Useful Table

Common examples of colliods

Dispresed Phase	Dispersing Medium	Type	Example
Liquid	Gas	Aerosol	Fog, clouds, mist
Solid	Gas	Aerosol	Smoke, automobile exhaust
Gas	Liquid	Foam	Shaving cream
Liquid	Liquid	Emulsion	Milk, face cream
Solid	Liquid	Sol	Milk of magnesina, Mud
Gas	Solid	Foam	Foam, rubber, sponge
Liquid	Solid	Gel	Jelly, cheese, butter
Solid	Solid	Solid sol	Coloured gemstone, milky glass

Products Obtained from Petroleum

Products Obtained from Petroleum

	Fraction	***Distillation Temperature Range (K)***	***Approx.%***	***Uses***
1.	Gaseous hydrocarbons	<293	3	As fuel and for gasoline and rubber manufacture.
2.	Light distillates	293-393	3	As solvent in varnish, dry cleaning.
	Petroleum, ether, Petrol or gasoline,	343-473	32	Motor fuel.
	Kerosene oil	450-560	18	Fuel and illuminant.
3.	Intermediate distillates Gas oil, diesel or heavy oil	525-673	20	Fuel
4.	Heavy distillates Lubricating oils, gaseous and in toilet goods, petroleum jelly	>673	-	Used as a Lubricant, ointments.
	Paraffin (wax)	>673	-	Candles, boot polish, etc.
5.	Residue	Residue	>40	Fuel, for making electrodes.
	Asphalt, petroleum coke			

Symbol derived from English name of the Elements

Sl. No.	Elements name	Symbol	Sl. No.	Elements name	Symbol
1.	Hydrogen	H	2.	Helium	He
3.	Lithium	Li	4.	Boron	B
5.	Carbon	C	6.	Nitrogen	N
7.	Oxygen	O	8.	Fluorine	F
9.	Neon	Ne	10.	Magnesium	Mg
11.	Aluminium	Al	12.	Silicon	Si
13.	Phosphorous	P	14.	Sulphur	S
15.	Chlorine	Cl	16.	Argon	Ar
17.	Calcium	Ca	18.	Manganese	Mn
19.	Nickel	Ni	20.	Zinc	Z
21.	Bromine	Br	22.	Krypton	Kr
23.	Iodine	I	24.	Barium	Ba
25.	Uranium	U	26.	Cobalt	Co

The chemical symbols of the important elements derived from their Latin names given below

Symbols Derived from the Latin names of the Elements

Sl. No.	English name of the element	Latin name of the elements	Symbol
1.	Sodium	Natrium	Na
2.	Potassium	Kalium	K
3.	Iron	Ferrum	Fe
4.	Copper	Cuprum	Cu
5.	Silver	Argentum	Ag
6.	Gold	Aurum	Au
7.	Mercury	Hydragyrum	Hg
8.	Lead	Plumbum	Pb
9.	Tin	Stannum	Sn

Atomic Masses of few element

Elements	Atomic mass (μ)	Elements	Atomic mass (μ)
Hydrogen	1	Carbon	12
Nitrogen	14	Oxygen	16
Sodium	3	Magnesium	24
Sulphur	32	Chlorine	35.5
Calcium	40		

Molecular formulae of some common elements

Element	Formula	Element	Formula	Element	Formula
Hydrogen	H_2	Nitrogen	N_2	Oxygen	O_2
Chlorine	Cl_2	Bromine	Br_2	Iodine	I_2
Phosphorous	P_4	Sulphur	S_6		

Formulae of some Molecular compounds

	Name	Formula	Elements present
1.	Water	H_2O	H & O
2.	Carbon dioxide	CO_2	C & O
3.	Sulphure dioxide	SO_2	S & O
4.	Ammonia	NH_3	N & H
5.	Methan	CH_4	C & H
6.	Ethanol	C_2H_5OH	C, H & O
7.	Carbon tetrachloride	CCl_4	C & Cl
8.	Hydrogen Chloride	HCl	H & Cl
9.	Hydrogen Sulphide	H_2S	H & S
10.	Carbon disulphide	Cs_2	C & S

Molecular mass of some common Elements

	Element	Symbol	Atomic mass	Molecular formula	Molecular Mass
1.	Hydrogen	H	1 µ	H_2	1×2=2 u
2.	Nitrogen	N	14 µ	N_2	2×14=24u
3.	Oxygen	O	16 µ	O_2	16×2=32u
4.	Chlorine	Cl	35.5 µ	Cl_2	2×35.5=71u

Valency :The combining power of an Element is known as its Valency.
The valency of some common ions are given in the table below.

