Chapter 5.2: Solution and Rate of Solubility

1. Solute 溶质, Solvent 溶剂, and Solution 溶液

- **Solute**: Substance 物质 that dissolves 溶解 in a liquid.
- **Solvent**: Liquid that dissolves a solute.
- **Solution**: Mixture 混合物 formed 形成 when a solute dissolves in a solvent.

Example Sentence: Sugar (solute) dissolves in water (solvent) to form a sugar water solution.

2. Types of Solutions

a. Dilute 稀释 Solution

- Less solute in the solvent.
- Can dissolve more solute.

b. Concentrated 浓缩 Solution

- More solute in the solvent.
- Can dissolve less solute.

c. Saturated 饱和 Solution

- Excess 多余 solute in the solvent.
- Cannot dissolve any more solute and may form precipitate 沉淀.

Example Sentence: A cup of coffee can be a dilute, concentrated, or saturated solution depending on the amount of sugar dissolved in it.

3. Solution and Suspension 悬浮液

Solution

- Clear mixture 混合物.
- Solute 溶质 dissolves 溶解 completely 完全 in the solvent 溶剂.

Suspension悬浮液

- Cloudy mixture 多云混合物.
- Undissolved 未溶解 solute particles are suspended in the solvent.

Example Sentence: River 河 water can be a suspension containing sand and other particles that do not dissolve in water.

4. Factors Affecting Solubility

- **Temperature**: Higher temperatures increase solubility.
- **Stirring**: Increases the rate of solubility by moving particles faster.
- **Size of Solute Particles**: Smaller particles dissolve faster due to larger surface area.

Example Sentence: Sugar dissolves faster in hot tea when stirred compared to just letting it sit.

5. Colloid 胶体

- A mixture where solutes are dispersed 分散 evenly 均匀 but do not form a clear solution or precipitate 沉淀物.
- Intermediate 中级 between a solution and a suspension.

Example Sentence: Milk is a colloid where fat particles are dispersed in water.

6. Water as a Universal Solvent

- Dissolves most substances including solids, liquids, and gases.
- Used in domestic, industrial, agricultural, and medical applications.

Example Sentence: Water is called the universal solvent because it can dissolve many substances, making it essential for life.

7. Organic 有机 Solvents 溶剂

- Carbon-based solvents used to dissolve solutes insoluble in water.
- Examples: Alcohol 酒精, Kerosene 煤油, Acetone 丙酮, Turpentine 松节油, Ether 醚.

Example Sentence: Nail 指甲 varnish 油 remover contains acetone 丙酮, an organic solvent.

8. Water Purification and Water Supply

Water Purification 净化 Methods

- **Boiling**: Kills microorganisms.
- **Chlorination 氯化**: Kills microorganisms.
- **Filtration 过滤**: Separates 分离 suspended 悬浮 particles 颗粒.
- **Distillation**: Separates dissolved substances and kills microorganisms.

Example Sentence: Filtration and chlorination are common methods to purify drinking water.

Water Supply System

- **Processes**: Filtration, Oxidation, Coagulation, Sedimentation, Filtration, Chlorination, and Fluoridation.
- **Purpose**: To remove impurities and make water safe for consumption.

Example Sentence: Water purification involves multiple steps to ensure it is safe to drink.

9. Water Sustainability 可持续性

- **Sources of Pollution**: Domestic waste, industrial waste, agricultural chemicals, oil spillage.
- **Ways to Overcome Pollution**:
  - Upgrade sewerage 污水处理系统 systems.
  - Enforce industrial waste treatment laws.
  - Educate farmers on using biodegradable fertilizers and pesticides.

    - Contain and manage oil spills.

Example Sentence: Educating farmers on sustainable practices can help reduce water pollution from agricultural chemicals.

Summary

- Defines key terms: solute, solvent, and solution.
- Explains types of solutions: dilute, concentrated, and saturated.
- Differentiates between solutions and suspensions.
- Discusses factors affecting solubility: temperature, stirring, and particle size.
- Introduces colloids as mixtures between solutions and suspensions.
- Highlights water as a universal solvent and mentions organic solvents.
- Covers water purification methods and supply systems.
- Addresses water sustainability and pollution prevention strategies.