

PHYSICS

- 1) If wavelengths of visible rays, microwaves and X-rays are λ_v , λ_m and λ_x respectively. Then out of the following which relation is correct one?

(A) $\lambda_m > \lambda_v > \lambda_x$

(B) $\lambda_v > \lambda_m > \lambda_x$

(C) $\lambda_m < \lambda_v < \lambda_x$

(D) $\lambda_v = \lambda_m = \lambda_x$

- 2) An object is placed at 10 cm in front of a concave mirror of focal length 15 cm. The image formed will be _____.

(A) virtual, erect and magnified

(B) real, inverted and diminished

(C) virtual, erect and diminished

(D) real, inverted and magnified

- 3) If in compound microscope objective with focal length 1.0 cm, eyepiece with focal length 2.0 cm, tube length of 20 cm and near point for an observer is 25 cm. Then value of magnification of compound microscope will be _____.

(A) 2.5

(B) 250

(C) 25

(D) 2500

(Space for Rough Work)

- 4) Two thin convex lenses of focal length f_1 and f_2 are placed in contact with each other. The equivalent power of the lens combination is _____.

(A) $f_1 \times f_2$

(B) $\frac{f_1 + f_2}{f_1 \times f_2}$

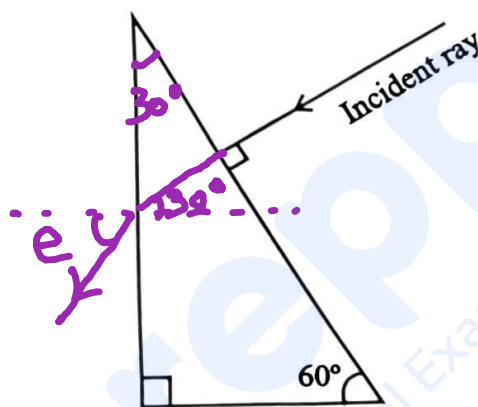
(C) $f_1 + f_2$

(D) $\frac{f_1 \times f_2}{f_1 + f_2}$

- 5) (A) For general students :

Find the value of angle of emergence for a emergent ray from the prism in the figure given below.

(refractive index of material of prism is $\sqrt{3}$ and refractive index of air is 1)



(A) 60°

(B) 45°

(C) 30°

(D) 90°

- 5) (B) For blind students only :

If the refractive index of a prism with small prism angle is 1.6 and angle of minimum deviation is 2.4° . Then prism angle of prism is _____.

(A) 4°

(B) 3°

(C) 2°

(D) 6°

(Space for Rough Work)

- 6) According to Huygens principle the phase difference between oscillations of any two particles on a same wave front is _____ rad.
- (A) $\frac{\pi}{2}$ (B) π
(C) 0 (D) 2π
- 7) In a Young's double slit experiment, the slits are separated by 0.2 mm and screen is placed 2.0 m away. The distance between the central bright fringe and the third bright fringe is measured to be 1.5 cm. Determine the wavelength of light used in the experiment.
- (A) 4200 Å (B) 5000 Å
(C) 4600 Å (D) 6000 Å
- 8) In photoelectric effect the graph of stopping potential (V_0) versus frequency (ν) is a straight line. The slope of this graph is _____.
- (A) h (B) $\frac{e}{h}$
(C) $\frac{V_0}{e}$ (D) $\frac{h}{e}$
- 9) The photoelectric cut-off voltage in a certain experiment is 1.5 V. The maximum kinetic energy of photoelectrons emitted will be _____.
- (A) 1.5 J (B) 1.5 eV
(C) 2.4 eV (D) 2.4 J

(Space for Rough Work)

10) The relation between the wavelength of electromagnetic radiation (λ) and the de Broglie wavelength of its quantum (photon) (λ') is ____

(A) $\lambda' > \lambda$

(B) $\lambda' = \lambda$

(C) $\lambda' < \lambda$

(D) $\lambda' = \frac{\lambda}{2}$

11) Out of the following physical quantities which quantity has the same unit as that of Planck's constant?

