**Salt Lake Community College, Chemistry Department**

**Chem 1110 Workshop 7 - Part I**

**Topic: Chemical Equations**

***Objective:***

* Balancing chemical reactions
* Ways to classify the chemical reactions
* Strong, weak and non-electrolytes

**Balancing Chemical Reactions:**

1. Remember mass balance!
2. Use the Periodic Table and a knowledge of polyatomic formulas and charges to select the ratios of ions and how they go together (Empirical Formula)
3. There is a difference between the subscripts in molecular formulas and the coefficients of balanced chemical equations

**Ways to classify chemical Reactions:**

Chemical Reactions

Synthesis Reactions

Decomposition Reactions

Combustion Reactions

Oxidation- Reduction Reactions

Neutralization Reactions (Acid- Bases Reactions)

Double Displacement Reaction (Precipitation Reactions)

**Strong, weak and non-electrolytes:**

1. Strong electrolytes - dissociate (ionize) ~100%. This includes all ionic compounds and strong acids and bases.
2. Weak electrolytes - dissociate less than 100%, usually 1-10% or less. The most common weak electrolytes are the organic acids
3. Nonelectrolytes - do not dissociate. This includes all covalent compounds except organic acids and bases



**Practice Problems:**

1. Which statement regarding balanced chemical equations is **not** true?

1. The number of each kind of atom must be the same on each side.
2. Coefficients are used in front of formulas to balance the equation.
3. **Subscripts may be changed to make an equation simpler to balance.**
4. When no coefficient is written in front of a formula, the number "one" is assumed.
5. Reactants are written to the left of the arrow.
6. **Balance the following reactions:**
7. N2 (g) + **3**H2 (g) → **2**NH3 (g)
8. 4Al (s) + **3**O2 (g) → **2**Al2O3 (s)
9. C3H8 (g) + **5**O2 (g) → **3**CO2 (g) + **4**H2O (g)
10. Fe2O3 (s) + **3**CO (g) → **2**Fe (s) + **3**CO2 (g)
11. Which is the correct equation for the reaction of magnesium (Mg) with hydrochloric acid (HCl) to produce hydrogen (H2) and magnesium chloride (?
12. **Mg + 2 HCl → H2 + MgCl2**
13. Mg + HCl → H + MgCl
14. 2 Mg + 6 HCl → 3 H2 + 2 MgCl2
15. Mg + 2 HCl → 2 H + MgCl2
16. Mg + 3 HCl → 3 H + MgCl2
17. Which reaction is an example of an acid-base reaction?

a) H2CO3 (aq) → H2O(l) + CO2 (g)

**b) H2SO4 (aq) + Ca(OH)2 (aq) → CaSO4 (aq) + 2 H2O(l)**

c) 6 HCl(aq) + 2 Al(s) → 2 AlCl3 (aq) + 3 H2 (g)

d) FeCl3 (aq) + 3 KOH(aq) → Fe(OH)3 (s) + 3 KCl(aq)

e) 2 Hg(l) + O2 (g) →2 HgO(s)

1. The following reaction can be classified as what type(s) of reaction(s)?

 2 Al(OH)3(aq) + 3 H2SO4(aq) → Al2(SO4)3(s) + 6 H2O(l)

1. precipitation
2. acid-base neutralization
3. redox reaction
4. combustion
5. **both A and B**
6. Classify the following as a precipitation, an acid-base neutralization, or a redox reaction (rxn).
7. Ca(OH)2(*aq*) + 2HBr(*aq*) → 2H2O(*l) +* CaBr2(*aq)*

***(Acid-Base neutralization rxn)***

1. Pb(ClO4)2(*aq*) + 2NaCl(*aq*) → 2PbCl2(*s) +* 2NaClO4(*aq)*

***(Double displacement rxn, precipitation)***

1. 2AgNO3(*aq*) + Cu(*s*) → 2Ag(*s) +* Cu(NO3)2(*aq)*

***(Oxidation-Reduction Reaction, Redox rxn)***