

### 3. What is Chemistry?

- It is the science of **matter** its **properties** & its **make up**
- Looks at:
  - what substances are made of and how they are **structured**
  - the **properties** of substances
  - the conditions under which substances can change and form **new** substances



### 4. Elements and the Periodic Table

#### Brainpop "Periodic Table of Elements"

- Our world is composed of several pure substances which cannot be broken down or changed into other substances using chemical means
- These pure substances are called **elements**.
- There are 118 elements, of which 92 are found in **nature** & 26 were produced in a **laboratory**.
- All elements are included in the **Periodic Table** with their own **symbols**.





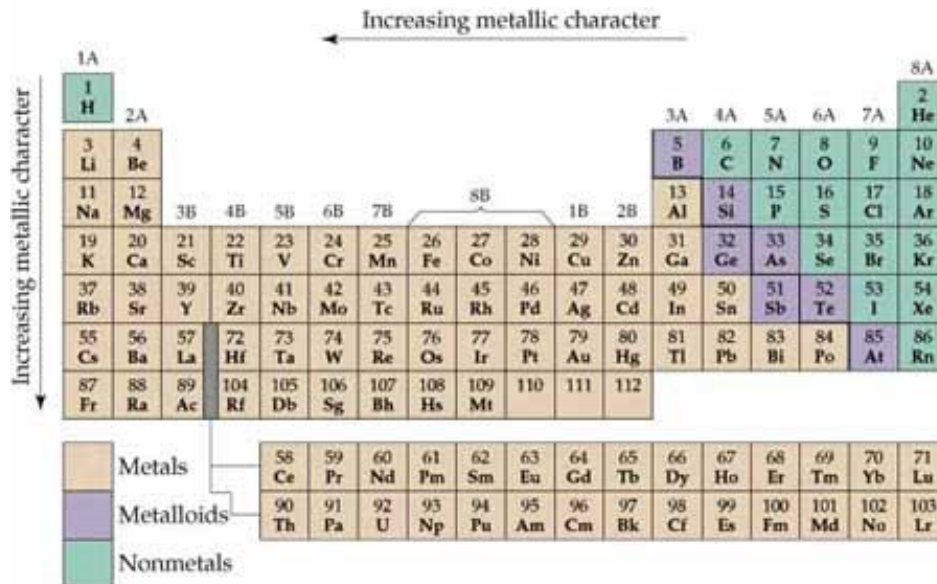
- Examples of chemical symbols are: N (for nitrogen), He (for helium) and Pb (for lead).
- Symbols are the formal **abbreviations** for the element
- They are universal to all languages and are written in the following way:
  - The symbol has 1 or 2 **letters**
  - The first letter is always **capitalized**
  - If present, the second letter is **lowercase**

- In the periodic table the elements are listed according to **atomic number**  
: information for each element is given as:

8	← Atomic Number
O	← Symbol
Oxygen	← Element Name
15.999	← Atomic Mass

- Let's practice... What is the symbol for each of the following elements?
  - a) Silicon \_\_\_\_\_
  - b) Copper \_\_\_\_\_
  - c) Lead \_\_\_\_\_
  - d) Tungsten \_\_\_\_\_
  - e) Magnesium \_\_\_\_\_

- the arrangement of the periodic table helps to explain & predict the **physical** and **chemical** properties of the elements
  - Vertical columns  are called **groups** or **families**.
  - Horizontal rows  are called **periods**.
- When the periodic table was organized, certain elements ended up together.



- Metals, Nonmetals & Metalloids

: Metals and nonmetals have different physical & chemical properties (explained by the **structure** of atoms that make up these elements).

- Metals are on the **LEFT**
- Non-metals on the **RIGHT**
- Metalloids are along the **STAIRCASE**
- Metalloids are elements that have **both** metallic and non-metallic properties

Metals	Non-Metals
Good conductors of heat and electricity	Poor conductors of heat & electricity
Malleable: can be beaten into thin sheets	Brittle: if solid
Ductile: can be stretched into wire	Non-ductile
Possess metallic luster	Do not possess metallic luster
Solid at room temperature (except Hg)	Solids, liquids or gases at room temperature

## - Chemical Families

- groups of elements in the same vertical column
- tend to have similar physical and chemical properties

### Group 1: Alkali Metals

- include Li, Na, K
- are shiny, silvery metals
- **most** chemically **reactive** group
- form compounds that are mostly white solids and are very soluble in water (salts)

### Group 2: Alkaline Earth Metals

- include Mg, Ca, Ba
- are shiny, silvery metals
- very reactive

### Groups 3-12: Transition Metals

- include Ni, Cu, Ag
- less reactive than Group 1 and 2 elements
- vary in chemical and physical **properties**
- many of them form **alloys** (fusion of metals) with 2 or more other transition metals  
~ C and Fe = Steel                      ~Cu and Zn = Brass

### Group 17: Halogens

- include F, Cl, Br...
- poisonous elements that easily **react** with sodium and other alkali metals

### Group 18: Noble Gases

- include He, Ne, Xe
- very **stable** gases that generally do **not** form compounds
- most stable elements on the periodic table