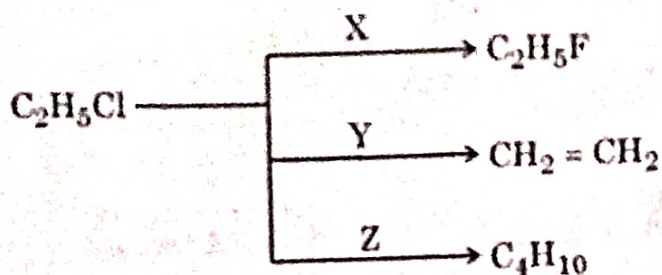


1. In the following scheme of reaction,



X, Y and Z respectively are :

- (A) AgF, alcoholic KOH and benzene  
(B) HF, aqueous KOH and Na in dry ether  
(C) Hg<sub>2</sub>F<sub>2</sub>, alcoholic KOH and Na in dry ether  
(D) CoF<sub>2</sub>, aqueous KOH and benzene
2. 8.8 g of monohydric alcohol added to ethyl magnesium iodide in ether liberates 2240 cm<sup>3</sup> of ethane at STP. This monohydric alcohol when oxidised using pyridinium-chlorochromate, forms a carbonyl compound that answers silver mirror test (Tollens' test). The monohydric alcohol is :
- (A) butan-2-ol  
(B) 2, 2-dimethyl propan-1-ol  
(C) pentan-2-ol  
(D) 2, 2-dimethyl ethan-1-ol
3. When a tertiary alcohol 'A' (C<sub>4</sub>H<sub>10</sub>O) reacts with 20% H<sub>3</sub>PO<sub>4</sub> at 358 K, it gives a compound 'B' (C<sub>4</sub>H<sub>8</sub>) as a major product. The IUPAC name of the compound 'B' is :
- (A) But-1-ene  
(B) But-2-ene  
(C) Cyclobutane  
(D) 2-Methylpropene
4. PCC is :
- (A) K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> + Pyridine  
(B) CrO<sub>3</sub> + CHCl<sub>3</sub>  
(C) CrO<sub>3</sub> + H<sub>2</sub>SO<sub>4</sub>  
(D) A complex of chromium trioxide with pyridine + HCl

5. Propanone and Propanal are :

- (A) Position isomers (B) Functional isomers  
(C) Chain isomers (D) Geometrical isomers

6. Sodium ethanoate on heating with soda lime gives 'X'. Electrolysis of aqueous solution of sodium ethanoate gives 'Y'. 'X' and 'Y' respectively are :

- (A) Methane and Ethane (B) Methane and Methane  
(C) Ethane and Methane (D) Ethane and Ethane

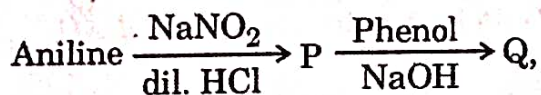
7. But-1-yne on reaction with dil.  $H_2SO_4$  in presence of  $Hg^{2+}$  ions at 333 K gives :

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

8. Biologically active adrenaline and ephedrine used to increase blood pressure contain :

- (A) Primary amino group (B) Secondary amino group  
(C) Tertiary amino group (D) Quaternary ammonium salt

9. In the reaction



'Q' is :

- (A)  $C_6H_5N_2Cl$  (B) ortho-hydroxyazobenzene  
(C) para-hydroxyazobenzene (D) meta-hydroxyazobenzene

10. The female sex hormone which is responsible for the development of secondary female characteristics and participates in the control of menstrual cycle is :

- (A) Testosterone (B) Estradiol  
(C) Insulin (D) Thyroxine

Space for Rough Work / ಬರಟು ಕೆಲಸಕ್ಕೆ ಸ್ಥಳ

11. The type of linkage present between nucleotides is :

- (A) Phosphoester linkage (B) Phosphodiester linkage  
(C) Amide linkage (D) Glycosidic linkage

12.  $\alpha$  - D - (+) - glucose and  $\beta$  - D - (+) - glucose are :

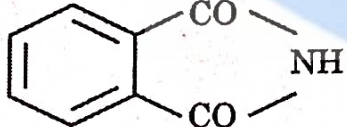
- (A) Enantiomers (B) Conformers  
(C) Epimers (D) Anomers

