eSaral

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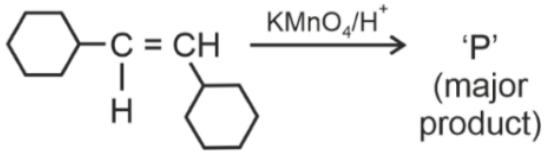
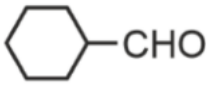
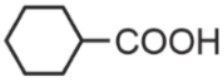
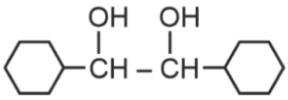
51. For the given reaction:

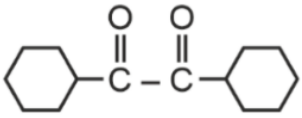


' P ' is

(A) 

(B) 

(C) 

(D) 

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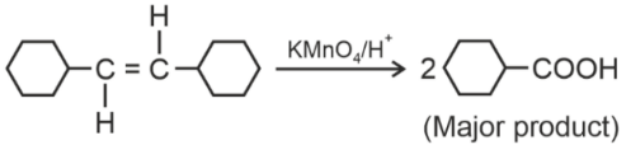
Correct Option: B

Solution:



52. The plot of osmotic pressure (Π) vs concentration (molL^{-1}) for a solution gives a straight line with slope $25.73\ \text{Lbarmol}-^{1}$. The temperature at which the osmotic pressure measurement is done is
(Use $\text{R} = 0.083\ \text{L bar mol}^{-1}\ \text{K}^{-1}$)

(A) 37°C (B) 310°C

(C) 25.73°C (D) 12.05°C

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Correct Option: A

Solution:

$\Pi = \text{CRT}$

$Slope = \text{RT}$

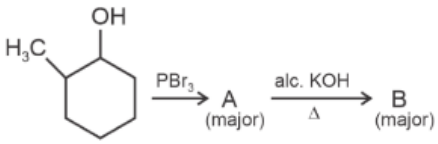
$25.73 = 0.083 \times \text{T}$

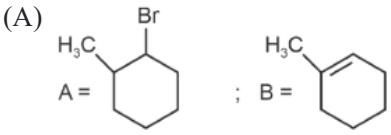
$\text{T} = \dfrac{25.73}{0.083} = 309.47 \approx 310\ \text{K}$

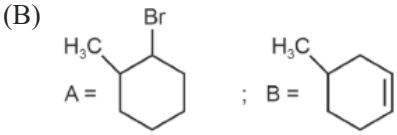
$\therefore \quad Temperature\ in^{\circ}\text{C} = 310 - 273$

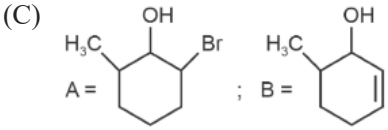
$= 37^{\circ}\text{C}$

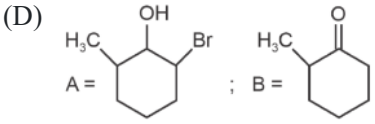
53. Major products A and B formed in the following reactic sequence, are



(A) 

(B) 

(C) 

(D) 

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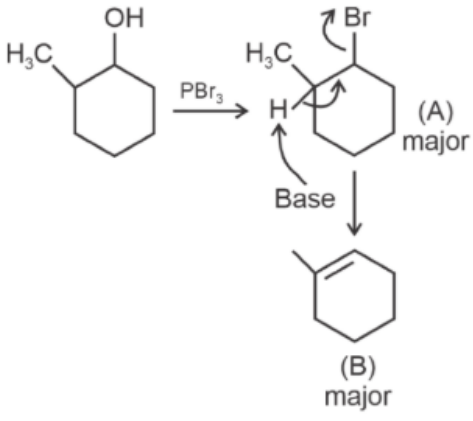
Correct Option: A

Solution:



54. In which of the following processes entropy increases?
A. A liquid evaporates to vapour.

B. Temperature of a crystalline solid lowered from 130 K to 0 K .
C. $2NaHCO_{3(s)} \rightarrow Na_2CO_{3(s)} + CO_{2(g)} + H_2O_{(g)}$
D. $Cl_{2(g)} \rightarrow 2Cl_{(g)}$
Choose the correct answer from the options given below:

(A) A and D (B) A , B and D

(C) A , C and D (D) C and D

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Correct Option: C

Solution:

When a liquid evaporates to vapour entropy increases.

$2NaHCO_{3(s)} \rightarrow Na_2CO_{3(s)} + CO_{2(g)} + H_2O_{(g)}$

Number of gaseous product molecules increases so entropy increases.

$Cl_{2(g)} \rightarrow 2Cl_{(g)}$

1 mole $Cl_{2(g)}$ form $2molCl_{(g)}$. So entropy increases.

55. Match List I with List II.

	List I (Complex)		List II (Type of isomerism)
A.	$[Co(NH_3)_5(NO_2)]Cl$	I.	Solvate isomerism
B.	$[Co(NH_3)_5(SO_4)]Br$	II.	Linkage isomerism
C.	$[Co(NH_3)_6][Cr(CN)_6]$	III.	Ionization isomerism
D.	$[Co(H_2O)_6]Cl_3$	IV.	Coordination isomerism

Choose the correct answer from the options given below:

(A) A-II, B-III, C-IV, D-I (B) A-I, B-III, C-IV, D-II

(C) A-I, B-IV, C-III, D-II (D) A-II, B-IV, C-III, D-I

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Correct Option: A

Solution:

A.	$[Co(NH_3)_5(NO_2)]Cl_2$	II.	Linkage isomerism due to ' N ' and ' O ' linkage by NO_2
B.	$[Co(NH_3)_5(SO_4)]Br$	III.	Ionization isomerism
C.	$[Co(NH_3)_6][Cr(CN)_6]$	IV.	Coordination isomerism
D.	$[Co(H_2O)_6]Cl_3$	I.	Solvate isomerism

56. On heating, some solid substances change from solid vapour state without passing through liquid state. Th technique used for the purification of such solid sub stances based on the above principle is known as

(A) Crystallization (B) Sublimation

(C) Distillation (D) Chromatography

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Correct Option: B

Solution:

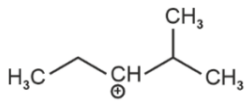
(1) Crystallization : It is based on difference in the solubilities of the compound and impurities in a suitable solvent.

