JEE MAIN 2023
Paper with Solution

CHEMISTRY | 30th Jan 2023 _ Shift-1

Umeed **Rank** Ki Ho Ya **Selection** Ki, JEET NISCHIT HAI!

Most Promising RANKS
Produced by MOTION Faculties

NEET / AIIMS

AIR-1 to 10
25 Times

AIR-11 to 50
83 Times

AIR-51 to 100
81 Times

JEE MAIN+ADVANCED

AIR-1 to 10
8 Times

AIR-11 to 50
32 Times

AIR-51 to 100
36 Times

Nation's Best SELECTION
Percentage (%) Ratio

Student Qualified in NEET

(2022)
4837/5356 = **90.31%**
(2021)
3276/3411 = **93.12%**

Student Qualified in JEE ADVANCED

(2022)
1756/4818 = **36.45%**
(2021)
1256/2994 = **41.95%**

Student Qualified in JEE MAIN

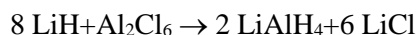(2022)
4818/6653 = **72.41%**
(2021)
2994/4087 = **73.25%**

NITIN VIIJAY (NV Sir)
Founder & CEO

SECTION - A

31. Lithium aluminium hydride can be prepared from the reaction of

(1) LiH and $Al(OH)_3$

(2) LiH and Al_2Cl_6

(3) LiCl and Al_2H_6

(4) LiCl, Al and H_2

Sol. 2

$8 \, LiH + Al_2Cl_6 \rightarrow 2 \, LiAlH_4 + 6 \, LiCl$

32. Amongst the following compounds, which one is an antacid?

(1) Terfenadine   (2) Meprobamate   (3) Brompheniramine   (4) Ranitidine

Sol. 4

Ranitidine is an antacid it is an antihistamine and decrease the reaction of gastric juice in stomach

33. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : In expensive scientific instruments, silica gel is kept in watch-glasses or in semipermeable membrane bags.

Reason (R) : Silica gel adsorbs moisture from air via adsorption, thus protects the instrument from water corrosion (rusting) and / or prevents malfunctioning.

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

(1) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(2) (A) is false but (R) is true

(3) Both (A) and (R) are true and (R) is the correct explanation of (A)

(4) (A) is true but (R) is false

Sol. 3

Theory based

34. Match List I with List II

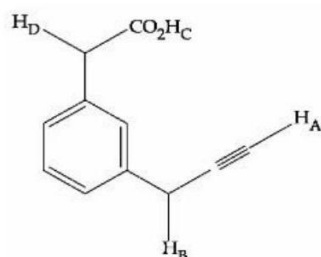| LIST I (Atomic number)	LIST II (Block of periodic table)
A. 37	I. p-block
B. 78	II. d-block
C. 52	III. f-block
D. 65	IV. s-block

Choose the correct answer from the options given below:

(1) A - IV, B - III, C - II, D – I

(2) A - II, B - IV, C - I, D – III

(3) A - IV, B - II, C - I, D – III

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

Sol. 3

37 (K)   s-block

78 (pt)   d-block

52 (Te)   p-block

65 (Tb)   f-block

35. What is the correct order of acidity of the protons marked A-D in the given compounds ?
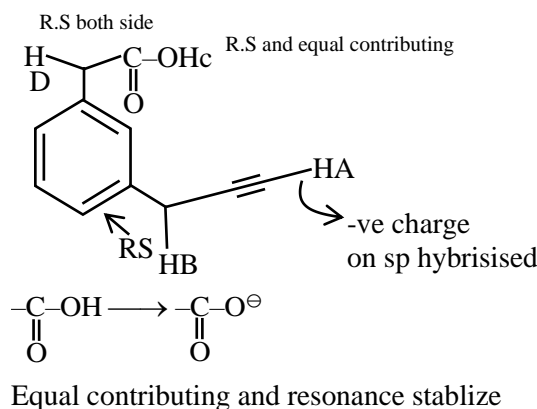

