LearnoHub
learning simplified

Class 7 - ICSE CHEMISTRY

www.learnohub.com

Atomic Structure

Notes

Atom

➢ Smallest particle of an element which shows all the properties of that element

❖ May or may not have independent existence

❖ Takes part in chemical reaction

❖ Atoms of different element differ from each other.

❖ The properties of an element depend upon the atoms constituting it.

➢ Sub-atomic particles

Sub-atomic particles	Symbol	Relative charge	Mass (g)
Electrons	e^-	-1	9.1×10^{-28}
Protons	p^+	+1	1.6×10^{-24}
Neutrons	n	0	1.6×10^{-24}

**Except H-atom → Lacks neutrons

Molecule

➢ 2 or more atoms of same or different elements combine to form a molecule.

1) Same elements → Molecule of element

e.g., O_2, H_2, Cl_2

✓ Molecular formula

2) Different elements (definite ratio) → Molecule of compound

e.g., CO, H_2O, NH_3, CH_4

❖ Molecule of compound → All properties of compound

❖ Exception → Inert gases/Noble gases (Single atom)

➢ Independent existence

Atomicity of elements & compounds

➢ No. of atoms in an entity (molecule) of element or compound

➢ Depending on the atomicity

✓ Monoatomic molecule

e.g., He, Ne, Ar

✓ Diatomic molecule

e.g., H_2, Cl_2, O_2, N_2

✓ Triatomic molecule

e.g., H_2O, CO_2, O_3

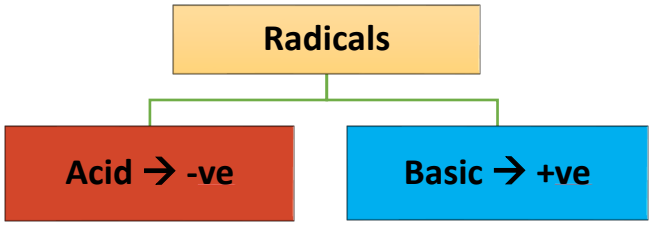
✓ Polyatomic molecule

e.g., NH_3, CCl_4, P_4, S_8

Radical

➢ Atom of an element having charge or group of atoms behaving as a single charged unit.

e.g., Cl^-, Na^+, SO_4^{2-}



❖ Radical → Ion

Anions → Acid radicals → -ve

Cations → Basic radicals → +ve

Valency of element & radical

➢ Combining capacity of element

1) No. of H-atoms combined with one atom of element

e.g., HCl, H_2O, NH_3, CH_4

2) No. of H-atoms replaced by one atom of element

e.g., Na (1H), Mg (2H)

➢ Combining capacity of radical

1) No. of H^+ ions combined with radical

e.g., Cl^-, SO_4^{2-}, PO_4^{3-}

2) No. of H^+ ions replaced by radical

e.g., Na^+, NH_4^+, Ca^{2+}, Al^{3+}

List of radicals having valency 1,2,3 or 4

<u>Basic radicals</u>

Name	Symbol	Valency
Iron (II)	Fe^{2+}	2
Copper (II)	Cu^{2+}	2
Iron (III)	Fe^{3+}	3
Aluminium	Al^{3+}	3
Gold	Au^{3+}	3
Tin (IV)	Sn^{4+}	4
Platinum (IV)	Pt^{4+}	4

Name	Symbol	Valency
Hydrogen	H^+	1
Sodium	Na^+	1
Potassium	K^+	1
Silver	Ag^+	1
Ammonium	NH_4^+	1
Magnesium	Mg^{2+}	2
Calcium	Ca^{2+}	2
Zinc	Zn^{2+}	2

Acid radicals

Name	Symbol	Valency
Chloride	Cl^-	1
Bromide	Br^-	1
Iodide	I^-	1
Hydroxide	OH^-	1
Acetate	CH_3COO^-	1
Nitrate	NO_3^-	1
Nitrite	NO_2^-	1
Bicarbonate	HCO_3^-	1

Name	Symbol	Valency
Bisulphate	HSO_4^-	1
Bisulphite	HSO_3^-	1
Oxide	O^{2-}	2
Carbonate	CO_3^{2-}	2
Sulphate	SO_4^{2-}	2
Sulphite	SO_3^{2-}	2
Dichromate	$Cr_2O_7^{2-}$	2
Nitride	N^{3-}	3
Phosphate	PO_4^{3-}	3

List of elements having valency 1,2,3 or 4

H	He	Li	Be	B	C	N	O	F	Ne
1	0	1	2	3	4	3	2	1	0

Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca
1	2	3	4	3	2	1	0	1	2

Periodic table

➢ Arrangement of elements → Study systematically

➢ Based on Physical & Chemical properties of elements

Valency & Group number

➢ Horizontal rows → Period → 1 to 7

➢ Vertical columns → Group → 1 to 18/ IA, IIA,…VIIA, Zero

➢ 1 to 4 then 4 to 0

➢ Same gp → Same Valency

➢ Valency → Grp No (Upto IVA)

****