# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 3, 2024 – 01:55 pm GMT

| | | |
|---|---|---|
| PDB ID | : | 5DOT |
| Title | : | Crystal Structure of Human Carbamoyl phosphate synthetase I (CPS1), apo form |
| Authors | : | Polo, L.M.; de Cima, S.; Fita, I.; Rubio, V. |
| Deposited on | : | 2015-09-11 |
| Resolution | : | 2.40 Å(reported) |

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

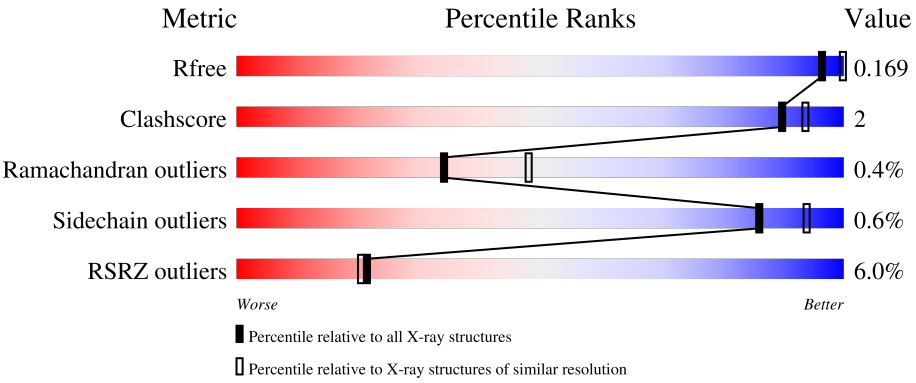
| | | |
|---|---|---|
| MolProbity | : | 4.02b-467 |
| Mogul | : | 1.8.4, CSD as541be (2020) |
| Xtriage (Phenix) | : | 1.13 |
| EDS | : | 2.36 |
| Percentile statistics | : | 20191225.v01 (using entries in the PDB archive December 25th 2019) |
| Refmac | : | 5.8.0158 |
| CCP4 | : | 7.0.044 (Gargrove) |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.36 |

# 1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 Å.

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




| Metric | Whole archive (#Entries) | Similar resolution (#Entries, resolution range(Å)) |
|---|---|---|
| $R_{free}$ | 130704 | 3907 (2.40-2.40) |
| Clashscore | 141614 | 4398 (2.40-2.40) |
| Ramachandran outliers | 138981 | 4318 (2.40-2.40) |
| Sidechain outliers | 138945 | 4319 (2.40-2.40) |
| RSRZ outliers | 127900 | 3811 (2.40-2.40) |

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

| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 1 | A | 1489 | 6% 86% · 9% |
| 1 | B | 1489 | 5% 86% · 9% |

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

| Mol | Type | Chain | Res | Chirality | Geometry | Clashes | Electron density |
|---|---|---|---|---|---|---|---|
| 4 | GOL | A | 1607 | - | - | - | X |

# 2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 21866 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called Carbamoyl-phosphate synthase [ammonia], mitochondrial.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 1352 | Total | C | N | O | S | 0 | 4 | 0 |
| | | | 10503 | 6678 | 1777 | 1994 | 54 | | | |
| 1 | B | 1351 | Total | C | N | O | S | 0 | 5 | 0 |
| | | | 10498 | 6677 | 1774 | 1993 | 54 | | | |

There are 56 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| A | 12 | MET | - | initiating methionine | UNP P31327 |
| A | 13 | SER | - | expression tag | UNP P31327 |
| A | 14 | TYR | - | expression tag | UNP P31327 |
| A | 15 | TYR | - | expression tag | UNP P31327 |
| A | 16 | HIS | - | expression tag | UNP P31327 |
| A | 17 | HIS | - | expression tag | UNP P31327 |
| A | 18 | HIS | - | expression tag | UNP P31327 |
| A | 19 | HIS | - | expression tag | UNP P31327 |
| A | 20 | HIS | - | expression tag | UNP P31327 |
| A | 21 | HIS | - | expression tag | UNP P31327 |
| A | 22 | ASP | - | expression tag | UNP P31327 |
| A | 23 | TYR | - | expression tag | UNP P31327 |
| A | 24 | ASP | - | expression tag | UNP P31327 |
| A | 25 | ILE | - | expression tag | UNP P31327 |
| A | 26 | PRO | - | expression tag | UNP P31327 |
| A | 27 | THR | - | expression tag | UNP P31327 |
| A | 28 | THR | - | expression tag | UNP P31327 |
| A | 29 | GLU | - | expression tag | UNP P31327 |
| A | 30 | ASN | - | expression tag | UNP P31327 |
| A | 31 | LEU | - | expression tag | UNP P31327 |
| A | 32 | TYR | - | expression tag | UNP P31327 |
| A | 33 | PHE | - | expression tag | UNP P31327 |
| A | 34 | GLN | - | expression tag | UNP P31327 |
| A | 35 | GLY | - | expression tag | UNP P31327 |
| A | 36 | ALA | - | expression tag | UNP P31327 |

