

**Answer all the questions:**

- 1) Which of the following particles having same kinetic energy would have the maximum de Broglie wavelength  
 a)  $\alpha$ -particle      b) proton      c)  $\beta$ -particle      d) neutron
- 2) The hybridization in  $SF_6$  molecule is  
 a)  $sp^3$       b)  $sp^3d^2$       c)  $sp^3d$       d)  $sp^3d^3$
- 3) Noble gases have \_\_\_\_\_ electron affinity  
 a) High      b) Low      c) Zero      d) Very low
- 4) The lightest gas which is non inflammable  
 a) He      b)  $H_2$       c)  $N_2$       d) Ar
- 5) Which of the following ions will give colourless aqueous solution?  
 a)  $Ni^{2+}$       b)  $Fe^{2+}$       c)  $Cu^{2+}$       d)  $Cu^+$
- 6) Silver obtained from silver coins is purified by fusion with  
 a)  $AgNO_3$       b)  $HNO_3$       c)  $H_2SO_4$       d) borax
- 7) \_\_\_\_\_ is used in gas lamp material  
 a)  $MnO_2$       b)  $CeO_2$       c)  $N_2O_5$       d)  $Fe_2O_3$
- 8) The common oxidation state of actinides is  
 a) +2      b) +3      c) +4      d) +6
- 9) An example of a chelating ligand is  
 a)  $NO_2^-$       b) chloro      c) bromo      d) en
- 10)  ${}_{92}U^{235}$  nucleus absorbs a neutron and disintegrates into  ${}_{54}Xe^{139}$ ,  ${}_{37}Sr^{94}$  and X. What will be the product X?  
 a) 3 neutrons      b) 2 neutrons      c)  $\alpha$  particle      d)  $\beta$  particles
- 11) Rutile is  
 a)  $TiO_2$       b)  $CH_2O$       c)  $MoS_2$       d) Ru
- 12) If  $\Delta G$  for a reaction is negative the change is  
 a) Spontaneous      b) Non spontaneous      c) Reversible      d) Equilibrium
- 13) The percentage efficiency of a heat engine that operates between  $127^\circ C$  and  $27^\circ C$  is  
 a) 20%      b) 50%      c) 100%      d) 25%
- 14) In the equilibrium  $N_2 + 3H_2 \rightleftharpoons 2NH_3$ , the maximum yield of  $NH_3$  will be obtained with the process having  
 a) Low Pressure and High Temperature      b) Low Pressure and Low Temperature  
 c) High Temperature and High Pressure      d) High Pressure and Low Temperature
- 15) The equilibrium constant for the reaction  $2A \rightleftharpoons B$  is  $25 \text{ mol}^{-1} \text{ dm}^3$  at 900 K. What is the equilibrium constant for the reaction  $B \rightleftharpoons 2A$  in  $\text{dm}^{-3} \text{ mol}$  at the same temperature?  
 a) 25      b) 625      c) 0.04      d) 0.4
- 16) For a reaction  $E_a = 0$  and  $K = 4.2 \times 10^5 \text{ sec}^{-1}$  at 300 K, the value of K at 310 K will be  
 a)  $4.2 \times 10^5 \text{ sec}^{-1}$       b)  $8.4 \times 10^5 \text{ sec}^{-1}$       c)  $7.4 \times 10^5 \text{ sec}^{-1}$       d) unpredictable
- 17) Fog is a colloidal solution of  
 a) gas in liquid      b) liquid in gas      c) gas in solid      d) solid in gas
- 18) Colloids are purified by  
 a) precipitation      b) coagulation      c) dialysis      d) filtration

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- 19) The decomposition of  $H_2O_2$  in the presence of colloidal platinum is
  - a) Positive catalysis
  - b) Negative catalysis
  - c) Auto catalysis
  - d) Induced catalysis
- 20) The pH of a solution containing 0.1 N NaOH solution is
  - a) 1
  - b)  $10^{-1}$
  - c) 13
  - d)  $10^{-13}$
- 21) A compound that gives positive iodoform test is
  - a) 1-pentanol
  - b) 2-pentanone
  - c) 3-pentanone
  - d) pentanol
- 22) According to Lewis concept of acids and bases, ethers are
  - a) Neutral
  - b) Acidic
  - c) Basic
  - d) Amphoteric
- 23) How many alcohol isomers are possible for the formula  $C_4H_{10}O$ 
  - a) 4
  - b) 2
  - c) 3
  - d) 7
- 24) The compound that does not undergo Cannizzaro reaction is
  - a) Formaldehyde
  - b) Acetaldehyde
  - c) Benzaldehyde
  - d) Trimethyl acetaldehyde
- 25) Among the following the strongest acid is
  - a)  $ClCH_2COOH$
  - b)  $Cl_3C-COOH$
  - c)  $CH_3COOH$
  - d)  $Cl_2CHCOOH$
- 26) The basic character of Amines is due to
  - a) Tetrahedral Structure
  - b) Presence of Nitrogen atom
  - c) Lone Pair of electrons on nitrogen atom
  - d) High electronegativity of hydrogen
- 27) Which one of the following is a secondary amine
  - a) Aniline
  - b) Diphenyl amine
  - c) Secondary butyl amine
  - d) Tertiary butyl amine
- 28) Which of the following compounds is called oil of mirbane
  - a) Aniline
  - b) Nitromethane
  - c) Benzene diazonium chloride
  - d) nitrobenzene
- 29) Identify the reducing sugar
  - a) Sucrose
  - b) Cellulose
  - c) Starch
  - d) Glucose
- 30) Cephalins are used in the process of
  - a) Metabolism
  - b) Organisation of the body
  - c) Blood purification
  - d) blood coagulation

