हमारा विश्वास... हर एक विद्यार्थी है ख़ास

# NEET

12<sup>th</sup> Sep. 2021

QUESTION PAPER WITH SOLUTION



CHEMISTRY CODE - P2











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हमारा विश्वास... हर एक विद्यार्थी है खास

#### **SECTION - A**

- 51. The incorrect statement among the following is:
  - (1) Actinoids are highly reactive metals, especially when finely divided.
  - (2) Actinoid contraction is greater for element to element than Lanthanoid contraction.
  - (3) Most of the trivalent Lanthanoid ions are colorless in the solid state.
  - (4) Lanthanoids are good conductors of heat and electricity.
- Sol. 3

Fact

**52.** Given below are two statements:

#### Statement I:

Aspirin and Paracetamol belong to the class of narcotic analgesics.

#### Statement II:

Morphine and Heroin are non-narcotic analgesics. In the light of the above statements, choose the correct answer from the options given below.

- (1) Statement I is incorrect but Statement II is true.
- (2) Both Statement I and Statement II are true.
- (3) Both Statmenet I and Statement II are false.
- (4) Statement I is correct but Statement II is false.
- Sol. 3

Fact

#### 53. Statement-I:

Acid strength increases in the order given as HF << HCl << HBr << HI.

#### Statement II:

As the size of the elements F, Cl, Br, I increases down the group, the bond strength of HF, HCl, HBr and HI decreases and so the acid strength increases.

In the light of the above statements, choose the correct answer from the options given below.

- (1) Statement I is incorrect but Statement II is true.
- (2) Both Statement I and Statement II are true.
- (3) Both Statement I and Statement II are false.
- (4) Statement I is correct but Statement II is false.
- Sol.

In hydra acids acidic strength increases an moving down the group as acid easily release H+ and conjugate anion stabilise due to decrease in charge density

54. Which one among the following is the correct option for right relationship between C<sub>P</sub> and C<sub>V</sub> for one mole of ideal gas?

(1) 
$$C_V = RC_P$$

(2) 
$$C_P + C_V = R$$
 (3)  $C_P - C_V = R$  (4)  $C_P = RC_V$ 

(3) 
$$C_P - C_v = R$$

$$(4) C_P = RC_V$$

Sol.

$$C_P - C_V = R$$



**NEET KOTA CLASSROOM** 

New Batch Starting from : 15<sup>th</sup> Sep. 2021

55.	The correct option for the number of body centred unit cells in all 14 types of Bravais lattice unit cells is:					
	(1) 3	(2) 7	(3) 5		(4) 2	
Sol.	1	1000				
	Cubic	→ 1BCC	T			
	Tetragonal	→ 1BCC	Total BC	C 3		
	Orthorhombic	→ 1BCC				
56.	Among the following alkaline earth metal halides, one which is covalent and soluble in organ					
50.	solvents is :					
	(1) Beryllium chlor	ide	(2) Calc	(2) Calcium chloride		
	(3) Strontium chlor					
Sol.	1	(4) Magnesium chloride				
50	Covalent character directly proportional to the polarisation &					
	Polarisation   charge on cation & anion					
	Polarisation $\propto \frac{1}{\text{size of cation}}$					
	Polarisation ∞ size of anion					
	Here +ve = const					
	-ve = const					
	Size of anion = constant Size of cation: Be <sup>+2</sup> <mg<sup>+2<ca<sup>+2<sr<sup>+2</sr<sup></ca<sup></mg<sup>					
	$\therefore \text{ Polarisation Be}^{+2} > \text{Mg}^{+2} > \text{Ca}^{+2} > \text{Sr}^{+2}$					
	∴ Covalent character BeCl <sub>2</sub> >MgCl <sub>2</sub> >CaCl <sub>2</sub> >SrCl <sub>2</sub>					
<b>57.</b>		radioactive isotope of hydrogen, emits which of the following particles?				
	(1) Neutron (n)		(2) Beta			
	(3) Alpha ( $\alpha$ )		(4) Gan	nma (γ)		
Sol.	2					
58.	The maximum temperature that can be achieved is blast furnace is:					
30.	(1) upto 5000 K	berature that can be a		1200 K	cers.	
	(3) upto 2200 K		. , .	1900 K		
Sol.	3		(+) upt	) 1300 K		
501.	Fact					
	1 460					
59.	BF <sub>3</sub> is planar and electron deficient compound. Hybridization and number of electrons aroun					
	the central atom, respectively are :					
	(1) sp <sup>2</sup> and 8	, , , , ,	(2) sp <sup>3</sup>	and 4		
	(3) sp <sup>3</sup> and 6		(4) sp <sup>2</sup>			
Sol.	4		( ) -			
	∠F					
	F—B					
	$\ell p \text{ on CA} = 0$					
	$\sigma$ -bond with boron = 3					
	∴ Stearic number = 3					
	Hybridization = $sp^2$					

