**6.1 Types of Chemical Reactions**

**1) Synthesis (combination)**

Two reactants combine:

*Examples – predict the product and balance:*

*a) Mg + N2 →*

*b) Al + F2 →*

*c) K + O2 →*

*d) Cd + I2 →*

*e) Cs + P4 →*

**2) Decomposition**

A single reactant is broken down:

*Examples – predict the products and balance:*

*a) AuCl3 →*

*b) K2O →*

*c) MgF2 →*

*d) Ca3N2 →*

*e) CsI →*

**3) Single Replacement**

A reactive element (metal or non-) replaces the element in a compound:

or

*Examples – predict the products and balance:*

*a) PbCl4 + Al →*

*b) Na + Cu2O →*

*c) CuF2 + Mg →*

*d) Cl2 + CsBr →*

*e) Be + Fe(NO3)2 →*

**4) Double Replacement**

Two compounds react to form two new compounds:

*Examples – predict the products and balance:*

*a) CaS + NaOH →*

*b) K3PO4 + MgI2 →*

*c) SrCl2 + Pb(NO3)2 →*

*d) AlCl3 + CuNO3 →*

*e) AgNO3 + Na2CrO4 →*

**5) Neutralization (Acid-Base)**

An acid and a base react to form water and a salt:

*Examples – predict the products and balance:*

*a) HBr + NaOH →*

*b) H3PO4 + Mg(OH)2 →*

*c) HCl + Pb(OH)2 →*

*d) Al(OH)3 + HClO4 →*

*e) H2SO4 + Ca(OH)2 →*

**6) Combustion**

A compound or element reacts with \_\_\_\_\_\_\_\_\_ to form carbon dioxide, water, and heat:

*Examples – predict the products and balance:*

*a) C6H12O6 + O2 →*

*b) H3PO4 + Mg(OH)2 →*

*c) HCl + Pb(OH)2 →*

*d) Al(OH)3 + HClO4 →*

*e) H2SO4 + Ca(OH)2 →*

Summary of Chemical Reaction Types

There are six types of chemical reactions:

|  |  |
| --- | --- |
| Reactants and Products | Reaction Type |
| A + B → AB |  |
| AB → A + B |  |
| A + BC → B + AC  or  A + BC → C + BA |  |
| AB + CD → AD + CB |  |
| HX + MOH → MX + H2O |  |
| CXHY + O2 → CO2 + H2O |  |

*Examples – Classify the reaction type (S, D, SR, DR, N, C). Then predict the products and balance:*

\_\_\_\_ 1) Fe2O3 →

\_\_\_\_ 2) Al + NiBr3 →

\_\_\_\_ 3) HCl + Mg(OH)2 →

\_\_\_\_ 4) C18H38 + O2 →

\_\_\_\_ 5) Li + N2 →

\_\_\_\_ 6) AgNO3 + Na2CrO4 →

**6.2 Factors Affecting the Rate of Chemical Reactions**

Reaction Rate:

Four factors can increase reaction rate:

1) *↑ Temperature*

Reason:

Example:

2) *↑ Concentration*

Reason:

Example:

3) ↑ Surface Area

Reason:

Example:

4) Adding a Catalyst

Reason:

Example: