Acids, Bases, and Solutions

Understanding Solutions
Concentration and Solubility
Describing Acids and Bases
Acids and Bases in Solution
Digestion and pH

Understanding Solutions

What are the characteristics of solutions, colloids, and suspensions?

- A solution has the same properties throughout.
- It contains solute particles (molecules or ions) that are too small to see.
    - Solution: a well-mixed mixture containing a solvent and at least one solute that has the same properties throughout
    - Solvent: the part of a solution that is present in the largest amount and dissolves a solute

Understanding Solutions

What are the characteristics of solutions, colloids, and suspensions?

- A colloid contains larger particles than a solution.
- The particles are still too small to be seen easily, but are large enough to scatter a light beam.
    - Colloid: a mixture containing small, undissolved particles that do not settle out

Understanding Solutions

What are the characteristics of solutions, colloids, and suspensions?

- Unlike a solution, a suspension does not have the same properties throughout.
- It contains visible particles that are larger than the particles in solutions or colloids.
    - Suspension: a mixture in which particles can be seen and easily separated by settling or filtration

Understanding Solutions

What happens to the particles of a solute when a solution forms?

- Particles of the solute leave each other and become surrounded by particles of the solvent.

Understanding Solutions

How do solutes affect the freezing point and boiling point of a solvent?

- Solutes lower the freezing point.
- Solutes raise the boiling point.

Concentration and Solubility

How is concentration measured?

- Compare the amount of solute to the amount of solvent or to the total amount of solution.
  - Dilute solution: a mixture that has only a little solute dissolved in it
  - Concentrated solution: a mixture that has a lot of solute dissolved in it

Concentration and Solubility

Why is solubility useful in identifying substances?

- Solubility can be used to help identify a substance because it is a characteristic property of matter.
  - Solubility: a measure of how much solute can dissolve in a given solvent at a given temperature
  - Saturated solution: a mixture that contains as much dissolved solute as is possible at a given temperature
  - Unsaturated solution: a mixture that contains less dissolved solute than is possible at a given temperature

Concentration and Solubility

What factors affect the solubility of a substance?

- Factors that affect the solubility of a substance include pressure, the type of solvent, and temperature.
    - Supersaturated solution: a mixture that has more dissolved solute than is predicted by its solubility at a given temperature

Describing Acids and Bases

What are the properties of acids and bases?

- An acid is a substance that:
    - Tastes sour
    - Reacts with metals and carbonates
    - Turns blue litmus paper red
    - Acid: a substance that tastes sour, reacts with metals and carbonates, and turns blue litmus paper red
    - Corrosive: the way in which acids react with some metals so as to eat away the metal
    - Indicator: a compound that changes color in the presence of an acid or a base

Describing Acids and Bases

What are the properties of acids and bases?

- A base is a substance that:
    - Tastes bitter
    - Feels slippery
    - Turns red litmus paper blue
    - Base: a substance that tastes bitter, feels slippery, and turns red litmus paper blue

Describing Acids and Bases

Where are acids and bases commonly used?

- Acids and bases have many uses around the home and in industry.

Acids and Bases in Solution

What kinds of ions do acids and bases form in water?

- An acid is any substance that produces hydrogen ions (H^+) in water.
  - Hydrogen ion (H^+): a positively charged ion formed of a hydrogen atom that has lost its electron

Acids and Bases in Solution

What kinds of ions do acids and bases form in water?

- A base is any substance that produces hydroxide ions (OH^-) in water.
  - Hydroxide ion (OH^-): a negatively charged ion made of oxygen and hydrogen

Acids and Bases in Solution

What does pH tell you about a solution?

- A low pH tells you that the concentration of hydrogen ions is high.
- A high pH tells you that the concentration of hydrogen ions is low.
    - pH scale: a range of values used to express the concentration of hydrogen ions in a solution

Acids and Bases in Solution

What happens in a neutralization reaction?

- In a neutralization reaction, an acid reacts with a base to produce a salt and water.
  - Neutralization: a reaction of an acid with a base, yielding a solution that is not as acidic or basic as the starting solutions were
  - Salt: an ionic compound made from the neutralization of an acid with a base

Digestion and pH

Why must your body digest food?

- Foods must be broken down into simpler substances that your body can use for raw materials and energy.
  - Digestion: the process that breaks down complex molecules of food into smaller molecules
  - Mechanical digestion: the physical process that tears, grinds, and mashes large pieces of food into smaller ones
  - Chemical digestion: the process that breaks large molecules in food into smaller molecules

Digestion and pH

How does pH affect digestion?

- Some digestive enzymes work at a low pH.
- Other enzymes work at a high or neutral pH.