# Full wwPDB X-ray Structure Validation Report (i)

Nov 24, 2022 – 12:21 pm GMT

| | | |
|---|---|---|
| PDB ID | : | 7ZVJ |
| Title | : | Homodimeric structure of LARGE1 |
| Authors | : | Diskin, R.; Katz, M. |
| Deposited on | : | 2022-05-16 |
| Resolution | : | 2.61 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 (i) symbol.

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

---

The following versions of software and data (see references (1)) were used in the production of this report:

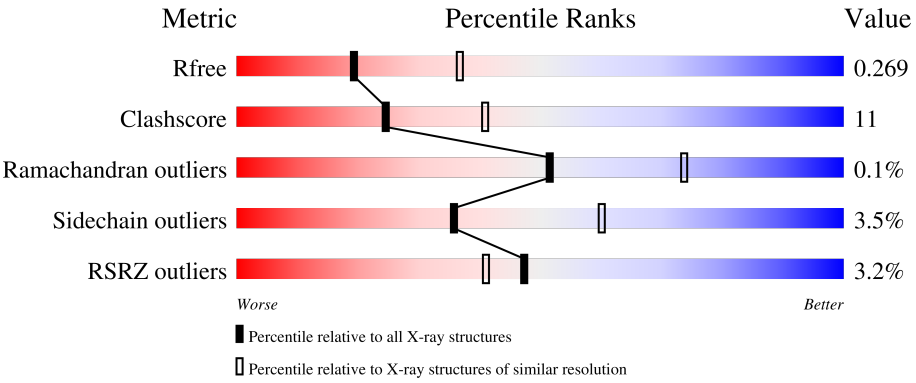
| | | |
|---|---|---|
| MolProbity | : | 4.02b-467 |
| Mogul | : | 1.8.4, CSD as541be (2020) |
| Xtriage (Phenix) | : | 1.13 |
| EDS | : | 2.31.3 |
| Percentile statistics | : | 20191225.v01 (using entries in the PDB archive December 25th 2019) |
| Refmac | : | 5.8.0267 |
| CCP4 | : | 7.1.010 (Gargrove) |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.31.3 |

# 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 2.61 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 | 3797 (2.64-2.60) |
| Clashscore | 141614 | 4168 (2.64-2.60) |
| Ramachandran outliers | 138981 | 4093 (2.64-2.60) |
| Sidechain outliers | 138945 | 4093 (2.64-2.60) |
| RSRZ outliers | 127900 | 3731 (2.64-2.60) |

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 | 619 | 3% 70% 22% • 6% |
| 1 | B | 619 | 4% 71% 22% • 5% |

## 2 Entry composition

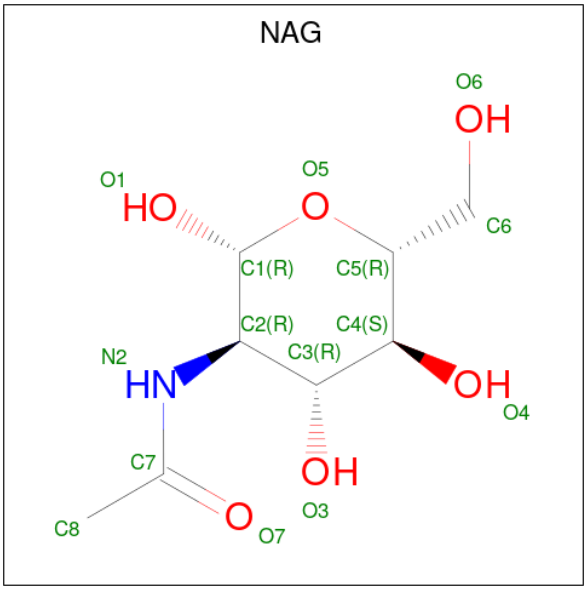
There are 5 unique types of molecules in this entry. The entry contains 9774 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Xylosyl- and glucuronyltransferase LARGE1.

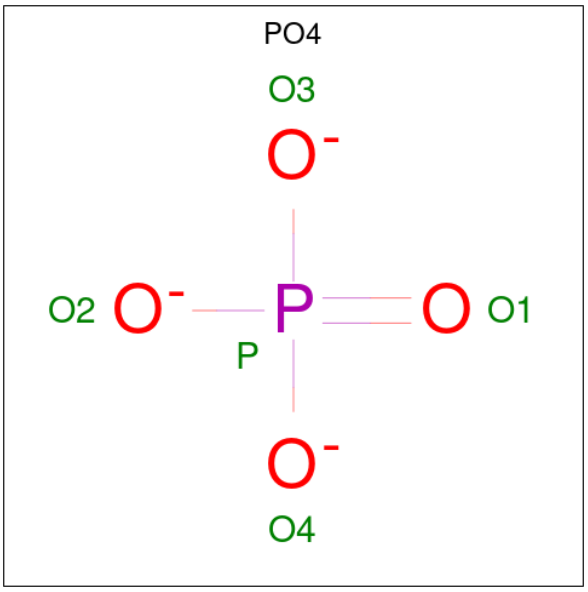
| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 583 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 4824 | 3133 | 806 | 857 | 28 | | | |
| 1 | B | 587 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 4861 | 3157 | 817 | 859 | 28 | | | |

- Molecule 2 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).




| Mol | Chain | Residues | Atoms | | | | ZeroOcc | AltConf |
|---|---|---|---|---|---|---|---|---|
| 2 | A | 1 | Total | C | N | O | 0 | 0 |
| | | | 14 | 8 | 1 | 5 | | |
| 2 | B | 1 | Total | C | N | O | 0 | 0 |
| | | | 14 | 8 | 1 | 5 | | |

- Molecule 3 is PHOSPHATE ION (three-letter code: PO4) (formula: $O_4P$).




| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 3 | A | 1 | Total O P<br>5 4 1 | 0 | 0 |
| 3 | B | 1 | Total O P<br>5 4 1 | 0 | 0 |
| 3 | B | 1 | Total O P<br>5 4 1 | 0 | 0 |

- Molecule 4 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 4 | A | 1 | Total Mn<br>1 1 | 0 | 0 |
| 4 | B | 1 | Total Mn<br>1 1 | 0 | 0 |

- Molecule 5 is water.

