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

Oct 5, 2023 – 04:09 AM EDT

| | | |
|---|---|---|
| PDB ID | : | 6V48 |
| Title | : | The crystal structure of hemagglutinin from A/mallard/Gurjev/263/1982 (H14N5) |
| Authors | : | Yang, H.; Stevens, J. |
| Deposited on | : | 2019-11-27 |
| Resolution | : | 3.00 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 | : | FAILED |
| Mogul | : | 1.8.5 (274361), CSD as541be (2020) |
| Xtriage (Phenix) | : | 1.13 |
| EDS | : | FAILED |
| Percentile statistics | : | 20191225.v01 (using entries in the PDB archive December 25th 2019) |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.35.1 |

# 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 3.00 Å.

There are no overall percentile quality scores available for this entry.

MolProbity and EDS failed to run properly - the sequence quality summary graphics cannot be shown.

## 2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 23322 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 Hemagglutinin HA1 chain.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 319 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 2442 | 1519 | 436 | 476 | 11 | | | |
| 1 | C | 319 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 2442 | 1519 | 436 | 476 | 11 | | | |
| 1 | E | 319 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 2442 | 1519 | 436 | 476 | 11 | | | |
| 1 | G | 319 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 2442 | 1519 | 436 | 476 | 11 | | | |
| 1 | I | 319 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 2442 | 1519 | 436 | 476 | 11 | | | |
| 1 | K | 319 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 2442 | 1519 | 436 | 476 | 11 | | | |

There are 30 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| A | -3 | ALA | - | expression tag | UNP P26136 |
| A | -2 | ASP | - | expression tag | UNP P26136 |
| A | -1 | PRO | - | expression tag | UNP P26136 |
| A | 0 | GLY | - | expression tag | UNP P26136 |
| A | 65 | ASP | HIS | conflict | UNP P26136 |
| C | -3 | ALA | - | expression tag | UNP P26136 |
| C | -2 | ASP | - | expression tag | UNP P26136 |
| C | -1 | PRO | - | expression tag | UNP P26136 |
| C | 0 | GLY | - | expression tag | UNP P26136 |
| C | 65 | ASP | HIS | conflict | UNP P26136 |
| E | -3 | ALA | - | expression tag | UNP P26136 |
| E | -2 | ASP | - | expression tag | UNP P26136 |
| E | -1 | PRO | - | expression tag | UNP P26136 |
| E | 0 | GLY | - | expression tag | UNP P26136 |
| E | 65 | ASP | HIS | conflict | UNP P26136 |
| G | -3 | ALA | - | expression tag | UNP P26136 |
| G | -2 | ASP | - | expression tag | UNP P26136 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| G | -1 | PRO | - | expression tag | UNP P26136 |
| G | 0 | GLY | - | expression tag | UNP P26136 |
| G | 65 | ASP | HIS | conflict | UNP P26136 |
| I | -3 | ALA | - | expression tag | UNP P26136 |
| I | -2 | ASP | - | expression tag | UNP P26136 |
| I | -1 | PRO | - | expression tag | UNP P26136 |
| I | 0 | GLY | - | expression tag | UNP P26136 |
| I | 65 | ASP | HIS | conflict | UNP P26136 |
| K | -3 | ALA | - | expression tag | UNP P26136 |
| K | -2 | ASP | - | expression tag | UNP P26136 |
| K | -1 | PRO | - | expression tag | UNP P26136 |
| K | 0 | GLY | - | expression tag | UNP P26136 |
| K | 65 | ASP | HIS | conflict | UNP P26136 |

- Molecule 2 is a protein called Hemagglutinin HA2 chain.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | B | 168 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1375 | 849 | 247 | 275 | 4 | | | |
| 2 | D | 168 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1375 | 849 | 247 | 275 | 4 | | | |
| 2 | F | 168 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1375 | 849 | 247 | 275 | 4 | | | |
| 2 | H | 168 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1375 | 849 | 247 | 275 | 4 | | | |
| 2 | J | 168 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1375 | 849 | 247 | 275 | 4 | | | |
| 2 | L | 168 | Total | C | N | O | S | 0 | 0 | 0 |
| | | | 1375 | 849 | 247 | 275 | 4 | | | |

There are 42 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| B | 182 | SER | - | expression tag | UNP P26136 |
| B | 183 | GLY | - | expression tag | UNP P26136 |
| B | 184 | ARG | - | expression tag | UNP P26136 |
| B | 185 | LEU | - | expression tag | UNP P26136 |
| B | 186 | VAL | - | expression tag | UNP P26136 |
| B | 187 | PRO | - | expression tag | UNP P26136 |
| B | 188 | ARG | - | expression tag | UNP P26136 |
| D | 182 | SER | - | expression tag | UNP P26136 |
| D | 183 | GLY | - | expression tag | UNP P26136 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| D | 184 | ARG | - | expression tag | UNP P26136 |
| D | 185 | LEU | - | expression tag | UNP P26136 |
| D | 186 | VAL | - | expression tag | UNP P26136 |
| D | 187 | PRO | - | expression tag | UNP P26136 |
| D | 188 | ARG | - | expression tag | UNP P26136 |
| F | 182 | SER | - | expression tag | UNP P26136 |
| F | 183 | GLY | - | expression tag | UNP P26136 |
| F | 184 | ARG | - | expression tag | UNP P26136 |
| F | 185 | LEU | - | expression tag | UNP P26136 |
| F | 186 | VAL | - | expression tag | UNP P26136 |
| F | 187 | PRO | - | expression tag | UNP P26136 |
| F | 188 | ARG | - | expression tag | UNP P26136 |
| H | 182 | SER | - | expression tag | UNP P26136 |
| H | 183 | GLY | - | expression tag | UNP P26136 |
| H | 184 | ARG | - | expression tag | UNP P26136 |
| H | 185 | LEU | - | expression tag | UNP P26136 |
| H | 186 | VAL | - | expression tag | UNP P26136 |
| H | 187 | PRO | - | expression tag | UNP P26136 |
| H | 188 | ARG | - | expression tag | UNP P26136 |
| J | 182 | SER | - | expression tag | UNP P26136 |
| J | 183 | GLY | - | expression tag | UNP P26136 |
| J | 184 | ARG | - | expression tag | UNP P26136 |
| J | 185 | LEU | - | expression tag | UNP P26136 |
| J | 186 | VAL | - | expression tag | UNP P26136 |
| J | 187 | PRO | - | expression tag | UNP P26136 |
| J | 188 | ARG | - | expression tag | UNP P26136 |
| L | 182 | SER | - | expression tag | UNP P26136 |
| L | 183 | GLY | - | expression tag | UNP P26136 |
| L | 184 | ARG | - | expression tag | UNP P26136 |
| L | 185 | LEU | - | expression tag | UNP P26136 |
| L | 186 | VAL | - | expression tag | UNP P26136 |
| L | 187 | PRO | - | expression tag | UNP P26136 |
| L | 188 | ARG | - | expression tag | UNP P26136 |

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

| Mol | Chain | Residues | Atoms | | | | ZeroOcc | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 3 | M | 2 | Total | C | N | O | 0 | 0 | 0 |
| | | | 28 | 16 | 2 | 10 | | | |
| 3 | N | 2 | Total | C | N | O | 0 | 0 | 0 |
| | | | 28 | 16 | 2 | 10 | | | |

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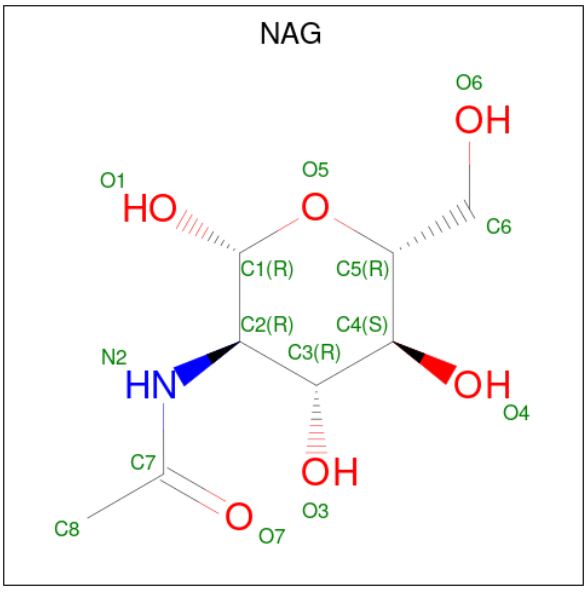
| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf | Trace |
|---|---|---|---|---|---|---|
| 3 | O | 2 | Total C N O<br>28 16 2 10 | 0 | 0 | 0 |
| 3 | P | 2 | Total C N O<br>28 16 2 10 | 0 | 0 | 0 |
| 3 | Q | 2 | Total C N O<br>28 16 2 10 | 0 | 0 | 0 |
| 3 | R | 2 | Total C N O<br>28 16 2 10 | 0 | 0 | 0 |
| 3 | S | 2 | Total C N O<br>28 16 2 10 | 0 | 0 | 0 |
| 3 | T | 2 | Total C N O<br>28 16 2 10 | 0 | 0 | 0 |
| 3 | U | 2 | Total C N O<br>28 16 2 10 | 0 | 0 | 0 |
| 3 | V | 2 | Total C N O<br>28 16 2 10 | 0 | 0 | 0 |
| 3 | W | 2 | Total C N O<br>28 16 2 10 | 0 | 0 | 0 |
| 3 | X | 2 | Total C N O<br>28 16 2 10 | 0 | 0 | 0 |