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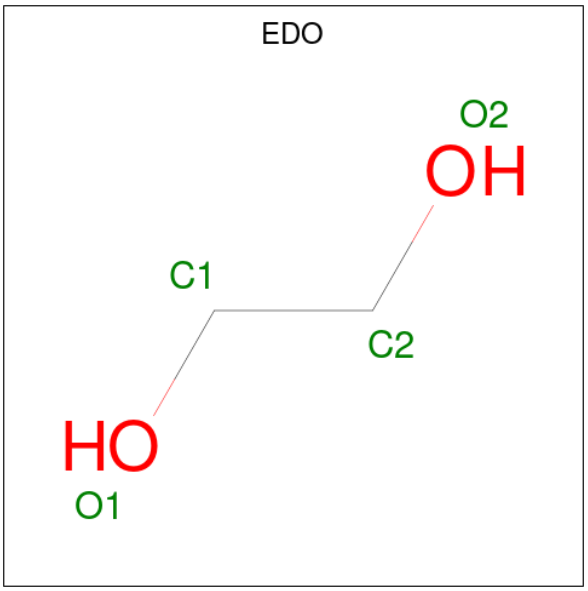
| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| A | 37 | MET | - | expression tag | UNP P31327 |
| A | 38 | ASP | - | expression tag | UNP P31327 |
| A | 39 | PRO | - | expression tag | UNP P31327 |
| B | 12 | MET | - | initiating methionine | UNP P31327 |
| B | 13 | SER | - | expression tag | UNP P31327 |
| B | 14 | TYR | - | expression tag | UNP P31327 |
| B | 15 | TYR | - | expression tag | UNP P31327 |
| B | 16 | HIS | - | expression tag | UNP P31327 |
| B | 17 | HIS | - | expression tag | UNP P31327 |
| B | 18 | HIS | - | expression tag | UNP P31327 |
| B | 19 | HIS | - | expression tag | UNP P31327 |
| B | 20 | HIS | - | expression tag | UNP P31327 |
| B | 21 | HIS | - | expression tag | UNP P31327 |
| B | 22 | ASP | - | expression tag | UNP P31327 |
| B | 23 | TYR | - | expression tag | UNP P31327 |
| B | 24 | ASP | - | expression tag | UNP P31327 |
| B | 25 | ILE | - | expression tag | UNP P31327 |
| B | 26 | PRO | - | expression tag | UNP P31327 |
| B | 27 | THR | - | expression tag | UNP P31327 |
| B | 28 | THR | - | expression tag | UNP P31327 |
| B | 29 | GLU | - | expression tag | UNP P31327 |
| B | 30 | ASN | - | expression tag | UNP P31327 |
| B | 31 | LEU | - | expression tag | UNP P31327 |
| B | 32 | TYR | - | expression tag | UNP P31327 |
| B | 33 | PHE | - | expression tag | UNP P31327 |
| B | 34 | GLN | - | expression tag | UNP P31327 |
| B | 35 | GLY | - | expression tag | UNP P31327 |
| B | 36 | ALA | - | expression tag | UNP P31327 |
| B | 37 | MET | - | expression tag | UNP P31327 |
| B | 38 | ASP | - | expression tag | UNP P31327 |
| B | 39 | PRO | - | expression tag | UNP P31327 |

- Molecule 2 is NICKEL (II) ION (three-letter code: NI) (formula: Ni).

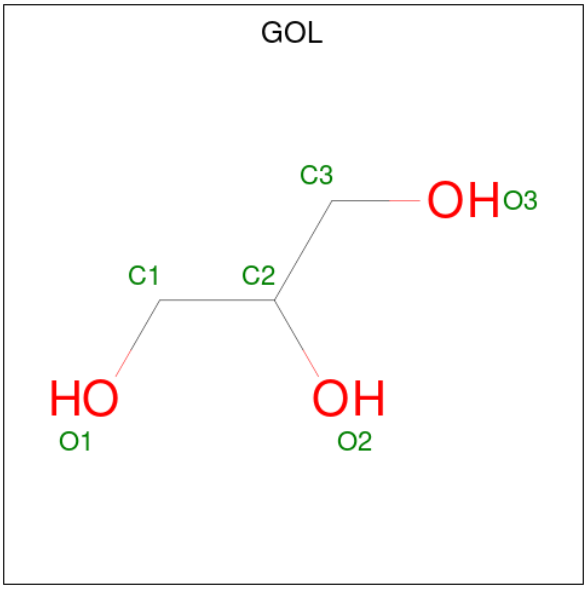
| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 2 | A | 1 | Total Ni<br>1 1 | 0 | 0 |
| 2 | B | 1 | Total Ni<br>1 1 | 0 | 0 |

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).




| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 3 | A | 1 | Total C O<br>4 2 2 | 0 | 0 |
| 3 | A | 1 | Total C O<br>4 2 2 | 0 | 0 |
| 3 | A | 1 | Total C O<br>4 2 2 | 0 | 0 |
| 3 | A | 1 | Total C O<br>4 2 2 | 0 | 0 |
| 3 | B | 1 | Total C O<br>4 2 2 | 0 | 0 |

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 4 | A | 1 | Total C O<br>6 3 3 | 0 | 0 |
| 4 | A | 1 | Total C O<br>6 3 3 | 0 | 0 |
| 4 | B | 1 | Total C O<br>6 3 3 | 0 | 0 |
| 4 | B | 1 | Total C O<br>6 3 3 | 0 | 0 |

- Molecule 5 is water.

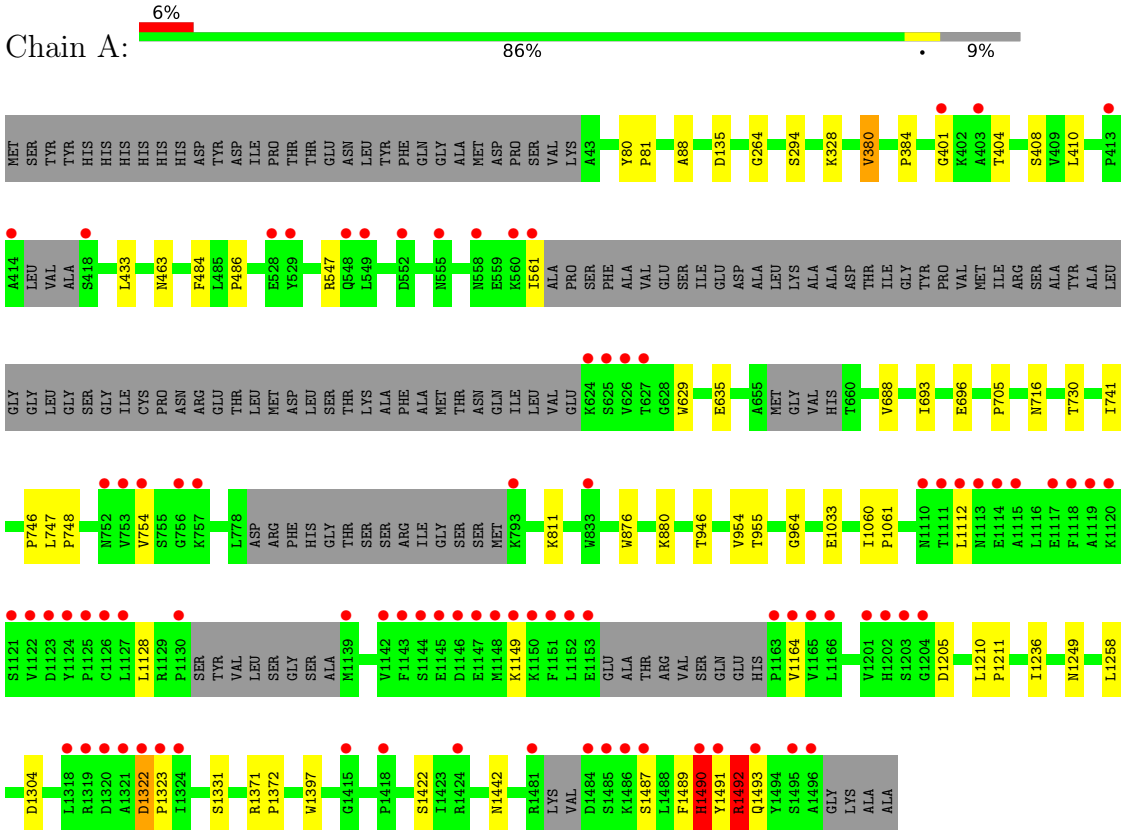
| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 5 | A | 398 | Total O<br>398 398 | 0 | 0 |
| 5 | B | 421 | Total O<br>421 421 | 0 | 0 |

