

Aim: I can recognize physical and chemical properties and changes in matter.

Lessons 1 and 2 in Intro to Chemistry book.



WHAT IS MATTER?

- Anything that has mass and takes up space

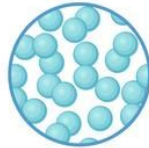
STATE OF MATTER



SOLID



LIQUID



GAS



COOL

HOT

PHYSICAL PROPERTIES

- Used to identify, describe, and classify matter
- Can be observed
- Examples:
 - Color
 - Phase at room temperature
 - Shape
 - Heat conductivity
 - Electrical conductivity
 - Freezing or boiling point
 - Texture
 - Density
 - Hardness
 - Odor
 - Viscosity



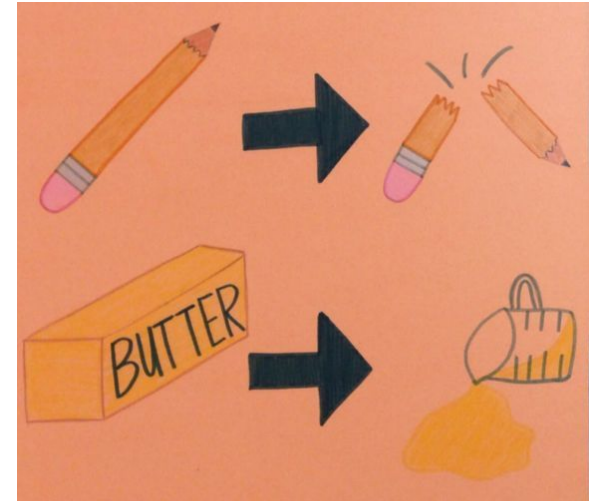
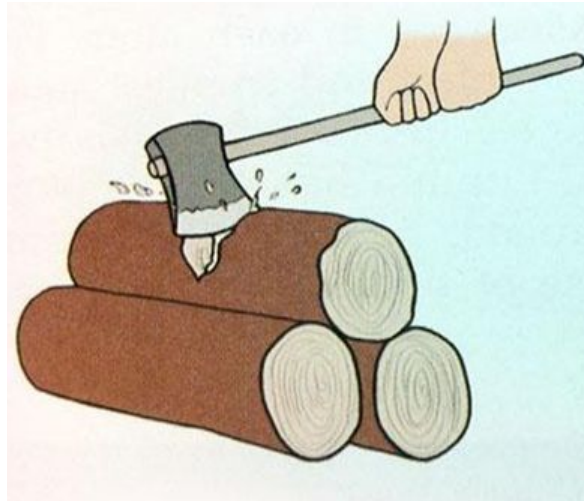
CHEMICAL PROPERTIES

- Describe how a substance changes into a new substance
- Examples:
 - Ability to burn (flammability)
 - Ability to rust
 - Ability to react with acids



PHYSICAL CHANGES

- Matter changes (state or phase) but keeps its chemical composition and properties
- Examples:
 - Phase changes (freezing, melting, condensation, evaporation)
 - Tearing
 - Crushing



