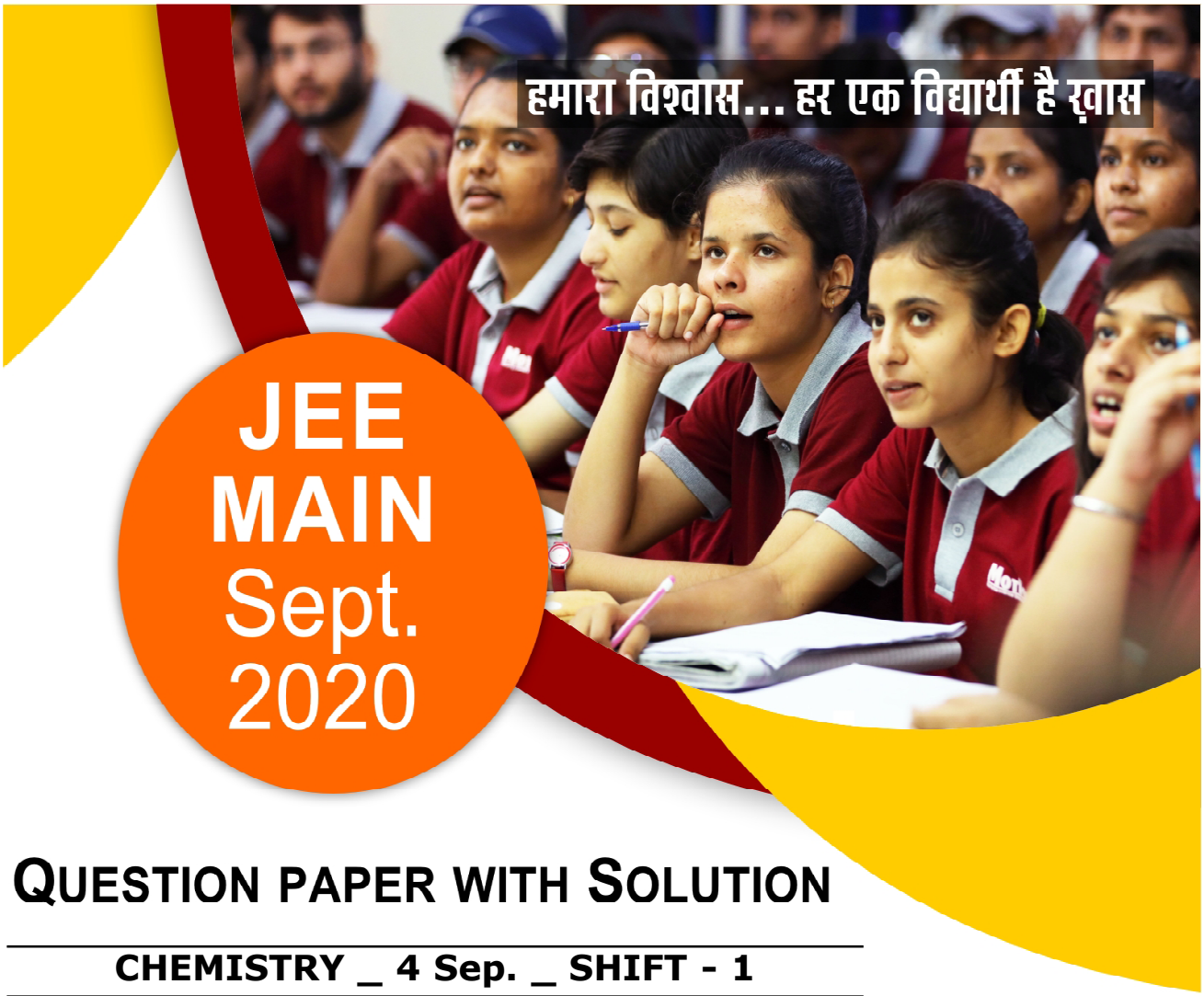

JEE MAIN Sept. 2020

QUESTION PAPER WITH SOLUTION

CHEMISTRY _ 4 Sep. _ SHIFT - 1

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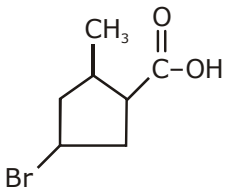
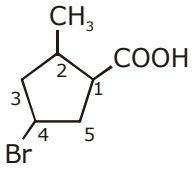
1. The IUPAC name of the following compound is :



