



wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 21, 2018 – 03:38 pm GMT

PDB ID : 2IBZ
Title : Yeast Cytochrome BC1 Complex with Stigmatellin
Authors : Hunte, C.
Deposited on : 2006-09-12
Resolution : 2.30 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 : 1.7.3 (157068), CSD as539be (2018)
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk30686

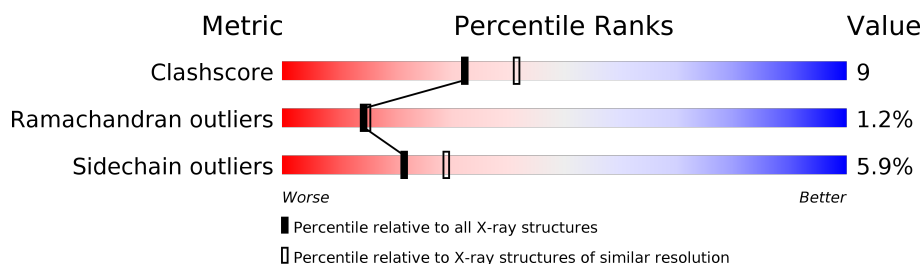
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 Å.

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



| Metric | Whole archive (#Entries) | Similar resolution (#Entries, resolution range(Å)) |
|-----------------------|-----------------------------|---|
| Clashscore | 122078 | 5071 (2.30-2.30) |
| Ramachandran outliers | 120005 | 5021 (2.30-2.30) |
| Sidechain outliers | 119972 | 5020 (2.30-2.30) |





The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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 electron density. The numeric value is given above the bar.

Note EDS was not executed.

| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 1 | A | 431 | |
| 2 | B | 352 | |
| 3 | C | 385 | |
| 4 | D | 248 | |
| 5 | E | 185 | |
| 6 | H | 74 | |
| 7 | F | 127 | |

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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|---|
| 8 | G | 94 |  76% 20% . . |
| 9 | I | 66 |  70% 12% . 17% |
| 10 | X | 127 |  68% 28% . |
| 11 | Y | 107 |  62% 34% . . |

2 Entry composition

There are 16 unique types of molecules in this entry. The entry contains 17779 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called Ubiquinol-cytochrome-c reductase complex core protein 1.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|---------|-------|
| 1 | A | 431 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3344 | 2109 | 576 | 653 | 6 | | | |

There is a discrepancy between the modelled and reference sequences:

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

- Molecule 2 is a protein called Ubiquinol-cytochrome-c reductase complex core protein 2.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|---------|-------|
| 2 | B | 352 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 2735 | 1747 | 453 | 534 | 1 | | | |

- Molecule 3 is a protein called Cytochrome b.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|---------|-------|
| 3 | C | 385 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3089 | 2080 | 484 | 504 | 21 | | | |

There is a discrepancy between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|-------|---------|----------|--------|----------|------------|
| C | 122 | THR | ILE | CONFLICT | UNP P00163 |

- Molecule 4 is a protein called Cytochrome c1, heme protein, mitochondrial precursor.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|---------|-------|
| 4 | D | 245 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1933 | 1232 | 333 | 359 | 9 | | | |

- Molecule 5 is a protein called Ubiquinol-cytochrome c reductase iron-sulfur subunit, mito-

chondrial precursor.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---------|---------|-------|
| 5 | E | 185 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1411 | 893 | 242 | 266 | 10 | | | |

- Molecule 6 is a protein called Ubiquinol-cytochrome c reductase complex 17 kDa protein.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| 6 | H | 74 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 624 | 391 | 108 | 123 | 2 | | | |

- Molecule 7 is a protein called Ubiquinol-cytochrome c reductase complex 14 kDa protein.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| 7 | F | 125 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1012 | 648 | 172 | 190 | 2 | | | |

- Molecule 8 is a protein called Ubiquinol-cytochrome c reductase complex ubiquinone-binding protein QP-C.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| 8 | G | 93 | Total | C | N | O | S | 98 | 0 | 0 |
| | | | 773 | 510 | 131 | 130 | 2 | | | |

- Molecule 9 is a protein called Ubiquinol-cytochrome c reductase complex 7.3 kDa protein.

| Mol | Chain | Residues | Atoms | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---------|---------|-------|
| 9 | I | 55 | Total | C | N | O | 0 | 0 | 0 |
| | | | 448 | 298 | 75 | 75 | | | |

- Molecule 10 is a protein called Variable Heavy chain of antibody fragment.

