



wwPDB X-ray Structure Validation Summary Report

Aug 31, 2020 – 07:35 AM BST

PDB ID : 6Q8X
Title : Respiratory complex I from *Thermus thermophilus* with bound Pyridaben.
Authors : Gutierrez-Fernandez, J.; Minhas, G.S.; Sazanov, L.A.
Deposited on : 2018-12-16
Resolution : 3.51 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the  symbol.

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtrriage (Phenix) : 1.13
EDS : **FAILED**
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.13

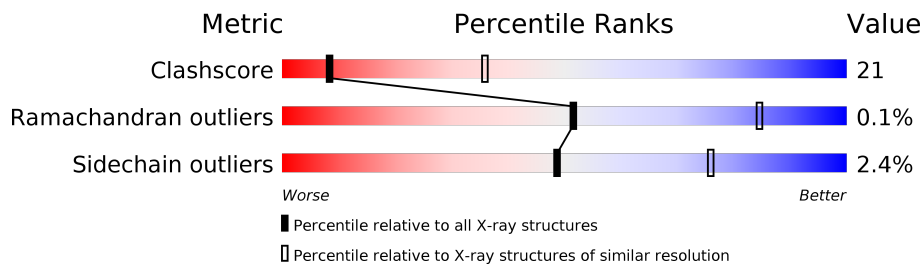
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.51 Å.

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



| Metric | Whole archive (#Entries) | Similar resolution (#Entries, resolution range(Å)) |
|-----------------------|-----------------------------|---|
| Clashscore | 141614 | 1036 (3.58-3.42) |
| Ramachandran outliers | 138981 | 1005 (3.58-3.42) |
| Sidechain outliers | 138945 | 1006 (3.58-3.42) |

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

Note EDS failed to run properly.

| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|--|
| 1 | 1 | 438 | 57% 42% . |
| 1 | B | 438 | 48% 50% . |
| 2 | 2 | 181 | 65% 31% .. |
| 2 | C | 181 | 57% 39% .. |
| 3 | 3 | 783 | 59% 37% .. |
| 3 | D | 783 | 57% 39% .. |
| 4 | 4 | 409 | 49% 44% . 6% |
| 4 | E | 409 | 44% 49% . 6% |

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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 5 | 5 | 207 | 54% 39% 5% |
| 5 | F | 207 | 50% 43% 5% |
| 6 | 6 | 181 | 43% 45% 8% |
| 6 | G | 181 | 44% 43% 5% 8% |
| 7 | 9 | 182 | 60% 38% . |
| 7 | O | 182 | 51% 48% . |
| 8 | 7 | 129 | 59% 38% .. |
| 8 | I | 129 | 60% 36% .. |
| 9 | W | 131 | 65% 32% . |
| 9 | X | 131 | 68% 29% . |
| 10 | A | 119 | 54% 44% .. |
| 10 | P | 119 | 55% 39% .. |
| 11 | J | 176 | 56% 34% . 9% |
| 11 | R | 176 | 57% 32% . 9% |
| 12 | K | 95 | 64% 35% . |
| 12 | S | 95 | 67% 32% . |
| 13 | L | 606 | 60% 39% . |
| 13 | T | 606 | 61% 38% . |
| 14 | M | 469 | 60% 39% . |
| 14 | U | 469 | 59% 39% . |
| 15 | N | 427 | 64% 35% . |
| 15 | V | 427 | 62% 38% . |
| 16 | H | 365 | 52% 42% .. |
| 16 | Q | 365 | 48% 46% .. |

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 crite-

ria:

| Mol | Type | Chain | Res | Chirality | Geometry | Clashes | Electron density |
|------------|-------------|--------------|------------|------------------|-----------------|----------------|-------------------------|
| 17 | SF4 | 3 | 803 | - | - | X | - |
| 17 | SF4 | 9 | 201 | - | - | X | - |
| 17 | SF4 | 9 | 202 | - | - | X | - |
| 17 | SF4 | G | 201 | - | - | X | - |
| 17 | SF4 | O | 201 | - | - | X | - |
| 19 | FES | 2 | 201 | - | - | X | - |

2 Entry composition [i](#)

There are 20 unique types of molecules in this entry. The entry contains 74134 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called NADH-quinone oxidoreductase subunit 1.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 1 | 1 | 437 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3417 | 2180 | 595 | 624 | 18 | | | |
| 1 | B | 437 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3417 | 2180 | 595 | 624 | 18 | | | |

- Molecule 2 is a protein called NADH-quinone oxidoreductase subunit 2.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 2 | 2 | 178 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1406 | 895 | 238 | 265 | 8 | | | |
| 2 | C | 178 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1406 | 895 | 238 | 265 | 8 | | | |

- Molecule 3 is a protein called NADH-quinone oxidoreductase subunit 3.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|------|------|----|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 3 | 3 | 756 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 5895 | 3754 | 1057 | 1053 | 31 | | | |
| 3 | D | 756 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 5895 | 3754 | 1057 | 1053 | 31 | | | |

- Molecule 4 is a protein called NADH-quinone oxidoreductase subunit 4.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 4 | 4 | 384 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3067 | 1975 | 522 | 559 | 11 | | | |
| 4 | E | 384 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3067 | 1975 | 522 | 559 | 11 | | | |

- Molecule 5 is a protein called NADH-quinone oxidoreductase subunit 5.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|---------|-------|
| 5 | 5 | 196 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1607 | 1043 | 273 | 288 | 3 | | | |
| 5 | F | 196 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1607 | 1043 | 273 | 288 | 3 | | | |

- Molecule 6 is a protein called NADH-quinone oxidoreductase subunit 6.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---------|---------|-------|
| 6 | 6 | 166 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1289 | 815 | 235 | 226 | 13 | | | |
| 6 | G | 166 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1289 | 815 | 235 | 226 | 13 | | | |

- Molecule 7 is a protein called NADH-quinone oxidoreductase subunit 9.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---------|---------|-------|
| 7 | 9 | 180 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1388 | 890 | 232 | 255 | 11 | | | |
| 7 | O | 180 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1388 | 890 | 232 | 255 | 11 | | | |

- Molecule 8 is a protein called NADH-quinone oxidoreductase subunit 15.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| 8 | 7 | 127 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1031 | 664 | 183 | 181 | 3 | | | |
| 8 | I | 127 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1031 | 664 | 183 | 181 | 3 | | | |

- Molecule 9 is a protein called Uncharacterized protein.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| 9 | W | 127 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 967 | 623 | 165 | 175 | 4 | | | |
| 9 | X | 127 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 967 | 623 | 165 | 175 | 4 | | | |

- Molecule 10 is a protein called NADH-quinone oxidoreductase subunit 7.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| 10 | A | 117 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 910 | 624 | 138 | 144 | 4 | | | |

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| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 10 | P | 117 | 910 | 624 | 138 | 144 | 4 | 0 | 0 | 0 |

- Molecule 11 is a protein called NADH-quinone oxidoreductase subunit 10.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 11 | J | 160 | 1183 | 806 | 183 | 191 | 3 | 0 | 0 | 0 |
| 11 | R | 160 | 1183 | 806 | 183 | 191 | 3 | 0 | 0 | 0 |

- Molecule 12 is a protein called NADH-quinone oxidoreductase subunit 11.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 12 | K | 95 | 703 | 456 | 118 | 126 | 3 | 0 | 0 | 0 |
| 12 | S | 95 | 703 | 456 | 118 | 126 | 3 | 0 | 0 | 0 |

- Molecule 13 is a protein called NADH-quinone oxidoreductase subunit 12.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 13 | L | 605 | 4604 | 3089 | 740 | 756 | 19 | 0 | 0 | 0 |
| 13 | T | 605 | 4604 | 3089 | 740 | 756 | 19 | 0 | 0 | 0 |

- Molecule 14 is a protein called NADH-quinone oxidoreductase subunit 13.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 14 | M | 467 | 3489 | 2363 | 546 | 572 | 8 | 0 | 0 | 0 |
| 14 | U | 467 | 3489 | 2363 | 546 | 572 | 8 | 0 | 0 | 0 |

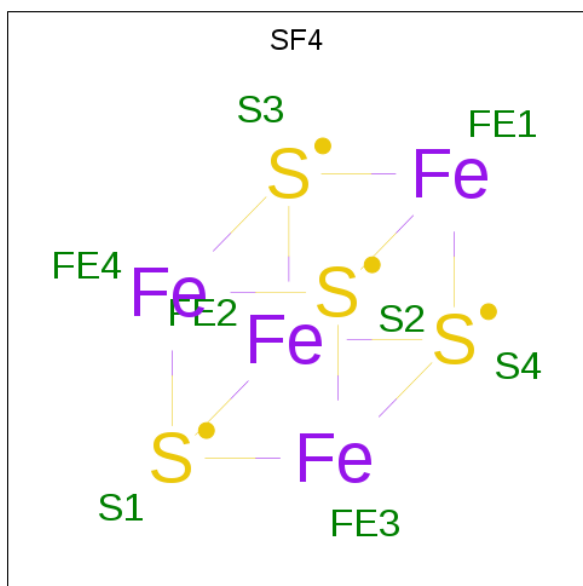
- Molecule 15 is a protein called NADH-quinone oxidoreductase subunit 14.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 15 | N | 427 | 3154 | 2125 | 505 | 518 | 6 | 0 | 0 | 0 |
| 15 | V | 427 | 3154 | 2125 | 505 | 518 | 6 | 0 | 0 | 0 |

- Molecule 16 is a protein called NADH-quinone oxidoreductase subunit 8.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|---------------|-----------|----------|----------|--------|---------|---------|-------|
| | | | Total | C | N | O | S | | | |
| 16 | H | 353 | Total 2838 | C 1943 | N 431 | O 457 | S 7 | 0 | 0 | 0 |
| 16 | Q | 353 | Total 2838 | C 1943 | N 431 | O 457 | S 7 | 0 | 0 | 0 |

- Molecule 17 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe₄S₄).



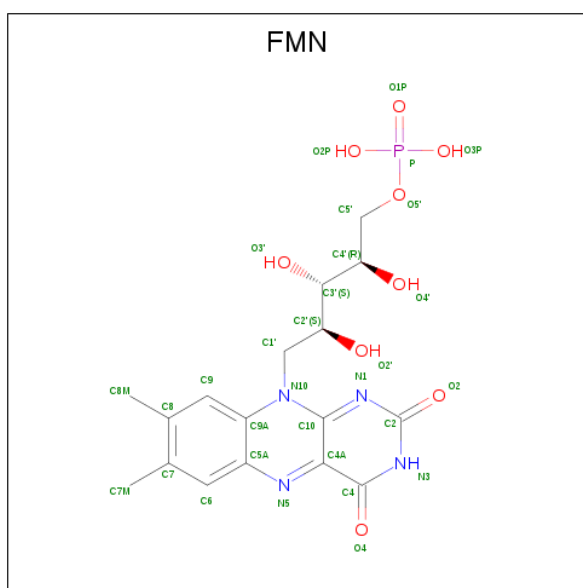
| Mol | Chain | Residues | Atoms | | ZeroOcc | AltConf | |
|-----|-------|----------|------------|---------|---------|---------|---|
| | | | Total | Fe S | | | |
| 17 | 1 | 1 | Total 8 | Fe 4 | S 4 | 0 | 0 |
| 17 | 3 | 1 | Total 8 | Fe 4 | S 4 | 0 | 0 |
| 17 | 3 | 1 | Total 8 | Fe 4 | S 4 | 0 | 0 |
| 17 | 3 | 1 | Total 8 | Fe 4 | S 4 | 0 | 0 |
| 17 | 6 | 1 | Total 8 | Fe 4 | S 4 | 0 | 0 |
| 17 | 9 | 1 | Total 8 | Fe 4 | S 4 | 0 | 0 |
| 17 | 9 | 1 | Total 8 | Fe 4 | S 4 | 0 | 0 |
| 17 | B | 1 | Total 8 | Fe 4 | S 4 | 0 | 0 |
| 17 | D | 1 | Total 8 | Fe 4 | S 4 | 0 | 0 |