13. Which of the following set of polymers are used as fibre ?

- (i) Teflon (ii) Starch (iii) Terylene (iv) Orlon  
(A) (i) and (ii) (B) (ii) and (iii)  
(C) (iii) and (iv) (D) (i) and (iv)

14. The biodegradable polymer obtained by polymerisation of Glycine and Aminocaproic acid is :

- (A) Nylon 6 (B) PHBV  
(C) Nylon 2 - Nylon 6 (D) Nylon 6, 10

15. The compound  is :

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

16. Which one of the following is a cationic detergent ?

- (A) Cetyltrimethylammonium bromide  
(B) Sodium dodecylbenzene sulphonate  
(C) Dodecylbenzene sulphonic acid  
(D) Dodecylbenzene

17. For which one of the following mixtures is composition uniform throughout ?

- (A) Sand and water
- (B) Grains and pulses with stone
- (C) Mixture of oil and water
- (D) Dilute aqueous solution of sugar

18. The energy associated with first orbit of  $\text{He}^+$  is :

- (A) 0 J
- (B)  $-8.72 \times 10^{-18} \text{ J}$
- (C)  $-4.58 \times 10^{-18} \text{ J}$
- (D)  $-0.545 \times 10^{-18} \text{ J}$

19. A metalloid is :

- (A) Bi
- (B) Sb
- (C) P
- (D) Se

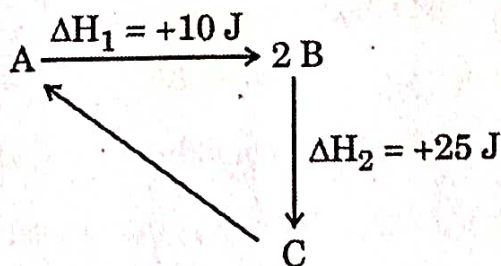
20. A pair of isoelectronic species having bond order of one is :

- (A)  $\text{N}_2, \text{CO}$
- (B)  $\text{N}_2, \text{NO}^+$
- (C)  $\text{O}_2^{2-}, \text{F}_2$
- (D)  $\text{CO}, \text{NO}^+$

21. Identify the *wrong* relation for real gases :

- (A)  $Z = \frac{V_{\text{ideal}}}{V_{\text{real}}}$
- (B)  $P_{\text{ideal}} = P_{\text{real}} + \frac{an^2}{V^2}$
- (C)  $V_{\text{real}} = V_{\text{ideal}} - nb$
- (D)  $\left(p + \frac{a}{V^2}\right)(V - b) = RT$

22. From the diagram



$\Delta_r H$  for the reaction  $\text{C} \rightarrow \text{A}$  is :

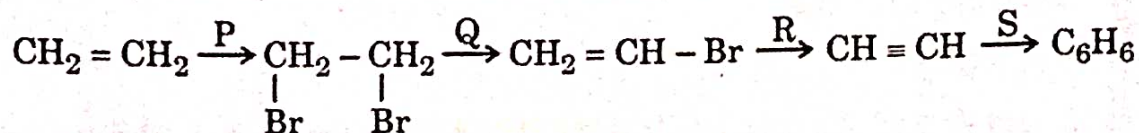
- (A) +35 J
- (B) -15 J
- (C) -35 J
- (D) +15 J

