# KCET – 2024 TEST PAPER WITH ANSWER KEY (HELD ON FRIDAY 19TH APRIL 2024)

## CHEMISTRY

**1.** 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

**Ans. D**

**2.** $NO_2$ gas is :

(A) Colourless, neutral

(B) Colourless, acidic

(C) Brown, acidic

(D) Brown, neutral

**Ans. C**

**3.** 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

**Ans. D**

**4.** Gold sol in ***not*** a :

(A) Macromolecular colloid

(B) Lyophobic colloid

(C) Multimolecular colloid

(D) Negatively charged colloid

**Ans. A**

**5.** The ***incorrect*** statement about Hall-Heroult process is :

(A) Carbon anode is oxidised to CO and $CO_2$

(B) $Na_3AlF_6$ helps to decrease the melting point of the electrolyte

(C) $CaF_2$ helps to increase the conductivity of the electrolyte

(D) Oxidation state of oxygen changes in the overall cell reaction

**Ans. D**

**6.** Propanone and Propanal are :

(A) Position isomers

(B) Functional isomers

(C) Chain isomers

(D) Geometrical isomers

**Ans. B**

**7.** Sodium enthanoate on heating with soda lime give 'X'. Electrolysis of aqueous solution of sodium ethanoate gives 'Y', 'X' and 'Y' respectively are :

(A) Methane and Ethane

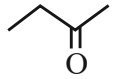
(B) Methane and Methane

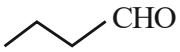
(C) Ethane and Methane

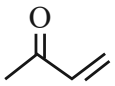
(D) Ethane and Ethane

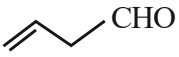
**Ans. A**

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

(A) 

(B) 

(C) 

(D) 

**Ans. A**

**9.** 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

**Ans. B**

**10.** In the reaction

$$\text{Aniline} \xrightarrow[\text{dil. HCl}]{\text{NaNO}_2} \text{P} \xrightarrow[\text{NaOH}]{\text{Phenol}} \text{Q},$$

'Q' is :

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

**Ans. C**

**11.** 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

**Ans. B**

**12.** The type of linkage present between nucleotides is :

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

**Ans. B**

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

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

**Ans. D**

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

(i) Teflon (ii) Starch (iii) Terylene (iv) Orlon

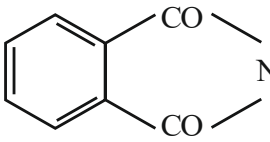
(A) (i) and (ii)
(B) (ii) and (iii)
(C) (iii) and (iv)
(D) (i) and (iv)

**Ans. C**

**15.** 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

**Ans. C**

**16.** The compound  is :

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

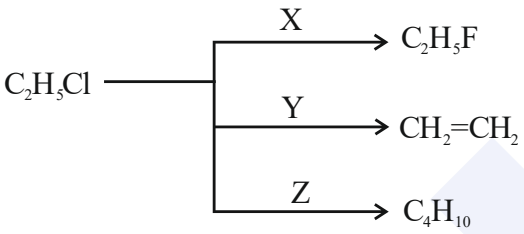
**Ans. Bonus**

**17.** Which one of the following is a cationic detergent ?

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

**Ans. A**

**18.** 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) $Hg_2F_2$, alcoholic KOH and Na in dry ether
(D) $CoF_2$, aqueous KOH and benzene

**Ans. C**

**19.** 8.8 g of monohydric alcohol added to ethyl magnesium iodide in ether liberates 2240 $cm^3$ 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

**Ans. B**

**20.** When a tertiary alcohol 'A' $(C_4H_{10}O)$ reacts with 20% $H_3PO_4$ at 358 K, it gives a compound 'B' $(C_4H_8)$ 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

**Ans. D**

**21.** PCC is :

(A) $K_2Cr_2O_7$ + Pyridine
(B) $CrO_3 + CHCl_3$
(C) $CrO_3 + H_2SO_4$
(D) A complex of chromium trioxide with pyridine + HCl

**Ans. D**

**22.** On treating 100 rnL of 0.1 M aqueous solution of the complex $CrCl_3.6H_2O$ with excess of $AgNO_3$, 2.86 g of AgCl was obtained. The complex is :

(A) $\left[Cr(H_2O)_3Cl_3\right].3H_2O$ (B) $\left[Cr(H_2O)_4Cl_2\right]Cl.2H_2O$

