

PART - A - MCQ

- (1) Calculate the osmotic pressure of 0.25 M urea solution at 27°C temp. ($R = 0.082 \text{ lit.at./mole K}$, $R = 1.987 \text{ K cal.}$)
 (A) 0.0615 atmosphere (B) 61.5 atmosphere (C) 6.15 atmospere (D) 0.615 atmospher
- (2) At certain temperature 1.6% solution of an unknown substance is isotonic with 2.4% solution of Urea. If both the solutions have the same solvent and both the solutions have same density 1 gm/cm^3 , what will be the molecular mass of unknown substance in gm/mol.
 [Mole. mass of urea = 60 gm/mol]
 (A) 40 (B) 90 (C) 80 (D) 30
- (3) What will be the normality of resulting solution obtained by mixing 4 mL 0.05 M $\text{H}_2\text{SO}_{4(aq)}$ solution and 6 mL 0.3 M $\text{H}_2\text{SO}_{4(aq)}$?
 (A) 0.175 N (B) 0.35 N (C) 0.4 N (D) 0.2 N
- (4) Mention percentage of Ag (Silver) in German silver alloy.
 (A) 0.0% (B) 20-30% (C) 10% (D) 40-50%
- (5) Which of the following aqueous solution has highest boiling point ?
 (A) 0.1 M $\text{K}_4[\text{Fe}(\text{CN})_6]$ (B) 0.1 M KNO_3 (C) 0.1 M urea (D) 0.1 M NH_4NO_3
- (6) Which of the following cell is concentration cell ?
 (A) $\text{Cu}_{(s)} \mid \text{Cu}_{(aq,1M)}^{2+} \parallel \text{Cu}_{(aq,1M)}^{2+} \mid \text{Cu}_{(s)}$
 (B) $\text{Zn}_{(s)} \mid \text{Zn}_{(aq,0.5M)}^{2+} \parallel \text{Cu}_{(aq,0.1M)}^{2+} \mid \text{Cu}_{(s)}$
 (C) $\text{Cu}_{(s)} \mid \text{Cu}_{(aq,0.5M)}^{2+} \parallel \text{Cu}_{(aq,0.5M)}^{2+} \mid \text{Cu}_{(s)}$
 (D) $^{\oplus}\text{Pt}_{(s)} \mid \text{H}_{2(g,1\text{bar})} \mid \text{HCl}_{(aq,0.002M)} \parallel \text{HCl}_{(aq,0.005M)} \mid \text{H}_{2(g,1\text{bar})} \mid \text{Pt}^{\oplus}$
- (7) If from AlCl_3 , AgNO_3 and MgSO_4 solution 1 mole electron is passed, then at what ratio of weight Al, Ag and Mg will deposit on electrode ?
 (A) 3 : 6 : 2 (B) 2 : 6 : 3 (C) 1 : 2 : 3 (D) 3 : 2 : 1
- (8) Resistance of conductor having unit meter length and 1 square meter cross sectional area is known as
 (A) Specific resistance (B) Conductivity (C) Specific conductivity (D) Molar conductivity
- (9) At 298 temperature, in Nernst equation 0.059 value is of :
 (A) $\frac{2.303RT}{F}$ (B) $\frac{RT}{F}$ (C) $\frac{RT}{2.303F}$ (D) $\frac{2.303R}{TF}$
- (10) Which substance is used as cathode in mercury cell ?
 (A) $\text{HgO} + \text{KOH}$ (B) $\text{ZnO} + \text{Pt}$ (C) $\text{HgO} + \text{C}$ (D) $\text{ZnO} + \text{NaOH}$
- (11) Mention the unit of K for zero order reaction.
 (A) $\text{mole litre}^{-1} \text{ second}^{-1}$ (B) second^{-1}

(C) $(\text{mole/litre})^{-1} \text{ second}^{-1}$

(D) $(\text{mole/litre})^{1-n} \text{ second}^{-1}$

(12) For any chemical reaction, value of slope of in $K \rightarrow \frac{1}{T}$ graph will be

(A) $-\frac{E_a}{2.303}$

(B) $-\frac{E_a}{R}$

(C) $-\frac{E_a}{2.303 R}$

(D) $-E_a$

(13) Which of the following relation is correct for zero order reaction ?

