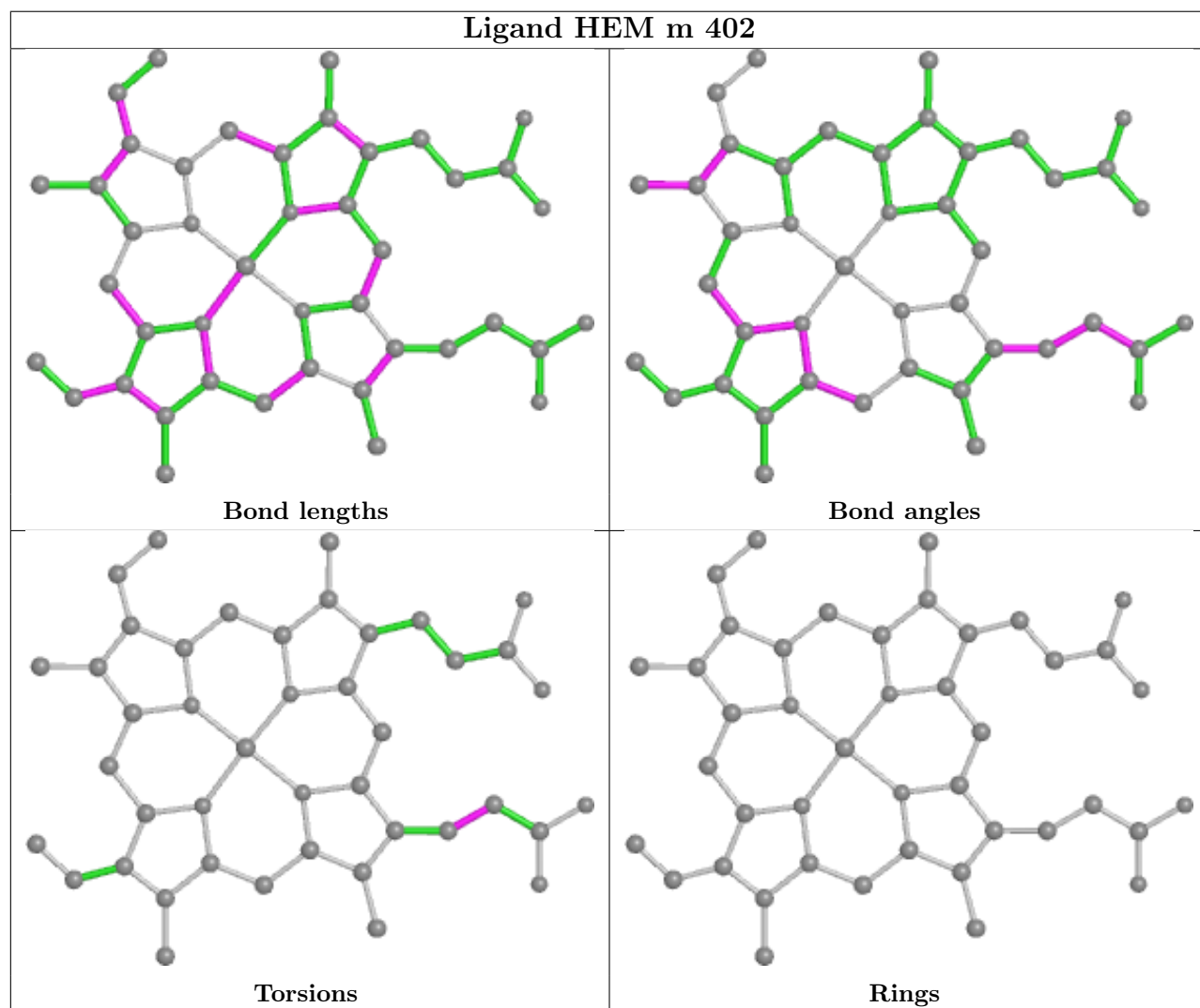
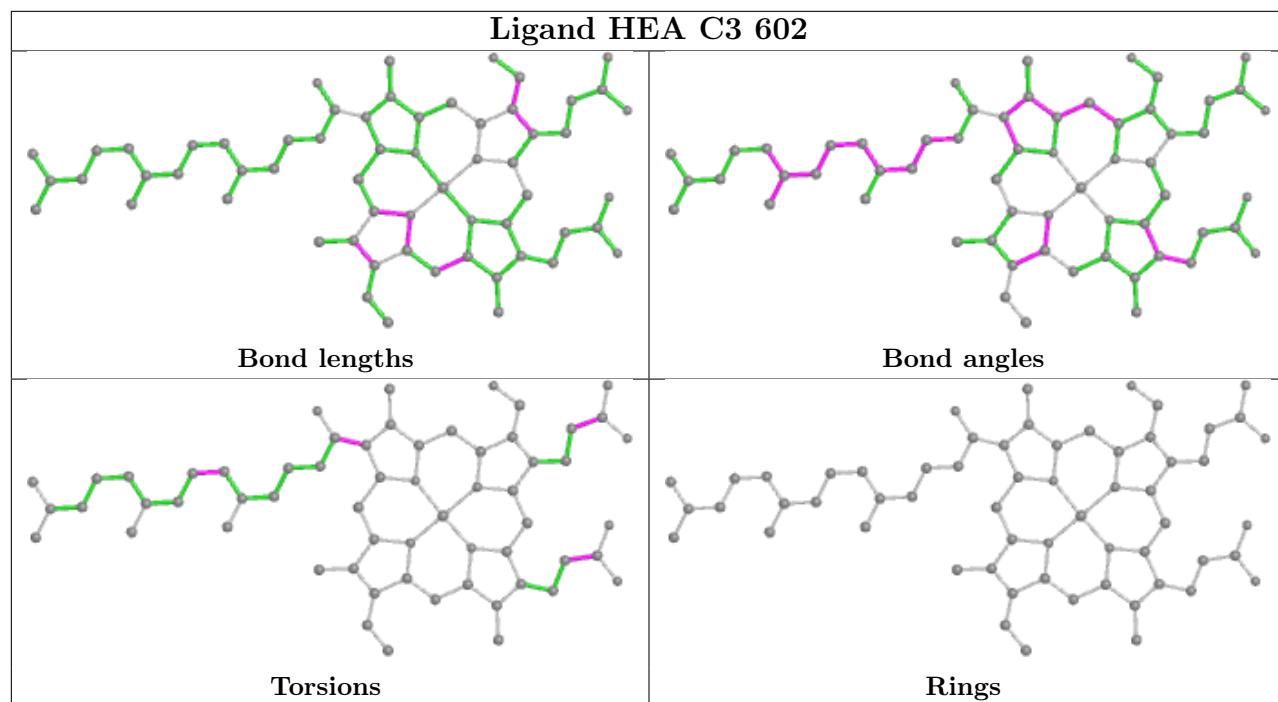




