Chemistry 140C  
Whitesell  
Winter Quarter, 2014  
Final Exam, Monday March 17, 2014

_________________________  ___________________________  ___________________________
first name  middle initial  last name

Student ID Number

<table>
<thead>
<tr>
<th>Quest</th>
<th>Points</th>
<th>score</th>
<th>Regrade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Your answers to this exam are to be only your own work. You may use no written or electronic information during this test period other than the five pages of this exam. You may not use the back of any pages for answers. You may submit your exam for regrading if and only if you have made NO marks on the exam except for a star (*) ON THIS PAGE next to the number(s) of the question(s) you would like regarded and your signature(s) and check(s) below. You must place your exam in the drop box on the sixth floor of PAC Hall no later that midnight of the first day of classes for the Spring, 2014 quarter.

_________________________
your signature (read the above before signing)

To request regrading, sign below and check the appropriate box(es).

_________________________
your signature
I would like the questions marked with a star (*) regraded (check box at right)
If you feel that we have made an addition error in your score, check the box at the right
If we have recorded your grade on TED in error, check the box at the right
la. The correct order of reactivity of the following carboxylic acid derivatives (most reactive to the right) is:

☐ amide < thio ester < ester
☐ ester < thio ester < amide
☒ amide < ester < thio ester
☐ thio ester < amide < ester

b. In the average bond energy scheme the contribution of the π bond of a ketone is:

☐ 86
☐ 60
☒ 93

☐ 83

c. The pKa of the conjugate acid of pyridine is:

☒ 4.6
☐ 8.6
☐ 14
☒ 15.7

d. The side chain of the amino acid isoleucine is:

☒ hydrophobic
☐ hydrophilic
☐ basic
☐ acidic

d. The side chain of the amino acid lysine is:

☐ hydrophobic
☐ hydrophilic
☒ basic
☐ acidic

f. For the polymers of glucose:

☐ cellulose has an α and starch has an α linkage
☒ cellulose has a β and starch has an α linkage
☐ cellulose has an α and starch has a β linkage
☐ cellulose has a β and starch has a β linkage

g. The minimum number of amino acid residues required for one hydrogen bond in the helix is:

☐ 2
☒ 4
☐ 3
☐ 5
h. The correct order of acidity, with the most acid at the right is:

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

i. The most common sugar in nature is:
- [ ] fructose
- [X] glucose
- [ ] sucrose
- [ ] mannose

j. Fructose is an:
- [ ] aldohexose
- [X] ketohexose
- [ ] aldopentose
- [ ] ketopentose

k. Select the compound below which is NOT a high explosive:
- [ ] TNT
- [ ] acetone peroxide
- [X] ammonium nitrate
- [X] table salt

l. Pairing of bases that is critical to DNA/RNA replication involves the following numbers of hydrogen bonds:
- [X] 2-3
- [ ] 1-2
- [ ] 3-4
- [ ] 1-3

m. The sequence of amino acids in a peptide/protein is referred to as the:
- [X] primary structure
- [ ] secondary structure
- [ ] tertiary structure
- [ ] quaternary structure

n. The 3D arrangement of helices, pleated sheets, beta-turns of a peptide/ protein is referred to as the
- [ ] primary structure
- [X] tertiary structure
- [ ] secondary structure
- [ ] quaternary structure
2. Provide a complete and detailed reaction mechanism for the following transformation including curved arrows show the movement of all electrons. Your answer must fit completely within the box provided. There is no additional information that will be provided by a TA or the Prof.
3. Using the templates provided below, finish the pyranose drawings from the Fisher projections of these three carbohydrates.

![Pyranose drawings](image)

4. In the box provided using no more than 25 words (zero credit if you use more) explain why a carboxylic thiol ester undergoes nucleophilic acyl substitution more rapidly than does the corresponding carboxylic acid ester.

Resonance stabilization is greater with O because of significant mismatch between S and O.

![Resonance stabilization](image)
5. Provide the letter of the name that matches each of the following structures.

Leucine A  Alanine B  Lipoic acid C  NADH D  FADH₂ E  
Acetyl CoA F  AMP G  ADP H  ATP J  Isoleucine K  
Thiamine pyrophosphate L  Histidine M

Your signature (in ink)
6. Provide a complete and detailed reaction mechanism for the following transformation including curved arrows show the movement of all electrons. Your answer must fit completely within the box provided.
7. Provide the expected major organic product from the following reactions in the box at the right. Several of the reactions have organic byproducts. Do not put these as your answer. Your answer must fit entirely within the box.