# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 03:16 AM UTC

| | | |
|---|---|---|
| PDB ID | : | 9I9S / pdb_00009i9s |
| Title | : | Room temperature structure of PBP2a at the LCLS |
| Authors | : | Grieco, A.; Botha, S.; Martin-Garcia, J.M. |
| Deposited on | : | 2025-02-07 |
| Resolution | : | 2.80 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.

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

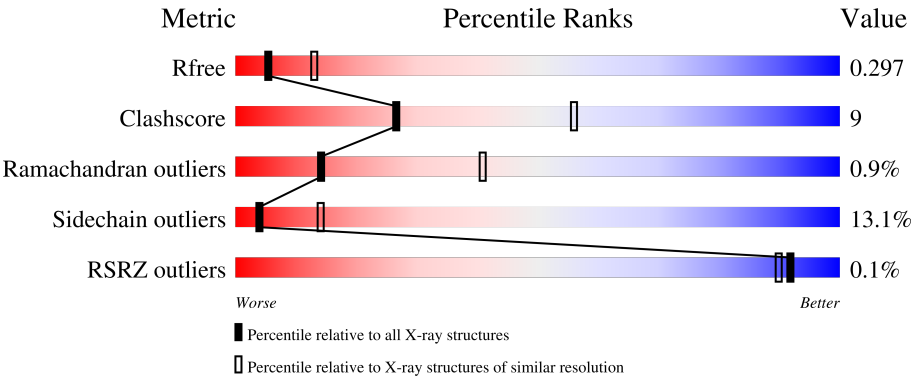
| | | |
|---|---|---|
| MolProbity | : | 4-5-2 with Phenix2.0 |
| Xtriage (Phenix) | : | 2.0 |
| EDS | : | 3.0 |
| Percentile statistics | : | 20250101.v01 (using entries in the PDB archive January 1st 2025) |
| CCP4 | : | 9.0.010 (Gargrove) |
| Density-Fitness | : | 1.0.12 |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.49 |

# 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 2.80 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)) |
|---|---|---|
| $R_{free}$ | 180053 | 3866 (2.80-2.80) |
| Clashscore | 190562 | 4276 (2.80-2.80) |
| Ramachandran outliers | 187476 | 4196 (2.80-2.80) |
| Sidechain outliers | 187428 | 4198 (2.80-2.80) |
| RSRZ outliers | 180081 | 3869 (2.80-2.80) |

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 | 643 | 69% 27% . |
| 1 | B | 643 | 71% 25% . . |

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 |
|---|---|---|---|---|---|---|---|
| 3 | CL | B | 704 | - | - | X | - |
| 3 | CL | B | 706 | - | - | X | - |

# 2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 10400 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 MecA.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 643 | Total | C | N | O | S | 0 | 1 | 0 |
| | | | 5169 | 3257 | 873 | 1023 | 16 | | | |
| 1 | B | 638 | Total | C | N | O | S | 0 | 1 | 0 |
| | | | 5135 | 3237 | 866 | 1017 | 15 | | | |

There are 12 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| A | 246 | GLU | GLY | conflict | UNP B3VQ68 |
| A | 664 | TYR | - | expression tag | UNP B3VQ68 |
| A | 665 | ASP | - | expression tag | UNP B3VQ68 |
| A | 666 | ILE | - | expression tag | UNP B3VQ68 |
| A | 667 | ASP | - | expression tag | UNP B3VQ68 |
| A | 668 | GLU | - | expression tag | UNP B3VQ68 |
| B | 246 | GLU | GLY | conflict | UNP B3VQ68 |
| B | 664 | TYR | - | expression tag | UNP B3VQ68 |
| B | 665 | ASP | - | expression tag | UNP B3VQ68 |
| B | 666 | ILE | - | expression tag | UNP B3VQ68 |
| B | 667 | ASP | - | expression tag | UNP B3VQ68 |
| B | 668 | GLU | - | expression tag | UNP B3VQ68 |

- Molecule 2 is CADMIUM ION (CCD ID: CD) (formula: Cd).

| Mol | Chain | Residues | Atoms | | ZeroOcc | AltConf |
|---|---|---|---|---|---|---|
| 2 | A | 4 | Total | Cd | 0 | 0 |
| | | | 4 | 4 | | |
| 2 | B | 3 | Total | Cd | 0 | 0 |
| | | | 3 | 3 | | |

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 3 | A | 2 | Total Cl<br>2 2 | 0 | 0 |
| 3 | B | 5 | Total Cl<br>5 5 | 0 | 0 |

- Molecule 4 is water.