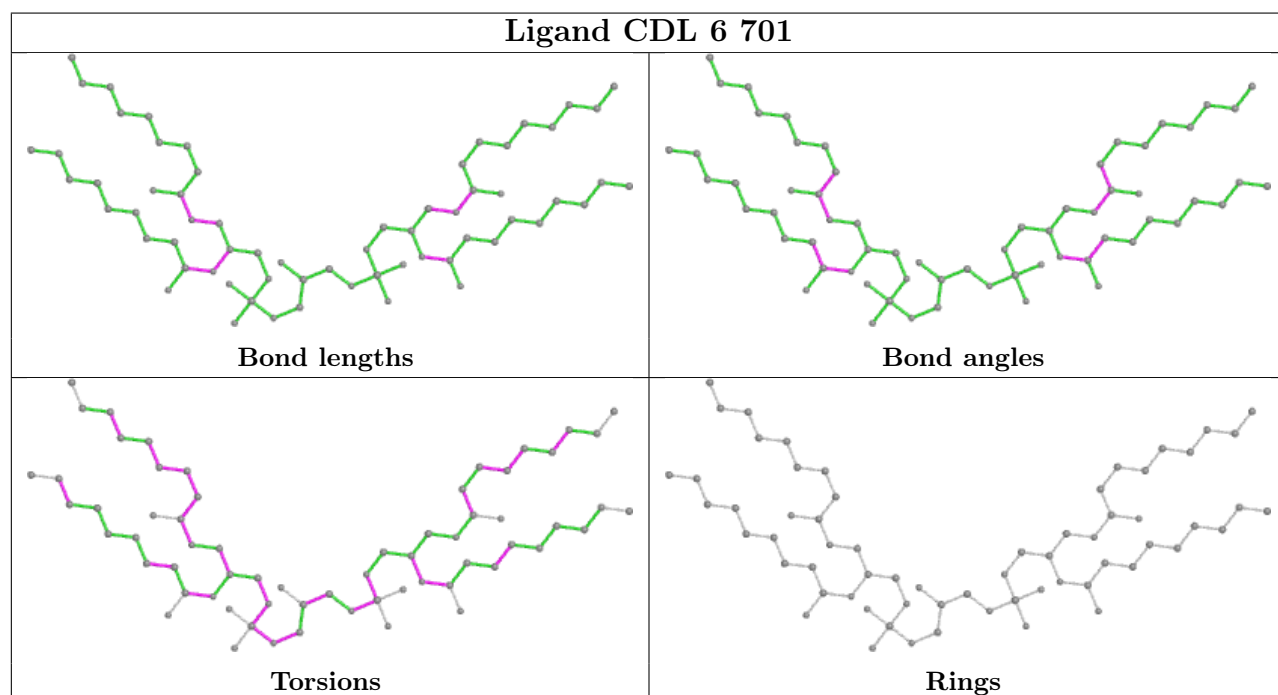
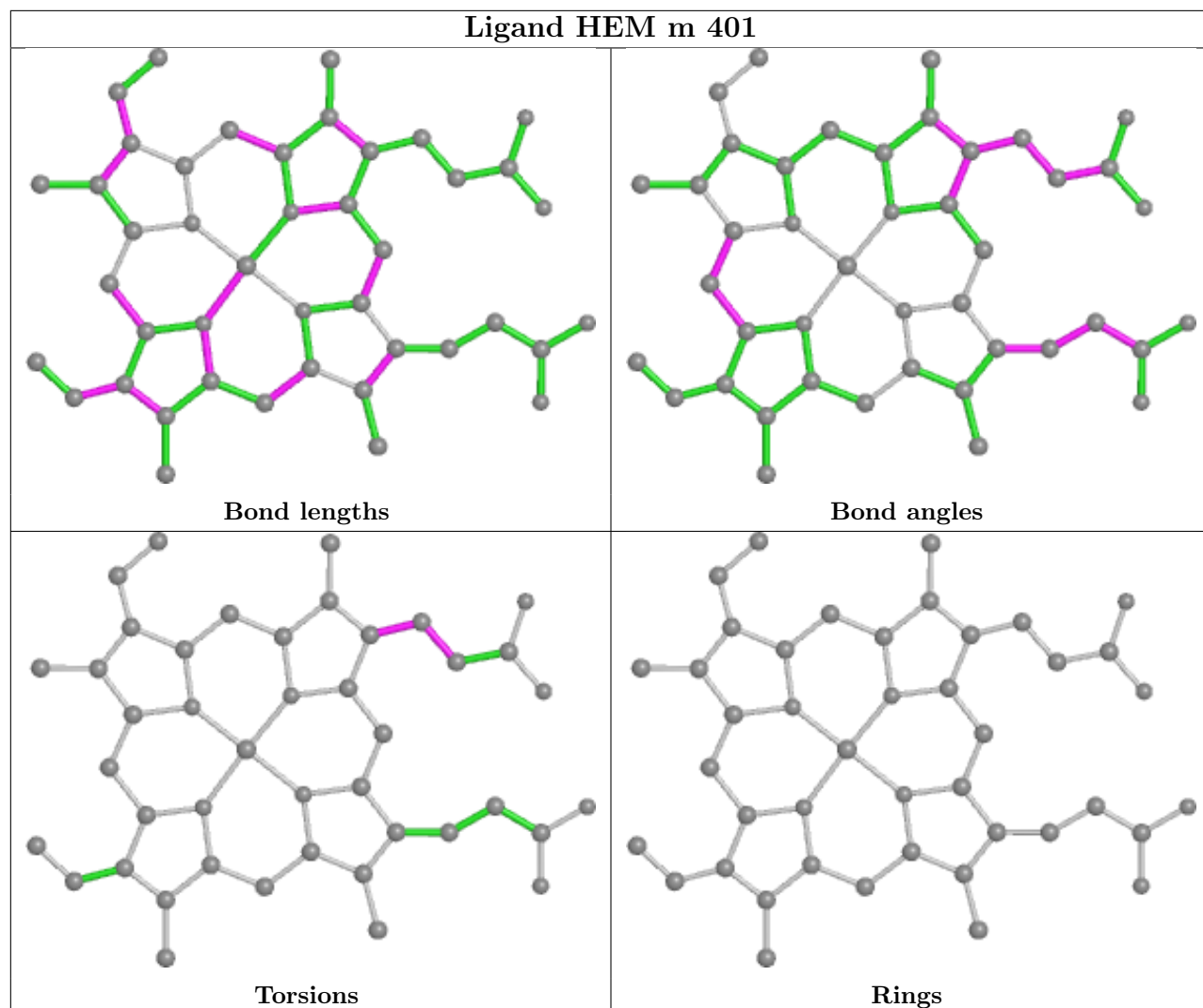