(1) $H_C > H_A > H_D > H_B$　　　　(2) $H_D > H_C > H_B > H_A$

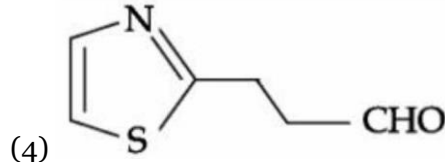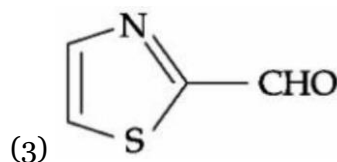(3) $H_C > H_D > H_B > H_A$　　　　(4) $H_C > H_D > H_A > H_B$
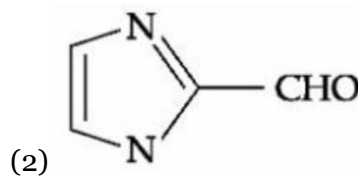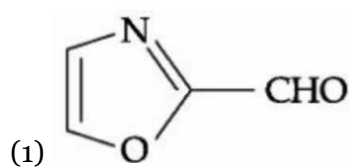
Sol. **4**

So order $H_C > H_D > H_A > H_B$

36. Which of the following compounds would give the following set of qualitative analysis?

(i) Fehling's Test : Positive

(ii) Na fusion extract upon treatment with sodium nitroprusside gives a blood red colour but not prussian blue.
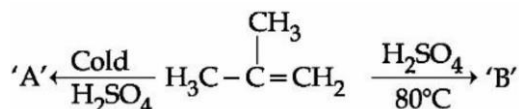

Sol. **4**

fehling test gives positive result for aliphatic aldehyde While sodium nitroprasside gives blood red color with S and N.

So $Na + N + C + S \rightarrow NaSCN$ (Sodium thiocyanate)

$SCN^- + Fe^{3+} \rightarrow [Fe(SCN)]^{2+}$ Ferric thiocyanate (Blood red color)

Confims presence of N and S

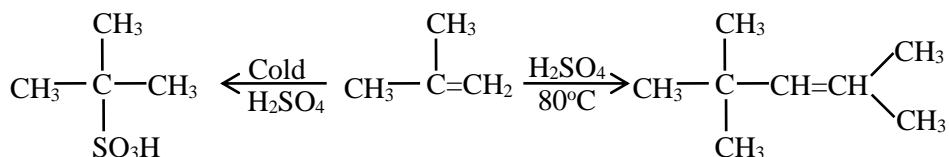**37.** The major products ' A' and ' B ', respectively, are

$$'A' \xleftarrow{\text{Cold } H_2SO_4} H_3C-\underset{\underset{\displaystyle CH_3}{|}}{C}=CH_2 \xrightarrow{\underset{80°C}{H_2SO_4}} 'B'$$

(1)
$$CH_3-\underset{\underset{\displaystyle CH_3}{|}}{\overset{\overset{\displaystyle CH_3}{|}}{C}}=CH-\underset{\underset{\displaystyle CH_3}{|}}{C}-CH_3 \quad \& \quad CH_3-\underset{\underset{\displaystyle OSO_3H}{|}}{\overset{\overset{\displaystyle CH_3}{|}}{C}}-CH_3$$

(2)
$$H_3C-\underset{\underset{\displaystyle OSO_3H}{|}}{\overset{\overset{\displaystyle CH_3}{|}}{C}}-CH_3 \quad \& \quad CH_3-\underset{\underset{\displaystyle CH_3}{|}}{\overset{\overset{\displaystyle CH_3}{|}}{C}}=CH-\underset{}{\overset{\overset{\displaystyle CH_3}{|}}{C}}-CH_3$$

(3)
$$H_3C-\underset{\underset{\displaystyle OSO_3H}{|}}{\overset{\overset{\displaystyle CH_3}{|}}{C}}-CH_3 \quad \& \quad CH_3-\underset{\underset{\displaystyle CH_3}{|}}{\overset{\overset{\displaystyle CH_3}{|}}{CH}}-CH_2CH_2-\underset{}{\overset{\overset{\displaystyle CH_3}{|}}{HC}}-CH_3$$

