KCET EXAMINATION – 2021
SUBJECT : CHEMISTRY

VERSION : C3

DATE :- 29-08-2021 **TIME : 10.30 AM TO 11.50 AM**

1. For the reaction
$A(g)+B(g) \rightleftharpoons C(g)+D(g);\ \Delta H=-QKJ$
The equilibrium constant cannot be disturbed by
a) Addition of A
b) Addition of D
c) Increasing of pressure
d) Increasing of temperature

Ans. **c**

Sol. $A_{(g)}+B_{(g)} \rightleftharpoons C_{(g)}+D_{(g)};\Delta H=-Q\ KJ$

Pressure has no effect on equilibrium state if $\Delta n=0$

2. An organic compound 'X' on treatment with PCC in dichloromethane gives the compound Y. Compound 'Y' reacts with I_2 and alkali to form yellow precipitate of triiodomethane. The compound X is
a) CH_3CHO b) CH_3COCH_3
c) CH_3CH_2OH d) CH_3COOH

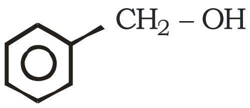
Ans. **c**

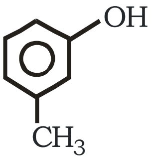
Sol.

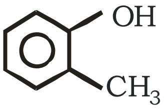
$$CH_3-\overset{X}{CH_2}-OH\xrightarrow[CH_2Cl_2]{PCC}CH_3\overset{Y}{-}CHO\xrightarrow[NaOH]{I_2}CHI_3+HCOONa$$

$$\therefore X=CH_3CH_2OH$$

3. A compound 'A' (C_7H_8O) is insoluble in $NaHCO_3$ solution but dissolve in NaOH and give a characteristic colour with neutral $FeCl_3$ solution. When treated with Bromine water compound 'A' forms the compound B with the formula $C_7H_5OBr_3$. 'A' is

a) 

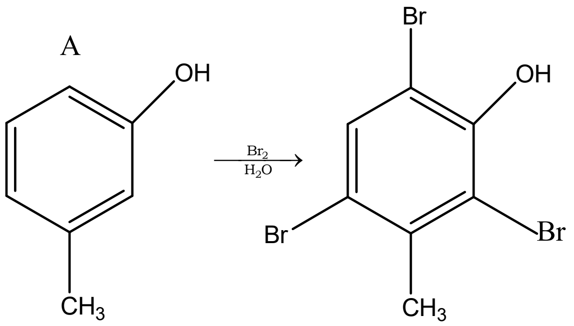
b) 

c) 

d) 

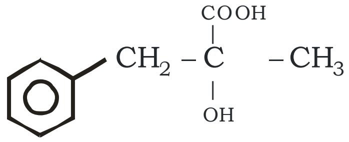
Ans. b

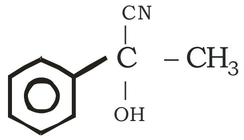
Sol.

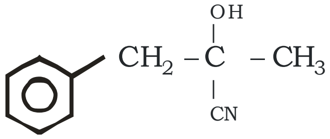


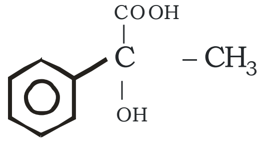
4. In set of reactions, identify D

$$CH_3COOH \xrightarrow{SOCl_2} A \xrightarrow[\text{Anh } AlCl_3]{\text{Benzene}} B \xrightarrow{HCN} C \xrightarrow{H_2O} D$$

a) 

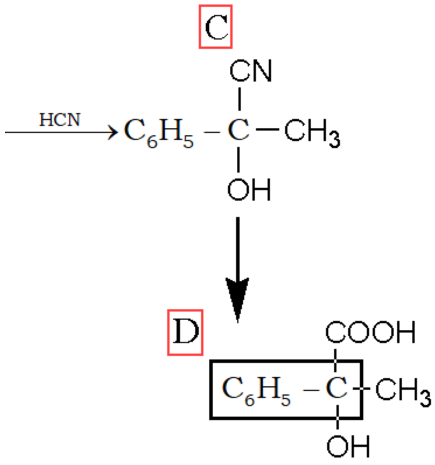
b) 

c) 

d) 

Ans. d

Sol. $CH_3-COOH \xrightarrow{SoCl_2} \overset{A}{CH_3COCl} \xrightarrow[\text{anhydrous } AlCl_3]{C_6H_6} \overset{B}{C_6H_5COCH_3}$



$$\boxed{C}\ \xrightarrow{HCN} C_6H_5-\overset{\overset{CN}{|}}{\underset{\underset{OH}{|}}{C}}-CH_3 \;\downarrow\; \boxed{D}\ \boxed{C_6H_5-\overset{\overset{COOH}{|}}{\underset{\underset{OH}{|}}{C}}-CH_3}$$

5. K_a values for acids H_2SO_3, HNO_2, CH_3COOH and HCN are respectively 1.3×10^{-2}, 4×10^{-4}, 1.8×10^{-5} and 4×10^{-10}, which of the above acids produces stronger conjugate base in aqueous solution ?

