



Full wwPDB EM Validation Report ⓘ

Oct 15, 2021 – 01:02 am BST

PDB ID : 7PJV
EMDB ID : EMD-13461
Title : Structure of the 70S-EF-G-GDP-Pi ribosome complex with tRNAs in hybrid state 1 (H1-EF-G-GDP-Pi)
Authors : Petrychenko, V.; Peng, B.Z.; Schwarzer, A.C.; Peske, F.; Rodnina, M.V.; Fischer, N.
Deposited on : 2021-08-24
Resolution : 3.10 Å (reported)
Based on initial models : 5J9Z, 4AQY, 6YSS, 5LZD

This is a Full wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : 0.0.0.dev97
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.2

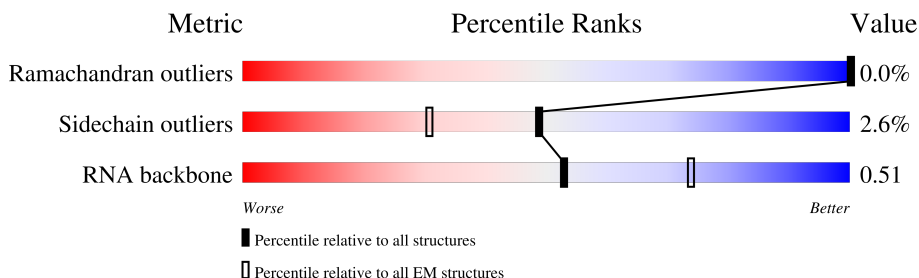
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.10 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.




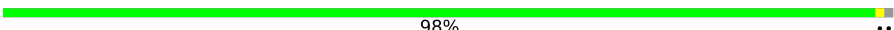
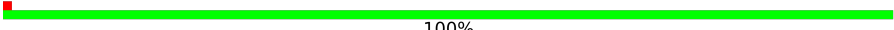
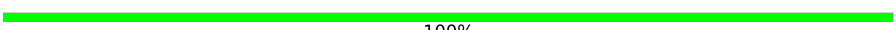
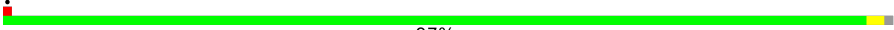





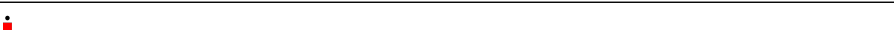

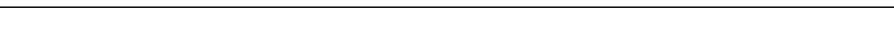
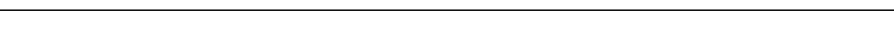
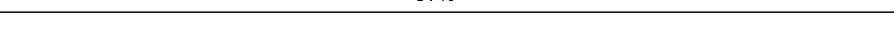
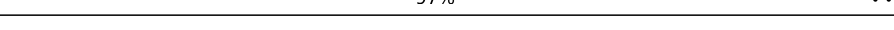
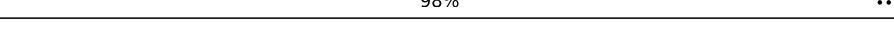
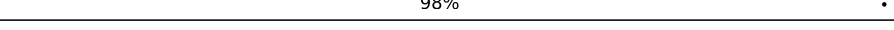
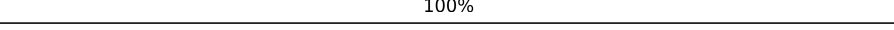
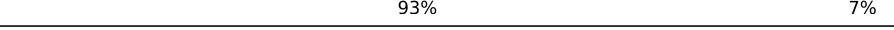
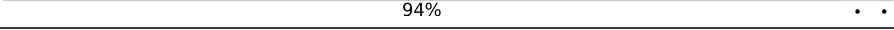
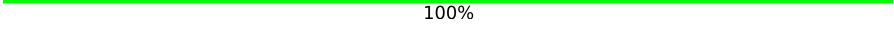

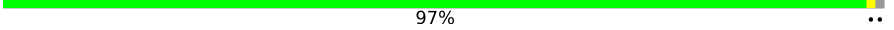
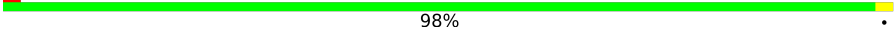
| Metric | Whole archive (#Entries) | EM structures (#Entries) |
|-----------------------|--------------------------|--------------------------|
| Ramachandran outliers | 154571 | 4023 |
| Sidechain outliers | 154315 | 3826 |
| RNA backbone | 4643 | 859 |

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 1 | 0 | 57 | 98% |
| 2 | 1 | 55 | 89% |
| 3 | 2 | 46 | 100% |
| 4 | 3 | 65 | 98% |
| 5 | 4 | 38 | 97% |
| 6 | 5 | 165 | 57% |
| 7 | 6 | 70 | 90% |
| 8 | A | 2903 | 76% |

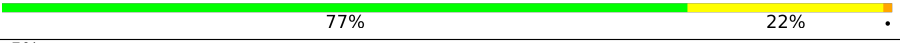


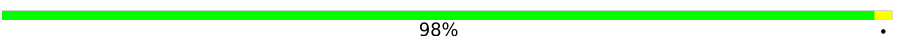
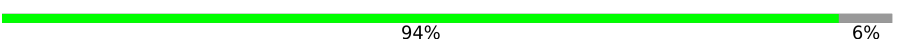

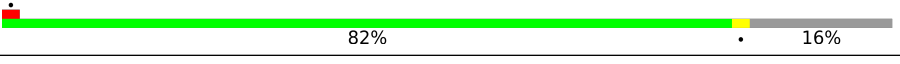
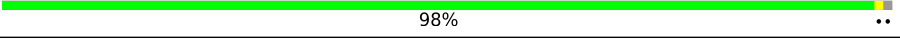
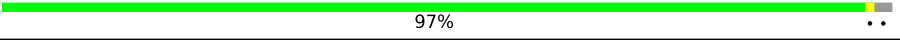
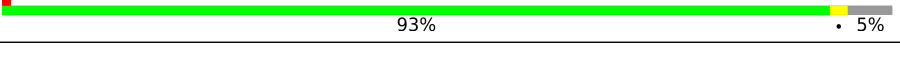
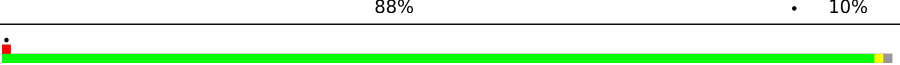



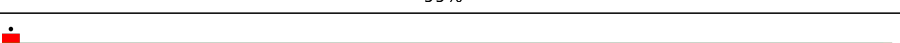
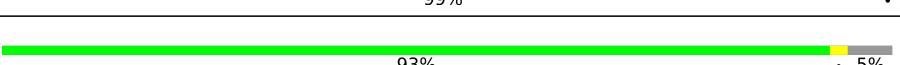

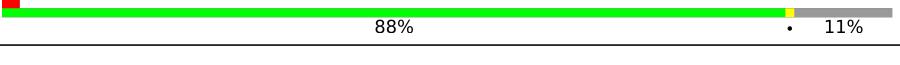
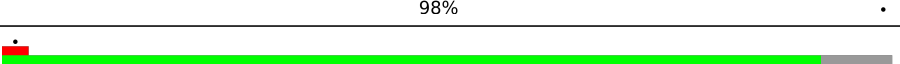

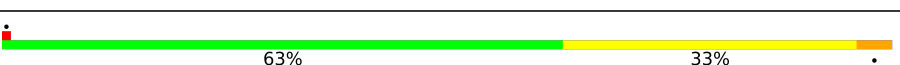




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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|--|
| 9 | B | 120 |  72%28% |
| 10 | C | 273 |  98%.. |
| 11 | D | 209 |  100% |
| 12 | E | 201 |  100% |
| 13 | F | 179 |  97%.. |
| 14 | G | 177 |  99%.. |
| 15 | H | 149 |  51%100% |
| 16 | I | 142 |  51%99%. |
| 17 | J | 142 |  100% |
| 18 | K | 123 |  98%.. |
| 19 | L | 144 |  99%.. |
| 20 | M | 136 |  99%. |
| 21 | N | 127 |  94%6%6% |
| 22 | O | 117 |  97%.. |
| 23 | P | 115 |  97%.. |
| 24 | Q | 118 |  98%.. |
| 25 | R | 103 |  98%. |
| 26 | S | 110 |  100% |
| 27 | T | 100 |  93%7% |
| 28 | U | 104 |  94%.. |
| 29 | V | 94 |  100% |
| 30 | W | 85 |  88%12% |
| 31 | X | 78 |  97%.. |
| 32 | Y | 63 |  98%. |
| 33 | Z | 59 |  98%. |


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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|--|
| 34 | a | 1542 |  |
| 35 | b | 240 |  |
| 36 | c | 233 |  |
| 37 | d | 206 |  |
| 38 | e | 167 |  |
| 39 | f | 135 |  |
| 40 | g | 179 |  |
| 41 | h | 130 |  |
| 42 | i | 130 |  |
| 43 | j | 103 |  |
| 44 | k | 129 |  |
| 45 | l | 124 |  |
| 46 | m | 118 |  |
| 47 | n | 102 |  |
| 48 | o | 89 |  |
| 49 | p | 82 |  |
| 50 | q | 84 |  |
| 51 | r | 75 |  |
| 52 | s | 92 |  |
| 53 | t | 87 |  |
| 54 | u | 71 |  |
| 55 | v | 77 |  |
| 56 | w | 76 |  |
| 57 | x | 704 |  |
| 58 | y | 2 |  |

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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|---|
| 59 | z | 33 |  A horizontal bar chart showing the quality of chain 59. The bar is divided into three segments: a green segment on the left labeled '21%', a yellow segment in the middle labeled '12%', and a grey segment on the right labeled '67%'. The total length of the bar represents 100%. |

2 Entry composition

There are 65 unique types of molecules in this entry. The entry contains 153165 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called 50S ribosomal protein L32.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 1 | 0 | 56 | Total | C | N | O | S | 0 | 0 |
| | | | 444 | 269 | 94 | 80 | 1 | | |

- Molecule 2 is a protein called 50S ribosomal protein L33.

| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---------|-------|
| 2 | 1 | 50 | Total | C | N | O | 0 | 0 |
| | | | 409 | 263 | 75 | 71 | | |

- Molecule 3 is a protein called 50S ribosomal protein L34.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 3 | 2 | 46 | Total | C | N | O | S | 0 | 0 |
| | | | 377 | 228 | 90 | 57 | 2 | | |

- Molecule 4 is a protein called 50S ribosomal protein L35.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|---|---------|-------|
| 4 | 3 | 64 | Total | C | N | O | S | 0 | 0 |
| | | | 504 | 323 | 105 | 74 | 2 | | |

- Molecule 5 is a protein called 50S ribosomal protein L36.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 5 | 4 | 38 | Total | C | N | O | S | 0 | 0 |
| | | | 302 | 185 | 65 | 48 | 4 | | |

- Molecule 6 is a protein called 50S ribosomal protein L10.

| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|
| 6 | 5 | 131 | Total | C | N | O | 0 | 0 |
| | | | 647 | 385 | 131 | 131 | | |

- Molecule 7 is a protein called 50S ribosomal protein L31.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 7 | 6 | 66 | Total | C | N | O | S | 0 | 0 |
| | | | 522 | 323 | 99 | 94 | 6 | | |

- Molecule 8 is a RNA chain called 23S ribosomal RNA.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-------|-------|-------|------|---------|-------|
| 8 | A | 2903 | Total | C | N | O | P | 0 | 0 |
| | | | 62338 | 27816 | 11471 | 20148 | 2903 | | |

- Molecule 9 is a RNA chain called 5S ribosomal RNA.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|-----|---------|-------|
| 9 | B | 120 | Total | C | N | O | P | 0 | 0 |
| | | | 2570 | 1144 | 468 | 838 | 120 | | |

- Molecule 10 is a protein called 50S ribosomal protein L2.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 10 | C | 271 | Total | C | N | O | S | 0 | 0 |
| | | | 2082 | 1288 | 423 | 364 | 7 | | |

- Molecule 11 is a protein called 50S ribosomal protein L3.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 11 | D | 209 | Total | C | N | O | S | 0 | 0 |
| | | | 1565 | 979 | 288 | 294 | 4 | | |

- Molecule 12 is a protein called 50S ribosomal protein L4.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 12 | E | 201 | Total | C | N | O | S | 0 | 0 |
| | | | 1552 | 974 | 283 | 290 | 5 | | |

- Molecule 13 is a protein called 50S ribosomal protein L5.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 13 | F | 177 | Total | C | N | O | S | 0 | 0 |
| | | | 1410 | 899 | 249 | 256 | 6 | | |

- Molecule 14 is a protein called 50S ribosomal protein L6.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 14 | G | 176 | Total | C | N | O | S | 0 | 0 |
| | | | 1323 | 832 | 243 | 246 | 2 | | |

- Molecule 15 is a protein called 50S ribosomal protein L9.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 15 | H | 149 | Total | C | N | O | S | 0 | 0 |
| | | | 1111 | 699 | 197 | 214 | 1 | | |

- Molecule 16 is a protein called 50S ribosomal protein L11.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 16 | I | 141 | Total | C | N | O | S | 0 | 0 |
| | | | 693 | 411 | 141 | 141 | | | |

- Molecule 17 is a protein called 50S ribosomal protein L13.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 17 | J | 142 | Total | C | N | O | S | 0 | 0 |
| | | | 1129 | 714 | 212 | 199 | 4 | | |

- Molecule 18 is a protein called 50S ribosomal protein L14.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 18 | K | 122 | Total | C | N | O | S | 0 | 0 |
| | | | 938 | 587 | 180 | 165 | 6 | | |

- Molecule 19 is a protein called 50S ribosomal protein L15.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 19 | L | 143 | Total | C | N | O | S | 0 | 0 |
| | | | 1045 | 649 | 206 | 189 | 1 | | |

- Molecule 20 is a protein called 50S ribosomal protein L16.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 20 | M | 136 | Total | C | N | O | S | 0 | 0 |
| | | | 1074 | 686 | 205 | 177 | 6 | | |

- Molecule 21 is a protein called 50S ribosomal protein L17.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 21 | N | 120 | Total | C | N | O | S | 0 | 0 |
| | | | 960 | 593 | 196 | 166 | 5 | | |

- Molecule 22 is a protein called 50S ribosomal protein L18.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|--|---------|-------|
| 22 | O | 116 | Total | C | N | O | | 0 | 0 |
| | | | 892 | 552 | 178 | 162 | | | |

- Molecule 23 is a protein called 50S ribosomal protein L19.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 23 | P | 114 | Total | C | N | O | S | 0 | 0 |
| | | | 917 | 574 | 179 | 163 | 1 | | |

- Molecule 24 is a protein called 50S ribosomal protein L20.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|--|---------|-------|
| 24 | Q | 117 | Total | C | N | O | | 0 | 0 |
| | | | 947 | 604 | 192 | 151 | | | |

- Molecule 25 is a protein called 50S ribosomal protein L21.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 25 | R | 103 | Total | C | N | O | S | 0 | 0 |
| | | | 816 | 516 | 153 | 145 | 2 | | |

- Molecule 26 is a protein called 50S ribosomal protein L22.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 26 | S | 110 | Total | C | N | O | S | 0 | 0 |
| | | | 857 | 532 | 166 | 156 | 3 | | |

- Molecule 27 is a protein called 50S ribosomal protein L23.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 27 | T | 93 | Total | C | N | O | S | 0 | 0 |
| | | | 738 | 466 | 139 | 131 | 2 | | |

- Molecule 28 is a protein called 50S ribosomal protein L24.

| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---------|-------|
| 28 | U | 102 | Total | C | N | O | 0 | 0 |
| | | | 779 | 492 | 146 | 141 | | |

- Molecule 29 is a protein called 50S ribosomal protein L25.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 29 | V | 94 | Total | C | N | O | S | 0 | 0 |
| | | | 753 | 479 | 137 | 134 | 3 | | |

- Molecule 30 is a protein called 50S ribosomal protein L27.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 30 | W | 75 | Total | C | N | O | S | 0 | 0 |
| | | | 575 | 356 | 116 | 102 | 1 | | |

- Molecule 31 is a protein called 50S ribosomal protein L28.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 31 | X | 77 | Total | C | N | O | S | 0 | 0 |
| | | | 625 | 388 | 129 | 106 | 2 | | |

- Molecule 32 is a protein called 50S ribosomal protein L29.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 32 | Y | 63 | Total | C | N | O | S | 0 | 0 |
| | | | 509 | 313 | 99 | 95 | 2 | | |

- Molecule 33 is a protein called 50S ribosomal protein L30.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|---|---------|-------|
| 33 | Z | 58 | Total | C | N | O | S | 0 | 0 |
| | | | 449 | 281 | 87 | 79 | 2 | | |

- Molecule 34 is a RNA chain called 16S ribosomal RNA.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-------|------|-------|------|---------|-------|
| 34 | a | 1540 | Total | C | N | O | P | 0 | 0 |
| | | | 33050 | 14748 | 6057 | 10705 | 1540 | | |

- Molecule 35 is a protein called 30S ribosomal protein S2.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 35 | b | 218 | Total | C | N | O | S | 0 | 0 |
| | | | 1704 | 1081 | 305 | 311 | 7 | | |

- Molecule 36 is a protein called 30S ribosomal protein S3.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 36 | c | 206 | Total | C | N | O | S | 0 | 0 |
| | | | 1624 | 1028 | 305 | 288 | 3 | | |

- Molecule 37 is a protein called 30S ribosomal protein S4.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|------|-----|-----|---|---------|-------|
| 37 | d | 205 | Total | C | N | O | S | 0 | 0 |
| | | | 1643 | 1026 | 315 | 298 | 4 | | |

- Molecule 38 is a protein called 30S ribosomal protein S5.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 38 | e | 157 | Total | C | N | O | S | 0 | 0 |
| | | | 1141 | 709 | 218 | 208 | 6 | | |

- Molecule 39 is a protein called 30S ribosomal protein S6, fully modified isoform.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 39 | f | 100 | Total | C | N | O | S | 0 | 0 |
| | | | 817 | 515 | 148 | 148 | 6 | | |

- Molecule 40 is a protein called 30S ribosomal protein S7.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 40 | g | 151 | Total | C | N | O | S | 0 | 0 |
| | | | 1181 | 735 | 227 | 215 | 4 | | |

- Molecule 41 is a protein called 30S ribosomal protein S8.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 41 | h | 129 | Total | C | N | O | S | 0 | 0 |
| | | | 979 | 616 | 173 | 184 | 6 | | |

- Molecule 42 is a protein called 30S ribosomal protein S9.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 42 | i | 127 | Total | C | N | O | S | 0 | 0 |
| | | | 1022 | 634 | 206 | 179 | 3 | | |

- Molecule 43 is a protein called 30S ribosomal protein S10.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 43 | j | 98 | Total | C | N | O | S | 0 | 0 |
| | | | 786 | 493 | 150 | 142 | 1 | | |

- Molecule 44 is a protein called 30S ribosomal protein S11.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 44 | k | 116 | Total | C | N | O | S | 0 | 0 |
| | | | 869 | 535 | 173 | 158 | 3 | | |

- Molecule 45 is a protein called 30S ribosomal protein S12.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 45 | l | 123 | Total | C | N | O | S | 0 | 0 |
| | | | 955 | 590 | 196 | 165 | 4 | | |

- Molecule 46 is a protein called 30S ribosomal protein S13.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 46 | m | 114 | Total | C | N | O | S | 0 | 0 |
| | | | 883 | 546 | 178 | 156 | 3 | | |

- Molecule 47 is a protein called 30S ribosomal protein S14.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 47 | n | 101 | Total | C | N | O | S | 0 | 0 |
| | | | 799 | 498 | 165 | 133 | 3 | | |

There is a discrepancy between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|-------|---------|----------|--------|-----------|------------|
| n | 35 | ALA | - | insertion | UNP P0AG59 |

- Molecule 48 is a protein called 30S ribosomal protein S15.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 48 | o | 88 | Total | C | N | O | S | 0 | 0 |
| | | | 714 | 439 | 144 | 130 | 1 | | |

- Molecule 49 is a protein called 30S ribosomal protein S16.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 49 | p | 82 | Total | C | N | O | S | 0 | 0 |
| | | | 649 | 406 | 128 | 114 | 1 | | |

- Molecule 50 is a protein called 30S ribosomal protein S17.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 50 | q | 80 | Total | C | N | O | S | 0 | 0 |
| | | | 648 | 411 | 121 | 113 | 3 | | |

- Molecule 51 is a protein called 30S ribosomal protein S18.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|---|---------|-------|
| 51 | r | 65 | Total | C | N | O | S | 0 | 0 |
| | | | 535 | 339 | 100 | 95 | 1 | | |

- Molecule 52 is a protein called 30S ribosomal protein S19.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 52 | s | 82 | Total | C | N | O | S | 0 | 0 |
| | | | 658 | 421 | 125 | 110 | 2 | | |

- Molecule 53 is a protein called 30S ribosomal protein S20.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|---|---------|-------|
| 53 | t | 85 | Total | C | N | O | S | 0 | 0 |
| | | | 665 | 411 | 137 | 114 | 3 | | |

- Molecule 54 is a protein called 30S ribosomal protein S21.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|---|---------|-------|
| 54 | u | 65 | Total | C | N | O | S | 0 | 0 |
| | | | 506 | 313 | 105 | 87 | 1 | | |

- Molecule 55 is a RNA chain called P-site tRNA(fMet).

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---|---------|-------|
| 55 | v | 77 | Total | C | N | O | P | S | 0 | 0 |
| | | | 1642 | 733 | 297 | 534 | 77 | 1 | | |

- Molecule 56 is a RNA chain called P-site fMet-Phe-tRNA(Phe).

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---|---------|-------|
| 56 | w | 76 | Total | C | N | O | P | S | 0 | 0 |
| | | | 1631 | 731 | 291 | 531 | 76 | 2 | | |

- Molecule 57 is a protein called Elongation factor G.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|-----|-------|----------|-------|------|-----|------|----|--|---------|-------|
| 57 | x | 703 | Total | C | N | O | S | | 0 | 0 |
| | | | 5444 | 3429 | 942 | 1048 | 25 | | | |

- Molecule 58 is a protein called Dipeptide (FME-PHE).

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|----|---|---|---|---------|-------|
| 58 | y | 2 | Total | C | N | O | S | 0 | 0 |
| | | | 21 | 15 | 2 | 3 | 1 | | |

- Molecule 59 is a RNA chain called mRNA.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|-----|-------|----------|-------|-----|----|----|----|---------|-------|
| 59 | z | 11 | Total | C | N | O | P | 0 | 0 |
| | | | 230 | 103 | 35 | 81 | 11 | | |

- Molecule 60 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

| Mol | Chain | Residues | Atoms | | AltConf |
|-----|-------|----------|-------|-----|---------|
| 60 | 0 | 1 | Total | Mg | 0 |
| | | | 1 | 1 | |
| 60 | A | 262 | Total | Mg | 0 |
| | | | 262 | 262 | |
| 60 | B | 7 | Total | Mg | 0 |
| | | | 7 | 7 | |
| 60 | C | 3 | Total | Mg | 0 |
| | | | 3 | 3 | |
| 60 | D | 1 | Total | Mg | 0 |
| | | | 1 | 1 | |
| 60 | O | 1 | Total | Mg | 0 |
| | | | 1 | 1 | |

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| Mol | Chain | Residues | Atoms | | AltConf |
|-----|-------|----------|-------------|----------|---------|
| 60 | P | 1 | Total 1 | Mg 1 | 0 |
| 60 | Q | 1 | Total 1 | Mg 1 | 0 |
| 60 | Z | 1 | Total 1 | Mg 1 | 0 |
| 60 | a | 85 | Total 85 | Mg 85 | 0 |
| 60 | m | 1 | Total 1 | Mg 1 | 0 |
| 60 | n | 1 | Total 1 | Mg 1 | 0 |
| 60 | v | 1 | Total 1 | Mg 1 | 0 |
| 60 | w | 1 | Total 1 | Mg 1 | 0 |
| 60 | x | 1 | Total 1 | Mg 1 | 0 |
| 60 | z | 1 | Total 1 | Mg 1 | 0 |

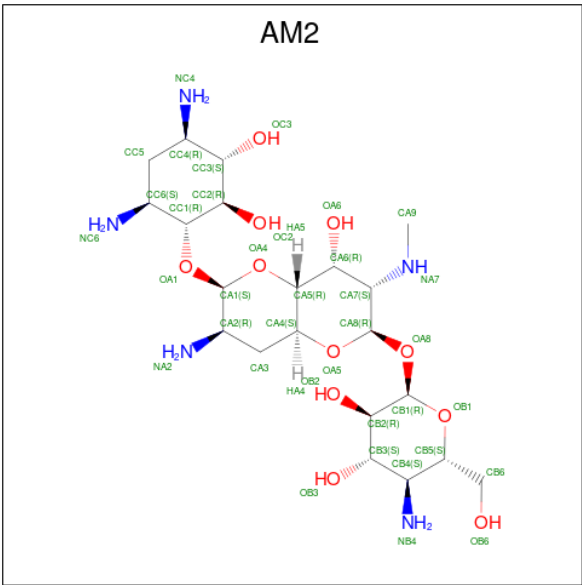
- Molecule 61 is ZINC ION (three-letter code: ZN) (formula: Zn).

| Mol | Chain | Residues | Atoms | | AltConf |
|-----|-------|----------|------------|---------|---------|
| 61 | 4 | 1 | Total 1 | Zn 1 | 0 |
| 61 | 6 | 1 | Total 1 | Zn 1 | 0 |

- Molecule 62 is SODIUM ION (three-letter code: NA) (formula: Na).

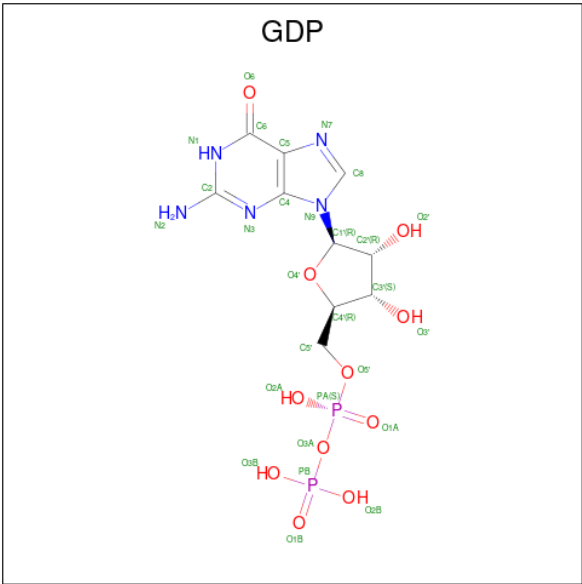
| Mol | Chain | Residues | Atoms | | AltConf |
|-----|-------|----------|------------|---------|---------|
| 62 | A | 1 | Total 1 | Na 1 | 0 |
| 62 | B | 1 | Total 1 | Na 1 | 0 |

- Molecule 63 is APRAMYCIN (three-letter code: AM2) (formula: C₂₁H₄₁N₅O₁₁).



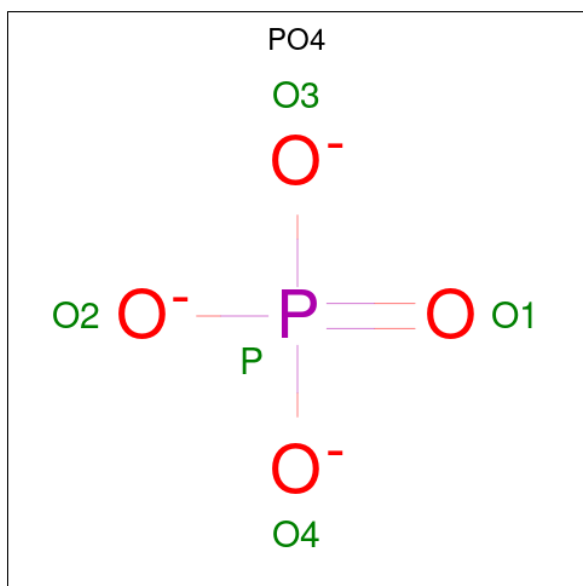
| Mol | Chain | Residues | Atoms | | | | AltConf |
|-----|-------|----------|-------|----|----|----|---------|
| 63 | a | 1 | Total | C | N | O | 0 |
| | | | 111 | 63 | 15 | 33 | |
| 63 | a | 1 | Total | C | N | O | 0 |
| | | | 111 | 63 | 15 | 33 | |
| 63 | a | 1 | Total | C | N | O | 0 |
| | | | 111 | 63 | 15 | 33 | |

- Molecule 64 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).

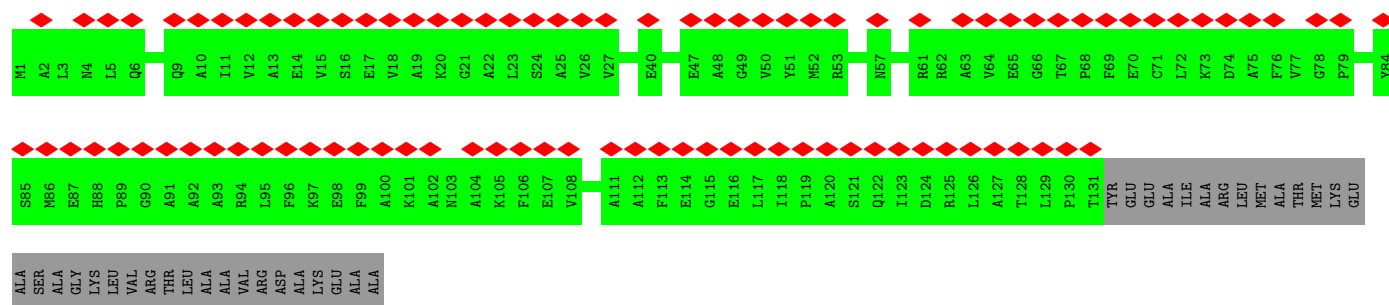


| Mol | Chain | Residues | Atoms | | | | | AltConf |
|-----|-------|----------|-------|----|---|----|---|---------|
| 64 | x | 1 | Total | C | N | O | P | 0 |
| | | | 28 | 10 | 5 | 11 | 2 | |

- Molecule 65 is PHOSPHATE ION (three-letter code: PO4) (formula: O_4P).