23. In the analysis of III group basic radicals of salts, the purpose of adding  $\text{NH}_4\text{Cl}_{(s)}$  to  $\text{NH}_4\text{OH}$  is :
- (A) to increase the concentration of  $\text{OH}^-$  ions.  
 (B) to precipitate the radicals of group IV and V.  
 (C) to suppress the dissociation of  $\text{NH}_4\text{OH}$ .  
 (D) to introduce  $\text{Cl}^-$  ions.
24. Solubility product of  $\text{CaC}_2\text{O}_4$  at a given temperature in pure water is  $4 \times 10^{-9} \text{ (mol L}^{-1}\text{)}^2$ . Solubility of  $\text{CaC}_2\text{O}_4$  at the same temperature is :
- (A)  $6.3 \times 10^{-5} \text{ mol L}^{-1}$  (B)  $2 \times 10^{-5} \text{ mol L}^{-1}$   
 (C)  $2 \times 10^{-4} \text{ mol L}^{-1}$  (D)  $6.3 \times 10^{-4} \text{ mol L}^{-1}$
25. In the reaction between moist  $\text{SO}_2$  and acidified permanganate solution :
- (A)  $\text{SO}_2$  is oxidised to  $\text{SO}_4^{2-}$   
 $\text{MnO}_4^-$  is reduced to  $\text{Mn}^{2+}$   
 (B)  $\text{SO}_2$  is reduced to S  
 $\text{MnO}_4^-$  is oxidised to  $\text{MnO}_4$   
 (C)  $\text{SO}_2$  is oxidised to  $\text{SO}_3^{2-}$   
 $\text{MnO}_4^-$  is reduced to  $\text{MnO}_2$   
 (D)  $\text{SO}_2$  is reduced to  $\text{H}_2\text{S}$   
 $\text{MnO}_4^-$  is oxidised to  $\text{MnO}_4$
26. Which one of the following properties is generally **not** applicable to ionic hydrides ?
- (A) Non-volatile (B) Non-conducting in solid state  
 (C) Crystalline (D) Volatile
27. Which one of the following nitrate will decompose to give  $\text{NO}_2$  on heating ?
- (A)  $\text{NaNO}_3$  (B)  $\text{KNO}_3$  (C)  $\text{RbNO}_3$  (D)  $\text{LiNO}_3$
28. Which of the following halides **cannot** be hydrolysed ?
- (A)  $\text{CCl}_4$  (B)  $\text{SiCl}_4$  (C)  $\text{GeCl}_4$  (D)  $\text{SnCl}_4$

29. 0.48 g of an organic compound on complete combustion produced 0.22 g of  $\text{CO}_2$ . The percentage of C in the given organic compound is :

- (A) 25 (B) 50 (C) 12.5 (D) 87.5

30. In the given sequence of reactions, identify 'P', 'Q', 'R' and 'S' respectively.



- (A)  $\text{Br}_2$ , Alc. KOH, NaOH,  $\text{Al}_2\text{O}_3$   
(B) HBr, Alc. KOH,  $\text{CaC}_2$ ,  $\text{KMnO}_4$   
(C) HBr, Alc. KOH,  $\text{NaNH}_2$ , Red hot iron tube  
(D)  $\text{Br}_2$ , Alc. KOH,  $\text{NaNH}_2$ , Red hot iron tube

31. The first chlorinated organic insecticide prepared is :

- (A) Gammexane (B) Chloroform  
(C)  $\text{COCl}_2$  (D) DDT

32. Which of the following crystals has the unit cell such that  $a = b \neq c$  and  $\alpha = \beta = 90^\circ$ ,  $\gamma = 120^\circ$  ?

- (A) Zinc blende (B) Graphite  
(C) Cinnabar (D) Potassium dichromate

33. MnO exhibits :

- (A) Ferrimagnetism (B) Antiferromagnetism  
(C) Ferromagnetism (D) Paramagnetism

34. The number of atoms in 4.5 g of a face-centred cubic crystal with edge length 300 pm is : (Given density =  $10 \text{ g cm}^{-3}$  and  $N_A = 6.022 \times 10^{23}$ )

- (A)  $6.6 \times 10^{20}$  (B)  $6.6 \times 10^{23}$   
(C)  $6.6 \times 10^{19}$  (D)  $6.6 \times 10^{22}$

