

Equilibrium

Aim

- to describe the behavior of reversible reactions

Notes

Equilibrium - forward and reverse reaction rates are equal in reversible systems

- ★ Dynamic equilibrium - state of balance between two opposing activities
 - ☆ The concentration of the reactants and the products remain constant despite the continuation of both the forward and reverse reactions
 - ☆ The concentrations of reactants and products at equilibrium can be quite different
 - ☆ Equilibrium can be attained from either the forward or the reverse reaction
- ★ Types of equilibrium
 - ☆ Phase equilibrium - since phase changes are reversible, in closed systems a state of equilibrium between phases can be reached
 - ☆ When solids or liquids are confined in a container, equilibrium will be reached when there are enough particles of gas (vapor) to cause the rate of return to the original phase to be equal to the rate of escape
 - ☆ This causes the characteristic vapor pressure of a substance at a given temperature
 - ☆ Solution equilibrium
 - ☆ Gases in liquids
 - ☆ equilibrium is reached between the gas dissolved in the liquid and the undissolved gas above the liquid
 - ☆ equilibrium is affected by temperature and pressure
 - ☆ low temperature and high pressure favor solution of gases
 - ☆ carbonated beverages stay carbonated best when tightly closed and chilled
 - ☆ Solids and liquids
 - ☆ solid added to a saturated solution will fall to the bottom instead of dissolving
 - ☆ equilibrium is reached between the dissolved solute and the undissolved solute when the rate of dissolving equals the rate of crystallization
 - ☆ Chemical equilibrium
 - ☆ Nature of chemical equilibrium
 - ☆ equilibrium occurs when forward and reverse reactions occur at equal rates
 - ☆ at equilibrium, macroscopic or observable changes no longer occur (color, temperature, pressure, etc.)

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

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| <p>1. A chemical reaction has reached equilibrium when</p> <ol style="list-style-type: none"> (1) the reverse reaction begins (2) the forward reaction ceases (3) the concentration of the reactants and products become equal (4) the concentrations of the reactants and products become constant | <p>2. When a catalyst is added to a reaction at equilibrium, the rate of the forward reaction</p> <ol style="list-style-type: none"> (1) decreases and the rate of the reverse reaction decreases (2) decreases and the rate of the reverse reaction increases (3) increases and the rate of the reverse reaction decreases (4) increases and the rate of the reverse reaction increases |
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