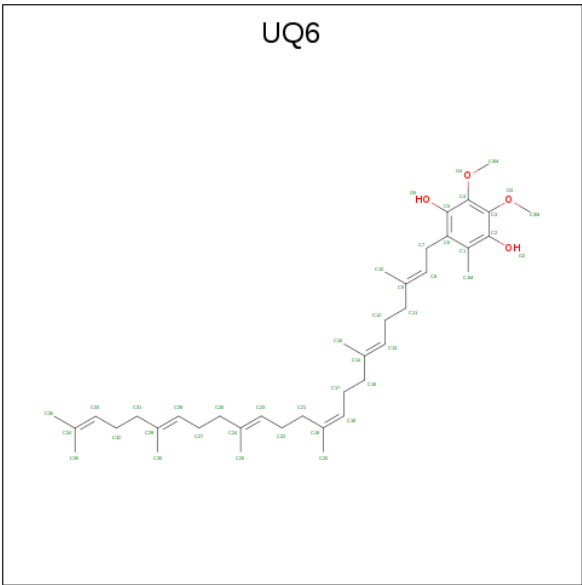
| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|---------|-------|
| 10 | X | 127 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1015 | 644 | 167 | 201 | 3 | | | |

- Molecule 11 is a protein called Variable Light chain of antibody fragment.

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

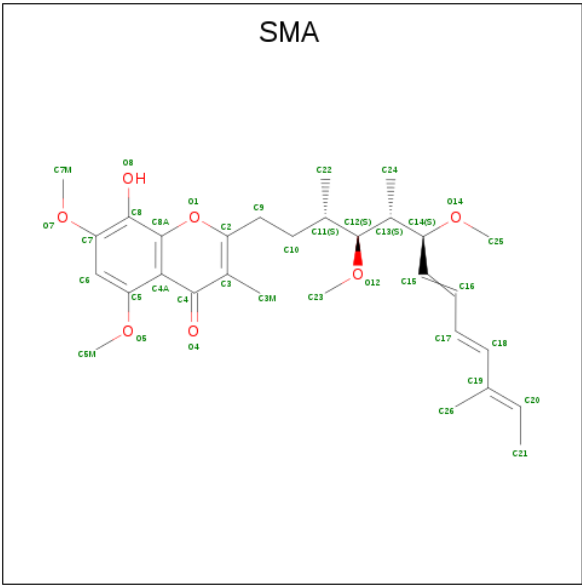
- # HEM

- Molecule 13 is 5-(3,7,11,15,19,23-HEXAMETHYL-TETRACOSA-2,6,10,14,18,22-HEXAENYL)-2,3-DIMETHOXY-6-METHYL-BENZENE-1,4-DIOL (three-letter code: UQ6) (formula: C₃₉H₆₀O₄).



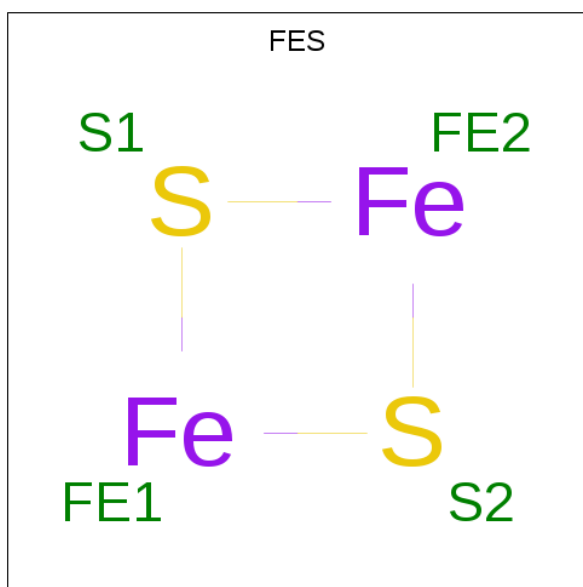
| Mol | Chain | Residues | Atoms | | | ZeroOcc | AltConf |
|-----|-------|----------|-------|----|---|---------|---------|
| 13 | C | 1 | Total | C | O | 0 | 0 |
| | | | 43 | 39 | 4 | | |

