



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 15, 2020 – 04:46 am BST

PDB ID : 4L27
Title : Crystal structure of delta1-39 and delta516-525 human cystathionine beta-synthase D444N mutant containing C-terminal 6xHis tag
Authors : Ereno, J.; Majtan, T.; Oyenarte, I.; Kraus, J.P.; Martinez, L.A.
Deposited on : 2013-06-04
Resolution : 3.39 Å(reported)

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

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

A user guide is available at

<https://www.wwpdb.org/validation/2017/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)
Xtriage (Phenix) : 1.13
EDS : 2.11
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.11

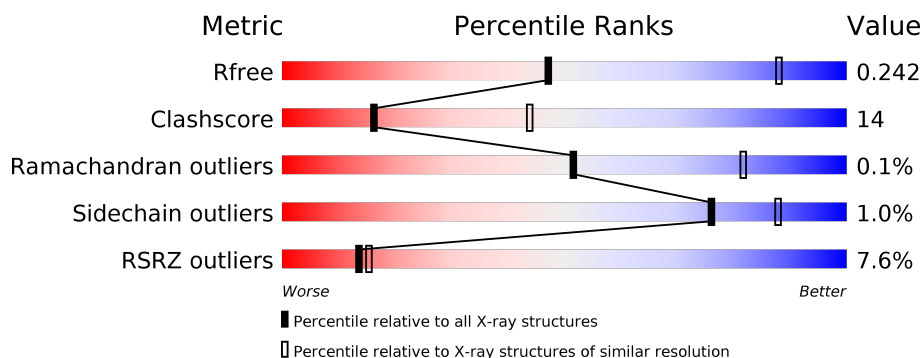
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.39 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)) |
|-----------------------|-----------------------------|---|
| R_{free} | 130704 | 1026 (3.48-3.32) |
| Clashscore | 141614 | 1055 (3.48-3.32) |
| Ramachandran outliers | 138981 | 1038 (3.48-3.32) |
| Sidechain outliers | 138945 | 1038 (3.48-3.32) |
| RSRZ outliers | 127900 | 2173 (3.50-3.30) |

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 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 electron density. The numeric value is given above the bar.

| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|--|
| 1 | A | 548 | <div> <div>13%</div> <div> <div></div> <div>65%</div> <div>23%</div> <div>•</div> <div>11%</div> </div> </div> |
| 1 | B | 548 | <div> <div>4%</div> <div> <div></div> <div>69%</div> <div>20%</div> <div>•</div> <div>11%</div> </div> </div> |
| 1 | C | 548 | <div> <div>3%</div> <div> <div></div> <div>66%</div> <div>24%</div> <div></div> <div>10%</div> </div> </div> |
| 1 | D | 548 | <div> <div>7%</div> <div> <div></div> <div>69%</div> <div>20%</div> <div>•</div> <div>10%</div> </div> </div> |

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 15361 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 Cystathionine beta-synthase.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|----|---------|---------|-------|
| 1 | B | 490 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3791 | 2402 | 661 | 706 | 22 | | | |
| 1 | D | 491 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3788 | 2398 | 662 | 706 | 22 | | | |
| 1 | A | 485 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3757 | 2381 | 656 | 698 | 22 | | | |
| 1 | C | 491 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3793 | 2403 | 665 | 703 | 22 | | | |

There are 76 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|-------|---------|----------|--------|---------------------|------------|
| B | 444 | ASN | ASP | ENGINEERED MUTATION | UNP P35520 |
| B | ? | - | ILE | DELETION | UNP P35520 |
| B | ? | - | GLN | DELETION | UNP P35520 |
| B | ? | - | TYR | DELETION | UNP P35520 |
| B | ? | - | HIS | DELETION | UNP P35520 |
| B | ? | - | SER | DELETION | UNP P35520 |
| B | ? | - | THR | DELETION | UNP P35520 |
| B | ? | - | GLY | DELETION | UNP P35520 |
| B | ? | - | LYS | DELETION | UNP P35520 |
| B | ? | - | SER | DELETION | UNP P35520 |
| B | ? | - | SER | DELETION | UNP P35520 |
| B | 552 | LEU | - | EXPRESSION TAG | UNP P35520 |
| B | 553 | GLU | - | EXPRESSION TAG | UNP P35520 |
| B | 554 | HIS | - | EXPRESSION TAG | UNP P35520 |
| B | 555 | HIS | - | EXPRESSION TAG | UNP P35520 |
| B | 556 | HIS | - | EXPRESSION TAG | UNP P35520 |
| B | 557 | HIS | - | EXPRESSION TAG | UNP P35520 |
| B | 558 | HIS | - | EXPRESSION TAG | UNP P35520 |
| B | 559 | HIS | - | EXPRESSION TAG | UNP P35520 |
| D | 444 | ASN | ASP | ENGINEERED MUTATION | UNP P35520 |
| D | ? | - | ILE | DELETION | UNP P35520 |

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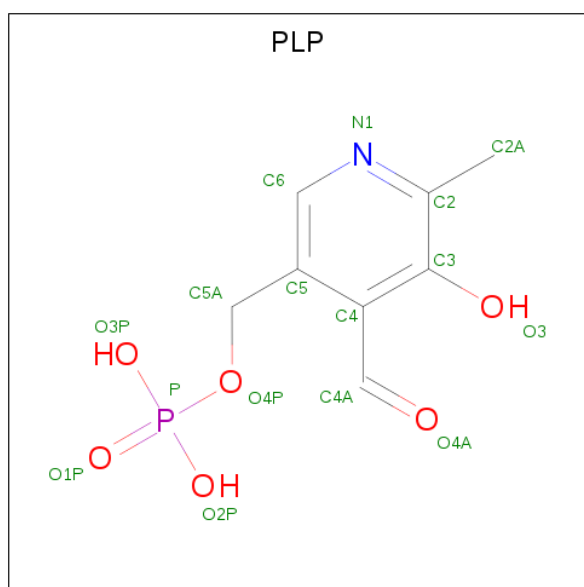
| Chain | Residue | Modelled | Actual | Comment | Reference |
|-------|---------|----------|--------|---------------------|------------|
| D | ? | - | GLN | DELETION | UNP P35520 |
| D | ? | - | TYR | DELETION | UNP P35520 |
| D | ? | - | HIS | DELETION | UNP P35520 |
| D | ? | - | SER | DELETION | UNP P35520 |
| D | ? | - | THR | DELETION | UNP P35520 |
| D | ? | - | GLY | DELETION | UNP P35520 |
| D | ? | - | LYS | DELETION | UNP P35520 |
| D | ? | - | SER | DELETION | UNP P35520 |
| D | ? | - | SER | DELETION | UNP P35520 |
| D | 552 | LEU | - | EXPRESSION TAG | UNP P35520 |
| D | 553 | GLU | - | EXPRESSION TAG | UNP P35520 |
| D | 554 | HIS | - | EXPRESSION TAG | UNP P35520 |
| D | 555 | HIS | - | EXPRESSION TAG | UNP P35520 |
| D | 556 | HIS | - | EXPRESSION TAG | UNP P35520 |
| D | 557 | HIS | - | EXPRESSION TAG | UNP P35520 |
| D | 558 | HIS | - | EXPRESSION TAG | UNP P35520 |
| D | 559 | HIS | - | EXPRESSION TAG | UNP P35520 |
| A | 444 | ASN | ASP | ENGINEERED MUTATION | UNP P35520 |
| A | ? | - | ILE | DELETION | UNP P35520 |
| A | ? | - | GLN | DELETION | UNP P35520 |
| A | ? | - | TYR | DELETION | UNP P35520 |
| A | ? | - | HIS | DELETION | UNP P35520 |
| A | ? | - | SER | DELETION | UNP P35520 |
| A | ? | - | THR | DELETION | UNP P35520 |
| A | ? | - | GLY | DELETION | UNP P35520 |
| A | ? | - | LYS | DELETION | UNP P35520 |
| A | ? | - | SER | DELETION | UNP P35520 |
| A | ? | - | SER | DELETION | UNP P35520 |
| A | 552 | LEU | - | EXPRESSION TAG | UNP P35520 |
| A | 553 | GLU | - | EXPRESSION TAG | UNP P35520 |
| A | 554 | HIS | - | EXPRESSION TAG | UNP P35520 |
| A | 555 | HIS | - | EXPRESSION TAG | UNP P35520 |
| A | 556 | HIS | - | EXPRESSION TAG | UNP P35520 |
| A | 557 | HIS | - | EXPRESSION TAG | UNP P35520 |
| A | 558 | HIS | - | EXPRESSION TAG | UNP P35520 |
| A | 559 | HIS | - | EXPRESSION TAG | UNP P35520 |
| C | 444 | ASN | ASP | ENGINEERED MUTATION | UNP P35520 |
| C | ? | - | ILE | DELETION | UNP P35520 |
| C | ? | - | GLN | DELETION | UNP P35520 |
| C | ? | - | TYR | DELETION | UNP P35520 |
| C | ? | - | HIS | DELETION | UNP P35520 |
| C | ? | - | SER | DELETION | UNP P35520 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|-------|---------|----------|--------|----------------|------------|
| C | ? | - | THR | DELETION | UNP P35520 |
| C | ? | - | GLY | DELETION | UNP P35520 |
| C | ? | - | LYS | DELETION | UNP P35520 |
| C | ? | - | SER | DELETION | UNP P35520 |
| C | ? | - | SER | DELETION | UNP P35520 |
| C | 552 | LEU | - | EXPRESSION TAG | UNP P35520 |
| C | 553 | GLU | - | EXPRESSION TAG | UNP P35520 |
| C | 554 | HIS | - | EXPRESSION TAG | UNP P35520 |
| C | 555 | HIS | - | EXPRESSION TAG | UNP P35520 |
| C | 556 | HIS | - | EXPRESSION TAG | UNP P35520 |
| C | 557 | HIS | - | EXPRESSION TAG | UNP P35520 |
| C | 558 | HIS | - | EXPRESSION TAG | UNP P35520 |
| C | 559 | HIS | - | EXPRESSION TAG | UNP P35520 |

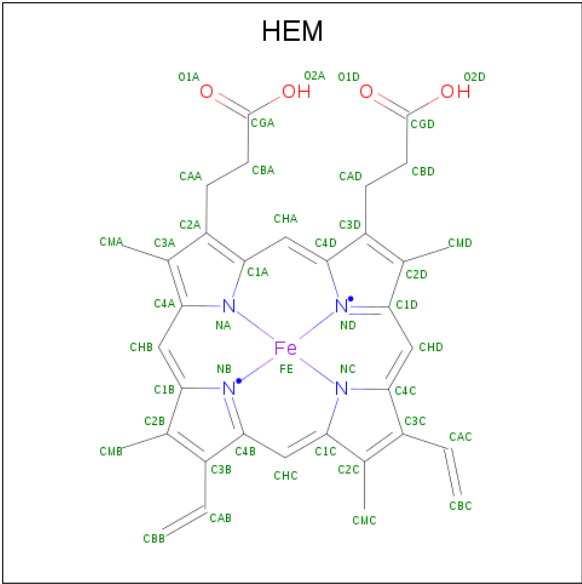
- Molecule 2 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula: C₈H₁₀NO₆P).



| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf |
|-----|-------|----------|-------|---|---|---|---|---------|---------|
| 2 | B | 1 | Total | C | N | O | P | 0 | 0 |
| | | | 15 | 8 | 1 | 5 | 1 | | |
| 2 | D | 1 | Total | C | N | O | P | 0 | 0 |
| | | | 15 | 8 | 1 | 5 | 1 | | |
| 2 | A | 1 | Total | C | N | O | P | 0 | 0 |
| | | | 15 | 8 | 1 | 5 | 1 | | |
| 2 | C | 1 | Total | C | N | O | P | 0 | 0 |
| | | | 15 | 8 | 1 | 5 | 1 | | |

- Molecule 3 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (for-

mula: C₃₄H₃₂FeN₄O₄).



| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf |
|-----|-------|----------|-------|----|----|---|---|---------|---------|
| 3 | B | 1 | Total | C | Fe | N | O | 0 | 0 |
| | | | 43 | 34 | 1 | 4 | 4 | | |
| 3 | D | 1 | Total | C | Fe | N | O | 0 | 0 |
| | | | 43 | 34 | 1 | 4 | 4 | | |
| 3 | A | 1 | Total | C | Fe | N | O | 0 | 0 |
| | | | 43 | 34 | 1 | 4 | 4 | | |
| 3 | C | 1 | Total | C | Fe | N | O | 0 | 0 |
| | | | 43 | 34 | 1 | 4 | 4 | | |

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 ($\text{RSRZ} > 2$). 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.