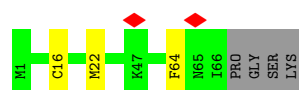


| Mol | Chain | Residues | Atoms | | | AltConf |
|-----|-------|----------|-------|---|---|---------|
| 65 | x | 1 | Total | O | P | 0 |
| | | | 5 | 4 | 1 | |



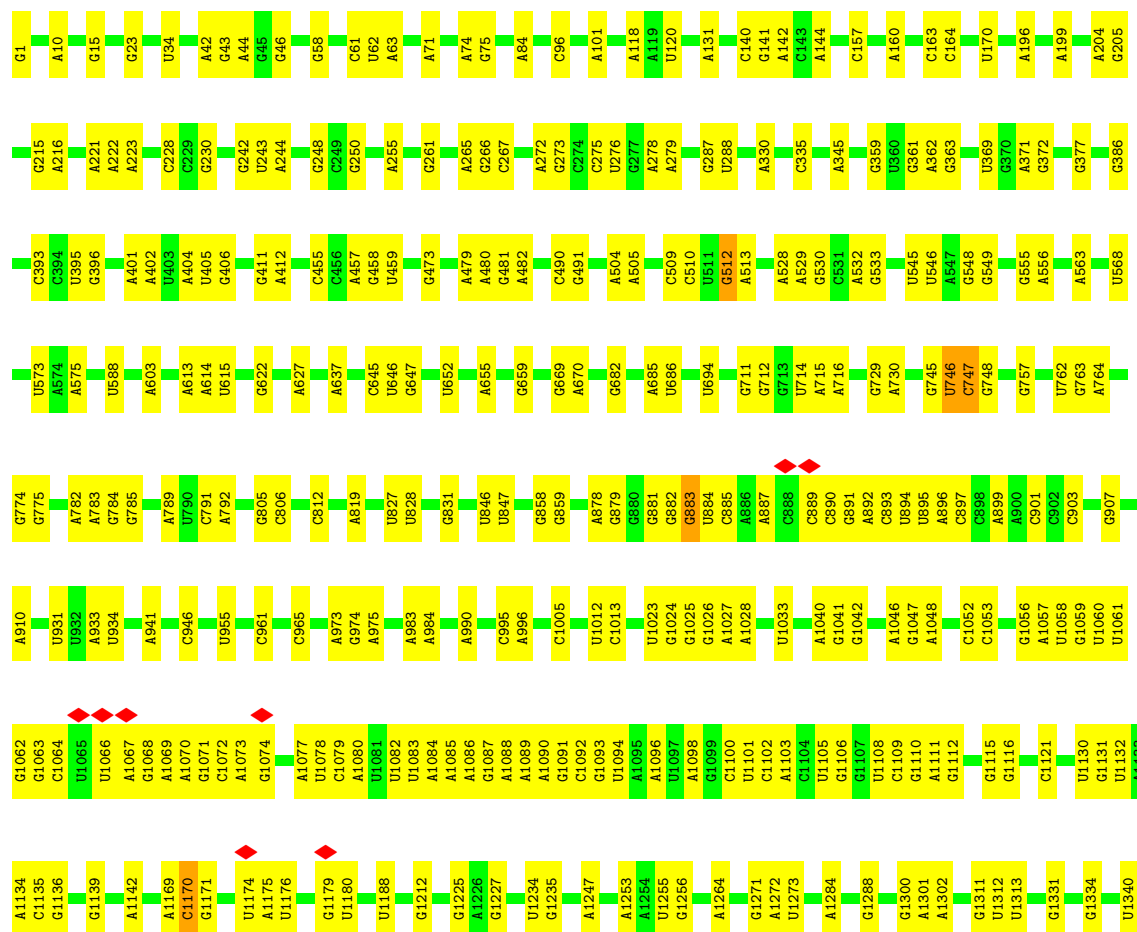
- Molecule 7: 50S ribosomal protein L31

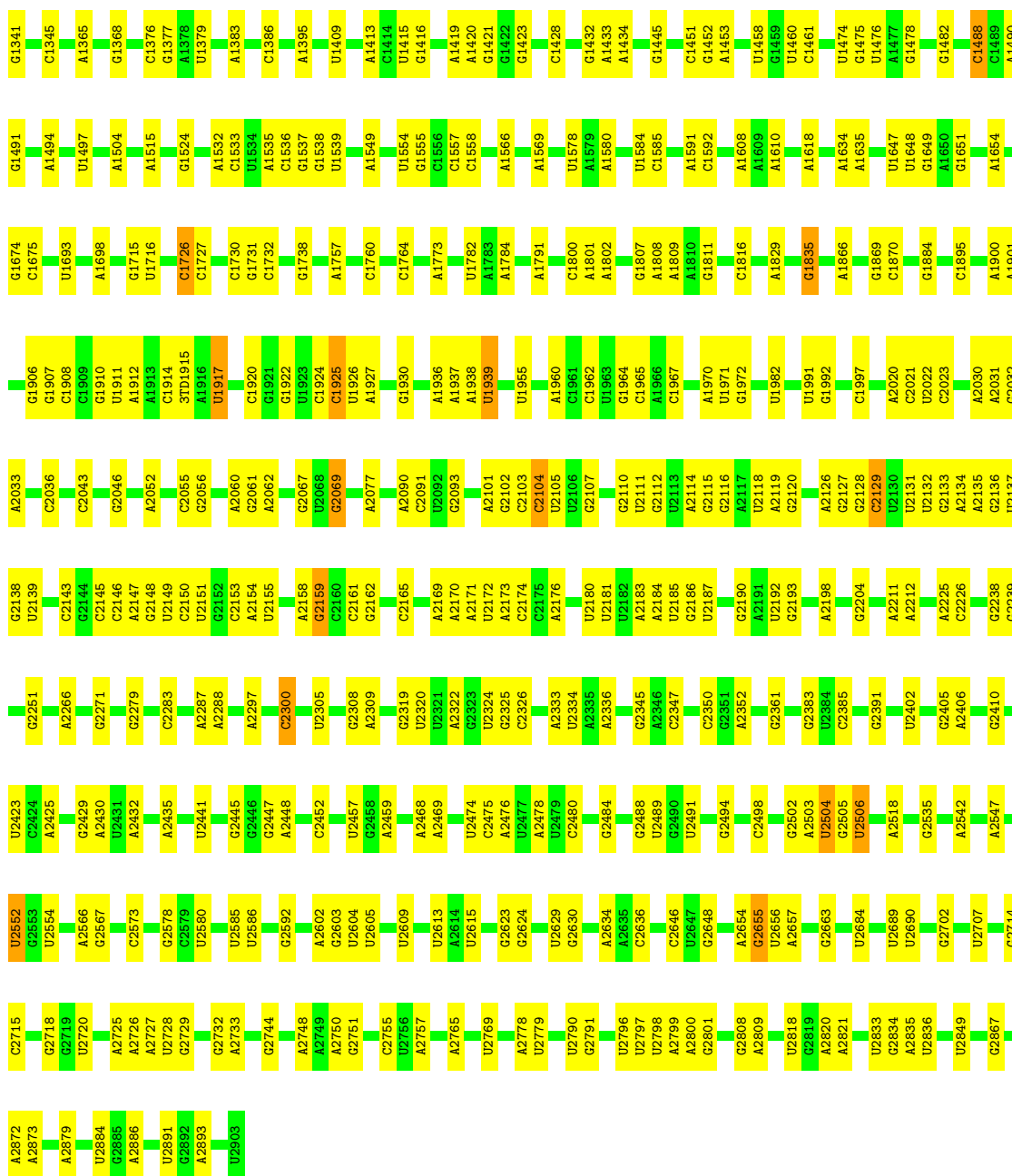
Chain 6: 90% 6%



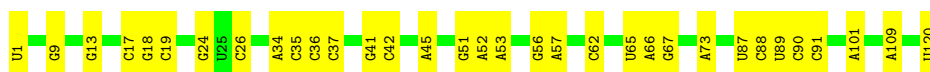
- Molecule 8: 23S ribosomal RNA

Chain A: 76% 23%





- Molecule 9: 5S ribosomal RNA



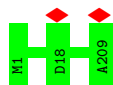
- Molecule 10: 50S ribosomal protein L2





- Molecule 11: 50S ribosomal protein L3

Chain D: 100%



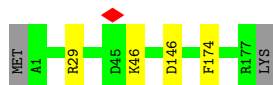
- Molecule 12: 50S ribosomal protein L4

Chain E: 100%

There are no outlier residues recorded for this chain.

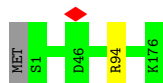
- Molecule 13: 50S ribosomal protein L5

Chain F: 97%



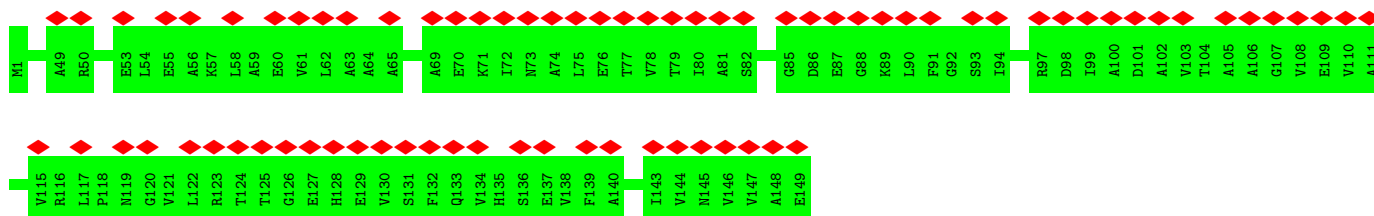
- Molecule 14: 50S ribosomal protein L6

Chain G: 99%



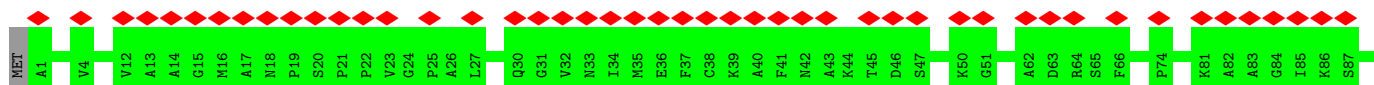
- Molecule 15: 50S ribosomal protein L9

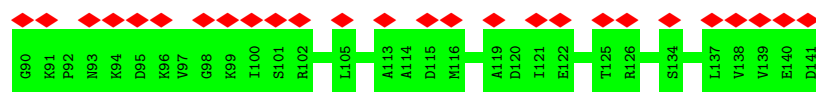
Chain H: 51%
100%



- Molecule 16: 50S ribosomal protein L11

Chain I: 51%
99%





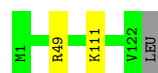
- Molecule 17: 50S ribosomal protein L13

Chain J:  100%

There are no outlier residues recorded for this chain.

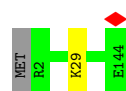
- Molecule 18: 50S ribosomal protein L14

Chain K:  98%



- Molecule 19: 50S ribosomal protein L15

Chain L:  99%



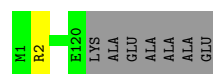
- Molecule 20: 50S ribosomal protein L16

Chain M:  99%



- Molecule 21: 50S ribosomal protein L17

Chain N:  94%



- Molecule 22: 50S ribosomal protein L18

Chain O: 97%



- Molecule 23: 50S ribosomal protein L19

Chain P: 97%



- Molecule 24: 50S ribosomal protein L20

Chain Q: 98% ..



- Molecule 25: 50S ribosomal protein L21

Chain R: 98% .



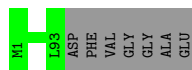
- Molecule 26: 50S ribosomal protein L22

Chain S: 100%

There are no outlier residues recorded for this chain.

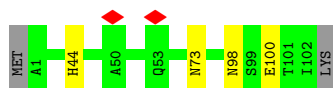
- Molecule 27: 50S ribosomal protein L23

Chain T: 93% 7%



- Molecule 28: 50S ribosomal protein L24

Chain U: 94% . .



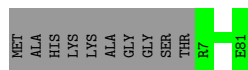
- Molecule 29: 50S ribosomal protein L25

Chain V: 100%

There are no outlier residues recorded for this chain.

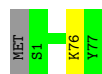
- Molecule 30: 50S ribosomal protein L27

Chain W: 88% 12%



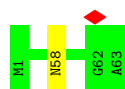
- Molecule 31: 50S ribosomal protein L28

Chain X:  97%



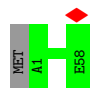
- Molecule 32: 50S ribosomal protein L29

Chain Y:  98%


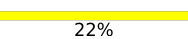


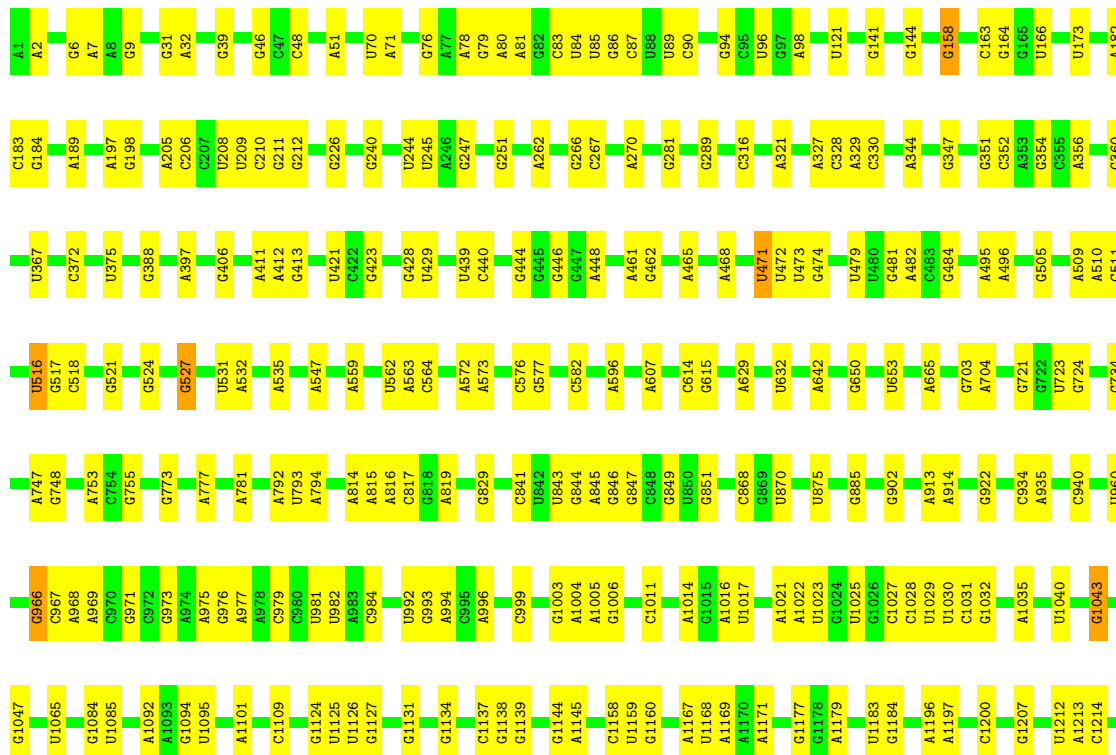
- Molecule 33: 50S ribosomal protein L30

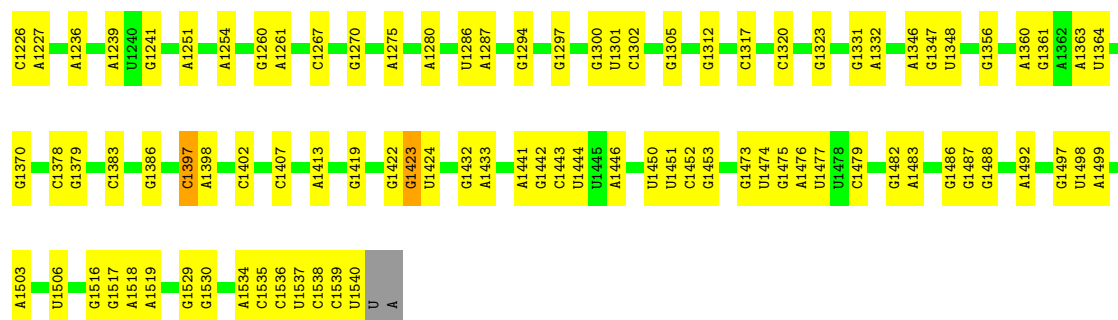
Chain Z:  98%



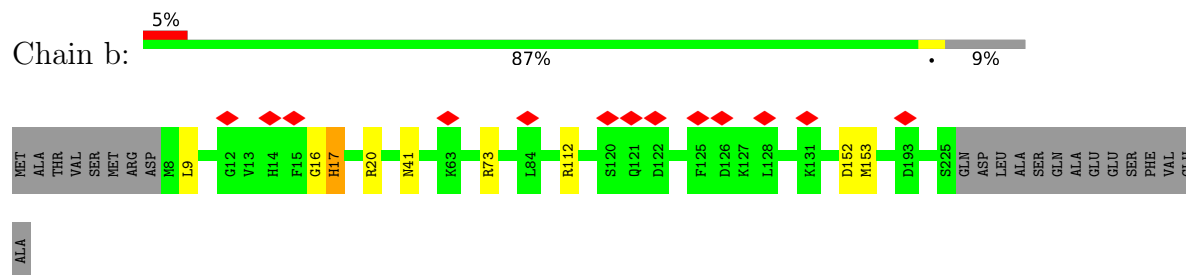
- Molecule 34: 16S ribosomal RNA

Chain a:  77%  22%

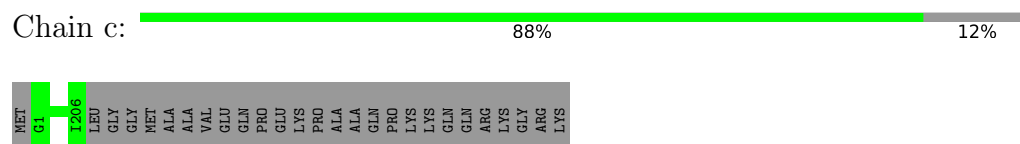




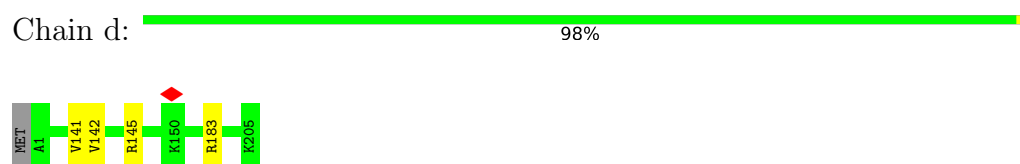
- Molecule 35: 30S ribosomal protein S2



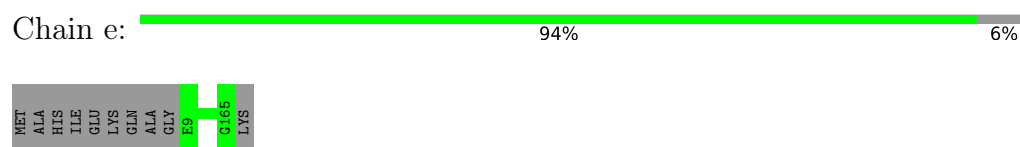
- Molecule 36: 30S ribosomal protein S3



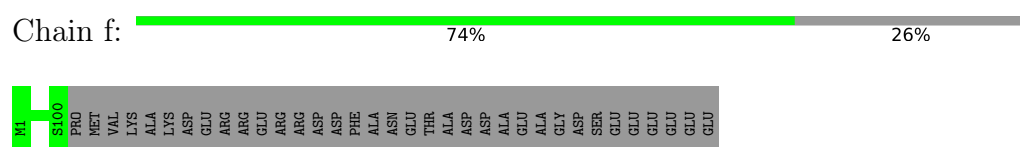
- Molecule 37: 30S ribosomal protein S4




- Molecule 38: 30S ribosomal protein S5

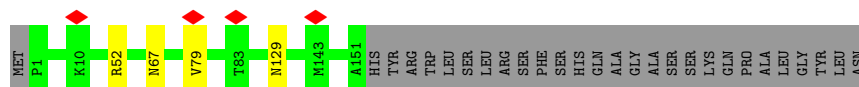


- Molecule 39: 30S ribosomal protein S6, fully modified isoform



- Molecule 40: 30S ribosomal protein S7

Chain g:  82% 16%



- Molecule 41: 30S ribosomal protein S8

Chain h:  98% ..




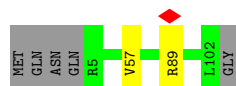
- Molecule 42: 30S ribosomal protein S9

Chain i:  97% ..




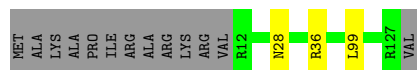
- Molecule 43: 30S ribosomal protein S10

Chain j:  93% 5%



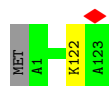
- Molecule 44: 30S ribosomal protein S11

Chain k:  88% 10%



- Molecule 45: 30S ribosomal protein S12

Chain l:  98% ..



- Molecule 46: 30S ribosomal protein S13

Chain m:  96% ..



- Molecule 47: 30S ribosomal protein S14

Chain n:  99%



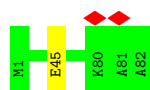
- Molecule 48: 30S ribosomal protein S15

Chain o:  99%



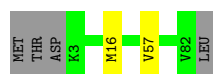
- Molecule 49: 30S ribosomal protein S16

Chain p:  99%




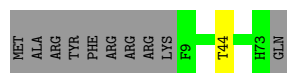
- Molecule 50: 30S ribosomal protein S17

Chain q:  93% 5%




- Molecule 51: 30S ribosomal protein S18

Chain r:  85% 13%



- Molecule 52: 30S ribosomal protein S19

Chain s:  88% 11%



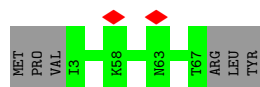
- Molecule 53: 30S ribosomal protein S20

Chain t:  98%



- Molecule 54: 30S ribosomal protein S21

Chain u:  92% 8%



- Molecule 55: P-site tRNA(fMet)

Chain v:  73% 23%




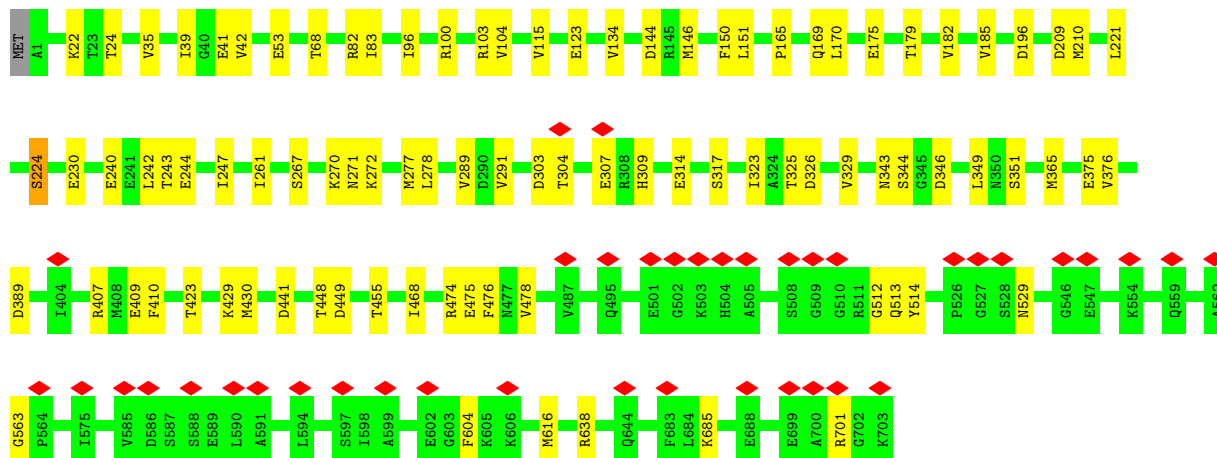
- Molecule 56: P-site fMet-Phe-tRNA(Phe)

Chain w:  63% 33%



- Molecule 57: Elongation factor G

Chain x:  6% 87% 13%



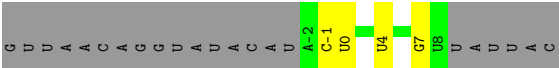
- Molecule 58: Dipeptide (FME-PHE)

Chain y:  50% 50%



- Molecule 59: mRNA

Chain z:  21% 12% 67%



4 Experimental information

| Property | Value | Source |
|--------------------------------------|---|-----------|
| EM reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, Not provided | |
| Number of particles used | 24313 | Depositor |
| Resolution determination method | FSC 0.143 CUT-OFF | Depositor |
| CTF correction method | PHASE FLIPPING AND AMPLITUDE CORRECTION | Depositor |
| Microscope | FEI TITAN KRIOS | Depositor |
| Voltage (kV) | 300 | Depositor |
| Electron dose ($e^-/\text{\AA}^2$) | 30 | Depositor |
| Minimum defocus (nm) | 500 | Depositor |
| Maximum defocus (nm) | 1200 | Depositor |
| Magnification | 59000 | Depositor |
| Image detector | FEI FALCON III (4k x 4k) | Depositor |
| Maximum map value | 16.323 | Depositor |
| Minimum map value | -7.685 | Depositor |
| Average map value | 0.000 | Depositor |
| Map value standard deviation | 1.000 | Depositor |
| Recommended contour level | 1.5 | Depositor |
| Map size (Å) | 334.08, 334.08, 334.08 | wwPDB |
| Map dimensions | 512, 512, 512 | wwPDB |
| Map angles (°) | 90.0, 90.0, 90.0 | wwPDB |
| Pixel spacing (Å) | 0.6525, 0.6525, 0.6525 | Depositor |

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 1MG, MA6, PO4, 2MA, 5MU, FME, 5MC, AM2, OMG, 4SU, UR3, OMU, NA, PSU, H2U, MIA, OMC, 3TD, 4OC, ZN, G7M, GDP, 2MG, 6MZ, MG

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 | 0 | 0.43 | 0/450 | 0.48 | 0/599 |
| 2 | 1 | 0.38 | 0/416 | 0.48 | 0/554 |
| 3 | 2 | 0.42 | 0/380 | 0.50 | 0/498 |
| 4 | 3 | 0.40 | 0/513 | 0.62 | 0/676 |
| 5 | 4 | 0.40 | 0/303 | 0.49 | 0/397 |
| 6 | 5 | 0.27 | 0/646 | 0.56 | 0/898 |
| 7 | 6 | 0.33 | 0/531 | 0.54 | 0/709 |
| 8 | A | 0.82 | 2/69266 (0.0%) | 0.87 | 46/108055 (0.0%) |
| 9 | B | 0.70 | 1/2873 (0.0%) | 0.86 | 0/4478 |
| 10 | C | 0.44 | 0/2121 | 0.55 | 1/2852 (0.0%) |
| 11 | D | 0.43 | 0/1586 | 0.51 | 0/2134 |
| 12 | E | 0.42 | 0/1571 | 0.50 | 0/2113 |
| 13 | F | 0.34 | 0/1434 | 0.51 | 0/1926 |
| 14 | G | 0.34 | 0/1343 | 0.49 | 0/1816 |
| 15 | H | 0.30 | 0/1122 | 0.54 | 0/1515 |
| 16 | I | 0.29 | 0/692 | 0.57 | 0/960 |
| 17 | J | 0.42 | 0/1152 | 0.48 | 0/1551 |
| 18 | K | 0.40 | 0/947 | 0.58 | 0/1268 |
| 19 | L | 0.40 | 0/1054 | 0.56 | 0/1403 |
| 20 | M | 0.40 | 0/1093 | 0.51 | 0/1460 |
| 21 | N | 0.39 | 0/973 | 0.52 | 0/1301 |
| 22 | O | 0.35 | 0/902 | 0.49 | 0/1209 |
| 23 | P | 0.41 | 0/929 | 0.49 | 0/1242 |
| 24 | Q | 0.48 | 0/960 | 0.45 | 0/1278 |
| 25 | R | 0.41 | 0/829 | 0.57 | 0/1107 |
| 26 | S | 0.37 | 0/864 | 0.51 | 0/1156 |
| 27 | T | 0.36 | 0/744 | 0.52 | 0/994 |
| 28 | U | 0.39 | 0/787 | 0.57 | 1/1051 (0.1%) |
| 29 | V | 0.38 | 0/766 | 0.45 | 0/1025 |
| 30 | W | 0.42 | 0/582 | 0.46 | 0/769 |
| 31 | X | 0.40 | 0/635 | 0.52 | 0/848 |

| Mol | Chain | Bond lengths | | Bond angles | |
|-----|-------|--------------|-----------------|-------------|------------------|
| | | RMSZ | # Z >5 | RMSZ | # Z >5 |
| 32 | Y | 0.32 | 0/510 | 0.45 | 0/677 |
| 33 | Z | 0.35 | 0/453 | 0.49 | 0/605 |
| 34 | a | 0.68 | 0/36725 | 0.86 | 17/57285 (0.0%) |
| 35 | b | 0.30 | 0/1735 | 0.56 | 3/2338 (0.1%) |
| 36 | c | 0.35 | 0/1651 | 0.48 | 0/2225 |
| 37 | d | 0.36 | 0/1665 | 0.54 | 0/2227 |
| 38 | e | 0.37 | 0/1154 | 0.53 | 0/1554 |
| 39 | f | 0.34 | 0/835 | 0.49 | 0/1128 |
| 40 | g | 0.31 | 0/1195 | 0.49 | 0/1602 |
| 41 | h | 0.37 | 0/989 | 0.51 | 0/1326 |
| 42 | i | 0.33 | 0/1034 | 0.53 | 0/1375 |
| 43 | j | 0.34 | 0/796 | 0.60 | 1/1077 (0.1%) |
| 44 | k | 0.36 | 0/885 | 0.51 | 0/1195 |
| 45 | l | 0.42 | 0/969 | 0.55 | 0/1300 |
| 46 | m | 0.31 | 0/892 | 0.53 | 0/1193 |
| 47 | n | 0.31 | 0/811 | 0.49 | 0/1081 |
| 48 | o | 0.34 | 0/722 | 0.46 | 0/964 |
| 49 | p | 0.37 | 0/659 | 0.52 | 0/884 |
| 50 | q | 0.40 | 0/657 | 0.56 | 1/881 (0.1%) |
| 51 | r | 0.35 | 0/544 | 0.49 | 0/731 |
| 52 | s | 0.33 | 0/675 | 0.49 | 0/908 |
| 53 | t | 0.31 | 0/671 | 0.43 | 0/888 |
| 54 | u | 0.32 | 0/512 | 0.48 | 0/683 |
| 55 | v | 0.62 | 1/1745 (0.1%) | 0.89 | 4/2716 (0.1%) |
| 56 | w | 0.48 | 0/1650 | 0.89 | 2/2569 (0.1%) |
| 57 | x | 0.56 | 5/5546 (0.1%) | 0.90 | 8/7504 (0.1%) |
| 58 | y | 0.63 | 0/11 | 0.37 | 0/13 |
| 59 | z | 0.71 | 0/255 | 0.87 | 0/394 |
| All | All | 0.67 | 9/164410 (0.0%) | 0.80 | 84/245165 (0.0%) |