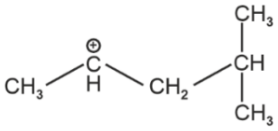
(2) Sublimation : It is the purification technique based on principle that on heating, some solid substances change from solid to vapour state without passing through liquid state.

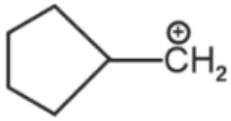
(3) Distillation : It is used to separate volatile liquids from non-volatile impurities and the liquids having sufficient difference in their boiling point.

(4) Chromatography : It is based on separation by using stationary and mobile phase.

57. The most stable carbocation among the following is :

(A) 

(B) 

(C) 

(D)

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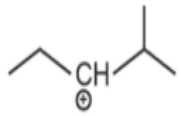
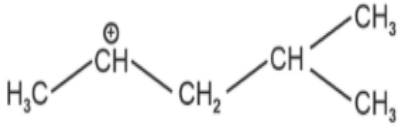
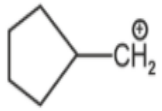
Correct Option: D

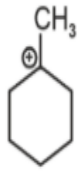
Solution:

The stability of carbocation can be described by the hyperconjugation. Greater the extent of hyperconjugation, more is the stability of carbocation.

(1)  → 3 α-H

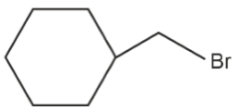
(2)  → 5 α-H

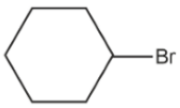
(3)  → 1 α-H

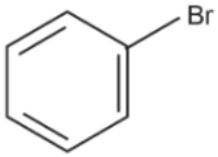
(4)  → 7 α-H

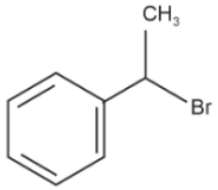
Stability order of carbocations $= (4) > (2) > (1) > (3)$

58. The compound that will undergo S_N1 reaction with the fastest rate is

(A) 

(B) 

(C) 

(D) 

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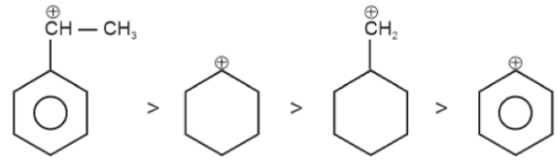
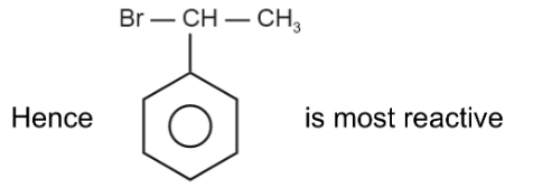
Correct Option: D

Solution:

Reactivity towards S_N1 depends upon stability of carbocation.

Order of stability is





59. A compound with a molecular formula of C_6H_{14} has tw tertiary carbons. Its IUPAC name is :

(A) n-hexane (B) 2-methylpentane

(C) 2,3-dimethylbutane (D) 2,2-dimethylbutane

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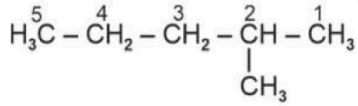
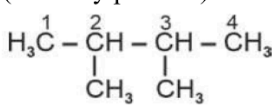
Correct Option: C

Solution:

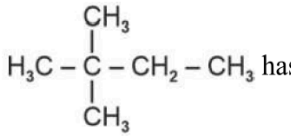
$CH_3-CH_2-CH_2-CH_2-CH_2-CH_3$ has no teritary carbon (n-Hexane)

 has only one tertiary carbon

(2-Methylpentane)

 has two tertiary carbon.

(2, 3-Dimethylbutane)

 has no tertiary carbon

(2, 2-Dimethylbutane)

60. Mass in grams of copper deposited by passing 9.6487 A current through a voltmeter containing copper sulphate solution for 100 seconds is (Given : Molar mass of Cu : 63 g mol^{-1}, 1 F = 96487C)

(A) 3.15 g (B) 0.315 g (C) 31.5 g (D) 0.0315 g

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Correct Option: B

Solution:

$Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$

Mass of Cu deposited $(w) = \frac{M \times i \times t}{nF}$

$= \frac{63 \times 9.6487 \times 100}{2 \times 96487}$

$= 0.315$ g

61. The rate of a reaction quadruples when temperature changes from 27°C to 57°C. Calculate the energy of activation.
(Given R = 8.314 J K^{-1} mol^{-1}, log 4 = 0.6021)

(A) 38.04 kJ/mol

(B) 380.4 kJ/mol

(C) 3.80 kJ/mol

(D) 3804 kJ/mol

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Correct Option: A

Solution:

$\log\left(\frac{k_2}{k_1}\right) = \frac{E_a}{2.303R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$

$\log\left(\frac{4}{1}\right) = \frac{E_a}{2.303R}\left(\frac{1}{300} - \frac{1}{330}\right)$

$E_a = \frac{(\log(4)) \times 2.303 \times 8.314 \times 300 \times 330}{30}$

$= 3.804 \times 10^4$ J/mol

$= 38.04$ kJ/mol

62. Activation energy of any chemical reaction can be calculated if one knows the value of

(A) rate constant at standard temperature

(B) probability of collision

(C) orientation of reactant molecules during collision

(D) rate constant at two different temperatures

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Correct Option: D

Solution:

To calculate value of E_a

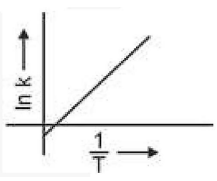
Equation used is

$\log\left(\frac{k_2}{k_1}\right) = \frac{E_a}{2.303R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$

Hence E_a can be calculated if value of rate constant k is known at two different temperatures T_1 and T_2.

