

PHYSICS

1. The distance between two slits is 3 mm & screen is placed at 2 m distance. When blue-green light of wavelength 500 nm is used then distance between two fringes will be?

(A) 0.43 mm (B) 0.33 mm
(C) 0.5 mm (D) 0.4 mm

Answer (B)

Sol. Distance = $\lambda \frac{D}{d} = \frac{500 \times 10^{-9} \times 2}{3 \times 10^{-3}} \text{ m}$
= 0.33 mm

2. For what distance is ray optics a good approximation when the aperture is 4 mm wide & the wavelength is 500 nm?

(A) 32 m (B) 18 m
(C) 8 m (D) 6 m

Answer (A)

Sol. $z_r = \frac{a^2}{\lambda} = \frac{16 \times 10^{-6}}{500 \times 10^5} = 32 \text{ m}$

3. Resolving power of microscope is

(A) $\frac{2\lambda}{1.22 n \sin \beta}$ (B) $\frac{1.22 n}{2\lambda \sin \beta}$
(C) $\frac{1.22 n \sin \beta}{2 n \lambda}$ (D) $\frac{1.22 \lambda}{2 n \sin \beta}$

Answer (None of above)

Sol. $\frac{2n \sin \beta}{1.22 \lambda}$

4. How much is the De-Broglie wavelength for an electron accelerated by an 100 V potential difference?

(A) 123 nm (B) 0.123 nm
(C) 12.3 nm (D) 0.123 cm

Answer (B)

Sol. $d = \frac{12.27}{\sqrt{V}} \text{ \AA}$

5. The threshold frequency of cesium is 5.16×10^{14} Hz. Then its work function is eV.

(A) 2.14 (B) 1.14
(C) 1.12 (D) 4.12

Answer (A)

Sol. $\phi = hf$

6. The nucleus of gold is about times heavier than an α -particle.

(A) 50 (B) 10
(C) 100 (D) 200

Answer (A)

Sol. $\frac{M_{Au}}{M_{\alpha}} = \frac{197}{4} = 50$

7. The ground state energy of hydrogen atom is -13.6 eV. What is the kinetic energy of electron in this state?

(A) -13.6 eV (B) +13.6 eV
(C) -27.2 eV (D) +27.2 eV

Answer (B)

Sol. $|TE| = |KE|$

8. The minimum wavelength for Balmer series is

.....
(A) $\frac{9}{R}$ (B) $\frac{4}{R}$
(C) $\frac{36}{5R}$ (D) $\frac{R}{4}$

Answer (B)

Sol. $\frac{1}{\gamma} = R \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) = R \left(\frac{1}{2^2} - \frac{1}{\infty^2} \right)$

9. Calculate the energy equivalent of 1g of substance

(A) $9 \times 10^{13} \text{ J}$ (B) $4 \times 10^{12} \text{ J}$
(C) $6 \times 10^{11} \text{ J}$ (D) $7 \times 10^{12} \text{ J}$

Answer (A)

Sol. $E = mc^2$

10. In which process neutron is converted into proton?

(A) β^+ decay (B) α - decay
(C) β^- decay (D) γ decay

Answer (C)

Sol. $n \rightarrow p + e^-$

11. The Forbidden gap between conduction band & valance band is maximum for

(A) Insulator (B) Metal
(C) Semiconductor (D) Superconductor

Answer (A)

12. The below truth table is for which gate :

Input		Output
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

- (A) AND (B) OR
(C) NOR (D) NAND

Answer (D)

13. For a pure Si crystal has 5×10^{28} atom m^{-3} . It is doped by 1 PPM concentration of pentavalent As. Calculate the number of electron & holes.

(Given that $n_i = 1.5 \times 10^{16} \text{ m}^{-3}$)

- (A) $5.4 \times 10^9 \text{ m}^{-3}$ (B) $4.5 \times 10^9 \text{ m}^{-3}$
(C) $4.5 \times 10^{-9} \text{ m}^{-3}$ (D) $5.4 \times 10^{-9} \text{ m}^{-3}$

Answer (B)

Sol. Each As atom will provide 1 free electron total no. of free electrons

$$n_e = \frac{1}{10^6} \times 5 \times 10^{28} = 5 \times 10^{22}$$

$$n_e n_h = n_i^2$$

$$\Rightarrow n_h = \frac{n_i^2}{n_e}$$

14. In diode, increasing the forward voltage, the thickness of depletion layer

- (A) Does not change (B) Increases
(C) Decreases (D) Cannot be decided

Answer (C)

15. If charge q is placed on one of the vertex of a cube. Then flux passing through any one surface of cube is

- (A) $\frac{q}{\epsilon_0}$ (B) $\frac{q}{6\epsilon_0}$
(C) $\frac{q}{24\epsilon_0}$ (D) None of these

Answer (C)

Sol. $\phi_{\text{total}} = \frac{Q}{8\epsilon_0}$

$$\phi_{\text{one surface}} = \frac{\phi_{\text{total}}}{3} = \frac{Q}{24\epsilon_0}$$

16. Two point electric charges $+10^{-8} \text{ C}$ and -10^{-8} C are placed 0.1 m apart. Find the magnitude of Total Electric field at the center of the line joining the two charges.

