JEE Main January 2026

Question Paper With Text Solution

24 January | Shift-2

CHEMISTRY

MATRIX

JEE Main & Advanced | XI-XII Foundation| VI-X Pre-Foundation

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JEE MAIN JANUARY 2026 | 24 JANUARY SHIFT-2

SECTION – A

Question ID : 444792655

51. At 298 K , the mole percentage of $N_2(g)$ in air is 80%. Water is in equilibrium with air at a pressure of 10 atm . What is the mole fraction of $N_2(g)$ in water at 298 K ?

$(K_H$ for N_2 is 6.5×10^7 mmHg$)$

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(1) 1.23×10^{-7} (2) 1.17×10^{-4} (3) 9.35×10^{-5} (4) 9.35×10^{5}

Ans. Official answer NTA (3)

Sol. $P_{N_2}=10\times\frac{80}{100}=8\,atm$

$=8\times760\,mm\,Hg$

$P_{N_2}=K_H\times x_{N_2}$

$8\times760=6.5\times10^7\times x_{N_2}$

$x_{N_2}=\frac{8\times760}{6.5\times10^7}$

$=9.35\times10^{-5}$

Question ID : 444792661

52. The wavelength of light absorbed for the following complexes are in the order

$[Co(NH_3)_6]^{3+}$; $[Co(H_2O)_6]^{3+}$; $[Co(CN)_6]^{3-}$; $[Co(NH_3)_5(H_2O)]^{3+}$; $[CoF_6]^{3-}$

(I) (II) (III) (IV) (V)

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(1) III < IV < I < II < V (2) III < I < II < IV < V

(3) III < I < IV < V < II (4) III < I < IV < II < V

Ans. Official answer NTA (4)

Sol. strength of liganas

$\overline{CN}>NH_3>H_2O>F^-$

$\Delta_0\propto\frac{hc}{\lambda}\propto$ strength of ligand

Δ_0 $III>I>IV>II>V$

λ_{absorb} V > II > IV > I > III

Question ID : 444792654

53. The heat of atomisation of methane and ethane are 'x' $kJmol^{-1}$ and 'y' $kJmol^{-1}$ respectively. The longest wavelength (λ) of light capable of breaking the $C-C$ bond can be expressed in SI unit as:

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(1) $\frac{N_A hc}{250(4y-6x)}$ (2) $\frac{N_A hc}{250(y-6x)}$ (3) $\frac{hc}{1000}\left(\frac{y-6x}{4}\right)^{-1}$ (4) $N_A hc\left(y-\frac{6x}{4}\right)^{-1}$

Ans. Official answer NTA (4)

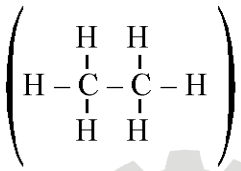
Sol. $CH_4(g) \rightarrow C(g)+4H$

$\Delta H = x\,kJ/mol$

$BE_{C-H} = \frac{x}{4} kJ/mol$

$CH_3-CH_3 \rightarrow 2C(g)+6H(g)$

$\Delta H = y\,kJ/mol$



$BE_{C-C}+6BE_{C-H} = y$

$BE_{C-C} = y-6\times\frac{x}{4} kJ/mol$

$\frac{4y-6x}{4} kJ/mol$

$\frac{4y-6x}{4}\times 1000\,J/mol$

$250(4y-6x) = \frac{hc}{\lambda}\times N_A$

$\lambda = \frac{hcN_A}{250(4y-6x)}$

Question ID : 444792670

54. In the Group analysis of cations, Ba^{2+} & Ca^{2+} are precipitated respectively as"

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(1) hydroxide & carbonate (2) carbonate & carbonate

(3) chromate & sulphide (4) sulphide & sulphide

Ans. Official answer NTA (2)

Sol. $Ba^{2+}/Ca^{2+}/Sr^{2+}$ belongs to group 5.