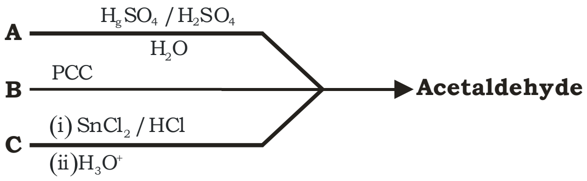
a) H_2SO_3 b) HNO_2

c) CH_3COOH d) HCN

Ans. d

Sol. Acidic strength $\propto$ Ka

The conjugate base of a weakest acid is strongest $\therefore$ HCN $\left(K_a = 4\times10^{-10}\right)$(least value)

6. 

A, B and C respectively are

a) ethanol, ethane nitrile and ethyne

b) ethane nitrile, ethanol and ethyne

c) ethyne, ethanol and ethane nitrile

d) ethyne, ethane nitrile and ethanol

Ans. c

Sol. $A \rightarrow CH\equiv CH \xrightarrow[H_2SO_4]{HgSO_4} CH_2=CH-OH \xrightleftharpoons[\text{Tautamerises}]{} CH_3CHO$

$B \rightarrow CH_3CH_2OH \xrightarrow{PCC} CH_3CHO$

$C \rightarrow CH_3CN \xrightarrow[(ii)H_3O^+]{(i)SnCl_2/HCl} CH_3CHO$

7. The reagent which can do the conversion $CH_3COOH \rightarrow CH_3-CH_2-OH$ is

a) $LiAlH_4$ / ether b) H_2, Pt

c) $NaBH_4$ d) Na and C_2H_5OH

Ans. a

Sol. $CH_3COOH \xrightarrow{LiAlH_4} CH_3CH_2OH$

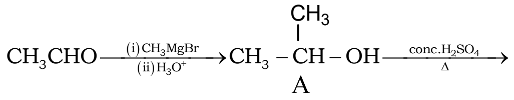
8. $CH_3CHO \xrightarrow[(ii)\ H_3O^+]{(i)\ CH_3MgBr} A \xrightarrow[\Delta]{\text{Conc } H_2SO_4} B \xrightarrow[(ii)\ H_2O,\ OH^-]{(i)\ B_2H_6} C$

A and C are

a) Identical b) Position isomers

c) Functional d) Optical isomers

Ans. b

Sol. 

$$CH_3CHO \xrightarrow[(ii)H_3O^+]{(i)CH_3MgBr} \underset{A}{CH_3-\overset{\overset{CH_3}{|}}{CH}-OH} \xrightarrow[\Delta]{conc.H_2SO_4}$$

$$\underset{B}{CH_3-CH=CH_2} \xrightarrow[(ii)H_2O,OH^-]{(i)B_2H_6} \underset{C}{CH_3CH_2CH_2OH}$$

$\therefore$ A and C are position isomers.

9. Which of the following is not true for oxidation?

a) addition of oxygen

b) addition of electronegative element

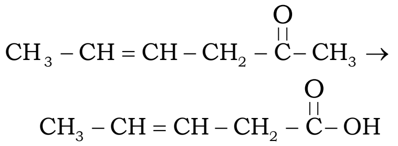
c) removal of hydrogen

d) removal of electronegative element

Ans. d

Sol. Conceptual

10. Which is the most suitable reagent for the following conversion ?



$$CH_3-CH=CH-CH_2-\overset{\overset{O}{||}}{C}-CH_3 \rightarrow CH_3-CH=CH-CH_2-\overset{\overset{O}{||}}{C}-OH$$

a) Tollen's reagent
b) Benzoyl peroxide
c) I_2 and NaOH solution with subsequent acidification
d) Sn and NaOH solution

Ans. c

Sol. Conceptual

11. $C_6H_5CH_2Cl \xrightarrow{\text{alc.}NH_3} A \xrightarrow{2CH_3Cl} B$. The product B is

a) N, N-Dimethyl phenyl methanamine
b) N, N-Dimethyl benzenamine
c) N-Benzyl-N-methyl methanamine
d) phynyl-N-N-dimethyl methanamine

Ans. a

Sol. $C_6H_5CH_2Cl \xrightarrow{\text{alc.}NH_3} C_6H_5\overset{A}{C}H_2NH_2 \xrightarrow{2CH_3Cl} C_6H_5CH_2\overset{B}{N}(CH_3)_2$