# 3 Residue-property plots (i)

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

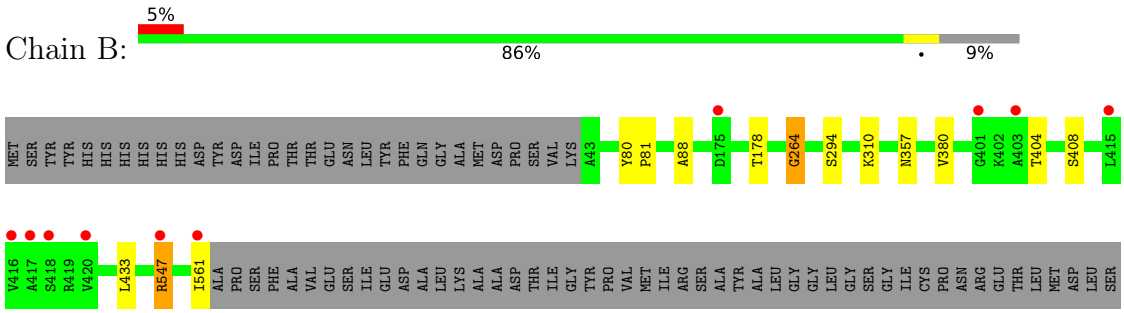
• Molecule 1: Carbamoyl-phosphate synthase [ammonia], mitochondrial

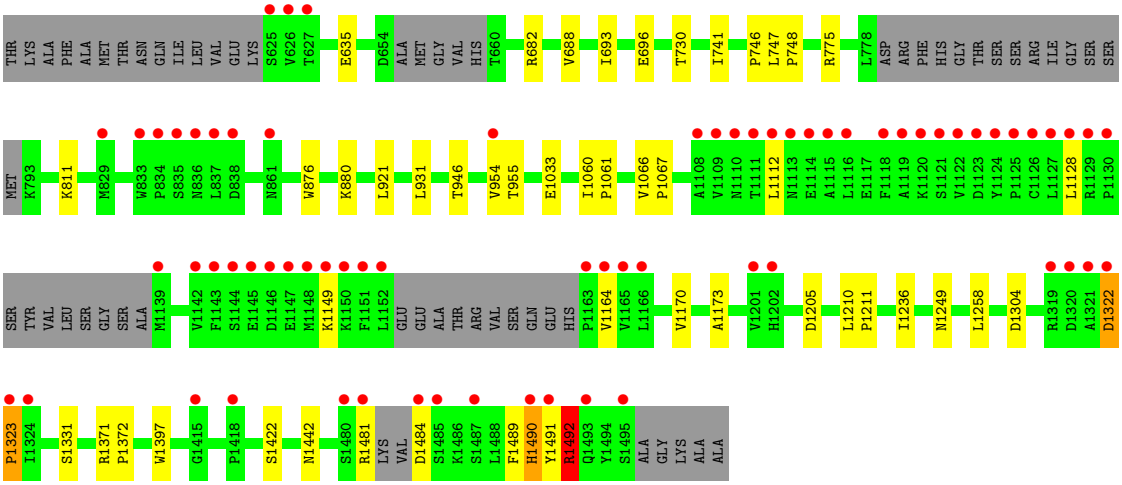
Chain A:




• Molecule 1: Carbamoyl-phosphate synthase [ammonia], mitochondrial

Chain B:




THR LYS ALA PHE ALA MET THR ASN GLN ILE LEU VAL GLU LYS S625 V626 T627 E635 D654 ALA MET GLY VAL HIS T660 R682 V688 I693 E696 T730 I741 P746 L747 P748 R775 L778 ASP ARG PHE HIS GLY THR SER SER ARG ILE GLY SER SER
MET K793 K811 M829 W833 P834 S835 N836 L837 D838 N861 W876 K880 L921 L931 T946 V954 T955 E1033 I1060 P1061 V1066 P1067 A1108 V1109 N1110 T1111 L1112 N1113 E1114 A1115 L1116 E1117 F1118 A1119 K1120 S1121 V1122 D1123 Y1124 P1125 C1126 L1127 L1128 R1129 P1130
SER TYR VAL LEU SER GLY SER ALA M1139 V1142 F1143 S1144 E1145 D1146 E1147 M1148 K1149 K1150 F1151 L1152 GLU GLU ALA THR ARG VAL SER GLN GLU HIS P1163 V1164 V1165 L1166 V1170 A1173 V1201 H1202 D1205 L1210 P1211 I1236 N1249 L1258 D1304 R1319 D1320 A1321 D1322
P1323 I1324 S1331 R1371 P1372 W1397 G1415 P1418 S1422 N1442 S1480 R1481 LYS VAL D1484 S1485 K1486 S1487 L1488 F1489 H1490 Y1491 R1492 Q1493 Y1494 S1495 ALA GLY LYS ALA ALA