All (9) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|-------|--------|-------------|----------|
| 9 | B | 1 | U | OP3-P | -10.52 | 1.48 | 1.61 |
| 55 | v | 1 | C | OP3-P | -10.23 | 1.48 | 1.61 |
| 8 | A | 1 | G | OP3-P | -10.19 | 1.49 | 1.61 |
| 57 | x | 317 | SER | CA-CB | -7.42 | 1.41 | 1.52 |
| 8 | A | 2657 | A | O3'-P | -5.82 | 1.54 | 1.61 |
| 57 | x | 267 | SER | CA-CB | -5.78 | 1.44 | 1.52 |
| 57 | x | 344 | SER | CA-CB | -5.50 | 1.44 | 1.52 |
| 57 | x | 224 | SER | CA-CB | -5.40 | 1.44 | 1.52 |
| 57 | x | 351 | SER | CA-CB | -5.10 | 1.45 | 1.52 |

All (84) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 57 | x | 563 | GLY | N-CA-C | 9.43 | 136.68 | 113.10 |
| 35 | b | 16 | GLY | N-CA-C | 9.19 | 136.09 | 113.10 |
| 8 | A | 2506 | U | C2-N1-C1' | 7.78 | 127.03 | 117.70 |
| 34 | a | 481 | G | C4-N9-C1' | 7.46 | 136.20 | 126.50 |
| 28 | U | 98 | ASN | N-CA-C | -7.45 | 90.89 | 111.00 |
| 8 | A | 2104 | C | N1-C2-O2 | 7.08 | 123.15 | 118.90 |
| 8 | A | 1313 | U | C2-N1-C1' | 7.03 | 126.13 | 117.70 |
| 8 | A | 2506 | U | N1-C2-O2 | 6.97 | 127.68 | 122.80 |
| 34 | a | 481 | G | C6-C5-N7 | -6.66 | 126.40 | 130.40 |
| 8 | A | 2129 | C | N3-C2-O2 | -6.50 | 117.35 | 121.90 |
| 8 | A | 2159 | G | N3-C4-N9 | -6.43 | 122.14 | 126.00 |
| 8 | A | 2655 | G | C1'-O4'-C4' | -6.41 | 104.77 | 109.90 |
| 34 | a | 1158 | C | N1-C2-O2 | 6.35 | 122.71 | 118.90 |
| 57 | x | 169 | GLN | CB-CA-C | -6.27 | 97.85 | 110.40 |
| 8 | A | 1675 | C | N1-C2-O2 | 6.24 | 122.64 | 118.90 |
| 8 | A | 883 | G | P-O3'-C3' | 6.23 | 127.18 | 119.70 |
| 57 | x | 144 | ASP | CB-CA-C | -6.22 | 97.97 | 110.40 |
| 8 | A | 2159 | G | C5-C6-O6 | 6.20 | 132.32 | 128.60 |
| 34 | a | 481 | G | C8-N9-C1' | -6.13 | 119.03 | 127.00 |
| 8 | A | 2104 | C | N3-C2-O2 | -6.07 | 117.66 | 121.90 |
| 8 | A | 2129 | C | N1-C2-O2 | 6.03 | 122.52 | 118.90 |
| 8 | A | 2474 | U | C2-N1-C1' | 5.98 | 124.87 | 117.70 |
| 57 | x | 307 | GLU | N-CA-C | -5.96 | 94.92 | 111.00 |
| 34 | a | 471 | U | N3-C2-O2 | -5.93 | 118.05 | 122.20 |
| 34 | a | 481 | G | N7-C8-N9 | 5.93 | 116.06 | 113.10 |
| 55 | v | 42 | G | O5'-P-OP1 | -5.90 | 100.39 | 105.70 |
| 8 | A | 1675 | C | N3-C2-O2 | -5.88 | 117.78 | 121.90 |
| 8 | A | 512 | G | O4'-C1'-N9 | 5.86 | 112.89 | 108.20 |
| 34 | a | 1158 | C | C2-N1-C1' | 5.84 | 125.22 | 118.80 |
| 8 | A | 1726 | C | C2-N1-C1' | 5.79 | 125.17 | 118.80 |
| 8 | A | 1313 | U | N1-C2-O2 | 5.79 | 126.85 | 122.80 |
| 8 | A | 2104 | C | C2-N1-C1' | 5.78 | 125.16 | 118.80 |
| 8 | A | 2474 | U | N1-C2-O2 | 5.76 | 126.83 | 122.80 |
| 8 | A | 2506 | U | N3-C2-O2 | -5.75 | 118.17 | 122.20 |
| 43 | j | 57 | VAL | N-CA-C | 5.74 | 126.49 | 111.00 |
| 35 | b | 9 | LEU | CA-CB-CG | 5.71 | 128.42 | 115.30 |
| 34 | a | 1356 | G | C4-N9-C1' | 5.66 | 133.85 | 126.50 |
| 34 | a | 471 | U | N1-C2-O2 | 5.58 | 126.70 | 122.80 |
| 34 | a | 1158 | C | N3-C2-O2 | -5.57 | 118.00 | 121.90 |
| 8 | A | 528 | A | C2-N3-C4 | -5.56 | 107.82 | 110.60 |
| 8 | A | 1920 | C | C2-N1-C1' | 5.54 | 124.89 | 118.80 |
| 34 | a | 158 | G | C4'-C3'-C2' | -5.53 | 97.07 | 102.60 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|------|------|------------|-------|-------------|----------|
| 8 | A | 1539 | U | C5-C4-O4 | -5.53 | 122.58 | 125.90 |
| 57 | x | 512 | GLY | N-CA-C | 5.51 | 126.88 | 113.10 |
| 8 | A | 2129 | C | C6-N1-C2 | -5.50 | 118.10 | 120.30 |
| 8 | A | 883 | G | N3-C4-N9 | -5.48 | 122.71 | 126.00 |
| 55 | v | 74 | C | N3-C2-O2 | -5.48 | 118.07 | 121.90 |
| 34 | a | 1423 | G | O5'-P-OP1 | -5.46 | 100.79 | 105.70 |
| 57 | x | 271 | ASN | CB-CA-C | 5.45 | 121.30 | 110.40 |
| 8 | A | 2655 | G | O4'-C1'-N9 | 5.42 | 112.53 | 108.20 |
| 35 | b | 17 | HIS | N-CA-C | -5.39 | 96.45 | 111.00 |
| 8 | A | 2391 | G | C4-N9-C1' | -5.38 | 119.51 | 126.50 |
| 8 | A | 2506 | U | C6-N1-C1' | -5.36 | 113.69 | 121.20 |
| 8 | A | 2159 | G | N1-C6-O6 | -5.31 | 116.72 | 119.90 |
| 8 | A | 901 | C | C2-N1-C1' | 5.27 | 124.60 | 118.80 |
| 8 | A | 2129 | C | C2-N1-C1' | 5.27 | 124.60 | 118.80 |
| 50 | q | 57 | VAL | N-CA-C | -5.27 | 96.78 | 111.00 |
| 34 | a | 1158 | C | C6-N1-C2 | -5.26 | 118.20 | 120.30 |
| 8 | A | 1870 | C | N1-C2-O2 | 5.21 | 122.03 | 118.90 |
| 8 | A | 748 | G | O4'-C1'-N9 | 5.18 | 112.34 | 108.20 |
| 8 | A | 2474 | U | N3-C2-O2 | -5.18 | 118.57 | 122.20 |
| 8 | A | 901 | C | N3-C2-O2 | -5.17 | 118.28 | 121.90 |
| 8 | A | 1925 | C | C6-N1-C2 | -5.17 | 118.23 | 120.30 |
| 55 | v | 74 | C | C2-N1-C1' | 5.16 | 124.47 | 118.80 |
| 8 | A | 2300 | C | C2-N1-C1' | 5.14 | 124.46 | 118.80 |
| 57 | x | 150 | PHE | CB-CA-C | -5.14 | 100.11 | 110.40 |
| 8 | A | 1488 | C | C2-N1-C1' | 5.13 | 124.45 | 118.80 |
| 56 | w | 69 | G | C8-N9-C1' | 5.13 | 133.68 | 127.00 |
| 34 | a | 1397 | C | N1-C2-O2 | 5.13 | 121.98 | 118.90 |
| 10 | C | 204 | LEU | N-CA-C | -5.12 | 97.17 | 111.00 |
| 57 | x | 323 | ILE | N-CA-C | -5.11 | 97.19 | 111.00 |
| 34 | a | 1043 | G | C8-N9-C1' | 5.11 | 133.64 | 127.00 |
| 8 | A | 1914 | C | C2-N1-C1' | 5.09 | 124.41 | 118.80 |
| 8 | A | 1920 | C | N3-C2-O2 | -5.08 | 118.34 | 121.90 |
| 8 | A | 2391 | G | O4'-C1'-N9 | 5.08 | 112.27 | 108.20 |
| 8 | A | 901 | C | N1-C2-O2 | 5.07 | 121.94 | 118.90 |
| 8 | A | 1533 | C | C2-N1-C1' | 5.07 | 124.37 | 118.80 |
| 56 | w | 69 | G | N3-C4-N9 | -5.05 | 122.97 | 126.00 |
| 8 | A | 2187 | U | N1-C2-O2 | 5.04 | 126.33 | 122.80 |
| 8 | A | 1170 | C | N1-C2-O2 | 5.03 | 121.92 | 118.90 |
| 34 | a | 979 | C | C2-N1-C1' | 5.03 | 124.33 | 118.80 |
| 34 | a | 481 | G | C4-C5-N7 | 5.02 | 112.81 | 110.80 |
| 55 | v | 74 | C | N1-C2-O2 | 5.01 | 121.91 | 118.90 |
| 8 | A | 61 | C | N1-C2-O2 | 5.01 | 121.91 | 118.90 |

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|-----|-------|---------------|-----------|----------|----------|-------------|-----|
| 1 | 0 | 54/57 (95%) | 53 (98%) | 1 (2%) | 0 | 100 | 100 |
| 2 | 1 | 48/55 (87%) | 45 (94%) | 3 (6%) | 0 | 100 | 100 |
| 3 | 2 | 44/46 (96%) | 40 (91%) | 4 (9%) | 0 | 100 | 100 |
| 4 | 3 | 62/65 (95%) | 57 (92%) | 5 (8%) | 0 | 100 | 100 |
| 5 | 4 | 36/38 (95%) | 31 (86%) | 5 (14%) | 0 | 100 | 100 |
| 6 | 5 | 129/165 (78%) | 110 (85%) | 19 (15%) | 0 | 100 | 100 |
| 7 | 6 | 64/70 (91%) | 54 (84%) | 10 (16%) | 0 | 100 | 100 |
| 10 | C | 269/273 (98%) | 247 (92%) | 22 (8%) | 0 | 100 | 100 |
| 11 | D | 207/209 (99%) | 186 (90%) | 21 (10%) | 0 | 100 | 100 |
| 12 | E | 199/201 (99%) | 190 (96%) | 9 (4%) | 0 | 100 | 100 |
| 13 | F | 175/179 (98%) | 153 (87%) | 22 (13%) | 0 | 100 | 100 |
| 14 | G | 174/177 (98%) | 162 (93%) | 12 (7%) | 0 | 100 | 100 |
| 15 | H | 147/149 (99%) | 122 (83%) | 25 (17%) | 0 | 100 | 100 |
| 16 | I | 139/142 (98%) | 114 (82%) | 25 (18%) | 0 | 100 | 100 |
| 17 | J | 140/142 (99%) | 133 (95%) | 7 (5%) | 0 | 100 | 100 |
| 18 | K | 120/123 (98%) | 109 (91%) | 11 (9%) | 0 | 100 | 100 |
| 19 | L | 141/144 (98%) | 131 (93%) | 10 (7%) | 0 | 100 | 100 |
| 20 | M | 134/136 (98%) | 123 (92%) | 11 (8%) | 0 | 100 | 100 |

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| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|-----|-------|---------------|-----------|----------|----------|-------------|-----|
| 21 | N | 118/127 (93%) | 111 (94%) | 7 (6%) | 0 | 100 | 100 |
| 22 | O | 114/117 (97%) | 108 (95%) | 6 (5%) | 0 | 100 | 100 |
| 23 | P | 112/115 (97%) | 103 (92%) | 9 (8%) | 0 | 100 | 100 |
| 24 | Q | 115/118 (98%) | 110 (96%) | 5 (4%) | 0 | 100 | 100 |
| 25 | R | 101/103 (98%) | 92 (91%) | 9 (9%) | 0 | 100 | 100 |
| 26 | S | 108/110 (98%) | 98 (91%) | 10 (9%) | 0 | 100 | 100 |
| 27 | T | 91/100 (91%) | 87 (96%) | 4 (4%) | 0 | 100 | 100 |
| 28 | U | 100/104 (96%) | 91 (91%) | 9 (9%) | 0 | 100 | 100 |
| 29 | V | 92/94 (98%) | 86 (94%) | 6 (6%) | 0 | 100 | 100 |
| 30 | W | 73/85 (86%) | 67 (92%) | 6 (8%) | 0 | 100 | 100 |
| 31 | X | 75/78 (96%) | 70 (93%) | 5 (7%) | 0 | 100 | 100 |
| 32 | Y | 61/63 (97%) | 58 (95%) | 3 (5%) | 0 | 100 | 100 |
| 33 | Z | 56/59 (95%) | 53 (95%) | 3 (5%) | 0 | 100 | 100 |
| 35 | b | 216/240 (90%) | 197 (91%) | 19 (9%) | 0 | 100 | 100 |
| 36 | c | 204/233 (88%) | 194 (95%) | 10 (5%) | 0 | 100 | 100 |
| 37 | d | 203/206 (98%) | 176 (87%) | 27 (13%) | 0 | 100 | 100 |
| 38 | e | 155/167 (93%) | 144 (93%) | 11 (7%) | 0 | 100 | 100 |
| 39 | f | 98/135 (73%) | 88 (90%) | 10 (10%) | 0 | 100 | 100 |
| 40 | g | 149/179 (83%) | 139 (93%) | 10 (7%) | 0 | 100 | 100 |
| 41 | h | 127/130 (98%) | 120 (94%) | 7 (6%) | 0 | 100 | 100 |
| 42 | i | 125/130 (96%) | 109 (87%) | 16 (13%) | 0 | 100 | 100 |
| 43 | j | 96/103 (93%) | 83 (86%) | 13 (14%) | 0 | 100 | 100 |
| 44 | k | 114/129 (88%) | 98 (86%) | 16 (14%) | 0 | 100 | 100 |
| 45 | l | 121/124 (98%) | 107 (88%) | 14 (12%) | 0 | 100 | 100 |
| 46 | m | 112/118 (95%) | 100 (89%) | 12 (11%) | 0 | 100 | 100 |
| 47 | n | 99/102 (97%) | 92 (93%) | 7 (7%) | 0 | 100 | 100 |
| 48 | o | 86/89 (97%) | 81 (94%) | 5 (6%) | 0 | 100 | 100 |
| 49 | p | 80/82 (98%) | 71 (89%) | 9 (11%) | 0 | 100 | 100 |
| 50 | q | 78/84 (93%) | 71 (91%) | 7 (9%) | 0 | 100 | 100 |
| 51 | r | 63/75 (84%) | 57 (90%) | 6 (10%) | 0 | 100 | 100 |
| 52 | s | 80/92 (87%) | 76 (95%) | 4 (5%) | 0 | 100 | 100 |

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| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|-----|-------|-----------------|------------|----------|----------|-------------|-----|
| 53 | t | 83/87 (95%) | 81 (98%) | 2 (2%) | 0 | 100 | 100 |
| 54 | u | 63/71 (89%) | 55 (87%) | 8 (13%) | 0 | 100 | 100 |
| 57 | x | 701/704 (100%) | 652 (93%) | 48 (7%) | 1 (0%) | 51 | 83 |
| All | All | 6551/6924 (95%) | 5985 (91%) | 565 (9%) | 1 (0%) | 100 | 100 |

All (1) Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 57 | x | 165 | PRO |

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 PDB entries followed by that with respect to all EM entries.

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

| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|-----|-------|----------------|------------|----------|-------------|-----|
| 1 | 0 | 47/48 (98%) | 47 (100%) | 0 | 100 | 100 |
| 2 | 1 | 45/49 (92%) | 44 (98%) | 1 (2%) | 52 | 78 |
| 3 | 2 | 38/38 (100%) | 38 (100%) | 0 | 100 | 100 |
| 4 | 3 | 51/52 (98%) | 51 (100%) | 0 | 100 | 100 |
| 5 | 4 | 34/34 (100%) | 33 (97%) | 1 (3%) | 42 | 72 |
| 7 | 6 | 59/62 (95%) | 56 (95%) | 3 (5%) | 24 | 56 |
| 10 | C | 216/218 (99%) | 214 (99%) | 2 (1%) | 78 | 91 |
| 11 | D | 164/164 (100%) | 164 (100%) | 0 | 100 | 100 |
| 12 | E | 165/165 (100%) | 165 (100%) | 0 | 100 | 100 |
| 13 | F | 148/150 (99%) | 144 (97%) | 4 (3%) | 44 | 74 |
| 14 | G | 137/138 (99%) | 136 (99%) | 1 (1%) | 84 | 93 |
| 15 | H | 114/114 (100%) | 114 (100%) | 0 | 100 | 100 |
| 17 | J | 116/116 (100%) | 116 (100%) | 0 | 100 | 100 |
| 18 | K | 103/104 (99%) | 101 (98%) | 2 (2%) | 57 | 81 |
| 19 | L | 102/103 (99%) | 101 (99%) | 1 (1%) | 76 | 90 |

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| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|-----|-------|----------------|------------|----------|-------------|-----|
| 20 | M | 109/109 (100%) | 107 (98%) | 2 (2%) | 59 | 82 |
| 21 | N | 100/103 (97%) | 99 (99%) | 1 (1%) | 76 | 90 |
| 22 | O | 86/87 (99%) | 84 (98%) | 2 (2%) | 50 | 77 |
| 23 | P | 99/100 (99%) | 97 (98%) | 2 (2%) | 55 | 80 |
| 24 | Q | 89/90 (99%) | 88 (99%) | 1 (1%) | 73 | 89 |
| 25 | R | 84/84 (100%) | 82 (98%) | 2 (2%) | 49 | 76 |
| 26 | S | 93/93 (100%) | 93 (100%) | 0 | 100 | 100 |
| 27 | T | 80/84 (95%) | 80 (100%) | 0 | 100 | 100 |
| 28 | U | 83/85 (98%) | 80 (96%) | 3 (4%) | 35 | 67 |
| 29 | V | 78/78 (100%) | 78 (100%) | 0 | 100 | 100 |
| 30 | W | 57/63 (90%) | 57 (100%) | 0 | 100 | 100 |
| 31 | X | 67/68 (98%) | 66 (98%) | 1 (2%) | 65 | 85 |
| 32 | Y | 55/55 (100%) | 54 (98%) | 1 (2%) | 59 | 82 |
| 33 | Z | 48/49 (98%) | 48 (100%) | 0 | 100 | 100 |
| 35 | b | 180/198 (91%) | 173 (96%) | 7 (4%) | 32 | 65 |
| 36 | c | 170/190 (90%) | 170 (100%) | 0 | 100 | 100 |
| 37 | d | 172/173 (99%) | 168 (98%) | 4 (2%) | 50 | 77 |
| 38 | e | 114/126 (90%) | 114 (100%) | 0 | 100 | 100 |
| 39 | f | 87/116 (75%) | 87 (100%) | 0 | 100 | 100 |
| 40 | g | 124/147 (84%) | 120 (97%) | 4 (3%) | 39 | 69 |
| 41 | h | 104/105 (99%) | 103 (99%) | 1 (1%) | 76 | 90 |
| 42 | i | 105/107 (98%) | 104 (99%) | 1 (1%) | 76 | 90 |
| 43 | j | 86/90 (96%) | 85 (99%) | 1 (1%) | 71 | 88 |
| 44 | k | 89/99 (90%) | 86 (97%) | 3 (3%) | 37 | 69 |
| 45 | l | 103/104 (99%) | 102 (99%) | 1 (1%) | 76 | 90 |
| 46 | m | 92/96 (96%) | 91 (99%) | 1 (1%) | 73 | 89 |
| 47 | n | 79/84 (94%) | 79 (100%) | 0 | 100 | 100 |
| 48 | o | 76/77 (99%) | 76 (100%) | 0 | 100 | 100 |
| 49 | p | 65/65 (100%) | 64 (98%) | 1 (2%) | 65 | 85 |
| 50 | q | 74/78 (95%) | 73 (99%) | 1 (1%) | 67 | 86 |
| 51 | r | 56/65 (86%) | 55 (98%) | 1 (2%) | 59 | 82 |

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| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|-----|-------|-----------------|------------|----------|-------------|-----|
| 52 | s | 72/79 (91%) | 71 (99%) | 1 (1%) | 67 | 86 |
| 53 | t | 65/66 (98%) | 65 (100%) | 0 | 100 | 100 |
| 54 | u | 46/61 (75%) | 46 (100%) | 0 | 100 | 100 |
| 57 | x | 577/578 (100%) | 498 (86%) | 79 (14%) | 3 | 16 |
| 58 | y | 1/1 (100%) | 1 (100%) | 0 | 100 | 100 |
| All | All | 5204/5408 (96%) | 5068 (97%) | 136 (3%) | 49 | 74 |

All (136) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 2 | 1 | 16 | THR |
| 5 | 4 | 12 | ARG |
| 7 | 6 | 16 | CYS |
| 7 | 6 | 22 | MET |
| 7 | 6 | 64 | PHE |
| 10 | C | 69 | ASN |
| 10 | C | 239 | PHE |
| 13 | F | 29 | ARG |
| 13 | F | 46 | LYS |
| 13 | F | 146 | ASP |
| 13 | F | 174 | PHE |
| 14 | G | 94 | ARG |
| 18 | K | 49 | ARG |
| 18 | K | 111 | LYS |
| 19 | L | 29 | LYS |
| 20 | M | 57 | VAL |
| 20 | M | 58 | LYS |
| 21 | N | 2 | ARG |
| 22 | O | 31 | THR |
| 22 | O | 33 | ARG |
| 23 | P | 67 | GLU |
| 23 | P | 88 | ARG |
| 24 | Q | 36 | GLN |
| 25 | R | 51 | VAL |
| 25 | R | 72 | VAL |
| 28 | U | 44 | HIS |
| 28 | U | 73 | ASN |
| 28 | U | 100 | GLU |
| 31 | X | 76 | LYS |
| 32 | Y | 58 | ASN |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 35 | b | 17 | HIS |
| 35 | b | 20 | ARG |
| 35 | b | 41 | ASN |
| 35 | b | 73 | ARG |
| 35 | b | 112 | ARG |
| 35 | b | 152 | ASP |
| 35 | b | 153 | MET |
| 37 | d | 141 | VAL |
| 37 | d | 142 | VAL |
| 37 | d | 145 | ARG |
| 37 | d | 183 | ARG |
| 40 | g | 52 | ARG |
| 40 | g | 67 | ASN |
| 40 | g | 79 | VAL |
| 40 | g | 129 | ASN |
| 41 | h | 76 | ARG |
| 42 | i | 11 | ARG |
| 43 | j | 89 | ARG |
| 44 | k | 28 | ASN |
| 44 | k | 36 | ARG |
| 44 | k | 99 | LEU |
| 45 | l | 122 | LYS |
| 46 | m | 13 | HIS |
| 49 | p | 45 | GLU |
| 50 | q | 16 | MET |
| 51 | r | 44 | THR |
| 52 | s | 63 | ASP |
| 57 | x | 22 | LYS |
| 57 | x | 24 | THR |
| 57 | x | 35 | VAL |
| 57 | x | 39 | ILE |
| 57 | x | 41 | GLU |
| 57 | x | 42 | VAL |
| 57 | x | 53 | GLU |
| 57 | x | 68 | THR |
| 57 | x | 82 | ARG |
| 57 | x | 83 | ILE |
| 57 | x | 96 | ILE |
| 57 | x | 100 | ARG |
| 57 | x | 103 | ARG |
| 57 | x | 104 | VAL |
| 57 | x | 115 | VAL |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 57 | x | 123 | GLU |
| 57 | x | 134 | VAL |
| 57 | x | 146 | MET |
| 57 | x | 151 | LEU |
| 57 | x | 170 | LEU |
| 57 | x | 175 | GLU |
| 57 | x | 179 | THR |
| 57 | x | 182 | VAL |
| 57 | x | 185 | VAL |
| 57 | x | 196 | ASP |
| 57 | x | 209 | ASP |
| 57 | x | 210 | MET |
| 57 | x | 221 | LEU |
| 57 | x | 224 | SER |
| 57 | x | 230 | GLU |
| 57 | x | 240 | GLU |
| 57 | x | 242 | LEU |
| 57 | x | 243 | THR |
| 57 | x | 244 | GLU |
| 57 | x | 247 | ILE |
| 57 | x | 261 | ILE |
| 57 | x | 270 | LYS |
| 57 | x | 272 | LYS |
| 57 | x | 277 | MET |
| 57 | x | 278 | LEU |
| 57 | x | 289 | VAL |
| 57 | x | 291 | VAL |
| 57 | x | 303 | ASP |
| 57 | x | 304 | THR |
| 57 | x | 309 | HIS |
| 57 | x | 314 | GLU |
| 57 | x | 325 | THR |
| 57 | x | 326 | ASP |
| 57 | x | 329 | VAL |
| 57 | x | 343 | ASN |
| 57 | x | 346 | ASP |
| 57 | x | 349 | LEU |
| 57 | x | 365 | MET |
| 57 | x | 375 | GLU |
| 57 | x | 376 | VAL |
| 57 | x | 389 | ASP |
| 57 | x | 407 | ARG |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 57 | x | 409 | GLU |
| 57 | x | 410 | PHE |
| 57 | x | 423 | THR |
| 57 | x | 429 | LYS |
| 57 | x | 430 | MET |
| 57 | x | 441 | ASP |
| 57 | x | 448 | THR |
| 57 | x | 449 | ASP |
| 57 | x | 455 | THR |
| 57 | x | 468 | ILE |
| 57 | x | 474 | ARG |
| 57 | x | 475 | GLU |
| 57 | x | 476 | PHE |
| 57 | x | 478 | VAL |
| 57 | x | 513 | GLN |
| 57 | x | 514 | TYR |
| 57 | x | 529 | ASN |
| 57 | x | 604 | PHE |
| 57 | x | 616 | MET |
| 57 | x | 638 | ARG |
| 57 | x | 685 | LYS |
| 57 | x | 701 | ARG |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 13 | F | 62 | GLN |

5.3.3 RNA [i](#)

| Mol | Chain | Analysed | Backbone Outliers | Pucker Outliers |
|-----|-------|-----------------|-------------------|-----------------|
| 34 | a | 1536/1542 (99%) | 335 (21%) | 0 |
| 55 | v | 76/77 (98%) | 17 (22%) | 0 |
| 56 | w | 74/76 (97%) | 23 (31%) | 0 |
| 59 | z | 10/33 (30%) | 4 (40%) | 0 |
| 8 | A | 2898/2903 (99%) | 647 (22%) | 45 (1%) |
| 9 | B | 119/120 (99%) | 29 (24%) | 3 (2%) |
| All | All | 4713/4751 (99%) | 1055 (22%) | 48 (1%) |