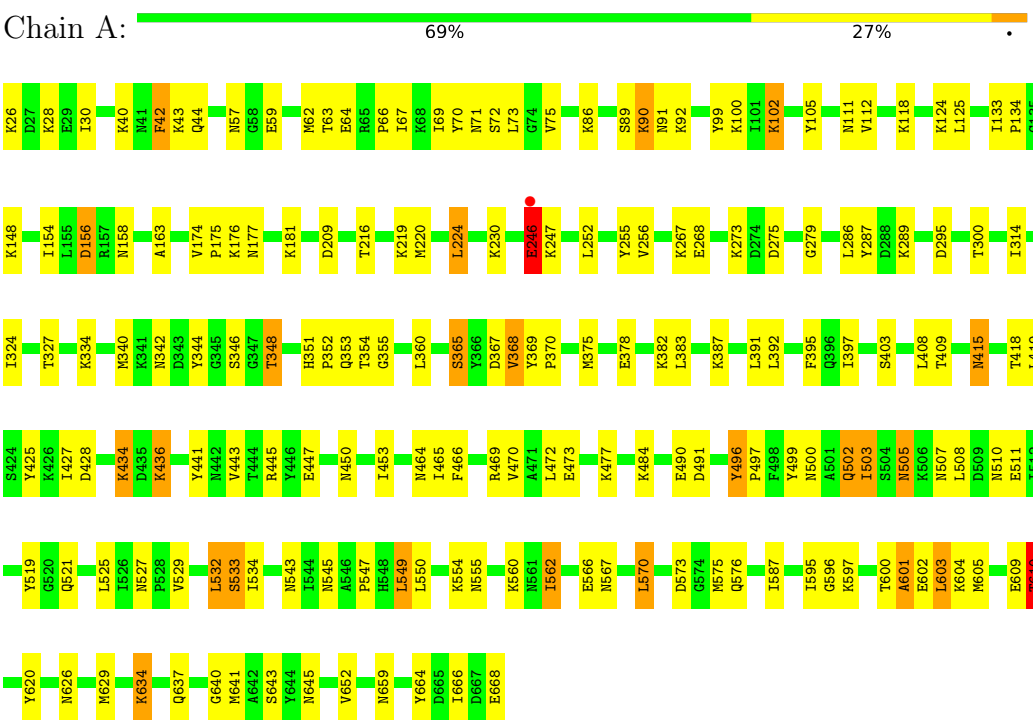
| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 4 | A | 43 | Total O<br>43 43 | 0 | 0 |
| 4 | B | 39 | Total O<br>39 39 | 0 | 0 |

# 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.

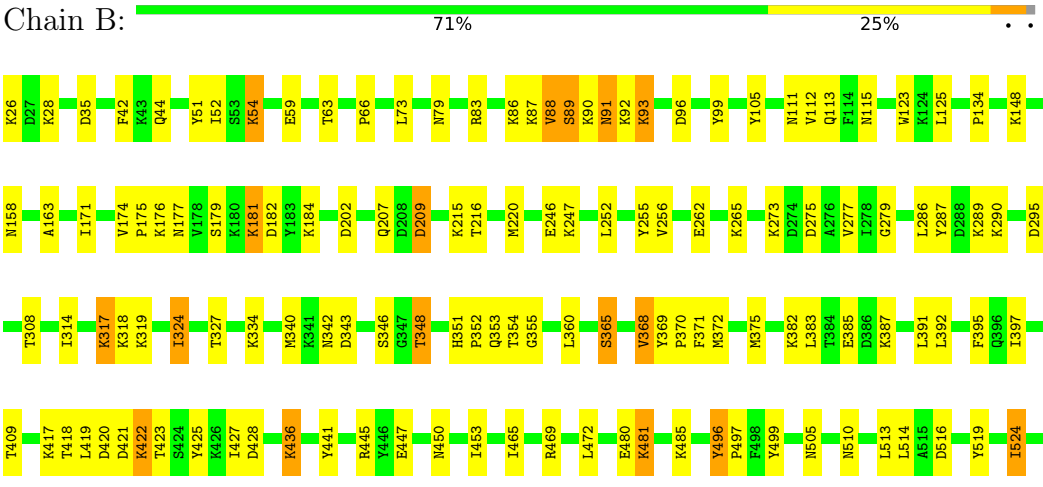
• Molecule 1: MecA

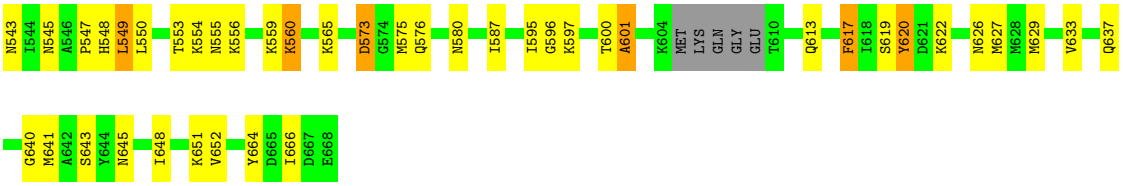
Chain A:




• Molecule 1: MecA

Chain B:




N543
I544
N545
A546
P547
H548
L549
L550
T553
K554
N555
K556
K559
K560
K565
D573
G574
M575
Q576
N580
I587
I595
G596
K597
T600
A601
K604
MET
LYS
GLN
GLY
GLU
T610
Q613
F617
I618
S619
Y620
D621
K622
N626
M627
M628
M629
V633
Q637
G640
M641
A642
S643
Y644
N645
I648
K651
V652
Y664
D665
I666
D667
E668

# 4 Data and refinement statistics (i)

| Property | Value | Source |
|---|---|---|
| Space group | P 21 21 21 | Depositor |
| Cell constants<br>a, b, c, $\alpha$, $\beta$, $\gamma$ | 81.40Å 107.70Å 185.20Å<br>90.00° 90.00° 90.00° | Depositor |
| Resolution (Å) | 35.27 – 2.80<br>35.27 – 2.80 | Depositor<br>EDS |
| % Data completeness<br>(in resolution range) | 99.0 (35.27-2.80)<br>99.0 (35.27-2.80) | Depositor<br>EDS |
| $R_{merge}$ | (Not available) | Depositor |
| $R_{sym}$ | (Not available) | Depositor |
| $< I/\sigma(I) >$ [1] | 1.01 (at 2.81Å) | Xtriage |
| Refinement program | REFMAC 5.8.0425 | Depositor |
| R, $R_{free}$ | 0.220 , 0.290<br>0.230 , 0.297 | Depositor<br>DCC |
| $R_{free}$ test set | 2040 reflections (4.99%) | wwPDB-VP |
| Wilson B-factor (Å$^2$) | 78.7 | Xtriage |
| Anisotropy | 0.150 | Xtriage |
| Bulk solvent $k_{sol}$(e/Å$^3$), $B_{sol}$(Å$^2$) | 0.27 , 78.4 | EDS |
| L-test for twinning[2] | $< \|L\| > = 0.45$, $< L^2 > = 0.28$ | Xtriage |
| Estimated twinning fraction | No twinning to report. | Xtriage |
| $F_o$,$F_c$ correlation | 0.96 | EDS |
| Total number of atoms | 10400 | wwPDB-VP |
| Average B, all atoms (Å$^2$) | 105.0 | wwPDB-VP |