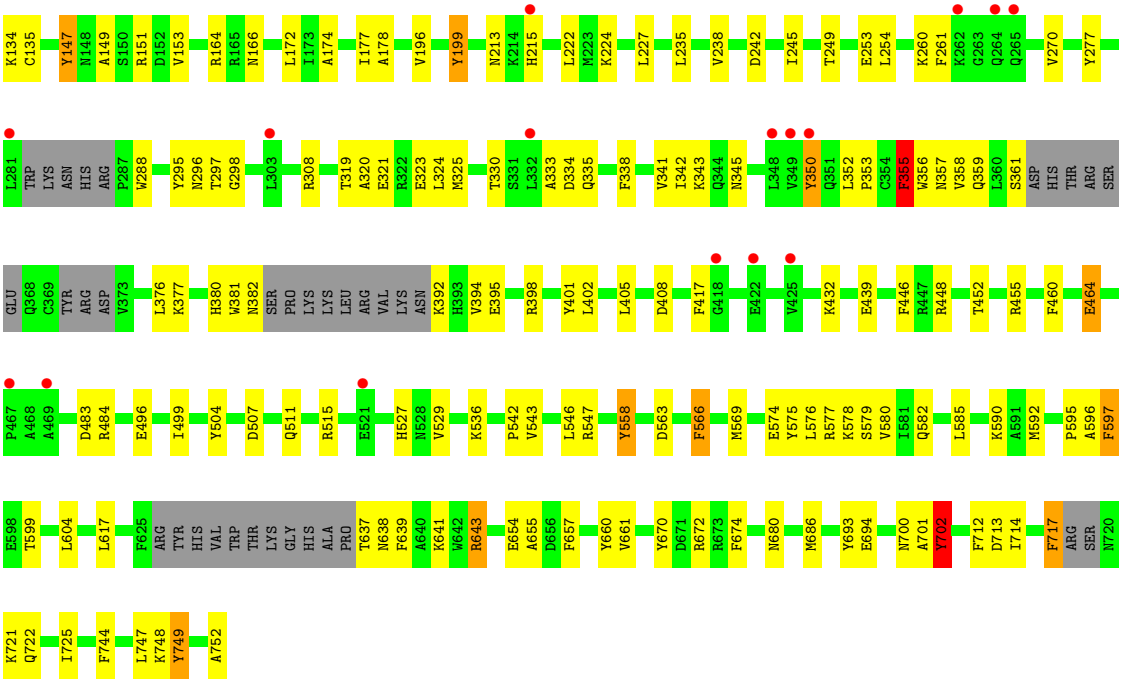
| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 5 | A | 26 | Total O<br>26 26 | 0 | 0 |
| 5 | B | 18 | Total O<br>18 18 | 0 | 0 |

# 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.

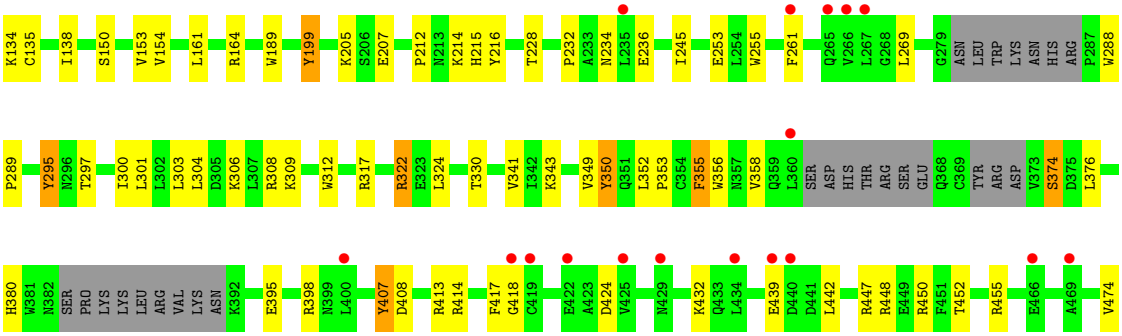
• Molecule 1: Xylosyl- and glucuronyltransferase LARGE1

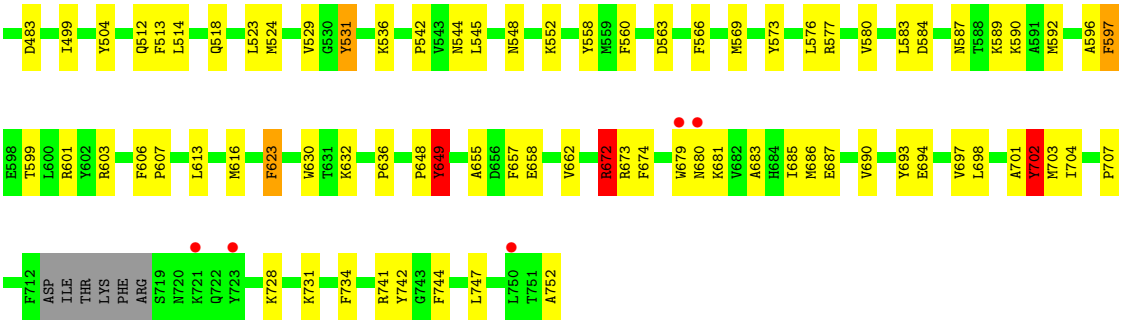
Chain A:

• Molecule 1: Xylosyl- and glucuronyltransferase LARGE1

Chain B:


D483 I499 Y504 Q512 F513 L514 Q518 L523 M524 V529 G530 Y531 K536 P542 V543 N544 L545 N548 K552 Y558 M559 F560 D563 F566 M569 Y573 L576 R577 V580 L583 D584 N587 T588 K589 K590 A591 M592 A596 F597
E598 T599 L600 R601 Y602 R603 F606 P607 L613 M616 F623 W630 T631 K632 P636 P648 Y649 A655 D656 F657 E658 V662 R672 R673 F674 W679 N680 K681 V682 A683 H684 I685 M686 E687 V690 Y693 E694 V697 L698 A701 Y702 M703 I704 P707
F712 ASP ILE THR LYS PHE ARG S719 N720 K721 Q722 Y723 K728 K731 F734 R741 Y742 G743 F744 L747 L750 T751 A752

# 4 Data and refinement statistics (i)

| Property | Value | Source |
|---|---|---|
| Space group | C 1 2 1 | Depositor |
| Cell constants<br>a, b, c, $\alpha$, $\beta$, $\gamma$ | 196.53Å 107.38Å 100.33Å<br>90.00° 120.26° 90.00° | Depositor |
| Resolution (Å) | 45.64 – 2.61<br>45.64 – 2.61 | Depositor<br>EDS |
| % Data completeness<br>(in resolution range) | 95.1 (45.64-2.61)<br>95.1 (45.64-2.61) | Depositor<br>EDS |
| $R_{merge}$ | (Not available) | Depositor |
| $R_{sym}$ | (Not available) | Depositor |
| $< I/\sigma(I) >$ [1] | 1.04 (at 2.61Å) | Xtriage |
| Refinement program | PHENIX 1.20.1_4487, PHENIX 1.20.1_4487 | Depositor |
| R, $R_{free}$ | 0.215 , 0.270<br>0.215 , 0.269 | Depositor<br>DCC |
| $R_{free}$ test set | 1194 reflections (2.28%) | wwPDB-VP |
| Wilson B-factor (Å$^2$) | 75.7 | Xtriage |
| Anisotropy | 0.134 | Xtriage |
| Bulk solvent $k_{sol}$(e/Å$^3$), $B_{sol}$(Å$^2$) | (Not available) , (Not available) | EDS |
| L-test for twinning[2] | $< \|L\| > = 0.50$, $< L^2 > = 0.33$ | Xtriage |
| Estimated twinning fraction | 0.033 for -h-2*l,-k,l | Xtriage |
| $F_o$,$F_c$ correlation | 0.94 | EDS |
| Total number of atoms | 9774 | wwPDB-VP |
| Average B, all atoms (Å$^2$) | 84.0 | wwPDB-VP |

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.06% 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: NAG, PO4, MN

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 | 0.40 | 0/4948 | 0.71 | 3/6703 (0.0%) |
| 1 | B | 0.45 | 1/4991 (0.0%) | 0.76 | 5/6765 (0.1%) |
| All | All | 0.43 | 1/9939 (0.0%) | 0.73 | 8/13468 (0.1%) |

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

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

All (1) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|---|---|---|---|---|---|---|---|
| 1 | B | 309 | LYS | CD-CE | 5.10 | 1.64 | 1.51 |

All (8) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | B | 728 | LYS | CD-CE-NZ | -6.91 | 95.82 | 111.70 |
| 1 | B | 702 | TYR | CB-CG-CD2 | -6.38 | 117.17 | 121.00 |
| 1 | A | 702 | TYR | CB-CG-CD2 | -5.66 | 117.60 | 121.00 |
| 1 | B | 613 | LEU | CA-CB-CG | 5.37 | 127.64 | 115.30 |
| 1 | B | 649 | TYR | CB-CG-CD2 | -5.34 | 117.79 | 121.00 |
| 1 | B | 322 | ARG | CG-CD-NE | 5.11 | 122.54 | 111.80 |
| 1 | A | 355 | PHE | CB-CG-CD2 | -5.08 | 117.25 | 120.80 |
| 1 | A | 464 | GLU | CA-CB-CG | 5.06 | 124.53 | 113.40 |

There are no chirality outliers.

All (4) planarity outliers are listed below:

| Mol | Chain | Res | Type | Group |
|---|---|---|---|---|
| 1 | B | 322 | ARG | Sidechain |
| 1 | B | 672 | ARG | Sidechain |
| 1 | B | 702 | TYR | Sidechain |
| 1 | B | 741 | ARG | Sidechain |

## 5.2 Too-close contacts (i)

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

| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|---|---|---|---|---|---|---|
| 1 | A | 4824 | 0 | 4760 | 107 | 0 |
| 1 | B | 4861 | 0 | 4790 | 105 | 0 |
| 2 | A | 14 | 0 | 13 | 0 | 0 |
| 2 | B | 14 | 0 | 13 | 0 | 0 |
| 3 | A | 5 | 0 | 0 | 0 | 0 |
| 3 | B | 10 | 0 | 0 | 1 | 0 |
| 4 | A | 1 | 0 | 0 | 0 | 0 |
| 4 | B | 1 | 0 | 0 | 0 | 0 |
| 5 | A | 26 | 0 | 0 | 3 | 0 |
| 5 | B | 18 | 0 | 0 | 1 | 0 |
| All | All | 9774 | 0 | 9576 | 210 | 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 11.

All (210) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:B:599:THR:OG1 | 1:B:603:ARG:NH1 | 2.00 | 0.94 |
| 1:A:402:LEU:HD11 | 1:A:515:ARG:HH22 | 1.38 | 0.87 |
| 1:A:134:LYS:HG2 | 1:A:135:CYS:H | 1.43 | 0.84 |
| 1:A:569:MET:HB3 | 1:A:702:TYR:CE1 | 2.13 | 0.83 |
| 1:B:563:ASP:OD1 | 5:B:901:HOH:O | 1.97 | 0.83 |
| 1:B:499:ILE:HB | 1:B:529:VAL:HG22 | 1.60 | 0.81 |
| 1:A:744:PHE:HA | 1:A:747:LEU:HD23 | 1.66 | 0.77 |
| 1:B:450:ARG:HE | 1:B:673:ARG:HB3 | 1.54 | 0.73 |