All (1055) RNA backbone outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 8 | A | 10 | A |
| 8 | A | 15 | G |
| 8 | A | 23 | G |
| 8 | A | 34 | U |
| 8 | A | 42 | A |
| 8 | A | 43 | G |
| 8 | A | 44 | A |
| 8 | A | 46 | G |
| 8 | A | 58 | G |
| 8 | A | 62 | U |
| 8 | A | 63 | A |
| 8 | A | 71 | A |
| 8 | A | 74 | A |
| 8 | A | 75 | G |
| 8 | A | 84 | A |
| 8 | A | 96 | C |
| 8 | A | 101 | A |
| 8 | A | 118 | A |
| 8 | A | 120 | U |
| 8 | A | 131 | A |
| 8 | A | 140 | C |
| 8 | A | 141 | G |
| 8 | A | 142 | A |
| 8 | A | 144 | A |
| 8 | A | 157 | C |
| 8 | A | 160 | A |
| 8 | A | 163 | C |
| 8 | A | 164 | C |
| 8 | A | 170 | U |
| 8 | A | 196 | A |
| 8 | A | 199 | A |
| 8 | A | 204 | A |
| 8 | A | 205 | G |
| 8 | A | 215 | G |
| 8 | A | 216 | A |
| 8 | A | 221 | A |
| 8 | A | 222 | A |
| 8 | A | 223 | A |
| 8 | A | 228 | C |
| 8 | A | 230 | G |
| 8 | A | 242 | G |
| 8 | A | 243 | U |
| 8 | A | 244 | A |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 8 | A | 248 | G |
| 8 | A | 250 | G |
| 8 | A | 255 | A |
| 8 | A | 261 | G |
| 8 | A | 265 | A |
| 8 | A | 266 | G |
| 8 | A | 267 | C |
| 8 | A | 272 | A |
| 8 | A | 273 | G |
| 8 | A | 275 | C |
| 8 | A | 276 | U |
| 8 | A | 278 | A |
| 8 | A | 279 | A |
| 8 | A | 287 | G |
| 8 | A | 288 | U |
| 8 | A | 330 | A |
| 8 | A | 335 | C |
| 8 | A | 345 | A |
| 8 | A | 359 | G |
| 8 | A | 361 | G |
| 8 | A | 362 | A |
| 8 | A | 363 | G |
| 8 | A | 369 | U |
| 8 | A | 371 | A |
| 8 | A | 372 | G |
| 8 | A | 377 | G |
| 8 | A | 386 | G |
| 8 | A | 393 | C |
| 8 | A | 395 | U |
| 8 | A | 396 | G |
| 8 | A | 401 | A |
| 8 | A | 402 | A |
| 8 | A | 404 | A |
| 8 | A | 405 | U |
| 8 | A | 406 | G |
| 8 | A | 411 | G |
| 8 | A | 412 | A |
| 8 | A | 455 | C |
| 8 | A | 457 | A |
| 8 | A | 458 | G |
| 8 | A | 459 | U |
| 8 | A | 473 | G |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 8 | A | 480 | A |
| 8 | A | 481 | G |
| 8 | A | 482 | A |
| 8 | A | 490 | C |
| 8 | A | 491 | G |
| 8 | A | 504 | A |
| 8 | A | 505 | A |
| 8 | A | 509 | C |
| 8 | A | 510 | C |
| 8 | A | 512 | G |
| 8 | A | 513 | A |
| 8 | A | 529 | A |
| 8 | A | 530 | G |
| 8 | A | 532 | A |
| 8 | A | 533 | G |
| 8 | A | 546 | U |
| 8 | A | 548 | G |
| 8 | A | 549 | G |
| 8 | A | 556 | A |
| 8 | A | 563 | A |
| 8 | A | 568 | U |
| 8 | A | 573 | U |
| 8 | A | 575 | A |
| 8 | A | 588 | U |
| 8 | A | 603 | A |
| 8 | A | 613 | A |
| 8 | A | 614 | A |
| 8 | A | 615 | U |
| 8 | A | 622 | G |
| 8 | A | 627 | A |
| 8 | A | 637 | A |
| 8 | A | 645 | C |
| 8 | A | 646 | U |
| 8 | A | 647 | G |
| 8 | A | 655 | A |
| 8 | A | 659 | G |
| 8 | A | 669 | G |
| 8 | A | 670 | A |
| 8 | A | 682 | G |
| 8 | A | 685 | A |
| 8 | A | 686 | U |
| 8 | A | 694 | U |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 8 | A | 711 | G |
| 8 | A | 712 | G |
| 8 | A | 714 | U |
| 8 | A | 715 | A |
| 8 | A | 716 | A |
| 8 | A | 729 | G |
| 8 | A | 730 | A |
| 8 | A | 747 | 5MC |
| 8 | A | 757 | G |
| 8 | A | 762 | U |
| 8 | A | 763 | G |
| 8 | A | 764 | A |
| 8 | A | 775 | G |
| 8 | A | 782 | A |
| 8 | A | 783 | A |
| 8 | A | 784 | G |
| 8 | A | 785 | G |
| 8 | A | 789 | A |
| 8 | A | 791 | C |
| 8 | A | 792 | A |
| 8 | A | 805 | G |
| 8 | A | 806 | C |
| 8 | A | 812 | C |
| 8 | A | 819 | A |
| 8 | A | 827 | U |
| 8 | A | 828 | U |
| 8 | A | 831 | G |
| 8 | A | 846 | U |
| 8 | A | 847 | U |
| 8 | A | 858 | G |
| 8 | A | 859 | G |
| 8 | A | 878 | A |
| 8 | A | 879 | G |
| 8 | A | 881 | G |
| 8 | A | 882 | G |
| 8 | A | 883 | G |
| 8 | A | 884 | U |
| 8 | A | 885 | C |
| 8 | A | 887 | A |
| 8 | A | 889 | C |
| 8 | A | 890 | C |
| 8 | A | 891 | G |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 892 | A |
| 8 | A | 893 | C |
| 8 | A | 894 | U |
| 8 | A | 895 | U |
| 8 | A | 896 | A |
| 8 | A | 897 | C |
| 8 | A | 899 | A |
| 8 | A | 903 | C |
| 8 | A | 907 | G |
| 8 | A | 910 | A |
| 8 | A | 931 | U |
| 8 | A | 933 | A |
| 8 | A | 934 | U |
| 8 | A | 941 | A |
| 8 | A | 946 | C |
| 8 | A | 961 | C |
| 8 | A | 965 | C |
| 8 | A | 973 | A |
| 8 | A | 974 | G |
| 8 | A | 975 | A |
| 8 | A | 983 | A |
| 8 | A | 984 | A |
| 8 | A | 990 | A |
| 8 | A | 995 | C |
| 8 | A | 996 | A |
| 8 | A | 1005 | C |
| 8 | A | 1012 | U |
| 8 | A | 1013 | C |
| 8 | A | 1024 | G |
| 8 | A | 1025 | G |
| 8 | A | 1026 | G |
| 8 | A | 1027 | A |
| 8 | A | 1028 | A |
| 8 | A | 1033 | U |
| 8 | A | 1040 | A |
| 8 | A | 1041 | G |
| 8 | A | 1042 | G |
| 8 | A | 1046 | A |
| 8 | A | 1047 | G |
| 8 | A | 1048 | A |
| 8 | A | 1052 | C |
| 8 | A | 1053 | C |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 1056 | G |
| 8 | A | 1057 | A |
| 8 | A | 1058 | U |
| 8 | A | 1059 | G |
| 8 | A | 1060 | U |
| 8 | A | 1061 | U |
| 8 | A | 1062 | G |
| 8 | A | 1063 | G |
| 8 | A | 1064 | C |
| 8 | A | 1066 | U |
| 8 | A | 1067 | A |
| 8 | A | 1068 | G |
| 8 | A | 1069 | A |
| 8 | A | 1070 | A |
| 8 | A | 1071 | G |
| 8 | A | 1072 | C |
| 8 | A | 1073 | A |
| 8 | A | 1074 | G |
| 8 | A | 1077 | A |
| 8 | A | 1078 | U |
| 8 | A | 1079 | C |
| 8 | A | 1080 | A |
| 8 | A | 1083 | U |
| 8 | A | 1084 | A |
| 8 | A | 1085 | A |
| 8 | A | 1086 | A |
| 8 | A | 1087 | G |
| 8 | A | 1088 | A |
| 8 | A | 1089 | A |
| 8 | A | 1090 | A |
| 8 | A | 1091 | G |
| 8 | A | 1092 | C |
| 8 | A | 1094 | U |
| 8 | A | 1096 | A |
| 8 | A | 1098 | A |
| 8 | A | 1100 | C |
| 8 | A | 1101 | U |
| 8 | A | 1102 | C |
| 8 | A | 1103 | A |
| 8 | A | 1105 | U |
| 8 | A | 1106 | G |
| 8 | A | 1108 | U |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 1109 | C |
| 8 | A | 1110 | G |
| 8 | A | 1111 | A |
| 8 | A | 1112 | G |
| 8 | A | 1115 | G |
| 8 | A | 1116 | G |
| 8 | A | 1121 | C |
| 8 | A | 1130 | U |
| 8 | A | 1131 | G |
| 8 | A | 1132 | U |
| 8 | A | 1134 | A |
| 8 | A | 1135 | C |
| 8 | A | 1136 | G |
| 8 | A | 1139 | G |
| 8 | A | 1142 | A |
| 8 | A | 1169 | A |
| 8 | A | 1170 | C |
| 8 | A | 1171 | G |
| 8 | A | 1174 | U |
| 8 | A | 1175 | A |
| 8 | A | 1176 | U |
| 8 | A | 1179 | G |
| 8 | A | 1180 | U |
| 8 | A | 1188 | U |
| 8 | A | 1212 | G |
| 8 | A | 1225 | G |
| 8 | A | 1227 | G |
| 8 | A | 1234 | U |
| 8 | A | 1235 | G |
| 8 | A | 1247 | A |
| 8 | A | 1253 | A |
| 8 | A | 1255 | U |
| 8 | A | 1256 | G |
| 8 | A | 1264 | A |
| 8 | A | 1271 | G |
| 8 | A | 1272 | A |
| 8 | A | 1273 | U |
| 8 | A | 1284 | A |
| 8 | A | 1288 | G |
| 8 | A | 1300 | G |
| 8 | A | 1301 | A |
| 8 | A | 1302 | A |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 1311 | G |
| 8 | A | 1312 | U |
| 8 | A | 1334 | G |
| 8 | A | 1340 | U |
| 8 | A | 1341 | G |
| 8 | A | 1345 | C |
| 8 | A | 1365 | A |
| 8 | A | 1368 | G |
| 8 | A | 1376 | C |
| 8 | A | 1377 | G |
| 8 | A | 1379 | U |
| 8 | A | 1383 | A |
| 8 | A | 1386 | C |
| 8 | A | 1395 | A |
| 8 | A | 1409 | U |
| 8 | A | 1413 | A |
| 8 | A | 1415 | U |
| 8 | A | 1416 | G |
| 8 | A | 1419 | A |
| 8 | A | 1420 | A |
| 8 | A | 1421 | G |
| 8 | A | 1428 | C |
| 8 | A | 1432 | G |
| 8 | A | 1433 | A |
| 8 | A | 1434 | A |
| 8 | A | 1445 | G |
| 8 | A | 1452 | G |
| 8 | A | 1453 | A |
| 8 | A | 1458 | U |
| 8 | A | 1460 | U |
| 8 | A | 1461 | C |
| 8 | A | 1474 | U |
| 8 | A | 1476 | U |
| 8 | A | 1478 | G |
| 8 | A | 1482 | G |
| 8 | A | 1488 | C |
| 8 | A | 1490 | A |
| 8 | A | 1491 | G |
| 8 | A | 1494 | A |
| 8 | A | 1497 | U |
| 8 | A | 1504 | A |
| 8 | A | 1515 | A |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 1524 | G |
| 8 | A | 1532 | A |
| 8 | A | 1535 | A |
| 8 | A | 1536 | C |
| 8 | A | 1537 | G |
| 8 | A | 1538 | G |
| 8 | A | 1549 | A |
| 8 | A | 1554 | U |
| 8 | A | 1555 | G |
| 8 | A | 1557 | C |
| 8 | A | 1558 | C |
| 8 | A | 1566 | A |
| 8 | A | 1569 | A |
| 8 | A | 1578 | U |
| 8 | A | 1580 | A |
| 8 | A | 1584 | U |
| 8 | A | 1585 | C |
| 8 | A | 1591 | A |
| 8 | A | 1592 | C |
| 8 | A | 1608 | A |
| 8 | A | 1610 | A |
| 8 | A | 1634 | A |
| 8 | A | 1635 | A |
| 8 | A | 1647 | U |
| 8 | A | 1648 | U |
| 8 | A | 1649 | G |
| 8 | A | 1651 | G |
| 8 | A | 1654 | A |
| 8 | A | 1674 | G |
| 8 | A | 1693 | U |
| 8 | A | 1698 | A |
| 8 | A | 1715 | G |
| 8 | A | 1716 | U |
| 8 | A | 1726 | C |
| 8 | A | 1727 | C |
| 8 | A | 1730 | C |
| 8 | A | 1731 | G |
| 8 | A | 1732 | C |
| 8 | A | 1738 | G |
| 8 | A | 1757 | A |
| 8 | A | 1760 | C |
| 8 | A | 1764 | C |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 1773 | A |
| 8 | A | 1782 | U |
| 8 | A | 1784 | A |
| 8 | A | 1791 | A |
| 8 | A | 1800 | C |
| 8 | A | 1801 | A |
| 8 | A | 1802 | A |
| 8 | A | 1807 | G |
| 8 | A | 1808 | A |
| 8 | A | 1809 | A |
| 8 | A | 1811 | G |
| 8 | A | 1816 | C |
| 8 | A | 1829 | A |
| 8 | A | 1835 | 2MG |
| 8 | A | 1866 | A |
| 8 | A | 1869 | G |
| 8 | A | 1884 | G |
| 8 | A | 1895 | C |
| 8 | A | 1900 | A |
| 8 | A | 1901 | A |
| 8 | A | 1906 | G |
| 8 | A | 1908 | C |
| 8 | A | 1910 | G |
| 8 | A | 1912 | A |
| 8 | A | 1917 | PSU |
| 8 | A | 1922 | G |
| 8 | A | 1924 | C |
| 8 | A | 1925 | C |
| 8 | A | 1926 | U |
| 8 | A | 1927 | A |
| 8 | A | 1930 | G |
| 8 | A | 1936 | A |
| 8 | A | 1937 | A |
| 8 | A | 1938 | A |
| 8 | A | 1939 | 5MU |
| 8 | A | 1955 | U |
| 8 | A | 1960 | A |
| 8 | A | 1964 | G |
| 8 | A | 1965 | C |
| 8 | A | 1967 | C |
| 8 | A | 1970 | A |
| 8 | A | 1971 | U |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 1972 | G |
| 8 | A | 1982 | U |
| 8 | A | 1991 | U |
| 8 | A | 1992 | G |
| 8 | A | 1997 | C |
| 8 | A | 2020 | A |
| 8 | A | 2021 | C |
| 8 | A | 2022 | U |
| 8 | A | 2023 | C |
| 8 | A | 2031 | A |
| 8 | A | 2032 | G |
| 8 | A | 2033 | A |
| 8 | A | 2036 | C |
| 8 | A | 2043 | C |
| 8 | A | 2046 | G |
| 8 | A | 2052 | A |
| 8 | A | 2055 | C |
| 8 | A | 2056 | G |
| 8 | A | 2060 | A |
| 8 | A | 2061 | G |
| 8 | A | 2062 | A |
| 8 | A | 2067 | G |
| 8 | A | 2069 | G7M |
| 8 | A | 2077 | A |
| 8 | A | 2090 | A |
| 8 | A | 2091 | C |
| 8 | A | 2093 | G |
| 8 | A | 2101 | A |
| 8 | A | 2102 | G |
| 8 | A | 2103 | C |
| 8 | A | 2104 | C |
| 8 | A | 2105 | U |
| 8 | A | 2107 | G |
| 8 | A | 2110 | G |
| 8 | A | 2111 | U |
| 8 | A | 2112 | G |
| 8 | A | 2114 | A |
| 8 | A | 2115 | G |
| 8 | A | 2116 | G |
| 8 | A | 2118 | U |
| 8 | A | 2119 | A |
| 8 | A | 2120 | G |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 2126 | A |
| 8 | A | 2127 | G |
| 8 | A | 2128 | G |
| 8 | A | 2129 | C |
| 8 | A | 2131 | U |
| 8 | A | 2132 | U |
| 8 | A | 2133 | G |
| 8 | A | 2134 | A |
| 8 | A | 2135 | A |
| 8 | A | 2136 | G |
| 8 | A | 2137 | U |
| 8 | A | 2138 | G |
| 8 | A | 2139 | U |
| 8 | A | 2143 | C |
| 8 | A | 2145 | C |
| 8 | A | 2146 | C |
| 8 | A | 2147 | A |
| 8 | A | 2148 | G |
| 8 | A | 2150 | C |
| 8 | A | 2151 | U |
| 8 | A | 2153 | C |
| 8 | A | 2154 | A |
| 8 | A | 2155 | U |
| 8 | A | 2158 | A |
| 8 | A | 2159 | G |
| 8 | A | 2161 | C |
| 8 | A | 2162 | G |
| 8 | A | 2165 | C |
| 8 | A | 2169 | A |
| 8 | A | 2170 | A |
| 8 | A | 2171 | A |
| 8 | A | 2172 | U |
| 8 | A | 2173 | A |
| 8 | A | 2174 | C |
| 8 | A | 2176 | A |
| 8 | A | 2180 | U |
| 8 | A | 2181 | U |
| 8 | A | 2183 | A |
| 8 | A | 2184 | A |
| 8 | A | 2185 | U |
| 8 | A | 2186 | G |
| 8 | A | 2190 | G |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 2193 | G |
| 8 | A | 2198 | A |
| 8 | A | 2204 | G |
| 8 | A | 2211 | A |
| 8 | A | 2212 | A |
| 8 | A | 2225 | A |
| 8 | A | 2226 | C |
| 8 | A | 2238 | G |
| 8 | A | 2239 | G |
| 8 | A | 2266 | A |
| 8 | A | 2271 | G |
| 8 | A | 2279 | G |
| 8 | A | 2283 | C |
| 8 | A | 2287 | A |
| 8 | A | 2288 | A |
| 8 | A | 2297 | A |
| 8 | A | 2300 | C |
| 8 | A | 2305 | U |
| 8 | A | 2309 | A |
| 8 | A | 2320 | U |
| 8 | A | 2322 | A |
| 8 | A | 2325 | G |
| 8 | A | 2326 | C |
| 8 | A | 2333 | A |
| 8 | A | 2334 | U |
| 8 | A | 2336 | A |
| 8 | A | 2345 | G |
| 8 | A | 2347 | C |
| 8 | A | 2350 | C |
| 8 | A | 2352 | A |
| 8 | A | 2361 | G |
| 8 | A | 2383 | G |
| 8 | A | 2385 | C |
| 8 | A | 2402 | U |
| 8 | A | 2406 | A |
| 8 | A | 2410 | G |
| 8 | A | 2423 | U |
| 8 | A | 2425 | A |
| 8 | A | 2429 | G |
| 8 | A | 2430 | A |
| 8 | A | 2432 | A |
| 8 | A | 2435 | A |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 2441 | U |
| 8 | A | 2447 | G |
| 8 | A | 2448 | A |
| 8 | A | 2452 | C |
| 8 | A | 2459 | A |
| 8 | A | 2469 | A |
| 8 | A | 2475 | C |
| 8 | A | 2476 | A |
| 8 | A | 2478 | A |
| 8 | A | 2480 | C |
| 8 | A | 2484 | G |
| 8 | A | 2488 | G |
| 8 | A | 2489 | U |
| 8 | A | 2491 | U |
| 8 | A | 2494 | G |
| 8 | A | 2502 | G |
| 8 | A | 2504 | PSU |
| 8 | A | 2505 | G |
| 8 | A | 2506 | U |
| 8 | A | 2518 | A |
| 8 | A | 2535 | G |
| 8 | A | 2542 | A |
| 8 | A | 2547 | A |
| 8 | A | 2552 | OMU |
| 8 | A | 2554 | U |
| 8 | A | 2566 | A |
| 8 | A | 2567 | G |
| 8 | A | 2573 | C |
| 8 | A | 2578 | G |
| 8 | A | 2585 | U |
| 8 | A | 2586 | U |
| 8 | A | 2592 | G |
| 8 | A | 2602 | A |
| 8 | A | 2603 | G |
| 8 | A | 2609 | U |
| 8 | A | 2613 | U |
| 8 | A | 2615 | U |
| 8 | A | 2623 | G |
| 8 | A | 2624 | G |
| 8 | A | 2629 | U |
| 8 | A | 2630 | G |
| 8 | A | 2634 | A |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 2636 | C |
| 8 | A | 2646 | C |
| 8 | A | 2648 | G |
| 8 | A | 2654 | A |
| 8 | A | 2655 | G |
| 8 | A | 2656 | U |
| 8 | A | 2663 | G |
| 8 | A | 2684 | U |
| 8 | A | 2689 | U |
| 8 | A | 2690 | U |
| 8 | A | 2702 | G |
| 8 | A | 2707 | U |
| 8 | A | 2714 | G |
| 8 | A | 2715 | C |
| 8 | A | 2718 | G |
| 8 | A | 2720 | U |
| 8 | A | 2725 | A |
| 8 | A | 2726 | A |
| 8 | A | 2727 | A |
| 8 | A | 2729 | G |
| 8 | A | 2732 | G |
| 8 | A | 2733 | A |
| 8 | A | 2744 | G |
| 8 | A | 2748 | A |
| 8 | A | 2750 | A |
| 8 | A | 2751 | G |
| 8 | A | 2755 | C |
| 8 | A | 2757 | A |
| 8 | A | 2765 | A |
| 8 | A | 2769 | U |
| 8 | A | 2778 | A |
| 8 | A | 2779 | U |
| 8 | A | 2790 | U |
| 8 | A | 2791 | G |
| 8 | A | 2796 | U |
| 8 | A | 2797 | U |
| 8 | A | 2798 | U |
| 8 | A | 2799 | A |
| 8 | A | 2800 | A |
| 8 | A | 2801 | G |
| 8 | A | 2808 | G |
| 8 | A | 2809 | A |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 2818 | U |
| 8 | A | 2820 | A |
| 8 | A | 2821 | A |
| 8 | A | 2833 | U |
| 8 | A | 2834 | G |
| 8 | A | 2835 | A |
| 8 | A | 2836 | U |
| 8 | A | 2849 | U |
| 8 | A | 2867 | G |
| 8 | A | 2872 | A |
| 8 | A | 2873 | A |
| 8 | A | 2879 | A |
| 8 | A | 2884 | U |
| 8 | A | 2886 | A |
| 8 | A | 2891 | U |
| 8 | A | 2893 | A |
| 9 | B | 9 | G |
| 9 | B | 13 | G |
| 9 | B | 17 | C |
| 9 | B | 18 | G |
| 9 | B | 19 | C |
| 9 | B | 24 | G |
| 9 | B | 26 | C |
| 9 | B | 34 | A |
| 9 | B | 35 | C |
| 9 | B | 37 | C |
| 9 | B | 41 | G |
| 9 | B | 42 | C |
| 9 | B | 45 | A |
| 9 | B | 51 | G |
| 9 | B | 53 | A |
| 9 | B | 56 | G |
| 9 | B | 57 | A |
| 9 | B | 62 | C |
| 9 | B | 65 | U |
| 9 | B | 67 | G |
| 9 | B | 73 | A |
| 9 | B | 87 | U |
| 9 | B | 88 | C |
| 9 | B | 89 | U |
| 9 | B | 90 | C |
| 9 | B | 91 | C |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 9 | B | 101 | A |
| 9 | B | 109 | A |
| 9 | B | 120 | U |
| 34 | a | 2 | A |
| 34 | a | 6 | G |
| 34 | a | 7 | A |
| 34 | a | 9 | G |
| 34 | a | 31 | G |
| 34 | a | 32 | A |
| 34 | a | 39 | G |
| 34 | a | 46 | G |
| 34 | a | 48 | C |
| 34 | a | 51 | A |
| 34 | a | 70 | U |
| 34 | a | 71 | A |
| 34 | a | 76 | G |
| 34 | a | 78 | A |
| 34 | a | 79 | G |
| 34 | a | 80 | A |
| 34 | a | 81 | A |
| 34 | a | 83 | C |
| 34 | a | 84 | U |
| 34 | a | 85 | U |
| 34 | a | 86 | G |
| 34 | a | 87 | C |
| 34 | a | 89 | U |
| 34 | a | 90 | C |
| 34 | a | 94 | G |
| 34 | a | 96 | U |
| 34 | a | 98 | A |
| 34 | a | 121 | U |
| 34 | a | 141 | G |
| 34 | a | 144 | G |
| 34 | a | 158 | G |
| 34 | a | 163 | C |
| 34 | a | 164 | G |
| 34 | a | 166 | U |
| 34 | a | 173 | U |
| 34 | a | 182 | A |
| 34 | a | 183 | C |
| 34 | a | 184 | G |
| 34 | a | 189 | A |

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Continued from previous page...

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 34 | a | 197 | A |
| 34 | a | 198 | G |
| 34 | a | 205 | A |
| 34 | a | 206 | C |
| 34 | a | 208 | U |
| 34 | a | 209 | U |
| 34 | a | 210 | C |
| 34 | a | 211 | G |
| 34 | a | 212 | G |
| 34 | a | 226 | G |
| 34 | a | 240 | G |
| 34 | a | 244 | U |
| 34 | a | 245 | U |
| 34 | a | 247 | G |
| 34 | a | 251 | G |
| 34 | a | 262 | A |
| 34 | a | 266 | G |
| 34 | a | 267 | C |
| 34 | a | 270 | A |
| 34 | a | 281 | G |
| 34 | a | 289 | G |
| 34 | a | 316 | C |
| 34 | a | 321 | A |
| 34 | a | 327 | A |
| 34 | a | 328 | C |
| 34 | a | 329 | A |
| 34 | a | 330 | C |
| 34 | a | 344 | A |
| 34 | a | 347 | G |
| 34 | a | 351 | G |
| 34 | a | 352 | C |
| 34 | a | 354 | G |
| 34 | a | 356 | A |
| 34 | a | 360 | G |
| 34 | a | 367 | U |
| 34 | a | 372 | C |
| 34 | a | 375 | U |
| 34 | a | 388 | G |
| 34 | a | 397 | A |
| 34 | a | 406 | G |
| 34 | a | 411 | A |
| 34 | a | 412 | A |

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Continued from previous page...