(1) 3-Bromo-5-methylcyclopentane carboxylic acid
(2) 4-Bromo-2-methylcyclopentane carboxylic acid
(3) 5-Bromo-3-methylcyclopentanoic acid
(4) 3-Bromo-5-methylcyclopentanoic acid

Sol. **2**



4–Bromo-2-methylcyclopentane carboxylic acid

2. On heating, lead(II) nitrate gives a brown gas (A). The gas (A) on cooling changes to a colourless solid/liquid (B). (B) on heating with NO changes to a blue solid (C). The oxidation number of nitrogen in solid (C) is :

(1) +3 (2) +4 (3) +2 (4) +5

Sol. **1**

$Pb(NO_3)_2 \rightarrow PbO + \underset{(A)}{NO_2} + O_2$

Brown gas

$2NO_2 \xrightarrow{\text{cooling}} \underset{(C)}{N_2O_4}$

colourless solid

$NO_2 + NO \rightarrow \underset{(C)}{N_2O_3} + \overset{+3}{N_2}O_3$

blue solid

3. The ionic radii of O^{2-}, F^-, Na^+ and Mg^{2+} are in the order :

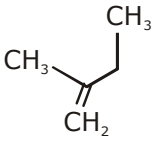
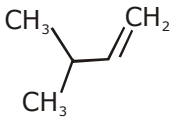
(1) $F^- > O^{2-} > Na^+ > Mg^{2+}$ (2) $Mg^{2+} > Na^+ > F^- > O^{2-}$
(3) $O^{2-} > F^- > Na^+ > Mg^{2+}$ (4) $O^{2-} > F^- > Mg^{2+} > Na^+$

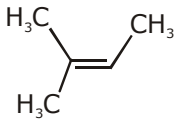
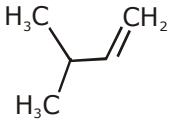
Sol. **3**

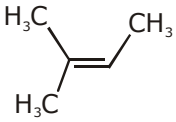
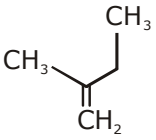
$O^{2-} > F^- > Na^{\oplus} > Mg^{2+}$

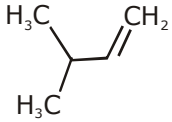
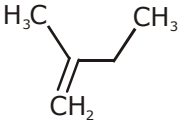
Ans. option (3)

4. When neopentyl alcohol is heated with an acid, it slowly converted into an 85 : 15 mixture of alkenes A and B, respectively. What are these alkenes ?

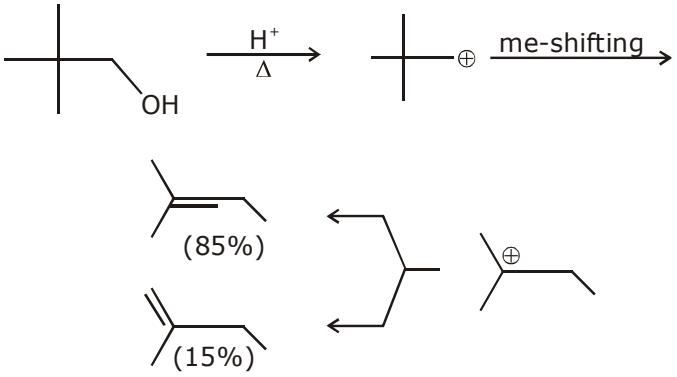
(1)  and 

(2)  and 

(3)  and 

(4)  and 

Sol. **3**



5. The region in the electromagnetic spectrum where the Balmer series lines appear is :

(1) Microwave (2) Infrared (3) Ultraviolet (4) Visible

Sol. **4**

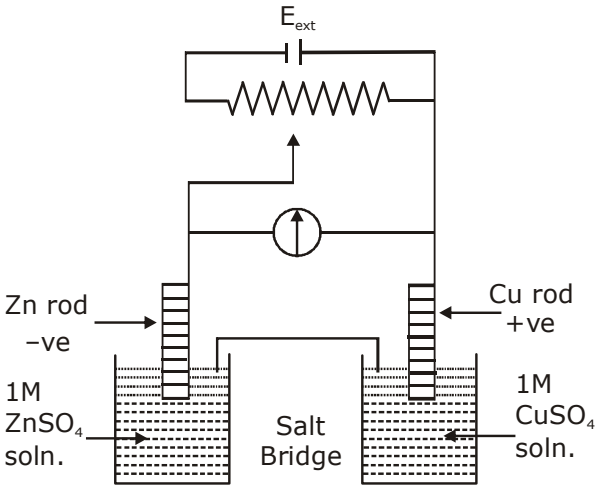
Question should be Bonous

As lines of Balamer series belongs to both UV as well visible region of EM spectrum.

