**Physical Science NCFE Guided Review 2.2**

**(Bonds, Reactions, Acid/Base)**

**2.2.1 Infer valence electrons, oxidation number, and reactivity of an element based on its location in the Periodic Table.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Group | **1** | **2** | **3-12** | **13** | **14** | **15** | **16** | **17** | **18** |
| Valence Electrons |  |  |  |  |  |  |  |  |  |
| Oxidation Number (Charge) |  |  |  |  |  |  |  |  |  |
| Reactivity |  |  |  |  |  |  |  |  |  |

**2.2.2 Infer the type of chemical bond that occurs, whether covalent, ionic, or metallic, in a given substance.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Ionic** | **Covalent** | **Metallic** |
| **Electrons** |  |  |  |
| **Elements Involved** |  |  |  |
| **Example** |  |  |  |

Classify the following as ionic, covalent, or metallic:

1. NaBr \_\_\_\_\_\_\_ 4. Fe-Cu alloy \_\_\_\_\_\_\_

2. H2O \_\_\_\_\_\_\_ 5. CCl4 \_\_\_\_\_\_\_

3. Al(NO3)3 \_\_\_\_\_\_\_ 6. PbI2 \_\_\_\_\_\_\_

**2.2.3 Predict chemical formulas and names for simple compounds based on knowledge of bond formation and naming conventions.**

* Binary Ionic Compounds:
  + Naming: the cation (metal) name stays the same, the anion (nonmetal) name changes the ending to \_\_\_\_\_\_\_\_
    - Example: Na and Cl =
  + Writing Formulas: find the \_\_\_\_\_\_\_\_\_\_\_ from the periodic table, then cross them to make the \_\_\_\_\_\_\_\_\_\_\_\_
    - Example: Magnesium and Iodine
* Ionic compounds with polyatomic ions (3 or more elements)
  + Naming: the cation keeps its name, the anion keeps its name
  + Look on the reference table for a list of polyatomic ions!
    - Example: Sr3(PO4)2 =
  + Writing Formulas: Same as with binary ionic compounds (cross charges to make subscripts)
    - Example: lithium and sulfate
* Covalent compounds
  + Naming: use prefixes to indicate subscript numbers

1 – 6-

2- 7-

3- 8-

4- 9-

5- 10-

Example: N2O5 =

* Writing formulas: use prefixes to determine subscripts (don’t cross them)
  + Examples: triphosphorus tetrachloride =

**2.2.4 Exemplify the law of conservation of mass by balancing chemical equations.**

* Balancing:
  + Use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to make numbers of elements on reactants and products \_\_\_\_\_\_\_\_\_\_\_\_
  + Remember that coefficients \_\_\_\_\_\_\_\_\_\_\_\_\_ to everything in the compound!

Example: \_\_\_\_\_\_Mg + \_\_\_\_\_\_O2 🡪 \_\_\_\_\_\_\_MgO

**2.2.5 Classify types of reactions such as synthesis, decomposition, single replacement, or double replacement.**

* Synthesis =
* Decomposition =
* Single Replacement =
* Double Replacement =
* Combustion =

**2.2.6 Summarize the characteristics and interactions of acids and bases.**

|  |  |  |
| --- | --- | --- |
|  | **Acid** | **Base** |
| **Formula/Definition** |  |  |
| **Taste/Feel** |  |  |
| **Litmus test** |  |  |
| **pH** |  |  |
| **Conductivity** |  |  |
| **Reaction with Metals** |  |  |
| **Reaction with Fats/Oils** |  |  |

* pH Scale =

Sample Questions

1. A recently discovered element would be placed in Group I, Period 8 of the periodic table. Which statement would best describe this element?

1. This element has a -1 oxidation number.
2. This element will form an ion with +1 charge.
3. This element has two valence electrons.
4. This element is a gas.

2. How many valence electrons does a phosphorus atom contain?

1. 5
2. 7
3. 9
4. 15

3. Which of the following metals is more reactive than magnesium?

1. aluminum
2. calcium
3. copper
4. zinc

4. Which combinations of elements will form an ionic bond?

1. carbon and hydrogen
2. chlorine and magnesium
3. chlorine and fluorine
4. hydrogen and oxygen

5. What is the correct chemical formula for magnesium phosphate?

1. Mg3P
2. MgPO4
3. Mg3 PO4
4. Mg3 (PO4)2

6. What is the coefficient of iron (Fe) when the following chemical equation is balanced?

Fe + Cl2 🡪 FeCl3

1. 1
2. 2
3. 3
4. 4

7. Which is a synthesis reaction?

1. 2H20 🡪 2H2 + O2
2. Mg + 2HCl 🡪 MgCl2 + H2
3. 2Cu + O2 🡪 2CuO
4. HCl + NaOH🡪 NaCl +H2O

8. Which pH would indicate the most acidic substance?

1. 2
2. 4
3. 10
4. 14