(C) $\left[Cr(H_2O)_5Cl\right]Cl_2.H_2O$ (D) $\left[Cr(H_2O)_6Cl_3\right]$

**Ans. C**

**23.** The complex compounds $\left[Co(NH_3)_5SO_4\right]Br$ and $\left[Co(NH_3)_5Br\right]SO_4$ are :

(A) Coordination isomers (B) Geometrical isomers

(C) Optical isomers (D) Ionisation isomer

**Ans. D**

**24.** Which of the following statements are true about $\left[CoF_6\right]^{3-}$ ion?

I. The complex has octahedral geometry.

II. Coordination number of Co is 3 and oxidation state is + 6.

III. The complex is $sp^3d^2$ 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

**Ans. B**

**25.** A haloalkane undergoes $S_N2$ or $S_N1$ reaction depending on :

(A) Solvent used in the reaction (B) Low temperature

(C) The type of halogen atom (D) Stability of the haloalkane

**Ans. A**

**26.** 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

**Ans. A**

**27.** In the analysis of III group basic radicals of salts, the purpose of adding $NH_4Cl_{(s)}$ to $NH_4OH$ is :

(A) To increase the concentration of $OH^-$ ions. (B) To precipitate the radicals of group IV and V.

(C) To suppress the dissociation of $NH_4OH$. (D) To introduce $Cl^-$ ions.

**Ans. C**

**28.** Solubility product of $CaC_2O_4$ at a given temperature in pure water is $4\times10^{-9}\left(mol\ L^{-1}\right)^2$. Solubility of $CaC_2O_4$ at the same temperature is :

(A) $6.3\times10^{-5}$ mol $L^{-1}$ (B) $2\times10^{-5}$ mol $L^{-1}$

(C) $2\times10^{-4}$ mol $L^{-1}$ (D) $6.3\times10^{-4}$ mol $L^{-1}$

**Ans. A**

**29.** In the reaction between moist $SO_2$ and acidified permanganate solution :

(A) $SO_2$ is oxidised to $SO_4^{2-}$
$MnO_4^-$ is reduced to $Mn^{2+}$

(B) $SO_2$ is reduced to S
$MnO_4^-$ is oxidised to $MnO_4$

(C) $SO_2$ is oxidised to $SO_3^{2-}$
$MnO_4^-$ is reduced to $MnO_2$

(D) $SO_2$ is reduced to $H_2S$
$MnO_4^-$ is oxidised to $MnO_4$

**Ans. A**

**30.** 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

**Ans. D**

**31.** Which one of the following nitrate will decompose to give $NO_2$ on heating ?

(A) $NaNO_3$
(B) $KNO_3$
(C) $RbNO_3$
(D) $LiNO_3$

**Ans. D**

**32.** Which of the following halides cannot be hydrolysed ?

(A) $CCl_4$
(B) $SiCl_4$
(C) $GeCl_4$
(D) $SnCl_4$

**Ans. A**

**33.** 0.48 g of an. organic compound on complete combustion produced 0.22 g of $CO_2$. The percentage of C in the given organic compound is :

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

**Ans. C**

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

$$CH_2=CH_2 \xrightarrow{P} \underset{\underset{Br}{|}}{CH_2}-\underset{\underset{Br}{|}}{CH_2} \xrightarrow{Q} CH_2=CH-Br \xrightarrow{R} CH\equiv CH \xrightarrow{S} C_6H_6$$

(A) $Br_2$, Alc. KOH, NaOH, $Al_2O_3$
(B) HBr, Alc, KOH, $CaC_2$, $KMnO_4$
(C) HBr, Alc. KOH, $NaNH_2$, Red hot iron tube
(D) $Br_2$, Alc. KOH, $NaNH_2$, Red hot iron tube

**Ans. D**

**35.** The first chlorinated organic insecticide prepared is :

(A) Gammexane
(B) Chloroform
(C) $COCl_2$
(D) DDT

**Ans. D**

**36.** 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

**Ans. B**

**37.** MnO exhibits :

(A) Ferrimagnetism (B) Antiferromagnetism

(C) Ferromagnetism (D) Paramagnetism

**Ans. B**

**38.** The number of atoms in 4.5 g of a face-centred cubic crystal with edge length 300 pm is :

(Given density = 10 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) $6.6 \times 10^{22}$