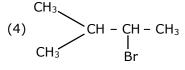
**60.** The major product of the following chemical reaction is:

$$CH_3$$
  $CH - CH = CH_2 + HBr \frac{(C_6H_5CO)_2O_2}{CH_3}$ ?

$$CH_3$$
 $CBr - CH_2 - CH_3$ 

$$CH_3$$
 CH -  $CH_2$  -  $CH_2$  -  $Br$ 

(3) 
$$CH_3 - CH_2 - CH_2 - O - COC_6H_5$$



Sol. 2

Peroxide effect, major product according to anti markovnikov's rule (based on stability of free radical intermediate)

**61.** The molar conductance of NaCl, HCl and CH<sub>3</sub>COONa at infinite dilution are 126.45, 426.16 and 91.0 S cm<sup>2</sup> mol<sup>-1</sup> respectively. The molar conductance of CH<sub>3</sub>COOH at infinite dilution is. Choose the right option for your answer.

(1) 540.48 S cm<sup>2</sup> mol<sup>-1</sup>

(2) 201.28 S cm<sup>2</sup> mol<sup>-1</sup>

(3) 390.71 S cm<sup>2</sup> mol<sup>-1</sup>

(4) 698.28 S cm<sup>2</sup> mol<sup>-1</sup>

**Sol.** 3

$$NaCl \longrightarrow Na^{+} + Cl^{-} \qquad \dots (1)$$

$$HCI \longrightarrow H^+ + CI^- \qquad .... (2)$$

$$CH_3COONa \longrightarrow CH_3COO^- + Na^+ \dots (3)$$

$$(2) + (3) - (1)$$

$$= 390.71$$

**62.** A particular station of All India Radio, New Delhi, broadcasts on a frequency of 1.368 kHz (kilohertz). The wavelength of the electromagnetic radiation emitted by the transmitter is : [speed of light,  $c = 3.0 \times 10^8 \text{ ms}^{-1}$ ]

- (1) 21.92 cm
- (2) 219.3 m
- (3) 219.2 m
- (4) 2192 m

$$\gamma = \frac{C}{a}$$

$$\lambda = \frac{C}{2}$$

$$\lambda = \frac{3 \times 10^8}{1368 \times 10^3}$$

$$\lambda = 219.29 = 219.3 \text{ m}$$

(1) 
$$2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2 \uparrow$$
 (2)  $2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2 \uparrow$ 

(2) 
$$2KCIO_3 \xrightarrow{\Delta} 2KCI + 3O_3$$

(3) 
$$Cr_2O_3 + 2Al \xrightarrow{\Delta} Al_2O_3 + 2Cr$$
 (4)  $Fe + 2HCl \rightarrow FeCl_2 + H_2 \uparrow$ 

(4) Fe + 2HCl 
$$\rightarrow$$
 FeCl<sub>2</sub> + H<sub>2</sub> 1

#### Sol.

$$Cr_2O_3 + 2AI \longrightarrow AI_2O_3 + 2Cr$$

#### 64. The right option for the statement. "Tyndall effect is exhibited by". is:

(1) Urea solution

(2) NaCl solution

(3) Glucose solution

(4) Starch solution

#### Sol. 4

Tyndall effect shown by starch solution

#### 65. The compound which shows metamerism is:

- (1)  $C_4H_{10}O$
- (2)  $C_5H_{12}$
- (3) C<sub>3</sub>H<sub>8</sub>O
- (4) C<sub>3</sub>H<sub>6</sub>O

#### Sol. 1

#### C<sub>4</sub>H<sub>10</sub>O

This molecular formula is applicable for homologous series ether (-O-) a bivalent functional group and as we know ether with minimum four-C shows metamerism.

CH<sub>3</sub>-CH<sub>2</sub>-O-CH<sub>2</sub>-CH<sub>3</sub> & CH<sub>3</sub>-O-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>3</sub> are metamers.

