CHM 1010 **GAGE**

PROBLEM INVOLVING ENERGY IN PROCESSES

1. Decide whether each of the following processes are endothermic or exothermic:

   a. condensing steam into water
   b. burning a candle
   c. melting ice cream
   d. cooling hot coffee
   e. formation of snow flakes
   f. heating iron to form iron (II) oxide

2. a. How many kJ are represented by 3.44×10^4 cal of heat?
   b. If a reaction releases 70.8 kJ, how many nutritional calories does it generate?
   c. How can you determine the amount of heat exchanged in a reaction?

3. Use the following equation to answer the questions that follow it:

   $2\ H_2O\ (l) \text{ ----> } 2\ H_2\ (g) + O_2\ (g) \qquad \Delta H = +571.6\ kJ$

   a. Is this process exothermic or endothermic and why?
   b. How many kJ are transferred when 25.0 g of water are decomposed?
   c. How many g of hydrogen are produced when 775 J of energy are used?
   d. How many mol of water are decomposed if 450 kJ are used?

4. Use the following equation to answer the questions that follow it:

   $CH_4\ (g) + 2\ O_2\ (g) \text{ ----> } CO_2\ (g) + 2\ H_2O(l) \qquad \Delta H = -890.4\ kJ$
   methane

   a. Is this process exothermic or endothermic and why?
   b. How many moles of methane are required to transfer 4.66×10^3 kJ?
   c. If you start with 10.0 g of methane and 20 g of oxygen gas, how much energy will be transferred?

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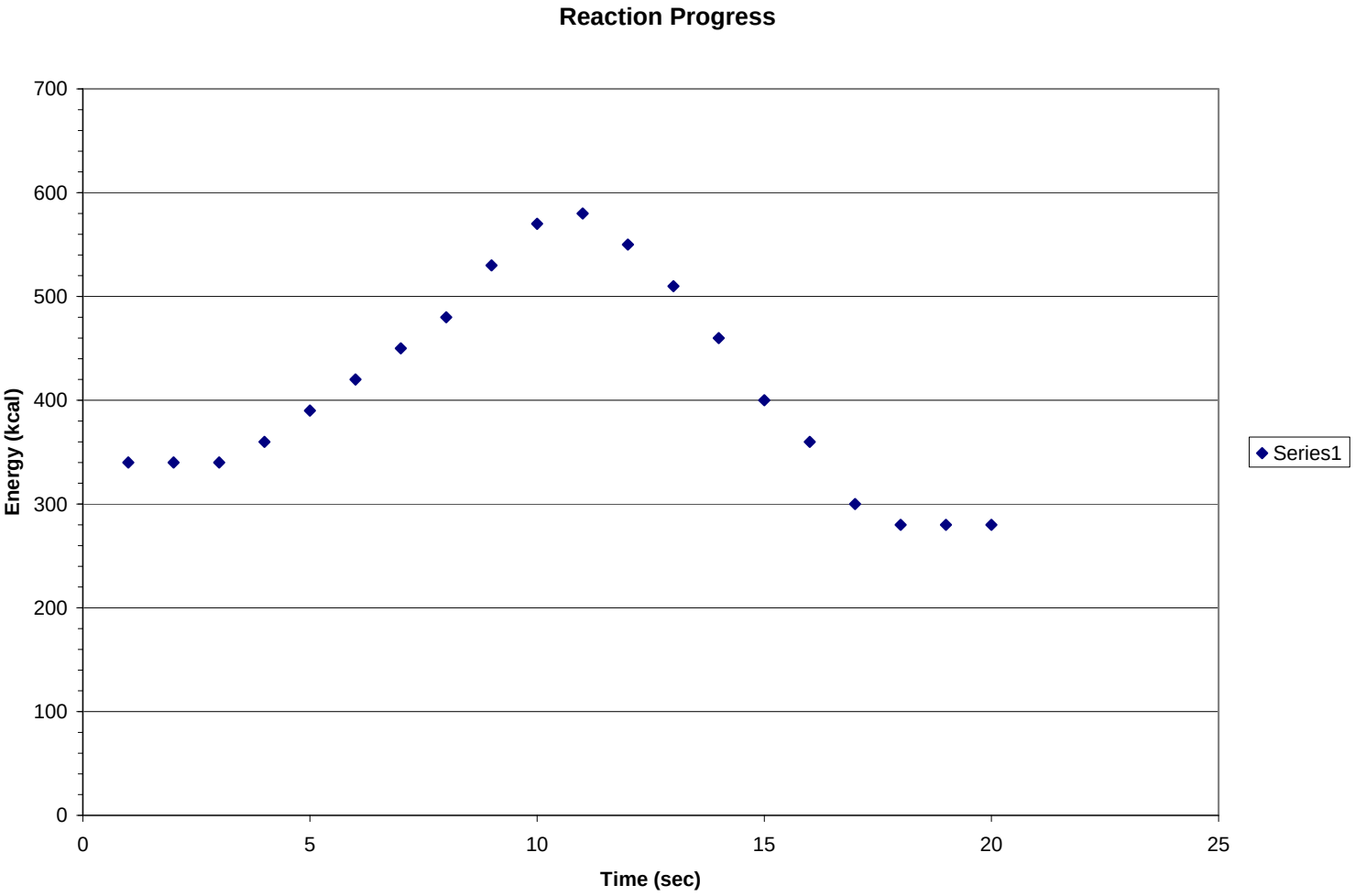
5. Use the graph below to address the questions that follow it:



a. Determine the activation energy for this reaction.
b. Is the reaction endothermic or exothermic? Explain how you know.
c. Determine the amount of energy absorbed or released in the process.
d. On the axes above, sketch the graph of the reaction if a catalyst is added.