Name: Key Date: _____

Chemical Reactions

A + B → C + D
A and B are reactants
C and D are products
"+" is read "and" or "plus" (when mixed with…., added to…., exposed to…, etc.)
"→" is read "produces" (can also mean "decomposes into" when there is only one reactant)

Signs a Reaction has Occurred

- Bubbles appear (shows that a gas has been produced)
- A **PRECIPITATE** forms (a solid that settles to the bottom, sometimes the solid particles are too small to detect and instead it appears as a cloudy solution)
- Color change
- Temperature change
- Light is emitted
- Change in volume (because of a change in density)
- Change in electrical conductivity
- Change in melting or boiling point
- Change in smell
- Change in taste

Chemical Reactions

For the following reactions, write: **a) The word equation**
b) The skeletal equation

1. **Magnesium metal reacts in a solution of sulfuric acid to produce hydrogen gas and a solution of magnesium sulfate.**

WE: Magnesium metal + Sulfuric acid → Hydrogen gas + Magnesium Sulfate

SE: $Mg(s) + H_2SO_4(aq) \rightarrow H_2(g) + MgSO_4(aq)$

2. **Potassium hydroxide and hydrogen are produced when potassium is placed in water.**

WE: Potassium + water → Potassium Hydroxide and Hydrogen

SE: $K(s) + H_2O(l) \rightarrow KOH(s) + H_2O(l)$

3. **Zinc reacts with lead (IV) nitrate to produce zinc nitrate and lead.**

WE: Zinc + lead (IV) nitrate → zinc Nitrate + Lead

SE: $Zn(s) + Pb(NO_3)_4 \rightarrow Zn(NO_3)_2 + Pb(s)$

4. **Calcium chloride reacts with silver nitrate to produce a white precipitate, silver chloride and calcium nitrate remains in solution.**

WE: Calcium chloride + Silver nitrate → Silver chloride + Calcium Nitrate

SE: $CaCl_2 + AgNO_3 \rightarrow AgCl(s) + Ca(NO_3)_2(aq)$

5. **Calcium carbonate decomposes into calcium oxide and carbon dioxide.**

WE: Calcium Carbonate → Calcium Oxide + Carbon dioxide

SE: $CaCO_3 \rightarrow CaO + CO_2(g)$

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6. Potassium chlorate, a solid white powder, can be decomposed on heating to yield solid potassium chloride and pure oxygen gas.

WE: Potassium chlorate → Potassium chloride + Oxygen gas

SE: $KClO_3(s) \rightarrow KCl(s) + O_2(g)$

7. In the hydrogen bomb, hydrogen gas and oxygen gas react to make water.

WE: Hydrogen gas + Oxygen gas → Water

SE: $H_2(g) + O_2(g) \rightarrow H_2O(l)$

8. Carbon monoxide and hydrogen gas are produced when carbon is placed in water.

W.E.: Carbon + Water → carbon monoxide + Hydrogen gas

S.E.: $C(s) + H_2O(l) \rightarrow CO(g) + H_2(g)$

9. Nitrogen monoxide from automobile exhaust reacts with oxygen to produced nitrogen dioxide, which is a toxic brown gas.

W.E.: Nitrogen monoxide + Oxygen → Nitrogen dioxide

S.E.: $NO(g) + O_2(g) \rightarrow NO_2(g)$

10. Sodium sulfate and a greenish brown solid copper (II) sulfide are formed when copper (II) sulfate is mixed with sodium sulfide.

W.E.: Copper (II) sulfate + Sodium sulfide → Sodium sulfate + Copper (II) sulfide

S.E.: $CuSO_4 + Na_2S \rightarrow Na_2SO_4 + CuS(s)$

11. A clear, colorless solution of ammonium hydroxide reacts with a clear blue solution of copper (I) sulfate to produce a blue precipitate of copper (I) hydroxide and a solution of ammonium sulfate.

W.E.: Ammonium Hydroxide + Copper (I) sulfate → Copper (I) Hydroxide + Ammonium sulfate

SE: $NH_4OH(aq) + Cu_2SO_4(aq) \rightarrow CuOH(s) + (NH_4)_2SO_4(aq)$

12. When solutions of copper (II) sulfate and lead (II) nitrate are mixed, a precipitate of lead (II) sulfate forms. The other product of the reaction, copper (II) nitrate remains in solution.

W.E.: Copper (II) sulfate + Lead (II) Nitrate → Lead (II) sulfate + Copper (II) Nitrate

S.E.: $CuSO_4(aq) + Pb(NO_3)_2(aq) \rightarrow PbSO_4(s) + Cu(NO_3)_2(aq)$

13. When a piece of solid iron is placed in a solution of copper (I) sulfate, solid copper forms on the iron strip and the solution turns red with iron (II) sulfate dissolved in solution.

W.E.: Iron + Copper (I) sulfate → Copper + Iron (II) sulfate

S.E.: $Fe(s) + Cu_2SO_4(aq) \rightarrow Cu(s) + FeSO_4(aq)$

14. A silver nitrate solution reacts with a sodium chloride solution to produce solid silver chloride and a sodium nitrate solution.

W.E.: Silver Nitrate + Sodium chloride → Silver Chloride + Sodium Nitrate

S.E.: $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$