**Chem 250**

### In-class Quiz #2v2 Updated Key

This exam is composed of 16 questions.

*As discussed in the course syllabus, honesty and integrity are absolute essentials for this class. In fairness to others, dishonest behavior will be dealt with to the full extent of University regulations.*

*I hereby state that all answers on this exam are my own and that I have neither gained unfairly from others nor have I assisted others in obtaining an unfair advantage on this exam.*

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**Signature**

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**PERIODIC TABLE OF THE ELEMENTS**

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**Compound Structures**

**D-glucose**

![D-glucose](image1.png)

**β-D-Glucose**

![β-D-Glucose](image2.png)
1. (5 points) The geometry around the carbon of a carboxylic acid group is:
   1) tetrahedral  2) trigonal planar  3) linear  4) octahedral

   (2) It’s sp² hybridized – OWL  Chptr 19

2. (5 points) In general, which is more reactive, an ester or an anhydride?
   1) ester  2) anhydride

   (2) anhydride  Chptr 19

3. (8 points) The products of the following reaction are:

   HCOCH₂CH₃  +  NaOH  \rightarrow  

   1) sodium propanoate and water  
   2) ethanol and sodium formate  
   3) sodium acetate and formaldehyde  
   4) methane and sodium acetate  
   5) none of the above

   (2) hydrolysis of an ester  Chapter 19, p 480

4. (5 points) Which of the following is expected to have the highest melting point?

   1) CH₃(CH₂)₁₈COOH  
   2) CH₃(CH₂)₁₀COOH  
   3) it is not possible to predict

   (1) longer chain leads to more van der Waals interactions  OWL 18.4a

5. (5 points) Circle the stronger acid: Cl₃CCOOH  Cl₂CHCOOH

   Cl₃CCOOH is the stronger acid, since Cl is electron-withdrawing  
   OWL 18.5a
6. (8 points) Which two reactants would lead to the Fischer esterification reaction intermediate shown at right?

1) pentanal and formic acid
2) pentanoic acid and methanol
3) 1-pentanone and formic acid
4) hexanoic ester and water
5) none of the above

\[ \text{(2) OWL 18.5e} \]

7. (8 points) Draw the hemiacetal structure of the product formed by reaction of butanal with ethanol.

\[ \text{OWL 17 End of Chapter Q's - Question 9} \]

8. (8 points) Draw the structural formula for the major organic product of the reaction below:

\[ \text{(CH}_3\text{)}_3\text{CCOCCH}_3 + \text{water} \rightarrow \]

\[ \text{OWL19.3b} \]

9. (8 points) Draw the structural formulas for major products of the reaction below:

\[ \text{OWL 19.3d} \]
10. (8 points) Draw the structural formula for the major product of the reaction of 2,2-dimethylpropanoic acid and LiAlH₄ in water:

```
\[ \text{H}_2\text{O} \rightarrow \text{H}^+ + 2\text{H}^+ \]
```

OWL 18.5d

11. (5 points) Which of the following is/are aldose(s)? Circle any (or none) that apply.

```
CHO → CH₂OH
CHOH → CO
CH₂OH → CH₂OH
```

The first one is - glyceraldehyde. see p 494 and OWL 20.1b

Aldose → Aldehyde. Look for the one with the aldehyde

12. (5 points) Circle all of the stereocenters below (or write “none,” if appropriate).

```
CHO → CH₂OH → CH₂OH
CHOH → CO → CHOH
CH₂OH → CH₂OH → CH₂OH
```

Only the middle carbon of the first sugar. Chptr 20 p 494

Note that the symmetry of the 3rd molecule makes its middle carbon achiral.

13. (5 points) Circle the more favored form of the following aldopentose in solution.

```
The cyclic hemiacetal is more stable. OWL 20.2c
```
Questions 14 to 15 refer to the following molecule

\[
\begin{align*}
\text{CHO} & \quad \text{H} & \quad \text{H} & \quad \text{OH} & \quad \text{OH} & \quad \text{HCH}_2\text{OH} \\
\text{NH}_2 & \quad \text{OH} & \quad \text{H} & \quad \text{H} & \quad \text{H} & \quad \text{H}
\end{align*}
\]

14. (10 points) Draw one of the stable cyclic hemiacetals formed by the above molecule, paying attention to the stereochemistries of each atom.

![Diagram of cyclic hemiacetal](attachment:image.png)

**D-Mannosamine Chptr 20 p 499**

I put D-glucose in both its linear and cyclized forms on the front page to help both with this question and with the next. I was hoping that you could use that as an analogy to help in answering this question.

15. (5 points) The above molecule is which type of sugar?

1) D-sugar 2) L-sugar

(1) **Chptr 20**

16. (2 points) What is the course number of this class?

1) 111 2) 250 3) 496 4) 728

(2)