- Molecule 14 is STIGMATELLIN A (three-letter code: SMA) (formula: C₃₀H₄₂O₇).



| Mol | Chain | Residues | Atoms | | | ZeroOcc | AltConf |
|-----|-------|----------|-------|----|---|---------|---------|
| 14 | C | 1 | Total | C | O | 0 | 0 |
| | | | 37 | 30 | 7 | | |

- Molecule 15 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe₂S₂).



| Mol | Chain | Residues | Atoms | | | ZeroOcc | AltConf |
|-----|-------|----------|-------|----|---|---------|---------|
| 15 | E | 1 | Total | Fe | S | 0 | 0 |
| | | | 4 | 2 | 2 | | |

- Molecule 16 is water.

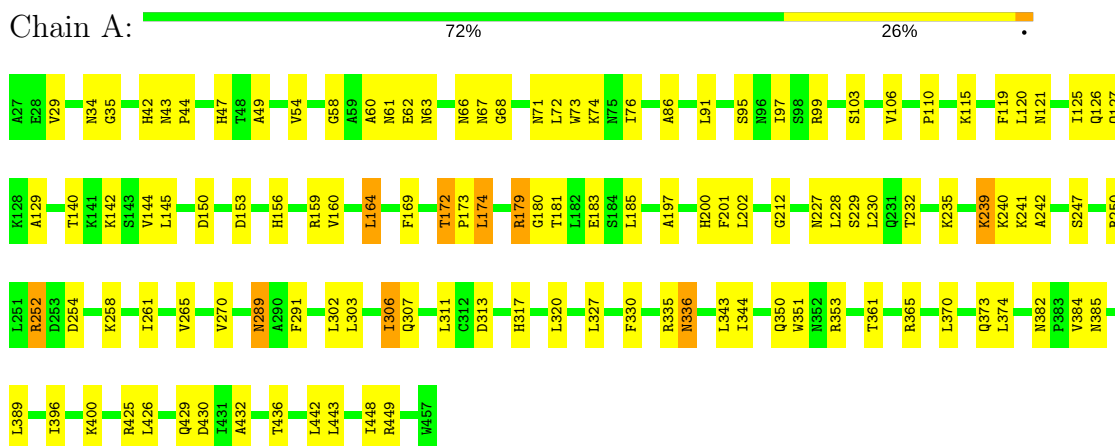
| Mol | Chain | Residues | Atoms | | ZeroOcc | AltConf |
|-----|-------|----------|-------|-----|---------|---------|
| 16 | A | 49 | Total | O | 0 | 0 |
| | | | 49 | 49 | | |
| 16 | B | 11 | Total | O | 0 | 0 |
| | | | 11 | 11 | | |
| 16 | C | 111 | Total | O | 0 | 0 |
| | | | 111 | 111 | | |
| 16 | D | 68 | Total | O | 0 | 0 |
| | | | 68 | 68 | | |
| 16 | E | 32 | Total | O | 0 | 0 |
| | | | 32 | 32 | | |
| 16 | H | 6 | Total | O | 0 | 0 |
| | | | 6 | 6 | | |
| 16 | F | 36 | Total | O | 0 | 0 |
| | | | 36 | 36 | | |
| 16 | G | 19 | Total | O | 0 | 0 |
| | | | 19 | 19 | | |
| 16 | I | 1 | Total | O | 0 | 0 |
| | | | 1 | 1 | | |
| 16 | X | 5 | Total | O | 0 | 0 |
| | | | 5 | 5 | | |
| 16 | Y | 2 | Total | O | 0 | 0 |
| | | | 2 | 2 | | |