CHEMICAL CHANGES

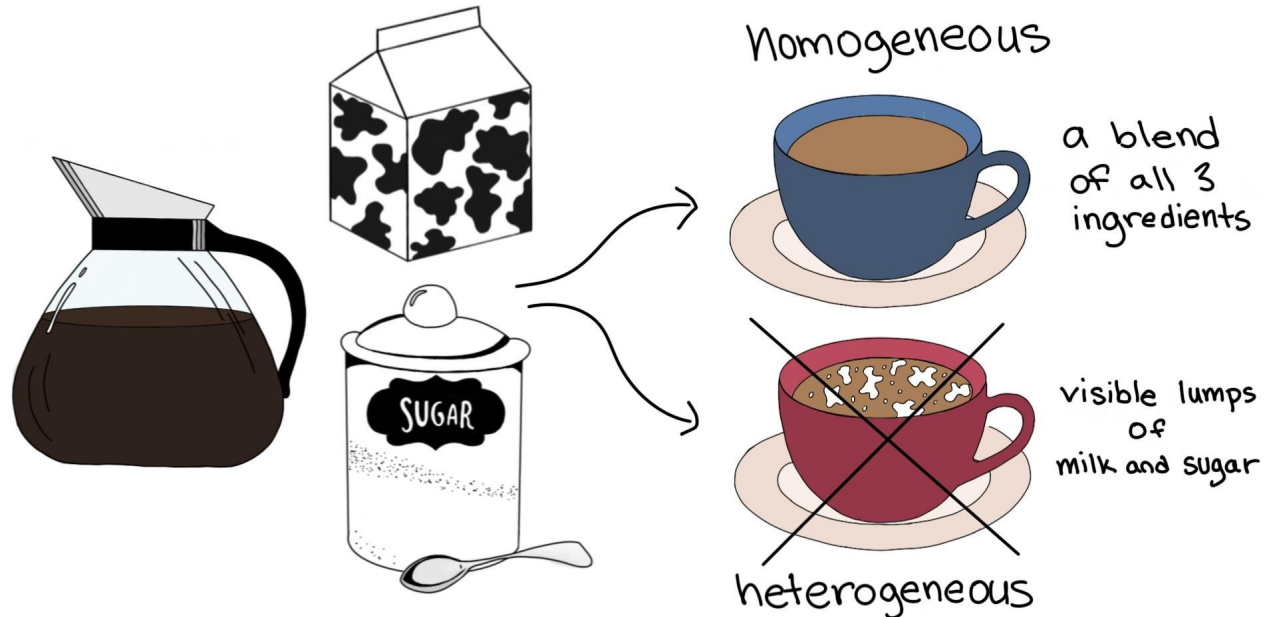
- New substances are formed with different chemical properties
- Indicated by bubbles, heat production, light production, changes in color, smoke
- Examples:
 - Burning wood
 - Cooking food
 - Iron rusting
 - Milk souring

Chemical Change

↳ OBJECT HAS NEW PROPERTIES!

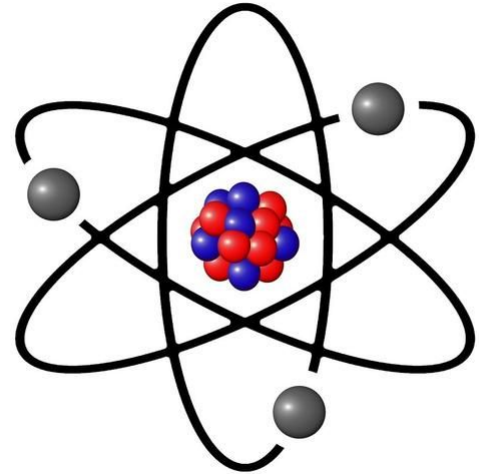
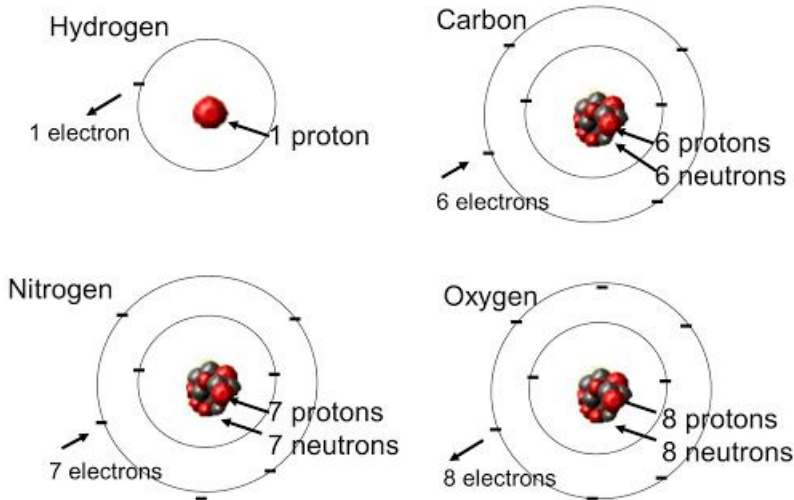