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).




| Mol | Chain | Residues | Atoms | ZeroOcc | AltConf |
|---|---|---|---|---|---|
| 4 | A | 1 | Total C N O<br>14 8 1 5 | 0 | 0 |

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| Mol | Chain | Residues | Atoms | | | | ZeroOcc | AltConf |
|---|---|---|---|---|---|---|---|---|
| 4 | C | 1 | Total | C | N | O | 0 | 0 |
| | | | 14 | 8 | 1 | 5 | | |
| 4 | E | 1 | Total | C | N | O | 0 | 0 |
| | | | 14 | 8 | 1 | 5 | | |
| 4 | G | 1 | Total | C | N | O | 0 | 0 |
| | | | 14 | 8 | 1 | 5 | | |
| 4 | I | 1 | Total | C | N | O | 0 | 0 |
| | | | 14 | 8 | 1 | 5 | | |
| 4 | K | 1 | Total | C | N | O | 0 | 0 |
| | | | 14 | 8 | 1 | 5 | | |

MolProbity and EDS failed to run properly - this section is therefore empty.

# 3 Data and refinement statistics (i)

EDS failed to run properly - this section is therefore incomplete.

| Property | Value | Source |
|---|---|---|
| Space group | C 1 2 1 | Depositor |
| Cell constants<br>a, b, c, $\alpha$, $\beta$, $\gamma$ | 174.66Å 100.97Å 236.07Å<br>90.00° 103.93° 90.00° | Depositor |
| Resolution (Å) | 45.11 – 3.00 | Depositor |
| % Data completeness<br>(in resolution range) | 99.1 (45.11-3.00) | Depositor |
| $R_{merge}$ | (Not available) | Depositor |
| $R_{sym}$ | 0.12 | Depositor |
| $< I/\sigma(I) >$ [1] | 2.22 (at 3.01Å) | Xtriage |
| Refinement program | PHENIX 1.14_3260 | Depositor |
| R, $R_{free}$ | 0.224 , 0.260 | Depositor |
| Wilson B-factor (Å$^2$) | 44.3 | Xtriage |
| Anisotropy | 0.077 | Xtriage |
| L-test for twinning[2] | $< \|L\| > = 0.48$, $< L^2 > = 0.31$ | Xtriage |
| Estimated twinning fraction | 0.399 for 1/2*h+3/2*k,1/2*h-1/2*k,-1/2*h-1/2*k-l<br>0.399 for 1/2*h-3/2*k,-1/2*h-1/2*k,-1/2*h+1/2*k-l | Xtriage |
| Total number of atoms | 23322 | wwPDB-VP |
| Average B, all atoms (Å$^2$) | 60.0 | wwPDB-VP |

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 37.75 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 4.0936e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[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.

# 4 Model quality

## 4.1 Standard geometry

MolProbity failed to run properly - this section is therefore empty.

## 4.2 Too-close contacts

MolProbity failed to run properly - this section is therefore empty.

## 4.3 Torsion angles

### 4.3.1 Protein backbone

MolProbity failed to run properly - this section is therefore empty.

### 4.3.2 Protein sidechains

MolProbity failed to run properly - this section is therefore empty.

### 4.3.3 RNA

MolProbity failed to run properly - this section is therefore empty.

## 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

24 monosaccharides 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 | NAG | M | 1 | 1,3 | 14,14,15 | 0.61 | 0 | 17,19,21 | 0.53 | 0 |
| 3 | NAG | M | 2 | 3 | 14,14,15 | 1.19 | 1 (7%) | 17,19,21 | 1.55 | 2 (11%) |
| 3 | NAG | N | 1 | 2,3 | 14,14,15 | 0.77 | 1 (7%) | 17,19,21 | 0.61 | 0 |
| 3 | NAG | N | 2 | 3 | 14,14,15 | 0.80 | 1 (7%) | 17,19,21 | 0.43 | 0 |
| 3 | NAG | O | 1 | 1,3 | 14,14,15 | 0.62 | 0 | 17,19,21 | 0.58 | 0 |
| 3 | NAG | O | 2 | 3 | 14,14,15 | 0.83 | 1 (7%) | 17,19,21 | 0.78 | 0 |
| 3 | NAG | P | 1 | 2,3 | 14,14,15 | 0.66 | 1 (7%) | 17,19,21 | 0.70 | 0 |
| 3 | NAG | P | 2 | 3 | 14,14,15 | 0.64 | 0 | 17,19,21 | 0.47 | 0 |
| 3 | NAG | Q | 1 | 1,3 | 14,14,15 | 0.57 | 0 | 17,19,21 | 0.50 | 0 |
| 3 | NAG | Q | 2 | 3 | 14,14,15 | 1.00 | 1 (7%) | 17,19,21 | 0.88 | 1 (5%) |
| 3 | NAG | R | 1 | 2,3 | 14,14,15 | 0.82 | 1 (7%) | 17,19,21 | 0.70 | 0 |
| 3 | NAG | R | 2 | 3 | 14,14,15 | 0.71 | 1 (7%) | 17,19,21 | 0.43 | 0 |
| 3 | NAG | S | 1 | 1,3 | 14,14,15 | 0.62 | 0 | 17,19,21 | 0.56 | 0 |
| 3 | NAG | S | 2 | 3 | 14,14,15 | 0.92 | 1 (7%) | 17,19,21 | 0.72 | 0 |
| 3 | NAG | T | 1 | 2,3 | 14,14,15 | 0.72 | 1 (7%) | 17,19,21 | 0.69 | 0 |
| 3 | NAG | T | 2 | 3 | 14,14,15 | 0.67 | 0 | 17,19,21 | 0.46 | 0 |
| 3 | NAG | U | 1 | 1,3 | 14,14,15 | 0.55 | 0 | 17,19,21 | 0.56 | 0 |
| 3 | NAG | U | 2 | 3 | 14,14,15 | 0.87 | 1 (7%) | 17,19,21 | 0.79 | 1 (5%) |
| 3 | NAG | V | 1 | 2,3 | 14,14,15 | 0.70 | 1 (7%) | 17,19,21 | 0.71 | 0 |
| 3 | NAG | V | 2 | 3 | 14,14,15 | 0.76 | 0 | 17,19,21 | 0.44 | 0 |
| 3 | NAG | W | 1 | 1,3 | 14,14,15 | 0.62 | 0 | 17,19,21 | 0.55 | 0 |
| 3 | NAG | W | 2 | 3 | 14,14,15 | 1.09 | 1 (7%) | 17,19,21 | 0.88 | 1 (5%) |
| 3 | NAG | X | 1 | 2,3 | 14,14,15 | 0.76 | 1 (7%) | 17,19,21 | 0.71 | 0 |
| 3 | NAG | X | 2 | 3 | 14,14,15 | 0.84 | 1 (7%) | 17,19,21 | 0.43 | 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 | NAG | M | 1 | 1,3 | - | 2/6/23/26 | 0/1/1/1 |
| 3 | NAG | M | 2 | 3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | N | 1 | 2,3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | N | 2 | 3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | O | 1 | 1,3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | O | 2 | 3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | P | 1 | 2,3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | P | 2 | 3 | - | 2/6/23/26 | 0/1/1/1 |

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| Mol | Type | Chain | Res | Link | Chirals | Torsions | Rings |
|---|---|---|---|---|---|---|---|
| 3 | NAG | Q | 1 | 1,3 | - | 2/6/23/26 | 0/1/1/1 |
| 3 | NAG | Q | 2 | 3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | R | 1 | 2,3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | R | 2 | 3 | - | 2/6/23/26 | 0/1/1/1 |
| 3 | NAG | S | 1 | 1,3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | S | 2 | 3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | T | 1 | 2,3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | T | 2 | 3 | - | 2/6/23/26 | 0/1/1/1 |
| 3 | NAG | U | 1 | 1,3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | U | 2 | 3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | V | 1 | 2,3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | V | 2 | 3 | - | 2/6/23/26 | 0/1/1/1 |
| 3 | NAG | W | 1 | 1,3 | - | 2/6/23/26 | 0/1/1/1 |
| 3 | NAG | W | 2 | 3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | X | 1 | 2,3 | - | 0/6/23/26 | 0/1/1/1 |
| 3 | NAG | X | 2 | 3 | - | 2/6/23/26 | 0/1/1/1 |

The worst 5 of 15 bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|---|---|---|---|---|---|---|---|
| 3 | M | 2 | NAG | O5-C1 | -4.25 | 1.36 | 1.43 |
| 3 | W | 2 | NAG | O5-C1 | -3.80 | 1.37 | 1.43 |
| 3 | Q | 2 | NAG | O5-C1 | -3.36 | 1.38 | 1.43 |
| 3 | S | 2 | NAG | O5-C1 | -3.09 | 1.38 | 1.43 |
| 3 | U | 2 | NAG | O5-C1 | -2.77 | 1.39 | 1.43 |

All (5) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 3 | M | 2 | NAG | C3-C4-C5 | 4.03 | 117.42 | 110.24 |
| 3 | M | 2 | NAG | C4-C3-C2 | 3.88 | 116.71 | 111.02 |
| 3 | W | 2 | NAG | C4-C3-C2 | 2.37 | 114.49 | 111.02 |
| 3 | Q | 2 | NAG | C4-C3-C2 | 2.29 | 114.37 | 111.02 |
| 3 | U | 2 | NAG | C4-C3-C2 | 2.15 | 114.17 | 111.02 |

There are no chirality outliers.