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.74% 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: CD, CL

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 | 0.49 | 0/5255 | 1.06 | 2/7065 (0.0%) |
| 1 | B | 0.49 | 0/5220 | 1.06 | 6/7018 (0.1%) |
| All | All | 0.49 | 0/10475 | 1.06 | 8/14083 (0.1%) |

There are no bond length outliers.

All (8) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | B | 182 | ASP | CA-CB-CG | 6.38 | 118.98 | 112.60 |
| 1 | A | 573 | ASP | CA-CB-CG | 6.13 | 118.73 | 112.60 |
| 1 | B | 209 | ASP | CA-CB-CG | 5.33 | 117.93 | 112.60 |
| 1 | B | 436 | LYS | CB-CA-C | 5.19 | 119.69 | 109.72 |
| 1 | B | 308 | THR | CA-CB-OG1 | -5.11 | 101.94 | 109.60 |
| 1 | A | 209 | ASP | CA-CB-CG | 5.08 | 117.69 | 112.60 |
| 1 | B | 202 | ASP | CA-CB-CG | 5.02 | 117.62 | 112.60 |
| 1 | B | 420 | ASP | CA-CB-CG | 5.00 | 117.60 | 112.60 |

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 | 5169 | 0 | 5165 | 97 | 0 |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|---|---|---|---|---|---|---|
| 1 | B | 5135 | 0 | 5131 | 94 | 0 |
| 2 | A | 4 | 0 | 0 | 0 | 0 |
| 2 | B | 3 | 0 | 0 | 0 | 0 |
| 3 | A | 2 | 0 | 0 | 1 | 0 |
| 3 | B | 5 | 0 | 0 | 9 | 0 |
| 4 | A | 43 | 0 | 0 | 9 | 0 |
| 4 | B | 39 | 0 | 0 | 9 | 0 |
| All | All | 10400 | 0 | 10296 | 191 | 0 |

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 9.

