Acids and Bases Notes

1. Acids and bases are types of compounds that have characteristic formulas and similar chemical behaviours, especially when they are dissolved in water

Table 1: Properties of acids and bases

Acids	Bases

   a. We encounter acids and bases everyday: common acids include lemon juice, vitamin C, and vinegar. Common bases include antacids, ammonia, and baking soda.
   b. Problems have been associated with acids and bases.
      i. Acids and bases must be handled safely whether at home, school, or work.
      ii. Concentrated solutions of acids and bases can cause severe burns, so spills must be dealt with immediately.
      iii. Acid in the atmosphere mixes with rain to cause acid precipitation.

2. How do we recognize acids and bases?
   a. Acids and bases are common chemical compounds that can be grouped according to their physical and chemical properties
   b. Common acids are easily recognized because their formulas begin with a hydrogen.
      i. *E.g.*, sulfuric acid is H_2SO_4, carbonic acid is H_2CO_3, and phosphoric acid is H_3PO_4.
   c. Most bases are compounds that contain the hydroxide ion (OH^-). When you see the hydroxide group in an ionic compound, you know that the compound is a base.
      i. *E.g.*, sodium hydroxide has the formula NaOH.
   d. An **indicator**, is a substance that turn different colours in acids and bases. Litmus is one example of an indicator. In acid solutions, blue litmus paper turns red; in basic solutions, red litmus paper turns blue.

3. The pH scale
   a. Concentrated acids and bases are very hazardous, but diluted acids and bases can be useful. Hydrochloric acid can burn through clothing but your stomach has hydrochloric acid in it, and baking soda is safe enough to eat. A dilute solution of hydrochloric acid is less acidic and less likely to react than a concentrated solution. How can we determine how acidic or basic a substance is?
   b. The pH scale (which goes from 1-14) is used to represent how acidic or basic a solution is. Most acids and bases can be ranked on this scale.
      i. A very acidic solution has a very low pH value.
      ii. A neutral solution, like pure water, has a pH of 7.
      iii. A very basic (or alkaline) solution has a very high pH value.

4. Acids are named using specific rules. The rules are:
    a. Name the first ion (hydrogen) in full and change the name of the second ion to end in "ide" (unless it is polyatomic)
    b. Change to the acid name using the following categories:

H + ____ate = ___ic acid	H_2SO_4 =
H + ____ite = ___ous acid	H_2SO_3 =
H + ____ide = hydro __ic acid	HCl =

    c. Bases have no special rules for naming - just follow the normal instructions.

5. Neutralization Reactions
    a. A neutralization reaction happens when acids and bases are mixed together.
    b. The products of this kind of reaction are water and a **salt**. A salt is a special ionic compound made through neutralization.
    c. The products are neutral (not acidic or basic).
    d. If there is the right amount and strength of acid and base, the entire solution will be neutral.
    e. *E.g.*, $HBr + NaOH \rightarrow H_2O + NaBr$
        acid base water salt
    f. In **all** neutralization reactions, the hydrogen ion from the acid (H^+) joins with the hydroxide ion from the base (OH^-) to form water.
        i. $H^+ + OH^- \rightarrow HOH$ or H_2O
    g. Neutralization reactions are a special case of the double displacement reactions.
    h. A neutralization reaction is also useful for cleaning up acid spills. By pouring a base on an acid spill, the acid will be neutralized.