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

Nov 11, 2023 – 08:09 am GMT

| | | |
|---|---|---|
| PDB ID | : | 5NIJ |
| Title | : | Crystal structure of arabidopsis thaliana legumain isoform gamma in two-chain activation state |
| Authors | : | Zauner, F.B.; Dall, E.; Brandstetter, H. |
| Deposited on | : | 2017-03-24 |
| Resolution | : | 2.75 Å(reported) |

This is a wwPDB X-ray Structure Validation Summary 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.

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

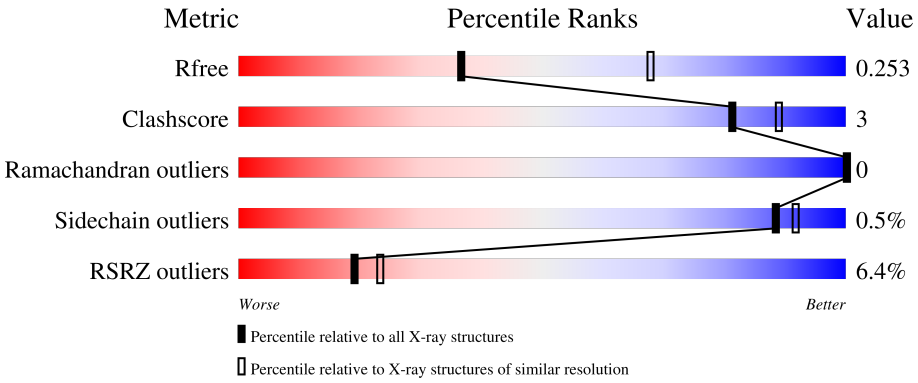
| | | |
|---|---|---|
| MolProbity | : | 4.02b-467 |
| Mogul | : | 1.8.4, CSD as541be (2020) |
| Xtriage (Phenix) | : | 1.13 |
| EDS | : | 2.36 |
| Percentile statistics | : | 20191225.v01 (using entries in the PDB archive December 25th 2019) |
| Refmac | : | 5.8.0158 |
| CCP4 | : | 7.0.044 (Gargrove) |
| 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 2.75 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 | 1235 (2.78-2.74) |
| Clashscore | 141614 | 1277 (2.78-2.74) |
| Ramachandran outliers | 138981 | 1257 (2.78-2.74) |
| Sidechain outliers | 138945 | 1257 (2.78-2.74) |
| RSRZ outliers | 127900 | 1207 (2.78-2.74) |

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 | 454 | 2% 87% 7% 6% |
| 1 | B | 454 | 6% 92% · 6% |
| 1 | C | 454 | 8% 89% 6% 6% |
| 1 | D | 454 | 8% 87% 7% 6% |

## 2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 13474 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 Vacuolar-processing enzyme gamma-isozyme.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 429 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3342 | 2099 | 578 | 646 | 19 | | | |
| 1 | B | 428 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3338 | 2099 | 575 | 645 | 19 | | | |
| 1 | C | 429 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3342 | 2099 | 578 | 646 | 19 | | | |
| 1 | D | 428 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 3335 | 2094 | 577 | 645 | 19 | | | |

There are 60 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| A | 41 | SER | - | expression tag | UNP Q39119 |
| A | 42 | LEU | - | expression tag | UNP Q39119 |
| A | 43 | GLU | - | expression tag | UNP Q39119 |
| A | 44 | HIS | - | expression tag | UNP Q39119 |
| A | 45 | HIS | - | expression tag | UNP Q39119 |
| A | 46 | HIS | - | expression tag | UNP Q39119 |
| A | 47 | HIS | - | expression tag | UNP Q39119 |
| A | 48 | HIS | - | expression tag | UNP Q39119 |
| A | 49 | HIS | - | expression tag | UNP Q39119 |
| A | 50 | GLU | - | expression tag | UNP Q39119 |
| A | 51 | ASN | - | expression tag | UNP Q39119 |
| A | 52 | LEU | - | expression tag | UNP Q39119 |
| A | 53 | TYR | - | expression tag | UNP Q39119 |
| A | 54 | PHE | - | expression tag | UNP Q39119 |
| A | 55 | GLN | - | expression tag | UNP Q39119 |
| B | 41 | SER | - | expression tag | UNP Q39119 |
| B | 42 | LEU | - | expression tag | UNP Q39119 |
| B | 43 | GLU | - | expression tag | UNP Q39119 |
| B | 44 | HIS | - | expression tag | UNP Q39119 |
| B | 45 | HIS | - | expression tag | UNP Q39119 |
| B | 46 | HIS | - | expression tag | UNP Q39119 |

