



# Medical chemistry- year1



## Chemical bonding

### Lecture 2 (part1)

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# Medical chemistry- year1



## Objectives

- 1- definition of chemical bond and Valence electrons
- 2- types of chemical bonding
- 3- properties of ionic compounds
- 4- properties of covalent compounds
- 5- type of covalent bonds
- 6- Metallic bonds
- 7- Properties of Metallic bonds

# definition

**Chemical Bonding-** mutual electrical attraction between the nuclei and valence electrons of different atoms that bind the atoms together .

**Valence electrons-** outer most electrons that are available to be lost ,gained or shared to form a chemical bond.

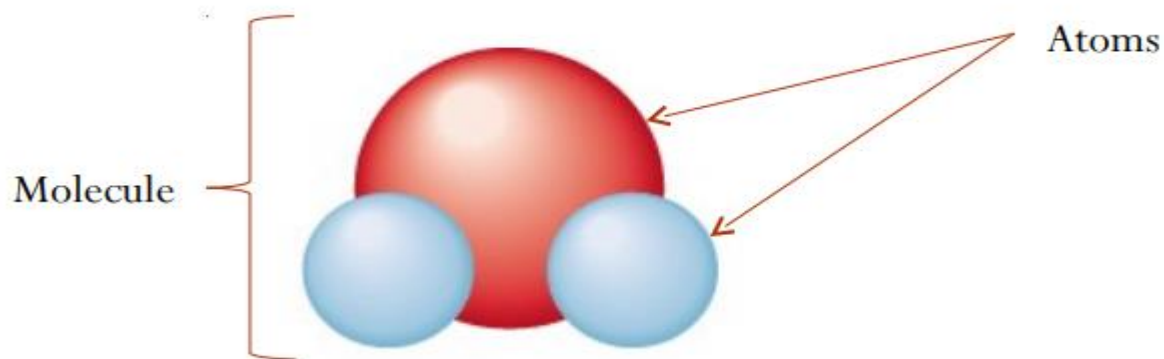
- All atoms trying to achieve a **stable octet**.

# Chemical Bond

A force that holds groups of 2 or more atoms together and makes them function as unit

**Atom**- smallest unit of an element

**Molecule**- group of covalently bonded atoms



# Types chemical Bonding

## three major types of bonding

**Ionic Bonds(Compounds)**

**Covalent Bonds (molecules)**

**Metallic Bonds**

## Ionic Bonds

- Electrons are transferred between valence shells of atoms
- ionic compounds are made of ions
- ionic compounds are called salts or crystals
- always formed between metals and non-metals

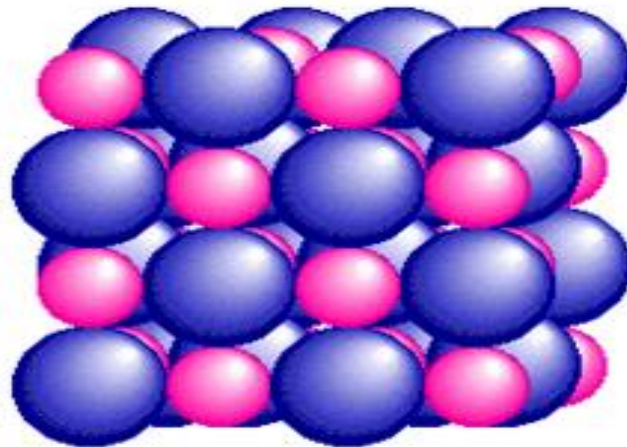
**Metals**  $\longrightarrow$  lose e-

**non- metals**  $\longrightarrow$  gained e -

## **Ionic Bonds**

- **Lose an electron Atom is Positive**
- **Gain an electron Atom is Negative**
- **Positive Ion is called Cation**
- **Negative Ion is called Anion**

# Ionic Bonds



Anion (-)






Cation (+)