Precipitated in form of carbonate

group reagent of this group is $(NH_4)_2CO_3$ in the presence of NH_4Cl and NH_4OH.

$Ba^{2+}/Ca^{2+} \rightarrow BaCO_3/CaCO_3$

Question ID : 444792669

55. The number of possible tripeptides formed involving alanine (ala), glycine (gly) and valine (val), where no amino acid has been used more than once is:

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(1) 6 (2) 4 (3) 8 (4) 3

Ans. Official answer NTA (1)

Sol. Possible Tripeptides

A G V

A V G

G V A

G A V

V A G

V G A

total = 6

Question ID : 444792665

56. The unsaturated ether on acidic hydrolysis produces carbonyl compounds as shown below:

$$CH_3-CH=CH=O-CH=CH_2$$
$$\downarrow H_3O^{(+)}$$
$$CH_3-CH_2-CH=O \text{ and } O=CH-CH_3$$

Based on this, predict the solution/reagent that will help to distinguish "P" and "Q" obtained in the following reaction:

$$CH_3-CH=CH-O-\overset{CH_3}{\overset{|}{C}}=CH_2 \xrightarrow[\Delta]{H_3O^{(+)}} P+Q$$

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(1) Fehling solution

(2) Lucas reagent

(3) 2, 4 - DNP reagent

(4) Saturated $NaHSO_3$ solution

Ans. Official answer NTA (1)

Sol.

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

$$CH_3-CH=\underset{OH}{\underset{|}{CH}} + \overset{CH_3}{\overset{|}{C}}=\underset{OH}{\underset{|}{CH_2}}$$

$$\downarrow$$

$$CH_3-CH_2CHO + CH_3-\overset{O}{\overset{||}{C}}-CH_3$$

Aldehyde & ketone are distinguished by fehling sol^n

Question ID : 444792652

57. The wavelength of spectral line obtained in the spectrum of Li^{2+} ion, when the transition takes place between two levels whose sum is 4 and difference is 2 , is

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(1) 2.28×10^{-6} cm (2) 1.14×10^{-7} cm (3) 2.28×10^{-7} cm (4) 1.14×10^{-6} cm

Ans. Official answer NTA (4)

Sol. $3 + 1 = 4$

$3 - 1 = 2$

$n_1 = 1 \mid n_2 = 3$

$$\frac{1}{\lambda} = R_H (Z)^2 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

$$\frac{1}{\lambda} = R_H (3)^2 \left(\frac{1}{1} - \frac{1}{9}\right) = R_H \times 9 \times \frac{8}{9} = 8R_H$$

$$\lambda = \frac{1}{8R_H} = \frac{1}{8} \times 912 = 114 A^\circ$$

$= 114 \times 10^{-8}$ cm

$= 1.14 \times 10^{-6}$

Question ID : 444792658

58. The correct order of C, N, O and F in terms of second ionisation potential is

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(1) $F < N < C < O$ (2) $C < N < F < O$ (3) $C < F < N < O$ (4) $C < O < N < F$

Ans. Official answer NTA (2)

Sol. for 2nd IP, remove one electron

C	N	O	F
$1s^2 2s^2 2p^2$	p^3	p^4	p^5
↓	↓	↓	↓
p^1	p^2	p^3	p^4

IE $p^3 > p^4 > p^2 > p^1$

$\therefore$ O > F > N > C

Question ID : 444792668

59. Given below are two statements:

Statement I: The dipole moment of R-CN is greater than R-NC and R-NC can undergo hydrolysis under acidic medium to produce $R-\overset{\overset{O}{\|}}{C}-OH$

Statement II: R-CN hydrolyses under acidic medium to produce a compound which on treatment with $SOCl_2$, followed by the addition of NH_3 gives another compound (x). This compound (x) on treatment with $NaOCl / NaOH$ gives a product, that on treatment with $CHCl_3 / KOH / \Delta$ produces R-NC

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

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(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