- (A) $3.6 \times 10^4 \text{ NC}^{-1}$ (B) $7.2 \times 10^4 \text{ NC}^{-1}$
(C) Zero (D) $12.96 \times 10^4 \text{ NC}^{-1}$

Answer (B)

Sol. Both charges will give their respective field in same direction

$$\therefore E = \frac{2kq}{(d/2)^2}$$

$$q = 10^{-8} \text{ C}$$

$$d = 0.1 \text{ m}$$

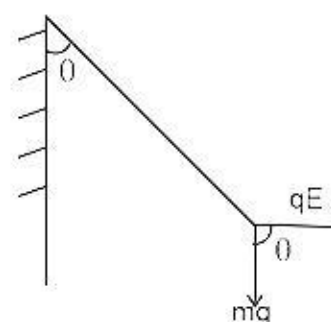
17. The charge density of uniformly charged infinite plane is σ . A simple pendulum is suspended vertically downward near it. Charge q_0 is placed on metallic bob. If the angle made by the string is θ with vertical direction then

- (A) $\sigma \propto \frac{\tan \theta}{q_0}$ (B) $\sigma \propto \frac{\cot \theta}{q_0}$
(C) $\sigma \propto \tan \theta$ (D) $\sigma \propto \frac{q_0}{\tan \theta}$

Answer (A)

Sol. $E = \frac{\sigma}{2\epsilon_0}$

$$\tan \theta = \frac{qE}{mg} = \frac{q\sigma}{2\epsilon_0 mg}$$



18. The dimensional formula of Polarization P is

- (A) $\text{M}^1 \text{L}^{-2} \text{A}^1 \text{T}^1$
(B) $\text{L}^{-2} \text{A}^{-1} \text{T}^{-1}$
(C) $\text{L}^2 \text{A}^{-1} \text{T}^{-1}$
(D) $\text{L}^{-2} \text{A}^1 \text{T}^1$

Answer (D)

Sol. Polarization = $\frac{\text{dipole moment}}{\text{volume}}$

$$[P] = \frac{[AT][L]}{L^3}$$

19. If relative permittivity for any substance is 80 then its electric susceptibility is

(A) 7×10^{-10} (B) 7×10^{-9}
(C) 79 (D) 81×10^{-10}

Answer (C)

Sol. $\epsilon_r = 1 + \chi_e \Rightarrow \chi_e = 80 - 1 = 79$

20. 2 μF capacitor is connected with 50 V supply & 3 μF capacitor is connected with 100 V supply. Now after removing battery if two plates of same type of charges are placed to form new capacitor then potential difference is V.

(A) 333 (B) 80
(C) 200 (D) 75

Answer (B)

Sol. $V_c = \frac{C_1 V_1 + C_2 V_2}{C_1 + C_2} = \frac{2 \times 50 + 3 \times 100}{2 + 3} = 80 \text{ volts}$

21. The emf of a car battery is 12 V. If internal resistance of battery is 0.4Ω , then maximum power drawn from battery is W.

(A) 360
(B) 30
(C) 4.8
(D) Zero

Answer (A)

Sol. $P = \frac{V^2}{r}$

22. The resistance of the platinum wire of a platinum resistance thermometer at an ice point is 5Ω & at steam point is 5.23Ω . When the thermometer is inserted in a hot bath, the resistance of a platinum wire is 5.795Ω . Calculate the temperature of the bath.

(A) 365.65°C
(B) 354.56°C
(C) 345.65°C
(D) 245.65°C

Answer (C)

Sol. $R = R_0 (1 + \alpha \Delta T)$

$$t = \frac{Rt - R_0}{R_{100} - R_0} \times 100 = \frac{5.795 - 5}{5.23 - 5} \times 100$$

23. One electric cell (having emf of 2V & internal resistance of 0.1Ω) and other electric cell (having emf of 4V & internal resistance of 0.2Ω) are connected in parallel to each other. Then its equivalent emf will be V

(A) 2.57
(B) 2.67
(C) 1.33
(D) 0.38

Answer (B)

Sol. $E_{\text{net}} = \frac{\frac{E_1}{r_1} + \frac{E_2}{r_2}}{\frac{1}{r_1} + \frac{1}{r_2}}$

24. The source of magnetic field is & source of electric field is

(A) scalar, scalar
(B) vector, vector
(C) scalar, vector
(D) vector, scalar

Answer (D)

25. A coil having 10 Am^2 magnetic moment is placed in a vertical plane & is free to rotate about its horizontal axis coincides with its diameter. A uniform magnetic field of 2T in the horizontal direction exists such that initially the axis of the coil is in the direction of the field. The coil rotates through an angle of 90° under the influence of magnetic field. The moment of inertia of coil is 0.1 kg m^2 . What will be its angular speed?

(A) 10 rad/s
(B) 5 rad/s
(C) 20 rad/s
(D) 40 rad/s

Answer (C)

Sol. $\Delta U + \Delta K = 0$

$$\frac{1}{2} I \omega^2 = MB$$

$$\omega = \sqrt{\frac{2MB}{I}}$$

26. A current is passing through a very long wire of radius 5 cm. Then magnetic field at a distance of 2 cm insider from its curved surface is $\times 10^{-5}$ T.

