

SOLID STATE

ONE MARK QUESTIONS

1. Which type of solid is anisotropic in nature?

Ans: Crystalline solids are anisotropic in nature

2. Which type of solids is called as super cooled liquids or pseudo solids?

Ans: Amorphous solids are called super cooled liquids

3. A solid has a sharp melting point, and then to which type of solids does it belong?

Ans: Crystalline solids

4. Which type of solids has long range orderly arrangement of constituent particles?

Ans: Crystalline solids

5. Sodium chloride and quartz belong to which type of solid?

Ans: Crystalline solids

6. A solid shows different values for refractive index when measured in different directions. - Identify the type of solid

Ans: Crystalline solids

7. When a solid is cut with a sharp edged tool, they cut into two pieces and the newly generated surfaces are plain and smooth. – Identify the type of solid.

Ans: Crystalline solids

8. Which type of force of attractions is present between the molecules in polar molecular solids?

Ans: Dipole –dipole interactions

9. Which type of force of attractions is present between the molecules in non-polar molecular solids?

Ans: London forces or Dispersion forces

10. Which type of force of attractions is present between the particles in ionic solids?

Ans: Electrostatic force of attraction or coulombic force of attraction

11. Solid SO₂ and solid NH₃ belong to which type of molecular solids?

Ans: Polar molecular solids

12. What is crystal lattice?

Ans: The regular three dimensional arrays of lattice points in space is called crystal lattice

13. What is a unit cell?

Ans: It is the smallest repeating unit which when arranged in three dimension gives the crystal lattice.

14. How many types of primitive unit cells are present?

Ans: Three types

15. What is a primitive cubic unit cell?

Ans: The cubic unit cell in which the particles/atoms are present only at the eight corner of the cube is called primitive cubic unit cell.

16. Define the co-ordination number of a particle in solids.

Ans: It is the total number of nearest neighboring particles to a given particle.

17. What is the number of octahedral voids generated, if the number of close packed spheres is N?

Ans: N

18. What is the number of tetrahedral voids generated, if the number of close packed spheres is N?

Ans: 2N

19. What is the co-ordination number of a particle in a tetrahedral void?

Ans: Four

20. Among Schottky and Frenkel defect, which type of defect decreases the density of the crystal?

Ans: Schottky defect

21. What are point defects?

Ans: Deviations from the ideal arrangement around a particular point or an atom in a crystalline solid

22. What are F-centers?

Ans: The anionic sites occupied by the unpaired electrons are called F- centre.

23. To which colour potassium chloride crystal turns, when excess potassium ion is present?

Ans: Violet

24. Name the type of non-Stoichiometric defect observed when white ZnO turns yellow on heating.

Ans: Metal excess defect

25. Name the non-Stoichiometric defect responsible for the composition of ferrous oxide to be $\text{Fe}_{0.95}\text{O}_1$.

Ans: Metal deficiency defect

26. Which type of point defect is observed when NaCl containing little SrCl_2 is crystallized?

Ans: Impurity defect

27. Which defect is also called as dislocation defect?

Ans: Frenkel defect

28. What is doping?

Ans: The process of increasing the conductivity of an intrinsic semiconductor by adding a suitable impurity is called doping

29. What type of semiconductors is obtained when silicon doped with boron impurity?

Ans: p-type semiconductor

30. Name the unit used to measure magnetic moment.

Ans: Am^2 (1Bohr magneton= $9.27 \times 10^{-24} \text{ Am}^2$)

31. What are diamagnetic substances?

Ans: These are the substances which are repelled by the magnetic field

32. What are ferromagnetic substances?

Ans: These are the substances which are strongly attracted by the magnet

33. How body diagonal and radius of a sphere(r) are related in bcc unit cell?

Ans: $4r = \sqrt{2}a$

34. Give an example for Ferromagnetic substance.

Ans: Fe Co Ni Gd CrO₂

35. Give an example for Diamagnetic substance.

Ans: H₂O, NaCl, and C₆H₆

36. What is F- center?

Ans: The anionic sites occupied by the unpaired electrons are called F- Centre.

37. What colour is imparted to the NaCl crystal, due to the presence of excess sodium?

Ans: The colour of NaCl crystal is Yellow

38. Name the crystal defect which lowers the density in an ionic crystal.

Ans: Schottky defect

SOLUTION

ONE MARK QUESTIONS

1. What is solution?

Ans: It is a homogenous mixture of two or more compounds.

2. What is dilute solution?

Ans: It is a solution in which solute concentration is very less.

3. Give an example for solid-solid solution

Ans: Copper dissolved in gold.

4. Give an example for gas-gas solution

Ans: Mixture of oxygen and nitrogen gases.

5. Give an example for gas-solid solution

Ans: Solution of hydrogen in palladium.

6. Give an example for liquid-solid solution

Ans: Amalgam of mercury with sodium.

7. Give an example for liquid-liquid solution

Ans: Ethanol dissolved in water.

8. Give an example for solid-gas solution

Ans: Camphor in nitrogen gas.

9. Define molarity.

Ans: Number of moles of solute present in one litre solution is called molarity

10. Define molality.

Ans: Number of moles of solute present in one kg of solvent is called molality

11. Define normality.

Ans: Number of moles of gram equivalent of substance present in one litre solution is called normality

12. What is effect of temperature on molarity?

Ans: Molarity of solution decreases with increase in temperature.

13. Why molarity of solution decreases with increase in temperature?

Ans: Because molarity is volume dependent, when temperature increases volume expansion takes place and thereby leads to decrease in molarity.

14. What happens to the molality of solution when temperature increases?

Ans: Molality remains constant.

15. Why molality of solution does not change with temperature?

Ans: Because Molality is mass dependent which is unaffected by change in temperature

16. Define the term solubility of a substance.

Ans: Solubility of a substance is its maximum amount that can be dissolved in a specified amount of solvent at a specified temperature.

17. State Henry's law.

Ans: Henry's Law: At constant temperature solubility of a gas in a liquid is directly proportional to the partial pressure of gas present above the solution.

18. How pressure affects the solubility of a gas in liquid.

Ans: The solubility of gases increases with increases in pressure.

19. What is the significance of Henry's (K_H) constant?

Ans: Higher the value of K_H lower is the solubility

20. At a given temperature and pressure nitrogen gas is more soluble than helium gas. Which one of them has higher K_H value?

Ans: Helium gas

21. Aquatic species are more comfortable in cold water than warm water. Give reason

Ans: Because solubility of oxygen is more in cold water than warm water

22. Name the law behind the dissociation of CO_2 gas in soft drinks.

Ans: Henry's law

23. What are ideal solutions?

Ans: The solutions which obey Raoult's law over the entire range of concentration are known as ideal solution.

24. Name the disease caused to the sea divers if they carry atmospheric air?

Ans: Bends

25. Name the disease caused to the people living in high altitudes or mountain climbers.

Ans: Anoxia

26. What are non-ideal solutions?

Ans: When a solution does not obey Raoult's law over the entire range of concentration, then it is called non-ideal solution.

27. Give an example for non-ideal solution with positive deviation from Raoult's law.

Ans: Mixtures of ethanol and acetone

28. Give an example for non-ideal solution with negative deviation from Raoult's law.

Ans: An example of this type is a mixture of phenol and aniline, *chloroform & acetone*

29. What are azeotropes?

Ans: Azeotropes are binary mixtures having the same composition in liquid and vapour phase and boil at a constant temperature.

30. State Raoult's law of relative lowering of vapour pressure.

Ans: Relative lowering of vapour pressure is equal to the mole fraction of the solute.

31. Define colligative property.

Ans: The properties depend on the number of solute particles irrespective of their nature relative to the total number of particles present in the solution. Such properties are called colligative properties

32. What is elevation in boiling point?

Ans: Elevation in boiling point is the difference between the boiling point of the solution containing non-volatile solute and the boiling point of the pure solvent

33. What happens to the boiling point of liquid when a non volatile solute is dissolved in a pure solvent?

Ans: boiling point of liquid increases

34. Give the S.I. unit of Ebulioscopic constant or boiling point elevation constant or molal elevation constant.

Ans: The unit of K_b is K kg mol^{-1}

35. What is depression in freezing point?

Ans: It is the decrease in the freezing point of solution when non-volatile solute is added into solvent.

36. Give the S.I. unit of cryoscopic constant.

Ans: The unit of K_f is K kg mol^{-1}

37. Define osmosis.

Ans: The process of movement of solvent particles from lower concentration to higher concentration through semi-permeable membrane to attain equilibrium is called osmosis.

38. What are isotonic solutions?

Ans: Two different solutions having same osmotic pressure are called isotonic solutions

39. What are hypertonic solutions?

Ans: The solution having more osmotic pressure than other

40. What are hypotonic solutions?

Ans: The solution having less osmotic pressure than other

41. What is reverse osmosis?

Ans: Movement of solvent particles from higher concentration to lower concentration through a semi permeable membrane, when pressure is applied greater than osmotic pressure

42. What happens when RBC is place in 1% NaCl solution?

Ans: RBC will shrink (hypertonic solution)

43. What happens when RBC is place in 0.5% NaCl solution?

Ans: RBC will swell or even burst (hypotonic solution)

44. What is abnormal molar mass?

Ans: A molar mass that is either lower or higher than the expected or normal value is called as abnormal molar mass.