#### Match List I with List-II. 66.

#### List-I List-II

- (a) PCl<sub>5</sub>
- (i) Square pyramidal
- (b) SF<sub>6</sub>
- (ii) Trigonal planar
- (c) BrF<sub>5</sub>
- (iii) Octahedral
- (d) BF<sub>3</sub>
- (iv) Trigonal bipyramidal

Choose the correct answer from the options given below:

- (1) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
- (2) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
- (3) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
- (4) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

#### Sol. 2

# SN(Stearic number)

PCl<sub>5</sub> 5 
$$\ell p = 0 \ \sigma = 5$$
 Trigonal bipyramidal SF<sub>6</sub> 6  $\ell p = 0 \ \sigma = 6$  octahedral

SF<sub>6</sub> 6

BF<sub>3</sub>

 $\ell p = 1 \sigma = 5$  square pyramidal  $\ell p = 0 \sigma = 3$  trigonal bipyramidal

#### 67. Which one of the following polymers is prepared by addition polymerisation?

(1) Dacron

BrF<sub>5</sub>

- (2) Teflon
- (3) Nylon-66
- (4) Novolac

#### Sol.

Teflon is addition polymer which formed by addition polymerisation of Tetra fluoroethene

$$n F_2C = CF_2 \xrightarrow{\text{Polymerisation}} \left[F_2C - CF_2\right]_n$$

6

3

- 68. The RBC deficiency is deficiency disease of:
  - (1) Vitamin B<sub>2</sub>
- (2) Vitamin B<sub>12</sub>
- (3) Vitamin B<sub>6</sub> (4) Vitamin B<sub>1</sub>

Sol. 2

Vitamin B<sub>12</sub>

69. Identify the compound that will react with Hinsberg's reagent to give a solid which dissolves in

(4) 
$$CH_3$$
  $CH_2$   $NH_2$ 

Sol. 4

> 1º amine reacts with hinsberg reagent to give ppt. that is soluble in alkali. CH<sub>3</sub>-CH<sub>2</sub>-NH<sub>2</sub>

- 70. Zr(Z=40) and Hf(Z=72) have similar atomic and ionic radii because of :
  - (1) having similar chemical properties
  - (2) belogning to same group
  - (3) diagonal relationship
  - (4) lanthanoid contraction
- Sol.

From IV A to II B

Due to lanthanoid contration size of 4d & 5d series elements of same group are approx same.

- Ethylene diaminetetraacetate (EDTA) ion is: 71.
  - (1) Tridentate ligand with three "N" donor atoms
  - (2) Hexadentate ligand with four "O" and two "N" donor atoms
  - (3) Unidentate ligand
  - (4) Bidentate ligand with two "N" donor atoms
- Sol.

- 72. The major product formed in dehydrohalogenation reactions of 2-Bromo pentane is Pent-2-ene. This product formation is based on?
  - (1) Huckel's Rule

(2) Saytzeff's Rule

(3) Hund's Rule

(4) Hofmann Rule

$$\begin{array}{c|c} CH_3-CH_2-CH_2-CH_3 & \underline{Base} \\ & (E_2) & Major \\ Br & More stable \\ Saytzeff's product \\ & CH_3-CH_2-CH_2-CH=CH_2 \\ & Minor \\ less stable \\ & Hofomann's product \\ \end{array}$$

- **73.** An organic compound contains 78% (by wt.) carbon and remaining percentage of hydrogen. The right option for the empirical formula of this compound is: [Atomic wt. of C is 12, H is 1] (1) CH<sub>4</sub>

- (2) CH
- (3) CH<sub>2</sub>
- (4) CH<sub>3</sub>

C 78 
$$\frac{78}{12} = 6.5$$
  $\frac{6.5}{6.5} = 1$   
H 22  $\frac{22}{1} = 22$   $\frac{22}{6.5} = 3.38 \approx 3$ 

- 74. The  $pK_b$  of dimethylamine and  $pK_a$  of acetic acid are 3.27 and 4.77 respectively at T(K). The correct option for the pH of dimethylammonium acetate solution is:
  - (1) 6.25
- (2) 8.50
- (3) 5.50
- (4) 7.75

$$pH \; = \; 7 + \frac{1}{2} P^{Ka} \, - \frac{1}{2} P^{Kb}$$

$$pH = 7 + \frac{1}{2} \times 4.77 - \frac{1}{2} \times 3.27$$

$$pH = 7 \times \frac{1}{2} \times 1.5$$

$$pH = 7.75$$

- **75.** The structure of beryllium chloride in solid state and vapour phase, are:
  - (1) Chain in both

(2) Chain and dimer, respectively

(3) Linear in both

(4) Dimer and Linear, respectively

Sol.