*Continued on next page...*

*Continued from previous page...*

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:574:GLU:HG2 | 5:A:901:HOH:O | 1.87 | 0.73 |
| 1:B:544:ASN:ND2 | 1:B:680:ASN:OD1 | 2.23 | 0.72 |
| 1:A:496:GLU:OE2 | 5:A:901:HOH:O | 2.08 | 0.70 |
| 1:A:569:MET:HB3 | 1:A:702:TYR:CD1 | 2.27 | 0.70 |
| 1:B:413:ARG:HH21 | 1:B:455:ARG:HG3 | 1.58 | 0.69 |
| 1:B:649:TYR:CE1 | 1:B:697:VAL:HB | 2.29 | 0.68 |
| 1:A:566:PHE:HE2 | 1:A:596:ALA:HB1 | 1.58 | 0.68 |
| 1:A:452:THR:O | 1:A:672:ARG:NH2 | 2.27 | 0.66 |
| 1:B:134:LYS:HG2 | 1:B:135:CYS:H | 1.62 | 0.65 |
| 1:A:712:PHE:CE2 | 1:B:512:GLN:HB3 | 2.32 | 0.65 |
| 1:A:455:ARG:NH2 | 1:A:507:ASP:OD1 | 2.30 | 0.64 |
| 1:B:744:PHE:HA | 1:B:747:LEU:HD23 | 1.80 | 0.63 |
| 1:B:207:GLU:OE1 | 1:B:317:ARG:NH2 | 2.32 | 0.63 |
| 1:B:407:TYR:HD1 | 1:B:408:ASP:N | 1.97 | 0.62 |
| 1:B:353:PRO:HD2 | 1:B:356:TRP:HD1 | 1.66 | 0.61 |
| 1:B:395:GLU:HG2 | 1:B:398:ARG:HH21 | 1.64 | 0.61 |
| 1:B:583:LEU:HD21 | 1:B:648:PRO:HG2 | 1.82 | 0.61 |
| 1:B:655:ALA:HB2 | 1:B:752:ALA:HB1 | 1.82 | 0.60 |
| 1:A:558:TYR:HE2 | 1:A:585:LEU:HB3 | 1.66 | 0.60 |
| 1:A:405:LEU:HD13 | 1:A:511:GLN:HG3 | 1.83 | 0.60 |
| 1:A:288:TRP:CZ2 | 1:A:330:THR:HG22 | 2.37 | 0.59 |
| 1:B:577:ARG:O | 1:B:580:VAL:HG22 | 2.02 | 0.59 |
| 1:B:674:PHE:HB2 | 1:B:680:ASN:OD1 | 2.02 | 0.59 |
| 1:B:450:ARG:HE | 1:B:673:ARG:CB | 2.17 | 0.58 |
| 1:A:499:ILE:HB | 1:A:529:VAL:HG22 | 1.86 | 0.57 |
| 1:A:574:GLU:O | 1:A:578:LYS:HD3 | 2.04 | 0.57 |
| 1:A:149:ALA:O | 1:A:153:VAL:HG23 | 2.05 | 0.56 |
| 1:B:545:LEU:HB2 | 1:B:672:ARG:HD2 | 1.86 | 0.56 |
| 1:A:579:SER:HA | 1:A:582:GLN:HG2 | 1.88 | 0.56 |
| 1:A:147:TYR:CE1 | 1:A:177:ILE:HD13 | 2.41 | 0.55 |
| 1:A:353:PRO:HB2 | 1:A:355:PHE:CE1 | 2.42 | 0.55 |
| 1:B:504:TYR:CZ | 1:B:536:LYS:HA | 2.42 | 0.55 |
| 1:A:319:THR:O | 1:A:323:GLU:HG2 | 2.07 | 0.55 |
| 1:A:134:LYS:O | 1:A:166:ASN:ND2 | 2.40 | 0.55 |
| 1:A:297:THR:HG21 | 1:A:335:GLN:HA | 1.89 | 0.55 |
| 1:A:686:MET:HG3 | 1:A:749:TYR:CD2 | 2.42 | 0.55 |
| 1:A:260:LYS:HD3 | 1:A:350:TYR:OH | 2.07 | 0.54 |
| 1:A:350:TYR:C | 1:A:350:TYR:HD1 | 2.11 | 0.54 |
| 1:B:261:PHE:CD1 | 1:B:350:TYR:CD2 | 2.95 | 0.54 |
| 1:A:254:LEU:HB2 | 1:A:356:TRP:CZ3 | 2.42 | 0.54 |
| 1:A:242:ASP:OD2 | 1:A:298:GLY:HA2 | 2.08 | 0.53 |