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 34 | a | 413 | G |
| 34 | a | 421 | U |
| 34 | a | 423 | G |
| 34 | a | 428 | G |
| 34 | a | 429 | U |
| 34 | a | 439 | U |
| 34 | a | 440 | C |
| 34 | a | 444 | G |
| 34 | a | 446 | G |
| 34 | a | 448 | A |
| 34 | a | 461 | A |
| 34 | a | 462 | G |
| 34 | a | 465 | A |
| 34 | a | 468 | A |
| 34 | a | 471 | U |
| 34 | a | 472 | U |
| 34 | a | 473 | U |
| 34 | a | 474 | G |
| 34 | a | 479 | U |
| 34 | a | 482 | A |
| 34 | a | 484 | G |
| 34 | a | 495 | A |
| 34 | a | 496 | A |
| 34 | a | 505 | G |
| 34 | a | 509 | A |
| 34 | a | 510 | A |
| 34 | a | 511 | C |
| 34 | a | 516 | PSU |
| 34 | a | 517 | G |
| 34 | a | 518 | C |
| 34 | a | 521 | G |
| 34 | a | 524 | G |
| 34 | a | 527 | G7M |
| 34 | a | 531 | U |
| 34 | a | 532 | A |
| 34 | a | 535 | A |
| 34 | a | 547 | A |
| 34 | a | 559 | A |
| 34 | a | 562 | U |
| 34 | a | 563 | A |
| 34 | a | 564 | C |
| 34 | a | 572 | A |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 34 | a | 573 | A |
| 34 | a | 576 | C |
| 34 | a | 577 | G |
| 34 | a | 582 | C |
| 34 | a | 596 | A |
| 34 | a | 607 | A |
| 34 | a | 614 | C |
| 34 | a | 615 | G |
| 34 | a | 629 | A |
| 34 | a | 632 | U |
| 34 | a | 642 | A |
| 34 | a | 650 | G |
| 34 | a | 653 | U |
| 34 | a | 665 | A |
| 34 | a | 703 | G |
| 34 | a | 704 | A |
| 34 | a | 721 | G |
| 34 | a | 723 | U |
| 34 | a | 724 | G |
| 34 | a | 734 | G |
| 34 | a | 747 | A |
| 34 | a | 748 | G |
| 34 | a | 753 | A |
| 34 | a | 755 | G |
| 34 | a | 773 | G |
| 34 | a | 777 | A |
| 34 | a | 781 | A |
| 34 | a | 792 | A |
| 34 | a | 793 | U |
| 34 | a | 794 | A |
| 34 | a | 814 | A |
| 34 | a | 815 | A |
| 34 | a | 816 | A |
| 34 | a | 817 | C |
| 34 | a | 819 | A |
| 34 | a | 829 | G |
| 34 | a | 841 | C |
| 34 | a | 843 | U |
| 34 | a | 844 | G |
| 34 | a | 845 | A |
| 34 | a | 846 | G |
| 34 | a | 847 | G |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 34 | a | 849 | G |
| 34 | a | 851 | G |
| 34 | a | 868 | C |
| 34 | a | 870 | U |
| 34 | a | 875 | U |
| 34 | a | 885 | G |
| 34 | a | 902 | G |
| 34 | a | 913 | A |
| 34 | a | 914 | A |
| 34 | a | 922 | G |
| 34 | a | 934 | C |
| 34 | a | 935 | A |
| 34 | a | 940 | C |
| 34 | a | 960 | U |
| 34 | a | 966 | 2MG |
| 34 | a | 968 | A |
| 34 | a | 969 | A |
| 34 | a | 971 | G |
| 34 | a | 973 | G |
| 34 | a | 975 | A |
| 34 | a | 976 | G |
| 34 | a | 977 | A |
| 34 | a | 981 | U |
| 34 | a | 982 | U |
| 34 | a | 984 | C |
| 34 | a | 992 | U |
| 34 | a | 993 | G |
| 34 | a | 994 | A |
| 34 | a | 996 | A |
| 34 | a | 999 | C |
| 34 | a | 1003 | G |
| 34 | a | 1004 | A |
| 34 | a | 1005 | A |
| 34 | a | 1006 | G |
| 34 | a | 1011 | C |
| 34 | a | 1014 | A |
| 34 | a | 1016 | A |
| 34 | a | 1017 | U |
| 34 | a | 1021 | A |
| 34 | a | 1022 | A |
| 34 | a | 1023 | U |
| 34 | a | 1025 | U |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 34 | a | 1027 | C |
| 34 | a | 1028 | C |
| 34 | a | 1029 | U |
| 34 | a | 1030 | U |
| 34 | a | 1031 | C |
| 34 | a | 1032 | G |
| 34 | a | 1035 | A |
| 34 | a | 1040 | U |
| 34 | a | 1043 | G |
| 34 | a | 1047 | G |
| 34 | a | 1065 | U |
| 34 | a | 1084 | G |
| 34 | a | 1085 | U |
| 34 | a | 1092 | A |
| 34 | a | 1094 | G |
| 34 | a | 1095 | U |
| 34 | a | 1101 | A |
| 34 | a | 1109 | C |
| 34 | a | 1124 | G |
| 34 | a | 1125 | U |
| 34 | a | 1126 | U |
| 34 | a | 1127 | G |
| 34 | a | 1131 | G |
| 34 | a | 1134 | G |
| 34 | a | 1137 | C |
| 34 | a | 1138 | G |
| 34 | a | 1139 | G |
| 34 | a | 1144 | G |
| 34 | a | 1145 | A |
| 34 | a | 1159 | U |
| 34 | a | 1160 | G |
| 34 | a | 1167 | A |
| 34 | a | 1168 | U |
| 34 | a | 1169 | A |
| 34 | a | 1171 | A |
| 34 | a | 1177 | G |
| 34 | a | 1179 | A |
| 34 | a | 1183 | U |
| 34 | a | 1184 | G |
| 34 | a | 1196 | A |
| 34 | a | 1197 | A |
| 34 | a | 1200 | C |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 34 | a | 1212 | U |
| 34 | a | 1213 | A |
| 34 | a | 1214 | C |
| 34 | a | 1226 | C |
| 34 | a | 1227 | A |
| 34 | a | 1236 | A |
| 34 | a | 1239 | A |
| 34 | a | 1241 | G |
| 34 | a | 1251 | A |
| 34 | a | 1254 | A |
| 34 | a | 1260 | G |
| 34 | a | 1261 | A |
| 34 | a | 1267 | C |
| 34 | a | 1270 | G |
| 34 | a | 1275 | A |
| 34 | a | 1280 | A |
| 34 | a | 1286 | U |
| 34 | a | 1287 | A |
| 34 | a | 1294 | G |
| 34 | a | 1297 | G |
| 34 | a | 1300 | G |
| 34 | a | 1301 | U |
| 34 | a | 1302 | C |
| 34 | a | 1305 | G |
| 34 | a | 1312 | G |
| 34 | a | 1317 | C |
| 34 | a | 1320 | C |
| 34 | a | 1323 | G |
| 34 | a | 1331 | G |
| 34 | a | 1332 | A |
| 34 | a | 1346 | A |
| 34 | a | 1347 | G |
| 34 | a | 1348 | U |
| 34 | a | 1360 | A |
| 34 | a | 1361 | G |
| 34 | a | 1363 | A |
| 34 | a | 1364 | U |
| 34 | a | 1370 | G |
| 34 | a | 1378 | C |
| 34 | a | 1379 | G |
| 34 | a | 1383 | C |
| 34 | a | 1386 | G |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 34 | a | 1397 | C |
| 34 | a | 1398 | A |
| 34 | a | 1413 | A |
| 34 | a | 1419 | G |
| 34 | a | 1422 | G |
| 34 | a | 1423 | G |
| 34 | a | 1424 | U |
| 34 | a | 1432 | G |
| 34 | a | 1433 | A |
| 34 | a | 1441 | A |
| 34 | a | 1442 | G |
| 34 | a | 1443 | C |
| 34 | a | 1444 | U |
| 34 | a | 1446 | A |
| 34 | a | 1450 | U |
| 34 | a | 1451 | U |
| 34 | a | 1452 | C |
| 34 | a | 1453 | G |
| 34 | a | 1473 | G |
| 34 | a | 1474 | U |
| 34 | a | 1475 | G |
| 34 | a | 1476 | A |
| 34 | a | 1477 | U |
| 34 | a | 1479 | C |
| 34 | a | 1482 | G |
| 34 | a | 1483 | A |
| 34 | a | 1486 | G |
| 34 | a | 1487 | G |
| 34 | a | 1488 | G |
| 34 | a | 1492 | A |
| 34 | a | 1497 | G |
| 34 | a | 1499 | A |
| 34 | a | 1503 | A |
| 34 | a | 1506 | U |
| 34 | a | 1517 | G |
| 34 | a | 1529 | G |
| 34 | a | 1530 | G |
| 34 | a | 1534 | A |
| 34 | a | 1535 | C |
| 34 | a | 1536 | C |
| 34 | a | 1537 | U |
| 34 | a | 1538 | C |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 34 | a | 1539 | C |
| 34 | a | 1540 | U |
| 55 | v | 9 | G |
| 55 | v | 14 | A |
| 55 | v | 18 | G |
| 55 | v | 20 | H2U |
| 55 | v | 21 | A |
| 55 | v | 33 | U |
| 55 | v | 34 | C |
| 55 | v | 42 | G |
| 55 | v | 43 | A |
| 55 | v | 44 | A |
| 55 | v | 45 | G |
| 55 | v | 46 | A |
| 55 | v | 47 | U |
| 55 | v | 48 | C |
| 55 | v | 52 | G |
| 55 | v | 55 | PSU |
| 55 | v | 76 | A |
| 56 | w | 8 | 4SU |
| 56 | w | 13 | C |
| 56 | w | 14 | A |
| 56 | w | 16 | U |
| 56 | w | 17 | C |
| 56 | w | 18 | G |
| 56 | w | 19 | G |
| 56 | w | 20 | U |
| 56 | w | 21 | A |
| 56 | w | 29 | G |
| 56 | w | 36 | A |
| 56 | w | 40 | C |
| 56 | w | 44 | G |
| 56 | w | 45 | U |
| 56 | w | 46 | G7M |
| 56 | w | 53 | G |
| 56 | w | 59 | U |
| 56 | w | 60 | U |
| 56 | w | 61 | C |
| 56 | w | 67 | C |
| 56 | w | 68 | C |
| 56 | w | 69 | G |
| 56 | w | 74 | C |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 59 | z | -1 | C |
| 59 | z | 0 | U |
| 59 | z | 4 | U |
| 59 | z | 7 | G |

All (48) RNA pucker outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 242 | G |
| 8 | A | 361 | G |
| 8 | A | 458 | G |
| 8 | A | 479 | A |
| 8 | A | 481 | G |
| 8 | A | 545 | U |
| 8 | A | 555 | G |
| 8 | A | 652 | U |
| 8 | A | 715 | A |
| 8 | A | 746 | PSU |
| 8 | A | 774 | G |
| 8 | A | 784 | G |
| 8 | A | 883 | G |
| 8 | A | 894 | U |
| 8 | A | 895 | U |
| 8 | A | 1023 | U |
| 8 | A | 1024 | G |
| 8 | A | 1082 | U |
| 8 | A | 1090 | A |
| 8 | A | 1093 | G |
| 8 | A | 1300 | G |
| 8 | A | 1331 | G |
| 8 | A | 1423 | G |
| 8 | A | 1432 | G |
| 8 | A | 1451 | C |
| 8 | A | 1475 | G |
| 8 | A | 1490 | A |
| 8 | A | 1715 | G |
| 8 | A | 1730 | C |
| 8 | A | 1907 | G |
| 8 | A | 1926 | U |
| 8 | A | 2149 | U |
| 8 | A | 2192 | U |
| 8 | A | 2287 | A |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 8 | A | 2308 | G |
| 8 | A | 2319 | G |
| 8 | A | 2324 | U |
| 8 | A | 2405 | G |
| 8 | A | 2468 | A |
| 8 | A | 2488 | G |
| 8 | A | 2505 | G |
| 8 | A | 2655 | G |
| 8 | A | 2728 | U |
| 8 | A | 2796 | U |
| 8 | A | 2808 | G |
| 9 | B | 36 | C |
| 9 | B | 52 | A |
| 9 | B | 66 | A |

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

46 non-standard protein/DNA/RNA residues 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 |
| 8 | PSU | A | 2605 | 8 | 17,21,22 | 1.13 | 2 (11%) | 20,30,33 | 3.15 | 6 (30%) |
| 55 | 5MU | v | 54 | 55 | 15,22,23 | 2.83 | 3 (20%) | 16,32,35 | 2.79 | 2 (12%) |
| 55 | H2U | v | 20 | 55 | 18,21,22 | 3.15 | 5 (27%) | 21,30,33 | 1.96 | 5 (23%) |
| 8 | G7M | A | 2069 | 60,8 | 20,26,27 | 4.89 | 15 (75%) | 20,39,42 | 2.88 | 7 (35%) |
| 8 | PSU | A | 1911 | 8 | 17,21,22 | 1.20 | 3 (17%) | 20,30,33 | 2.99 | 6 (30%) |
| 8 | 6MZ | A | 2030 | 8 | 18,25,26 | 2.18 | 3 (16%) | 16,36,39 | 2.29 | 3 (18%) |
| 34 | 2MG | a | 1516 | 34 | 19,26,27 | 4.74 | 8 (42%) | 21,38,41 | 2.51 | 7 (33%) |
| 8 | 5MC | A | 747 | 8 | 15,22,23 | 2.99 | 5 (33%) | 19,32,35 | 1.62 | 4 (21%) |
| 8 | 2MA | A | 2503 | 60,8 | 17,25,26 | 3.57 | 5 (29%) | 19,37,40 | 1.72 | 5 (26%) |
| 34 | MA6 | a | 1518 | 34 | 19,26,27 | 0.99 | 1 (5%) | 18,38,41 | 2.92 | 2 (11%) |
| 56 | PSU | w | 32 | 56 | 17,21,22 | 1.02 | 1 (5%) | 20,30,33 | 3.27 | 7 (35%) |

| Mol | Type | Chain | Res | Link | Bond lengths | | | Bond angles | | |
|-----|------|-------|------|-------|--------------|------|----------|-------------|------|----------|
| | | | | | Counts | RMSZ | # Z > 2 | Counts | RMSZ | # Z > 2 |
| 56 | MIA | w | 37 | 56 | 24,31,32 | 3.23 | 7 (29%) | 26,44,47 | 3.29 | 11 (42%) |
| 8 | 2MG | A | 2445 | 8 | 19,26,27 | 1.20 | 1 (5%) | 21,38,41 | 2.48 | 9 (42%) |
| 8 | 1MG | A | 745 | 8 | 18,26,27 | 3.47 | 5 (27%) | 19,39,42 | 2.44 | 2 (10%) |
| 34 | UR3 | a | 1498 | 34,60 | 14,22,23 | 2.78 | 4 (28%) | 15,32,35 | 0.76 | 0 |
| 8 | 5MC | A | 1962 | 8 | 15,22,23 | 1.22 | 1 (6%) | 19,32,35 | 1.65 | 5 (26%) |
| 34 | MA6 | a | 1519 | 34 | 19,26,27 | 1.00 | 1 (5%) | 18,38,41 | 2.76 | 2 (11%) |
| 8 | PSU | A | 2504 | 60,8 | 17,21,22 | 1.12 | 3 (17%) | 20,30,33 | 3.23 | 6 (30%) |
| 8 | OMG | A | 2251 | 56,8 | 18,26,27 | 1.21 | 1 (5%) | 20,38,41 | 2.54 | 8 (40%) |
| 8 | 6MZ | A | 1618 | 8 | 18,25,26 | 2.13 | 4 (22%) | 16,36,39 | 2.03 | 3 (18%) |
| 8 | OMU | A | 2552 | 60,8 | 14,22,23 | 3.25 | 5 (35%) | 14,31,34 | 0.65 | 0 |
| 56 | PSU | w | 55 | 56 | 17,21,22 | 1.81 | 3 (17%) | 20,30,33 | 3.31 | 6 (30%) |
| 56 | PSU | w | 39 | 56 | 17,21,22 | 1.02 | 2 (11%) | 20,30,33 | 2.93 | 6 (30%) |
| 8 | PSU | A | 1917 | 8 | 17,21,22 | 1.03 | 1 (5%) | 20,30,33 | 3.13 | 7 (35%) |
| 8 | 5MU | A | 1939 | 8 | 15,22,23 | 2.83 | 3 (20%) | 16,32,35 | 2.86 | 2 (12%) |
| 58 | FME | y | 101 | 58 | 8,9,10 | 0.99 | 1 (12%) | 7,9,11 | 0.86 | 0 |
| 56 | 5MU | w | 54 | 56 | 15,22,23 | 1.21 | 1 (6%) | 16,32,35 | 1.95 | 3 (18%) |
| 8 | 3TD | A | 1915 | 8 | 17,22,23 | 3.55 | 7 (41%) | 19,32,35 | 1.39 | 4 (21%) |
| 8 | PSU | A | 2457 | 8 | 17,21,22 | 1.23 | 3 (17%) | 20,30,33 | 2.98 | 6 (30%) |
| 8 | PSU | A | 955 | 8 | 17,21,22 | 1.24 | 3 (17%) | 20,30,33 | 3.05 | 6 (30%) |
| 56 | 4SU | w | 8 | 56 | 14,21,22 | 1.63 | 2 (14%) | 15,30,33 | 1.56 | 3 (20%) |
| 8 | OMC | A | 2498 | 60,8 | 15,22,23 | 3.39 | 5 (33%) | 17,31,34 | 1.35 | 1 (5%) |
| 34 | 2MG | a | 966 | 34 | 19,26,27 | 4.93 | 8 (42%) | 21,38,41 | 2.05 | 7 (33%) |
| 55 | 4SU | v | 8 | 55 | 14,21,22 | 3.30 | 5 (35%) | 15,30,33 | 1.27 | 2 (13%) |
| 8 | 2MG | A | 1835 | 8 | 19,26,27 | 4.74 | 8 (42%) | 21,38,41 | 2.13 | 8 (38%) |
| 8 | PSU | A | 2604 | 8 | 17,21,22 | 1.40 | 3 (17%) | 20,30,33 | 3.10 | 6 (30%) |
| 34 | 5MC | a | 1407 | 34 | 15,22,23 | 3.05 | 5 (33%) | 19,32,35 | 1.28 | 1 (5%) |
| 55 | PSU | v | 55 | 55 | 17,21,22 | 0.89 | 1 (5%) | 20,30,33 | 3.08 | 7 (35%) |
| 34 | PSU | a | 516 | 34,60 | 17,21,22 | 0.98 | 1 (5%) | 20,30,33 | 3.26 | 7 (35%) |
| 56 | G7M | w | 46 | 56 | 20,26,27 | 4.93 | 15 (75%) | 20,39,42 | 2.68 | 6 (30%) |
| 34 | 4OC | a | 1402 | 34 | 16,23,24 | 3.21 | 6 (37%) | 17,32,35 | 1.46 | 1 (5%) |
| 34 | G7M | a | 527 | 34 | 20,26,27 | 4.94 | 15 (75%) | 20,39,42 | 2.68 | 6 (30%) |
| 8 | PSU | A | 746 | 60,8 | 17,21,22 | 1.17 | 3 (17%) | 20,30,33 | 3.32 | 7 (35%) |
| 34 | 5MC | a | 967 | 34 | 15,22,23 | 3.16 | 5 (33%) | 19,32,35 | 1.31 | 3 (15%) |
| 34 | 2MG | a | 1207 | 34 | 19,26,27 | 4.78 | 7 (36%) | 21,38,41 | 2.36 | 8 (38%) |
| 8 | PSU | A | 2580 | 60,8 | 17,21,22 | 1.43 | 3 (17%) | 20,30,33 | 3.20 | 8 (40%) |

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 |
|-----|------|-------|------|-------|---------|------------|---------|
| 8 | PSU | A | 2605 | 8 | - | 0/7/25/26 | 0/2/2/2 |
| 55 | 5MU | v | 54 | 55 | - | 0/5/25/26 | 0/2/2/2 |
| 55 | H2U | v | 20 | 55 | - | 7/7/38/39 | 0/2/2/2 |
| 8 | G7M | A | 2069 | 60,8 | - | 2/3/25/26 | 0/3/3/3 |
| 8 | PSU | A | 1911 | 8 | - | 0/7/25/26 | 0/2/2/2 |
| 8 | 6MZ | A | 2030 | 8 | - | 2/5/27/28 | 0/3/3/3 |
| 34 | 2MG | a | 1516 | 34 | - | 0/5/27/28 | 0/3/3/3 |
| 8 | 5MC | A | 747 | 8 | - | 1/5/25/26 | 0/2/2/2 |
| 8 | 2MA | A | 2503 | 60,8 | - | 1/3/25/26 | 0/3/3/3 |
| 34 | MA6 | a | 1518 | 34 | - | 0/7/29/30 | 0/3/3/3 |
| 56 | PSU | w | 32 | 56 | - | 4/7/25/26 | 0/2/2/2 |
| 56 | MIA | w | 37 | 56 | - | 3/11/33/34 | 0/3/3/3 |
| 8 | 2MG | A | 2445 | 8 | - | 0/5/27/28 | 0/3/3/3 |
| 8 | 1MG | A | 745 | 8 | - | 0/3/25/26 | 0/3/3/3 |
| 34 | UR3 | a | 1498 | 34,60 | - | 0/5/25/26 | 0/2/2/2 |
| 8 | 5MC | A | 1962 | 8 | - | 2/5/25/26 | 0/2/2/2 |
| 34 | MA6 | a | 1519 | 34 | - | 3/7/29/30 | 0/3/3/3 |
| 8 | PSU | A | 2504 | 60,8 | - | 0/7/25/26 | 0/2/2/2 |
| 8 | OMG | A | 2251 | 56,8 | - | 2/5/27/28 | 0/3/3/3 |
| 8 | 6MZ | A | 1618 | 8 | - | 0/5/27/28 | 0/3/3/3 |
| 8 | OMU | A | 2552 | 60,8 | - | 1/7/27/28 | 0/2/2/2 |
| 56 | PSU | w | 55 | 56 | - | 0/7/25/26 | 0/2/2/2 |
| 56 | PSU | w | 39 | 56 | - | 2/7/25/26 | 0/2/2/2 |
| 8 | PSU | A | 1917 | 8 | - | 3/7/25/26 | 0/2/2/2 |
| 8 | 5MU | A | 1939 | 8 | - | 4/5/25/26 | 0/2/2/2 |
| 58 | FME | y | 101 | 58 | - | 7/7/9/11 | - |
| 56 | 5MU | w | 54 | 56 | - | 0/5/25/26 | 0/2/2/2 |
| 8 | 3TD | A | 1915 | 8 | - | 2/7/25/26 | 0/2/2/2 |
| 8 | PSU | A | 2457 | 8 | - | 0/7/25/26 | 0/2/2/2 |
| 8 | PSU | A | 955 | 8 | - | 0/7/25/26 | 0/2/2/2 |
| 56 | 4SU | w | 8 | 56 | - | 0/5/25/26 | 0/2/2/2 |
| 8 | OMC | A | 2498 | 60,8 | - | 1/7/27/28 | 0/2/2/2 |
| 34 | 2MG | a | 966 | 34 | - | 2/5/27/28 | 0/3/3/3 |
| 55 | 4SU | v | 8 | 55 | - | 0/5/25/26 | 0/2/2/2 |
| 8 | 2MG | A | 1835 | 8 | - | 2/5/27/28 | 0/3/3/3 |

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| Mol | Type | Chain | Res | Link | Chirals | Torsions | Rings |
|-----|------|-------|------|-------|---------|-----------|---------|
| 8 | PSU | A | 2604 | 8 | - | 0/7/25/26 | 0/2/2/2 |
| 34 | 5MC | a | 1407 | 34 | - | 0/5/25/26 | 0/2/2/2 |
| 55 | PSU | v | 55 | 55 | - | 4/7/25/26 | 0/2/2/2 |
| 34 | PSU | a | 516 | 34,60 | - | 1/7/25/26 | 0/2/2/2 |
| 56 | G7M | w | 46 | 56 | - | 1/3/25/26 | 0/3/3/3 |
| 34 | 4OC | a | 1402 | 34 | - | 1/9/29/30 | 0/2/2/2 |
| 34 | G7M | a | 527 | 34 | - | 1/3/25/26 | 0/3/3/3 |
| 8 | PSU | A | 746 | 60,8 | - | 3/7/25/26 | 0/2/2/2 |
| 34 | 5MC | a | 967 | 34 | - | 0/5/25/26 | 0/2/2/2 |
| 34 | 2MG | a | 1207 | 34 | - | 0/5/27/28 | 0/3/3/3 |
| 8 | PSU | A | 2580 | 60,8 | - | 0/7/25/26 | 0/2/2/2 |