(4)
$$CH_3-\underset{\underset{\displaystyle CH_3}{|}}{\overset{}{CH}}-CH_2CH_2-\underset{}{\overset{\overset{\displaystyle CH_3}{|}}{CH}}-CH_3 \quad \& \quad H_3C-\underset{\underset{\displaystyle OSO_3H}{|}}{\overset{\overset{\displaystyle CH_3}{|}}{C}}-CH_3$$

Sol. **2**

$$CH_3-\underset{\underset{\displaystyle SO_3H}{|}}{\overset{\overset{\displaystyle CH_3}{|}}{C}}-CH_3 \xleftarrow{\underset{H_2SO_4}{\text{Cold}}} CH_3-\underset{}{\overset{\overset{\displaystyle CH_3}{|}}{C}}=CH_2 \xrightarrow{\underset{80°C}{H_2SO_4}} CH_3-\underset{\underset{\displaystyle CH_3}{|}}{\overset{\overset{\displaystyle CH_3}{|}}{C}}-CH=CH\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{<}}$$

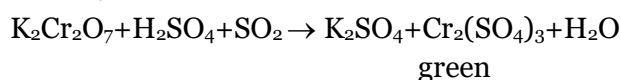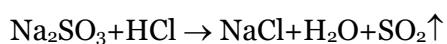**38.** During the qualitative analysis of SO_3^{2-} using dilute H_2SO_4, SO_2 gas is evolved which turns $K_2Cr_2O_7$ solution (acidified with dilute H_2SO_4) :
(1) green (2) blue (3) red (4) black

Sol. **1**
$Na_2SO_3+HCl \rightarrow NaCl+H_2O+SO_2\uparrow$
$K_2Cr_2O_7+H_2SO_4+SO_2 \rightarrow K_2SO_4+Cr_2(SO_4)_3+H_2O$
                green

39. In the wet tests for identification of various cations by precipitation, which transition element cation doesn't belong to group IV in qualitative inorganic analysis ?
(1) Ni^{2+} (2) Zn^{2+} (3) Co^{2+} (4) Fe^{3+}

sol. **4**
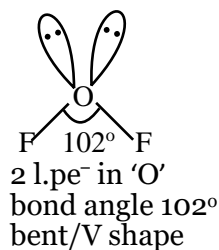$Zn^{+2}, CO^{+2}, Ni^{+2},$ IVth group
$Fe^{+3} =$ IIIrd group

40. For OF_2 molecule consider the following :
A. Number of lone pairs on oxygen is 2.   B. FOF angle is less than 104.5°.
C. Oxidation state of O is -2.   D. Molecule is bent ' V ' shaped.
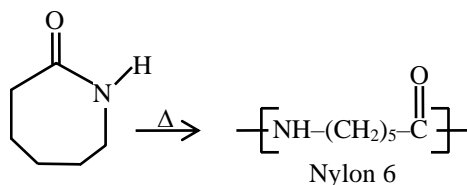E. Molecular geometry is linear.
correct options are:
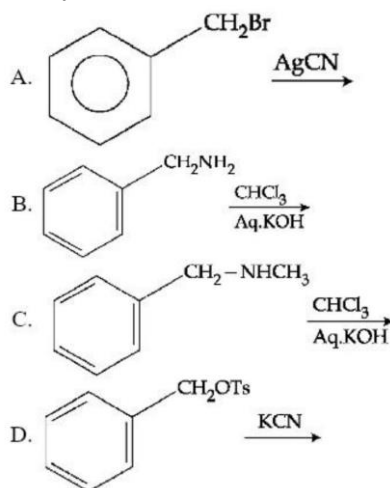(1) A, C, D only (2) C, D, E only (3) A, B, D only (4) B, E, A only