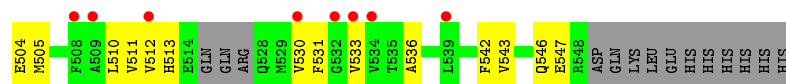
Chain B:

69% 20% 11%

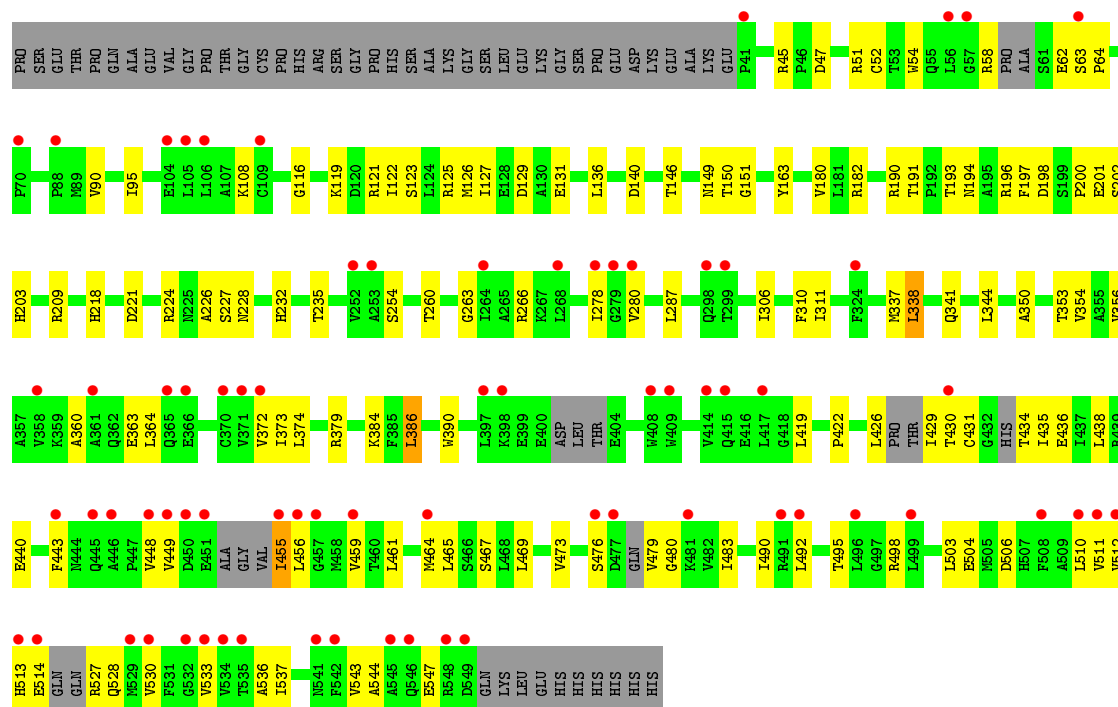
PRO G115 G258 V414 L499 E504 F508 A509 L510 E514 GLN GLN ARG GLN M529 W530 F531 G532 V533 V534 L539 V543 A544 E547 R548 ASP GLN LYS LEU LEU GLU HIS HIS HIS HIS HIS HIS

G115 K119 D120 G121 I122 ALA S123 VAL M126 I127 E128 R132 PRO Q133 HIS N149 T150 S157 G158 I166 SER V178 D179 V180 G181 L182 LEU L183 GLU E187 L190 R191 P192 T193 ASP N194 L195 G196 ALA S199 L203 H203 L220 Y223 C22 C23 S24 N227 N228 H232 S23 S26 L21 L22 R23 K23 L240 S254 V255 G256 V257

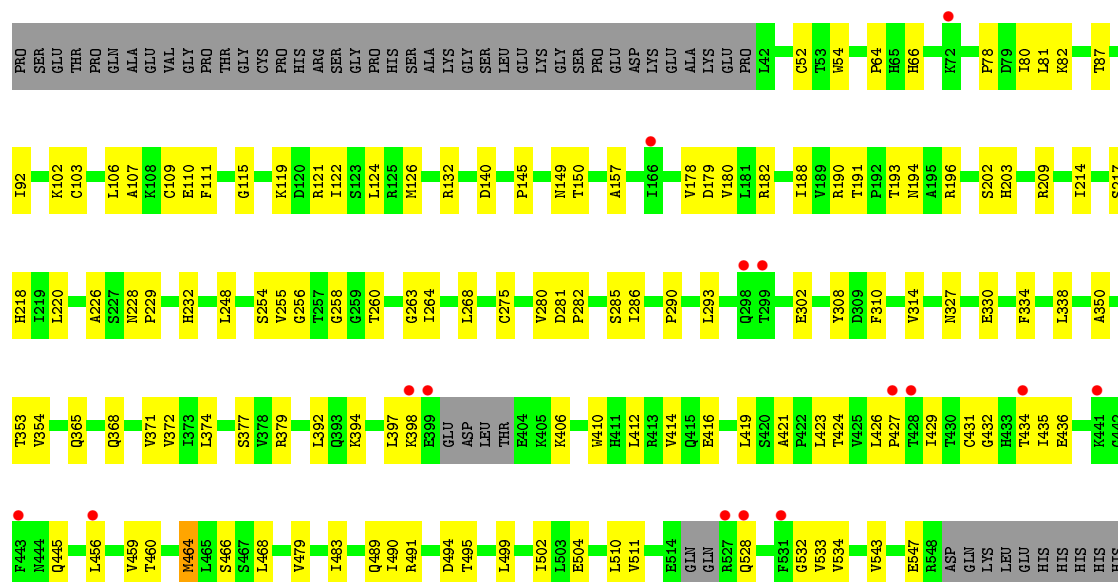
[illegible]



• Molecule 1: Cystathionine beta-synthase



• Molecule 1: Cystathionine beta-synthase



HIS

4 Data and refinement statistics

| Property | Value | Source |
|---|---|------------------|
| Space group | P 65 | Depositor |
| Cell constants a, b, c, α , β , γ | 190.45Å 190.45Å 140.85Å 90.00° 90.00° 120.00° | Depositor |
| Resolution (Å) | 56.62 – 3.39 57.01 – 3.39 | Depositor EDS |
| % Data completeness (in resolution range) | 99.7 (56.62-3.39) 99.7 (57.01-3.39) | Depositor EDS |
| R_{merge} | 0.11 | Depositor |
| R_{sym} | (Not available) | Depositor |
| $\langle I/\sigma(I) \rangle$ ¹ | 1.85 (at 3.40Å) | Xtriage |
| Refinement program | PHENIX (phenix.refine: 1.8.1_1168) | Depositor |
| R, R_{free} | 0.206 , 0.244 0.205 , 0.242 | Depositor DCC |
| R_{free} test set | 2009 reflections (5.00%) | wwPDB-VP |
| Wilson B-factor (Å ²) | 120.5 | Xtriage |
| Anisotropy | 0.195 | Xtriage |
| Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²) | 0.32 , 60.5 | EDS |
| L-test for twinning ² | $\langle L \rangle = 0.43$, $\langle L^2 \rangle = 0.25$ | Xtriage |
| Estimated twinning fraction | 0.079 for h,-h-k,-l | Xtriage |
| F_o, F_c correlation | 0.94 | EDS |
| Total number of atoms | 15361 | wwPDB-VP |
| Average B, all atoms (Å ²) | 88.0 | wwPDB-VP |

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.35% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: HEM, PLP

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 | 0.30 | 0/3820 | 0.58 | 4/5157 (0.1%) |
| 1 | B | 0.28 | 0/3861 | 0.52 | 1/5225 (0.0%) |
| 1 | C | 0.29 | 0/3864 | 0.55 | 1/5230 (0.0%) |
| 1 | D | 0.28 | 0/3858 | 0.53 | 1/5220 (0.0%) |
| All | All | 0.29 | 0/15403 | 0.55 | 7/20832 (0.0%) |

There are no bond length outliers.

All (7) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|-----|------|--------|-------|-------------|----------|
| 1 | A | 116 | GLY | O-C-N | -8.89 | 108.48 | 122.70 |
| 1 | A | 123 | SER | O-C-N | -7.32 | 110.99 | 122.70 |
| 1 | A | 116 | GLY | C-N-CA | 6.36 | 137.61 | 121.70 |
| 1 | D | 116 | GLY | O-C-N | -6.34 | 112.56 | 122.70 |
| 1 | C | 124 | LEU | O-C-N | -6.30 | 112.62 | 122.70 |
| 1 | B | 123 | SER | O-C-N | -5.85 | 113.34 | 122.70 |
| 1 | A | 116 | GLY | CA-C-N | 5.78 | 129.92 | 117.20 |

There are no chirality outliers.

There are no planarity outliers.

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 | 3757 | 0 | 3811 | 141 | 1 |
| 1 | B | 3791 | 0 | 3845 | 97 | 0 |
| 1 | C | 3793 | 0 | 3849 | 112 | 1 |
| 1 | D | 3788 | 0 | 3831 | 94 | 0 |
| 2 | A | 15 | 0 | 7 | 4 | 0 |
| 2 | B | 15 | 0 | 7 | 3 | 0 |
| 2 | C | 15 | 0 | 7 | 2 | 0 |
| 2 | D | 15 | 0 | 7 | 3 | 0 |
| 3 | A | 43 | 0 | 30 | 15 | 0 |
| 3 | B | 43 | 0 | 30 | 12 | 0 |
| 3 | C | 43 | 0 | 30 | 14 | 0 |
| 3 | D | 43 | 0 | 30 | 9 | 0 |
| All | All | 15361 | 0 | 15484 | 443 | 1 |

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 14.