3 Residue-property plots

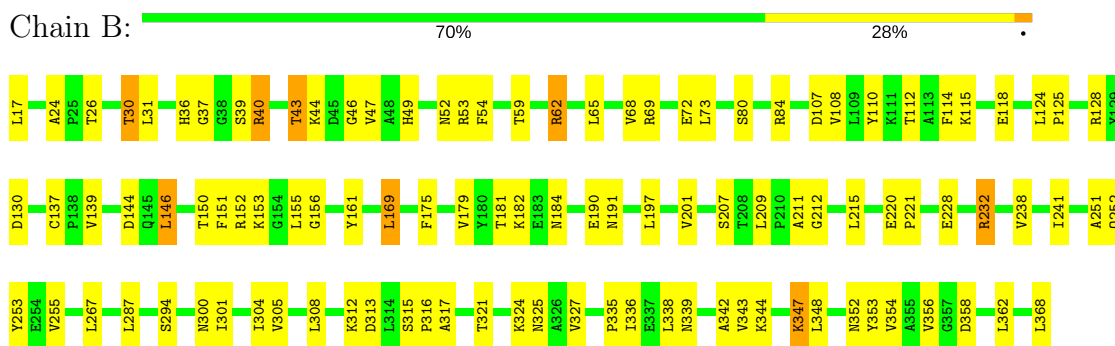
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are 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 dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

Note EDS was not executed.

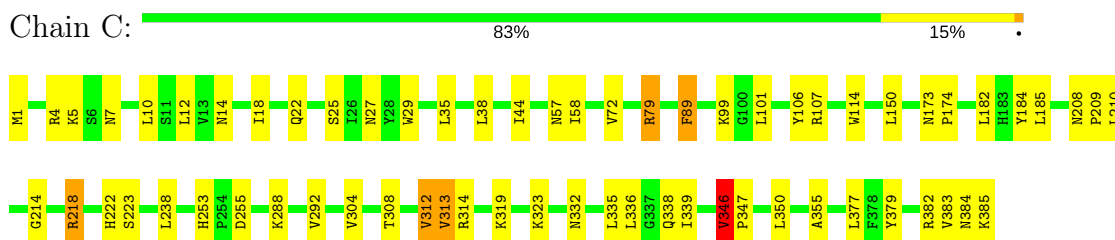
- Molecule 1: Ubiquinol-cytochrome-c reductase complex core protein 1



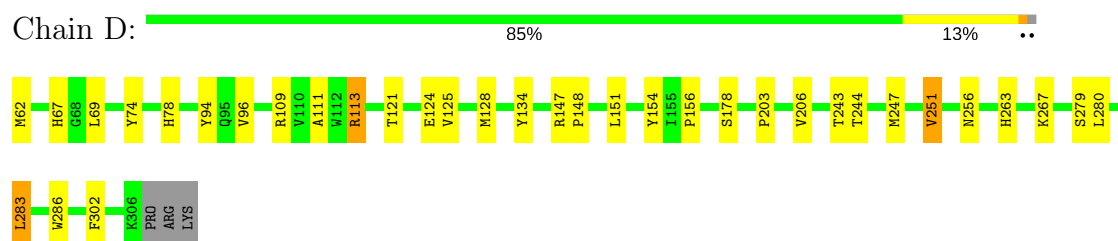
- Molecule 2: Ubiquinol-cytochrome-c reductase complex core protein 2



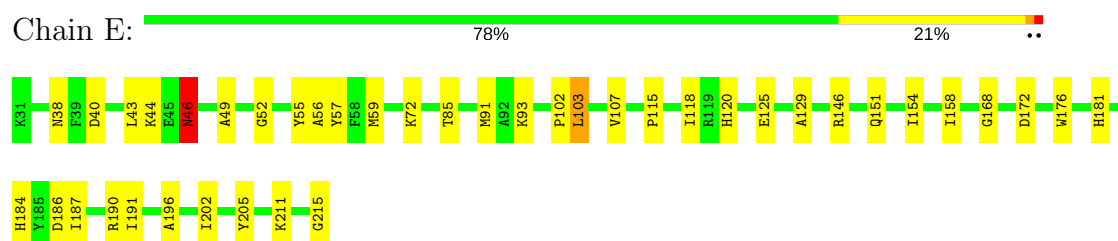
- Molecule 3: Cytochrome b



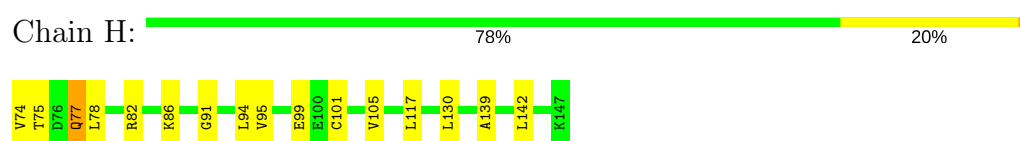
- Molecule 4: Cytochrome c1, heme protein, mitochondrial precursor



