# Wings

# Physical Chemistry_Revision_Set I

**DATE:** 08-01-2022 **TIME:** 200mins

**1** **A radioactive element has atomic mass 90 amu and a half-life of 28 years. The number of disintegrations per second per gm of the element is-**

**Correct Options:**

**(D)** $5.24 \times 10^{12}$

**Solution:**

$\lambda = \frac{0.693}{28 \times 365 \times 24 \times 3600} = 7.848 \times 10^{-10}\ \text{sec}^{-1}$

$\therefore a = 7.848 \times \frac{1}{90} \times 6.023 \times 10^{23} \times 10^{-10}$

$= 5.24 \times 10^{12}$

**2** **The suspension of slaked lime in water is known as:**

**Correct Options:**

**(C)** Milk of lime

**Solution:**

Milk of lime

**3** **An insulated container of gas has two chambers separated by an insulating partition. One of the chambers has volume $V_1$ and contains ideal gas at pressure P1 and temperature $T_1$. The other chambers has volume v2 and contains ideal gas at pressure $P_2$ and temperature $T_2$. If the partion is removed without doing any work on the gas, the final equilibrium temperature of the gas in the container will be**

**Correct Options:**

**(A)**

$$\frac{T_1T_2(P_1V_1+P_2V_2)}{P_1V_1T_2+P_2V_2T_1}$$

**Solution:**

$$\Delta U = \Delta U_1 + \Delta U_2 = q + \omega = 0$$
$$\Rightarrow\ n_1C_v(T_f - T_1) + n_2C_v(T_f - f_2) = 0$$

$$\text{Where, } n_1 = \frac{p_1v_1}{RT_1} \ \&\ n_2 = \frac{p_2v_2}{RT_2}$$

$$\therefore\ T_f = \frac{T_1T_2(P_1V_1+P_2V_2)}{P_1v_1T_2+P_2V_2T_1}$$

**4** ***The ratio of closed packed atoms to tetrahedral holes in cubic close packing is***

**Correct Options:**

**(B)** *1:2*

**Solution:**

Every constituent has two tetrahedral voids

In CCP lattice no. of atoms $= 8 \times \frac{1}{8} + 6 \times \frac{1}{2} = 4$

$\therefore$ tetrahedral voids $= 4 \times 2 = 8$ Thus, ratio $= 4:8$ i.e. 1:2

**5**

The correct option for free expansion of an ideal gas under adiabatic condition is

**Correct Options:**

**(A)** $q = 0, \Delta T = 0$ and $w = 0$

**Solution:**

(a) : For free expansion of an ideal gas, $P_{ex} = 0$,
$w = -P_{ex}\Delta V = 0$
For adiabatic process, $q = 0$
According to first law of thermodynamics,
$\Delta U = q + w = 0$

As internal energy of an ideal gas is a function of temperature, $\Delta U = 0$, $\therefore$ $\Delta T = 0$

**6**

**A particle of mass M is moving in a horizontal circle of radius R with uniform speed V When it moves from one point to a diametrically opposite point, its:**

**Correct Options:**

**(C)** momentum changes by 2MV

**Solution:**

momentum changes by 2MV

**7**

**The oscillating electric and magnetic field vectors of electromagnetic wave are oriented along :**

**Correct Options:**

**(C)** mutually perpendicular directions and are in phase

**Solution:**

mutually perpendicular directions and are in phase

**8**

**28g of $N_2$ and 6g of $H_2$ were mixed. At equilibrium 17g $NH_3$ was produced. The weight of $N_2$ and $H_2$ at equilibrium are respectively -**

**Correct Options:**

**(C)** 14g , 3g

**Solution:**

.

**9**

**A physical quantity of the dimension of length that can be formed out of c, G and $\frac{e^2}{4\pi\varepsilon_0}$ is :**

**[c is velocity of light, G is universal constant of gravitation, e is charge]**

**Correct Options:**

**(D)** $1/c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$

**Solution:**

$1/c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$

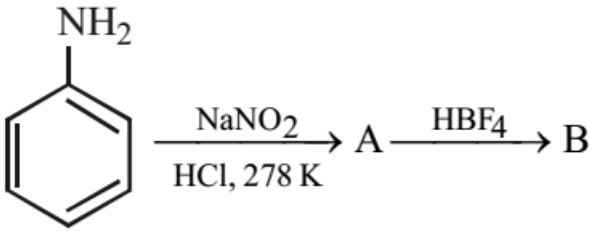
**10** **Calculate the work done when 2 moles of hydrogen expand isothermally and reversibly at 27ºC from 15 to 50 litres.**

**Correct Options:**

**(C)** 1445 cals

**Solution:**

**11** In the chemical reactions,

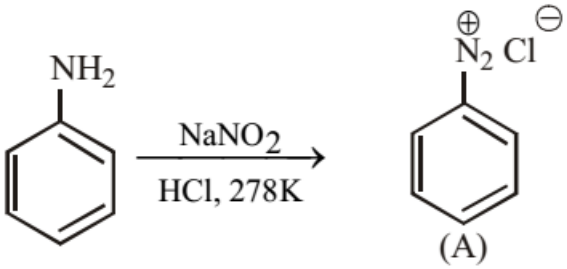



the compounds 'A' and 'B' respectively are

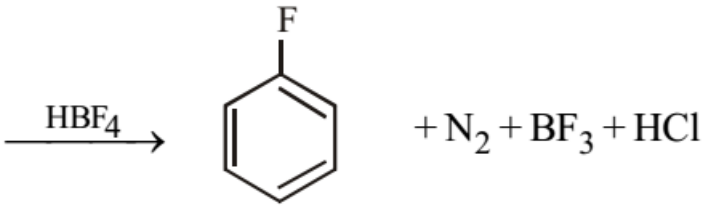
**Correct Options:**

**(C)** benzene diazonium chloride and fluorobenzene

**Solution:**




(A)
Benzene diazonium chloride




(B)
Fluorobenzene

**12** **Which of the following represents the expressionfor 3/4th the life of a first-order reaction ?**

**Correct Options:**

**(C)** $\frac{2.303}{k}$ log 4

**Solution:**

.

**13** **A crystalline solid is made of X, Y and Z elements.**
**Atoms of X form fcc packing; atoms of Y occupy octahedral voids while atoms of Z occupy tetrahedral voids. What will be the simplest formula of solid if atoms along one body diagonal are removed ?**

**Correct Options:**

**(A)** $X_5Y_4Z_8$

**Solution:**

-

**14** **For the given reaction:**
$H_{2(g)} + Cl_{2(g)} \rightarrow 2H^+_{(aq)} + 2Cl^-_{(aq)}; \Delta G° = -262.4$ **kJ. The value of free energy of formation (ΔG°f) for the ion** $Cl^-_{(aq)}$**, therefore will be**

**Correct Options:**

**(A)** $-131.2$ kJ $mol^{-1}$

**Solution:**

ΔG° reaction =ΔG0f (products) − ΔG0f (reactants)

= [ 2ΔG0f(H+) + 2ΔG0f (Cl−)] − [ΔG0f(H2) + ΔG0f(Cl2)]

= [ 0 + 2ΔG0f(Cl−)] − [0 +0]

or,− 262.4 = $2\Delta G^0_f$(Cl−)

or,ΔG0f(Cl−) = − 131.2 kJ mol−1.

**15**
**A compound formed by elements X and Y crystallizes in a cubic structure in which the X atoms are at the cornersof a cube and the Y atoms are at the face-centres. The formula of the compound is**

**Correct Options:**

**(A)** $XY_3$

**Solution:**

.

**16** **The relationship between osmotic presures (**$\pi_1$**,** $\pi_2$ **and** $\pi_3$**) at a definite temperature when 1 g glucose, 1 g urea and 1 g sucrose are dissolved in 1 litre of water is (assume i = 1 for all)**

**Correct Options:**

**(C)** $\pi_2 > \pi_1 > \pi_3$

**Solution:**

-

**17** **The density of solid argon (Ar = 40 g/mol) is**
**1.68 g/mL at 40 K. If the argon atom is assumed to be a sphere of radius = 1.50 × $10^{-8}$ cm, what % of solid Ar is apparently empty space ?**

**Correct Options:**

**(B)** 64.36

**Solution:**

Vol. of all atoms in 1.68 gm

argon = $\frac{1.68}{40} \times N_A \times \frac{4}{3} \times \pi \times (1.5 \times 10^{-8})^3$ = 0.3564

vol. of solid argon = 1 cm3

% empty space = (1 – 0.3564) × 100 = 64.36

**18** **The number of octahedral void(s) per atom present in a cubic close-pakced structure is**

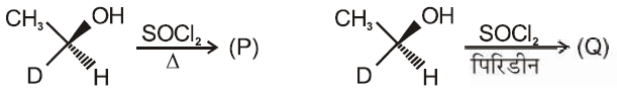
**Correct Options:**

**(C)** 1

**Solution:**

-

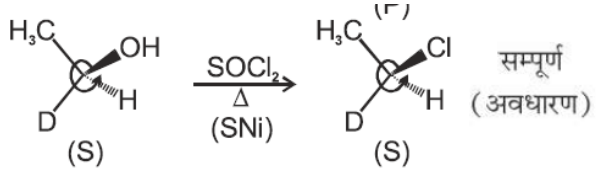
**19**

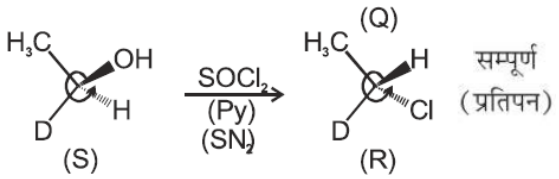
P तथा Q के मध्य सम्बंध पहचानिये 


**Correct Options:**

**(C)** प्रतिबिम्बरूपी

**Solution:**




⇒ P तथा Q प्रतिबिम्ब रूपी है।

**20** **In which of the following compounds, both Frenkel and Schottky defects are founds ?**

**Correct Options:**

**(D)** AgBr

**Solution:**

-

**21**


यौगिक (P) है :

**Correct Options:**

**(B)**

**Solution:**

-

**22** **Calgon used as a water softener, is :**

**Correct Options:**

**(A)** $Na_2[Na_4(PO_3)_6]$

**Solution:**

$Na_2[Na_4(PO_3)_6]$

**23** **How many types of space-lattices are possible ?**

**Correct Options:**

**(D)** 14

**Solution:**

-

**24**

**Calcium crystallises in a face centred cubic unit cell with edge length a = 0.556 nm. Calculate the density. If it contains 0.1% frenkel defects. :-**

**Correct Options:**

**(A)** 1.55 $gcm^{-3}$

**Solution:**

1.55 $gcm^{-3}$

**25**

Which of the following is the correct equation?