5 of 16 torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 3 | R | 2 | NAG | O5-C5-C6-O6 |

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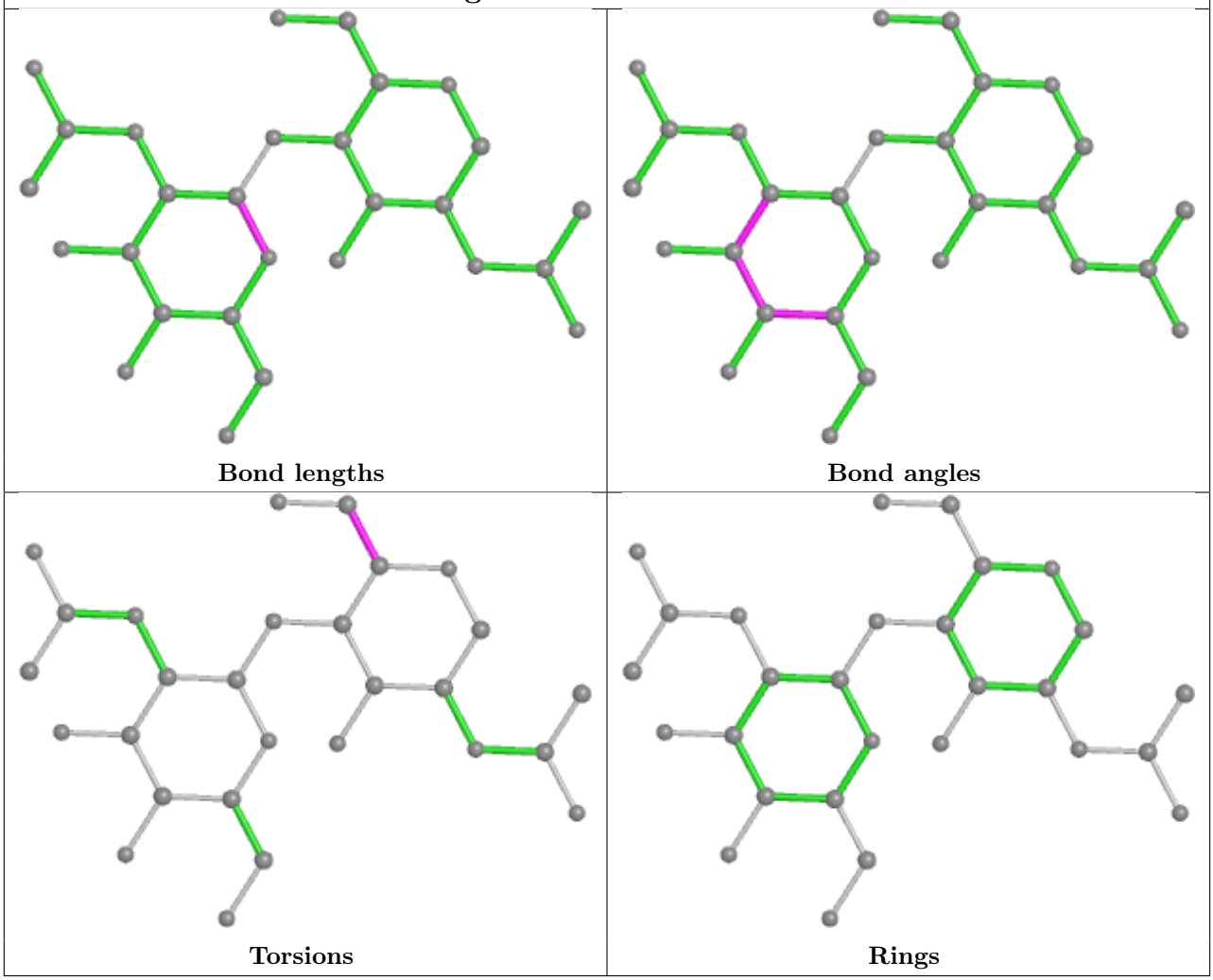
| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 3 | T | 2 | NAG | O5-C5-C6-O6 |
| 3 | P | 2 | NAG | O5-C5-C6-O6 |
| 3 | T | 2 | NAG | C4-C5-C6-O6 |
| 3 | P | 2 | NAG | C4-C5-C6-O6 |

There are no ring outliers.

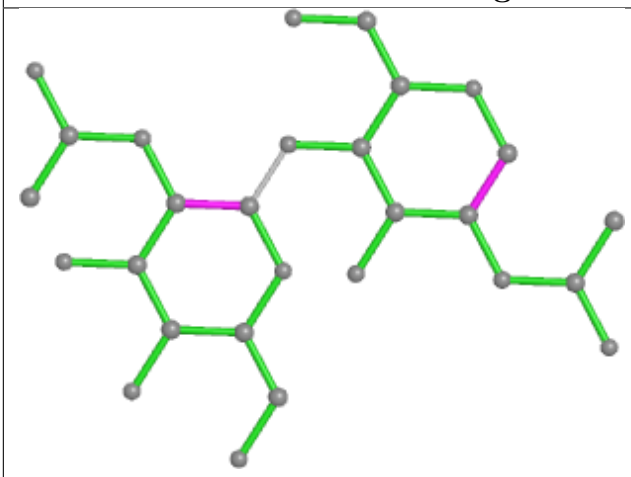
No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

