Describe the chemical reaction: 2K (s) + 2H2O (l) ⟶ 2KOH + H2 (g) + heat. List evidence:

Writing & Balancing Chemical Equations

\_\_\_\_\_\_\_ are the substances that enter into a chemical reaction. \_\_\_\_\_\_\_ are the substances that form. A chemical \_\_\_\_\_\_\_ is a group of chemical formulas & symbols that represent the reactants & products in a chemical reaction, expressed in words or formulas.

For all chemical reactions: \_\_\_\_\_\_\_ **🡪** \_\_\_\_\_\_\_

The \_\_\_\_\_\_\_ are written on the left separated by an \_\_\_\_\_\_\_ from the \_\_\_\_\_\_\_ on the right.

The arrow signifies “\_\_\_\_\_\_\_*”*, “*gives”*, or “*reacts to* \_\_\_\_\_\_\_ *…”.*

 e.g. Fe + O2 → Fe2O3 *iron plus oxygen reacts to produce (yields) IronIII* Oxide

\_\_\_\_\_\_\_ states of substances are indicated by (*\_\_*) for solid, (*\_\_*) for liquid, (*\_\_*) for gas, or (*\_\_*) for a substance dissolved in water:

**Chemical reactions represent changes in bonding & energy**

\_\_\_\_\_\_\_ Reactions 🡪 *?*

 2 KClO3 (s)  **+ energy** 🡪 2 KCl (s)  + 3 O2 (g)

Potassium Chlorate Potassium Chloride Oxygen

*Is energy a reactant or product?*

\_\_\_\_\_\_\_ Reactions 🡪 *?*

 2 H2 (g)  + O2 (g) 🡪 H2O (g)  **+ energy**

 Hydrogen Oxygen diHydrogen monOxide

 *Is energy a reactant or product?*

All Chemical Reactions require \_\_\_\_\_\_\_ Energy:



 *the minimum energy needed for a reaction to* \_\_\_\_\_\_\_*.*

Enzymes, \_\_\_\_\_\_\_, or \_\_\_\_\_\_\_ commonly yield the activation energy needed in chemical reactions

In many chemical reactions, a catalyst is added to the reaction mixture. A \_\_\_\_\_\_\_ is a substance that \_\_\_\_\_\_\_ up the reaction but is not used up (or part of) in the reaction.

Write a **skeleton** equation for a chemical reaction:

1. Write the correct \_\_\_\_\_\_\_ for each substance in the reaction.

2. Indicate the \_\_\_\_\_\_\_ of each substance.

3. Separate the reactants from the products with an \_\_\_\_\_\_\_.

4. Use \_\_\_\_\_\_\_ signs to separate the two reactants and each of the three products.

HCl (aq) + NaHCO3 (s) → NaCl (aq) + H2O (l) + CO2 (g)

\_\_\_\_\_\_\_ Chemical Equations

* + Have the \_\_\_\_\_\_\_ types of atoms (\_\_\_\_\_\_\_) on both sides of equations
	+ Have the same \_\_\_\_\_\_\_ of each type of atom
	+ Show \_\_\_\_\_\_\_ of mass
* Determine the \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_ for the chemical reaction … write a \_\_\_\_\_\_\_ equation.
* All symbols and \_\_\_\_\_\_\_ must be correct \_\_\_\_\_\_\_ balancing the chemical equation.
* NEVER change a \_\_\_\_\_\_\_ or \_\_\_\_\_\_\_ when balancing the overall equation

ONLY \_\_\_\_\_\_\_ are used when balancing equations.

* A chemical equation must have the same \_\_\_\_\_\_\_ of \_\_\_\_\_\_\_ on each side of the arrow (\_\_\_\_\_\_\_ *of matter, mass & energy*)
* Coefficients indicate the number of \_\_\_\_\_\_\_ units (compounds or molecules) represented by the formula in a chemical reaction.

