MOLECULAR AND MOLAR INTERPRETATIONS OF CHEMICAL REACTIONS

Chemical Equation: a written representation of a chemical rxn.

{Reactants} {products}

2Na + O --------------🡪 Na2O

coefficient subscript

**Subscript:** number written below and to the right of an element in a molecular formula that tells how many atoms of the element are present

**Coefficient:** The number written in front of a molecular formula or elemental symbol telling how many particles are present .

**Molar interpretation:**

As we look at a chemical equation, the coefficients can represent the ratio of moles of each of the reactants and products

**Molecular Interpretation:**

We can look at the coefficients in a chem. Eq. as the ratio of molecules of each reactant and product

Zn + 2HCl ------------------- ZnCl2(aq) + H2(g)

In the above equation we could say:

(Molecular interpretation)

1 Zn atom reacted with 2 molecules of HCl

To produce 1 molecule of ZnCl2 and 1 molecule of hydrogen gas

Or ………

In the above equation we could say:

( Molar Interpretation)

1mole of zn reacts with 2 moles of HCl to

produce 1 mole of ZnCl2 and 1 mole of

hydrogen gas

From this , knowing any amount of grams of moles of a reactant or product we can find the amounts of the rest

Ex.

.2n of potassium carbonate reacts with an excess of calcium Chloride to form Potassium chloride and Calcium Carbonate. Find the moles then the mass of calcium chloride that reacts and the grams of each of the products.

1. Write a balanced equation ( can’t do this? then well… you are …….out of luck)

CaCl2 + K2CO3 --------🡪

1. Find the moles of each substance

**EXOTHERMIC VS ENDOTHERMIC REACTIONS**

Note: in all chemical rxns, energy is either released or absorbed. This energy is either stored in chemical bonds(endothermic) or released when bonds are broken (exothermic).

Exothermic rxn: is a reaction that releases energy when chemical bonds are broken ( exo: out)

Endothermic rxn: is a reaction that absorbs energy when chemical bonds are formed (endo: in)

Identifying chemical reactions:

How can you tell if a chemical reaction has occurred?

1. Heat change
2. Smoke
3. Odor
4. Light
5. Explosion : sound and light
6. Bubbling
7. Color change
8. Gas released
9. Phase change

Note: none of these stands by itself . You must look at a variety of things.

Lets look at some examples

LIMITING REACTANTS:

The reactant in a chemical reaction which is used up first ( completely used up)

One reactant will run out first and one will be left in excess usually.

NOTE: In most reactions one of the reactants is left over and one is completely used up. The one completely used up is the limiting reactant.

Before we can find the moles and mass of each reactant and product we must determine which is the limiting reactant.

5 grams of hydrogen gas is reacted with 20grams of oxygen gas to produce water.

How many moles of water are produced??

H2 + O2 --------🡪 H2O

5g 20g

1. What is the limiting reactant?
2. How many moles of excess are left?
3. How many grams of excess reactant are left?
4. Find mass of both products