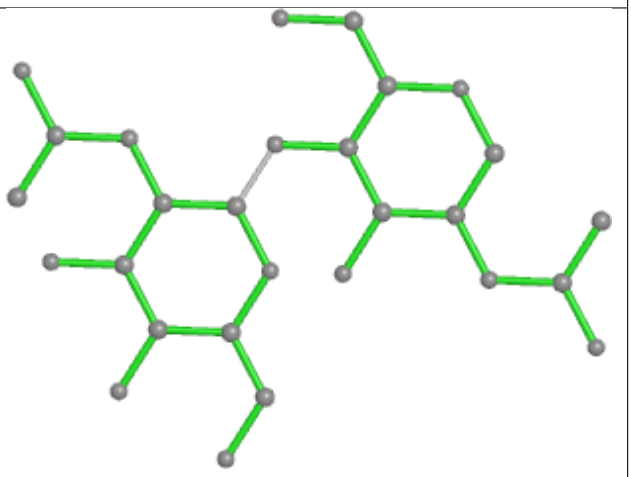
**Oligosaccharide Chain M**



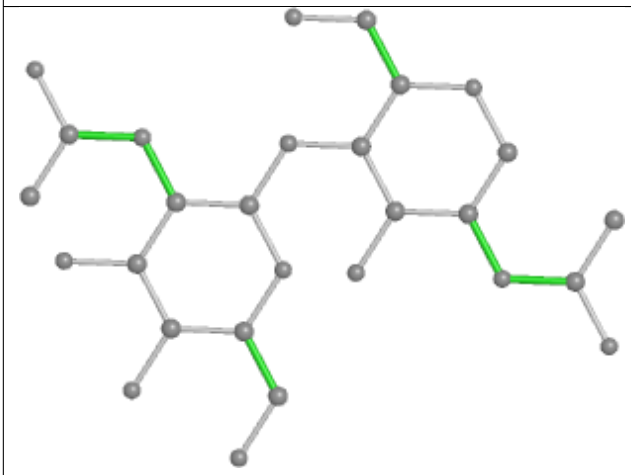
**Oligosaccharide Chain N**



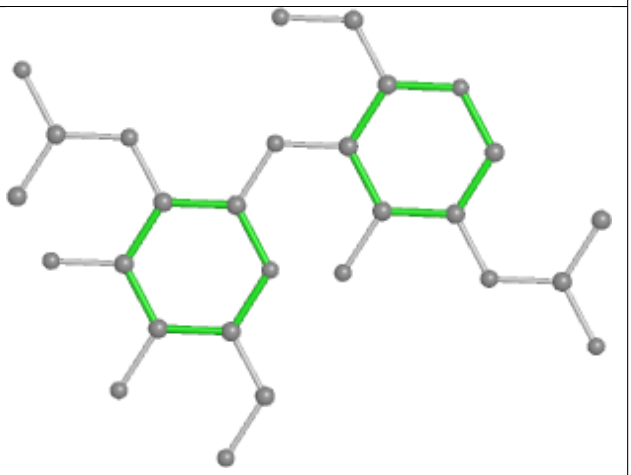
**Bond lengths**



**Bond angles**

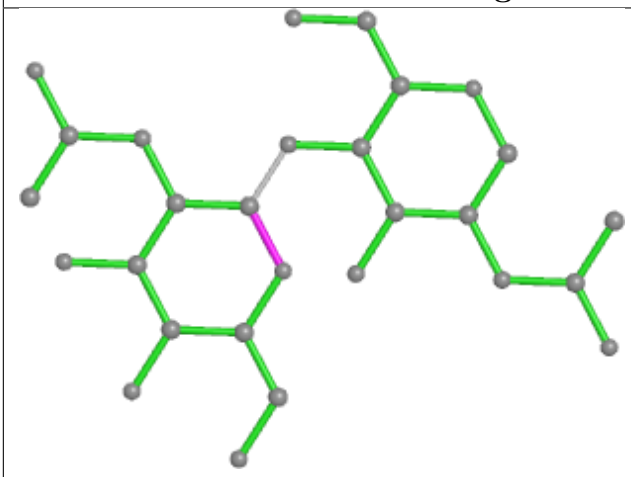


**Torsions**

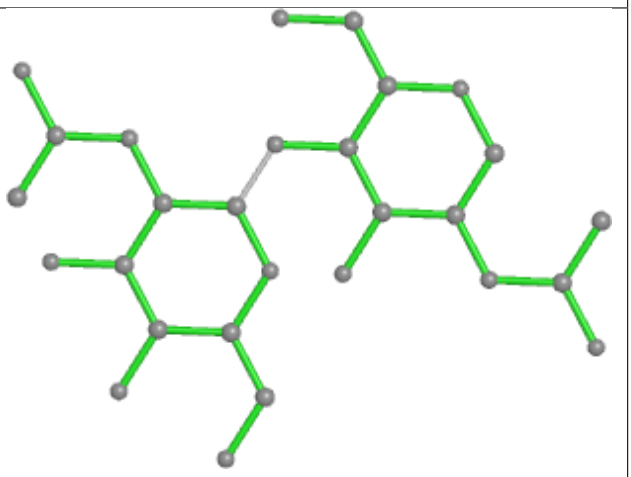


**Rings**

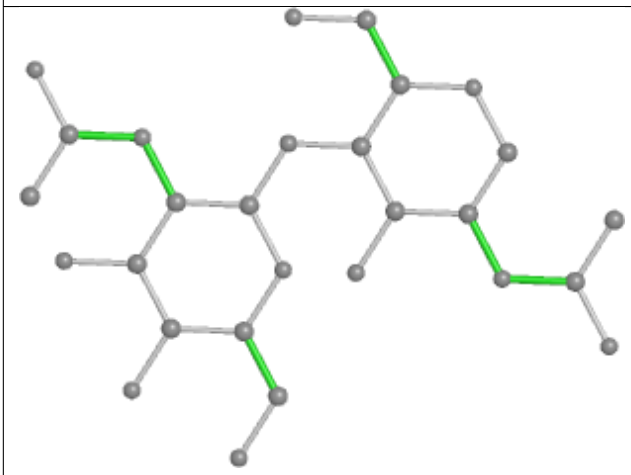
**Oligosaccharide Chain O**



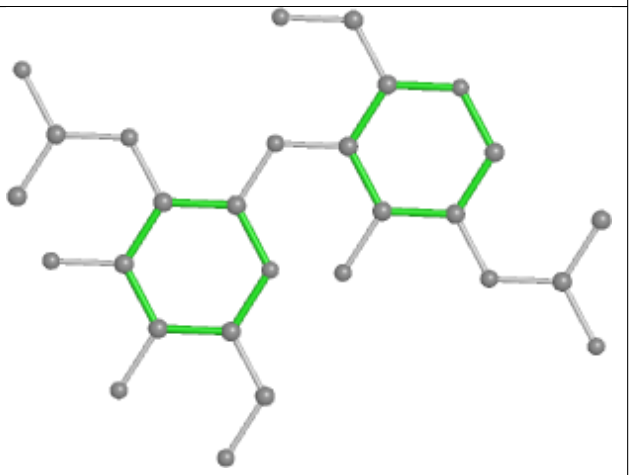
**Bond lengths**



**Bond angles**

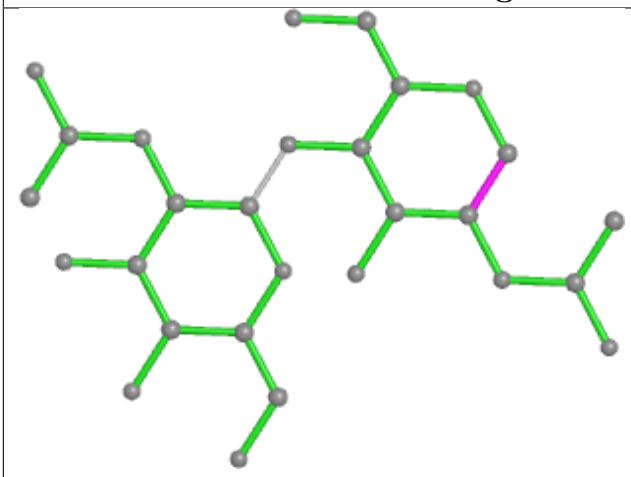


**Torsions**

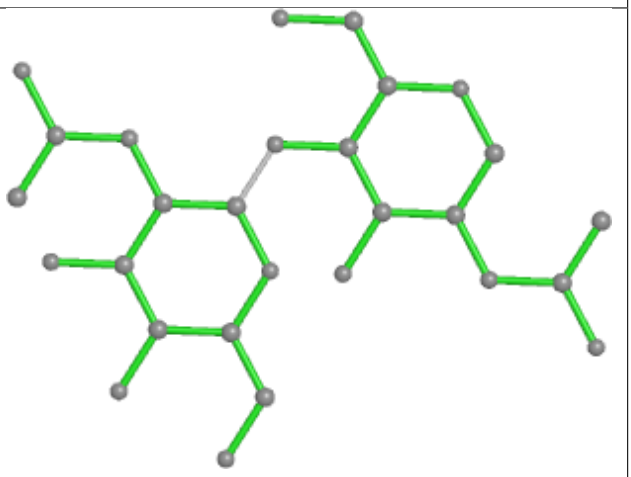


**Rings**

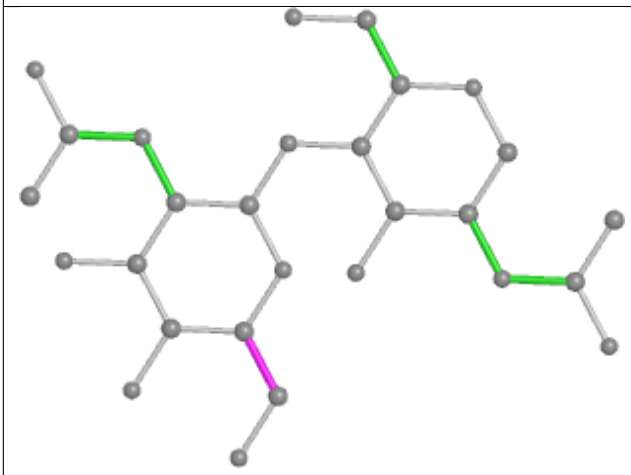
**Oligosaccharide Chain P**



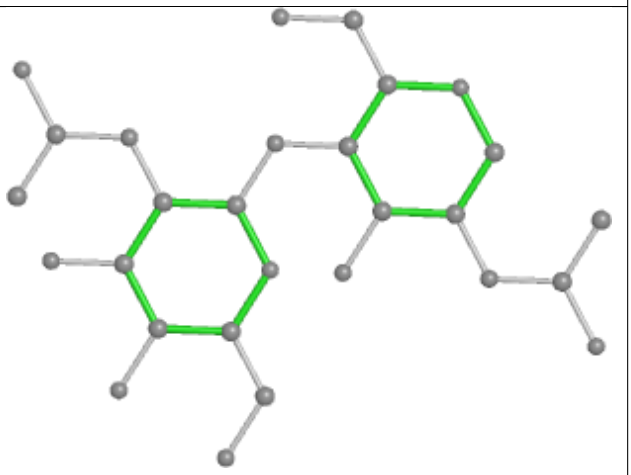
**Bond lengths**



**Bond angles**

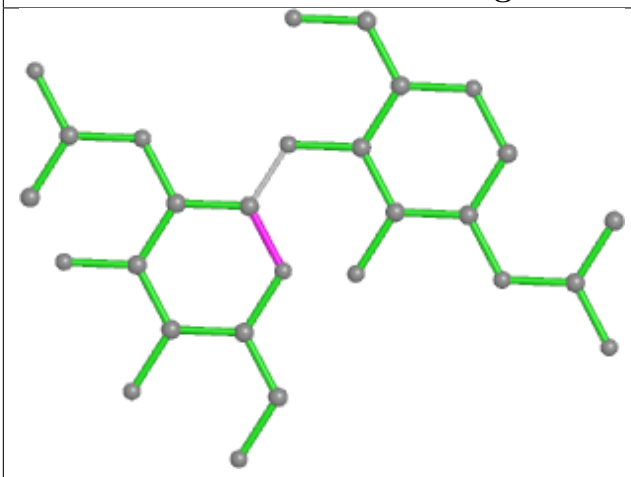


**Torsions**

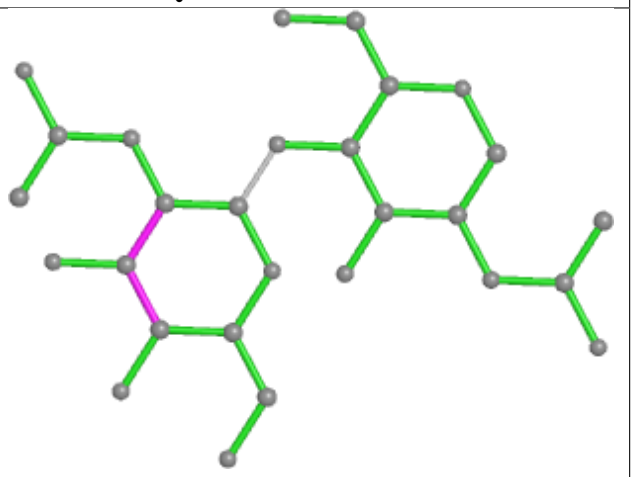


**Rings**

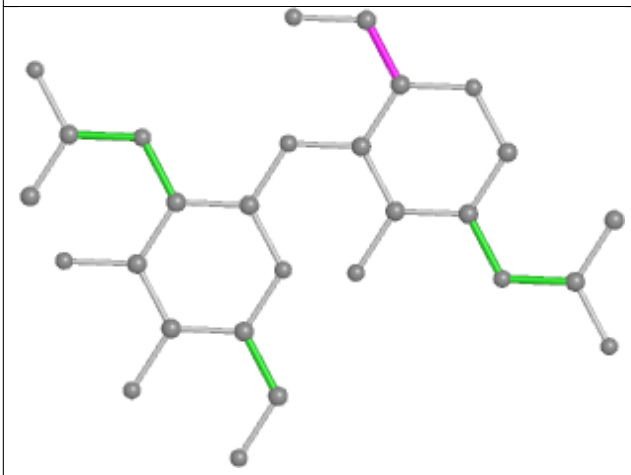
**Oligosaccharide Chain Q**



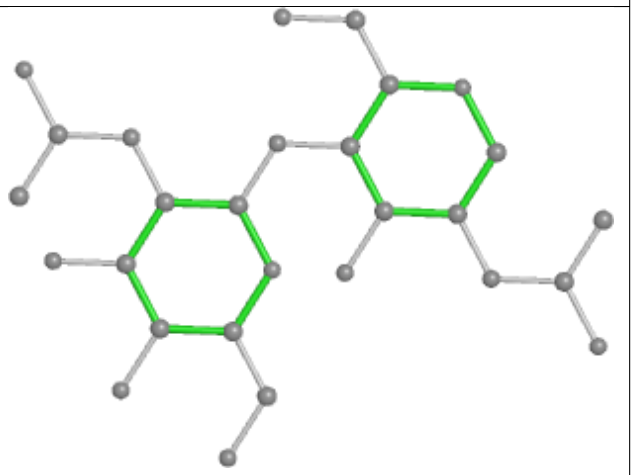
**Bond lengths**



**Bond angles**

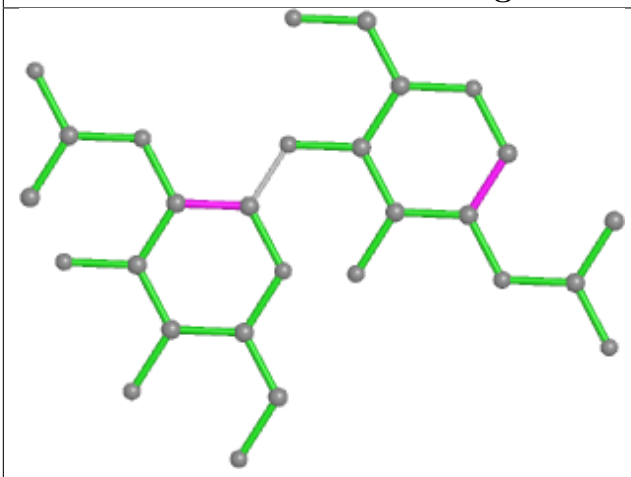


**Torsions**

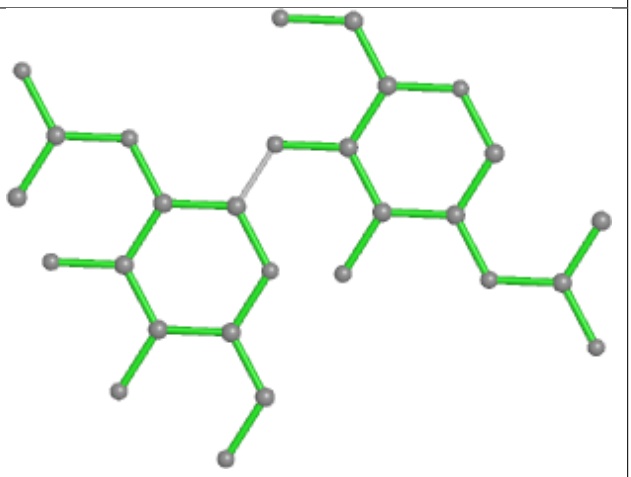