- (A) 6.7×10^{-5}
 (B) 2.4×10^{-5}
 (C) 2.4×10^5
 (D) 2.4

Answer (D)

$$\text{Sol. } B = \frac{\mu_0 2I}{4\pi R^2} r = \frac{10^{-7} \times 2 \times 10}{25 \times 10^{-4}} \times 3 \times 10^{-2}$$

27. In India, declination at Delhi is

- (A) $0^\circ 41'$ W
 (B) $0^\circ 41'$ E
 (C) $0^\circ 58'$ E
 (D) $0^\circ 58'$ W

Answer (B)

28. The relative permeability in a core of a solenoid is 400. The windings of a solenoid are insulated from the core and carry a current of 2 A. If the number of turns is 1000 per meter. Then magnetic intensity inside the core of solenoid is A/m

- (A) 2×10^3
 (B) 2.5×10^{-3}
 (C) 2.5×10^3
 (D) 2×10^{-3}

Answer (A)

$$\text{Sol. } H = ni = 1000 \times 2$$

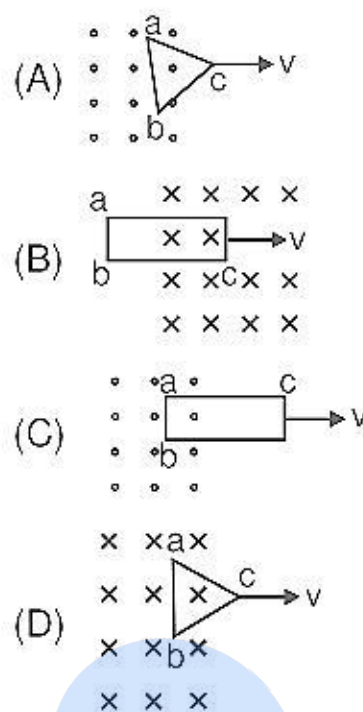
29. The coil having 1000 turns & Area of 0.10 m^2 rotates at half a revolution per second & it is placed in a uniform magnetic field of 0.01 T perpendicular to the axis of rotation of coil. Then max. emf voltage generated in coil is V

- (A) 5.0
 (B) 0.5
 (C) 3.14
 (D) 0.314

Answer (C)

$$\begin{aligned} \text{Sol. } E_{\max} &= NAB\omega \\ &= 1000 \times 0.01 \times 0.1 \times \pi \end{aligned}$$

30. Out of the following given loops in which loop, the direction of induced current is from $a \rightarrow c \rightarrow b$.



Answer (D)

Sol. Using Lenz's law, current will be in clockwise direction.

31. Which is not the unit of Inductance?

- (A) V.s.A^{-1}
 (B) WbA^{-1}
 (C) H
 (D) Wb.s.A^{-1}

Answer (D)

$$\text{Sol. } \phi = Li$$

$$\therefore \text{Unit} = \text{Wb.A}^{-1}$$

$$e = -L \frac{di}{dt} \Rightarrow \text{unit of } L \Rightarrow \text{V.s.A}^{-1}$$

32. A bulb of 100 W rating is connected with 220 V supply. The resistance of bulb is

- (A) $484 \Omega \text{m}^{-1}$
 (B) 484Ω
 (C) 2.2Ω
 (D) $2.2 \times 10^{-3} \Omega \text{m}^{-1}$

Answer (B)

$$\text{Sol. } R = \frac{V^2}{P} = \frac{220 \times 220}{100} = 484 \Omega$$

33. A sine voltage having maximum value of 283 V & frequency of 50 Hz is applied to LCR series connection where $R = 3 \Omega$, $L = 25.48 \text{ mH}$ & $C = 796 \mu\text{F}$. Then impedance is at resonance condition.

- (A) 5Ω
- (B) 15Ω
- (C) 3Ω
- (D) 4Ω

Answer (A)

$$\text{Sol. } Z = \sqrt{R^2 + (X_C - X_L)^2}$$

$$R = 3 \Omega$$

$$X_C = \frac{1}{\omega C} = \frac{1}{2\pi f C} = 4 \Omega$$

$$X_L = \omega L = 2\pi f L = 8 \Omega$$

34. What is correct for real transformer?

- (A) $P_i > P_o$
- (B) $P_i < P_o$
- (C) $P_i = P_o$
- (D) All are correct

Answer (A)

$$\text{Sol. } n = \frac{P_{out}}{P_{in}} < 1$$

35. The source of displacement current is

- (A) Changing Electric Field
- (B) Static Electric Field
- (C) Changing Magnetic Field
- (D) Static Magnetic Field

Answer (A)

36. The range of wavelength for Ultraviolet is from to

- (A) 0.1 m to 1 mm
- (B) 700 nm to 400 nm
- (C) 1mm to 700 nm
- (D) 400 nm to 1.0 nm

Answer (D)

37. The earth rotates on its axis takes 24 hours to complete one revolution. How much time it takes at sun from earth to have shift of 1° ?

- (A) 4 hrs.
- (B) 4 min.
- (C) 4 sec.
- (D) 24 hrs.

Answer (C)

$$\text{Sol. } \Delta t = \frac{24 \times 60}{360} = 4 \text{ second}$$

38. For glass lens $f = +50 \text{ cm}$. Then power of lens is

- (A) -2 D
- (B) $+0.02 \text{ D}$
- (C) $+2 \text{ D}$
- (D) -0.02 D

Answer (C)

$$\text{Sol. } P = \frac{100}{f_{(\text{cm})}} = +2 \text{ D}$$

39. A lens ($n = 1.5$) is placed in a liquid. To make it disappear, the value of n of liquid should be

- (A) $n < 1.5$
- (B) $n = 1.5$
- (C) $n > 1.5$
- (D) Any n

Answer (B)

Sol. Lens should be kept in liquid having same refractive index as that of lens.

