Classification of Matter

Classification of Matter

- Now that we have defined chemical and physical properties of matter, we can use that to help us classify it.

- One way chemists classify matter is based on its purity.

Classification of Matter

- **Pure Substance** – Matter that has only 1 set of chemical and physical properties.

Example: Pure water always has the exact same chemical and physical properties under the same conditions.

If water ever tastes different then it isn't pure water; it fits into our next category.

Classification of Matter

- **<u>Mixture</u>** – Two or more pue substances mixed together. Each substance in the mixture retains its own set of chemical and physical properties.

Example: Copper and Zinc can be mixed together to produce brass.

Even though it may look different, it is still copper and zinc. Each metal retains its own properties like melting point.

Classification of Matter

- **<u>Mixture</u>** – Two or more pure substances mixed together. Each substance in the mixture retains its own set of chemical and physical properties.

Unlike pure substances, mixtures can always be separated by physical means.

How could we separate the copper and zinc back out?

Mixtures

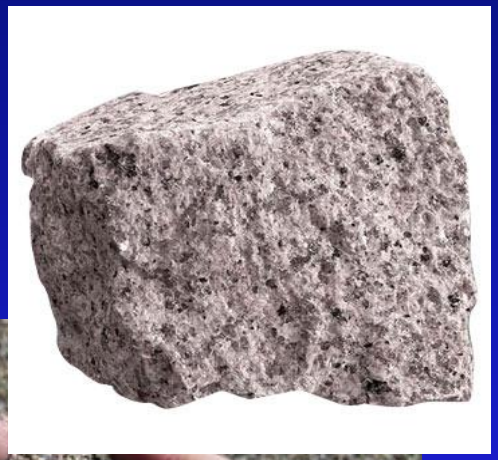
- **Mixture** – Two or more pure substances mixed together. Each substance in the mixture retains its own set of chemical and physical properties.

If a sample of sand contains iron and salt, how could you separate them from the other minerals?

Mixtures

- Some mixtures are more pure than others.
- **<u>Heterogeneous mixture</u>** – Uneven distribution of substances. (Very impure)

  - You can see the different parts.



Examples:
Sand
Granite
Wood

Mixtures

- Some mixtures are more pure than others.
- **<u>Homogeneous Mixture</u>**– Even distribution of substances.

  - You cannot see the different parts.

Examples:
Milk
Blood

Mixtures

- **<u>Homogeneous Mixture</u>** – Components are evenly mixed. (More pure than heterogeneous)

  - Cannot see the parts.

Salt water contains salt and water, but are mixed all the way to the atomic level, but it can still be separated by physical means.

Seawater distillation plant

Pure Substances

- Pure substances can also be divided into 2 categories: compounds and elements.

Pure Substances

- **<u>Compound</u>** – Two or more elements chemically bonded together.

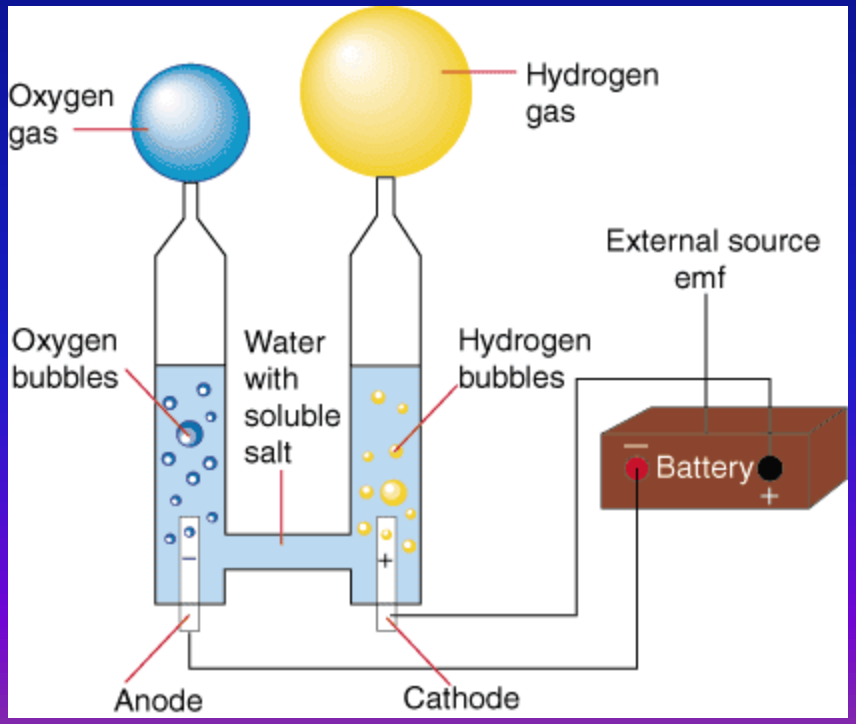
Examples:
Carbon Dioxide (CO_2)
Water (H_2O)
Salt (NaCl)
Sucrose ($C_{12}H_{22}O_{11}$)

Pure Substances

- Compounds have only 1 set of properties. They cannot be separated by any physical process.

