Chemistry 140C
Whitesell
Winter Quarter, 2014
Second Midterm Exam, Monday March 10, 2014

first name          middle initial          last name

Student ID Number

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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. Up to one week (exactly 168 hours) after your exam is available you may submit it 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.

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

Key
1a. The correct order of reactivity of the following carboxylic acid derivatives (most reactive to the right) is:

- thio ester < amide < ester
- amide < thio ester < ester
- amide < ester < thio ester
- ester < thio ester < amide

b. In the average bond energy scheme the contribution of an S—S bond is:

- 86
- 60
- 83
- 111

c. Combustion of palmitic acid results in the production of how many carbon dioxide molecules for each molecule of acid:

- 12
- 14
- 16
- 18

d. The isoelectric point for an amino acid represents the pH at which:

- all of the amino groups are protonated
- all of the acid groups are deprotonated
- the number of ammonium ions equals the number of carboxylates
- none of the above

e. Fatty acid degradation results in the production of:

- NADH and FAD
- FAD and NAD
- FADH₂ and NAD
- FADH₂ and NADH

f. Reductive amination is involved in:

- fatty acid synthesis
- fatty acid degradation
- amino acid synthesis
- amino acid degradation
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 drawings for the indicated carbohydrates.

\[ \text{D-Glucose} \quad \text{D-Mannose} \quad \text{D-Galactose} \]

4. Provided on the following page are several structures of biologically significant molecules. Provide the letter of the structure that matches each of the following names.

Citric acid \( R \)  
Alanine \( G \)  
Lipoic acid \( D \)

NADH \( M \)  
FAD \( N \)  
ATP \( B \)

Pyridoxamine phosphate \( L \)  
Acetyl CoA \( E \)  
AMP \( A \)

Thiamine pyrophosphate \( C \)  
Oleic acid \( P \)
5. 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.