63. Which plot of ln k vs $\frac{1}{T}$ is consistent with Arrhenius equation?

(A)



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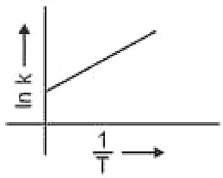
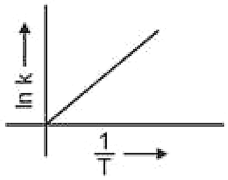
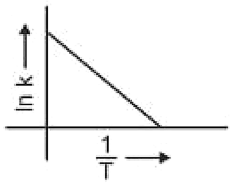


(C)



(D)



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Correct Option: D

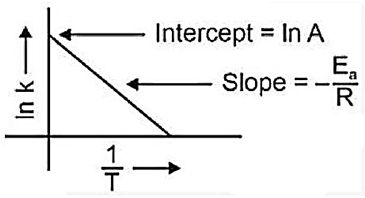
Solution:

The Arrhenius equation is given as

$k = Ae^{-\frac{E_a}{RT}}$

$\therefore \quad \ln k = \ln A - \frac{E_a}{RT}$

ln k v/s $\left(\frac{1}{T}\right)$ gives a straight line graph with slope $= -\frac{E_a}{R}$ and intercept $= \ln A$



64. The pair of lanthanoid ions which are diamagnetic is

(A) Ce^{4+} and Yb^{2+}

(B) Ce^{3+} and Eu^{2+}

(C) Gd^{3+} and Eu^{3+}

(D) Pm^{3+} and Sm^{3+}

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Correct Option: A

Solution:

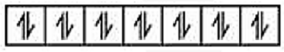
Magnetic moment $\mu = \sqrt{n(n+2)}$

n → number of unpaired electron

$Ce^{4+} \Rightarrow (Xe)4f^0$

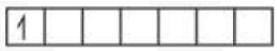
$\mu = 0$ Diamagnetic

$Yb^{2+} \Rightarrow (Xe)4f^{14}$



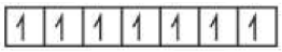
$\mu = 0$ Diamagnetic

$Ce^{3+} \Rightarrow (Xe)4f^{1}$



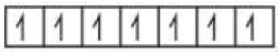
$\mu = \sqrt{3}$ Paramagnetic

$Eu^{2+} \Rightarrow (Xe)4f^{7}$



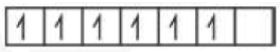
$\mu = \sqrt{63}$ Paramagnetic

$Gd^{3+} \Rightarrow (Xe)4f^{7}$



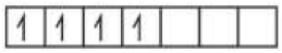
$\mu = \sqrt{63}$ Paramagnetic

$Eu^{3+} \Rightarrow (Xe)4f^{6}$



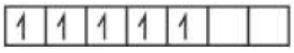
$\mu = \sqrt{48}$ Paramagnetic

$Pm^{3+} \Rightarrow (Xe)4f^{4}$



$\mu = \sqrt{24}$ Paramagnetic

$Sm^{3+} \Rightarrow (Xe)4f^{5}$



$\mu = \sqrt{35}$ Paramagnetic

Hence Ce^{4+} and Yb^{2+} are only diamagnetic.

65. The E° value for the Mn^{3+}/Mn^{2+} couple is more positive than that of Cr^{3+}/Cr^{2+} or Fe^{3+}/Fe^{2+} due to change of

(A) d^5 to d^4 configuration

(B) d^5 to d^2 configuration

(C) d^4 to d^5 configuration

(D) d^3 to d^5 configuration

NEET 2024

Correct Option: C

Solution:

$E^0_{Mn^{3+}/Mn^{2+}} > E^0_{Cr^{3+}/Cr^{2+}}$ or $E^0_{Fe^{3+}/Fe^{2+}}$

Electronic configuration of $Mn^{3+} = [Ar]3d^4$

Electronic configuration of $Mn^{2+} = [Ar]3d^5$

Electronic configuration of $Cr^{3+} = [Ar]3d^3$

Electronic configuration of $Cr^{2+} = [Ar]3d^4$

As Mn^{3+} from d^4 configuration goes to more stable d^5 configuration (half filled), due to more exchange energy in d^5 configuration.

66. Given below are two statements : [NEET(UG) 2024]
Statement I:
$[Co(NH_3)_6]^{3+}$ is a homoleptic complex whereas $[Co(NH_3)_4Cl_2]^{+}$ is a heteroleptic complex.
Statement II : Complex $[Co(NH_3)_6]^{3+}$ has only one kind of ligands but $[Co(NH_3)_4Cl_2]^{+}$ has more than one kind of ligands.
In the light of the above statements, choose the corre answer from the options given below.

(A) Both Statement I and Statement II are true

(B) Both Statement I and Statement II are false

(C) Statement I is true but Statement II is false

(D) Statement I is false but Statement II is true

NEET 2024

Correct Option: A

Solution:

$[Co(NH_3)_6]^{3+}$ is a homoleptic complex as only one type of ligands

(NH_3) is coordinated with Co^{3+} ion. While

$[Co(NH_3)_4Cl_2]^{+}$ is a heteroleptic complex in which

Co^{3+} ion is ligated with more than one type of ligands, i.e., NH_3 and Cl^{-}.

67. Given below are two statements :
Statement I:
Both $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$ complexes are octah dral but differ in their magnetic behaviour. Statement II: $[Co(NH_3)_6]^{3+}$ is diamagnetic whereas $[CoF_6]^{3-}$ is par magnetic. In the light of the above statements, choose tl correct answer from the options given below:

(A) Both Statement I and Statement II are true

(B) Both Statement I and Statement II are false

(C) Statement I is true but Statement II is false

(D) Statement I is false but Statement II is true

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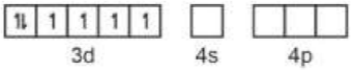
Correct Option: A

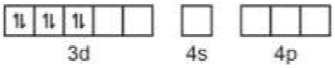
Solution:

In $[Co(NH_3)_6]^{3+}$, Co^{3+} ion is having 3 d^6 configuration. Electronic configuration of Co^3

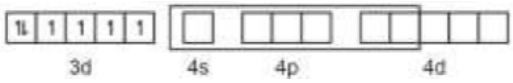


In presence of NH_3 ligand, pairing of electrons takes place and it becomes diamagnetic complex ion

In presence of NH_3 ligand :



$\therefore$ $[Co(NH_3)_6]^{3+}$ is octahedral with d^2sp^3 hybridisation and it is diamagnetic in nature. In case of $[CoF_6]^{3-}$, Co is in +3 oxidation state and it is having 3 d^6 configuration. In presence of weak field F^- ligand, pairing does not take place. In presence of F^- ligands : □



$\therefore$ In $[CoF_6]^{3-}$, Co^{3+} is sp^3 d^2 hybridised with four unpaired electrons, so it is paramagnetic in nature.