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

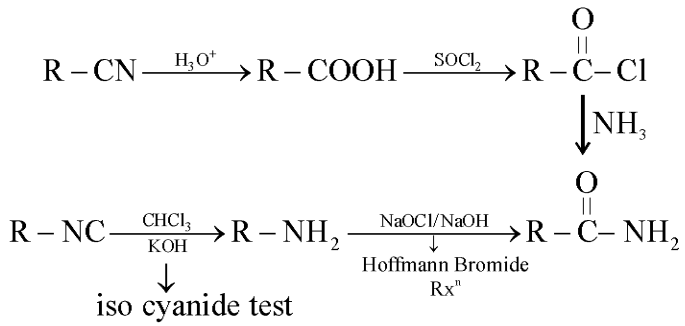
(4) Statement I is true but Statement II is false

Ans. Official answer NTA (3)

Sol. $R - N \equiv C \xrightarrow{H_3O^+} R - NH_2 + HCOOH$

$\therefore$ statement I is incorrect

Statment 2 :



Question ID : 444792659

60. Choose the Incorrect statement

(1) Carbon exhibits negative oxidation states along with +4 and +2 .

(2) CO_2 is the most acidic oxide among the dioxides of group of 14 elements.

(3) Carbon cannot exceed its covalency more than four.

(4) Among the isotopes of carbon, ^{13}C is a radioactive isotope.

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Ans. Official answer NTA (4)

Sol. (I) $\overset{-4}{C}H_4$ $\overset{+4}{C}Cl_4$

$\therefore$ correct

(II) As we go down the gp metallic character increases so acidic strength of oxide dec

$\therefore$ CO_2 is most acidic in group 14.

(III) C can form max 4 bond

(IV) ^{14}C is radioactive not ^{13}C.

Question ID : 444792660

61. "X" is an oxoanion of the lightest element of group 7 (in the periodic table). The metal is in +6 oxidation state in "X". The color of the potassium salt of X is

(1) green (2) yellow (3) purple (4) orange

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Ans. Official answer NTA (1)

Sol. Group 7 $\Rightarrow$ d – block

lightest element $\Rightarrow$ Mn

$K\overset{+7}{M}nO_4$ $K_2\overset{+6}{M}nO_4$

green

Question ID : 444792657

62. Consider the following gaseous equilibrium in a closed container of volume 'V' at $^{13}CT(K)$.

$$P_2(g)+Q_2(g) \rightleftharpoons 2PQ(g)$$

2 moles each of $P_2(g), Q_2(g)$ and $PQ(g)$ are present at equilibrium. Now one mole each of 'P_2' and 'Q_2' are added to the equilibrium keeping the temperature at $T(K)$. The number of moles of P_2, Q_2 and PQ at the new equilibrium, respectively, are

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(1) 2.67,2.67,2.67 (2) 1.21, 2.24, 1.56 (3) 2.56,1.62,2.24 (4) 1.66, 1.66, 1.66

Ans. Official answer NTA (1)

Sol.

	$P_2(g)$	+	$Q_2(g)$	=	$2PQ(g)$
at eq	2		2		2

$$k_{eq}=\frac{2^2}{2\times 2}=1$$

If one mol of each P_2 & Q_2 are added
eq. shifted in forward direction

P_2	+	Q_2	=	$2PQ$
$3-x$		$3-x$		$2+2x$

k_{eq} remains same

$$\therefore \frac{(2+2x)^2}{(3-x)^2}=1$$

$$\frac{2+2x}{3-x}=1$$

$$x=\frac{1}{3}$$

$$n_p=3-\frac{1}{3}=\frac{8}{3}=2.67$$

$$n_Q=3-\frac{1}{3}=\frac{8}{3}=2.67$$

$$n_{PQ}=2+2\times\frac{1}{3}=\frac{8}{3}=2.67$$

Question ID : 444792664

63. Given below are two statements:

Statement I : Cross aldol condensation between two different aldehydes will always produce four different products.

