<table>
<thead>
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<th>COMMENTS/ SUGGESTIONS</th>
<th>Name:</th>
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<tbody>
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<td>(VERY IMPORTANT!)</td>
<td>Name:</td>
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**What worked best?**

**What could be improved?**

**What would you like to see next time?**

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
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- This review was interactive and engaging.

**Comments**

- The presentation volume was acceptable.

**Comments**

- The presentation was visually clear and logically organized.

**Comments**

- The review improved/reinforced your understanding of the material.

**Comments**

**The quality of the review packet was**

**Comments**

Please fill out this evaluation, even if you plan to leave early. Thank you very much.
This page is intentionally left blank on purpose. You can use this page as scratch work if you want.
Final Review

1) Fill in the blank and then label the molecules below as either Lewis Acid/Base and/or Bronsted-Lowry Acid/Base.
   a) A _________________ is a proton (H+) donor and a ________________ is a proton acceptor.
   b) A _________________ is an electron pair donor and a ________________ is an electron pair acceptor.

   \[
   \begin{align*}
   H_2SO_4 & \quad \text{and} \quad NH_3 \\
   BF_3 & \quad \text{and} \quad F^-
   \end{align*}
   \]

2) Draw the reaction coordinate diagrams for the following general reactions. Label the axes, reactants, products, \( \Delta G \), \( E_a \), transition states, and the rate-determining step.
   a) \( A-B + C \rightarrow A + B-C \) (one-step, exothermic)
b) \( A^- + B-C \rightarrow B^+ + A-C \) (two-step - 1st step is rate-determining, endothermic)

3) Match the following mass spectrum with their respective Mass Spectrum.
4) Determine the absolute configurations for the following compounds and determine which molecules are enantiomers and diastereomers.

1

2

3

5) Draw the most stable chair conformation of the following compounds.
6) What is the IUPAC name of the following compounds?

7) Based on the IR below, note any notable peaks that you see.
8) Using the molecular formula, NMR and IR spectrum, draw out the structure of the molecule. For the IR, note any prominent peaks that you see. (Hint: first find the degrees of unsaturation).

a) $C_5H_{10}O$
9) Which of the following choices indicate a spontaneous reaction?
   a. $K_{eq} = 10^{-6}$
   b. $\Delta G^o = -6$ kJ
   c. $K_{eq} = 0.5$
   d. $\Delta G^o = 10^{-6}$

10) Determine whether the starting material or the product is favored at equilibrium, based on the given values.

   $K_{eq} = 0.5$
   $\Delta G^o = -10$ kJ/mol

   $K_{eq} = 18$
   $\Delta G^o = 5.0$ kJ/mol

   $\Delta S^o = -10$ J/(K·mol)

   $\Delta H^o = +10$ kJ/mol

   $\Delta S^o = +10$ J/(K·mol)

   $\Delta H^o = -800$ kJ/mol
11) a. Which step is the rate determining step?  
b. What is the rate equation of this reaction?  
c. If the concentration of OCH₃⁻ was increased by 10 times, what would happen to the overall rate of the reaction?  
d. If the concentration of CH₃COCl was increased by 10 times, what would happen to the overall rate of the reaction?  
e. If the concentration of the intermediate between steps 1 and 2 was increased by 10 times, what would happen to the overall rate of the reaction?  
f. If the concentrations of each reactant (OCH₃⁻ and CH₃COCl) were increased by 10 times, what would happen to the overall rate of the reaction?

12) Rank the following molecules in order of the increasing boiling point.

13) Which molecule has the higher melting point? Why?
14) Label the nucleophile and electrophile in each reaction

- OH (nucleophile) + B-F (electrophile)
- C6H5+ (nucleophile) + H2O (electrophile)
- C6H5 (nucleophile) + HCl (electrophile)