All (191) 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:30:ILE:HA | 4:A:808:HOH:O | 1.38 | 1.18 |
| 1:B:35:ASP:HB3 | 4:B:801:HOH:O | 1.54 | 1.07 |
| 1:B:548:HIS:CE1 | 3:B:704:CL:CL | 2.61 | 0.91 |
| 1:A:268:GLU:OE2 | 4:A:801:HOH:O | 1.94 | 0.85 |
| 1:A:219:LYS:HG2 | 1:A:220:MET:H | 1.45 | 0.82 |
| 1:A:562:ILE:HB | 4:A:818:HOH:O | 1.88 | 0.74 |
| 1:A:219:LYS:HG2 | 1:A:220:MET:N | 2.02 | 0.74 |
| 1:A:133:ILE:HB | 1:A:136:MET:HE2 | 1.68 | 0.73 |
| 1:B:220:MET:HA | 1:B:220:MET:HE2 | 1.71 | 0.72 |
| 1:B:275:ASP:HB2 | 4:B:806:HOH:O | 1.91 | 0.70 |
| 1:B:327:THR:OG1 | 1:B:549:LEU:HA | 1.93 | 0.69 |
| 1:A:71:ASN:OD1 | 1:A:72:SER:N | 2.26 | 0.68 |
| 1:A:219:LYS:CG | 1:A:220:MET:H | 2.06 | 0.68 |
| 1:A:327:THR:OG1 | 1:A:549:LEU:HA | 1.93 | 0.67 |
| 1:A:352:PRO:HD2 | 1:A:353:GLN:OE1 | 1.94 | 0.67 |
| 1:A:441:TYR:OH | 1:A:516:ASP:OD1 | 2.13 | 0.67 |
| 1:B:441:TYR:OH | 1:B:516:ASP:OD1 | 2.12 | 0.67 |
| 1:A:434:LYS:NZ | 1:A:511:GLU:OE1 | 2.28 | 0.66 |
| 1:B:255:TYR:HB3 | 1:B:368:VAL:HG12 | 1.78 | 0.66 |
| 1:B:352:PRO:HD2 | 1:B:353:GLN:OE1 | 1.96 | 0.66 |
| 1:B:524:ILE:H | 1:B:524:ILE:HD13 | 1.61 | 0.66 |
| 1:B:303:ASP:HA | 4:B:804:HOH:O | 1.97 | 0.65 |
| 1:A:30:ILE:HG12 | 4:A:808:HOH:O | 1.96 | 0.64 |
| 1:B:627:MET:CE | 1:B:629:MET:HB2 | 2.28 | 0.64 |
| 1:B:51:TYR:HA | 1:B:54:LYS:HD2 | 1.79 | 0.63 |
| 1:B:88:VAL:O | 1:B:89:SER:C | 2.42 | 0.63 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:B:554:LYS:C | 3:B:704:CL:CL | 2.78 | 0.63 |
| 1:A:445:ARG:HA | 1:A:464:ASN:HD22 | 1.63 | 0.63 |
| 1:A:425:TYR:OH | 1:A:473:GLU:HG3 | 1.99 | 0.63 |
| 1:B:627:MET:HE1 | 1:B:629:MET:HB2 | 1.81 | 0.62 |
| 1:A:255:TYR:HB3 | 1:A:368:VAL:HG12 | 1.80 | 0.62 |
| 1:B:154:ILE:HB | 1:B:163:ALA:HB3 | 1.81 | 0.62 |
| 1:A:30:ILE:CG1 | 4:A:808:HOH:O | 2.48 | 0.61 |
| 1:B:555:ASN:N | 3:B:704:CL:CL | 2.71 | 0.61 |
| 1:A:154:ILE:HB | 1:A:163:ALA:HB3 | 1.83 | 0.60 |
| 1:A:567:ASN:HA | 1:A:570:LEU:HD23 | 1.84 | 0.60 |
| 1:B:171:ILE:HD11 | 1:B:220:MET:HE1 | 1.85 | 0.59 |
| 1:B:88:VAL:O | 1:B:89:SER:O | 2.20 | 0.59 |
| 1:B:553:THR:O | 3:B:704:CL:CL | 2.59 | 0.57 |
| 1:B:369:TYR:HB2 | 1:B:370:PRO:HD3 | 1.85 | 0.57 |
| 1:A:42:PHE:HB2 | 1:A:63:THR:HG22 | 1.86 | 0.57 |
| 1:A:224:LEU:C | 1:A:224:LEU:HD12 | 2.29 | 0.57 |
| 1:B:99:TYR:CD2 | 1:B:134:PRO:HG3 | 2.40 | 0.56 |
| 1:A:99:TYR:CD2 | 1:A:134:PRO:HG3 | 2.41 | 0.56 |
| 1:B:427:ILE:HD12 | 1:B:453:ILE:HG13 | 1.88 | 0.55 |
| 1:A:369:TYR:HB2 | 1:A:370:PRO:HD3 | 1.88 | 0.54 |
| 1:A:422:LYS:O | 1:A:423:THR:C | 2.51 | 0.54 |
| 1:B:422:LYS:O | 1:B:423:THR:C | 2.51 | 0.54 |
| 1:A:516:ASP:HA | 1:A:519:TYR:CE1 | 2.43 | 0.54 |
| 1:A:89:SER:OG | 1:A:90:LYS:N | 2.41 | 0.53 |
| 1:B:35:ASP:CB | 4:B:801:HOH:O | 2.28 | 0.53 |
| 1:A:427:ILE:HD12 | 1:A:453:ILE:HG13 | 1.90 | 0.53 |
| 1:B:580:ASN:ND2 | 4:B:803:HOH:O | 2.42 | 0.53 |
| 1:B:548:HIS:CD2 | 3:B:704:CL:CL | 2.93 | 0.52 |
| 1:A:428:ASP:HA | 1:A:450:ASN:OD1 | 2.10 | 0.52 |
| 1:B:428:ASP:HA | 1:B:450:ASN:OD1 | 2.10 | 0.52 |
| 1:B:371:PHE:CE1 | 1:B:375:MET:HE1 | 2.45 | 0.51 |
| 1:B:516:ASP:HA | 1:B:519:TYR:CE1 | 2.45 | 0.51 |
| 1:B:555:ASN:HA | 3:B:704:CL:CL | 2.48 | 0.51 |
| 1:B:481:LYS:O | 1:B:481:LYS:HD3 | 2.10 | 0.51 |
| 1:A:603:LEU:HD23 | 1:A:612:ARG:HB2 | 1.93 | 0.51 |
| 1:A:397:ILE:HA | 1:A:499:TYR:HD2 | 1.76 | 0.50 |
| 1:B:207:GLN:HG3 | 3:B:706:CL:CL | 2.49 | 0.50 |
| 1:A:89:SER:HB3 | 1:A:92:LYS:HB2 | 1.94 | 0.50 |
| 1:A:102:LYS:HG3 | 4:A:827:HOH:O | 2.12 | 0.50 |