*Continued on next page...*

*Continued from previous page...*

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:599:THR:HG21 | 1:A:604:LEU:HD22 | 1.90 | 0.53 |
| 1:B:452:THR:O | 1:B:672:ARG:NH1 | 2.42 | 0.53 |
| 1:A:277:TYR:OH | 1:A:335:GLN:HG2 | 2.08 | 0.53 |
| 1:B:576:LEU:O | 1:B:580:VAL:HG13 | 2.08 | 0.53 |
| 1:A:350:TYR:C | 1:A:350:TYR:CD1 | 2.82 | 0.53 |
| 1:A:381:TRP:CZ2 | 1:A:401:TYR:HB2 | 2.44 | 0.53 |
| 1:A:749:TYR:CD1 | 1:A:749:TYR:N | 2.77 | 0.53 |
| 1:B:297:THR:HB | 1:B:300:ILE:HD11 | 1.90 | 0.53 |
| 1:A:713:ASP:OD1 | 1:A:714:ILE:N | 2.42 | 0.53 |
| 1:B:584:ASP:OD1 | 1:B:587:ASN:ND2 | 2.41 | 0.53 |
| 1:B:607:PRO:HG3 | 1:B:616:MET:SD | 2.49 | 0.52 |
| 1:B:548:ASN:O | 1:B:552:LYS:HG3 | 2.09 | 0.52 |
| 1:A:401:TYR:CE2 | 1:A:405:LEU:HD11 | 2.45 | 0.52 |
| 1:A:597:PHE:CD1 | 1:A:597:PHE:N | 2.76 | 0.52 |
| 1:A:597:PHE:CE2 | 1:A:617:LEU:HD11 | 2.45 | 0.52 |
| 1:B:450:ARG:HG3 | 1:B:673:ARG:HA | 1.91 | 0.52 |
| 1:A:558:TYR:CE2 | 1:A:585:LEU:HB3 | 2.44 | 0.52 |
| 1:A:439:GLU:OE1 | 1:A:439:GLU:N | 2.37 | 0.52 |
| 1:B:513:PHE:HZ | 1:B:531:TYR:CD2 | 2.28 | 0.52 |
| 1:B:569:MET:HB2 | 1:B:702:TYR:CD1 | 2.44 | 0.51 |
| 1:A:147:TYR:CD1 | 1:A:147:TYR:N | 2.79 | 0.51 |
| 1:A:504:TYR:CE2 | 1:A:536:LYS:HG2 | 2.46 | 0.51 |
| 1:A:338:PHE:O | 1:A:342:ILE:HD12 | 2.11 | 0.51 |
| 1:A:394:VAL:O | 1:A:398:ARG:HG2 | 2.09 | 0.51 |
| 1:A:566:PHE:CE2 | 1:A:596:ALA:HB1 | 2.43 | 0.51 |
| 1:B:483:ASP:OD1 | 1:B:483:ASP:N | 2.44 | 0.51 |
| 1:A:701:ALA:O | 1:A:702:TYR:HB3 | 2.09 | 0.51 |
| 1:A:655:ALA:HB2 | 1:A:752:ALA:HB1 | 1.91 | 0.51 |
| 1:B:597:PHE:CD1 | 1:B:597:PHE:N | 2.79 | 0.50 |
| 1:A:721:LYS:HG3 | 1:A:722:GLN:N | 2.25 | 0.50 |
| 1:B:407:TYR:HD1 | 1:B:407:TYR:C | 2.14 | 0.50 |
| 1:B:474:VAL:HG22 | 1:B:558:TYR:HB2 | 1.93 | 0.50 |
| 1:B:269:LEU:HD21 | 1:B:300:ILE:HG12 | 1.93 | 0.50 |
| 1:A:320:ALA:O | 1:A:324:LEU:HB2 | 2.12 | 0.50 |
| 1:A:261:PHE:CD1 | 1:A:350:TYR:CD2 | 3.00 | 0.50 |
| 1:B:658:GLU:HG2 | 1:B:681:LYS:HD3 | 1.93 | 0.49 |
| 1:A:721:LYS:O | 1:A:725:ILE:HD12 | 2.12 | 0.49 |
| 1:B:236:GLU:O | 1:B:304:LEU:N | 2.46 | 0.49 |
| 1:A:151:ARG:HD3 | 1:A:460:PHE:O | 2.13 | 0.49 |
| 1:A:353:PRO:HB2 | 1:A:355:PHE:CD1 | 2.48 | 0.49 |
| 1:A:721:LYS:HG3 | 1:A:722:GLN:H | 1.78 | 0.49 |

*Continued on next page...*

*Continued from previous page...*

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:558:TYR:N | 1:A:558:TYR:CD1 | 2.81 | 0.48 |
| 1:B:674:PHE:HB2 | 1:B:680:ASN:CG | 2.34 | 0.48 |
| 1:A:547:ARG:HD2 | 1:A:670:TYR:CE2 | 2.48 | 0.48 |
| 1:A:714:ILE:HA | 1:A:717:PHE:CE1 | 2.47 | 0.48 |
| 1:B:245:ILE:HD11 | 1:B:380:HIS:CD2 | 2.48 | 0.48 |
| 1:B:353:PRO:HB2 | 1:B:355:PHE:CD1 | 2.48 | 0.48 |
| 1:B:407:TYR:C | 1:B:407:TYR:CD1 | 2.87 | 0.48 |
| 1:B:681:LYS:O | 1:B:685:ILE:HG12 | 2.13 | 0.48 |
| 1:B:301:LEU:HD13 | 1:B:352:LEU:HD11 | 1.93 | 0.48 |
| 1:B:439:GLU:N | 1:B:439:GLU:OE1 | 2.45 | 0.48 |
| 1:A:575:TYR:CZ | 1:A:700:ASN:HB2 | 2.48 | 0.48 |
| 1:A:402:LEU:HD11 | 1:A:515:ARG:NH2 | 2.19 | 0.48 |
| 1:B:417:PHE:CG | 1:B:418:GLY:N | 2.80 | 0.48 |
| 1:A:253:GLU:HB2 | 1:A:356:TRP:HH2 | 1.79 | 0.48 |
| 1:A:134:LYS:HG2 | 1:A:135:CYS:N | 2.21 | 0.48 |
| 1:B:686:MET:O | 1:B:690:VAL:HG22 | 2.13 | 0.48 |
| 1:A:361:SER:HB2 | 1:A:382:ASN:HB2 | 1.96 | 0.47 |
| 1:A:392:LYS:N | 1:A:394:VAL:HG12 | 2.29 | 0.47 |
| 1:A:395:GLU:HA | 1:A:398:ARG:CG | 2.44 | 0.47 |
| 1:A:639:PHE:CE2 | 1:A:643:ARG:HD2 | 2.49 | 0.47 |
| 1:B:518:GLN:HA | 1:B:524:MET:SD | 2.53 | 0.47 |
| 1:A:199:TYR:N | 1:A:199:TYR:CD1 | 2.82 | 0.47 |
| 1:B:687:GLU:OE1 | 1:B:742:TYR:OH | 2.29 | 0.47 |
| 1:A:341:VAL:O | 1:A:345:ASN:N | 2.48 | 0.47 |
| 1:A:417:PHE:CB | 1:B:374:SER:HB2 | 2.45 | 0.47 |
| 1:B:205:LYS:HE2 | 1:B:216:TYR:OH | 2.15 | 0.47 |
| 1:B:212:PRO:HD2 | 1:B:324:LEU:HD11 | 1.97 | 0.47 |
| 1:B:228:THR:HG21 | 1:B:312:TRP:HD1 | 1.79 | 0.47 |
| 1:B:288:TRP:CZ2 | 1:B:330:THR:HG22 | 2.50 | 0.47 |
| 1:B:514:LEU:O | 1:B:518:GLN:HG3 | 2.15 | 0.47 |
| 1:A:576:LEU:O | 1:A:580:VAL:HG13 | 2.15 | 0.46 |
| 1:B:358:VAL:HG21 | 1:B:376:LEU:HG | 1.97 | 0.46 |
| 1:A:222:LEU:HD22 | 1:A:333:ALA:HB1 | 1.97 | 0.46 |
| 1:A:224:LYS:O | 1:A:227:LEU:HG | 2.15 | 0.46 |
| 1:A:358:VAL:HG21 | 1:A:376:LEU:HG | 1.97 | 0.46 |
| 1:B:150:SER:O | 1:B:154:VAL:HG23 | 2.15 | 0.46 |
| 1:B:138:ILE:HG23 | 1:B:255:TRP:CE3 | 2.50 | 0.46 |
| 1:B:589:LYS:HG2 | 1:B:693:TYR:CD2 | 2.51 | 0.46 |
| 1:A:172:LEU:HD23 | 1:A:196:VAL:HG13 | 1.98 | 0.46 |
| 1:B:649:TYR:O | 1:B:649:TYR:HD1 | 1.98 | 0.46 |
| 1:B:312:TRP:HZ3 | 1:B:341:VAL:HG11 | 1.81 | 0.46 |