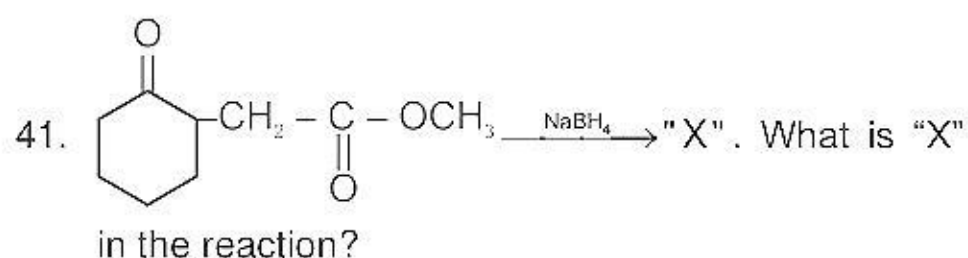
40. What is the type of nature of image formed for an object placed on axis of concave mirror between pole & centre?

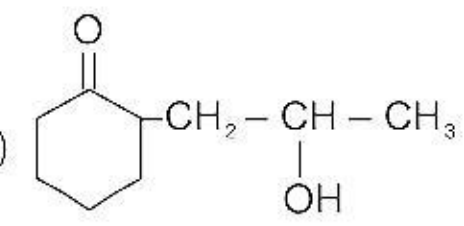
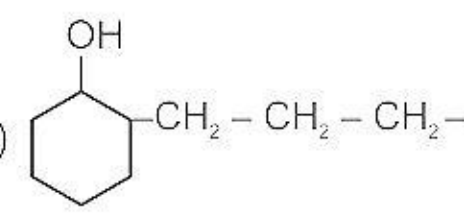
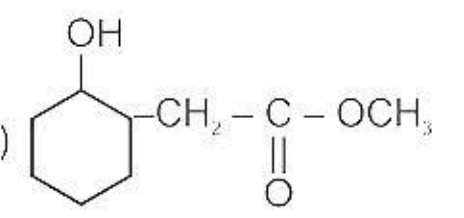
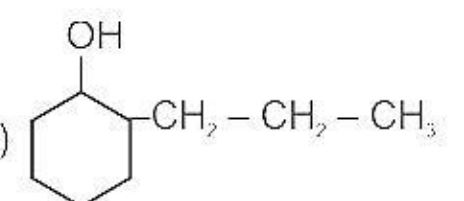
- (A) Virtual, erect & diminished
- (B) Real, inverted & diminished
- (C) Real, inverted & magnified
- (D) Virtual, erect & magnified

Answer (C, D)

Sol. C & D both possible

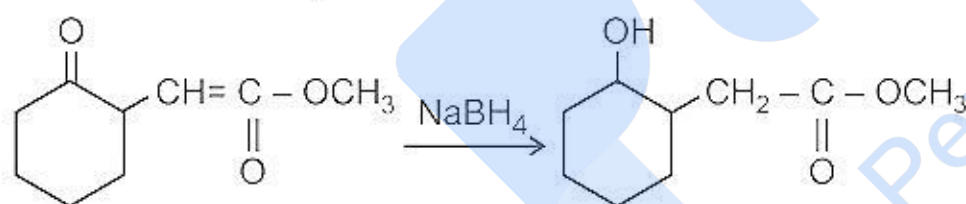
CHEMISTRY



- (A) 
 (B) 
 (C) 
 (D) 

Answer (C)

Sol. As we know NaBH_4 is a weak reducing agent and reduce only aldehyde, ketone into alcohol and doesn't reduce carboxylic acid derivative into alcohol except acid halide.



42. Which of the following has highest boiling point?

- (A) Ethoxy ethane
 (B) n-Butane
 (C) Pentanal
 (D) Pentan-1-ol

Answer (D)

Sol. N - Butane = -1°C

Pentanal = 103°C

Ethoxy ethane = 34.6°C

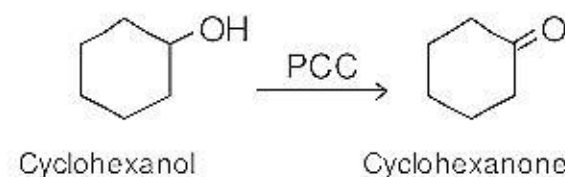
Pentanol = 138°C

43. Which reagent is required to convert cyclohexanol to cyclohexanone?

- (A) $\text{O}_3 / \text{H}_2\text{O} - \text{Zn dust}$ (B) PCC
 (C) Anhydrous CrO_3 (D) DIBAL - H

Answer (B)

Sol.



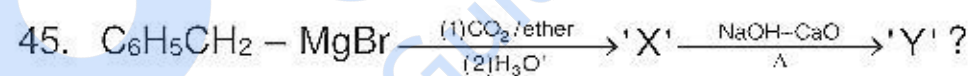
44. Which of the following acid has highest pKa value?

- (A) $\text{O}_2\text{NCH}_2\text{COOH}$ (B) NCCH_2COOH
 (C) FCH_2COOH (D) $\text{C}_6\text{H}_5\text{CH}_2\text{COOH}$

Answer (D)

Sol. Acidic strength $\propto \frac{1}{\text{pKa}} \propto$ stability of conjugate base.

$\text{C}_6\text{H}_5\text{CH}_2\text{COOH}$ is weakest acid among all so has highest pKa value.

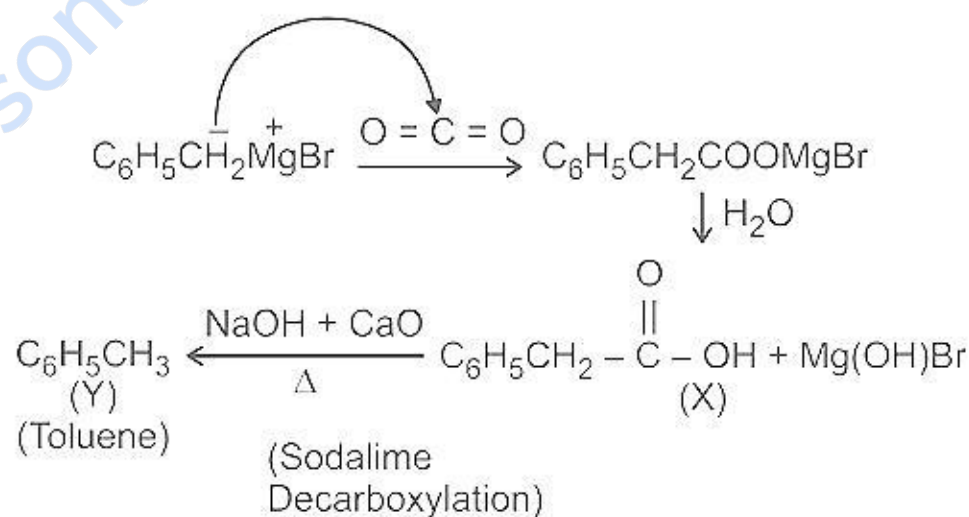


What is the final product in this reaction?

- (A) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_3$ (B) $\text{C}_6\text{H}_5\text{CH}_3$
 (C) C_6H_6 (D) $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$

Answer (B)

Sol.



46. Which of the following compound has least Basic strength?

- (A) $\text{C}_6\text{H}_5\text{NH}_2$
 (B) NH_3
 (C) $(\text{C}_2\text{H}_5)_2\text{NH}$
 (D) $\text{C}_2\text{H}_5\text{NH}_2$

Answer (A)

Sol. Basic strength $\propto$ Lone pair Availability. In Aniline ($C_6H_5NH_2$) as the lone pair is in conjugation so it is least basic among all given.

47. The source of nitrogen in Gabriel synthesis of amines is

- (A) NaN_3 (B) KCN
(C) $C_6H_4(CO)_2N^-K^+$ (D) $NaNO_2$

Answer (C)

Sol.

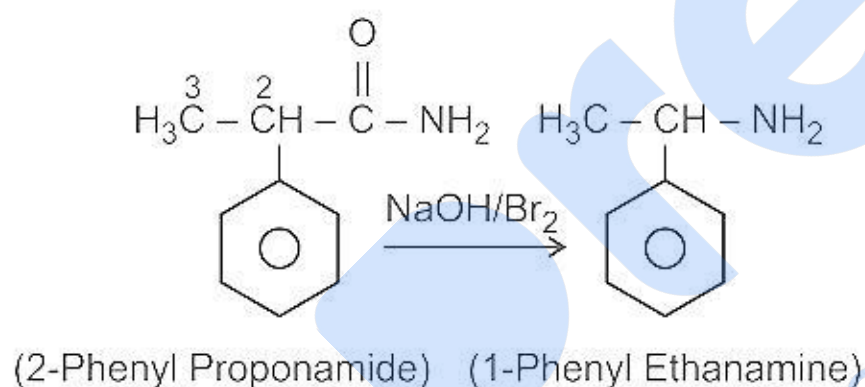


48. The best reagent for converting 2-phenyl propanamide into 1-Phenyl ethanamine is

- (A) $NaBH_4$ (B) H_2/Pt
(C) $LiAlH_4$ (D) $NaOH/Br_2$

Answer (D)

Sol.



49. Giving 'T' Symbol for true statement and 'F' symbol for false statement, select correct option.

- (i) Most naturally occurring amino acids have L-configuration
(ii) β -D ribose sugar is present in RNA
(iii) Amylose is water insoluble component made up of α -D-(+) glucose units
(iv) All monosaccharides are non-reducing sugars.
- (A) TTFF (B) TFTF
(C) TTFT (D) FTTF

Answer (A)

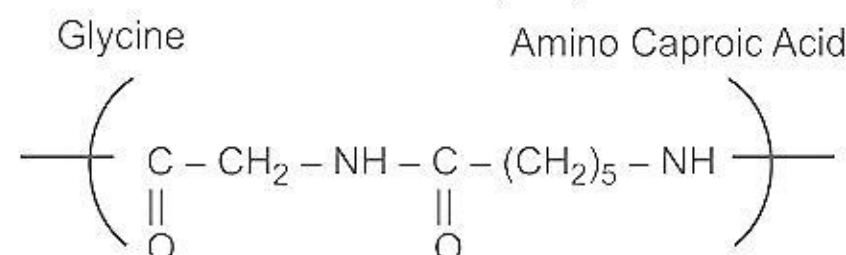
Sol. Fact

50. Which amino acids are used in the preparation of Nylon-2-Nylon 6?

- (A) Phenol and Formaldehyde
(B) Phthalic acid and glycine
(C) Amino Caproic acid and glycine
(D) Ethylene glycol and Phthalic acid

Answer (C)