Aim: I can classify mixtures as homogeneous or heterogeneous



ATOMS & ELEMENTS

- The basic particles from which all elements are made
- Elements are materials listed in the Periodic Table



ELEMENTS

Periodic Table of the Elements

Legend:

- Atomic number
- Relative atomic mass
- Block number
- Element symbol
- Discovery year
- Atomic weight
- Alkali metals
- Alkaline earth metals
- Lanthanides
- Actinides
- Transition metals
- Unknown properties
- Metals
- Other nonmetals
- Hydrogen
- Metalloids
- Other nonmetals
- Noble gases
- Post-transition metals

Source: National Institute of Standards and Technology, International Union of Pure and Applied Chemistry

- Found on the Periodic Table of Elements
- All atoms in the sample have the same identity.
 - They are pure
 - Cannot be broken into smaller, pure substances

Examples:

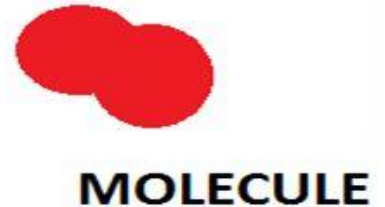
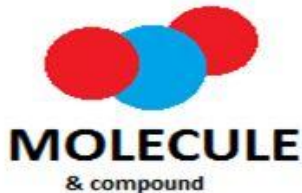
- Na (sodium), Fe (iron), Mg (magnesium), Zn (zinc)
- Every time you see a new capital letter, it's a new element!

ELEMENTS

<p>4</p> <p>Be</p> <p>BERYLLIUM 9.0122</p>	<p>19</p> <p>K</p> <p>POTASSIUM 39.0983</p>	<p>53</p> <p>I</p> <p>IODINE 126.9045</p>	<p>(60)</p> <p>Nd</p> <p>NEODYMIUM 144.24</p>
---	--	--	--

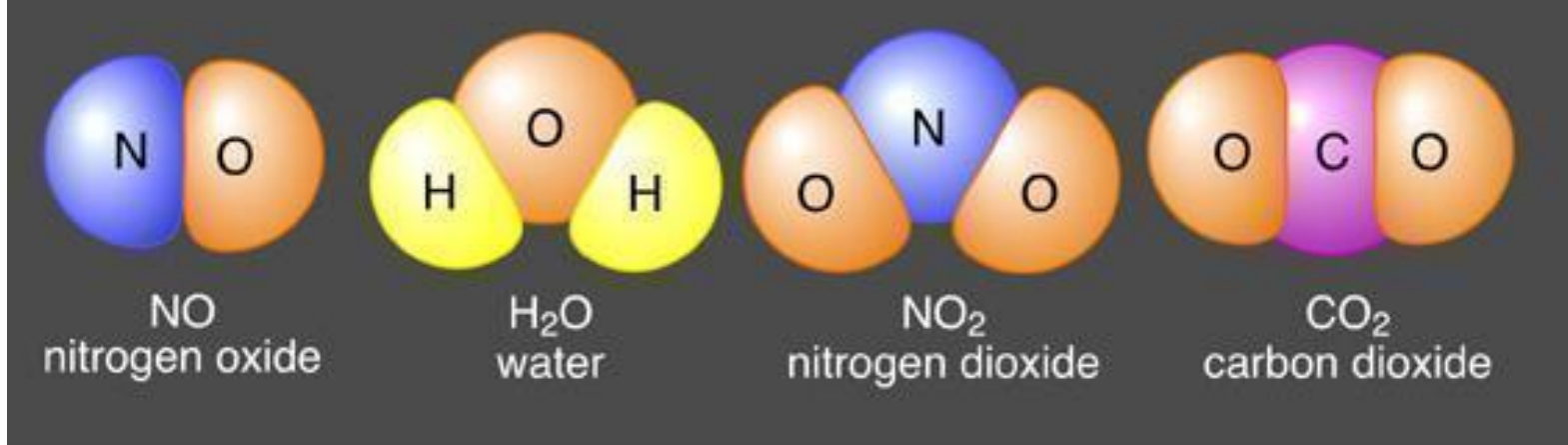
MOLECULES

- Any 2 or more elements combined (chemically bonded together)
- Ex: O_2 (oxygen), H_2O (water), CO_2 (carbon dioxide)