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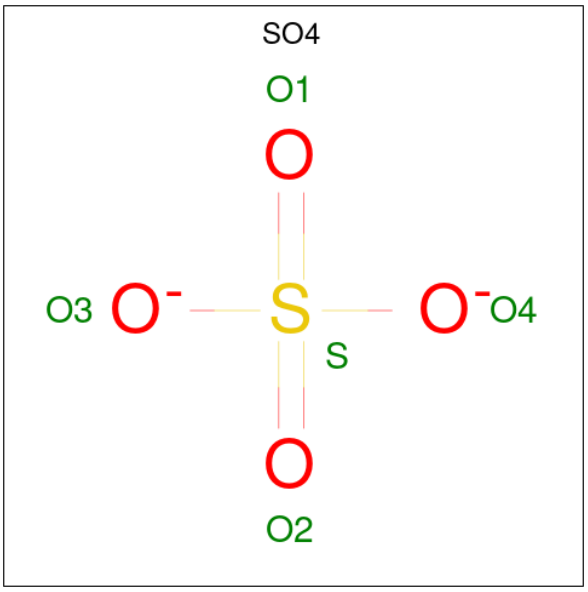
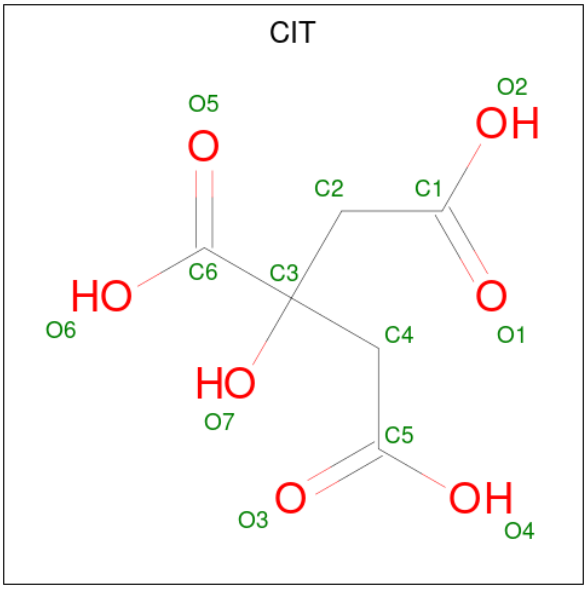
| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| B | 47 | HIS | - | expression tag | UNP Q39119 |
| B | 48 | HIS | - | expression tag | UNP Q39119 |
| B | 49 | HIS | - | expression tag | UNP Q39119 |
| B | 50 | GLU | - | expression tag | UNP Q39119 |
| B | 51 | ASN | - | expression tag | UNP Q39119 |
| B | 52 | LEU | - | expression tag | UNP Q39119 |
| B | 53 | TYR | - | expression tag | UNP Q39119 |
| B | 54 | PHE | - | expression tag | UNP Q39119 |
| B | 55 | GLN | - | expression tag | UNP Q39119 |
| C | 41 | SER | - | expression tag | UNP Q39119 |
| C | 42 | LEU | - | expression tag | UNP Q39119 |
| C | 43 | GLU | - | expression tag | UNP Q39119 |
| C | 44 | HIS | - | expression tag | UNP Q39119 |
| C | 45 | HIS | - | expression tag | UNP Q39119 |
| C | 46 | HIS | - | expression tag | UNP Q39119 |
| C | 47 | HIS | - | expression tag | UNP Q39119 |
| C | 48 | HIS | - | expression tag | UNP Q39119 |
| C | 49 | HIS | - | expression tag | UNP Q39119 |
| C | 50 | GLU | - | expression tag | UNP Q39119 |
| C | 51 | ASN | - | expression tag | UNP Q39119 |
| C | 52 | LEU | - | expression tag | UNP Q39119 |
| C | 53 | TYR | - | expression tag | UNP Q39119 |
| C | 54 | PHE | - | expression tag | UNP Q39119 |
| C | 55 | GLN | - | expression tag | UNP Q39119 |
| D | 41 | SER | - | expression tag | UNP Q39119 |
| D | 42 | LEU | - | expression tag | UNP Q39119 |
| D | 43 | GLU | - | expression tag | UNP Q39119 |
| D | 44 | HIS | - | expression tag | UNP Q39119 |
| D | 45 | HIS | - | expression tag | UNP Q39119 |
| D | 46 | HIS | - | expression tag | UNP Q39119 |
| D | 47 | HIS | - | expression tag | UNP Q39119 |
| D | 48 | HIS | - | expression tag | UNP Q39119 |
| D | 49 | HIS | - | expression tag | UNP Q39119 |
| D | 50 | GLU | - | expression tag | UNP Q39119 |
| D | 51 | ASN | - | expression tag | UNP Q39119 |
| D | 52 | LEU | - | expression tag | UNP Q39119 |
| D | 53 | TYR | - | expression tag | UNP Q39119 |
| D | 54 | PHE | - | expression tag | UNP Q39119 |
| D | 55 | GLN | - | expression tag | UNP Q39119 |