68. The reagents with which glucose does not react to give the corresponding tests/products are:
A. Tollen's reagent
B. Schiff's reagent
C. HCN
D. NH_2OH
E. $NaHSO_3$
Choose the correct options from the given below:

(A) B and C (B) A and D (C) B and E (D) E and D

NEET 2024

Correct Option: C

Solution:

Despite having the aldehyde group glucose does not give Schiff test and if does not form the hydrogen sulphate addition product with $NaHSO_f$.

69. Identify the major product C formed in the following reaction sequence:

$$CH_3-CH_2-CH_2-I \xrightarrow{NaCN} A \xrightarrow[\text{Partial Hydrolysis}]{OH^-} B \xrightarrow[Br_2]{NaOH} \underset{(major)}{C}$$

(A) propylamine (B) butylamine

(C) butanamide (D) α-bromobutanoic acid

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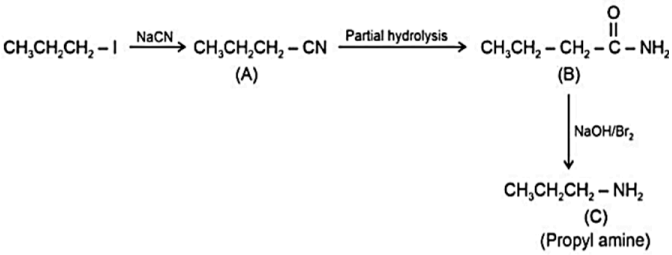
Correct Option: A

Solution:



- Step-I is SN reaction with CN nucleophile.

- Step-II will give amide.

- Step-III is Hoffmann bromamide degradation reaction.

70. Given below are two statements:
Statement I : Aniline does not undergo Friedel-Craf alkylation reaction.
Statement II : Aniline cannot be prepared throug Gabriel synthesis.
In the light of the above statements, choose the corre answer from the options given below:

(A) Both statement I and Statement II are true

(B) Both Statement I and Statement II are false

(C) Statement I is correct but Statement II is false

(D) Statement I is incorrect but Statement II is true

NEET 2024

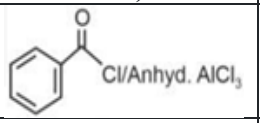
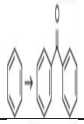
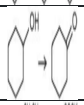
Correct Option: A

Solution:

- Aniline does not undergo Friedel-Crafts alkylation reaction due to salt formation with aluminium chloride, the Lewis acid, which is used as a catalyst.

- Aniline (aromatic primary amine) cannot be prepared by Gabriel phthalimide synthesis because aryl halides do not undergo nucleophilic substitution with anion formed by phthalimide.

71. Match List I with List II.

List I (Reaction)		List II (Reagents/Condition)	
(A)		(I)	
(B)		(II)	CrO_3
(C)		(III)	$KMnO_4/KOH, \Delta$
(D)		(IV)	(i) O_3 (ii) $Zn - H_2O$

Choose the correct answer from the options given below:

(A) A-IV, B-I, C-III, D-II (B) A-III, B-I, C-II, D-IV

(C) A-IV, B-I, C-II, D-III (D) A-I, B-IV, C-II, D-III

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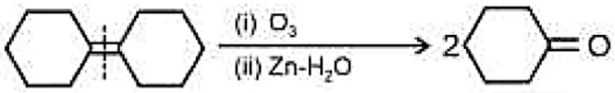
Correct Option: C

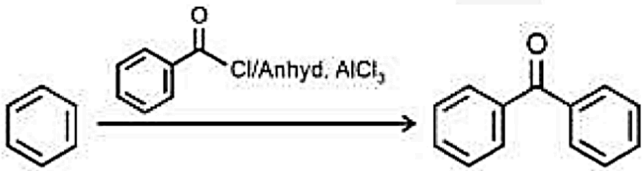
Solution:

(A)



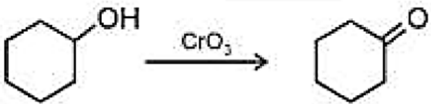
It is reductive ozonolysis

(B)



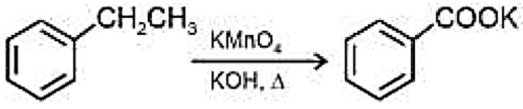
It is Friedel-Crafts acylation reaction.

(C)



Secondary alcohols are oxidised to ketones by CrO_3

(D)



72. Fehling's solution 'A' is

(A) aqueous copper sulphate

(B) alkaline copper sulphate

(C) alkaline solution of sodium potassium tartrate (Rochelle's salt)

(D) aqueous sodium citrate

NEET 2024

Correct Option: A

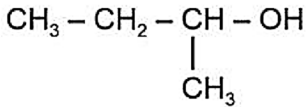
Solution:

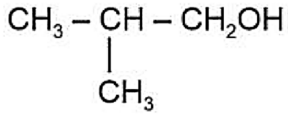
Fehling solution 'A' = Aqueous copper sulphate

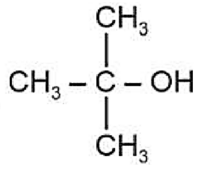
Fehling solution 'B' = Alkaline sodium potassium tartrate (Rochelle salt)

73. Which one of the following alcohols reacts instant neously with Lucas reagent?

(A) $CH_3 - CH_2 - CH_2 - CH_2OH$

(B) 

(C) 

(D) 

NEET 2024

Correct Option: D

Solution:

Tertiary alcohols react instantaneously with Lucas reagent and gives immediate turbidity. In case of tertiary alcohols, they form halides easily with Lucas reagent (conc. HCl anc $ZnCl_2$)

74. Given below are two statements:

Statement I: The boiling point of hydrides of Group 1 elements follow the order $H_2O > H_2Te > H_2Se > H_2$ S

Statement II: On the basis of molecular mass, H_2O expected to have lower boiling point than the other mer bers of the group but due to the presence of extensive H bonding in H_2O, it has higher boiling point.