4. Vapour pressure of a solution containing 18 g of glucose and 178.2 g of water at 100°C is :  
(Vapour pressure of pure water at 100°C = 760 torr)
- (A) 76.0 torr      (B) 752.4 torr      (C) 7.6 torr      (D) 3207.6 torr
5. A mixture of phenol and aniline shows negative deviation from Raoult's law. This is due to the formation of :
- (A) Polar covalent bond      (B) Non-polar covalent bond  
(C) Intermolecular Hydrogen bond      (D) Intramolecular Hydrogen bond
7. Which one of the following pairs will show positive deviation from Raoult's Law ?
- (A) Water - HCl      (B) Benzene - Methanol  
(C) Water - HNO<sub>3</sub>      (D) Acetone - Chloroform
38. How many Coulombs are required to oxidise 0.1 mole of H<sub>2</sub>O to oxygen ?
- (A) 1.93 × 10<sup>5</sup> C      (B) 1.93 × 10<sup>4</sup> C  
(C) 3.86 × 10<sup>4</sup> C      (D) 9.65 × 10<sup>3</sup> C
39. A current of 3 A is passed through a molten calcium salt for 1 hr 47 min 13 sec. The mass of calcium deposited is : (Molar mass of Ca = 40 g mol<sup>-1</sup>)
- (A) 6.0 g      (B) 2.0 g      (C) 8.0 g      (D) 4.0 g
40. The value of 'A' in the equation  $\lambda_m = \lambda_m^0 - A\sqrt{C}$  is same for the pair :
- (A) NaCl and CaCl<sub>2</sub>      (B) CaCl<sub>2</sub> and MgSO<sub>4</sub>  
(C) NaCl and KBr      (D) MgCl<sub>2</sub> and NaCl
41. For the reaction, A ⇌ B, E<sub>a</sub> = 50 kJ mol<sup>-1</sup> and ΔH = - 20 kJ mol<sup>-1</sup>. When a catalyst is added, E<sub>a</sub> decreases by 10 kJ mol<sup>-1</sup>. What is the E<sub>a</sub> for the backward reaction in the presence of catalyst ?
- (A) 60 kJ mol<sup>-1</sup>      (B) 40 kJ mol<sup>-1</sup>  
(C) 70 kJ mol<sup>-1</sup>      (D) 20 kJ mol<sup>-1</sup>

42. For the reaction  $\text{PCl}_5 \rightarrow \text{PCl}_3 + \text{Cl}_2$ , rate and rate constant are  $1.02 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$  and  $3.4 \times 10^{-5} \text{ s}^{-1}$  respectively at a given instant. The molar concentration of  $\text{PCl}_5$  at that instant is :

- (A)  $8.0 \text{ mol L}^{-1}$  (B)  $3.0 \text{ mol L}^{-1}$   
(C)  $0.2 \text{ mol L}^{-1}$  (D)  $2.0 \text{ mol L}^{-1}$

43. Which one of the following does *not* represent Arrhenius equation ?

- (A)  $\log k = \log A - \frac{E_a}{2.303 RT}$  (B)  $k = A e^{-E_a/RT}$   
(C)  $\ln k = -\frac{E_a}{RT} + \ln A$  (D)  $k = A e^{E_a/RT}$

44. Identify the *incorrect* statement :

- (A) Values of colligative properties of colloidal solution are of small order compared to values of true solution.  
(B) Tyndall effect is observed only when diameter of the dispersed particles is not much smaller than wavelength of incident light.  
(C) Colour of colloidal solution depends on the wavelength of light scattered by the dispersed particles.  
(D) Brownian movement is due to balanced bombardment of molecules of dispersion medium on colloidal particles.

45. For the coagulation of positively charged hydrated ferric-oxide sol, the flocculating power of the ions is in the order :

- (A)  $\text{PO}_4^{3-} > \text{SO}_4^{2-} > \text{Cl}^- > [\text{Fe}(\text{CN})_6]^{4-}$   
(B)  $\text{Cl}^- > \text{SO}_4^{2-} > \text{PO}_4^{3-} > [\text{Fe}(\text{CN})_6]^{4-}$   
(C)  $\text{SO}_4^{2-} = \text{Cl}^- = \text{PO}_4^{3-} = [\text{Fe}(\text{CN})_6]^{4-}$   
(D)  $[\text{Fe}(\text{CN})_6]^{4-} > \text{PO}_4^{3-} > \text{SO}_4^{2-} > \text{Cl}^-$



46. Gold sol is *not* a :

- (A) Macromolecular colloid (B) Lyophobic colloid  
(C) Multimolecular colloid (D) Negatively charged colloid

47. The *incorrect* statement about Hall-Héroult process is :

- (A) Carbon anode is oxidised to CO and CO<sub>2</sub>.  
(B) Na<sub>3</sub>AlF<sub>6</sub> helps to decrease the melting point of the electrolyte.  
(C) CaF<sub>2</sub> helps to increase the conductivity of the electrolyte.  
(D) Oxidation state of oxygen changes in the overall cell reaction.

