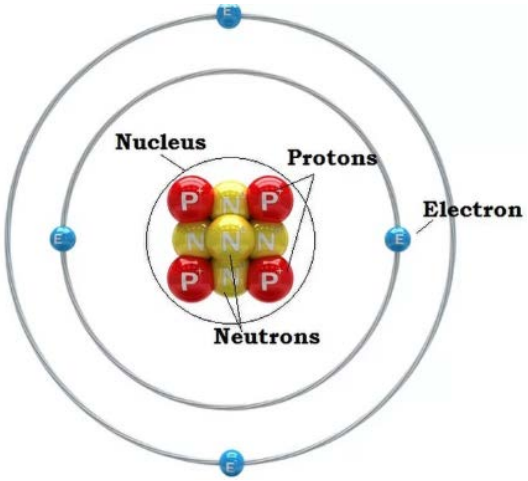
Structure of an atom

An atom is the smallest uncharged particle that can take part in a chemical change.



- An atom contains a centrally located nucleus.
- The nucleus contains positively charged protons and neutral neutrons.[Protons + neutrons= nucleon number or mass number]
- The electrons revolve around the nucleus in fixed orbits called electron shells or energy levels.
- An atom is electrically neutral as the number of protons (+vely charged) are equal to the number of electrons (-vely charged).
- Position of elements in the periodic table is based on their atomic number.

Subatomic particles	Symbol	Relative mass	Relative charge
PROTON	p	1	+1
NEUTRON	n	1	No charge
ELECTRON	e	0.00054	-1

Define:

- **Proton number (Atomic number):** It is the number of protons in the nucleus of an atom.
- **Nucleon number (Mass number):** It is the total number of protons and neutrons in the nucleus of an atom.

Electronic configuration for the atoms and ions of first 10 elements

Atom	E.C.	Type of ions formed	Reason for no ion formation
Hydrogen	1	H^+ , H^-	
Helium- Group-8	2	Ni ion formation	It has a completely filled outer shell
Lithium Group-1	2,1	Li^+	
Beryllium Group-2	2,2	Be^{2+}	
Boron Group-3	2,3	B^{3+}	
Carbon Group-4	2,4	No ion formation	It has a tendency to share electrons
Nitrogen Group-5	2,5	N^{3-}	
Oxygen Group-6	2,6	O^{2-}	
Fluorine Group-7	2,7	F^-	
Neon Group-8	2,8	No ion formation	It has a completely filled outer shell

Electronic configuration for the atoms and ions of from atomic number 11-20 of the periodic table:

Atom	E.C.	Type of ions formed	Reason for no ion formation
Sodium Group-1	1,8,1	Na^+	
Magnesium Group-2	2,8,2	Mg^{2+}	
Aluminium Group-3	2,8,3	Al^{3+}	
Silicon Group-4	2,8,4	No ion formation	It has a tendency to share electrons
Phosphorous Group-5	2,8,5	P^{3-}	
Sulfur Group-6	2,8,6	S^{2-}	
Chlorine Group-7	2,8,7	Cl^-	
Argon Group-8	2,8,8	No ion formation	It has a completely filled outer shell
Potassium Group-1	2,8,8,1	K^+	
Calcium Group-2	2,8,8,2	Ca^{2+}	

Note:

- Group 8 noble gases have a fuller outer shell

Example:

Atom	E.C.	Type of ions formed	Reason for no ion formation
Helium- Group-8	2	Ni ion formation	It has a completely filled outer shell
Neon Group-8	2,8	No ion formation	It has a completely filled outer shell
Argon Group-8	28,8	No ion formation	It has a completely filled outer shell

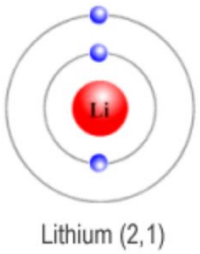
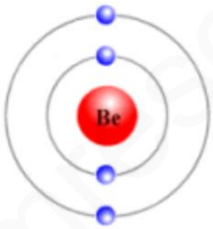
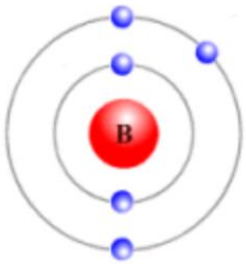
- The number of outer shell electrons is equal to the group number in groups 1 to VII

Example:

Atom	E.C.	Type of ions formed	Reason for no ion formation
Sodium Group-1	2,8,1	Na^+	
Magnesium Group-2	2,8,2	Mg^{2+}	
Aluminium Group-3	2,8,3	Al^{3+}	
Silicon Group-4	2,8,4	No ion formation	It has a tendency to share electrons
Phosphorous Group-5	2,8,5	P^{3-}	
Sulfur Group-6	2,8,6	S^{2-}	
Chlorine Group-7	2,8,7	Cl^-	

- **The number of occupied electron shells is equal to the period number:**

  Example:

Element	Period	Number of occupied electron shells
Lithium	**2**	**2**  Lithium (2,1)
Beryllium	**2**	**2**  Beryllium (2,2)
Boron	**2**	**2**  Boron (2,3)