| 1:B:469:ARG:HG2 | 4:B:809:HOH:O | 2.12 | 0.49 |
| 1:A:105:TYR:O | 1:A:314:ILE:HG21 | 2.11 | 0.49 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:360:LEU:HD22 | 1:A:395:PHE:CD1 | 2.47 | 0.49 |
| 1:B:397:ILE:HA | 1:B:499:TYR:HD2 | 1.78 | 0.49 |
| 1:B:587:ILE:CD1 | 1:B:617:PHE:CE1 | 2.96 | 0.48 |
| 1:A:30:ILE:CA | 4:A:808:HOH:O | 2.20 | 0.48 |
| 1:A:75:VAL:HG23 | 1:A:75:VAL:O | 2.13 | 0.48 |
| 1:B:90:LYS:HG2 | 4:B:833:HOH:O | 2.12 | 0.48 |
| 1:A:600:THR:O | 1:A:601:ALA:HB2 | 2.14 | 0.48 |
| 1:A:286:LEU:HD21 | 1:A:497:PRO:HD3 | 1.96 | 0.48 |
| 1:B:286:LEU:HD21 | 1:B:497:PRO:HD3 | 1.96 | 0.48 |
| 1:B:369:TYR:HD1 | 1:B:372:MET:HE2 | 1.79 | 0.48 |
| 1:B:317:LYS:HA | 1:B:317:LYS:HE3 | 1.96 | 0.47 |
| 1:B:360:LEU:HD22 | 1:B:395:PHE:CD1 | 2.49 | 0.47 |
| 1:A:156:ASP:OD1 | 1:A:158:ASN:N | 2.41 | 0.47 |
| 1:A:344:TYR:CE1 | 1:A:634:LYS:HE3 | 2.48 | 0.47 |
| 1:A:370:PRO:HB2 | 1:A:375:MET:HE2 | 1.96 | 0.47 |
| 1:A:496:TYR:CD1 | 1:A:497:PRO:HD2 | 2.50 | 0.47 |
| 1:A:555:ASN:CG | 3:A:705:CL:CL | 2.83 | 0.47 |
| 1:A:340:MET:HE1 | 1:A:346:SER:O | 2.15 | 0.47 |
| 1:B:600:THR:O | 1:B:601:ALA:HB2 | 2.13 | 0.47 |
| 1:A:640:GLY:O | 1:A:643:SER:N | 2.46 | 0.47 |
| 1:B:496:TYR:CD1 | 1:B:497:PRO:HD2 | 2.50 | 0.46 |
| 1:A:351:HIS:HD2 | 1:A:354:THR:OG1 | 1.97 | 0.46 |
| 1:A:355:GLY:O | 1:A:547:PRO:HA | 2.14 | 0.46 |
| 1:B:617:PHE:HB2 | 1:B:645:ASN:HB3 | 1.95 | 0.46 |
| 1:B:355:GLY:O | 1:B:547:PRO:HA | 2.13 | 0.46 |
| 1:A:247:LYS:O | 1:A:365:SER:OG | 2.34 | 0.46 |
| 1:B:35:ASP:OD1 | 1:B:83:ARG:NH1 | 2.46 | 0.46 |
| 1:A:464:ASN:OD1 | 1:A:519:TYR:CD2 | 2.68 | 0.46 |
| 1:B:255:TYR:HB3 | 1:B:368:VAL:CG1 | 2.44 | 0.46 |
| 1:A:491:ASP:HA | 1:A:500:ASN:OD1 | 2.16 | 0.46 |
| 1:B:351:HIS:HD2 | 1:B:354:THR:OG1 | 1.98 | 0.46 |
| 1:B:407:ILE:HG12 | 1:B:597:LYS:HD3 | 1.97 | 0.46 |
| 1:B:445:ARG:HD3 | 1:B:465:ILE:HD12 | 1.98 | 0.46 |
| 1:A:464:ASN:OD1 | 1:A:519:TYR:HD2 | 1.99 | 0.46 |
| 1:B:613:GLN:N | 1:B:637:GLN:OE1 | 2.48 | 0.46 |
| 1:B:105:TYR:O | 1:B:314:ILE:HG21 | 2.16 | 0.46 |
| 1:B:207:GLN:CG | 3:B:706:CL:CL | 3.01 | 0.46 |
| 1:B:256:VAL:HA | 1:B:279:GLY:HA2 | 1.98 | 0.46 |
| 1:A:502:GLN:HE22 | 1:A:525:LEU:HD12 | 1.80 | 0.45 |
| 1:A:640:GLY:O | 1:A:641:MET:C | 2.59 | 0.45 |
| 1:A:256:VAL:HA | 1:A:279:GLY:HA2 | 1.99 | 0.45 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:408:LEU:HD22 | 1:A:534:ILE:HG21 | 1.97 | 0.45 |
| 1:B:383:LEU:HB3 | 1:B:391:LEU:HD13 | 1.98 | 0.45 |
| 1:A:421:ASP:OD1 | 1:A:421:ASP:N | 2.50 | 0.45 |
| 1:A:610:THR:O | 1:A:611:GLY:C | 2.59 | 0.45 |
| 1:A:613:GLN:N | 1:A:637:GLN:OE1 | 2.50 | 0.45 |
| 1:B:575:MET:HE3 | 1:B:596:GLY:HA2 | 1.98 | 0.45 |
| 1:A:348:THR:HB | 1:A:532:LEU:HD12 | 1.99 | 0.45 |
| 1:A:443:VAL:O | 1:A:465:ILE:CD1 | 2.65 | 0.45 |
| 1:A:322:LYS:HA | 1:A:322:LYS:HE3 | 1.99 | 0.45 |
| 1:B:156:ASP:OD1 | 1:B:158:ASN:N | 2.41 | 0.45 |
| 1:A:287:TYR:CZ | 1:A:550:LEU:HD11 | 2.52 | 0.45 |
| 1:A:246:GLU:OE2 | 1:A:367:ASP:OD1 | 2.35 | 0.44 |
| 1:A:469:ARG:O | 1:A:472:LEU:N | 2.50 | 0.44 |
| 1:A:496:TYR:CD1 | 1:A:496:TYR:C | 2.95 | 0.44 |
| 1:B:247:LYS:O | 1:B:365:SER:OG | 2.34 | 0.44 |
| 1:B:469:ARG:O | 1:B:472:LEU:N | 2.50 | 0.44 |
| 1:B:640:GLY:O | 1:B:643:SER:N | 2.46 | 0.44 |
| 1:A:543:ASN:OD1 | 1:A:560:LYS:HA | 2.18 | 0.44 |
| 1:B:640:GLY:O | 1:B:641:MET:C | 2.60 | 0.44 |
| 1:B:59:GLU:O | 1:B:63:THR:OG1 | 2.33 | 0.44 |
| 1:B:148:LYS:HA | 1:B:295:ASP:OD1 | 2.18 | 0.44 |
| 1:A:575:MET:HE3 | 1:A:596:GLY:HA2 | 1.99 | 0.44 |
| 1:A:255:TYR:HB3 | 1:A:368:VAL:CG1 | 2.46 | 0.44 |
