PDB ID : 2UUB
Title : Structure of the Thermus thermophilus 30S ribosomal subunit complexed with a Valine-ASL with cmo5U in position 34 bound to an mRNA with a GUU-codon in the A-site and paromomycin.
Authors : Weixlbaumer, A.; Murphy, F.V.; Dziergowska, A.; Malkiewicz, A.; Vendeix, F.A.P.; Agris, P.F.; Ramakrishnan, V.
Deposited on : 2007-03-01
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 following versions of software and data (see references) were used in the production of this report:

- MolProbity : 4.02b-467
- Mogul : 1.7.3 (157068), CSD as539be (2018)
- Xtriage (Phenix) : 1.13
- EDS : rb-20031021
- Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
- Refmac : 5.8.0158
- CCP4 : 7.0 (Gargrove)
- Ideal geometry (proteins) : Engh & Huber (2001)
- Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
- Validation Pipeline (wwPDB-VP) : rb-20031021
1 Overall quality at a glance

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.

<table>
<thead>
<tr>
<th>Metric</th>
<th>Percentile Ranks</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>R_{free}</td>
<td></td>
<td>0.442</td>
</tr>
<tr>
<td>Clashscore</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>Ramachandran outliers</td>
<td></td>
<td>4.9%</td>
</tr>
<tr>
<td>Sidechain outliers</td>
<td></td>
<td>8.0%</td>
</tr>
<tr>
<td>RNA backbone</td>
<td></td>
<td>0.68</td>
</tr>
</tbody>
</table>

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 on the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. 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%.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Length</th>
<th>Quality of chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>1522</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>209</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>162</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>101</td>
<td></td>
</tr>
</tbody>
</table>

*Continued on next page...*
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<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Length</th>
<th>Quality of chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>G</td>
<td>156</td>
<td>54% 40% 6%</td>
</tr>
<tr>
<td>8</td>
<td>H</td>
<td>138</td>
<td>55% 38% 6%</td>
</tr>
<tr>
<td>9</td>
<td>I</td>
<td>128</td>
<td>28% 59% 12%</td>
</tr>
<tr>
<td>10</td>
<td>J</td>
<td>105</td>
<td>24% 53% 16%</td>
</tr>
<tr>
<td>11</td>
<td>K</td>
<td>129</td>
<td>54% 35% 8%</td>
</tr>
<tr>
<td>12</td>
<td>L</td>
<td>135</td>
<td>46% 36% 10%</td>
</tr>
<tr>
<td>13</td>
<td>M</td>
<td>126</td>
<td>35% 55% 10%</td>
</tr>
<tr>
<td>14</td>
<td>N</td>
<td>61</td>
<td>36% 51% 11%</td>
</tr>
<tr>
<td>15</td>
<td>O</td>
<td>89</td>
<td>65% 28% 6%</td>
</tr>
<tr>
<td>16</td>
<td>P</td>
<td>88</td>
<td>53% 39% 5%</td>
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<tr>
<td>17</td>
<td>Q</td>
<td>105</td>
<td>54% 42% 6%</td>
</tr>
<tr>
<td>18</td>
<td>R</td>
<td>88</td>
<td>39% 39% 6%</td>
</tr>
<tr>
<td>19</td>
<td>S</td>
<td>93</td>
<td>31% 44% 12%</td>
</tr>
<tr>
<td>20</td>
<td>T</td>
<td>106</td>
<td>39% 45% 9%</td>
</tr>
<tr>
<td>21</td>
<td>U</td>
<td>27</td>
<td>48% 41% 7%</td>
</tr>
<tr>
<td>22</td>
<td>X</td>
<td>6</td>
<td>33% 50% 17%</td>
</tr>
<tr>
<td>23</td>
<td>Y</td>
<td>17</td>
<td>41% 18% 6%</td>
</tr>
</tbody>
</table>
2 Entry composition

There are 27 unique types of molecules in this entry. The entry contains 52,363 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 RNA chain called 16S Ribosomal RNA.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>1512</td>
<td>Total C N O P</td>
<td>32489</td>
<td>14462</td>
<td>6011</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10505</td>
<td>1511</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 2 is a protein called 30S RIBOSOMAL PROTEIN S2.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>B</td>
<td>235</td>
<td>Total C N O S</td>
<td>1901</td>
<td>1213</td>
<td>342</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>341</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 3 is a protein called 30S RIBOSOMAL PROTEIN S3.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>C</td>
<td>207</td>
<td>Total C N O S</td>
<td>1613</td>
<td>1016</td>
<td>315</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>281</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 4 is a protein called 30S RIBOSOMAL PROTEIN S4.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>D</td>
<td>208</td>
<td>Total C N O S</td>
<td>1703</td>
<td>1066</td>
<td>339</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>291</td>
<td>7</td>
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<td>0</td>
</tr>
</tbody>
</table>