(A) moment of force

(B) power

(C) angular momentum

(D) moment of inertia

12) The ground state energy of hydrogen atom is -13.6 eV. What is the ratio of kinetic energy and potential energy of the electron of this state?

(A) $-\frac{1}{2}$

(B) $\frac{1}{2}$

(C) -1

(D) -2

13) The radius of the innermost electron orbit of a hydrogen atom is $5.3 \times 10^{-11} \text{ m}$. What is the radius of the $n = 3$ orbit?

(A) $1.59 \times 10^{-10} \text{ m}$

(B) $1.06 \times 10^{-10} \text{ m}$

(C) $1.43 \times 10^{-9} \text{ m}$

(D) $4.77 \times 10^{-10} \text{ m}$

(Space for Rough Work)

14) The energy equivalent of 1.0 kg of substance is _____.

(A) 9×10^{13} J

(B) 3×10^{13} J

(C) 9×10^{16} J

(D) 9×10^{18} J

15) The nuclear radius of hydrogen atom will be _____.

(A) 1.5 fm

(B) 1.2 fm

(C) 2.3 fm

(D) 3.2 fm

16) The nuclides of $^{197}_{79}\text{Au}$ and $^{198}_{80}\text{Hg}$ are called _____ of each other.

(A) isotopes

(B) isotones

(C) isobars

(D) isomers

17) When a forward bias is applied to a p-n junction. It _____

(A) raises the potential barrier

(B) lowers the potential barrier

(C) reduces the majority carrier current to zero

(D) none of the above

(Space for Rough Work)

- 18) If the output frequency of a full-wave rectifier is 100 Hz, then input frequency will be ____.
- (A) 50 Hz (B) 200 Hz
(C) 100 Hz (D) 25 Hz
- 19) Out of the following impurities, which impurity is not a trivalent?
- (A) Aluminium (Al) (B) Antimony (Sb)
(C) Indium (In) (D) Boron (B)
- 20) A proton and a α -particle are placed in uniform electric field. Accelerations produced in them are a_p and a_α respectively. Then a_p/a_α will be ____
- (A) 1 : 2 (B) 4 : 1
(C) 2 : 1 (D) 1 : 4
- 21) If charge q is placed on one of the vertex of a cube, then total electric flux passing through the cube is ____.
- (A) $\frac{q}{\epsilon_0}$ (B) $\frac{q}{8\epsilon_0}$
(C) $\frac{q}{4\epsilon_0}$ (D) $\frac{q}{24\epsilon_0}$

(Space for Rough Work)

- 22) Two infinitely long thin straight parallel wires are kept a perpendicular distance of $2R$ having uniform linear charge densities $+\lambda$ and $-\lambda$ respectively. The magnitude of electric field at a mid point between two wires will be _____.

(A) $\frac{\lambda}{\pi\epsilon_0 R}$

(B) $\frac{\lambda}{2\pi\epsilon_0 R}$

(C) $\frac{2\lambda}{\pi\epsilon_0 R}$

(D) $\frac{\lambda}{4\pi\epsilon_0 R}$

- 23) A parallel plate capacitor with air between the plates has a capacitance of 1.0 pF. If the distance between the plates is made doubled and space between them is filled with dielectric substance, the capacitance becomes 2.0 pF. Then the value of dielectric constant of dielectric substance is _____.

(A) 1.5

(B) 3.0

(C) 2.0

(D) 4.0

- 24) The total charge on a uniformly charged spherical shell having radius R is Q . Then electric potential at a distance $r = \frac{R}{2}$ from the centre of the shell _____.

(A) $\frac{Q}{4\pi\epsilon_0 R}$

(B) $\frac{Q}{\pi\epsilon_0 R}$

(C) $\frac{Q}{2\pi\epsilon_0 R}$

(D) $\frac{Q}{8\pi\epsilon_0 R}$

(Space for Rough Work)

- 25) An electric dipole of dipole moment $\vec{P}$ is placed parallel to the uniform electric field of intensity $\vec{E}$. On rotating it through angle of 90° from this situation, the amount of work done is _____.