12. The method by which aniline cannot be prepared is

a) Nitration of benzene followed by reduction with Sn and con. HCl
b) Degradation of benzamide with bromine in alkaline solution
c) Reduction of nitrobenzene with H_2/Pd is ethanol
d) Potassium salt of pthalimide treated with chlorobenzene followed by the hydrolysis with aqueous NaOH solution

Ans. d

Sol. Conceptual

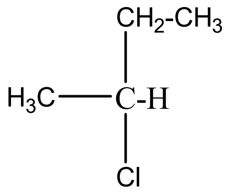
13. Permanent hardness cannot be removed by

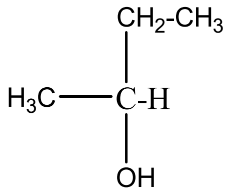
a) Using washing soda
b) Calgon's method
c) Clark's method
d) Ion exchange method

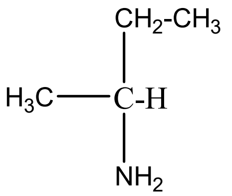
Ans. c

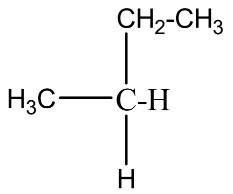
Sol. Conceptual

14. A hydrocarbon $A(C_4H_8)$ on reaction with HCl gives a compound $B(C_4H_9Cl)$ which on reaction with 1 mol of NH_3 gives compound $C(C_4H_{10}N)$. On reacting with $NaNO_2$ and HCl followed by treatment with water, compound C yields an optically active compound D. The is

a) 

b) 

c) 

d) 

Ans. b

Sol. Optically active compound is option B.

15. RNA and DNA are chiral molecules, their chirality is due to the presence of

a) D-sugar component
b) L-sugar component
c) Chiral bases
d) Chiral phosphate ester unit

Ans. a

Sol. Conceptual

16. The property of the alkaline earth metals that increases with their atomic number is

a) Ionisation enthalpy
b) Electronegativity
c) Solubility of their hydroxide in water
d) Solubility of their sulphate in water

Ans. c

Sol. Conceptual

17. Primary structure in a nucleic acid contains bases as GATGC ... The chain which is complementary to this chain is

a) G G T G A ....
b) T G A A G ....
c) C T A C G ...
d) T T T A G ....

Ans. c

Sol. Conceptual

18. In the detection of II group acid radical, the salt containing chloride is treated with concentrated sulphuric acid, the colourless gas is liberated. The name of the gas is

a) Hydrogen chloride gas
b) Chlorine gas
c) Sulphur dioxide gas
d) Hydrogen gas

Ans. a

Sol. Conceptual

19. The number of six membered and five membered rings in Buckminster Fullerence respectively is

a) 20, 12 b) 12, 20 c) 14, 18 d) 14, 11

Ans. a

Sol. Conceptual

20. In chrysoberyl, a compound containing Beryllium, Aluminium and oxygen, oxide ions form cubic close packed structure. Aluminium ions occupy $\frac{1}{4}$th of octahedral voids. The formula of the compound is

a) $BeAlO_4$ b) $BeAl_2O_4$ c) Be_2AlO_2 d) $BeAlO_2$

Ans. b

$$\begin{array}{llll} \text{Be} & \text{Al} & \text{O} & \text{N} = \text{No.of oxide ions invoved in CCP} \\ \frac{N}{4}: & \frac{2N}{4}: & N & \therefore \text{octahedral voids} = N \\ 1: & 2: & 4 & \text{Tetrahedral voids} = 2N \end{array}$$

Sol.

21. The correct statement regarding defects in solid is

a) Frenkel defect is a vacancy defect
b) Schottky defect is a dislocation defect
c) Trapping of an electron in the lattice leads to the formation of F-centre
d) Schottky defect has no effect on density

Ans. c

Sol. Frenkel defect – dislocation defect
Schottky defect – decreases density
F-centre – Trapping of on electrons in the lattices

22. A metal crystallises in BCC lattice with unit cell edge length of 300 pm and density $6.15 gcm^{-3}$. The molar mass of the metal is

a) $50\,g\,mol^{-1}$ b) $60\,g\,mol^{-1}$
c) $40\,g\,mol^{-1}$ d) $70\,g\,mol^{-1}$