BeCl<sub>2(s)</sub> polymeric

BeCl<sub>2(v)</sub> Dimer

- 76. Which one of the following methods can be used to obtain highly pure metal which is liquid at room temperature?
  - (1) Zone refining

(2) Electrolysis

(3) Chromatography

(4) Distillation

Sol. 1

Fact

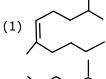
- 77. Right option for the number of tetrahedral and octahedral voids in hexagonal primitive unit cell are:
  - (1) 12, 6
- (2) 8, 4
- (3) 6, 12
- (4) 2, 1

1

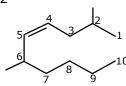
$$THV = 12$$

$$OHV = 6$$

**78.** The correct structure of 2, 6-Dimethyl-dec-4-ene is :

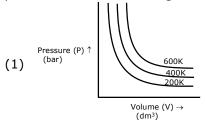


**Sol.** 2

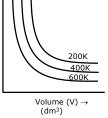


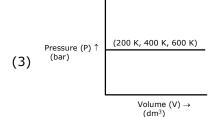
2, 6-Dimethyl dec-4-ene

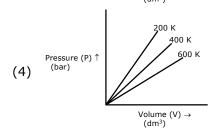
**79.** Choose the correct option for graphical representation of Boyle's law, which shows a graph of pressure vs. volume of a gas at different temperature.

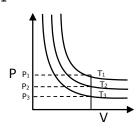












$$PV = nRT$$

$$P \propto T$$

$$P_1 > P_2 > T_3$$

$$T_1 > T_2 > T_3$$

**80.** The following solutions were prepared by dissolving 10g of glucose ( $C_6H_{12}O_6$ ) in 250 ml of water ( $P_1$ ), 10 g of urea ( $C_1H_{12}O_1$ ) in 250 ml of water ( $P_2$ ) and 10 g of sucrose ( $C_1H_{12}O_1$ ) in 250 ml of water ( $P_3$ ). The right option for the decreasing order of osmotic pressure of these solution is:

(1)  $P_3 > P_1 > P_2$ 

(2) 
$$P_2 > P_1 > P_3$$

(3) 
$$P_1 > P_2 > P_3$$

(4) 
$$P_2 > P_3 > P_1$$

Sol. 2

$$\Pi = CRT$$

$$\Pi \propto C \ \Rightarrow \Pi \propto \ \frac{1}{M_W}$$

 $Glucose \Rightarrow M_{w1} = 180$ 

 $Urea \Rightarrow M_{w2} = 60$ 

Sucrose  $\Rightarrow$  M<sub>w3</sub> = 342

 $P_2 > P_1 > P_3$ 

**81.** The correct sequence of bond enthalpy of 'C-X' and is

(1)  $CH_3 - CI > CH_3 - F > CH_3 - Br > CH_3 - I$ 

- (2)  $CH_3 F < CH_3 CI < CH_3 Br < CH_3 I$
- (3)  $CH_3 F > CH_3 CI > CH_3 Br > CH_3 I$
- (4)  $CH_3 F < CH_3 CI > CH_3 Br > CH_3 I$

**Sol.** 3

Bond enthalpy of C-X bond

 $CH_3-F > CH_3-CI > CH_3-Br > CH_3-I$ 

Down the group with the increase in size of halogen in C-X bond, energy decreases.

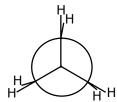
**82.** Dihedral angle of least stable conformer of ethane is :

 $(1) 0^{\circ}$ 

- $(2) 120^{\circ}$
- $(3) 180^{\circ}$
- $(4) 60^{\circ}$

Sol. 1

Least stable conformer of ethane is eclipsed form



It's when dihedral angle is 0°.