Sol. **3**

OF$_2$

F 102° F
2 l.pe⁻ in 'O'
bond angle 102°
bent/V shape

41. Caprolactam when heated at high temperature in presence of water, gives
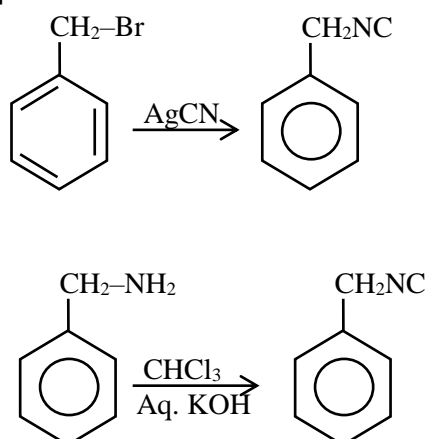(1) Nylon 6, 6   (2) Nylon 6   (3) Teflon   (4) Dacron

**Sol.** **2**

Nylon 6

42. Benzyl isocyanide can be obtained by :

A. [benzene with CH$_2$Br] $\xrightarrow{\text{AgCN}}$

B. [benzene with CH$_2$NH$_2$] $\xrightarrow[\text{Aq.KOH}]{\text{CHCl}_3}$

C. [benzene with CH$_2$–NHCH$_3$] $\xrightarrow[\text{Aq.KOH}]{\text{CHCl}_3}$

D. [benzene with CH$_2$OTs] $\xrightarrow{\text{KCN}}$

Choose the correct answer from the options given below :
(1) A and D   (2) Only B   (3) B and C   (4) A and B

Sol. **4**

[benzene with CH$_2$–Br] $\xrightarrow{\text{AgCN}}$ [benzene with CH$_2$NC]

[benzene with CH$_2$–NH$_2$] $\xrightarrow[\text{Aq. KOH}]{\text{CHCl}_3}$ [benzene with CH$_2$NC]

43. Formation of photochemical smog involves the following reaction in which A, B and C are respectively.

$$i. \ NO_2 \xrightarrow{h\nu} A + B$$
$$ii. \ B + O_2 \rightarrow C$$
$$iii. \ A + C \rightarrow NO_2 + O_2$$
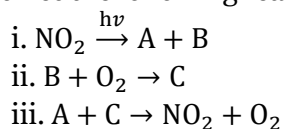
Choose the correct answer from the options given below:

(1) O, N_2O & NO (2) O, NO & NO_3^- (3) NO, O & O_3 (4) N, O_2 & O_3

Sol. **3**

$$NO_2 \xrightarrow{h\upsilon} NO + O$$
$$\quad\quad\quad\quad (A) \quad (B)$$
$$\downarrow O_2$$
$$O_3$$
$$(C)$$
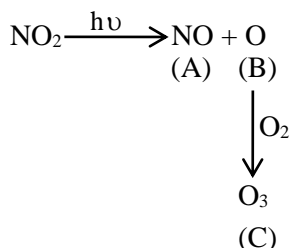
44. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Ketoses give Seliwanoff's test faster than Aldoses.

Reason (R) : Ketoses undergo β-elimination followed by formation of furfural.

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

(1) (A) is false but (R) is true

(2) (A) is true but (R) is false

(3) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(4) Both (A) and (R) are true and (R) is the correct explanation of (A)

Sol. **2**

Seliwanoff's test – Test to differentiate for ketose and aldose.

In this keto hexose are more rapidly dehydrated to form 5–hydroxy methyl furfural when heated in acidic medium which on condensation with resorcinol, as result brown red colored complex is formed.

45. Match List I with List II

LIST I (molecules/ions)		LIST II (No. of lone pairs of e⁻ on central atom)	
A.	IF_7	I.	Three
B.	ICl_4^-	II.	One
C.	XeF_6	III.	Two
D.	XeF_2	IV.	Zero

Choose the correct answer from the options given below:

(1) A - II, B - III, C - IV, D – I (2) A - II, B - I, C - IV, D – III

(3) A - IV, B - I, C - II, D – III (4) A - IV, B - III, C - II, D – I

Sol. **4**

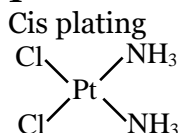| Molecule	l.pe⁻ of C.M.
IF_7	0
ICl_4^-	2
XeF_6	1
XeF_2	3