# 4 Data and refinement statistics (i)

| Property | Value | Source |
|---|---|---|
| Space group | P 1 21 1 | Depositor |
| Cell constants<br>a, b, c, $\alpha$, $\beta$, $\gamma$ | 99.34Å 133.48Å 142.91Å<br>90.00° 102.51° 90.00° | Depositor |
| Resolution (Å) | 43.95 – 2.40<br>43.92 – 2.40 | Depositor<br>EDS |
| % Data completeness<br>(in resolution range) | 96.1 (43.95-2.40)<br>96.1 (43.92-2.40) | Depositor<br>EDS |
| $R_{merge}$ | (Not available) | Depositor |
| $R_{sym}$ | 0.11 | Depositor |
| $< I/\sigma(I) >$ [1] | 3.39 (at 2.39Å) | Xtriage |
| Refinement program | REFMAC 5.7.0032 | Depositor |
| R, $R_{free}$ | 0.165 , 0.196<br>0.172 , 0.169 | Depositor<br>DCC |
| $R_{free}$ test set | 6821 reflections (4.99%) | wwPDB-VP |
| Wilson B-factor (Å$^2$) | 31.8 | Xtriage |
| Anisotropy | 0.532 | Xtriage |
| Bulk solvent $k_{sol}$(e/Å$^3$), $B_{sol}$(Å$^2$) | 0.32 , 37.9 | EDS |
| L-test for twinning[2] | $< \|L\| > = 0.48$, $< L^2 > = 0.31$ | Xtriage |
| Estimated twinning fraction | No twinning to report. | Xtriage |
| $F_o$,$F_c$ correlation | 0.95 | EDS |
| Total number of atoms | 21866 | wwPDB-VP |
| Average B, all atoms (Å$^2$) | 40.0 | wwPDB-VP |

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.88% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

# 5 Model quality

## 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, EDO, NI

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

| Mol | Chain | Bond lengths | | Bond angles | |
|---|---|---|---|---|---|
| | | RMSZ | #$\|Z\|$ >5 | RMSZ | #$\|Z\|$ >5 |
| 1 | A | 0.50 | 0/10717 | 0.65 | 3/14511 (0.0%) |
| 1 | B | 0.51 | 1/10716 (0.0%) | 0.65 | 1/14514 (0.0%) |
| All | All | 0.51 | 1/21433 (0.0%) | 0.65 | 4/29025 (0.0%) |

All (1) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|---|---|---|---|---|---|---|---|
| 1 | B | 264 | GLY | N-CA | -5.17 | 1.38 | 1.46 |

All (4) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | A | 1492 | ARG | NE-CZ-NH1 | 6.64 | 123.62 | 120.30 |
| 1 | B | 1492 | ARG | NE-CZ-NH1 | 5.62 | 123.11 | 120.30 |
| 1 | A | 410 | LEU | CA-CB-CG | 5.42 | 127.77 | 115.30 |
| 1 | A | 1492 | ARG | NE-CZ-NH2 | -5.19 | 117.70 | 120.30 |

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts

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

| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|---|---|---|---|---|---|---|
| 1 | A | 10503 | 0 | 10578 | 37 | 0 |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|---|---|---|---|---|---|---|
| 1 | B | 10498 | 0 | 10576 | 39 | 0 |
| 2 | A | 1 | 0 | 0 | 0 | 0 |
| 2 | B | 1 | 0 | 0 | 0 | 0 |
| 3 | A | 16 | 0 | 24 | 1 | 0 |
| 3 | B | 4 | 0 | 6 | 0 | 0 |
| 4 | A | 12 | 0 | 16 | 0 | 0 |
| 4 | B | 12 | 0 | 16 | 1 | 0 |
| 5 | A | 398 | 0 | 0 | 2 | 0 |
| 5 | B | 421 | 0 | 0 | 3 | 0 |
| All | All | 21866 | 0 | 21216 | 76 | 0 |

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 2.