All (199) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|---------|--------|-------------|----------|
| 34 | a | 966 | 2MG | C2-N2 | 16.26 | 1.47 | 1.34 |
| 34 | a | 1207 | 2MG | C2-N2 | 15.41 | 1.47 | 1.34 |
| 8 | A | 1835 | 2MG | C2-N2 | 15.40 | 1.47 | 1.34 |
| 34 | a | 1516 | 2MG | C2-N2 | 15.39 | 1.47 | 1.34 |
| 56 | w | 37 | MIA | C2-S10 | -11.90 | 1.65 | 1.75 |
| 8 | A | 2069 | G7M | C2'-C3' | -11.59 | 1.21 | 1.53 |
| 34 | a | 527 | G7M | C2'-C3' | -11.39 | 1.22 | 1.53 |
| 56 | w | 46 | G7M | C2'-C3' | -10.78 | 1.23 | 1.53 |
| 55 | v | 20 | H2U | C2-N1 | 9.80 | 1.49 | 1.35 |
| 34 | a | 966 | 2MG | C4-N3 | 9.27 | 1.50 | 1.35 |
| 55 | v | 54 | 5MU | C4-C5 | 9.09 | 1.60 | 1.41 |
| 8 | A | 1939 | 5MU | C4-C5 | 8.95 | 1.60 | 1.41 |
| 8 | A | 1835 | 2MG | C4-N3 | 8.85 | 1.49 | 1.35 |
| 34 | a | 1207 | 2MG | C4-N3 | 8.59 | 1.49 | 1.35 |
| 34 | a | 527 | G7M | C4-N3 | 8.56 | 1.49 | 1.35 |
| 34 | a | 1516 | 2MG | C4-N3 | 8.46 | 1.48 | 1.35 |
| 8 | A | 745 | 1MG | C4-N3 | 8.45 | 1.48 | 1.35 |
| 8 | A | 2069 | G7M | C4-N3 | 8.40 | 1.48 | 1.35 |
| 8 | A | 2498 | OMC | C6-N1 | 8.39 | 1.46 | 1.35 |
| 56 | w | 46 | G7M | C4-N3 | 8.38 | 1.48 | 1.35 |
| 8 | A | 2503 | 2MA | C4-N3 | 8.32 | 1.48 | 1.35 |
| 8 | A | 1915 | 3TD | C6-C5 | 7.88 | 1.50 | 1.38 |
| 34 | a | 1402 | 4OC | C6-N1 | 7.67 | 1.45 | 1.35 |
| 34 | a | 967 | 5MC | C4-N3 | 7.64 | 1.46 | 1.35 |
| 8 | A | 2030 | 6MZ | C6-N6 | 7.55 | 1.47 | 1.35 |
| 56 | w | 46 | G7M | C6-C5 | 7.41 | 1.54 | 1.41 |
| 34 | a | 1498 | UR3 | C6-N1 | 7.38 | 1.44 | 1.35 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|---------|-------|-------------|----------|
| 8 | A | 2503 | 2MA | C6-C5 | 7.37 | 1.52 | 1.41 |
| 8 | A | 1618 | 6MZ | C6-N6 | 7.33 | 1.47 | 1.35 |
| 55 | v | 8 | 4SU | C5-C4 | 7.33 | 1.46 | 1.38 |
| 34 | a | 527 | G7M | C6-C5 | 7.30 | 1.53 | 1.41 |
| 8 | A | 747 | 5MC | C4-N3 | 7.26 | 1.45 | 1.35 |
| 8 | A | 2069 | G7M | C6-C5 | 7.21 | 1.53 | 1.41 |
| 34 | a | 1407 | 5MC | C4-N3 | 7.16 | 1.45 | 1.35 |
| 34 | a | 1516 | 2MG | C6-C5 | 7.05 | 1.53 | 1.41 |
| 34 | a | 1207 | 2MG | C6-C5 | 7.00 | 1.53 | 1.41 |
| 8 | A | 2552 | OMU | C4-N3 | 6.84 | 1.45 | 1.33 |
| 8 | A | 2552 | OMU | C6-N1 | 6.68 | 1.44 | 1.35 |
| 8 | A | 745 | 1MG | C6-C5 | 6.66 | 1.51 | 1.41 |
| 8 | A | 2503 | 2MA | C2-N3 | 6.58 | 1.45 | 1.34 |
| 55 | v | 20 | H2U | C2-N3 | 6.52 | 1.49 | 1.38 |
| 34 | a | 966 | 2MG | C6-C5 | 6.50 | 1.52 | 1.41 |
| 8 | A | 745 | 1MG | C2-N3 | 6.40 | 1.44 | 1.34 |
| 8 | A | 745 | 1MG | C2-N2 | 6.36 | 1.46 | 1.33 |
| 34 | a | 527 | G7M | O4'-C1' | 6.35 | 1.49 | 1.41 |
| 8 | A | 1835 | 2MG | C6-C5 | 6.34 | 1.52 | 1.41 |
| 56 | w | 46 | G7M | O4'-C1' | 6.32 | 1.49 | 1.41 |
| 8 | A | 2069 | G7M | O4'-C1' | 6.31 | 1.49 | 1.41 |
| 34 | a | 527 | G7M | O4'-C4' | -6.17 | 1.31 | 1.45 |
| 8 | A | 1915 | 3TD | C5-C1' | -6.17 | 1.47 | 1.52 |
| 8 | A | 2498 | OMC | C4-N3 | 6.14 | 1.45 | 1.35 |
| 56 | w | 37 | MIA | C13-C14 | 6.05 | 1.49 | 1.32 |
| 8 | A | 2069 | G7M | O4'-C4' | -6.05 | 1.31 | 1.45 |
| 56 | w | 46 | G7M | O4'-C4' | -5.98 | 1.31 | 1.45 |
| 34 | a | 1207 | 2MG | C6-N1 | 5.91 | 1.43 | 1.33 |
| 56 | w | 46 | G7M | C6-N1 | 5.85 | 1.43 | 1.33 |
| 34 | a | 527 | G7M | C6-N1 | 5.69 | 1.43 | 1.33 |
| 8 | A | 1915 | 3TD | C2-N1 | 5.65 | 1.49 | 1.38 |
| 8 | A | 2069 | G7M | C6-N1 | 5.63 | 1.42 | 1.33 |
| 56 | w | 55 | PSU | C5-C1' | -5.61 | 1.47 | 1.52 |
| 34 | a | 1516 | 2MG | C6-N1 | 5.58 | 1.42 | 1.33 |
| 8 | A | 1835 | 2MG | C6-N1 | 5.54 | 1.42 | 1.33 |
| 8 | A | 1915 | 3TD | C4-N3 | 5.45 | 1.46 | 1.38 |
| 8 | A | 2552 | OMU | C2-N3 | 5.44 | 1.49 | 1.38 |
| 8 | A | 2503 | 2MA | C2-N1 | 5.40 | 1.43 | 1.34 |
| 55 | v | 8 | 4SU | C6-N1 | 5.36 | 1.42 | 1.35 |
| 8 | A | 1939 | 5MU | C4-N3 | -5.33 | 1.23 | 1.33 |
| 8 | A | 747 | 5MC | C2-N3 | 5.33 | 1.48 | 1.38 |
| 8 | A | 1915 | 3TD | C6-N1 | 5.32 | 1.45 | 1.34 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|---------|-------|-------------|----------|
| 34 | a | 967 | 5MC | C2-N3 | 5.30 | 1.48 | 1.38 |
| 34 | a | 966 | 2MG | C6-N1 | 5.29 | 1.42 | 1.33 |
| 34 | a | 527 | G7M | C2-N2 | 5.18 | 1.44 | 1.33 |
| 8 | A | 2498 | OMC | C2-N3 | 5.15 | 1.48 | 1.38 |
| 34 | a | 1407 | 5MC | C2-N3 | 5.15 | 1.48 | 1.38 |
| 56 | w | 46 | G7M | C3'-C4' | 5.15 | 1.66 | 1.53 |
| 55 | v | 54 | 5MU | C4-N3 | -5.13 | 1.24 | 1.33 |
| 8 | A | 2498 | OMC | C6-C5 | 5.07 | 1.49 | 1.38 |
| 34 | a | 967 | 5MC | C4-N4 | 5.04 | 1.46 | 1.34 |
| 34 | a | 1402 | 4OC | C6-C5 | 5.02 | 1.49 | 1.38 |
| 34 | a | 1402 | 4OC | C4-N3 | 5.01 | 1.44 | 1.34 |
| 56 | w | 37 | MIA | C2'-C1' | -5.01 | 1.46 | 1.53 |
| 55 | v | 20 | H2U | C4-N3 | 5.01 | 1.46 | 1.37 |
| 56 | w | 46 | G7M | C2-N2 | 4.98 | 1.43 | 1.33 |
| 34 | a | 1407 | 5MC | C4-N4 | 4.96 | 1.46 | 1.34 |
| 8 | A | 2069 | G7M | C2-N2 | 4.96 | 1.43 | 1.33 |
| 34 | a | 1498 | UR3 | C6-C5 | 4.95 | 1.49 | 1.38 |
| 8 | A | 747 | 5MC | C4-N4 | 4.93 | 1.46 | 1.34 |
| 55 | v | 8 | 4SU | C2-N3 | 4.85 | 1.47 | 1.38 |
| 34 | a | 967 | 5MC | C5-C4 | 4.75 | 1.48 | 1.41 |
| 55 | v | 8 | 4SU | C4-S4 | -4.71 | 1.58 | 1.67 |
| 56 | w | 46 | G7M | C2-N1 | 4.71 | 1.43 | 1.35 |
| 55 | v | 8 | 4SU | C6-C5 | 4.66 | 1.48 | 1.38 |
| 56 | w | 8 | 4SU | C4-S4 | -4.65 | 1.59 | 1.67 |
| 34 | a | 1402 | 4OC | C2-N3 | 4.65 | 1.47 | 1.38 |
| 34 | a | 1407 | 5MC | C5-C4 | 4.61 | 1.48 | 1.41 |
| 34 | a | 527 | G7M | C3'-C4' | 4.60 | 1.64 | 1.53 |
| 8 | A | 2069 | G7M | C3'-C4' | 4.55 | 1.64 | 1.53 |
| 8 | A | 2069 | G7M | C2-N1 | 4.44 | 1.43 | 1.35 |
| 34 | a | 527 | G7M | C2-N1 | 4.42 | 1.43 | 1.35 |
| 56 | w | 46 | G7M | C2'-C1' | 4.39 | 1.60 | 1.53 |
| 34 | a | 1498 | UR3 | C4-N3 | 4.32 | 1.44 | 1.38 |
| 8 | A | 2552 | OMU | C6-C5 | 4.30 | 1.47 | 1.38 |
| 34 | a | 1402 | 4OC | C5-C4 | 4.22 | 1.49 | 1.39 |
| 34 | a | 966 | 2MG | C2-N3 | 4.10 | 1.47 | 1.34 |
| 8 | A | 1915 | 3TD | C4-C5 | 4.09 | 1.50 | 1.41 |
| 8 | A | 2604 | PSU | C5-C1' | -3.94 | 1.48 | 1.52 |
| 8 | A | 747 | 5MC | C5-C4 | 3.94 | 1.47 | 1.41 |
| 34 | a | 527 | G7M | C2'-C1' | 3.82 | 1.59 | 1.53 |
| 8 | A | 1835 | 2MG | C2-N3 | 3.81 | 1.46 | 1.34 |
| 8 | A | 1962 | 5MC | C5-C4 | 3.79 | 1.47 | 1.41 |
| 34 | a | 1402 | 4OC | C4-N4 | 3.77 | 1.44 | 1.36 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|---------|-------|-------------|----------|
| 8 | A | 2503 | 2MA | C6-N1 | 3.68 | 1.42 | 1.35 |
| 34 | a | 1207 | 2MG | C2-N3 | 3.67 | 1.45 | 1.34 |
| 34 | a | 1516 | 2MG | C2-N3 | 3.56 | 1.45 | 1.34 |
| 8 | A | 2030 | 6MZ | C5-C4 | -3.44 | 1.31 | 1.40 |
| 34 | a | 967 | 5MC | C6-C5 | 3.44 | 1.49 | 1.40 |
| 56 | w | 54 | 5MU | C4-C5 | 3.43 | 1.48 | 1.41 |
| 8 | A | 2445 | 2MG | C6-C5 | 3.41 | 1.47 | 1.41 |
| 56 | w | 37 | MIA | O4'-C4' | -3.38 | 1.37 | 1.45 |
| 34 | a | 1407 | 5MC | C6-C5 | 3.37 | 1.49 | 1.40 |
| 8 | A | 2580 | PSU | C5-C1' | -3.31 | 1.49 | 1.52 |
| 8 | A | 2069 | G7M | C2'-C1' | 3.29 | 1.58 | 1.53 |
| 8 | A | 747 | 5MC | C6-C5 | 3.23 | 1.49 | 1.40 |
| 56 | w | 46 | G7M | O2'-C2' | 3.21 | 1.50 | 1.43 |
| 8 | A | 1618 | 6MZ | C5-C4 | -3.19 | 1.32 | 1.40 |
| 34 | a | 1207 | 2MG | C2-N1 | 3.10 | 1.44 | 1.34 |
| 56 | w | 55 | PSU | C4-C5 | 3.03 | 1.48 | 1.41 |
| 34 | a | 966 | 2MG | O6-C6 | -3.00 | 1.17 | 1.24 |
| 8 | A | 1835 | 2MG | O6-C6 | -3.00 | 1.17 | 1.24 |
| 8 | A | 1835 | 2MG | C2-N1 | 2.97 | 1.43 | 1.34 |
| 34 | a | 1516 | 2MG | C2-N1 | 2.97 | 1.43 | 1.34 |
| 34 | a | 1516 | 2MG | O6-C6 | -2.92 | 1.17 | 1.24 |
| 34 | a | 966 | 2MG | C2-N1 | 2.92 | 1.43 | 1.34 |
| 34 | a | 527 | G7M | O2'-C2' | 2.91 | 1.49 | 1.43 |
| 8 | A | 1917 | PSU | C4-N3 | 2.89 | 1.38 | 1.33 |
| 8 | A | 2580 | PSU | O4'-C1' | -2.88 | 1.40 | 1.44 |
| 34 | a | 1207 | 2MG | O6-C6 | -2.87 | 1.17 | 1.24 |
| 8 | A | 2580 | PSU | C4-N3 | 2.86 | 1.38 | 1.33 |
| 56 | w | 32 | PSU | C4-N3 | 2.82 | 1.38 | 1.33 |
| 8 | A | 2069 | G7M | O2'-C2' | 2.80 | 1.49 | 1.43 |
| 55 | v | 55 | PSU | C4-N3 | 2.79 | 1.37 | 1.33 |
| 56 | w | 46 | G7M | O3'-C3' | 2.79 | 1.49 | 1.43 |
| 8 | A | 745 | 1MG | C6-N1 | 2.78 | 1.42 | 1.38 |
| 34 | a | 1519 | MA6 | C5-C4 | -2.75 | 1.33 | 1.40 |
| 8 | A | 955 | PSU | C5-C1' | -2.73 | 1.49 | 1.52 |
| 8 | A | 2504 | PSU | C4-N3 | 2.68 | 1.37 | 1.33 |
| 34 | a | 516 | PSU | C4-N3 | 2.67 | 1.37 | 1.33 |
| 8 | A | 2457 | PSU | C5-C1' | -2.67 | 1.50 | 1.52 |
| 8 | A | 746 | PSU | C4-N3 | 2.66 | 1.37 | 1.33 |
| 34 | a | 1518 | MA6 | C5-C4 | -2.65 | 1.33 | 1.40 |
| 8 | A | 2498 | OMC | C4-N4 | 2.62 | 1.42 | 1.35 |
| 8 | A | 1911 | PSU | C5-C1' | -2.55 | 1.50 | 1.52 |
| 56 | w | 46 | G7M | O6-C6 | -2.52 | 1.18 | 1.24 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|---------|-------|-------------|----------|
| 8 | A | 955 | PSU | C4-N3 | 2.52 | 1.37 | 1.33 |
| 56 | w | 46 | G7M | C2-N3 | 2.51 | 1.46 | 1.34 |
| 56 | w | 37 | MIA | C3'-C4' | -2.50 | 1.46 | 1.53 |
| 8 | A | 2069 | G7M | C5-C4 | -2.50 | 1.36 | 1.39 |
| 8 | A | 2457 | PSU | O4'-C1' | -2.50 | 1.40 | 1.44 |
| 8 | A | 1911 | PSU | C4-N3 | 2.49 | 1.37 | 1.33 |
| 8 | A | 1618 | 6MZ | C2-N3 | 2.49 | 1.36 | 1.32 |
| 55 | v | 54 | 5MU | O4-C4 | -2.49 | 1.18 | 1.24 |
| 34 | a | 527 | G7M | O3'-C3' | 2.48 | 1.48 | 1.43 |
| 34 | a | 527 | G7M | C2-N3 | 2.47 | 1.46 | 1.34 |
| 8 | A | 1939 | 5MU | O4-C4 | -2.46 | 1.18 | 1.24 |
| 34 | a | 1498 | UR3 | O4-C4 | -2.46 | 1.18 | 1.24 |
| 8 | A | 2604 | PSU | C4-N3 | 2.43 | 1.37 | 1.33 |
| 8 | A | 2605 | PSU | C5-C1' | -2.42 | 1.50 | 1.52 |
| 8 | A | 1618 | 6MZ | C6-N1 | -2.42 | 1.30 | 1.34 |
| 56 | w | 8 | 4SU | C2-N3 | -2.41 | 1.33 | 1.38 |
| 8 | A | 2069 | G7M | O6-C6 | -2.38 | 1.18 | 1.24 |
| 8 | A | 2552 | OMU | O4-C4 | -2.37 | 1.18 | 1.24 |
| 56 | w | 39 | PSU | C4-N3 | 2.36 | 1.37 | 1.33 |
| 8 | A | 746 | PSU | C5-C1' | -2.35 | 1.50 | 1.52 |
| 34 | a | 527 | G7M | O6-C6 | -2.35 | 1.18 | 1.24 |
| 8 | A | 2605 | PSU | C4-N3 | 2.32 | 1.37 | 1.33 |
| 55 | v | 20 | H2U | O4-C4 | -2.32 | 1.18 | 1.23 |
| 55 | v | 20 | H2U | O2-C2 | -2.31 | 1.18 | 1.23 |
| 8 | A | 2069 | G7M | C2-N3 | 2.31 | 1.45 | 1.34 |
| 8 | A | 2457 | PSU | C4-N3 | 2.28 | 1.37 | 1.33 |
| 56 | w | 55 | PSU | C2'-C1' | -2.25 | 1.51 | 1.54 |
| 34 | a | 527 | G7M | C5-C4 | -2.25 | 1.36 | 1.39 |
| 34 | a | 1516 | 2MG | C5-C4 | -2.24 | 1.35 | 1.40 |
| 8 | A | 1911 | PSU | O4'-C1' | -2.17 | 1.41 | 1.44 |
| 8 | A | 2030 | 6MZ | C2-N3 | 2.17 | 1.35 | 1.32 |
| 56 | w | 46 | G7M | C5-C4 | -2.16 | 1.36 | 1.39 |
| 8 | A | 746 | PSU | O4'-C1' | -2.15 | 1.41 | 1.44 |
| 8 | A | 2069 | G7M | O3'-C3' | 2.15 | 1.48 | 1.43 |
| 56 | w | 39 | PSU | O4'-C1' | -2.12 | 1.41 | 1.44 |
| 8 | A | 2251 | OMG | C2-N1 | -2.11 | 1.31 | 1.35 |
| 8 | A | 1915 | 3TD | O4'-C1' | -2.08 | 1.41 | 1.44 |
| 8 | A | 955 | PSU | O4'-C1' | -2.05 | 1.41 | 1.44 |
| 8 | A | 1835 | 2MG | C5-C4 | -2.04 | 1.35 | 1.40 |
| 8 | A | 2504 | PSU | C5-C1' | -2.04 | 1.50 | 1.52 |
| 56 | w | 37 | MIA | O5'-C5' | -2.02 | 1.39 | 1.44 |
| 8 | A | 2504 | PSU | O4'-C1' | -2.02 | 1.41 | 1.44 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|---------|-------|-------------|----------|
| 8 | A | 2604 | PSU | O4'-C1' | -2.01 | 1.41 | 1.44 |
| 58 | y | 101 | FME | CA-N | -2.01 | 1.43 | 1.46 |
| 56 | w | 37 | MIA | C2'-C3' | -2.01 | 1.47 | 1.53 |
| 34 | a | 966 | 2MG | C5-C4 | -2.00 | 1.35 | 1.40 |

All (221) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|--------|-------------|----------|
| 34 | a | 516 | PSU | N1-C2-N3 | -11.19 | 119.53 | 128.43 |
| 56 | w | 37 | MIA | C12-C13-C14 | -11.05 | 105.63 | 127.14 |
| 8 | A | 746 | PSU | N1-C2-N3 | -10.78 | 119.86 | 128.43 |
| 8 | A | 2504 | PSU | N1-C2-N3 | -10.60 | 120.00 | 128.43 |
| 56 | w | 32 | PSU | N1-C2-N3 | -10.58 | 120.02 | 128.43 |
| 34 | a | 1518 | MA6 | N1-C6-N6 | -10.56 | 105.94 | 117.06 |
| 8 | A | 1917 | PSU | N1-C2-N3 | -10.37 | 120.19 | 128.43 |
| 8 | A | 2605 | PSU | N1-C2-N3 | -10.37 | 120.19 | 128.43 |
| 55 | v | 55 | PSU | N1-C2-N3 | -10.32 | 120.23 | 128.43 |
| 8 | A | 2457 | PSU | N1-C2-N3 | -10.25 | 120.28 | 128.43 |
| 8 | A | 2580 | PSU | N1-C2-N3 | -10.19 | 120.33 | 128.43 |
| 34 | a | 1519 | MA6 | N1-C6-N6 | -9.95 | 106.58 | 117.06 |
| 8 | A | 955 | PSU | N1-C2-N3 | -9.91 | 120.55 | 128.43 |
| 8 | A | 1911 | PSU | N1-C2-N3 | -9.91 | 120.55 | 128.43 |
| 56 | w | 39 | PSU | N1-C2-N3 | -9.74 | 120.69 | 128.43 |
| 8 | A | 2604 | PSU | N1-C2-N3 | -9.72 | 120.70 | 128.43 |
| 8 | A | 745 | 1MG | C1'-N9-C4 | -9.37 | 110.17 | 126.64 |
| 8 | A | 1939 | 5MU | C5-C6-N1 | -9.19 | 112.29 | 122.19 |
| 55 | v | 54 | 5MU | C5-C6-N1 | -8.46 | 113.07 | 122.19 |
| 8 | A | 2069 | G7M | C1'-N9-C4 | -8.32 | 112.02 | 126.64 |
| 56 | w | 55 | PSU | N1-C2-N3 | -8.14 | 121.95 | 128.43 |
| 56 | w | 46 | G7M | C1'-N9-C4 | -7.74 | 113.04 | 126.64 |
| 34 | a | 527 | G7M | C1'-N9-C4 | -6.98 | 114.37 | 126.64 |
| 55 | v | 54 | 5MU | C4-N3-C2 | 6.97 | 121.02 | 115.14 |
| 55 | v | 20 | H2U | C4-N3-C2 | -6.80 | 120.16 | 125.79 |
| 56 | w | 55 | PSU | C5-C1'-C2' | -6.67 | 103.42 | 115.32 |
| 56 | w | 54 | 5MU | C4-N3-C2 | 6.62 | 120.73 | 115.14 |
| 8 | A | 1939 | 5MU | C4-N3-C2 | 6.28 | 120.44 | 115.14 |
| 56 | w | 55 | PSU | C4-N3-C2 | 6.24 | 120.41 | 115.14 |
| 34 | a | 1516 | 2MG | C1'-N9-C4 | -6.06 | 116.00 | 126.64 |
| 8 | A | 2580 | PSU | C4-N3-C2 | 5.80 | 120.04 | 115.14 |
| 34 | a | 516 | PSU | C4-N3-C2 | 5.79 | 120.03 | 115.14 |
| 34 | a | 1519 | MA6 | N3-C2-N1 | -5.76 | 119.67 | 128.68 |
| 34 | a | 1518 | MA6 | N3-C2-N1 | -5.72 | 119.74 | 128.68 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 34 | a | 527 | G7M | N3-C2-N1 | -5.71 | 119.61 | 127.22 |
| 8 | A | 2504 | PSU | C4-N3-C2 | 5.64 | 119.90 | 115.14 |
| 56 | w | 37 | MIA | C16-C14-C13 | -5.60 | 106.46 | 122.65 |
| 56 | w | 32 | PSU | C4-N3-C2 | 5.58 | 119.85 | 115.14 |
| 55 | v | 55 | PSU | C4-N3-C2 | 5.58 | 119.85 | 115.14 |
| 8 | A | 1917 | PSU | C4-N3-C2 | 5.57 | 119.84 | 115.14 |
| 8 | A | 2030 | 6MZ | N3-C2-N1 | -5.56 | 119.99 | 128.68 |
| 8 | A | 2069 | G7M | N3-C2-N1 | -5.52 | 119.86 | 127.22 |
| 56 | w | 39 | PSU | C4-N3-C2 | 5.43 | 119.73 | 115.14 |
| 34 | a | 966 | 2MG | N2-C2-N3 | 5.43 | 122.18 | 116.96 |
| 8 | A | 1618 | 6MZ | N3-C2-N1 | -5.39 | 120.25 | 128.68 |
| 8 | A | 2251 | OMG | C2-N3-C4 | 5.39 | 121.51 | 115.36 |
| 56 | w | 55 | PSU | C5-C4-N3 | -5.31 | 118.52 | 125.36 |
| 56 | w | 46 | G7M | N3-C2-N1 | -5.29 | 120.17 | 127.22 |
| 34 | a | 1402 | 4OC | CM4-N4-C4 | -5.26 | 118.45 | 122.97 |
| 8 | A | 2457 | PSU | C4-N3-C2 | 5.21 | 119.54 | 115.14 |
| 8 | A | 955 | PSU | C4-N3-C2 | 5.21 | 119.54 | 115.14 |
| 8 | A | 746 | PSU | C4-N3-C2 | 5.20 | 119.54 | 115.14 |
| 8 | A | 2503 | 2MA | C2-N3-C4 | 5.15 | 119.70 | 115.52 |
| 56 | w | 32 | PSU | O4'-C1'-C5 | 5.09 | 117.82 | 109.93 |
| 8 | A | 2445 | 2MG | C2-N3-C4 | 5.06 | 121.03 | 115.28 |
| 8 | A | 1618 | 6MZ | C9-N6-C6 | -4.92 | 118.63 | 122.87 |
| 8 | A | 2030 | 6MZ | C9-N6-C6 | -4.91 | 118.64 | 122.87 |
| 8 | A | 2580 | PSU | C5-C4-N3 | -4.89 | 119.06 | 125.36 |
| 34 | a | 1207 | 2MG | C1'-N9-C4 | -4.88 | 118.07 | 126.64 |
| 8 | A | 2605 | PSU | C4-N3-C2 | 4.78 | 119.18 | 115.14 |
| 56 | w | 37 | MIA | C15-C14-C13 | -4.77 | 108.86 | 122.65 |
| 8 | A | 2030 | 6MZ | C1'-N9-C4 | -4.72 | 118.34 | 126.64 |
| 34 | a | 1207 | 2MG | CM2-N2-C2 | -4.72 | 117.89 | 123.59 |
| 34 | a | 1516 | 2MG | CM2-N2-C2 | -4.62 | 118.02 | 123.59 |
| 8 | A | 2604 | PSU | C4-N3-C2 | 4.59 | 119.02 | 115.14 |
| 34 | a | 527 | G7M | C2-N3-C4 | 4.58 | 120.59 | 115.36 |
| 8 | A | 1911 | PSU | C4-N3-C2 | 4.53 | 118.97 | 115.14 |
| 8 | A | 2251 | OMG | C6-C5-C4 | -4.51 | 116.49 | 120.80 |
| 8 | A | 2498 | OMC | C2-N3-C4 | 4.44 | 120.84 | 116.34 |
| 8 | A | 2504 | PSU | C5-C1'-C2' | -4.44 | 107.40 | 115.32 |
| 56 | w | 37 | MIA | O4'-C4'-C3' | -4.44 | 96.33 | 105.11 |
| 8 | A | 1917 | PSU | C5-C4-N3 | -4.36 | 119.74 | 125.36 |
| 8 | A | 2069 | G7M | C2-N3-C4 | 4.36 | 120.34 | 115.36 |
| 34 | a | 1207 | 2MG | C2-N3-C4 | 4.36 | 120.23 | 115.28 |
| 8 | A | 955 | PSU | C5-C4-N3 | -4.34 | 119.77 | 125.36 |
| 34 | a | 966 | 2MG | C2-N3-C4 | 4.33 | 120.20 | 115.28 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|------|------|------------|-------|-------------|----------|
| 34 | a | 1516 | 2MG | N2-C2-N1 | 4.33 | 121.12 | 116.96 |
| 8 | A | 2504 | PSU | C5-C4-N3 | -4.32 | 119.79 | 125.36 |
| 34 | a | 1516 | 2MG | C2-N3-C4 | 4.32 | 120.18 | 115.28 |
| 56 | w | 55 | PSU | C5-C6-N1 | -4.32 | 119.13 | 124.44 |
| 8 | A | 2604 | PSU | C5-C6-N1 | -4.28 | 119.18 | 124.44 |
| 8 | A | 2445 | 2MG | CM2-N2-C2 | -4.26 | 118.45 | 123.59 |
| 8 | A | 2604 | PSU | C5-C4-N3 | -4.25 | 119.88 | 125.36 |
| 8 | A | 1835 | 2MG | CM2-N2-C2 | -4.25 | 118.47 | 123.59 |
| 8 | A | 2445 | 2MG | C6-C5-C4 | -4.23 | 116.76 | 120.80 |
| 8 | A | 2604 | PSU | C5-C1'-C2' | -4.23 | 107.78 | 115.32 |
| 8 | A | 1835 | 2MG | C1'-N9-C4 | -4.16 | 119.34 | 126.64 |
| 56 | w | 46 | G7M | C2-N3-C4 | 4.14 | 120.08 | 115.36 |
| 55 | v | 55 | PSU | C5-C4-N3 | -4.13 | 120.04 | 125.36 |
| 8 | A | 746 | PSU | C5-C4-N3 | -4.13 | 120.04 | 125.36 |
| 34 | a | 1207 | 2MG | N2-C2-N1 | 4.11 | 120.91 | 116.96 |
| 56 | w | 39 | PSU | C5-C4-N3 | -4.11 | 120.07 | 125.36 |
| 56 | w | 55 | PSU | C6-N1-C2 | 4.10 | 122.13 | 115.36 |
| 8 | A | 746 | PSU | C5-C1'-C2' | -4.09 | 108.03 | 115.32 |
| 8 | A | 1911 | PSU | C5-C6-N1 | -4.01 | 119.51 | 124.44 |
| 8 | A | 2457 | PSU | C5-C4-N3 | -4.01 | 120.19 | 125.36 |
| 56 | w | 32 | PSU | C5-C4-N3 | -4.01 | 120.19 | 125.36 |
| 8 | A | 2251 | OMG | N3-C2-N1 | -4.01 | 121.88 | 127.22 |
| 8 | A | 955 | PSU | C5-C1'-C2' | -4.00 | 108.18 | 115.32 |
| 8 | A | 2605 | PSU | C5-C6-N1 | -3.96 | 119.57 | 124.44 |
| 34 | a | 516 | PSU | C5-C4-N3 | -3.96 | 120.26 | 125.36 |
| 8 | A | 2445 | 2MG | C6-N1-C2 | 3.93 | 122.22 | 115.18 |
| 56 | w | 8 | 4SU | C2-N3-C4 | 3.89 | 120.79 | 115.15 |
| 8 | A | 2251 | OMG | C6-N1-C2 | 3.88 | 122.09 | 115.93 |
| 34 | a | 966 | 2MG | N3-C2-N1 | -3.86 | 120.12 | 126.23 |
| 34 | a | 1516 | 2MG | N3-C2-N1 | -3.86 | 120.12 | 126.23 |
| 34 | a | 1407 | 5MC | C2-N3-C4 | 3.84 | 120.66 | 116.02 |
| 34 | a | 1207 | 2MG | N3-C2-N1 | -3.83 | 120.18 | 126.23 |
| 56 | w | 37 | MIA | C2-N3-C4 | 3.81 | 120.58 | 115.32 |
| 8 | A | 2445 | 2MG | C5-C6-N1 | -3.81 | 118.22 | 123.43 |
| 8 | A | 746 | PSU | O4'-C1'-C5 | 3.79 | 115.80 | 109.93 |
| 8 | A | 2605 | PSU | C5-C4-N3 | -3.78 | 120.49 | 125.36 |
| 8 | A | 1835 | 2MG | N2-C2-N3 | 3.74 | 120.55 | 116.96 |
| 8 | A | 1911 | PSU | C5-C4-N3 | -3.70 | 120.59 | 125.36 |
| 8 | A | 1835 | 2MG | N3-C2-N1 | -3.68 | 120.41 | 126.23 |
| 8 | A | 746 | PSU | C5-C6-N1 | -3.65 | 119.96 | 124.44 |
| 8 | A | 1835 | 2MG | C2-N3-C4 | 3.63 | 119.40 | 115.28 |
| 8 | A | 1962 | 5MC | N4-C4-N3 | 3.59 | 122.11 | 117.03 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 8 | A | 2251 | OMG | O2'-C2'-C1' | -3.53 | 102.09 | 109.09 |
| 8 | A | 745 | 1MG | C2-N3-C4 | 3.49 | 119.35 | 115.36 |
| 8 | A | 2580 | PSU | C5-C1'-C2' | 3.45 | 121.46 | 115.32 |
| 8 | A | 747 | 5MC | N4-C4-N3 | 3.42 | 121.87 | 117.03 |
| 34 | a | 967 | 5MC | C2-N3-C4 | 3.41 | 120.14 | 116.02 |
| 55 | v | 8 | 4SU | C2-N3-C4 | 3.39 | 120.06 | 115.15 |
| 8 | A | 2605 | PSU | C6-N1-C2 | 3.38 | 120.94 | 115.36 |
| 34 | a | 516 | PSU | O4'-C1'-C5 | 3.31 | 115.06 | 109.93 |
| 8 | A | 746 | PSU | C6-N1-C2 | 3.31 | 120.82 | 115.36 |
| 34 | a | 527 | G7M | O4'-C1'-C2' | -3.29 | 102.12 | 106.93 |
| 8 | A | 2445 | 2MG | N2-C2-N1 | 3.27 | 120.11 | 116.96 |
| 8 | A | 747 | 5MC | C2-N3-C4 | 3.27 | 119.97 | 116.02 |
| 8 | A | 2604 | PSU | C6-N1-C2 | 3.27 | 120.75 | 115.36 |
| 8 | A | 2605 | PSU | C5-C1'-C2' | -3.27 | 109.49 | 115.32 |
| 8 | A | 2251 | OMG | C5-C6-N1 | -3.27 | 118.96 | 123.43 |
| 8 | A | 1962 | 5MC | C2-N3-C4 | 3.25 | 119.94 | 116.02 |
| 8 | A | 747 | 5MC | CM5-C5-C4 | -3.23 | 118.46 | 121.72 |
| 8 | A | 1915 | 3TD | C5-C6-N1 | -3.22 | 120.48 | 124.44 |
| 56 | w | 37 | MIA | O2'-C2'-C3' | -3.21 | 101.44 | 111.82 |
| 56 | w | 37 | MIA | O2'-C2'-C1' | -3.21 | 99.02 | 110.85 |
| 55 | v | 20 | H2U | N3-C2-N1 | 3.16 | 120.00 | 116.65 |
| 8 | A | 2457 | PSU | C5-C6-N1 | -3.16 | 120.55 | 124.44 |
| 8 | A | 1911 | PSU | C6-N1-C2 | 3.16 | 120.56 | 115.36 |
| 56 | w | 37 | MIA | O4'-C4'-C5' | -3.11 | 99.15 | 109.37 |
| 55 | v | 55 | PSU | C6-N1-C2 | 3.10 | 120.48 | 115.36 |
| 8 | A | 1917 | PSU | C5-C1'-C2' | -3.08 | 109.83 | 115.32 |
| 55 | v | 8 | 4SU | C5-C4-N3 | -3.05 | 119.74 | 123.83 |
| 56 | w | 39 | PSU | C5-C6-N1 | -3.03 | 120.71 | 124.44 |
| 34 | a | 516 | PSU | C6-N1-C2 | 3.03 | 120.36 | 115.36 |
| 56 | w | 37 | MIA | O4'-C1'-C2' | -2.96 | 102.60 | 106.93 |
| 8 | A | 2504 | PSU | C6-N1-C2 | 2.94 | 120.21 | 115.36 |
| 55 | v | 55 | PSU | C5-C6-N1 | -2.94 | 120.83 | 124.44 |
| 8 | A | 2457 | PSU | C6-N1-C2 | 2.93 | 120.20 | 115.36 |
| 8 | A | 1911 | PSU | C5-C1'-C2' | -2.93 | 110.10 | 115.32 |
| 56 | w | 32 | PSU | C6-N1-C2 | 2.91 | 120.16 | 115.36 |
| 8 | A | 2503 | 2MA | N3-C2-N1 | -2.91 | 120.37 | 125.72 |
| 8 | A | 2445 | 2MG | O5'-C5'-C4' | -2.89 | 99.16 | 108.99 |
| 8 | A | 2069 | G7M | O4'-C1'-C2' | -2.88 | 102.72 | 106.93 |
| 8 | A | 955 | PSU | C5-C6-N1 | -2.85 | 120.94 | 124.44 |
| 56 | w | 54 | 5MU | C3'-C2'-C1' | 2.83 | 105.24 | 100.98 |
| 8 | A | 1618 | 6MZ | C1'-N9-C4 | -2.78 | 121.76 | 126.64 |
| 8 | A | 1917 | PSU | C6-N1-C2 | 2.78 | 119.94 | 115.36 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 8 | A | 2504 | PSU | C5-C6-N1 | -2.76 | 121.05 | 124.44 |
| 8 | A | 955 | PSU | C6-N1-C2 | 2.75 | 119.90 | 115.36 |
| 8 | A | 1915 | 3TD | C6-N1-C2 | 2.74 | 119.89 | 115.36 |
| 55 | v | 20 | H2U | C5-C4-N3 | 2.73 | 119.72 | 116.65 |
| 8 | A | 2503 | 2MA | C5-C6-N1 | -2.72 | 120.20 | 123.06 |
| 55 | v | 20 | H2U | C5-C6-N1 | 2.71 | 120.55 | 111.61 |
| 56 | w | 8 | 4SU | C3'-C2'-C1' | 2.70 | 105.04 | 100.98 |
| 56 | w | 39 | PSU | C6-N1-C2 | 2.69 | 119.80 | 115.36 |
| 34 | a | 527 | G7M | C6-N1-C2 | 2.67 | 120.18 | 115.93 |
| 8 | A | 2580 | PSU | C5-C6-N1 | -2.67 | 121.15 | 124.44 |
| 56 | w | 37 | MIA | C2'-C3'-C4' | -2.66 | 97.47 | 102.64 |
| 8 | A | 2580 | PSU | C6-N1-C2 | 2.65 | 119.72 | 115.36 |
| 56 | w | 32 | PSU | C5-C6-N1 | -2.65 | 121.19 | 124.44 |
| 8 | A | 747 | 5MC | C5-C6-N1 | -2.57 | 119.42 | 122.19 |
| 34 | a | 1207 | 2MG | C5-C6-N1 | -2.57 | 119.92 | 123.43 |
| 8 | A | 2069 | G7M | C6-N1-C2 | 2.57 | 120.01 | 115.93 |
| 34 | a | 527 | G7M | C5-C6-N1 | -2.56 | 119.93 | 123.43 |
| 8 | A | 2069 | G7M | C5-C6-N1 | -2.56 | 119.93 | 123.43 |
| 8 | A | 1835 | 2MG | C5-C6-N1 | -2.55 | 119.94 | 123.43 |
| 8 | A | 1917 | PSU | O4'-C1'-C5 | 2.53 | 113.86 | 109.93 |
| 8 | A | 2580 | PSU | O4'-C1'-C2' | 2.52 | 108.74 | 104.66 |
| 8 | A | 2251 | OMG | CM2-O2'-C2' | -2.48 | 108.01 | 114.52 |
| 56 | w | 8 | 4SU | C5-C4-N3 | -2.46 | 120.53 | 123.83 |
| 8 | A | 1917 | PSU | C5-C6-N1 | -2.44 | 121.43 | 124.44 |
| 56 | w | 46 | G7M | C5-C6-N1 | -2.44 | 120.10 | 123.43 |
| 8 | A | 1835 | 2MG | C6-N1-C2 | 2.42 | 119.52 | 115.18 |
| 8 | A | 2445 | 2MG | C4-C5-N7 | -2.42 | 106.87 | 109.40 |
| 34 | a | 1516 | 2MG | C5-C6-N1 | -2.42 | 120.12 | 123.43 |
| 34 | a | 516 | PSU | C5-C6-N1 | -2.37 | 121.53 | 124.44 |
| 56 | w | 54 | 5MU | C5-C6-N1 | -2.36 | 119.65 | 122.19 |
| 34 | a | 966 | 2MG | C1'-N9-C4 | -2.33 | 122.54 | 126.64 |
| 34 | a | 1207 | 2MG | C6-N1-C2 | 2.33 | 119.35 | 115.18 |
| 34 | a | 1516 | 2MG | C6-N1-C2 | 2.33 | 119.35 | 115.18 |
| 56 | w | 46 | G7M | C6-N1-C2 | 2.33 | 119.63 | 115.93 |
| 56 | w | 46 | G7M | C3'-C2'-C1' | 2.33 | 104.48 | 100.98 |
| 8 | A | 1962 | 5MC | O4'-C1'-C2' | -2.32 | 103.53 | 106.93 |
| 8 | A | 1962 | 5MC | CM5-C5-C4 | -2.32 | 119.38 | 121.72 |
| 8 | A | 1962 | 5MC | C5-C6-N1 | -2.30 | 119.71 | 122.19 |
| 56 | w | 37 | MIA | C11-S10-C2 | -2.27 | 100.57 | 102.27 |
| 8 | A | 2251 | OMG | O4'-C4'-C3' | -2.27 | 100.62 | 105.11 |
| 55 | v | 20 | H2U | O2-C2-N1 | -2.27 | 120.26 | 123.11 |
| 34 | a | 966 | 2MG | C6-N1-C2 | 2.24 | 119.18 | 115.18 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 34 | a | 967 | 5MC | N4-C4-N3 | 2.23 | 120.18 | 117.03 |
| 55 | v | 55 | PSU | O4'-C1'-C5 | 2.21 | 113.36 | 109.93 |
| 8 | A | 2445 | 2MG | N3-C2-N1 | -2.21 | 122.74 | 126.23 |
| 8 | A | 1835 | 2MG | N2-C2-N1 | 2.16 | 119.04 | 116.96 |
| 8 | A | 2457 | PSU | O4'-C1'-C2' | 2.14 | 108.13 | 104.66 |
| 34 | a | 967 | 5MC | C5-C6-N1 | -2.12 | 119.91 | 122.19 |
| 8 | A | 1915 | 3TD | O4'-C1'-C2' | 2.12 | 108.09 | 104.66 |
| 8 | A | 2069 | G7M | N2-C2-N1 | 2.10 | 120.53 | 117.25 |
| 34 | a | 516 | PSU | O4'-C1'-C2' | 2.08 | 108.03 | 104.66 |
| 8 | A | 2580 | PSU | O4'-C1'-C5 | -2.08 | 106.70 | 109.93 |
| 56 | w | 39 | PSU | O4'-C1'-C2' | 2.08 | 108.03 | 104.66 |
| 34 | a | 966 | 2MG | C5-C6-N1 | -2.08 | 120.59 | 123.43 |
| 8 | A | 2503 | 2MA | C1'-N9-C4 | -2.06 | 123.02 | 126.64 |
| 8 | A | 2503 | 2MA | CM2-C2-N3 | 2.04 | 120.34 | 117.16 |
| 34 | a | 1207 | 2MG | N2-C2-N3 | 2.03 | 118.91 | 116.96 |
| 34 | a | 966 | 2MG | CM2-N2-C2 | -2.01 | 121.16 | 123.59 |
| 8 | A | 1915 | 3TD | C5-C4-N3 | 2.01 | 120.28 | 118.66 |
| 55 | v | 55 | PSU | O4'-C1'-C2' | 2.00 | 107.91 | 104.66 |
| 56 | w | 32 | PSU | O4'-C1'-C2' | 2.00 | 107.90 | 104.66 |