**Correct Options:**

**(B)** $\Delta U = \Delta Q - W$

**Solution:**

**(b) :** This is the mathematical relation of first law of thermodynamics. Here $\Delta U$ = change in internal energy; $\Delta Q$ = heat absorbed by the system and $W$ = work done by the system.

**26**

**Calculate the ΔHCΦ for diborane B2H6 using**

(i) $2B(s) + \frac{3}{2} O_2(g) \longrightarrow B_2O_3(s)$ $\quad \Delta H = -1273$ kJ

(ii) $H_2(g) + \frac{1}{2} O_2(g) \longrightarrow H_2O(\ell)$ $\quad \Delta H = -286$ kJ

(iii) $H_2O(\ell) \longrightarrow H_2O(g)$ $\quad \Delta H = 44$ kJ

(iv) $2B(s) + 3H_2(g) \longrightarrow B_2H_6(g)$ $\quad \Delta H = 36$ kJ

**Correct Options:**

**(A)** – 2035 kJ/mol

**Solution:**

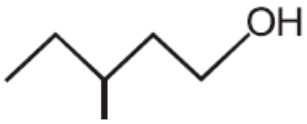
The equation $B_2H_6(g) + 3O_2(g) \longrightarrow B_2O_3(s) + 3H_2O(1)$ can be obtained by taking
$-(4) + (1) + 3 \times (2) + 3 \times (3)$
Hence $\Delta H_C^\Phi = -36 - 1273 + 3 \times (-286) + 3 \times 44 = -2035$ kJ

**27**

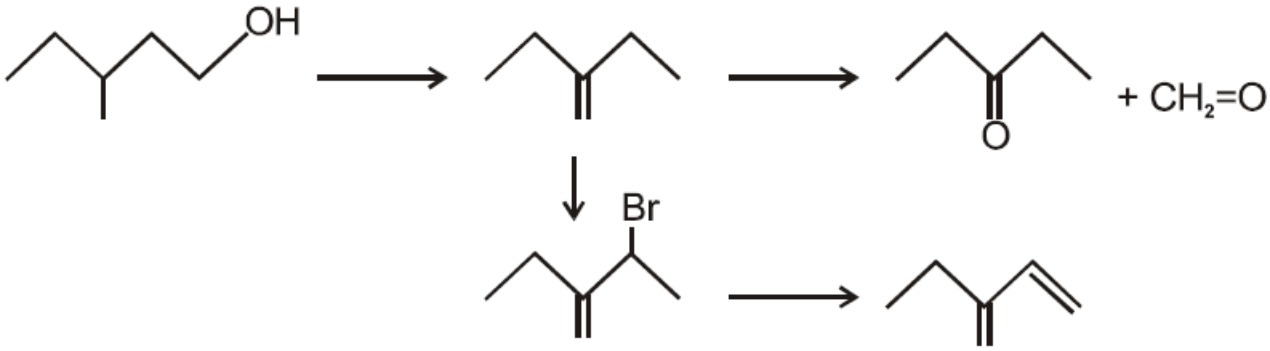
यौगिक (A) को पहचानिये

**Correct Options:**

**(B)**




**Solution:**




**28** **Which of the following crystallises in bcc structure?**

**Correct Options:**

**(D)** CsCl

**Solution:**

one Cs at body centre and $Cl^-$ at corners

**29** **In a face-centred cubic lattice, atom A occupies the corner position and atom B occupies the facecentre positions. If one atom of B is mising from one of the face-centred points, the formula of the compounds is**

**Correct Options:**

**(A)** $A_2B_5$

**Solution:**

-

**30** **When NaCl is dopped with $10^{-5}$ mole % of $SrCl^2$,what is the no of cationic vacancies ?**

**Correct Options:**

**(B)** $10^{-7} \times NA$

**Solution:**

-

**31** **The enthalpy of fusion of ice per mole is**

**Correct Options:**

**(D)** 6 kJ

**Solution:**

**32** **Hot concentrated, sulphuric acid is a moderately strong oxidizing agent. Which of the following reactions do not show oxidizing behaviour?**

**Correct Options:**

**(D)** $CaF_2 + H_2SO_4 \rightarrow CaSO_4 + 2HF$

**Solution:**

$CaF_2 + H_2SO_4 \rightarrow CaSO_4 + 2HF$

**33**

The members w, x, y and z of a naturally occurring radioactive series are related as

$$w \xrightarrow{-\alpha} x \xrightarrow{-\beta} y \xrightarrow{-\beta} z$$

**The isotopes among the above are :**

**Correct Options:**

**(C)** w and z but not w and y

**Solution:**

Emission of $(1\alpha + 2\beta)$ particles from a radioactive element results in its isotope

**34**

**In calcium fluoride, having the fluorite structure, the coordination numbers for calcium ion ($Ca^{2+}$) and fluoride ion ($F^-$) are**

**Correct Options:**

**(C)** 8 and 4

**Solution:**

.

**35** **X-ray analysis Mn–Si alloy with 75% by atoms of Mn and 25% by atoms of Si, showed that the unit cell is cubic and lattice parameter is 2.86 Å. The density of alloy = 6850 kg/m3. How many number of atoms are present in the unit cell ? Mn : 55 and Si : 28**

**Correct Options:**

**(A)** 2

**Solution:**

Let total no. of atoms present in the unit cell = n

$\therefore$ no. of Mn atoms = $\frac{3}{4}$n ; no. of Si atoms = $\frac{n}{4}$

$$\therefore \frac{\left(\frac{3}{4}n \times 55 + \frac{n}{4} \times 28\right)}{6 \times 10^{23} \times (2.86)^3 \times 10^{-24}} = 6.85$$

$$\text{or} \frac{n[41.25+7]}{6 \times 23.39 \times 0.1} = 6.85$$

$$\text{or} n = \frac{6.85 \times 6 \times 2.339}{48.25} = 1.99 \sim 2$$

**36** **Potassium has a bcc structure with nearest neighbours distance 5.42Å. Its atomic weight is 39. Its density will be**

**Correct Options:**

**(B)** 816 kg $m^{-3}$

**Solution:**

Density = $Z \times M / a^3 \times N_A$

**37**

**Consider the following processes :-**

| | ΔH(kJ/mol) |
|---|---|
| $\frac{1}{2}$ A → B | +150 |
| 3B → 2C + D | −125 |
| E + A → 2D | +350 |

**For B + D → E + 2C, ΔH will be :**

**Correct Options:**

**(C)** –175 kJ / mol

**Solution:**

–175 kJ / mol

**38**

**A physical quantity of the dimension of length that can be formed out of c, G and $\frac{e^2}{4\pi\varepsilon_0}$ is :**

**[c is velocity of light, G is universal constant of gravitation, e is charge]**

**Correct Options:**

**(D)** $1/c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$

**Solution:**

$1/c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$

**39** **An ionic compound AB has ZnS type of structure, if the radius $A^+$ is 22.5 pm then the ideal radius of $B^-$ is**

**Correct Options:**

**(B)** 100 pm

**Solution:**

Since ionic compound AB has ZnS type of structure, therefore it has tetrahedral holes for which

$$\frac{\text{radius of cation}}{\text{radius of anion}} = 0.225$$

$$\frac{r^+}{r^-} = 0.225 \Rightarrow \frac{22.5}{r^-} = 0.225$$

Hence $r^-$ = 100 pm

**40** **In a face centred cubic arrangement of A and B atoms whose A atoms are at the corner of the unit cell and B atoms at the face centres. One of the B atoms is missing from one of the face in unit cell. The simplest formula of compound is :**

**Correct Options:**

**(C)** $A_2B_5$

**Solution:**

A face centred atom contributes 1/2 atom in one unit cell. Therefore, missing one B atoms give the formula $AB_{2/5}$ or $A_2B_5$.

**41**

**If enthalpy of neutralisation of HCl with NaOH is –50 kJ/eq then under the similar conditions, enthalpy of neutralisation of $H_2SO_4$ with NaOH would be :-**

**Correct Options:**

**(A)** –50 kJ/eq

**Solution:**

–50 kJ/eq

**42** **The dissociation energy of $CH_4$ and $C_2H_6$ are respectively 360 K cal/mole & 620 Kcal/mole. The bond energy of C–C is**

**Correct Options:**

**(D)** 80 kcal/mole

**Solution:**

Mean bond energy of C-H bond = 360 /4 = 90 Kcal/mole

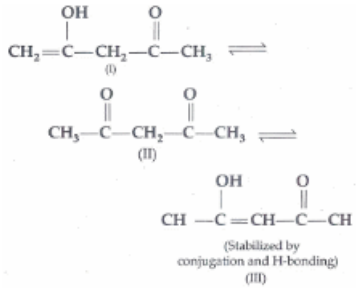
Dissociation energy of $C_2H_6$ = 6 x $\Delta_{C\text{-}H}H$ + $\Delta_{C\text{-}C}H$

620 = 6 x 90 + $\Delta_{C\text{-}C}H$

$\Delta_{C\text{-}C}H$ = 80 Kcal/mole

**43**

**The order of stability of the following tautomeric compound is :**




**Correct Options:**

**(B)** III > II > I

**Solution:**

III > II > I

**44**

**A plane polarised light coming out of a polarizer with intensity $I_0$ enters a analyser kept at an angle of 45° with the polarizer. What will be the intensity of the light coming out of the analyser?**

**Correct Options:**

**(B)** $I_0$ / 2

**Solution:**

$I_0$ / 2

**45** **The type of isomerism shown by $[Co(en)_2(NCS)_2]Cl$ and $[Co(en)_2(NCS)Cl]NCS$ is**

**Correct Options:**

**(A)** ionization

**Solution:**

-

**46** **Consider the following complex ions, P, Q, and R. P = $[FeF_6]^{3-}$, Q = $[V(H_2O)_6]^{2+}$ and R = $[Fe(H_2O)_6]^{2+}$, the correct order ofthe complex ions, according to their spin only magnetic moment values (in BM) is**

**Correct Options:**

**(A)** Q < R < P

**Solution:**

-

**47**

The bond dissociation energies of $X_2$, $Y_2$ and $XY$ are in the ratio of 1 : 0.5 : 1. $\Delta H$ for the formation of $XY$ is –200 kJ mol$^{-1}$. The bond dissociation energy of $X_2$ will be