46. To inhibit the growth of tumours, identify the compounds used from the following :
A. EDTA   B. Coordination Compounds of Pt
C. D – Penicillamine   D. Cis - Platin
Choose the correct answer from the option given below:
(1) B and D Only   (2) C and D Only   (3) A and C Only   (4) A and B Only

Sol. **1**
Cis plating

is used as Anticancer agent

47. The alkaline earth metal sulphate(s) which are readily soluble in water is/are :
A. $BeSO_4$ B. $MgSO_4$ C. $CaSO_4$ D. $SrSO_4$
E. $BaSO_4$
Choose the correct answer from the options given below :
(1) B only   (2) A and B (3) B and C   (4) A only

Sol. **2**
$BeSO_4$ & $MgSO_4$ are soluble in water
$CaSO_4$ is partially soluble
$SrSO_4$ & $BaSO_4$ is insoluble

48. Which of the following is correct order of ligand field strength ?
(1) $CO <$ en $< NH_3 < C_2O_4^{2-} < S^{2-}$ (2) $NH_3 <$ en $< CO < S^{2-} < C_2O_4^{2-}$
(3) $S^{2-} < C_2O_4^{2-} < NH_3 <$ en $< CO$ (4) $S^{2-} < NH_3 <$ en $< CO < C_2O_4^{2}$

Sol. **3**
order of ligand strength
$S^{2-} < C_2O_4^{2-} < NH_3 < en < CO$

49. Match List I with List II

	LIST I		LIST II
A.		I.	Fittig reaction
B.		II.	Wurtz Fittig reaction
C.		III.	Finkelstein reaction
D.	$C_2H_5Cl + NaI \rightarrow C_2H_5I + NaCl$	IV.	Sandmeyer reaction

Choose the correct answer from the options given below:
(1) A - II, B - I, C - IV, D – III   (2) A - IV, B - II, C - III, D – I
(3) A - III, B - II, C - IV, D – I   (4) A - II, B - I, C - III, D – IV

Sol. 1

(A) Chlorobenzene $+ CHCl_3 \xrightarrow{Na}$ Toluene (CH_3), Wurtz fittig reaction

(B) Chlorobenzene $+ 2Na \longrightarrow$ biphenyl, fittig rxn

(C) Benzenediazonium chloride ($\overset{\oplus}{N_2}\overset{\ominus}{Cl}$) $\xrightarrow{CH_2Cl_2}$ Chlorobenzene (Cl) $+ N_2$, sandmeyer rxn

(D) $C_2H_5Cl + NaI \rightarrow C_2H_5I + NaCl$ Finkelstein rxn
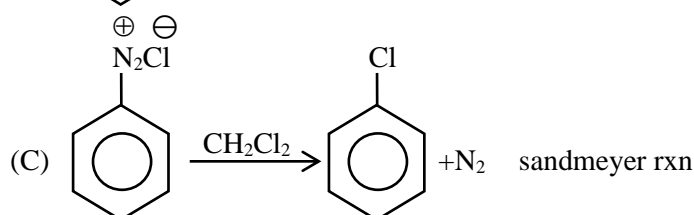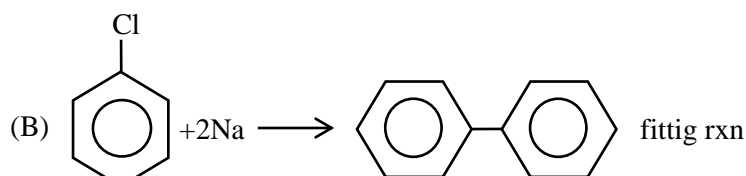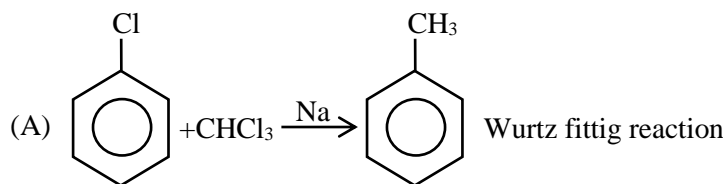
50. In the extraction of copper, its sulphide ore is heated in a reverberatory furnace after mixing with silica to:
(1) remove FeO as $FeSiO_3$
(2) decrease the temperature needed for roasting of Cu_2S
(3) separate CuO as $CuSiO_3$
(4) remove calcium as $CaSiO_3$