(A) ~~2PE~~

(B)

$$\frac{PE}{2}$$

(C) PE

(D) Zero

- 26) A metal rod of length 10 cm and a rectangular cross section of $1\text{ cm} \times \frac{1}{2}\text{ cm}$ is connected to a battery across opposite faces. The resistance will be _____.

(A) Maximum when the battery is connected across $1\text{ cm} \times \frac{1}{2}\text{ cm}$ faces.

(B) Maximum when the battery is connected across $10\text{ cm} \times \frac{1}{2}\text{ cm}$ faces.

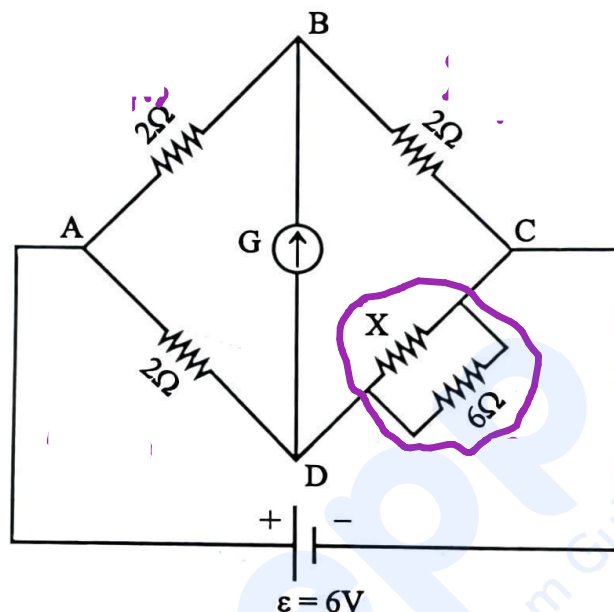
(C) Maximum when the battery is connected across $10\text{ cm} \times 1\text{ cm}$ faces.

(D) Same irrespective of the three faces.

(Space for Rough Work)

- 27) The emf of a storage battery of a car is 6.0 V. If internal resistance of the battery is 0.2Ω , then maximum power drawn from the battery is _____ W.
- (A) 2.4 (B) 180
(C) 15 (D) Zero

- 28) (A) For general students :



The Wheatstone bridge is in balanced condition in the given figure, then $X =$ _____.

- (A) 12Ω (B) 4Ω
(C) 6Ω (D) 3Ω
- 28) (B) For blind students only :
- On increasing the temperature of a conductor, for free electrons increases.
- (A) drift velocity (B) mobility
(C) relaxation time (D) thermal speed

(Space for Rough Work)

- 29) In the moving coil galvanometer, if number of turns in the coil is doubled, then the current sensitivity _____ and the voltage sensitivity _____.
(A) remains unchanged, will be doubled
(B) will be halved, will be doubled
(C) will be doubled, remains unchanged
(D) will be halved, remains unchanged
- 30) A horizontal overhead power line carries a current of 90A in east to west direction. What is the magnitude and direction of the magnetic field due to the current 1.5m above the line?
(A) 1.2×10^{-5} T, towards north
(B) $1.2\pi \times 10^{-5}$ T, towards north
(C) 1.2×10^{-5} T, towards south
(D) $1.2\pi \times 10^{-5}$ T, towards south
- 31) A charged particle having charge q is moving perpendicularly to the uniform magnetic field with linear speed v on a circular path of radius R . The periodic time of revolution of a particle _____.
(A) depends on v but does not depend on R .
(B) do not depend on v and R both.
(C) depends on R but does not depend on v .
(D) depend on v and R both.

(Space for Rough Work)

- 32) A closely wound solenoid of 800 turns and area of cross section $2.5 \times 10^{-4} \text{ m}^2$ carries a current of 3.0A. The magnetic moment associated with it is

(A) 60 JT^{-1}

(B) 0.60 JT^{-1}

(C) 6 JT^{-1}

(D) 0.06 JT^{-1}

- 33) The magnetic susceptibility χ for superconductors is .