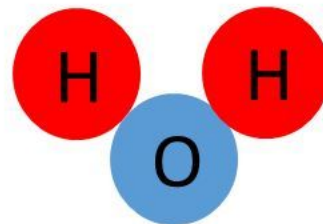
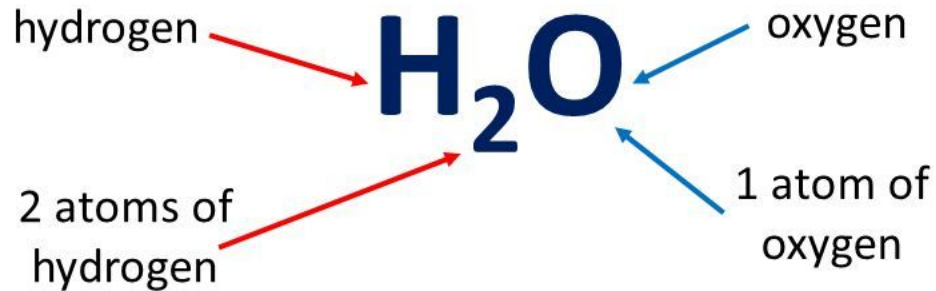
COMPOUNDS

- Are made from two or more **different** elements combined.
- Ex: H_2O (water), CO_2 (carbon dioxide)



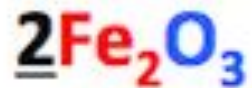
CHEMICAL FORMULAS

- Example: Water



2 DIFFERENT ELEMENTS, 3 TOTAL ATOMS, 1 MOLECULE

CHEMICAL FORMULAS



$$\text{Fe} = 4$$

$$\text{O} = 6$$

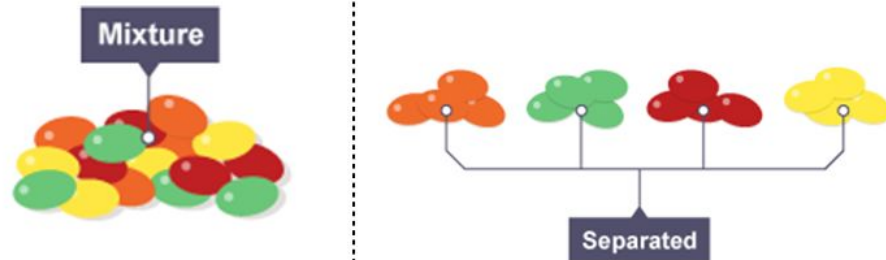
2 DIFFERENT ELEMENTS (**Fe and O**)

2 MOLECULES

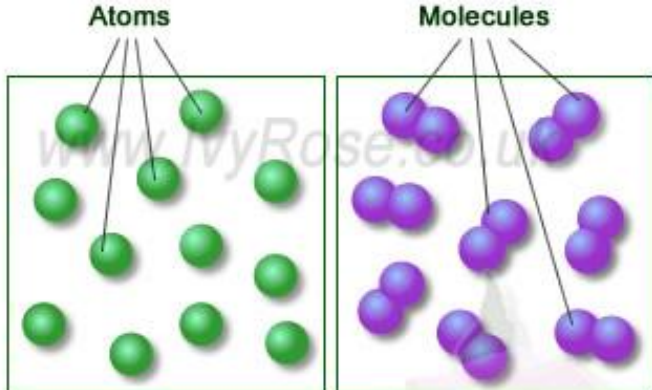
10 TOTAL ATOMS

MIXTURES

- A major characteristic of mixtures is that the materials DO NOT chemically combine.
- Since these mixtures are just physical blends, they can be separated easily, by physical means (no chemical reactions required).



