

Physical and Chemical

- We classify changes in matter according to whether the identity of matter changes during the process.

PHYSICAL CHANGE

- A change in the form or appearance of matter **WITHOUT** a change in identity

Examples:

- Melting, freezing (all phase changes) are physical; changes
- Breaking, cutting, etc. are also physical changes

CHEMICAL CHANGE

- A change in the identity of matter
- also called "chemical reactions"

Examples:

- Burning, rusting, metabolism

We classify PROPERTIES of substances by whether or not you must change the identity of a substance to obtain information about the property

PHYSICAL PROPERTIES

- can be determined without changing the identity of matter

Examples:

- size, shape, color, mass, hardness
- melting point, boiling point, density, etc.

CHEMICAL PROPERTIES

- can only be determined by changing the identity of matter

Examples:

- flammability, reactivity with acids, temperature at which thermal decomposition occurs

Classification of matter

- We can broadly classify matter by how difficult it is to separate

PURE SUBSTANCES

- CANNOT be separated into different materials by PHYSICAL PROCESSES

Examples:

Table salt, gold, silver, nitrogen, oxygen, carbon, hydrochloric acid, carbon dioxide, ethanol (grain alcohol), water, silicon dioxide

MIXTURES

- CAN be separated into other materials by PHYSICAL PROCESSES

Examples:

salt water, vodka, air, toilet bowl cleaner, beef, macaroni and cheese, dirt

More on PURE SUBSTANCES

- Pure substances can be further classified, depending on how easy it is to separate them by
CHEMICAL PROCESSES

ELEMENTS

- Cannot be broken down into simpler substances using physical or chemical means
- Elements are the building blocks of chemistry! They are the simple things from which all other things are formed!
- Listed on the PERIODIC TABLE OF THE ELEMENTS

Examples:

gold, silver, carbon, nitrogen, oxygen

COMPOUNDS

- Can be broken down into simpler substances using chemical means
- Are made of ELEMENTS combined in simple, fixed ratios
- A compound, no matter how it was made, has a definite ratio of one atom to another (LAW OF CONSTANT COMPOSITION)

H_2O : 2 parts hydrogen to one part oxygen!

Examples:

carbon dioxide, hydrochloric acid, ethanol, water

More on MIXTURES

- Mixtures can be further classified based on uniformity

HOMOGENEOUS MIXTURES

- uniform in composition and properties throughout
- physical properties the same at any point in the mixture

Examples:

salt water, toilet bowl cleaner, vodka

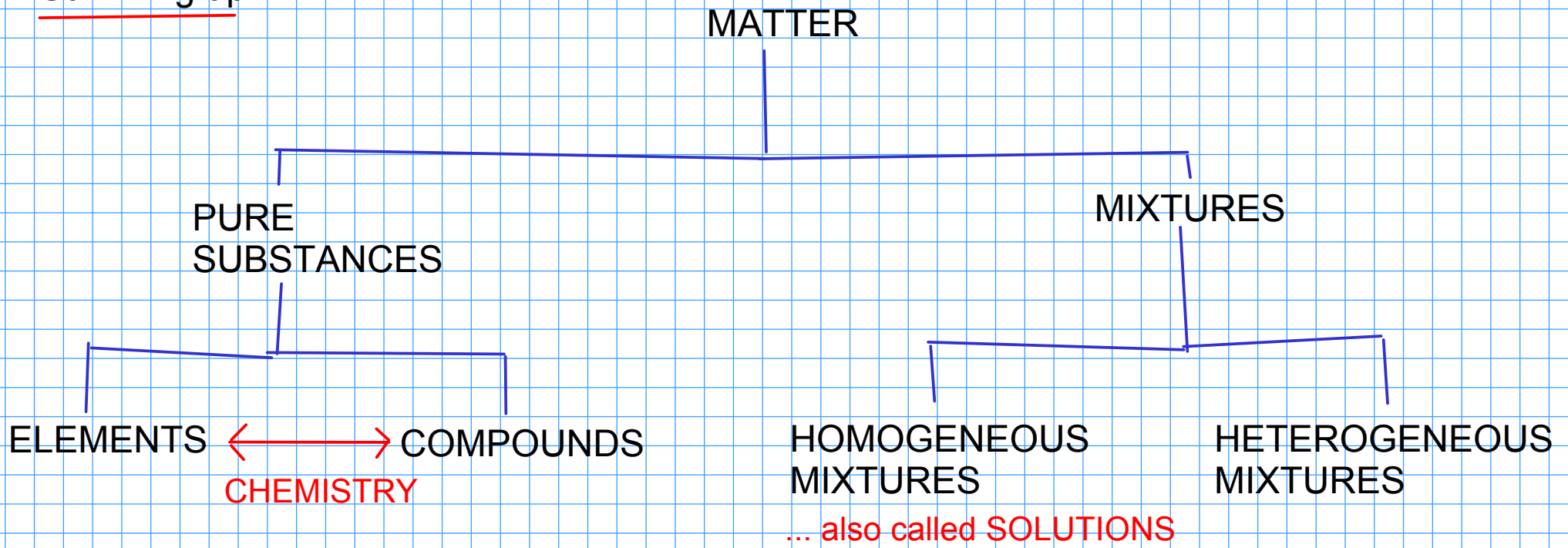
HETEROGENEOUS MIXTURES

- nonuniform
- physical properties may differ (sometimes dramatically) at different points in the mixture

Examples:

beef, dirt, macaroni and cheese

Summing up...



Conservation of mass

- During any chemical or physical process, the overall amount of mass remains constant, even if the chemical identity or physical state of the matter involved changes

* Total mass remains constant from (1) to (2), even though the mass of the GAS decreases and the mass of the SOLID increases after combustion!