All (76) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:1487:SER:HA | 1:A:1490:HIS:ND1 | 2.10 | 0.67 |
| 1:B:1492:ARG:HH11 | 1:B:1492:ARG:HG3 | 1.60 | 0.65 |
| 1:A:404:THR:HG22 | 1:A:408:SER:OG | 1.97 | 0.65 |
| 1:A:1492:ARG:HH11 | 1:A:1492:ARG:HG3 | 1.62 | 0.64 |
| 1:B:1304:ASP:O | 1:B:1492:ARG:NH2 | 2.32 | 0.63 |
| 1:A:88:ALA:HB2 | 1:A:264:GLY:HA3 | 1.81 | 0.62 |
| 1:B:357:ASN:ND2 | 5:B:1702:HOH:O | 2.32 | 0.62 |
| 1:B:404:THR:HG22 | 1:B:408:SER:OG | 1.99 | 0.61 |
| 1:B:88:ALA:HB2 | 1:B:264:GLY:HA3 | 1.82 | 0.60 |
| 1:A:964:GLY:O | 3:A:1602:EDO:H11 | 2.02 | 0.60 |
| 1:B:178:THR:OG1 | 1:B:310:LYS:HE2 | 2.03 | 0.58 |
| 1:B:1492:ARG:HH11 | 1:B:1492:ARG:CG | 2.16 | 0.58 |
| 1:B:1170:VAL:HG23 | 1:B:1173:ALA:HB2 | 1.87 | 0.55 |
| 1:A:1304:ASP:O | 1:A:1492:ARG:NH2 | 2.40 | 0.54 |
| 1:B:1170:VAL:CG2 | 1:B:1173:ALA:HB2 | 2.38 | 0.53 |
| 1:A:135:ASP:OD1 | 5:A:1701:HOH:O | 2.18 | 0.53 |
| 1:A:401:GLY:HA2 | 5:A:2042:HOH:O | 2.09 | 0.51 |
| 1:A:1371:ARG:HB3 | 1:A:1397:TRP:CZ2 | 2.45 | 0.51 |
| 1:A:1322:ASP:N | 1:A:1323:PRO:CD | 2.75 | 0.50 |
| 1:B:1371:ARG:HB3 | 1:B:1397:TRP:CZ2 | 2.46 | 0.50 |
| 1:B:775:ARG:NH2 | 5:B:1707:HOH:O | 2.44 | 0.50 |
| 1:A:754:VAL:HG13 | 1:A:955:THR:HB | 1.94 | 0.49 |
| 1:A:1492:ARG:HD3 | 1:A:1493:GLN:N | 2.27 | 0.49 |
| 1:B:1322:ASP:N | 1:B:1323:PRO:CD | 2.76 | 0.49 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:B:931:LEU:HD12 | 5:B:2036:HOH:O | 2.14 | 0.48 |
| 1:A:547:ARG:NH2 | 1:A:561:ILE:HG21 | 2.30 | 0.47 |
| 1:A:635:GLU:OE1 | 1:A:696:GLU:OE2 | 2.33 | 0.47 |
| 1:A:404:THR:CG2 | 1:A:408:SER:OG | 2.63 | 0.47 |
| 1:A:954:VAL:HG12 | 1:A:954:VAL:O | 2.15 | 0.47 |
| 1:A:1492:ARG:HG3 | 1:A:1492:ARG:NH1 | 2.30 | 0.47 |
| 1:B:1128:LEU:HD11 | 1:B:1164:VAL:HG11 | 1.98 | 0.46 |
| 1:A:1060:ILE:HB | 1:A:1061:PRO:CD | 2.45 | 0.46 |
| 1:B:1205:ASP:HB2 | 1:B:1331:SER:OG | 2.15 | 0.46 |
| 1:B:730:THR:O | 1:B:946:THR:HG22 | 2.16 | 0.46 |
| 1:B:1060:ILE:HB | 1:B:1061:PRO:CD | 2.46 | 0.46 |
| 1:A:730:THR:O | 1:A:946:THR:HG22 | 2.15 | 0.45 |
| 1:B:404:THR:CG2 | 1:B:408:SER:OG | 2.64 | 0.45 |
| 1:B:811:LYS:NZ | 1:B:1033:GLU:OE2 | 2.50 | 0.45 |
| 1:B:876:TRP:CZ2 | 1:B:880:LYS:HE2 | 2.52 | 0.45 |
| 1:A:741:ILE:HD11 | 1:A:747:LEU:HD21 | 1.99 | 0.44 |
| 1:A:811:LYS:NZ | 1:A:1033:GLU:OE2 | 2.49 | 0.44 |
| 1:A:1128:LEU:HD11 | 1:A:1164:VAL:HG11 | 1.99 | 0.44 |
| 1:A:746:PRO:HB2 | 1:A:748:PRO:HD2 | 1.99 | 0.44 |
| 1:B:1492:ARG:HG3 | 1:B:1492:ARG:NH1 | 2.30 | 0.44 |
| 1:B:1489:PHE:O | 1:B:1491:TYR:N | 2.51 | 0.44 |
| 1:B:1481:ARG:HG3 | 1:B:1484:ASP:N | 2.32 | 0.43 |
| 1:B:746:PRO:HB2 | 1:B:748:PRO:HD2 | 2.00 | 0.43 |
| 1:B:954:VAL:HG12 | 1:B:954:VAL:O | 2.18 | 0.43 |
| 1:A:688:VAL:HG13 | 1:A:693:ILE:HB | 2.01 | 0.43 |
| 1:A:876:TRP:CZ2 | 1:A:880:LYS:HE2 | 2.54 | 0.43 |
| 1:A:1205:ASP:HB2 | 1:A:1331:SER:OG | 2.18 | 0.43 |
| 1:A:1371:ARG:HB2 | 1:A:1372:PRO:HD3 | 2.01 | 0.43 |
| 1:B:635:GLU:OE2 | 1:B:696:GLU:OE2 | 2.36 | 0.43 |
| 1:A:486:PRO:HD3 | 1:A:1489:PHE:CE2 | 2.54 | 0.43 |
| 1:A:1489:PHE:O | 1:A:1491:TYR:N | 2.53 | 0.42 |
| 1:B:1112:LEU:HD21 | 1:B:1149:LYS:HG3 | 2.02 | 0.42 |
| 1:A:1236:ILE:HD11 | 1:A:1258:LEU:HD11 | 2.02 | 0.42 |
| 1:B:1066:VAL:HB | 1:B:1067:PRO:HD3 | 2.02 | 0.42 |
| 1:A:80:TYR:N | 1:A:81:PRO:CD | 2.83 | 0.42 |
| 1:A:1060:ILE:HB | 1:A:1061:PRO:HD3 | 2.00 | 0.42 |
| 1:A:463:ASN:O | 1:A:484:PHE:HA | 2.20 | 0.42 |
| 1:B:80:TYR:N | 1:B:81:PRO:CD | 2.83 | 0.42 |
| 1:B:741:ILE:HD11 | 1:B:747:LEU:HD21 | 2.01 | 0.41 |
| 1:B:921:LEU:O | 4:B:1604:GOL:H2 | 2.20 | 0.41 |
| 1:B:547:ARG:NH2 | 1:B:561:ILE:HG21 | 2.35 | 0.41 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:B:1236:ILE:HD11 | 1:B:1258:LEU:HD11 | 2.02 | 0.41 |
| 1:A:1112:LEU:HD21 | 1:A:1149:LYS:HG3 | 2.02 | 0.41 |
| 1:B:1371:ARG:HB2 | 1:B:1372:PRO:HD3 | 2.02 | 0.41 |
| 1:B:1210:LEU:HD12 | 1:B:1211:PRO:HA | 2.03 | 0.41 |
| 1:B:1060:ILE:HB | 1:B:1061:PRO:HD3 | 2.02 | 0.41 |
| 1:B:682:ARG:HD2 | 1:B:682:ARG:HA | 1.77 | 0.41 |
| 1:B:688:VAL:HG13 | 1:B:693:ILE:HB | 2.03 | 0.41 |
| 1:A:1210:LEU:HD12 | 1:A:1211:PRO:HA | 2.03 | 0.41 |
| 1:A:629:TRP:HA | 1:A:705:PRO:HD3 | 2.03 | 0.40 |
| 1:B:1205:ASP:CB | 1:B:1331:SER:OG | 2.69 | 0.40 |
| 1:A:380:VAL:HG11 | 1:A:384:PRO:O | 2.21 | 0.40 |

There are no symmetry-related clashes.