All (443) 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) |
|------------------|------------------|--------------------------|-------------------|
| 1:B:178:VAL:CG2 | 1:B:190:ARG:HH21 | 1.36 | 1.39 |
| 1:B:178:VAL:HG21 | 1:B:190:ARG:NH2 | 1.29 | 1.38 |
| 1:A:431:CYS:SG | 1:A:464:MET:HE1 | 1.68 | 1.32 |
| 1:B:178:VAL:CG2 | 1:B:190:ARG:NH2 | 1.94 | 1.24 |
| 1:A:431:CYS:SG | 1:A:464:MET:CE | 2.32 | 1.18 |
| 1:A:480:GLY:HA2 | 1:A:483:ILE:CD1 | 1.73 | 1.17 |
| 1:B:439:ARG:NH2 | 1:B:465:LEU:HD21 | 1.61 | 1.16 |
| 1:A:492:LEU:HD23 | 1:A:511:VAL:HG21 | 1.15 | 1.08 |
| 1:A:479:VAL:O | 1:A:483:ILE:HG13 | 1.54 | 1.07 |
| 1:A:58:ARG:NE | 1:A:62:GLU:OE2 | 1.86 | 1.07 |
| 1:A:480:GLY:HA2 | 1:A:483:ILE:HD12 | 1.01 | 1.01 |
| 1:B:178:VAL:HG22 | 1:B:190:ARG:HH21 | 1.26 | 0.98 |
| 1:A:480:GLY:CA | 1:A:483:ILE:HD12 | 1.93 | 0.98 |
| 1:D:264:ILE:O | 1:D:268:LEU:HD13 | 1.63 | 0.96 |
| 1:B:439:ARG:HH21 | 1:B:465:LEU:HD21 | 1.20 | 0.95 |
| 1:D:451:GLU:O | 1:D:453:GLY:N | 2.00 | 0.95 |
| 3:A:602:HEM:HHA | 3:A:602:HEM:HBD1 | 1.45 | 0.95 |
| 1:B:178:VAL:HG21 | 1:B:190:ARG:HH22 | 1.23 | 0.94 |
| 1:C:264:ILE:O | 1:C:268:LEU:HD13 | 1.66 | 0.93 |
| 1:A:232:HIS:HD2 | 1:A:260:THR:HA | 1.32 | 0.92 |
| 1:A:429:ILE:HD11 | 1:A:434:THR:CG2 | 2.01 | 0.90 |
| 1:D:419:LEU:HD12 | 1:D:511:VAL:HG11 | 1.53 | 0.90 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:C:431:CYS:SG | 1:C:435:ILE:HD11 | 2.12 | 0.90 |
| 1:A:465:LEU:O | 1:A:469:LEU:HD13 | 1.71 | 0.89 |
| 1:A:492:LEU:HD23 | 1:A:511:VAL:CG2 | 2.02 | 0.89 |
| 1:B:264:ILE:O | 1:B:268:LEU:HD13 | 1.74 | 0.88 |
| 1:B:54:TRP:HD1 | 3:B:602:HEM:CBB | 1.87 | 0.88 |
| 1:A:492:LEU:CD2 | 1:A:511:VAL:HG21 | 2.01 | 0.87 |
| 1:C:431:CYS:O | 1:C:435:ILE:HG13 | 1.74 | 0.86 |
| 1:B:63:SER:HB2 | 3:B:602:HEM:HAB | 1.59 | 0.84 |
| 1:D:419:LEU:CD1 | 1:D:511:VAL:HG11 | 2.07 | 0.84 |
| 3:A:602:HEM:CBD | 3:A:602:HEM:HHA | 2.06 | 0.83 |
| 1:A:467:SER:C | 1:A:473:VAL:HG12 | 1.99 | 0.83 |
| 1:A:429:ILE:CD1 | 1:A:434:THR:CG2 | 2.57 | 0.82 |
| 1:A:260:THR:OG1 | 2:A:601:PLP:O1P | 1.98 | 0.82 |
| 1:A:429:ILE:HD11 | 1:A:434:THR:HG22 | 1.61 | 0.80 |
| 1:A:232:HIS:CD2 | 1:A:260:THR:HA | 2.16 | 0.80 |
| 1:C:334:PHE:O | 1:C:338:LEU:HD23 | 1.82 | 0.79 |
| 1:D:392:LEU:CD2 | 1:D:397:LEU:HD12 | 2.12 | 0.79 |
| 3:B:602:HEM:HBD1 | 3:B:602:HEM:HHA | 1.65 | 0.79 |
| 1:A:149:ASN:ND2 | 2:A:601:PLP:H2A1 | 1.98 | 0.78 |
| 1:B:54:TRP:CD1 | 3:B:602:HEM:HBB2 | 2.17 | 0.78 |
| 1:C:397:LEU:HD13 | 1:C:397:LEU:C | 2.04 | 0.78 |
| 1:B:193:THR:O | 1:B:194:ASN:OD1 | 2.02 | 0.77 |
| 1:D:392:LEU:HD21 | 1:D:397:LEU:HD12 | 1.66 | 0.77 |
| 1:A:449:VAL:HG22 | 1:A:455:ILE:HG12 | 1.64 | 0.77 |
| 1:C:334:PHE:O | 1:C:338:LEU:CD2 | 2.33 | 0.77 |
| 1:B:149:ASN:ND2 | 2:B:601:PLP:H2A1 | 2.01 | 0.76 |
| 1:A:350:ALA:HB1 | 1:A:374:LEU:HD22 | 1.69 | 0.74 |
| 1:C:397:LEU:HD13 | 1:C:398:LYS:O | 1.88 | 0.73 |
| 1:D:397:LEU:HD13 | 1:D:397:LEU:C | 2.09 | 0.73 |
| 1:D:490:ILE:HD12 | 1:D:502:ILE:HD12 | 1.71 | 0.72 |
| 1:C:464:MET:O | 1:C:468:LEU:HD13 | 1.89 | 0.72 |
| 3:B:602:HEM:CBD | 3:B:602:HEM:HHA | 2.21 | 0.71 |
| 1:A:58:ARG:HH11 | 1:A:62:GLU:CD | 1.93 | 0.70 |
| 1:A:429:ILE:CD1 | 1:A:434:THR:HG22 | 2.18 | 0.70 |
| 1:C:256:GLY:HA3 | 2:C:601:PLP:H5A1 | 1.74 | 0.70 |
| 1:B:54:TRP:CD1 | 3:B:602:HEM:CBB | 2.72 | 0.70 |
| 1:A:430:THR:OG1 | 1:A:476:SER:O | 2.10 | 0.69 |
| 1:A:512:VAL:HG12 | 1:A:513:HIS:N | 2.06 | 0.69 |
| 1:A:467:SER:HB3 | 1:A:473:VAL:CG1 | 2.22 | 0.69 |
| 1:A:426:LEU:HD13 | 1:A:426:LEU:C | 2.13 | 0.69 |
| 1:B:58:ARG:NE | 1:B:62:GLU:OE1 | 2.25 | 0.69 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:C:232:HIS:CD2 | 1:C:260:THR:HA | 2.29 | 0.68 |
| 1:D:122:ILE:O | 1:D:126:MET:HG3 | 1.94 | 0.68 |
| 1:C:543:VAL:O | 1:C:547:GLU:HG3 | 1.93 | 0.68 |
| 1:A:419:LEU:CD1 | 1:A:511:VAL:HG11 | 2.23 | 0.67 |
| 1:A:431:CYS:HG | 1:A:464:MET:CE | 2.08 | 0.67 |
| 1:C:423:LEU:HD12 | 1:C:424:THR:H | 1.59 | 0.67 |
| 1:A:434:THR:HG21 | 1:A:479:VAL:HG21 | 1.77 | 0.67 |
| 1:D:350:ALA:HB1 | 1:D:374:LEU:HD22 | 1.76 | 0.67 |
| 1:C:412:LEU:HB3 | 1:C:416:GLU:OE1 | 1.95 | 0.67 |
| 1:C:431:CYS:O | 1:C:435:ILE:CG1 | 2.42 | 0.66 |
| 1:D:191:THR:HG21 | 1:D:203:HIS:HA | 1.78 | 0.66 |
| 3:D:602:HEM:HBB2 | 3:D:602:HEM:HMB1 | 1.77 | 0.66 |
| 1:B:193:THR:O | 1:B:194:ASN:CG | 2.35 | 0.65 |
| 1:D:451:GLU:OE2 | 1:D:451:GLU:N | 2.30 | 0.65 |
| 1:B:232:HIS:CD2 | 1:B:260:THR:HA | 2.31 | 0.65 |
| 1:D:119:LYS:HD2 | 1:D:150:THR:OG1 | 1.96 | 0.65 |
| 1:D:149:ASN:HD22 | 2:D:601:PLP:H2A1 | 1.62 | 0.64 |
| 1:A:182:ARG:NH1 | 1:C:504:GLU:OE1 | 2.30 | 0.64 |
| 1:A:459:VAL:HG11 | 1:A:479:VAL:HG13 | 1.78 | 0.64 |
| 1:C:263:GLY:HA2 | 3:C:602:HEM:HBC1 | 1.79 | 0.64 |
| 1:C:81:LEU:HD21 | 1:C:157:ALA:HA | 1.80 | 0.64 |
| 1:A:480:GLY:CA | 1:A:483:ILE:CD1 | 2.62 | 0.64 |
| 1:A:191:THR:HG21 | 1:A:203:HIS:HA | 1.80 | 0.64 |
| 1:A:180:VAL:HG21 | 1:A:379:ARG:NH1 | 2.13 | 0.63 |
| 1:D:58:ARG:NE | 1:D:62:GLU:OE1 | 2.31 | 0.63 |
| 1:A:363:GLU:CG | 1:A:364:LEU:N | 2.62 | 0.63 |
| 1:C:397:LEU:HD13 | 1:C:398:LYS:C | 2.19 | 0.63 |
| 1:D:232:HIS:CD2 | 1:D:260:THR:HA | 2.33 | 0.63 |
| 3:C:602:HEM:HHA | 3:C:602:HEM:HBD2 | 1.80 | 0.63 |
| 1:D:465:LEU:O | 1:D:469:LEU:HD13 | 1.98 | 0.63 |
| 1:C:392:LEU:CD2 | 1:C:397:LEU:HD12 | 2.29 | 0.63 |
| 1:A:254:SER:HB3 | 1:A:306:ILE:HG21 | 1.81 | 0.62 |
| 1:A:429:ILE:CD1 | 1:A:434:THR:HG23 | 2.28 | 0.62 |
| 1:D:397:LEU:HD13 | 1:D:398:LYS:O | 1.98 | 0.62 |
| 1:A:430:THR:HG1 | 1:A:476:SER:C | 2.03 | 0.62 |
| 1:C:350:ALA:HB1 | 1:C:374:LEU:HD22 | 1.80 | 0.62 |
| 1:A:149:ASN:HD22 | 2:A:601:PLP:H2A1 | 1.65 | 0.62 |
| 1:B:94:LYS:NZ | 1:D:159:ALA:O | 2.33 | 0.62 |
| 1:D:264:ILE:O | 1:D:268:LEU:CD1 | 2.43 | 0.62 |
| 1:A:338:LEU:HD12 | 1:A:344:LEU:HD12 | 1.82 | 0.62 |
| 1:B:350:ALA:HB1 | 1:B:374:LEU:HD22 | 1.80 | 0.61 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:C:406:LYS:HE3 | 1:C:410:TRP:CE2 | 2.35 | 0.61 |
| 1:A:467:SER:HB3 | 1:A:473:VAL:HG12 | 1.82 | 0.61 |
| 1:B:254:SER:HA | 1:B:280:VAL:HB | 1.82 | 0.61 |
| 1:B:458:MET:HE1 | 1:B:510:LEU:HD21 | 1.80 | 0.61 |
| 1:C:126:MET:HE2 | 1:C:220:LEU:HB3 | 1.82 | 0.61 |
| 1:D:415:GLN:HB3 | 1:D:492:LEU:HB3 | 1.82 | 0.61 |
| 1:A:363:GLU:HG3 | 1:A:364:LEU:N | 2.16 | 0.60 |
| 1:A:512:VAL:HG12 | 1:A:513:HIS:H | 1.66 | 0.60 |
| 1:C:226:ALA:HA | 3:C:602:HEM:HMD2 | 1.83 | 0.60 |
| 1:C:64:PRO:HG3 | 3:C:602:HEM:HMA1 | 1.83 | 0.60 |
| 1:A:140:ASP:OD2 | 1:A:218:HIS:NE2 | 2.29 | 0.60 |
| 3:A:602:HEM:HBA2 | 3:A:602:HEM:HBD2 | 1.83 | 0.60 |
| 1:C:412:LEU:HD22 | 1:C:416:GLU:OE1 | 2.01 | 0.60 |
| 1:D:149:ASN:ND2 | 2:D:601:PLP:H2A1 | 2.16 | 0.60 |
| 1:A:122:ILE:HG21 | 1:A:228:ASN:OD1 | 2.02 | 0.60 |
| 1:B:543:VAL:O | 1:B:547:GLU:HG2 | 2.02 | 0.60 |
| 1:C:226:ALA:HA | 3:C:602:HEM:CMD | 2.31 | 0.60 |
| 1:D:254:SER:HA | 1:D:280:VAL:HB | 1.84 | 0.60 |
| 1:A:479:VAL:C | 1:A:483:ILE:HG13 | 2.22 | 0.59 |
| 1:C:264:ILE:O | 1:C:268:LEU:CD1 | 2.44 | 0.59 |
| 1:A:543:VAL:O | 1:A:547:GLU:HG2 | 2.03 | 0.59 |
| 1:A:363:GLU:CG | 1:A:364:LEU:HD12 | 2.32 | 0.59 |
| 1:A:480:GLY:HA2 | 1:A:483:ILE:CG1 | 2.30 | 0.59 |
| 1:A:51:ARG:C | 1:A:52:CYS:CA | 2.71 | 0.59 |
| 1:C:122:ILE:O | 1:C:126:MET:HG3 | 2.02 | 0.59 |
| 1:C:229:PRO:HB2 | 3:C:602:HEM:HAC | 1.85 | 0.59 |
| 1:B:63:SER:CB | 3:B:602:HEM:HAB | 2.33 | 0.59 |
| 1:D:510:LEU:HD22 | 1:D:533:VAL:HG12 | 1.85 | 0.59 |
| 1:A:467:SER:CB | 1:A:473:VAL:CG1 | 2.81 | 0.58 |
| 1:B:490:ILE:HG22 | 1:B:491:ARG:O | 2.03 | 0.58 |
| 1:B:226:ALA:HA | 3:B:602:HEM:HMD2 | 1.84 | 0.58 |
| 1:C:464:MET:O | 1:C:468:LEU:CD1 | 2.50 | 0.58 |
| 1:C:397:LEU:CD1 | 1:C:397:LEU:C | 2.72 | 0.58 |
| 1:C:191:THR:HG21 | 1:C:203:HIS:HA | 1.85 | 0.58 |
| 1:B:510:LEU:HD22 | 1:B:533:VAL:HG22 | 1.85 | 0.58 |
| 1:B:431:CYS:O | 1:B:434:THR:OG1 | 2.17 | 0.58 |
| 3:D:602:HEM:HBD2 | 3:D:602:HEM:HHA | 1.86 | 0.58 |
| 1:A:338:LEU:HD21 | 1:A:354:VAL:HG21 | 1.84 | 0.57 |
| 1:A:435:ILE:HG13 | 1:A:464:MET:HE2 | 1.85 | 0.57 |
| 1:B:122:ILE:O | 1:B:126:MET:HG3 | 2.04 | 0.57 |
| 1:C:490:ILE:HD12 | 1:C:502:ILE:HD12 | 1.86 | 0.57 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:A:193:THR:O | 1:A:194:ASN:ND2 | 2.36 | 0.57 |
| 1:B:119:LYS:HB3 | 1:B:150:THR:HA | 1.86 | 0.57 |
| 1:C:122:ILE:HG21 | 1:C:228:ASN:OD1 | 2.04 | 0.57 |
| 1:A:431:CYS:SG | 1:A:464:MET:HE3 | 2.38 | 0.57 |
| 1:B:434:THR:HG21 | 1:B:479:VAL:HG21 | 1.87 | 0.57 |
| 1:D:451:GLU:C | 1:D:453:GLY:H | 2.08 | 0.57 |
| 1:B:430:THR:OG1 | 1:B:475:PRO:O | 2.18 | 0.57 |
| 1:D:54:TRP:HD1 | 3:D:602:HEM:HAB | 1.69 | 0.57 |
| 1:B:196:ARG:O | 1:B:199:SER:OG | 2.23 | 0.56 |
| 1:C:431:CYS:SG | 1:C:435:ILE:CD1 | 2.89 | 0.56 |
| 1:C:119:LYS:HB3 | 1:C:150:THR:HA | 1.87 | 0.56 |
| 1:C:254:SER:HA | 1:C:280:VAL:HB | 1.87 | 0.56 |
| 1:D:451:GLU:C | 1:D:453:GLY:N | 2.54 | 0.56 |
| 1:A:512:VAL:CG1 | 1:A:513:HIS:H | 2.18 | 0.56 |
| 1:D:256:GLY:HA3 | 2:D:601:PLP:H5A1 | 1.88 | 0.56 |
| 1:D:193:THR:O | 1:D:194:ASN:ND2 | 2.39 | 0.56 |
| 1:A:449:VAL:HG22 | 1:A:455:ILE:CG1 | 2.34 | 0.56 |
| 1:A:512:VAL:CG1 | 1:A:513:HIS:N | 2.68 | 0.56 |
| 1:C:429:ILE:HG23 | 1:C:434:THR:OG1 | 2.06 | 0.56 |
| 1:C:419:LEU:HD21 | 1:C:534:VAL:HG22 | 1.88 | 0.56 |
| 1:D:403:THR:HA | 1:D:406:LYS:HD2 | 1.88 | 0.56 |
| 1:A:200:PRO:HB2 | 1:A:209:ARG:NH1 | 2.21 | 0.55 |
| 1:A:430:THR:OG1 | 1:A:476:SER:C | 2.45 | 0.55 |
| 1:C:334:PHE:O | 1:C:338:LEU:HD22 | 2.06 | 0.55 |
| 1:D:423:LEU:HD22 | 1:D:441:LYS:HD2 | 1.87 | 0.55 |
| 1:C:54:TRP:HD1 | 3:C:602:HEM:CAB | 2.20 | 0.55 |
| 1:D:338:LEU:HD21 | 1:D:354:VAL:HG21 | 1.87 | 0.55 |
| 1:B:431:CYS:HB3 | 1:B:464:MET:SD | 2.46 | 0.55 |
| 1:A:504:GLU:OE1 | 1:C:182:ARG:NH1 | 2.40 | 0.55 |
| 1:B:102:LYS:HB2 | 1:B:365:GLN:HA | 1.88 | 0.55 |
| 1:D:397:LEU:CD1 | 1:D:397:LEU:C | 2.75 | 0.55 |
| 1:C:52:CYS:HA | 3:C:602:HEM:C1A | 2.42 | 0.55 |
| 1:A:467:SER:O | 1:A:473:VAL:HG12 | 2.06 | 0.54 |
| 1:A:422:PRO:HA | 1:A:443:PHE:CE2 | 2.42 | 0.54 |
| 1:B:264:ILE:O | 1:B:268:LEU:CD1 | 2.52 | 0.54 |
| 1:B:264:ILE:CG2 | 1:B:268:LEU:HD13 | 2.37 | 0.54 |
| 1:B:149:ASN:HD22 | 2:B:601:PLP:H2A1 | 1.71 | 0.54 |
| 1:A:467:SER:CB | 1:A:473:VAL:HG12 | 2.38 | 0.54 |
| 1:A:492:LEU:CD2 | 1:A:511:VAL:CG2 | 2.74 | 0.54 |
| 1:A:54:TRP:HD1 | 3:A:602:HEM:CBB | 2.20 | 0.54 |
| 1:C:459:VAL:HG12 | 1:C:483:ILE:HA | 1.90 | 0.54 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:B:191:THR:HG21 | 1:B:203:HIS:HA | 1.89 | 0.54 |
| 1:C:78:PRO:HG2 | 1:C:82:LYS:HD3 | 1.90 | 0.54 |
| 1:A:278:ILE:HD12 | 1:A:360:ALA:HB1 | 1.88 | 0.53 |
| 1:D:122:ILE:HG21 | 1:D:228:ASN:OD1 | 2.08 | 0.53 |
| 1:D:406:LYS:HD3 | 1:D:410:TRP:CE2 | 2.43 | 0.53 |
| 1:B:128:GLU:O | 1:B:132:ARG:HG3 | 2.08 | 0.53 |
| 1:B:439:ARG:HH22 | 1:B:465:LEU:HD21 | 1.65 | 0.53 |
| 1:B:490:ILE:HG22 | 1:B:491:ARG:N | 2.23 | 0.53 |
| 1:B:264:ILE:HG22 | 1:B:268:LEU:HD13 | 1.89 | 0.53 |
| 1:D:397:LEU:HD13 | 1:D:398:LYS:C | 2.29 | 0.53 |
| 1:B:429:ILE:HD11 | 1:B:433:HIS:ND1 | 2.24 | 0.53 |
| 1:A:510:LEU:HD22 | 1:A:533:VAL:HG22 | 1.91 | 0.53 |
| 3:A:602:HEM:HBA2 | 3:A:602:HEM:HHA | 1.91 | 0.53 |
| 1:B:119:LYS:HD2 | 1:B:150:THR:OG1 | 2.08 | 0.53 |
| 1:D:419:LEU:CD1 | 1:D:511:VAL:CG1 | 2.84 | 0.52 |
| 1:A:196:ARG:O | 1:A:202:SER:HB3 | 2.09 | 0.52 |
| 1:A:436:GLU:O | 1:A:440:GLU:HB2 | 2.10 | 0.52 |
| 1:D:111:PHE:HB2 | 1:D:377:SER:HB3 | 1.90 | 0.52 |
| 3:A:602:HEM:CHA | 3:A:602:HEM:HBD1 | 2.19 | 0.52 |
| 1:A:527:ARG:HG3 | 1:A:528:GLN:H | 1.73 | 0.52 |
| 1:B:433:HIS:O | 1:B:437:ILE:HG12 | 2.10 | 0.52 |
| 1:D:119:LYS:HB3 | 1:D:150:THR:HA | 1.90 | 0.52 |
| 1:D:353:THR:HG22 | 1:D:372:VAL:HG13 | 1.92 | 0.51 |
| 1:D:543:VAL:O | 1:D:547:GLU:HG3 | 2.10 | 0.51 |
| 1:B:490:ILE:CG2 | 1:B:491:ARG:N | 2.72 | 0.51 |
| 1:B:256:GLY:HA3 | 2:B:601:PLP:H5A1 | 1.91 | 0.51 |
| 1:B:284:GLY:HA2 | 1:B:296:THR:HG21 | 1.93 | 0.51 |
| 1:A:465:LEU:O | 1:A:469:LEU:CD1 | 2.51 | 0.51 |
| 1:C:193:THR:HG22 | 1:C:194:ASN:N | 2.25 | 0.51 |
| 1:A:449:VAL:HG22 | 1:A:455:ILE:HA | 1.92 | 0.51 |
| 1:A:226:ALA:HA | 3:A:602:HEM:HMD2 | 1.93 | 0.51 |
| 1:B:182:ARG:NH1 | 1:D:504:GLU:OE1 | 2.43 | 0.51 |
| 1:A:119:LYS:HG3 | 1:A:149:ASN:CB | 2.41 | 0.51 |
| 1:B:226:ALA:HA | 3:B:602:HEM:CMD | 2.41 | 0.51 |
| 1:A:119:LYS:HB3 | 1:A:150:THR:HA | 1.91 | 0.51 |