In the light of the above statements, choose the corre answer from the options given below:

(A) Both Statement I and Statement II are true

(B) Both Statement I and Statement II are false

(C) Statement I is true but Statement II is false

(D) Statement I is false but Statement II is true

NEET 2024

Correct Option: A

Solution:

Statement I is correct, because boiling point of hydrides of group 16 follows the order $H_2O > H_2Te > H_2Se > H_2S$

Statement II due to intermolecular H-bonding H_2O shows higher boiling point than respective hydrides of group 16.

(Both Statement are true)

Order from H_2Te to H_2S is due to decreasing molar mass.

75. The products A and B obtained in the following reactions, respectively, are:

$3ROH + PCl_3 \rightarrow 3RCl + A$

$ROH + PCl_5 \rightarrow RCl + HCl + B$

(A) $POCl_3$ and H_3PO_3

(B) $POCl_3$ and H_3PO_4

(C) H_3PO_4 and $POCl_3$

(D) H_3PO_3 and $POCl_3$

NEET 2024

Correct Option: D

Solution:

These reactions are preparation of haloalkanes from alcohols.

$3ROH + PCl_3 \longrightarrow 3RCl + H_3PO_3$

$ROH + PCl_5 \longrightarrow RCl + HCl + POCl_3$

A and B are H_3PO_3 and $POCl_3$ respectively.

76. Among Group 16 elements, which one does NOT show -2 oxidation state?

(A) O (B) Se (C) Te (D) Po

NEET 2024

Correct Option: D

Solution:

Oxygen shows $-2, -1, +1$, and +2 oxidation states.

Selenium shows $-2, +2, +4$, and +6 oxidation states.

Tellurium shows $-2, +2, +4$, and +6 oxidation states.

Polonium shows +2 and +4 oxidation states only.

77. Consider the following reaction in a sealed vessel at equ librium with concentrations of $N_2 = 3.0 \times 10^{-3}M$, O_2 = $4.2 \times 10^{-3}M$ and $NO = 2.8 \times 10^{-3}M$.

$2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}$

If 0.1 mol L^{-1} of $NO_{(g)}$ is taken in a closed vessel, wh will be degree of dissociation (α) of $NO_{(g)}$ equilibrium?

(A) 0.00889 (B) 0.0889 (C) 0.8889 (D) 0.717

NEET 2024

Correct Option: D

Solution:

$2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}$

$$K_c = \frac{[N_2][O_2]}{[NO]^2}$$

$$= \frac{3 \times 10^{-3} \times 4.2 \times 10^{-3}}{2.8 \times 10^{-3} \times 2.8 \times 10^{-3}}$$

$$= 1.607$$

$2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}$

t = 0 0.1 0 0

$0.1 - 0.1\alpha \quad 0.05\alpha \quad 0.05\alpha$

$$K_c = \frac{0.05\alpha \times 0.05\alpha}{(0.1 - 0.1\alpha)^2}$$

$$K_c = \frac{0.05\alpha \times 0.05\alpha}{0.01(1-\alpha)^2}$$

$$1.607 = \frac{(0.05)^2\alpha^2}{0.01(1-\alpha)^2}$$

$$\frac{\alpha^2}{(1-\alpha)^2} = \frac{1.607 \times (0.1)^2}{(0.05)^2}$$

$$\frac{\alpha}{1-\alpha} = \frac{1.27 \times 0.1}{0.05}$$

$$\frac{\alpha}{1-\alpha} = 2.54$$

$$\alpha = 2.54 - 2.54\alpha$$

$$3.54\alpha = 2.54$$

$$\alpha = \frac{2.54}{3.54} = 0.717$$

78. In which of the following equilibria, K_p and K_c are NO equal?

(A) $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$

(B) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

(C) $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$

(D) $2BrCl_{(g)} \rightleftharpoons Br_{2(g)} + Cl_{2(g)}$

NEET 2024

Correct Option: A

Solution:

79. For the reaction, $2\,A \rightleftharpoons B + C, K_C = 4 \times 10^{-3}$. At a given time, the composition of reaction mixture is: $[A] = [B] = [C] = 2 \times 10^{-3}$M. Then, which of the following is correct?

(A) Reaction is at equilibrium.

(B) Reaction has a tendency to go in forward direction.

(C) Reaction has a tendency to go in backward direction.

(D) Reaction has gone to completion in forward direction.

NEET 2024

Correct Option: C

Solution:

$2\,A \rightleftharpoons B + C,\ K_C = 4 \times 10^{-3}$

At a given time t, Q_c is to be calculated and been compared with K_c.

$$Q_C = \frac{[B][C]}{[A]^2} = \frac{(2 \times 10^{-3})(2 \times 10^{-3})}{(2 \times 10^{-3})^2}$$

$$Q_C = 1$$

As $Q_c > K_c$, so reaction has a tendency to move backward.

