UNIT - Ś PERIODIC CLASSIFICATION OF ELEMENTS



Modern periodic law & Table	Modern periodic law states that the physical and chemical properties of the elements are the periodic functions of their atomic number. Modern periodic table It is a tabular arrangement of elements in periods(rows) are groups(columns), highlighting the regular repetition of properties of the element				
Metallurgy	It is a science of extracting metals from their ores and modifying them into alloys for various uses. <i>Minerals :</i> single compound or complex mixture of various compounds of metals <i>Ores :</i> mineral from which a metal can be readily and economically extracted. <i>Mining :</i> The Process of extracting the ores from the Earth's crust. <i>Gangue/ Matrix :</i> The rocky impurity associated with an ore <i>Flux :</i> It is added to the ore to reduce fusion temperature and to remove impurities. <i>Slag :</i> The fusible product formed when flux reacts with gangue during the extraction. <i>Smelting :</i> Process of reducing roasted metallic oxide from metal in its molten state.				
Types of Separation (or) Concentration of Ore	Hydraulic method (Gravity separation) : Oxide ores Magnetic separation method : Tinstone SnO ₂ , Ore of Tin Froth floatation method : Sulphide ores Chemical method (or) Leaching : When ore is in Pure form. Ex : bauxite				
Alloy	An <i>alloy</i> is a homogeneous mixture of two or more metals (or) metals with certain non metallic elements. <i>Types</i> : 1) Ferrous 2) Non – ferrous				
Amalgam	It is an alloy of mercury with another metal. <i>Ex</i> : Silver-tin amalgam				
Corrosion	It is the gradual destruction of metals by chemical or electrochemical reaction with the environment. Dry/Chemical Corrosion : The corrosive action in the absence of moisture Wet/ Electrochemical Corrosion: The corrosive action in the presence of moisture				
Prevention of Corrosion	 Galvanization : Coating zinc on iron sheets by using electric current. Electroplating : Coating one metal over another metal by passing current. Anodizing : Electro chemical conversion of metal surface into a decorative, durable and corrosion resistant. Cathodic protection :Metal to be protected is coated with a sacrificial metal. 				

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Periodic property	Left to Right in a period	Top to Bottom in a group
 Atomic radius : It is the distance between the centre of its nucleus and the outermost shell containing the valence electron. Covalent radius – for non metallic elements Metallic radius – for metallic elements Ionic radius : It is the distance from the centre of the nucleus of ion upto the point where it exerts its influence on its electron cloud. 	In the same valence shell, the number of protons increases, increasing the attraction of protons over electrons. Thus, atomic/ionic radius <i>Decreases</i> .	Due to increase in valence shell number, atomic / ionic radius <i>Increases</i> .
<i>Ionisation Energy :</i> It is the minimum energy required to remove an electron from a gaseous atom in its ground state to form a cation.	As atomic radius decreases, more energy is required to remove the electrons and so Ionisation Energy <i>Increases</i> .	Atomic radius increases, so valence electrons are loosely bound. Less energy is required to remove the electrons and so IE <i>Decreases</i> .
<i>Electron Affinity</i> : It is the amount of energy released when a gaseous atom gains an electron to form its anion.	Atomic radius decreases and so, electron affinity <i>Increases</i> .	Atomic radius increases and so, valence electrons are loosely bound.
<i>Electronegativity</i> : It is the measure of the tendency of its atom to attract the shared pair of electrons towards itself in a covalent bond.	Increase in nuclear charge attracts the electrons more strongly. ∴ electronegativity <i>Increases</i> .	Increased number of valence shell, electronegativity <i>Decreases.</i>

Metallurgy Aluminium Copper Iron **Ores of Aluminium : Ores of Iron : Ores of Copper :** Bauxite $Al_2O_3.2H_2O$ Copper pyrites CuFeS₂ Haematite Fe₂O₃ Cuprite or ruby copper Cu₂O Cryolite Na₃AlF₆ Magnetite Fe₃O₄ Iron pyrite FeS₂ Corundum Al₂O₃ Copper glance Cu₂S **Extraction of aluminium : Extraction of Copper : Extraction of Iron :** (i) Conversion of bauxite into alumina i) Concentration of ore i)Concentration by Gravity Separation Baever's Process ii) Roasting and Calcination ii) Roasting (ii) Electrolytic reduction of alumina iii) Smelting iii) Smelting Hall's Process iv) Bessemerisation **Properties of Iron : Properties of Aluminium :** v) Refining • It is a lustrous metal, greyish • It is a silvery white metal. **Properties of Copper :** white in colour. • Reaction with air • It is a reddish brown metal • It can be magnetized. • Reaction with water Action of Air and Moisture • Reaction with air or oxygen • Reaction with alkalis: Al reacts • Action of Heat • Reaction with moist air: **Rusting** with strong caustic alkalis • Action of Acids: dil. HCl and • Reaction with steam forming aluminates. dil. H₂SO₄, dil. HNO₃ • Reaction with chlorine • Reaction with acids: With dilute • Action of Chlorine • Reaction with acids and con.HCl it liberates H_2 gas. • Action of Alkalis: not attacked Uses : • As reducing agent: a mixture of Uses : • **Pig iron** (2-4.5% of C) in aluminium powder and iron • It is used in manufacturing making pipes, stoves, radiators, oxide is ignited, the latter is electric cables and other railings, manhole covers and reduced to metal is known as electric appliances. drain pipes. aluminothermic process. • It is used for making utensils, • Steel (0.25-2% of C): construction Uses : containers, calorimeters and of buildings. machinery, • household utensils coins. transmission cables and T.V towers • electrical cable industry • It is used in electroplating. and in making alloys. • making aeroplanes & other industrial • Wrought iron ((<0.25% of C) mechine parts.

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is used in making springs, anchors and electromagnets.

UNIT - 11 CARBON AND ITS COMPOUNDS



Organic Comp	ound One o	One or more carbon atoms are covalently linked to atoms of other elements.					
Classification of Organic compounds							
Based on the pattern of Carbon cha	ne 1. Acy Sat Un 2.Cycl a) C i b) 1	 1. Acyclic or Open chain compound: Carbon atoms linked in a linear or open pattern. Saturated – Single bond Ex : Ethane CH₃ – CH₃ Unsaturated – Double or Triple bond Ex : Ethene CH₂ = CH₂, Ethyne CH ≡ CH 2. Cyclic or Closed chain compounds : Carbon atoms linked in a cyclic or closed pattern. a) Carbocyclic – Chain contains Carbon atom only. i) Alicyclic–It contains carbocyclic rings. Ex : Cyclobutane ii) Aromatic–It contains benzene rings. (alternate double bond). Ex : Benzene b) Heterocyclic – It contains carbon and other elements. Ex : Pyridine, Furan 					
Hydrocarbo	ons 1. Alk 2. Alk 3. Alk	The organic compounds that are composed of only carbon and hydrogen atoms. Types : 1. <i>Alkanes</i> – It contains only single bond, saturated compound. <i>Ex</i> : Alkane, C_nH_{2n+2} 2. <i>Alkenes</i> – It contains double bond, unsaturated compound. <i>Ex</i> : Alkene, C_nH_{2n} 3. <i>Alkynes</i> – It contains triple bond, unsaturated compound. <i>Ex</i> : Alkyne, C_nH_{2n-2}					
Classification of Organic compounds based on Functional group							
Class of the Compound	Alcohol	Aldehyde	Ketone	Carbo ac	oxylic id	Ester(Fruity odour)	Ether
Functional group	-ОН	О -С-Н	0 -C -	0 -C-0	ОН	0 -C -OR	-0 - R
Common Formula	R – OH	R – CHO	R - CO - R	R — C	соон	R – COOR	R - O - R
Example	Ethanol CH ₃ CH ₂ OH	Acetaldehyde CH ₃ CHO	Acetone CH ₃ COCH ₃	Acetic acid CH ₃ COOH		Methyl acetate CH ₃ COOCH ₃	Dimethyl ether CH ₃ OCH ₃
uses	solvent, antiseptic agent	disinfectant	solvent, Stain remover	making dyes, pigments & paint		cooking oils and lipids contain esters	anaesthetic agents, Pain Killer
		Ē	thanol			Ethanoic acid	1
Formula	M.F	: C ₂ H ₅ OH	H H H-C-C- S.F: H H	О—Н	M. F :	н- С ₂ Н ₄ О ₂ S. F	H O - C - C - OH H
Manufacturei) Dilution of molassesii) Addition of Nitrogen sourceiii) Addition of Yeastiv) Distillation of 'Wash'			Oxidation of ethanol in presence of alkaline potassium permanganate. $CH_3CH_2OH \xrightarrow{CM_0O_4/OH^-} CH_3COOH + H_2O$ EthanolEthanol				