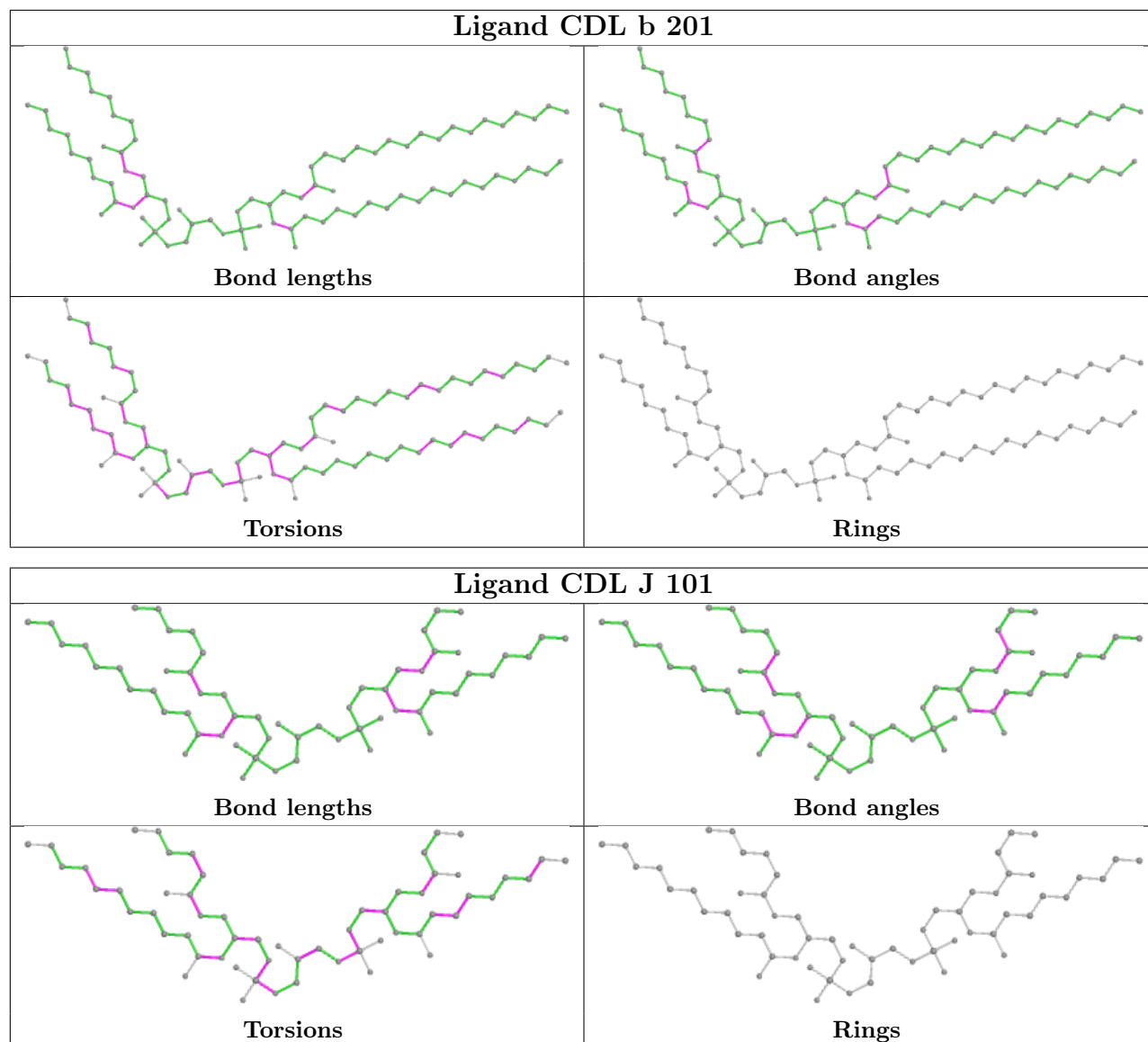


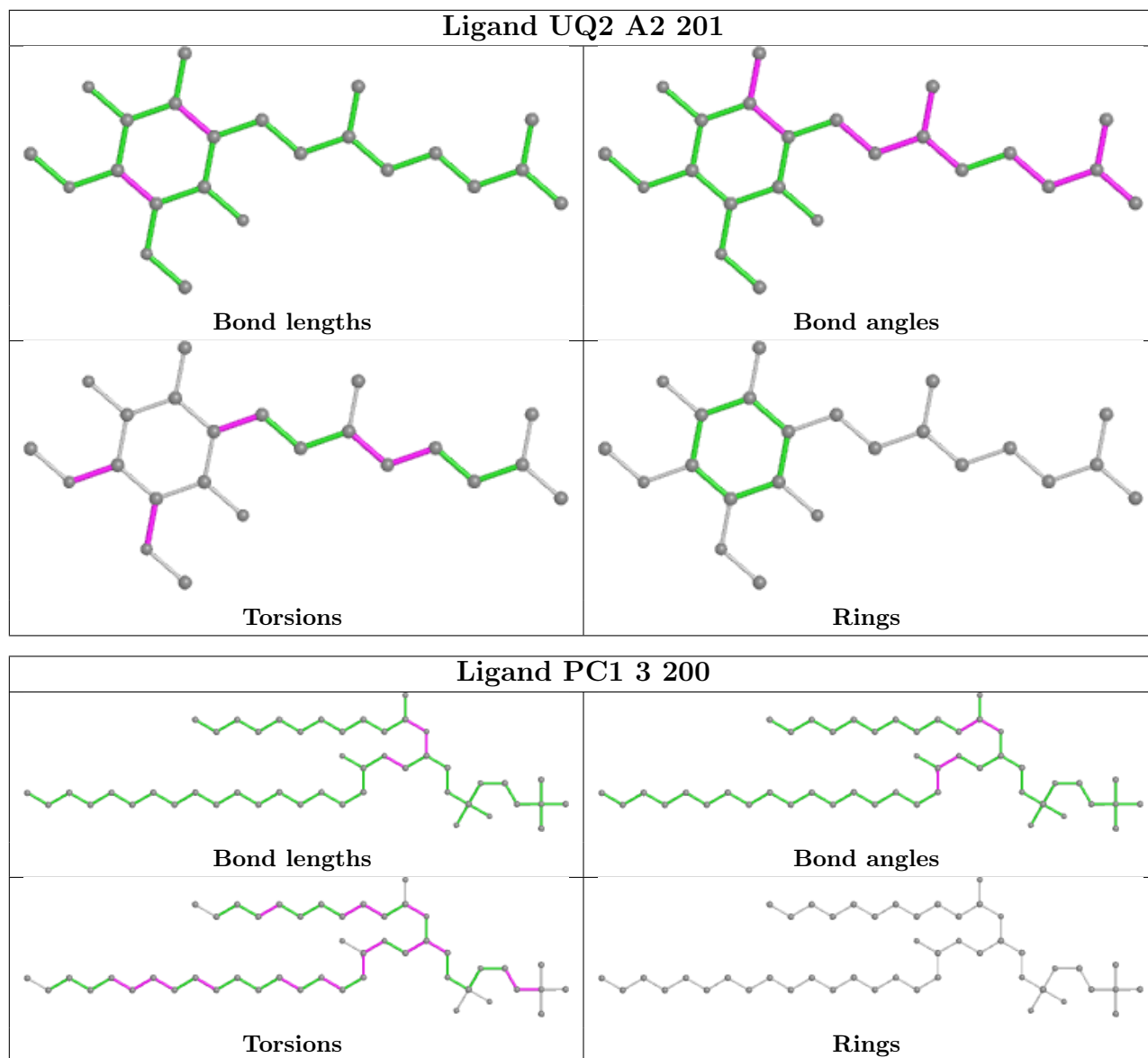


