# Unit 4.1: Balancing Chemical Reactions

**Notes for/from class**

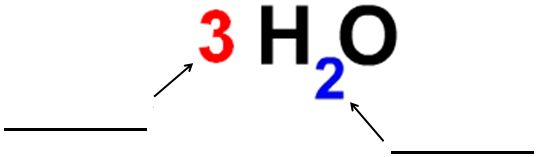
**Further Reference: 7.1 and 7.2 – Chemical Equations**

**CHEMICAL CHANGES**

1. In a chemical change, you are going to \_\_\_\_\_\_\_\_\_\_\_ bonds, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ those atoms, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. All chemical changes are a result of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Happen when you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bonds.
   2. Involve \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of atoms
   3. One set of compounds (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) forms another set of compounds (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

**LAW OF CONSERVATION OF MATTER**

1. The law of conservation of matter states that matter cannot be \_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_, but it can only \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   1. The number of each type of atom \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ must be \_\_\_\_\_\_\_\_\_\_\_ to the number of each type of atom \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**BEFORE WE BALANCE**

1. Complete the following figure:
   1. Coefficient: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Subscript: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PreBalancing Practice:** How many of each do you have?

2 H2O3 H = \_\_\_\_\_\_\_ O = \_\_\_\_\_\_\_

4 Fe2O3 Fe = \_\_\_\_\_\_\_ O = \_\_\_\_\_\_\_

6 NaCl Na = \_\_\_\_\_\_\_ Cl = \_\_\_\_\_\_\_

NO2 N = \_\_\_\_\_\_\_ O = \_\_\_\_\_\_\_

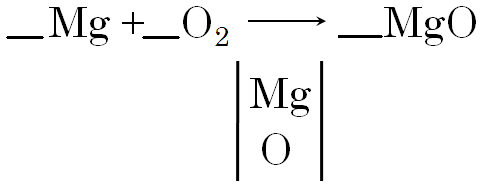
**BALANCING EQUATIONS**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the left, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the right
2. Symbols:
   1. + means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. 🡪 means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. g means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. s means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   5. l means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   6. aq means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. When balancing chemical equations, you are not allowed to change the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

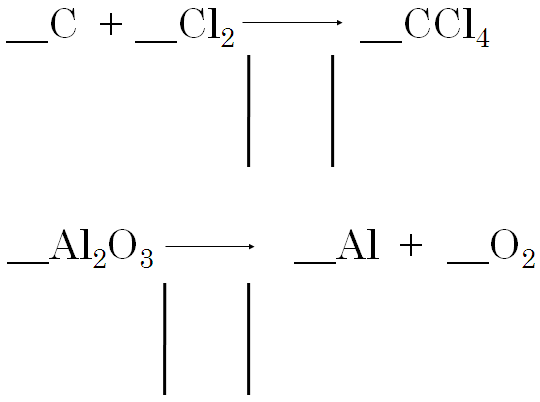
**Notes for/from class**

* 1. You CAN’T \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. You can only change the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on each side of the equation
   1. You CAN \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Practice: Use the T Chart below to balance the following equation
   1. Magnesium (solid) + Oxygen (gas) 🡪 Magnesium Oxide (solid)



**Balancing Practice:** Using the provided T Charts, balance the following equations.



# Unit 4.2: Chemical Reactions: Energy

**Notes for/from class**

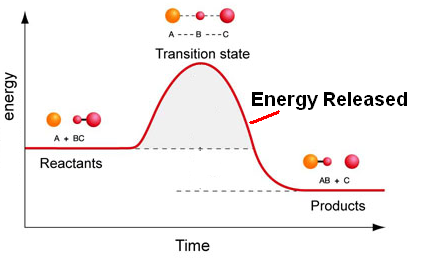
**Further Reference: 7.1 and 7.2 and 7.4 – Chemical Equations and Reaction Rates**