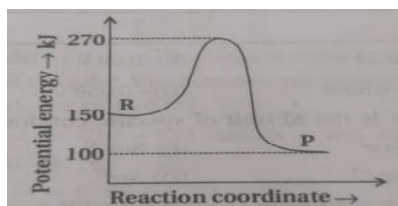
(A) $t_{\frac{1}{2}} \propto \frac{1}{[R]_0}$

(B) $t_{\frac{1}{2}} \propto [R]_0$

(C) $t_{\frac{1}{2}} \propto [R]_0^2$

(D) $t_{\frac{1}{2}}$ is independent if $[R]_0$

(14) For $R \rightarrow P$ reaction, following graph is given.



What will be enthalpy change for the given reaction ?

(A) -50 kJ

(B) 50 kJ

(C) 120 kJ

(D) 170 kJ

(15) The order of following reaction is $H_{2(g)} + Cl_{2(g)} \xrightarrow{h\nu} 2HCl_{(g)}$

(A) 2

(B) 1

(C) 1.5

(D) 0

(16) Which alloy does not contain Ni metal ?

(A) German silver

(B) Bronze

(C) Stainless steel

(D) Nichrome

(17) Which oxidation state is common for lanthanoid elements ?

(A) +4

(B) +3

(C) +2

(D) +5

(18) For complex, $[Fe(H_2O)_6]^{+3}$ which relation is true ?

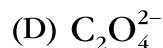
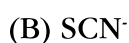
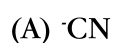
(A) $\Delta_0 < P$

(B) $\Delta_0 > P$

(C) $\Delta_0 \geq P$

(D) $\Delta_0 = P$

(19) Which is not an ambidentate ligand ?



(20) Charge on EDTA is

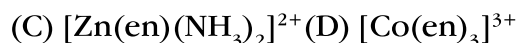
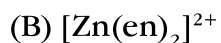
(A) -4

(B) -6

(C) 4

(D) 0

(21) Which is optical isomer from the following ?



(22) Magnetic momentum is calculated by the formula $\mu = \dots\dots\dots$

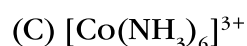
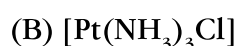
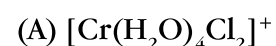
(A) $n(n+2)$

(B) $\sqrt{n(n+2)}$

(C) $\sqrt{n(n+1)}$

(D) $\sqrt{n(n-2)}$

(23) Indicate the complex ion which shows geometrical isomerism.



(24) The CFSE for octahedral $[CoCl_6]^{4-}$ is $18,000 \text{ cm}^{-1}$. The CFSE for tetrahedral $[CoCl_4]^{2-}$ will be.....

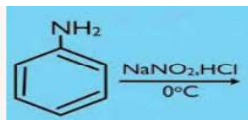
(A) $18,000 \text{ cm}^{-1}$

(B) $16,000 \text{ cm}^{-1}$

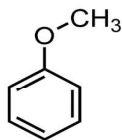
(C) $8,000 \text{ cm}^{-1}$

(D) $20,000 \text{ cm}^{-1}$

- (25) Which are the properties of transition elements ?
 (A) Paramagnetic (B) Diamagnetic (C) Corrosion resistance (D) None of these
- (26) Williamson synthesis is
 (A) S_N reaction (B) S_N1 reaction (C) S_N2 reaction (D) None of these
- (27) Which carbon - halogen bond has the lowest bond enthalpy ?
 (A) C - Cl (B) C - Br (C) C - F (D) C - I
- (28) Give the product of following reaction.

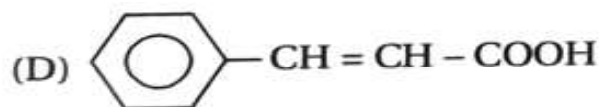
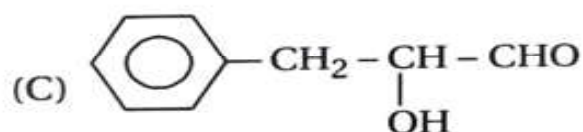
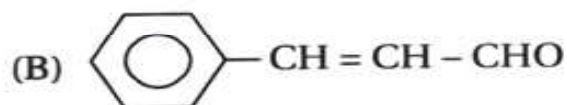
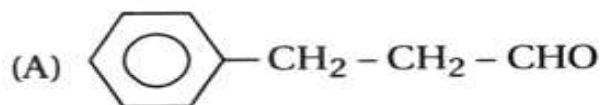