| 1:B:414:VAL:HG23 | 1:B:417:LEU:HD12 | 1.92 | 0.51 |
| 1:C:132:ARG:HG2 | 1:C:132:ARG:HH11 | 1.75 | 0.51 |
| 1:A:490:ILE:O | 1:A:511:VAL:HA | 2.11 | 0.51 |
| 1:A:122:ILE:O | 1:A:126:MET:HG3 | 2.10 | 0.51 |
| 1:C:193:THR:O | 1:C:194:ASN:ND2 | 2.43 | 0.51 |
| 1:A:126:MET:HG2 | 1:A:227:SER:HB2 | 1.93 | 0.50 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 3:C:602:HEM:HBC2 | 3:C:602:HEM:HMC2 | 1.93 | 0.50 |
| 1:B:411:HIS:O | 1:B:412:LEU:HG | 2.11 | 0.50 |
| 1:C:397:LEU:CD1 | 1:C:398:LYS:O | 2.59 | 0.50 |
| 1:D:338:LEU:HD12 | 1:D:344:LEU:HD12 | 1.92 | 0.50 |
| 1:A:58:ARG:CZ | 1:A:62:GLU:OE2 | 2.56 | 0.50 |
| 1:B:459:VAL:HG11 | 1:B:479:VAL:HG13 | 1.93 | 0.50 |
| 1:D:131:GLU:OE2 | 1:D:161:ARG:NH1 | 2.44 | 0.50 |
| 1:D:264:ILE:HG23 | 1:D:268:LEU:CD1 | 2.41 | 0.50 |
| 1:C:338:LEU:HD11 | 1:C:354:VAL:HG21 | 1.93 | 0.50 |
| 1:B:236:THR:HB | 1:B:264:ILE:HD11 | 1.93 | 0.50 |
| 1:B:180:VAL:HG21 | 1:B:379:ARG:NH1 | 2.26 | 0.50 |
| 1:B:115:GLY:N | 1:B:120:ASP:OD2 | 2.44 | 0.50 |
| 1:C:214:ILE:HG22 | 1:C:217:SER:HB3 | 1.94 | 0.50 |
| 1:A:419:LEU:HD13 | 1:A:511:VAL:HG11 | 1.93 | 0.50 |
| 1:B:126:MET:HG2 | 1:B:227:SER:HB2 | 1.94 | 0.49 |
| 1:C:102:LYS:HB2 | 1:C:365:GLN:HA | 1.93 | 0.49 |
| 1:A:119:LYS:CG | 1:A:149:ASN:HB3 | 2.42 | 0.49 |
| 1:A:426:LEU:CD1 | 1:A:426:LEU:C | 2.80 | 0.49 |
| 1:D:223:TYR:O | 1:D:314:VAL:HG13 | 2.13 | 0.49 |
| 1:B:425:VAL:HG13 | 1:B:448:VAL:HG22 | 1.95 | 0.49 |
| 1:D:115:GLY:O | 1:D:379:ARG:NH2 | 2.45 | 0.49 |
| 1:A:467:SER:CB | 1:A:473:VAL:HG11 | 2.43 | 0.49 |
| 1:A:455:ILE:HD11 | 1:A:530:VAL:CG2 | 2.43 | 0.49 |
| 1:B:52:CYS:HA | 3:B:602:HEM:C1A | 2.48 | 0.49 |
| 1:C:115:GLY:O | 1:C:379:ARG:NH2 | 2.46 | 0.49 |
| 1:A:527:ARG:HG3 | 1:A:528:GLN:N | 2.28 | 0.49 |
| 1:C:427:PRO:HG3 | 1:C:456:LEU:HD12 | 1.95 | 0.49 |
| 1:D:322:LYS:NZ | 1:C:66:HIS:HB2 | 2.26 | 0.49 |
| 1:B:414:VAL:CG2 | 1:B:417:LEU:HD12 | 2.43 | 0.48 |
| 1:C:353:THR:HG22 | 1:C:372:VAL:HG13 | 1.95 | 0.48 |
| 1:D:461:LEU:O | 1:D:465:LEU:HG | 2.13 | 0.48 |
| 1:D:513:HIS:HB2 | 1:D:531:PHE:HE2 | 1.78 | 0.48 |
| 1:D:287:LEU:HD23 | 1:D:311:ILE:HD13 | 1.94 | 0.48 |
| 1:A:438:LEU:HD22 | 1:A:461:LEU:HD13 | 1.94 | 0.48 |
| 1:A:45:ARG:NH2 | 1:A:47:ASP:OD2 | 2.47 | 0.48 |
| 1:C:459:VAL:HG11 | 1:C:479:VAL:CG1 | 2.43 | 0.48 |
| 1:A:479:VAL:HG12 | 1:A:483:ILE:HD11 | 1.96 | 0.48 |
| 1:B:412:LEU:HD13 | 1:B:416:GLU:OE1 | 2.14 | 0.48 |
| 1:A:121:ARG:NH1 | 1:A:235:THR:OG1 | 2.47 | 0.47 |
| 1:A:200:PRO:HB2 | 1:A:209:ARG:HH11 | 1.79 | 0.47 |
| 1:B:54:TRP:HB2 | 3:B:602:HEM:C4B | 2.48 | 0.47 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:C:293:LEU:HD12 | 1:C:293:LEU:N | 2.28 | 0.47 |
| 1:D:122:ILE:O | 1:D:126:MET:CG | 2.62 | 0.47 |
| 1:B:81:LEU:HD21 | 1:B:157:ALA:HA | 1.96 | 0.47 |
| 1:D:410:TRP:CE2 | 1:D:497:GLY:HA3 | 2.50 | 0.47 |
| 1:B:193:THR:HG22 | 1:B:194:ASN:N | 2.29 | 0.47 |
| 1:C:87:THR:HB | 1:C:109:CYS:O | 2.14 | 0.47 |
| 1:D:448:VAL:CG2 | 1:D:459:VAL:HG13 | 2.45 | 0.47 |
| 1:A:544:ALA:HA | 1:A:547:GLU:HG3 | 1.96 | 0.47 |
| 1:D:459:VAL:HG11 | 1:D:479:VAL:HG13 | 1.97 | 0.47 |
| 1:D:54:TRP:HB2 | 3:D:602:HEM:C4B | 2.50 | 0.47 |
| 1:B:419:LEU:HD21 | 1:B:534:VAL:HG22 | 1.96 | 0.47 |
| 1:A:119:LYS:HG3 | 1:A:149:ASN:HB3 | 1.97 | 0.47 |
| 1:B:314:VAL:HG12 | 3:B:602:HEM:CMD | 2.45 | 0.47 |
| 1:C:406:LYS:HE3 | 1:C:410:TRP:CD1 | 2.49 | 0.47 |
| 1:C:406:LYS:HE3 | 1:C:410:TRP:CD2 | 2.49 | 0.47 |
| 1:A:514:GLU:C | 1:A:527:ARG:HH21 | 2.18 | 0.47 |
| 1:A:266:ARG:HD2 | 3:A:602:HEM:HBC2 | 1.97 | 0.46 |
| 1:C:419:LEU:HD11 | 1:C:511:VAL:HG21 | 1.96 | 0.46 |
| 1:C:149:ASN:HD22 | 2:C:601:PLP:H2A1 | 1.81 | 0.46 |
| 1:C:510:LEU:HD22 | 1:C:533:VAL:HG12 | 1.97 | 0.46 |
| 1:D:449:VAL:HA | 1:D:455:ILE:HA | 1.97 | 0.46 |
| 1:A:119:LYS:HD2 | 1:A:150:THR:OG1 | 2.16 | 0.46 |
| 1:A:386:LEU:HD23 | 1:C:179:ASP:HB3 | 1.98 | 0.46 |
| 1:C:432:GLY:O | 1:C:436:GLU:HG2 | 2.16 | 0.46 |
| 1:D:103:CYS:HB2 | 1:D:368:GLN:O | 2.14 | 0.46 |
| 1:A:197:PHE:CE2 | 1:A:310:PHE:HB3 | 2.51 | 0.46 |
| 1:C:314:VAL:HG12 | 3:C:602:HEM:CMD | 2.45 | 0.46 |
| 1:A:287:LEU:HD23 | 1:A:311:ILE:HD13 | 1.97 | 0.46 |
| 1:A:537:ILE:HD12 | 1:C:209:ARG:CZ | 2.46 | 0.46 |
| 1:D:226:ALA:HA | 3:D:602:HEM:HMD2 | 1.97 | 0.46 |
| 1:D:264:ILE:CG2 | 1:D:268:LEU:HD13 | 2.46 | 0.46 |
| 1:A:353:THR:HG22 | 1:A:372:VAL:HG13 | 1.98 | 0.46 |
| 1:A:90:VAL:HG21 | 1:C:80:ILE:HD13 | 1.98 | 0.46 |
| 1:B:126:MET:HE2 | 1:B:220:LEU:HB3 | 1.98 | 0.46 |
| 1:A:434:THR:O | 1:A:438:LEU:HB3 | 2.16 | 0.46 |
| 1:B:280:VAL:HG13 | 1:B:356:VAL:HG21 | 1.97 | 0.45 |
| 1:B:499:LEU:HD23 | 1:B:539:LEU:HD22 | 1.98 | 0.45 |
| 1:A:125:ARG:NE | 1:A:129:ASP:OD1 | 2.50 | 0.45 |
| 1:A:495:THR:HG23 | 1:A:498:ARG:H | 1.81 | 0.45 |
| 1:C:281:ASP:OD2 | 1:C:282:PRO:HD2 | 2.16 | 0.45 |
| 1:C:392:LEU:HD21 | 1:C:397:LEU:HD12 | 1.97 | 0.45 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:C:419:LEU:HD13 | 1:C:532:GLY:HA3 | 1.97 | 0.45 |
| 1:D:286:ILE:HD11 | 1:D:310:PHE:HA | 1.98 | 0.45 |
| 1:A:95:ILE:HD12 | 1:A:338:LEU:HD13 | 1.98 | 0.45 |
| 1:A:384:LYS:O | 1:A:390:TRP:HB3 | 2.17 | 0.45 |
| 1:B:166:ILE:HG12 | 1:B:187:GLU:HB2 | 1.97 | 0.45 |
| 1:A:449:VAL:HG11 | 1:A:528:GLN:HG3 | 1.98 | 0.45 |
| 1:C:106:LEU:HB2 | 1:C:371:VAL:HG22 | 1.98 | 0.45 |
| 1:C:178:VAL:HG13 | 1:C:188:ILE:HD13 | 1.99 | 0.45 |
| 1:A:455:ILE:O | 1:A:455:ILE:HG22 | 2.15 | 0.45 |
| 1:B:544:ALA:HA | 1:B:547:GLU:HG3 | 1.98 | 0.45 |
| 1:B:490:ILE:HG23 | 1:B:494:ASP:HB2 | 1.97 | 0.45 |
| 1:D:192:PRO:HG2 | 1:D:195:ALA:HB2 | 1.99 | 0.45 |
| 1:D:264:ILE:HG23 | 1:D:268:LEU:HD13 | 1.99 | 0.45 |
| 1:C:431:CYS:HG | 1:C:435:ILE:HD11 | 1.76 | 0.45 |
| 1:D:451:GLU:O | 1:D:452:ALA:C | 2.53 | 0.45 |
| 1:A:434:THR:CG2 | 1:A:479:VAL:HG21 | 2.46 | 0.44 |
| 1:C:290:PRO:HD2 | 1:C:293:LEU:CD1 | 2.47 | 0.44 |
| 1:B:46:PRO:HB2 | 1:B:310:PHE:CE1 | 2.52 | 0.44 |
| 1:C:491:ARG:HB2 | 1:C:494:ASP:CG | 2.37 | 0.44 |
| 1:B:504:GLU:OE1 | 1:D:182:ARG:NH1 | 2.51 | 0.44 |
| 1:D:64:PRO:HG3 | 3:D:602:HEM:CHB | 2.48 | 0.44 |
| 1:B:406:LYS:HD3 | 1:B:410:TRP:CE2 | 2.53 | 0.44 |
| 1:A:198:ASP:HB2 | 1:C:466:SER:OG | 2.17 | 0.44 |
| 1:D:226:ALA:HA | 3:D:602:HEM:CMD | 2.47 | 0.44 |
| 1:C:92:ILE:HD11 | 1:C:107:ALA:HB2 | 2.00 | 0.44 |
| 1:C:52:CYS:HA | 3:C:602:HEM:NA | 2.33 | 0.44 |
| 1:B:223:TYR:CE1 | 1:B:257:THR:HG22 | 2.52 | 0.44 |
| 1:D:542:PHE:O | 1:D:546:GLN:HG2 | 2.18 | 0.44 |
| 1:A:131:GLU:HG3 | 1:A:136:LEU:HD23 | 2.00 | 0.44 |
| 1:A:363:GLU:HG3 | 1:A:364:LEU:HD12 | 2.00 | 0.44 |
| 1:B:468:LEU:HD23 | 1:B:473:VAL:O | 2.18 | 0.44 |
| 1:A:461:LEU:O | 1:A:464:MET:HB2 | 2.17 | 0.44 |
| 1:C:392:LEU:HD23 | 1:C:397:LEU:HD12 | 2.00 | 0.44 |
| 1:C:432:GLY:HA2 | 1:C:435:ILE:HD12 | 2.00 | 0.44 |
| 1:D:95:ILE:HD12 | 1:D:338:LEU:HD13 | 1.99 | 0.44 |
| 1:B:190:ARG:HG3 | 1:D:505:MET:C | 2.38 | 0.44 |
| 1:D:54:TRP:HD1 | 3:D:602:HEM:CAB | 2.29 | 0.43 |
| 1:B:413:ARG:HD2 | 1:B:493:THR:HA | 1.99 | 0.43 |
| 1:C:285:SER:HG | 1:C:308:TYR:H | 1.63 | 0.43 |
| 1:D:111:PHE:HB3 | 1:D:376:ASP:C | 2.38 | 0.43 |
| 1:A:63:SER:HB3 | 3:A:602:HEM:CAB | 2.48 | 0.43 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:B:240:ILE:HD12 | 1:B:264:ILE:HD12 | 1.99 | 0.43 |
| 1:C:140:ASP:OD2 | 1:C:218:HIS:CE1 | 2.71 | 0.43 |
| 1:D:503:LEU:HD13 | 1:D:536:ALA:HA | 2.00 | 0.43 |
| 1:A:146:THR:HG21 | 1:A:151:GLY:HA3 | 2.00 | 0.43 |
| 1:A:503:LEU:HA | 1:A:506:ASP:O | 2.19 | 0.43 |
| 1:C:423:LEU:HD12 | 1:C:424:THR:N | 2.30 | 0.43 |
| 1:C:286:ILE:HD11 | 1:C:310:PHE:HA | 2.00 | 0.43 |
| 1:D:220:LEU:HA | 1:D:220:LEU:HD23 | 1.84 | 0.43 |
| 1:C:110:GLU:OE2 | 1:C:121:ARG:NH2 | 2.50 | 0.43 |
| 1:C:145:PRO:HB2 | 1:C:203:HIS:CD2 | 2.53 | 0.43 |
| 1:D:169:MET:O | 1:D:190:ARG:HA | 2.18 | 0.43 |
| 1:A:337:MET:HG2 | 1:A:341:GLN:HG3 | 2.01 | 0.43 |
| 1:C:248:LEU:HG | 1:C:275:CYS:SG | 2.58 | 0.43 |
| 1:B:119:LYS:HG3 | 1:B:149:ASN:CB | 2.49 | 0.43 |
| 1:D:254:SER:HB2 | 1:D:306:ILE:HG21 | 2.01 | 0.43 |
| 1:A:54:TRP:CD1 | 3:A:602:HEM:CBB | 3.02 | 0.43 |
| 1:B:102:LYS:HD2 | 1:B:365:GLN:HA | 2.01 | 0.43 |
| 1:C:293:LEU:H | 1:C:293:LEU:CD1 | 2.32 | 0.43 |
| 1:C:489:GLN:NE2 | 1:C:528:GLN:OE1 | 2.50 | 0.43 |
| 1:D:392:LEU:HD23 | 1:D:397:LEU:HD12 | 1.94 | 0.43 |
| 1:D:512:VAL:HG12 | 1:D:530:VAL:HG22 | 2.00 | 0.43 |
| 1:A:479:VAL:HG12 | 1:A:483:ILE:CG1 | 2.49 | 0.42 |
| 1:A:503:LEU:HD13 | 1:A:536:ALA:HA | 2.01 | 0.42 |
| 1:B:397:LEU:HA | 1:B:397:LEU:HD23 | 1.92 | 0.42 |
| 1:B:429:ILE:HG13 | 1:B:430:THR:N | 2.33 | 0.42 |
| 1:C:111:PHE:HB2 | 1:C:377:SER:HB3 | 2.01 | 0.42 |
| 1:D:448:VAL:HG21 | 1:D:459:VAL:HG13 | 2.01 | 0.42 |
| 1:B:529:MET:HG2 | 1:B:531:PHE:CE1 | 2.54 | 0.42 |
| 1:C:445:GLN:HB3 | 1:C:460:THR:HG22 | 2.01 | 0.42 |
| 1:A:280:VAL:HG13 | 1:A:356:VAL:HG21 | 2.01 | 0.42 |
| 1:D:52:CYS:HA | 3:D:602:HEM:C1A | 2.54 | 0.42 |
| 1:A:467:SER:HB2 | 1:A:473:VAL:HG11 | 2.01 | 0.42 |
| 1:B:281:ASP:OD2 | 1:B:287:LEU:HD12 | 2.19 | 0.42 |
| 1:C:54:TRP:HB2 | 3:C:602:HEM:C4B | 2.55 | 0.42 |
| 1:A:419:LEU:HD12 | 1:A:511:VAL:HG11 | 1.99 | 0.42 |
| 1:B:469:LEU:O | 1:B:469:LEU:HD23 | 2.19 | 0.42 |
| 1:D:264:ILE:C | 1:D:268:LEU:HD13 | 2.35 | 0.42 |
| 1:A:108:LYS:HB3 | 1:A:373:ILE:HD13 | 2.00 | 0.42 |
| 1:A:51:ARG:HB3 | 3:A:602:HEM:O1A | 2.19 | 0.42 |
| 1:C:406:LYS:HE3 | 1:C:410:TRP:NE1 | 2.35 | 0.42 |
| 1:D:110:GLU:HG2 | 1:D:118:VAL:HB | 2.02 | 0.42 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:C:196:ARG:O | 1:C:202:SER:HB3 | 2.20 | 0.42 |
| 1:C:293:LEU:CD1 | 1:C:293:LEU:N | 2.82 | 0.42 |
| 1:C:397:LEU:CD1 | 1:C:397:LEU:O | 2.68 | 0.42 |
| 1:C:499:LEU:HD21 | 1:C:534:VAL:HG11 | 2.02 | 0.42 |
| 1:B:264:ILE:HG23 | 1:B:268:LEU:CD1 | 2.49 | 0.42 |
| 1:D:446:ALA:O | 1:D:459:VAL:HG22 | 2.20 | 0.42 |
| 1:C:412:LEU:O | 1:C:495:THR:HA | 2.20 | 0.42 |
| 1:D:281:ASP:OD1 | 1:D:285:SER:HB3 | 2.20 | 0.42 |
| 1:A:221:ASP:OD1 | 1:A:224:ARG:NH1 | 2.52 | 0.41 |
| 1:A:426:LEU:HB3 | 1:A:429:ILE:HG23 | 2.01 | 0.41 |
| 1:A:448:VAL:O | 1:A:456:LEU:N | 2.52 | 0.41 |
| 1:B:338:LEU:HD12 | 1:B:344:LEU:HD12 | 2.02 | 0.41 |
| 1:D:353:THR:CG2 | 1:D:372:VAL:HG13 | 2.50 | 0.41 |
| 1:B:301:TYR:CD2 | 1:B:301:TYR:N | 2.88 | 0.41 |
| 3:C:602:HEM:HBC2 | 3:C:602:HEM:CMC | 2.50 | 0.41 |
| 1:D:432:GLY:HA2 | 1:D:435:ILE:HD12 | 2.01 | 0.41 |
| 1:B:122:ILE:HG21 | 1:B:228:ASN:OD1 | 2.19 | 0.41 |
| 1:C:327:ASN:OD1 | 1:C:330:GLU:HB2 | 2.20 | 0.41 |
| 1:C:426:LEU:O | 1:C:429:ILE:HG22 | 2.20 | 0.41 |
| 1:D:190:ARG:HD2 | 1:D:190:ARG:HA | 1.89 | 0.41 |
| 1:C:190:ARG:HA | 1:C:190:ARG:HD2 | 1.83 | 0.41 |
| 1:C:229:PRO:HB2 | 3:C:602:HEM:CAC | 2.48 | 0.41 |
| 1:A:136:LEU:HG | 1:A:163:TYR:HE2 | 1.85 | 0.41 |
| 1:D:233:TYR:O | 1:D:267:LYS:HD2 | 2.20 | 0.41 |
| 1:D:180:VAL:HG21 | 1:D:379:ARG:NH1 | 2.36 | 0.41 |
| 1:D:406:LYS:HD3 | 1:D:410:TRP:NE1 | 2.35 | 0.41 |
| 1:A:435:ILE:HD11 | 1:A:464:MET:HB3 | 2.02 | 0.41 |
| 1:B:83:LYS:HD2 | 1:B:83:LYS:HA | 1.82 | 0.41 |
| 1:C:110:GLU:OE2 | 1:C:121:ARG:NE | 2.49 | 0.41 |
| 1:A:51:ARG:CB | 3:A:602:HEM:O1A | 2.68 | 0.41 |
| 1:D:214:ILE:HA | 1:D:215:PRO:HD3 | 1.91 | 0.41 |
| 1:A:226:ALA:HA | 3:A:602:HEM:CMD | 2.51 | 0.41 |
| 1:A:263:GLY:HA2 | 3:A:602:HEM:HBC1 | 2.03 | 0.41 |
| 1:A:422:PRO:HA | 1:A:443:PHE:HE2 | 1.86 | 0.41 |
| 1:B:264:ILE:CG2 | 1:B:268:LEU:CD1 | 2.99 | 0.41 |
| 1:C:302:GLU:OE2 | 1:C:394:LYS:NZ | 2.42 | 0.41 |
| 1:D:180:VAL:HG21 | 1:D:379:ARG:HH11 | 1.86 | 0.41 |
| 1:A:180:VAL:HG21 | 1:A:379:ARG:HH11 | 1.83 | 0.40 |
| 1:B:338:LEU:HD21 | 1:B:354:VAL:HG21 | 2.03 | 0.40 |
| 1:C:103:CYS:HB2 | 1:C:368:GLN:O | 2.21 | 0.40 |
| 1:A:190:ARG:NH1 | 1:C:504:GLU:O | 2.44 | 0.40 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 1:D:145:PRO:HB2 | 1:D:203:HIS:CD2 | 2.56 | 0.40 |
| 1:A:260:THR:CB | 2:A:601:PLP:O1P | 2.69 | 0.40 |
| 1:B:82:LYS:N | 1:B:82:LYS:HD2 | 2.36 | 0.40 |
| 1:D:322:LYS:NZ | 1:C:132:ARG:HH12 | 2.19 | 0.40 |
| 1:C:255:VAL:HG13 | 1:C:258:GLY:HA2 | 2.04 | 0.40 |
| 1:A:64:PRO:HG3 | 3:A:602:HEM:CMA | 2.51 | 0.40 |
| 1:C:180:VAL:HG21 | 1:C:379:ARG:NH1 | 2.37 | 0.40 |
| 1:A:191:THR:HB | 1:A:201:GLU:O | 2.21 | 0.40 |
| 1:B:258:GLY:HA3 | 1:B:315:LEU:HD13 | 2.03 | 0.40 |
| 1:B:337:MET:HG2 | 1:B:341:GLN:HG3 | 2.02 | 0.40 |
| 1:C:82:LYS:HD2 | 1:C:82:LYS:N | 2.37 | 0.40 |