- Molecule 5 is a protein called 30S RIBOSOMAL PROTEIN S5.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>E</td>
<td>151</td>
<td>Total C N O S</td>
<td>1147</td>
<td>724</td>
<td>218</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>201</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 6 is a protein called 30S RIBOSOMAL PROTEIN S6.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>F</td>
<td>101</td>
<td>Total C N O S</td>
<td>843</td>
<td>531</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>154</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
- Molecule 7 is a protein called 30S RIBOSOMAL PROTEIN S7.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>G</td>
<td>155</td>
<td>Total C N O S 1257 781 252 218 6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 8 is a protein called 30S RIBOSOMAL PROTEIN S8.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>H</td>
<td>138</td>
<td>Total C N O S 1116 705 215 193 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 9 is a protein called 30S RIBOSOMAL PROTEIN S9.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>I</td>
<td>127</td>
<td>Total C N O 1010 639 197 174</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 10 is a protein called 30S RIBOSOMAL PROTEIN S10.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>J</td>
<td>99</td>
<td>Total C N O S 793 498 157 137 1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

- Molecule 11 is a protein called 30S RIBOSOMAL PROTEIN S11.

<table>
<thead>
<tr>
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<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>K</td>
<td>119</td>
<td>Total C N O S 885 549 168 165 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 12 is a protein called 30S RIBOSOMAL PROTEIN S12.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>L</td>
<td>125</td>
<td>Total C N O S 971 611 196 163 1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

- Molecule 13 is a protein called 30S RIBOSOMAL PROTEIN S13.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>M</td>
<td>125</td>
<td>Total C N O S 997 617 207 171 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 14 is a protein called 30S RIBOSOMAL PROTEIN S14.
<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>N</td>
<td>60</td>
<td>Total C N O S</td>
<td>492 312 104 72 4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>O</td>
<td>88</td>
<td>Total C N O S</td>
<td>734 459 147 126 2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>P</td>
<td>84</td>
<td>Total C N O S</td>
<td>701 443 140 117 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>Q</td>
<td>104</td>
<td>Total C N O S</td>
<td>857 547 160 148 2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>18</td>
<td>R</td>
<td>73</td>
<td>Total C N O S</td>
<td>598 381 118 99 2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>19</td>
<td>S</td>
<td>81</td>
<td>Total C N O S</td>
<td>648 414 120 112 2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>T</td>
<td>99</td>
<td>Total C N O S</td>
<td>763 470 162 129 2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 15 is a protein called 30S RIBOSOMAL PROTEIN S15.
- Molecule 16 is a protein called 30S RIBOSOMAL PROTEIN S16.
- Molecule 17 is a protein called 30S RIBOSOMAL PROTEIN S17.
- Molecule 18 is a protein called 30S RIBOSOMAL PROTEIN S18.
- Molecule 19 is a protein called 30S RIBOSOMAL PROTEIN S19.
- Molecule 20 is a protein called 30S RIBOSOMAL PROTEIN S20.
- Molecule 21 is a protein called 30S RIBOSOMAL PROTEIN THX.
Molecule 22 is a RNA chain called 5'-R(*GP*UP*UP*AP*AP*AP)-3'.

Molecule 23 is a RNA chain called 5'-R(*CP*CP*UP*CP*CP*UP*CM0P*AP*CP*6MZP*AP *GP*GP*AP*GP*G)-3'.

Molecule 24 is PAROMOMYCIN (three-letter code: PAR) (formula: C_{23}H_{45}N_{5}O_{14}).

Molecule 25 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Continued on next page...
Continued from previous page...

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Q</td>
<td>3</td>
<td>Total 3 Mg 3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>D</td>
<td>1</td>
<td>Total 1 Mg 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>E</td>
<td>2</td>
<td>Total 2 Mg 2</td>
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<td>0</td>
</tr>
<tr>
<td>25</td>
<td>H</td>
<td>1</td>
<td>Total 1 Mg 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>B</td>
<td>1</td>
<td>Total 1 Mg 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>I</td>
<td>1</td>
<td>Total 1 Mg 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>A</td>
<td>203</td>
<td>Total 203 Mg 203</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>N</td>
<td>1</td>
<td>Total 1 Mg 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>X</td>
<td>1</td>
<td>Total 1 Mg 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>S</td>
<td>1</td>
<td>Total 1 Mg 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>F</td>
<td>1</td>
<td>Total 1 Mg 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>M</td>
<td>1</td>
<td>Total 1 Mg 1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 26 is POTASSIUM ION (three-letter code: K) (formula: K).