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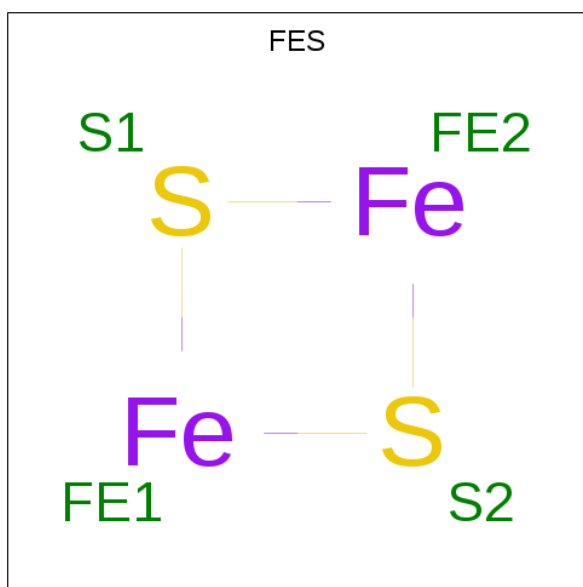
| Mol | Chain | Residues | Atoms | | | ZeroOcc | AltConf |
|-----|-------|----------|-------|----|---|---------|---------|
| 17 | D | 1 | Total | Fe | S | 0 | 0 |
| | | | 8 | 4 | 4 | | |
| 17 | D | 1 | Total | Fe | S | 0 | 0 |
| | | | 8 | 4 | 4 | | |
| 17 | G | 1 | Total | Fe | S | 0 | 0 |
| | | | 8 | 4 | 4 | | |
| 17 | O | 1 | Total | Fe | S | 0 | 0 |
| | | | 8 | 4 | 4 | | |
| 17 | O | 1 | Total | Fe | S | 0 | 0 |
| | | | 8 | 4 | 4 | | |

- Molecule 18 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: C₁₇H₂₁N₄O₉P).



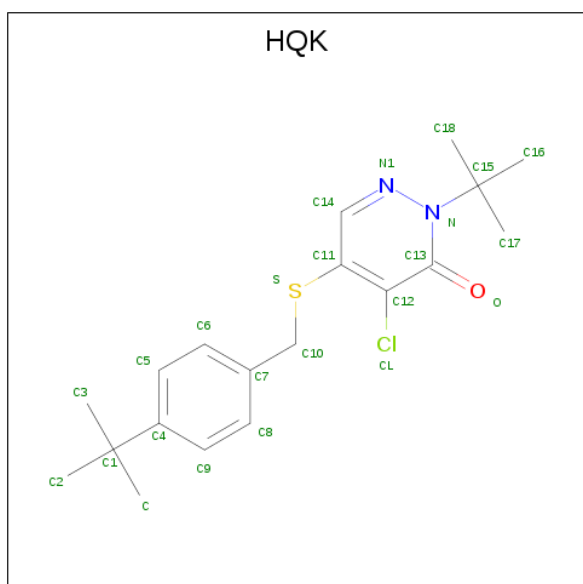
| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf |
|-----|-------|----------|-------|----|---|---|---|---------|---------|
| 18 | 1 | 1 | Total | C | N | O | P | 0 | 0 |
| | | | 31 | 17 | 4 | 9 | 1 | | |
| 18 | B | 1 | Total | C | N | O | P | 0 | 0 |
| | | | 31 | 17 | 4 | 9 | 1 | | |

- Molecule 19 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe₂S₂).



| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|-----|-------|----------|---------------------|---------|---------|
| 19 | 2 | 1 | Total Fe S 4 2 2 | 0 | 0 |
| 19 | 3 | 1 | Total Fe S 4 2 2 | 0 | 0 |
| 19 | C | 1 | Total Fe S 4 2 2 | 0 | 0 |
| 19 | D | 1 | Total Fe S 4 2 2 | 0 | 0 |

- Molecule 20 is Pyridaben (three-letter code: HQK) (formula: C₁₉H₂₅ClN₂OS) (labeled as "Ligand of Interest" by author).



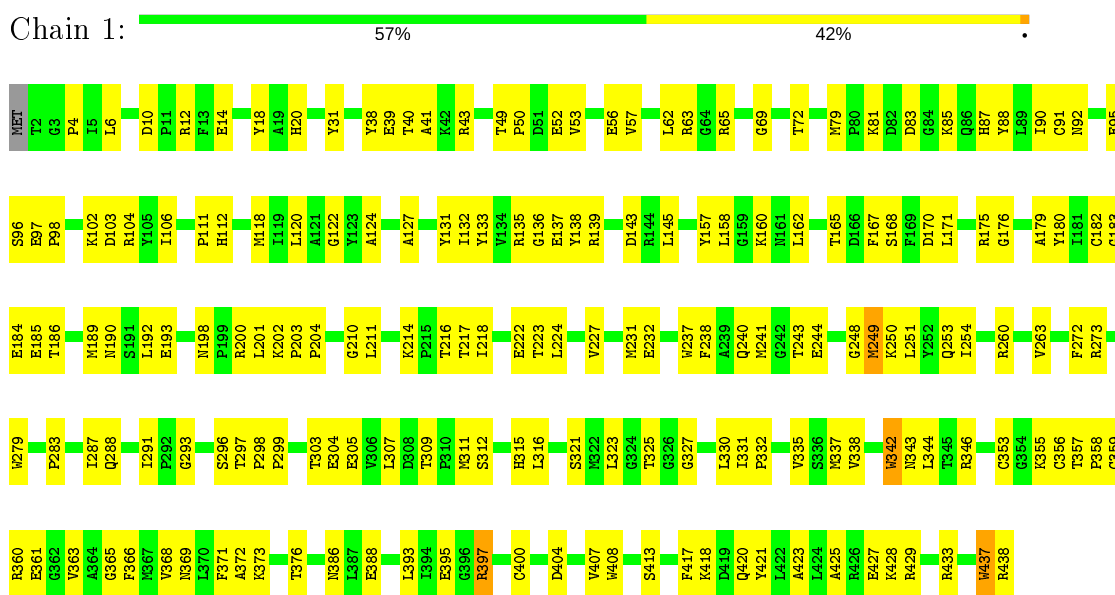
| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | |
|------------|--------------|-----------------|--------------|----|----|---|---|----------------|----------------|---|
| 20 | 4 | 1 | Total | C | Cl | N | O | S | 0 | 0 |
| | | | 24 | 19 | 1 | 2 | 1 | 1 | | |
| 20 | E | 1 | Total | C | Cl | N | O | S | 0 | 0 |
| | | | 24 | 19 | 1 | 2 | 1 | 1 | | |

3 Residue-property plots [i](#)

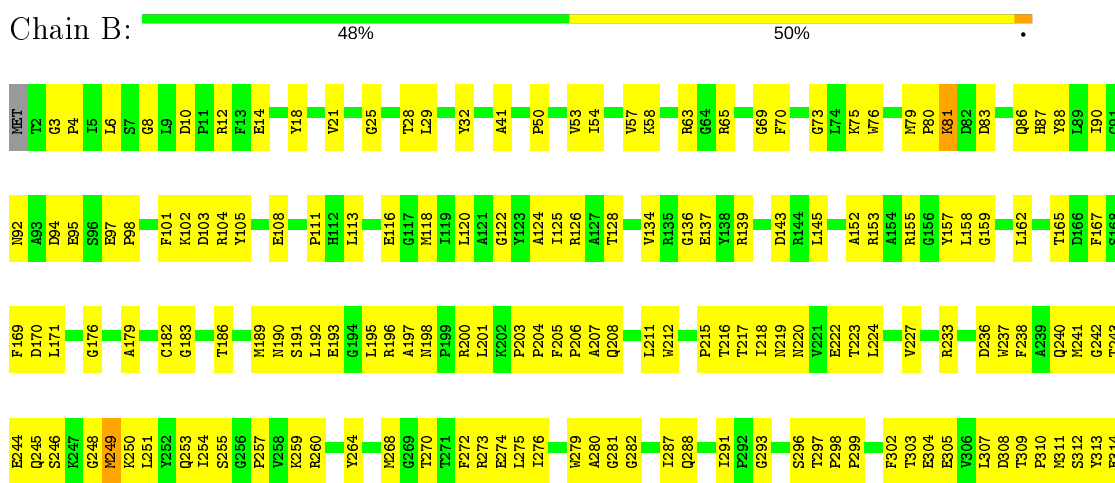
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded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

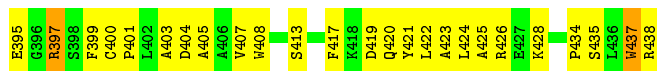
Note EDS failed to run properly.

- Molecule 1: NADH-quinone oxidoreductase subunit 1

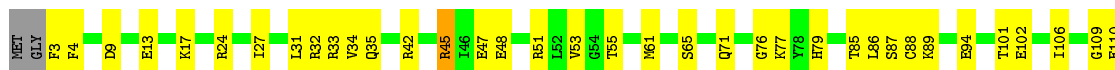


- Molecule 1: NADH-quinone oxidoreductase subunit 1

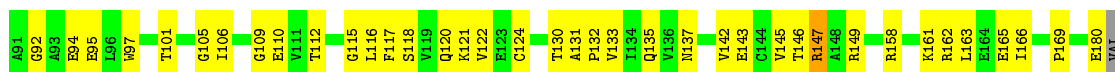
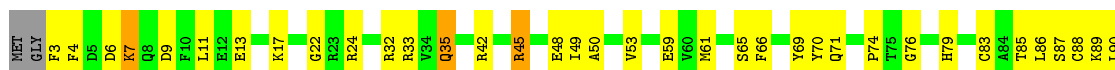




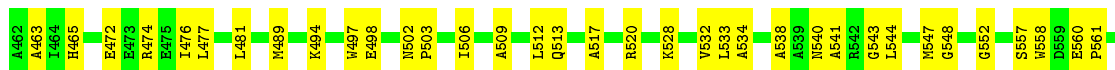
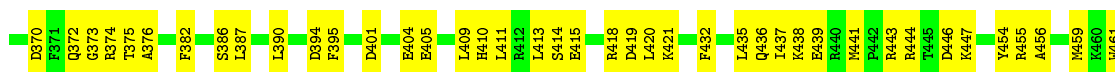
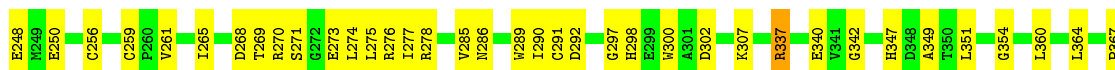
• Molecule 2: NADH-quinone oxidoreductase subunit 2



