Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd: \_\_\_\_\_ Ast: \_\_\_\_\_

**Physical Science Honors:**

**Chemical Reactions Study Guide**

1. What is a chemical reaction?

***The process of breaking chemical bonds and forming new ones among the same set of atoms.***

1. List at least three signs that a chemical reaction has occurred.

***Change in Energy (temperature change, light/flame given off)***

***Change in Properties (color change, smell, state change, new substance (ie – gas or precipitate))***

1. Give an example from class where you observed a chemical reaction and how you knew it was a chemical reaction.

***Chemical Reactions Lab – mix calcium chloride, baking soda, and phenol red solution 🡪 produces gas, turns yellow, gets hot\***

***Controlling Reactions Lab – mix Alka-Seltzer and water 🡪 produces gas***

1. You place a cube of sugar in warm tea and watch it dissolve as you stir the water. Next, you place a tablet of Alka-Seltzer in warm water and observe a lot of fizz (bubbles) as it dissolves. Compare these two processes. How would you classify them? Why?

***Dissolving sugar in tea is not a chemical reaction…it produces a mixture in the solution.***

***However, the Alka-Seltzer and water produce a gas (a new substance), indicating that a chemical reaction has taken place.***

1. What do you call the chemicals that are present before a reaction? What do you call the chemicals that are present after a reaction?

***REACTANTS are present before the reaction, PRODUCTS are present after the reaction***

1. If you were to compare the **elements** present before a chemical reaction with those present after the reaction, what would you find?

***The same elements will be present in the reactants and the products***

1. If you were to compare the **atoms** present before a chemical reaction with those present after the reaction, what would you find?

***The reactants and the products will be made of the same atoms, just rearranged***

1. Explain why it is important that the number of atoms for each element is the same on both sides of the equation.

***Chemical equations illustrate the law of conservation of mass by showing that matter (atoms) is not created or destroyed during a chemical reaction; that the same atoms are present before and after the process***

1. What is the difference between an endothermic chemical reaction and an exothermic chemical reaction?

***Endothermic reactions absorb energy, so they would feel “cold” to touch. Exothermic reactions release energy, so they would feel “warm” to touch.***

1. Illustrate at least two different ways to express that there are 6 sodium (Na) atoms in a chemical formula (write a chemical formula using coefficients and subscripts).

***Na6*** *or* ***3Na2*** *or* ***2Na3***

1. Indicate whether the following chemical reactions are balanced by writing “YES” or “NO” on the line.
   1. 2Fe + 3Cl2 🡪 2FeCl3 ***YES***
   2. CO2 + NaOH 🡪 NaHCO3 ***YES***
   3. 2HNO3 🡪 N2O5 + H2O ***YES***
   4. PCl3 + 3H2O 🡪 H3PO3 + 3HCl ***YES***
   5. C4H10O + 6O2 🡪 4CO2 + 5H2O ***YES***
2. Balance the following chemical reactions by placing the correct coefficient (number) on the line.
   1. 2Fe + 3Cl2 🡪 ***\_2\_***FeCl3
   2. ***\_2\_***Ag2CO3 🡪 4Ag + 2CO2 + O2
   3. 4Fe + 3O2 🡪 ***\_2\_***Fe2O3
   4. Zn + ***\_2\_***HCl 🡪 ZnCl2 + H2
   5. 2KClO3 🡪 2KCl + ***\_3\_***O2
3. From the chemical reactions listed above in #11 and #12, provide an example of:
   1. A synthesis reaction: ***#11 – a & b #12 – a & c***
   2. A decomposition reaction: ***#11 – c #12 – e***
   3. A replacement reaction: ***#11 – d & e #12 – b & d***
4. What is the difference between an endothermic and an exothermic reaction?

***Duplicate of #9…oops!***

1. What happens to a chemical reaction when you increase the temperature of the reactants? Explain why.

***Increasing the temperature causes the particles to move faster, causing more collisions between the particles. This increases the interactions between the chemicals, causing the reaction to happen faster.***

1. What happens to a chemical reaction when you increase the concentration of reactants? Explain why.

***Increasing the concentration of reactants causes more of the chemicals to come into contact faster, which will increase the rate and the size of the chemical reaction.***

1. What happens to a chemical reaction when you increase the surface area of the reactants? Explain why.

***Increasing the surface area of the reactants allows more of the chemicals to interact immediately, speeding up the rate of the reaction.***

1. Explain the role of catalysts and inhibitors in chemical reactions.

***Catalysts are chemicals that can be used to start or to speed up a chemical reaction, while inhibitors are chemicals that can be used to slow down or stop a chemical reaction.***