# 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.