Valency	Name of ion	Symbol	Non-metallic element	Symbol
1	Sodium	Na^+	Hydrogen	H^+
	Potassium	K^+	Hydride	H^-
	Silver	Ag^+	Chloride	Cl^-
	Copper I	Cu^+	Bromide	Br^-
			Iodide	I^-
2	Magnesium	Mg^{2+}		
	Calcium	Ca^{2+}	Oxide	O^{2-}
	Zinc	Zn^{2+}	Sulphide	S^{2-}
	Iron(II)	Fe^{2+}		
	Copper(II)	Cu^{2+}		
3	Aluminium	Al^{3+}	Nitride	N^{3-}
	Iron (III)	Fe^{3+}		

Valency	Polyatomic ion	symbol
1	Ammonium	NH_4^+
	Hydroxide	OH^-
	Nitrate	NO_3^-
	Hydrogen carbonate	HCO_3^-
2	Carbonate	CO_3^{2-}
	Sulphite	SO_3^{2-}
	Sulphate	SO_4^{2-}
3	Phosphate	PO_4^{3-}

Ionic Compounds:

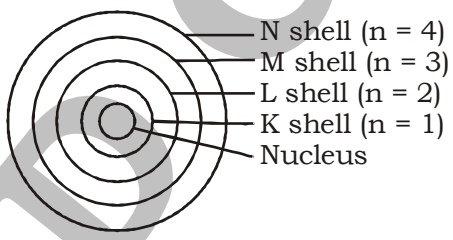
The compound which are made up of ions are known as ionic compounds.
Some ionic compounds are given below–

Sl. No.	Name	Formula	Ion Present
1.	Sodium Chloride	Nacl	Na^+ & Cl^-
2.	Potassium Chloride	KCl	K^+ & Cl^-
3.	Ammonium Chloride	NH_4Cl	NH_4^+ & Cl^-
4.	Magnesium chloride	$MgCl_2$	Mg^{2+} & Cl^-
5.	Calcium chloride	$CaCl_2$	Ca^{2+} & Cl^-

Arrangement of Electrons in the Atoms

Electrons are arranged according to their potential energy in different energy levels of shells. The energy levels of the electrons are denoted by the numbers 1, 2, 3, 4, 5 and 6 whereas shells are represented by the letters K, L, M, N, O and P.

1st energy level is K shell
2nd energy level is L shell
3rd energy level is M shell
4th energy level is N shell and so on.



Energy level of electron shells in an atom.

Electronic configurations of Elements

The arrangement of electrons in the various shells (or energy levels) of an atom of the element is known as electronic configuration of the element.

(1) The maximum number of electrons present in a shell is given by the formula $2n^2$ where 'n' is the orbit number.

Hence the maximum number of electrons in different shells are as follows

(i) For 1st energy n = 1.
So the maximum number of electron in 1st energy level = $2n^2 = 2\times1^2 = 2$

(ii) For 2nd energy level n = 2
So the maximum number of election in 2nd energy level = $2n^2 = 2\times2^2 = 8$

(iii) For 3rd energy level n = 3
So the maximum number of electrons in 3rd energy level $2n^2 = 2\times3^2 = 18$

(iv) For 4th energy level n = 4
So the maximum number of electrons in 4th energy level = $2n^2 = 2\times4^2 = 32$

Electron shell	Maximum no. of electron
1. K	2
2. L	8
3. M	18
4. N	32

Electronic configurations of first 20 elements

S.N.	Element	Symbol	Atomic number K,L,M,N	Electronic configuration	Valency
1.	Hydrogen	H	1	1	1
2.	Helium	He	2	2	0
3.	Lithium	Li	3	2,1	1
4.	Beryllium	Be	4	2,2	2
5.	Boron	B	5	2,3	3
6.	Carbon	C	6	2,4	4
7.	Nitrogen	N	7	2,5	3
8.	Oxygen	O	8	2,6	2
9.	Fluorine	F	9	2,7	1
10.	Neon	Ne	10	2,8	0
11.	Sodium	Na	11	2,8,1	1
12.	Magnesium	Mg	12	2,8,2	2
13.	Aluminum	Al	13	2,8,3	3
14.	Silicon	Si	14	2,8,4	4
15.	Phosphorus	P	15	2,8,5	3
16.	Sulphur	S	16	2,8,6	2
17.	Chlorine	Cl	17	2,8,7	1
18.	Argon	Ar	18	2,8,8	0
19.	Potassium	K	19	2,8,8,1	1
20.	Calcium	Ca	20	2,8,8,2	2

Noble gas	Symbol	Atomic No.	Electronic configuration	No. of elections is the Outermost shell (valence shell)
Helium	He	2	2	2
Neon	Ne	10	2,8	8
Argon	Ar	18	2,8,8	8
Krypton	Kr	36	2,81,8,8	8
Xenon	Xe	54	2,8,18,18,8	8
Radon	Rn	86	2,8,18,32,18,8	8

S.No.	Catalyst	Process in which used
1.	Fe + Mo	Synthesis of NH_3 by Habers process
2.	Ni	Synthesis of Vanspati Ghee (Hydrogenation)
3.	Pt	Synthesis of H_2SO_4 by contact process
4.	Mo	In the Manufacture of H_2SO_4 by the lead process
5.	Hot Al_2O_3	In the preparation of Ether from Alcohol
6.	$CuCl_2$	Preparation of Chlorine gas by Deacon process

Electrolytes	Formula	Ions Present (in aq)
Sodium hydroxide	$NaOH$	Na^+ and OH^-
Ammonium hydroxide	NH_4OH	NH_4^+ and OH^-
Sodium chloride	$NaCl$	Na^+ and Cl^-
Magnesium chloride	$MgCl_2$	Mg^{2+} and $2Cl^-$
Silver Nitrate	$AgNO_3$	Ag^+ and NO_3^-
Copper Sulphate	$CuSO_4$	Cu^{2+} and SO_4^{2-}
Hydrochloric acid	HCl	H^+ and Cl^-
Nitric acid	HNO_3	H^+ and NO_3^-
Sulphuric acid	H_2SO_4	$2H^+$ and SO_4^{2-}
Carbon acid	H_2CO_3	$2H^+$ and CO_3^{2-}

Some important strong and weak electrolytes:-

Name	Formula	Name	Formula
Sodium chloride	NaCl	Water	H_2O
Sodium Hydroxide	NaOH	Acetic acid	CH_3COOH
Copper Sulphate	$CuSO_4$	Carbonic acid	H_2CO_3
Silver Nitrate	$AgNO_3$	Hydro Dynamic acid	HCN
Hydrochloric acid	HCl	Ammonium Hydroxide	NH_4OH
Nitric acid	HNO_3	Calcium Hydroxide	$Ca(OH)_2$
Sulphuric acid	H_2SO_4	Ammonium Chloride	NH_4Cl

Classification of Acids

Strength

Strong acid
HCl
HNO_3
H_2SO_4

Weak Acid
CH_3COOH
H_2CO_3
HCOOH

Hydra acids
NH_3
H_2S
HCl
HBr
HF

Oxy Acid
HNO_3
H_2SO_4
$HClO_4$
HlO_4

No. of replaceable Hydrogen
(i) Mono basic acid HCl, HNO_3
(ii) Dibasic acid H_2SO_4, H_2CO_3
(iii) Tribasic acid H_3PO_4

Indicator	Colour changes in acid	Colour changes in base
1. Blue and red litmus paper.	1. Blue litmus turns red.	1. Red litmus turns blue.
2. Methyl orange.	2. Red in acid solution.	2. turns yellow in basic solution.
3. Phenolphtholein	3. Turns colourless in acid solution.	3. turns pink in basic solution.

VIII. Some acids & its uses:-

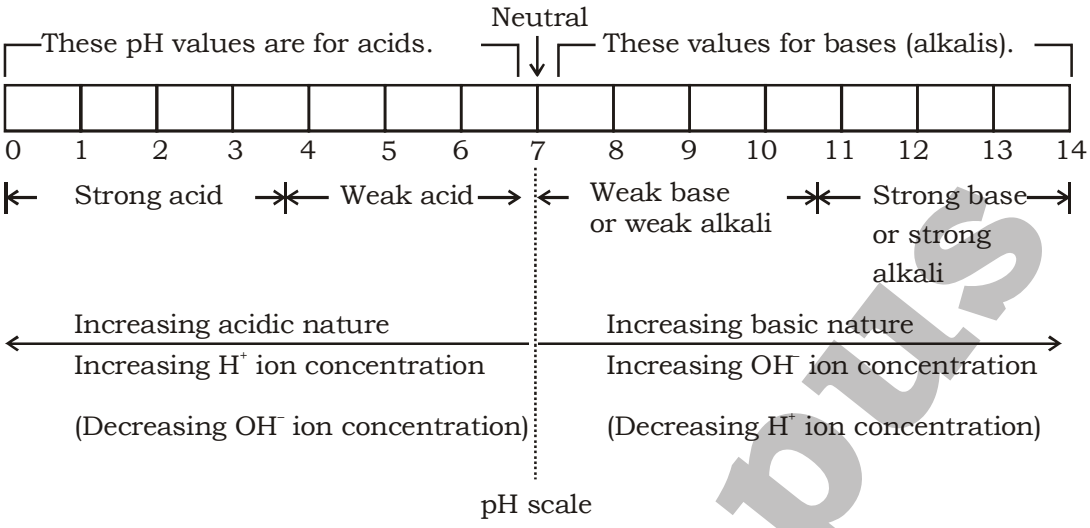
Name of Acids	Uses
1. HCl Hydrochloric acid	1. Hydrochloric acid (HCl) is used for removing oxide film from steel. Objects before they are galvanised. 2. Used as bathroom cleaner. 3. In the dying and textile industry. 4. HCl present in gastric juice are responsible for the digestion. 5. HCl is used in making plastics like polyvinylchloride (PVC). 6. In the tanning of leather
2. HNO_3 Nitric acid	1. In the manufacture of fertilizers like Ammonium Nitrate. 2. In the manufacture of explosives like TNT (Trinitrotolune) TNB. 3. In the manufacture of rayon. 4. In the manufacture of dyes and drugs.
3. H_2SO_4 Sulphuric acid	1. In a lead storage battery. 2. In the manufacture of HCl. 3. In the manufacture of Aluminium. 4. In the manufacture of fertilizers, drugs, detergents & explosives.
4. Boric acid H_3BO_3	As an antiseptic.
5. Phosphoric acid H_3PO_4	1. Its calcium salt makes our bones. 2. It form phosphoric fertilizers.
6. Ascorbic acid	Source of Vitamin C.
7. Citric and Acetic acid	Flavouring agent and food preservative
8. Tartaric acid	1. Souring agent for pickles.