**Rings**

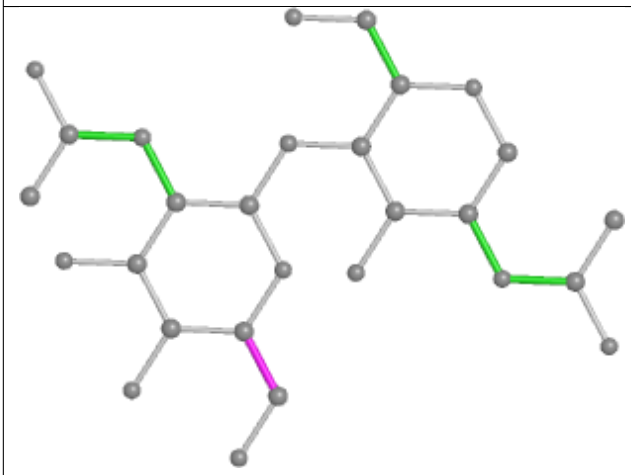
**Oligosaccharide Chain R**



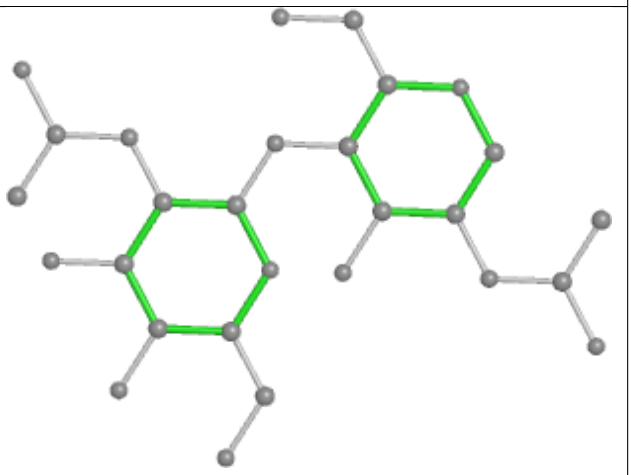
**Bond lengths**



**Bond angles**

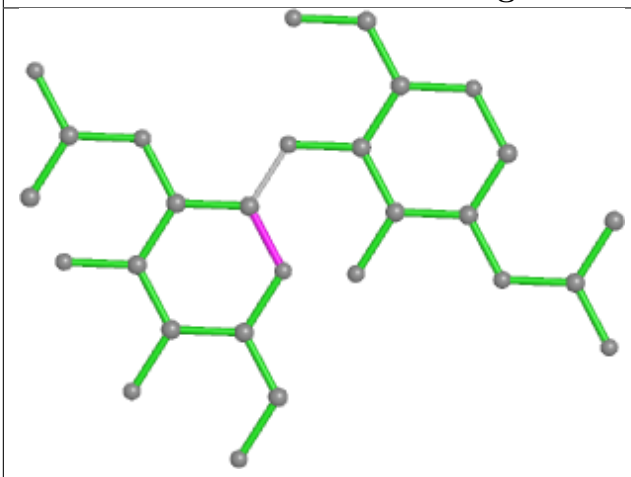


**Torsions**

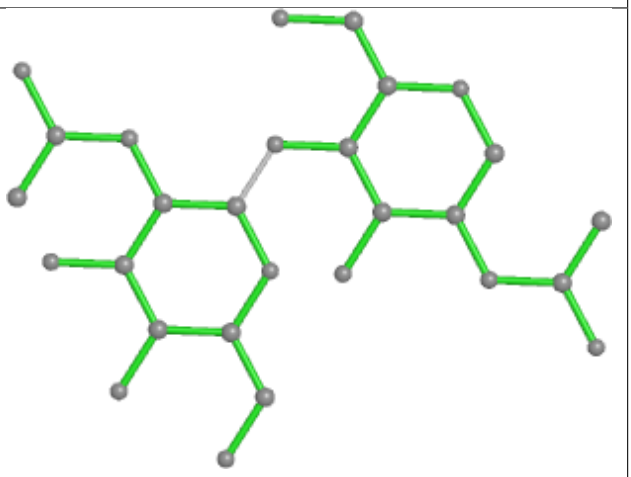


**Rings**

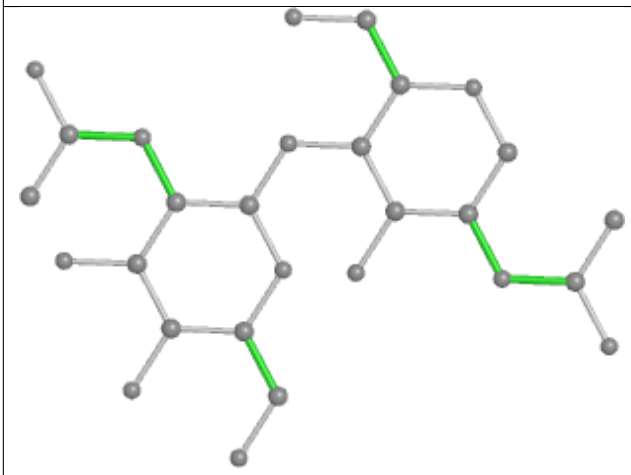
**Oligosaccharide Chain S**



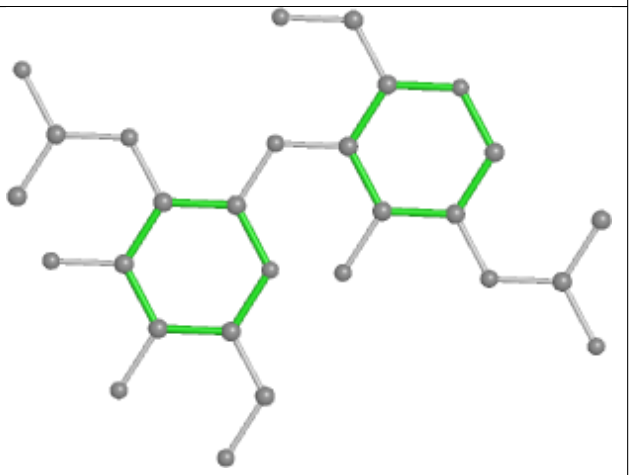
**Bond lengths**



**Bond angles**

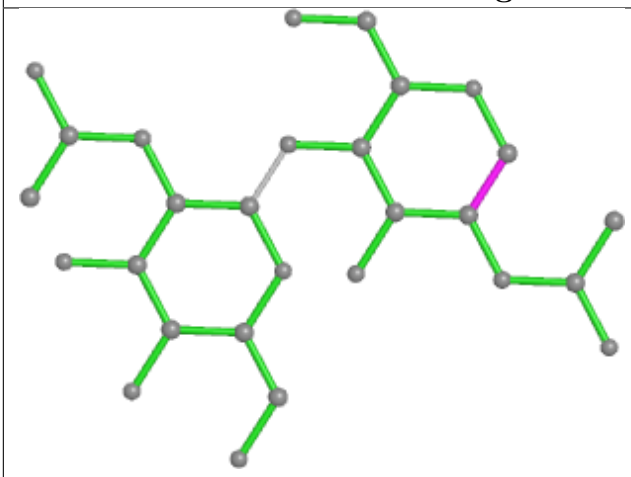


**Torsions**

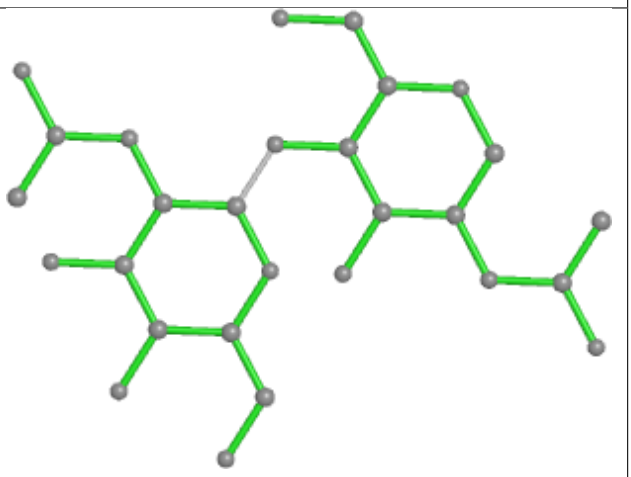


**Rings**

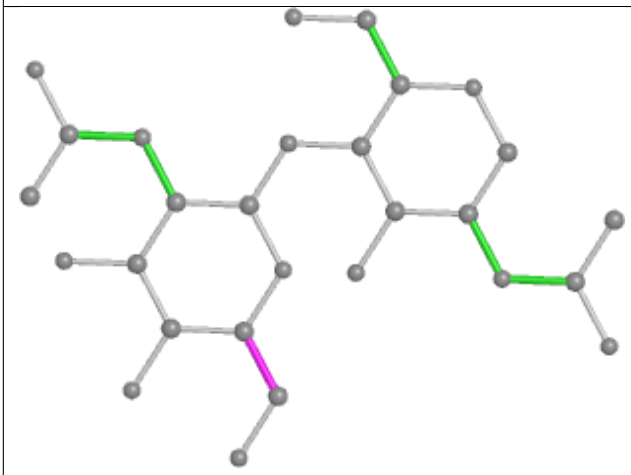
**Oligosaccharide Chain T**



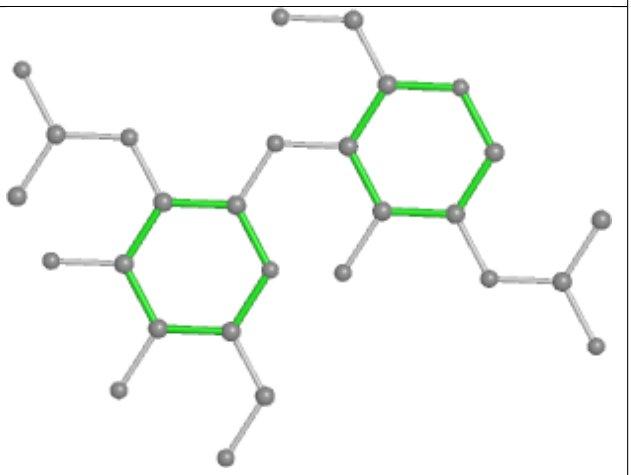
**Bond lengths**



**Bond angles**

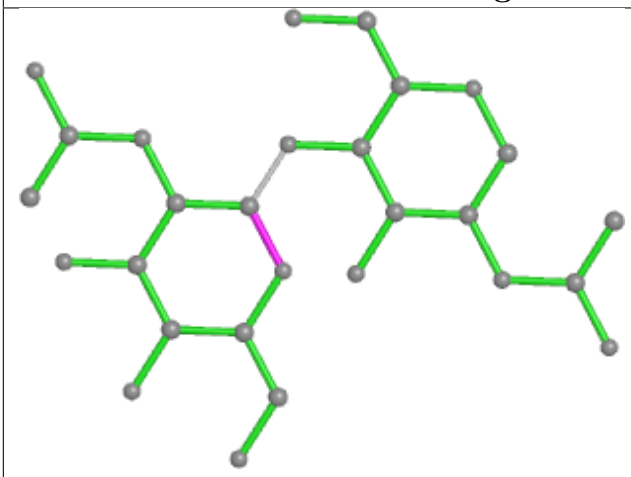


**Torsions**

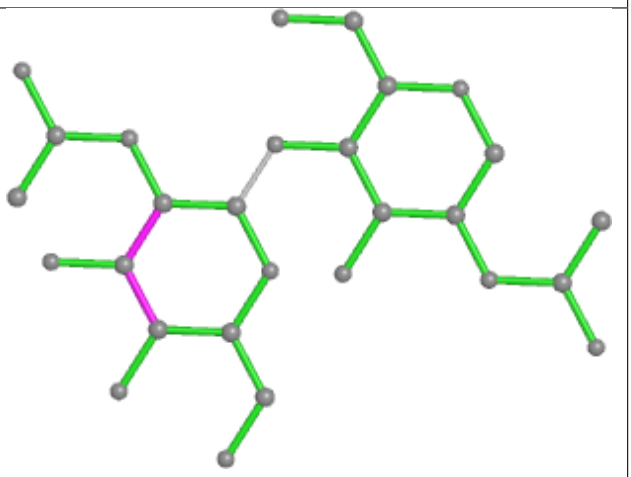


**Rings**

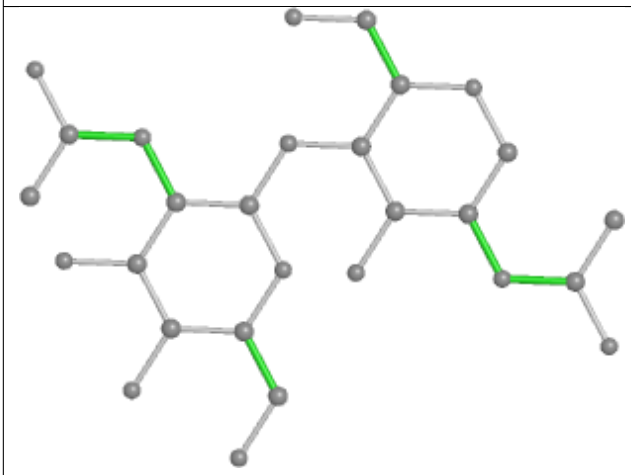
**Oligosaccharide Chain U**



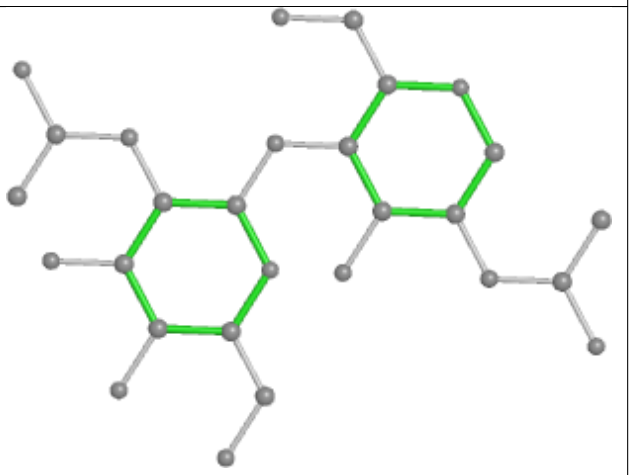
**Bond lengths**



**Bond angles**

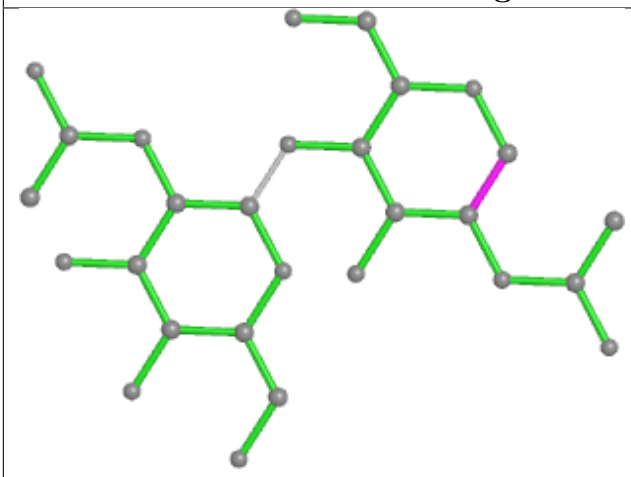


**Torsions**

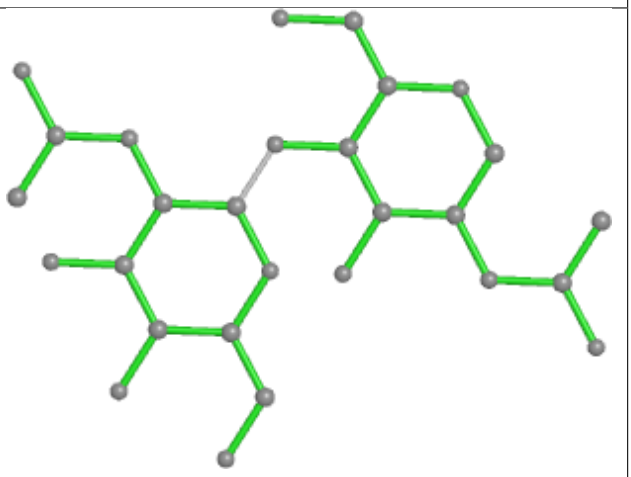


**Rings**

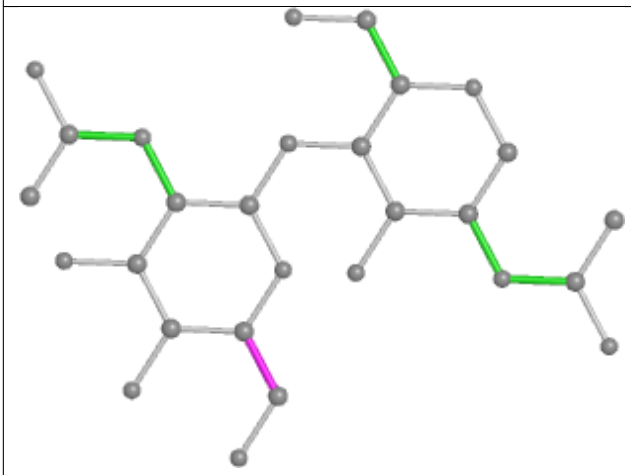
**Oligosaccharide Chain V**



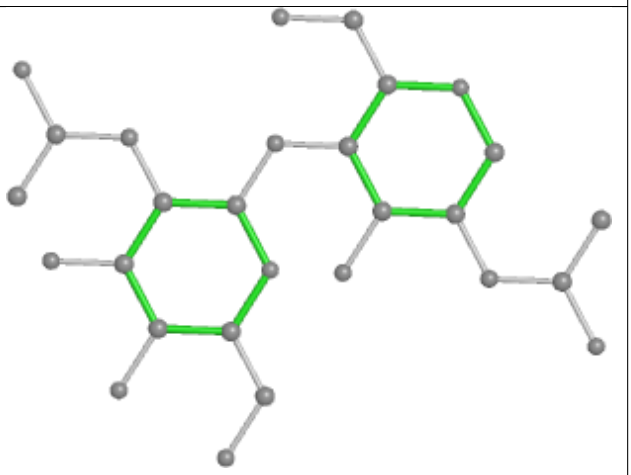