Elements



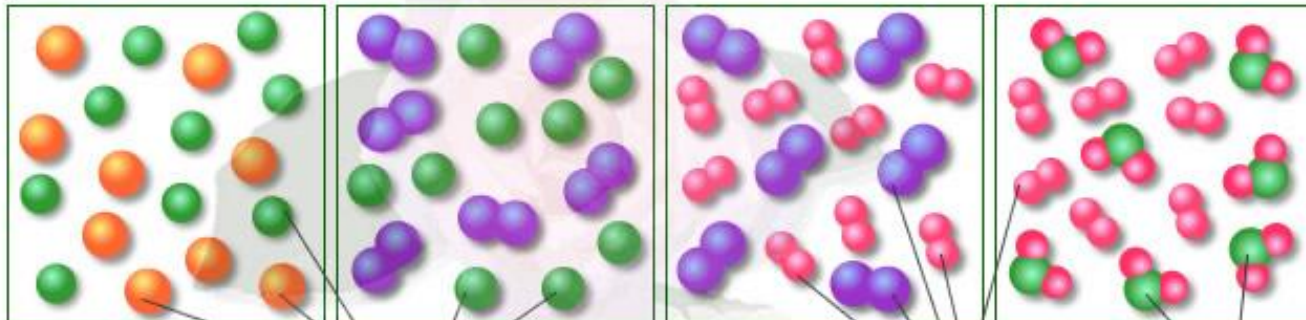
Atoms are represented by single spheres.
Spheres of the same size and colour represent atoms of the same element.

Molecules are represented by two or more spheres joined together.

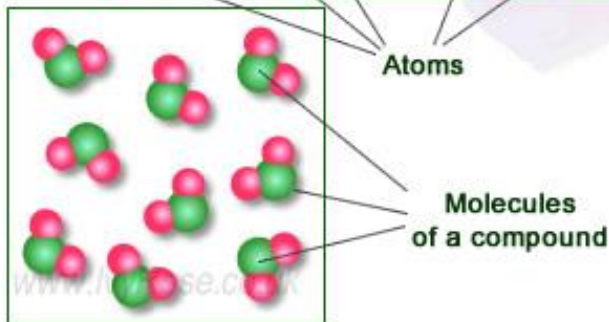
Molecules of Elements are represented by two or more spheres of the same size and colour joined together.

Molecules of Compounds are represented by two or more spheres of different sizes and colours joined together.

Mixtures



Compounds



Molecules
of an element

Molecules
of a compound

HOMOGENEOUS MIXTURES

- Homogeneous mixtures can also be called solutions(aq), and if something is a solution, it must be a homogeneous mixture.
- One phase with uniform properties throughout, having even mixtures of each component.
- Examples: salt water, coffee, tea

WHAT ARE HOMOGENEOUS MIXTURES?



homogeneous mixtures = solutions

HETEROGENEOUS MIXTURES

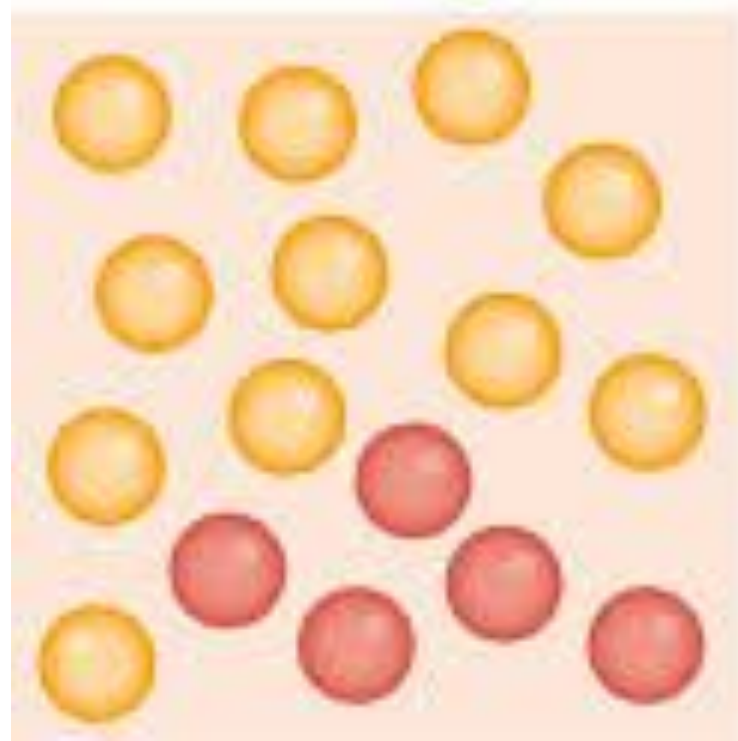
- Heterogeneous mixtures have parts that are noticeably different because they are in different phases, shapes and sizes.

