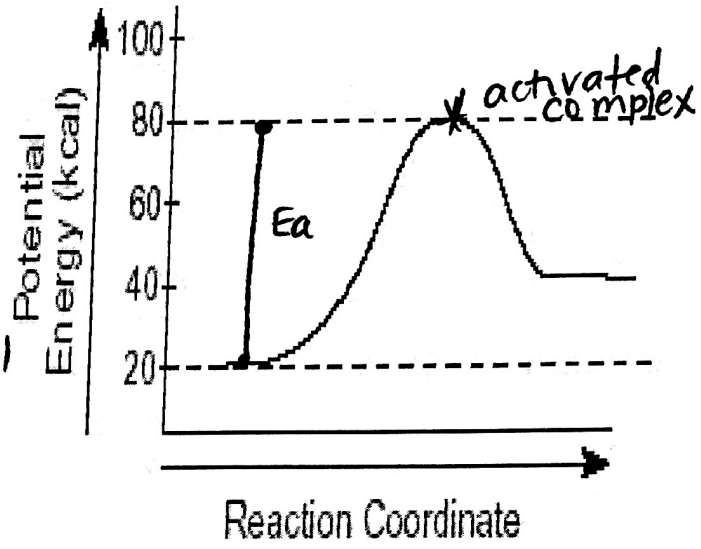
Name: _____ Block: _____

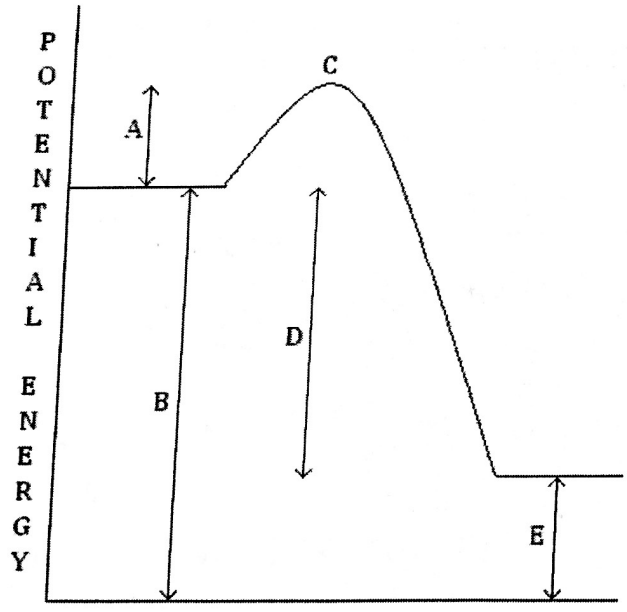
Potential Energy Diagrams, Thermochemical Equations, &Thermochemistry Dimensional Analysis

1. Use the following Potential Energy Diagram to the right for questions a-h



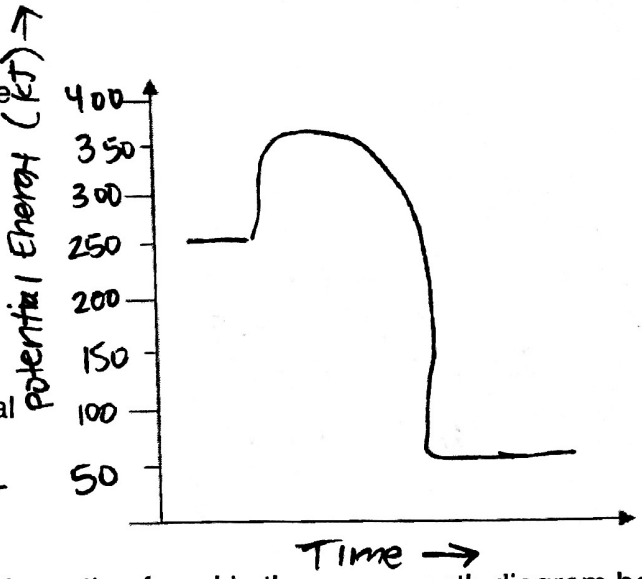
   a. Is this reaction **endothermic / exothermic**?
   b. How much stored P.E. do the reactants have? 20 kcal
   c. How much stored P.E. do the products have? 40 kcal
   d. How much activation energy, E_a, is needed for this reaction? 80 - 20 = 60kcal
   e. To get from the reactants to the products, energy had to be **added / removed**. How much? 40-20 = 20kcal
   f. How much P.E. must be added to the reactants to form the activated complex? 80 kcal
   g. What is the value of ΔH or ΔH_{rxn}? P-R = 40-20 = 20kcal
   h. Is ΔH_{rxn} positive or negative? positive

2. Use the Potential Energy Diagram to the left for questions a-f

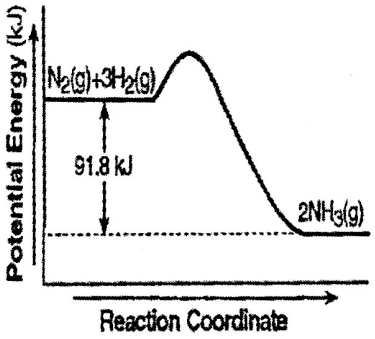


   a. Is this reaction **endothermic / exothermic**?
   b. Which line segment represents the stored P.E. of the reactants? B
   c. Which line segment represents the stored P.E. of the products? E
   d. Which line segment represents the activation energy, E_a, that is needed for this reaction? A
   e. Which line segment represents the ΔH (change in P.E.) for the reaction? D Is it **positive / negative**? negative
   f. Which line segment represents the P.E. of the activated complex? C

3. To the right, draw a reaction path diagram with the following criteria:
   - an exothermic reaction
   - reactants have 250kJ of potential energy stored in their bonds
   - 100kJ of activation energy required
   - products have 50kJ of potential energy stored in their bonds
   - Scale and label the y axis for kJ of potential energy.
   - Calculate ΔH = 50 - 250 = -200KJ



4. Write a thermochemical equation based off the information found in the energy path diagram below.



$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g) + 91.8KJ$

5. Write the following reactions with the change in enthalpy as a reactant or product.

   $Fe + CO_2 \rightarrow Fe_2O_3 + CO \quad \Delta H = +26.3$ kJ

   $Fe + CO_2 + 26.3KJ \rightarrow Fe_2O_3 + CO$

6. In the thermochemical equations below, the energy has been written on the reactants side or the products side. Write the energy as a ΔH value with the correct sign for the reaction below.

   $CrO_3 + H_2O \rightarrow H_2CrO_4 + 5.4$ kJ

   $CrO_3 + H_2O \rightarrow H_2CrO_4 \quad \Delta H = -5.4$ kJ

7. Compute the heat change for the production of 150 g iron (III) oxide in the following equation:

   $4FeO + O_2 \rightarrow 2Fe_2O_3 + 560$kJ

$$\frac{150g\ Fe_2O_3}{159.70g\ Fe_2O_3} \left| \frac{1\ mole\ Fe_2O_3}{2\ mole\ Fe_2O_3} \right| \frac{-560KJ}{} = -262.99$$

$= \boxed{-260\ KJ}$

8. How many molecules (particles) of carbon dioxide are produced by the decomposition of _____ Nitroglycerin?

   $4C_3H_5(NO_3)_3 \rightarrow 6N_2 + O_2 + 12CO_2 + 10H_2O + 1804$ kJ

Cant solve yet.