Ans. a

Sol. $d = \frac{ZM}{a^3 N_A}$

$$M = \frac{d\,a^3 N_A}{Z} = \frac{6.15 \times \left(300 \times 10^{-10}\right)^3 \times 6 \times 10^{23}}{2}$$

$$\cong 50\,g\ mol^{-1}$$

23. Henry's law constant for the solubility of N_2 gas in water at 298K is 1.0×10^5 atm. The mole fraction of N_2 in air is 0.8 The number of moles of N_2 from air dissolved in 10 moles of water at 298K and 5 atm pressure is

a) 4.0×10^{-4} b) 4.0×10^{-5}
c) 5.0×10^{-4} d) 4.0×10^{-6}

Ans. a

Sol. $P_{N_2} = X_{N_2}.P_{total}$

$= 0.8 \times 5 = 4$ atm

$P_{N_2} = K_H.X_{N_2}$

$4 = 10^5.X_{N_2}$

$X_{N_2} = 4 \times 10^{-5}$

$$X_{N_2} = \frac{n_{N_2}}{n_{N_2} + n_{H_2O}} \quad \left(n_{N_2} <<<<< n_{H_2O}\right)$$

$$4 \times 10^{-5} = \frac{n_{N_2}}{10}$$

$n_{N_2} = 4 \times 10^{-4}$

24. A pure compound contains 2.4g of C, 1.2×10^{23} atoms of H, 0.2 moles of oxygen atoms. Its empirical formula is

a) C_2HO b) $C_2H_2O_2$ c) CH_2O d) CHO

Ans. d

Sol. $2.4g\ C = \frac{2.4}{12} = 0.2\,mol$

$$1.2 \times 10^{23} \text{ atoms of } H = \frac{1.2 \times 10^{23}}{6 \times 10^{23}} = 0.2 \text{ mol}$$

0.2 mole of 'O' atoms

$\therefore$ simplest ratio = C : H : O

0.2 : 0.2 : 0.2

= C H O

25. Choose the correct statement

a) K_H value is same for a gas in any solution

b) Higher the K_H value more the solubility of gas

c) K_H value increases on increasing the temperature of the solution

d) Easily liquefiable gases usually has lesser K_H values

Ans. c

Sol. K_H value changes with solvent nature

Higher the K_H less is solubility

K_H value increase with increase of 'T'

Eerily liquefied gases have high K_H value

26. The K_H value (K bar) of Argon (I), Carbondioxide (II) formuldehyde (III) and methane (IV) are respectively 40.3, 167, 1.83×10^{-5} and 0.413 at 298 K. The increasing order of solubility of gas in liquid is

a) $I < II < IV < III$ b) $III < IV < II < I$

c) $I < III < II < IV$ d) $I < IV < II < III$

Ans. a

Sol. $P_H = K_H \times$

$$K_H \propto \frac{1}{X(\text{solubility})}$$

$\therefore$ more is the K_H less is the solubility

27. The vapour pressure of pure liquids A and B are 450 and 700 mm of Hg at 350 K respectively. If the total vapour pressure of the mixture is 600 mm of Hg, the composition of the mixture in the solution is

a) $x_A = 0.4,\ x_B = 0.6$ b) $x_A = 0.6,\ x_B = 0.4$

c) $x_A = 0.3,\ x_B = 0.7$ d) $x_A = 0.7,\ x_B = 0.3$

Ans. a

Sol. $P_{total} = P_A^O X_A + P_B^O X_B$

$= P_A^O X_A + P_B^O (1 - X_A)$

$600 = 450.X_A + 700(1 - X_A)$

$X_A = 0.4$

$X_B = 1 - 0.4 = 0.6$

28. Consider the following electrodes

$P = Zn^{2+}(0.0001M)/Zn$ $Q = Zn^{2+}(0.1M)/Zn$

$R = Zn^{2+}(0.01M)/Zn$ $S = Zn^{2+}(0.001M)/Zn$

$E^oZn/Zn^{2+} = -0.76\,V$ electrode potentials of the above electrodes in volts are in the order

a) $P > S > R > Q$ b) $S > R > Q > P$

c) $Q > R > S > P$ d) $P > Q > R > S$

Ans. c

Sol. $Zn^{2+}_{(aq)} + 2e^- \rightarrow Zn_{(s)}$

$$E_{red} = E^{\ominus}_{red} - \frac{0.059}{n}\log\frac{1}{\left[Zn^{2+}\right]}$$

$$E_{red} = -0.76 + \frac{0.059}{2}\log\left[Zn^{2+}\right]$$

as $\left[Zn^{2+}\right]\uparrow E_{red}\uparrow$

29. The number of angular and radial nodes in 3p orbital respectively are

a) 3,1 b) 1,1 c) 2,1 d) 2,3

Ans. b

Sol. No. of angular nodes = l = 1 (3p)