45. Define Vant Hoff factor

Ans: Van't Hoff factor 'i' to account for the extent of association or dissociation of a solute in a solvent is

$$i = \frac{\text{Normal molar mass}}{\text{Abnormal molar mass}}$$

$$i = \frac{\text{observed colligative property}}{\text{Calculated colligative property}}$$

46. What is the value of Van't Hoff factor (i) for NaCl.

Ans: 2

47. What is the value of i for K₂SO₄.

Ans: 3

48. What is the value of i for sugar.

Ans: 1

49. What is the value of i for glucose.

Ans: 1

50. What is the value of Van't Hoff factor for association of solute?

Ans: less than one i.e. $i < 1$

51. What will the value of i for dissociation of solute?

Ans: $i > 1$

52. On what factor the colligative property depends on.

Ans: It depends on number of moles of solute particles but not on the nature of the solute.

53. Define lowering of vapour pressure?

Ans: It is defined as the difference between the vapor pressure of the solvent in pure state and the vapour pressure of the solution. $\Delta P = P^o - P$

54. State Raoult's law of relative lowering of vapour pressure

Ans: It states that the relative lowering of vapour pressure is equal to the mole fraction of the solute

55. Why sea water freezes below 0 °C?

Ans: Sea water freezes below 0 °C due to the presence of the non-volatile solute dissolved in the water.

ELECTROCHEMISTRY

ONE MARK QUESTIONS

1. What is an electrolyte?

Ans: An electrolyte is a compound which conducts electricity either in its aqueous solution or in its molten state.

2. What is a weak electrolyte?

Ans: A weak electrolyte is an electrolyte that dissociates partially into ions in its aqueous solution.

Ex: CH_3COOH , NH_4OH

3. What is a strong electrolyte?

Ans: A strong electrolyte is an electrolyte that dissociates completely into ions in its aqueous solution. Ex: HCl , NaOH etc

4. Define conductivity of an electrolytic solution.

Ans: Conductivity of a solution of an electrolyte is the conductance of a solution placed between two electrodes each of one square meter area kept at a distance of 1 meter apart.

5. Write the S.I unit for conductivity.

Ans: SI unit for conductivity is Sm^{-1}

6. Give the S.I unit for molar conductivity.

Ans: $\text{Sm}^2 \text{mol}^{-1}$

7. What is effect of temperature on metallic conduction?

Ans: Metallic conduction decreases with increase in temperature.

6. What is effect of temperature on electrolytic conduction?

Ans: Electrolytic conduction increases with increase in temperature.

7. What are responsible for metallic conduction?

Ans: Electrons

8. What are responsible for the electrolytic conduction?

A: Ions

9. Define limiting molar conductivity.

Ans: Limiting molar conductivity is the molar conductivity of a solution when concentration approaches zero or molar conductivity at infinite dilution.

10. Write the limiting molar conductivity equation for NaCl .

Ans: $\lambda_{\text{NaCl}}^0 = \lambda_{\text{Na}^+}^0 + \lambda_{\text{Cl}^-}^0$

11. State Kohlrausch Law of independent ion migration.

Ans: The limiting molar conductivity of an electrolyte can be represented as the sum of the individual contributions of the anion and cation of the electrolyte.

12. Define electrode potential.

Ans: The potential difference developed between the electrode (metal) and the electrolyte (solution containing its own ions) when both the metal and the solution are in equilibrium is called electrode potential.

13. Define standard electrode potential.

Ans: Standard electrode potential is the electrode potential when the concentrations of all the species involved is unity (1M) and if a gas is involved its pressure should be 1 bar.

14. State Faradays first law of electrolysis

Ans: The amount of chemical reaction which occurs at any electrode during electrolysis by a current is proportional to the quantity of electricity passed through the electrolyte either through its aqueous solution or molten state.

15. State Faradays second law of electrolysis.

Ans: The amounts of different substances liberated by the same quantity of electricity passing through the electrolytic solution are proportional to their chemical equivalent weights.

16. Define cell potential.

Ans: Cell potential is the potential difference between the two electrodes of the galvanic cell.

17. Define EMF of the cell.

Ans: It is the difference between the electrode potential of the cathode and anode when no current is drawn through the cell.

18. What is Fuel cell?

Ans: Galvanic cells that are designed to convert the energy of combustion of fuels like hydrogen, methane etc directly into electrical energy are called fuel cells.

19. Give a method to prevent rusting.

Ans: Rusting may be prevented by barrier protection like painting, metal plating etc.

20. How does conductivity of a solution change with change in concentration of the solution? Give reason.

Ans: Conductivity of a solution decreases with decrease in concentration of the solution due to decrease in the number of ions per unit volume of the solution.

21. Write the relationship between molar conductivity and limiting molar conductivity.

Ans: $\lambda_m = \lambda^{\circ} m - A\sqrt{C}$

22. What is a primary battery/cell?

Ans: Primary battery is one in which reaction occurs only once and cannot be recharged.

Eg Dry cell or Leclanche cell and Mercury cell

23. What is a secondary battery/cell?

Ans: Secondary battery is one which can be recharged by passing current through it in opposite direction, so that it can be reused.

Eg: Lead storage battery and Nickel cadmium cell.

24. What is electrolysis?

Ans: The process of decomposition of electrolyte under the influence of electric current is called electrolysis

25. Name the gas liberated at anode during the electrolysis of molten NaCl?

Ans: Cl₂ gas

26. Name the product formed at cathode during the electrolysis of molten NaCl?

Ans: Na (sodium)

27. What are the electrolysis products of aqueous NaCl?

Ans: At anode: Cl₂ gas At cathode: H₂ gas

28. What happens when applied electric current is less than the emf of Daniel cell?

Ans: It will undergo forward reaction

29. At what condition Daniel cell can act as Galvanic cell?

Ans: If the applied external electric current is greater than the emf of cell then Daniel cell act as galvanic cell

30. What is cell constant?

Ans: In a conductivity cell, the ratio of distance between two electrodes to the area of the electrodes is called cell constant. Cell constant, (K_{cell}) = $\frac{l}{a}$

31. What is the chemical formula of rust?

Ans: The chemical formula of Fe₂O₃.xH₂O

32. How many coulombs of electricity required oxidizing one mole of Al to Al³⁺?

Ans 3F Coulombs or 289500 coulombs

CHEMICAL KINETICS

ONE MARK QUESTIONS

1. What is rate of reaction?

Ans: Change in molar concentration of reactant or product in per unit time is called rate of reaction.

2. Define rate constant of a reaction

Ans: Rate constant is equal to rate of reaction when the product of the molar conc. of reactants is unity.

3. What is rate law?

Ans: Representation of rate of reaction in terms of concentration of reactants is called rate law. Rate expression and rate equation

4. Define order of a reaction.

Ans: Sum of the powers of the concentration of the reactants in the rate equation is called order of reaction.

5. Calculate the overall order of a reaction which has the rate expression.

$$\text{Rate} = K [A]^{1/2} [B]^{3/2}$$

Ans: Order of reaction = $1/2 + 3/2$

$$= 2$$

6. What is elementary reaction?

Ans: Reactions taking place in one step are called elementary reaction.

7. What are complex reactions?

Ans: Reactions taking place in more than one step are called complex reaction.

8. What is SI Unit of rate constant of nth order reaction?

$$\text{Ans: } (\text{mol})^{1-n} \text{ L}^{n-1} \text{ s}^{-1}$$

9. What is SI unit of rate constant of zero order reaction?

Ans: $\text{mol L}^{-1} \text{s}^{-1}$

10. What is the order of reaction whose unit of rate constant and rate of reaction are same?

Ans: Zero order.

11. Identify the reaction order from the rate constant $K=2.3 \times 10^{-5} \text{ mol}^{-1} \text{ L s}^{-1}$

Ans: Comparing the unit of rate constant with general unit

$\text{Mol}^{-1} \cdot \text{L} \cdot \text{s}^{-1}$ with $(\text{mol})^{1-n} \text{ L}^n \text{s}^{-1}$

$$1-n = -1$$

$$n=2$$

12. Define molecularity of a reaction.

Ans: The number of reacting species taking part in an elementary reaction which must colloid simultaneously in order to bring about a chemical reaction is called molecularity of reaction

13. In a complex reaction which step controls the overall rate of reaction and what is it called?

Ans: Slowest step, which is called rate determining step.

14. The conversion of molecules X to Y follows second order kinetics .If conc. of X Increased to three times, how will it affect the rate of formation of Y?

Ans: Increased rate = (Increased conc.)ⁿ = $3^2 = 9$

Rate of formation of Y increases by 9 times

15. Define half life of a reaction.

Ans: The time in which the conc. of a reactant is reduced to one half of its initial conc. is called half life of a reaction ($t_{1/2}$)

16. How does rate of reaction vary with temperature?

Ans: Rate of reaction increases with increase of temperature.

17. What happens to the rate constant of a reaction when temperature is increased by 10° ?

Ans: Rate constant increases nearly by two times.

18. Write Arrhenius equation which relates the rate constant, activation energy and temperature

Ans: $K = A e^{-E_a/RT}$

19. Define energy of activation.

Ans: The minimum energy required for the reactants to form activated complex is called Activation energy.

20. What is threshold energy?

Ans: The minimum amount of energy that the reacting molecules possess in order to form products on collision is called threshold energy.

21. How is activation energy related to rate of reaction?

Ans: Rate of reaction is inversely proportional to activation energy.

$$r \propto 1/E_a$$

22. How is activation energy affected by presence of positive catalyst?

Ans: Activation energy of a reaction decreases in presence of catalyst.

23. What is the effect of catalyst on the rate of reaction?

Ans: Rate of reaction remains same or rate of reaction is independent on catalyst

24. For the reaction $2 \text{HI} \rightarrow \text{H}_2 + \text{I}_2$. Write its Molecularity.

Ans: Two

25. Give an example of zero-order reaction.

Ans: $2 \text{HI}(g) \rightarrow \text{H}_2(g) + \text{I}_2(g)$.

26. What happens to the half-life period for a first order reaction if the initial concentration of reactants is increased?

Ans: Remains same [because half life period of first order reaction is independent on initial concentration]

27. In a zero order reaction, the time taken to reduce the concentration of reactant from 50% to 25% is 30 min. What is the time required to reduce the concentration from 25% to 12.5%?

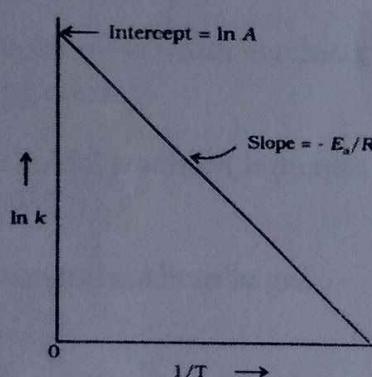
Ans: 15 minutes

28. Define collision frequency.

Ans: Number of collisions per second per unit volume is called collision frequency.

29. How is activation energy calculated by plotting graph $\ln k$ against $1/T$?

Ans:



30. Define pseudo first order reaction.

Ans: Chemical reactions which are not first order but behave as first order reaction under suitable conditions are called pseudo first order Reactions. Ex: Inversion of cane sugar.

[Example: $\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{C}_6\text{H}_{12}\text{O}_6$]

SURFACE CHEMISTRY

ONE MARK QUESTIONS

1. What is adsorption?

Ans: A surface phenomenon wherein there is accumulation of molecules on the surface (than in the bulk) of a solid or a liquid.

2. Why solids in finely divided state are good adsorbent?

Ans: Solids in finely divided state have large surface area, as surface area increases adsorbing power increases.

3. What is desorption?

Ans: The process of removing an adsorbed substance from a surface on which it is adsorbed is called desorption.

4. Name the substance used to decolour the solution of raw sugar.

Ans: Animal charcoal

5. Name of the phenomenon in which both the adsorption and desorption takes place simultaneously.

Ans: Sorption

6. Why is adsorption always exothermic?

Ans: During adsorption there is always decrease in residual forces on the surface, hence adsorption is always exothermic.

Or

There is decrease in surface energy which appears as heat, hence adsorption is always exothermic.

7. Name catalyst used in the conversion of alcohols into gasoline (petrol)

Ans: Zeolite ZSM-5 (Zeolite Sieve of molecular porosity-5)

8. Name the colloidal system in which dispersed phase is solid and dispersion medium is liquid

Ans: Sol

9. Name the dispersed phase in gel

Ans: Liquid

10. Give an example for oil in water emulsion

Ans: Milk, Vanishing cream

11. What type of colloidal emulsion is present in butter

Ans: Water in oil (W/O)

12. What is the dispersion medium in gel?

Ans: Solid

13. Between Na_2SO_4 and Na_3PO_4 which has greater power to coagulate a positively charged colloid?

Ans: Na_3PO_4

14. Alum is added to muddy drinking water. Why?

Ans: Alum is added to muddy drinking water to coagulate

15. What is the dispersed phase in milk?

Ans: Oil or liquid

16. A liquid is dispersed in a gas. Name the type of colloid obtained.

Ans: Liquid aerosol

17. Name the instrument designed by Zsigmondy.

Ans: Ultra microscope

18. Movement of the dispersion medium in an electric field by preventing the movement of colloidal particles by suitable method. Name the phenomenon

Ans: Electro osmosis

19. The process by which colloidal particles aggregate, become bigger and settle down. Name the phenomenon

Ans: Coagulation

20. What happens when an electrolyte is added to lyophobic sol?

Ans: Coagulation or precipitation

21. Name the phenomenon, when an electrolyte having a common ion is added to freshly prepared precipitate?

Ans: Peptization

22. Among SO_2 (critical temperature 630K) and CH_4 (critical temperature 190K) which gas will be adsorbed readily on the surface of 1 gram of activated charcoal.

Ans: SO_2 gas

23. What is the effect of temperature on physical and chemical adsorption?

Ans: Physical adsorption decreases with increase in temperature. Chemical adsorption increases with increase in temperature.

24. What is shape selective catalysis?

Ans: A catalytic reaction that depends on pore structure of the catalyst and size of the reactant and product molecules is called *shape selective catalysis*. E.g.: zeolites.

25. What is a Sol?

Ans: It is a colloid wherein the dispersed phase is a solid and dispersion medium is a liquid. [Eg: Sulphur dispersed in Water. Sulphur (solid) is the dispersed phase, water is the dispersion medium]

26. What is peptization? Give an example

Ans: The process of converting a freshly prepared precipitate (suspension) into a colloid by adding a electrolyte having a common ion is called peptization.

27. What is electro dialysis?

Ans: The process of increasing the rate of dialysis, under the influence of an electric field is called electro dialysis.

28. What is Electrophoresis?

Ans: Movement of electrically charged colloidal particles towards their oppositely charged electrodes when the colloid is placed in an electric field is electrophoresis

29. State and illustrate Hardy- Schulze rule.

Ans: Higher the valency of the flocculating ion added, greater is the coagulating power of the ion.

30. Define coagulating value or flocculating value

Ans: The minimum concentration of electrolyte in millimoles per litre required to cause precipitation of a sol in 2 hours is called coagulating value. Smaller the coagulating value, higher is the coagulating power of the ion.

GENERAL PRINCIPLES AND PROCESS OF ISOLATION OF ELEMENTS

ONE MARK QUESTIONS

1. What is mineral?

Ans: Naturally occurring substances which can be directly extracted from earth crest is called mineral

2. What is ore?

Ans: Ore is a mineral form from which a metal can be extracted economically and conveniently.

3. What is gangue or matrix?

Ans: the unwanted earthy and siliceous impurities associated with ore is called gangue or matrix

4. What is flux?

Ans: A chemical substance which is used to remove the gangue present in ore is called flux.

5. What is slag?

Ans: The easily fusible mass formed by gangue and flux is called slag.

6. Name an important ore of Aluminium.

Ans: Bauxite

7. Give the composition of copper pyrites.

Ans: CuFeS_2

8. What is meant by concentration of ores?

Ans: The process of removal of earthy impurities from the ore.

9. Name the electrolyte used in the extraction of aluminium.

Ans: Molten $\text{Al}_2\text{O}_3 + \text{Cryolite} + \text{CaF}_2$

10. Sulphide ores are roasted before reduction. Why?

Ans: To convert sulphides to oxides so that reduction is easy.

11. What are the products formed when calcium carbonate is calcined?

Ans: $\text{CaO} + \text{CO}_2$

12. Give the composition of copper matte.

Ans: $\text{Cu}_2\text{S} + \text{FeS}$

13. How is FeO removed during the extraction of copper?

Ans: It is removed as iron silicate FeSiO_3 using SiO_2 .

14. What do you mean by blister copper?

Ans: The solidified copper obtained has blistered appearance due to the evolution of SO_2 and so it is called blister copper.

15. During froth floatation process, name the component that comes along with the froth.

Ans: Ore

16. Why do we add collectors during froth floatation?

Ans: To enhance non-wettability of ore particles by water.

17. Name the depressant used in the concentration of ore containing ZnS and PbS?
Ans: NaCN

18. Name the refining method used to produce semiconductors
Ans: Zone refining

19. What type of elements are refined by zone refining method?
Ans: Elements such as Si, Ge, Ga, etc., which are used as semiconductors, are refined by this method.

20. Name the process usually employed for the purification of nickel.
Ans: Mond's process

21. Which metal is refined by Van – Arkel method?
Ans: Ti and Zr

22. Among carbon and carbon monoxide which one is a better reducing agent for Fe_2O_3 above 1073K?
Ans: Carbon

23. Why carbon monoxide can act as better reducing agent for reducing Fe_2O_3 below 1073K?
Ans: Because the ΔG° for the formation of oxide of carbon monoxide is more negative than the formation of iron oxide.

24. Write the principle involved in the Zone refining.

Ans: This method is based on the difference in solubility of impurities in molten and solid state of the metals.

25. Haematite ore particles are heavier than gangue. Suggest a suitable method for its concentration.
Ans: Gravity separation

26. Which type of ore is concentrated by froth floatation process?

Ans: Sulphide ore

27. What is the importance of roasting and calcination?

Ans: This is done to get the metal in its oxide form so that reduction can be done easily.

28. Give an example of a metal that can be extracted by electrolytic method.

Ans: Aluminium (Or Sodium, magnesium)

29. In the extraction of aluminium carbon anodes are replaced regularly. Why?

Ans: Because the carbon gets worn out as the oxygen liberated reacts with it to form CO_2 .

30. Name the refining method used for silver and gold?

Ans: Electrolytic refining

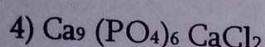
P- BLOCK ELEMENTS

ONE MARK QUESTIONS

1. Write the formula of

- 1) Chile salt petre
- 3) Apatite mineral

Answer: 1) NaNO_3



2. Write the valence shell electronic configuration of 15th group elements.

Answer: $\text{ns}^2 \text{np}^3$

1M each

2) Indian salt petre

4) chlorapatite

2) KNO_3

5) $\text{Ca}_9(\text{PO}_4)_6 \text{CaF}_2$

5) Fluorapatite

3) $\text{Ca}_9(\text{PO}_4)_6 \text{CaX}_2$

3. There is a considerable increase in covalent radius from N to P. However, from As to Bi only small increase in covalent radius is observed. Give reason.

Answer: This is due to the presence of completely filled d and/or f orbital in heavier members.

4. Ionization enthalpy decreases down the group 15. Give reason

Answer: Due to gradual increase in atomic size.