Sol. 1
The copper ore contains iron, it is mixed with silica before heating in reverberatory furnace, feO of slags off as $FeSiO_3$
$FeO + SiO_2 \rightarrow FeSiO_3$
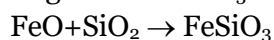
SECTION - B

51. 600 mL of 0.01MHCl is mixed with 400 mL of $0.01MH_2SO_4$. The pH of the mixture is
_____ $\times 10^{-2}$. (Nearest integer)
[Given log2 2 = 0.30
log 3 = 0.48
log 5 = 0.69
log 7 = 0.84
log 11 = 1.04]

Sol. 186

$[H^+]_{mix} = \dfrac{(600 \times 0.01) + (400 \times 0.01 \times 2)}{1000}$

$= \dfrac{6 + 8}{1000} = 14 \times 10^{-3}$

pH = $-\log(14 \times 10^{-3})$
= 3 – log 2 – log 7
= 3 - 0.30 - 0.84
pH = 1.86

52. The energy of one mole of photons of radiation of frequency 2×10^{12} Hz in J mol^{-1} is . (Nearest integer)

[Given : h = 6.626×10^{-34}Js

$N_A = 6.022 \times 10^{23}$ mol^{-1}]

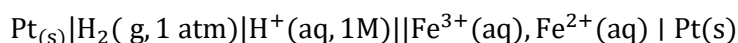**Sol.** **789**

$E_{photon} = 6.626 \times 10^{-34} \times 2 \times 10^{12} \times 6.023 \times 10^{23}$

$= 79.81 \times 10$
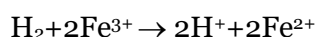
$= 798.1 \approx 798$

53. Consider the cell

$Pt_{(s)}|H_2(g, 1 \text{ atm})|H^+(aq, 1M)||Fe^{3+}(aq), Fe^{2+}(aq) | Pt(s)$

When the potential of the cell is 0.712 V at 298 K, the ratio $[Fe^{2+}]/[Fe^{3+}]$ is (Nearest integer)

Given : $Fe^{3+} + e^- = Fe^{2+}, E^\theta Fe^{3+}, Fe^{2+} | Pt = 0.771$

$$\frac{2.303RT}{F} = 0.06 \text{ V}$$

Sol. **10**

Cell reaction :-

$H_2 + 2Fe^{3+} \rightarrow 2H^+ + 2Fe^{2+}$

$E_{cell} = 0.771 - \frac{2.303RT}{2F} \log \frac{\left[Fe^{2+}\right]^2 \left[H^+\right]^2}{\left[Fe^{3+}\right]^2}$
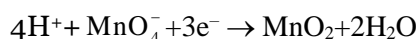
$0.712 = 0.771 - 0.03 \log(x)^2$

$\frac{0.059}{2} \log(x)^2 = 0.059$

$\log x = 1$

$x = \frac{\left[Fe^{2+}\right]}{\left[Fe^{3+}\right]} = 10$

54. The number of electrons involved in the reduction of permanganate to manganese dioxide in acidic medium is

Sol. **3**

$4H^+ + MnO_4^- + 3e^- \rightarrow MnO_2 + 2H_2O$

55. A 300 mL bottle of soft drink has $0.2MCO_2$ dissolved in it. Assuming CO_2 behaves as an ideal gas, the volume of the dissolved CO_2 at STP is_____mL. (Nearest integer)

Given : At STP, molar volume of an ideal gas is 22.7 L mol^{-1}

Sol. **1362**

Mole of dissolved $CO_2 = 0.2 \times 300 = 60$ mmol

$V_{CO_2} = 60 \times 10^{-3} \times 22.7$

$= 1362$ ml

56. A trisubstituted compound ' A ', $C_{10}H_{12}O_2$ gives neutral $FeCl_3$ test positive. Treatment of compound 'A' with NaOH and CH_3Br gives $C_{11}H_{14}O_2$, with hydroiodic acid gives methyl iodide and with hot conc. NaOH gives a compound B, $C_{10}H_{12}O_2$. Compound 'A' also decolorises alkaline $KMnO_4$. The number of π bond/s present in the compound ' A ' is