80. The work done during reversible isothermal expansion of one mole of hydrogen gas at 25°C from pressure of 20 atmosphere to 10 atmosphere is
(Given $R = 2.0$ cal K^{-1} mol^{-1})

(A) 0 calorie (B) -413.14 calories

(C) 413.14 calories (D) 100 calories

NEET 2024

Correct Option: B

Solution:

$$W_{rev,iso} = -2.303nRT \log \frac{P_i}{P_f}$$

$$= -2.303 \times 1 \times 2 \times 298 \times \log 2$$
$$= -2.303 \times 1 \times 2 \times 298 \times 0.3$$
$$= -413.14 calories$$

81. Match List I with List II.

List-I (Process)		List-II (Conditions)	
(A)	Isothermal process	(I)	No heat exchange
(B)	Isochoric process	(II)	Carried out at constant temperature
(C)	Isobaric process	(III)	Carried out at constant volume
(D)	Adiabatic process	(IV)	Carried out at constant pressure

Choose the correct answer from the options given below

(A) A-IV, B-III, C-II, D-I (B) A-IV, B-II, C-III, D-I

(C) A-I, B-II, C-III, D-IV (D) A-II, B-III, C-IV, D-I

NEET 2024

Correct Option: D

Solution:

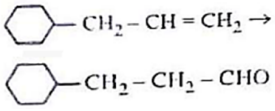
(A) Isothermal process ⇒ Temperature is constant throughout the process

(B) Isochoric process ⇒ Volume is constant throughout the process

(C) Isobaric process ⇒ Pressure is constant throughout the process

(D) Adiabatic process ⇒ No exchange of heat (q) between system and surrounding

82. Identify the correct reagents that would bring about tl following transformation.



(A) (i) H_2O/H^+ (ii) CrO_3

(B) (i) BH_3 (ii) $H_2O_2/\overset{\ominus}{O}H$
(iii) PCC

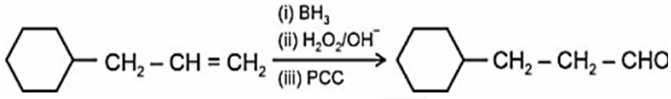
(C) (i) BH_3 (ii) $H_2O_2/\overset{\ominus}{O}H$
(iii) alk. $KMnO_4$ (iv) $H_3O^{\oplus}$

(D) (i) H_2O/H^+ (ii) PCC

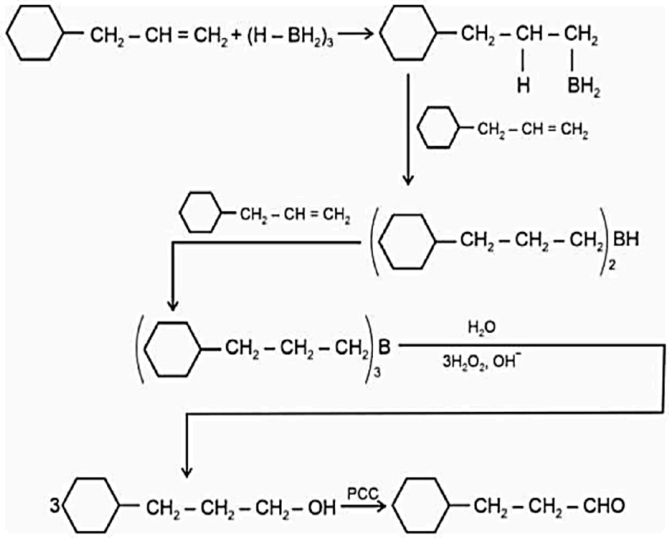
NEET 2024

Correct Option: B

Solution:



Mechanism :



83. A compound X contains 32% of A, 20% of B and remaining percentage of C . Then, the empirical formula of X is :
(Given atomic masses of A = 64; B = 40; C = 32u)

(A) A_2BC_2 (B) ABC_3

(C) AB_2C_2 (D) ABC_4

NEET 2024

Correct Option: B

Solution:

Element	Mass percentage %	No. of moles	No. of moles/ Smallest number	Simplest whole Number
A	32%	$\frac{32}{64}=\frac{1}{2}$	$\frac{1}{2}\times 2$	$=1$
B	20%	$\frac{20}{40}=\frac{1}{2}$	$\frac{1}{2}\times 2$	$=1$
C	48%	$\frac{48}{32}=\frac{3}{2}$	$\frac{3}{2}\times 2$	$=3$

So, empirical formula of X = $\begin{matrix} A & : & B & : & C \\ 1 & : & 1 & : & 3 \end{matrix}$

∴ The correct empirical formula of compound X is ABC ,

84. 1 gram of sodium hydroxide was treated with 25 mL of 0.75 M HCl solution, the mass of sodium hydroxide left unreacted is equal to

(A) 750 mg (B) 250 mg (C) Zero mg (D) 200 mg

NEET 2024

Correct Option: B

Solution:

$M = \frac{W\times 1000}{M_2\times V\,(in\ mL)}$

$W = \frac{M\times M_2\times V\,(in\ mL)}{1000} = \frac{0.75\times 36.5\times 25}{1000}$

$= 0.684g$ (Mass of HCl)

$\underset{36.5g}{HCl} + \underset{40g}{NaOH} \longrightarrow HCl + NaOH$

36.5 g HCl reacts with NaOH = 40 g

0.684 g HCl reacts with NaOH = $\frac{40}{36.5}\times 0.684 = 0.750g$

Amount of NaOH left $= 1g - 0.750g = 0.250g = 250mg$

85. The highest number of helium atoms is in

(A) 4 mol of helium (B) $4u$ of helium

(C) 4 g of helium (D) 2.271098 L of helium STP

NEET 2024

Correct Option: A

Solution:

(1) 4 mol of He = 4 N_A He atoms

(2) $4u$ of He = $\frac{4u}{4u} = 1$ He

(3) 4 g of Helium = $\frac{4\,g}{4\,g}$ mole = 1 mole = N_A He atom

(4) 2.271098 L of He at STP = $\frac{2.271}{22.710982}$ mole

= 0.1 mole
= 0.1 N_A He atom

86. Identify the correct answer.

(A) Three resonance structures can be drawn for ozone

(B) BF_3 has non-zero dipole moment

(C) Dipole moment of NF_3 is greater than that of NH_3

(D) Three canonical forms can be drawn for CO_3^{2-} ion

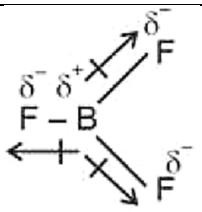
NEET 2024

Correct Option: D

Solution:

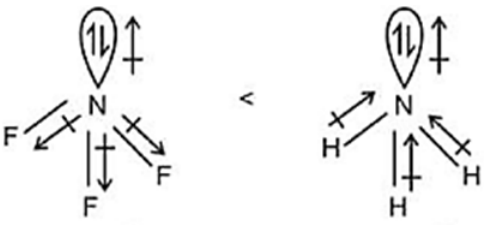
(1) In ozone, there are two resonating structures.