5. The ionization enthalpy of the group 15 elements is much greater than that of group 14 and group 16 elements in the corresponding periods. Give reason.

Answer: Because of the extra stable half-filled p orbital electronic configuration and smaller size.

6. How does electronegativities of 15th group elements varies down the group?

Answer: decreases

7. Mention the common Oxidation states of p block elements.

Answer: common oxidation state of these elements are -3, +3 and +5

8. Nitrogen atom has five valence electrons but it does not form NCl_5 .

Answer: Because of absence of d-orbitals it can't expand its covalency from 3 to 5.

9. Nitrogen does not form pentahalides. Why?

Answer: Nitrogen with $n = 2$, has s and p orbitals only. It does not have d orbitals to expand its covalence beyond four. That is why it does not form pentahalide.

10. Why is Nitrogen an inert gas?

Answer: Nitrogen exists as triply bonded diatomic non polar molecule. Due to short Internuclear distance between two nitrogen atoms the $\text{N} \equiv \text{N}$ bond strength is very high. It is, therefore, very difficult to break the bond.

11. Why $\text{R}_3\text{P}=\text{O}$ exist but $\text{R}_3\text{N}=\text{O}$ does not?

Answer: Due to the absence of d orbitals in valence shell of nitrogen, nitrogen cannot form d $\pi-\text{p } \pi$ bond. Hence $\text{R}_3\text{N}=\text{O}$ does not exist.

12. Catenation property of nitrogen is less than phosphorus. Why?

Answer: Due to strong $\text{p}\pi-\text{p}\pi$ overlap in Nitrogen and weaker N-N bond than the single P-P bond.

13. Write the formula of hydrides formed by 15th group elements?

Answer: EH₃

14. How does the stabilities of 15th group metal hydrides varies down the group?

Answer: The stability of hydrides decreases on moving down from NH₃ to BiH₃.

15. Why is NH₃ basic while BiH₃ is only feebly basic?

Answer: NH₃ is basic due to smaller size & high electro negativity of Nitrogen.

16. Ammonia has higher boiling point than Phosphine. Explain.

Answer: Ammonia (NH₃) forms hydrogen bond but Phosphine (PH₃) does not. Hence boiling point of ammonia is higher than that of phosphene.

17. Write the formula of two types of oxides formed by 15th group elements?

Answer: E₂O₃ and E₂O₅

18. Out of E₂O₃ and E₂O₅ which is acidic?

Answer: E₂O₅ (oxide with higher oxidation state is more acidic)

19. How does the acidic character of 15th group metal oxides varies down the group?

Answer: The acidic character decreases on moving down a group.

20. Write the increasing order of acidic character of N₂O₅, P₂O₅, As₂O₅ and Sb₂O₅

Answer: N₂O₅ > P₂O₅ > As₂O₅ > Sb₂O₅

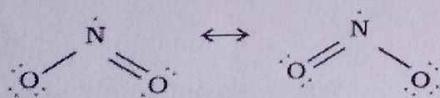
21. What is passivity?

Answer: Some metals like aluminium and chromium do not dissolve in concentrated nitric acid due to the formation of a protective layer of oxide on the surface of the metal. This phenomenon is called passivity of metals.

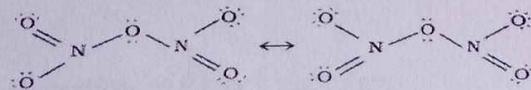
22. Write the resonance structures of a) NO b) NO₂ c) N₂O₅ 1M each

a) Answer: Structure of NO: $\ddot{\text{N}}=\ddot{\text{O}}$: \longleftrightarrow $\ddot{\text{N}}=\ddot{\text{O}}$:

b) Structure of NO₂:



c) Structure of N₂O₅:



23. Name the 16th group p-block element which is radioactive in nature.

Answer: Polonium

24. Write the valence shell electronic configuration of 16th group elements.

Answer: ns² np⁴

25. Mention the Oxidation state of oxygen.

Answer: Oxygen exhibits the oxidation state of -2 in metal oxides, -1 (H_2O_2), zero (O_2 and O_3) and +2 (OF_2).

26. Name the catalyst used in the manufacture of sulphuric acid by contact process
Answer: V_2O_5

27. Name i) the radioactive noble gas

Answer: i) Radon

ii) most abundant noble gas

ii) Argon

28. Why noble gases are chemically inert?

Answer: Stable completely filled orbitals are there.

29. Why noble gases have maximum ionization enthalpy in the corresponding period.

Answer: Stable completely filled orbitals are there

30. Why noble gases have positive electron gain enthalpy

Answer: Stable completely filled orbitals are there

31. Which is the first noble gas compound synthesized?

Answer: $Xe^+PtF_6^-$

32. Who prepared first noble gas compound?

Answer: Neil Bartlett

33. Noble gases have very low boiling point .Why?

Answer: They are mono atomic due to weak dispersion forces, hence have low boiling points.

d & f-BLOCK ELEMENTS

ONE MARK QUESTIONS

1. Zinc, cadmium and mercury of group 12 are not regarded as transition metals, Why?

Ans. Zinc, cadmium and mercury of group 12 have full d^{10} configuration (d orbitals are completely filled) in their ground state as well as in their common oxidation states and hence, are not regarded as transition metals

2. Why d- block elements are named as 'transition elements'?

Ans: The d-block elements occupy the middle of the periodic table and their properties are transitional between s- and p- block elements.

3. Write the general electronic configuration of d block elements.

Ans: [Noble gas] $(n-1)d^{1-10}ns^{1-2}$

4. Write the general outer electronic configuration of d- block elements.

Ans: The general outer electronic configuration of d- block elements is $(n-1)d^{1-10}ns^{1-2}$

5. Write the general electronic configuration of f- block elements.

Ans: The general electronic configuration of f- block elements (Lanthanoids) is $[Xe] 4f^1 - 14 5d^{0-1} 6s^2$

6. Name a member of the lanthanide series which is well known to exhibit +4 oxidation state.
Ans. Cerium

7. The outer electronic configuration of Cr is $3d^5 4s^1$ instead of $3d^4 4s^2$, why?
Ans: Half filled ($3d^5$) orbitals are relatively more stable, hence one electron of 4s orbital jumps to 3d orbital.

8. The outer electronic configuration of Cu is $3d^{10} 4s^1$ instead of $3d^9 4s^2$, why?
Ans. completely filled ($3d^{10}$) orbitals are relatively more stable, hence one electron of 4s orbital jumps to 3d orbital.

9. Why do transition metals have higher enthalpies of atomization?
Ans: Involvement of a large number of unpaired electrons of d orbitals favour stronger inter atomic interactions resulting in stronger bonds between the atoms of a metal and higher enthalpies of atomization.

10. Name one 3d series elements that do not show variable oxidation states.
Ans. Sc (+3)

11. Transition metals exhibit variable oxidation states in its compounds, why?
Ans. Transition metals exhibit variable oxidation states in its compounds due to the availability of both ns & (n - 1) d electrons for bond formation.

12. Name 3d series metal which shows highest oxidation state.
Ans: The highest oxidation state shown by 3d series transition metals is +7 by Mn

13. Name a metal in the 3d series of transition metals which exhibit +1 oxidation state most frequently.
Ans. copper

14. What is the trend in oxidation state of transition metals?

Ans: The oxidation state increases with increase in atomic number & reaches a maximum in the middle and then decreases.

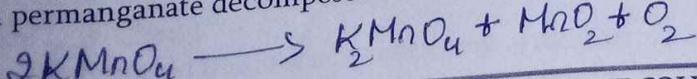
15. 3d series transition metals exhibit +2 as the most common oxidation state (except Sc) why?
Ans: The +2 oxidation state, which commonly occurs for nearly all the transition metal is due to the loss of their outer 4s electrons

16. Why transition metals and their compounds shows paramagnetic behaviour?
Ans. The transition metal ions are generally containing one or more unpaired electrons in them & hence their compounds are generally paramagnetic.

17. Name alloys of transition metals with non transition metals.
Ans. Brass (Cu & Zn) or Bronze (Cu & Sn)

18. What is the action of neutral or faintly alkaline permanganate solution on iodide?
Ans. Alkaline permanganate solution oxidizes iodide to iodate.

19. What happens when potassium permanganate is heated to 513 K?
Ans: Potassium permanganate decomposes at 513K to potassium manganate, manganese dioxide and oxygen.



20. What is the principal oxidation state exhibited by the lanthanoids?

Ans: The principal oxidation state of lanthanoids is +3.

21. Write the spin-only formula used to calculate the magnetic moment of metal ions.

Ans: The magnetic moment is determined by using the spin only formula,
 $\mu = \sqrt{n(n+2)}$ Where n is the number of unpaired electrons and μ is the magnetic moment

22. Why is Sc^{3+} (or Zn^{2+}) diamagnetic?

Ans: Sc^{3+} ($Z=21$) $3d^0$ no unpaired electron, $n=0$, $\mu=0$.
 (or Zn^{2+} ($Z=30$) $3d^{10}$) no unpaired electron, $n=0$, $\mu=0$)

23. What is the most common oxidation state of lanthanoids and actinoids?

Ans: The most common oxidation state of lanthanoids and actinoids is +3.

24. What is Actinoid contraction?

Ans: There is a gradual decrease in the size of atoms or M^{3+} ions across the series. This is known as the actinoid contraction.

25. Actinoid contraction is more than lanthanoid contraction. Give reason.

Ans: The actinoid contraction is, more than lanthanoid contraction due to poor shielding by $5f$ electrons from nuclear charge.

26. Actinoids show larger number of oxidation states than lanthanoids. Why?

Ans: In actinoids $5f$, $6d$ and $7s$ levels are of comparable energies, hence electrons from these orbitals are available to lose or share.