| 1:B:496:TYR:CD1 | 1:B:496:TYR:C | 2.95 | 0.44 |
| 1:B:90:LYS:HG3 | 1:B:91:ASN:OD1 | 2.18 | 0.43 |
| 1:B:343:ASP:HB3 | 1:B:633:VAL:HG13 | 2.00 | 0.43 |
| 1:A:71:ASN:OD1 | 1:A:71:ASN:C | 2.61 | 0.43 |
| 1:A:91:ASN:ND2 | 1:A:118:LYS:HB2 | 2.33 | 0.43 |
| 1:A:224:LEU:HD12 | 1:A:224:LEU:O | 2.18 | 0.43 |
| 1:B:176:LYS:CE | 1:B:209:ASP:HB3 | 2.49 | 0.43 |
| 1:A:59:GLU:O | 1:A:63:THR:OG1 | 2.33 | 0.43 |
| 1:B:96:ASP:OD1 | 1:B:113:GLN:HG2 | 2.18 | 0.43 |
| 1:B:287:TYR:CZ | 1:B:550:LEU:HD11 | 2.52 | 0.43 |
| 1:B:348:THR:HB | 1:B:532:LEU:HD12 | 2.00 | 0.43 |
| 1:A:629:MET:SD | 1:A:652:VAL:HG11 | 2.58 | 0.43 |
| 1:A:273:LYS:HB3 | 1:A:275:ASP:OD1 | 2.17 | 0.43 |
| 1:A:415:ASN:C | 1:A:415:ASN:HD22 | 2.26 | 0.43 |
| 1:B:543:ASN:OD1 | 1:B:560:LYS:HA | 2.19 | 0.43 |
| 1:B:262:GLU:HA | 1:B:265:LYS:HD2 | 2.01 | 0.43 |
| 1:A:503:ILE:H | 1:A:503:ILE:HD13 | 1.84 | 0.43 |
| 1:A:612:ARG:C | 1:A:637:GLN:OE1 | 2.61 | 0.42 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:659:ASN:ND2 | 4:A:805:HOH:O | 2.52 | 0.42 |
| 1:B:340:MET:HE1 | 1:B:346:SER:O | 2.18 | 0.42 |
| 1:A:529:VAL:O | 1:A:533:SER:OG | 2.36 | 0.42 |
| 1:B:42:PHE:CE1 | 1:B:66:PRO:HB3 | 2.54 | 0.42 |
| 1:B:273:LYS:HB3 | 1:B:275:ASP:OD1 | 2.19 | 0.42 |
| 1:A:555:ASN:N | 4:A:803:HOH:O | 2.52 | 0.42 |
| 1:B:371:PHE:CD1 | 1:B:375:MET:HE1 | 2.55 | 0.42 |
| 1:A:70:TYR:CD2 | 1:A:75:VAL:HG21 | 2.54 | 0.42 |
| 1:A:436:LYS:H | 1:A:436:LYS:HD3 | 1.85 | 0.42 |
| 1:B:93:LYS:HD2 | 1:B:123:TRP:CZ2 | 2.55 | 0.42 |
| 1:B:99:TYR:HD2 | 1:B:112:VAL:HG11 | 1.85 | 0.42 |
| 1:A:148:LYS:HA | 1:A:295:ASP:OD1 | 2.19 | 0.42 |
| 1:B:421:ASP:OD1 | 1:B:421:ASP:N | 2.52 | 0.42 |
| 1:B:573:ASP:O | 1:B:576:GLN:HB3 | 2.19 | 0.42 |
| 1:A:645:ASN:HD22 | 1:A:645:ASN:H | 1.68 | 0.42 |
| 1:B:626:ASN:ND2 | 1:B:664:TYR:O | 2.53 | 0.42 |
| 1:B:35:ASP:OD2 | 4:B:801:HOH:O | 2.22 | 0.42 |
| 1:B:174:VAL:O | 1:B:175:PRO:C | 2.62 | 0.42 |
| 1:B:369:TYR:HD1 | 1:B:372:MET:CE | 2.32 | 0.42 |
| 1:B:629:MET:SD | 1:B:652:VAL:HG11 | 2.60 | 0.42 |
| 1:A:99:TYR:HD2 | 1:A:112:VAL:HG11 | 1.83 | 0.42 |
| 1:A:383:LEU:HB3 | 1:A:391:LEU:HD13 | 2.03 | 0.41 |
| 1:A:603:LEU:HD11 | 1:A:614:ILE:HD11 | 2.01 | 0.41 |
| 1:A:42:PHE:CZ | 1:A:67:ILE:HG12 | 2.55 | 0.41 |
| 1:A:626:ASN:ND2 | 1:A:664:TYR:O | 2.53 | 0.41 |
| 1:B:351:HIS:CD2 | 1:B:354:THR:OG1 | 2.73 | 0.41 |
| 1:B:425:TYR:CB | 1:B:469:ARG:NH2 | 2.83 | 0.41 |
| 1:B:580:ASN:CB | 4:B:803:HOH:O | 2.69 | 0.41 |
| 1:A:521:GLN:HE22 | 1:A:602:GLU:HB2 | 1.85 | 0.41 |
| 1:A:505:ASN:C | 1:A:507:ASN:N | 2.78 | 0.41 |
| 1:A:466:PHE:O | 1:A:470:VAL:HG23 | 2.20 | 0.41 |
| 1:B:179:SER:OG | 1:B:181:LYS:O | 2.36 | 0.41 |
| 1:B:553:THR:C | 3:B:704:CL:CL | 3.01 | 0.41 |
| 1:B:619:SER:O | 1:B:620:TYR:HB3 | 2.20 | 0.41 |
| 1:B:327:THR:HG23 | 1:B:549:LEU:C | 2.46 | 0.41 |
| 1:A:327:THR:HG23 | 1:A:549:LEU:C | 2.46 | 0.40 |
| 1:A:174:VAL:O | 1:A:175:PRO:C | 2.64 | 0.40 |
| 1:B:154:ILE:HG12 | 1:B:324:ILE:HG22 | 2.03 | 0.40 |
| 1:A:57:ASN:HB2 | 1:A:62:MET:HE2 | 2.03 | 0.40 |
| 1:A:613:GLN:CD | 1:A:641:MET:HE1 | 2.47 | 0.40 |
| 1:B:360:LEU:O | 1:B:395:PHE:CE2 | 2.75 | 0.40 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:174:VAL:O | 1:A:176:LYS:N | 2.55 | 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 | 642/643 (100%) | 569 (89%) | 67 (10%) | 6 (1%) | 14 | 41 |
| 1 | B | 635/643 (99%) | 571 (90%) | 58 (9%) | 6 (1%) | 14 | 41 |
| All | All | 1277/1286 (99%) | 1140 (89%) | 125 (10%) | 12 (1%) | 14 | 41 |