Zinc + Hydrochloric acid 🡪 ZincII Chloride + Hydrogen

Zn**(s)** + **2** HCl **(aq)** 🡪 ZnCl2 **(s)** + H2 **(g)**

* Coefficients are understood to be \_\_\_ if not written.
* *Compare the* \_\_\_\_\_\_\_ *of each* \_\_\_\_\_\_\_ *on each side of the equation*.
* \_\_\_\_\_\_\_ change a subscript or formula when balancing the overall equation.

What are the Types of Chemical Reactions?

There are \_\_\_\_\_\_\_ general types of Chemical reactions (list):

Not all chemical reactions fit uniquely into one category, but may fit equally well into two categories. For instance, e.g. If one of the reactants in a \_\_\_\_\_\_\_ reaction is oxygen gas [O2], the reaction is also a \_\_\_\_\_\_\_ reaction.

A synthesis or \_\_\_\_\_\_\_ reaction is a chemical change in which two or more substances react to form \_\_\_\_\_\_\_ new substance (write general equation):

\_\_\_\_\_\_\_ reactions are the opposite of synthesis reactions.

\_\_\_\_\_\_\_ substance \_\_\_\_\_\_\_ down into simpler substances.

\_\_\_\_\_\_\_ reactant breaks down to more than one product.

(write general equation):

Most decomposition reactions require \_\_\_\_\_\_\_ in the form of heat, light, or electricity (\_\_\_\_thermic).

\_\_\_\_\_\_\_ -Replacement Reactions:

*A more* \_\_\_\_\_\_\_ *element will displace a less active element that is already part of a compound.*

A metal may displace another metal (write general formula):

A non-metal may displace another non-metal (write general formula):

Whether a certain **metal** replaces another **metal** or a **non-metal** replaces another **non-metal** is determined by the \_\_\_\_\_\_\_ series. Activity Series: description of the relative \_\_\_\_\_\_\_ of elements

Metals (list the MOST active metals):

Non-Metals: (activity series for halogens):

REFERENCE TABLE N

* As one proceeds \_\_\_\_\_\_\_ the table, \_\_\_\_\_\_\_ become more active, meaning a metal listed LOWER on the table will \_\_\_\_\_\_\_ a metal listed higher on the table.
* As one proceeds UP the table, \_\_\_\_\_\_\_ become more active, meaning a metal listed \_\_\_\_\_\_\_ on the table will replace a non-metal listed lower on the table.

\_\_\_\_\_\_\_ -Replacement Reactions

When two \_\_\_\_\_\_\_ compounds are mixed and they react, the positive and negative ions of the two compounds are interchanged (write general formula):

Double-replacement reactions are also referred to as \_\_\_\_\_\_\_ \_\_\_\_\_\_\_ or double-displacement reactions. To determine if a double displacement reaction has taken place, look at the \_\_\_\_\_\_\_ of the reaction. One of the following products will have formed:

* a \_\_\_\_\_\_\_ is evolved in the reaction (g) or ↑
* \_\_\_\_\_\_\_ formation (s) or **↓**
* A molecular (covalently bonded) substance, \_\_\_\_\_\_\_ is formed

Refer to REFERENCE TABLE E for solubilities of ionic compounds in water.

Give the following for the reaction between barium chloride and aluminum sulfate.

Skeletal Equation:

Ionic Equation:

NET Ionic Equation:

Spectator Ions:

Balanced Equation:

Combustion Reactions

A \_\_\_\_\_\_\_ reaction is a chemical change in which an element or a compound reacts with \_\_\_\_\_\_\_, often producing energy in the form of heat and light.

Often the other reactant (fuel) is a \_\_\_\_\_\_\_, which is a compound composed of hydrogen and carbon. The \_\_\_\_\_\_\_ combustion of a hydrocarbon produces \_\_\_\_\_\_\_ \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_.

Write the general formula of a complete combustion reaction:

\_\_\_\_\_\_\_ Exhibit Combustion

Metals react with \_\_\_\_\_\_\_ in the air to produce metal oxides and give off \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_.

If you heat the metal magnesium to a high enough temperature in the presence of oxygen, the following \_\_\_\_\_\_\_ reaction occurs (write balanced equation):