(A) Zero

(B) 1

(C) 0.1

(D) -1

- 34) Two concentric circular coils, one of small radius r_1 and the other of large radius r_2 , such that $r_1 \ll r_2$ are placed co-axially with centres coinciding. The mutual inductance M of the arrangement is proportional to

(A) $\frac{r_1}{r_2^2}$

(B) $\frac{r_2}{r_1^2}$

(C) $\frac{r_1^2}{r_2}$

(D) $\frac{r_2^2}{r_1}$

(Space for Rough Work)

35) The dimensional formula of $\frac{B^2}{2\mu_0}$ is _____.

(A) $M^1 L^{-1} T^{-2}$

(B) $M^0 L^{-1} T^{-2}$

(C) $M^1 L^2 T^{-2}$

(D) $M^1 L^1 T^{-2}$

36) A coil has N turns and current passes through it is I ampere then we obtain L Henry of self inductance. Now if current is made doubled then new self inductance will be _____ H.

(A) $\frac{L}{2}$

(B) $2L$

(C) L

(D) $4L$

37) A $15.0 \mu F$ capacitor is connected to a 220 V, 50 Hz source. Then capacitive reactance of the circuit is _____ Ω .

(A) 2.12

(B) 212

(C) 21.2

(D) 2120

(Space for Rough Work)

38) A charged $30 \mu\text{F}$ capacitor is connected to a 27 mH inductor. What is the angular frequency of free oscillations of the circuit?

(A) $11 \frac{\text{rad}}{\text{s}}$

(B) $1100 \frac{\text{rad}}{\text{s}}$

(C) $110 \frac{\text{rad}}{\text{s}}$

(D) $11000 \frac{\text{rad}}{\text{s}}$

39) In an ideal step up transformer, the number of turns in primary coil and secondary coil are 100 and 200 respectively. If output current is found to be 5A , then input current will be _____.

(A) 2.5 A

(B) 100 A

(C) 5.0 A

(D) 10 A

40) A charged particle oscillates about its mean equilibrium position with a frequency of $8 \times 10^9 \text{ Hz}$. What is the frequency of the electromagnetic waves produced by the oscillator?

(A) $4 \times 10^9 \text{ Hz}$

(B) $1.6 \times 10^{10} \text{ Hz}$

(C) $8 \times 10^9 \text{ Hz}$

(D) $2 \times 10^9 \text{ Hz}$

(Space for Rough Work)

CHEMISTRY

41) How much electricity in terms of Faraday is required to produce 40.0 g of Al from molten Al_2O_3 ?

(A) 4.44 F

(B) 4.14 F

(C) 8.88 F

(D) 8.14 F

42) According to Arrhenius equation in graph of $\log k \rightarrow \frac{1}{T}$, the slope will be _____.

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

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

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

(D) $\frac{E_a}{2.303R}$

43) Rate constant $k = 4.5 \times 10^{-7} \text{ L}^2 \text{ mol}^{-2} \text{ s}^{-1}$, then what is the order of reaction?

(A) 0

(B) 3

(C) 2

(D) 4

(Space for Rough Work)

- 44) When the value of rate constant (k) is 2.0 min^{-1} , then what will be half time of reaction ($t_{1/2}$) in seconds?

(A) 34.4

(B) 24.6

(C) 30.2

(D) 20.8

- 45) The rate of the chemical reaction doubles for an increase of 10 K in absolute temperature from 298 K. What will be the activation energy?

(A) $52.897 \text{ kJ mol}^{-1}$

(B) $51.897 \text{ kJ mol}^{-1}$

(C) $42.897 \text{ kJ mol}^{-1}$

(D) $41.897 \text{ kJ mol}^{-1}$

- 46) Which of the following metal does not liberate H_2 gas by reacting with HCl?

(A) Co

(B) Cu

(C) Ni

(D) Zn

(Space for Rough Work)

47) Which of the following ion has highest magnetic moment value?

(A) Cr^{2+}

(B) Ni^{2+}

(C) Cu^{2+}

(D) Co^{2+}

48) Which catalyst is used in Wacker process?