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: $O_4S$).




| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 2 | A | 1 | Total O S<br>5 4 1 | 0 | 0 |
| 2 | B | 1 | Total O S<br>5 4 1 | 0 | 0 |
| 2 | B | 1 | Total O S<br>5 4 1 | 0 | 0 |
| 2 | C | 1 | Total O S<br>5 4 1 | 0 | 0 |
| 2 | D | 1 | Total O S<br>5 4 1 | 0 | 0 |

- Molecule 3 is CITRIC ACID (three-letter code: CIT) (formula: $C_6H_8O_7$).



| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 3 | A | 1 | Total C O<br>13 6 7 | 0 | 0 |

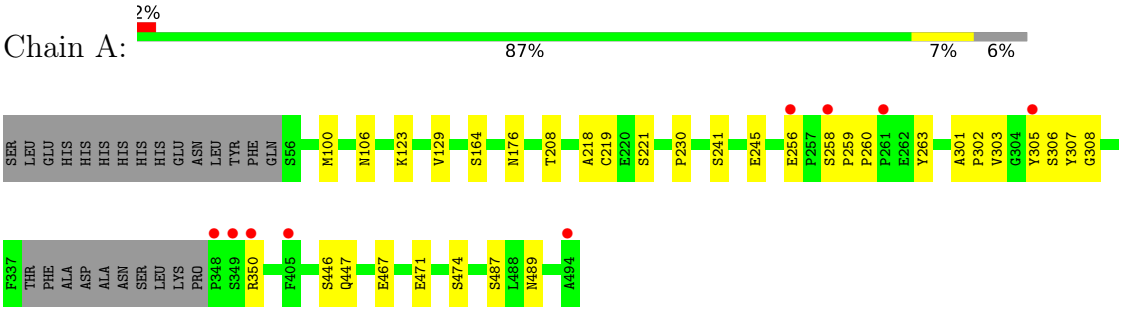
- Molecule 4 is water.

| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 4 | A | 33 | Total O<br>33 33 | 0 | 0 |
| 4 | B | 29 | Total O<br>29 29 | 0 | 0 |
| 4 | C | 12 | Total O<br>12 12 | 0 | 0 |
| 4 | D | 5 | Total O<br>5 5 | 0 | 0 |

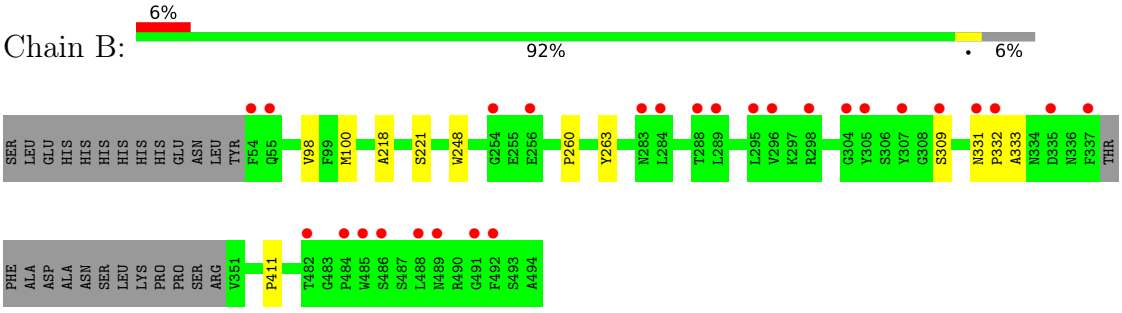
# 3 Residue-property plots (i)

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.

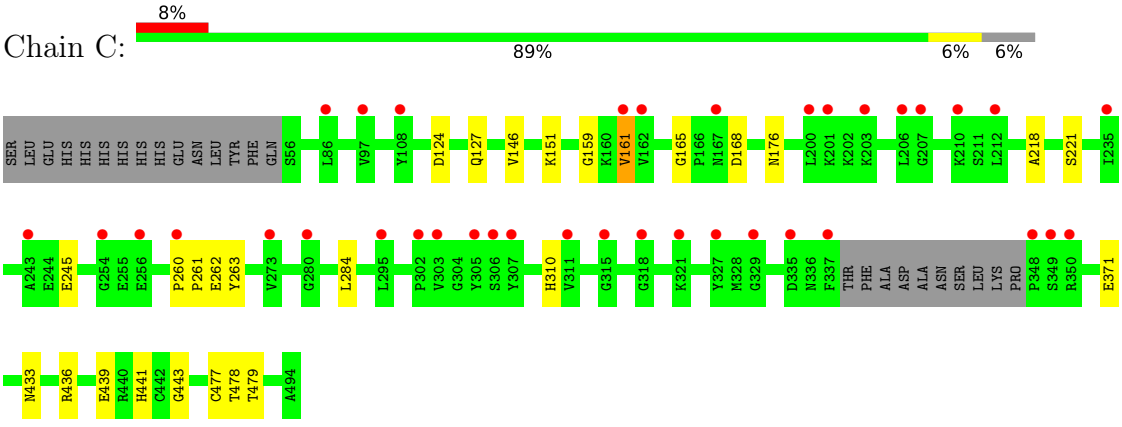
• Molecule 1: Vacuolar-processing enzyme gamma-isozyme




