

Chapter 5.1: Physical 物理 Characteristics 特征 of Water

1. Basic Properties 属性 of Water

- **Boiling Point:** 100°C
- **Freezing Point:** 0°C
- **Color:** Colourless
- **Taste:** Tasteless
- **Density:** 1 g/cm³

Example Sentence: Water is essential 必要的 for life, existing as a liquid 液体 at room temperature with unique properties.

2. Surface Tension 张力

- **High Surface Tension:** Allows insects 昆虫 like daddy longlegs to stay afloat on water.
- **Cause 原因:** Cohesive 凝聚 force力 between water molecules 分子 at the surface.

Example Sentence: The high surface tension of water is why you can see insects 昆虫 walking on it.

3. Capillary 毛细 Action 作用

- **Cohesive Force:** Between water molecules.
- **Adhesive 粘附 Force 力:** Between water molecules and cell walls of xylem 木质部 in plants.
- **Result:** Allows water to move from roots 根部 to leaves 叶子.

Example Sentence: Capillary action helps transport water in plants from the roots to the leaves.

4. States of Water and Phase Changes

- **Solid 固态 to Liquid 液态 (Melting 融化)**
- **Liquid 液态 to Gas 气态 (Evaporation 蒸发/Boiling 沸腾)**
- **Gas to Liquid (Condensation 凝结)**
- **Liquid to Solid (Freezing 冻结)**
- **Solid to Gas (Sublimation 升华)**
- **Gas to Solid (Sublimation 升华)**

Example Sentence: Water can exist in three states: solid, liquid, and gas, and it changes states through processes like melting, boiling, and freezing.

5. Composition 成分 of Water

- **Water as a Compound 化合物:** Made of oxygen and hydrogen.
- **Chemical Formula:** H_2O
- **Determination 测定 Method:** Electrolysis 电解.

Example Sentence: Water is composed of two hydrogen atoms and one oxygen atom, forming the compound H_2O .

6. Electrolysis of Water

- **Anode 阳极:** Produces oxygen gas.
- **Cathode 阴极:** Produces hydrogen gas.
- **Chemical Symbol:** H_2O

Example Sentence: During electrolysis, water decomposes 分解 into oxygen and hydrogen gases.

7. Effects of Impurities

- **Melting Point 熔点:** Lowered by impurities 杂质 like salt.
- **Boiling Point:** Increased by impurities.
- **Other Changes:** Taste, smell, and color.

Example Sentence: Adding salt to water lowers its melting point and raises 提高 its boiling point.

8. Evaporation of Water

- **Process:** Changes water to water vapor at the surface.
- **Kinetic Energy 动能:** Molecules 分子 at the surface move faster and escape into the air.

Example Sentence: Evaporation 蒸发 occurs 发生 when water molecules at the surface gain enough energy to become vapor.

9. Applications of Evaporation in Daily Life

- **Clothes Drying:** Clothes with large exposed surface areas dry faster.
- **Sea Salt Production:** Obtained from the evaporation of seawater.
- **Seafood Preservation:** Dried to prevent microorganism 微生物 growth 生长.
- **Hair Drying:** Increases evaporation rate with hot air.

Example Sentence: Evaporation is used in everyday activities like drying clothes and producing sea salt.

Summary

- **Basic Properties:** Water boils at 100°C, freezes at 0°C, is colorless and tasteless.
- **Surface Tension:** High surface tension allows insects to walk on water.
- **Capillary Action:** Enables water transport in plants from roots to leaves.
- **States and Phase Changes:** Water exists as solid, liquid, and gas, transitioning through processes like melting and evaporation.
- **Composition:** H₂O, consisting of two hydrogen atoms and one oxygen atom.
- **Electrolysis:** Decomposes water into oxygen and hydrogen gases.
- **Impurities:** Affect water's melting and boiling points, taste, smell, and color.
- **Evaporation:** Process of water changing to vapor, with various daily life applications.