Sol. $nH_2N-CH_2-COOH + nNH_2-(CH_2)_5-COOH$



51. Zeiglar Natta catalyst is a mixture of.....

- (A) $TiCl_4$ & $(C_2H_5)_2Al$ (B) $TiCl_2$ & $(C_2H_5)_3Al$
(C) $TiCl_3$ & $(C_2H_5)_4Al$ (D) $(C_2H_5)_3Al$ & $TiCl_4$

Answer (D)

Sol. Zeigler Natta catalyst = $Al(C_2H_5)_3$ & $TiCl_4$

52. Which antihistamine drug is used to prevent acidity?

- (A) Phenelzine (B) Cimetidine
(C) Morphine (D) Equanil

Answer (B)

Sol. Fact

53. Name the sweetner which is a trichloro derivative of Sucrose?

- (A) Sucralose (B) Saccharin
(C) Alitame (D) Aspartame

Answer (A)

Sol. Sucralose is a trichloro derivative of sucrose.

54. The deficiency of which vitamin causes scurvy?

- (A) Riboflavin
(B) Thiamine
(C) Ascorbic acid
(D) Pyridoxine

Answer (C)

Sol. The deficiency of Ascorbic acid (Vitamin C) causes scurvy.

- (A) Amorphous solids are anisotropic in nature
 (B) Silicon doped with Arsenic impurity is a p-type semiconductor
 (C) In the unit cell of rhombic Sulphur, the axial distance are equal and the value of each axial angle is 90°
 (D) In MnO , all the domains are aligned in the same direction

Answer (None is correct)

Sol. Fact

56. What are the fractions of Fe^{2+} and Fe^{3+} in $\text{Fe}_{0.93}\text{O}$ respectively?
 (A) 0.85, 0.15
 (B) 0.93, 0.07
 (C) 0.75, 0.25
 (D) 0.80, 0.20

Answer (A)

Sol. Let $\text{Fe}^{2+} = x$ & $\text{Fe}^{3+} = (0.93-x)$

By charge conservation,

$$+2(x) + 3(0.93-x) - 2(1) = 0$$

$$2x + 2.79 - 3x - 2 = 0$$

$$-x + 0.79 = 0 \Rightarrow x = 0.79$$

$$\text{Fraction of } \text{Fe}^{2+} = \frac{0.79}{0.93} = 0.85$$

$$\text{Fraction of } \text{Fe}^{3+} = (1-0.85) = 0.15$$

57. Maximum amount of a solid solute that can be dissolved in a specified amount of a given liquid solvent does not depend upon
 (i) Temperature
 (ii) Nature of Solute
 (iii) Pressure
 (iv) Nature of Solvent
 (A) (ii)
 (B) (i) & (iii)
 (C) (ii) & (iv)
 (D) (iii)

Answer (D)

Sol. As the solute is solid so solubility does not depend on pressure in this case.

having mole fraction 0.25 is

- (A) 16.67 m (B) 18.52 m
 (C) 33.33 m (D) 9.26 m

Answer (B)

Sol. $n_{\text{solute}} = 0.25$; $n_{\text{H}_2\text{O}} = 0.75$

$$\text{Mass of } \text{H}_2\text{O} = 0.75 \times 18 = 13.5\text{g}$$

$$\text{Molality} = \frac{n_{\text{solute}}}{\text{mass of } \text{H}_2\text{O}(\text{kg})}$$

$$= \frac{0.25}{13.5} \times 1000 = 18.51\text{m}$$

59. The osmotic pressure of 0.5 M aqueous solution of CH_3COOH having 2pH at temperature T is
 (A) 1.02 RT (B) 0.051 RT
 (C) 0.51 RT (D) 0.102 RT

Answer (C)

Sol. $\text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COO}(\text{ag}) + \text{H}^+$

$$t = 0, 0.5 \text{ M}$$

$$0.5(1-\alpha) \quad 0.5\alpha \quad 0.5\alpha$$

$$i = \frac{0.5(1-\alpha) + 0.5\alpha + 0.5\alpha}{0.5}$$

$$i = (1+\alpha)$$

$$\text{pH} = 2 \Rightarrow 0.5\alpha = 10^{-2}$$

$$\alpha = \frac{0.01}{0.5} = 0.02$$

$$\pi = icRT$$

$$\pi = (1.02)(0.5) \text{ RT}$$

$$\pi = 0.51 \text{ RT}$$

60. On the basis of the given following electrode potential, which one is the strongest reducing agent?
 $E^\circ_{\text{Cr}_2\text{O}_7^{2-}|\text{Cr}^{3+}} = 1.33 \text{ V}$
 $E^\circ_{\text{MnO}_4^-|\text{Mn}^{2+}} = 1.51 \text{ V}$
 $E^\circ_{\text{Br}_2|\text{Br}^-} = 1.09 \text{ V}$
 $E^\circ_{\text{Zn}^{2+}|\text{Zn}} = -0.76 \text{ V}$
 (A) Mn^{2+} (B) Cr^{3+}
 (C) Br^- (D) Zn

Answer (D)

Sol. Reducing power $\propto$ SOP value $\propto \frac{1}{\text{SRP Value}}$

61. For which of the following electrolytes the graph of Λ_m against $\sqrt{C}$ gives negative slope.

- (A) Sodium acetate
(B) Acetic acid
(C) Ammonium hydroxide
(D) Water

Answer (A)

Sol. λ_m v/s $\sqrt{C}$ is a straight line with negative slope for strong electrolyte sodium Acetate.