**ENERGY IN CHEMICAL REACTIONS**

1. All chemical reactions involve \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Every time a bond is \_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_, energy is used
   1. Breaking bonds \_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy
      1. Chemical reactions require energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Forming bonds \_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy
3. Chemical energy is stored inside \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. The stronger the bond is, the \_\_\_\_\_\_\_\_\_\_\_\_ it is to start the chemical reaction
4. Energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. The energy within the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ must be the same as the energy within the \_\_\_\_\_\_\_\_\_\_\_\_

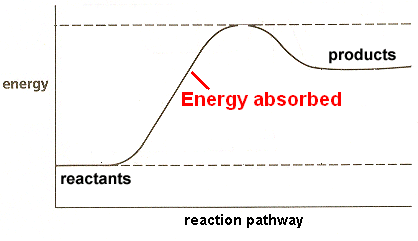
**HEAT ENERGY IN CHEMICAL REACTIONS**

1. Exothermic reactions \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy and the temperature \_\_\_\_\_\_\_\_\_\_



* 1. They \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ heat!
  2. Examples:
     1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Endothermic reactions \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy and the temperature \_\_\_\_\_\_\_\_\_\_



* 1. They \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ heat!
  2. Examples:
     1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PHOTOSYNTHESIS**

**Notes for/from class**

1. Photosynthesis is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reaction
   1. Reactants are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Products are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Energy from the \_\_\_\_\_\_\_\_\_\_\_ is being transformed into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which is being stored as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Show the formula for photosynthesis (without the coefficients!)**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 \_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_

**SPEEDING UP REACTIONS**

1. The following actions \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the rate of reactions because they \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!
   1. Increasing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Increasing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Increasing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Increasing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   5. AND \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**CATALYST**

1. A **CATALYST** is a substance that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. It does this by lowering the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a chem rxn.
   2. A catalyst is never \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and never\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Think of it as a \_\_\_\_\_\_\_\_\_\_\_\_\_, like a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      1. Each catalyst has only \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Enzymes are merely \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that work \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Just like catalysts, each enzyme has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Substrate: the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ an enzyme \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Essentially, the enzyme and substrate are like a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Unit 4.3: Types of Chemical Reactions

**Notes for/from class**

**Future Reference: 7.3 Nature of Chemical Reactions**

**Classifying Reactions**

1. Synthesis (Addition) Reactions:
   1. Describe it in your own words:
   2. Write the example using A, B, C, D, X, etc…
   3. Write a real world example found in the notes:
2. Decomposition Reactions:
   1. Describe it in your own words:
   2. Write the example using A, B, C, D, X, etc…
   3. Write a real world example found in your in the notes:
3. Single Displacement (Replacement) Reactions:
   1. Describe it in your own words:
   2. Write the example using A, B, C, D, X, etc…
   3. Write a real world example found in the notes:
4. Double Displacement (Replacement) Reactions:

**Notes for/from class**

* 1. Describe it in your own words:
  2. Write the example using A, B, C, D, X, etc…
  3. Write a real world example found in the notes:

1. Acid Base Reactions:
   1. Describe it in your own words:
   2. Write the example using A, B, C, D, X, etc…
   3. Write a real world example found in the notes:

Q1 – What 2 things does an Acid Base Reaction ALWAYS result in?

1. Combustion Reactions:
   1. Describe it in your own words:
   2. Write a real world example:
   3. What are the two products of combustion EVERY TIME?

Q2 – What is ALWAYS going to be the non chemical product of a combustion reaction?

# Unit 4.4: Translation

**Notes for/from class**

**Further Reference: Google.**

**TRANSLATION**

1. Translating is when I give you a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that you have to turn into an equation written \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Hints:
   1. Diatomic molecules are always written as:
      1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Words like \_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_ mean put a + into the equation
   3. Words like \_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_ mean put a 🡪 into the equation

**TRANSLATING PRACTICE (DO NOT BALANCE)**

1. Potassium bromide 🡪 potassium metal + bromide
2. Calcium fluoride 🡪 Calcium + fluoride
3. Hydrogen reacts with oxygen to produce water.
4. Silicon tetrachloride decomposes into silicon and chlorine.