• Molecule 2: NADH-quinone oxidoreductase subunit 2

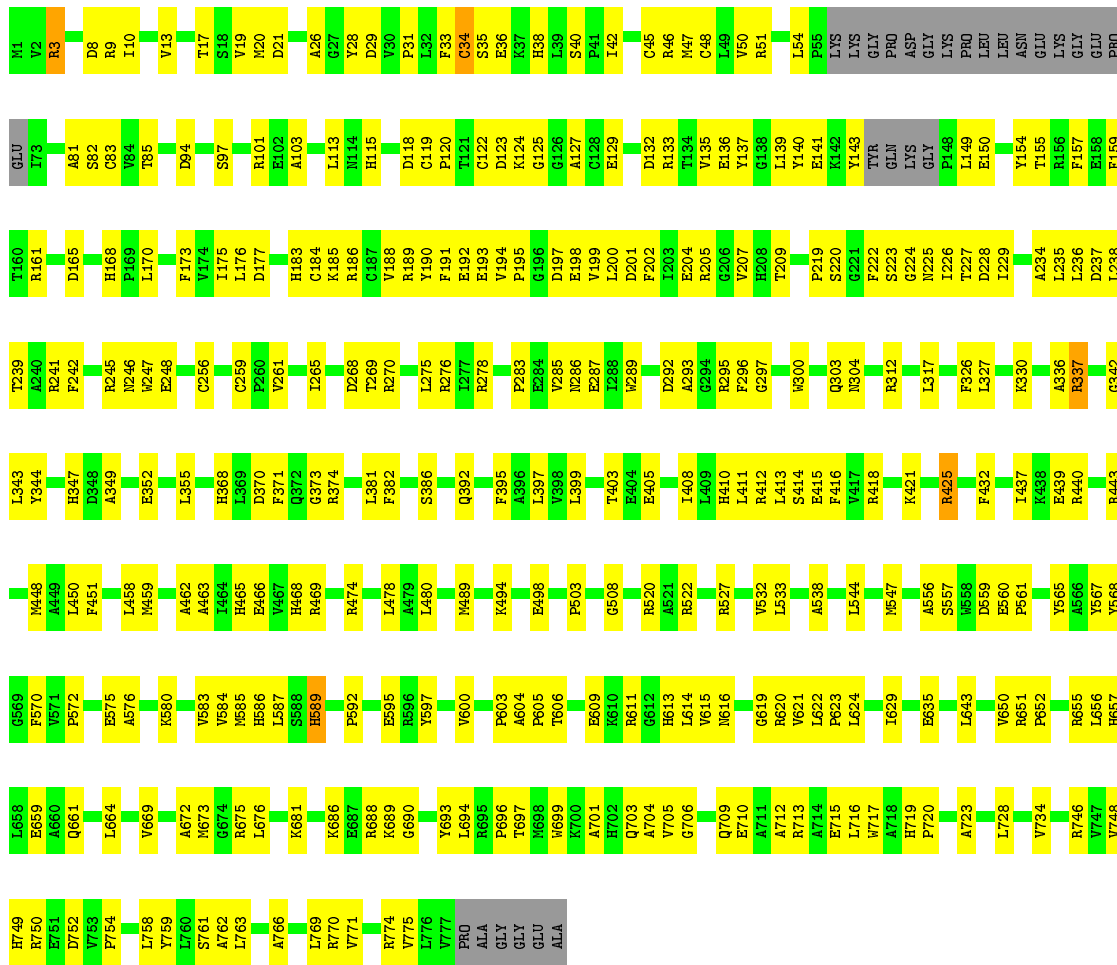


• Molecule 3: NADH-quinone oxidoreductase subunit 3

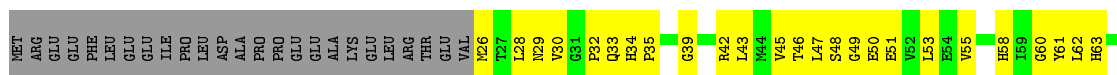


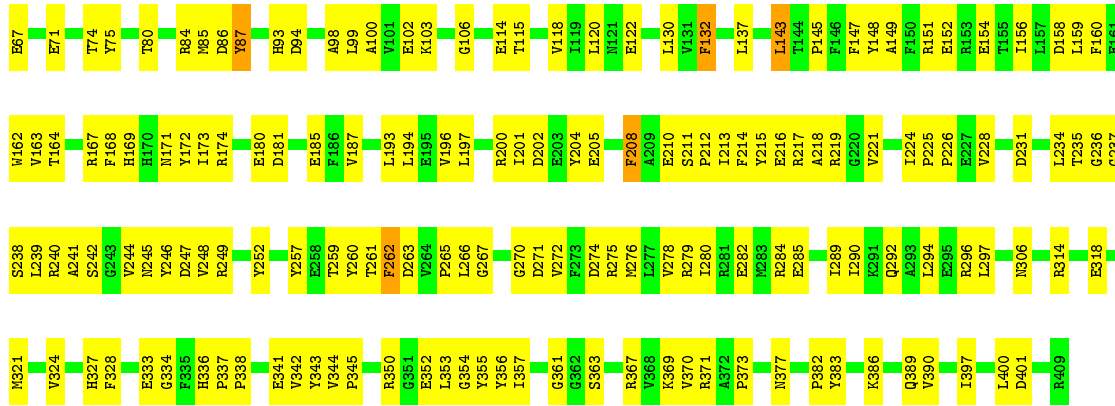


• Molecule 3: NADH-kinase oxidoreductase subunit 3

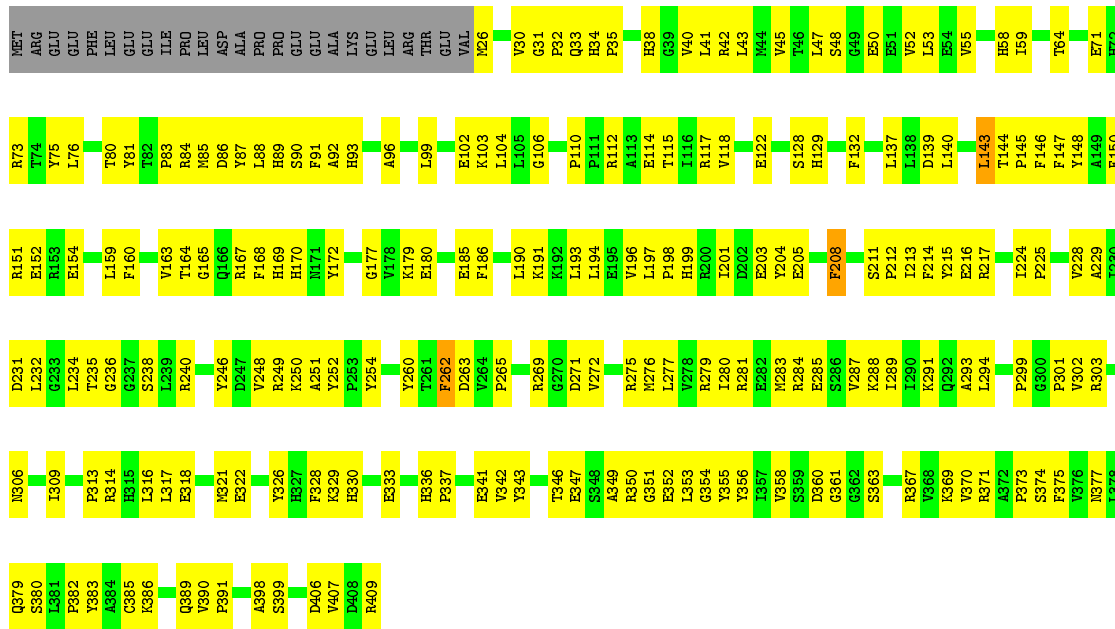


• Molecule 4: NADH-kinase oxidoreductase subunit 4

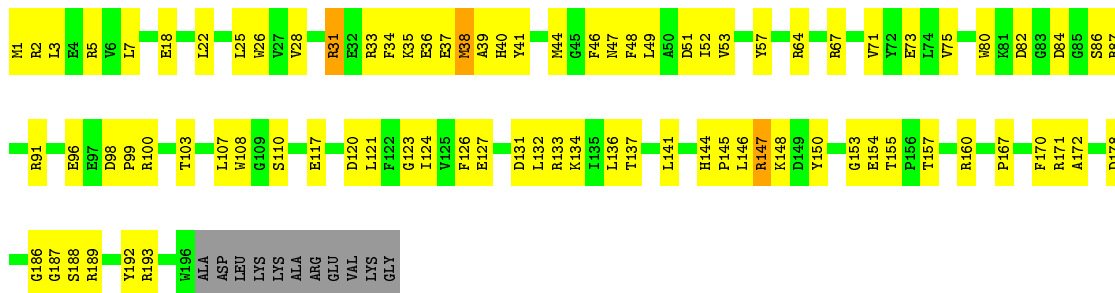




• Molecule 4: NADH-quinone oxidoreductase subunit 4

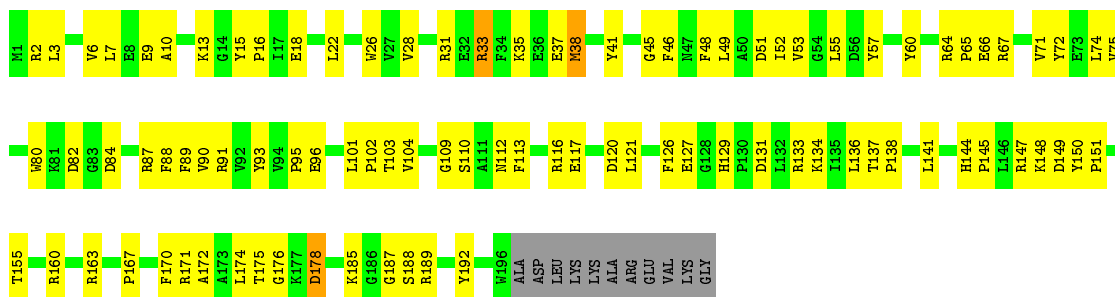


• Molecule 5: NADH-quinone oxidoreductase subunit 5



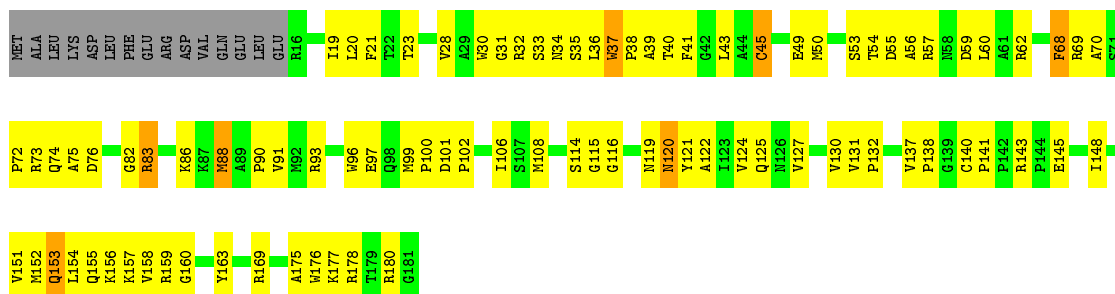
• Molecule 5: NADH-quinone oxidoreductase subunit 5

Chain F:  50% 43% 5%



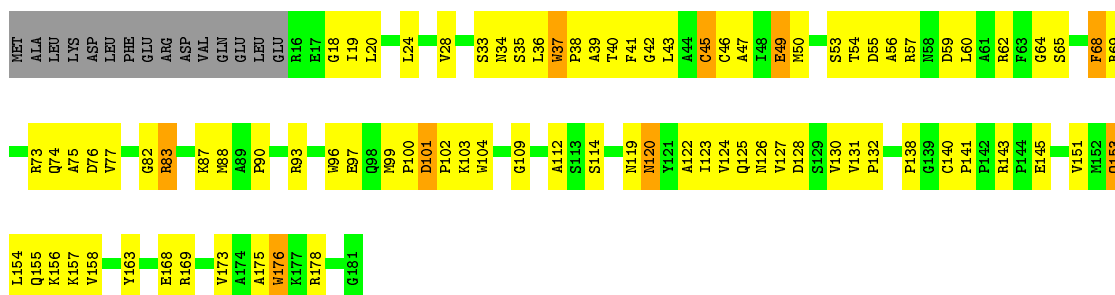
• Molecule 6: NADH-quinone oxidoreductase subunit 6

Chain 6:  43% 45% 8%



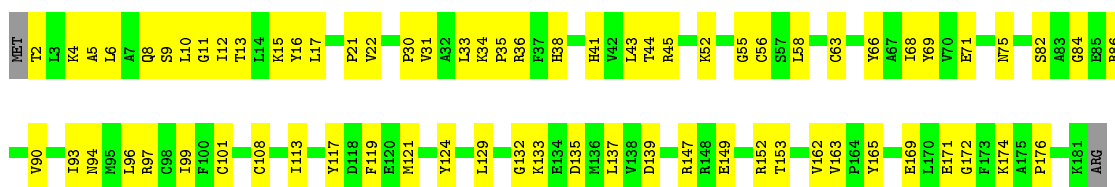
• Molecule 6: NADH-quinone oxidoreductase subunit 6