There are no chirality outliers.

All (62) torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|-----|-------|------|------|-----------------|
| 34 | a | 966 | 2MG | O4'-C4'-C5'-O5' |
| 34 | a | 966 | 2MG | C3'-C4'-C5'-O5' |
| 55 | v | 20 | H2U | O4'-C4'-C5'-O5' |
| 55 | v | 20 | H2U | O4'-C1'-N1-C6 |
| 8 | A | 746 | PSU | O4'-C1'-C5-C4 |
| 8 | A | 746 | PSU | C2'-C1'-C5-C6 |
| 8 | A | 746 | PSU | O4'-C1'-C5-C6 |
| 8 | A | 1915 | 3TD | O4'-C1'-C5-C4 |
| 8 | A | 1917 | PSU | C3'-C4'-C5'-O5' |
| 8 | A | 1939 | 5MU | C2'-C1'-N1-C6 |
| 8 | A | 1939 | 5MU | O4'-C1'-N1-C6 |
| 8 | A | 1962 | 5MC | O4'-C1'-N1-C6 |
| 8 | A | 1962 | 5MC | C2'-C1'-N1-C6 |
| 8 | A | 2030 | 6MZ | O4'-C4'-C5'-O5' |
| 8 | A | 2030 | 6MZ | C3'-C4'-C5'-O5' |
| 8 | A | 2251 | OMG | C1'-C2'-O2'-CM2 |
| 8 | A | 2498 | OMC | C2'-C1'-N1-C6 |
| 8 | A | 2552 | OMU | C1'-C2'-O2'-CM2 |

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| Mol | Chain | Res | Type | Atoms |
|-----|-------|------|------|-----------------|
| 56 | w | 32 | PSU | O4'-C1'-C5-C4 |
| 56 | w | 32 | PSU | O4'-C1'-C5-C6 |
| 56 | w | 37 | MIA | C12-C13-C14-C15 |
| 56 | w | 37 | MIA | C12-C13-C14-C16 |
| 56 | w | 39 | PSU | O4'-C1'-C5-C4 |
| 58 | y | 101 | FME | O1-CN-N-CA |
| 58 | y | 101 | FME | O-C-CA-CB |
| 55 | v | 20 | H2U | C3'-C4'-C5'-O5' |
| 8 | A | 1917 | PSU | O4'-C4'-C5'-O5' |
| 8 | A | 1939 | 5MU | O4'-C4'-C5'-O5' |
| 8 | A | 2069 | G7M | O4'-C4'-C5'-O5' |
| 56 | w | 37 | MIA | O4'-C4'-C5'-O5' |
| 58 | y | 101 | FME | CA-CB-CG-SD |
| 8 | A | 1835 | 2MG | O4'-C4'-C5'-O5' |
| 8 | A | 1835 | 2MG | C3'-C4'-C5'-O5' |
| 8 | A | 1939 | 5MU | C3'-C4'-C5'-O5' |
| 55 | v | 20 | H2U | C2'-C1'-N1-C6 |
| 58 | y | 101 | FME | N-CA-CB-CG |
| 55 | v | 20 | H2U | C2'-C1'-N1-C2 |
| 8 | A | 2069 | G7M | C3'-C4'-C5'-O5' |
| 8 | A | 2503 | 2MA | O4'-C4'-C5'-O5' |
| 8 | A | 1915 | 3TD | O4'-C1'-C5-C6 |
| 56 | w | 39 | PSU | O4'-C1'-C5-C6 |
| 58 | y | 101 | FME | CB-CG-SD-CE |
| 55 | v | 20 | H2U | O4'-C1'-N1-C2 |
| 55 | v | 55 | PSU | C4'-C5'-O5'-P |
| 56 | w | 46 | G7M | C4'-C5'-O5'-P |
| 34 | a | 1519 | MA6 | C3'-C4'-C5'-O5' |
| 34 | a | 527 | G7M | C4'-C5'-O5'-P |
| 34 | a | 1519 | MA6 | C5-C6-N6-C10 |
| 56 | w | 32 | PSU | C2'-C1'-C5-C6 |
| 34 | a | 1402 | 4OC | O4'-C4'-C5'-O5' |
| 58 | y | 101 | FME | C-CA-CB-CG |
| 34 | a | 1519 | MA6 | C4'-C5'-O5'-P |
| 55 | v | 55 | PSU | O4'-C1'-C5-C6 |
| 55 | v | 55 | PSU | O4'-C1'-C5-C4 |
| 8 | A | 1917 | PSU | O4'-C1'-C5-C4 |
| 34 | a | 516 | PSU | C2'-C1'-C5-C6 |
| 55 | v | 55 | PSU | C2'-C1'-C5-C6 |
| 8 | A | 747 | 5MC | C4'-C5'-O5'-P |
| 56 | w | 32 | PSU | O4'-C4'-C5'-O5' |
| 55 | v | 20 | H2U | C4'-C5'-O5'-P |

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| Mol | Chain | Res | Type | Atoms |
|-----|-------|------|------|-----------------|
| 8 | A | 2251 | OMG | C3'-C4'-C5'-O5' |
| 58 | y | 101 | FME | CB-CA-N-CN |

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 378 ligands modelled in this entry, 373 are monoatomic - leaving 5 for Mogul analysis.

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

| Mol | Type | Chain | Res | Link | Bond lengths | | | Bond angles | | |
|-----|------|-------|------|------|--------------|------|----------|-------------|------|----------|
| | | | | | Counts | RMSZ | # Z > 2 | Counts | RMSZ | # Z > 2 |
| 65 | PO4 | x | 802 | 60 | 4,4,4 | 4.81 | 2 (50%) | 6,6,6 | 1.00 | 0 |
| 63 | AM2 | a | 1648 | - | 40,40,40 | 0.54 | 0 | 53,60,60 | 0.93 | 1 (1%) |
| 64 | GDP | x | 801 | 60 | 24,30,30 | 1.15 | 2 (8%) | 31,47,47 | 2.42 | 14 (45%) |
| 63 | AM2 | a | 1657 | - | 40,40,40 | 0.51 | 0 | 53,60,60 | 0.87 | 2 (3%) |
| 63 | AM2 | a | 1652 | - | 40,40,40 | 0.52 | 0 | 53,60,60 | 1.00 | 3 (5%) |

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 |
|-----|------|-------|------|------|---------|------------|---------|
| 63 | AM2 | a | 1657 | - | - | 2/12/84/84 | 0/4/4/4 |
| 63 | AM2 | a | 1652 | - | - | 2/12/84/84 | 0/4/4/4 |
| 63 | AM2 | a | 1648 | - | - | 0/12/84/84 | 0/4/4/4 |

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| Mol | Type | Chain | Res | Link | Chirals | Torsions | Rings |
|-----|------|-------|-----|------|---------|------------|---------|
| 64 | GDP | x | 801 | 60 | - | 0/12/32/32 | 0/3/3/3 |

All (4) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|---------|-------|-------------|----------|
| 65 | x | 802 | PO4 | P-O1 | 9.16 | 1.72 | 1.50 |
| 64 | x | 801 | GDP | C6-C5 | 2.68 | 1.46 | 1.41 |
| 64 | x | 801 | GDP | C2'-C1' | -2.54 | 1.49 | 1.53 |
| 65 | x | 802 | PO4 | P-O3 | -2.07 | 1.48 | 1.54 |

All (20) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 64 | x | 801 | GDP | C6-C5-C4 | -5.60 | 115.45 | 120.80 |
| 64 | x | 801 | GDP | PA-O3A-PB | -4.50 | 117.39 | 132.83 |
| 64 | x | 801 | GDP | O3'-C3'-C4' | -4.25 | 98.75 | 111.05 |
| 64 | x | 801 | GDP | C6-N1-C2 | 4.15 | 122.52 | 115.93 |
| 64 | x | 801 | GDP | C2-N3-C4 | 4.14 | 120.08 | 115.36 |
| 63 | a | 1648 | AM2 | CA9-NA7-CA7 | 3.70 | 119.77 | 114.38 |
| 63 | a | 1652 | AM2 | CA9-NA7-CA7 | 3.60 | 119.63 | 114.38 |
| 64 | x | 801 | GDP | N3-C2-N1 | -3.60 | 122.42 | 127.22 |
| 63 | a | 1657 | AM2 | CA9-NA7-CA7 | 3.52 | 119.51 | 114.38 |
| 64 | x | 801 | GDP | C5-C6-N1 | -3.17 | 119.10 | 123.43 |
| 64 | x | 801 | GDP | C1'-N9-C4 | -2.77 | 121.78 | 126.64 |
| 63 | a | 1657 | AM2 | CB1-OA8-CA8 | -2.71 | 109.58 | 114.42 |
| 64 | x | 801 | GDP | C5'-C4'-C3' | -2.54 | 105.66 | 115.18 |
| 64 | x | 801 | GDP | O2A-PA-O1A | 2.47 | 124.43 | 112.24 |
| 64 | x | 801 | GDP | O3A-PB-O1B | -2.43 | 97.68 | 111.19 |
| 63 | a | 1652 | AM2 | CA1-OA4-CA5 | 2.43 | 116.98 | 113.06 |
| 64 | x | 801 | GDP | O3B-PB-O2B | 2.33 | 116.55 | 107.64 |
| 64 | x | 801 | GDP | O3'-C3'-C2' | -2.20 | 104.71 | 111.82 |
| 64 | x | 801 | GDP | C4-C5-N7 | -2.08 | 107.23 | 109.40 |
| 63 | a | 1652 | AM2 | OA4-CA5-CA4 | 2.03 | 111.95 | 108.88 |

There are no chirality outliers.

All (4) torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|-----|-------|------|------|-----------------|
| 63 | a | 1652 | AM2 | OA5-CA8-OA8-CB1 |
| 63 | a | 1657 | AM2 | CA6-CA7-NA7-CA9 |
| 63 | a | 1657 | AM2 | OB1-CB5-CB6-OB6 |

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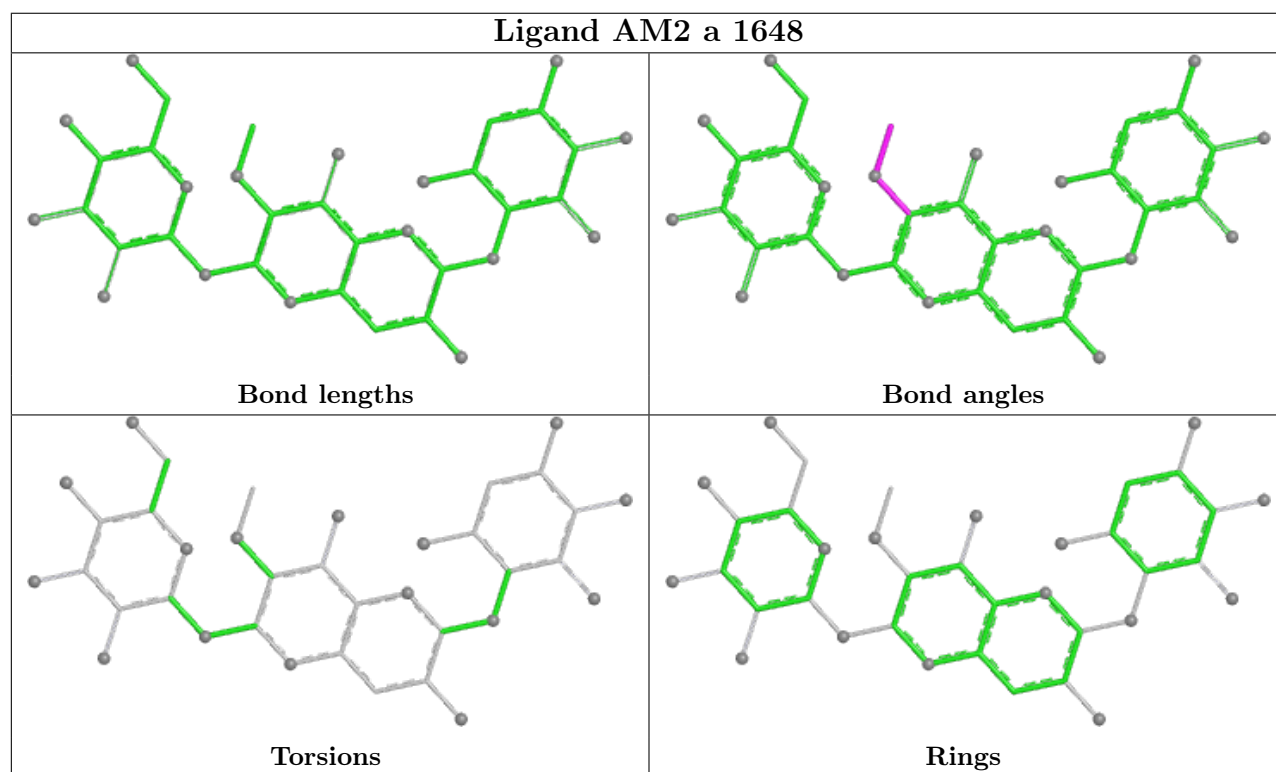
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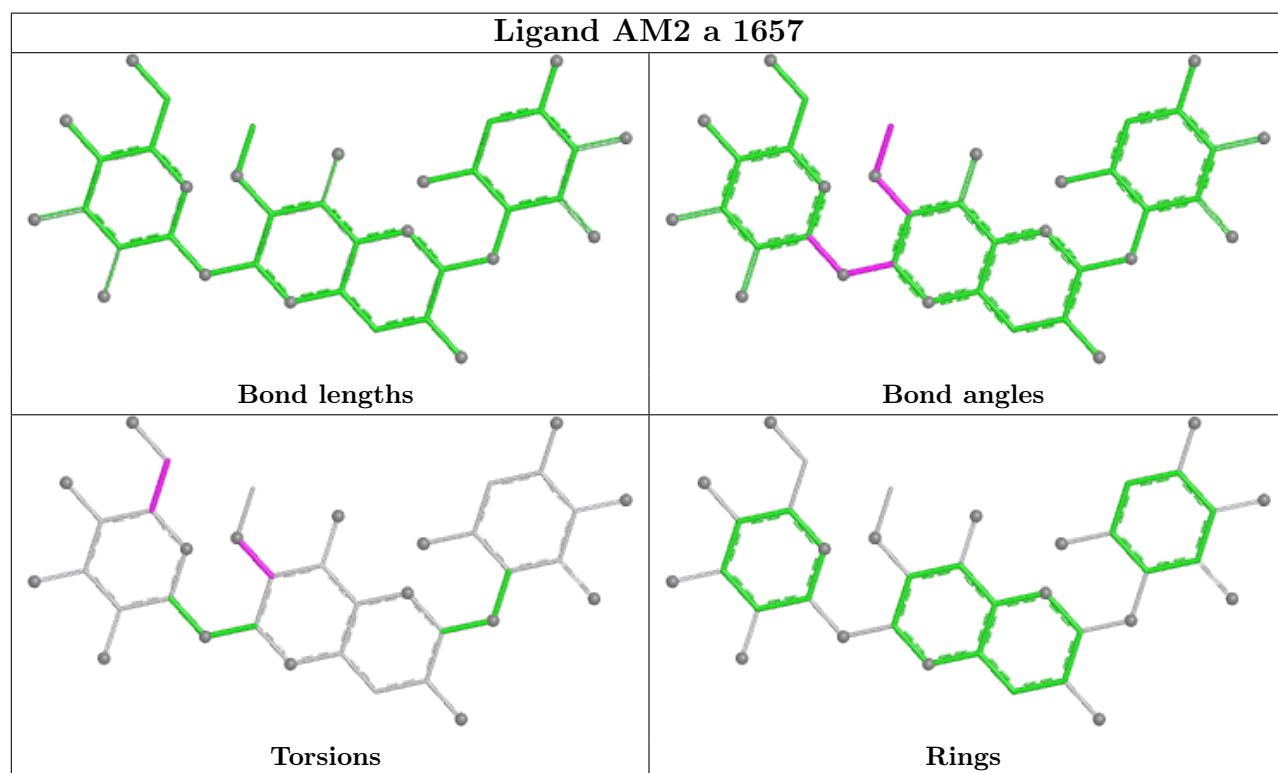
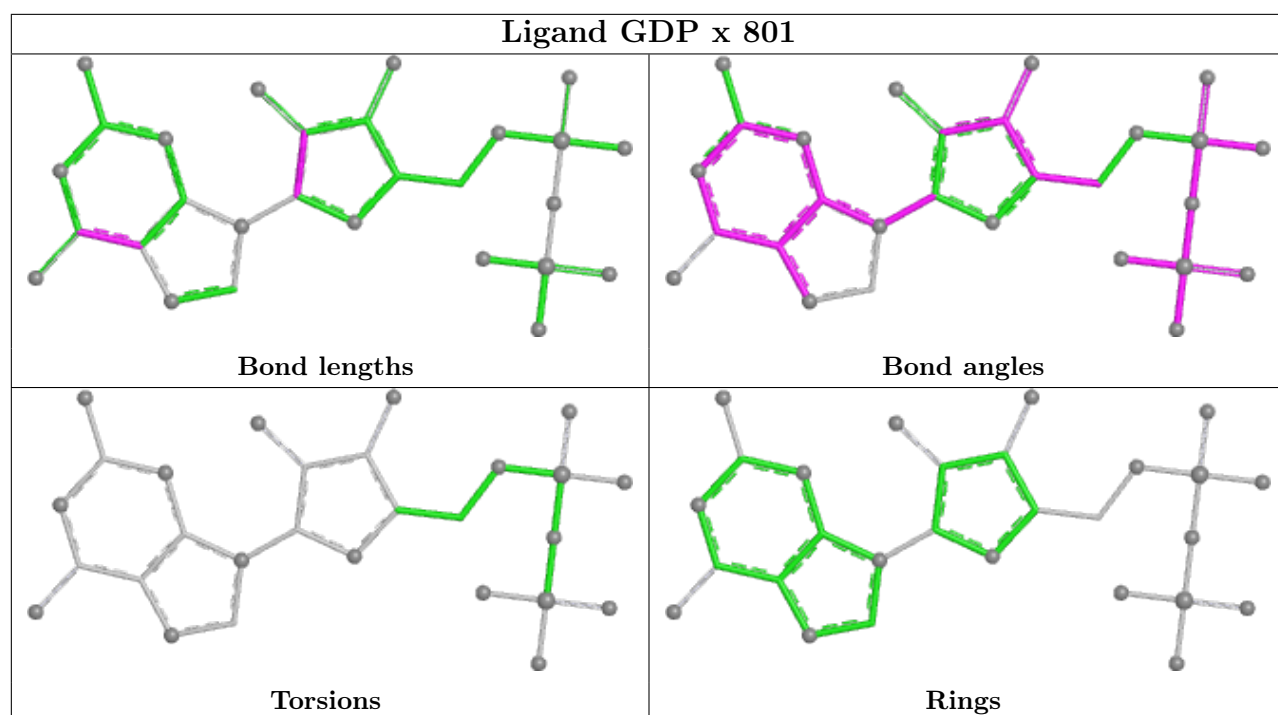
| Mol | Chain | Res | Type | Atoms |
|-----|-------|------|------|-----------------|
| 63 | a | 1652 | AM2 | OA4-CA1-OA1-CC1 |

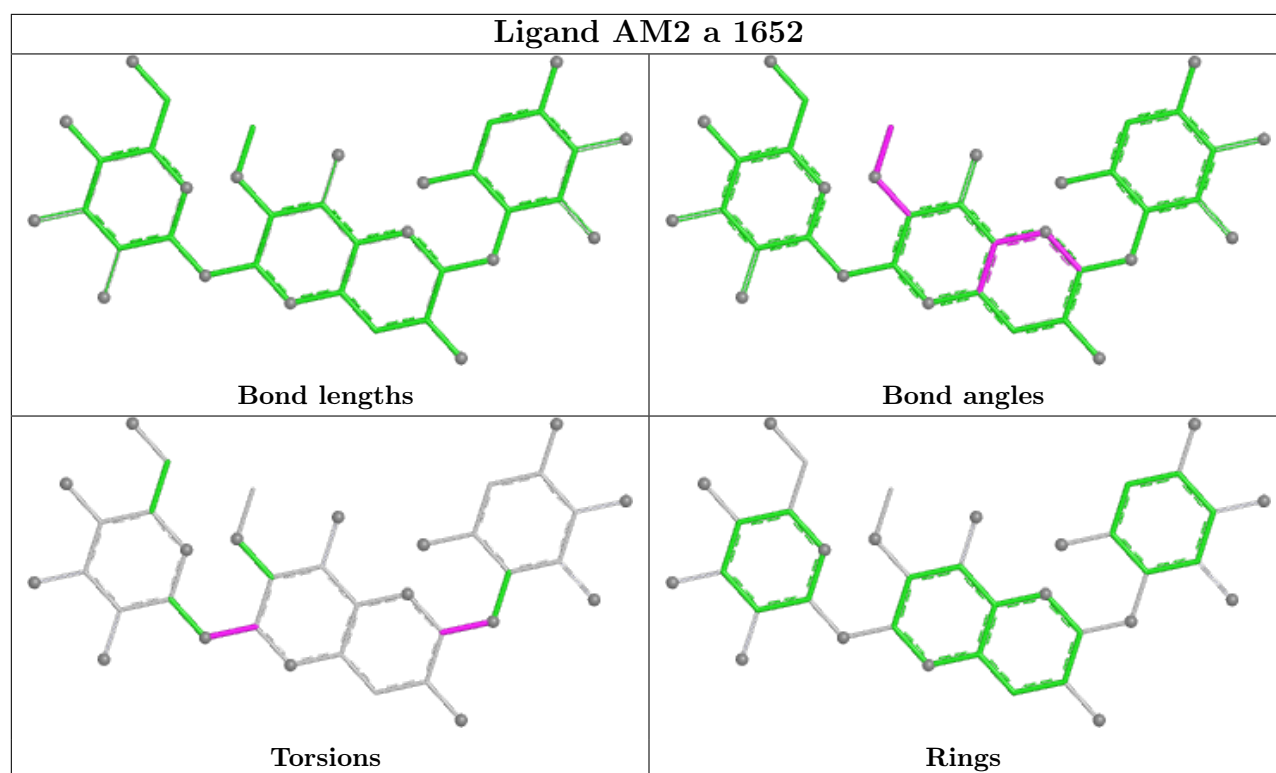
There are no ring outliers.

No monomer is involved in short contacts.

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







5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

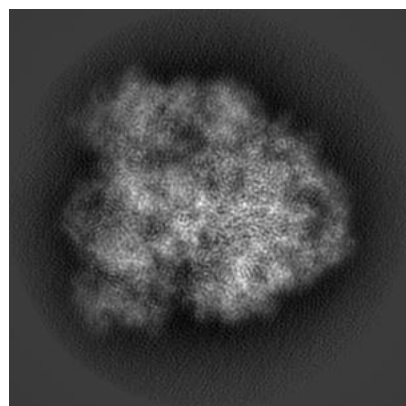
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-13461. These allow visual inspection of the internal detail of the map and identification of artifacts.