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|-----------------|-----------------------|--------------------------|-------------------|
| 1:A:465:LEU:CD2 | 1:C:421:ALA:CB[5_455] | 2.13 | 0.07 |

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 | 467/548 (85%) | 455 (97%) | 12 (3%) | 0 | 100 | 100 |
| 1 | B | 482/548 (88%) | 475 (98%) | 7 (2%) | 0 | 100 | 100 |
| 1 | C | 485/548 (88%) | 478 (99%) | 7 (1%) | 0 | 100 | 100 |
| 1 | D | 483/548 (88%) | 475 (98%) | 7 (1%) | 1 (0%) | 47 | 78 |
| All | All | 1917/2192 (88%) | 1883 (98%) | 33 (2%) | 1 (0%) | 51 | 82 |

All (1) Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | D | 452 | ALA |

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 | 408/463 (88%) | 404 (99%) | 4 (1%) | 76 | 88 |
| 1 | B | 413/463 (89%) | 407 (98%) | 6 (2%) | 65 | 82 |
| 1 | C | 411/463 (89%) | 409 (100%) | 2 (0%) | 88 | 94 |
| 1 | D | 411/463 (89%) | 407 (99%) | 4 (1%) | 76 | 88 |
| All | All | 1643/1852 (89%) | 1627 (99%) | 16 (1%) | 76 | 88 |

All (16) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | B | 220 | LEU |
| 1 | B | 301 | TYR |
| 1 | B | 338 | LEU |
| 1 | B | 377 | SER |
| 1 | B | 479 | VAL |
| 1 | B | 493 | THR |
| 1 | D | 217 | SER |
| 1 | D | 338 | LEU |
| 1 | D | 414 | VAL |
| 1 | D | 451 | GLU |
| 1 | A | 127 | ILE |
| 1 | A | 338 | LEU |
| 1 | A | 386 | LEU |
| 1 | A | 455 | ILE |
| 1 | C | 414 | VAL |
| 1 | C | 464 | MET |

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | D | 194 | ASN |
| 1 | A | 194 | ASN |
| 1 | A | 232 | HIS |
| 1 | C | 194 | ASN |

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

8 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 |
| 2 | PLP | C | 601 | 1 | 15,15,16 | 1.22 | 0 | 20,22,23 | 1.10 | 2 (10%) |
| 2 | PLP | A | 601 | 1 | 15,15,16 | 1.30 | 2 (13%) | 20,22,23 | 1.17 | 1 (5%) |
| 2 | PLP | D | 601 | 1 | 15,15,16 | 1.26 | 1 (6%) | 20,22,23 | 1.11 | 1 (5%) |
| 3 | HEM | A | 602 | 1 | 27,50,50 | 2.14 | 5 (18%) | 17,82,82 | 3.16 | 9 (52%) |
| 2 | PLP | B | 601 | 1 | 15,15,16 | 1.25 | 1 (6%) | 20,22,23 | 1.12 | 1 (5%) |
| 3 | HEM | D | 602 | 1 | 27,50,50 | 2.17 | 7 (25%) | 17,82,82 | 1.33 | 3 (17%) |
| 3 | HEM | B | 602 | 1 | 27,50,50 | 2.16 | 7 (25%) | 17,82,82 | 1.30 | 2 (11%) |
| 3 | HEM | C | 602 | 1 | 27,50,50 | 2.20 | 7 (25%) | 17,82,82 | 2.69 | 5 (29%) |