- (A) Nitrobenzene (B) Chlorobenzene (C) Benzene diazonium chloride (D) Benzene
- (29) The degree of halide in isobutyl chloride is :
 (A) 4° (B) 2° (C) 3° (D) 1°
- (30) How many Carbon, Hydrogen and Chlorine atoms are present in DDT ?
 (A) C = 13, H = 8, Cl = 3 (B) C = 14, H = 9, Cl = 5
 (C) C = 14, H = 8, Cl = 5 (D) C = 13, H = 9, Cl = 3
- (31) $C_2H_5 - O - C_2H_5 + 2HBr \xrightarrow[-H_2O]{\Delta} X$
 What is X ?
 (A) Bromo butane (B) Bromo ethane (C) Bromo ethene (D) Ethanol
- (32) $CH_3CH_2OH \xrightarrow[443\text{ K}]{\text{Excess conc. } H_2SO_4} X$. What is X ?
 (A) Ethene (B) Ethane (C) Dimethyl ether (D) Butene
- (33) What is the IUPAC name of

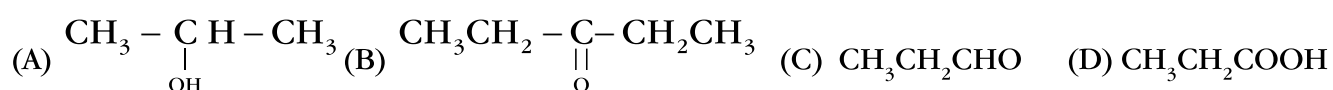


- (A) Methoxy benzene (B) Methyl benzene (C) Phenoxy methyl (D) Benzene methyether
- (34) In the following reaction

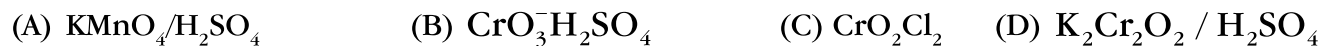
$$X \xrightarrow[\Delta]{\text{Zn dust}} Y \xrightarrow[\text{propene}]{\text{(Alkylation)}} Z$$
 What is X and Z ?
 (A) X = Benzene, Z = Cumene (B) X = Phenol, Z = Benzene
 (C) X = Phenol, Z = Cumene (D) X = Benzene, Z = Phenol
- (35) Which of the following has highest value of pK_a ?
 (A) m-nitro phenol (B) p-nitrophenol (C) phenol (D) p-cresol
- (36) What will be the main product in the following reaction ?



(37) Which of the following compound gives halo form test ?



(38) Which of the following oxidising agents is used for preparation of benzaldehyde from methyl benzene ?



(39) Which reagent is used in Gattermann reaction ?



(40) Which is the best reagent for gaining good product of aldehyde from primary alcohol ?



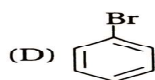
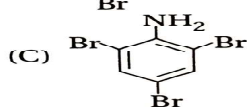
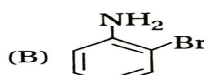
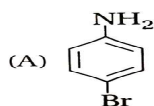
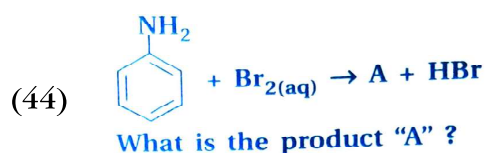
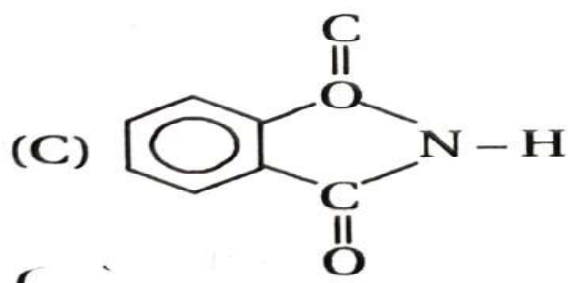
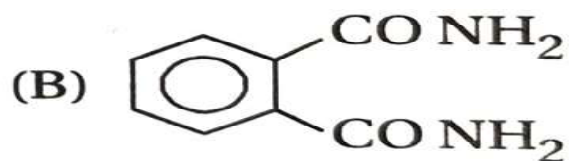
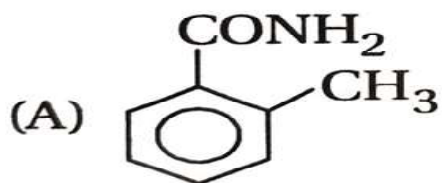
(41) Which of the following compound is known as alkyl carbyl amine ?



(42) Which compound will give Hoffmann bromamide degradation reaction ?



(43) Which of the following is the structure of Phthalimide ?



