Acids and Bases

- **Acids**

- substances which dissolve in water to form H^+ ions in solution

ie) $HCl\ (aq) \rightarrow H^+\ (aq) + Cl^-(aq)$

*Like all equations, dissociation equations are written in balanced form

Properties:

a) contain hydrogen ions → H^+
b) conduct electricity due to ionization
= are soluble in water and "dissolve" making ions
c) react with metals to produce hydrogen gas→ $H_2(g)$
d) taste sour (if safe to taste)
e) if strong enough they will cause severe burns

Ie) citrus, vinegar, pop, stomach acid (HCl), battery acid (H_2SO_4)

- **Bases**

- substances that dissolve in water to form OH^- ions in solution

Ie) $NaOH(aq) \rightarrow Na^+(aq) + OH^-(aq)$

Properties:

a) contain hydroxide ions → OH^-
- hydroxide ions will accept hydrogen ions to form water
b) conduct electricity due to ionization
c) taste bitter (if safe to taste)
d) feel slippery (if safe to touch)
e) if strong enough, bases will cause severe burns

Ie) soap, toothpaste, ammonia, antacids (tums), glass cleaner

Identifying Acids and Bases

- **pH Scale (Logarithmic scale → base 10)**
  - pH is a measure of the acidity of a solution (concentration of H^+)
  - ranges from 0 to 14
  - Acids: pH smaller then 7
  - Bases: greater than a pH of 7
  - Neutral substances have a pH of 7

- **Acid/Base Indicators**
  - substances which are used to determine if a compound is acidic or basic safely

  -Types of Indicators

  a) pH Paper (Universal Indicator Paper)
  - measures the strength of an acid or a base and changes color accordingly
  - the stronger a substance, the farther from pH 7 it will be
  - a pH of 1 is 10 times more acidic than a pH of 2
  - a pH of 12 is 10 times more basic than a pH of 11

  b) Litmus Paper
  - uses a dye from a lichen plant in the paper
  - turns red in the presence of acid
  - turns blue in the presence of bases

c) Synthetic Indicators

- solution that change color in the presence of an acid or base
- contain synthetic dyes

Ie)

Indicator	Presence of Acid	Presence of Base
Phenolphthalein	Colorless	Pink
Bromothymol blue	Yellow	Blue
Methyl Red	Red	Yellow
Congo Red	Blue	Red

- **Neutralization**

- you can mix an acid and a base and make a neutral solution
- this is called a **NEUTRALIZATION REACTION**
- these reactions always take the following form:

Acid + Base → salt + water

Ie) sodium hydroxide + hydrochloric acid → sodium chloride + water

$$NaOH(aq) + HCl(aq) \rightarrow NaCl(aq) + H_2O(l)$$

- the H+ ions react with the OH- ions to make water:

$$H^+ + OH^- \rightarrow H_20$$

- the Na+ ions in the acid react with the Cl- ions in the acid to make sodium chloride:

$$Na^+ + Cl^- \rightarrow NaCl$$

Acids and Bases

- **Acids**

  - substances which _____in water to form _____ in solution

    ie) _____

*Like all equations, dissociation equations are written in balanced form

Properties:

a) contain _____ ions → H^+

b)conduct electricity due to_____

= are soluble in water and break apart into their ions

c) react with metals to produce _____ gas→ $H^2(g)$

d) taste _____ (if safe to taste)

e) if strong enough they will cause _____

Ie) citrus, vinegar, pop, stomach acid (HCl), battery acid (H_2SO_4)

- **Bases**

  - substances that dissolve in water to form _____ in solution

    ie) _____

Properties:

a) contain _____ ions → OH^-

- hydroxide ions will accept hydrogen ions to form water

b) conduct electricity due to ionization

c) taste _____(if safe to taste)

d) feel _____ (if safe to touch)

e) if strong enough, bases will cause _____

Ie) soap, toothpaste, ammonia, antacids (tums), glass cleaner

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- the H+ ions react with the OH- ions to make water:

$$H^+ + OH^- \rightarrow$$

- the Na+ ions in the acid react with the Cl- ions in the acid to make sodium chloride:

$$Na^+ + Cl^- \rightarrow$$