*Continued on next page...*

*Continued from previous page...*

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:147:TYR:CE1 | 1:A:177:ILE:HG21 | 2.51 | 0.46 |
| 1:B:232:PRO:HB2 | 1:B:234:ASN:OD1 | 2.16 | 0.46 |
| 1:A:577:ARG:O | 1:A:580:VAL:HG22 | 2.17 | 0.45 |
| 1:A:654:GLU:O | 1:A:657:PHE:HB2 | 2.16 | 0.45 |
| 1:A:405:LEU:HD13 | 1:A:511:GLN:CG | 2.46 | 0.45 |
| 1:B:353:PRO:HD2 | 1:B:356:TRP:CD1 | 2.49 | 0.45 |
| 1:B:407:TYR:CD1 | 1:B:408:ASP:N | 2.81 | 0.45 |
| 1:B:134:LYS:CG | 1:B:135:CYS:H | 2.28 | 0.45 |
| 1:B:295:TYR:CE2 | 1:B:349:VAL:HG21 | 2.51 | 0.45 |
| 1:A:398:ARG:O | 1:A:402:LEU:HD23 | 2.17 | 0.45 |
| 1:A:543:VAL:O | 1:A:547:ARG:HG3 | 2.16 | 0.45 |
| 1:A:686:MET:HG3 | 1:A:749:TYR:HD2 | 1.81 | 0.45 |
| 1:A:343:LYS:NZ | 5:A:905:HOH:O | 2.49 | 0.45 |
| 1:A:702:TYR:C | 1:A:702:TYR:HD1 | 2.21 | 0.44 |
| 1:B:150:SER:O | 1:B:153:VAL:HG12 | 2.17 | 0.44 |
| 1:B:413:ARG:NH2 | 1:B:455:ARG:HG3 | 2.29 | 0.44 |
| 1:B:442:LEU:HD12 | 1:B:442:LEU:H | 1.82 | 0.44 |
| 1:B:601:ARG:HH21 | 3:B:803:PO4:P | 2.41 | 0.44 |
| 1:A:213:ASN:OD1 | 1:A:330:THR:OG1 | 2.34 | 0.44 |
| 1:B:623:PHE:N | 1:B:623:PHE:CD1 | 2.85 | 0.44 |
| 1:B:592:MET:HB3 | 1:B:698:LEU:HD11 | 1.99 | 0.44 |
| 1:A:147:TYR:HD1 | 1:A:147:TYR:H | 1.65 | 0.44 |
| 1:A:321:GLU:O | 1:A:325:MET:HG3 | 2.18 | 0.44 |
| 1:B:599:THR:HG1 | 1:B:603:ARG:NH1 | 2.11 | 0.44 |
| 1:B:573:TYR:CZ | 1:B:577:ARG:HD2 | 2.52 | 0.44 |
| 1:B:683:ALA:HB1 | 1:B:734:PHE:CZ | 2.53 | 0.44 |
| 1:B:548:ASN:HB3 | 1:B:552:LYS:HE2 | 1.99 | 0.43 |
| 1:A:674:PHE:HB3 | 1:A:680:ASN:OD1 | 2.18 | 0.43 |
| 1:B:597:PHE:N | 1:B:597:PHE:HD1 | 2.15 | 0.43 |
| 1:A:249:THR:HG21 | 1:A:377:LYS:HG2 | 1.99 | 0.43 |
| 1:B:303:LEU:HD13 | 1:B:306:LYS:HD2 | 2.00 | 0.43 |
| 1:A:174:ALA:HB1 | 1:A:178:ALA:HB3 | 1.99 | 0.43 |
| 1:A:235:LEU:O | 1:A:308:ARG:NH2 | 2.52 | 0.43 |
| 1:A:408:ASP:HA | 1:A:507:ASP:OD2 | 2.18 | 0.43 |
| 1:B:474:VAL:HA | 1:B:558:TYR:O | 2.18 | 0.43 |
| 1:A:464:GLU:HB3 | 1:A:527:HIS:ND1 | 2.34 | 0.43 |
| 1:A:270:VAL:HG22 | 1:A:352:LEU:HB2 | 2.01 | 0.43 |
| 1:B:355:PHE:HE1 | 1:B:356:TRP:NE1 | 2.15 | 0.43 |
| 1:A:357:ASN:O | 1:A:359:GLN:NE2 | 2.52 | 0.43 |
| 1:A:592:MET:O | 1:A:661:VAL:HA | 2.19 | 0.43 |
| 1:A:597:PHE:N | 1:A:597:PHE:HD1 | 2.16 | 0.42 |