48. Select the correct statement :

- (A) Roasting involves heating the ore in the absence of air.  
(B) Calcination involves heating the ore above its melting point.  
(C) Smelting involves heating the ore with suitable reducing agent and flux below its melting point.  
(D) Calcination of calcium carbonate is endothermic.

49. NO<sub>2</sub> gas is :

- (A) Colourless, neutral (B) Colourless, acidic  
(C) Brown, acidic (D) Brown, neutral

50. Identify the *incorrect* statement from the following :

- (A) Oxides of nitrogen in the atmosphere can cause depletion of the ozone layer.  
(B) Ozone absorbs the intense ultraviolet radiation of Sun.  
(C) Depletion of ozone layer is because of its chemical reactions with chlorofluoro alkanes  
(D) Ozone absorbs infrared radiation.

51. The correct decreasing order of boiling point of hydrogen halides is :

(A) HF > HCl > HBr > HI

(B) HI > HBr > HCl > HF

(C) HF > HI > HBr > HCl

(D) HI > HF > HBr > HCl

52. The synthetically produced radioactive noble gas by the collision of  ${}^{249}_{98}\text{Cf}$  with  ${}^{48}_{20}\text{Ca}$  is :

(A) Radon

(B) Radium

(C) Oganesson

(D) Xenon

53. The transition element ( $\approx 5\%$ ) present with lanthanoid metal in Misch metal is :

(A) Mg

(B) Fe

(C) Zn

(D) Co

54. Match the following :

I.  $\text{Zn}^{2+}$

i.  $d^8$  configuration

II.  $\text{Cu}^{2+}$

ii. colourless

III.  $\text{Ni}^{2+}$

iii.  $\mu = 1.73 \text{ BM}$

Codes :

I

II

III

(A) i

ii

iii

(B) ii

iii

i

(C) ii

i

iii

(D) i

iii

ii

55. Which of the following statements related to lanthanoids is *incorrect* ?

(A) Lanthanoids are silvery white soft metals.

(B) Samarium shows + 2 oxidation state.

(C)  $\text{Ce}^{+4}$  solutions are widely used as oxidising agents in titrimetric analysis.

(D) Colour of Lanthanoid ion in solution is due to d – d transition.

56. On treating 100 mL of 0.1 M aqueous solution of the complex  $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$  with excess of  $\text{AgNO}_3$ , 2.86 g of  $\text{AgCl}$  was obtained. The complex is :
- (A)  $[\text{Cr}(\text{H}_2\text{O})_3\text{Cl}_3] \cdot 3\text{H}_2\text{O}$  (B)  $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl} \cdot 2\text{H}_2\text{O}$   
(C)  $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2 \cdot \text{H}_2\text{O}$  (D)  $[\text{Cr}(\text{H}_2\text{O})_6\text{Cl}_3]$
57. The complex compounds  $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$  and  $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$  are :
- (A) Coordination isomers (B) Geometrical isomers  
(C) Optical isomers (D) Ionisation isomers
58. Which of the following statements are true about  $[\text{CoF}_6]^{3-}$  ion ?
- I. The complex has octahedral geometry.  
II. Coordination number of Co is 3 and oxidation state is + 6.  
III. The complex is  $\text{sp}^3\text{d}^2$  hybridised.  
IV. It is a high spin complex.
- (A) I, II and IV (B) I, III and IV  
(C) II and IV (D) II, III and IV
59. A haloalkane undergoes  $\text{S}_{\text{N}}2$  or  $\text{S}_{\text{N}}1$  reaction depending on :
- (A) Solvent used in the reaction  
(B) Low temperature  
(C) The type of halogen atom  
(D) Stability of the haloalkane
60. 2-Methyl propane can be prepared by Wurtz reaction. The haloalkanes taken along with metallic sodium and dry ether are :
- (A) chloromethane and 2-chloropropane  
(B) chloroethane and chloromethane  
(C) chloroethane and 1-chloropropane  
(D) chloromethane and 1-chloropropane