However most appropriate should be visible region

Ans. (4)

6.



$E^{\circ}_{Cu^{2+}|Cu} = +\ 0.34\,V$

$E^{\circ}_{Zn^{2+}|Zn} = -\ 0.76\,V$

Identify the incorrect statement form the options below for the above cell :

(1) If E_{ext} = 1.1 V, no flow of e^- or current occurs

(2) If E_{ext} > 1.1 V, Zn dissolves at Zn electrode and Cu deposits at Cu electrode

(3) If E_{ext} > 1.1 V, e^- flows from Cu to Zn

(4) If E_{ext} < 1.1 V, Zn dissolves at anode and Cu doposits at cathode

Sol. **2**

Direction NCERT Text theoritical questions

Ans. (2)

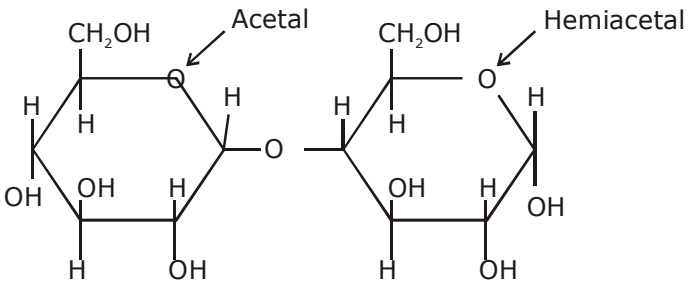
7. What are the functional groups present in the structure of maltose ?

(1) One acetal and one hemiacetal (2) One acetal and one ketal

(3) One ketal and one hemiketal (4) Two acetals

Sol. **1**

Meltose



8. Match the following :

(i) Foam	(a) smoke
(ii) Gel	(b) cell fluid
(iii) Aerosol	(c) jellies
(iv) Emulsion	(d) rubber
	(e) froth
	(f) milk

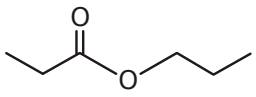
(1) (i)-(e), (ii)-(c), (iii)-(a), (iv)-(f) (2) (i)-(b), (ii)-(c), (iii)-(e), (iv)-(d)
(3) (i)-(d), (ii)-(b), (iii)-(a), (iv)-(e) (4) (i)-(d), (ii)-(b), (iii)-(e), (iv)-(f)

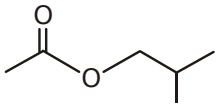
Sol. **1**

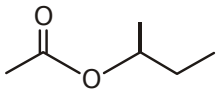
Foam → Froth, whipped cream, soaplather
Gel → Cheese, butter, jellies
Aerosol → smoke dust
Emulsion → milk
Sol → Cell fluid
rubber → Solid fom
froth → form

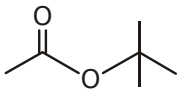
(i) - e, (ii) - c, (iii) - a, (iv) - f
Ans. 1

9. An organic compound (A) (molecular formula $C_6H_{12}O_2$) was hydrolysed with dil. H_2SO_4 to give a carboxylic acid (B) and an alcohol (C). 'C' gives white turbidity immediately when treated with anhydrous $ZnCl_2$ and conc. HCl. The organic compound (A) is :

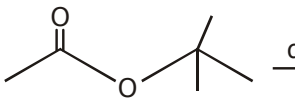
(1) 

(2) 

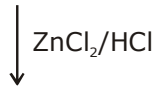
(3) 

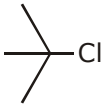
(4) 

Sol. **4**



(B) (C)





(Immidiate white turbidity)

10. Among the statements (a)-(d), the correct ones are :
(a) Lime stone is decomposed to CaO during the extraction of iron from its oxides.
(b) In the extraction of silver, silver is extracted as an anionic complex.
(c) Nickel is purified by Mond's process.
(d) Zr and Ti are purified by Van Arkel method.
(1) (c) and (d) only (2) (b), (c) and (d) only
(3) (a), (b), (c) and (d) (4) (a), (c) and (d) only