Statement II : When semicarbazide reacts with a mixture of benzaldehyde and acetophenone under optimum pH, it forms a condensation product with acetophenone only.

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

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(1) Both Statement I and Statement II are true

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

(3) Both Statement I and Statement II are false

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

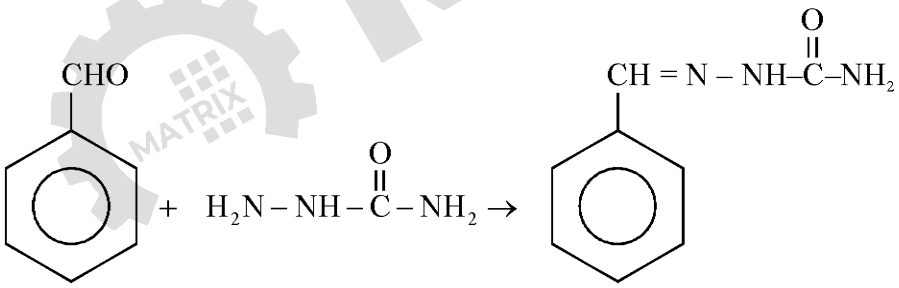
Ans. Official answer NTA (3)

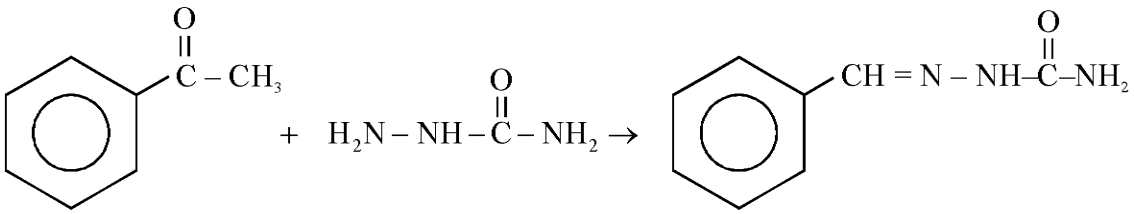
Sol. Statement I :

cross aldol not gives four deff. product always

$CH_3CHO + HCHO \rightarrow$ only one

Statement II :

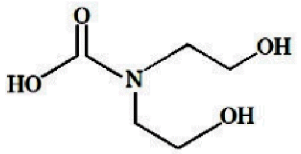


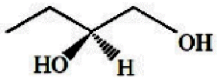


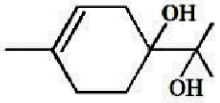
forms condensation product with both

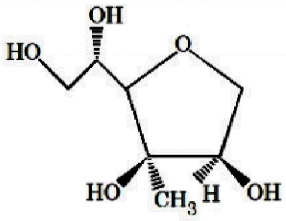
Question ID : 444792667

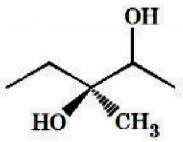
64. From the following, how many compounds contain at least one secondary alcohol?

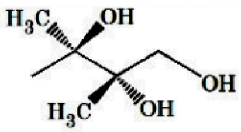

(I)


(II)


(III)


(IV)


(V)


(VI)

Choose the correct answer from the options given below:

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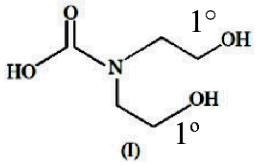
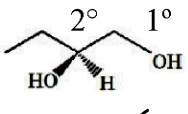
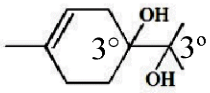
(1) Three (2) Four (3) Five (4) Two

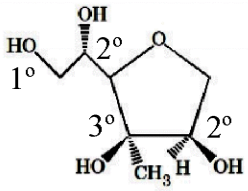
Ans. Official answer NTA (1)

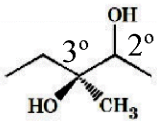
Sol. 2° alcohol means –OH attached to 2° carbon