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 |
|-----|------|-------|-----|------|---------|-----------|---------|
| 2 | PLP | C | 601 | 1 | - | 0/6/6/8 | 0/1/1/1 |
| 2 | PLP | A | 601 | 1 | - | 0/6/6/8 | 0/1/1/1 |
| 2 | PLP | D | 601 | 1 | - | 0/6/6/8 | 0/1/1/1 |
| 3 | HEM | A | 602 | 1 | - | 6/6/54/54 | - |
| 2 | PLP | B | 601 | 1 | - | 0/6/6/8 | 0/1/1/1 |
| 3 | HEM | D | 602 | 1 | - | 4/6/54/54 | - |
| 3 | HEM | B | 602 | 1 | - | 2/6/54/54 | - |
| 3 | HEM | C | 602 | 1 | - | 4/6/54/54 | - |

All (30) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|---------|-------|-------------|----------|
| 3 | A | 602 | HEM | C3D-C2D | 5.54 | 1.54 | 1.37 |
| 3 | D | 602 | HEM | C3D-C2D | 5.52 | 1.54 | 1.37 |
| 3 | B | 602 | HEM | C3D-C2D | 5.32 | 1.53 | 1.37 |
| 3 | C | 602 | HEM | C3D-C2D | 5.08 | 1.52 | 1.37 |
| 3 | B | 602 | HEM | C3C-C2C | -4.79 | 1.33 | 1.40 |
| 3 | B | 602 | HEM | C3B-C2B | -4.79 | 1.33 | 1.40 |
| 3 | C | 602 | HEM | C3C-C2C | -4.69 | 1.33 | 1.40 |
| 3 | A | 602 | HEM | C3C-C2C | -4.60 | 1.34 | 1.40 |
| 3 | D | 602 | HEM | C3C-C2C | -4.34 | 1.34 | 1.40 |
| 3 | D | 602 | HEM | C3B-C2B | -4.07 | 1.34 | 1.40 |
| 3 | A | 602 | HEM | C3B-C2B | -3.98 | 1.34 | 1.40 |
| 3 | C | 602 | HEM | C3B-CAB | 3.96 | 1.56 | 1.47 |
| 3 | C | 602 | HEM | C3B-C2B | -3.94 | 1.34 | 1.40 |
| 3 | D | 602 | HEM | C3B-CAB | 3.76 | 1.55 | 1.47 |
| 3 | A | 602 | HEM | C3C-CAC | 3.55 | 1.55 | 1.47 |
| 3 | D | 602 | HEM | C3C-CAC | 3.46 | 1.54 | 1.47 |
| 3 | A | 602 | HEM | C3B-CAB | 3.43 | 1.54 | 1.47 |
| 3 | C | 602 | HEM | CAA-C2A | 3.37 | 1.57 | 1.52 |
| 3 | C | 602 | HEM | C3C-CAC | 3.15 | 1.54 | 1.47 |
| 3 | B | 602 | HEM | C3C-CAC | 3.07 | 1.54 | 1.47 |
| 3 | B | 602 | HEM | C3B-CAB | 2.69 | 1.53 | 1.47 |
| 3 | D | 602 | HEM | CAA-C2A | 2.40 | 1.55 | 1.52 |
| 3 | B | 602 | HEM | CAD-C3D | 2.37 | 1.56 | 1.52 |
| 2 | A | 601 | PLP | C3-C2 | -2.27 | 1.38 | 1.40 |
| 2 | D | 601 | PLP | C3-C2 | -2.25 | 1.38 | 1.40 |
| 3 | B | 602 | HEM | CAA-C2A | 2.22 | 1.55 | 1.52 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|---------|-------|-------------|----------|
| 3 | D | 602 | HEM | CAD-C3D | 2.22 | 1.56 | 1.52 |
| 2 | B | 601 | PLP | P-O3P | -2.21 | 1.46 | 1.54 |
| 2 | A | 601 | PLP | C2-N1 | 2.15 | 1.37 | 1.33 |
| 3 | C | 602 | HEM | CMA-C3A | 2.04 | 1.55 | 1.51 |

All (24) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-------------|--------|-------------|----------|
| 3 | A | 602 | HEM | CAA-CBA-CGA | -10.16 | 95.62 | 112.67 |
| 3 | C | 602 | HEM | CMA-C3A-C4A | -6.03 | 119.19 | 128.46 |
| 3 | C | 602 | HEM | CAA-CBA-CGA | 5.34 | 121.64 | 112.67 |
| 3 | C | 602 | HEM | CMA-C3A-C2A | 4.19 | 132.84 | 124.94 |
| 3 | A | 602 | HEM | CBA-CAA-C2A | 3.92 | 119.71 | 112.49 |
| 3 | C | 602 | HEM | CMC-C2C-C3C | 3.78 | 131.75 | 124.68 |
| 3 | A | 602 | HEM | CAD-CBD-CGD | 3.05 | 117.79 | 112.67 |
| 3 | A | 602 | HEM | CMC-C2C-C3C | 2.69 | 129.72 | 124.68 |
| 2 | B | 601 | PLP | O3P-P-O1P | 2.63 | 120.97 | 110.68 |
| 3 | A | 602 | HEM | C4A-C3A-C2A | 2.62 | 108.82 | 107.00 |
| 3 | D | 602 | HEM | CMC-C2C-C3C | 2.56 | 129.46 | 124.68 |
| 2 | C | 601 | PLP | O3P-P-O1P | 2.54 | 120.61 | 110.68 |
| 2 | A | 601 | PLP | O3P-P-O1P | 2.53 | 120.58 | 110.68 |
| 2 | D | 601 | PLP | O3P-P-O1P | 2.50 | 120.47 | 110.68 |
| 3 | A | 602 | HEM | C1D-C2D-C3D | -2.49 | 105.27 | 107.00 |
| 3 | D | 602 | HEM | C4A-C3A-C2A | 2.45 | 108.70 | 107.00 |
| 3 | D | 602 | HEM | CMB-C2B-C3B | 2.37 | 129.12 | 124.68 |
| 3 | B | 602 | HEM | C4C-C3C-C2C | 2.33 | 108.53 | 106.90 |
| 3 | C | 602 | HEM | C4C-C3C-C2C | 2.29 | 108.50 | 106.90 |
| 3 | A | 602 | HEM | CAA-C2A-C3A | -2.21 | 120.91 | 127.25 |
| 2 | C | 601 | PLP | O4P-C5A-C5 | 2.10 | 113.34 | 109.35 |
| 3 | A | 602 | HEM | CMA-C3A-C4A | -2.05 | 125.31 | 128.46 |
| 3 | A | 602 | HEM | C3B-C4B-NB | -2.03 | 106.59 | 109.21 |
| 3 | B | 602 | HEM | CMC-C2C-C3C | 2.02 | 128.46 | 124.68 |

There are no chirality outliers.

All (16) torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|-----|-------|-----|------|-----------------|
| 3 | A | 602 | HEM | C1A-C2A-CAA-CBA |
| 3 | A | 602 | HEM | C3A-C2A-CAA-CBA |
| 3 | A | 602 | HEM | C2A-CAA-CBA-CGA |
| 3 | A | 602 | HEM | C2D-C3D-CAD-CBD |
| 3 | A | 602 | HEM | C4D-C3D-CAD-CBD |

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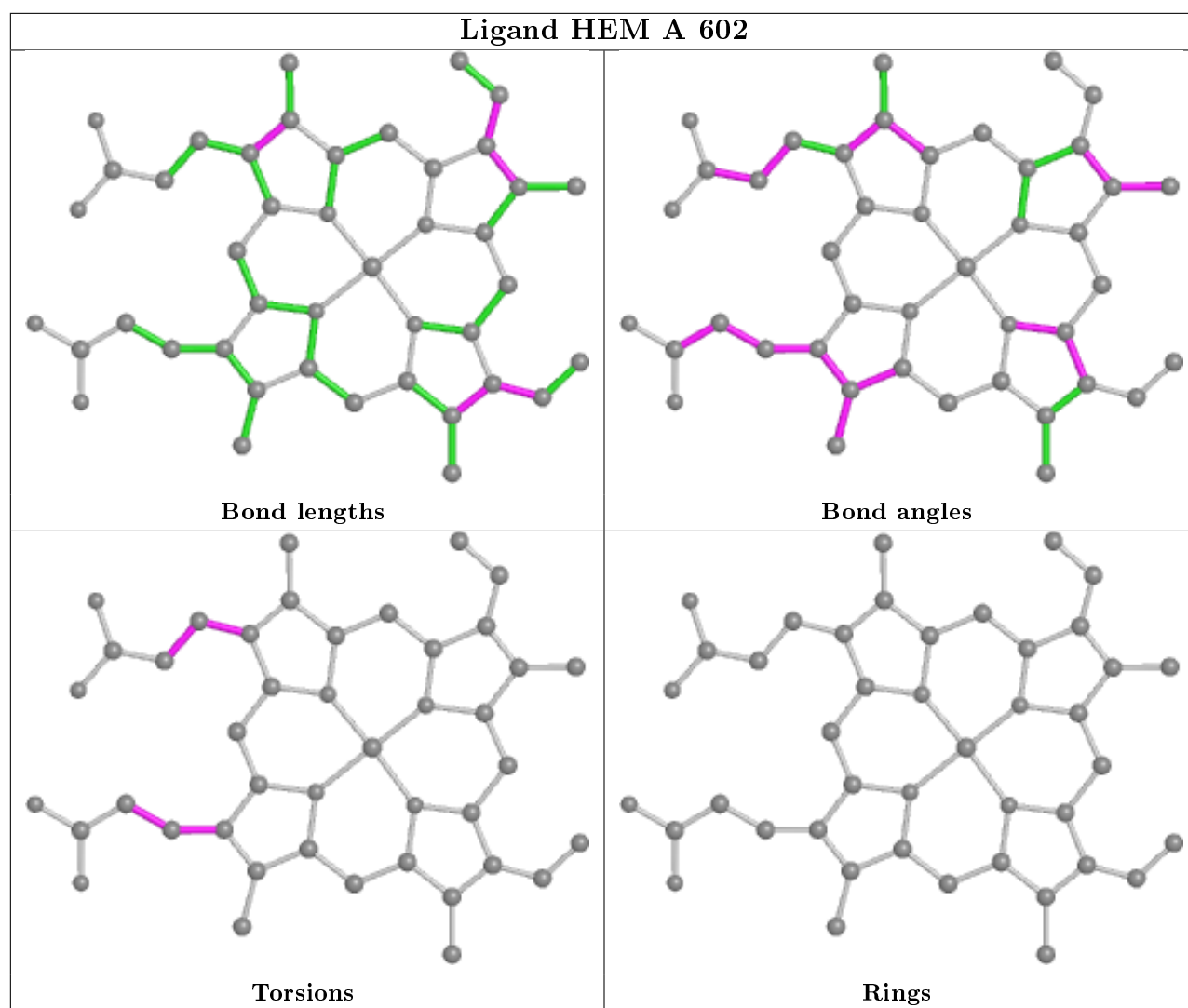
| Mol | Chain | Res | Type | Atoms |
|-----|-------|-----|------|-----------------|
| 3 | D | 602 | HEM | C1A-C2A-CAA-CBA |
| 3 | D | 602 | HEM | C3A-C2A-CAA-CBA |
| 3 | D | 602 | HEM | C2D-C3D-CAD-CBD |
| 3 | D | 602 | HEM | C4D-C3D-CAD-CBD |
| 3 | B | 602 | HEM | C2D-C3D-CAD-CBD |
| 3 | B | 602 | HEM | C4D-C3D-CAD-CBD |
| 3 | C | 602 | HEM | C1A-C2A-CAA-CBA |
| 3 | C | 602 | HEM | C3A-C2A-CAA-CBA |
| 3 | C | 602 | HEM | C2D-C3D-CAD-CBD |
| 3 | C | 602 | HEM | C4D-C3D-CAD-CBD |
| 3 | A | 602 | HEM | C3D-CAD-CBD-CGD |

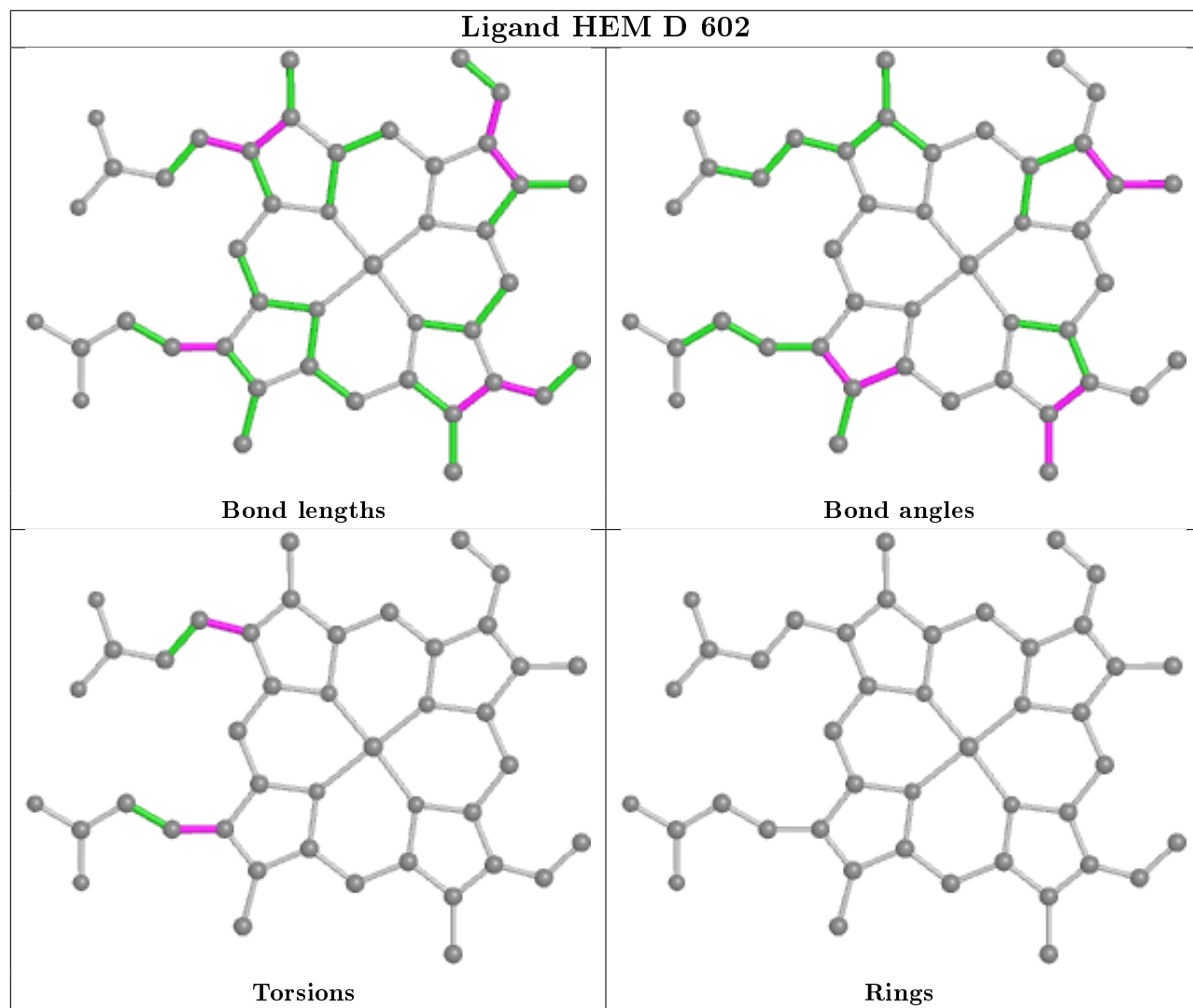
There are no ring outliers.