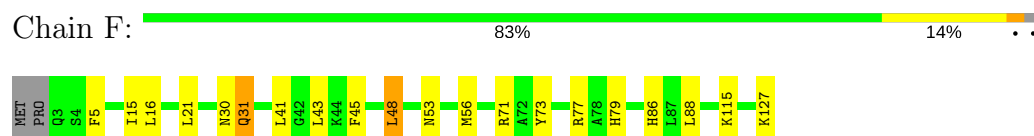
- Molecule 5: Ubiquinol-cytochrome c reductase iron-sulfur subunit, mitochondrial precursor



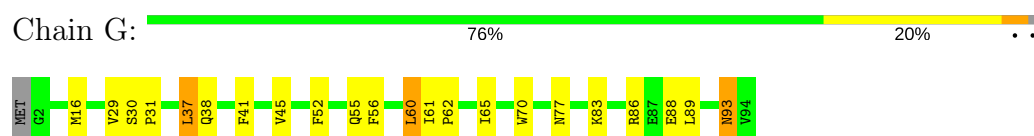
- Molecule 6: Ubiquinol-cytochrome c reductase complex 17 kDa protein



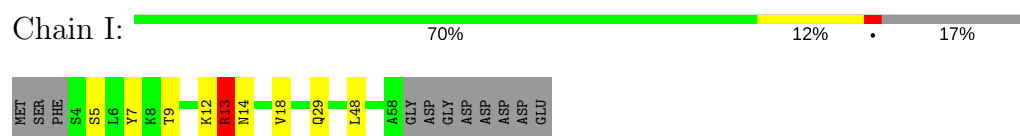
- Molecule 7: Ubiquinol-cytochrome c reductase complex 14 kDa protein



- Molecule 8: Ubiquinol-cytochrome c reductase complex ubiquinone-binding protein QP-C