27. Give one use of Misch metal.

Ans. Misch metal is used in Mg-based alloy to produce bullets, shell and lighter flint.

Why transition metals forms alloys readily?

Ans: Transition metals readily form alloys with other transition metals because of their similar radii

28. Give one use of transition metal alloy.

Ans: Ferrous alloys containing chromium, vanadium, tungsten, molybdenum and manganese are used for the production of a variety of steels.

COORDINATION COMPOUNDS

ONE MARK QUESTIONS

1. Define Coordination entity of coordination compounds.

Ans: A coordinate entity constitutes a central metal atom or ion bonded to a fixed number of ions or molecules (ligands).

2. What is central metal ion in a coordination compound?

Ans: The metal atom or ion in a coordination entity to which, a fixed number of ions or molecules (ligands) are bound in a definite geometrical arrangement around it is called central metal ion.

3. What are ligands?

Ans: The ions or molecules bonded to the central metal atom or ion in a coordination entity are called ligands. Ligands are Lewis bases.

4. Define the term coordination number of a central metal atom or ion in a complex compound.

Ans: The coordination number of central metal atom or ion in a complex is the number of ligand donor atoms to which the metal is directly bonded.

5. What is coordination number of Fe in $K_4[Fe(CN)_6]$?

Ans: coordination number of Fe^{2+} is 6.

6. Define coordination sphere of coordination compounds.

Ans: The central metal atom or ion and the ligands of the complex compound are written within square bracket. This is called coordination sphere of coordination compounds.

7. What are homoleptic complexes? Give an example.

Ans: Homoleptic complexes are the complexes in which central metal ion or atom is bound to only one type of donor groups.

e.g. $K_4[Fe(CN)_6]$

8. What are heteroleptic complexes? Give an example.

Ans: Homoleptic complexes are the complexes in which central metal ion or atom is bound to more than one type of donor groups. e.g. $[Co(NH_3)_5Cl]SO_4$

9. Give the IUPAC name for the following compounds.

Ans:

a) $K_4[Fe(CN)_6]$

potassium hexacyanidoferate(II)

1M each

b) $[Cu(NH_3)_4] SO_4$

tetramminecopper(II) sulphate

c) $[Co(NH_3)_5Cl]SO_4$

pentamminechloridocobalt(III) sulphate

d) $K_3[Fe(C_2O_4)_3]$

potassium trioxalatoferrate(III)

e) $[CoCl_2(en)_2]^+$

dichloridobis(ethane-1,2-diamine)cobalt(III)

f) $[Co(NH_3)_5(NO_2)]Cl_2$

pentamminenitrito-N-cobalt(III) chloride

g) $[Co(NH_3)_5(ONO)]Cl_2$

pentamminenitrito-O-cobalt(III) chloride

h) $[Ni(CO)_4]$

tetracarbonylnickel(0)

10. What are ambidentate ligands?

Ans: Ligands which have two donor atoms, but can bond to central metal atom or ion through only one donor atom are called ambidentate ligands. e.g. NO_2^- , SCN^- etc.,

11. Why $[CoF_6]^{3-}$ is called an outer orbital complex?

Ans: In this complex, Co^{3+} uses outer d orbital (4d) for hybridization. Therefore it is called an outer orbital complex

12. What is spectrochemical series?

Ans: Spectrochemical series is the arrangement of ligands in the order of increasing field strength.

HALOALKANES AND HALOARENES

ONE MARK QUESTIONS

1. What are haloalkanes?

Ans: Haloalkane is a derivative obtained by replacing hydrogen atom of alkane by halogen atom.

2. What is the hybridization of the carbon attached with vinylic halides (or) aryl halides?

Ans: sp^2 hybridisation.

3. Among phosphorus trihalides which halides are generated insitu?

Ans: PBr_3 , PI_3

4. Free radical halogenation of hydrocarbons is not a best method to prepare haloalkanes. Why?

Ans: Because this method gives mixture of isomeric mono and poly haloalkanes, which is difficult to separate as pure compounds.

5. Why fluoro compounds cannot be prepared from electrophilic substitution reaction?

Ans: Due to high reactivity of fluorine.

6. What happens to the boiling point of isomeric haloalkanes with increase in branching?

Ans: decreases.

7. How density and atomic mass of halogen atoms in haloalkanes are related?

Ans: Directly

8. Why tertiary alkyl halide undergoes S_N1 reaction very fast?

Ans: Because of the high stability of tertiary carbocation

9. What is the order of reactivity of alkyl halides towards S_N1 and S_N2 reaction?

Ans: Towards S_N1 reaction order of reactivity is $3^0 > 2^0 > 1^0$

Towards S_N2 reaction order of reactivity is $1^0 > 2^0 > 3^0$.

10. Allylic and benzylic halides are highly reactive towards S_N1 reaction. Why?

Ans: Because the carbocation formed from allylic and benzylic halides is more stable due to resonance.

11. Between S_N1 and S_N2 reaction which one proceeds with complete stereochemical inversion?

Ans: S_N2 reaction.

12. Between S_N1 and S_N2 reactions which one proceeds with racemisation?

Ans: S_N1 reaction.

13. What are optically active compounds?

Ans: Certain compounds rotate the plane polarized light when it is passed through their solutions are called as optically active compounds.

14. What are dextro rotatory compounds?

Ans: The compound which rotates plane polarized light in clockwise direction is called as dextro rotatory compound.

15. What is a laevo rotatory compound?

Ans: The compound which rotates plane polarized light in anticlockwise direction is called as laevo rotatory compound.

16. What are optical isomers?

Ans: The dextro and laevo rotatory isomers of a compound are called as optical isomers.

17. What is asymmetric carbon (or) stereocentre

Ans: A carbon atom attached with four different substituent groups is called as asymmetric carbon (or) stereocentre.

18. What are chirals?

Ans: The objects which are non-superimposable on their mirror image are said to be chirals.

19. What are achiral molecules?

Ans: The molecules which are, superimposable on their mirror images are called achiral molecules.

20. Between propan - 2- ol and butan - 2 - ol, identify the chiral molecule?

Ans: Butan - 2- ol.

21. What are enantiomers?

Ans: The stereo isomers related to each other as non-superimposable mirror images are called enantiomers.

22. What are racemic mixtures?

Ans: A mixture containing two enantiomers in equal proportions will have zero optical rotation, are called as racemic mixture (or) racemic modification.

23. What is racemization?

Ans: The process of conversion of enantiomer into a racemic mixture is known as racemization.

24. Between α and β - hydrogen which one is removed during dehydrohalogenation of alkyl halides?

Ans: β - Hydrogen.

25. What are organo-metallic compounds?

A: Most organic chlorides, bromides and iodides react with certain metals to give compounds containing carbon-metal bonds are known as organo – metallic compounds.

26. Write the general formula of Grignard reagent?

Ans: RMgX .

27. Name the product formed when Grignard reagent treated with water?

Ans: Alkanes

28. What is the hybridization of carbon atom in C-X bond of alkyl halides?

Ans: sp^3 hybridisation

29. Mention the hybridization of carbon atom in C-X bond of aryl halides?

Ans: sp^2 hybridisation

30. Why S_N1 mechanism is ruled out in haloarenes?

Ans: In case of haloarenes, the phenyl cation formed as a result of self-ionization will not be stabilized by resonance and therefore, S_N1 mechanism is ruled out.

31. What happens to the reactivity of haloarenes towards nucleophilic substitution when electron withdrawing group present at ortho or para position?

Ans: Increases.

32. What is wurtz-fitting reaction?

Ans: A mixture of an alkyl halide and aryl halide gives an alkylarene when treated with sodium in dry ether and is called as wurtz-fitting reaction.

33. Expand DDT

Ans: Dichlorodiphenyltrichloro ethane

34. Among chloral, chloroform, DDT, carbontetrachlorides, which has more number of chlorides?

Ans: DDT

35. What is phosgene?

Ans: Phosgene is an oxidised form of Chloroform.

36. $\text{CH}_3 - \text{Br} + \text{AgF} \rightarrow \text{CH}_3 - \text{F} + \text{AgBr}$. Name the reaction.

Ans: Swarts reaction

37. What are Freons?

Ans: Chlorofluorocarbons of methane and ethane are called freons

38. Name the organic product formed when chlorobenzene is treated with sodium in dry ether.

Ans: Biphenyl

39. $\text{R} - \text{X} + \text{NaI} \xrightarrow{\text{Dry acetone}} \text{R} - \text{I} + \text{NaX}$ What is the name of reaction?

Ans: Finkelstein reaction

40. Name the compound formed when 2 – bromopropane is heated with alcoholic potash

Ans: Propene

ALCOHOLS, PHENOLS & ETHERS

ONE MARK QUESTIONS

1. Name the alcohol which is used for polishing wooden furniture.

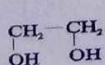
Ans: Ethanol

2. What are alcohols?

Ans: Hydroxyl derivatives of aliphatic compounds are called alcohols.

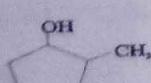
3. What is the IUPAC name of?

Ans: Ethane-1, 2-diol



4. Write the structure of 2-methyl cyclopentanol.

Ans:



5. Name the simplest hydroxyl derivative of benzene.

Ans: Phenol

6. What is the IUPAC name of Resorcinol?

Ans: Benzene-1, 3-diol

7. What is the common name of $\text{CH}_3\text{OC}_2\text{H}_5$?

Ans: Ethylmethyl ether

8. Write the formula of anisole.

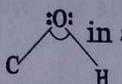
Ans: $\text{C}_6\text{H}_5\text{OCH}_3$

9. What is the IUPAC name of anisole?

Ans: Methoxybenzene.

