

Matter and Change

I. Properties of Matter

Matter – Anything that occupies space and has mass.

Substance – Matter that has a uniform and definite composition.
(Also referred to as pure substances).

Physical properties – A property or characteristic of a substance that can be determined without changing the substance into a different substance.

Examples: color, melting and boiling points, color, odor, hardness, density of substance.

Chemical properties – A property or characteristic of a substance that you can only determine by changing the substance into a different substance.

Examples: flammability, rust, decompose, ferment, etc..

II. States of Matter

The physical state of a substance is its physical property.

There are **3 main states**:

1. **Solid** – has definite shape and volume.
2. **Liquid** – has no definite shape, but a fixed volume.
3. **Gas** – has no definite shape or volume.

$\text{H}_2\text{O (s)}$ ----- $\text{H}_2\text{O (l)}$ ----- $\text{H}_2\text{O (g)}$ which is steam

III. Physical Changes

Physical Change – A change in the physical makeup of a substance that does not change the substance into a different substance.

Example: wood being chopped up

Chemical Change – A change in which one or more substances are converted into different substances. A reaction.

Example: the rusting of metal

IV. Mixtures

Mixture – Any combination of two or more substances in which each substance retains its own chemical identity. One important characteristic of mixtures is that their compositions may vary.

Two Types of Mixtures

1. Heterogeneous mixture – A mixture in which the composition is not identical in all parts of the mixture. Two or more phases.

Examples: salad, vinegar and oil, water and sand

2. Homogeneous mixture – A solution. All parts of the mixture are identical throughout. Single phase.

Examples: sugar water

V. Separating Mixtures

1. Physical means – most heterogeneous mixtures can be physical separated. Spooning out or magnetic departure.

2. Distillation – A liquid is boiled to produce a vapor that is then condensed again to a liquid. Most homogeneous mixtures.

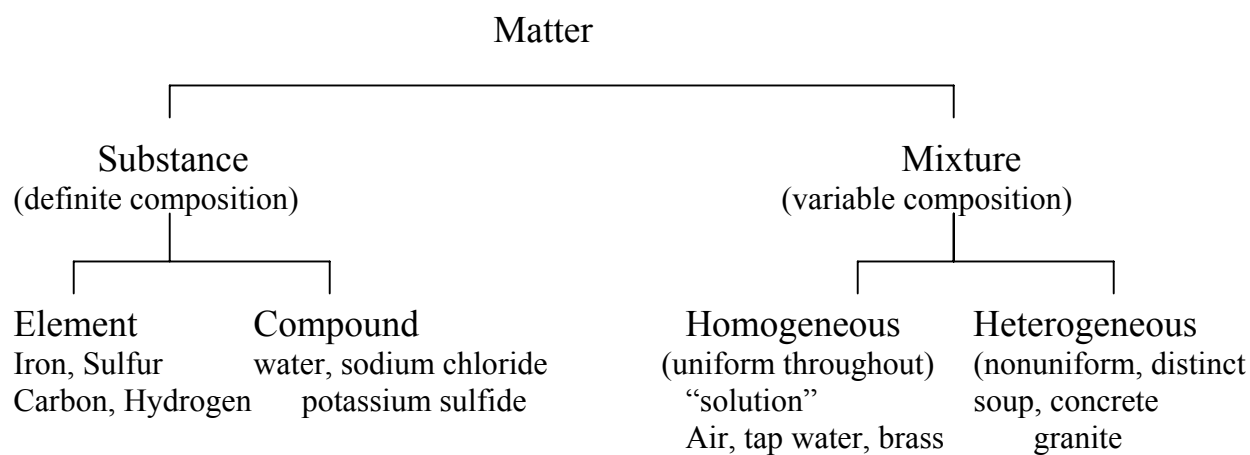
Elements & Compounds

I. Distinguishing Elements and Compounds

Element- Any substance that cannot be separated into similar pure substances by ordinary chemical means

Atom- the smallest particle of an element that is still that element

Compound- A pure substance composed of two or more elements combined in a definite proportion



Chemical Reactions

A chemical reaction is when one or more substances are converted into new substances.

Reactants (beginning substance) are converted into Products (ending substance)

Example: Iron + sulfur \longrightarrow iron sulfide

Chemical Property: the ability of a substance to undergo a chemical reaction and to form a new substance. It always involves a change in chemical composition of the substance.

Key words (action verbs) that help identify a chemical change

Rot, burn, decompose, ferment, explode, corrode, etc

Chemical reactions are not easily reversed

Signs of Chemical Change

1. Gas evolved (bubbling)
2. A precipitate forms (insoluble solid) ppt.
3. Color change occurs, NOT due to blending.
4. Heat is taken in or given off.

Conservation of Mass

In any chemical or physical process, mass is neither created nor destroyed.

The mass of the products (even gasses) must be equal to the mass of the reactants