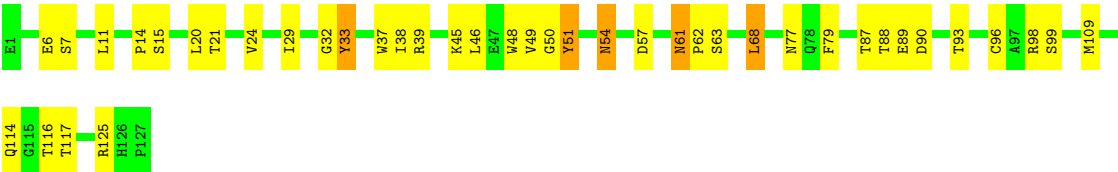


- Molecule 9: Ubiquinol-cytochrome c reductase complex 7.3 kDa protein

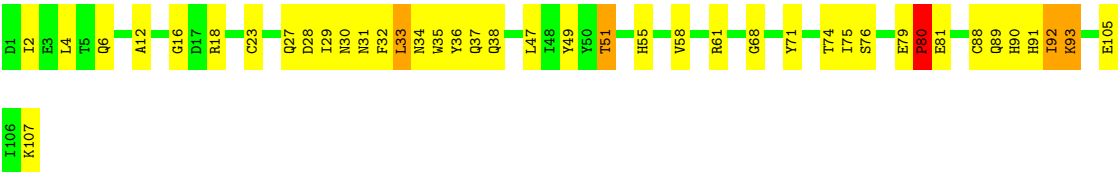


- Molecule 10: Variable Heavy chain of antibody fragment





● Molecule 11: Variable Light chain of antibody fragment



4 Data and refinement statistics

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

| Property | Value | Source |
|--|--|-----------|
| Space group | C 1 2 1 | Depositor |
| Cell constants a, b, c, α , β , γ | 214.47Å 163.92Å 147.28Å 90.00° 117.50° 90.00° | Depositor |
| Resolution (Å) | 14.96 – 2.30 | Depositor |
| % Data completeness (in resolution range) | 84.7 (14.96-2.30) | Depositor |
| R_{merge} | (Not available) | Depositor |
| R_{sym} | 0.07 | Depositor |
| Refinement program | CNS | Depositor |
| R, R_{free} | 0.222 , 0.256 | Depositor |
| Estimated twinning fraction | No twinning to report. | Xtriage |
| Total number of atoms | 17779 | wwPDB-VP |
| Average B, all atoms (Å ²) | 69.0 | wwPDB-VP |

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: HEM, FES, SMA, UQ6

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

| Mol | Chain | Bond lengths | | Bond angles | |
|-----|-------|--------------|---------|-------------|----------------|
| | | RMSZ | # Z >5 | RMSZ | # Z >5 |
| 1 | A | 0.39 | 0/3405 | 0.62 | 0/4614 |
| 2 | B | 0.35 | 0/2781 | 0.60 | 0/3764 |
| 3 | C | 0.53 | 0/3191 | 0.71 | 5/4353 (0.1%) |
| 4 | D | 0.40 | 0/1993 | 0.64 | 0/2714 |
| 5 | E | 0.39 | 0/1444 | 0.66 | 0/1957 |
| 6 | H | 0.37 | 0/638 | 0.54 | 0/858 |
| 7 | F | 0.42 | 0/1032 | 0.69 | 2/1397 (0.1%) |
| 8 | G | 0.43 | 0/804 | 0.54 | 0/1088 |
| 9 | I | 0.43 | 0/461 | 0.50 | 0/622 |
| 10 | X | 0.36 | 0/1043 | 0.64 | 0/1422 |
| 11 | Y | 0.32 | 0/863 | 0.55 | 0/1172 |
| All | All | 0.41 | 0/17655 | 0.63 | 7/23961 (0.0%) |

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

| Mol | Chain | #Chirality outliers | #Planarity outliers |
|-----|-------|---------------------|---------------------|
| 4 | D | 0 | 1 |

There are no bond length outliers.

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

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-----------|-------|-------------|----------|
| 3 | C | 79 | ARG | NE-CZ-NH1 | -7.80 | 116.40 | 120.30 |
| 7 | F | 71 | ARG | NE-CZ-NH1 | -7.35 | 116.62 | 120.30 |
| 3 | C | 314 | ARG | NE-CZ-NH1 | -5.57 | 117.52 | 120.30 |
| 3 | C | 346 | VAL | N-CA-C | 5.22 | 125.10 | 111.00 |
| 3 | C | 107 | ARG | NE-CZ-NH1 | -5.21 | 117.70 | 120.30 |

There are no chirality outliers.

All (1) planarity outliers are listed below:

| Mol | Chain | Res | Type | Group |
|-----|-------|-----|------|-----------|
| 4 | D | 94 | TYR | Sidechain |

5.2 Too-close contacts ⓘ

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

| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 1 | A | 3344 | 0 | 3321 | 74 | 0 |
| 2 | B | 2735 | 0 | 2774 | 73 | 0 |
| 3 | C | 3089 | 0 | 3125 | 37 | 0 |
| 4 | D | 1933 | 0 | 1855 | 23 | 0 |
| 5 | E | 1411 | 0 | 1386 | 30 | 0 |
| 6 | H | 624 | 0 | 581 | 11 | 0 |
| 7 | F | 1012 | 0 | 1026 | 13 | 0 |
| 8 | G | 773 | 0 | 736 | 13 | 0 |
| 9 | I | 448 | 0 | 445 | 6 | 0 |
| 10 | X | 1015 | 0 | 959 | 32 | 0 |
| 11 | Y | 842 | 0 | 820 | 29 | 0 |
| 12 | C | 86 | 0 | 60 | 5 | 0 |
| 12 | D | 43 | 0 | 30 | 0 | 0 |
| 13 | C | 43 | 0 | 58 | 6 | 0 |
| 14 | C | 37 | 0 | 41 | 0 | 0 |
| 15 | E | 4 | 0 | 0 | 1 | 0 |
| 16 | A | 49 | 0 | 0 | 1 | 0 |
| 16 | B | 11 | 0 | 0 | 0 | 0 |
| 16 | C | 111 | 0 | 0 | 1 | 0 |
| 16 | D | 68 | 0 | 0 | 2 | 0 |
| 16 | E | 32 | 0 | 0 | 0 | 0 |
| 16 | F | 36 | 0 | 0 | 1 | 0 |
| 16 | G | 19 | 0 | 0 | 0 | 0 |
| 16 | H | 6 | 0 | 0 | 0 | 0 |
| 16 | I | 1 | 0 | 0 | 0 | 0 |
| 16 | X | 5 | 0 | 0 | 1 | 0 |
| 16 | Y | 2 | 0 | 0 | 0 | 0 |
| All | All | 17779 | 0 | 17217 | 326 | 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 9.