All (12) Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | B | 89 | SER |
| 1 | A | 605 | MET |
| 1 | A | 610 | THR |
| 1 | A | 246 | GLU |
| 1 | B | 246 | GLU |
| 1 | A | 601 | ALA |
| 1 | A | 620 | TYR |
| 1 | B | 601 | ALA |
| 1 | B | 617 | PHE |
| 1 | B | 620 | TYR |
| 1 | A | 611 | GLY |
| 1 | B | 648 | ILE |

### 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 | 574/574 (100%) | 494 (86%) | 80 (14%) | 3 | 12 |
| 1 | B | 571/574 (100%) | 501 (88%) | 70 (12%) | 4 | 16 |
| All | All | 1145/1148 (100%) | 995 (87%) | 150 (13%) | 4 | 14 |

All (150) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 26 | LYS |
| 1 | A | 28 | LYS |
| 1 | A | 40 | LYS |
| 1 | A | 42 | PHE |
| 1 | A | 43 | LYS |
| 1 | A | 44 | GLN |
| 1 | A | 64 | GLU |
| 1 | A | 66 | PRO |
| 1 | A | 69 | ILE |
| 1 | A | 73 | LEU |
| 1 | A | 86 | LYS |
| 1 | A | 90 | LYS |
| 1 | A | 100 | LYS |
| 1 | A | 102 | LYS |
| 1 | A | 111 | ASN |
| 1 | A | 124 | LYS |
| 1 | A | 125 | LEU |
| 1 | A | 138 | LYS |
| 1 | A | 156 | ASP |
| 1 | A | 177 | ASN |
| 1 | A | 181 | LYS |
| 1 | A | 216 | THR |
| 1 | A | 224 | LEU |
| 1 | A | 230 | LYS |
| 1 | A | 246 | GLU |
| 1 | A | 252 | LEU |
| 1 | A | 267 | LYS |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 289 | LYS |
| 1 | A | 300 | THR |
| 1 | A | 318 | LYS |
| 1 | A | 324 | ILE |
| 1 | A | 334 | LYS |
| 1 | A | 342 | ASN |
| 1 | A | 348 | THR |
| 1 | A | 365 | SER |
| 1 | A | 368 | VAL |
| 1 | A | 378 | GLU |
| 1 | A | 382 | LYS |
| 1 | A | 387 | LYS |
| 1 | A | 392 | LEU |
| 1 | A | 403 | SER |
| 1 | A | 409 | THR |
| 1 | A | 415 | ASN |
| 1 | A | 418 | THR |
| 1 | A | 419 | LEU |
| 1 | A | 421 | ASP |
| 1 | A | 434 | LYS |
| 1 | A | 436 | LYS |
| 1 | A | 447 | GLU |
| 1 | A | 477 | LYS |
| 1 | A | 484 | LYS |
| 1 | A | 490 | GLU |
| 1 | A | 496 | TYR |
| 1 | A | 502 | GLN |
| 1 | A | 503 | ILE |
| 1 | A | 505 | ASN |
| 1 | A | 508 | LEU |
| 1 | A | 510 | ASN |
| 1 | A | 513 | LEU |
| 1 | A | 514 | LEU |
| 1 | A | 527 | ASN |
| 1 | A | 532 | LEU |
| 1 | A | 533 | SER |
| 1 | A | 545 | ASN |
| 1 | A | 549 | LEU |
| 1 | A | 554 | LYS |
| 1 | A | 562 | ILE |
| 1 | A | 566 | GLU |
| 1 | A | 570 | LEU |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 576 | GLN |
| 1 | A | 587 | ILE |
| 1 | A | 595 | ILE |
| 1 | A | 597 | LYS |
| 1 | A | 603 | LEU |
| 1 | A | 604 | LYS |
| 1 | A | 609 | GLU |
| 1 | A | 610 | THR |
| 1 | A | 634 | LYS |
| 1 | A | 666 | ILE |
| 1 | A | 668 | GLU |
| 1 | B | 26 | LYS |
| 1 | B | 28 | LYS |
| 1 | B | 44 | GLN |
| 1 | B | 52 | ILE |
| 1 | B | 54 | LYS |
| 1 | B | 73 | LEU |
| 1 | B | 79 | ASN |
| 1 | B | 86 | LYS |
| 1 | B | 87 | LYS |
| 1 | B | 88 | VAL |
| 1 | B | 91 | ASN |
| 1 | B | 92 | LYS |
| 1 | B | 93 | LYS |
| 1 | B | 111 | ASN |
| 1 | B | 115 | ASN |
| 1 | B | 125 | LEU |
| 1 | B | 156 | ASP |
| 1 | B | 177 | ASN |
| 1 | B | 181 | LYS |
| 1 | B | 184 | LYS |
| 1 | B | 215 | LYS |
| 1 | B | 216 | THR |
| 1 | B | 252 | LEU |
| 1 | B | 277 | VAL |
| 1 | B | 289 | LYS |
| 1 | B | 290 | LYS |
| 1 | B | 300 | THR |
| 1 | B | 317 | LYS |
| 1 | B | 318 | LYS |
| 1 | B | 319 | LYS |
| 1 | B | 324 | ILE |