**Correct Options:**

**(C)** 800 kJ mol$^{-1}$

**Solution:**

Let *B.E.* of $X_2$, $Y_2$ and $XY$ are $x$ kJ mol$^{-1}$, $0.5x$ kJ mol$^{-1}$ and $x$ kJ mol$^{-1}$ respectively.

$$\frac{1}{2}X_2 + \frac{1}{2}Y_2 \rightarrow XY\ ;\ \Delta H = -200\ \text{kJ mol}^{-1}$$

$$\Delta H = \Sigma(B.E.)_{\text{Reactants}} - \Sigma(B.E.)_{\text{Products}}$$

$$\therefore\ -200 = \left[\frac{1}{2}\times(x) + \frac{1}{2}\times(0.5x)\right] - [1\times(x)]$$

$$B.E.\ \text{of}\ X_2 = x = 800\ \text{kJ mol}^{-1}$$

**48**

A gas ($C_{v,m} = \frac{5}{2}R$) **behaving ideally was allowed to expand reversibly and adiabaticaly from 1 litre to 32 litre. It's initial temperature was 327°C. The molar enthalpy change (in J/mole) for the process is**

**Correct Options:**

**(C)** –1575 R

**Solution:**

$$y = \frac{7}{5}$$

$$y - 1 = \frac{2}{5}$$

$$T_2 = T_1\left(\frac{v_1}{v_2}\right)^{\frac{2}{5}}$$

$$= 600 \times \left(\frac{1}{32}\right)^{2/5} = 150\ \text{K}$$

**49**

5°C पर एक मोल जल का –5°C पर बर्फ में हिमांक करने पर एन्थैल्पी परिवर्तन होगा :

(दिया है : 0°C पर $\Delta_{fus}H$ = 6 kJ mol$^{-1}$, $C_p(H_2O, l)$ = 75.3 J mol$^{-1}$K$^{-1}$, $C_p(H_2O, s)$ = 36.8 J mol$^{-1}$ K$^{-1}$)

**Correct Options:**

**(B)** 6.56 kJ mol$^{-1}$

**Solution:**

-

**50** **In conversion of lime-stone to lime,** $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$ the values of $\Delta H^o$ and $\Delta S^o$ are $+179.1\ kJ\ mol^{-1}$ and 160.2 J/K respectively at 298K and 1 bar. Assuming that $\Delta H^o$ and $\Delta S^o$ do not change with temperature, temperature above which conversion of **limestone to lime will be spontaneous is**

**Correct Options:**

**(D)** 1118 K

**Solution:**

**(D).** $CaCO_3(s) \longrightarrow CaO(\ell) + CO_2(g)$

$\Delta G = \Delta H - T\Delta S$ ..... (1)

Now, $\Delta H$ and $\Delta S$ both are positive, hence reaction willl be spontaneous if $T\Delta S > \Delta H$.

i.e. $T > \frac{\Delta H}{\Delta S}$ or $T > \frac{179.1 \times 1000}{162.2} \Rightarrow T < 1118\ K$

**51** **Which of the following conditions regarding a chemical process ensures its spontaneity at all temperature?**

**Correct Options:**

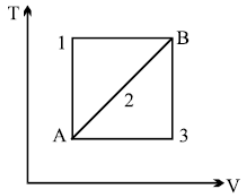
**(C)**

$\Delta H = -ve, \Delta S = +ve$

**Solution:**

-

**52** **Thermo A given mass of a gas expands from the state A to the state B by three paths 1, 2 and 3 as shown in V-T indicator diagram. If $W_1$, $W_2$ and $W_3$ respectively be the work done by the gas along the three paths,then**



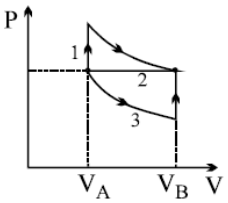

**Correct Options:**

**(A)** $W_1 > W_2 > W_3$

**Solution:**

From graph

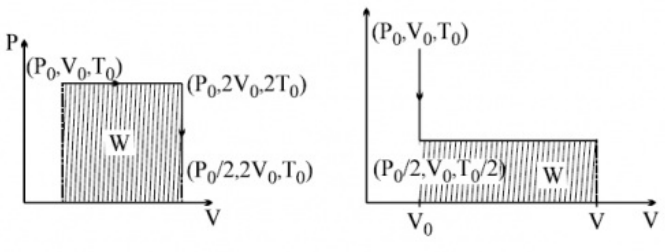
comparing area under curve




**53** **Two completely identical samples of the same ideal gas are in equal volume containers with the same pressure and temperature in containers labeled A and B. The gas in container A performs non-zero positive work W on the surroundings during an isobaric (constant pressure) process before the pressure is reduced isochorically (constant volume) to 1/2 its initial amount. The gas in container B has its pressure reduced isochorically (constant volume) to 1/2 its initial value and then the gas performs same non-zero positive work W on the surroundings during an isobaric (constant pressure) process. After the processes are performed on the gases in containers A and B, which is at the higher temperature?**

**Correct Options:**

**Solution:**




$\Rightarrow W=P_0.V_0 \Rightarrow P_0/2(V_f-V_0)$

$\Rightarrow V_f=3V_0 \Rightarrow T_f=3T_0/2 \Rightarrow T_B>T_A$

**54**

In which of the following reactions, standard reaction entropy changes ($\Delta S^\circ$) is positive and standard Gibbs energy change ($\Delta G^\circ$) decreases sharply with increasing temperature?

**Correct Options:**

**(A)** $C\ (graphite) + \frac{1}{2}O_2(g) \longrightarrow CO(g)$

**Solution:**

**55**

Consider the following liquid-vapour equilibrium

$$Liquid \rightleftharpoons Vapour$$

Which of the following relations is correct?

**Correct Options:**

**(C)** $\frac{d\ln P}{dT} = \frac{-\Delta H_v}{RT^2}$

**Solution:**

**56**

**28g of $N_2$ and 6g of $H_2$ were mixed. At equilibrium 17g $NH_3$ was produced. The weight of $N_2$ and $H_2$ at equilibrium are respectively -**

**Correct Options:**

**(C)** 14g , 3g

**Solution:**

.

**57**

For the reaction, $X_2O_4(l) \longrightarrow 2XO_2(g)$, $\Delta U = 2.1\,\text{kcal}, \Delta S = 20\ \text{cal}\,K^{-1}$ at 300 K. Hence, $\Delta G$ is

**Correct Options:**

**(B)** -2.7 kcal

**Solution:**

**58** **An amount Q of heat is given to ideal monoatomic gas in a process in which the gas performs a work Q/2 on its surrounding Molar specific heat capacity of gas is**

**Correct Options:**

**(C)** 3R

**Solution:**

From 1st law of thermodynamics
Q = Q/2 + ΔU

ΔU=Q/2=3/2RΔT; Q=3RΔT

Thus molar heat capacity = 3R

**59** **Given below are a few electrolytes, indicate which one among them will bring about the coagulation of a gold sol quickest and in the least of concentration?**

**Correct Options:**

**(C)** $Al_2(SO_4)_2$

**Solution:**

$Al_2(SO_4)_2$

**60** **Given the data below, what approximately is ΔH for the reaction:$H_2(g) + C_2H_4(g) \square\square\rightarrow C_2H_6(g)$. Average Bond energies H—H—436 kJ/moleCl—Cl—242 kJ/moleH—Cl—432 kJ/mole**

**Correct Options:**

**(B)** –186 kJ /mole

**Solution:**

ΔH = 436 + 242 – 2 × 432 = – 186 kJ

**61**

For a given reaction, $\Delta H = 35.5\ \text{kJ mol}^{-1}$ and $\Delta S = 83.6\,\text{JK}^{-1}\,\text{mol}^{-1}$. The reaction is spontaneous at : (Assume that $\Delta H$ and $\Delta S$ do not vary with temperature)

**Correct Options:**

**(B)** $T > 425\,\text{K}$

**Solution:**

**62** **In a fuel cell methanol is used as fuel and oxygen gas is used as an oxidizer. The reaction is** $CH_3OH(l) + \frac{3}{2}O_2(g) \longrightarrow CO_2(g) + 2H_2O(l)$ **At 298 K standard Gibb's energies of formation for $CH_3OH(l)$, $H_2O(l)$ and $CO_2(g)$ are –166.2, –237.2 and –394.4 kJ mol$^{-1}$ respectively. If standard enthalpy of combustion of methanol is –726 kJ mol$^{-1}$, efficiency of the fuel cell will be-**

**Correct Options:**

**(C)** 97%

**Solution:**

$$\eta = \frac{\Delta G}{\Delta H} \qquad \because \Delta G = \text{non-machanical work.}$$

$$\Delta H = \text{net heat exchange}$$

$$\Delta G = \Delta h_f^0 Co_2 + 2\Delta G_f^0 H_2O - \Delta G_f^0 CH_3OH$$
$$= -394.4 - (2\times 237.2) + (166.2)$$
$$= -702.6$$

$$\eta = \frac{-702.6}{726} = 96.77\ \% \approx 97\%$$

**63** **An ideal gas expands in volume from 1 × 10$^{-3}$ m$^3$ to 1 × 10$^{-2}$ m3 at 300 K against a constant pressure of 1 × 10$^5$ Nm$^{-2}$. The work done is -**

**Correct Options:**

**(A)** –900 J

**Solution:**

$$V_1 = 10^{-3}\,m^3$$
$$V_2 = 10\text{-}^2\,m^3$$
$$\gamma_{ext} = 10^5$$
$$w = -\gamma_{ext}(v_2 - v_1) \qquad = -10^5(10^{-2} - 10^{-3})$$
$$= -1000 + 100$$
$$= -900\ J.$$

**64** **A mixture of 4 gm helium and 28 gm of nitrogen is enclosed in a vessel of constant volume at 300 K. The quantity of heat absorbed by the mixture to increase root mean velocity of its molecules by 50% is (R is universal gas constant)**

**Correct Options:**

**(A)** 1500R

**Solution:**

Constant volume ⇒ $\Delta Q = nC_V\Delta T$
4 gm He ⇒ 1 mole = n1
28 gm N2 ⇒ 1 mole = n2

$C_V=(1.C_{V1}+1.C_{V2})/(1+1)=(3/2R+5/2R)/2=2R$

$\Delta Q = 2 \times 2R \times \Delta T$

$v_{rms}=1.5\sqrt{(3RT_{0)/M}}$

$T=2.25T_0$

$\Delta Q = 2 \times 2R \times 1.25 \times 300 = 1500\ R$

**65**

The entropy ($S^o$) of the following substances are :

