**Reaction Type and Balancing**

**Chm.2.2.3**

 Explain how to write and balance chemical equations predicting product(s) in a reaction.

 Identify acid-base neutralization as double replacement.

 Write and balance net ionic equations for double replacement reactions.

 Use reference table rules to predict products for all types of reactions to show the conservation of mass and give a conceptual understanding of the types of reactions below:

 -Synthesis

 -Decomposition

 -Single replacement

 -Double replacement

 -Combustion

 Use activity series to predict whether a single replacement reaction will take place.

**Reaction Rates**

**Chm.2.2.1**

 Explain collision theory

 Show and analyze/explain an energy diagram for endothermic and exothermic reactions including reactants, products, and activated complex‒with and without the presence of a catalyst.

**Chm.3.1.1**

• Demonstrate qualitatively that reaction rate is proportional to number of effective collisions.

• Explain how temperature (kinetic energy), concentration, and/or pressure affect the number of collisions.

• Explain how increased surface area increases number of collisions.

• Explain how a catalyst affects reaction rate.

**Chm.2.2.2**

Demonstrate that you can determine if a chemical reaction has occurred based on the following criteria:

 Precipitate formation (use of solubility rules)

 Color Change – Distinguish between color change as a result of chemical reaction, and a change in color intensity as a result of dilution.

 Temperature change

**Equilibrium**

**Chm.3.1.2**

• Define chemical equilibrium for reversible reactions.

• Distinguish between equal rates and equal concentrations.

**Chm.3.1.3**

• Illustrate the effects of stresses on systems at equilibrium. (Adding/ removing a reactant or product; adding/removing heat; increasing/decreasing pressure)

• Relate the shift that occurs in terms of the order/disorder of the system.