XIX. pH scale:- It is more convenient to express the acidity or alkalinity of the solution in terms of the H^+ ion concentration only. Therefore S.P.L. Sorenson, a Danish biochemist in 1909 devised a scale known as pH to represent the H^+ ion concentration of a given aqueous solution.

Definition:- The pH of solution is referred as the negative logarithm of the hydrogen ion concentration in mole per litre.

Thus, $pH = -\log [H^+]$

$$= \log \frac{1}{[H^+]}$$



The pH values of the common substance from our daily life.

Solution	pH	Solution	pH
1. Conic HCl	0	11. Saliva (before meals)	7.4
2. Oil HCl	1.0	12. Saliva (after meals)	5.8
3. Gastric Juice	1.4	13. Blood	7.4
4. Lemon Juice	2.5	14. Eggs	7.8
5. Vinegar	4.0	15. Toothpaste	8.0
6. Tomato juice	4.1	16. Baking Soda solution	8.5
7. Coffee	5.0	17. Washing Soda solution	9.0
8. Soft drink	6.0	18. Milk of Magnesia	10.5
9. Milk	6.5	19. Household ammonia	11.6
10. Pure water	7.0	21. Dilute sodium hydroxide	13.0
		20. Concentrated sodium hydroxide	14

Universal Indicator:- Universal indictor is a mixture of different indicators (or dyes) which gives different colours at different pH vlaues of the entire pH scale.
The colours produced by universal indicators at various pH values are given below:

pH	Colour	pH	Colour	pH	Colour
0	Dark Red	5	Orange yellow	10	Navy blue
1	Red	6	Greenish yellow	11	Purple
2	Red	7	Green	12	Dark purple
3	Orange Red	8	Greenish yellow	13	Violet
4	Orange	9	Blue	14	Violet

The names of some important salts and their formulae:-

Salt	Formula	Salt	Formula
1. Sodium chloride	NaCl	10. Zinc sulphate	$ZnSO_4$
2. Calcium chloride	$CaCl_2$	11. Copper sulphate	$CuSO_4$
3. Magnesium chloride	$MgCl_2$	12. Ammonium sulphate	$(NH_4)_2 SO_4$
4. Zinc chloride	$ZnCl_2$	13. Sodium nitrates	$NaNO_3$
5. Sodium sulphate	Na_2SO_4	14. Potassium nitrates	KNO_3
6. Potassium sulphate	K_2SO_4	15. Sodium carbonate	Na_2CO_3
7. Calcium sulphate	$CaSO_4$	16. Calcium carbonate	$CaCO_3$
8. Magnesium sulphate	$MgSO_4$	17. Zinc carbonate	$ZnCO_3$
9. Aluminium sulphate	$Al_2 (SO_4)_3$	19. Sodium acetate	CH_3COONa