  - Can only be separated by a chemical reaction.

Water can be separated into Hydrogen and Oxygen by a process called Electrolysis.

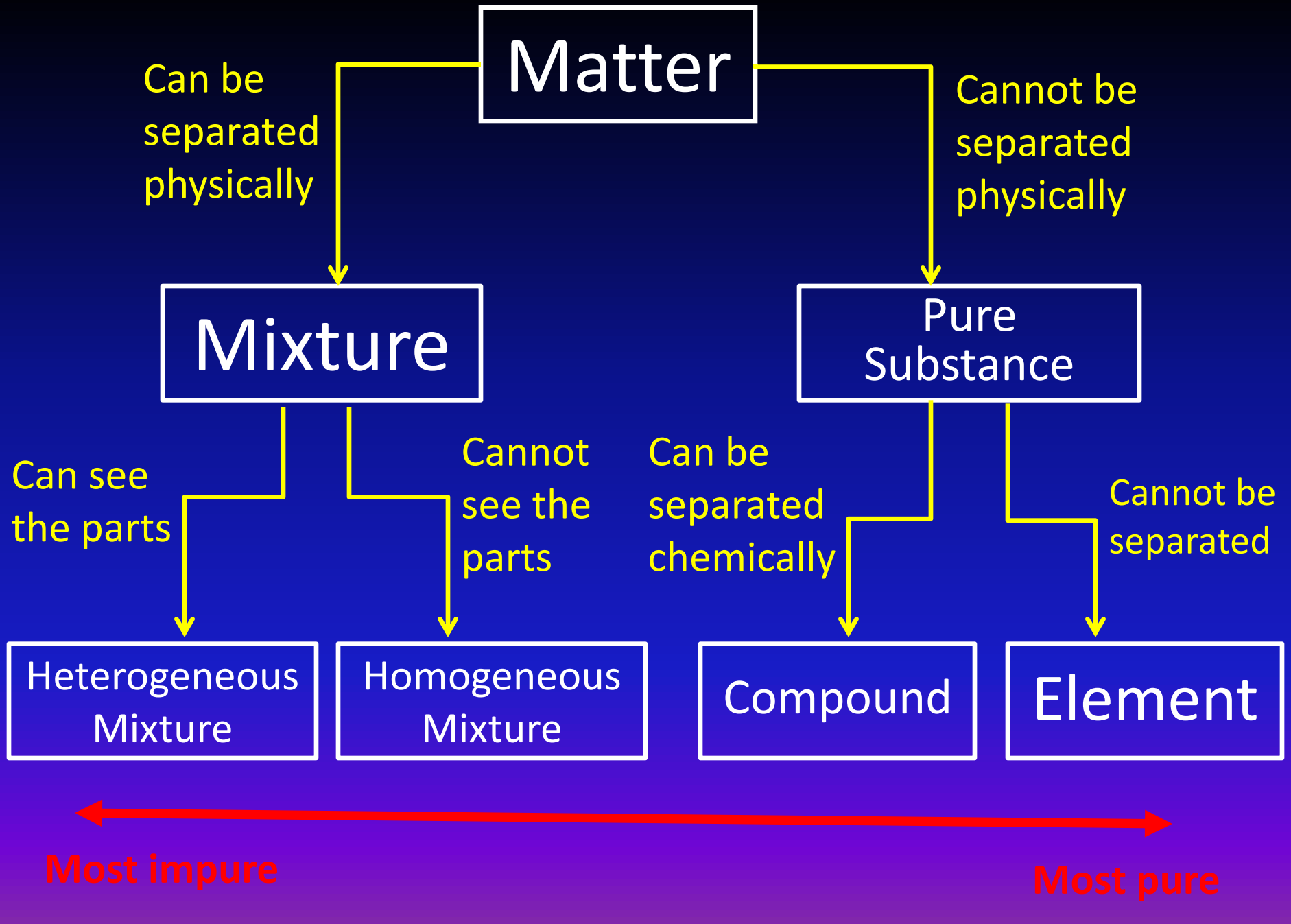


Pure Substances

- **<u>Elements</u>** – Substances made up of only one type of atom.

  - Cannot be separated by any physical OR chemical process.

Examples:
Carbon
Helium
Gold


Matter
Can be separated physically
Cannot be separated physically
Mixture
Pure Substance
Can see the parts
Cannot see the parts
Can be separated chemically
Cannot be separated
Heterogeneous Mixture
Homogeneous Mixture
Compound
Element
Most impure
Most pure