**Teacher:** Mr. Baruch **Unit:**  Kinetics

**Subject:** Potential Energy Diagrams

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Date:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Potential Energy Diagrams**

**An Exothermic Reaction**

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L **#4**

E **Reactants** - -- - - - - - - - - - - - - - - - - - - - - - - -

N

E **#5**

R **Products**

G - - - - - - - - - - - -- - - - - - - - - - - -- - - - - - - - - - - -- - - - -

Y

**#1** **#6** **#2**

Reaction ----------------------------------------->

**Arrow #1** - is the potential energy of the reactants

**Arrow #2** - is the potential energy of the products

**Arrow #3** - is the forward activation energy

**Arrow #4** - is the reverse activation energy

**Arrow #5** - is the change in energy or enthalpy or Heat of reaction or **Hrxn**

(Note that **Hrxn** is always products – reactants)

**Arrow #6** - is the activated complex

**FOR EACH OF THE FOLLOWING, USE THE DIAGRAM ON THE PREVIOUS PAGE TO SHOW HOW YOU CALCULATED YOUR ANSWERS.**

**1.** If the energy of the reactants is 25 kJ/mole, and the energy of the products is

10 kJ/mole, what is the heat of this reaction?

**2.** From the information in question #1, and given that the forward activation energy

is 45 kJ/mole, what is the reverse activation energy?

**3.** From the information in question #1 and #2, what is the activated complex for this

reaction?

**Kinetics Class work continued**

**1. Define the following words:**

**Exothermic – The release of heat in a chemical reaction.**

**Endothermic - The absorption of heat in a chemical reaction.**

**Kinetics – The rate of a chemical reaction.**

**Enthalpy- The change in heat during a chemical reaction**

**Entropy – The disorder or randomness as expressed in energy terms in a**

**chemical reaction.**

**Heat of Rxn – The change in the heat of products minus the heat of**

**reactants in a chemical reaction.**

**Heat of Formation – The heat released/absorbed when 1 mole of a**

**compound is formed through a synthesis reaction of its constituent elements. (Note: Heat of Formation is a type of Heat of Reaction).**

**Activation Energy – The minimum energy required to start a reaction.**

**Catalyst - a substance that increases the rate of a chemical reaction**

**without itself undergoing any permanent chemical change.**

**2.** Label the following reactions as **Endothermic** or **Exothermic:**

**C (s) + O2 (g) ----> CO2 (g) + heat**

**heat + N2 (g)+ O2 (g) -----> NO2 (g)**

**4.3 kcal + I2 (g) + Cl2 (g) -----> 2 ICl (g)**

**2 K (s) + Cl2 (g) ----> 2 KCl (g) + 98.3 kcal**

**3.** Each of the following reactions shows an increase in entropy, explain why.

**CO2 (s) ----> CO2 (g)**

**NaCl (s) ------> Na+ (aq) + Cl- (aq)**

**2 KClO3 (s) ----> 2 KCl (s) + 3 O2 (g)**

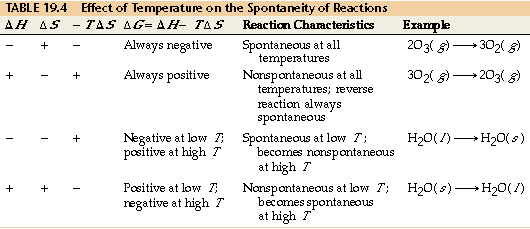
**H2O (g) at 110 oC -------> H2O (g) at 140 oC**

Go = Ho - TSo

Go is Gibbs Free Energy

Ho is Enthalpy

So is Entropy

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