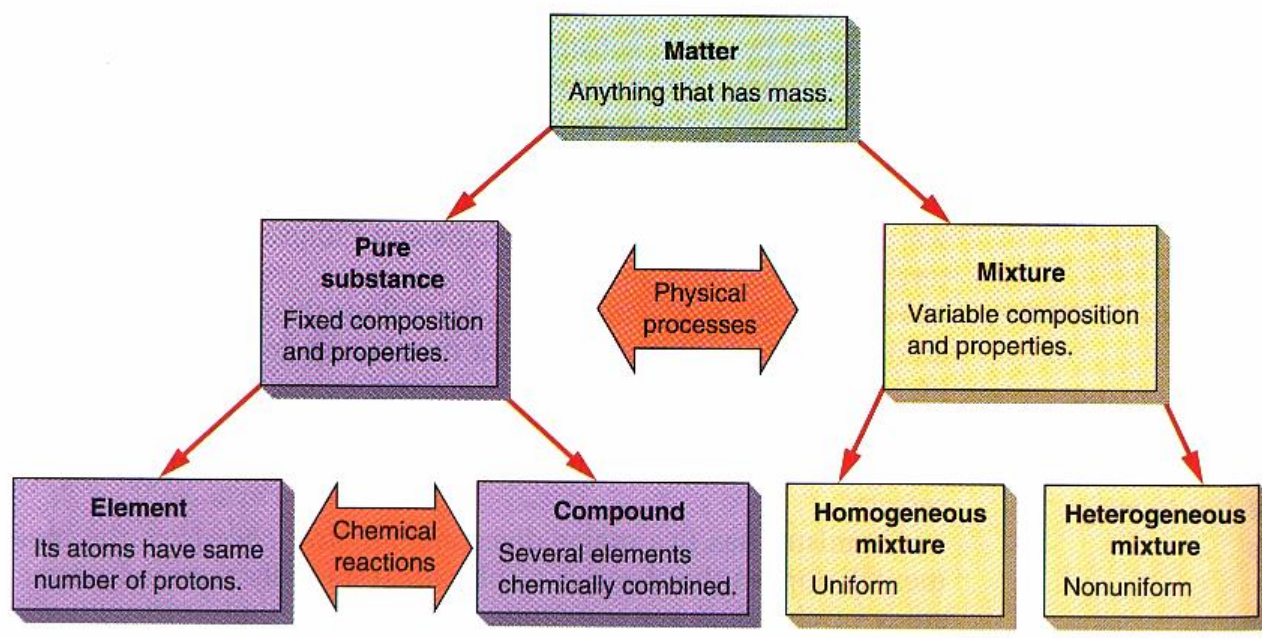


CLASSIFICATION OF MATTER

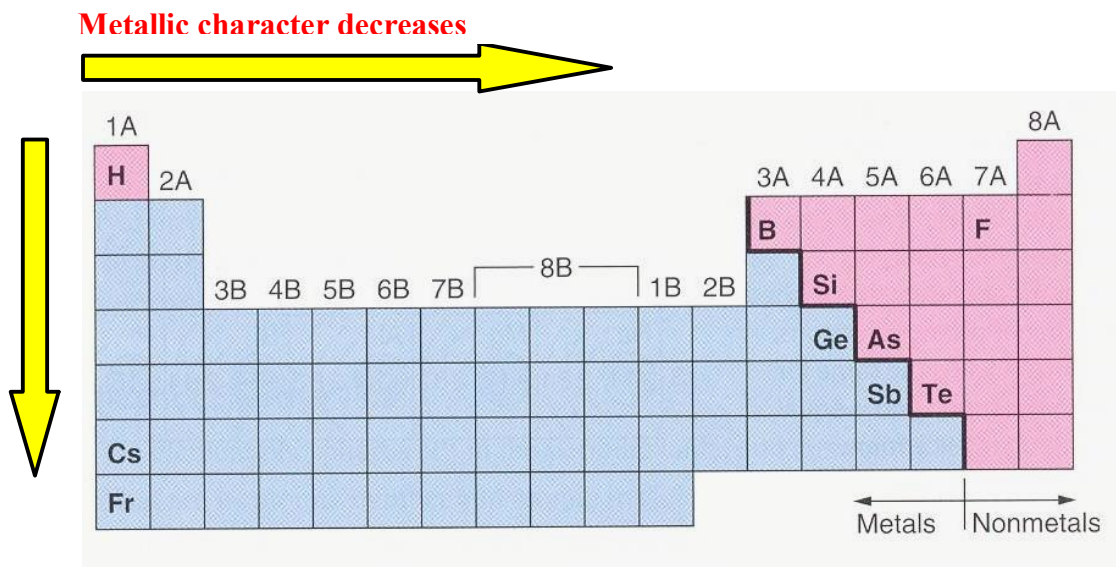
- **Chemistry** is the science that deals with the **composition** and **structure** of **matter**, and its **changes**.
- **Matter** is anything that has **mass**, and occupies **space**.
- Matter can be classified by its **physical state** as **gas**, **liquid** or **solid**.
- Matter can also be classified by its **composition** as **pure substance** or **mixture**.



- Mixtures can be converted into pure substances by simple physical processes (e.g. filtration, evaporation)
- Compounds can be converted into elements by chemical processes or reactions (e.g. electrolysis)

PERIODIC TABLE

- Arrangement of elements based on their atomic masses was first proposed by the Russian chemist, *Dmitri Mendeleev* in 1869.
- In the modern *periodic table* the elements are arranged according to their *atomic numbers*. The elements are generally classified as *metals*, *nonmetals* and *metalloids*.