• Molecule 1: Vacuolar-processing enzyme gamma-isozyme

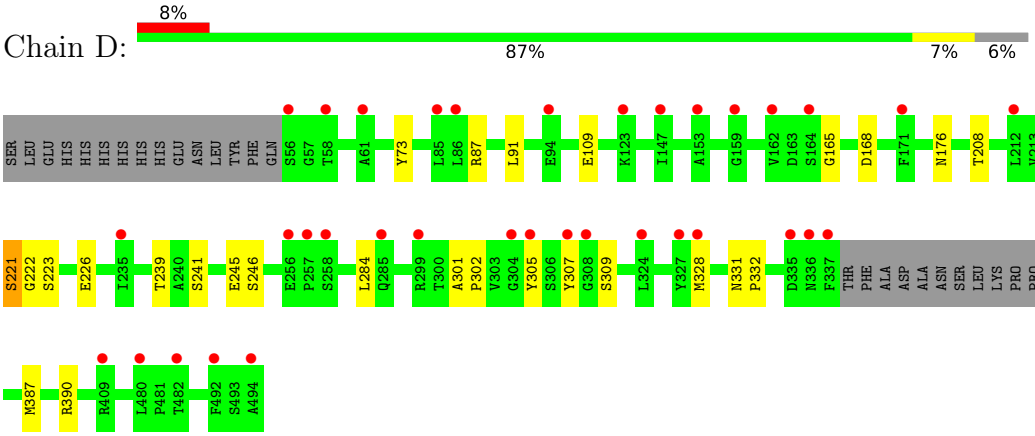



• Molecule 1: Vacuolar-processing enzyme gamma-isozyme




• Molecule 1: Vacuolar-processing enzyme gamma-isozyme

Chain D:


8%
87%
7%
6%
SER LEU GLU HIS HIS HIS HIS HIS HIS GLU ASN LEU TYR PHE GLN S56 G57 T58 A61 Y73 L85 L86 R87 L91 E94 E109 K123 I147 A153 G159 V162 D163 S164 G165 D168 F171 N176 T208 L212 V213 F214 C219 E220
S221 G222 S223 E226 I235 T239 A240 S241 E245 S246 E256 P257 S258 L284 Q285 R299 T300 A301 P302 V303 G304 Y305 S306 Y307 G308 S309 L324 Y327 M328 N331 P332 D335 N336 F337 THR PHE ALA ASP ALA ASN SER LEU LYS PRO PRO S349 R350 R375
M387 R390 R409 L480 P481 T482 F492 S493 A494

# 4 Data and refinement statistics (i)

| Property | Value | Source |
|---|---|---|
| Space group | P 41 | Depositor |
| Cell constants<br>a, b, c, $\alpha$, $\beta$, $\gamma$ | 147.83Å 147.83Å 101.60Å<br>90.00° 90.00° 90.00° | Depositor |
| Resolution (Å) | 66.11 – 2.75<br>72.86 – 2.75 | Depositor<br>EDS |
| % Data completeness<br>(in resolution range) | 99.8 (66.11-2.75)<br>99.9 (72.86-2.75) | Depositor<br>EDS |
| $R_{merge}$ | 0.10 | Depositor |
| $R_{sym}$ | (Not available) | Depositor |
| $< I/\sigma(I) >$ [1] | 1.96 (at 2.73Å) | Xtriage |
| Refinement program | PHENIX 1.9_1692 | Depositor |
| R, $R_{free}$ | 0.214 , 0.252<br>0.217 , 0.253 | Depositor<br>DCC |
| $R_{free}$ test set | 2711 reflections (4.76%) | wwPDB-VP |
| Wilson B-factor (Å$^2$) | 56.2 | Xtriage |
| Anisotropy | 0.069 | Xtriage |
| Bulk solvent $k_{sol}$(e/Å$^3$), $B_{sol}$(Å$^2$) | 0.33 , 41.1 | EDS |
| L-test for twinning[2] | $< \|L\| > = 0.48$, $< L^2 > = 0.31$ | Xtriage |
| Estimated twinning fraction | 0.031 for h,-k,-l | Xtriage |
| $F_o$,$F_c$ correlation | 0.93 | EDS |
| Total number of atoms | 13474 | wwPDB-VP |
| Average B, all atoms (Å$^2$) | 58.0 | wwPDB-VP |

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.42% 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: CIT, SCH, SNN, SO4

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 | 0.24 | 0/3408 | 0.41 | 0/4619 |
| 1 | B | 0.22 | 0/3404 | 0.38 | 0/4614 |
| 1 | C | 0.26 | 1/3408 (0.0%) | 0.42 | 0/4619 |
| 1 | D | 0.24 | 0/3400 | 0.40 | 0/4608 |
| All | All | 0.24 | 1/13620 (0.0%) | 0.40 | 0/18460 |

All (1) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|---|---|---|---|---|---|---|---|
| 1 | C | 161 | VAL | CB-CG2 | -5.30 | 1.41 | 1.52 |

There are no bond angle outliers.