- **83.** Noble gases are named because of their inertness towards reactivity. Identify an incorrect statement about them.
  - (1) Noble gases have large positive values of electron gain enthalpy.
  - (2) Noble gases are sparingly soluble in water.
  - (3) Noble gases have very high melting and boiling points.
  - (4) Noble gases have weak dispersion forces.
- Sol. 3

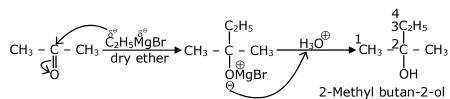
Fact

- **84.** What is the IUPAC name of the organic compound formed in the following chemical reaction? Acetone  $\xrightarrow{(i)C_2H_5MgBr, dry Ether}$  Product
  - (1) 2-methyl butan-2-ol

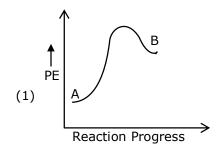
(2) 2-methyl propan-2-ol

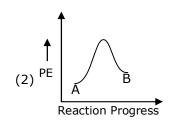
(3) pentan-2-ol

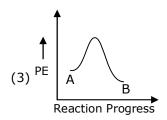
(4) pentan-3-ol

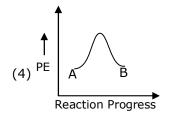


**85.** For a reaction  $A \rightarrow B$ , enthalpy of reaction is -4.2 kJ mol<sup>-1</sup> and enthalpy of activation is 9.6 kJ mol<sup>-1</sup>. The correction potential energy profile for the reaction is shown in option.









Sol. 3  $\Delta H = (E_a)_f - (E_a)_b$   $-4.2 = 9.6 - (E_a)_b$  $(E_a)_b = 13.8$ 

### **SECTION - B**

**86.** Match List-I with List-II.

#### List-I

# List-II

- (a)  $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$
- (i) Acid rain
- (b)  $HOCl(g) \xrightarrow{hv} OH + CI$
- (ii) Smog
- (c)  $CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$  (iii) Ozone depletion
- (d)  $NO_2(g) \xrightarrow{hv} NO(g) + O(g)$
- (iv) Tropospheric pollution

Choose the correct answer from the options given below.

- (1) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
- (2) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
- (3) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
- (4) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

Sol. 4

Fact

87.  $CH_3CH_2COO^-Na^+ \xrightarrow{NaOH, +?} CH_3CH_3 + Na_2CO_3.$ 

Consider the above reaction and identify the missing reagent/chemical.

(1) DIBAL-H

(2) B<sub>2</sub>H<sub>6</sub>

(3) Red Phosphorus

(4) CaO

Sol. 4

$$CH_3 - CH_2 - COONa \xrightarrow{NaOH + ?} CH_3 - CH_3$$

It's decarboxylation in presence of sodalime so missing reagent is CaO.

(NaOH + CaO) sodalime

**88.** The correct option for the value of vapour pressure of a solution at 45°C with benzene to octane in molar ratio 3 : 2 is :

[At 45°C vapour pressure of benzene is 280 mm Hg and that of octane is 420 mm Hg. Assume Ideal gas]

(1) 350 mm of Hg

(2) 160 mm of Hg

(3) 168 mm of Hg

(4) 336 mm of Hg

$$P_{s} = P_{A}^{O} x_{A} + P_{B}^{O} x_{B}$$

$$= 280 \times \frac{3}{5} + 420 \times \frac{2}{5}$$

$$= 56 \times 3 + 84 \times 2$$

$$= 168 + 168$$

$$= 336$$

#### **89.** Match List-I with List-II

#### List-I

#### List-II

(i) Hell-Volhard-Zelinsky reaction

$$(b) \begin{array}{c} O \\ \parallel \\ R-C-CH_3 + \\ NaOX \rightarrow \end{array}$$

(ii) Gattermann-Koch reaction

(iii) Haloform reaction

(d) R-CH<sub>2</sub>COOH
$$\xrightarrow{\text{(i)}X_2/\text{Red P}}$$

$$\xrightarrow{\text{(ii)}H_2O}$$

(iv) Esterification

Choose the correct answer from the options given below:

# **Sol.** 1

(a) 
$$+ (CO + HCI) \xrightarrow{AlCl_3} CuCl \rightarrow$$

Gattermann Koch aldehyde synthesis

(b) 
$$R-C-CH_3 \xrightarrow{NaOX} CHX_3 + R-COONa$$

Haloform reaction

(c) 
$$R-CH_2-OH + R'-COOH \xrightarrow{conc. H_2SO_4} R'-C-O-CH_2-R$$

Esterification

(d) 
$$R-CH_2-COOH \xrightarrow{(i) X_2/Red P} R-CH-COOH$$

HVZ Reaction (Hell-volhard zelinsky Reaction)