(A) CdCl_2

(B) ZnCl_2

(C) PbCl_2

(D) PdCl_2

49) What is the true IUPAC name of $\text{Hg}[\text{Co}(\text{SCN})_4]$ coordination compound?

(A) Mercury (I) tetrathiocyanato - S - cobaltate (III)

(B) Mercury (II) tetrathiocyanato - N - cobaltate (II)

(C) Mercury (I) tetrathiocyanato - S - cobalt (III)

(D) Mercury (I) tetrathiocyanato - N - cobalt (III)

(Space for Rough Work)

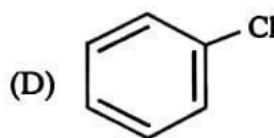
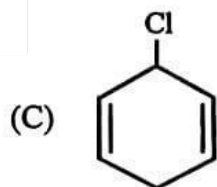
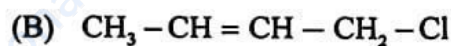
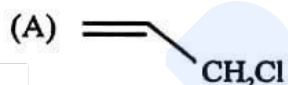
50) Which of the following statement is not applicable to Valence Bond Theory?

- (A) It does not give quantitative interpretation of magnetic data.
- (B) It does not distinguish between weak and strong ligands.
- (C) It explains the colour exhibited by coordination compounds.
- (D) It does not make exact predictions regarding the structures of 4-coordinate complexes.

51) In potassium trioxalatoaluminate (III), what are the primary and secondary valency of central atom respectively?

- (A) 3, 6
- (B) 3, 3
- (C) 6, 3
- (D) 6, 6

52) Which of the following compound is not allylic chloride?

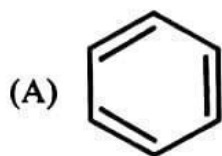
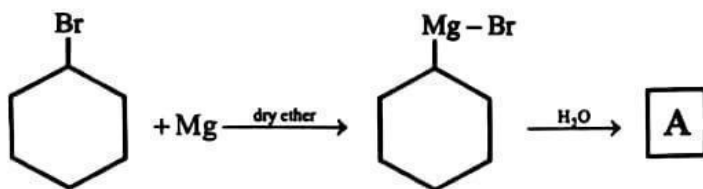


(Space for Rough Work)

53) A mixture of an alkyl halide and aryl halide with sodium in dry ether. What is the name of reaction?

- (A) Fittig reaction (B) Finkelstein reaction
(C) Wurtz - Fittig reaction (D) Wurtz reaction

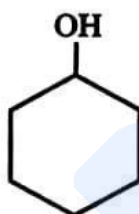
54) Identify 'A' in the following reaction.



(B)



(C)



(D)



55) By which reaction Freon-12 is manufactured from tetrachloromethane?

- (A) Finkelstein reaction (B) Grignard reaction
(C) Stephen reaction (D) Swarts reaction

(Space for Rough Work)

56) Which of the following compound has chiral carbon atom?

(A) 2-chlorobutane

(B) 2, 2-dichlorobutane

(C) 1-chlorobutane

(D) 2-chloro 2-methylpropane

57) Which of the following reagent is not use in qualitative and quantitative chemical analysis?

(A) EDTA

(B) Cupron

(C) DMG

(D) D-penicillamine

58) What is the IUPAC name of methyl isopropyl ether?

(A) 2-methoxypropane

(B) 1-methoxypropane

(C) Ethoxyethane

(D) Methyl propyl ether

59) Which of the following compound gives only primary alcohol on reaction with Grignard Reagent (RMgX)?

(A) $\text{CH}_3\text{CH}_2\text{CHO}$

(B) HCHO

(C) $\text{CH}_3\text{CH}_2\text{COCH}_3$

(D) $\text{C}_6\text{H}_5\text{COCH}_3$

60) Which product is not obtained when $\text{CH}_3\text{CH}_2\text{OH}$ react with H_2SO_4 .

(A) $\text{CH}_2=\text{CH}_2$

(B) $\text{CH}\equiv\text{CH}$

(C) $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$

(D) $\text{C}_2\text{H}_5\cdot\text{HSO}_4$

(Space for Rough Work)

61) Which reaction is used to prepare 2-hydroxy benzaldehyde from phenol?