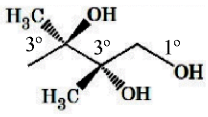

(I)


(II) ✓


(III)


(IV) ✓


(V) ✓


(VI)

Question ID : 444792651

65. One mole of $Cl_2(g)$ was passed into 2 L of cold 2 M KOH solution. After the reaction, the concentrations of Cl^-, ClO^- and OH^- are respectively (assume volume remains constant)

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(1) 0.75M, 0.75M, 1M

(2) 0.5M, 0.5M, 1M

(3) 1M, 1M, 1M

(4) 0.5M, 0.5M, 0.5M

Ans. Official answer NTA (2)

Sol. $\underset{\text{LR}}{Cl_2} + \underset{\substack{2M,\ 2L}}{2\ NaOH} \rightarrow NaCl + NaOCl + H_2O$

1 mol	$2 \times 2 = 4$ mol		
0	4 –2 mol	1 mol	1mol
0	2	1	1
	$\frac{2}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	=1 M	0.5 M	0.5 M

Question ID : 444792656

66. Two liquids A and B form an ideal solution at temperature T K . At T K , the vapour pressures of pure A and B are 55 and $15 kNm^{-2}$ respectively. What is the mole fraction of A in solution of A and B in equilibrium with a vapour in which the mole fraction of A is 0.8 ?

क

(1) 0.5217 (2) 0.340 (3) 0.663 (4) 0.480

Ans. Official answer NTA (1)

Sol. $y_A = 0.8$ $y_B = 0.2$

$$\frac{y_A}{y_B} = \frac{p_A^\circ}{p_B^\circ} \times \frac{x_A}{x_B}$$

$$\frac{0.8}{0.2} = \frac{55}{15} \times \frac{x_A}{x_B}$$

$$\frac{x_A}{x_B} = \frac{60}{55} = \frac{12}{11}$$

$$x_A = \frac{12}{12+11} = \frac{12}{23}$$

$= 0.5217$

Question ID : 444792653

67. Pair of species among the following having same bond order as well as paramagnetic character will be-

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(1) O_2^-, N_2^-

(2) O_2^+, N_2^-

(3) O_2^-, N_2^+

(4) O_2^+, N_2^{2-}

Ans. Official answer NTA (2)

Sol. Same no of $e^- \Rightarrow$ same BO

	O_2	O_2^-	O_2^+	
no of e^-	16	17	15	
BO 2	1.5	2.5		
	N_2	N_2^-	N_2^+	N_2^{2-}
no of e^-	14	13	15	16
B O	3	2.5	2.5	2

Question ID : 444792662

68. Find out the statements which are not true.

A. Resonating structures with more number of covalent bonds and lesser charge separation are more stable.

B. In electromeric effect, an unsaturated system shows +E effect with nucleophile and -E effect with electrophile.

C. Inductive effect is responsible for high melting point, boiling point and dipole moment of polar compounds.

D. The greater the number of alkyl groups attached to the doubly bonded carbon atoms, higher is the heat of hydrogenation.

E. Stability of carbanion increases with the increase in $s-$ character of the carbon carrying the negative charge.

Choose the correct answer from the options given below:

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(1) A, D & E only

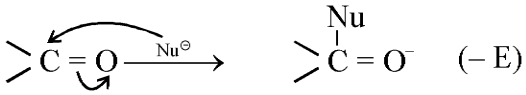
(2) B & D only

(3) A, C & D only

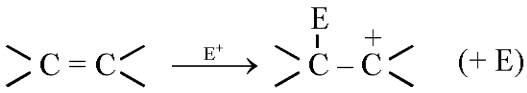
(4) B, D & E only

Ans. Official answer NTA (2)

Sol. (A) R S with more number of covalent bonds and lesser charge separation will be more stable ⇒ True



(B)



(C) Due to Inductive effect polarity develop so BP | DM changes

(D) As no. of alkyl groups increases on double bond stability of alkene increases so HOH decreases.

$$HOH \propto \frac{1}{\text{stability of alkene}}$$

(E) As % S character increas, the EN of carbon ↑

∴ – ve charge will be more stable on more EN carbon.