- (45) How many percent of m-nitro aniline is obtained when nitration of aniline is carried out with conc. HNO₃ and conc. H₂SO₄ at 288 K ?
 (A) 51 % (B) 37 % (C) 47 % (D) 2 %
- (46) What is the chemical name of vitamin B₁ ?
 (A) Riboflavin (B) Pyridoxine (C) Thiamine (D) α-Tocopherol
- (47) The deficiency of which vitamin causes scurvy ?
 (A) Thiamine (B) Riboflavin (C) Ascorbic acid (D) Pyridoxine
- (48) Deficiency of which vitamin increases blood clotting time ?
 (A) Vitamin E (B) Vitamin K (C) Vitamin D (D) Vitamin B₁₂
- (49) acts as Bio catalyst
 (A) Dinucleotides (B) Carbohydrate (C) Hormones (D) Enzymes
- (50) Which of the following is not a polysaccharide ?
 (A) Starch (B) Cellulose (C) Glycogen (D) Surcose

SECTION :- A

[16]

○ **Answer the following questions [Any eight] : [2 marks each]**

- [1] A solution of CuSO_4 is electrolysed for 8 minutes 45 seconds with a current of 5 amperes. What is the mass of copper deposited at the cathode ?
- [2] Derive $t_{1/2}$ equation for zero order reaction.
- [3] How to manufacture KMnO_4 in industry ?
- [4] Write any four reactions for lanthanoids ?
- [5] Any limitation for valence bond theory ?
- [6] Homoleptic & Heteroleptic complexes.
- [7] Prove primary alcohol in glucose.
- [8] What is a peptide bond ? Explain by one example of a dipeptide ?
- [9] Finkelstein reaction explain ?
- [10] Write reactions of aromatic & aliphatic primary amines with nitrous acid.
- [11] Write only reactions of phenol with dil HNO_3 & con. HNO_3 for nitration ?
- [12] Rosenmund reaction explain.

SECTION :- B

[18]

○ **Answer the following questions [Any six] : [3 marks each]**

- [13] The vapour pressure of pure benzene at a certain temperature is 0.850 bar. A non-volatile, non-electrolyte solid weighing 0.5 g when added to 39.0 g of benzene (molar mass 78 g mol^{-1}). Vapour pressure of the solution, then, is 0.845 bar. What is the molar mass of the solid substance ?
- [14] Write a note on standard hydrogen electrode ?
- [15] The rate of the chemical reaction doubles for an increase of 10 K in absolute temperature from 298 K. Calculate E_a ($R = 8.314 \text{ J/K mol}$)
- [16] Explain lanthanide contraction ?
- [17] β -elimination of haloalkane. Explain ?
- [18] Explain reactions of formaldehyde, acetaldehyde, & acetone with CH_3MgBr & after that hydrolysis ?
- [19] Write method of preparation for hydrocarbons by decarboxylation of carboxylic acids ?
- [20] Reaction of amine with aryl sulphonyl chloride ?
- [21] Ethanoic acid to methanamine.

SECTION :- C

[16]

○ Answer the following questions [Any four] : [4 marks each]

- [22] Henry's law constant for the molality of methane in benzene at 298 K is 4.27×10^5 . Calculate the solubility of methane in benzene at 298 K under 760 mm Hg.
- [23] (A) The rate constant for a first order reaction is 60 s^{-1} . How much time will it take to reduce the initial concentration of the reactant to its $\frac{1}{16}$ value ?
- (B) The rate constant for the decomposition of hydrocarbons is $2.418 \times 10^{-5} \text{ s}^{-1}$ at 546 K. If the energy of activation is 179.9 kJ/mol, what will be the value of pre-exponential factor.
- [24] Co-ordination no 4 & 6 for it give geometrical isomerism with example.
- [25] (i) A solution of $\text{Ni}(\text{NO}_3)_2$ is electrolysed between platinum electrodes using a current of 5 amperes for 20 minutes. What mass of Ni is deposited at the cathode ?
- (ii) Calculate equilibrium constant for the following reaction :
- $$\text{Ni}_{(s)} + \text{Cu}_{(aq)}^{2+} \rightarrow \text{Cu}_{(s)} + \text{Ni}_{(aq)}^{2+}$$
- $$[E_{\text{Ni}^{2+}|\text{Ni}}^{\ominus} = -0.25 \text{ V and } E_{\text{Cu}^{2+}|\text{Cu}}^{\ominus} = -0.34 \text{ V}]$$
- [26] Explain reaction of formation of Hemiacetal, acetal & Ketal by adding Alcohol into Aldehyde & keton.
- [27] (i) Lucas test for 1°, 2° & 3° alcohol.
- (ii) Salicylic acid to aspirin by esterification.