(A) Reimer-Tiemann reaction

(B) Kolbe's reaction

(C) Williamson synthesis

(D) Etard's reaction

62) What is the IUPAC name of the Mesityl oxide?

(A) 3-methylpent-4-en-2-one

(B) 4,4-dimethylbut-3-en-2-one

(C) 4-methylpent-3-en-2-one

(D) 1-methylpent-2-en-4-one

63) $\text{CH}_3\text{COOH} \xrightarrow{\text{LiAlH}_4} \text{X} \xrightarrow{\text{PCl}_5} \text{Y} \xrightarrow[\text{KOH}]{\text{Alcoholic}} \text{Z}$. Find product 'Z', in above reaction.

(A) Ethyne

(B) Ethanol

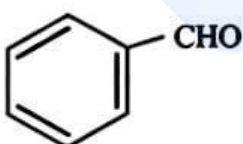
(C) Ethene

(D) Ethanal

64) Which of the following aldehyde does not give Cannizzaro reaction?

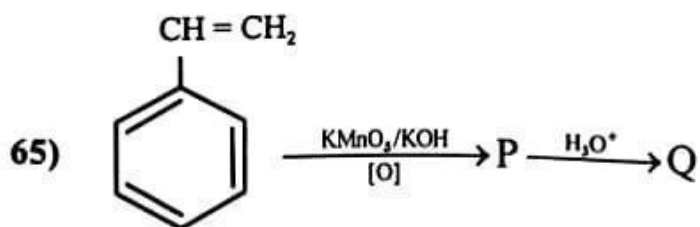
(A) HCHO

(B) CCl_3CHO

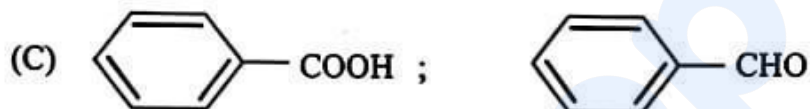
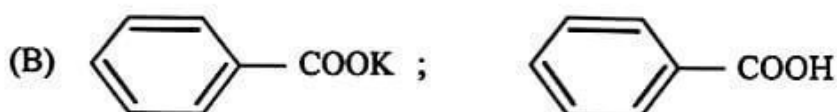
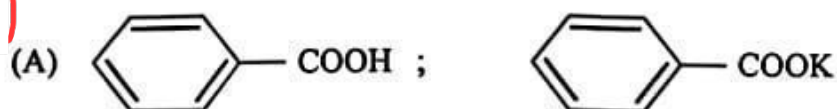
(C) 

(D) $\text{CH}_3\text{CH}_2\text{CHO}$

(Space for Rough Work)



Identify P and Q in above reaction respectively.



66) Which of the following compound is used for production of Nylon-6, 6?

(A) Adipic acid

(B) Succinic acid

(C) Malonic acid

(D) Glutaric acid

(Space for Rough Work)

67) Which of the following statement is true for the Benzenediazonium fluoroborate?

- (A) When it heated with NaNO_2 in presence of Cu, it gives aniline.
- (B) On heating, it does not decompose to yield fluorobenzene.
- (C) It is water insoluble and stable at room temperature.
- (D) It is water soluble and unstable at room temperature.

68) What will be the name of product on ammonolysis of benzyl chloride and reaction of amine so formed with two moles of CH_3Cl ?

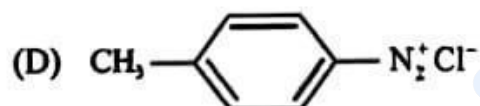
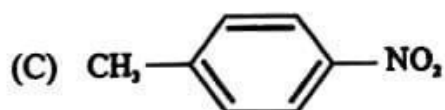
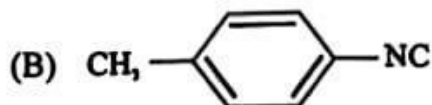
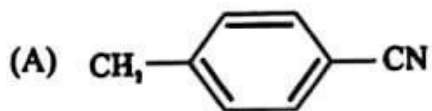
- (A) N, N-dimethylphenylmethanamine
- (B) N, N-diphenylmethanamine
- (C) N, N-diphenylethanamine
- (D) N-methyl, N-phenylmethanamine

69) What is the correct order of basic strength in substituted amine in aqueous solution?