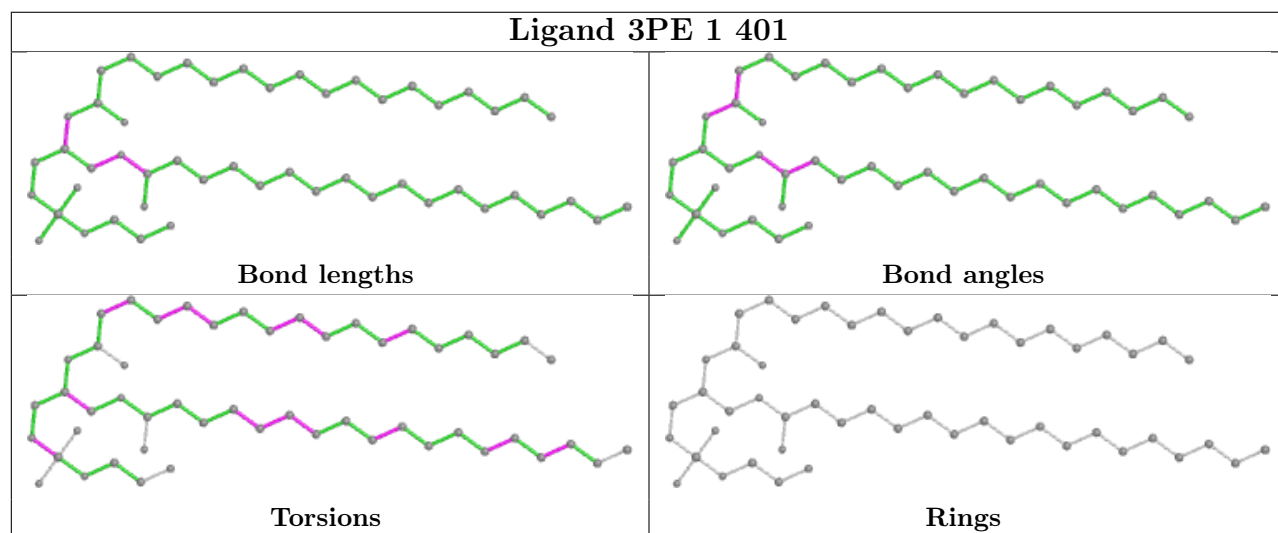
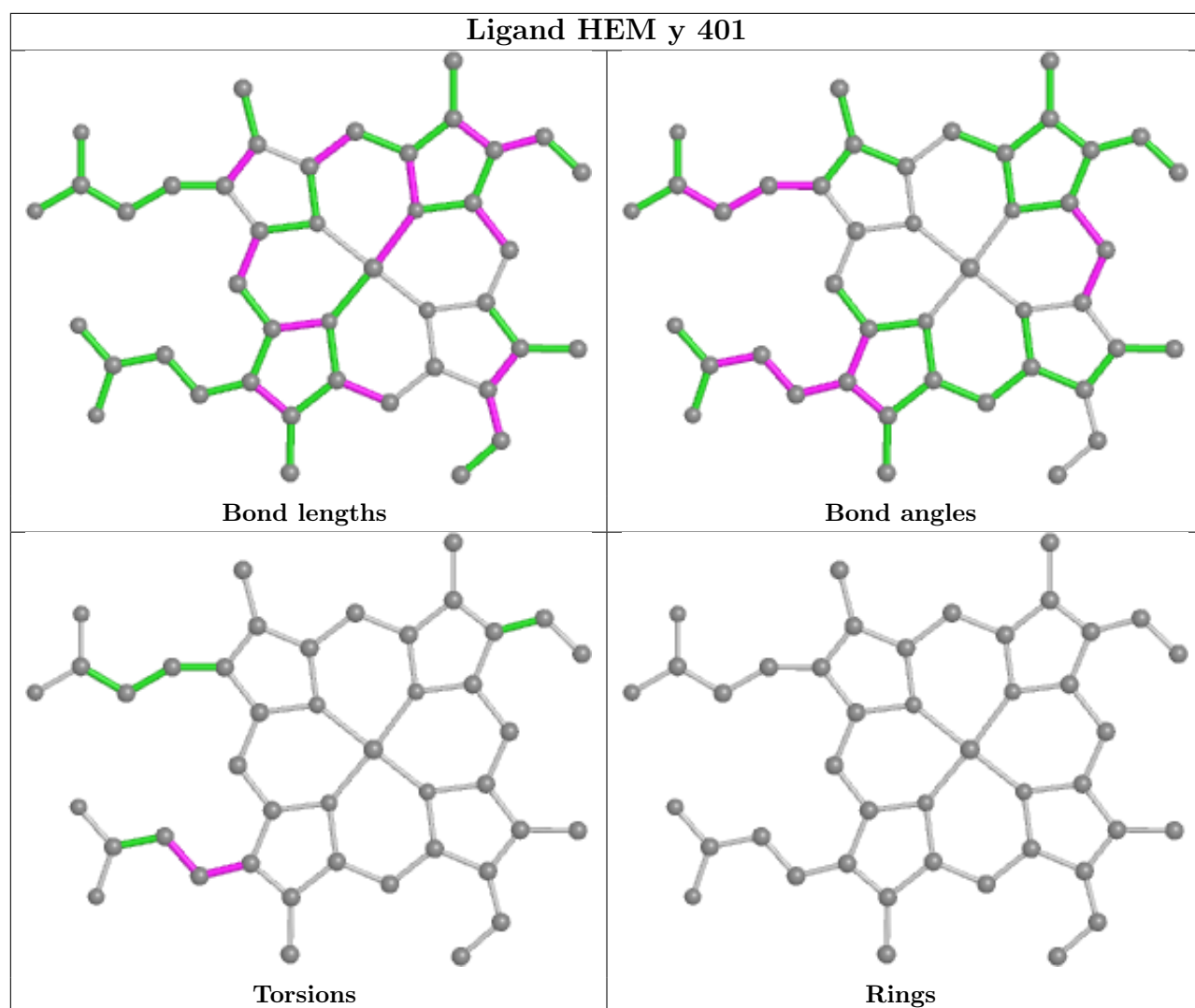