62. One electrolysis of aqueous solution of a halide of a metal 'M' by passing 1.5 ampere current for 10 minutes deposits 0.2938 g of metal. If the atomic mass of the metal is 63 gm/mole, then what will be the formula of the metal halide?

- (A) MCl_3 (B) MCl_2
(C) MCl (D) MCl_4

Answer (B)

Sol. From Faraday's 1st Law of electrolysis, $m = Zit$.

$$0.2938 = \frac{63}{n \times 96500} \times 1.5 \times 10 \times 60$$

$$n = \frac{63 \times 1.5 \times 600}{96500 \times 0.2938}$$

$$n = 2$$

$$\therefore \text{Formula} = \text{MCl}_2$$

63. In the presence of a catalyst, the heat evolved or absorbed during the reaction

- (A) Increases
(B) Decreases
(C) May decrease or increases
(D) Remains unchanged

Answer (D)

Sol. Remains unchanged

64. Which of the following graph has intercept equal to zero?

- (A) $\log \frac{[R]_0}{[R]} \rightarrow t$ (B) $\log [R] \rightarrow t$
(C) $\log K \rightarrow \frac{1}{T}$ (D) $[R] \rightarrow t$

Answer (A)

Sol. From the integrated Rate equation.

65. Time required to decompose SO_2Cl_2 to half of its initial amount is 40 minutes. If the decomposition is a first order reaction, what will be the rate constant of the reaction?

- (A) $2.88 \times 10^{-2} \text{ s}^{-1}$ (B) $1.73 \times 10^{-2} \text{ s}^{-1}$
(C) $2.88 \times 10^{-4} \text{ s}^{-1}$ (D) $1.73 \times 10^{-4} \text{ s}^{-1}$

Answer (C)

Sol. For 1st order Reaction,

$$K = \frac{\ln 2}{t_{1/2}} = \frac{\ln 2}{40 \times 60} = 2.88 \times 10^{-4} \text{ s}^{-1}$$

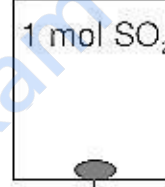
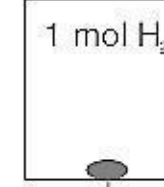
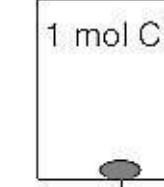
66. Which of the following is a reversible sol?

- (A) As_2S_3 sol (B) Gelatin sol
(C) $\text{Fe}(\text{OH})_3$ sol (D) Gold sol

Answer (B)

Sol. Gelatin sol is a reversible sol.

67. From the figure, in which of the following vessel, the pressure of the gas is the highest. [Temperature and volume of the gases are the same in each vessel].

P	Q	R	S
1 mol He	1 mol SO_2	1 mol H_2	1 mol CH_4
			
1g Charcoal	1g Charcoal	1g Charcoal	1g Charcoal

(A) P (B) Q
(C) R (D) S

Answer (A)

Sol. As He gas will not adsorb so the pressure of the gas will be highest in P.

68. Which soluble complex is formed in the leaching process of Gold?

- (A) $[\text{Au}(\text{CN})_4]^{2-}$ (B) $[\text{Au}(\text{OH})_2]^-$
(C) $[\text{Au}(\text{OH})_4]^{2-}$ (D) $[\text{Au}(\text{CN})_2]^-$

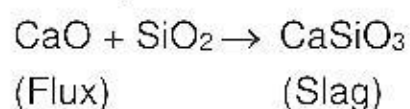
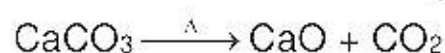
Answer (D)

Sol. $[\text{Au}(\text{CN})_2]^-$ is formed in the leaching process of Gold.

69. Which of the following slag is formed during the extraction of iron in the blast furnace?

- (A) FeCO_3 (B) CaCO_3
(C) CaSiO_3 (D) FeSiO_3

Answer (C)



70. Which of the following is the correct order?

- (A) Stability: $\text{HI} < \text{HBr} < \text{HCl} < \text{HF}$
 (B) Acidic strength: $\text{HClO}_4 < \text{HClO}_3 < \text{HClO}_2 < \text{HClO}$
 (C) Ionic character: $\text{MF} < \text{MCl} < \text{MBr} < \text{MI}$
 (D) Electron gain enthalpy: $\text{I} < \text{Br} < \text{Cl} < \text{F}$

Answer (A)

Sol. Since order of BDE $\propto$ stability

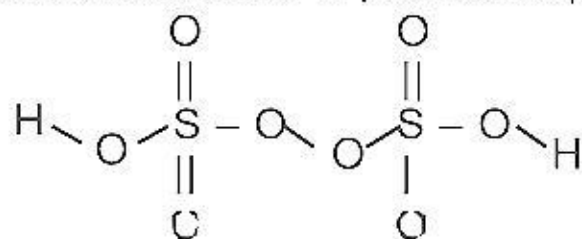
stability order = $\text{HF} > \text{HCl} > \text{HBr} > \text{HI}$

71. In which of the following oxoacid of Sulphur, S-O-O-S bond is present?

- (A) $\text{H}_2\text{S}_2\text{O}_8$ (B) $\text{H}_2\text{S}_2\text{O}_7$
 (C) $\text{H}_2\text{S}_2\text{O}_4$ (D) $\text{H}_2\text{S}_2\text{O}_3$

Answer (A)

