

Class Notes: Matter, Properties, Reactions

Substance: matter that has uniform (smooth) and definite (particular) composition (make-up)

--made only of certain things with no impurities (**Pure substance**)

2 Kinds:

1. Element: simplest form of matter that has unique set of properties (all atoms are identical, building material for all matter)

--**Symbol:** every element has a symbol

1 or 2 letters, first letter capitalized, second letter lowercase

2. Compound: contains one (or more) elements **chemically** combined in a fixed proportion (amounts never change)

(atoms stuck together to make new substances, can always be separated into simpler substances = different elements)

--**Formula:** shows elements in the compound

Shows relative amounts of each element using subscripts

ex. CaCO_3 , H_2O , $\text{C}_6\text{H}_{12}\text{O}_6$, NaHCO_3 , O_2 , O_3

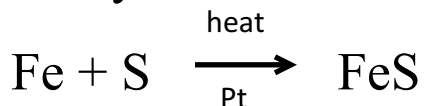
Equation: ex. Iron and sulfur, when heated, react to produce iron sulfide

Reactants: the substances you start with, on the left of the arrow

Products: the new substances (with new properties) that are produced, on the right of the arrow

Arrow \longrightarrow shows direction of reaction, separates reactants and products

***Words:** (above/below) arrow indicate conditions or catalysts that are required for the reaction to proceed



Substances have 2 types of properties:

1. Physical property: quality of a substance that can be observed or measured without changing composition

Ex. Color, solubility, odor, melting point, boiling point etc.

***Physical change:** some properties change, but the material does not change composition (end with what you start with, reversible)

2. Chemical property: ability of a substance to undergo a specific chemical change (can change to form new substance, only determined by changing substance)

Ex. Combustion, oxidation, rusting, rotting food

***Chemical change:** change that produces matter with a different composition than the original matter (end with something different than started with, difficult to reverse)

Chemical reaction = Chemical change

one or more substances change into one or more new substances (atoms are rearranged, new substances with new properties formed, heat is usually produced or absorbed)

Phase: any part of a sample with uniform composition and properties

Some substances are Mixtures: a physical blend (mixture) of two or more substances that remain distinct and their composition (make-up) stays the same (Not PURE substance)

Ex. Salt water, air, vegetable soup

2 types of mixtures:

1. Heterogeneous: composition is not uniform (not the same throughout), every sample will be different, there are 2 phases (you can see the differences)

Ex. Chocolate chip ice cream, beach sand, salad dressing

2. Homogeneous: composition is uniform throughout
= solution

Ex. Air, steel, crude oil, lemonade, sugar water

Mixtures can be separated by physical means

Law of conservation of mass: in any physical change or chemical reaction, mass is conserved (mass is neither created nor destroyed)

****mass of reactants and mass of products is always equal**