## 5.3 Torsion angles (i)

### 5.3.1 Protein backbone (i)

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

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

| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|---|---|---|---|---|---|---|---|
| 1 | A | 1340/1489 (90%) | 1296 (97%) | 39 (3%) | 5 (0%) | 34 | 48 |
| 1 | B | 1342/1489 (90%) | 1295 (96%) | 41 (3%) | 6 (0%) | 34 | 48 |
| All | All | 2682/2978 (90%) | 2591 (97%) | 80 (3%) | 11 (0%) | 34 | 48 |

All (11) Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 1322 | ASP |
| 1 | A | 1490 | HIS |
| 1 | B | 1322 | ASP |
| 1 | B | 1490 | HIS |
| 1 | A | 380 | VAL |
| 1 | A | 1442 | ASN |
| 1 | B | 380 | VAL |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | B | 1442 | ASN |
| 1 | A | 294 | SER |
| 1 | B | 294 | SER |
| 1 | B | 1323 | PRO |

### 5.3.2 Protein sidechains (i)

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

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

| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles |
|---|---|---|---|---|---|
| 1 | A | 1159/1266 (92%) | 1152 (99%) | 7 (1%) | 86 94 |
| 1 | B | 1160/1266 (92%) | 1153 (99%) | 7 (1%) | 86 94 |
| All | All | 2319/2532 (92%) | 2305 (99%) | 14 (1%) | 86 94 |

All (14) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 328 | LYS |
| 1 | A | 433 | LEU |
| 1 | A | 716 | ASN |
| 1 | A | 1249 | ASN |
| 1 | A | 1422 | SER |
| 1 | A | 1490 | HIS |
| 1 | A | 1492 | ARG |
| 1 | B | 433 | LEU |
| 1 | B | 547 | ARG |
| 1 | B | 955 | THR |
| 1 | B | 1249 | ASN |
| 1 | B | 1422 | SER |
| 1 | B | 1490 | HIS |
| 1 | B | 1492 | ARG |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 1103 | GLN |
| 1 | B | 154 | GLN |

### 5.3.3 RNA

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates

There are no monosaccharides in this entry.

## 5.6 Ligand geometry

Of 11 ligands modelled in this entry, 2 are monoatomic - leaving 9 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 | $\#\|Z\| > 2$ |
| 4 | GOL | A | 1607 | - | 5,5,5 | 0.61 | 0 | 5,5,5 | 0.47 | 0 |
| 3 | EDO | A | 1603 | - | 3,3,3 | 0.76 | 0 | 2,2,2 | 0.44 | 0 |
| 4 | GOL | B | 1603 | - | 5,5,5 | 0.57 | 0 | 5,5,5 | 0.57 | 0 |
| 3 | EDO | A | 1604 | - | 3,3,3 | 0.51 | 0 | 2,2,2 | 0.51 | 0 |
| 4 | GOL | A | 1605 | - | 5,5,5 | 0.48 | 0 | 5,5,5 | 0.25 | 0 |
| 4 | GOL | B | 1604 | - | 5,5,5 | 0.66 | 0 | 5,5,5 | 0.69 | 0 |
| 3 | EDO | A | 1602 | - | 3,3,3 | 0.77 | 0 | 2,2,2 | 0.32 | 0 |
| 3 | EDO | A | 1606 | - | 3,3,3 | 0.89 | 0 | 2,2,2 | 0.72 | 0 |
| 3 | EDO | B | 1602 | - | 3,3,3 | 0.74 | 0 | 2,2,2 | 0.38 | 0 |

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 |
|---|---|---|---|---|---|---|---|
| 4 | GOL | A | 1607 | - | - | 4/4/4/4 | - |
| 3 | EDO | A | 1603 | - | - | 0/1/1/1 | - |
| 4 | GOL | B | 1603 | - | - | 4/4/4/4 | - |
| 3 | EDO | A | 1604 | - | - | 1/1/1/1 | - |
| 4 | GOL | A | 1605 | - | - | 2/4/4/4 | - |
| 4 | GOL | B | 1604 | - | - | 0/4/4/4 | - |
| 3 | EDO | A | 1602 | - | - | 1/1/1/1 | - |
| 3 | EDO | A | 1606 | - | - | 0/1/1/1 | - |
| 3 | EDO | B | 1602 | - | - | 1/1/1/1 | - |

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (13) torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 4 | A | 1605 | GOL | C1-C2-C3-O3 |
| 4 | A | 1607 | GOL | O1-C1-C2-C3 |
| 4 | A | 1607 | GOL | C1-C2-C3-O3 |
| 4 | A | 1607 | GOL | O2-C2-C3-O3 |
| 4 | B | 1603 | GOL | O1-C1-C2-C3 |
| 4 | B | 1603 | GOL | C1-C2-C3-O3 |
| 4 | A | 1605 | GOL | O2-C2-C3-O3 |
| 4 | B | 1603 | GOL | O1-C1-C2-O2 |
| 4 | A | 1607 | GOL | O1-C1-C2-O2 |
| 4 | B | 1603 | GOL | O2-C2-C3-O3 |
| 3 | A | 1604 | EDO | O1-C1-C2-O2 |
| 3 | B | 1602 | EDO | O1-C1-C2-O2 |
| 3 | A | 1602 | EDO | O1-C1-C2-O2 |

There are no ring outliers.

2 monomers are involved in 2 short contacts:

| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|---|---|---|---|---|---|
| 4 | B | 1604 | GOL | 1 | 0 |
| 3 | A | 1602 | EDO | 1 | 0 |

## 5.7 Other polymers (i)

There are no such residues in this entry.