Uses of the important salts:-

Names	Uses
1. Common Salt (NaCl) Sodium chloride	1. Common salt is used in cooking gas. 2. It is used as a preservative in pickles and in curing meat and fish. 3. It is used in the manufacture of soap. 4. It is used to melt the ice in winter in cold countries. 5. Used in making large chemicals like washing soda, baking soda etc.
2. Sodium Hydroxide (NaOH) Sodium Hydroxide	1. used for making soap and detergent. 2. used for making artificial textile fibre (rayon) 3. used in the manufacture of paper. 4. used in purifying bauxite ore. 5. used in de-greasing metals, oil refining and making dyes and bleaches
3. Washing Soda ($Na_2CO_3.10H_2O$) Sodium Corporate	1. used as a 'cleansing agent' for domestic purposes like washing clothes. 2. used to remove permanent hardness of water. 3. used in the manufacture of glass, soap and paper. 4. used in the manufacture of sodium compounds such as borax.
4. Baking Soda ($NaHCO_3$) Sodium Bicarbonate	1. used as an antacid. 2. used in making baking powder which is used in making cakes, bread etc. 3. used in fire extinguishers.
5. Bleaching Powder ($CaOCl_2$) Calcium hypochlorite	1. used in textile industry for bleaching cotton and linen and in paper industry for bleaching wood pulp. 2. used for disinfecting drinking water. 3. used in the manufacture of chloroform ($CHCl_3$) 4. used for making wool unshrinkable. 5. used as oxidizing agent in many chemical industries.
6. Plaster of Paris ($CaSO_4 - \frac{1}{2}H_2O$) Calcium sulphate hemic hydrate	1. used in hospital for setting fractured bone. 2. used for making toys, decoration material cheap ornament, chalk etc. 3. used for fire-proofing material 4. used for making surface smooth.

COMMON NAMES OF SOME CHEMICAL COMPOUNDS

Common names of some chemical compounds:-

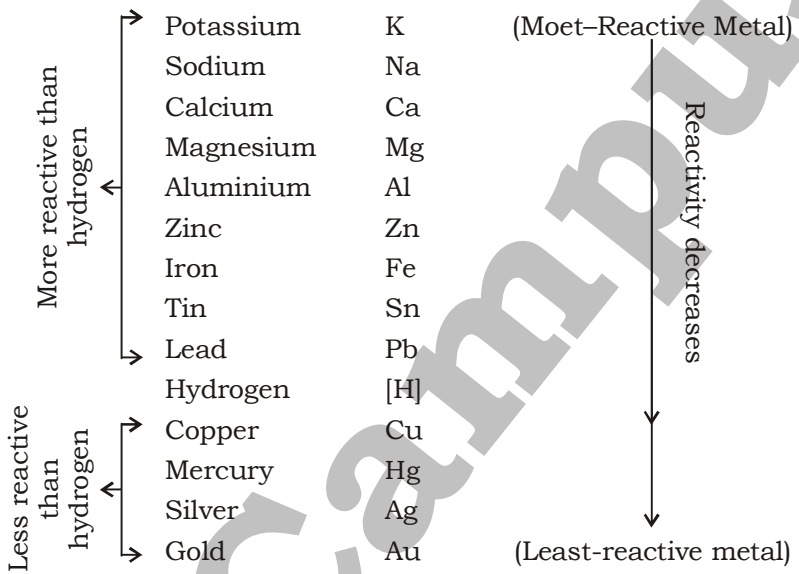
S.No.	CHEMICAL NAME	COMMON NAME	CHEMICAL FORMULA
1.	Calcium hydroxide	Slaked lime	$Ca(OH_2)$
2.	Sodium carbonate	Washing Soda	$Na_2CO_3.10H_2O$
3.	Sodium bicarbonate	Baking soda	$NaHCO_3$
4.	Magnesium hydroxide	Milk of magnesia	$Mg(OH)_2$
5.	Calcium hypochilorite	Bleaching powder	$CaOCl_2$
6.	Calcium sulphate digydrate	Gypsum	$CaSO_4.2H_2O$
7.	Calcuim sulphate hemihydrate	Plaster of Paris	$CaSO_4\frac{1}{2}H_2O$
8.	Sodium chloride	Common salt	NaCl
9.	Sodium hydroxide	Caustic Soda	NaOH
10.	Calcium carbonate	Chalk	$CaCO_3$
11.	Hydrated potassium aluminium sulphate	Alum	$K_2Al_2(SO_4)24H_2O$
12.	Calcium oxide	Quick lime	CaO
13.	Urea	Carbamide	$CO(NH_2)_2$
14.	Annhydrous sodium carbonate	Soda ash	ann Aa_2CO_3
15.	Copper sulphate pentahydrate	Blue vitriol	$CuSO_4.5H_2O$
16.	Ferrous sulphate	Green vitriol	$FeSO_4.7H_2O$
17.	Nitrous oxide	Laughing gas	N_2O
18.	No chemical name	Producer gas	$CO + H_2 + N_2$
19.	No cchemical name	Coal gas	Co, H_2 & CH_4
20.	No chemical name	Water gas	$CO + H_2$
21.	No chemical name	Bauxite	$Al_2O_3.2H_2O$
22.	Calcium carbonate	Lime stone	$CaCO_3$
23.	Silver chloride	Horn Silver	AgCl
24.	Conc. sulphuric acid	Oil of vitriol	Conc. H_2SO_4
25.	Fuming sulphuric acid	Oleum	$H_2S_2O_7$
26.	Sodium aluminosilicate	Zeolite	$Na_2Al_2Si_2O_8.XH_2O$ (Used to soften minerals water)

The reactivity series of metals (or activity series of metals) : -

The arrangement of metals is a vertical column in the order of decreasing reactivity is called the reactivity series, of metals.