**Bond lengths**



**Bond angles**

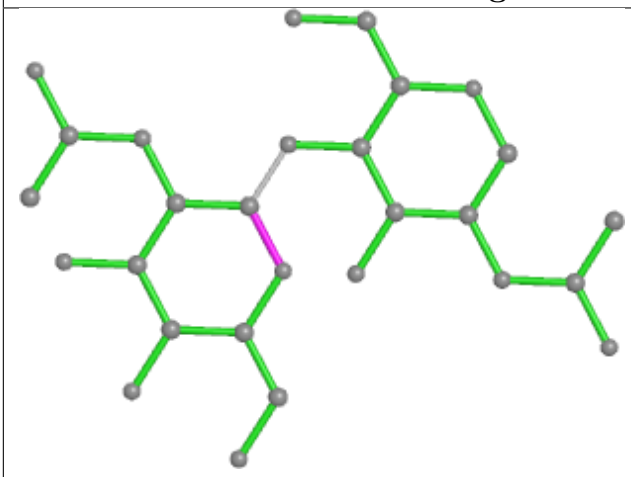


**Torsions**

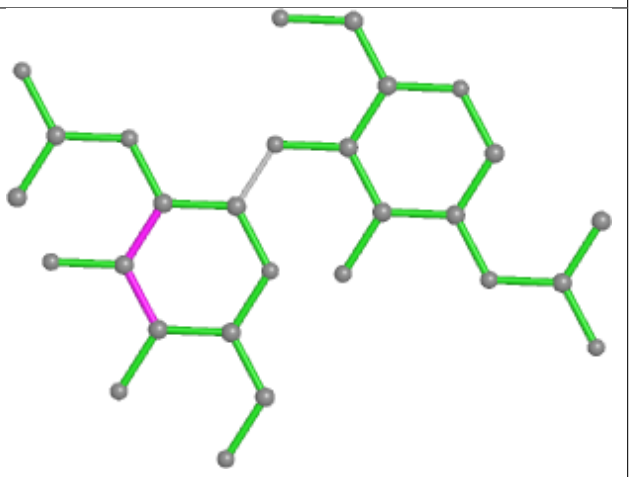


**Rings**

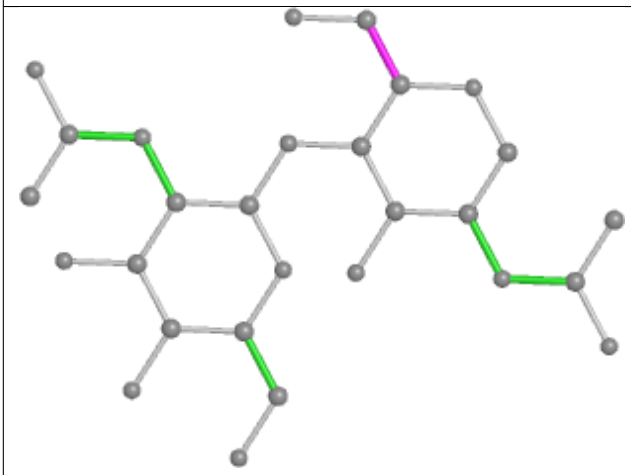
**Oligosaccharide Chain W**



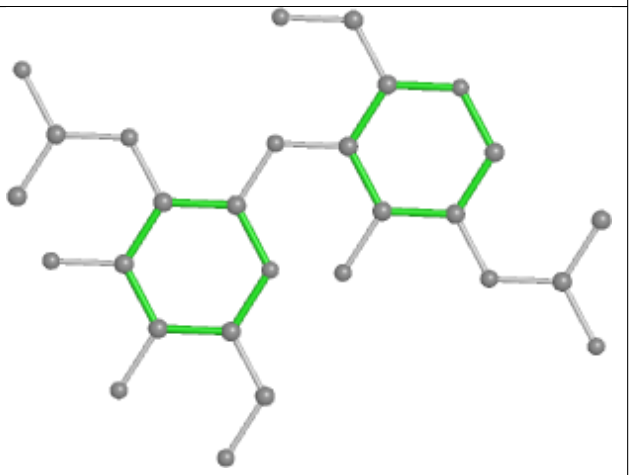
**Bond lengths**



**Bond angles**

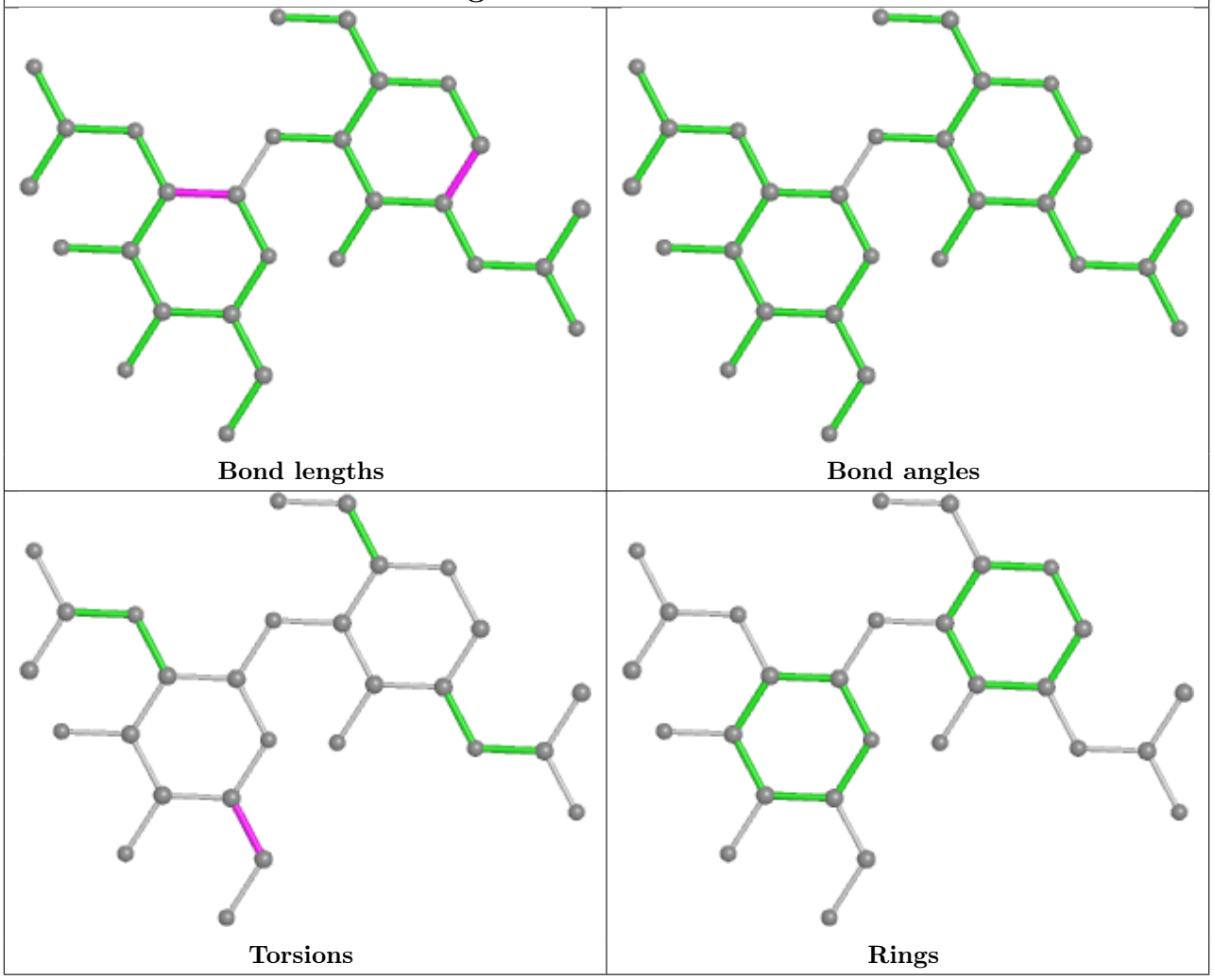


**Torsions**



**Rings**

**Oligosaccharide Chain X**




## 4.6 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 | $\#\|Z\| > 2$ |
| 4 | NAG | E | 501 | 1 | 14,14,15 | 0.77 | 1 (7%) | 17,19,21 | 1.17 | 2 (11%) |
| 4 | NAG | A | 501 | 1 | 14,14,15 | 0.82 | 1 (7%) | 17,19,21 | 1.21 | 2 (11%) |
| 4 | NAG | C | 501 | 1 | 14,14,15 | 0.81 | 1 (7%) | 17,19,21 | 0.94 | 1 (5%) |

| Mol | Type | Chain | Res | Link | Bond lengths | | | Bond angles | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Counts | RMSZ | $\#\|Z\|>2$ | Counts | RMSZ | $\#\|Z\|>2$ |
| 4 | NAG | G | 501 | 1 | 14,14,15 | 0.76 | 1 (7%) | 17,19,21 | 0.79 | 1 (5%) |
| 4 | NAG | K | 501 | 1 | 14,14,15 | 0.85 | 1 (7%) | 17,19,21 | 1.37 | 2 (11%) |
| 4 | NAG | I | 501 | 1 | 14,14,15 | 0.82 | 1 (7%) | 17,19,21 | 0.94 | 1 (5%) |