## 5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

# 6 Fit of model and data

## 6.1 Protein, DNA and RNA chains

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

| Mol | Chain | Analysed | <RSRZ> | #RSRZ>2 | | | OWAB(Å$^2$) | Q<0.9 |
|---|---|---|---|---|---|---|---|---|
| 1 | A | 1352/1489 (90%) | -0.00 | 84 (6%) | 20 | 19 | 17, 34, 90, 174 | 0 |
| 1 | B | 1351/1489 (90%) | -0.10 | 79 (5%) | 23 | 22 | 15, 32, 92, 160 | 0 |
| All | All | 2703/2978 (90%) | -0.05 | 163 (6%) | 21 | 20 | 15, 33, 91, 174 | 0 |

All (163) RSRZ outliers are listed below:

| Mol | Chain | Res | Type | RSRZ |
|---|---|---|---|---|
| 1 | A | 1321 | ALA | 12.7 |
| 1 | B | 1201 | VAL | 10.2 |
| 1 | A | 1320 | ASP | 9.7 |
| 1 | B | 1320 | ASP | 8.9 |
| 1 | B | 1323 | PRO | 8.1 |
| 1 | B | 1321 | ALA | 7.6 |
| 1 | B | 1151 | PHE | 7.0 |
| 1 | A | 1152 | LEU | 6.8 |
| 1 | A | 1151 | PHE | 6.5 |
| 1 | B | 1112 | LEU | 6.2 |
| 1 | A | 1491 | TYR | 6.0 |
| 1 | A | 1153 | GLU | 5.7 |
| 1 | B | 403 | ALA | 5.6 |
| 1 | A | 1112 | LEU | 5.6 |
| 1 | B | 1143 | PHE | 5.4 |
| 1 | B | 626 | VAL | 5.3 |
| 1 | A | 414 | ALA | 5.3 |
| 1 | A | 1324 | ILE | 5.3 |
| 1 | B | 1164 | VAL | 5.3 |
| 1 | A | 1201 | VAL | 5.2 |
| 1 | B | 1324 | ILE | 5.2 |
| 1 | B | 1124 | TYR | 5.1 |
| 1 | A | 1118 | PHE | 5.0 |
| 1 | B | 1152 | LEU | 4.9 |

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| Mol | Chain | Res | Type | RSRZ |
|---|---|---|---|---|
| 1 | A | 1144 | SER | 4.7 |
| 1 | A | 1124 | TYR | 4.7 |
| 1 | A | 401 | GLY | 4.7 |
| 1 | B | 1322 | ASP | 4.6 |
| 1 | B | 1148 | MET | 4.6 |
| 1 | A | 756 | GLY | 4.5 |
| 1 | A | 1164 | VAL | 4.4 |
| 1 | B | 1165 | VAL | 4.4 |
| 1 | B | 1149 | LYS | 4.2 |
| 1 | A | 1323 | PRO | 4.2 |
| 1 | B | 417 | ALA | 4.2 |
| 1 | A | 1484 | ASP | 4.2 |
| 1 | B | 1146 | ASP | 4.2 |
| 1 | B | 1484 | ASP | 4.2 |
| 1 | A | 1149 | LYS | 4.1 |
| 1 | A | 1143 | PHE | 4.0 |
| 1 | B | 1118 | PHE | 4.0 |
| 1 | A | 1485 | SER | 3.9 |
| 1 | B | 625 | SER | 3.9 |
| 1 | B | 1128 | LEU | 3.9 |
| 1 | A | 1148 | MET | 3.9 |
| 1 | A | 1122 | VAL | 3.9 |
| 1 | B | 1122 | VAL | 3.9 |
| 1 | A | 1490 | HIS | 3.9 |
| 1 | A | 560 | LYS | 3.9 |
| 1 | B | 1109 | VAL | 3.9 |
| 1 | A | 1481 | ARG | 3.8 |
| 1 | B | 1485 | SER | 3.8 |
| 1 | B | 175 | ASP | 3.8 |
| 1 | B | 1130 | PRO | 3.8 |
| 1 | B | 416 | VAL | 3.8 |
| 1 | B | 1491 | TYR | 3.8 |
| 1 | B | 415 | LEU | 3.7 |
| 1 | A | 1130 | PRO | 3.7 |
| 1 | A | 1487 | SER | 3.7 |
| 1 | A | 1493 | GLN | 3.7 |
| 1 | B | 401 | GLY | 3.6 |
| 1 | B | 627 | THR | 3.6 |
| 1 | B | 1163 | PRO | 3.6 |
| 1 | A | 1115 | ALA | 3.6 |
| 1 | A | 1146 | ASP | 3.6 |
| 1 | A | 1322 | ASP | 3.6 |

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| Mol | Chain | Res | Type | RSRZ |
|---|---|---|---|---|
| 1 | B | 1110 | ASN | 3.5 |
| 1 | A | 1150 | LYS | 3.5 |
| 1 | B | 1493 | GLN | 3.5 |
| 1 | A | 625 | SER | 3.5 |
| 1 | A | 1203 | SER | 3.5 |
| 1 | A | 1121 | SER | 3.4 |
| 1 | A | 1126 | CYS | 3.4 |
| 1 | B | 1166 | LEU | 3.4 |
| 1 | A | 1418 | PRO | 3.4 |
| 1 | B | 1129 | ARG | 3.3 |
| 1 | B | 837 | LEU | 3.3 |
| 1 | A | 1111 | THR | 3.3 |
| 1 | A | 1142 | VAL | 3.3 |
| 1 | A | 418 | SER | 3.2 |
| 1 | B | 1111 | THR | 3.2 |
| 1 | B | 1147 | GLU | 3.2 |
| 1 | A | 1495 | SER | 3.2 |
| 1 | A | 1145 | GLU | 3.2 |
| 1 | A | 413 | PRO | 3.2 |
| 1 | B | 1139 | MET | 3.1 |
| 1 | B | 418 | SER | 3.1 |
| 1 | B | 561 | ILE | 3.1 |
| 1 | A | 1415 | GLY | 3.0 |
| 1 | B | 1126 | CYS | 3.0 |
| 1 | A | 548 | GLN | 3.0 |
| 1 | A | 1163 | PRO | 3.0 |
| 1 | A | 1120 | LYS | 3.0 |
| 1 | B | 1150 | LYS | 3.0 |
| 1 | B | 1114 | GLU | 2.9 |
| 1 | A | 555 | ASN | 2.9 |
| 1 | B | 1202 | HIS | 2.9 |
| 1 | A | 753 | VAL | 2.9 |
| 1 | B | 1123 | ASP | 2.8 |
| 1 | B | 836 | ASN | 2.8 |
| 1 | B | 1142 | VAL | 2.8 |
| 1 | B | 1119 | ALA | 2.8 |
| 1 | A | 1123 | ASP | 2.8 |
| 1 | A | 1147 | GLU | 2.8 |
| 1 | A | 552 | ASP | 2.8 |
| 1 | B | 1108 | ALA | 2.7 |
| 1 | B | 1490 | HIS | 2.7 |
| 1 | A | 1318 | LEU | 2.7 |