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>A</td>
<td>34</td>
<td>Total 34 K 34</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>26</td>
<td>E</td>
<td>1</td>
<td>Total 1 K 1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Molecule 27 is ZINC ION (three-letter code: ZN) (formula: Zn).

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Residues</th>
<th>Atoms</th>
<th>ZeroOcc</th>
<th>AltConf</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>D</td>
<td>1</td>
<td>Total 1 Zn 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>27</td>
<td>N</td>
<td>1</td>
<td>Total 1 Zn 1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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. 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. 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: 16S Ribosomal RNA

Chain A:
• Molecule 2: 30S RIBOSOMAL PROTEIN S2

Chain B:

• Molecule 3: 30S RIBOSOMAL PROTEIN S3

Chain C:
• Molecule 4: 30S RIBOSOMAL PROTEIN S4

Chain D:

• Molecule 5: 30S RIBOSOMAL PROTEIN S5

Chain E:

• Molecule 6: 30S RIBOSOMAL PROTEIN S6

Chain F:

• Molecule 7: 30S RIBOSOMAL PROTEIN S7

Chain G:

• Molecule 8: 30S RIBOSOMAL PROTEIN S8

Chain H:
• Molecule 9: 30S RIBOSOMAL PROTEIN S9
Chain I:

• Molecule 10: 30S RIBOSOMAL PROTEIN S10
Chain J:

• Molecule 11: 30S RIBOSOMAL PROTEIN S11
Chain K:

• Molecule 12: 30S RIBOSOMAL PROTEIN S12
Chain L:

• Molecule 13: 30S RIBOSOMAL PROTEIN S13
Chain M:
• Molecule 14: 30S RIBOSOMAL PROTEIN S14

Chain N:

• Molecule 15: 30S RIBOSOMAL PROTEIN S15

Chain O:

• Molecule 16: 30S RIBOSOMAL PROTEIN S16

Chain P:

• Molecule 17: 30S RIBOSOMAL PROTEIN S17

Chain Q:

• Molecule 18: 30S RIBOSOMAL PROTEIN S18

Chain R:

• Molecule 19: 30S RIBOSOMAL PROTEIN S19

Chain S:
- Molecule 20: 30S RIBOSOMAL PROTEIN S20
  
  Chain T:
  
  - Molecule 21: 30S RIBOSOMAL PROTEIN THX
  
  Chain U:
  
  - Molecule 22: 5'-R(*GP*UP*UP*AP*AP*AP)-3'
  
  Chain X:
  
  - Molecule 23: 5'-R(*CP*CP*UP*CP*CP*UP*CM0P*AP*CP*6MZP*AP*GP*GP*AP*GP*G)-3'
  
  Chain Y:
4 Data and refinement statistics

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<td>Wilson B-factor (Å^2)</td>
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<tr>
<td>Anisotropy</td>
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<td>L-test for twinning^2</td>
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<td>L</td>
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<td>F_o,F_c correlation</td>
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<tr>
<td>Average B, all atoms (Å^2)</td>
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<td>wwPDB-VP</td>
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Xtriage’s analysis on translational NCS is as follows: The largest off-origin peak in the Patterson function is 1.77% of the height of the origin peak. No significant pseudotranslation is detected.

---

^1Intensities estimated from amplitudes.

^2Theoretical 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: MG, PAR, K, ZN, 6MZ, CM0

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).

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<th>Bond angles</th>
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<td>3/36365 (0.0%)</td>
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<tr>
<td>2</td>
<td>B</td>
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<td>0/1936</td>
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<tr>
<td>3</td>
<td>C</td>
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<td>0/1637</td>
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<td>4</td>
<td>D</td>
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<td>5</td>
<td>E</td>
<td>0.48</td>
<td>0/1163</td>
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<td>6</td>
<td>F</td>
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<td>0/856</td>
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<td>G</td>
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<td>0/1276</td>
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<td>9</td>
<td>I</td>
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<td>0/1029</td>
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<td>J</td>
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<td>0/806</td>
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<td>0/1008</td>
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<td>0/501</td>
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<td>P</td>
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<td>17</td>
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<td>All</td>
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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.
### Chirality outliers

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### Planarity outliers

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All (5) bond length outliers are listed below:

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<td>4</td>
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All (39) bond angle outliers are listed below:

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<th>Atoms</th>
<th>Z</th>
<th>Observed(°)</th>
<th>Ideal(°)</th>
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All (2) chirality outliers are listed below:

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All (34) planarity outliers are listed below:

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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.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Non-H</th>
<th>H(model)</th>
<th>H(added)</th>
<th>Clashes</th>
<th>Symm-Clashes</th>
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</table>

Continued on next page...
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 24.