In the reactivity series the most reactive metal is placed at the top whereas the least reactive metal is placed at the bottom.

The reactivity series (or Activity series) of Metals



USES

1. Metals	1. Copper and aluminium are used to make wires because they have very low electrical resistance 2. Iron, copper and aluminum are used to make household utensils. 3. Iron is used as a catalyst in the preparation of ammonia by Haber's prose. 4. Zinc is used for galvanizing iron to protect it from rusting. 5. Chromium and Nickel are used for electroplating and in manufacture of stainless steel. 6. Aluminum foil are used for packaging of medicines, cigarettes. 7. Silver and gold are used to make jewellery. 8. Sodium, titanium and zirconium are used is atomic energy. 9. The liquid metal 'mercury' is used for making thermometers. 10. Zirconium metal is used in making bullet-proof alloy steels. 11. Lead is used in making car batteries.

USES

2. Non-metals	1. Hydrogenation is used in the hydrogenation of vegetable oils to make vegetable ghee. 2. Hydrogen is used in the manufacture of ammonia. 3. Liquid hydrogen is used as a rocket fuel. 4. Carbon (in the form of graphite) is used for making electrodes. 5. Nitrogen is used in the manufacture of ammonia, nitric acid and fertilizers. 6. Due to inertness, nitrogen is used to preserve food materials. 7. Compounds of nitrogen like trinitro toluene (TNT) and nitroglycerin are used as explosives. 8. Sulphur is used for manufacturing sulphuric acid. 9. Sulphur is used to fumigate and in making gun powder.

MINERALS AND ORES

Minerals :- The natural materials in which the metals or their compounds are found in earth are called minerals.

Ores :- Those minerals from which the metals can be extracted conveniently and profitably are called **Ores**.

An ore contains a good percentage of metal and there is no objectionable impurities in it. Thus, all the ores are minerals, but all the minerals are not **Ores**.

The relative abundance (by weight) of some important metals in the earth is given below in the table

Metals	% (Percentage)
1. Aluminum	7%
2. Iron	4%
3. Calcium	3%
4. Sodium	2.5%
5. Potassium	2.5%
6. Magnesium	2%
7. Titanium	0.6%