Chain G:  44% 43% 5% 8%



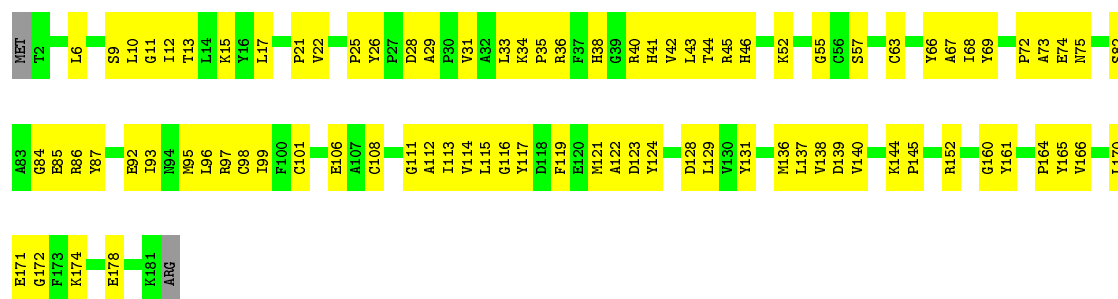
• Molecule 7: NADH-quinone oxidoreductase subunit 9

Chain 9:  60% 38%



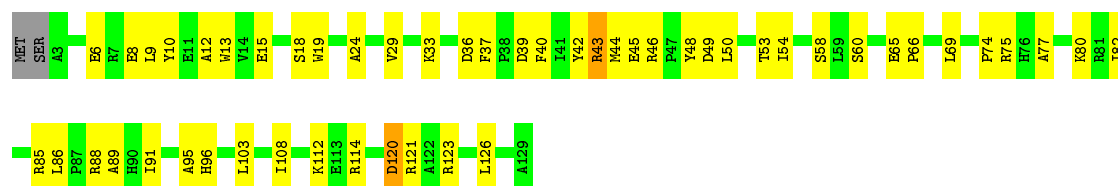
• Molecule 7: NADH-quinone oxidoreductase subunit 9

Chain O:  51% 48%



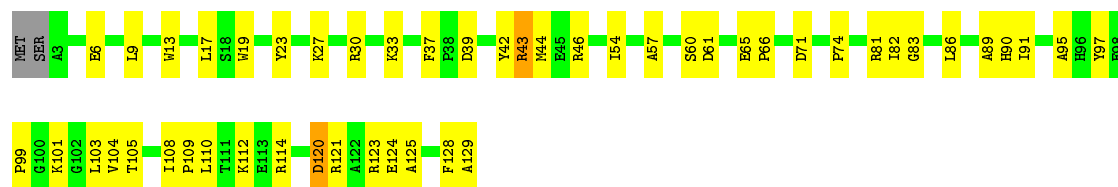
- Molecule 8: NADH-quinone oxidoreductase subunit 15

Chain 7:  59% 38%



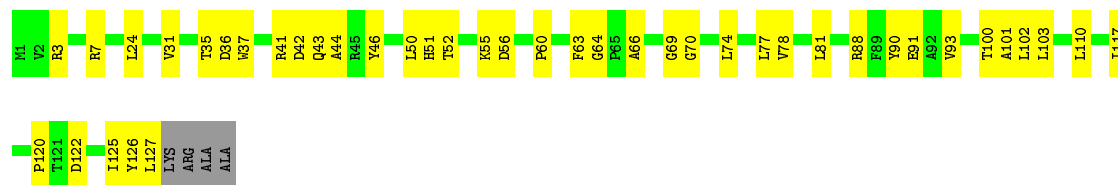
- Molecule 8: NADH-quinone oxidoreductase subunit 15

Chain I:  60% 36%



- Molecule 9: Uncharacterized protein

Chain W:  65% 32%



- Molecule 9: Uncharacterized protein

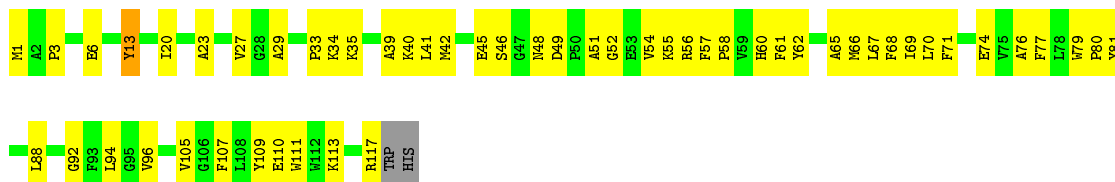
Chain X:  68% 29%





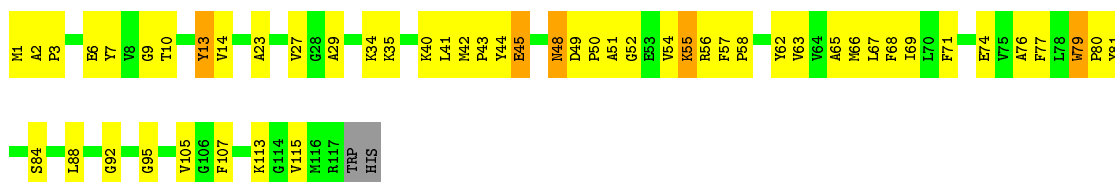
- Molecule 10: NADH-quinone oxidoreductase subunit 7

Chain A: 54% 44%



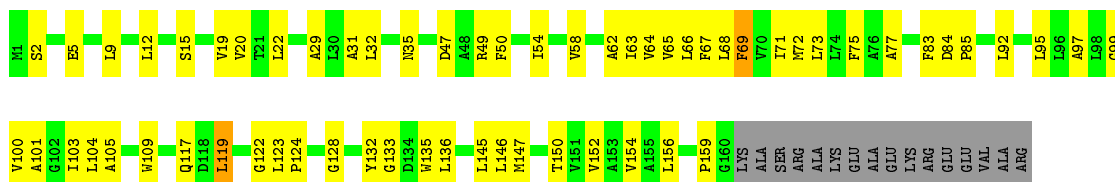
- Molecule 10: NADH-quinone oxidoreductase subunit 7

Chain P: 55% 39%



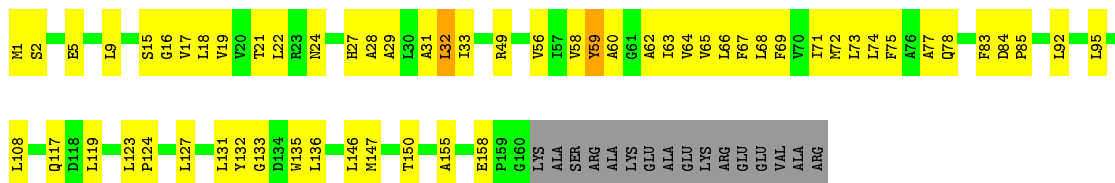
- Molecule 11: NADH-quinone oxidoreductase subunit 10

Chain J: 56% 34% 9%



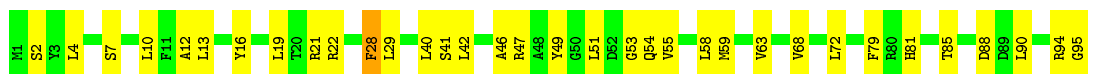
- Molecule 11: NADH-quinone oxidoreductase subunit 10

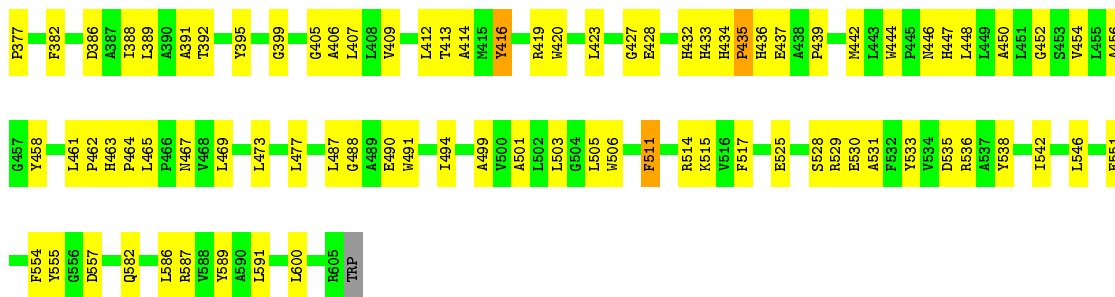
Chain R: 57% 32% 9%



- Molecule 12: NADH-quinone oxidoreductase subunit 11

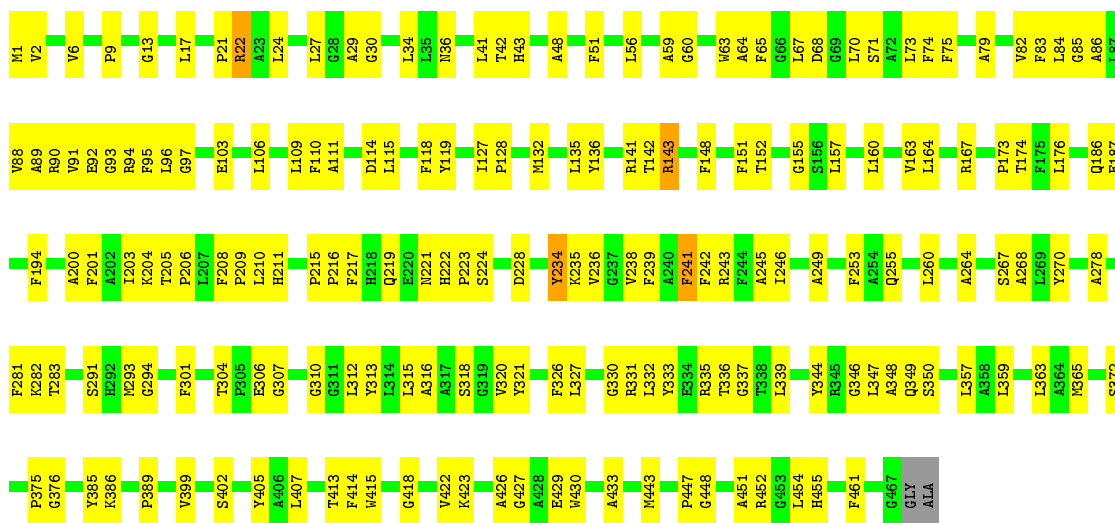
Chain K: 64% 35%





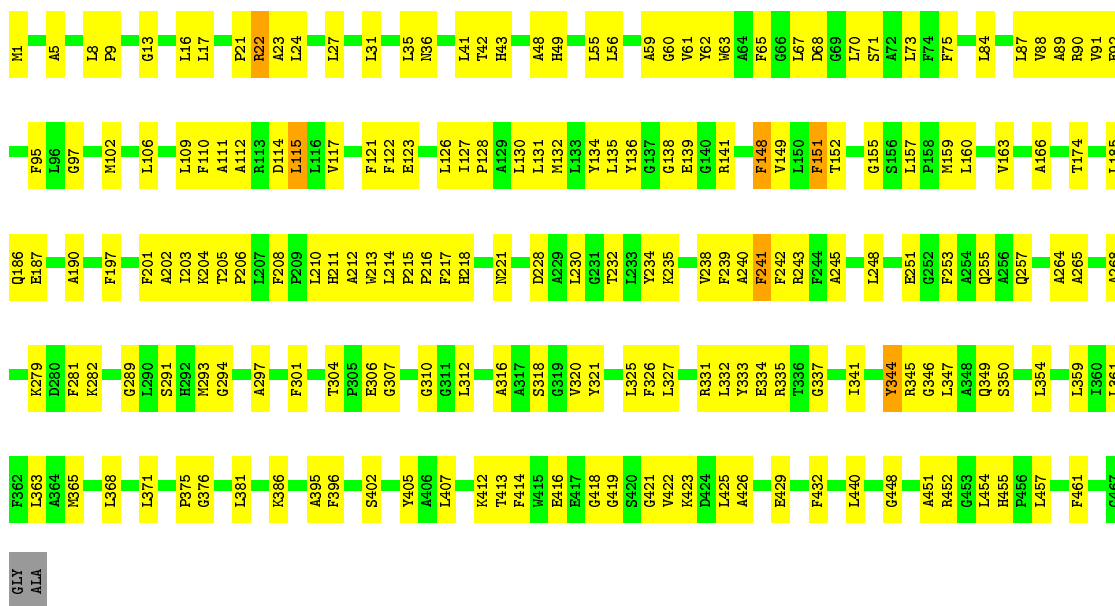
- Molecule 14: NADH-quinone oxidoreductase subunit 13