10. Write the IUPAC name of $\text{CH}_2 = \text{CH} - \text{CH}_2\text{OH}$

Ans: prop-2-en-1-ol

11. Why is the bond angle  in alcohols is slightly less than the tetrahedral angle?

Ans: It is due to the repulsion between the unshared electron pairs of oxygen atom

12. Write the chemical name of cumene.

Ans: Isopropyl benzene.

13. The boiling point of alcohols is much higher than ethers and other classes of compounds with similar molecular masses. Give reason.

Ans: Due to intermolecular hydrogen bonding in alcohols.

14. Give reason: Lower alcohols are soluble in water.

Ans: Due to the formation of hydrogen bonds with water molecules.

15. Name the compound which is also known as carbolic acid.

Ans: Phenol

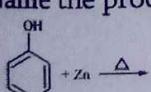
16. Name the method by which O-nitrophenol and p-nitrophenol are separated.

Ans: By steam distillation the two isomers are separated.

17. Ether is soluble in water. Give reason.

Ans: Ether is soluble in water because oxygen of ether form hydrogen bonds with water molecule.

18. Name the product formed in following reaction



Ans: Benzene

19. Complete the Reaction $\text{R} - \text{CH}_2 - \text{OH} \xrightarrow{\text{Cu}/300^\circ \text{ C}}$

Ans: $\text{R} - \text{CH}_2 - \text{OH} \xrightarrow{\text{Cu}/300^\circ \text{ C}} \text{RHO}$

20. What is Lucas Reagent?

Ans: Anhydrous ZnCl_2 + Conc. HCl

ALDEHYDES KETONES AND CARBOXYLIC ACIDS

ONE MARK QUESTIONS

1. What are aldehydes?

Ans: Aldehydes are the organic compounds containing carbonyl group, linked with one hydrogen and one alkyl/aryl group.

2. What are carboxylic acids?

Ans: Carboxylic acids are the organic compounds containing carboxyl (-COOH) group/s

3. Between aldehyde and ketones which one is confirmed using Tollen's reagent.

Ans: Aldehyde.

4. Between aldehyde and ketones which one is confirmed using Fehling's solution?

Ans: Aldehyde.

5. Write the IUPAC name of the compound. $\text{CHO}-\text{CH}_2-\text{CH}(\text{CHO})-\text{CH}_2-\text{CHO}$.

Ans: Propane-1,2,3-tricarbaldehyde.

6. The boiling point of aldehydes and ketones are higher than hydrocarbons and ethers of comparable molecular mass. Why.

Ans: Because in aldehydes and ketones there is a weak molecular association arising out of dipole-dipole interaction.

7. Arrange the following compounds in the increasing order of their acidic strength. HCOOH, CH_3COOH , $\text{CH}_3\text{CH}_2\text{COOH}$.

Ans: $\text{CH}_3\text{CH}_2\text{COOH} < \text{CH}_3\text{COOH} < \text{HCOOH}$

8. Arrange the following compounds in the decreasing order of their acidic strength. HCOOH, CH_3COOH , $\text{C}_6\text{H}_5\text{COOH}$

Ans: $\text{HCOOH} > \text{C}_6\text{H}_5\text{COOH} > \text{CH}_3\text{COOH}$.

9. Arrange the following compounds in the increasing order of their acidic strength. Cl- CH_2COOH , Br- CH_2COOH , F- CH_2COOH

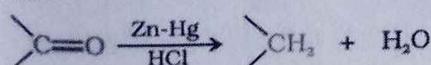
Ans: Br- $\text{CH}_2\text{COOH} < \text{Cl-CH}_2\text{COOH} < \text{F-CH}_2\text{COOH}$

10. Name the reagent used in the Stephen reaction.

Ans: Stannous chloride in presence of HCl.

11. Identify the following reaction

Ans:



Clemmensen's reduction

12. Name the products obtained when aldehydes are oxidized.

Ans: Carboxylic acid

13. What is Tollen's reagent?

Ans: Tollen's reagent is ammonical silver nitrate solution.

14. What is Fehling's solution?

Ans: Fehling's solution is a mixture of alkaline copper sulphate solution and sodium-potassium tartarate solution.

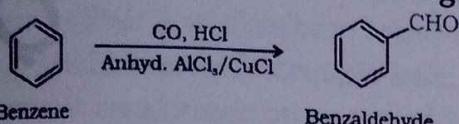
15. What is formalin?

Ans: 40 % aqueous solution of formaldehyde is called as formalin.

16. Name the product obtained when sodium acetate treated with sodalime.

Ans: Methane

17. Write the name of the following reaction.



Ans: Gutterman-koch reaction

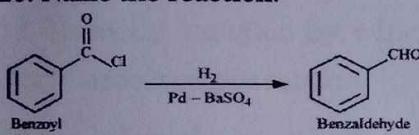
18. Which type of aldehydes will undergo Cannizzaro's reaction?

Ans: Aldehydes containing no α -hydrogen atoms

19. Which type of aldehydes will undergo aldol condensation reaction?

Ans: Aldehydes containing α -hydrogen atoms

20. Name the reaction.



Ans: Rosenmond reaction

AMINES

ONE MARK QUESTIONS

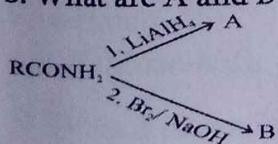
1. Name the product obtained when a nitrile is reduced by H_2/Ni .

Ans: Primary amine:

2. How is nitrobenzene converted into aniline?

Ans: By reduction using Sn/ HCl

3. What are A and B in following reactions?



Ans: A is RCH_2NH_2 , B is R-NH_2

4. Gabriel phthalimide synthesis is used to prepare which class of organic compound?

Ans: 1° aliphatic amine

5. Aniline cannot be prepared by Gabriel phthalimide synthesis method. Give reason.

Ans: Aryl halides are not reactive towards nucleophilic substitution reaction.

6. Name the reaction by which a 1° amine is prepared from an amide having one carbon atom more than 1° amine.

Ans: Hofmann bromamide degradation reaction

7. Between $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$ and $(\text{CH}_3)_3\text{N}$, which has higher boiling point and why?

Ans: $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$ has higher boiling point. $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$ has more H atoms on N to form intermolecular hydrogen bonding.

8. Give reason: i) Amines have lower boiling point than alcohol of same molar mass.
ii) Amines are insoluble in water.

Ans: i) Nitrogen in amines is less electronegative than oxygen in alcohol. Hence amines do not form H-bonds among them.
ii) Amines do not form H bonds with water

9. Give reason: aniline is a weaker base than ammonia but methanamine is a stronger base than ammonia.

Ans: Aniline is weaker base because the pair of electron on nitrogen gets delocalized towards benzene ring. Methanamine is stronger base; because-CH₃ group is electron releasing group and makes pair of electrons on nitrogen more available for protonation.

10. Arrange 1° , 2° and 3° methylamines in decreasing order of their base strength 1M each

Ans: i) In gaseous phase $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$

ii) In aqueous medium $(\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2 > (\text{CH}_3)_3\text{N}$

11. What is the final product obtained when 1° amine is alkylated? Give its general formula.

Ans. Quaternary ammonium salt: $R_4 N^+ X^-$

12. Name the reaction by which aniline is converted into phenyl isocyanide.

Ans: Carbylamine reaction

13. Complete the equations: $\text{CH}_3\text{NH}_2 + \text{CH}_3\text{COCl} \rightarrow \text{HCl} + \underline{\hspace{2cm}}$

Ans: $\text{CH}_3\text{CONHCH}_3$

14. What is the significance of acetylation of aniline before nitrating it?

Ans: When aniline is treated with concentrated HNO_3 , much of the aniline gets oxidized, aniline gets protonated and the major product is meta-nitroaniline. Hence to avoid all this aniline is acetylated.

15. Why Aniline does not undergo Friedel-Crafts reaction.

Ans: Aniline reacts with AlCl_3 to form a salt, which makes nitrogen of aniline to get a positive charge, which becomes a strongly deactivating group.

16. Aniline on reaction with concentrated HNO_3 forms meta nitro compound in significant amounts.

Give reason

Ans: Aniline with conc. HNO_3 forms anilinium ion which is meta directing.

17. What is diazotization?

Ans: Conversion of 1° aromatic amine into diazonium salt is diazotization.