All (2154) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

<table>
<thead>
<tr>
<th>Atom-1</th>
<th>Atom-2</th>
<th>Interatomic distance (Å)</th>
<th>Clash overlap (Å)</th>
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<tbody>
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<td>7:G:82:GLY:CA</td>
<td>1.86</td>
<td>1.22</td>
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<tr>
<td>1:A:402:G:H2'</td>
<td>1:A:403:C:H5''</td>
<td>1.20</td>
<td>1.18</td>
</tr>
<tr>
<td>10:J:99:LYS:HD3</td>
<td>10:J:100:THR:H</td>
<td>1.06</td>
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</tr>
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<td>2:B:146:GLN:HE21</td>
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<td>Atom-1</td>
<td>Atom-2</td>
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<td>Clash overlap (Å)</td>
</tr>
<tr>
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<td>--------</td>
<td>--------------------------</td>
<td>------------------</td>
</tr>
<tr>
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<td>5:E:52:PRO:HD2</td>
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<td>0.93</td>
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Continued from previous page...

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### Interatomic distances and clash overlap

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### Interatomic Distance and Clash Overlap

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### Interatomic distance (Å) and Clash overlap (Å)

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There are no symmetry-related clashes.

### 5.3 Torsion angles

#### 5.3.1 Protein backbone

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.

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5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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.

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

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

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<td>A</td>
<td>1281</td>
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<tr>
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<td>A</td>
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</tr>
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</tr>
<tr>
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<td>A</td>
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</tr>
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</tr>
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</tr>
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</tr>
<tr>
<td>1</td>
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<td>A</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>1503</td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>1504</td>
<td>G</td>
</tr>
<tr>
<td>1</td>
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<td>G</td>
</tr>
<tr>
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<td>A</td>
<td>1528</td>
<td>U</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>1543</td>
<td>C</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Type</th>
<th>Chain</th>
<th>Res</th>
<th>Link</th>
<th>Chirals</th>
<th>Torsions</th>
<th>Rings</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>CM0</td>
<td>Y</td>
<td>34</td>
<td>23</td>
<td>-</td>
<td>0/6/30/31</td>
<td>0/2/2/2</td>
</tr>
<tr>
<td>23</td>
<td>6MZ</td>
<td>Y</td>
<td>37</td>
<td>23</td>
<td>-</td>
<td>0/5/27/28</td>
<td>0/3/3/3</td>
</tr>
</tbody>
</table>

All (4) bond length outliers are listed below:

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Res</th>
<th>Type</th>
<th>Atoms</th>
<th>Z</th>
<th>Observed(Å)</th>
<th>Ideal(Å)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Y</td>
<td>34</td>
<td>CM0</td>
<td>O5-C5</td>
<td>-2.53</td>
<td>1.32</td>
<td>1.37</td>
</tr>
<tr>
<td>23</td>
<td>Y</td>
<td>34</td>
<td>CM0</td>
<td>C4-C5</td>
<td>3.06</td>
<td>1.48</td>
<td>1.40</td>
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<tr>
<td>23</td>
<td>Y</td>
<td>34</td>
<td>CM0</td>
<td>O5-C7</td>
<td>3.18</td>
<td>1.53</td>
<td>1.43</td>
</tr>
<tr>
<td>23</td>
<td>Y</td>
<td>34</td>
<td>CM0</td>
<td>C4-N3</td>
<td>3.70</td>
<td>1.39</td>
<td>1.33</td>
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</table>

All (5) bond angle outliers are listed below:

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<th>Chain</th>
<th>Res</th>
<th>Type</th>
<th>Atoms</th>
<th>Z</th>
<th>Observed(°)</th>
<th>Ideal(°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Y</td>
<td>37</td>
<td>6MZ</td>
<td>C5-C6-N6</td>
<td>3.15</td>
<td>125.67</td>
<td>120.35</td>
</tr>
<tr>
<td>23</td>
<td>Y</td>
<td>34</td>
<td>CM0</td>
<td>O5-C5-C4</td>
<td>3.30</td>
<td>119.54</td>
<td>115.20</td>
</tr>
<tr>
<td>23</td>
<td>Y</td>
<td>37</td>
<td>6MZ</td>
<td>C2-N1-C6</td>
<td>3.78</td>
<td>119.00</td>
<td>116.52</td>
</tr>
<tr>
<td>23</td>
<td>Y</td>
<td>34</td>
<td>CM0</td>
<td>C7-O5-C5</td>
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<td>136.39</td>
<td>117.74</td>
</tr>
<tr>
<td>23</td>
<td>Y</td>
<td>34</td>
<td>CM0</td>
<td>C4-N3-C2</td>
<td>15.76</td>
<td>128.55</td>
<td>115.14</td>
</tr>
</tbody>
</table>