Chain M: 60% 39%

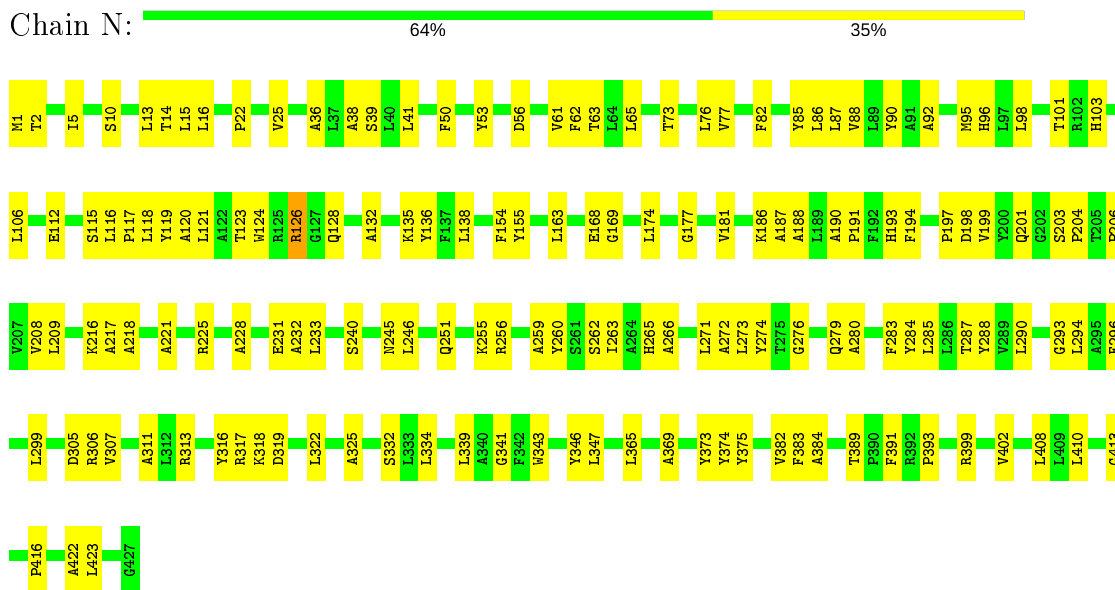


- Molecule 14: NADH-quinone oxidoreductase subunit 13

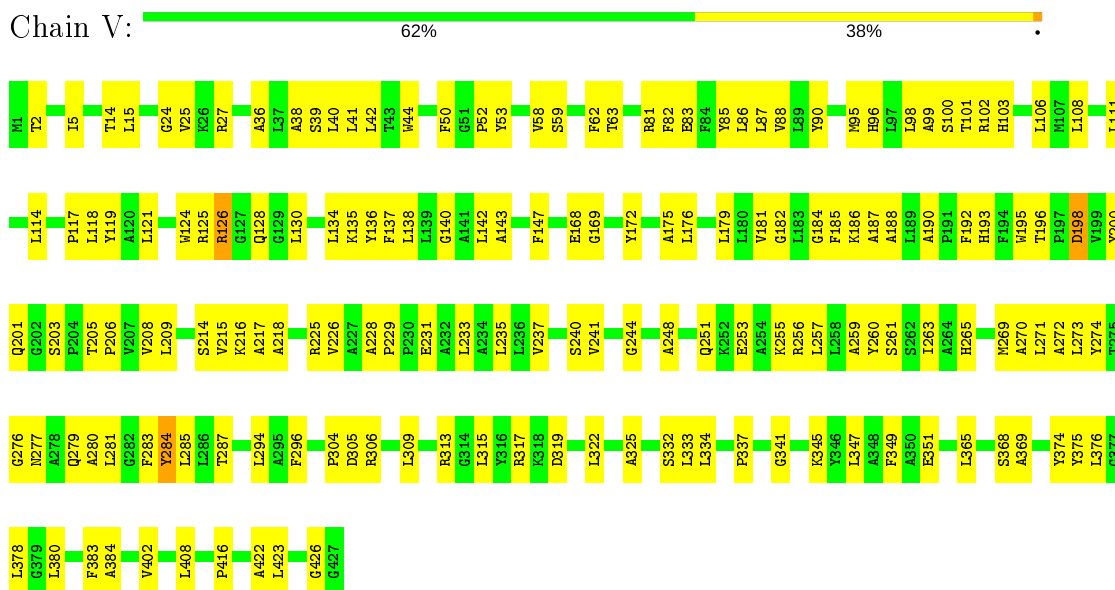
Chain U: 59% 39%



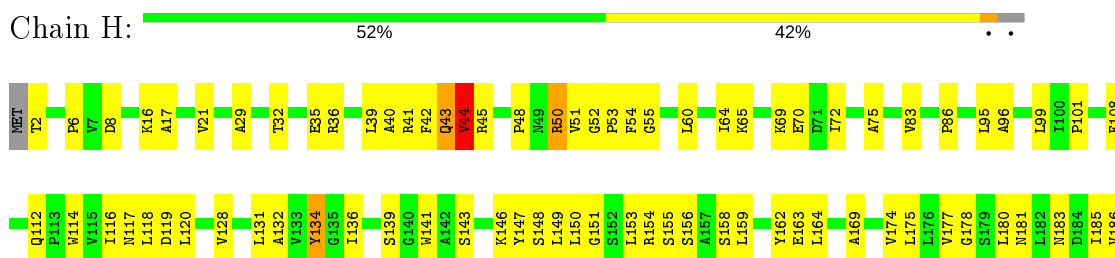
- Molecule 15: NADH-quinone oxidoreductase subunit 14

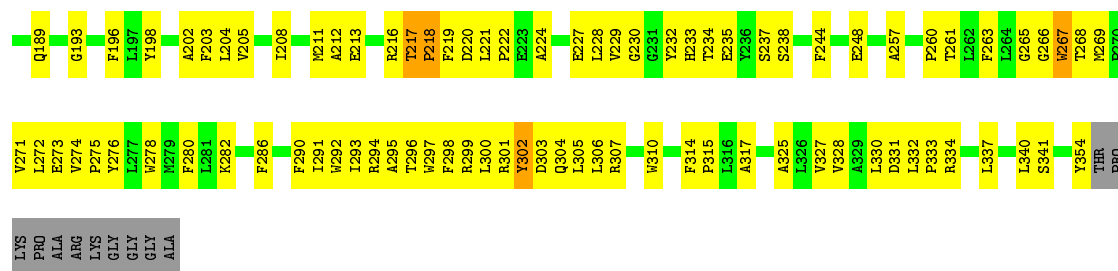


- Molecule 15: NADH-quinone oxidoreductase subunit 14



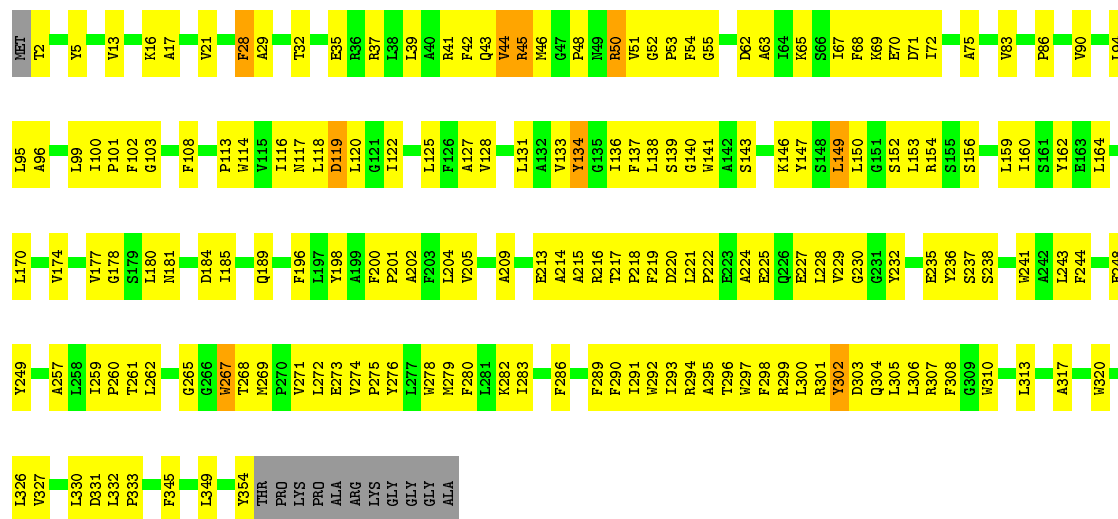
- Molecule 16: NADH-quinone oxidoreductase subunit 8





- Molecule 16: NADH-quinone oxidoreductase subunit 8

Chain Q: 48% 46%



4 Data and refinement statistics

EDS failed to run properly - this section is therefore incomplete.

| Property | Value | Source |
|--|---|-----------|
| Space group | P 1 21 1 | Depositor |
| Cell constants a, b, c, α , β , γ | 95.19Å 338.64Å 263.23Å 90.00° 100.41° 90.00° | Depositor |
| Resolution (Å) | 58.41 – 3.51 | Depositor |
| % Data completeness (in resolution range) | 81.6 (58.41-3.51) | Depositor |
| R_{merge} | 0.16 | Depositor |
| R_{sym} | (Not available) | Depositor |
| $\langle I/\sigma(I) \rangle$ ¹ | 1.08 (at 3.49Å) | Xtrriage |
| Refinement program | PHENIX (1.13rc1_2961: ???) | Depositor |
| R, R_{free} | 0.215 , 0.232 | Depositor |
| Wilson B-factor (Å ²) | 97.6 | Xtrriage |
| Anisotropy | 0.010 | Xtrriage |
| L-test for twinning ² | $\langle L \rangle = 0.35$, $\langle L^2 \rangle = 0.18$ | Xtrriage |
| Estimated twinning fraction | 0.348 for h,-k,-h-l | Xtrriage |
| Reported twinning fraction | 0.490 for -H,-K,H+L | Depositor |
| Outliers | 0 of 166363 reflections | Xtrriage |
| Total number of atoms | 74134 | wwPDB-VP |
| Average B, all atoms (Å ²) | 97.0 | wwPDB-VP |

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.12% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: FMN, SF4, HQK, FES