*Continued on next page...*

*Continued from previous page...*

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:617:LEU:HD13 | 1:A:639:PHE:CZ | 2.54 | 0.42 |
| 1:A:542:PRO:O | 1:A:546:LEU:HD23 | 2.19 | 0.42 |
| 1:B:304:LEU:HB3 | 1:B:308:ARG:NH1 | 2.33 | 0.42 |
| 1:B:523:LEU:HD22 | 1:B:531:TYR:OH | 2.19 | 0.42 |
| 1:B:560:PHE:HB2 | 1:B:662:VAL:HG22 | 2.01 | 0.42 |
| 1:B:542:PRO:HB2 | 1:B:545:LEU:HB3 | 2.01 | 0.42 |
| 1:B:636:PRO:HB2 | 1:B:657:PHE:CE1 | 2.55 | 0.42 |
| 1:A:638:ASN:HD22 | 1:A:641:LYS:HG2 | 1.83 | 0.42 |
| 1:A:748:LYS:HG3 | 1:A:749:TYR:CD1 | 2.54 | 0.42 |
| 1:B:289:PRO:HB2 | 1:B:343:LYS:HD3 | 2.01 | 0.42 |
| 1:B:199:TYR:CD1 | 1:B:199:TYR:N | 2.87 | 0.42 |
| 1:B:569:MET:HG3 | 1:B:702:TYR:CE1 | 2.55 | 0.42 |
| 1:B:599:THR:O | 1:B:707:PRO:HG3 | 2.19 | 0.42 |
| 1:B:630:TRP:CE3 | 1:B:632:LYS:HB2 | 2.54 | 0.42 |
| 1:A:245:ILE:HD11 | 1:A:380:HIS:CD2 | 2.55 | 0.42 |
| 1:B:566:PHE:CD2 | 1:B:703:MET:HG3 | 2.55 | 0.42 |
| 1:A:590:LYS:HG2 | 1:A:694:GLU:HB2 | 2.02 | 0.42 |
| 1:B:214:LYS:NZ | 1:B:215:HIS:CD2 | 2.88 | 0.41 |
| 1:B:253:GLU:HB2 | 1:B:356:TRP:HH2 | 1.85 | 0.41 |
| 1:B:701:ALA:O | 1:B:702:TYR:HB3 | 2.20 | 0.41 |
| 1:A:483:ASP:O | 1:A:484:ARG:HD2 | 2.21 | 0.41 |
| 1:A:702:TYR:CD1 | 1:A:702:TYR:C | 2.93 | 0.41 |
| 1:B:447:ARG:O | 1:B:450:ARG:HB3 | 2.18 | 0.41 |
| 1:A:749:TYR:N | 1:A:749:TYR:HD1 | 2.17 | 0.41 |
| 1:B:350:TYR:C | 1:B:350:TYR:CD1 | 2.94 | 0.41 |
| 1:A:235:LEU:HD21 | 1:A:238:VAL:CG1 | 2.50 | 0.41 |
| 1:A:334:ASP:OD1 | 1:A:334:ASP:N | 2.54 | 0.41 |
| 1:A:569:MET:SD | 1:A:701:ALA:HA | 2.61 | 0.41 |
| 1:B:189:TRP:CE2 | 1:B:455:ARG:HD3 | 2.55 | 0.41 |
| 1:B:606:PHE:CE1 | 1:B:704:ILE:HD12 | 2.56 | 0.41 |
| 1:B:649:TYR:CD1 | 1:B:697:VAL:HB | 2.55 | 0.41 |
| 1:B:679:TRP:HB3 | 1:B:731:LYS:NZ | 2.35 | 0.41 |
| 1:B:304:LEU:O | 1:B:308:ARG:HG3 | 2.21 | 0.40 |
| 1:B:566:PHE:HE2 | 1:B:596:ALA:HB1 | 1.86 | 0.40 |
| 1:B:590:LYS:HG2 | 1:B:694:GLU:HB3 | 2.03 | 0.40 |
| 1:B:674:PHE:O | 1:B:680:ASN:ND2 | 2.47 | 0.40 |
| 1:A:595:PRO:O | 1:A:702:TYR:HA | 2.21 | 0.40 |
| 1:B:161:LEU:HA | 1:B:164:ARG:HG2 | 2.02 | 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 | 569/619 (92%) | 554 (97%) | 15 (3%) | 0 | 100 100 |
| 1 | B | 575/619 (93%) | 556 (97%) | 18 (3%) | 1 (0%) | 47 69 |
| All | All | 1144/1238 (92%) | 1110 (97%) | 33 (3%) | 1 (0%) | 51 74 |

All (1) Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | B | 424 | ASP |

### 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 | 523/557 (94%) | 501 (96%) | 22 (4%) | 30 53 |
| 1 | B | 525/557 (94%) | 510 (97%) | 15 (3%) | 42 67 |
| All | All | 1048/1114 (94%) | 1011 (96%) | 37 (4%) | 36 60 |

All (37) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 147 | TYR |
| 1 | A | 164 | ARG |
| 1 | A | 199 | TYR |
| 1 | A | 215 | HIS |
| 1 | A | 295 | TYR |

*Continued on next page...*

*Continued from previous page...*

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 296 | ASN |
| 1 | A | 350 | TYR |
| 1 | A | 355 | PHE |
| 1 | A | 432 | LYS |
| 1 | A | 446 | PHE |
| 1 | A | 448 | ARG |
| 1 | A | 558 | TYR |
| 1 | A | 563 | ASP |
| 1 | A | 566 | PHE |
| 1 | A | 597 | PHE |
| 1 | A | 637 | THR |
| 1 | A | 643 | ARG |
| 1 | A | 660 | TYR |
| 1 | A | 693 | TYR |
| 1 | A | 702 | TYR |
| 1 | A | 717 | PHE |
| 1 | A | 749 | TYR |
| 1 | B | 199 | TYR |
| 1 | B | 295 | TYR |
| 1 | B | 350 | TYR |
| 1 | B | 355 | PHE |
| 1 | B | 374 | SER |
| 1 | B | 407 | TYR |
| 1 | B | 414 | ARG |
| 1 | B | 432 | LYS |
| 1 | B | 448 | ARG |
| 1 | B | 531 | TYR |
| 1 | B | 597 | PHE |
| 1 | B | 623 | PHE |
| 1 | B | 649 | TYR |
| 1 | B | 672 | ARG |
| 1 | B | 702 | TYR |