18. Write the IUPAC name of $(CH_3)_2N - CH_2 - CH_3$

Ans: N,N-Dimethylethanamine

19. What is Hinesburg reagent?

Ans: Benzene sulphonylchloride is called Hinesburg reagent

20. Identify the reactant A in the following reaction: $A + 2 R - X \rightarrow R_4N^+X^-$

Ans: Secondary amine i.e. R_2NH

BIOMOLECULES

ONE MARK QUESTIONS

1. Give an example of aldohexose

Ans: Glucose or Galactose

2. Give example of ketohexose

Ans: Fructose

3. Gluconic acid on oxidation with HNO_3 gives saccharic acid. What does it indicate about the structure of glucose?

Ans: Confirmation of the presence of primary alcoholic group

4. What is glycosidic bond / linkage?

Ans: Glycosidic linkage – Linkage between two monosaccharide units through oxygen atom

5. Name the sugar present in cane sugar

Ans: Sucrose

6. What are the expected products of hydrolysis of sucrose?

Ans: α -glucose and β – fructose

7. What are the expected products of hydrolysis of lactose?

Ans: β – Galactose and β - glucose

8. Name the sugar present in milk sugar

Ans: Lactose

9. Name the components of starch

Ans: Amylose and amylopectin

10. Name water soluble component of starch

Ans: Amylose

11. Name water insoluble component of starch

Ans: Amylopectin

12. Name the storage polysaccharide in plants

Ans: Starch

13. Name the storage polysaccharide in animals

Ans: Glycogen (animal starch)

14. Name the structural polysaccharide in plants

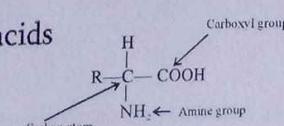
Ans: cellulose

15. Why cellulose cannot be used as food by human beings?

Ans: Human saliva do not contain the enzyme that can hydrolyses β 1-4 linkages present in cellulose

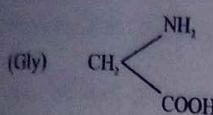
16. Write the general structure of amino acids

Ans:



17. Write the structure of an optically inactive amino acid

Ans:



18. Name an amino acid containing sulphur

Ans: Cysteine, methionine

19. Name an amino acid which is acidic

Ans: Aspartic acid, Glutamic acid

20. Name an amino acid which is basic

Ans: Glutamine, Lysine

21. Name an amino acid which contains heterocyclic nucleus

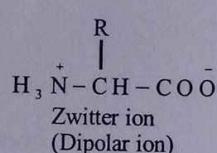
Ans: Proline, histidine

22. What is zwitter ion?

Ans: These are the amino acid dipolar ions, carrying both positive and negative charges. These moves neither towards cathode nor towards anode in electric field

23. Write its general structure of zwitter ion

Ans: Zwitter ion is represented as



23. What is isoelectric point?

Ans: The pH at which amino acids acts as zwitter ions in aqueous solution is called isoelectric pH / point

24. What is peptide bond?

Ans: It is the amide bond present between two amino acids units in peptides and protein.

25. What is poly peptide?

Ans: Poly peptides are the polymers of (n) amino acids containing 10 to 50 amino acids in chain linked by (n-1) peptide bonds

26. How many peptide bonds are present in a pentapeptide?

Ans: 4

27. What are proteins?

Ans: Proteins' are the polymers of (n) amino acids containing more than 50 amino acids in chain linked by (n-1) peptide bonds

28. Name a hormone which controls the carbohydrate metabolism.

Ans: Insulin

29. What are vitamins?

Ans: Vitamins are micronutrients that take part in metabolic process, to produce energy and growth.

31. How are vitamins classified?

Ans: These are classified as water soluble vitamins (vitamin B complex and vitamin C). Fat soluble vitamins (vitamin A, D, K, E,.)

31. What are nucleic acids?

Ans: Nucleic acids are the polymers of nucleotides linked by 3-5 phosphodiester bonds.

32. Which is the nitrogenous base present only in DNA but not in RNA?

Ans: Thymine

33. Which is the nitrogenous base present only in RNA but not in DNA?

Ans: Uracil

34. What are hormones?

Ans: Hormones are biochemical messengers produced by endocrine glands.

35. Give an example for each type of hormone

a) Polypeptide hormones b) Amino acid derivatives

1M each

c) Steroid hormones

Ans: a) Polypeptide hormones -----> insulin/ glucagons

b) Amino acid derivatives-----> Thyroxine/Epinephrine

c) Steroid hormones----->Testosterone/Estradiol/progesterone

36. Write the function of the following hormones:

a) Insulin

b) Thyroxin

c) Estrogen and androgen:

Ans: a) Insulin: Maintains blood sugar level

b) Thyroxin: Growth and development

c) Estrogen and androgen: Development of secondary sex characters

Important points on vitamins

SI No.	Vitamin	Sources	Disease caused by Deficiency
1	Vitamin A	Fish liver oil, carrots, butter and milk	Exophthalmia, night blindness
2	Vitamin B ₁₂	Meat, fish, egg and curd	Pernicious anemia
3	Vitamin C	Citrus fruits, <i>amla</i> and green leafy vegetables	Scurvy
4	Vitamin D	Exposure to sunlight, fish and egg yolk	Rickets and osteomalacia

Proteins can also be classified on the basis of their functions.

Protein	Function	Examples
1. Enzymes	Biological catalysts, vital to all living systems. Proteins that hold living systems together.	Trypsin, pepsin
2. Structural proteins	Act as messengers.	Collagen
3. Hormones	Carry ions or molecules from one place to another in the living system.	Insulin
4. Transport proteins	Destroy any foreign substance released into the living system.	Haemoglobin
5. Protective proteins (antibiotics)	Poisonous in nature.	Gamma globulin
6. Toxins		Snake venom

POLYMERS

ONE MARK QUESTIONS

1. What are polymers?

Ans: A large number of simple repeating units linked together through covalent bond are called polymers. They are also called as macromolecules

2. What is a monomer?

Ans: The simple molecules which combine to form polymer are called monomers.

3. What is polymerisation?

Ans: The process by which monomers are converted into polymer is called polymerisation

4. What are natural polymers?

Ans: The polymers which are found in nature i.e in plants and animals are called natural polymers.

Ex: proteins, Nucleic acid , starch, cellulose, rubber

5. What are semi synthetic polymers?

Ans: Chemically modified natural polymers are called semi synthetic polymers.

[Ex: Cellulose acetate (rayon), cellulose nitrate, vulcanised rubber.]

6. What are synthetic polymers?

Ans: Synthetic polymers are man -made polymers synthesized in the Laboratories or industries used in daily life.

[Ex: Polythene, poly vinyl chloride, nylon, terylene, Teflon bakelite]

7. What is Co- polymerization

Ans: It is polymerization reaction in which a mixture of more than one monomeric species is allowed to polymerize and form a co polymer.

8. What are elastomers?

Ans: Elastomers are rubber like solid with elastic properties. In these the polymer chains are held by weakest intermolecular forces. The weak binding forces permit the polymer to be stretched.

[Ex: vulcanized rubber, Buna-S, Buna-N, neoprene etc.]

9. What are fibers?

Ans: Fibres are thread- like polymer possessing high tensile strength and high modulus. These characterizations are due to strong intermolecular forces like hydrogen bonding which result in close packing of chain imparts crystalline structure to the polymer.

[Ex: Nylon 6, 6, terylene, Nylon 6, silk etc]

10. Name the monomer and write the partial structure of Nylon-6

(1 + 1)

Ans: Monomer of Nylon-6 - caprolactum

Partial structure - $[-CO-(CH_2)_5-NH-]^n$

11. Name the monomers and write the partial structure of Nylon- 6, 6

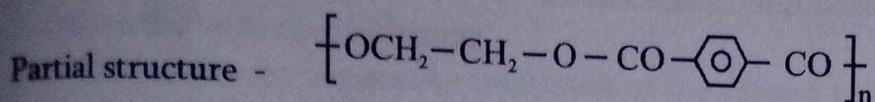
(1 + 1)

Ans: Monomer of Nylon-6,6 - Hexamethylene diamine and Adipic-acid

Partial structure - $[-OC-(CH_2)_4-CONH-(CH_2)_6-NH-]^n$

12. Name the monomers and write the partial structure of terylene (Dacron)
Ans: Monomer of terylene:- Ethylene glycol and terephthalic-acid

(1 + 1)

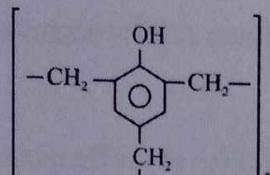


13. Name the monomer and write the partial structure of Bakelite?

(1 + 1)

Ans: Monomer of Bakelite - Phenol and formaldehyde

Partial structure:

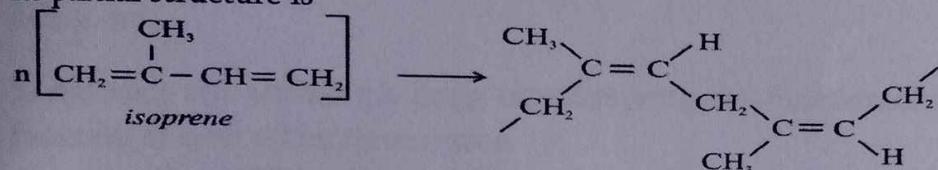


14. Name the monomer present in natural rubber. Write the partial structure

(1 + 1)

Ans: Natural rubber is a polymer of cis-2-methyl-1, 3-butadiene (isoprene).

Its partial structure is



15. Define Synthetic rubber? Give one example

(1 + 1)

Ans: Synthetic rubber is defined as any vulcanisable rubber like polymer capable of getting stretched to twice its length and returns to its original length, size and shape when the stretching force is withdrawn

Ex: Neoprene, Buna-S, Buna-N

16. What is Vulcanisation?

(1 + 1)

Ans: The process of heating natural rubber with sulphur or sulphur containing compounds at about 415k for a few hours in order to give strength and elasticity to natural rubber is called vulcanization.

18. What is bio-degradable polymer? Give example

(1 + 1)

Ans: Bio-degradable polymers are those which contain functional groups similar to the functional groups present in bio-polymers

Ex: 1. Polyhydroxybutyrate-co-hydroxyvalerate (PHBV)

19. What is non bio-degradable polymer? Give example

Ans: A large number of synthetic polymers are resistant to the environmental degradation processes and responsible for the accumulation of polymers solid waste materials and cause environmental problems are called Non-biodegradable polymers.

Ex: polythene, Nylon, Terylene etc

CHEMISTRY IN EVERYDAY LIFE

ONE/TWO MARK QUESTIONS

1. Define the term chemotherapy.

Ans: Chemotherapy means the treatment of the disease by means of chemicals that have specific effect upon the disease causing micro-organisms without harming the friendly micro-organisms or bacteria which the body needs.

2. What is drug?

Ans: A low molecular mass substance which can interact with large molecular mass targets is called drug.