$CH_4(g) = 186\ JK^{-1}\ mol^{-1}$

$O_2(g) = 205.0\ JK^{-1}\ mol^{-1}$

$CO_2(g) = 213\ JK^{-1}\ mol^{-1}$

$H_2O(l) = 70\ JK^{-1}\ mol^{-1}$

The entropy change ($\Delta S^o$) for the reaction $CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l)$ is :

**Correct Options:**

**(B)** –243 J $K^{-1}$ $mol^{-1}$

**Solution:**

-

**66** **Heat of neutralization of $H_2C_2O4$ (oxalic acid) is -26 Kcal/mole. The dissociation energy of**

(A) $H_2C_2O_4 \rightleftharpoons 2H^+ + C_2O_4^{-2}$ is

**Correct Options:**

**(B)** 1.4 Kcal/mole

**Solution:**

Heat of neutralization of a strong dibasic acid with a strong base is = - 2 x 13.7 = -27.4 KJ/mol

When acid is oxalic acid, part of heat liberated is utilized to ioinze oxalic acid.

so for given reaction, dissociation energy = -26 + 27.4 = 1.4 Kcal /mol

**67** **At high pressure, Langmuir adsorption isotherm takes the form**

**Correct Options:**

**(B)** $\frac{x}{m} = \frac{a}{b}$

**Solution:**

the answer is 2

**68**

**The density of 3M solution of sodium chloride is 1.252 g mL–1. The molality of the solution will be: (molar mass, NaCl = 58.5 g mol–1) (a) 260 m (b) 2.18 m (c) 2.79 m (d) 3.00 m**

**10. Match the columns. Column-I Column-II**

**A. 88 g of $CO_2$ I. 0.25 mole**

**B. 6.022 × $10^{23}$ molecules II. 2 mole of $H^2O$**

**C. 5.6 litres of $O_2$ at STP III. 1 mole**

**D. 96 g of $O_2$ IV. 6.022 × $10^{23}$ molecules**

**E. 1 mol of any gas V. 3 mole**

**Correct Options:**

**(C)** A – II; B – I; C – III; D – V; E – IV

**Solution:**

A – II; B – I; C – III; D – V; E – IV

**69** **Which is an example of coagulation?**

**Correct Options:**

**(D)**
All the three are example of coagulation

**Solution:**

All three are example of coagulation.

**70** **5g of each of the following gases at 87°C and 750 mm pressure are taken. Which of them will have the least volume?**

**Correct Options:**

**(D)** Hi

**Solution:**

$PV = \frac{w}{m}RT$ . If other factors are same, $V \propto \frac{1}{m}$

$\therefore$ Volume will be least in case of Hi because HI low the maximum molecular weight.

**71** **For which of the following $K_P$ is less than $K_C$?**

**Correct Options:**

**(B)** $N_2 + 3H_2 \rightleftharpoons 2NH_3$

**Solution:**

.

**72** **Formation of alcohol by oxymercuration demercuration of alkenes :**

**Correct Options:**

**(A)** involves carbocations and rearrangement

**Solution:**

involves carbocations and rearrangement

**73** **28g of $N_2$ and 6g of $H_2$ were mixed. At equilibrium 17g $NH_3$ was produced. The weight of $N_2$ and $H_2$ at equilibrium are respectively -**

**Correct Options:**

**(C)** 14g , 3g

**Solution:**

.

**74** **Which relation is incorrect ?**

**Correct Options:**

**(C)** $\Delta_f H\ (CH_4) = \Delta_C H\ (CH_4)$

**Solution:**

$\Delta_f H\ (CH_4) = \Delta_C H\ (CH_4)$

**75** **The number of atoms of oxygen present in 10·6 g of $Na_2CO_3$ will be**

**Correct Options:**

**(C)** $1{\cdot}806 \times 10^{23}$

**Solution:**

-

**76**

The standard enthalpies of formation of CO2(g), $H_2O(\ell)$ and glucose(s) at 25°C are –400 kJ/mol, –300 kJ/mol and –1300 kJ/mol, respectively. The standard enthalpy of combustion per gram of glucose at 25°C is

**Correct Options:**

**(C)** –16.11 kJ

**Solution:**

$$C_6H_{12}O_6(s) + 6O_2(g) \longrightarrow 6CO_2(g) + 6H_2O(\ell)$$

$\Delta_f H^o$ : −1300 , 0 , −400 , −300

$$\Delta_r H^o = \Sigma(\Delta_f H^o)_P - \Sigma(\Delta_f H^o)_R$$

$$= [6(-400) + 6(-300)] - [(-1300)]$$

$$= [-2400 - 1800] + 1300$$

$$= -2900 \ \frac{kJ}{mole}$$

$$\Delta_c H^o \frac{kJ}{gm} = \frac{\Delta_c H^o\left(\frac{kJ}{mole}\right)}{\text{molecular wt.}\left(\frac{gm}{mole}\right)}$$

$$= \frac{-2900}{180} = -16.11 \text{ kJ/gm}$$

**77** **A real gas most closely approaches the behaviour of an ideal gas at**

**Correct Options:**

**(C)** 0.5 atm and 500K

**Solution:**

Low pressure and high temperature.

**78** **The difference between heats of reaction at constant pressure and constant volume for the reaction**

$2C_6H_6(\ell) + 15O_2(g) \longrightarrow 12CO_2(g) + 6H_2O(\ell)$ at 25°C in KJ $mol^{-1}$ is

**Correct Options:**

**(A)** -7.43 $KJmol^{-1}$

**Solution:**

The difference between heats of reaction at constant pressure and constant volume i.e

$\Delta H - \Delta E = \Delta n_g RT$

$= -3 \times 8.314 \times 298$ J

$= -7.432$ KJ $mol^{-1}$

**79** **Which of the following statements is not correct for a lyophobic solution ?**

**Correct Options:**

**(A)** It can be easily solvated

**Solution:**

Lyophobic colloid are solvent hating.

**80**

The enthalpy change on freezing of 1 mol of water at 5°C to ice at –5°C is :

(Given : $\Delta_{fus}H$ = 6 kJ mol$^{-1}$ at 0°C, $C_p(H_2O, l)$ = 75.3 J mol$^{-1}$K$^{-1}$, $C_p(H_2O, s)$ = 36.8 J mol$^{-1}$ K$^{-1}$)

**Correct Options:**

**(B)** 6.56 kJ mol$^{-1}$

**Solution:**

-

**81** **The entropy change in the fusion of 1 mol of a solid melting at 27°C. (Latent heat of fusion, 2930 J mol$^{-1}$) is**

**Correct Options:**

**(A)** 9.77 JK$^{-1}$ mol$^{-1}$

**Solution:**

-

**82** $\Delta H$ and $\Delta U$ for the reaction,

$S(s) + \left(\frac{3}{2}\right) O_2(g) \rightarrow SO_3(g)$ are related as

**Correct Options:**

**(A)** $\Delta H = \Delta U - 0.5\ RT$

**Solution:**

-

**83** **In physisorption, adsorbent does not show specificity for any particular gas because .....**

**Correct Options:**

**(A)** involved van der Waal forces are universal

**Solution:**

the answer is 1

**84**

The enzyme which hydrolyses triglycerides to fatty acids and glycerol is called

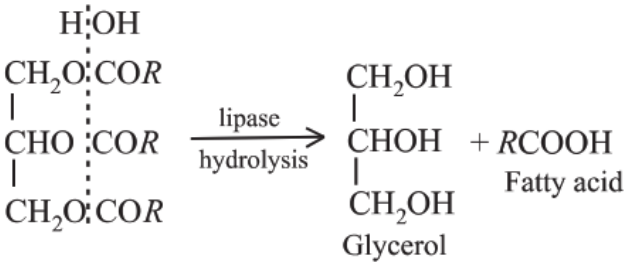
**Correct Options:**

**(B)**

lipase

**Solution:**

**(b) :**




**85**

Which one of the following characteristics is associated with adsorption?

**Correct Options:**

**(D)** $\Delta G$, $\Delta H$ and $\Delta S$ all are negative.

**Solution:**

**(d) :** As the molecules of the adsorbate are held on the surface of the solid adsorbent, entropy decreases *i.e.*, $\Delta S$ = –ve.

As $\Delta G = \Delta H - T\Delta S$

For the adsorption to occur, $\Delta G$ = –ve and it is possible only if $\Delta H$ = –ve.

**86 Which of the following is wrong?**

**Correct Options:**

**(B)** in a cyclic process w $\neq$ Q

**Solution:**

For an ideal gas, internal energy and enthalpy are functions of temperature only.

In a cyclic process, as ΔU = 0,

so as per first law of thermodynamics,

Q+W = 0,

Q = -W,

So amount of work involved during the process = Amount of heat transfer during the process.

**87 Small liquid droplets dispersed in another liquid is called**

**Correct Options:**

**(B)** emulsion

**Solution:**

-

**88 A monoatomic gas (CV =3/2R) is allowed to expand adiabatically and reversibly from initial volume of 8L at 300 K to a volume of V2 at 250 K. V2 is**

**Correct Options:**

**(A)** 10.5 L

**Solution:**

$TV^{\gamma-1}$ = constant

$\gamma = \frac{5}{3} \quad \therefore \quad \gamma - 1 = \frac{2}{3}$

$\therefore \quad 300 \times (8)^{2/3} = 250 \times (V_2)^{2/3} \quad \Rightarrow \quad (V_2)^{2/3} = 4.8$

$\Rightarrow \quad V_2 = (4.8)^{3/2} \cong 4.8 \times 2.2 = 10.5\ L$

**89** **In the combustion of 2.0 g of methane, 25 kcal heat is liberated. Heat of combustion of methane would be**

**Correct Options:**

**(B)** 200 kcal

**Solution:**

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ Molecular weight of $CH_4 = 12 + 4 = 16$. ∴ On the combustion of 2.0 g of methane = 25.0 kcal. ∴ On the combustion of 16.0 g methane, $\frac{25 \times 16}{2} = 200$ kcal

**90** **Which is the intensive property -**

**Correct Options:**

**(D)** All

**Solution:**

.

**91** **The heat of combustion of yellow phosphorus and red phosphorus are –9.91 kJ and –8.78 kJ respectively. The heat of transition of yellow phosphorus to red phosphorus is**

**Correct Options:**

**(D)** –1.13 kJ

**Solution:**

-

**92** **Which of the following is the cause of brownian movement of colloids –**

**Correct Options:**

**(C)**
Unbalanced impacts by molecules
of the dispersion medium

**Solution:**

Due to the unbalanced bombardment of the particles by the molecules of the dispersion medium.