**90.** The intermediate compound 'X' in the following chemical reaction is :

$$CH_3 + CrO_2Cl_2 \xrightarrow{CS_2} X \xrightarrow{H_3O^+} H$$

**Sol.** 2

$$CH_3 + C_rO_2CI_2 \xrightarrow{CS_2} \chi \xrightarrow{H_3O^{\oplus}} CH = 0$$

It's Etard Reaction "X" formed during the reaction

**91.** The product formed in the following chemical reaction is:

$$CH_2 - C - OCH_3$$

$$CH_3$$

$$CH_3$$

$$CH_3$$

$$NaBH_4$$

$$C_2H_5OH$$

$$\begin{array}{c|c}
OH & O\\
CH_2 - C - OCH_3
\end{array}$$
(1)

$$\begin{array}{c}
OH & H \\
CH_2 - C - OCH_3 \\
OH
\end{array}$$

$$(4) \begin{array}{c} OH & H \\ CH_2 - C - CH_3 \\ OH \end{array}$$

**Sol.** 1

$$CH_{2}-C-OCH_{3}$$

$$CH_{2}-C-OCH_{3}$$

$$CH_{3}$$

$$CH_{3}$$

$$CH_{3}$$

$$CH_{3}$$

$$CH_{3}$$

NaBH<sub>4</sub> does not reduce ester group

The slope of Arrhenius Plot  $\left(\ln K / vs \frac{1}{T}\right)$  of first order reaction is  $-5 \times 10^3$  K. The value of  $E_a$  of 92.

the reaction is. Choose the correct option for your answer.

[Given  $R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$ ]

- (1)  $-83 \text{ kJ mol}^{-1}$  (2)  $41.5 \text{ kJ mol}^{-1}$
- (3) 83.0 kJ mol<sup>-1</sup>
- (4) 166 kJ mol<sup>-1</sup>

Sol.

$$Ink = InA - \frac{E_a}{RT}$$

$$m = -\frac{E_a}{R}$$

$$\frac{-E_a}{R} = -5 \times 10^3$$

$$E_a = 5 \times 10^3 \times 8.314$$

$$E_a = 41.5$$

93. The reagent 'R' in the given sequence of chemical reaction is :

$$\begin{array}{c} \text{Br} \\ \text{Br} \\ \text{Br} \\ \end{array} \begin{array}{c} \text{Br} \\ \text{Br} \\ \text{Br} \\ \end{array} \begin{array}{c} \text{Br} \\ \text{Br} \\ \text{Br} \\ \end{array} \begin{array}{c} \text{Br} \\ \text{Br} \\ \text{Br} \\ \end{array}$$

- (1) CuCN/KCN
- $(2) H_2O$
- (3) CH<sub>3</sub>CH<sub>2</sub>OH
- (4) HI

Sol.

$$\begin{array}{c} \text{Br} \\ \text{Br} \\ \\ \text{R} = \text{CH}_3 - \text{CH}_2 - \text{OH} \\ \\ \text{Br} \\ \\ \text{Br} \\ \\ \text{R} = \text{CH}_3 - \text{CH}_2 - \text{OH} \\ \\ \text{CH}_3 - \text{CH}_3 - \text{CH}_2 - \text{OH} \\ \\ \text{CH}_3 - \text{CH}_3 - \text{CH}_3 - \text{CH}_2 - \text{OH} \\ \\ \text{CH}_3 - \text{CH}_3$$

- 94. For irreversible expansion of an ideal gas under isothermal condition, the correct option is :
  - (1)  $\Delta U \neq 0$ ,  $\Delta S_{total} = 0$

(2)  $\Delta U = 0$ ,  $\Delta S_{total} = 0$ 

(3)  $\Delta U \neq 0$ ,  $\Delta S_{total} \neq 0$ 

(4)  $\Delta U = 0$ ,  $\Delta S_{total} \neq 0$ 

$$\Delta S_{total} > 0$$

$$\Delta S_{total} \neq 0$$

$$\Delta U = 0$$

- **95.** From the following pairs of ions which one is not an iso-electronic pair?
  - (1)  $Fe^{2+}$ ,  $Mn^{2+}$

(2) O<sup>2-</sup>, F<sup>-</sup>

(3) Na+, Mg<sup>2+</sup>

(4)  $Mn^{2+}$ ,  $Fe^{3+}$ 

**Sol.** 1

Not isoelectronic

- Fe<sup>+2</sup> Mn<sup>+2</sup>
  - $\downarrow$   $\downarrow$
- 24e<sup>-</sup> 23e<sup>-</sup>
- **96.** The molar conductivity of 0.007 M acetic acid is 20 Scm<sup>2</sup>mol<sup>-1</sup>. What is the dissociation constant of acetic acid? Choose the correct option.