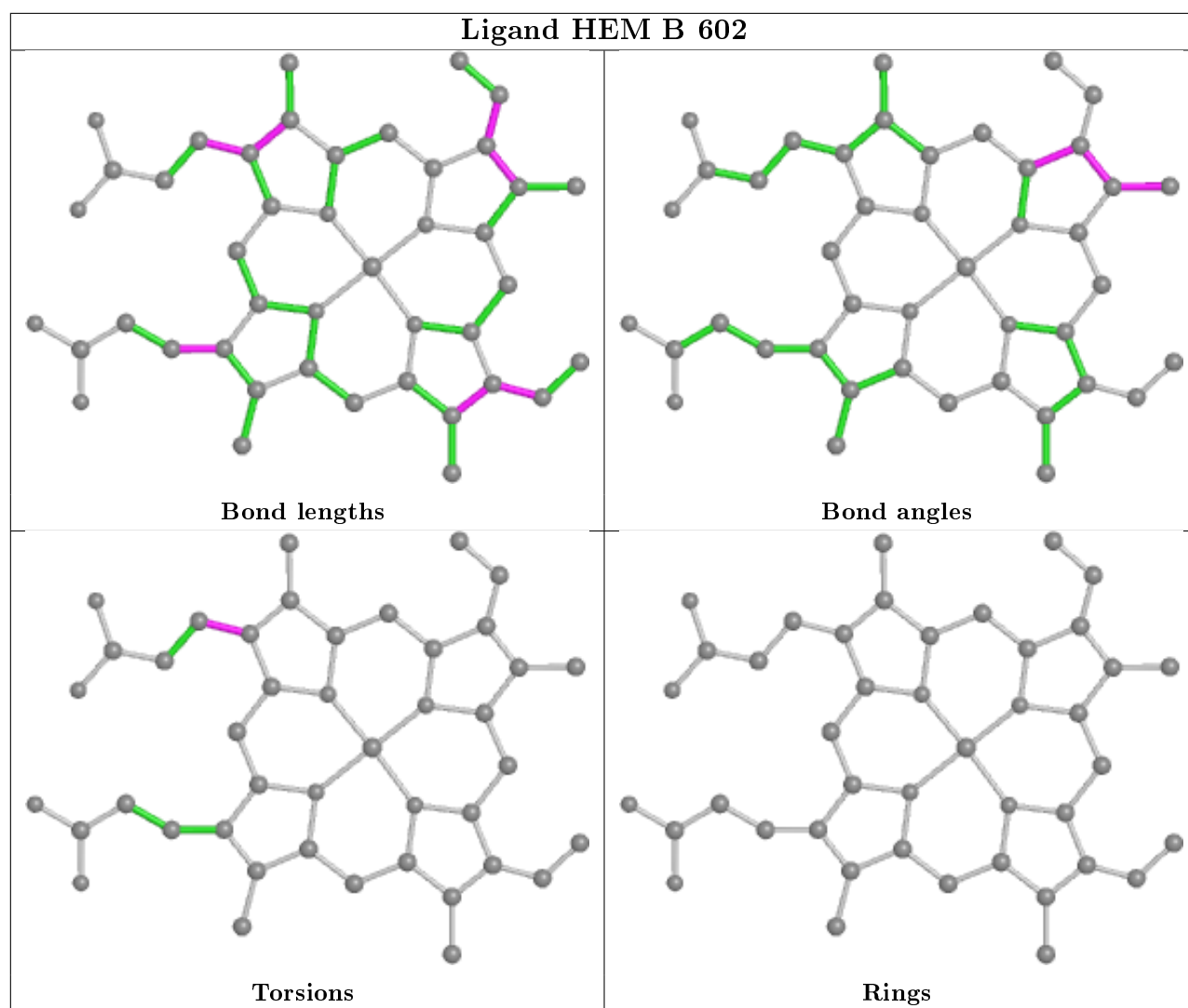
8 monomers are involved in 62 short contacts:

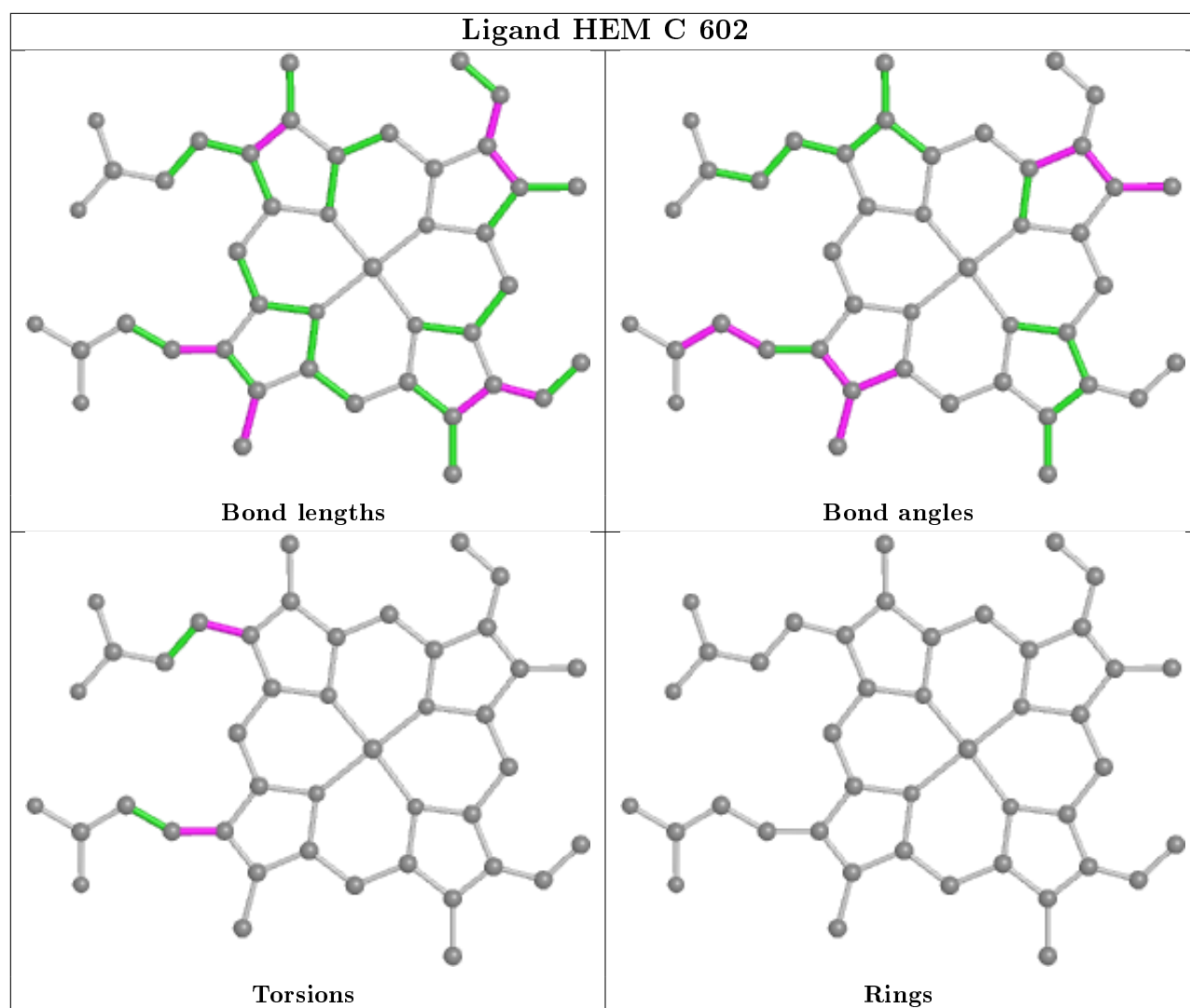
| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|-----|-------|-----|------|---------|--------------|
| 2 | C | 601 | PLP | 2 | 0 |
| 2 | A | 601 | PLP | 4 | 0 |
| 2 | D | 601 | PLP | 3 | 0 |
| 3 | A | 602 | HEM | 15 | 0 |
| 2 | B | 601 | PLP | 3 | 0 |
| 3 | D | 602 | HEM | 9 | 0 |
| 3 | B | 602 | HEM | 12 | 0 |
| 3 | C | 602 | HEM | 14 | 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

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

| Mol | Chain | Analysed | <RSRZ> | #RSRZ>2 | OWAB(Å ²) | Q<0.9 |
|-----|-------|-----------------|--------|------------------------------|-----------------------|-------|
| 1 | A | 485/548 (88%) | 0.72 | 72 (14%) 2 3 | 43, 83, 160, 205 | 0 |
| 1 | B | 490/548 (89%) | 0.20 | 23 (4%) 31 31 | 40, 84, 141, 214 | 0 |
| 1 | C | 491/548 (89%) | 0.23 | 15 (3%) 49 48 | 39, 78, 137, 185 | 0 |
| 1 | D | 491/548 (89%) | 0.36 | 39 (7%) 12 14 | 34, 75, 159, 207 | 0 |
| All | All | 1957/2192 (89%) | 0.38 | 149 (7%) 13 15 | 34, 80, 154, 214 | 0 |

All (149) RSRZ outliers are listed below:

| Mol | Chain | Res | Type | RSRZ |
|-----|-------|-----|------|------|
| 1 | A | 57 | GLY | 12.1 |
| 1 | A | 443 | PHE | 6.9 |
| 1 | B | 427 | PRO | 6.5 |
| 1 | A | 41 | PRO | 6.2 |
| 1 | A | 417 | LEU | 6.1 |
| 1 | A | 446 | ALA | 5.6 |
| 1 | A | 456 | LEU | 5.5 |
| 1 | C | 427 | PRO | 5.4 |
| 1 | A | 512 | VAL | 5.4 |
| 1 | A | 56 | LEU | 5.2 |
| 1 | A | 409 | TRP | 5.1 |
| 1 | A | 496 | LEU | 5.1 |
| 1 | A | 298 | GLN | 5.1 |
| 1 | A | 414 | VAL | 5.0 |
| 1 | A | 532 | GLY | 4.9 |
| 1 | D | 532 | GLY | 4.8 |
| 1 | A | 545 | ALA | 4.8 |
| 1 | A | 548 | ARG | 4.7 |
| 1 | D | 452 | ALA | 4.6 |
| 1 | D | 533 | VAL | 4.6 |
| 1 | A | 448 | VAL | 4.5 |

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| Mol | Chain | Res | Type | RSRZ |
|-----|-------|-----|------|------|
| 1 | D | 417 | LEU | 4.5 |
| 1 | C | 531 | PHE | 4.5 |
| 1 | A | 450 | ASP | 4.4 |
| 1 | A | 109 | CYS | 4.4 |
| 1 | D | 456 | LEU | 4.3 |
| 1 | A | 278 | ILE | 4.3 |
| 1 | A | 370 | CYS | 4.3 |
| 1 | D | 427 | PRO | 4.3 |
| 1 | D | 457 | GLY | 4.2 |
| 1 | D | 539 | LEU | 4.0 |
| 1 | B | 456 | LEU | 4.0 |
| 1 | B | 450 | ASP | 4.0 |
| 1 | A | 529 | MET | 4.0 |
| 1 | A | 481 | LYS | 3.9 |
| 1 | A | 510 | LEU | 3.8 |
| 1 | D | 445 | GLN | 3.8 |
| 1 | A | 415 | GLN | 3.8 |
| 1 | D | 434 | THR | 3.8 |
| 1 | A | 252 | VAL | 3.8 |
| 1 | B | 531 | PHE | 3.7 |
| 1 | A | 546 | GLN | 3.7 |
| 1 | A | 459 | VAL | 3.7 |
| 1 | A | 477 | ASP | 3.7 |
| 1 | A | 533 | VAL | 3.7 |
| 1 | B | 423 | LEU | 3.6 |
| 1 | D | 455 | ILE | 3.6 |
| 1 | A | 514 | GLU | 3.6 |
| 1 | C | 298 | GLN | 3.6 |
| 1 | A | 70 | PRO | 3.6 |
| 1 | D | 458 | MET | 3.5 |
| 1 | A | 398 | LYS | 3.5 |
| 1 | B | 455 | ILE | 3.5 |
| 1 | B | 532 | GLY | 3.5 |
| 1 | A | 397 | LEU | 3.4 |
| 1 | A | 542 | PHE | 3.4 |
| 1 | A | 299 | THR | 3.4 |
| 1 | D | 449 | VAL | 3.3 |
| 1 | A | 549 | ASP | 3.3 |
| 1 | B | 399 | GLU | 3.2 |
| 1 | D | 479 | VAL | 3.2 |
| 1 | B | 481 | LYS | 3.2 |
| 1 | C | 399 | GLU | 3.2 |