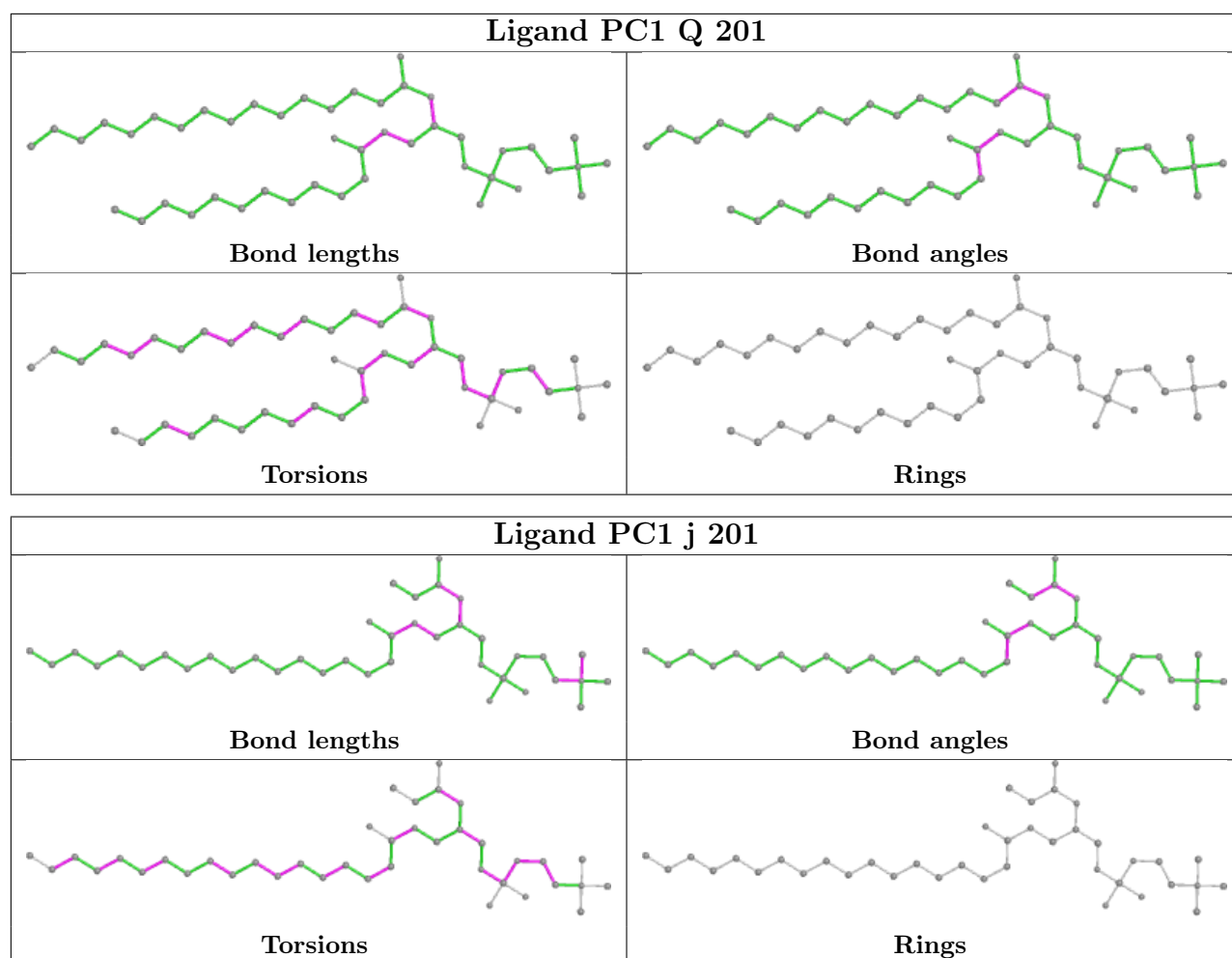












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

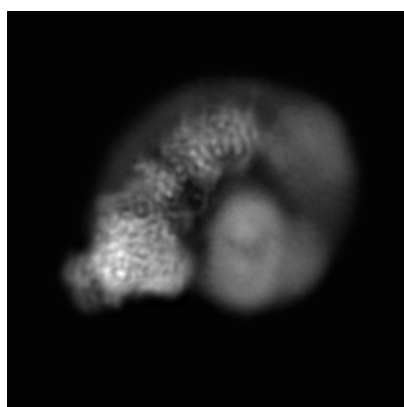
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-30673. These allow visual inspection of the internal detail of the map and identification of artifacts.

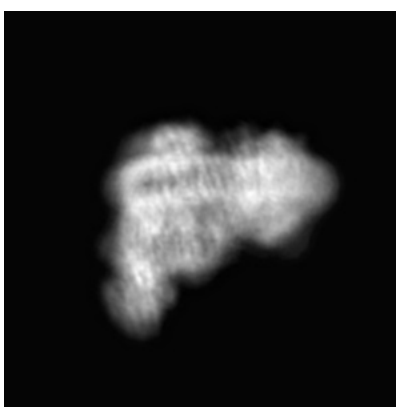
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

### 6.1 Orthogonal projections [i](#)

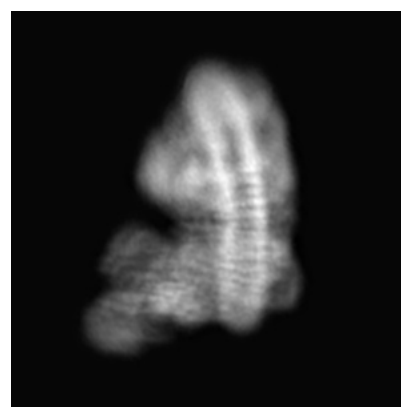
#### 6.1.1 Primary map



X



Y

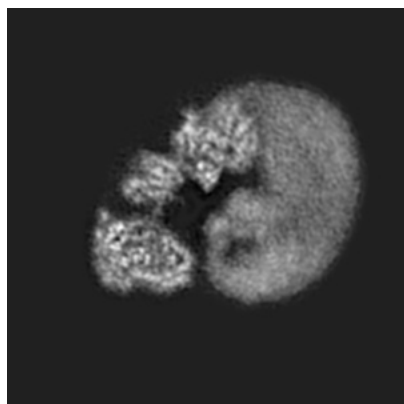


Z

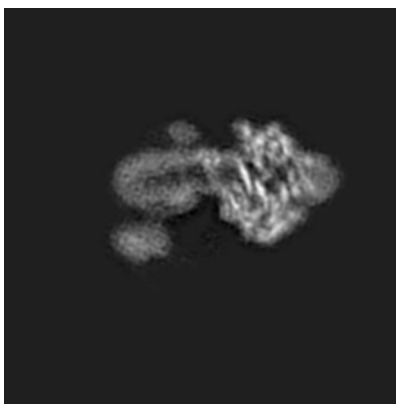
The images above show the map projected in three orthogonal directions.

### 6.2 Central slices [i](#)

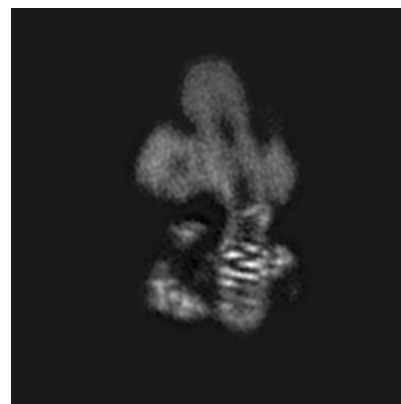
#### 6.2.1 Primary map



X Index: 140



Y Index: 140

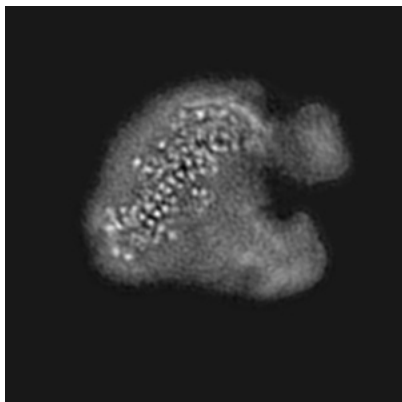


Z Index: 140

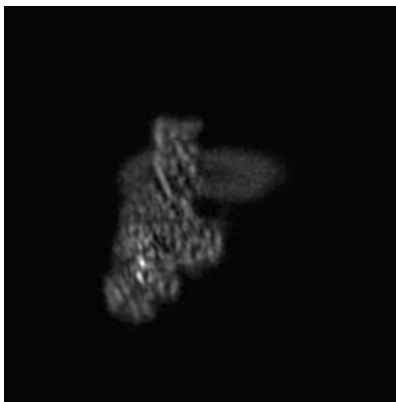
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

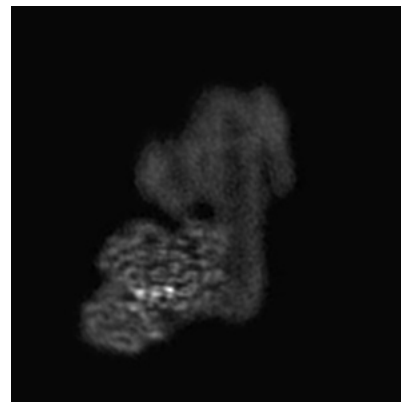
### 6.3.1 Primary map



X Index: 173



Y Index: 78

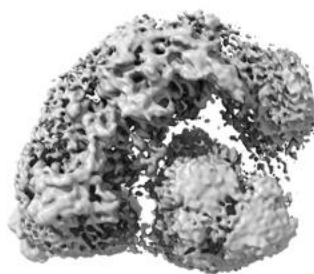


Z Index: 95

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 0.07. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