- Uneven or non uniform composition

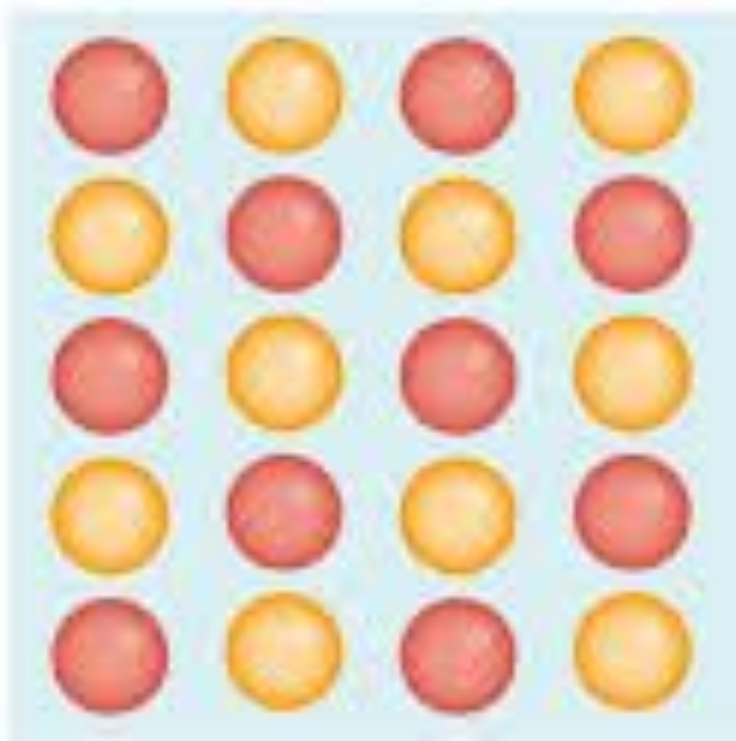


- Examples: granite, chicken soup, blood.

Heterogeneous
mixture

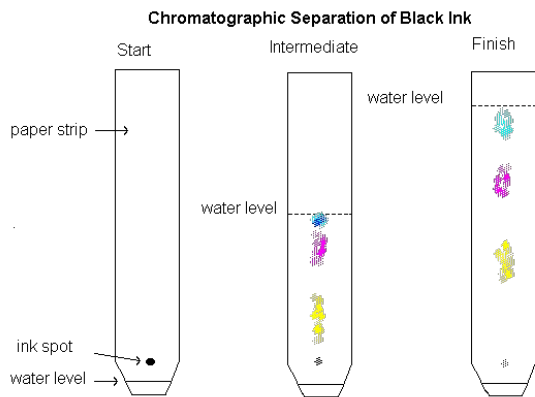


Homogeneous
mixture



SEPARATING MIXTURES

- Sorting
- Magnetism
- Filtration
- Sifting or sieving
- Extraction and evaporation
- Chromatography



Separating Mixtures



Funnel



A funnel separates liquids from small solids.



Magnet



A magnet separates metals from nonmetals.



Boiling



Boiling separates solids from a liquid.