Sol. **4**
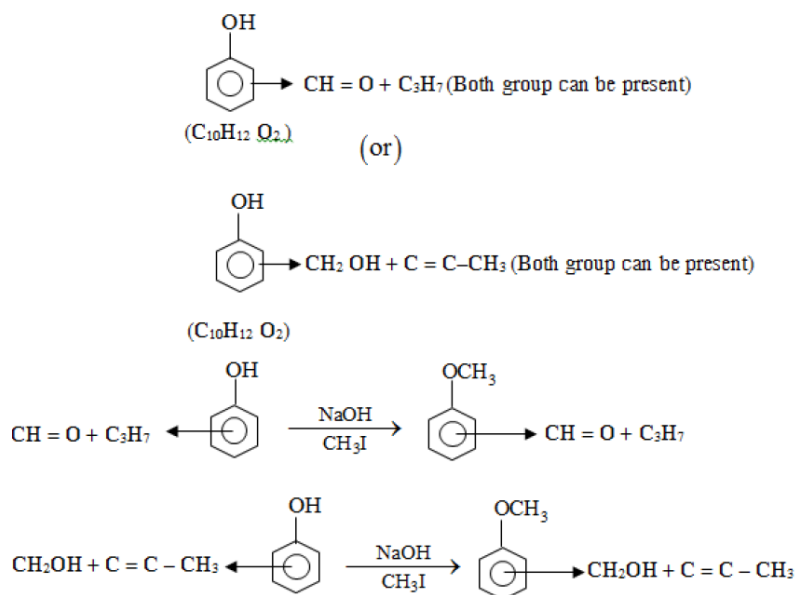
57. If compound A reacts with B following first order kinetics with rate constant $2.011 \times 10^{-3} s^{-1}$. The time taken by A (in seconds) to reduce from 7 g to 2 g will be (Nearest Integer)

$[\log 5 = 0.698, \log 7 = 0.845, \log 2 = 0.301]$

Sol. **623**

For Ist order:-

$$t = \frac{1}{2.011 \times 1^{-3}} \times 2.303 \times \log \frac{7}{2}$$

$$= \frac{2.303 \times (0.845 - 0.301)}{2.011 \times 10^{-3}}$$

$$= 622.9 \approx 623$$

58. A solution containing 2 g of a non-volatile solute in 20 g of water boils at 373.52 K. The molecular mass of the solute is_____g mol^{-1}. (Nearest integer)

Given, water boils at 373 K, K_b for water $= 0.52$ K kg mol^{-1}

Sol. **100**

$\Delta T_b = 373.52 - 373 = 0.52$

$\Delta T_b = iK_b m \qquad i=1$

$$0.52 = 0.52 \times \frac{2/x}{20} \times 1000$$

$x = 100$ gm/mol

59. When 2 litre of ideal gas expands isothermally into vacuum to a total volume of 6 litre, the change in internal energy is J. (Nearest integer)

Sol. **0**

$\Delta U = 0$

process is Isothermal

60. Some amount of dichloromethane (CH_2Cl_2) is added to 671.141 mL of chloroform ($CHCl_3$) to prepare 2.6×10^{-3}M solution of CH_2Cl_2 (DCM). The concentration of DCM is ppm (by mass).

Given : atomic mass : $C = 12$

$H = 1$

$Cl = 35.5$

density of $CHCl_3 = 1.49$ g cm^{-3}

Sol. **148.322**

Molar mass = 12+2+71

= 85

mmoles of DCM = 671.141×2.6×10⁻³

mass of solution = 1.49×671.141

$$PPM = \frac{671.141 \times 2.6 \times 10^{-3} \times 85 \times 10^{-3}}{1.49 \times 671.141} \times 10^6$$

148.322

Perfect mix of CLASSROOM Program aided with technology for sure SUCCESS.

Continuing the legacy for the last 16 years