Full wwPDB Geometry-Only Validation Report

Mar 11, 2018 – 04:30 pm GMT

PDB ID : 1KES
Title : CONFORMATION OF KERATAN SULPHATE
Authors : Arnott, S.
Deposited on : 1978-05-23
Resolution : 3.00 Å (reported)

This is a Full wwPDB Geometry-Only Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org
A user guide is available at
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)
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk31020
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*FIBER DIFFRACTION*

The reported resolution of this entry is 3.00 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>Whole archive (#Entries)</th>
<th>Similar resolution (#Entries, resolution range(Å))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clashscore</td>
<td>122126</td>
<td>2167 (3.00-3.00)</td>
</tr>
</tbody>
</table>
2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 66 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 D-GALACTOSE-6-SULFATE (three-letter code: G6S) (formula: C$_6$H$_{12}$O$_9$S).

![G6S molecule](image)

<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>1</td>
<td>A</td>
<td>1</td>
<td>Total C O S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15 6 8 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>1</td>
<td>Total C O S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15 6 8 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Molecule 2 is 2-(acetylamino)-2-deoxy-6-O-sulfo-beta-D-glucopyranose (three-letter code: NGS) (formula: C$_8$H$_{15}$NO$_9$S).
<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>2</td>
<td>A</td>
<td>1</td>
<td>Total C N O S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18 8 1 8 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>1</td>
<td>Total C N O S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18 8 1 8 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3  Residue-property plots

There is no protein, DNA or RNA chain in this entry to show sequence plots.
4  Model quality

4.1  Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: G6S, NGS

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).

There are no protein, RNA or DNA chains available to summarize Z scores of covalent bonds and angles.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

4.2  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>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>30</td>
<td>0</td>
<td>17</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>36</td>
<td>0</td>
<td>22</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>All</td>
<td>All</td>
<td>66</td>
<td>0</td>
<td>39</td>
<td>8</td>
<td>0</td>
</tr>
</tbody>
</table>

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 76.

All (8) 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>
</tr>
</thead>
<tbody>
<tr>
<td>1:A:3:G6S:O2</td>
<td>2:A:4:NGS:HH3A</td>
<td>1.92</td>
<td>0.69</td>
</tr>
<tr>
<td>1:A:1:G6S:O2</td>
<td>2:A:2:NGS:HH3A</td>
<td>1.92</td>
<td>0.68</td>
</tr>
<tr>
<td>1:A:1:G6S:O2</td>
<td>2:A:2:NGS:C</td>
<td>2.61</td>
<td>0.48</td>
</tr>
<tr>
<td>1:A:1:G6S:O2</td>
<td>2:A:2:NGS:CH3</td>
<td>2.62</td>
<td>0.48</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Atom-1</th>
<th>Atom-2</th>
<th>Interatomic distance (Å)</th>
<th>Clash overlap (Å)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:A:3:G6S:O2</td>
<td>2:A:4:NGS:C</td>
<td>2.61</td>
<td>0.48</td>
</tr>
<tr>
<td>1:A:1:G6S:O2</td>
<td>2:A:2:NGS:N</td>
<td>2.47</td>
<td>0.48</td>
</tr>
<tr>
<td>1:A:3:G6S:O2</td>
<td>2:A:4:NGS:N</td>
<td>2.47</td>
<td>0.47</td>
</tr>
<tr>
<td>1:A:3:G6S:O2</td>
<td>2:A:4:NGS:CH3</td>
<td>2.62</td>
<td>0.47</td>
</tr>
</tbody>
</table>

There are no symmetry-related clashes.

4.3 Torsion angles

4.3.1 Protein backbone

There are no protein molecules in this entry.

4.3.2 Protein sidechains

There are no protein molecules in this entry.

4.3.3 RNA

There are no RNA molecules in this entry.

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

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

4.5 Carbohydrates

There are no carbohydrates in this entry.

4.6 Ligand geometry

4 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).

<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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Counts</td>
<td>RMS</td>
</tr>
<tr>
<td>1</td>
<td>G6S</td>
<td>A</td>
<td>1</td>
<td>2</td>
<td>15,15,16</td>
<td>0.48</td>
</tr>
<tr>
<td>2</td>
<td>NGS</td>
<td>A</td>
<td>2</td>
<td>1</td>
<td>18,18,19</td>
<td>0.65</td>
</tr>
<tr>
<td>1</td>
<td>G6S</td>
<td>A</td>
<td>3</td>
<td>2</td>
<td>15,15,16</td>
<td>0.48</td>
</tr>
<tr>
<td>2</td>
<td>NGS</td>
<td>A</td>
<td>4</td>
<td>1</td>
<td>18,18,19</td>
<td>0.65</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>1</td>
<td>G6S</td>
<td>A</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>0/6/22/26</td>
<td>0/1/1/1</td>
</tr>
<tr>
<td>2</td>
<td>NGS</td>
<td>A</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>0/10/26/30</td>
<td>0/1/1/1</td>
</tr>
<tr>
<td>1</td>
<td>G6S</td>
<td>A</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>0/6/22/26</td>
<td>0/1/1/1</td>
</tr>
<tr>
<td>2</td>
<td>NGS</td>
<td>A</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>0/10/26/30</td>
<td>0/1/1/1</td>
</tr>
</tbody>
</table>

There are no bond length outliers.

All (4) bond angle 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(°)</th>
<th>Ideal(°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>1</td>
<td>G6S</td>
<td>O6-C6-C5</td>
<td>2.18</td>
<td>111.80</td>
<td>107.64</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>3</td>
<td>G6S</td>
<td>O6-C6-C5</td>
<td>2.18</td>
<td>111.80</td>
<td>107.64</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>4</td>
<td>NGS</td>
<td>O6-C6-C5</td>
<td>2.21</td>
<td>111.81</td>
<td>107.69</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>2</td>
<td>NGS</td>
<td>O6-C6-C5</td>
<td>2.21</td>
<td>111.81</td>
<td>107.69</td>
</tr>
</tbody>
</table>

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 8 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>1</td>
<td>A</td>
<td>1</td>
<td>G6S</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>2</td>
<td>NGS</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>A</td>
<td>3</td>
<td>G6S</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>4</td>
<td>NGS</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>
4.7 Other polymers

There are no such residues in this entry.

4.8 Polymer linkage issues

There are no chain breaks in this entry.