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 5 short contacts:

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Res</th>
<th>Type</th>
<th>Clashes</th>
<th>Symm-Clashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Y</td>
<td>34</td>
<td>CM0</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>
5.5 Carbohydrates

There are no carbohydrates in this entry.

5.6 Ligand geometry

Of 256 ligands modelled in this entry, 255 are monoatomic - leaving 1 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).

<table>
<thead>
<tr>
<th>Mol</th>
<th>Type</th>
<th>Chain</th>
<th>Res</th>
<th>Link</th>
<th>Bond lengths</th>
<th>Bond angles</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td>Counts</td>
<td>RMSZ</td>
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<tr>
<td>24</td>
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<td>A</td>
<td>1601</td>
<td>-</td>
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<td>1.40</td>
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</table>

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.

<table>
<thead>
<tr>
<th>Mol</th>
<th>Type</th>
<th>Chain</th>
<th>Res</th>
<th>Link</th>
<th>Chirals</th>
<th>Torsions</th>
<th>Rings</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>PAR</td>
<td>A</td>
<td>1601</td>
<td>-</td>
<td>-</td>
<td>0/18/94/94</td>
<td>0/4/4/4</td>
</tr>
</tbody>
</table>

All (8) bond length outliers are listed below:

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Res</th>
<th>Type</th>
<th>Atoms</th>
<th>Z</th>
<th>Observed(Å)</th>
<th>Ideal(Å)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>A</td>
<td>1601</td>
<td>PAR</td>
<td>O54-C54</td>
<td>2.01</td>
<td>1.49</td>
<td>1.44</td>
</tr>
<tr>
<td>24</td>
<td>A</td>
<td>1601</td>
<td>PAR</td>
<td>O51-C11</td>
<td>2.01</td>
<td>1.47</td>
<td>1.41</td>
</tr>
<tr>
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<td>A</td>
<td>1601</td>
<td>PAR</td>
<td>C14-C24</td>
<td>2.18</td>
<td>1.56</td>
<td>1.52</td>
</tr>
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<td>24</td>
<td>A</td>
<td>1601</td>
<td>PAR</td>
<td>C34-C24</td>
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<td>1.56</td>
<td>1.53</td>
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<td>A</td>
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<td>PAR</td>
<td>C11-C21</td>
<td>2.43</td>
<td>1.57</td>
<td>1.52</td>
</tr>
<tr>
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<td>A</td>
<td>1601</td>
<td>PAR</td>
<td>C31-C21</td>
<td>2.76</td>
<td>1.57</td>
<td>1.53</td>
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<tr>
<td>24</td>
<td>A</td>
<td>1601</td>
<td>PAR</td>
<td>C52-C42</td>
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<td>1.58</td>
<td>1.52</td>
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<td>1601</td>
<td>PAR</td>
<td>O54-C14</td>
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</table>

All (8) bond angle outliers are listed below:

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<th>Type</th>
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<th>Z</th>
<th>Observed(°)</th>
<th>Ideal(°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>A</td>
<td>1601</td>
<td>PAR</td>
<td>O52-C13-O43</td>
<td>-2.23</td>
<td>109.01</td>
<td>111.43</td>
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</table>
Continued from previous page...

<table>
<thead>
<tr>
<th>Mol</th>
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<th>Res</th>
<th>Type</th>
<th>Atoms</th>
<th>Z</th>
<th>Observed(°)</th>
<th>Ideal(°)</th>
</tr>
</thead>
<tbody>
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<td>PAR</td>
<td>O11-C11-C21</td>
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<td>A</td>
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<td>O33-C14-C24</td>
<td>4.10</td>
<td>115.56</td>
<td>108.24</td>
</tr>
</tbody>
</table>

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

<table>
<thead>
<tr>
<th>Mol</th>
<th>Chain</th>
<th>Res</th>
<th>Type</th>
<th>Clashes</th>
<th>Symm-Clashes</th>
</tr>
</thead>
<tbody>
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<td>1601</td>
<td>PAR</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

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
Unable to reproduce the depositors R factor - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains
Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates
Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands
Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers
Unable to reproduce the depositors R factor - this section is therefore empty.