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 | 3342 | 0 | 3184 | 30 | 0 |
| 1 | B | 3338 | 0 | 3175 | 6 | 0 |
| 1 | C | 3342 | 0 | 3184 | 16 | 0 |
| 1 | D | 3335 | 0 | 3176 | 26 | 0 |
| 2 | A | 5 | 0 | 0 | 0 | 0 |
| 2 | B | 10 | 0 | 0 | 0 | 0 |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|---|---|---|---|---|---|---|
| 2 | C | 5 | 0 | 0 | 0 | 0 |
| 2 | D | 5 | 0 | 0 | 0 | 0 |
| 3 | A | 13 | 0 | 5 | 5 | 0 |
| 4 | A | 33 | 0 | 0 | 3 | 0 |
| 4 | B | 29 | 0 | 0 | 1 | 0 |
| 4 | C | 12 | 0 | 0 | 0 | 0 |
| 4 | D | 5 | 0 | 0 | 0 | 0 |
| All | All | 13474 | 0 | 12724 | 69 | 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 3.

The worst 5 of 69 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:306:SER:HB3 | 1:D:305:TYR:CE2 | 2.12 | 0.84 |
| 1:A:307:TYR:HB2 | 1:D:305:TYR:CE1 | 2.12 | 0.84 |
| 1:C:151:LYS:HE3 | 1:C:159:GLY:O | 1.76 | 0.84 |
| 1:A:447:GLN:H | 3:A:502:CIT:H21 | 1.44 | 0.80 |
| 1:D:302:PRO:HA | 1:D:350:ARG:HH22 | 1.47 | 0.80 |

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 | 423/454 (93%) | 401 (95%) | 22 (5%) | 0 | 100 | 100 |
| 1 | B | 422/454 (93%) | 409 (97%) | 13 (3%) | 0 | 100 | 100 |
| 1 | C | 423/454 (93%) | 411 (97%) | 12 (3%) | 0 | 100 | 100 |
| 1 | D | 422/454 (93%) | 405 (96%) | 17 (4%) | 0 | 100 | 100 |

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| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles |
|---|---|---|---|---|---|---|
| All | All | 1690/1816 (93%) | 1626 (96%) | 64 (4%) | 0 | 100 100 |

There are no Ramachandran outliers to report.

### 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 | 357/380 (94%) | 357 (100%) | 0 | 100 100 |
| 1 | B | 356/380 (94%) | 355 (100%) | 1 (0%) | 92 95 |
| 1 | C | 357/380 (94%) | 355 (99%) | 2 (1%) | 86 90 |
| 1 | D | 356/380 (94%) | 352 (99%) | 4 (1%) | 73 84 |
| All | All | 1426/1520 (94%) | 1419 (100%) | 7 (0%) | 88 92 |

5 of 7 residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | D | 73 | TYR |
| 1 | D | 208 | THR |
| 1 | D | 221 | SER |
| 1 | D | 214 | PHE |
| 1 | C | 371 | GLU |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

8 non-standard protein/DNA/RNA residues are modelled in this entry.