**93** **The weight of iron which will he converted into its oxide ($Fe_3O_4$) by the action of 18 g of steam on it will be (at. wt. of Fe = 56)**

**Correct Options:**

**(C)** 42 g

**Solution:**

-

**94** **10 ml of a solution of $H_2O_2$ labelled '10 volume' just decolorises 100 ml of potassium permanganate solution acidified with dilute $H_2SO_4$. Calculate the amount of potassium permanganate in the given solution.**

**Correct Options:**

**(B)** 0.563 gm

**Solution:**

$2H_2O_2 \rightarrow H_2O + O_2$

22400 ml of $O_2$ evolved from 68 gm of $H_2O_2$

$\therefore$ 10 ml of $O_2$ is evolved from $\frac{680}{22400}$ gm of $H_2O_2$

Hence 1 ml of $H_2O_2$ contain $\frac{0.0303}{34}$ mol = 0.00178 equivalent 10 ml of $H_2O_2$ will 0.0178 equivalents which will be present in 100 ml of $KMnO_4$ solution.

Amount of $KMnO_4$ in given sample = $\frac{158}{5} \times 0.001785$ = 0.563 gm

$\therefore$ (B)

**95** **For reaction HI ⇌ ½ $H_2$ + ½ $I_2$ value of Kc is 1/8 then value of Kc for $H_2$ + $I_2$⇌ 2HI**

**Correct Options:**

**(B)** 64

**Solution:**

.

**96** **The heats of neutralization of four acids a, b c and d when neutralized against a common base are 13.7, 9.4, 11.2 and 12.4 Kcal respectively. The weakest among these acids is**

**Correct Options:**

**(B)** b

**Solution:**

Acid which has lowest heat of neutralization will be the weakest.

**97** In view of the signs of $\Delta_r G^\circ$ for the following reactions :

$PbO_2 + Pb \rightarrow 2\ PbO,\ \Delta_r G^\circ < 0$

$SnO_2 + Sn \rightarrow 2\ SnO,\ \Delta_r G^\circ > 0,$

**which oxidation states are more characteristic for lead and tin ?**

**Correct Options:**

**(C)** For lead + 2, for tin + 4

**Solution:**

$PbO_2 + Pb \rightarrow 2PbO \qquad \Delta G^0 < 0$

$\Rightarrow Pb^+$ is more stable

$SnO_2 + sn \rightarrow 2S_nO \qquad \Delta G^0 > 0$

$\therefore\ sn^{+4}$ is more stable

**98** **The enthalpy of combustion of cyclohexane, cyclohexene and $H_2$ are respectively –3920, –3800 and –241 kJ $mol^{-1}$. The heat of hydrogenation of cyclohexene is**

**Correct Options:**

**(A)** –121 kJ $mol^{-1}$

**Solution:**

-

**99** 56. 'Anodisedaluminiumis aluminium:
(a) obtained on anode (b) electrolytically coated with Aluminium oxide
(c) alloy of Al containing 95% (d) none

**Correct Options:**

**(B)** 2

**Solution:**

2

**100** **An organic compound contains 20.0% C, 6.66% H, 47.33% N and the rest was oxygen. Its molar mass is 60 g** $\mathrm{mol}^{-1}$ **the molecular formula of the compound is**

**Correct Options:**

**(A)** $CH_4N_2O$

**Solution:**

SOLVE

**101** **A compound (88 gm) on analysis gave**
**C = 24 gm , H = 4 gm , O = 32 gm ,**
**N = 28 gm . Its empirical formula is :**

**Correct Options:**

**(A)** $C_2H_4O_2N_2$

**Solution:**

concpetual

**102**
**Two elements X (at-mass 16) and Y (at-mass 14) combine to form compounds A, B and C. The ratio of different masses of Y which combines with a fixed mass of X in A, B and C is 1 : 3 : 5. If 32 parts by mass of X combines with 84 parts by mass of Y in B, then in C 16 parts by mass of X will combine with :**

**Correct Options:**

**(C)** 70 parts by mass of Y

**Solution:**

70 parts by mass of Y

**103** **(A) Molar entropy of vaporization of water is different form ethanol.**
**(R) Water is more polar than methanol**

**Correct Options:**

**(B)**
If both ‘A’ and ‘R’ are correct but
‘R’ is not the correct explanation
for ‘A’.

**Solution:**

CONCEPTUAL

**104**

Measuring zeta potential is useful in determining which property of colloidal solution?

**Correct Options:**

**(C)** Stability of the colloidal particles

**Solution:**

**105** **Which one is false in the following statement ?**

**Correct Options:**

**(D)** Ni is used as a catalyst in the manufacture of ammonia

**Solution:**

Finely divided iron is used as catalyst in manufacture of $NH_3$.

**106** **One atoms of an element x weigh 6.64310-23 g. Number of moles in 20 kg is :**

**Correct Options:**

**(D)** 500

**Solution:**

500

**107** **Five grams each of the following gases at 87°C and 750mm pressure are taken. Which of them will have the least volume?**

**Correct Options:**

**(D)** Hi

**Solution:**

moles proportional to volume

moles will be least for HI

**108** **A gas absorbs 200 J heat and undergoes expansion against a constant external pressure of $10^5$ Pa. The volume changes from 4L to 5L. The change in internal energy is -**

**Correct Options:**

**(B)** 100 J

**Solution:**

conceptual

**109**

$$H_2(g) \longrightarrow 2H(g)$$

**Correct Options:**

**(A)** H atom has higher entropy

**Solution:**

CONCEPTUAL

**110** **Which of the following is a mismatch ?**

**Correct Options:**

**(A)**
Electrophoresis - movement of dispersion medium under the influence of electric field.

**Solution:**

-

**111**

If $x$ is amount of adsorbate and $m$ is amount of adsorbent, which of the following relations is not related to adsorption process?

**Correct Options:**

**(D)** $\frac{x}{m} = p \times T$

**Solution:**

**(d) :** $\frac{x}{m} = p \times T$ is the incorrect relation.

The correct relation is

amount of absorption $\frac{x}{m} \propto \frac{P}{T}$

**112**

**A hypothetical electrochemical cell is shown below**

**$A|A^+$ (xM)$||B^+$ (yM)$|B$**

**The emf measured is + 0.20 V. The cell reaction is :**

**Correct Options:**

**(C)** $A + B^+ \square A^+ + B$

**Solution:**

$A + B^+ \square A^+ + B$

**113**

The relation between pressure P and volume V is given by $PV^{\frac{1}{4}} = \text{constant}$. If the percentage decrease in volume is $\frac{1}{4}$, then the approximate percentage increase in pressure is

**Correct Options:**

**(A)** $\frac{1}{16}$

**Solution:**

$P\,V^{\frac{1}{4}} = \text{Constant}$

$\%\ \text{decreases in volume} = \frac{1}{4}$

$\frac{dv}{v} \times 100 = \frac{1}{4}$

Now, $PV^{\frac{1}{4}} = a$

$\log P + \frac{1}{4}\log v = \log a$

$\frac{dp}{p} + \frac{1}{4}\frac{dv}{v} = 0$

$100 \times \frac{dP}{P} + \frac{1}{4}\frac{dV}{V} \times 100 = 0$

$\frac{dP}{P} \times 100 = -\frac{1}{4}\frac{dV}{V} \times 100$

$= \frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$

**114**

Which of the following is correct option for free expansion of an ideal gas under adiabatic condition?

**Correct Options:**

**(C)** $q = 0, \Delta T = 0, w = 0$

**Solution:**

(c) : For free expansion of an ideal gas under adiabatic condition $q = 0, \Delta T = 0, w = 0$.
For free expansion, $w = 0$, adiabatic process, $q = 0$
$\Delta U = q + w = 0$
Internal energy remain constant means $\Delta T = 0$.

**115 An example of solid sol is :**

**Correct Options:**

**(A)** Gem stones

**Solution:**

-

**116**

On which of the following properties does the coagulating power of an ion depend?

**Correct Options:**

**(C)** Both magnitude and sign of the charge on the ion

**Solution:**

(c) : According to Hardy-Schulze rule, the coagulating power of an electrolyte depends on both magnitude and sign of the charge of the effective ion or electrolyte.

**117 Hardy-Schulze law states that**

**Correct Options:**

**(D)**
the ions carrying more opposite charge to that of sol particle are effective in coagulation

**Solution:**

-

**118 A fluorine disposal plant was constructed to carryout the reactions :**

$$F_2 + 2NaOH \longrightarrow \frac{1}{2}O_2 + 2NaF + H_2O$$

$$2NaF + CaO + H_2O \longrightarrow CaF_2 + 2NaOH$$

**As the plant operated, excess lime was added to bring about complete precipitation of the fluoride as CaF2. Over a period of operation, 950 kg of fluorine were fed into a plant and 5,000 kg of lime were required. What was the percentage utilisation of lime. [ At. mass F = 19 ], [Lime : CaO, Ca = 40, O = 16]**

**Correct Options:**

**(C)** 28%

**Solution:**

$$\text{moles of } F_2 = \frac{950}{38} \times 1000 = \frac{9.5 \times 10^5}{38} = 2.5 \times 10^4$$

$$\therefore \text{ moles of CaO required} = 2.5 \times 10^2$$

$$\therefore \text{ moles of CaO required} = 2.5 \times 10^2 \times 56$$

$$\therefore \text{ utilisation} = \frac{2.5 \times 10^4}{5 \times 10^6} \times 100 \times 56 = 28\%$$

**119** **If the ore contains impurities like $SiO_2$ then the flux used is**

**Correct Options:**

**(D)** all of these

**Solution:**

-

**120** **Which of the following statements is not correct ?**

**Correct Options:**

**(D)**
Molecularity of a complex reaction

$$A + 2B \longrightarrow C \text{ is } 3.$$

**Solution:**

molecularity defined for elementary reaction

**121** **Henderson equation $pH - pK_a = 5$ will be applicable to an acidic buffer when :-**

**Correct Options:**

**(B)** [Acid] × $10^5$ = [Conjugate base]

**Solution:**

[Acid] × $10^5$ = [Conjugate base]

**122** **According to the law of mass action, rate of a chemical reaction is proportional to**

**Correct Options:**

**(B)** molar concentraation of reactants

**Solution:**

-

**123** **The reactions**

$$PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)} \text{ and } COCl_{2(g)} \rightleftharpoons CO_{(g)} + Cl_{2(g)}$$

**are simultaneously in equilibrium in an equilibrium box at constant volume. A few moles of $CO_{(g)}$ are later introduced into the vessel. After some time, the new equilibrium concentration of**