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| Mol | Chain | Res | Type | RSRZ |
|-----|-------|-----|------|------|
| 1 | A | 499 | LEU | 3.2 |
| 1 | C | 398 | LYS | 3.1 |
| 1 | A | 492 | LEU | 3.1 |
| 1 | A | 104 | GLU | 3.1 |
| 1 | A | 451 | GLU | 3.1 |
| 1 | C | 299 | THR | 3.0 |
| 1 | A | 530 | VAL | 3.0 |
| 1 | B | 489 | GLN | 3.0 |
| 1 | D | 397 | LEU | 3.0 |
| 1 | A | 372 | VAL | 3.0 |
| 1 | D | 419 | LEU | 2.9 |
| 1 | B | 448 | VAL | 2.9 |
| 1 | A | 268 | LEU | 2.9 |
| 1 | C | 428 | THR | 2.8 |
| 1 | D | 508 | PHE | 2.8 |
| 1 | A | 535 | THR | 2.8 |
| 1 | A | 430 | THR | 2.8 |
| 1 | D | 534 | VAL | 2.8 |
| 1 | A | 508 | PHE | 2.8 |
| 1 | B | 425 | VAL | 2.7 |
| 1 | C | 443 | PHE | 2.7 |
| 1 | A | 264 | ILE | 2.7 |
| 1 | A | 106 | LEU | 2.6 |
| 1 | D | 482 | VAL | 2.6 |
| 1 | A | 253 | ALA | 2.6 |
| 1 | D | 411 | HIS | 2.6 |
| 1 | A | 534 | VAL | 2.6 |
| 1 | A | 358 | VAL | 2.6 |
| 1 | B | 446 | ALA | 2.6 |
| 1 | A | 324 | PHE | 2.6 |
| 1 | B | 482 | VAL | 2.6 |
| 1 | A | 408 | TRP | 2.6 |
| 1 | A | 449 | VAL | 2.6 |
| 1 | A | 63 | SER | 2.5 |
| 1 | A | 366 | GLU | 2.5 |
| 1 | D | 443 | PHE | 2.5 |
| 1 | D | 147 | SER | 2.5 |
| 1 | A | 513 | HIS | 2.5 |
| 1 | D | 428 | THR | 2.5 |
| 1 | D | 483 | ILE | 2.5 |
| 1 | B | 449 | VAL | 2.4 |
| 1 | A | 365 | GLN | 2.4 |

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| Mol | Chain | Res | Type | RSRZ |
|-----|-------|-----|------|------|
| 1 | B | 424 | THR | 2.4 |
| 1 | A | 476 | SER | 2.3 |
| 1 | A | 105 | LEU | 2.3 |
| 1 | A | 457 | GLY | 2.3 |
| 1 | A | 511 | VAL | 2.3 |
| 1 | A | 541 | ASN | 2.3 |
| 1 | A | 455 | ILE | 2.3 |
| 1 | D | 429 | ILE | 2.3 |
| 1 | A | 371 | VAL | 2.3 |
| 1 | A | 445 | GLN | 2.3 |
| 1 | B | 458 | MET | 2.2 |
| 1 | A | 361 | ALA | 2.2 |
| 1 | D | 416 | GLU | 2.2 |
| 1 | D | 478 | GLN | 2.2 |
| 1 | D | 438 | LEU | 2.2 |
| 1 | C | 456 | LEU | 2.2 |
| 1 | B | 533 | VAL | 2.2 |
| 1 | D | 512 | VAL | 2.2 |
| 1 | D | 441 | LYS | 2.2 |
| 1 | A | 279 | GLY | 2.2 |
| 1 | C | 527 | ARG | 2.2 |
| 1 | B | 492 | LEU | 2.2 |
| 1 | D | 403 | THR | 2.2 |
| 1 | B | 530 | VAL | 2.1 |
| 1 | C | 441 | LYS | 2.1 |
| 1 | B | 548 | ARG | 2.1 |
| 1 | D | 485 | LYS | 2.1 |
| 1 | B | 508 | PHE | 2.1 |
| 1 | D | 425 | VAL | 2.1 |
| 1 | C | 166 | ILE | 2.1 |
| 1 | C | 528 | GLN | 2.1 |
| 1 | D | 422 | PRO | 2.1 |
| 1 | D | 509 | ALA | 2.1 |
| 1 | A | 464 | MET | 2.1 |
| 1 | D | 447 | PRO | 2.1 |
| 1 | B | 490 | ILE | 2.1 |
| 1 | C | 72 | LYS | 2.1 |
| 1 | D | 446 | ALA | 2.1 |
| 1 | A | 280 | VAL | 2.1 |
| 1 | D | 530 | VAL | 2.1 |
| 1 | A | 88 | PRO | 2.1 |
| 1 | C | 434 | THR | 2.0 |

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| Mol | Chain | Res | Type | RSRZ |
|-----|-------|-----|------|------|
| 1 | A | 491 | ARG | 2.0 |
| 1 | D | 435 | ILE | 2.0 |

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

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

6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

6.4 Ligands [i](#)

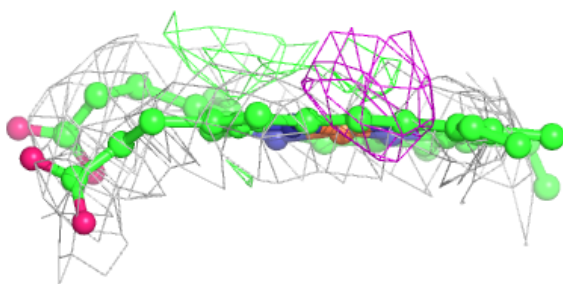
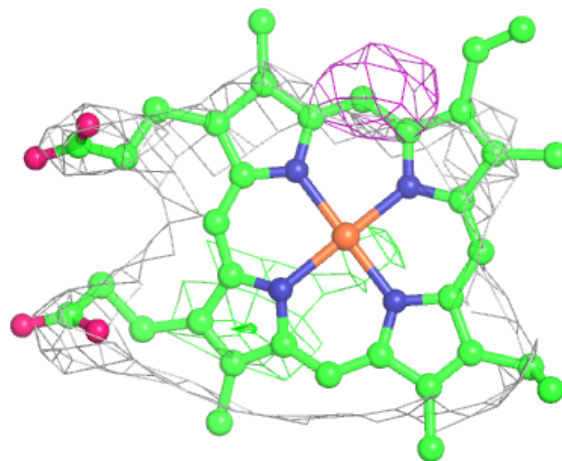
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists the number of atoms with occupancy less than 0.9.

| Mol | Type | Chain | Res | Atoms | RSCC | RSR | B-factors(\AA^2) | Q<0.9 |
|-----|------|-------|-----|-------|------|------|-----------------------------|-------|
| 2 | PLP | A | 601 | 15/16 | 0.91 | 0.25 | 50,67,77,77 | 0 |
| 3 | HEM | A | 602 | 43/43 | 0.91 | 0.34 | 106,106,107,107 | 0 |
| 2 | PLP | C | 601 | 15/16 | 0.94 | 0.28 | 45,56,60,63 | 0 |
| 2 | PLP | B | 601 | 15/16 | 0.94 | 0.23 | 57,70,80,81 | 0 |
| 3 | HEM | B | 602 | 43/43 | 0.94 | 0.29 | 112,112,113,113 | 0 |
| 3 | HEM | C | 602 | 43/43 | 0.94 | 0.33 | 79,79,80,80 | 0 |
| 3 | HEM | D | 602 | 43/43 | 0.95 | 0.28 | 79,79,80,80 | 0 |
| 2 | PLP | D | 601 | 15/16 | 0.96 | 0.24 | 49,56,65,66 | 0 |

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

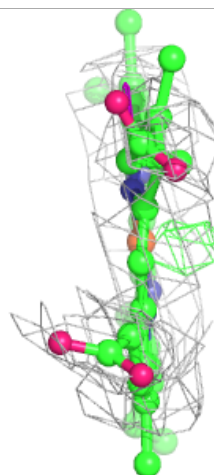
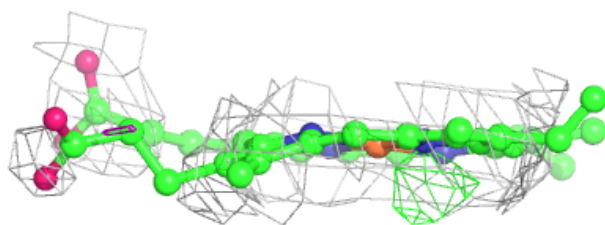
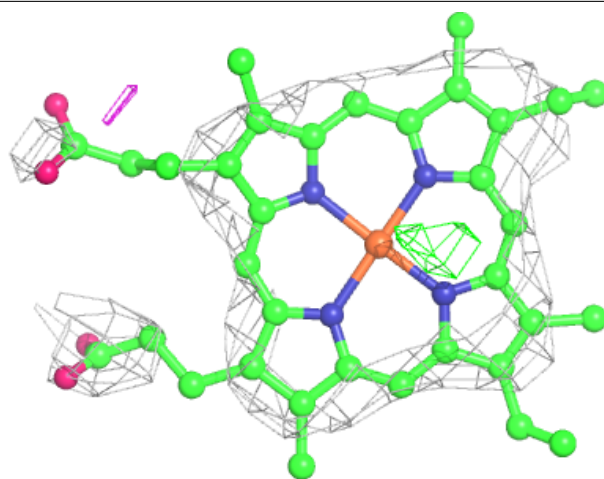
Electron density around HEM A 602:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



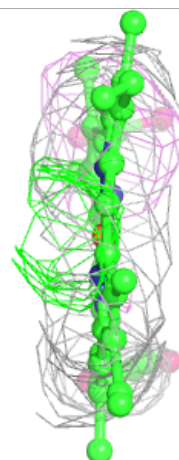
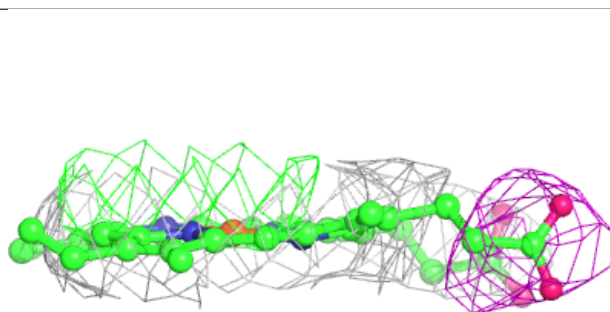
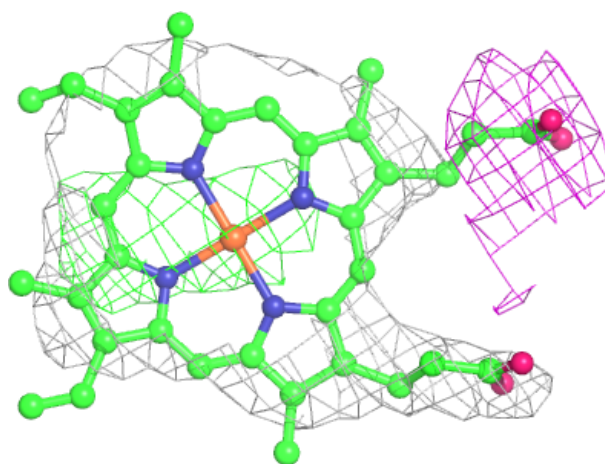
Electron density around HEM B 602:

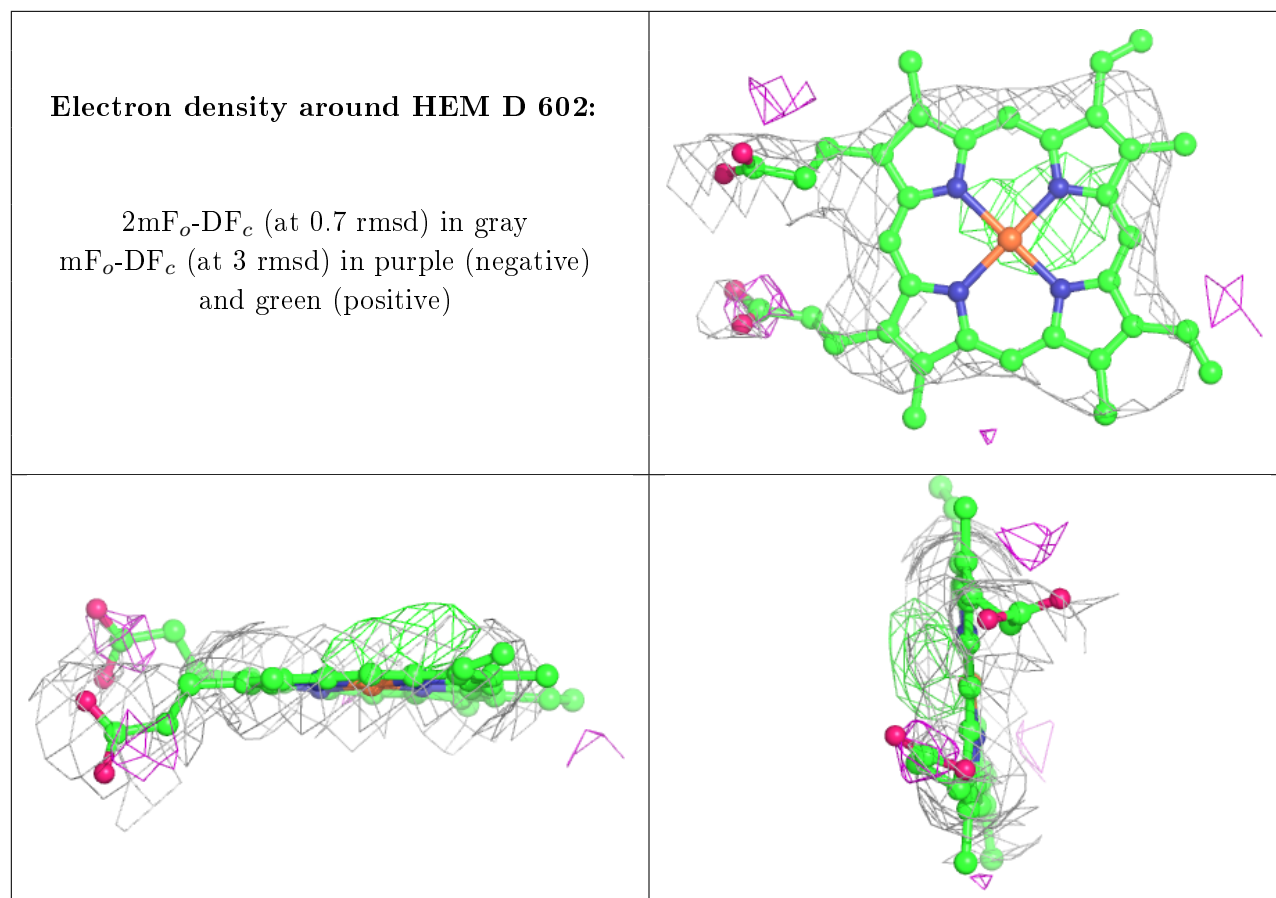
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around HEM C 602:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





6.5 Other polymers ⓘ

There are no such residues in this entry.