- (A) $\text{NH}_3 > \text{C}_2\text{H}_5\text{NH}_2 > (\text{C}_2\text{H}_5)_3\text{N} > (\text{C}_2\text{H}_5)_2\text{NH}$
- (B) $(\text{C}_2\text{H}_5)_3\text{N} > (\text{C}_2\text{H}_5)_2\text{NH} > \text{C}_2\text{H}_5\text{NH}_2 > \text{NH}_3$
- (C) $(\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N} > \text{C}_2\text{H}_5\text{NH}_2 > \text{NH}_3$
- (D) $\text{NH}_3 > \text{C}_2\text{H}_5\text{NH}_2 > (\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N}$

(Space for Rough Work)

70) Which product is formed on carbylamine reaction with 4-methylaniline?



71) Which of the following is not polysaccharide?

(A) Ribose

(B) Starch

(C) Gum

(D) Glycogen

(Space for Rough Work)

72) Which of the following disease occur due to deficiency of pyridoxine?

(A) Cheilosis

(B) Beri beri

(C) Scurvy

(D) Convulsions

73) Which of the following hormone is responsible for development of secondary female characteristics and participates in the control of menstrual cycle?

(A) Glucagon

(B) Testosterone

(C) Progesterone

(D) Estradiol

74) The molarity of solution containing 15 g of NaOH in 900 ml solution will be _____.

(A) 0.42 M

(B) 0.042 M

(C) 4.2 M

(D) 42.0 M

(Space for Rough Work)

75) For the ideal solutions, which of the following condition is suitable?

(A) $\Delta_{\text{mix}} H \neq 0; \Delta_{\text{mix}} V \neq 0$

(B) $\Delta_{\text{mix}}^* H = 0; \Delta_{\text{mix}} V = 0$

(C) $\Delta_{\text{mix}}^* H \neq 0; \Delta_{\text{mix}} V = 0$

(D) $\Delta_{\text{mix}} H = 0; \Delta_{\text{mix}} V \neq 0$

76) Calculate the mass of ascorbic acid ($\text{C}_6\text{H}_8\text{O}_6$) to be dissolved in 75 g of acetic acid to lower its melting point by 1.5°C . [$K_f = 3.9 \text{ K kg mol}^{-1}$, $H = 1$, $C = 12$, $O = 16 \text{ amu}$]

(A) 5.770 g

(B) 4.077 g

(C) 5.077 g

(D) 4.770 g

77) Which of the following solutions will show negative deviation from Raoult's law?

(A) Chloroform + Acetone

(B) Benzene + Toluene

(C) Ethanol + Acetone

(D) Bromoethane + Chloroethane

(Space for Rough Work)

78) Which of the following metal is behave as weakest reducing agent?

$$E^\circ_{(\text{Li}^+/\text{Li})} = -3.05 \text{ V}, \quad E^\circ_{(\text{Au}^{3+}/\text{Au})} = 1.40 \text{ V}$$

$$E^\circ_{(\text{Ag}^+/\text{Ag})} = 0.80 \text{ V}, \quad E^\circ_{(\text{Mg}^{2+}/\text{Mg})} = -2.36 \text{ V}$$

(A) Li

(B) Ag

(C) Au

(D) Mg

79) Which of the following statement is not true for fuel cell?

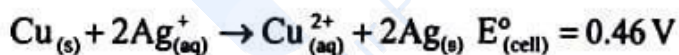
(A) Converting fuel energy directly into electrical energy.

(B) Water produced during reaction, can not be used for drinking

(C) The reaction of hydrogen with oxygen to form water.

(D) They are pollution free.

80) Calculate the equilibrium constant of the following reaction :



(A) 3.92×10^{14}

(B) 4.92×10^{14}

(C) 4.92×10^{14}

(D) 3.92×10^{15}

(Space for Rough Work)