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

| Mol | Chain | Bond lengths | | Bond angles | |
|-----|-------|--------------|---------------|-------------|---------------|
| | | RMSZ | # Z >5 | RMSZ | # Z >5 |
| 1 | 1 | 0.28 | 0/3506 | 0.48 | 0/4745 |
| 1 | B | 0.29 | 0/3506 | 0.48 | 0/4745 |
| 2 | 2 | 0.29 | 0/1439 | 0.49 | 0/1953 |
| 2 | C | 0.28 | 0/1439 | 0.47 | 0/1953 |
| 3 | 3 | 0.31 | 1/6035 (0.0%) | 0.51 | 0/8185 |
| 3 | D | 0.30 | 0/6035 | 0.51 | 1/8185 (0.0%) |
| 4 | 4 | 0.31 | 0/3150 | 0.50 | 0/4284 |
| 4 | E | 0.29 | 0/3150 | 0.47 | 0/4284 |
| 5 | 5 | 0.30 | 0/1656 | 0.51 | 0/2246 |
| 5 | F | 0.30 | 0/1656 | 0.50 | 0/2246 |
| 6 | 6 | 0.32 | 0/1319 | 0.53 | 0/1786 |
| 6 | G | 0.31 | 0/1319 | 0.52 | 1/1786 (0.1%) |
| 7 | 9 | 0.33 | 0/1423 | 0.52 | 0/1933 |
| 7 | O | 0.33 | 0/1423 | 0.52 | 0/1933 |
| 8 | 7 | 0.28 | 0/1059 | 0.49 | 0/1429 |
| 8 | I | 0.28 | 0/1059 | 0.50 | 0/1429 |
| 9 | W | 0.30 | 0/985 | 0.51 | 0/1335 |
| 9 | X | 0.30 | 0/985 | 0.49 | 0/1335 |
| 10 | A | 0.30 | 0/940 | 0.51 | 0/1280 |
| 10 | P | 0.29 | 0/940 | 0.50 | 0/1280 |
| 11 | J | 0.26 | 0/1206 | 0.47 | 0/1649 |
| 11 | R | 0.28 | 0/1206 | 0.46 | 0/1649 |
| 12 | K | 0.28 | 0/710 | 0.46 | 0/962 |
| 12 | S | 0.27 | 0/710 | 0.45 | 0/962 |
| 13 | L | 0.28 | 0/4741 | 0.46 | 0/6460 |
| 13 | T | 0.27 | 0/4741 | 0.45 | 0/6460 |
| 14 | M | 0.28 | 0/3591 | 0.47 | 0/4896 |
| 14 | U | 0.28 | 0/3591 | 0.47 | 0/4896 |
| 15 | N | 0.28 | 0/3238 | 0.45 | 0/4434 |
| 15 | V | 0.29 | 0/3238 | 0.45 | 0/4434 |
| 16 | H | 0.30 | 0/2935 | 0.53 | 0/4014 |
| 16 | Q | 0.31 | 0/2935 | 0.52 | 0/4014 |

| Mol | Chain | Bond lengths | | Bond angles | |
|-----|-------|--------------|----------------|-------------|-----------------|
| | | RMSZ | # Z >5 | RMSZ | # Z >5 |
| All | All | 0.29 | 1/75866 (0.0%) | 0.49 | 2/103182 (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 |
|-----|-------|---------------------|---------------------|
| 7 | 9 | 0 | 1 |
| 7 | O | 0 | 1 |
| 10 | P | 0 | 1 |
| 13 | L | 0 | 1 |
| 13 | T | 0 | 1 |
| 16 | H | 0 | 1 |
| 16 | Q | 0 | 1 |
| All | All | 0 | 7 |

All (1) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|-------|-------|-------------|----------|
| 3 | 3 | 624 | LEU | C-N | -5.75 | 1.20 | 1.34 |

All (2) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|-----|------|--------|-------|-------------|----------|
| 6 | G | 169 | ARG | C-N-CA | -6.07 | 106.53 | 121.70 |
| 3 | D | 650 | VAL | C-N-CA | -5.36 | 108.30 | 121.70 |

There are no chirality outliers.

5 of 7 planarity outliers are listed below:

| Mol | Chain | Res | Type | Group |
|-----|-------|-----|------|---------|
| 7 | 9 | 21 | PRO | Peptide |
| 16 | H | 217 | THR | Peptide |
| 13 | L | 435 | PRO | Peptide |
| 7 | O | 21 | PRO | Peptide |
| 10 | P | 45 | GLU | Peptide |

5.2 Too-close contacts [i](#)

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

| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 1 | 1 | 3417 | 0 | 3388 | 138 | 0 |
| 1 | B | 3417 | 0 | 3388 | 204 | 0 |
| 2 | 2 | 1406 | 0 | 1373 | 60 | 0 |
| 2 | C | 1406 | 0 | 1373 | 67 | 0 |
| 3 | 3 | 5895 | 0 | 5931 | 219 | 0 |
| 3 | D | 5895 | 0 | 5930 | 251 | 0 |
| 4 | 4 | 3067 | 0 | 3049 | 179 | 0 |
| 4 | E | 3067 | 0 | 3049 | 204 | 0 |
| 5 | 5 | 1607 | 0 | 1574 | 81 | 0 |
| 5 | F | 1607 | 0 | 1574 | 95 | 0 |
| 6 | 6 | 1289 | 0 | 1298 | 86 | 0 |
| 6 | G | 1289 | 0 | 1299 | 94 | 0 |
| 7 | 9 | 1388 | 0 | 1383 | 75 | 0 |
| 7 | O | 1388 | 0 | 1383 | 78 | 0 |
| 8 | 7 | 1031 | 0 | 1029 | 49 | 0 |
| 8 | I | 1031 | 0 | 1029 | 47 | 0 |
| 9 | W | 967 | 0 | 1010 | 27 | 0 |
| 9 | X | 967 | 0 | 1010 | 26 | 0 |
| 10 | A | 910 | 0 | 939 | 61 | 0 |
| 10 | P | 910 | 0 | 939 | 61 | 0 |
| 11 | J | 1183 | 0 | 1286 | 64 | 0 |
| 11 | R | 1183 | 0 | 1286 | 60 | 0 |
| 12 | K | 703 | 0 | 747 | 37 | 0 |
| 12 | S | 703 | 0 | 747 | 28 | 0 |
| 13 | L | 4604 | 0 | 4734 | 193 | 0 |
| 13 | T | 4604 | 0 | 4734 | 180 | 0 |
| 14 | M | 3489 | 0 | 3606 | 141 | 0 |
| 14 | U | 3489 | 0 | 3606 | 158 | 0 |
| 15 | N | 3154 | 0 | 3343 | 120 | 0 |
| 15 | V | 3154 | 0 | 3343 | 126 | 0 |
| 16 | H | 2838 | 0 | 2903 | 185 | 0 |
| 16 | Q | 2838 | 0 | 2903 | 194 | 0 |
| 17 | 1 | 8 | 0 | 0 | 0 | 0 |
| 17 | 3 | 24 | 0 | 0 | 4 | 0 |
| 17 | 6 | 8 | 0 | 0 | 1 | 0 |
| 17 | 9 | 16 | 0 | 0 | 4 | 0 |
| 17 | B | 8 | 0 | 0 | 0 | 0 |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 17 | D | 24 | 0 | 0 | 2 | 0 |
| 17 | G | 8 | 0 | 0 | 3 | 0 |
| 17 | O | 16 | 0 | 0 | 3 | 0 |
| 18 | 1 | 31 | 0 | 19 | 2 | 0 |
| 18 | B | 31 | 0 | 19 | 8 | 0 |
| 19 | 2 | 4 | 0 | 0 | 2 | 0 |
| 19 | 3 | 4 | 0 | 0 | 0 | 0 |
| 19 | C | 4 | 0 | 0 | 0 | 0 |
| 19 | D | 4 | 0 | 0 | 1 | 0 |
| 20 | 4 | 24 | 0 | 0 | 4 | 0 |
| 20 | E | 24 | 0 | 0 | 2 | 0 |
| All | All | 74134 | 0 | 75224 | 3128 | 0 |

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 21.

The worst 5 of 3128 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|-------------------|--------------------------|-------------------|
| 16:Q:267:TRP:CD1 | 16:Q:268:THR:N | 1.98 | 1.30 |
| 16:H:267:TRP:CD1 | 16:H:268:THR:N | 2.03 | 1.25 |
| 7:9:10:LEU:HD12 | 16:H:296:THR:HG21 | 1.28 | 1.09 |
| 16:H:146:LYS:HA | 16:H:149:LEU:HB2 | 1.46 | 0.98 |
| 4:E:110:PRO:HB3 | 4:E:301:PRO:HG2 | 1.48 | 0.96 |

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles |
|-----|-------|---------------|-----------|---------|----------|-----------------------|
| 1 | 1 | 435/438 (99%) | 411 (94%) | 24 (6%) | 0 | 100 100 |

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| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|-----|-------|----------------|-----------|----------|----------|-------------|-----|
| 1 | B | 435/438 (99%) | 410 (94%) | 25 (6%) | 0 | 100 | 100 |
| 2 | 2 | 176/181 (97%) | 170 (97%) | 6 (3%) | 0 | 100 | 100 |
| 2 | C | 176/181 (97%) | 168 (96%) | 8 (4%) | 0 | 100 | 100 |
| 3 | 3 | 750/783 (96%) | 699 (93%) | 51 (7%) | 0 | 100 | 100 |
| 3 | D | 750/783 (96%) | 699 (93%) | 51 (7%) | 0 | 100 | 100 |
| 4 | 4 | 382/409 (93%) | 362 (95%) | 20 (5%) | 0 | 100 | 100 |
| 4 | E | 382/409 (93%) | 359 (94%) | 23 (6%) | 0 | 100 | 100 |
| 5 | 5 | 194/207 (94%) | 183 (94%) | 11 (6%) | 0 | 100 | 100 |
| 5 | F | 194/207 (94%) | 183 (94%) | 11 (6%) | 0 | 100 | 100 |
| 6 | 6 | 164/181 (91%) | 149 (91%) | 14 (8%) | 1 (1%) | 25 | 64 |
| 6 | G | 164/181 (91%) | 151 (92%) | 12 (7%) | 1 (1%) | 25 | 64 |
| 7 | 9 | 178/182 (98%) | 168 (94%) | 10 (6%) | 0 | 100 | 100 |
| 7 | O | 178/182 (98%) | 168 (94%) | 10 (6%) | 0 | 100 | 100 |
| 8 | 7 | 125/129 (97%) | 119 (95%) | 6 (5%) | 0 | 100 | 100 |
| 8 | I | 125/129 (97%) | 115 (92%) | 10 (8%) | 0 | 100 | 100 |
| 9 | W | 125/131 (95%) | 121 (97%) | 4 (3%) | 0 | 100 | 100 |
| 9 | X | 125/131 (95%) | 119 (95%) | 6 (5%) | 0 | 100 | 100 |
| 10 | A | 115/119 (97%) | 105 (91%) | 10 (9%) | 0 | 100 | 100 |
| 10 | P | 115/119 (97%) | 104 (90%) | 11 (10%) | 0 | 100 | 100 |
| 11 | J | 158/176 (90%) | 145 (92%) | 13 (8%) | 0 | 100 | 100 |
| 11 | R | 158/176 (90%) | 144 (91%) | 14 (9%) | 0 | 100 | 100 |
| 12 | K | 93/95 (98%) | 89 (96%) | 4 (4%) | 0 | 100 | 100 |
| 12 | S | 93/95 (98%) | 89 (96%) | 4 (4%) | 0 | 100 | 100 |
| 13 | L | 603/606 (100%) | 567 (94%) | 35 (6%) | 1 (0%) | 47 | 81 |
| 13 | T | 603/606 (100%) | 566 (94%) | 36 (6%) | 1 (0%) | 47 | 81 |
| 14 | M | 465/469 (99%) | 440 (95%) | 25 (5%) | 0 | 100 | 100 |
| 14 | U | 465/469 (99%) | 439 (94%) | 26 (6%) | 0 | 100 | 100 |
| 15 | N | 425/427 (100%) | 403 (95%) | 22 (5%) | 0 | 100 | 100 |
| 15 | V | 425/427 (100%) | 403 (95%) | 22 (5%) | 0 | 100 | 100 |
| 16 | H | 351/365 (96%) | 297 (85%) | 49 (14%) | 5 (1%) | 11 | 46 |
| 16 | Q | 351/365 (96%) | 304 (87%) | 42 (12%) | 5 (1%) | 11 | 46 |

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| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles |
|-----|-------|-----------------|------------|----------|----------|-------------|
| All | All | 9478/9796 (97%) | 8849 (93%) | 615 (6%) | 14 (0%) | 51 84 |

5 of 14 Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 16 | H | 51 | VAL |
| 16 | Q | 51 | VAL |
| 16 | H | 44 | VAL |
| 16 | Q | 44 | VAL |
| 16 | H | 50 | ARG |