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

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | B | 215 | HIS |
| 1 | B | 380 | HIS |
| 1 | B | 705 | HIS |
| 1 | B | 722 | GLN |

### 5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry (i)

Of 7 ligands modelled in this entry, 2 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 | $\#\|Z\| > 2$ |
| 2 | NAG | B | 801 | 1 | 14,14,15 | 0.27 | 0 | 17,19,21 | 0.40 | 0 |
| 3 | PO4 | B | 803 | - | 4,4,4 | 0.91 | 0 | 6,6,6 | 0.48 | 0 |
| 3 | PO4 | B | 802 | - | 4,4,4 | 0.88 | 0 | 6,6,6 | 0.57 | 0 |
| 3 | PO4 | A | 802 | - | 4,4,4 | 0.99 | 0 | 6,6,6 | 0.57 | 0 |
| 2 | NAG | A | 801 | 1 | 14,14,15 | 0.34 | 0 | 17,19,21 | 0.53 | 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 |
|---|---|---|---|---|---|---|---|
| 2 | NAG | A | 801 | 1 | - | 2/6/23/26 | 0/1/1/1 |
| 2 | NAG | B | 801 | 1 | - | 3/6/23/26 | 0/1/1/1 |

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (5) torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 2 | A | 801 | NAG | C4-C5-C6-O6 |
| 2 | A | 801 | NAG | O5-C5-C6-O6 |
| 2 | B | 801 | NAG | C8-C7-N2-C2 |
| 2 | B | 801 | NAG | O7-C7-N2-C2 |
| 2 | B | 801 | NAG | O5-C5-C6-O6 |

There are no ring outliers.

1 monomer is involved in 1 short contact:

| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|---|---|---|---|---|---|
| 3 | B | 803 | PO4 | 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 | 583/619 (94%) | 0.28 | 16 (2%) | 54 | 49 | 50, 74, 130, 195 | 0 |
| 1 | B | 587/619 (94%) | 0.38 | 22 (3%) | 41 | 35 | 55, 82, 136, 187 | 0 |
| All | All | 1170/1238 (94%) | 0.33 | 38 (3%) | 47 | 41 | 50, 79, 133, 195 | 0 |

All (38) RSRZ outliers are listed below:

| Mol | Chain | Res | Type | RSRZ |
|---|---|---|---|---|
| 1 | B | 679 | TRP | 5.4 |
| 1 | A | 425 | VAL | 5.2 |
| 1 | B | 418 | GLY | 4.6 |
| 1 | A | 262 | LYS | 4.1 |
| 1 | B | 469 | ALA | 3.9 |
| 1 | A | 467 | PRO | 3.8 |
| 1 | A | 281 | LEU | 3.7 |
| 1 | B | 434 | LEU | 3.6 |
| 1 | B | 440 | ASP | 3.4 |
| 1 | A | 422 | GLU | 3.3 |
| 1 | A | 350 | TYR | 3.0 |
| 1 | B | 439 | GLU | 2.9 |
| 1 | B | 466 | GLU | 2.9 |
| 1 | A | 418 | GLY | 2.9 |
| 1 | A | 215 | HIS | 2.8 |
| 1 | B | 680 | ASN | 2.7 |
| 1 | B | 422 | GLU | 2.6 |
| 1 | B | 267 | LEU | 2.6 |
| 1 | A | 332 | LEU | 2.6 |
| 1 | B | 429 | ASN | 2.5 |
| 1 | B | 750 | LEU | 2.5 |
| 1 | A | 349 | VAL | 2.5 |
| 1 | B | 419 | CYS | 2.4 |
| 1 | B | 723 | TYR | 2.4 |

*Continued on next page...*

*Continued from previous page...*

| Mol | Chain | Res | Type | RSRZ |
|---|---|---|---|---|
| 1 | A | 265 | GLN | 2.4 |
| 1 | B | 265 | GLN | 2.3 |
| 1 | A | 469 | ALA | 2.3 |
| 1 | A | 348 | LEU | 2.3 |
| 1 | B | 266 | VAL | 2.3 |
| 1 | B | 721 | LYS | 2.3 |
| 1 | B | 261 | PHE | 2.3 |
| 1 | B | 400 | LEU | 2.3 |
| 1 | B | 425 | VAL | 2.2 |
| 1 | A | 521 | GLU | 2.2 |
| 1 | A | 303 | LEU | 2.2 |
| 1 | B | 360 | LEU | 2.1 |
| 1 | B | 235 | LEU | 2.1 |
| 1 | A | 264 | GLN | 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 |
|---|---|---|---|---|---|---|---|---|
| 4 | MN | A | 803 | 1/1 | 0.70 | 0.23 | 123,123,123,123 | 0 |
| 2 | NAG | A | 801 | 14/15 | 0.71 | 0.23 | 86,102,119,128 | 0 |
| 4 | MN | B | 804 | 1/1 | 0.77 | 0.29 | 122,122,122,122 | 0 |
| 2 | NAG | B | 801 | 14/15 | 0.81 | 0.33 | 104,117,131,136 | 0 |
| 3 | PO4 | B | 803 | 5/5 | 0.90 | 0.19 | 102,103,144,148 | 5 |
| 3 | PO4 | B | 802 | 5/5 | 0.93 | 0.16 | 83,83,100,112 | 0 |
| 3 | PO4 | A | 802 | 5/5 | 0.94 | 0.14 | 83,90,93,100 | 0 |

## 6.5 Other polymers (i)

There are no such residues in this entry.