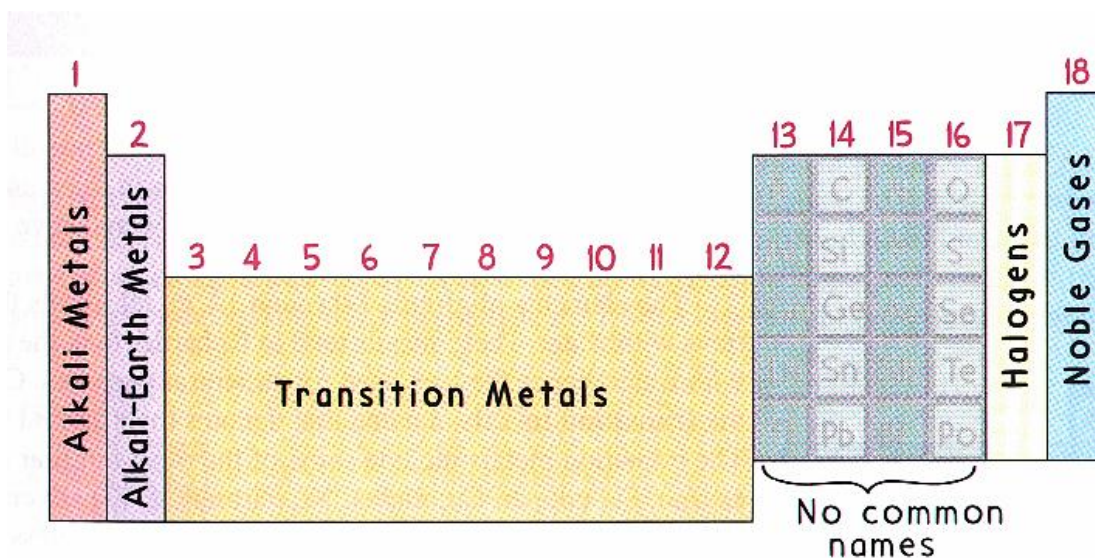


Metals	Nonmetals
<ol style="list-style-type: none"> 1. Mostly solid 2. Have shiny appearance 3. Good conductors of heat and electricity 4. Are malleable and ductile 5. Lose electrons in a chemical reaction 	<ol style="list-style-type: none"> 1. Can be solid, liquid or gas 2. Have dull appearance 3. Poor conductors of heat and electricity 4. Are brittle (if solid) 5. Gain or share electrons in a chemical reaction

- **Metalloids** are elements that possess some properties of metals and some of non-metals. The most important metalloids are silicon (Si) and germanium (Ge) which are used extensively in computer chips.
- Metallic character *increases* going *down a group*, and *decreases* going *across a period*.
- Seven elements (H₂, N₂, O₂, F₂, Cl₂, Br₂ and I₂) exist as **diatomic molecules**. All others exist as monatomic (single atom).

PERIODIC TABLE

- The periodic table is composed of **periods** (rows) and **groups or families** (columns).
- Elements in the same family have similar properties, and are commonly referred to by their traditional names.



- Elements in groups **1-2** and **13-18** are referred to as **main-group** or **representative elements**.
- **Alkali metals** are **soft** metals that are **very reactive**. They often react explosively with other elements.
- **Noble gases** are **unreactive** gases that are commonly used in light bulbs.
- **Halogens** are the most **reactive nonmetals**, and occur in nature only as compounds.
- Group 2 elements are called **alkaline-earth metals**. These metals are less reactive than alkali metals.
- The group of metals in between the main group elements are called the **transition metals**.

SOLUTIONS

- **Solutions** are **homogeneous mixtures** made from two substances.
- **Solutions** are composed of **solute** and **solvent**.
- **Solute** is the substance that is being dissolved.
- **Solvent** is the substance that dissolves the solute.
- Solutes and solvents can be any of the 3 phases of matter: solids, liquid or gas.

Some Common Solutions

<i>Solution</i>	<i>Solute</i>	<i>Solvent</i>
air	oxygen	nitrogen
soda water	carbon dioxide	water
antifreeze	ethylene glycol	water
wine	ethyl alcohol	water
salt water	salt	water
brass	copper	zinc
steel	carbon	iron

- Most common solutions have **water as solvent** and are called **aqueous**.
- Solutions that **do not contain the maximum amount of solute** dissolved in them are called **unsaturated**.
- Solutions that **contain the maximum amount of solute** dissolved in them and cannot dissolve anymore solute are called **saturated**.
- Solutions that **contain more than the maximum amount of solute** dissolved in them are called **supersaturated**.
- **Supersaturated** solutions are **unstable** and can be made to form crystals with the slightest disturbance.

COMPOUND NAMES & FORMULAS

- Elements combine *chemically* to form compounds. Each compound is represented by a *chemical formula*.
- Chemical formulas are written by placing element symbols next to one another. The more metallic element is written first followed by the less metallic element.
- Subscripts are used to indicate the number of atoms of each element in the compound.

Examples:**Naming Binary Compounds of a Metal and a Non-metal**

- To name a binary (2-element) compound of a metal and non-metal, first name the metal followed by the non-metal with ending changed to -ide.

**Naming Binary Compounds of 2 Non-metals**

- To name a binary compound of 2 non-metals, the more metallic element is written first, followed by the second element with the -ide ending.
- The number of atoms for each element is indicated by Greek prefixes: mono-(1); di-(2); tri-(3); tetra-(4); penta-(5); hexa-(6); hepta-(7).