## 6.5 Mask visualisation

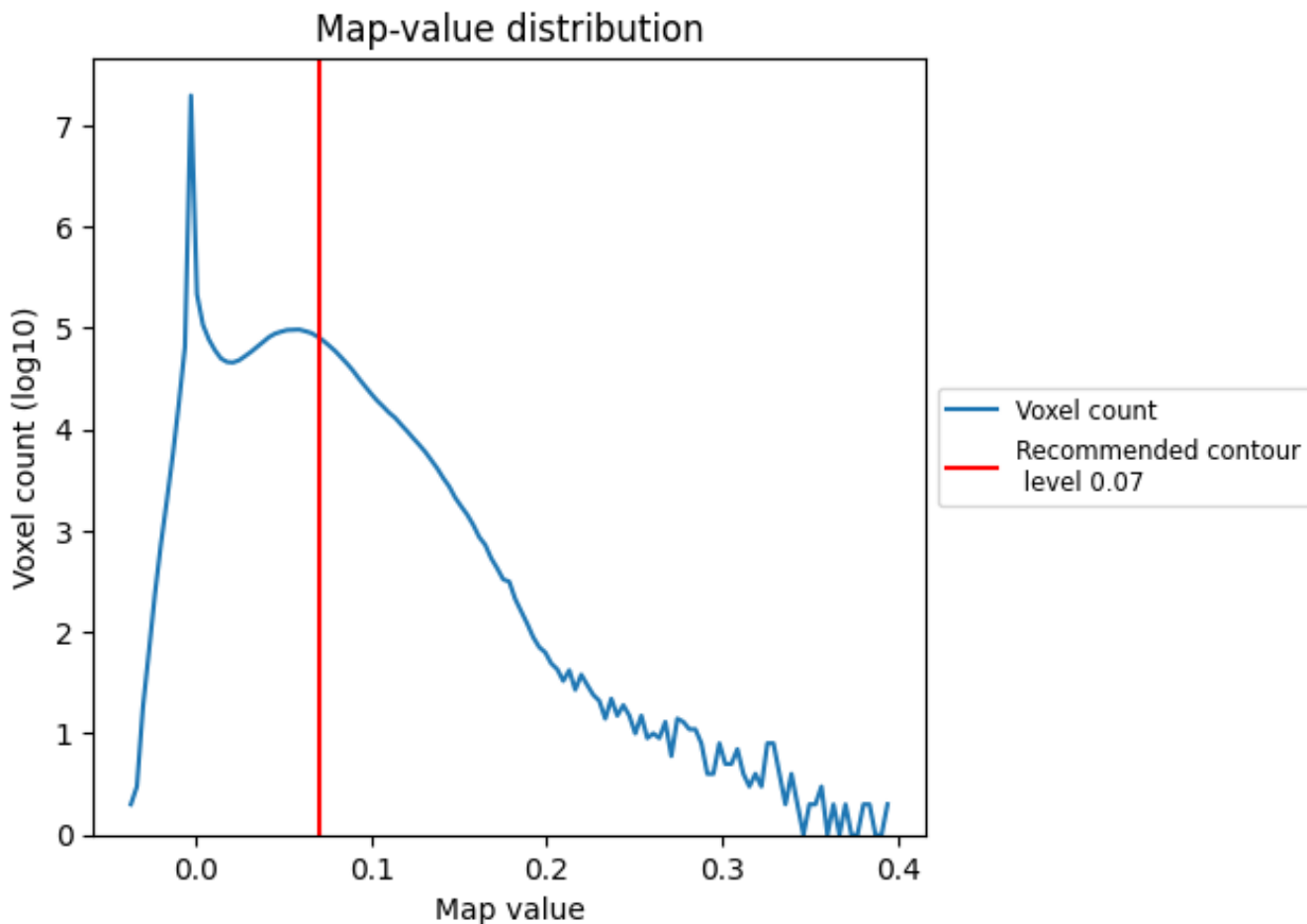
This section was not generated. No masks/segmentation were deposited.



## 7 Map analysis [i](#)

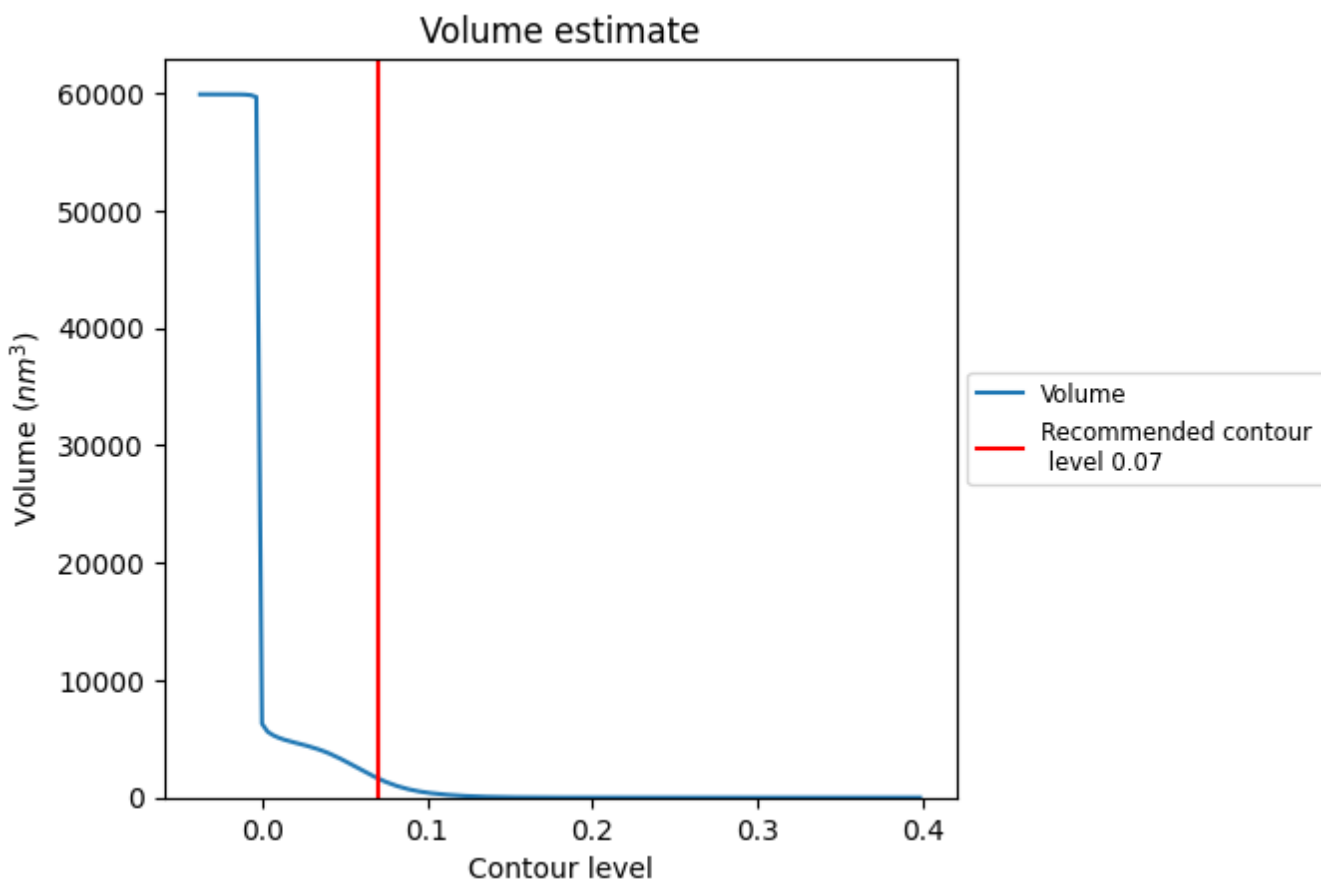
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