- (1)  $2.50 \times 10^{-5} \text{ mol L}^{-1}$
- (2)  $1.75 \times 10^{-4} \text{ mol L}^{-1}$
- (3)  $2.50 \times 10^{-4} \text{ mol L}^{-1}$
- (4)  $1.75 \times 10^{-5} \text{ mol L}^{-1}$
- Sol. 4

$$(\Lambda_{\rm m}^{\infty})_{\rm CH_3COOH} = 50 + 350$$

$$\alpha = \frac{\Lambda_m}{\Lambda_m^{\infty}} = \frac{20}{400} = 0.05$$

- $= K_a = C\alpha^2$
- $= 0.007 \times (0.05)^2$
- $= 7 \times 10^{-3} \times 25 \times 10^{-4}$
- $= 175 \times 10^{-7}$
- $= 1.75 \times 10^{-5}$
- **97.** Which of the following molecules is non-polar in nature?
  - (1) NO<sub>2</sub>
- (2) POCl<sub>3</sub>
- (3) CH<sub>2</sub>O
- (4) SbCl<sub>5</sub>

Sol. 4

Fact

**98.** Match List – I with List – II.

## List - I

List - II

(a)  $[Fe(CN)_6]^{3-}$ 

(i) 5.92 BM

(b)  $[Fe(H_2O)_6]^{3+}$ 

(ii) 0 BM

(c)  $[Fe(CN)_6]^{4-}$ 

(iii) 4.90 BM

(d)  $[Fe(H_2O)_6]^{2+}$ 

- (i) 1.73 BM
- Choose the correct answer from the options given below.
- (1) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
- (2) (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)
- (3) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)
- (4) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

- - Back pairing •
  - ∴ n = 1
  - $\therefore \mu = 1.73 \text{ BM}$
- (b)  $[Fe(H_2O)_6]^{+3} Fe^{+2}$
- 3 d<sup>3</sup>
  - Back pairing x
  - ∴ n = 5
  - $\therefore \mu = 5.92 \text{ BM}$
- (c) [Fe(CN)<sub>6</sub>]<sup>4-</sup> Fe<sup>+2</sup>
- 3 d<sup>6</sup>

Back pairing .

- ∴ n = 0
- $\therefore \mu = 0 BM$
- (d)  $[Fe(H_2O)_6]^{+2} Fe^{+2}$
- $\begin{array}{c|c}
  3 & d^6 \\
  \hline
  1 & 1 & 1 & 1 \\
  Back pairing \checkmark
  \end{array}$ 
  - ∴ n = 4
  - $\therefore \mu = 4.90 \text{ BM}$
- **99.** Choose the correct option for the total pressure (in atm.) in a mixture of 4g  $O_2$  and 2g  $H_2$  confined in a total volume of one litre at  $0^{\circ}$ C is :
  - [Given R = 0.82 L atm mol<sup>-1</sup> K<sup>-1</sup>, T = 273 K]
  - (1) 26.02

(2) 2.518

(3) 2.602

(4) 25.18

- Sol. 4
  - PV = nRT
  - $P \times 1 = \left(\frac{4}{32} + \frac{2}{2}\right) \times 0.082 \times 273$
  - P = 25.18 atm.
- **100.** In which one of the following arrangements the given sequence is not strictly according to the properties indicated against it?
  - $(1) \ CO_2 {<} SiO_2 {<} SnO_2 {<} PbO_2 \qquad \qquad : Increasing oxidizing power$
  - (2) HF<HCl< HBr<HI : Increasing acidic strength
  - (3)  $H_2O < H_2S < H_2Te$  : Increasing pK<sub>a</sub> values
  - (4)  $NH_3 < PH_3 < AsH_3 < SbH_3$  : Increasing acidic character
- **Sol.** 3
  - Oxidising power :  $CO_2 < SiO_2 < SnO_2 < PbO_2$
  - Acidic strength : HF< HCl < HBr < HI
  - $P_{Ka}$  :  $H_2O > H_2S > H_2Se > H_2Te$
  - Acidic strength :  $\propto \frac{1}{P_{e}}$
  - Acidic strength :  $NH_3 < PH_3 < AsH_3 < SbH_3$

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