Chemistry: Form Ls7.2A | Name ________________________________

KINETICS AND EQUILIBRIUM | Date __________________ Period _____

Energy and Entropy

Aim

- Explain the mechanisms by which reactions occur

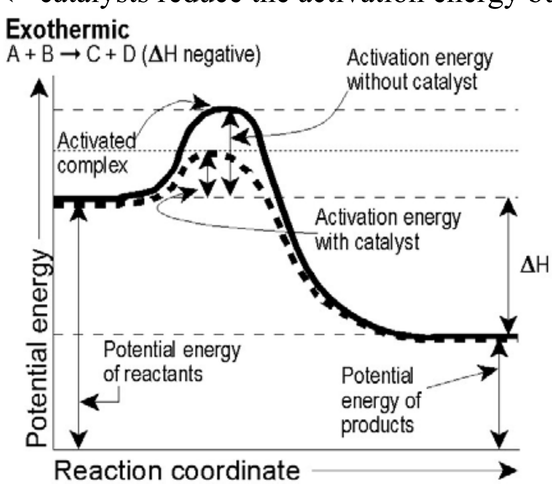
Notes

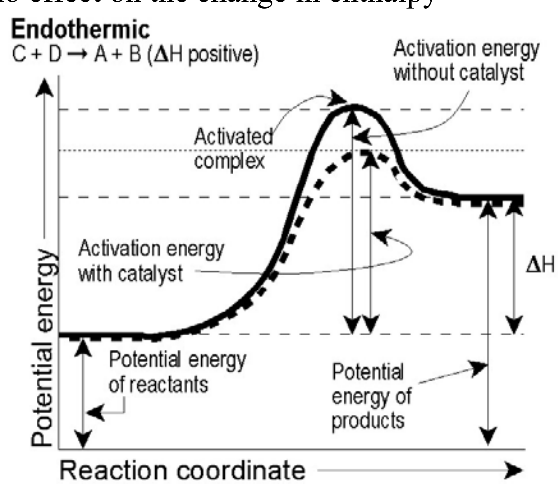
Role of energy in reactions

- ✭ In order for a reaction to begin, energy is needed
  - ✰ The energy needed to begin the reaction is the activation energy
  - ✰ The activation energy comes from effective collisions
- ✭ During a chemical reaction, heat may be released or absorbed
  - ✰ Heat released or absorbed during a chemical reaction is called heat of reaction or enthalpy (ΔH)
  - ✰ Enthalpy is the difference between the potential energy of the products and the reactants

$$\Delta H = H_{products} - H_{reactants}$$

  - ✰ Exothermic reactions - reactions in which energy is released
    - ✯ the potential energy of the products is lower than the potential energy of the reactants
    - ✯ ΔH is negative
    - ✯ catalysts reduce the activation energy but have no effect on the change in enthalpy
  - ✰ Endothermic reactions - reactions in which energy is absorbed
    - ✯ the potential energy of the products is higher than the potential energy of the reactants
    - ✯ ΔH is positive
    - ✯ catalysts reduce the activation energy but have no effect on the change in enthalpy





Entropy - randomness or disorder

- ✭ In nature, processes tend toward low energy and high entropy

Answer the questions below by circling the number of the correct response

1. The difference between the heat content of the products and the heat content of the reactants is
(1) entropy of reaction (3) free energy
(2) heat of reaction (4) activation energy

2. The purpose of the catalyst in a reaction is to
(1) change the activation energy required of the reaction
(2) provide the energy necessary to start the reaction
(3) increase the amount of product formed
(4) decrease the amount of reactants used

3. Given the reaction $A + B \rightleftharpoons AB + 210\ kJ$. If an activation energy of 21 kJ is required, the activation energy of the reverse reaction is
(1) 21 kJ (3) 210 kJ
(2) 189 kJ (4) 231 kJ

4. The difference between the potential energy of the reactants and the potential energy of the products is
(1) ΔG (3) ΔS
(2) ΔH (4) ΔT

5. When a catalyst is added to a system at equilibrium, there is a decrease in the activation energy of
(1) the forward reaction, only
(2) the reverse reaction, only
(3) both the forward and reverse reaction
(4) neither the forward nor the reverse reactions

6. The net effect of a catalyst is to change the (1) potential energy of the reactants, (2) potential energy of the products, (3) heat of reaction, (4) rates of both forward and reverse reactions

7. Heat of reaction, ΔH, is equal to
(1) $H_{products} + H_{reactants}$ (3) $H_{products} \times H_{reactants}$
(2) $H_{products} - H_{reactants}$ (4) $H_{products}/H_{reactants}$

8. An increase in temperature increases the rate of chemical reactions. This is primarily because the
(1) concentration of the reactants increases
(2) number of effective collisions increases
(3) activation energy increases
(4) average kinetic energy decreases

9. An increase in temperature increases the rate of a chemical reaction because the
(1) activation energy increases
(2) activation energy decreases
(3) number of molecular collisions increases
(4) number of molecular collisions decreases

10. For a given chemical reaction, the potential energy of the reactants is less than the potential energy of the products. This reaction is (1) endothermic and energy is absorbed, (2) endothermic and energy is given off, (3) exothermic and energy is absorbed, (4) exothermic and energy is given off

11. As a catalyst increases the rate of a reaction, the activation energy of the reaction (1) decreases, (2) increases, (3) remains the same

12. In a chemical reaction, the products have a lower potential energy than the reactants. This reaction must have a negative
(1) ΔG (3) ΔH
(2) ΔS (4) ΔX