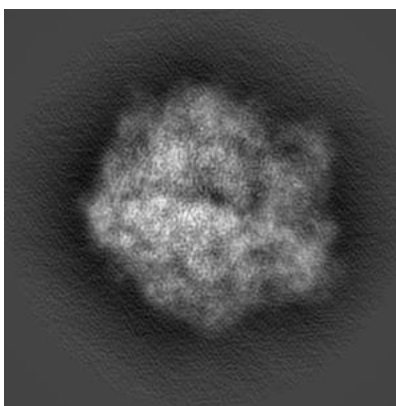
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

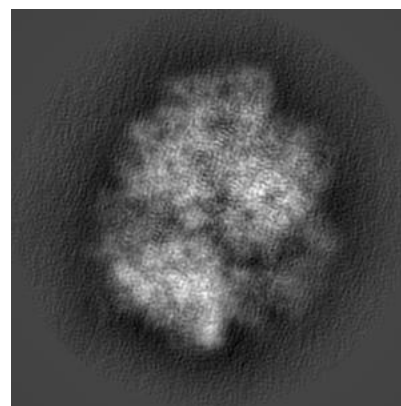
6.1.1 Primary map



X

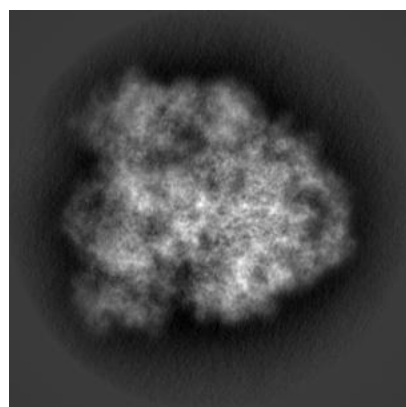


Y

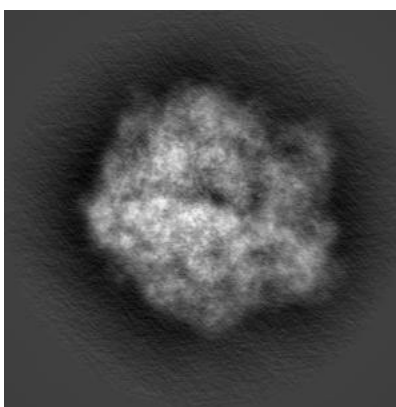


Z

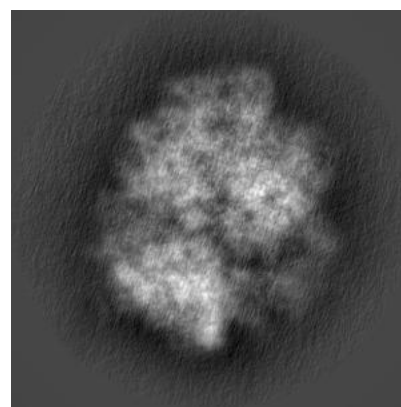
6.1.2 Raw map



X



Y

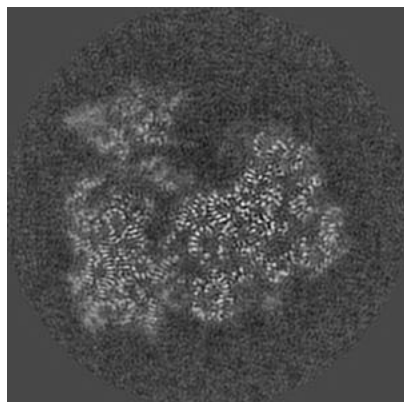


Z

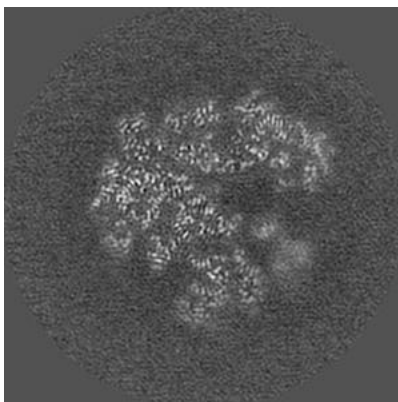
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

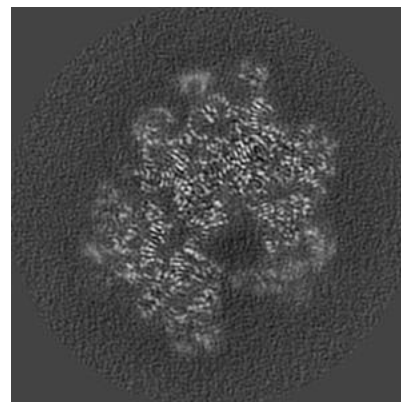
6.2.1 Primary map



X Index: 256

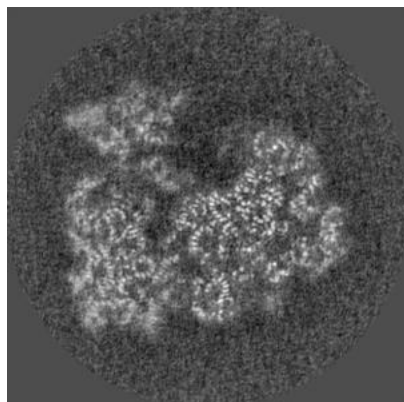


Y Index: 256

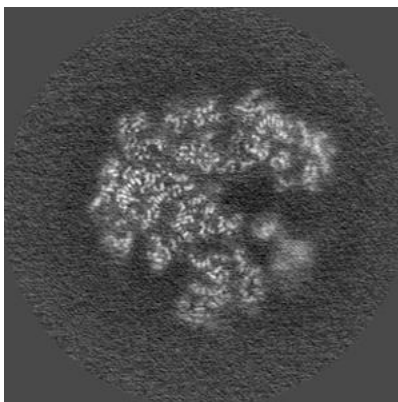


Z Index: 256

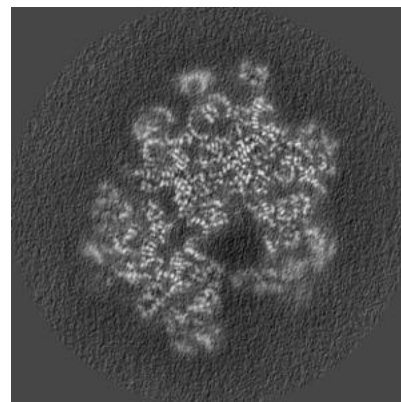
6.2.2 Raw map



X Index: 144



Y Index: 144

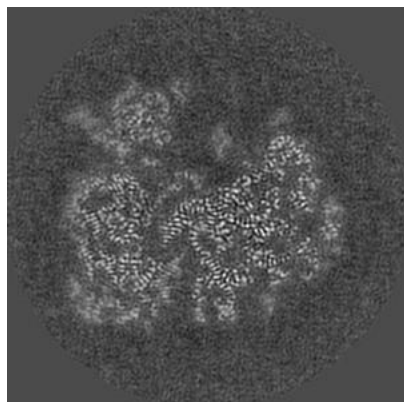


Z Index: 144

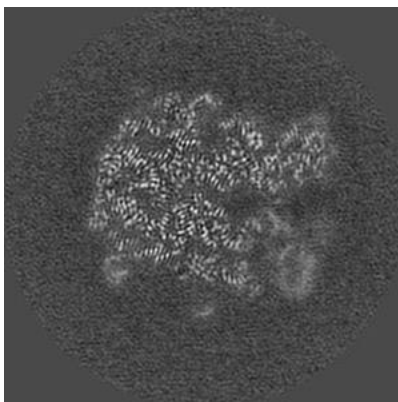
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

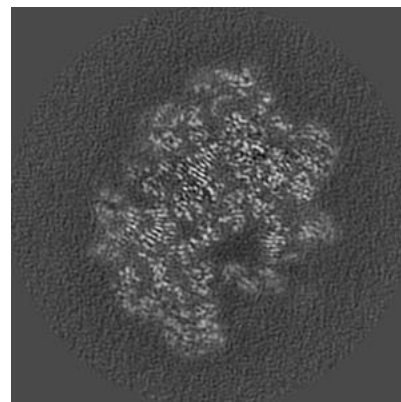
6.3.1 Primary map



X Index: 248

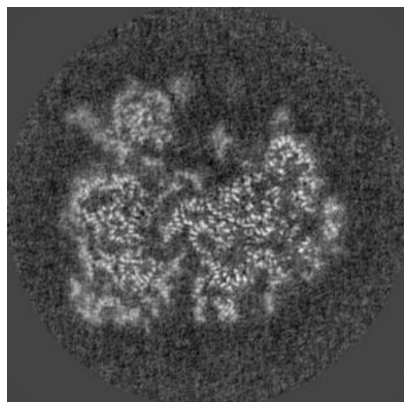


Y Index: 280

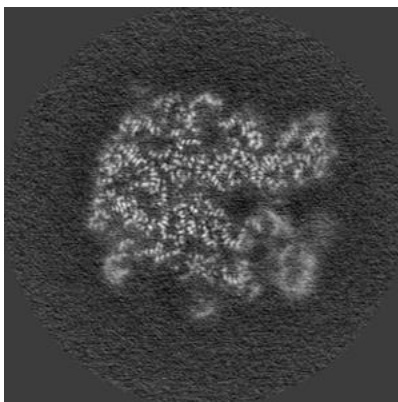


Z Index: 239

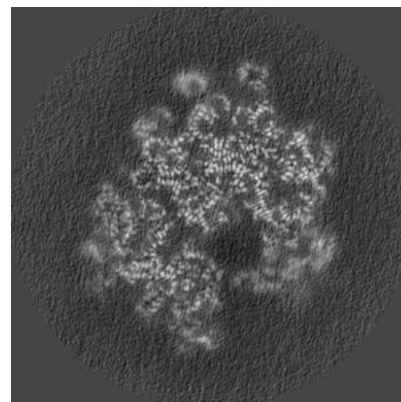
6.3.2 Raw map



X Index: 139



Y Index: 157

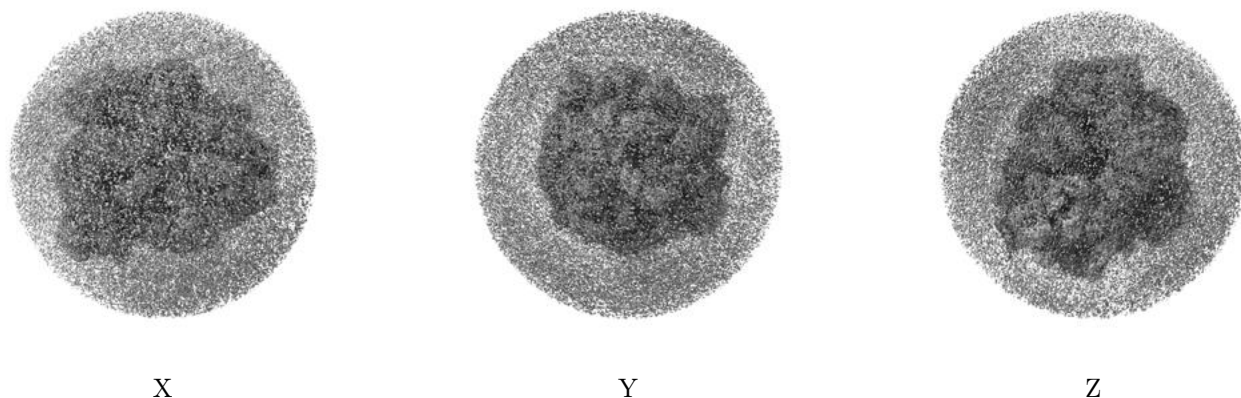


Z Index: 146

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

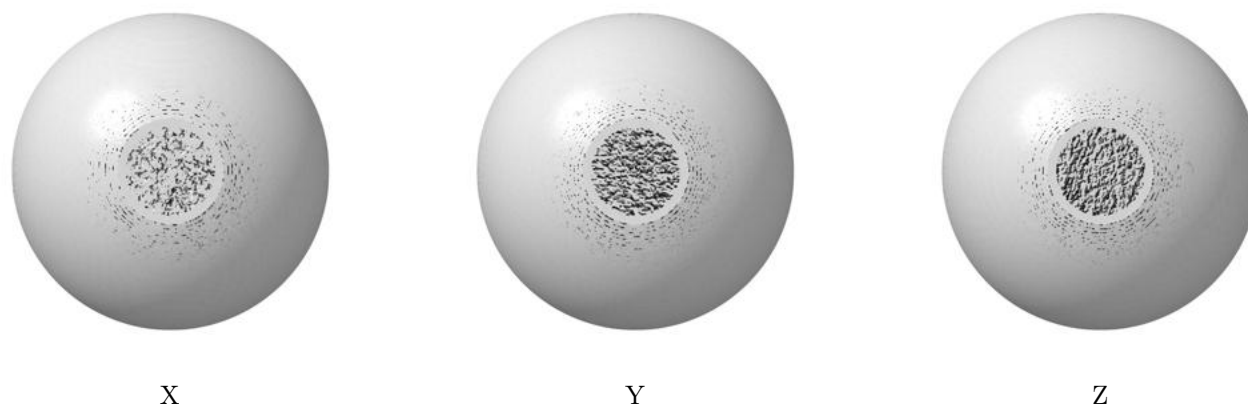
6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 1.5. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

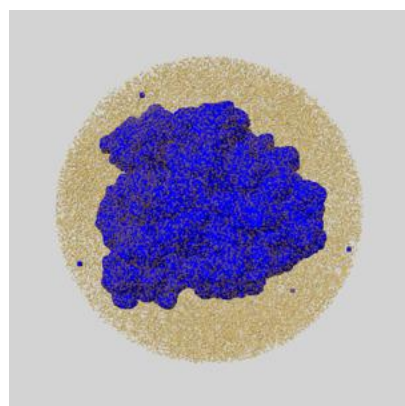
6.5 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

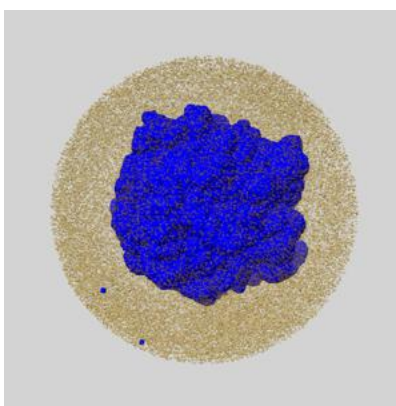
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

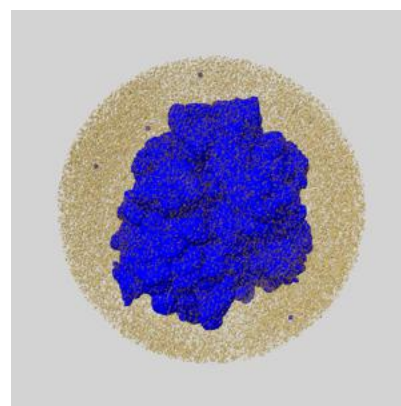
6.5.1 emd_13461_msk_1.map [i](#)



X



Y

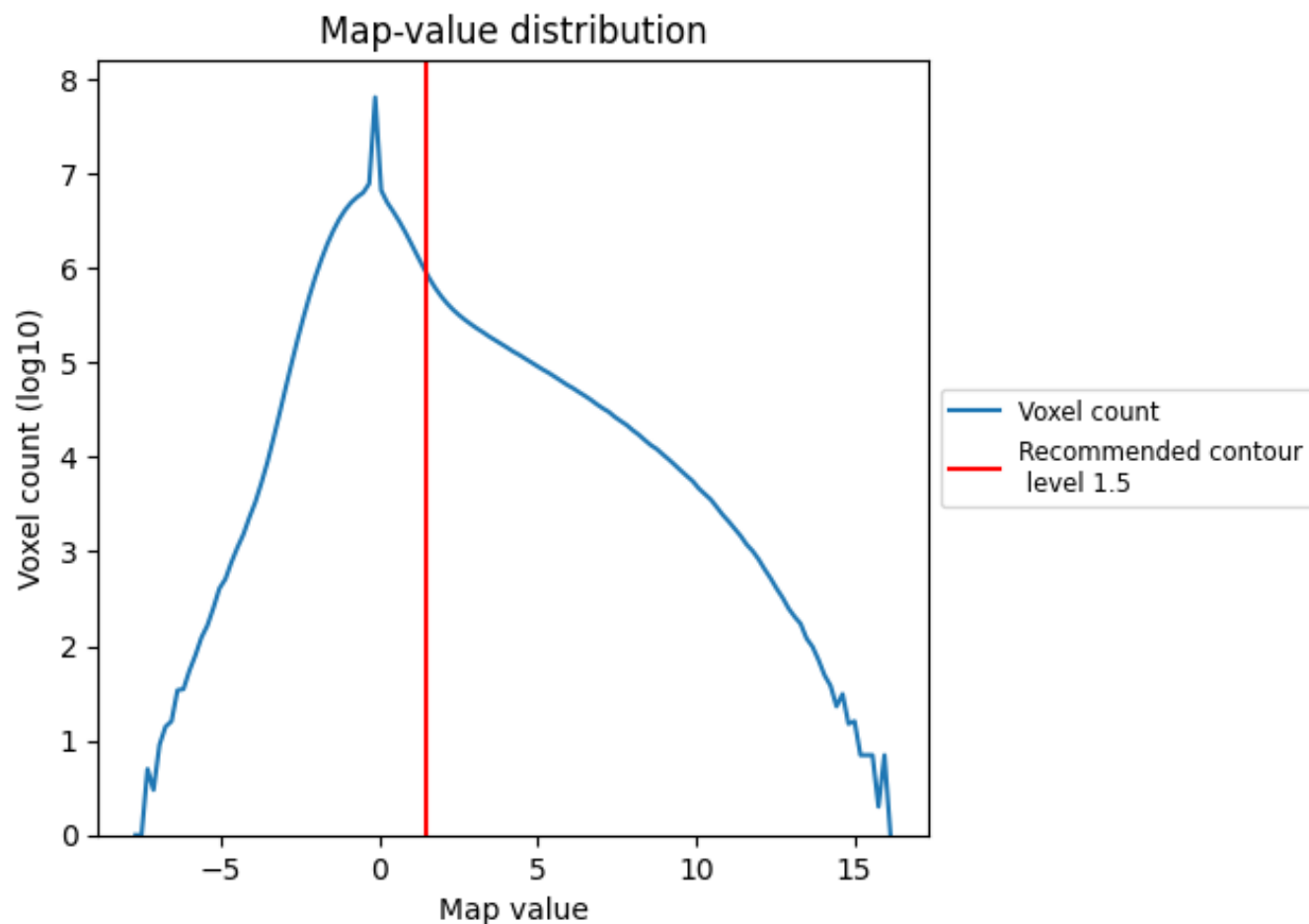


Z

7 Map analysis [i](#)

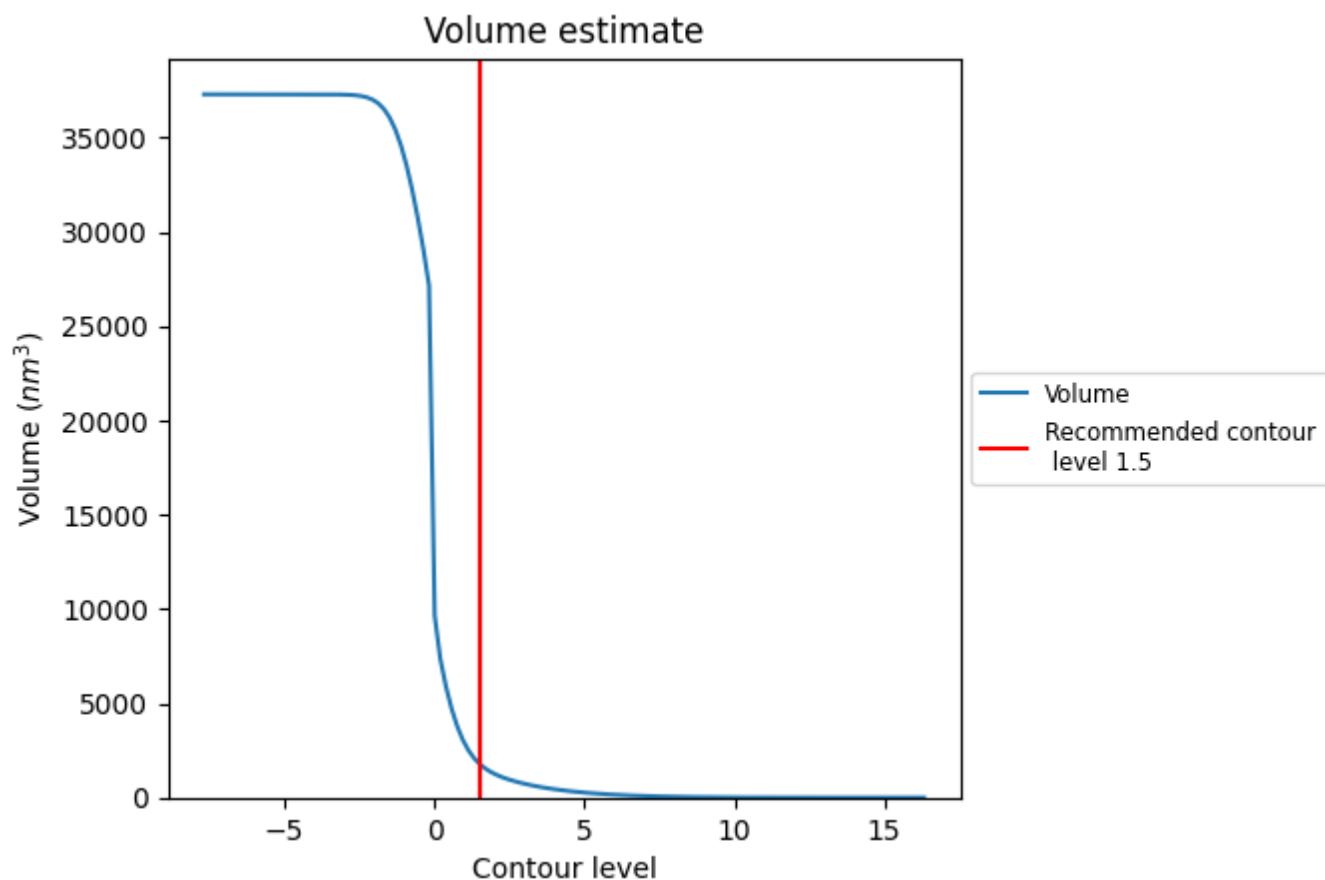
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1787 nm³; this corresponds to an approximate mass of 1614 kDa.

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

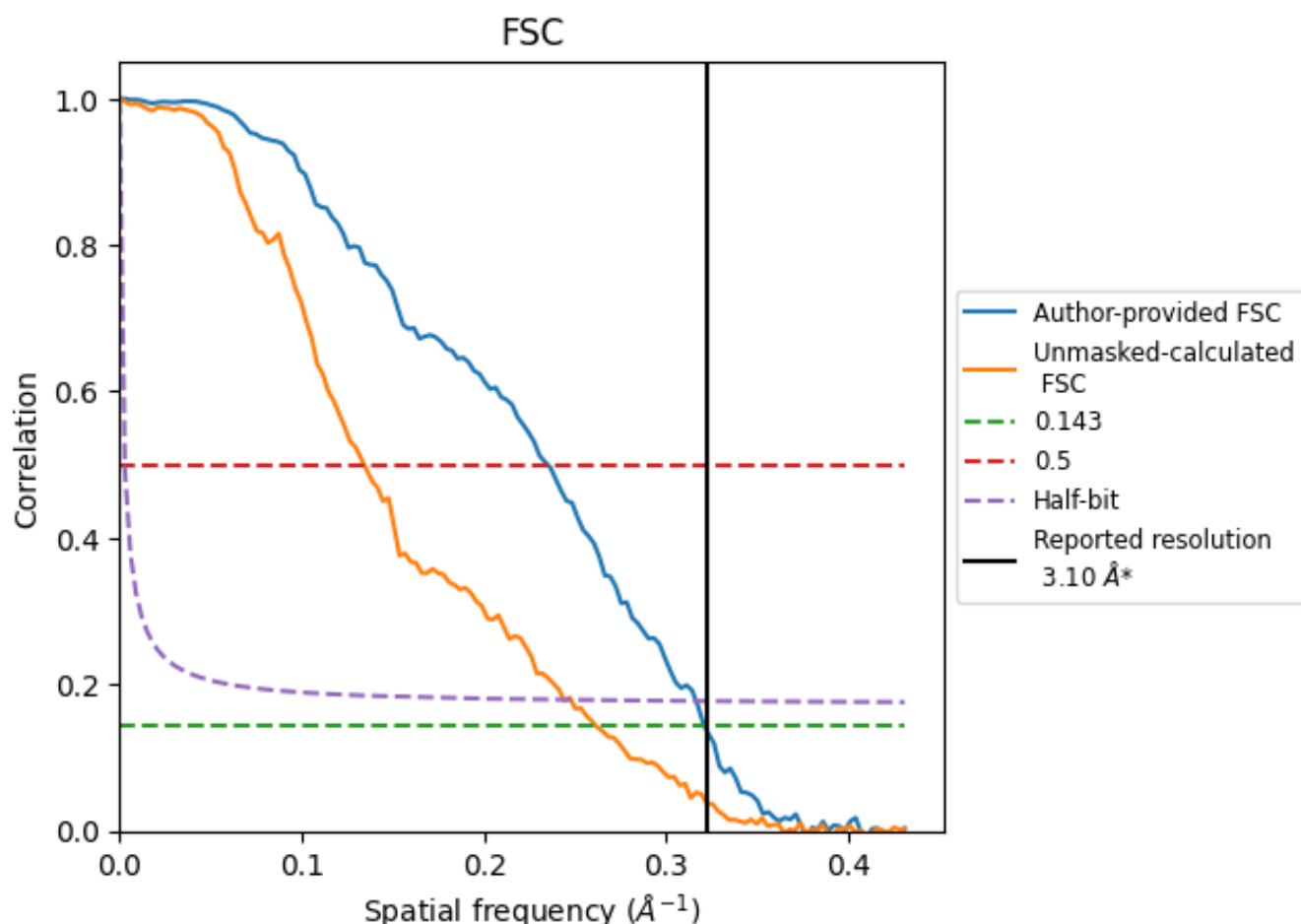
7.3 Rotationally averaged power spectrum [i](#)

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.323 Å⁻¹

8.2 Resolution estimates [i](#)

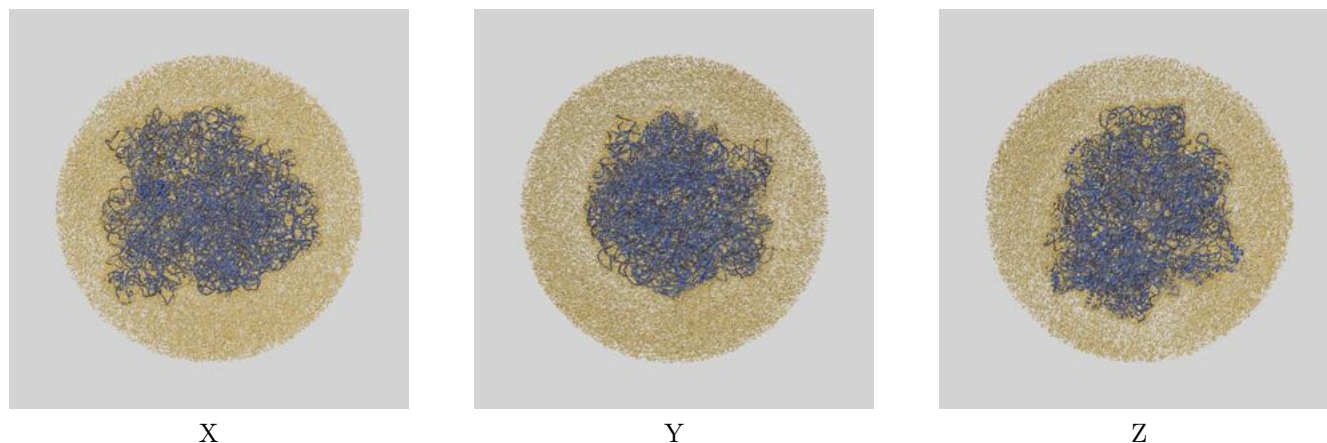
| Resolution estimate (Å) | Estimation criterion (FSC cut-off) | | |
|---------------------------|------------------------------------|------|----------|
| | 0.143 | 0.5 | Half-bit |
| Reported by author | 3.10 | - | - |
| Author-provided FSC curve | 3.11 | 4.26 | 3.16 |
| Unmasked-calculated* | 3.82 | 7.45 | 4.10 |

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.82 differs from the reported value 3.1 by more than 10 %

9 Map-model fit [i](#)

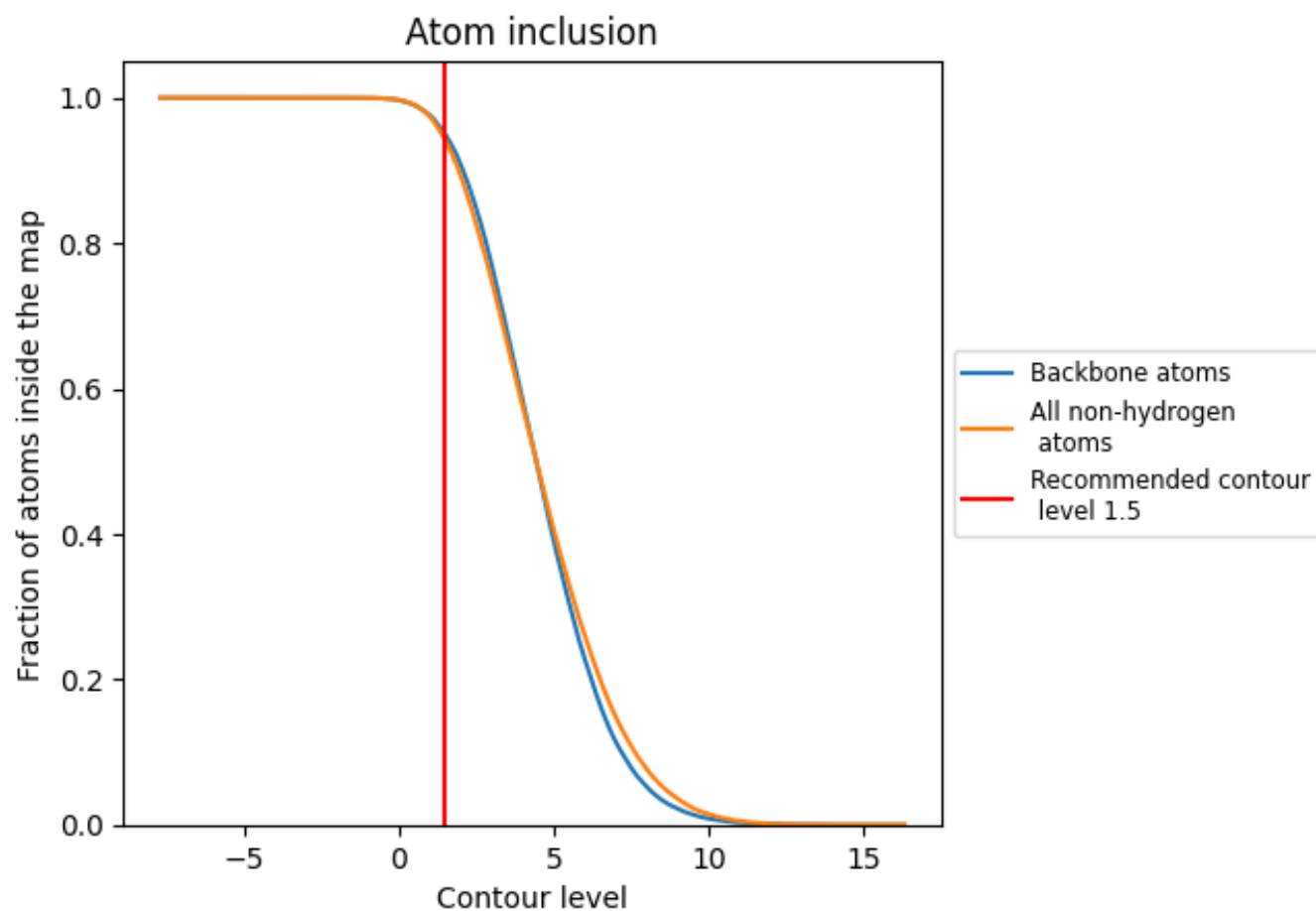
This section contains information regarding the fit between EMDB map EMD-13461 and PDB model 7PJV. Per-residue inclusion information can be found in section [3](#) on page [18](#).

9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 1.5 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Atom inclusion [i](#)



At the recommended contour level, 95% of all backbone atoms, 94% of all non-hydrogen atoms, are inside the map.