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Properties	 Colourless liquid having pleasant odour. Boiling point 78°C <u>Dehydration :</u>Forms ethene. <u>Reaction with sodium:</u> <u>Oxidation :</u>identification of alcohols <u>Esterification -</u> Fruity odour <u>Dehydrogenation :</u>Cu used as catalyst at 573 K dehydrogenated to acetaldehyde. <u>Combustion :</u>Formation of CO₂& H₂O 	 Colourless liquid having unpleasant odour On cooling pure ethanoic acid forming ice flakes. It is called glacial acetic acid. <u>Reaction with metal :</u> <u>With Carbonates & bicarbonates:</u> Liberate CO₂, with brisk effervescence <u>With base:</u>to form sodium ethanoate & H₂O <u>Decarboxylation:</u> Removal of CO₂ 			
Uses	 Medical wipes, as an antiseptic. As an anti – freeze in automobile radiators. 	Manufacture of plastic.Making dyes, pigments and paint.			
Types of Alcohols	Rectified spirit : Mixture of 95.5% ethanol and 4.5 % water. Methylated spirit : Mixture of 95% ethanol and 5 % methanol. Absolute alcohol : Pure alcohol (100%) Denatured spirit : Mixture of ethanol and pyridine. Power alcohol : Mixture of petrol and ethanol.				
Soaps	 Soaps are sodium or potassium salts of long chain carboxylic acids, called fatty acids. <i>Hard Soap</i> : It is prepared by the saponification of oils or fats with caustic soda. <u>Uses</u> : Washing purpose Soft Soap : It is prepared by the saponification of oils or fats with potassium salts. <u>Uses</u> : Bathing purpose Manufacture: Kettle Process – i) Saponification of oil ii) Salting out of Soap 				
Cleansing of Soap	 Micelles : When a soap or detergent is dissolved in water, the molecules join together as clusters. Polar end (Hydrophilic): Short head of carboxylate — Dissolved in water Non polar end (Hydrophobic): Long tail of hydrocarbon chain - Dirt is attached miscelles 				
Detergents	 Sodium salts of sulphonic acids or alkyl hydrogen sulphates. <u>Types :</u> 1.<i>Biodegradable detergents</i> : Straight hydrocarbon chain, easily degraded by bacteria. 2.<i>Non-biodegradable detergents</i>: Highly branched hydrocarbon chains, cannot be degraded by bacteria. 				

Nomenclature of Organic Compounds

A systematic method for naming the organic compounds based on their structures. **IUPAC** – International Union of Pure and Applied Chemistry (set of rules)

Components of IUPAC : Prefix + Root word + Suffix

Prefix (Rule 2)		Root words (Rule 1)		Suffix			
(Substituent/Branch)		(No of Carbon atoms)		Primary(Bond type)(Rule 3)		Secondary (Functional group) (Rule 4)	
Substituent	Name	No of 'C' atoms	Name	Bond	Name	Group	Name
-F	Fluoro	1	Meth -	Single _ane	-ane	Alcohol(-OH)	-ol
-Cl	Chloro	2	Eth -	biligie	une	Aldehyde(CHO)	-al
-Br	Bromo	3	Prop -	Double	-ene	Ketone(-CO-)	-one
—I	Iodo	4	But -	Triple	-vne	Carboxylic acid	-oic acid
$-NH_2$	Amino	5	Pent -	inpie	Jiic	(-COOH)	
$-CH_3$	Methyl	6	Hex -	Rule 5 - When the primary & secondary suffixes are joined, the terminal 'e' of the primary suffix is removed.			
$-CH_2CH_3$	Ethyl	8	Oct -				
		9	Non -	Rule 6 - Identify the substituent and use a number followed			
		10	Dec -	by a dash and a prefix to specify its location and identity.			

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