Sol. **3**
Lime stone finally goes to slag formation
$CaCO_3 \rightarrow CaO + CO_2$
$CaO + SiO_2 \rightarrow CaSiO_3$
slag

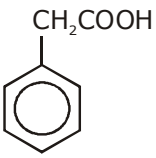
11. For one mole of an ideal gas, which of these statements must be true ?
(a) U and H each depends only on temperature
(b) Compressibility factor z is not equal to 1
(c) $C_{P,m} - C_{V,m} = R$
(d) $dU = C_V dT$ for any process
(1) (a), (c) and (d) (2) (a) and (c)
(3) (c) and (d) (4) (b), (c) and (d)

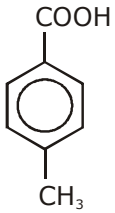
Sol. **1**
For ideal gas

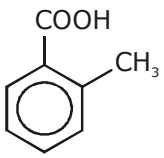
$$\left.\frac{\delta v}{\delta v}\right|_T = 0 \;\&\; \left.\frac{\delta H}{\delta v}\right|_T = 0$$

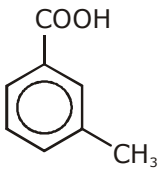
(a) Hence function of temp. only.
(b) Compressibility factor (z) = 1 Always
(c) $C_{p,m} - C_{V,m} = R$
(d) $dv = nC_{v,m}\, dT$ for all process
Ans. a,c,d
option (1)

12. [P] on treatment with $Br_2/FeBr_3$ in CCl_4 produced a single isomer $C_8H_7O_2Br$ while heating [P] with sodalime gave toluene. The compound [P] is :

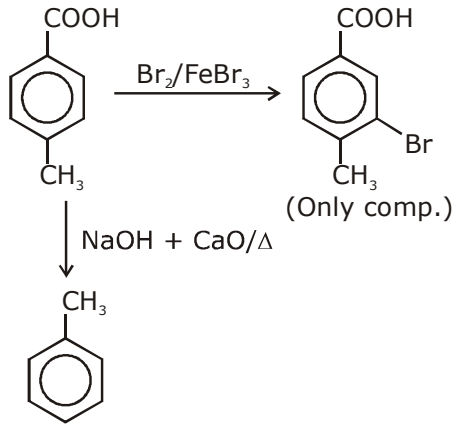
(1) 

(2) 

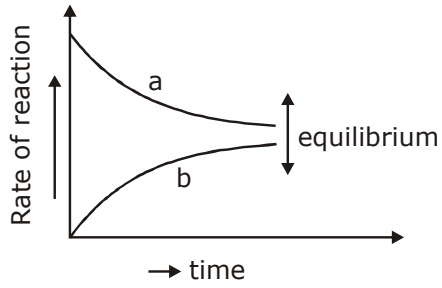
(3) 

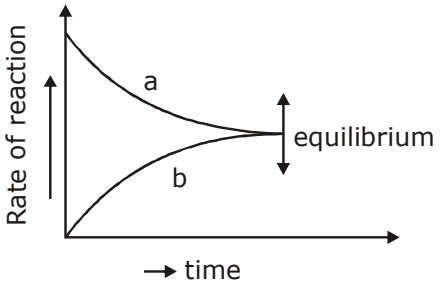
(4) 

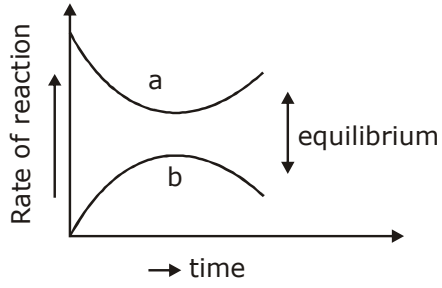
Sol. **2**

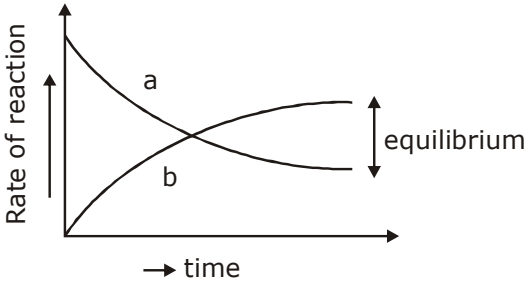


13. For the equilibrium A ⇌ B the variation of the rate of the forward (a) and reverse (b) reaction with time is given by :