The worst 5 of 326 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 6:H:77:GLN:H | 6:H:77:GLN:HE21 | 1.00 | 0.98 |
| 13:C:506:UQ6:H103 | 13:C:506:UQ6:H1M1 | 1.46 | 0.95 |
| 11:Y:31:ASN:HD22 | 11:Y:51:THR:HG21 | 1.36 | 0.90 |
| 5:E:72:LYS:HZ3 | 9:I:29:GLN:HE22 | 1.16 | 0.88 |
| 2:B:347:LYS:HD3 | 2:B:347:LYS:H | 1.40 | 0.85 |

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 | A | 429/431 (100%) | 400 (93%) | 25 (6%) | 4 (1%) | 19 | 22 |
| 2 | B | 350/352 (99%) | 308 (88%) | 38 (11%) | 4 (1%) | 16 | 17 |
| 3 | C | 383/385 (100%) | 368 (96%) | 13 (3%) | 2 (0%) | 31 | 38 |
| 4 | D | 243/248 (98%) | 236 (97%) | 7 (3%) | 0 | 100 | 100 |
| 5 | E | 183/185 (99%) | 172 (94%) | 8 (4%) | 3 (2%) | 11 | 10 |
| 6 | H | 72/74 (97%) | 69 (96%) | 3 (4%) | 0 | 100 | 100 |
| 7 | F | 123/127 (97%) | 121 (98%) | 2 (2%) | 0 | 100 | 100 |
| 8 | G | 91/94 (97%) | 80 (88%) | 7 (8%) | 4 (4%) | 3 | 1 |
| 9 | I | 53/66 (80%) | 51 (96%) | 0 | 2 (4%) | 3 | 2 |
| 10 | X | 125/127 (98%) | 114 (91%) | 9 (7%) | 2 (2%) | 11 | 10 |
| 11 | Y | 105/107 (98%) | 88 (84%) | 12 (11%) | 5 (5%) | 2 | 1 |
| All | All | 2157/2196 (98%) | 2007 (93%) | 124 (6%) | 26 (1%) | 14 | 15 |

5 of 26 Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 2 | B | 335 | PRO |
| 3 | C | 223 | SER |
| 5 | E | 103 | LEU |
| 8 | G | 93 | ASN |
| 10 | X | 33 | TYR |

5.3.2 Protein sidechains ⓘ

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

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

| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|-----|-------|-----------------|------------|----------|-------------|----|
| 1 | A | 370/370 (100%) | 344 (93%) | 26 (7%) | 16 | 21 |
| 2 | B | 301/301 (100%) | 282 (94%) | 19 (6%) | 20 | 26 |
| 3 | C | 338/338 (100%) | 318 (94%) | 20 (6%) | 21 | 29 |
| 4 | D | 203/206 (98%) | 196 (97%) | 7 (3%) | 40 | 55 |
| 5 | E | 151/151 (100%) | 148 (98%) | 3 (2%) | 58 | 75 |
| 6 | H | 67/67 (100%) | 63 (94%) | 4 (6%) | 21 | 28 |
| 7 | F | 109/111 (98%) | 101 (93%) | 8 (7%) | 15 | 19 |
| 8 | G | 77/78 (99%) | 73 (95%) | 4 (5%) | 25 | 35 |
| 9 | I | 45/54 (83%) | 41 (91%) | 4 (9%) | 11 | 13 |
| 10 | X | 112/112 (100%) | 104 (93%) | 8 (7%) | 16 | 21 |
| 11 | Y | 93/93 (100%) | 85 (91%) | 8 (9%) | 11 | 14 |
| All | All | 1866/1881 (99%) | 1755 (94%) | 111 (6%) | 21 | 29 |