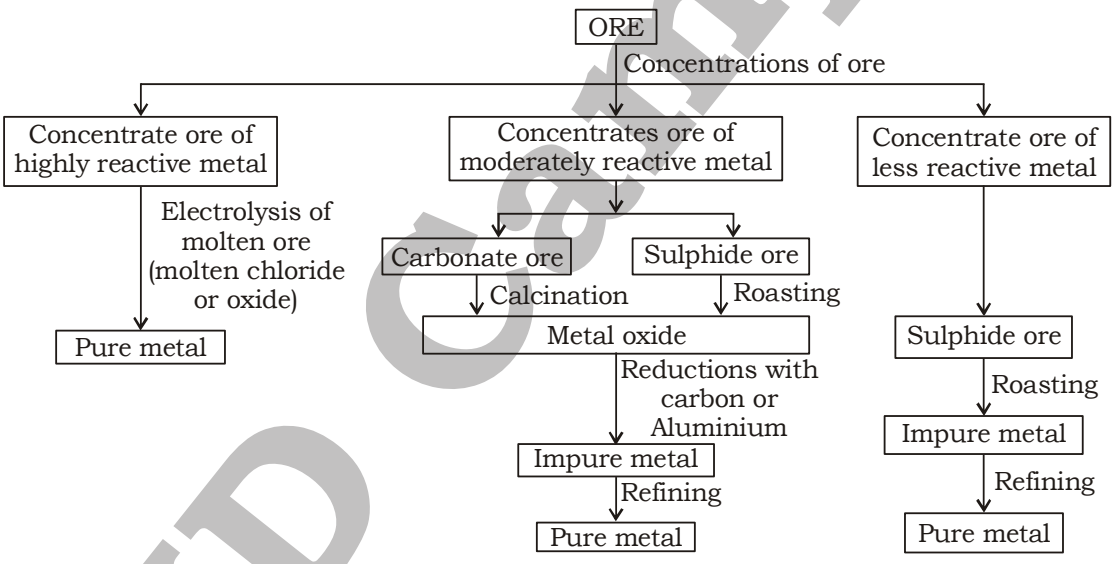
TYPES OF ORES

S. No.	Types of ores	Element	Names of ores
1.	Oxides	Aluminum	Bauxite ($Al_2O_3 \cdot 2H_2O$)
		Copper	Cuprites (Cu_2O)
		Iron	Hematite (Fe_2O_3)
		Tin	Casseterite (SnO_2)
2.	Carbonate ores	Calcium	Limestone ($CaCO_3$)
		Zinc	Calamine ($ZnCO_3$)
		Iron	Siderite ($FeCO_3$)
3.	Sulphide	Zinc	Zinc blende (ZnS)
		Copper	Copper glance (Cu_2S)
		Lead	Galena (PbS)
		Mercury	Cinnabar (HgS)
4.	Halide ores	Sodium	Rock salt ($NaCl$)
		Fluoride	Flourspar (CaF_2)
		Silver	Horn silver ($AgCl$)

CHIEF ORES AND METHODS OF EXTRACTION OF SOME COMMON METALS			
Metals	**Occurrence**	**Extraction method**	**Remark**
1. Lithium	Spodumeme $LiAl(SiO_3)_2$ Lipidolite	Electrolysis of fused $LiCl / KCl$	Because of their high reactivity, they are extracted under anhydrous condition.
2. Sodium	Rock salt (NaCl)	Electrolyses of fused $NaCl/CaCl_2$	Sodium is highly reactive. It react with water.
3. Magnesium	Carnallite $KCl.MgCl2.6H_2O$ Magnesite $MgCO_3$	Electrolysis of fused MgO or $MgCl_2 / KCl$ carbon reduction of MgO	Carbon reduction is not possible with alkaline earth metals as carbide is formed with them
4. Calcium	Limestone $CaCO_3$ Dolomite $MgCO_3 \cdot CaCO_3$ Gypsum $CaSO_4 \cdot 2H_2O$	Electrolyses of fused $CaCl_2 / CaF_2$	Electrolysis in aqueous solution is not possible as calcium is highly reactive.
5. Copper	Copper pyrite $(CuFeS_2)$ Cuprites (Cu_2O) Copper glance (Cu_2S) Malachite $CuCO_3 \cdot Cu(OH)_2$ Azurite $2CuCO_3 \cdot Cu(OH)_2$	Roasting of sulphide partially and reduction $2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$	It is self reduction in a converter. Sulphuric acid leaching is also employed.
6. Aluminum	Bauxite $Al_3O_3 \cdot 2H_2O$ Cryolite Na_2AlF_6	Electrolyses of Al_2O_3 dissolved in molten cryolite or in Na_3AlF_6	A good source of electricity is needed in the extraction of Al.
7. Zinc	Zinc blende (ZnS) Zencite (ZnO) Calamine $(ZnCO_3)$	Roasting and then reduction with C	The metal may be purified by fractional distillation.
8. Lead trated	Galena PbS	Roasting of sulphide ore, then reduction of the oxide.	Sulphide ore is concen-by froth floatation process.

9. Iron	Hematite Fe_2O_3 Magnetite Fe_3O_4 Siderite $FeCO_3$ Iron pyrite FeS_2 Limonite $Fe_2O_3 \cdot 3H_2O$	Reduction with the help of CO and Coke in blast furnace, chemical reduction with CO, Calcination followed by reduction with CO. Roasting followed by reduction with CO	Limestone is added as flux which removes SiO_2 as calcium silicate (slag) floats over molten iron and prevents its oxidation Temperature approaching 2170K is required

A summary of the various steps involved in the extraction of pure metals from their ores.



Some of the common alloys are :-

Alloy	Alloy of	Composition	Uses
1. Duralumin	Aluminum	Al + Cu + Mg + Mn 95% 3% 2% 1%	For making pressure cooker, Aeroplanes, light tools.
2. Magnalium	Aluminum	Al + Mg 95% 5%	To make balance beams & light instruments.
3. Alnico	Aluminum	Al + Ni + CO + Fe	Used for making magnet
4. Stainless steel lery.	Iron	Fe + Cr + Ni + C 75% 15% 9.5% 0.5%	Utensils, surgical cut-
5. Nickel steel	Iron	Fe + Ni 95% 5%	Electrical wire automo-biles parts.
6. Steel	Iron	Fe + C 99% 1%	Nails, screws, bridges, railway lines.
7. Brass	Copper	Cu + Zn 70% 30%	Decorative material, handles.
8. Bronze	Copper	Cu + Sn 80% 20%	Statues, coins, medals and utensils.
9. German silver	Copper	Cu + Zn + Ni 50% 30% 20%	Ornaments, Decorative articles.
10. Rolled gold	Copper	Cu + Al 90% 10%	Cheap ornaments
11. Gun metal	Copper	Cu + Sn + Zn + Pb 88% 10% 1% 1%	Gun, Barrels, gears and bearings.
12. Dutch metal	Copper	Cu + Zn 80% 20%	Artificial Ornaments
13. Solder	lead and tin	Pb + Sn 50% 50%	For soldering electrical wire together.
14. Amalgam	Mercury	Hg + one or more metals Like Na, Sn, Zn etc	Used by dentist for fill-ing in teeth.

