**18-19 Ch 9 Review**

1. What does the formula for an **acid** look like? **H**X where X can be a non-metal or a poly. Criss-cross rule for formula.
2. What does the formula for a **base** look like? ZOH where Z can be a metal or ammonium (NH4). Criss-cross rule for formula.
3. What is a **metal oxide**? Metal-O at back. Criss-cross rule for formula. Also = a BIC.
4. What is a **non-metal oxide**? Nonmetal-O at back.
5. What does the **Activity Series of the Metals** tell you? Why is there no Activity Series for the Halogens? Which metals are more reactive than others. Helps you predict products in a SR-M rxn.
6. When do you **use** the Activity Series of the Metals? Metal + cmpd (cmpd contains another metal) to predict products.
7. What does **aq (aqueous)** mean? Dissolved in water.
8. How do you recognize each type of reaction?
   1. Synthesis 1 product
   2. Decomposition 1 reactant
   3. Single Replacement of a Metal Metal + cmpd (w metal in front) check Act. Series of the Metals.\*
   4. Single Replacement of a Halogen Halogen + cmpd (w halogen in back) check PT for hierarchy.
   5. Combustion of a Metal O2 + metal Metal oxide (use criss-cross rule 1st); like Synth of a BIC.
   6. Combustion of a Hydrocarbon O2 + CxHy CO2 + H2O
   7. Double Replacement cmpd + cmpd new cmpd + new cmpd (almost always both ionic and aqueous); CATIONS switch places. Use criss-cross rule to write new cmpds, then balance.
9. What is a **halogen**? Where are they found on the periodic table? (7A, and/or col. 17). Have 7 valence e-‘s. When ionize, form – 1 ions.
10. What is a **hydrocarbon**? CxHy (might also contain O); participate in comb rxn.
11. What is a **precipitate**? Solid that forms from DR rxn; cloudy, color change.
12. What is **activation energy**? E required to break old bonds so new ones can form; from starting pt to highest point (peak of curve).
13. What does **exothermic** mean? Of the three reactions (Whoosh Bottle, Burning Mg and Elephant toothpaste), which were **exothermic**? ALL
14. Draw the **energy diagram** (activation energy diagram) for an **exothermic** reaction.
15. What does **endothermic** mean? Energy is required to form new bonds; new substances are higher in energy than old ones. Feels cold.
16. Draw the **energy diagram** (activation energy diagram) for an **endothermic** reaction. Of the three reactions (Whoosh Bottle, Burning Mg and Elephant toothpaste), which were **endothermic**? None
17. What is a **BIC**? Binary Ionic cmpd. Metal + nonmetal. Criss-cross rule. Reduce.
18. What type of **ions** will elements in each group form? Why is group 4A not shown? They don’t normally ionize (except Pb and Sn). The rest of the Grp 4A’s normally form molecular bonds.

|  |  |
| --- | --- |
| 1A +1 | 5A -3 |
| 2A +2 | 6A -2 |
| 3A +3 | 7A -1 |

1. List the 7 diatomic molecules? What does that mean? When alone, there are always 2 as shown.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| N2 | O2 | F2 | Cl2 | Br2 | I2 | H2 |

1. List the 8 special 8 metals. Why are they called special 8’s? May ionize in morr than one way! Roman numeral = charge.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Cr | Mn | Fe | Co | Cu | Pb | Sn | Hg |

1. What substance is a **reactant** in **ALL combustion reactions**? O2
2. What **2 products** are formed in **Combustion of a Hydrocarbon** reactions? H2O + CO2
3. What type of reaction was the **Whoosh Bottle**? **Combustion** of a hydrocarbon.
4. Know how to **draw / recognize** the **before and after products** (including ENERGY) for the Whoosh Bottle.
5. What type of reaction was the **Burning of Magnesium**?

C-M

1. How are the **Whoosh Bottle and Burning of Magnesium** Reactions **alike**? O2 is a reactant; both are exothermic (give off energy) **Different**? One is combustion of a metal; make a BIC = metal oxide; one is combustion of a hydrocarbon; form water and carbon dioxide.
2. When do you need to use the **criss-cross rule**? Formula for a BIC or TIC (acid).
3. What type of reaction was the **Elephant Toothpaste**?

Decomp

1. What is a **catalyst**? Substance/process that speeds up a chemical rxn by lowering the Activation Energy.
2. Which substance(s) in the elephant toothpaste reaction were true reactants? Peroxide (H2O2) Products? H2O + O2 Catalysts? Yeast Spectators? Soap, food coloring/dye.
3. What was the purpose of the spectator substance(s) in the elephant toothpaste reaction? Effect!
4. What type of reaction could be classified in two ways?

C-M What are those ways? C-M (makes BIC = metal oxide) and S.

1. Explain how to use the criss-cross rule. Charges become the subscripts (reduce).
2. What does the symbol **Δ** written above the arrow in a chemical equation mean? Heat is a catalyst.

**Predicting Products of Reactions**

1. **Metal + non-metal → BIC (use Criss-cross rule).**
2. **Metal oxide + H2O → Base = Metal-OH (NH4OH).**
3. **Non-Metal oxide + H2O → Acid (H-Anion). Use the newly formed poly to determine the # of H’s needed.**
4. **Metal (reactive)\* + H2O → Base + H2**
5. **BIC → Metal + Non-metal (Decomp);**

**note 7 diatomic when alone.**

1. **Acid → Non-Metal oxide + H2O (Decomp)**
2. **Base → Metal oxide (Criss-cross rule) + H2O (Decomp)**
3. **CxHy + O2 → CO2 + H2O (C-HC)**
4. **Metal + O2 → Metal-O (Criss-cross rule); (Synth = C-M)**
5. **Halogen + cmpd → If new halogen is morr reactive than halogen in cmpd, new cmpd and new halogen alone. (SR-H). Halogens are already in order of decreasing reactivity in grp 7A.**
6. **Metal\* + cmpd → If new metal is morr reactive than metal in cmpd, new cmpd and old metal alone. (SR-M).**
7. **(ionic) cmpd + (ionic) cmpd → Two new ionic cmpds; switch cations, use criss-cross rule, then balance. (DR).**

**Happen because either:**

**Form a gas, form a ppt, or water. If you put H in the presence of OH, always form water.**

**EX’s:**

\_\_D\_1. \_\_\_\_\_MnF2 → Mn + F2 (bal’d)

\_\_S\_2. \_\_\_\_\_ K2O + \_\_\_\_\_H2O **→ 2 KOH**

\_\_D\_3. \_\_1\_\_H2SO3 → 1 H2O + 1 SO2

SR-H 4. \_\_\_\_\_ RbCl + \_\_\_\_\_Br2 **→ no rxn**

SR-M 5. \_\_\_\_\_ Ca + \_\_2\_ H2O **→ Ca(OH)2 + H2**

SR-H 6. \_\_\_\_\_CaCl2 + \_\_\_\_\_F2 → CaF2 + Cl2 (bal’d)

SR-M 7. \_\_\_\_\_ Fe + \_\_\_\_ H2O **→ no rxn**

SR-M 8. \_\_\_\_\_ Cu + \_\_\_\_\_ AgNO3 **→ Ag + CuNO3+** (bal’d)

DR\_ 9. \_\_\_2\_ AgNO3 + \_\_\_\_\_ MgSO4 **→ Mg(NO3)2 + Ag2SO4**