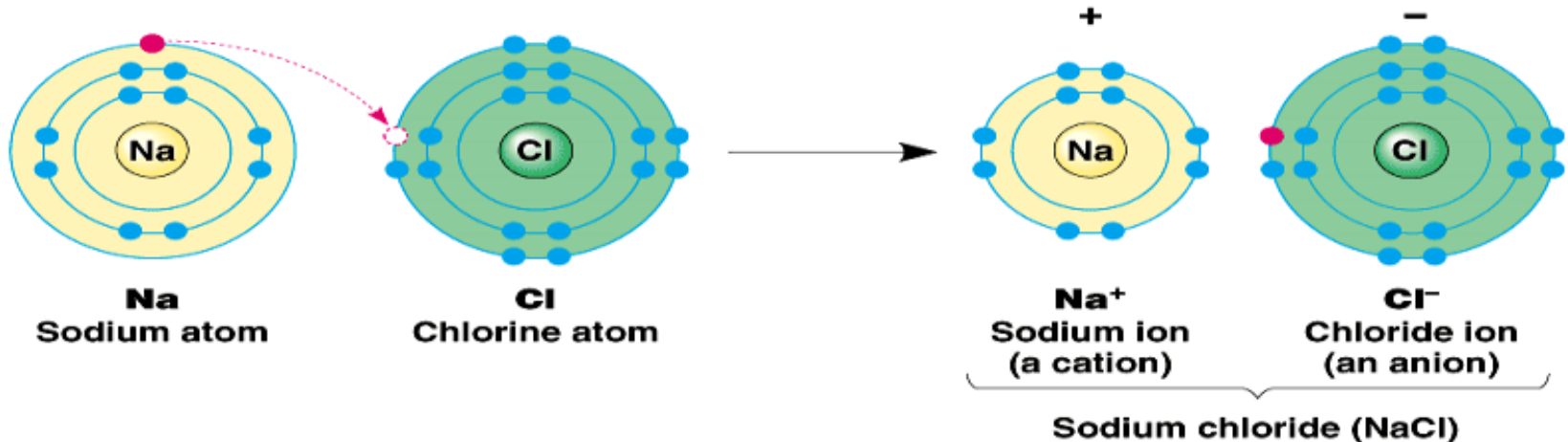
# Ionic Compounds

The Periodic Table of the Elements

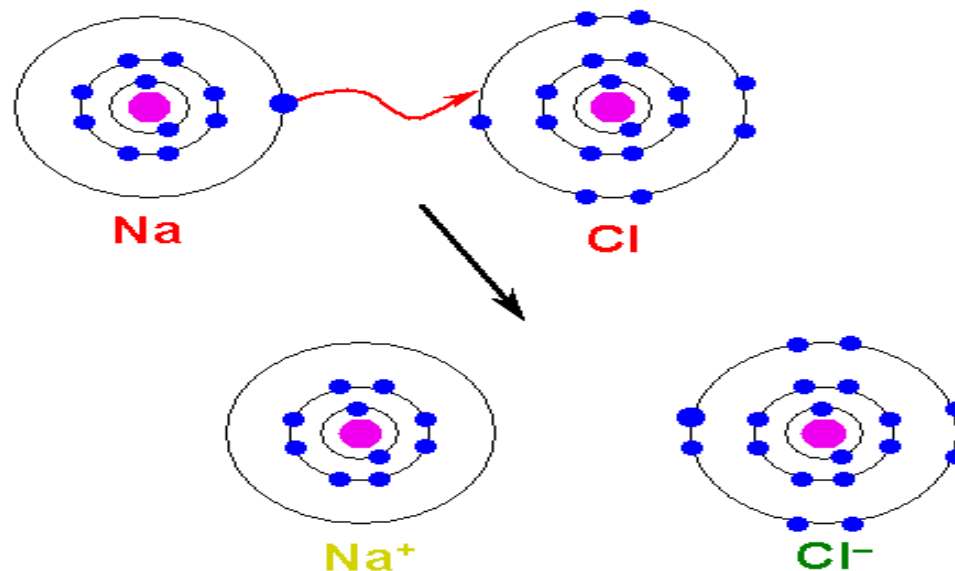
1 H Hydrogen																	2 He Helium								
3 Li Lithium	4 Be Beryllium	 <b>Metals</b>										 <b>Metalloids</b>					 <b>Non-Metals</b>			5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium																	13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon		
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton								
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon								
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon								
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110	111	112	113	114												



# Example Of Ionic Bonds



A classic example of ionic bonding is between Na and Cl. Na is a silvery metal. It has 1 valence electron. Cl is a yellow-green gas, and it needs 1 electron to fill its valence shell. If you put the gas and the metal together, then they will burn as electrons are exchanged. The metal dissolves and the gas disappears. The ions now have opposite charges and are attracted to each other by electrostatic forces. They form a crystal with the rock salt structure.



## Properties of Ionic Compounds

- hard solid at 22°C .
- high mp temperatures .
- **non**conductors of electricity in **solid** phase.
- good conductors in liquid phase or dissolved in water (aq) .