**Correct Options:**

**(C)** $PCl_5$ will become less

**Solution:**

CONCEPTUAL

**124** **3A→ B + C it would be a zero order reaction when**

**Correct Options:**

**(B)** the rate of reaction remains same at any concentration of A

**Solution:**

-

**125 According to the law of mass action, rate of a chemical reaction is proportional to**

**Correct Options:**

**(B)** molar concentration of reactants

**Solution:**

-

**126 When propene is chlorinated at 773 K. the product is:**

**Correct Options:**

**(C)** allyl chloride

**Solution:**

-

**127 The rate constant of a first order reaction is $6 \times 10^{-3}$ s–1. If the initial concentration is 0.10 M, the initial rate of reaction is**

**Correct Options:**

**(B)** $6 \times 10^{-4}$ M $s^{-1}$

**Solution:**

-

**128 In which of the following cases, does the reaction go furthest to completion?**

**Correct Options:**

**(C)** $K = 10^5$

**Solution:**

conceptual

**129 Consider the heterogeneous equilibrium in a closed container$NH_4HS$ (s) $\rightleftharpoons$ $NH_3$ (g) + $H_2S$(g)**
**If more $NH_4HS$ is added to the equilibrium**

**Correct Options:**

**(D)**
No effect on partial pressure of
$NH_3$ and $H_2S$.

**Solution:**

$NH_4HS$ (s) $\rightleftharpoons$ $NH_3$(g) + $H_2S$(g)

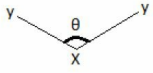
$K_p = NH_3(g) \times H_2S(g)$

Partially pressure of $NH_3$ and $H_2O$ doesn't affected by $NH_4HS$(s) because $NH_4HS$(s) is solid for solid active mass unity.

**130** 52. Which bond angle θ would result in the maximum dipole moment for the triatomic molecule $XY_2$?

(a) $90^0$ (b) $120^0$

(c)$150^0$ (d) $180^0$




**Correct Options:**

**(A)** 1

**Solution:**

1

**131**

$$2N_2O_5 \rightarrow 4NO_2 + O_2$$

If $\frac{\Delta[N_2O_5]}{\Delta t} = K_1[N_2O_5]$, $\frac{\Delta[NO_2]}{\Delta t} = K_2[N_2O_5]$,

$\frac{\Delta[O_2]}{\Delta t} = K_3[N_2O_5]$, then

**Correct Options:**

**(B)** $2K_1 = K_2 = 4K_3$

**Solution:**

conceptual

**132** **Half life of reaction doesn't change by increasing the concentration then reaction must be**

**Correct Options:**

**(B)** 1st order

**Solution:**

$t_{1/2}$=0.693/K

**133**

53.With which of the following solutions lead cannot be precipitated as $PbCl_2$ , Ksp=2.4 x $10^{-4}$, when equal concentration of $Pb(NO_3)_2$ is mixed with equal volume of:
(a)0.5 N HCl (b) 0.05 N HCl (c)1.0 N HCl (d) 2.0 N HCl

**Correct Options:**

**(B)** 2

**Solution:**

2

**134**

The data for the reaction $A + B \rightarrow C$ is

| Exp. | $[A]_0$ | $[B]_0$ | initial rate |
|---|---|---|---|
| 1 | 0.012 | 0.035 | 0.10 |
| 2 | 0.024 | 0.035 | 0.80 |
| 3 | 0.012 | 0.070 | 0.10 |
| 4 | 0.024 | 0.070 | 0.80 |

**Correct Options:**

**(B)** $r = k [A]^3$

**Solution:**

Let $r = (A)^x (B)^y$

$$x = \frac{\log\left(\frac{r_1}{r_2}\right)}{\log\left(\frac{a_1}{a_2}\right)} = \frac{\log\frac{0.1}{0.1}}{\log\left(\frac{0.012}{0.024}\right)} = \frac{\log\left(\frac{1}{8}\right)}{\log\left(\frac{1}{2}\right)}$$

$x = 3$

$$y = \frac{\log\frac{r_1}{r_3}}{\log\left(\frac{b_1}{b_2}\right)} = \frac{\log\left(\frac{0.1}{0.1}\right)}{\log\left(\frac{0.035}{0.070}\right)} = \frac{\log(1)}{\log\left(\frac{1}{2}\right)}$$

$y = 0$

**135** **The rate constant, the activation energy and the frequency factor of a chemical reaction at 25°C are $3.0 \times 10^{-2}$ $s^{-1}$, 104.4 KJ $mol^{-1}$ and $6.0 \times 10^{14}$ $s^{-1}$ respectively.**
**The value of the rate constant as $T \to \infty$ is :**

**Correct Options:**

**(B)** $6.0 \times 10^{14}$ $s^{-1}$

**Solution:**

$K = 3 \times 10^{-2}$ $s^{-1}$
Ea = 104.4 KJ/mol
$A = 6 \times 10^{14}$

Value of rate constant at $T = \infty$ will be equal tofrequency factor i.e. $A = 6 \times 10^{14}$ $s^{-1}$

**136** **At 30°C, Kp for the dissociation reaction**
$SO_2Cl_{2(g)} \rightleftharpoons SO_{2(g)} + Cl_{2(g)}$ **is** $2.9 \times 10^{-2}$ **atm. If the total pressure is 1 atm, the degree ofdissociation of $SO_2Cl_2$ is**

**Correct Options:**

**(C)** 17%

**Solution:**

conceptual

**137** **The correct order of electron gain enthalpy with negative sign of F, Cl, Br and I, having atomic number 9, 17, 35 and 53 respectively, is –**

**Correct Options:**

**(B)** Cl > F > Br > I

**Solution:**

.

**138** **In a reaction $A_2 + 3B_2 \rightarrow 2C$, the order is 1.5. The ratio of rate of formation of C to that of disappearence of $B_2$ is**

**Correct Options:**

**(B)** $\frac{2}{3}$

**Solution:**

conceptual

**139**

For the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ the degree of dissociation of $N_2O_4$ at equilibrium is 0.2 at one atmosphere. The equilibrium constant Kp will be

**Correct Options:**

**(C)** 1/6

**Solution:**

$N_2O_4 \rightarrow 2NO_2$

t=0 1 0

t=eq 1-0.2 2 x 0.2

0.8/1.2 0.4/1.2

$Kp = (0.4/1.2)^2/(0.8/1.2) = 1/6$

**140**

**What is the value of electron gain enthalpy of $Na^+$ if $IE_1$ of Na = 5.1 eV?**

**Correct Options:**

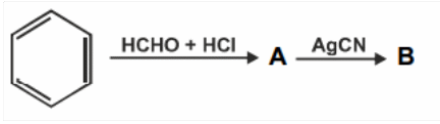
**(B)** –5.1 eV

**Solution:**

.

**141**

**The compounds A and B in the following reaction are, respectively**




**Correct Options:**

**(D)** A = Benzyl chloride, B = Benzyl isocyanide

**Solution:**

A = Benzyl chloride, B = Benzyl isocyanide

**142**

Consider the following reaction in aqueous solution at equilibrium

$6HCHO(aq) \rightleftharpoons C_6H_{12}O_6(aq)$

**What is the degree of association of HCHO in the above reaction if observed molar mass of HCHO and C6H12O6 in the mixture is 150?**

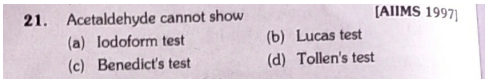
**Correct Options:**

**(D)** 0.96

**Solution:**

CONCEPTUAL

**143**


21. Acetaldehyde cannot show [AIIMS 1997]
(a) Iodoform test (b) Lucas test
(c) Benedict's test (d) Tollen's test

**Correct Options:**

**(B)** 2

**Solution:**

2

**144** **The following mechanism has been proposed for the reaction of NO wilh $Br_2$ to form NOBr $NO(g) + Br_2(g) \rightleftharpoons NOBr_2(g)$ $NOBr_2(g) + NO(g) \rightarrow 2NOBr(g)$**
**If the second step is the rate determining step, theorder of the reaction with respect to NO(g) is**

**Correct Options:**

**(D)** 2

**Solution:**

the answer is 4

**145**

***The rate of a reaction increases 4-fold when concentration of reactant is increased 16 times. If the rate of reaction is $4 \times 10^{-6}$ mole $L^{-1}$ $S^{-1}$ mole $L^{-1}$ when concentration of the reactant is $4 \times 10^{-4}$, the rate constant of the reaction will be***

**Correct Options:**

**(A)**

$2 \times 10^{-4}$ $mole^{1/2}$ $L^{-1/2}$ $S^{-1}$

**Solution:**

$$\text{Rate} \propto \sqrt{\text{concentration}}\,, \quad \text{Rate} = k\sqrt{\text{concentration}}$$

$$k = \frac{\text{Rate}}{(\text{concen})^{1/2}} = \frac{4\times10^{-6}}{\left(4\times10^{-4}\right)^{1/2}} = \frac{4\times10^{-6}}{2\times10^{-2}} = 2 \times 10^{-4}\ \text{mole}^{1/2}\ \text{L}^{-1/2}\ \text{S}^{-1}$$

**146**

**For the reaction,$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$.** If $\frac{d[NH]_3}{dt} = 2 \times 10^{-4}$ mol $L^{-1}$ $s^{-1}$, the value of $\frac{-d[H_2]}{dt}$ would be

**Correct Options:**

**(B)** $3 \times 10^{-4}$ mol $L^{-1}$ $s^{-1}$

**Solution:**

-

**147** **In the gaseous equilibrium , A + 2B $\rightleftharpoons$ C + heat, the forward reaction is favoured by:**

**Correct Options:**

**(C)**
High pressure and low temperature

**Solution:**

exothermic reaction

**148** **Which alkene on ozonolysis gives $CH_3CH_2CHO$ and $CH_3COCH_3$ :**

**Correct Options:**

**(A)** $CH_3CH_2\ CH = C(CH_3)_2$

**Solution:**

-

**149**

$N_2(g) + 3H_2(g) \underset{K_b}{\overset{K_f}{\rightleftharpoons}} 2NH_3(g)$ take place in a closed container. Helium is added at constant pressure in it, then

**Correct Options:**

**(D)**
Reduce the formation of $NH_3$

**Solution:**

conceptual

**150** **One mole of $SO_2Cl_2$ is added to excess of water resulting sulphuric acid and hydrochloric acid. The number of moles of $Ba(OH)_2$ required to neutralise the resulting solution will be**