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

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 3 | C | 89 | PHE |
| 3 | C | 350 | LEU |
| 10 | X | 89 | GLU |
| 3 | C | 99 | LYS |
| 3 | C | 185 | LEU |

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 59 such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 3 | C | 22 | GLN |
| 4 | D | 79 | ASN |
| 11 | Y | 31 | ASN |
| 3 | C | 43 | GLN |
| 3 | C | 208 | 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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

6 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 | $\# Z > 2$ |
| 12 | HEM | C | 401 | 3 | 27,50,50 | 1.83 | 6 (22%) | 17,82,82 | 1.69 | 4 (23%) |
| 12 | HEM | C | 402 | 3 | 27,50,50 | 1.40 | 4 (14%) | 17,82,82 | 1.60 | 4 (23%) |
| 14 | SMA | C | 505 | - | 36,38,38 | 1.50 | 5 (13%) | 44,52,52 | 1.48 | 5 (11%) |
| 13 | UQ6 | C | 506 | - | 43,43,43 | 2.54 | 16 (37%) | 52,55,55 | 2.12 | 19 (36%) |
| 12 | HEM | D | 3 | 4 | 27,50,50 | 1.70 | 6 (22%) | 17,82,82 | 1.53 | 4 (23%) |
| 15 | FES | E | 4 | 5 | 0,4,4 | 0.00 | - | 0,4,4 | 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 |
|-----|------|-------|-----|------|---------|------------|---------|
| 12 | HEM | C | 401 | 3 | - | 0/6/54/54 | 0/0/8/8 |
| 12 | HEM | C | 402 | 3 | - | 0/6/54/54 | 0/0/8/8 |
| 14 | SMA | C | 505 | - | - | 0/33/34/34 | 0/2/2/2 |
| 13 | UQ6 | C | 506 | - | - | 0/39/39/39 | 0/1/1/1 |
| 12 | HEM | D | 3 | 4 | - | 0/6/54/54 | 0/0/8/8 |
| 15 | FES | E | 4 | 5 | - | 0/0/4/4 | 0/1/1/1 |

The worst 5 of 37 bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|---------|-------|-------------|----------|
| 13 | C | 506 | UQ6 | O5-C5 | -5.59 | 1.24 | 1.37 |
| 13 | C | 506 | UQ6 | O2-C2 | -5.30 | 1.24 | 1.37 |
| 12 | C | 401 | HEM | C3B-CAB | -4.06 | 1.39 | 1.47 |
| 12 | D | 3 | HEM | C3B-C2B | -4.01 | 1.34 | 1.40 |
| 12 | D | 3 | HEM | C3C-C2C | -3.78 | 1.35 | 1.40 |

The worst 5 of 36 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-------------|-------|-------------|----------|
| 14 | C | 505 | SMA | C3-C4-C4A | -4.66 | 115.06 | 121.25 |
| 14 | C | 505 | SMA | C9-C10-C11 | -4.31 | 108.91 | 114.72 |
| 12 | C | 401 | HEM | CMD-C2D-C1D | -4.14 | 122.10 | 128.46 |
| 12 | D | 3 | HEM | CMD-C2D-C1D | -3.95 | 122.39 | 128.46 |
| 12 | C | 402 | HEM | CMD-C2D-C1D | -3.59 | 122.94 | 128.46 |

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 12 short contacts:

| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|-----|-------|-----|------|---------|--------------|
| 12 | C | 401 | HEM | 4 | 0 |
| 12 | C | 402 | HEM | 1 | 0 |
| 13 | C | 506 | UQ6 | 6 | 0 |
| 15 | E | 4 | FES | 1 | 0 |

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 was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.