No. of radial nodes = n – l - 1 = 3-1-1=1

30. The resistance of 0.01 m KCl solution at 298 K is 1500 Ω. If the conductivity of 0.01 m KCl solution at 298 K is $0.1466\times10^{-3}\,S\,cm^{-1}$. The cell constant of the conductivity cell in cm^{-1} is

a) 0.219 b) 0.291 c) 0.301 d) 0.194

Ans. a

Sol. $G^* = KR$

$= 0.146\times10^{-3}\times1500$

$= 0.219$

31. $H_{2(g)} + 2AgCl_{(s)} \rightleftarrows 2Ag_{(s)} + 2HCl_{(aq)}$

E^o_{cell} at $25^\circ C$ for the cell is 0.22 V. The equilibrium constant at $25^\circ C$ is

a) 2.8×10^7 b) 5.2×10^8

c) 2.8×10^5 d) 5.2×10^4

Ans. a

Sol. $$\log K_c = \frac{E^{\ominus}_{cell}\times n}{0.059} = \frac{0.22\times2}{0.059} = 7.45$$

$$K_c = \text{Antilog}\,(7.45) = 2.8\times10^7$$

32. For a reaction $A + 2B \rightarrow \text{Products}$, when concentration of B alone is increased half life remains the same. If concentration of A alone is doubled, rate remains the same. The unit of rate constant for the reaction is

a) S^{-1}　　b) $L\ mol^{-1}\ S^{-1}$

c) $mol\ L^{-1}\ S^{-1}$　　d) atm^{-1}

Ans. a

Sol. As $['B']$ increase, $t_{\frac{1}{2}}$ remains same

i.e. 1st order with respect to 'B'

$\text{rate} = k[A]^0[B]^1$

$\text{overall order} = 1$

$\therefore \text{units of } k = S^{-1}$

33. The third ionisation enthalpy is highest in

a) Alkali metals
b) Alkaline earth metals
c) Chalcogens
d) Pnictogens

Ans. b

Sol. Conceptual

34. If the rate constant for a first order reaction is k, the time(t) required for the completion of 99% of the reaction is given by

a) $t = \frac{4.606}{k}$　　b) $t = \frac{2.303}{k}$

c) $t = \frac{0.693}{k}$　　d) $t = \frac{6.909}{k}$

Ans. a

Sol. $t = \frac{2.303}{k}\log\frac{[R]_0}{[R]}$

$= \frac{2.303}{k}\log\left(\frac{100}{1}\right)$

$= \frac{4.606}{k}$

35. The rate of a gaseous reaction is given by the expression $k[A][B]^2$. If the volume of vessel is reduced to one half of the initial volume, the reaction rate as compared to original rate is

a) $\frac{1}{16}$　　b) $\frac{1}{8}$　　c) 8　　d) 16

Ans. c

Sol. $\text{rate} = K[A]^1[B]^2$

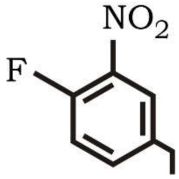
$= K\left[\frac{n}{v}\right]_A^1\left[\frac{n}{v}\right]_B^2$

$= K\left[\frac{n}{\frac{v}{2}}\right]^1\left[\frac{n}{\frac{v}{2}}\right]^2$

$= '8'\ K\left[\frac{n}{v}\right]^1\left[\frac{n}{v}\right]^2$

'8' times increases

36. The correct IUPAC name of



a) 4-Ethyl-1-Fluoro-2-nitrobenzene
b) 1-Ethyl-4-Fluoro-3-nitrobenzene
c) 3-Ethyl-6-Fluoronitrobenzene
d) 5-Ethyl-2-Fluoronitrobenzene

Ans. a

Sol. Conceptual

37. Higher order (>3) reactions are rare due to

a) Shifting of equilibrium towards reactants due to elastic collisions
b) Loss of active species on collision
c) Low probability of simultaneous collision of all reacting species
d) Increase in entropy as more molecules are involved

Ans. c

Sol. Conceptual

38. Arrange benzene, n-hexane and ethyne in decreasing order of their acidic behaviour

a) Benzene > n-hexane > ethyne
b) n-hexane > Benzene > ethyne
c) ethyne > n-hexane > Benzene
d) ethyne > Benzene > n-hexane

