

Chapter 4 - Types of Chemical Reactions and Solution Stoichiometry

Section 4.1 - Water, the common solvent

1. Polar Molecule

"Positive ends" of the water molecule are attracted to negatively charged ions, and "negative ends" are attracted to the positively charged cations

2. **Solubility** - the amount of a substance that dissolves in a given volume of solvent at a given temperature.

Section 4.2 - The Nature of Aqueous Solutions

1. **Solute** - substance which is dissolved.

2. **Solvent** - substance which does the dissolving.

3. **Electrical conductivity** - ability to conduct an electric current.

A. **Strong electrolyte** - aqueous solutions which conduct current very efficiently.

Strong Electrolyte:

Acid: substance that produces H⁺ ions when it is dissolved in water (Arrhenius Def)

Strong Acid: virtually every molecule ionizes

Base: substance that produces OH⁻ ions when it is dissolved in water (Arrhenius Def)

Strong Base: virtually every molecule ionizes

B. **Weak electrolyte** - aqueous solutions which conduct only a small current.

Weak Electrolyte:

Weak Acid: dissociates (ionizes) only to a slight extent in aqueous solutions

Weak Base: dissociates (ionizes) only to a slight extent in aqueous solutions

C. **Nonelectrolyte** - solutions permit no current to flow.

Section 4.3 - The Composition of Solutions

1. **Molarity** - moles of solute per volume of solution in liters: (concentration)

$$\text{Molarity} = M = \frac{\text{moles of solute}}{\text{liters of solution}}$$

2. **Standard solution** - solution whose concentration is accurately known.

3. **Dilution** - water added to achieve the molarity desired for a particular solution.

equation, $M_1V_1 = M_2V_2$

Section 4.5 - Precipitation Reactions

Precipitation Reaction - a reaction in which a solid is formed (precipitate).

Know Table 4.1 p. 151

Section 4.6 - Describing Reactions in Solution

- a. Molecular equation
- b. Complete ionic equation
- c. Spectator ions
- d. Net ionic equation

Section 4.7 - Stoichiometry of Precipitation Reactions

Section 4.8 - Acid-Base Reactions

Brrønsted - Lowery definitions.

Acid - a proton donor.

Base - a proton acceptor.

Acid-Base Titrations

Volumetric analysis - a technique for determining the amount of a certain substance by doing a titration.

Titration - delivery (from a buret) of a measured volume of a solution of known concentration (the **titrant**) into a solution containing the substance being analyzed (the **analyte**).

Equivalence point (Stoichiometric point) - the point in the titration where enough titrant has been added to react exactly with the analyte. (This point is often marked by an indicator - a substance added at the beginning of the titration that changes color at the equivalence point. This point is often called the **end point**.)

****Notes have been derived from Zumdahl 4th ed. - All page and table references are made to this edition.**