**Balancing & Writing Chemical Equations**

**Part I** – Circle each subscript, draw a square around each coefficient, and answer the questions related to each formula.

1. In the chemical formula O2 what does the “O” represent? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. For the chemical formula CO2 how many atoms of each element are present? C = \_\_\_\_\_\_\_\_ & O = \_\_\_\_\_\_\_\_
3. For the chemical formula 5H2 how many atoms of Hydrogen are shown? H = \_\_\_\_\_\_\_
4. For the chemical formula 2C2H6 how many atoms of each element are present? C= \_\_\_\_\_\_ & H = \_\_\_\_\_\_\_\_
5. For the chemical formula 2Na2SO4 how many atoms of each element are shown? Na = \_\_\_\_ S = \_\_\_ & O = \_\_\_

**Part II** – Label the chemical equation using the terms: **Product, Reactant, Subscript, Coefficient, and Yields.**

2Mg + O2 🡪 2MgO

**Part III** – Fill in the blanks for the following statement based on the Law of Conservation of Mass………Atoms are not \_\_\_\_\_\_\_\_\_\_\_\_\_ nor \_\_\_\_\_\_\_\_\_\_\_\_ during a chemical reaction. Scientists know that there must be the \_\_\_\_\_\_\_\_\_\_\_\_\_ number of atoms on each \_\_\_\_\_\_\_\_\_\_\_\_ of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_. To balance the chemical equation, you must add \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in front of the chemical formulas in the equation. You cannot \_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_ subscripts.

* Determine the number of atoms for each element.
* Pick an element that is not equal on both sides of the equation.
* Add a coefficient in front of the formula with that element and adjust your counts.
* Continue adding coefficients to get the same number of atoms of each element on each side of the equation.

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| --- | --- | --- | --- | --- |
| **Reactants** | **Products** |  | **Reactants** | **Products** |
| \_\_\_Ca + \_\_\_ O2 🡪  Ca =  O = | \_\_\_ CaO  Ca =  O = | \_\_\_Cu2O + \_\_\_C 🡪  Cu =  O =  C = | \_\_\_ Cu + \_\_\_ CO2  Cu =  O =  C = |
| \_\_\_Mg + \_\_\_O2 🡪  Mg =  O = | \_\_\_MgO  Mg =  O = | \_\_\_H2O2 🡪  H =  O = | \_\_\_H2O + \_\_\_O2  H =  O = |
| \_\_\_N2 + \_\_\_H2 🡪  N =  H = | \_\_\_NH3  N =  H = | \_\_\_Na2SO4 + \_\_\_CaCl2 🡪  Na =  S =  O =  Ca =  Cl = | \_\_\_CaSO4 + \_\_\_NaCl  Na =  S =  O =  Ca =  Cl = |

**Part IV** – Balance the following chemical equations according to the Law of Conservation of Mass.

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| \_\_\_H2 + \_\_\_ O2 🡪 \_\_\_H2O | \_\_\_HgO 🡪 \_\_\_Hg + \_\_\_O2 |
| \_\_\_Na + \_\_\_O2 🡪 \_\_\_Na2O | \_\_\_Zn + \_\_\_HCl 🡪 \_\_\_ZnCl2 + \_\_\_H2 |
| \_\_\_P4 + \_\_\_O2 🡪 \_\_\_P4O6 | \_\_\_SiCl4 + \_\_\_H2O 🡪 \_\_\_H4SiO4 + \_\_\_HCl |
| \_\_\_C + \_\_\_H2 🡪 \_\_\_CH4 | \_\_\_K + \_\_\_Br2 🡪 \_\_\_KBr |
| \_\_\_Al2O3 🡪 \_\_\_Al + \_\_\_O2 | \_\_\_Al(OH)3 + \_\_\_H2SO4 🡪 \_\_\_Al2(SO4)3 + \_\_\_H2O |
| \_\_\_Fe + \_\_\_H2O 🡪 \_\_\_Fe3O4 + \_\_\_H2 | \_\_\_Fe + \_\_\_O2 🡪 \_\_\_Fe2O3 |
| \_\_\_C2H6 + O2 🡪 \_\_\_CO2 + \_\_\_H2O | \_\_\_HCl + \_\_\_CaCO3 🡪 \_\_\_CaCl2 + \_\_\_H2O + \_\_\_CO2 |
| \_\_\_S8 + \_\_\_O2 🡪 \_\_\_SO3 | \_\_\_Fe2(SO4)3 + \_\_\_KOH 🡪 \_\_\_K2SO4 + \_\_\_Fe(OH)3 |
| \_\_\_N2 + \_\_\_O2 🡪 \_\_\_N2O | \_\_\_Al + \_\_\_FeO 🡪 \_\_\_Al2O3 + \_\_\_Fe |
| \_\_\_CO2 + \_\_\_H2O 🡪 \_\_\_C6H12O6 + \_\_\_O2 | \_\_\_C7H16 + \_\_\_O2 🡪 \_\_\_CO2 + \_\_\_H2O |
| \_\_\_AlBr3 + K2SO4 🡪 \_\_\_KBr + \_\_\_Al2(SO4)3 | \_\_\_FeCl3 + \_\_\_NaOH 🡪 \_\_\_Fe(OH)3 + \_\_\_NaCl |

* For the equations below predict the products and then balance the equations. Use the Periodic Table of Ions to determine the ion symbols of each chemical formula. (Polyatomic ions are in parentheses)

|  |  |
| --- | --- |
| \_\_\_Ag + \_\_\_Cu(SO4) 🡪 | \_\_\_C4H8 + \_\_\_O2 🡪 |
| \_\_\_NaI + \_\_\_CaCl2 🡪 | \_\_\_KCl + \_\_\_Mg(OH)2 🡪 |
| \_\_\_Ag(NO2) + \_\_\_Ba(SO4) 🡪 | \_\_\_Zn + \_\_\_Au(NO2)2 🡪 |
| \_\_\_Li(NO3) + \_\_\_Ag 🡪 | \_\_\_Na2O 🡪 |
| \_\_\_LiBr + \_\_\_Co(SO3)2 🡪 | \_\_\_H2O2 🡪 |

* Write the balanced chemical equation each sentence describes. (use the periodic table of ions)

1. Solid lithium and liquid water react to form lithium hydroxide in aqueous solution and hydrogen gas.
2. Solid iron (III) and gaseous oxygen react to form iron (III) oxide.
3. Sodium phosphate and calcium chloride react to form calcium phosphate and sodium chloride
4. The combustion of methane gas.