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

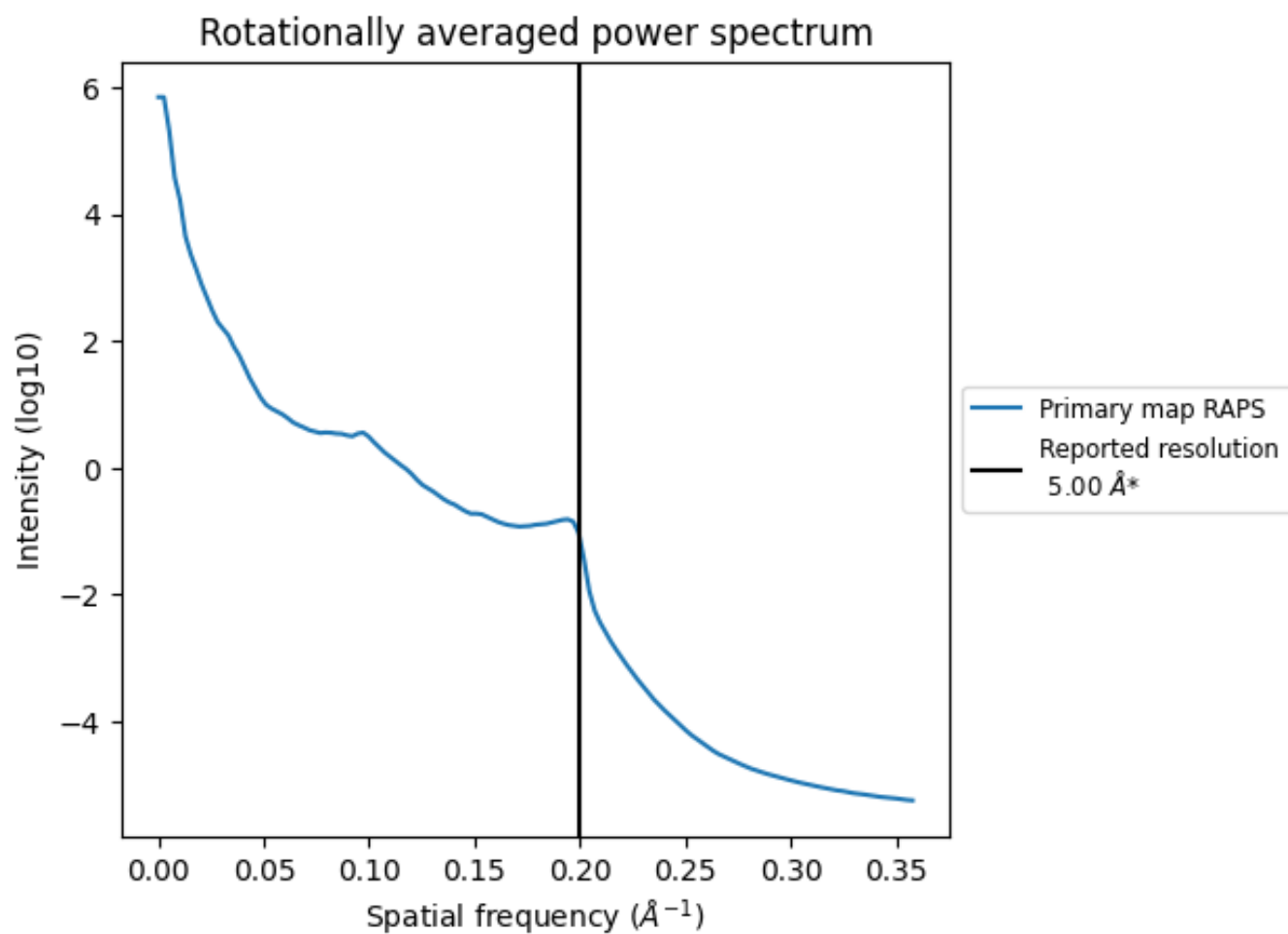
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 1648  $\text{nm}^3$ ; this corresponds to an approximate mass of 1489 kDa.

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

### 7.3 Rotationally averaged power spectrum [i](#)



\*Reported resolution corresponds to spatial frequency of  $0.200 \text{\AA}^{-1}$

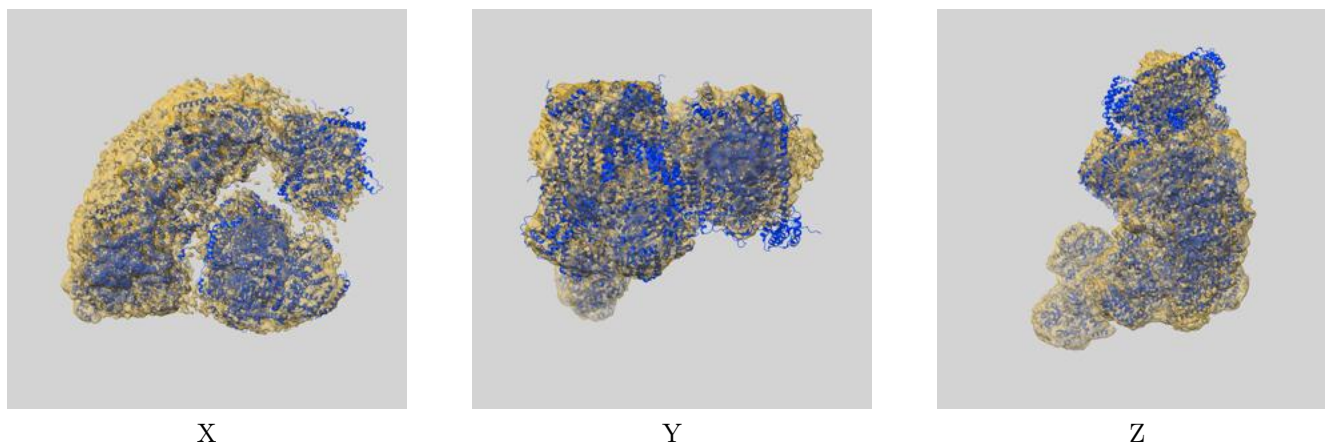
## 8 Fourier-Shell correlation

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

## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-30673 and PDB model 7DGQ. Per-residue inclusion information can be found in section [3](#) on page [25](#).

### 9.1 Map-model overlay [i](#)

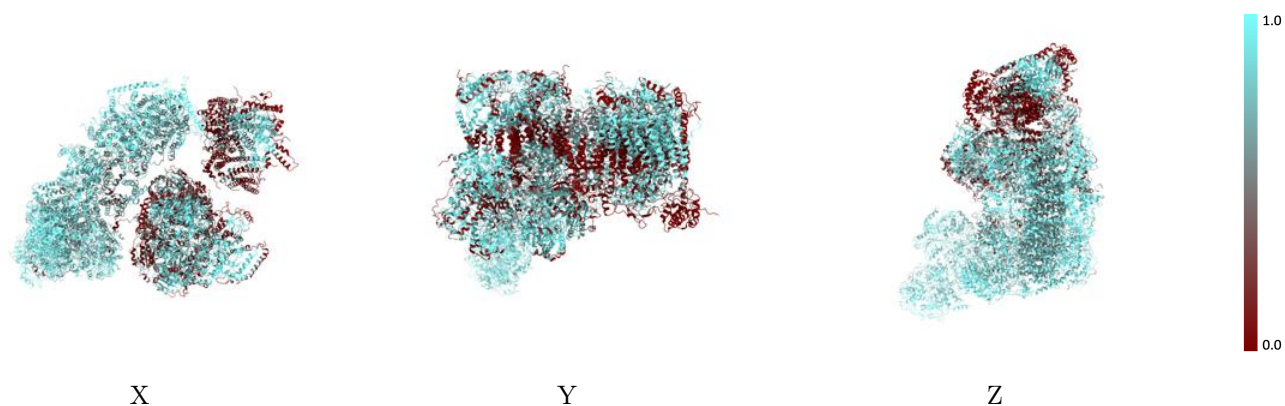


The images above show the 3D surface view of the map at the recommended contour level 0.07 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Q-score mapped to coordinate model [i](#)