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 |
|---|---|---|---|---|---|---|---|
| 4 | NAG | E | 501 | 1 | - | 3/6/23/26 | 0/1/1/1 |
| 4 | NAG | A | 501 | 1 | - | 1/6/23/26 | 0/1/1/1 |
| 4 | NAG | C | 501 | 1 | - | 2/6/23/26 | 0/1/1/1 |
| 4 | NAG | G | 501 | 1 | - | 2/6/23/26 | 0/1/1/1 |
| 4 | NAG | K | 501 | 1 | - | 3/6/23/26 | 0/1/1/1 |
| 4 | NAG | I | 501 | 1 | - | 2/6/23/26 | 0/1/1/1 |

The worst 5 of 6 bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|---|---|---|---|---|---|---|---|
| 4 | A | 501 | NAG | C1-C2 | 2.78 | 1.56 | 1.52 |
| 4 | K | 501 | NAG | C1-C2 | 2.71 | 1.56 | 1.52 |
| 4 | E | 501 | NAG | C1-C2 | 2.48 | 1.56 | 1.52 |
| 4 | I | 501 | NAG | C1-C2 | 2.44 | 1.56 | 1.52 |
| 4 | C | 501 | NAG | C1-C2 | 2.40 | 1.55 | 1.52 |

The worst 5 of 9 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 4 | K | 501 | NAG | C2-N2-C7 | 3.67 | 128.13 | 122.90 |
| 4 | K | 501 | NAG | C1-O5-C5 | 3.40 | 116.80 | 112.19 |
| 4 | A | 501 | NAG | C2-N2-C7 | 3.19 | 127.45 | 122.90 |
| 4 | E | 501 | NAG | C1-O5-C5 | 3.07 | 116.35 | 112.19 |
| 4 | A | 501 | NAG | C1-O5-C5 | 2.81 | 116.00 | 112.19 |

There are no chirality outliers.

5 of 13 torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 4 | G | 501 | NAG | O5-C5-C6-O6 |

*Continued on next page...*

*Continued from previous page...*

| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 4 | I | 501 | NAG | O5-C5-C6-O6 |
| 4 | G | 501 | NAG | C4-C5-C6-O6 |
| 4 | I | 501 | NAG | C4-C5-C6-O6 |
| 4 | C | 501 | NAG | O5-C5-C6-O6 |

There are no ring outliers.

No monomer is involved in short contacts.

## 4.7 Other polymers (i)

There are no such residues in this entry.

## 4.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

# 5 Fit of model and data

## 5.1 Protein, DNA and RNA chains

EDS failed to run properly - this section is therefore empty.

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

EDS failed to run properly - this section is therefore empty.

## 5.3 Carbohydrates

EDS failed to run properly - this section is therefore empty.

## 5.4 Ligands

EDS failed to run properly - this section is therefore empty.

## 5.5 Other polymers

EDS failed to run properly - this section is therefore empty.