(2) BF_3 i.e.,



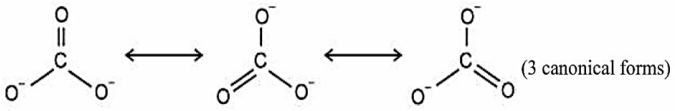
; Dipole moment = 0

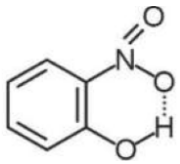
(3)



$(0.80 \times 10^{-30}\text{Cm})$ $(4.90 \times 10^{-30}\text{Cm})$

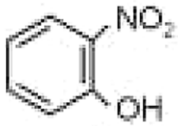
(4)

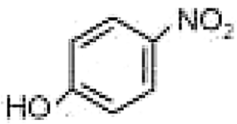


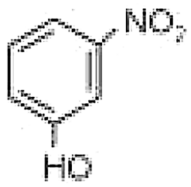


⟵ H-bonding

87. Intramolecular hydrogen bonding is present in

(A) 

(B) 

(C) 

(D) HF

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Correct Option: A

Solution:

In o-nitrophenol intramolecular H-bonding is present.

88. Match List I with List II.

List I		List II	
(Compound):		**(Shape/Geometry):**	
(A)	NH_3	(I)	Trigonal Pyramidal
(B)	BrF_5	(II)	Square Planar
(C)	XeF_4	(III)	Octahedral
(D)	SF_6	(IV)	Square Pyramidal

Choose the correct answer from the options given below

(A) A-I, B-IV, C-II, D-III (B) A-II, B-IV, C-III, D-I

(C) A-III, B-IV, C-I, D-II (D) A-II, B-III, C-IV, D-I

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Correct Option: A

Solution:

$NH_3 \rightarrow sp^3$ hybridised with 1 lone pair. Structure will be Trigonal Pyramidal.

$BrF_5 \rightarrow sp^3d^2$ hybridised with 1 lone pair. Structure will be Square Pyramidal.

$XeF_4 \rightarrow sp^3d^2$ with two lone pairs. Structure will be Square Planar.

$SF_6 \rightarrow sp^3d^2$ with no lone pair. Structure will be Octahedral.

$A-I, B-IV, C-II, D-III$

89. Match List I with List II.

List I (Molecule)		List II (Number and types of bond/s between two carbon atoms)	
(A)	ethane	(I)	one σ-bond and two π-bonds
(B)	Ethene	(II)	two π-bonds
(C)	carbon molecule, C_2	(III)	one σ-bond
(D)	ethyne	(IV)	one σ-bond and one π-bond

Choose the correct answer from the options given below

(A) $A-I, B-IV, C-II, D-III$ (B) $A-IV, B-III, C-I$

(C) $A-III, B-IV, C-II, D-I$ (D) $A-III, B-IV, C-$

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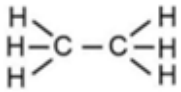
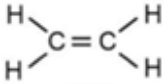
Correct Option: C

Solution:

(A)	ethane 	one $(C-C)\sigma$ bond
(B)	Ethene 	one $(C-C)\sigma$ and one $(C-C)\pi$ bond
(C)	C_2	two $(C-C)\pi$ bonds
(D)	Ethyne $H-C\equiv C-C$	two $(C-C)\pi$ bonds and one $(C-C)\sigma$ bond

90. Arrange the following elements in increasing order of first ionization enthalpy: Li, Be, B, C, N.
Choose the correct answer from the options given below:

(A) $Li < Be < B < C < N$

(B) $Li < B < Be < C < N$

(C) $Li < Be < C < B < N$

(D) $Li > Be < C > B < N$

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Correct Option: B

Solution:

Increasing order of first ionization enthalpy is $Li < B < Be < C < N$

Element	First ionization enthalpy $(\Delta_i H/kJmol^{-1})$
Li	520
Be	899
B	801
C	1086
N	1402

91. Arrange the following elements in increasing order of electronegativity:
N, O, F, C, Si
Choose the correct answer from the options given below:

(A) $Si < C < N < O < F$

(B) $Si < C < O < N < F$

(C) $O < F < N < C < Si$

(D) $F < O < N < C < Si$

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Correct Option: A

Solution:

Electronegativity increases across the period on moving left to right. It decreases on moving down the group.

The correct option is $Si < C < N < O < F$

92. Match List I with List II

List I (Quantum Number)		List II (Information provided)	
A.	m_ℓ	I.	Shape of orbital
B.	m_s	II.	Size of orbital
C.	ℓ	III.	Orientation of orbital
D.	n	IV.	Orientation of spin of electron

Choose the correct answer from the options given below

(A) $A-III, B-IV, C-I, D-II$ (B) $A-I, B-III, C-II$

(C) $A-III, B-IV, C-II, D-I$ (D) $A-II, B-I, C-IV$

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Correct Option: A

Solution:

- Magnetic quantum number m_ℓ informs about orientation of orbital.

- Spin quantum number m_s informs about orientation of spin of electron.

- Azimuthal quantum number (ℓ) informs about shape of orbital

- Principal quantum number (n) informs about size of orbital

93. The energy of an electron in the ground state $(n=1)$ fo He^+ ion is -x J , then that for an electron in $n=2$ state for Be^{3+} ion in J is

(A) -x (B) $-\frac{x}{9}$

(C) $-4x$ (D) $-\frac{4}{9}x$

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Correct Option: A

Solution:

$E_n = -R_H\left(\frac{z^2}{n^2}\right) J$

For $He^+(n=1)$,

$E_n = -x = -R_H\left(\frac{2^2}{1^2}\right) = -4R_H$

$\therefore \quad R_H = \frac{x}{4}$

For $Be^{3+}(n = 2)$,

$E_n = -R_H\left(\frac{Z^2}{n^2}\right) J$

$= -\frac{x}{4} \times \left(\frac{4 \times 4}{2 \times 2}\right) = -x\,J$

94. Given below are two statements :

Statement I: The boiling point of three isomeric pentanes follows the order *n*-pentane > isopentane > neopentane.