**Part - II****15×3=45****Answer any fifteen questions.**

- 31) Why  $He_2$  is not formed?
- 32) Ionisation Energy of Ne is greater than that of F. Why?
- 33) What is Plumbo solvency?
- 34) HF cannot be stored in glass bottles. Why?
- 35) d-block elements exhibit variable oxidation states. Explain.
- 36) What is the action of gold with aqua regia?
- 37) The atomic masses of Li, He and proton are 7.01823 amu, 4.00387 amu and 1.00715 amu respectively. Calculate the energy evolved in the reaction,  ${}_3Li^7 + {}_1H^1 \rightarrow 2{}_2He^4 + \Delta E$ . (1 amu = 931 MeV)
- 38) What is Bragg's equations?
- 39) Calculate the change of entropy for the process, water (liq) to water (vapour, 373 K) involving  $\Delta H_{rap} = 40850 \text{ J mol}^{-1}$  at 373 K.
- 40) Define reaction quotient.
- 41) Explain Parallel reaction with an example.

- 42) Write Arrhenius equation.
- 43) What are promoters. Give an example.
- 44) State Ostwald's dilution law.
- 45) Differentiate between Racemic form and meso form.
- 46) Alcohols can not be used as solvents for grignard reagents. Why?
- 47) Explain Phthalein reaction.
- 48) What is Urotrophine? How is it prepared?
- 49) Write any 3 tests for Salicylic acids.
- 50) What is chloropicrin? How is it prepared? Give its use.
- 51) What are antiseptics?

**Part - III****7×5=35**

*Answer any seven questions choosing atleast two questions from each sections.*

**Section - A**

- 52) Explain the formation of O<sub>2</sub> molecule by using Molecular Orbital Theory.
- 53) How is silver extracted from its ore?
- 54) How are lanthanides extracted from monazite sand?
- 55) Explain coordination isomerism and ionisation isomerism.

**Section - B**

- 56) Write various statements of second law of thermodynamics.
- 57) Derive K<sub>C</sub> and K<sub>p</sub> for the decomposition of PCl<sub>5</sub>.
- 58) Write the characteristics of order of a reaction.
- 59) Calculate the emf of the cell Zn/Zn<sup>2+</sup> (0.001 M) || Ag<sup>+</sup> (0.1 M)/Ag  
The standard potential of Ag/Ag<sup>+</sup> half cell is 0.8 V and Zn/Zn<sup>2+</sup> is -0.76 V.

**Section - C**

- 60) Write any 3 methods of preparation of diethyl ether.
- 61) Write the mechanism for aldol condensation of acetaldehyde.
- 62) How will you convert lactic acid into
  - i) Pyruvic acid
  - ii) Lactyl chloride
  - iii) Lactide
- 63) Explain briefly on Rocket Propellents.

**Part - IV****4×10=40**

*Question number 70 is compulsory and answer any four from the remaining questions.*

- 64) a] How will you calculate electronegativity using Pauling Scale?  
b] How is fluorine isolated from fluorides by using Dennis method.
- 65) a] Explain the postulates of Valence Bond Theory.  
b] Differentiate between Chemical reactions and Nuclear reactions.
- 66) a] Explain Bragg's Spectrometer method.  
b] Explain Intermediate compound formation theory for Catalysis.

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- 67) a] Explain Quinonoid theory of Indicators.  
b] Derive Nernst equation.
- 68) a] Equatorial Cyclohexanol is more stable than axial cyclohexanol. Why?  
b] Account for the reducing nature of formic acid.
- 69) a] Explain (i) Gabriel phthalimide reaction and (ii) Carbylamine reaction  
b] Elucidate the structure of Glucose.
- 70) a] An organic compound (A) of molecular formula  $C_6H_6O$  gives violet colouration with neutral  $FeCl_3$ . (A) on treatment with  $NH_3$  in the presence of anhydrous  $ZnCl_2$  gives compound (B) ( $C_6H_7N$ ) which answers carbylamine test. (A) on treatment with nitration mixture gives yellow coloured compound (C). Identify A, B and C. Explain the reactions.
- b] An element (A) belonging to group number 11 and period number 4 is extracted from its pyrite ore. (A) reacts with oxygen at two different temperatures forming compounds (B) and (C). (A) also reacts with conc.  $HNO_3$  and forms (D) with the evolution of  $NO_2$ . Find (A), (B), (C) and (D). Explain the reactions.

**(OR)**

- c] An aromatic compound (A) of molecular formula  $C_7H_6O$  has the smell of bitter almonds. (A) reacts with  $Cl_2$  in the absence of catalyst to give (B) and in the presence of catalyst compound (A) reacts with  $Cl_2$  to give (C) Identify A, B and C. Explain the reactions.
- d] 0.1978 g of copper is deposited by a current of 0.2 ampere in 50 minutes. What is the electrochemical equivalent of copper?

-X-X-X-X-