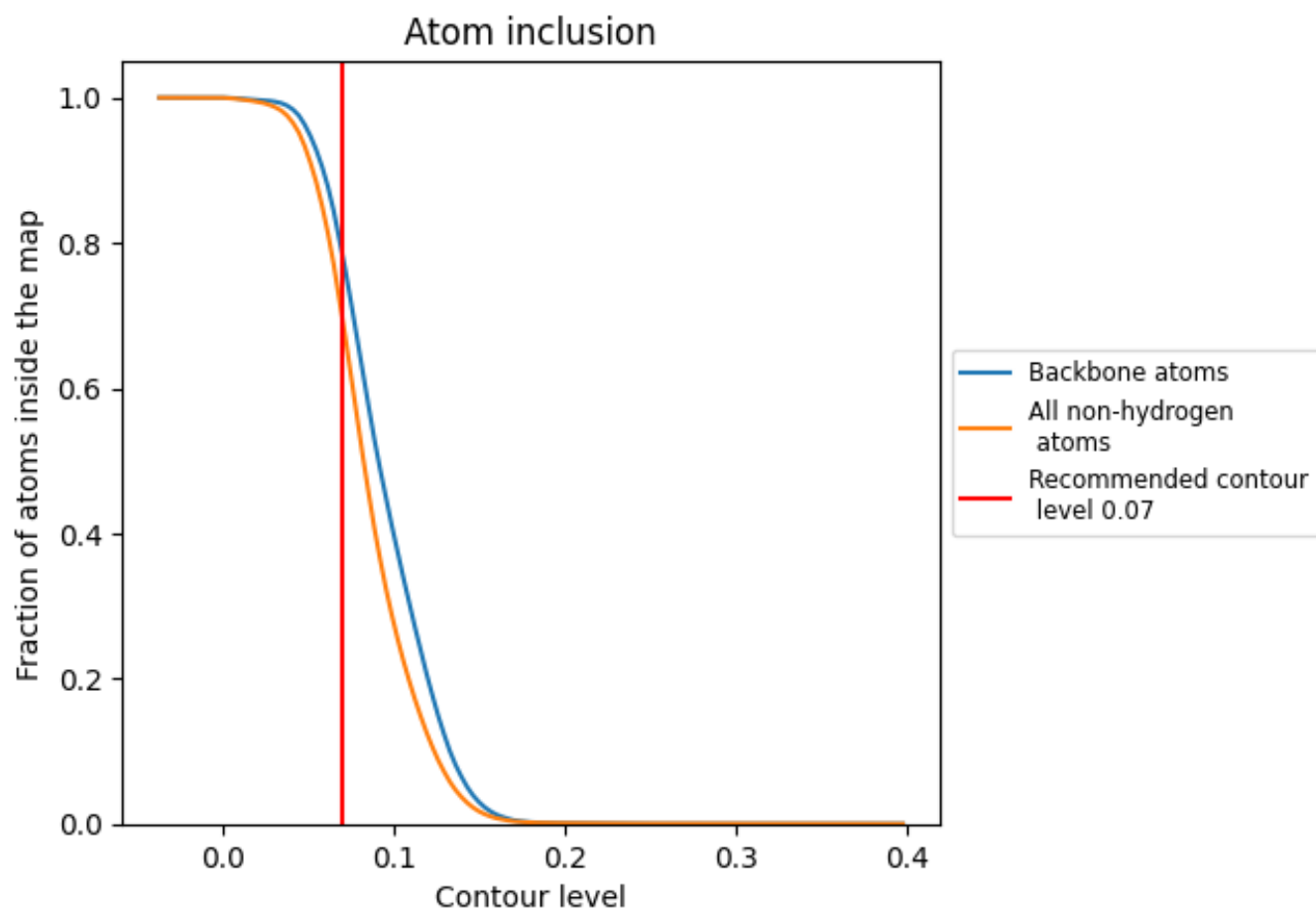
This section was not generated.

## 9.3 Atom inclusion mapped to coordinate model [i](#)



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 (0.07).




































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 78% of all backbone atoms, 69% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary [i](#)

The table lists the average atom inclusion at the recommended contour level (0.07) and Q-score for the entire model and for each chain.











































| Chain | Atom inclusion   |
|-------|--|
| All   |  0.6936   |
| 1     |  0.7226   |
| 2     |  0.7404   |
| 3     |  0.5620   |
| 4     |  0.7336   |
| 5     |  0.7100   |
| 6     |  0.7258   |
| 7     |  0.6964   |
| 8     |  0.9592   |
| 9     |  0.9320   |
| A     |  0.9352   |
| A0    |  0.2079   |
| A1    |  0.4260   |
| A2    |  0.3527   |
| A3    |  0.4264  |
| A4    |  0.2549 |
| A5    |  0.1520 |
| A6    |  0.1564 |
| A7    |  0.1288 |
| A8    |  0.2349 |
| A9    |  0.2672 |
| B     |  0.8152 |
| B2    |  0.1039 |
| B3    |  0.2533 |
| B4    |  0.0245 |
| B5    |  0.3056 |
| B6    |  0.1844 |
| B7    |  0.2870 |
| C     |  0.9059 |
| C0    |  0.3152 |
| C1    |  0.6678 |
| C2    |  0.2379 |
| C3    |  0.5321 |
| D     |  0.8569 |
| E     |  0.9311 |



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| Chain | Atom inclusion   |
|-------|--|
| F     |  0.9011   |
| G     |  0.8669   |
| H     |  0.8867   |
| I     |  0.7859   |
| J     |  0.8706   |
| K     |  0.9184   |
| L     |  0.8311   |
| M     |  0.5950   |
| N     |  0.9197   |
| O     |  0.8256   |
| P     |  0.8649   |
| Q     |  0.8940   |
| R     |  0.8114   |
| S     |  0.8080   |
| T     |  0.6509   |
| U     |  0.7062   |
| V     |  0.8730   |
| W     |  0.9363  |
| X     |  0.8607 |
| Y     |  0.9553 |
| Z     |  0.8574 |
| a     |  0.7881 |
| b     |  0.8673 |
| c     |  0.9454 |
| d     |  0.9698 |
| e     |  0.8136 |
| f     |  0.8951 |
| g     |  0.9179 |
| h     |  0.8656 |
| i     |  0.8938 |
| j     |  0.8153 |
| k     |  0.6736 |
| l     |  0.5389 |
| m     |  0.5362 |
| o     |  0.7827 |
| p     |  0.5511 |
| q     |  0.6247 |
| r     |  0.6616 |
| s     |  0.5896 |
| t     |  0.5810 |
| u     |  0.6012 |
| v     |  0.3036 |

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| Chain | Atom inclusion   |
|-------|--|
| w     |  0.5845 |
| x     |  0.7487 |
| y     |  0.5750 |
| z     |  0.6911 |