(1)


(2)


(3)


(4)


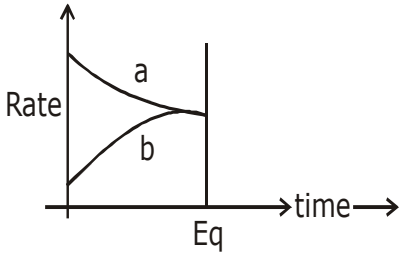
Sol. **2**

At equilibrium

Rate of forward = Rate of backward

a = b

Hence



Ans. option (2)

14. The pair in which both the species have the same magnetic moment (spin only) is :

(1) $[Co(OH)_4]^{2-}$ and $[Fe(NH_3)_6]^{2+}$ (2) $[Mn(H_2O)_6]^{2+}$ and $[Cr(H_2O)]^{2+}$

(3) $[Cr(H_2O)_6]^{2+}$ and $[CoCl_4]^{2-}$ (4) $[Cr(H_2O)_6]^{2+}$ and $[Fe(H_2O)_6]^{2+}$

Sol. **4**

$[Cr(H_2O)_6]^{2+}$ $3d^4$

$[Fe(H_2O)_6]^{2+}$ $3d^6$ ↿ ↿ ↿↾ ↿ ↿

Both has 4 unpaired electron

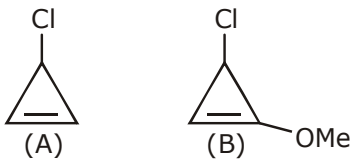
15. The number of isomers possible for $[Pt(en)(NO_2)_2]$ is :

(1) 2 (2) 3 (3) 4 (4) 1

Sol. **2**

Three linkage isomer NO_2^-; ONO^-

16. The decreasing order of reactivity of the following organic moleules towards $AgNo_3$ solution is :



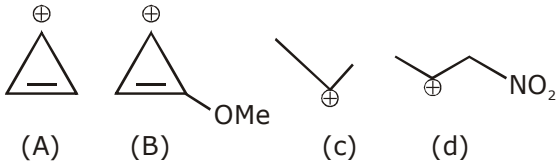
CH_3CHCH_3 (C) Cl

$CH_3CHCH_2NO_2$ (D) Cl

(1) (B) > (A) > (C) > (D) (2) (A) > (B) > (C) > (D)

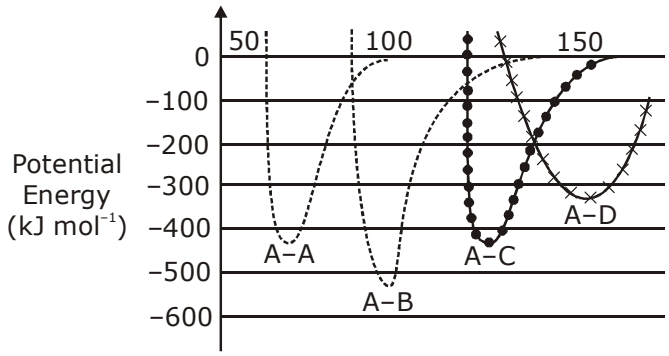
(3) (A) > (B) > (D) > (C) (4) (C) > (D) > (A) > (B)

Sol. **1**



Order or stability
(B) > (A) > (C) > (D)

17. The intermolecular potential energy for the molecules A, B, C and D given below suggests that :



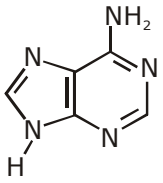
(1) A–A has the largest bond enthalpy.
(2) D is more electronegative than other atoms.
(3) A–D has the shortest bond length.
(4) A–B has the stiffest bond.

