Chapter 10

Acids, Bases, and Salts

Chapter 10 Outline

I. Arrhenius Definition
II. Bronsted-Lowry Definition
III. Strengths of Acids and Bases
IV. Acid-Base Reactions
V. Acidic and Basic Salts
VI. Lewis Acids and Bases

I. Arrhenius Definition

Arrhenius definition of acids and bases:

Acid – substance that contains H and produces H^+ ions in solution

Base – substance that contains the OH group and produces OH^- ions in solution

What about NH_3?

II. Bronsted-Lowry Definition

Bronsted-Lowry definition of acids and bases:

Acid – proton donor

Base – proton acceptor

Acid-Base Reaction – proton is transferred from an acid to a base

III. Strengths of Acids and Bases

General Rules:

1. The stronger the acid, the weaker its conjugate base
2. The weaker the acid, the stronger its conjugate base.

TABLE 10-2 Relative Strengths of Conjugate Acid–Base Pairs

Acid		Base
$HClO_4$	100% ionized in dilute aq. soln. No molecules of nonionized acid.	ClO_4^-
HI		I^-
HBr		Br^-
HCl		Cl^-
HNO_3		NO_3^-
	Negligible base strength in water.	
	acid loses H^+ ⇌ base gains H^+	
H_3O^+	Equilibrium mixture of nonionized molecules of acid, conjugate base, and $H^+(aq)$.	H_2O
HF		F^-
CH_3COOH		CH_3COO^-
HCN		CN^-
NH_4^+		NH_3
H_2O		OH^-
NH_3	Reacts completely with H_2O to form OH^-; cannot exist in aqueous solution.	NH_2^-

Acid strength increases ↑ ↓ Base strength increases

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III. Strengths of Acids and Bases (cont.)

- *Relative strengths of binary acids*
- *Relative strengths of oxoacids*

IV. Acid-Base Reactions

V. Acidic and Basic Salts

A. *Book Definition*
- *Normal salt = salt that results from a complete neutralization reaction*
- *Acidic and basis salts = salts that result from incomplete neutralization reactions*

B. *Another important definition*
- *Neutral salt = salt that when dissolved in water produces a neutral solution*
- *Acidic salt = salt that when dissolved in water produces an acidic solution*
- *Basic salt = salt that when dissolved in water produces a basic solution*

VI. Lewis Acids and Bases

Most comprehensive definition of acids and bases:
- *Lewis acid = electron pair acceptor*
- *Lewis base = electron pair donor*