Honors

Directions: You must show all work for calculation problems. No work = no credit. Use reference charts provided. Circle all final answers.

1. How much heat is required when 100. g of ice at -52.0°C is heated to 27.0°C?

2. Consider the following problem: A sample of water at -30°C is heated until the temperature reaches 167°C. Draw a graphic representing the change in temperature. Label the change in state and temperature.
   a. Be sure to include the following:
      i. The physical states of H₂O
      ii. The name of the change of state occurring
      iii. Any important temperatures
      iv. Where change in temp occur
      v. Where change in states occur
3. For the reaction: 
\[ 3 \text{Cu(NO}_3\text{)}_2 + 4\text{H}_2\text{O} + 2\text{NO} \rightarrow 3\text{Cu} + 8\text{HNO}_3 \]

<table>
<thead>
<tr>
<th>Component</th>
<th>H (kJ/mole)</th>
<th>S (J/mole*K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu</td>
<td>0</td>
<td>+33.1</td>
</tr>
<tr>
<td>Cu(NO₃)₂</td>
<td>-350</td>
<td>+193</td>
</tr>
<tr>
<td>HNO₃</td>
<td>-207</td>
<td>+53.3</td>
</tr>
<tr>
<td>H₂O</td>
<td>-286</td>
<td>+69.9</td>
</tr>
<tr>
<td>NO</td>
<td>+90.2</td>
<td>+211</td>
</tr>
</tbody>
</table>

A. Calculate the enthalpy of the reaction.

B. Based on H, would you predict this reaction to be exothermic or endothermic?

C. Calculate the change in entropy in this reaction.

D. Based on S, would you predict this reaction to be spontaneous or non-spontaneous?

E. Calculate the value of Gibb’s Free Energy for this reaction at room temperature.

F. Would this reaction be exothermic or endothermic? Cite the reason for your answer.
4. Find $\Delta H$ for the following net equation:

$$3C(s) + 4H_2(g) \rightarrow C_3H_8(g)$$

Given the following:

$$C(s) + O_2(g) \rightarrow CO_2 \quad \Delta H = -393.51 \text{kJ}$$
$$H_2(g) + O_2(g) \rightarrow H_2O(l) \quad \Delta H = -285.83 \text{kJ}$$
$$3CO_2(g) + 4H_2O(l) \rightarrow C_3H_8(g) + 7O_2(g) \quad \Delta H = +2219.9 \text{kJ}$$
Honors Kinetics Quiz

PART II.

Use the diagram provided to answer the following questions.

1. Which letter measures the Potential Energy of the Reactants?

2. Which letter measures the Activation Energy of the Reactants?

3. Which letter measures the ΔH of the reaction?

4. Which letter represents the Potential Energy of the Activated Complex?

5. Which letter represents the Activation Energy of the forward rxn?

6. Which letter represents the Activation Energy with a catalyst?

7. Which letter represents the Potential Energy of the Product?

8. Which letter represents the Activation Energy of the reverse rxn?

9. Which letter represents the Potential Energy with a catalyst?

10. Is this reaction endo or exothermic?