Ans. d

Sol. Conceptual

39. A colloidal solution is subjected to an electric field than colloidal particles more towards anode. The amount of electrolytes of $BaCl_2, AlCl_3$ and $NaCl$ required to coagulate the given colloid is in the order

a) $NaCl > BaCl_2 > AlCl_3$

b) $BaCl_2 < AlCl_3 > NaCl$

c) $AlCl_3 = NaCl = BaCl_2$

d) $AlCl_3 > BaCl_2 > NaCl$

Ans. **a**

Sol. As ions are moving toward anode i.e. negatively charged colloid

$$\text{Coagulation value} \propto \frac{1}{\text{cogulating power}}$$

$$\therefore Na^{+1} > Ba^{+2} > Al^{+3}$$

40. Which of the following is an incorrect statement?

a) Hydrogen bonding is stronger than dispersion forces

b) Sigma bonds are stronger than π-bonds

c) Ionic bonding is non-directional

d) σ-electrons are referred to as mobile electrons

Ans. **d**

Sol. Conceptual

41. Zeta potential is

a) Potential required to bring about coagulation of a colloidal sol.

b) Potential required to give the particle a speed of 1 cm S^{-1}

c) Potential difference between fixed charged layer and the diffused layer having opposite charges

d) Potential energy of the colloidal particles.

Ans. **c**

Sol. Conceptual

42. Which of the following compound on heating gives N_2O?

a) $Pb(NO_3)_2$ b) NH_4NO_3

c) NH_4NO_2 d) $NaNO_3$

Ans. **b**

Sol. Conceptual

43. Which of the following property is true for the given sequence

$NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$?

a) Reducing property b) Thermal stability

c) Bond angle d) Acidic character

Ans. **b**

Sol. Conceptual

44. The correct order of boiling point in the following compounds is

a) $HF > H_2O > NH_3$ b) $H_2O > HF > NH_3$

c) $NH_3 > H_2O > HF$ d) $NH_3 > HF > H_2O$

Ans. **b**

Sol. Conceptual

45. XeF_6 on partial hydrolysis gives a compound X, which has square pyramidal geometry 'X' is

a) XeO_3 b) XeO_4 c) $XeOF_4$ d) XeO_2F_2

Ans. **c**

Sol. $XeF_6 + H_2O \rightarrow XeOF_4 + 2HF\,(XeOF_4 - \text{square pyramidal})$

$$XeF_6 + 2H_2O \rightarrow XeO_2F_2 + 4HF\,(XeO_2F_2 - \text{See} - \text{saw})$$

46. A colourless, neutral, paramagnetic oxide of Nitrogen 'P' on oxidation gives reddish brown gas Q. Q on cooling gives colourless gas R. R on reaction with P gives blue solid S. Identify P, Q, R, S respectively

a) N_2O NO $NO_2N_2O_5$ b) N_2O NO_2 $N_2O_4N_2O_3$

c) NO NO_2 $N_2O_4N_2O_3$ d) NO $NO N_2O_4N_2O_5$

Ans. **c**

Sol.

$$\underset{P}{2NO} + O_2 \rightarrow \underset{Q}{2NO_2} \rightarrow \underset{R}{N_2O_4} \xrightarrow{2NO} \underset{S}{2N_2O_3}$$

47. Which of the following does not represent property stated against it?

a) $CO^{+2} < Fe^{+2} < Mn^{+2}$ - Ionic size

b) $Ti < V < Mn$ - Number of oxidation states

c) $Cr^{+2} < Mn^{+2} < Fe^{+2}$ – Paramagnetic behaviour

d) $Sc > Cr > Fe$ – Density

Ans. **c**

Sol. Conceptual

48. Which one of the following is correct for all elements from Sc to Cu?

a) The lowest oxidation state shown by them is +2

b) 4S orbital is completely filled in the ground state

c) 3d orbital is not completely filled in the ground state

d) The ions in +2 oxidation states are paramagnetic

Ans. **d**

Sol. Conceptual

49. When the absolute temperature of ideal gas is doubled and pressure is halved, the volume of gas

a) will be half of original volume

b) will be 4 times the original volume

c) will be 2 times the original volume

d) will be 1/4th times the original volume

Ans. **b**

Sol. $PV = nRT$

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \qquad \frac{P\times V_1}{T} = \frac{P}{2}\times\frac{V_2}{2T} \quad V_2 = 4V_1$$

50. Which of the following pairs has both the ions coloured in aqueous solution? [Atomic numbers of $[Sc = 21, Ti = 22, Ni = 28, Cu = 29, Mn = 25]$

a) Sc^{3+}, Mn^{2+}

b) Ni^{2+}, Ti^{4+}

c) Ti^{3+}, Cu^{+}

d) Mn^{2+}, Ti^{3+}

Ans. **d**

Sol. Conceptual

51. For the crystal field splitting in octahedral complexes,

a) the energy of the e_g orbitals will decrease by $(3/5)\Delta_0$ and that of the t_{2g} will increase by $(2/5)\Delta_0$

b) the energy of the e_g orbitals will increase by $(3/5)\Delta_0$ and that of the t_{2g} will decrease by $(2/5)\Delta_0$

c) the energy of the e_g orbitals will increase by $(3/5)\Delta_0$ and that of the t_{2g} will increase by $(2/5)\Delta_0$

d) the energy of the e_g orbitals will decrease by $(3/5)\Delta_0$ and that of the t_{2g} will decrease by $(2/5)\Delta_0$