Sol. $\text{H}_2\text{S}_2\text{O}_8$: Marshall's acid or peroxy-disulphuric acid



72. Concentrated HNO_3 oxidise white phosphorus into which substance?

- (A) $\text{H}_4\text{P}_2\text{O}_7$ (B) H_3PO_2
 (C) H_3PO_4 (D) H_3PO_3

Answer (C)

Sol. $\text{P}_4 + 20\text{HNO}_3 \rightarrow 4\text{H}_3\text{PO}_4 + 20\text{NO}_2 + 4\text{H}_2\text{O}$
 (Phosphoric acid)

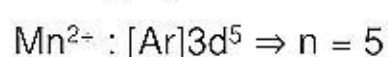
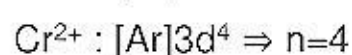
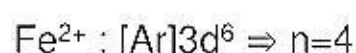
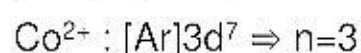
73. The divalent ion of which of the following element in aqueous solution has magnetic moment 5.92 BM?

- (A) Cr (B) Co
 (C) Fe (D) Mn

Answer (D)

Sol. For Magnetic Moment of 5.92 BM

$$\mu = \sqrt{n(n+2)} = 5.92 \Rightarrow n = 5$$



and Hafnium belongs to 5d transition series, even then they show similar physical and chemical properties because

- (A) Both have same number of electrons
 (B) Both belongs to d-block
 (C) Both have similar atomic radius
 (D) Both belongs to the same group of the periodic table

Answer (C)

Sol. Due to lanthanoid contraction, Zr & Hf shows similar properties and also have similar atomic radius due to which also they show similar Physical and chemical properties.

75. Which isomerism is possible in hexa ammine cobalt (III) hexacyanido chromate (III) complex?

- (A) Co-ordination isomerism
 (B) Linkage isomerism
 (C) Ionisation isomerism
 (D) Solvate isomerism

Answer (A)

Sol. Since the complex is $[\text{Co}(\text{NH}_3)_6]^{3+} [\text{Cr}(\text{CN})_6]^{3-}$

So, co-ordination Isomerisation is possible in the above complex

76. Which of the following complex will absorb maximum wavelength of light?

- (A) $[\text{Co}(\text{NH}_3)_5(\text{H}_2\text{O})]^{3+}$ (B) $[\text{CoCl}(\text{NH}_3)_5]^{2+}$
 (C) $[\text{Co}(\text{NH}_3)_6]^{3+}$ (D) $[\text{Co}(\text{CN})_6]^{3-}$

Answer (B)

Sol. CFSE $\propto$ strength of ligand $\propto 1/\lambda$

$\therefore$ complex $[\text{CoCl}(\text{NH}_3)_5]^{2+}$ has minimum charge among all the complex so has lower CFSE so will absorb maximum wavelength of light.

77. The complex having highest electrical conductivity in aqueous solution under similar conditions is

- (A) Triqua trichlorido cobalt (III)
 (B) Penta aqua chlorido cobalt (III) chloride
 (C) Tetra aqua dichlorido cobalt (III) chloride
 (D) Hexa aqua cobalt (III) chloride

Answer (D)

Sol. Since, electrical conductivity $\propto$ Number of ions produced in aqueous solution

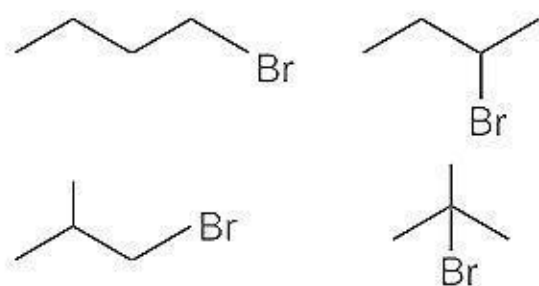
In complex $(\text{Co}(\text{H}_2\text{O})_6)\text{Cl}_3$; the total number of ions produced in aqueous solution is equal to 4.

78. How many optically active isomers are possible in the compound having formula $\text{C}_4\text{H}_9\text{Br}$?

- (A) 2
(B) 3
(C) 1
(D) 4

Answer (A)

Sol. In $\text{C}_4\text{H}_9\text{Br}$, the possible structural isomers are:-



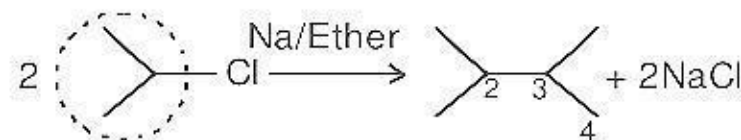
$\therefore$ Two optically active isomers (d + l) of $\text{C}_4\text{H}_9\text{Br}$ are possible.

79. $\text{R}' - \text{Cl} \xrightarrow{\text{Na/ether}} 2, 3\text{-dimethyl butane}$. What is R' in the above reaction?

- (A) isobutyl (B) isopropyl
(C) sec-butyl (D) n-propyl

Answer (B)

Sol.



80. 1 mole of metal 'M' reacts completely with alcohol to give 1.5 moles of H_2 . Then what will be the valency of metal 'M'?

- (A) 3 (B) 4
(C) 2 (D) 1

Answer (A)

Sol. $\text{M}^n + \text{R-OH} \rightarrow (\text{R-O})_n\text{M} + 1/2\text{H}_2(\text{g})$

If 1 mole of metal gives $3/2$ moles of H_2 with alcohol that means,