Question ID : 444792666

69. A student has planned to prepare acetanilide from aniline using acetic anhydride.

The student has started from 9.3 g of aniline. However, the student has managed to obtain 11 g of dry acetanilide.

The % yield of this reaction is :-

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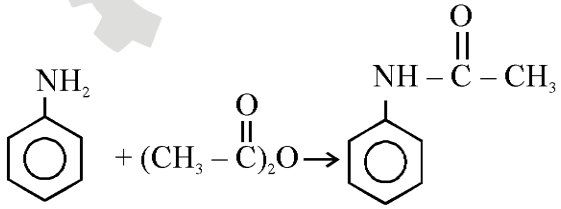
(1) 59.5% (2) 81.5% (3) 97.5% (4) 72.5%

Ans. Official answer NTA (2)

Sol.



9. 3 g

$\frac{9.3}{93}$

= 0.1 mol 0.1 mol

0.1×135

$m_{th} = 13.5$ gm

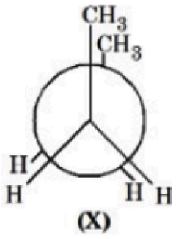
$$\% \text{ yield} = \frac{m_{ob}}{m_{th}} \times 100$$

$$= \frac{11}{13.5} \times 100 = 81.5$$

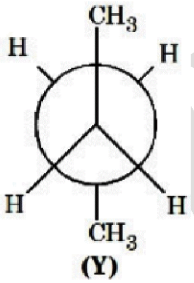
Question ID : 444792663

70. Given below are two statements:

Statement I: There are several conformers for n -butane. Out of those conformers,



is the least stable and most stable conformer is



Statement II: As the dihedral angle increases, torsional strain decreases from (X) to (Y).

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

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(1) Both Statement I and Statement II are false

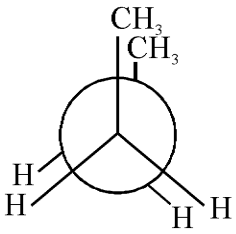
(2) Statement I is false but Statement II is true

(3) Both Statement I and Statement II are true

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

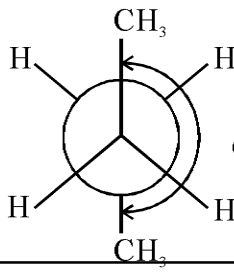
Ans. Official answer NTA (3)

Sol.



max steric repulsion & max torsianal strain

$\therefore$ least stable



$\phi = 180$ dihedral angle is max, torsional strain min.

SECTION – B

Question ID : 444792672

71. Grignard reagent RMgBr(P) reacts with water and forms a gas (Q). One gram of Q occupies $1.4dm^3$ at STP. (P) on reaction with dry ice in dry ether followed by H_3O^+ forms a compound (Z). 0.1 mole of (Z) will weigh _____ g. (Nearest integer)

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Ans. Official answer NTA (6)

Sol. $RMgBr \xrightarrow{H_2O} \underset{Q}{R-H}$

1 gm

1.4 dm^3 at STP

$$\frac{1}{M} \times 22.4 = 1.4$$

M = 16 (CH_4 gas)

R will be CH_3

$$CH_3MgBr + CO_2 \xrightarrow{H^+} \underset{(z)}{CH_3COOH}$$

(dry ice) 0.1 mol

$0.1 \times 60 = 6g$

Question ID : 444792675

72. 72 The half-life of ^{65}Zn is 245 days. After x days, 75% of original activity remained.