**Correct Options:**

**(A)** 2

**Solution:**

SO2Cl2 + 2H2O -------> H2SO4 + 2HCl

1 1 2

moles of $H^+$ = 2 + 2 = 4

Moles of $OH^-$ required = 4

Moles of $Ca(OH)_2$ required = 2

**151** **For a first order reaction the ratio of $t_{0.75}$ to $t_{0.50}$ would be**

**Correct Options:**

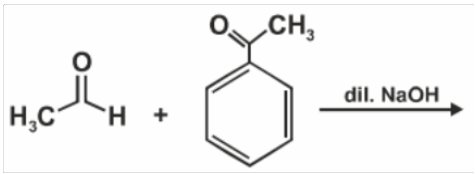
**(C)** 2 : 1

**Solution:**

$t_{3/4}=2t_{1/2}$

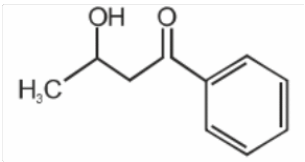
**152**

**The major product formed in the following reaction is**

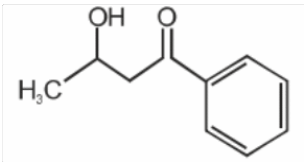



**Correct Options:**

**(C)**




**Solution:**




**153** **For a first order reaction with half life of 150 seconds, the time taken for the concentration of the reactant to fall from M/10 to M/100 will be approximately**

**Correct Options:**

**(B)** 500 sec

**Solution:**

$$K = \frac{0.693}{150}\text{sec}^{-1} = \frac{2.303}{t}\log\frac{1/10}{1/100} \text{ or } t = \frac{2.303\times 150}{0.693}\log 10$$

$\approx$ 500 sec

**154**

Consider the following reaction in which all the reactants and products are in the gaseous state.

$2AB \rightleftharpoons A_2+B_2;\ K_1=3.6\times10^{5}$

$AB+\frac{1}{2}C_2 \rightleftharpoons ABC;K_2=6\times10^{-3}$

The equilibrium constant $K_3$ for the reaction

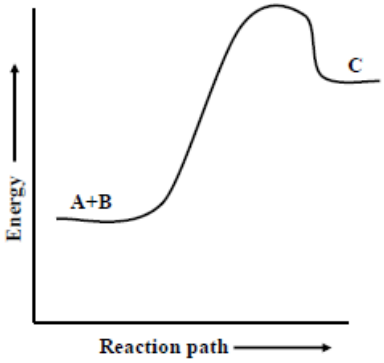
$\frac{1}{2}A_2+\frac{1}{2}B_2+\frac{1}{2}C_2 \rightleftharpoons ABC$ is

**Correct Options:**

**(C)** $1\times10^{-5}$

**Solution:**

**155** **The energy profile for the reaction:** $A+B \rightleftharpoons C$ **is shown as:The equilibrium constant for the said equilibrium**




**Correct Options:**

**(A)**
increases with the increase in temperature

**Solution:**

endothermic reaction

**156** **When $BrO_3^-$ ion reacts with Br– ion in acid solution $Br_2$ is liberated the equivalent weight of $KBrO_3$ in this reaction is :**

**Correct Options:**

**(C)** M/5

**Solution:**

N factor of $BrO_3^-$ = 5

Equivalent weight = M / 5

**157**
**If k is the rate constant of a first order reaction, then the time required for 99.9% completion of the reaction is**

**Correct Options:**

**(B)** 6.909/k

**Solution:**

**158** **Match the following**

| | Column A | | Column B |
|---|---|---|---|
| (i) | Zero order reaction | (a) | $\frac{k_{t+10}}{k_t}$ |
| (ii) | First order reation | (b) | $\frac{dx}{dt}$ |
| (iii) | Second order reaction | (c) | $-\frac{dx}{dt} = k[A]^2[B]$ |
| (iv) | Instantaneous rate | (d) | $H_2 + Cl_2 \xrightarrow{hv} 2HCl$ |
| (v) | Temperature coefficient | (e) | $CH_3COOCH_3 + NaOH \rightarrow CH_3COONa + CH_3OH$ |
| (vi) | Rate equation for third order reaction | (f) | $2H_2O_2 \rightarrow H_2O + O_2$ |
| (vii) | Acidic hydrolysis of ester | (g) | Pseudo-unimolecular reaction |

**Correct Options:**

**(B)** i-d, ii-f, iii-e, iv-b, v-a, vi-c, vii-g

**Solution:**

CONCEPTUAL

**159** **CO cannot be used for reduction of ZnO because**

**Correct Options:**

**(A)** $\Delta_f G°$ of $CO_2$ from CO is always higher than that of ZnO

**Solution:**

-

**160** **An increase in the temperature of an equilibrium system:**

**Correct Options:**

**(B)**
Favours the endothermic reaction

**Solution:**

CONCEPTUAL

**161** **Products of the following reaction** $MeC = CHCH_3 \xrightarrow[(ii)\,(CH_3)_2S]{(i)\,O_3} ?$ are:

**Correct Options:**

**(B)** $Me_2CO + CH_3CHO$

**Solution:**

-

CH3CHO + CH3COOH

b) Me2CO + CH3CHO

c) Me2CO + CH3COOH

d) 2Me2CO.

**162**
**pOH of $H_2O$ is 7.0 at 298 K . If water is heated at 350 K, which of the following statement should be true ?**

**Correct Options:**

**(A)** pOH will decrease

**Solution:**

.

**163** **Assuming complete precipitation of AgCl, calculate the sum of the molar concentration of all the ions if 2 lit of 2M $Ag_2SO_4$ is mixed with 4 lit of 1 M NaCl solution is :**

**Correct Options:**

**(B)** 2M

**Solution:**

$2NaCl + Ag_2SO_4 \rightarrow 2AgCl + Na_2SO_4$

Initially

No. of moles of $Ag_2SO_4 = 2 \times 2 = 4$

No. of moles of $NaCl = 4 \times 1$

AgCl formed = 4 moles

No. of moles of $Ag^{2+}$ left $= 4 \times 2 - 4 = 4$

No. of moles of $Cl^-$ left = 0

No. of moles of $Na^+ = 4$

No. of moles of $SO_4^{-2} = 4$

$$\text{Sum of molar conc.} = \frac{12}{6} = 2\ M$$

**164** The rate equation for the reaction 2A + B → C is found to be : rate = k [A] [B]. The correct statement in relation to this reaction is

**Correct Options:**

**(D)**
value of k is independent of the initial concentrations of A and B.

**Solution:**

D

**165**

The reaction of $NO_2$ (g) and $O_3$ (g) is first-order in $NO_2$ (g) and $O_3$ (g)

$$2\ NO_2\ (g) + O_3\ (g) \longrightarrow N_2O_5\ (g) + O_2\ (g)$$

The reaction can take place by mechanism :

$$\text{I} : NO_2 + O_3 \xrightarrow{\text{slow}} NO_3 + O_2$$

$$NO_3 + NO_2 \xrightarrow{\text{fast}} N_2O_5$$

$$\text{II} : O_3 \underset{k_b}{\overset{k_a\ \text{fast}}{\rightleftharpoons}} O_2 + [O]$$

$$NO_2 + O \xrightarrow{\text{slow}} NO_3$$

$$NO_3 + NO_2 \xrightarrow{\text{fast}} N_2O_5$$

Select correct mechanism.

**Correct Options:**

**(C)** both I and II

**Solution:**

For Rxn rate determining step is slowest step
Then in 1st Rxn

$$\text{Rate} = k\,[NO_2]\,[O_3] \qquad \text{.....(i)}$$

But 2nd Rxn

$$O_3 \underset{k_b}{\overset{k_a \text{ fast}}{\rightleftharpoons}} O_2 + [O] \qquad \text{....(a)}$$

$$NO_2 + O \xrightarrow{\text{slow}} NO_3 \qquad \text{....(b)}$$

$$NO_3 + NO_2 \xrightarrow{\text{fast}} N_2O_5 \qquad \text{....(c)}$$

Then for Rxn (a)

$$\frac{k_a}{k_b} = \frac{[O_2][O]}{[O_3]} = k_{eq} \qquad \text{....(d)}$$

by Rxn (b)

$$\text{Rate} = k\,[NO_2]\,[O] \qquad \text{....(ii)}$$

put value of [O] from (d) to (ii)

$$\text{Rate} = k\,\frac{k_{eq}[O_3]}{[O_2]} \times [NO_2]$$

$$\text{Rate} = \frac{k_1[NO_2][O_3]}{[O_2]}$$

**166 The half-life of a substance in a first order reaction is 15 minutes. The rate constant is**

**Correct Options:**

**(C)** $3 \times 10^{-2}\ min^{-1}$

**Solution:**

-

**167**

Consider following two reactions

$$A \longrightarrow \text{Product} \longrightarrow -\frac{d[A]}{dt} = k_1\,[A]^o$$

$$B \longrightarrow \text{Product} \longrightarrow -\frac{d[B]}{dt} = k_2\,[B]$$

Units of $k_1$ and $k_2$ are expressed in terms of molarity (mol $L^{-1}$) and time ($sec^{-1}$) as –

**Correct Options:**

**(D)** $M\ sec^{-1}$, $sec^{-1}$

**Solution:**

**(D).** $A \rightarrow \text{product} \Rightarrow -\frac{d[A]}{dt} = k_1[A]^\circ \Rightarrow \text{zero order}$

$B \rightarrow \text{product} \Rightarrow -\frac{d[B]}{dt} = k_2[A] \Rightarrow 1^{st} \text{ order}$

For zero order $\Rightarrow$ mol $L^{-1}$ time$^{-1}$ = M sec$^{-1}$

For $1^{st}$ order $\Rightarrow$ time$^{-1}$ or sec$^{-1}$

**168**

**If different quantities of ethanol and acetic acid were used in the following reversible reaction**

$CH_3COOH(\ell) + C_2H_5OH(\ell) \rightleftharpoons CH_3COOC_2H_5(\ell) + H_2O(\ell)$

**the equilibrium constant will have values which will be ?**

**Correct Options:**

**(B)** same in all cases

**Solution:**

.

**169**

For a hypothetical reaction $A_{(g)} + 3B_{(g)} \rightleftharpoons 2C_{(g)} \Delta H = -100kJ \ \ and \ \ \Delta S = -200JK^{-1}$. Then the temperature at which the reaction will be in equilibrium.