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| Mol | Chain | Res | Type | RSRZ |
|---|---|---|---|---|
| 1 | A | 793 | LYS | 2.7 |
| 1 | B | 1125 | PRO | 2.7 |
| 1 | A | 752 | ASN | 2.7 |
| 1 | A | 561 | ILE | 2.7 |
| 1 | B | 1121 | SER | 2.7 |
| 1 | B | 1495 | SER | 2.7 |
| 1 | B | 1319 | ARG | 2.7 |
| 1 | B | 834 | PRO | 2.6 |
| 1 | A | 1119 | ALA | 2.6 |
| 1 | A | 1204 | GLY | 2.6 |
| 1 | A | 757 | LYS | 2.6 |
| 1 | B | 1115 | ALA | 2.6 |
| 1 | A | 1117 | GLU | 2.6 |
| 1 | A | 1165 | VAL | 2.5 |
| 1 | B | 954 | VAL | 2.5 |
| 1 | A | 1202 | HIS | 2.5 |
| 1 | B | 829 | MET | 2.5 |
| 1 | A | 626 | VAL | 2.5 |
| 1 | A | 833 | TRP | 2.5 |
| 1 | A | 1496 | ALA | 2.5 |
| 1 | B | 1113 | ASN | 2.4 |
| 1 | B | 838 | ASP | 2.4 |
| 1 | B | 1145 | GLU | 2.4 |
| 1 | A | 627 | THR | 2.4 |
| 1 | B | 1144 | SER | 2.4 |
| 1 | A | 624 | LYS | 2.4 |
| 1 | A | 1127 | LEU | 2.4 |
| 1 | A | 1110 | ASN | 2.3 |
| 1 | B | 861 | ASN | 2.3 |
| 1 | B | 1418 | PRO | 2.3 |
| 1 | A | 529 | TYR | 2.3 |
| 1 | B | 1415 | GLY | 2.3 |
| 1 | A | 1319 | ARG | 2.3 |
| 1 | B | 1120 | LYS | 2.3 |
| 1 | A | 1125 | PRO | 2.3 |
| 1 | B | 835 | SER | 2.3 |
| 1 | A | 1166 | LEU | 2.3 |
| 1 | A | 1139 | MET | 2.3 |
| 1 | A | 403 | ALA | 2.3 |
| 1 | B | 1481 | ARG | 2.2 |
| 1 | A | 558 | ASN | 2.2 |
| 1 | B | 420 | VAL | 2.2 |

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| Mol | Chain | Res | Type | RSRZ |
|---|---|---|---|---|
| 1 | A | 528 | GLU | 2.2 |
| 1 | B | 1127 | LEU | 2.2 |
| 1 | B | 833 | TRP | 2.2 |
| 1 | B | 1480 | SER | 2.2 |
| 1 | A | 1486 | LYS | 2.1 |
| 1 | A | 1114 | GLU | 2.1 |
| 1 | A | 1113 | ASN | 2.1 |
| 1 | A | 1424 | ARG | 2.1 |
| 1 | B | 1116 | LEU | 2.1 |
| 1 | B | 1487 | SER | 2.0 |
| 1 | A | 754 | VAL | 2.0 |
| 1 | A | 549 | LEU | 2.0 |
| 1 | B | 547 | ARG | 2.0 |

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

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

## 6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

## 6.4 Ligands (i)

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

| Mol | Type | Chain | Res | Atoms | RSCC | RSR | B-factors(Å$^2$) | Q<0.9 |
|---|---|---|---|---|---|---|---|---|
| 3 | EDO | A | 1602 | 4/4 | 0.73 | 0.32 | 44,47,56,62 | 0 |
| 3 | EDO | A | 1606 | 4/4 | 0.74 | 0.25 | 40,44,48,54 | 0 |
| 4 | GOL | A | 1607 | 6/6 | 0.78 | 0.43 | 48,65,82,84 | 0 |
| 4 | GOL | A | 1605 | 6/6 | 0.82 | 0.18 | 48,55,65,66 | 0 |
| 3 | EDO | A | 1603 | 4/4 | 0.84 | 0.23 | 34,45,46,47 | 0 |
| 4 | GOL | B | 1603 | 6/6 | 0.84 | 0.17 | 58,65,69,69 | 0 |
| 4 | GOL | B | 1604 | 6/6 | 0.86 | 0.19 | 53,57,62,66 | 0 |
| 3 | EDO | B | 1602 | 4/4 | 0.93 | 0.19 | 40,41,46,46 | 0 |
| 3 | EDO | A | 1604 | 4/4 | 0.94 | 0.17 | 40,43,44,45 | 0 |
| 2 | NI | B | 1601 | 1/1 | 1.00 | 0.08 | 32,32,32,32 | 0 |

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| Mol | Type | Chain | Res | Atoms | RSCC | RSR | B-factors(Å$^2$) | Q<0.9 |
|---|---|---|---|---|---|---|---|---|
| 2 | NI | A | 1601 | 1/1 | 1.00 | 0.05 | 36,36,36,36 | 0 |

## 6.5 Other polymers (i)

There are no such residues in this entry.