Ans. **b**

Sol. Conceptual

52. Peroxide effect is observed with the addition of HBr but not with the addition of HI to unsymmetrical alkene because

a) H-I bond is stronger that H-Br and is not cleaved by the free radical

b) H-I bond is weaker than H-Br bond so that iodine free radicals combine to form iodine molecules

c) Bond strength of HI and HBr are same but free radicals are formed in HBr

d) All of these

Ans. **b**

Sol. Conceptual

53. The IUPAC name of $[Co(NH_3)_5(CO_3)]Cl$ is

a) Pentaamminecarbonatocobalt (III) Chloride

b) Carbonatopentamminecobalt (III) Chloride

c) Pentaamminecarbonatocobaltate (III) Chloride

d) Pentaammine cobalt (III) Carbonate Chloride

Ans. **a**

Sol. Conceptual

54. Homoleptic complexes among the following are

A) $K_3[Al(C_2O_4)_3]$, B) $[CoCl_2(en)_2]^{+}$

C) $K_2[Zn(OH)_4]$

a) A only

b) A and B only

c) A and C only

d) C only

Ans. **c**

Sol. Conceptual

55. The correct order for wavelengths of light absorbed in the complex ions $[CoCl(NH_3)_5]^{2+}$, $[Co(NH_3)_6]^{3+}$ and $[Co(CN)_6]^{3-}$ is

a) $[CoCl(NH_3)_5]^{2+} > [Co(NH_3)_6]^{3+} > [Co(CN)_6]^{3-}$

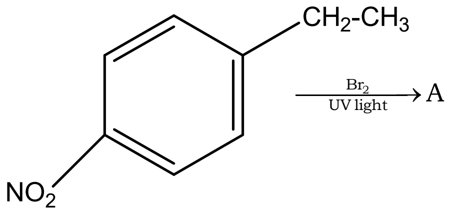
b) $[Co(NH_3)_6]^{3+} > [Co(CN)_6]^{3-} > [CoCl(NH_3)_5]^{2+}$

c) $[Co(CN)_6]^{3-} > [CoCl(NH_3)_5]^{2+} > [Co(CN)_6]^{3-}$

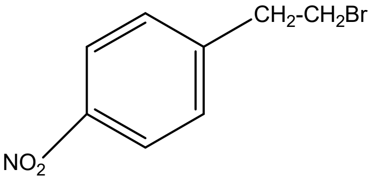
d) $[Co(NH_3)_6]^{3+} > [CoCl(NH_3)_5] > [Co(CN)_6]^{3-}$

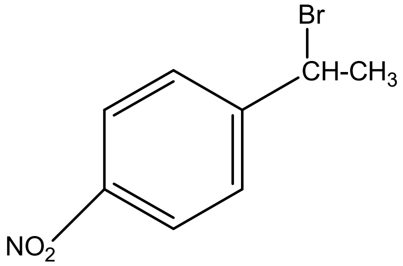
Ans. **a**

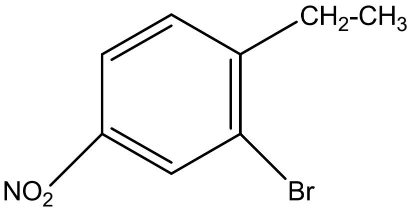
Sol. Wave length of light absorbed is inversely proportional to strength of the ligand.

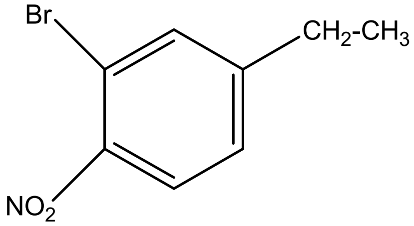
56. 

The compound A (major product) is

a) 

b) 

c) 

d) 

Ans. b

Sol. Free radical substitution of alkane part. (Benzyl free radical) takes place.