**Correct Options:**

**(A)** 500K

**Solution:**

Gibb's energy and equlibrium constant

**170**

**The halide that exhibits trigonal bipyramidal geometry is ____.**

**Correct Options:**

**(B)** $SeF_4$

**Solution:**

$SeF_4$

**171**

**50% completion of a first order reaction takes place in 16 minutes. Then fraction that would react in 32 minutes from the begining**

**Correct Options:**

**(D)** 3/4

**Solution:**

-

**172**

**A radioactive element has a half life of 4.5 × $10^9$ year. If 80 g of this was taken, the time taken for it to decay to 40 g will be:**

**Correct Options:**

**(B)** 4.50 × $10^9$ year

**Solution:**

half life time=4.5 × $10^9$ year

**173**

**The reaction** $A(g) \longrightarrow B(g) + 2C(g)$ **is a first order reaction with rate constant 3465 × $10^{-6}$ $s^{-1}$. Starting with 0.1 mole of A in 2 litre vessel, find the concentration of A after 200 sec., when the reaction is allowed to take place at constant pressure and temperature.**

**Correct Options:**

**(C)** 0.0125 M

**Solution:**

$A_2 \rightarrow B + 2C$
$A_0 - x \quad x \quad 2x$
$A = A_0 e^{-kt}$

$A_0 - = \frac{A_0}{z} \qquad V_1 = 2\ell$

$nx = \frac{A_0}{z} \qquad V_2 = 4\ell$

$[a] = \frac{0.05}{4} = 0.0125$

**174** **A freshly prepared radioactive source of half life 2 hr. emits radiations of intensity which is 64 times the permissible safe level. The minimum time after which it would be possible to work safely with this source is:**

**Correct Options:**

**(B)** 12 hr

**Solution:**

APPLY 1ST ORDER FORMULA

**175**

The relation between $K_p$ and $K_c$ for the reaction $2NO_2 \rightleftharpoons N_2O_4$, is

**Correct Options:**

**(B)** $K_P = K_C(RT)^{-1}$

**Solution:**

**176**

Equimolar concentrations of $H_2$ and $I_2$ are heated to attain equilibrium. At equilibrium, the forward and backward rate constants are found to be equal. The percentage of $I_2$ that has reacted at equilibrium is

**Correct Options:**

**(B)** 33%

**Solution:**

**177**

In which of the following, the concentration of the product is higher than that of the reactant at equilibrium?

**Correct Options:**

**(C)** $X \rightleftharpoons Y;\ K = 5$

**Solution:**

**178**

The unit of $K_p$ for the reaction

$NH_4HS_{(s)} \rightleftharpoons NH_{3(g)} + H_2S_{(g)}$

**Correct Options:**

**(A)** $atm^{-1}$

**Solution:**

**179**

The relation between $K_p$ and $K_c$ for the reaction, $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ is

**Correct Options:**

**(D)** $K_p = K_c(RT)^{-2}$

**Solution:**

**180**

The unit of $K_p$ for the reaction

$NH_4HS_{(s)} \rightleftharpoons NH_{3(g)} + H_2S_{(g)}$

**Correct Options:**

**(A)** $atm^{-1}$

**Solution:**

**181** **Zn can displace**

**Correct Options:**

**(B)** Cu from its aqueous solution

**Solution:**

-

**182**

A button cell used in watches function as following :

$Zn_{(s)} + Ag_2O_{(s)} + H_2O_{(l)} \rightleftharpoons 2Ag_{(s)} + Zn^{2+}_{(aq)} + 2OH^-_{(aq)}$

If half cell potentials are

$Zn^{2+}_{(aq)} + 2e^- \rightarrow Zn_{(s)}; E^\circ = -0.76\ V$

$Ag_2O_{(s)} + H_2O_{(l)} + 2e^- \rightarrow 2Ag_{(s)} + 2OH^-_{(aq)}; E^\circ = 0.34\ V$

The cell potential will be

**Correct Options:**

**(C)** 1.10 V

**Solution:**

$(c): E^\circ_{cell} = E^\circ_{O.P.} + E^\circ_{R.P.}$

$= 0.76 + 0.34 = 1.10\ V$

**183** **The unit of specific conductivity is**

**Correct Options:**

**(D)** ohm–1 $cm^{-1}$

**Solution:**

-

**184** **Highest oxidation state of Mn is present in**

**Correct Options:**

**(A)** $KMnO_4$

**Solution:**

$4$

et the Ox no. of Mn in $KMnO$ be x.

We know that, OX no. of $K = +1$

Ox no. of $O = -2$

So, Ox no. $K + $ Ox no. $Mn + 4(Ox.no.O) = 0$

or $+1+x+4(-2)=0$

or $+1+x-8=0$

or $x=+8-1=+7$

$4$

Hence, Ox no. of Mn in $KMnO$ is $+7$.

**185** **Species having zero dipole moment :-**

**Correct Options:**

**(A)** $XeF_4$

**Solution:**

$XeF_4$

**186** **Molar ionic conductivities of a bivalent electrolyte are 57 and 73. The molar conductivity of the solution will be**

**Correct Options:**

**(A)** 130 S $cm^2$ $mol^{-1}$

**Solution:**

-

**187** **Electrolysis of dil $H_2SO_4$ liberates gases at anode and cathode**

**Correct Options:**

**(C)** $O_2$ & $H_2$ respectively

**Solution:**

$O_2$ & $H_2$ respectively

**188** **Saturated solution of $KNO_3$ with agar-agar is used to make 'salt bridge' because**

**Correct Options:**

**(C)** velocities of $K^+$ and $NO_3^-$ are nearly the same

**Solution:**

-

**189**

Following limiting molar conductivities are given as :

$\lambda^\circ_{m(H_2SO_4)} = x\ S\ cm^2\ mol^{-1}$

$\lambda^\circ_{m(K_2SO_4)} = y\ S\ cm^2\ mol^{-1}$

$\lambda^\circ_{m(CH_3COOK)} = z\ S\ cm^2\ mol^{-1}$

$\lambda^\circ_m$ (in $S\ cm^2\ mol^{-1}$) for $CH_3COOH$ will be

**Correct Options:**

**(D)** $\frac{(x-y)}{2}+z$

**Solution:**

**(d) :** According to Kohlrausch's law,

$\lambda^o_m$ for $CH_3COOH = \lambda^o_{CH_3COO^-} + \lambda^o_{H^+}$

$\lambda^\circ$ for $H_2SO_4 = 2\lambda^\circ_{H^+} + \lambda^\circ_{SO_4^{2-}} = x\ S\ cm^2 mol^{-1}$ ...(i)

$\lambda^\circ$ for $K_2SO_4 = 2\lambda^\circ_{K^+} + \lambda^\circ_{SO_4^{2-}} = y\ S\ cm^2 mol^{-1}$ ...(ii)

$\lambda^\circ$ for $CH_3COOK = \lambda^\circ_{CH_3COO^-} + \lambda^\circ_{K^+} = z\ S\ cm^2 mol^-$ ...(iii)

On adding equation (i) and 2 × (iii) and subtracting (ii), we get

$2\lambda^\circ_{H^+} + \lambda^\circ_{SO_4^{2-}} + 2\lambda^\circ_{CH_3COO^-} + 2\lambda^\circ_{K^+} - 2\lambda^\circ_{K+} - \lambda^\circ_{SO_4^{2-}} = x + 2z - y$

$2\lambda^\circ_{H^+} + 2\lambda^\circ_{CH_3COO^-} = x + 2z - y$

$\lambda^\circ_{H^+} + \lambda^\circ_{CH_3COO^-} = \frac{(x-y)}{2} + z$

**190** **A solution of potassium bromide is treated with each of the following. Which one would liberate bromine?**

**Correct Options:**

**(C)** Chlorine

**Solution:**

A stronger oxidising agent ($Cl_2$) displaces a weaker oxidising agent ($Br_2$) from its salt solution. $2KBr + Cl_2 \rightarrow 2KCl + Br_2$

**191** **The emf of a Daniell cell at 298 K is $E_1 Zn|ZnSO_4(0.001\ M)||CuSO_4(1.0M)|Cu$**
**When the conc. of $ZnSO_4$ is 1.0 M and that of $CuSO_4$ is 0.01 M, the emf changed to $E_2$. What is relationship between $E_1$ and $E_2$ ?**

**Correct Options:**

**(A)** $E_1 > E_2$

**Solution:**

-

**192** **Kohlrauschs law states that at**

**Correct Options:**

**(A)**
infinite dilution, each ion makes definite contribution to conductance of an electrolyte whatever be the nature of the other ion of the electrolyte

**Solution:**

**193** **In the electrolytic cell, flow of electrons in from**

**Correct Options:**

**(C)**
Cathode to anode through internal supply

**Solution:**

In electrolytic cell, flow of electron is possible from cathode to anode through internal supply.

**194** **Which of the following is a strongest nucleophile?**

**Correct Options:**

**(D)** $I^-$

**Solution:**

$I^-$

**195** **Select the correct statement in the following reaction, $NH_4NO_2 \rightarrow N_2 + 2H_2O$**

**Correct Options:**

**(B)**
Oxidation number of N in $NH_4^+$ changed from -3 to 0 and that in $NO_2^-$ changed from +3 to 0.

**Solution:**

Oxidation number of N in $NH_4^+$ changed from -3 to 0 and that in $NO_2^-$ changed from +3 to 0.

**196** The cell reaction for the cell $Zn + Zn^{2+}$ (1.0M) | $Cd^{2+}$ (1.0 M) | Cd is given by –

**Correct Options:**

**(D)** $Zn + Cd^{2+} \rightarrow Zn^{2+} + Cd$

**Solution:**

D

**197** Given standard electrode potentials

$Fe^{++} + 2e^- \rightarrow Fe; E^0 = -0.440\,V$

$Fe^{+++} + 3e^- \rightarrow Fe; E^0 = -0.036\,V$

The standard electrode potential ($E^o$) for $Fe^{+++} + e^- \rightarrow Fe^{++}$ is :

**Correct Options:**

**(D)** +0.771V

**Solution:**

D

**198**

**What would be the product of electrolysis if molten is electrolysed 3ICl**

**Correct Options:**

**(C)** Both I2 and $cl_2$ are liberated at both electrodes

**Solution:**

Both I2 and $cl_2$ are liberated at both electrodes

**199**

**Which of the following polymer has ester linkage?**

**Correct Options:**

**(A)** Dacron

**Solution:**

Dacron

**200**

What is the standard cell potential for the cell $Zn / Zn^{2+}(1M) \| Cu^{2+}(1M) / Cu$

$E^{o}$ for $Zn / Zn^{2+}(1M) = -0.76\,V$ and $Cu^{2+} / Cu = +0.34\,V$

**Correct Options:**

**(C)** $0.34 - (-0.76) = 1.10\ V$

**Solution:**

C