Statement II: When branching increases, the molecule attains a shape of sphere. This results in smaller surface area for contact, due to which the intermolecular forces between the spherical molecules are weak, thereby lowering the boiling point.

In the light of the above statements, choose the most appropriate answer from the options given below

(A) Both Statement I and Statement II are correct

(B) Both Statement I and Statement II are incorrect

(C) Statement I is correct but Statement II is incorrect

(D) Statement I is incorrect but Statement II is correct

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Correct Option: A

Solution:

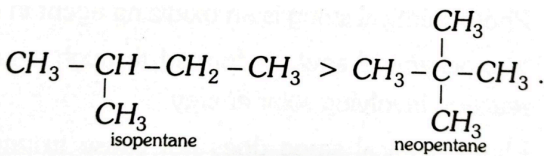
For alkanes

Boiling point $\propto$ molecular mass

$\propto \frac{1}{Branching}(if molecular mass is same)$

Boiling point

$\underset{n-pentane}{CH_3 - CH_2 - CH_2 - CH_3} >$



95. Given below are certain cations. Using inorganic qualitative analysis, arrange them in increasing group number from 0 to VI.

A. Al^{3+}

B. Cu^{2+}

C. Ba^{2+}

D. Co^{2+}

E. Mg^{2+}

Choose the correct answer from the options given below

(A) B, A, D, C, E

(B) B, C, A, D, E

(C) *E*, *C*, *D*, *B*, *A*

(D) *E*, *A*, *B*, *C*, *D*

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Correct Option: A

Solution:

	Basic Radicals	Group Number
B.	Cu^{+2}	II
A.	Al^{+3}	III
D.	Co^{+2}	IV
C.	Ba^{+2}	V
E.	Mg^{+2}	VI

B, A, D, C, E.

96. Match List I with List II

	List I (Conversion)		List II (Number of Faraday required)
(A)	1 mol of H_2O to O_2	(I)	3F
(B)	1 mol of MnO_4^- to Mn^{2+}	(II)	2F
(C)	1.5 mol of Ca from molten $CaCl_2$	(III)	1F
(D)	1 mol of FeO to Fe_2O_3	(IV)	5F

Choose the correct answer from the options given below

(A) A-II, B-IV, C-I, D-III (B) A-III, B-IV, C-I, D-II

(C) A-II, B-III, C-I, D-IV (D) A-III, B-IV, C-II, D-I

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Correct Option: A

Solution:

A. $2H_2O \rightarrow O_2 + 4H^+ + 4e^-$

1 molH_2O will req. 2 F charge

B. $8H^+ + MnO_4^- + 5e^- \rightarrow Mn^{+2} + 4H_2O$

1 mole MnO_4^- will req. $5F$ charge

C. $CaCl_2 + 2e^- \rightarrow Ca + 2Cl^{-1}$

1.5 mole Ca will req. $3F$ charge

D. $2FeO + H_2O \rightarrow Fe_2O_3 + 2H^+ + 2e^-$

1 mole FeO will req. $1F$ charge

97. Which reaction is not a redox reaction?

(A) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

(B) $2KClO_3 + I_2 \rightarrow 2KIO_3 + Cl_2$

(C) $H_2 + Cl_2 \rightarrow 2HCl$

(D) $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

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Correct Option: D

Solution:

$BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

98. During the preparation of Mohr's salt solution (Ferrous ammonium sulphate), which of the following acid is added to prevent hydrolysis of Fe^{+2} ion?

(A) dilute nitric acid (B) dilute sulphuric acid

(C) dilute hydrochloric acid (D) concentrated sulphuric acid

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Correct Option: B

Solution:

Addition of H_2SO_4 prevent hydrolysis of Fe^{+2} but, dilute solution is used. If concentrated H_2SO_4 be used it can oxidise Fe^{+2} into Fe^{+3}.

99. The Henry's law constant (k_H) values of three gases (A, B, C) in water are $145, 2 \times 10^{-5}$ and 35 kbar, respectively. The solubility of these gases in water follow the order:

(A) B > A > C

(B) B > C > A

(C) A > C > B

(D) A > B > C

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Correct Option: B

Solution:

According to Henry's law: $P = K_H x$ Thus, a lower value of K_H indicates higher value of x (mole fraction/ concentration) for a given pressure and therefore higher solubility. Since, K_H : B < C < A; Solubility; B > C > A.

100. 'Spin only' magnetic moment is same for which of tl following ions?

A. Ti^{3+} B. Cr^{2+}

C. Mn^{2+} D. Fe^{2+}

E. Sc^{3+}

Choose the most appropriate answer from the optio given below.

(A) B and D only (B) A and E only

(C) B and C only (D) A and D only

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Correct Option: A

Solution:

Ions	No. of unpaired electrons	Configuration
Ti^{3+}	1	$3\,d^1$
Cr^{2+}	4	$3\,d^4$
Mn^{2+}	5	$3\,d^5$
Fe^{2+}	4	$3\,d^6$
Sc^{3+}	0	$3\,d^0$

Spin only magnetic moment is given by $\sqrt{n(n+2)}$BM

$\therefore$ Cr^{2+} and Fe^{2+} will have same spin only magnetic moment.

NEET 2024 Paper - ANSWER KEY

Que.	51	52	53	54	55	56	57	58	59	60
Ans.	B	A	A	C	A	B	D	D	C	B
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	A	D	D	A	C	A	A	C	A	A
Que.	71	72	73	74	75	76	77	78	79	80
Ans.	C	A	D	A	D	D	D	A	C	B
Que.	81	82	83	84	85	86	87	88	89	90
Ans.	D	B	B	B	A	D	A	A	C	B
Que.	91	92	93	94	95	96	97	98	99	100
Ans.	A	A	A	A	A	A	D	B	B	A