The value of x in days is _____ (Nearest integer)

(Given: log 3=0.4771 and log 2=0.3010)

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Ans. Official answer NTA (102)

Sol. $t_{\frac{1}{2}} = 245$ days

75% of origional activity remained means on 25% of rection is completed

$$t_{x\%} = \frac{1}{K} \ln \frac{100}{100-x}$$

$$K = \frac{\ln 2}{245}$$

$$t \times \frac{\ln 2}{245} = \ln \frac{100}{100-25} = \ln \frac{100}{75} = \ln \frac{4}{3}$$

$$t = 101.675 \simeq 102 \text{ day}$$

Question ID :444792671

73. A chromium complex with a formula $CrCl_3 \cdot 6H_2O$ has a spin only magnetic moment value of 3.87 BM and its solution conductivity corresponds to 1: 2 electrolyte. 2.75 g of the complex solution was initially passed through a cation exchanger. The solution obtained after the process was reacted with excess of $AgNO_3$. The amount of AgCl formed in the above process is _____g. (Nearest integer)

[Given: Molar mass in $gmol^{-1}$ $Cr: 52; Cl: 35.5, Ag: 108, O: 16, H: 1$]

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Ans. Official answer NTA (3)

Sol. $CrCl_3 \cdot 6H_2O \Rightarrow [Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$

1 : 2

$[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O + AgNO_3 \rightarrow 2AgCl$

2.75 g

$\frac{2.75}{266.5}$

= 0.01 mol 0.02 mol

$= 0.02 \times 143.5$

$= 2.87$ g

$\simeq 3$g

Question ID : 444792673

74. 0.25 g of an organic compound "A" containing carbon, hydrogen and oxygen was analysed using the combustion method. There was an increase in mass of $CaCl_2$ tube and potash tube at the end of the experiment. The amount was found to be 0.15 g and 0.1837 g , respectively. The percentage of oxygen in compound A is _____ %. (Nearest integer)"(Given: molar mass in $gmol^{-1}$ $H: 1, C: 12, O: 16$)

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Ans. Official answer NTA (73)

Sol. $OC \rightarrow CO_2 + H_2O$

(C,H,O) 0.1837 g 0.15 g

$$\%C = \frac{0.1837}{44 \times 0.25} \times 100 = 20$$

$$\%H = \frac{0.15 \times 2}{18 \times 0.25} \times 100 = 6.67$$

$$\%O = 100 - (\%C + \%H)$$

$$= 100 - 26.67$$

$$= 73.33\ \%$$

$$\simeq 73\%$$

Question ID : **444792674**

75. Molar conductivity of a weak acid HQ of concentration 0.18 M was found to be 1/30 of the molar conductivity of another weak acid HZ with concentration of 0.02 M . If $\lambda^{\circ}Q^{-}$ happened to be equal with $\lambda^{\circ}Z^{-}$, then the difference of the pK_a values of the two weak acids $(pK_a(HQ) - pK_a(HZ))$ is _____ (Nearest integer).

[Given: degree of dissociation $(\alpha) \ll 1$ for both weak acids, λ° : limiting molar conductivity of ions]

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Ans. Official answer NTA (2)

Sol. $K(HQ) = C_1 \alpha_1^2$ $\quad \alpha_1 = \frac{\lambda m(HQ)}{\lambda^{\circ} m(HQ)}$

$K(HZ) = C_2 \alpha_1^2$ $\quad \alpha_2 = \frac{\lambda m(HZ)}{\lambda^{\circ} m(HZ)}$

$$\frac{K(HQ)}{K(HZ)} = \frac{C_1}{C_2}\left(\frac{\alpha_1}{\alpha_2}\right)^2 = \frac{0.18}{0.02}\left(\frac{\lambda m(HQ)}{\lambda m(HZ)}\right)^2$$

$$= 9\left(\frac{1}{30}\right)^2 = \frac{1}{100}$$

$$-\log\left(\frac{K(HQ)}{K(HZ)}\right) = -\log\frac{1}{100}$$

$$pk_a(HQ) - pk_a(HZ) = 2$$