USEFUL GASES	
Name	**Uses**
1. Acetylene, ethylene	To produce a hot flame for welding
2. Ammonia	Fertilizer, synthetic fibers, refrigeration
3. Butane	Cigarette lighters/domestic fuel
4. Ether	Anaesthetic and industrial processes
5. Ethylene	Plastics
6. Helium	Fluorescent tubes, laser, balloons
7. Krypton	Fluorescent tubes, high speed photography
8. Laughing gas (Nitrious oxide) N_2O	Mild anesthetic
9. Methane	To make chloroform
10. Neon	Illuminated sign
11. Propane	Fuel and refrigerant
12. Radon	Radio therapy, atomic research
13. Xenon	flash lamps and lasers.

NATURAL ACIDS	
Name	**Source**
1. Acetic acid	Vinegar
2. Amino acid	Proteins
3. Ascorbic acid	Vitamin C
4. Citric acid	Lemon/citrus food
5. Hydrochloric acid	Digestive juices
6. Lactic acid	Milk
7. Malic acid	Unripe apple/fruits
8. Tannic acid	Tea
9. Uric acid	Urine

CLASSIFICATION OF FUEL

1. **Solid fuel :-** e.g., Wood, coal, charcoal, coke etc.
2. **Liquid fuel :-** e.g., petrol, kerosene oil, diesel, lubricating oil, ether, alcohol etc.
3. **Gaseous fuel :-** e.g., Natural gas, coal gas, LPG, producer gas, water gas.

COAL

On the basis of carbon percentage and calorific value, there are four types of coal.

Types	Properties
1. Peat	Low grade coal, produce less heat and more smoke and ash. Percentage of carbon : 50-60% calorific value (cal/gm) : 2500-3500
2. Lignite	High moisture content, burns easily low calorific value Percentage of carbon – 60- 70% calorific value (cal/gm) : 3500-4500
3. Bituminous	Black, hard, smoky flame, domestic fuel. Percentage of carbon: 75-80% calorific value (cal/gm) : 7500-8000
4. Anthracite	Superior quality, hardest form high calorific value. Percentage of carbon : 75- 90% calorific value (cal/gm) : 6700-7500.

Compounds of metal and non-metal & their uses :-

1. **Iodine (I_2)** :- (i) Used as antiseptic (ii) Medicine (iii) Tincture of Iodine
2. **Chlorine (Cl_2)** :- (i) Mustard gas (ii) Bleaching agent (iii) Bleaching cloth and paper.
3. **Hydrochloric acid (HCl)** :- (i) In aqua regia ($HCl + HNO_3$) in the ratio 3 : 1 (ii) Dyes
4. **Sulphuric acid** (H_2SO_4) :- (i) Reagent (ii) Storage battery
5. **Sulphur dioxide** (SO_2) :- (i) Oxidants and reductants (ii) As bleaching agent
6. **Water gas** ($CO + H_2$) :- (i) As fuel (ii) Welding
7. **Coal gas** :- (i) As fuel (ii) Inert atmo sphere
8. **Nitrous oxide** (N_2O) :- (i) Laughing gas (ii) Surgery
9. **Carbon dioxide** :- (i) Soda water (ii) Fire extinguisher
10. **Carbon monoxide** :- (i) In phosgene gas ($COCl_2$)
11. **Graphite** :- (i) As electrodes
12. **Diamond** :- (i) Ornaments (ii) Glass cutting (iii) Rock drilling

13. **Alum** $[K_2SO_4Al_2(SO_4)_3 24H_2O]$:- (i) Purification of water
(ii) Leather industry

14. **Mercury** (Hg) :- (i) Thermometer (ii) Vermillion
(iii) Amalgam

15. **Plaster of Paris** $(CaSO_4)\frac{1}{2}H_2O$:- (i) Statue (ii) Surgery

16. **Heavy water** (D_2O) :- (i) Nuclear reaction reactor

17. **Liquid hydrogen** :- (i) Rocket fuel