5.3.2 Protein sidechains [i](#)

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

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

| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles |
|-----|-------|----------------|-----------|----------|-------------|
| 1 | 1 | 355/356 (100%) | 344 (97%) | 11 (3%) | 40 70 |
| 1 | B | 355/356 (100%) | 344 (97%) | 11 (3%) | 40 70 |
| 2 | 2 | 150/152 (99%) | 145 (97%) | 5 (3%) | 38 68 |
| 2 | C | 150/152 (99%) | 144 (96%) | 6 (4%) | 31 64 |
| 3 | 3 | 609/628 (97%) | 598 (98%) | 11 (2%) | 59 81 |
| 3 | D | 609/628 (97%) | 597 (98%) | 12 (2%) | 55 79 |
| 4 | 4 | 332/355 (94%) | 327 (98%) | 5 (2%) | 65 84 |
| 4 | E | 332/355 (94%) | 329 (99%) | 3 (1%) | 78 90 |
| 5 | 5 | 167/175 (95%) | 163 (98%) | 4 (2%) | 49 76 |
| 5 | F | 167/175 (95%) | 163 (98%) | 4 (2%) | 49 76 |
| 6 | 6 | 135/149 (91%) | 124 (92%) | 11 (8%) | 11 41 |
| 6 | G | 135/149 (91%) | 124 (92%) | 11 (8%) | 11 41 |
| 7 | 9 | 148/150 (99%) | 147 (99%) | 1 (1%) | 84 93 |
| 7 | O | 148/150 (99%) | 147 (99%) | 1 (1%) | 84 93 |
| 8 | 7 | 104/106 (98%) | 102 (98%) | 2 (2%) | 57 80 |
| 8 | I | 104/106 (98%) | 102 (98%) | 2 (2%) | 57 80 |

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| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|-----|-------|-----------------|------------|----------|-------------|----|
| 9 | W | 99/101 (98%) | 98 (99%) | 1 (1%) | 76 | 88 |
| 9 | X | 99/101 (98%) | 98 (99%) | 1 (1%) | 76 | 88 |
| 10 | A | 90/92 (98%) | 88 (98%) | 2 (2%) | 52 | 78 |
| 10 | P | 90/92 (98%) | 86 (96%) | 4 (4%) | 28 | 62 |
| 11 | J | 118/130 (91%) | 115 (98%) | 3 (2%) | 47 | 75 |
| 11 | R | 118/130 (91%) | 115 (98%) | 3 (2%) | 47 | 75 |
| 12 | K | 71/71 (100%) | 70 (99%) | 1 (1%) | 67 | 85 |
| 12 | S | 71/71 (100%) | 70 (99%) | 1 (1%) | 67 | 85 |
| 13 | L | 453/454 (100%) | 444 (98%) | 9 (2%) | 55 | 79 |
| 13 | T | 453/454 (100%) | 442 (98%) | 11 (2%) | 49 | 76 |
| 14 | M | 332/332 (100%) | 322 (97%) | 10 (3%) | 41 | 71 |
| 14 | U | 332/332 (100%) | 323 (97%) | 9 (3%) | 44 | 73 |
| 15 | N | 302/302 (100%) | 298 (99%) | 4 (1%) | 69 | 86 |
| 15 | V | 302/302 (100%) | 296 (98%) | 6 (2%) | 55 | 79 |
| 16 | H | 293/300 (98%) | 284 (97%) | 9 (3%) | 40 | 70 |
| 16 | Q | 293/300 (98%) | 283 (97%) | 10 (3%) | 37 | 68 |
| All | All | 7516/7706 (98%) | 7332 (98%) | 184 (2%) | 49 | 76 |

5 of 184 residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 16 | H | 134 | TYR |
| 2 | C | 35 | GLN |
| 15 | V | 126 | ARG |
| 16 | H | 267 | TRP |
| 1 | B | 353 | CYS |

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 67 such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 16 | H | 112 | GLN |
| 1 | B | 240 | GLN |
| 13 | T | 582 | GLN |
| 16 | H | 117 | ASN |
| 16 | H | 187 | ASN |

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](#)

22 ligands are modelled in this entry.

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

| Mol | Type | Chain | Res | Link | Bond lengths | | | Bond angles | | |
|-----|------|-------|-----|------|--------------|------|----------|-------------|------|----------|
| | | | | | Counts | RMSZ | # Z > 2 | Counts | RMSZ | # Z > 2 |
| 17 | SF4 | O | 202 | 7 | 0,12,12 | 0.00 | - | - | | |
| 17 | SF4 | D | 801 | 3 | 0,12,12 | 0.00 | - | - | | |
| 19 | FES | 3 | 804 | 3 | 0,4,4 | 0.00 | - | - | | |
| 17 | SF4 | 3 | 802 | 3 | 0,12,12 | 0.00 | - | - | | |
| 19 | FES | D | 804 | 3 | 0,4,4 | 0.00 | - | - | | |
| 17 | SF4 | B | 501 | 1 | 0,12,12 | 0.00 | - | - | | |
| 17 | SF4 | G | 201 | 6 | 0,12,12 | 0.00 | - | - | | |
| 17 | SF4 | O | 201 | 7 | 0,12,12 | 0.00 | - | - | | |
| 17 | SF4 | 3 | 803 | 3 | 0,12,12 | 0.00 | - | - | | |
| 17 | SF4 | 6 | 201 | 6 | 0,12,12 | 0.00 | - | - | | |
| 17 | SF4 | 3 | 801 | 3 | 0,12,12 | 0.00 | - | - | | |
| 17 | SF4 | D | 803 | 3 | 0,12,12 | 0.00 | - | - | | |
| 19 | FES | C | 201 | 2 | 0,4,4 | 0.00 | - | - | | |
| 18 | FMN | 1 | 502 | - | 31,33,33 | 1.44 | 4 (12%) | 40,50,50 | 1.49 | 5 (12%) |
| 20 | HQK | E | 501 | - | 21,25,25 | 0.56 | 0 | 28,38,38 | 1.05 | 2 (7%) |
| 17 | SF4 | 1 | 501 | 1 | 0,12,12 | 0.00 | - | - | | |
| 18 | FMN | B | 502 | - | 31,33,33 | 1.43 | 3 (9%) | 40,50,50 | 1.73 | 6 (15%) |

| Mol | Type | Chain | Res | Link | Bond lengths | | | Bond angles | | |
|-----|------|-------|-----|------|--------------|------|----------|-------------|------|----------|
| | | | | | Counts | RMSZ | # Z > 2 | Counts | RMSZ | # Z > 2 |
| 19 | FES | 2 | 201 | 2 | 0,4,4 | 0.00 | - | - | | |
| 20 | HQK | 4 | 501 | - | 21,25,25 | 0.56 | 0 | 28,38,38 | 1.05 | 2 (7%) |
| 17 | SF4 | 9 | 201 | 7 | 0,12,12 | 0.00 | - | - | | |
| 17 | SF4 | 9 | 202 | 7 | 0,12,12 | 0.00 | - | - | | |
| 17 | SF4 | D | 802 | 3 | 0,12,12 | 0.00 | - | - | | |

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 |
|-----|------|-------|-----|------|---------|------------|---------|
| 17 | SF4 | O | 202 | 7 | - | - | 0/6/5/5 |
| 17 | SF4 | D | 801 | 3 | - | - | 0/6/5/5 |
| 19 | FES | 3 | 804 | 3 | - | - | 0/1/1/1 |
| 17 | SF4 | 3 | 802 | 3 | - | - | 0/6/5/5 |
| 19 | FES | D | 804 | 3 | - | - | 0/1/1/1 |
| 17 | SF4 | B | 501 | 1 | - | - | 0/6/5/5 |
| 17 | SF4 | G | 201 | 6 | - | - | 0/6/5/5 |
| 17 | SF4 | O | 201 | 7 | - | - | 0/6/5/5 |
| 17 | SF4 | 3 | 803 | 3 | - | - | 0/6/5/5 |
| 17 | SF4 | 6 | 201 | 6 | - | - | 0/6/5/5 |
| 17 | SF4 | 3 | 801 | 3 | - | - | 0/6/5/5 |
| 17 | SF4 | D | 803 | 3 | - | - | 0/6/5/5 |
| 19 | FES | C | 201 | 2 | - | - | 0/1/1/1 |
| 18 | FMN | 1 | 502 | - | - | 8/18/18/18 | 0/3/3/3 |
| 20 | HQK | E | 501 | - | - | 1/11/17/17 | 0/2/2/2 |
| 17 | SF4 | 1 | 501 | 1 | - | - | 0/6/5/5 |
| 18 | FMN | B | 502 | - | - | 8/18/18/18 | 0/3/3/3 |
| 19 | FES | 2 | 201 | 2 | - | - | 0/1/1/1 |
| 20 | HQK | 4 | 501 | - | - | 1/11/17/17 | 0/2/2/2 |
| 17 | SF4 | 9 | 201 | 7 | - | - | 0/6/5/5 |
| 17 | SF4 | 9 | 202 | 7 | - | - | 0/6/5/5 |
| 17 | SF4 | D | 802 | 3 | - | - | 0/6/5/5 |

The worst 5 of 7 bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|--------|------|-------------|----------|
| 18 | B | 502 | FMN | C10-N1 | 4.36 | 1.38 | 1.33 |
| 18 | 1 | 502 | FMN | C10-N1 | 4.07 | 1.38 | 1.33 |
| 18 | 1 | 502 | FMN | C4A-N5 | 3.55 | 1.38 | 1.33 |
| 18 | B | 502 | FMN | C4A-N5 | 3.24 | 1.38 | 1.33 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|-------|------|-------------|----------|
| 18 | 1 | 502 | FMN | C4-N3 | 3.14 | 1.38 | 1.33 |

The worst 5 of 15 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-------------|-------|-------------|----------|
| 18 | 1 | 502 | FMN | C4-N3-C2 | 5.40 | 119.70 | 115.14 |
| 18 | B | 502 | FMN | C4-N3-C2 | 5.25 | 119.58 | 115.14 |
| 18 | B | 502 | FMN | C1'-N10-C10 | 5.23 | 123.10 | 118.41 |
| 18 | B | 502 | FMN | C5A-C9A-N10 | 4.29 | 120.82 | 117.72 |
| 20 | 4 | 501 | HQK | C14-C11-C12 | -3.92 | 114.17 | 118.20 |

There are no chirality outliers.

5 of 18 torsion outliers are listed below:

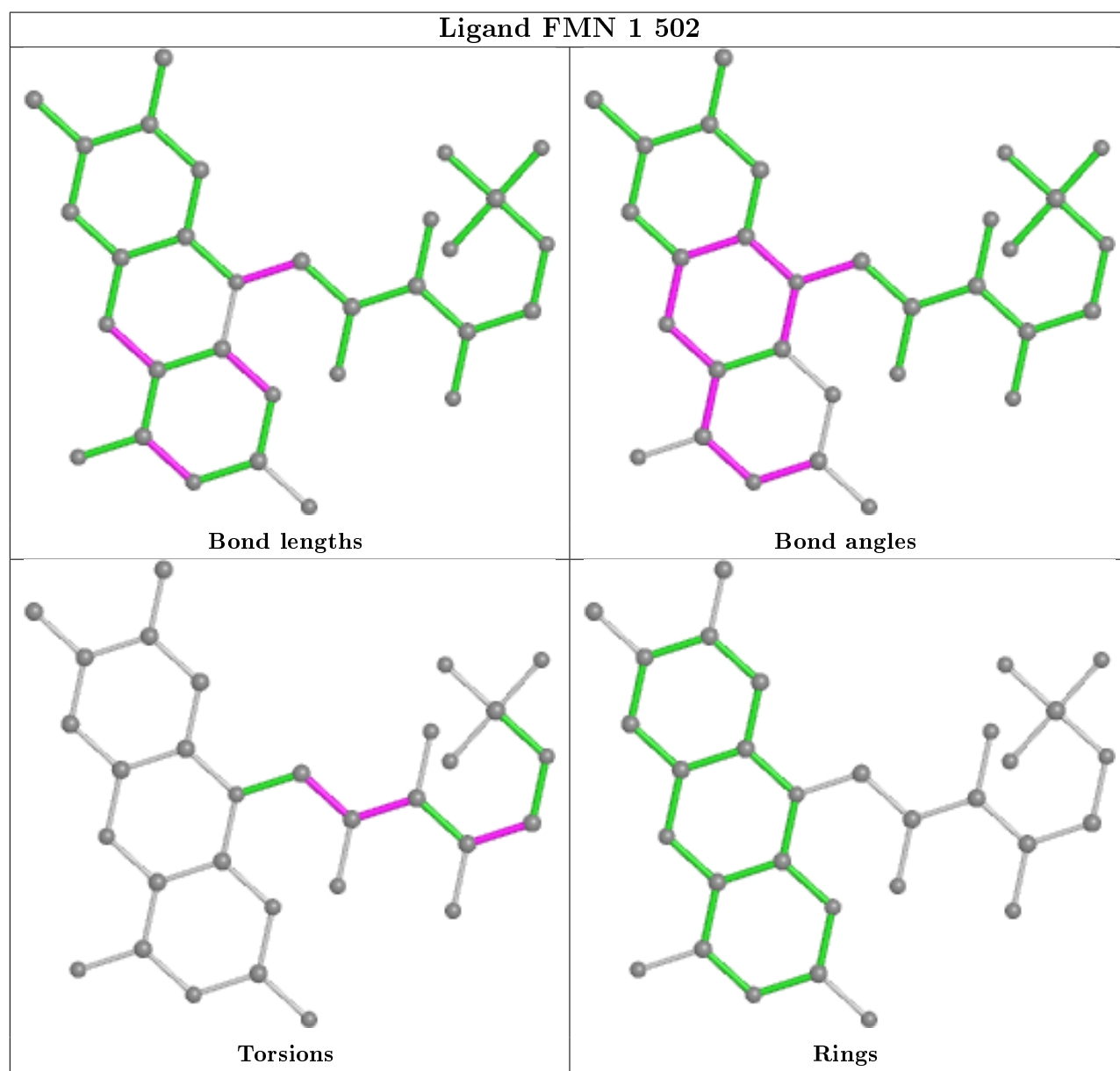
| Mol | Chain | Res | Type | Atoms |
|-----|-------|-----|------|-----------------|
| 18 | 1 | 502 | FMN | N10-C1'-C2'-O2' |
| 18 | 1 | 502 | FMN | N10-C1'-C2'-C3' |
| 18 | 1 | 502 | FMN | C1'-C2'-C3'-O3' |
| 18 | 1 | 502 | FMN | C1'-C2'-C3'-C4' |
| 18 | 1 | 502 | FMN | O4'-C4'-C5'-O5' |

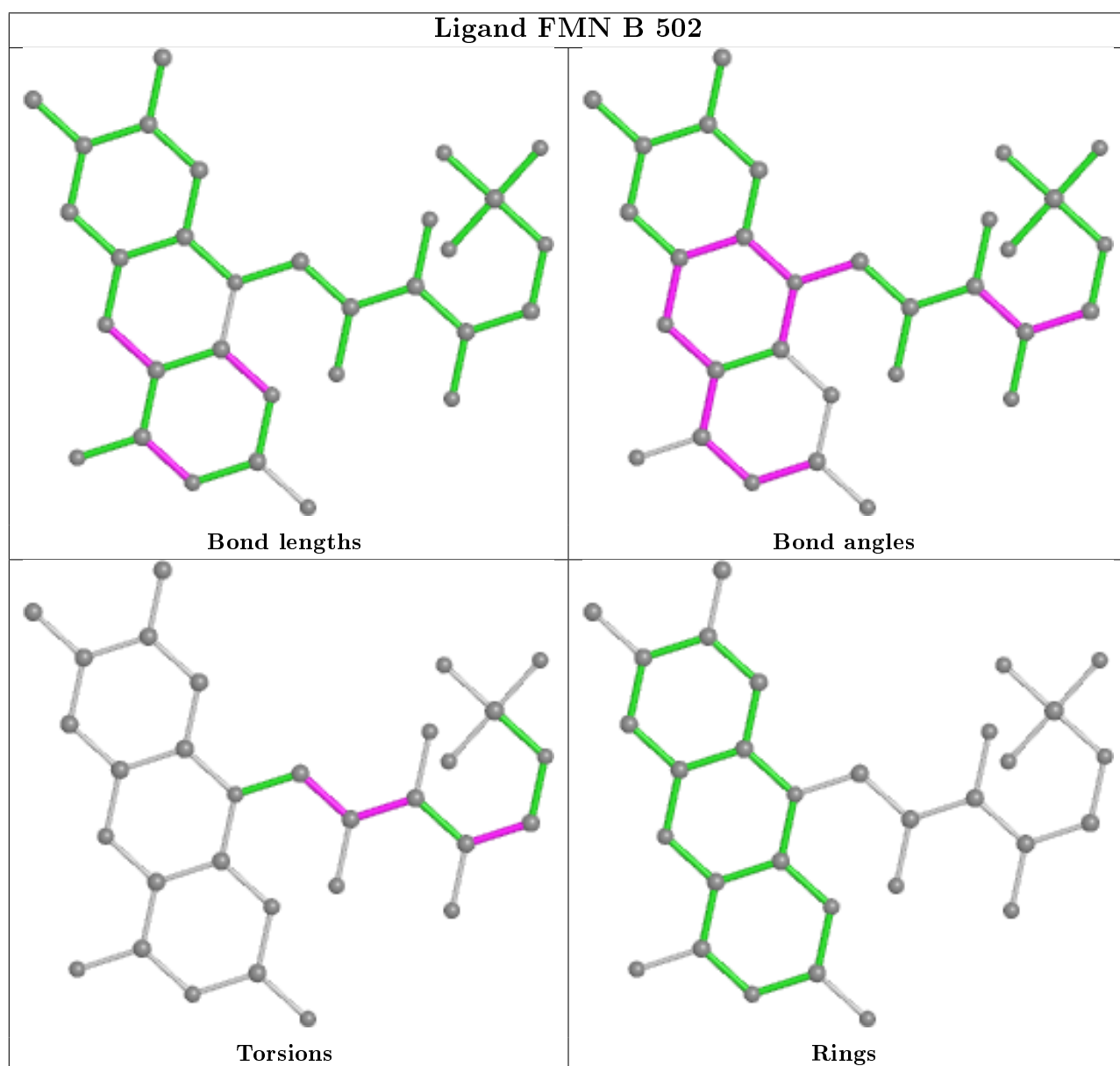
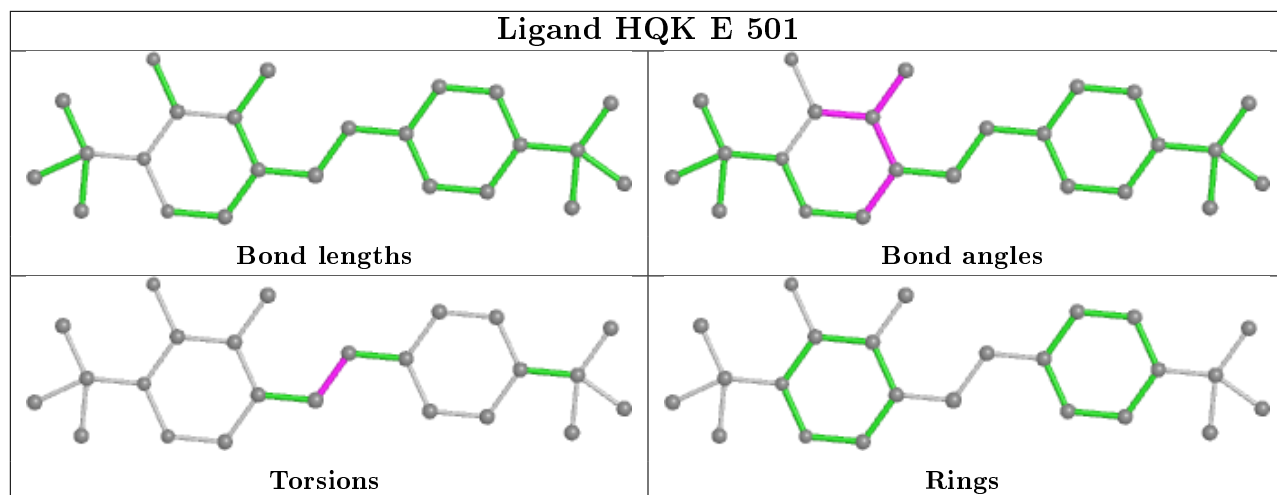
There are no ring outliers.

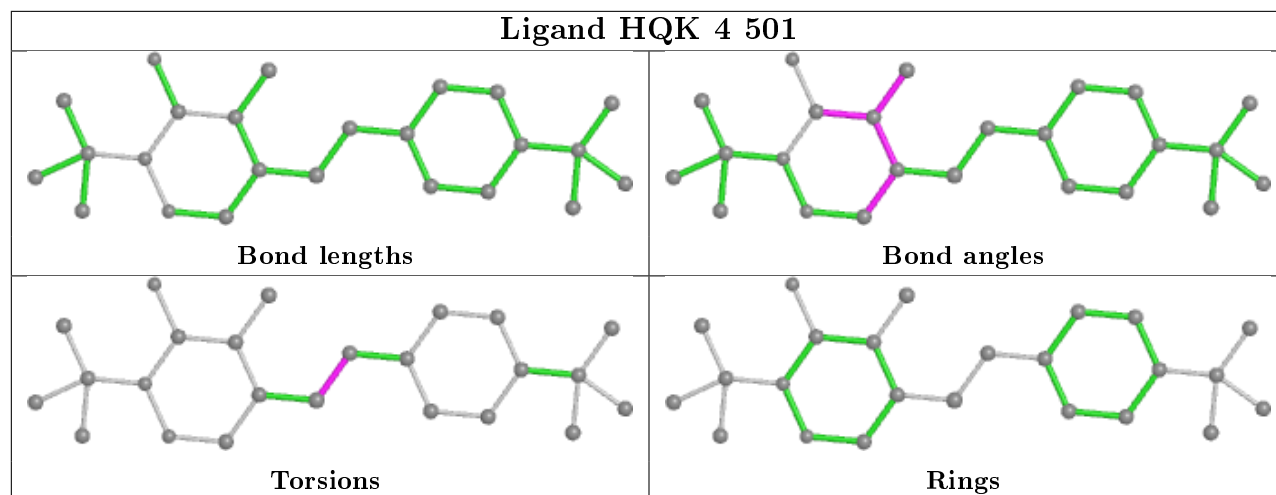
16 monomers are involved in 36 short contacts:

| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|-----|-------|-----|------|---------|--------------|
| 17 | O | 202 | SF4 | 1 | 0 |
| 17 | D | 801 | SF4 | 1 | 0 |
| 19 | D | 804 | FES | 1 | 0 |
| 17 | G | 201 | SF4 | 3 | 0 |
| 17 | O | 201 | SF4 | 2 | 0 |
| 17 | 3 | 803 | SF4 | 3 | 0 |
| 17 | 6 | 201 | SF4 | 1 | 0 |
| 17 | 3 | 801 | SF4 | 1 | 0 |
| 17 | D | 803 | SF4 | 1 | 0 |
| 18 | 1 | 502 | FMN | 2 | 0 |
| 20 | E | 501 | HQK | 2 | 0 |
| 18 | B | 502 | FMN | 8 | 0 |
| 19 | 2 | 201 | FES | 2 | 0 |
| 20 | 4 | 501 | HQK | 4 | 0 |
| 17 | 9 | 201 | SF4 | 2 | 0 |
| 17 | 9 | 202 | SF4 | 2 | 0 |

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

6.1 Protein, DNA and RNA chains

EDS failed to run properly - this section is therefore empty.

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

EDS failed to run properly - this section is therefore empty.

6.3 Carbohydrates

EDS failed to run properly - this section is therefore empty.

6.4 Ligands

EDS failed to run properly - this section is therefore empty.

6.5 Other polymers

EDS failed to run properly - this section is therefore empty.