**Ans. D**

**39.** 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

**Ans. B**

**40.** 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

**Ans. C**

**41.** Which one of the following pairs will show positive deviation from Raoult's Law?

(A) Water - HCl (B) Benzene - Methanol

(C) Water - $HNO_3$ (D) Acetone - Chloroform

**Ans. B**

**42.** How many Coulombs are required to oxidise 0.1 mole of $H_2O$ to oxygen?

(A) $1.93 \times 10^5$ C (B) $1.93 \times 10^4$ C

(C) $3.86 \times 10^4$ C (D) $9.65 \times 10^3$ C

**Ans. B**

**43.** 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 $Ca = 40\,g\,mol^{-1}$ )

(A) 6.0 g (B) 2.0 g

(C) 8.0 g (D) 4.0 g

**Ans. D**

**44.** The value of 'A' in the equation $\lambda_m = \lambda_m^\circ - A\sqrt{C}$ is same for the pair :

(A) NaCl and $CaCl_2$ (B) $CaCl_2$ and $MgSO_4$

(C) NaCl and KBr (D) $MgCl_2$ and NaCl

**Ans. C**

**45.** For the reaction, $A \rightleftharpoons B, E_a = 50\,kJ\,mol^{-1}$ and $\Delta H = -20\,kJ\,mol^{-1}$. When a catalyst is added, $E_a$ decreases by $10\,kJ\,mol^{-1}$. What is the $E_a$ for the backward reaction in the presence of catalyst?

(A) $60\,kJ\,mol^{-1}$ (B) $40\,kJ\,mol^{-1}$

(C) $70\,kJ\,mol^{-1}$ (D) $20\,kJ\,mol^{-1}$

**Ans. A**

**46.** For the reaction $PCl_5 \rightarrow PCl_3 + Cl_2$, rate and rate constant are $1.02\times10^{-4}\,mol\,L^{-1}\,s^{-1}$ and $3.4\times10^{-5}\,s^{-1}$ respectively at a given instant. The molar concentration of $PCl_5$ at that instant is :

(A) $8.0\,mol\,L^{-1}$ (B) $3.0\,mol\,L^{-1}$

(C) $0.2\,mol\,L^{-1}$ (D) $2.0\,mol\,L^{-1}$

**Ans. B**

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

(A) $\log k = \log A - \dfrac{Ea}{2.303RT}$ (B) $k = Ae^{-Ea/RT}$

(C) $\ln k = -\dfrac{Ea}{RT} + \ln A$ (D) $k = Ae^{Ea/RT}$

**Ans. D**

**48.** 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

**Ans. D**

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

(A) $PO_4^{3-} > SO_4^{2-} > Cl^- > \left[Fe(CN)_6\right]^{4-}$ (B) $Cl^- > SO_4^{2-} > PO_4^{3-} > \left[Fe(CN)_6\right]^{4-}$

(C) $SO_4^{2-} = Cl^- = PO_4^{3-} = \left[Fe(CN)_6\right]^{4-}$ (D) $\left[Fe(CN)_6\right]^{4-} > PO_4^{3-} > SO_4^{2-} > Cl^-$

**Ans. D**

**50.** 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

**Ans. D**

**51.** The energy associated with first orbit is $He^+$ is

(A) 0J (B) $-8.72\times10^{-18}\,J$

(C) $-4.58\times10^{-18}\,J$ (D) $-0.545\times10^{-18}\,J$

**Ans. B**

**52.** A metalloid is

(A) Bi (B) Sb

(C) P (D) Se

**Ans. B**

**53.** A pair of isoelectric species having bond order of one is:

(A) $N_2$, CO (B) $N_2$, $NO^+$

(C) $O_2^{2-}$, $F_2$ (D) CO, $NO^+$

**Ans. C**

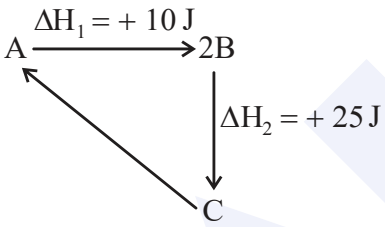
**54.** Identify the ***wrong*** relation for real gases

(A) $Z = \frac{V_{ideal}}{V_{real}}$ (B) $P_{ideal} = P_{real} + \frac{an^2}{V^2}$

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

**Ans. A & C**

**55.** From the diagram




$\Delta_r H$ for the reaction $C \rightarrow A$ is

(A) +35J (B) –15J

(C) –35J (D) +15J

**Ans. C**

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

(A) Mg (B) Fe

(C) Zn (D) Co

**Ans. B**

**57.** Match the following:

| | |
|---|---|
| I. $Zn^{2+}$ | i. $d^8$ configuration |
| II. $Cu^{2+}$ | ii. colourless |
| III. $Ni^{2+}$ | iii. $\mu = 1.73$BM |

| | I | II | II |
|---|---|---|---|
| (A) | i | ii | iii |
| (B) | ii | iii | i |
| (C) | ii | i | iii |
| (D) | i | iii | ii |

**Ans. B**

**58.** Which of the following statements related to lanthanoids is **incorreect**?

(A) Lanthanoids are silvery white soft metals

(B) Samarium shows +2 oxidation state

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

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

**Ans. D**

**59.** 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

**Ans. C**

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

(A) Radon

(B) Radium

(C) Oganesson

(D) Xenon

**Ans. C**