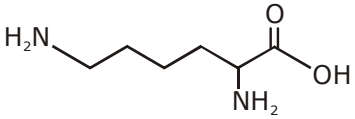
Sol. **4**
Acc. to Diagram
Ans option (4)
As E_{A-B} is Highest

18. Which of the follwong will react with $CHCl_3$ + alc. KOH ?
(1) Thymine and proline
(2) Adenine and thymine
(3) Adenine and lysine
(4) Adenine and proline

Sol. **3**
$CHCl_3$ + Alc. KOH reacts with those compound which have $-NH_2$ group

Adenive **Lysin**





19. The elements with atomic numbers 101 and 104 belong to, respectively, :

(1) Actinoids and Group 6 (2) Group 11 and Group 4

(3) Group 6 and Actinoids (4) Actinoids and Group 4

Sol. **4**

$Z = 101 \rightarrow [R_n]^{86}\ 7s^2\ 5f^{13}$

↓

Actinoids

$Z = 104 \rightarrow [R_n]^{86}\ 7s^2\ 5f^{14}\ 6d^2$

↓

4^{th} group element

Ans Actinoids & 4^{th} group

Ans. (4)

20. On combustion of Li, Na and K in excess of air, the major oxides formed, respectively, are :

(1) Li_2O_2, Na_2O_2 and K_2O_2 (2) Li_2O, Na_2O_2 and KO_2

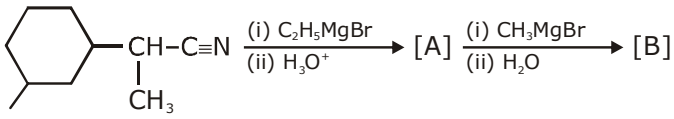
(3) Li_2O, Na_2O and K_2O_2 (4) Li_2O, Na_2O_2 and K_2O

Sol. **2**

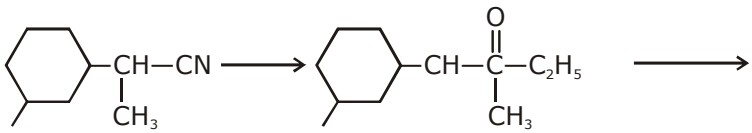
Li_2O, Na_2O_2 K_2O_2

option (2)

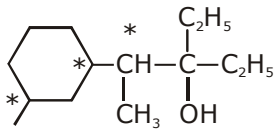
21. The number of chiral centres present in [B] is _____.



Sol. **3**



(A)



3 chiral center is present in final products

22. At 300 K, the vapour pressure of a solution containing 1 mole of n-hexane and 3 moles of n-heptane is 550 mm of Hg. At the same temperature, if one more mole of n-heptane is added to this solution, the vapour pressure of the solution increases by 10 mm of Hg. What is the vapour pressure in mm Hg of n-heptane in its pure state _____?

Sol. $550 = \frac{1}{4} \times p^0_{C_6H_{14}} + \frac{3}{4} \times p^0_{C_7H_{16}}$

$560 = \frac{1}{5} \times p^0_{C_6H_{14}} + \frac{4}{5} \times p^0_{C_7H_{16}}$

$p^0_{C_7H_{16}} = [560 \times 5 - 550 \times 4]$

$= 550 + 50 = 600$ mm of Hg

23. The mass of ammonia in grams produced when 2.8 kg of dinitrogen quantitatively reacts with 1 kg of dihydrogen is _____.

Sol. $N_2 + 3H_2 \longrightarrow 2NH_3$

2800g 1000g

100 mol 500 mol

L.R.

mole of NH_3 produced = 200 mol

mass = 3400 g

24. If 75% of a first order reaction was completed in 90 minutes, 60% of the same reaction would be completed in approximately (in minutes) _____.
(take : log 2 = 0.30; log 2.5 = 0.40)

Sol. **60**

$t_{75\%} = 90$ min $= 2 \times t_{1/2}$

$t_{1/2} = 45$ min

$\frac{\ln(2)}{45} \times t_{60\%} = \ln\left\{\frac{100}{40}\right\}$

$t_{60\%} = 45 \times \frac{0.4}{0.3}$

$t_{60\%} = 60$ min

25. A 20.0 mL solution containing 0.2 g impure H_2O_2 reacts completely with 0.316 g of $KMnO_4$ in acid solution. The purity of H_2O_2 (in %) is _____ (mol. wt. of H_2O_2 = 34' mole wt. of $KMnO_4$ = 158)

Sol. $H_2O_2 + KmnO_4 \rightarrow Mn^{+2} + O_2$

$[\text{moles of } H_2O_2] \times 2 = \frac{0.316}{158} \times 5$

moles of $H_2O_2 = 5 \times 10^{-3}$

mass of $H_2O_2 = 170 \times 10^{-3}$ g

$\%\ \text{purity} = \frac{170 \times 10^{-3}}{0.2} \times 100 = 85\%$

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