3. What is medicine?

Ans: A drug which has therapeutic effect is called medicine

4. Which forces are involved in holding the drugs to the active sites of enzymes?

Ans: These are different inter-molecular forces like dipolar forces, Hydrogen bonding, van der Waals' forces etc...

5. Antacids and antiallergic drugs interfere with the function of histamines but do not interfere with the function of each other. Give reason

Ans They do not interfere with the functioning of each other because they work on different receptors in the body.

6. What is meant by the term 'broad spectrum antibiotic'?

Ans. Broad spectrum antibiotics are drugs which are effective against a large number of harmful micro-organisms causing diseases.

7. Low level of noradrenaline is the cause of depression.

Ans: Low level of noradrenaline which acts as a neurotransmitter reduces the signal sending ability to the nerves and the patient suffers from depression. Antidepressants are needed to give relief from depression. These are also called tranquilizers or neurologically active drugs. The two specific drugs are iproniazid and phenelzine.

8. What types of drugs are needed to cure this problem? Name two drugs.

Antidepressants are needed to give relief from depression. These are also called tranquilizers or neurologically active drugs. The two specific drugs are iproniazid and phenelzine.

9. Why are cimetidine and ranitidine better antacids than sodium bicarbonate or magnesium or aluminium hydroxides?

Ans. Both sodium bicarbonate and hydroxides of magnesium or aluminium are very good antacids since they neutralise the acidity in the stomach. But their prolonged use can cause the secretion of excessive acid in the stomach. This may be quite harmful and may lead to the formation of ulcers both cimetidine and ranitidine are better salts without any side effect.

10. Why are cimetidine and ranitidine better antacids than sodium bicarbonate or magnesium or aluminium hydroxides?

Ans. Both sodium bicarbonate and hydroxides of magnesium or aluminium are very good antacids since they neutralise the acidity in the stomach. But their prolonged use can cause the secretion of excessive acid in the stomach. This may be quite harmful and may lead to the formation of ulcers. Both cimetidine and ranitidine are better salts without any side effect.

11. Name a substance which can be used as an antiseptic as well as disinfectant.

Ans: About 0.2 percent solution of phenol can act as antiseptic whereas about 1.0 percent solution of the same can act as disinfectant.

12. What are the main constituents of dettol?

Ans: The main constituents of antiseptic dettol are chloroxylenol and terpenol.

13. What is tincture of iodine? What is its use?

Ans: Tincture of iodine is a dilute solution of iodine (2 to 3 percent) prepared in ethanol. It is a powerful antiseptic particularly in case of fresh wounds.

14. Why is use of aspartame restricted to cold foods and drinks?

Ans: Aspartame is a very good sweetener for foods and drinks. But its use is restricted to cold stuff only. In case these are hot, the sweetener may decompose and it may not be effective any more.

15. Name the sweetening agent used in the preparation of sweets for a diabetic patient.

Ans: Saccharine is the well known sweetening agent which is more than 550 times sweet as compared to sucrose (or sugar). It is commonly used in the preparation of sweets for diabetic patients. Actually, it is not a carbohydrate. Now better sweetening agents are also available.

16. What problem arises by using alitame as artificial sweetener?

Ans: Alitame is no doubt, a very potent sweetener. Its sweetening capacity is more than 2000 times as compared to ordinary cane sugar or sucrose. But sometimes, it becomes quite difficult to control the sweetness level in the food which is actually desired.

17. Why are detergents called soapless soaps?

Ans: Detergents are called soapless soaps because they resemble soaps in their cleansing action but they do not contain the usual chemical contents of soaps i.e., sodium or potassium salts of long chain fatty acids. In other words, we can say that they behave as soaps without being actually soaps.

18. What are biodegradable and non-biodegradable detergents? Give an example of each.

Ans: Detergents are non-biodegradable in the sense that they cannot be degraded or decomposed by the micro-organisms. They mix with water present in rivers, ponds, lakes etc. as such without getting decomposed and thus cause pollution problems. The biodegradable detergents are the ones which can be degraded. These are being synthesised by reducing the branching of the chain. Sodium *n*-dodecylbenzene sulphonate is a biodegradable detergent. Even soaps act as biodegradable detergents.

19. Why do soaps not work in hard water?

Ans: Soaps are water soluble sodium or potassium salts of higher fatty acids like palmitic acid ($C_{15}H_{31}COOH$), oleic acid ($C_{17}H_{33}COOH$) and stearic acid ($C_{17}H_{35}COOH$). Hard water contains certain calcium and magnesium salts which combine with soaps to form corresponding magnesium compounds. These being insoluble, get separated as curdy white precipitates resulting in wastage of soap.

20. Can you use soaps and synthetic detergents to check the hardness of water?

Ans: Soaps can be used to check hardness of water as they will form insoluble precipitates of calcium and magnesium salts on reacting with hard water. Since detergents do not form any precipitate they cannot check hardness of water.

SUMMARY OF CHEMISTRY IN EVERYDAY LIFE

Antacids:

- These are drugs used to treat hyper acidity.
- Example: NaHCO_3 , a mixture of $\text{Mg}(\text{OH})_2$ and $\text{Al}(\text{OH})_3$, Cimetidine (Tegamet) and ranitidine (Zantac)

Histamine:

- It is a potent vasodilator.
- It has many functions.
- It is responsible for the nasal congestion associated with common cold and allergic response to pollen

Antihistamine:

- Antihistamines are antiallergic drugs that inhibit the action of Histamine.
- Examples: brompheniramine (Dimetapp) and terfenadine (Seldane) act as antihistamines

Neurologically active drugs:

- These can affect the message transfer mechanism from nerve to receptor.
- These include tranquilizers and analgesics.

Tranquilizers:

- These are drugs used for the treatment of stress and mild or even severe mental diseases.
- These are neurologically active drugs.
- These relieve anxiety, stress and excitement by inducing a sense of well-being.
- These are present in sleeping pills.

Antidepressant:

- Drugs for reducing depression.
- E.g., Iproniazid and phenelzine

Mild tranquilizers:

- Suitable for relieving tension.
- E.g., chlordiazepoxide and meprobamate, equanil

Barbiturates:

- These are derivatives of barbituric acid.
- These are hypnotic (i.e., sleep producing) agents.
- E.g., veronal, amyta, nembutal, luminal and seconal

Note:- Valium and serotonin are also used as tranquilizers

Analgesics:

- Analgesics are used to reduce or abolish pain.
- These include narcotic and non-narcotic analgesics.

Non narcotic analgesics:

- Aspirin and paracetamol belongs to this class.
- These are non-addictive.

Aspirin

- Its chemical name is Acetylsalicylic acid
- It is a widely used non-narcotic analgesic and antipyretic drug.
- Aspirin inhibits the synthesis of Chemical prostaglandins which stimulate inflammation in the tissue and cause pain.
- It helps in reducing fever (antipyretic).
- It helps in relieving skeletal pain such as that due to arthritis, head ache, back ache etc.
- It helps in preventing platelet coagulation.
- Because of its anti blood clotting action, aspirin finds use in prevention of heart attacks

Paracetamol:

It is a general antipyretic and analgesic. Over dosage may lead to liver damage.

Narcotic analgesics:

- These are addictive in nature.
- Morphine, Heroin, Codeine etc belongs to this class.
- In medicinal doses, they relieve pain and produce sleep.
- These analgesics are chiefly used for the relief of postoperative pain, cardiac pain and pains of terminal cancer and in child birth.
- Morphine is obtained from opium poppy, so it is referred to as opiates.

Antimicrobials:

- These are chemical compounds which prevent the action of microbes
- These include antibacterial agents, antiviral agents (kills virus), antifungal agents, antiparasitic agents, antibiotics, antiseptics etc

Antibiotics:

- These are chemicals of less toxicity used to treat infections.
- Antibiotics are produced by microorganisms or by chemical synthesis.
- Antibiotics are capable to destroy or inhibit the growth of microorganisms (pathogens).
- Antibiotics may be bacteriostatic (static effect on bacteria) or bacteriocidal (cidal effect).
- Bacteriostatic antibiotics inhibit the growth of bacteria without killing them.
E.g., Chloramphenicol
- Bacteriocidal antibiotics inhibit the growth of bacteria by killing them.
E.g., Penicillin, Ofloxacin.

Note: The first antibiotic, Penicillin (found in Penicillium fungus) was discovered by Alexander Fleming. Ampicillin and Amoxycillin are synthetic modifications of penicillin. It is essential to test the patients for sensitivity (allergy) to penicillin before it is administered.

Classification of Antibiotics:

On the basis of their range, antibiotics can be grouped as: broad spectrum, narrow spectrum and limited spectrum antibiotics.

Broad spectrum:

- Effective against a wide range of gram positive and gram negative bacteria.
- E.g. Chloramphenicol, Amoxycillin, Ampicillin, ofloxacin etc.

Narrow spectrum:

- Effective against gram positive or gram negative bacteria
- E.g., Penicillin G.

Limited spectrum:

- Effective against a single bacterium

Antiseptics & disinfectants:

- These are chemicals which kill or prevent the growth of micro organisms.
- These are not ingested like antibiotics.
- These are used for sterilization purposes.

Antiseptics	Disinfectants
<ol style="list-style-type: none"> 1. These are applied to living tissues such as wounds, ulcers etc. 2. Examples: Dettol®, tincture of iodine, iodoform(for wounds), phenol(0.02%), furacine, soframycin, etc.... 	<ol style="list-style-type: none"> 1. These are used only on inanimate (nonliving) objects such as floors, drainage etc 2. Examples: Phenol (1%), non diluted Dettol® etc...