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

| Mol | Type | Chain | Res | Link | Bond lengths | | | Bond angles | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Counts | RMSZ | $\#\|Z\| > 2$ | Counts | RMSZ | $\#\|Z\| > 2$ |
| 1 | SNN | B | 176 | 1 | 5,6,8 | 0.49 | 0 | 3,6,11 | 1.43 | 0 |
| 1 | SCH | B | 219 | 1 | 6,7,8 | 0.98 | 0 | 3,7,9 | 1.63 | 0 |
| 1 | SCH | D | 219 | 1 | 6,7,8 | 0.99 | 0 | 3,7,9 | 1.61 | 1 (33%) |
| 1 | SNN | C | 176 | 1 | 5,6,8 | 0.48 | 0 | 3,6,11 | 1.43 | 1 (33%) |
| 1 | SCH | C | 219 | 1 | 6,7,8 | 1.01 | 0 | 3,7,9 | 1.69 | 0 |
| 1 | SCH | A | 219 | 1 | 6,7,8 | 0.96 | 0 | 3,7,9 | 1.85 | 1 (33%) |
| 1 | SNN | D | 176 | 1 | 5,6,8 | 0.48 | 0 | 3,6,11 | 1.52 | 1 (33%) |
| 1 | SNN | A | 176 | 1 | 5,6,8 | 0.49 | 0 | 3,6,11 | 1.69 | 1 (33%) |

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 |
|---|---|---|---|---|---|---|---|
| 1 | SNN | B | 176 | 1 | - | 3/3/5/12 | - |
| 1 | SCH | B | 219 | 1 | - | 0/2/6/8 | - |
| 1 | SCH | D | 219 | 1 | - | 0/2/6/8 | - |
| 1 | SNN | C | 176 | 1 | - | 3/3/5/12 | - |
| 1 | SCH | C | 219 | 1 | - | 0/2/6/8 | - |
| 1 | SCH | A | 219 | 1 | - | 0/2/6/8 | - |
| 1 | SNN | D | 176 | 1 | - | 3/3/5/12 | - |
| 1 | SNN | A | 176 | 1 | - | 3/3/5/12 | - |

There are no bond length outliers.

All (5) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | A | 219 | SCH | CB-SG-SD | 2.39 | 110.02 | 103.82 |
| 1 | D | 219 | SCH | CE-SD-SG | 2.28 | 110.46 | 102.58 |
| 1 | A | 176 | SNN | CA-C4-C5 | -2.21 | 106.06 | 114.44 |
| 1 | D | 176 | SNN | CA-C4-C5 | -2.21 | 106.06 | 114.44 |

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| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 1 | C | 176 | SNN | CA-C4-C5 | -2.00 | 106.84 | 114.44 |

There are no chirality outliers.

5 of 12 torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 1 | A | 176 | SNN | O-C-CA-C4 |
| 1 | A | 176 | SNN | C5-C4-CA-N |
| 1 | A | 176 | SNN | CA-C4-C5-O5 |
| 1 | B | 176 | SNN | O-C-CA-C4 |
| 1 | B | 176 | SNN | C5-C4-CA-N |

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry (i)

6 ligands are modelled in this entry.

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

| Mol | Type | Chain | Res | Link | Bond lengths | | | Bond angles | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Counts | RMSZ | $\#\|Z\| > 2$ | Counts | RMSZ | $\#\|Z\| > 2$ |
| 3 | CIT | A | 502 | - | 12,12,12 | 1.10 | 0 | 17,17,17 | 1.48 | 3 (17%) |
| 2 | SO4 | B | 502 | - | 4,4,4 | 0.35 | 0 | 6,6,6 | 0.05 | 0 |
| 2 | SO4 | B | 501 | - | 4,4,4 | 0.32 | 0 | 6,6,6 | 0.07 | 0 |
| 2 | SO4 | D | 501 | - | 4,4,4 | 0.34 | 0 | 6,6,6 | 0.05 | 0 |
| 2 | SO4 | A | 501 | - | 4,4,4 | 0.33 | 0 | 6,6,6 | 0.05 | 0 |
| 2 | SO4 | C | 501 | - | 4,4,4 | 0.34 | 0 | 6,6,6 | 0.04 | 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 |
|---|---|---|---|---|---|---|---|
| 3 | CIT | A | 502 | - | - | 7/16/16/16 | - |

There are no bond length outliers.

