

Chapter from Chemistry 2

Periodic law : The properties of the elements are a periodic function of atomic numbers.

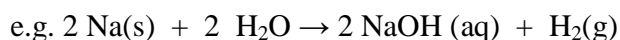
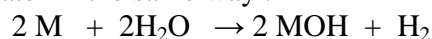
Many properties of the elements vary periodically with their atomic numbers e.g. boiling point, ionization energy (is the energy needed to remove an electron from each atom in one mole of its atoms), formation of binary compounds with hydrogen and so on.

The periodic table organizes the elements to show off their periodic properties. Each horizontal row is called a period and each vertical column is called a group. **Representative groups** are the groups from IA to VIIA plus group 0. **Transition elements** are elements in the middle of the periodic table and they are marked like B groups (IB - VIII B). The two rows of elements placed outside the table are the inner transition elements (lanthanide and actinide serieses). The names of the column of representative elements are alkali metals (IA), alkaline earth metals (IIA), halogens (VIIA). Other groups are named simply after the first member of the column : the boron family (IIIA), the carbon family (IVA), the nitrogen family (VA) and the oxygen family (VIA).

Metals and nonmetals are separated in the periodic table. The great majority of all elements are metals. The nonmetals are placed in the periodic table in the upper right-hand corner. Elements betw, ^{K+een} metals and nonmetals (borderline) are **metalloids**. Metalloids have properties partly metallic and partly nonmetallic.

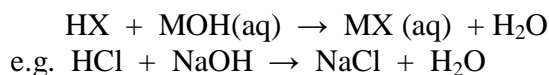
The members of a group in the Periodic table form resembling compounds with similar chemical properties :

Alkali metals (IA) react with water in the same way :



Group IA are alkali metals, common properties - caustic substances, chemical burn to the skin

The property of acids HX (F, Cl, Br, I) are neutralized (their caustic properties) by reaction = **neutralization** :



In **nature** there are 81 stable elements. 15 of these are present in all living things. Almost 99% of the atoms in the bodies of animals can be accounted for by just four elements H (hydrogen), O (oxygen), C (carbon) and N (nitrogen). Hydrogen and oxygen are the constituents of water. This represents about 60-70% of cell mass. Many biomolecules also contain sulfur (S) or phosphorus (P). All these elements are essential for life and we name them the **macroelements**.

A second group of biologically important elements (0.5% of the body mass) are elements in the **ionic form** sodium (Na⁺), potassium (K⁺), magnesium (Mg²⁺) and calcium (Ca²⁺). the halogen chlorine is always ionized in the cell (Cl⁻).

Next group of elements, important for life, is formed by so called **trace elements** which are present in very small quantities iron (Fe), zinc (Zn), copper (Cu), cobalt (Co) and manganese (Mn). To these metals we can include also two non-metals iodine (I) and selenium (Se).

The neutral atom has oxidation state zero. To form the compounds, the elements must release or accept electron/electrons (ionic bonds) or share the electron/electrons (covalent bonds). See chapter 3.

As you know, two of the subatomic particles proton and electron carry electrical charges. Do not forget that **Opposite charges attract** and **Like charges repel**.