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| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | B | 334 | LYS |
| 1 | B | 342 | ASN |
| 1 | B | 348 | THR |
| 1 | B | 365 | SER |
| 1 | B | 368 | VAL |
| 1 | B | 382 | LYS |
| 1 | B | 385 | GLU |
| 1 | B | 387 | LYS |
| 1 | B | 392 | LEU |
| 1 | B | 403 | SER |
| 1 | B | 409 | THR |
| 1 | B | 417 | LYS |
| 1 | B | 418 | THR |
| 1 | B | 419 | LEU |
| 1 | B | 422 | LYS |
| 1 | B | 436 | LYS |
| 1 | B | 447 | GLU |
| 1 | B | 480 | GLU |
| 1 | B | 481 | LYS |
| 1 | B | 485 | LYS |
| 1 | B | 496 | TYR |
| 1 | B | 505 | ASN |
| 1 | B | 510 | ASN |
| 1 | B | 513 | LEU |
| 1 | B | 514 | LEU |
| 1 | B | 524 | ILE |
| 1 | B | 527 | ASN |
| 1 | B | 532 | LEU |
| 1 | B | 545 | ASN |
| 1 | B | 549 | LEU |
| 1 | B | 556 | LYS |
| 1 | B | 559 | LYS |
| 1 | B | 560 | LYS |
| 1 | B | 565 | LYS |
| 1 | B | 573 | ASP |
| 1 | B | 595 | ILE |
| 1 | B | 622 | LYS |
| 1 | B | 651 | LYS |
| 1 | B | 666 | ILE |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (27) such sidechains are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 32 | ASN |
| 1 | A | 79 | ASN |
| 1 | A | 91 | ASN |
| 1 | A | 129 | HIS |
| 1 | A | 342 | ASN |
| 1 | A | 351 | HIS |
| 1 | A | 393 | ASN |
| 1 | A | 442 | ASN |
| 1 | A | 464 | ASN |
| 1 | A | 502 | GLN |
| 1 | A | 505 | ASN |
| 1 | A | 507 | ASN |
| 1 | A | 521 | GLN |
| 1 | A | 567 | ASN |
| 1 | A | 576 | GLN |
| 1 | A | 577 | GLN |
| 1 | A | 613 | GLN |
| 1 | A | 645 | ASN |
| 1 | B | 32 | ASN |
| 1 | B | 79 | ASN |
| 1 | B | 342 | ASN |
| 1 | B | 351 | HIS |
| 1 | B | 393 | ASN |
| 1 | B | 502 | GLN |
| 1 | B | 521 | GLN |
| 1 | B | 567 | ASN |
| 1 | B | 645 | ASN |

### 5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry

Of 14 ligands modelled in this entry, 14 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

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 | 643/643 (100%) | -0.67 | 1 (0%) 91 88 | 39, 98, 162, 237 | 1 (0%) |
| 1 | B | 638/643 (99%) | -0.70 | 0 100 100 | 42, 102, 156, 210 | 1 (0%) |
| All | All | 1281/1286 (99%) | -0.68 | 1 (0%) 92 90 | 39, 100, 160, 237 | 2 (0%) |

All (1) RSRZ outliers are listed below:

| Mol | Chain | Res | Type | RSRZ |
|---|---|---|---|---|
| 1 | A | 246 | GLU | 2.4 |

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

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

## 6.3 Carbohydrates

There are no oligosaccharides in this entry.

## 6.4 Ligands

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 | CL | A | 705 | 1/1 | 0.81 | 0.10 | 247,247,247,247 | 0 |
| 3 | CL | B | 704 | 1/1 | 0.84 | 0.10 | 294,294,294,294 | 0 |
| 3 | CL | B | 705 | 1/1 | 0.87 | 0.05 | 96,96,96,96 | 0 |
| 2 | CD | A | 704 | 1/1 | 0.91 | 0.11 | 198,198,198,198 | 0 |

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| Mol | Type | Chain | Res | Atoms | RSCC | RSR | B-factors(Å$^2$) | Q<0.9 |
|---|---|---|---|---|---|---|---|---|
| 3 | CL | A | 706 | 1/1 | 0.98 | 0.14 | 37,37,37,37 | 0 |
| 2 | CD | B | 701 | 1/1 | 0.98 | 0.06 | 154,154,154,154 | 0 |
| 2 | CD | A | 701 | 1/1 | 0.98 | 0.08 | 178,178,178,178 | 0 |
| 3 | CL | B | 708 | 1/1 | 0.98 | 0.05 | 39,39,39,39 | 0 |
| 3 | CL | B | 707 | 1/1 | 0.99 | 0.08 | 54,54,54,54 | 0 |
| 3 | CL | B | 706 | 1/1 | 0.99 | 0.03 | 61,61,61,61 | 0 |
| 2 | CD | B | 703 | 1/1 | 1.00 | 0.02 | 65,65,65,65 | 0 |
| 2 | CD | A | 702 | 1/1 | 1.00 | 0.04 | 81,81,81,81 | 0 |
| 2 | CD | A | 703 | 1/1 | 1.00 | 0.01 | 63,63,63,63 | 0 |
| 2 | CD | B | 702 | 1/1 | 1.00 | 0.02 | 55,55,55,55 | 0 |

## 6.5 Other polymers (i)

There are no such residues in this entry.