57. Bond enthalpies of A_2, B_2 and AB are in the ratio 2 : 1 : 2. If bond enthalpy of formation of AB is $-100\,KJ\,mol^{-1}$. The bond enthalpy of B_2 is

a) $100\,KJ\ mol^{-1}$ b) $50\,KJ\ mol^{-1}$

c) $200\,KJ\ mol^{-1}$ d) $150\,KJ\ mol^{-1}$

Ans. c

Sol. Assume bond strength of $A_2 = 2X$, then,

$B_2 = X,\ AB = 2X$

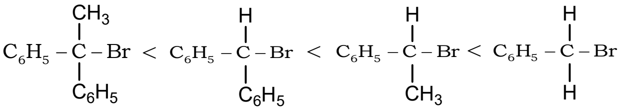
$$\Delta_r H^{\ominus} = \sum \Delta_{diss} H^{\ominus}{}_{(R)} - \sum \Delta_{diss} H^{\ominus}{}_{(P)}$$

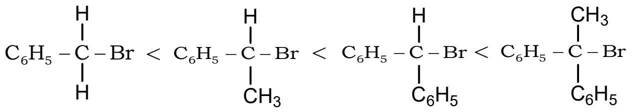
$$\frac{1}{2}A_2 + \frac{1}{2}B_2 \rightarrow AB$$

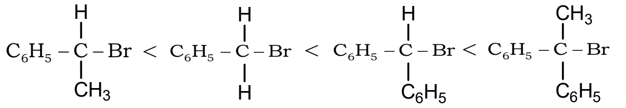
$$-100 = \frac{1}{2}2X + \frac{1}{2}X - 2$$

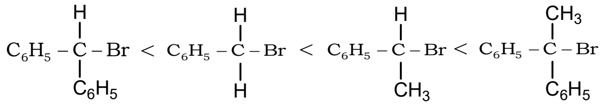
$X = 200$

58. The order of reactivity of the compounds $C_6H_5CH_2Br, C_6H_5CH(C_6H_5)Br, C_6H_5CH(CH_3)Br$ and $C_6H_5C(CH_3)(C_6H_5)Br$ in S_N2 reaction is

a) 
$C_6H_5-\overset{CH_3}{\underset{C_6H_5}{C}}-Br < C_6H_5-\overset{H}{\underset{C_6H_5}{C}}-Br < C_6H_5-\overset{H}{\underset{CH_3}{C}}-Br < C_6H_5-\overset{H}{\underset{H}{C}}-Br$

b) 
$C_6H_5-\overset{H}{\underset{H}{C}}-Br < C_6H_5-\overset{H}{\underset{CH_3}{C}}-Br < C_6H_5-\overset{H}{\underset{C_6H_5}{C}}-Br < C_6H_5-\overset{CH_3}{\underset{C_6H_5}{C}}-Br$

c) 
$C_6H_5-\overset{H}{\underset{CH_3}{C}}-Br < C_6H_5-\overset{H}{\underset{H}{C}}-Br < C_6H_5-\overset{H}{\underset{C_6H_5}{C}}-Br < C_6H_5-\overset{CH_3}{\underset{C_6H_5}{C}}-Br$

d) 
$C_6H_5-\overset{H}{\underset{C_6H_5}{C}}-Br < C_6H_5-\overset{H}{\underset{H}{C}}-Br < C_6H_5-\overset{H}{\underset{CH_3}{C}}-Br < C_6H_5-\overset{CH_3}{\underset{C_6H_5}{C}}-Br$

Ans. a

Sol. Conceptual

59. The major product of the following reaction is

$$CH_2 = CH - CH_2 - OH \xrightarrow[Excess]{HBr} \text{Product}$$

a) $CH_3 - CHBr - CH_2Br$

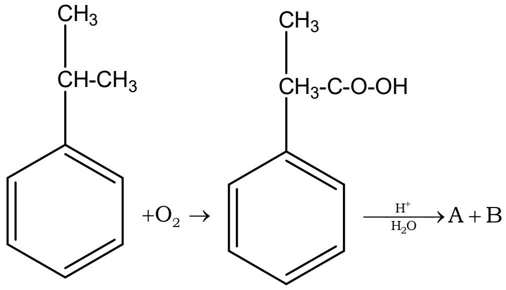
b) $CH_2 = CH - CH_2Br$

c) $CH_3 - CHBr - CH_2 - OH$

d) $CH_3 - CHOH - CH_2OH$

Ans. a

Sol. $CH_2 = CH - CH_2OH \xrightarrow[Excess]{HBr} CH_3CH(Br) -$
$CH_2OH \xrightarrow{HBr} CH_3CH(Br) - CH_2Br$

60. 

The product 'A' gives white precipitate when treated with bromine water. The product 'B' is treated with Barium hydroxide to give the product C. The compound C is heated strongly to form product D. The product D is

a) 4-Methylpent-3-en-2-one

b) But-2 enal

c) 3-Methylpent-3-en-2-one

d) 2-Methylbut-2-enal

Ans. a

Sol. A is phenol

B is acetone

Acetone when treated with $Ba(OH)_2$ Undergoes aldol condensation and followed by heating gives 4-methylpent -3-en-2-one