All (3) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 3 | A | 502 | CIT | O6-C6-C3 | 3.70 | 119.47 | 113.05 |
| 3 | A | 502 | CIT | C3-C2-C1 | 2.50 | 119.87 | 113.81 |
| 3 | A | 502 | CIT | O4-C5-C4 | 2.11 | 121.13 | 114.35 |

There are no chirality outliers.

5 of 7 torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 3 | A | 502 | CIT | O7-C3-C6-O5 |
| 3 | A | 502 | CIT | O7-C3-C6-O6 |
| 3 | A | 502 | CIT | C4-C3-C6-O5 |
| 3 | A | 502 | CIT | C4-C3-C6-O6 |
| 3 | A | 502 | CIT | C6-C3-C4-C5 |

There are no ring outliers.

1 monomer is involved in 5 short contacts:

| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|---|---|---|---|---|---|
| 3 | A | 502 | CIT | 5 | 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 | 427/454 (94%) | 0.30 | 9 (2%) 63 72 | 29, 49, 79, 116 | 0 |
| 1 | B | 426/454 (93%) | 0.56 | 27 (6%) 20 24 | 32, 48, 95, 155 | 0 |
| 1 | C | 427/454 (94%) | 0.70 | 37 (8%) 10 12 | 32, 56, 97, 157 | 0 |
| 1 | D | 426/454 (93%) | 0.69 | 37 (8%) 10 12 | 41, 66, 99, 129 | 0 |
| All | All | 1706/1816 (93%) | 0.56 | 110 (6%) 19 23 | 29, 55, 95, 157 | 0 |

The worst 5 of 110 RSRZ outliers are listed below:

| Mol | Chain | Res | Type | RSRZ |
|---|---|---|---|---|
| 1 | C | 306 | SER | 9.9 |
| 1 | D | 305 | TYR | 9.8 |
| 1 | C | 305 | TYR | 8.5 |
| 1 | B | 305 | TYR | 6.1 |
| 1 | B | 284 | LEU | 5.8 |

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

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 |
|---|---|---|---|---|---|---|---|---|
| 1 | SCH | C | 219 | 8/9 | 0.93 | 0.16 | 45,48,53,54 | 0 |
| 1 | SCH | B | 219 | 8/9 | 0.94 | 0.18 | 44,47,61,66 | 0 |
| 1 | SNN | B | 176 | 7/8 | 0.94 | 0.21 | 29,34,38,40 | 0 |
| 1 | SNN | D | 176 | 7/8 | 0.94 | 0.17 | 48,49,51,52 | 0 |
| 1 | SCH | A | 219 | 8/9 | 0.95 | 0.20 | 31,36,59,59 | 0 |
| 1 | SCH | D | 219 | 8/9 | 0.95 | 0.23 | 41,47,60,60 | 0 |
| 1 | SNN | C | 176 | 7/8 | 0.96 | 0.20 | 39,42,42,48 | 0 |

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| Mol | Type | Chain | Res | Atoms | RSCC | RSR | B-factors(Å$^2$) | Q<0.9 |
|---|---|---|---|---|---|---|---|---|
| 1 | SNN | A | 176 | 7/8 | 0.96 | 0.21 | 28,30,33,34 | 0 |

## 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 | CIT | A | 502 | 13/13 | 0.78 | 0.35 | 39,43,50,51 | 13 |
| 2 | SO4 | B | 502 | 5/5 | 0.81 | 0.33 | 88,91,106,130 | 0 |
| 2 | SO4 | A | 501 | 5/5 | 0.86 | 0.29 | 100,100,101,102 | 0 |
| 2 | SO4 | D | 501 | 5/5 | 0.89 | 0.29 | 83,94,100,121 | 0 |
| 2 | SO4 | C | 501 | 5/5 | 0.90 | 0.13 | 85,87,99,121 | 0 |
| 2 | SO4 | B | 501 | 5/5 | 0.94 | 0.17 | 68,69,73,77 | 0 |

## 6.5 Other polymers (i)

There are no such residues in this entry.