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JEE (MAIN) 2026

MEMORY BASED QUESTIONS & TEXT SOLUTION

SHIFT-2

DATE & DAY: 02nd April 2026 & Thursday

PAPER-1

Duration: 3 Hrs.
Time: 03:00 PM – 06:00 PM

SUBJECT: CHEMISTRY

REGISTERED & CORPORATE OFFICE (CIN: U80302RJ2007PLC024029):
CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Rajasthan) - 324005
0744-2777777 | 73400 10345 | contact@resonance.ac.in | www.resonance.ac.in | Follow Us: @ResonanceEdu | @Resonance_Edu

PART : CHEMISTRY

1. ' x ' be the osmotic pressure of solution formed by dissolving 1 g of a protein ($\mathrm{M} = 50{,}000\ \mathrm{g/mol}$) in 0.5 litre and ' y ' be the osmotic pressure of solution formed by dissolving 2g of same protein in 1 litre at 300 K . If ' z ' be the osmotic pressure of solution formed by mixing above two solutions. Then the value of ' x ', ' y ' and ' z ' respectively are.
{Use : $\mathrm{R} = 0.083$ lit-bar/K-mol}
(1) 9.96×10^{-4} bar, 9.96×10^{-4} bar, 4.48×10^{-4} bar
(2) 9.96×10^{-4} bar, 19.2×10^{-4} bar, 9.96×10^{-4} bar
(3) 19.2×10^{-4} bar, 19.2×10^{-4} bar, 19.2×10^{-4} bar
(4) 9.96×10^{-4} bar, 9.96×10^{-4} bar, 9.96×10^{-4} bar

Ans. **(4)**

Sol. $'\mathrm{x}' = \frac{1}{50{,}000 \times 0.5} \times \mathrm{R} \times 300 = 9.96 \times 10^{-4}$ bar

$'\mathbf{y}' = \frac{2}{50{,}000 \times 1} \times \mathrm{R} \times 300 = 9.96 \times 10^{-4}$ bar

$'\mathbf{z}' = \frac{'x' \times \frac{1}{2} + 'y' \times 1}{\frac{3}{2}} = 9.96 \times 10^{-4}$ bar

2. Molarity of $\mathrm{H_2SO_4}$ (aq.) solution is 4.9 M . If density of solution is $1.40\ \mathrm{g/ml}$, then molality and mole fraction of solute in the solution is :
(Molar mass of $\mathrm{H_2SO_4} = 98\mathrm{gm/}$ mole)
(1) $\mathrm{m} = 5.33, \mathrm{x_{solute}} = 0.072$
(2) $\mathrm{m} = 5.33, \mathrm{x_{solute}} = 0.087$
(3) $\mathrm{m} = 5.21, \mathrm{x_{solute}} = 0.072$
(4) $\mathrm{m} = 5.21, \mathrm{x_{solute}} = 0.087$

Ans. **(2)**

Sol. $\mathrm{m} = \frac{1000 \times \mathrm{M}}{1000\ \mathrm{d} - \mathrm{M} \cdot \mathrm{M}_{\mathrm{H_2SO_4}}} = \frac{1000 \times 4.9}{1000 \times 1.40 - 4.9 \times 98}$

$\Rightarrow \frac{4900}{1400 - 480.2} \Rightarrow \frac{4900}{919.8} = 5.327'\mathrm{m}'$

Mole fraction x

$= \frac{5.327}{5.327 + 55.56} = \frac{5.327}{60.887} = 0.087$

3. A hydrocarbon has mass ratio of C and H in 12 : 1 . Each molecule of hydrocarbon has 2 carbon atoms. Calculate mass of $\mathrm{CO_2}$ (in gm) produced, when 3.38 gm hydrocarbon undergoes combustion.
(1) 11.44 (2) 22.88 (3) 3.28 (4) 6.44

Ans. **(1)**

Sol. Molecular formula of hydrocarbon is $\mathrm{C_2H_2}$

Moles of $\mathrm{C_2H_2} = \frac{3.38}{26}$

$\mathrm{C_2H_2(g)} + \frac{5}{2}\mathrm{O_2(g)} \rightarrow 2\mathrm{CO_2(g)} + \mathrm{H_2O}(l)$

Moles of $\mathrm{CO_2}$ produced $= \left(\frac{3.38}{26} \times 2\right)$

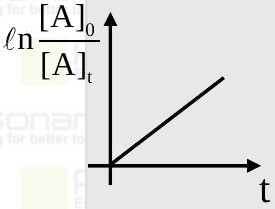
Mass of $\mathrm{CO_2}$ produced $= \left(\frac{3.38}{26} \times 2\right) \times 44 = 11.44$

4. For process $\mathrm{X} \rightarrow \mathrm{Y}$ work done by the gas is 10 J and heat absorb in the process is 2 J . For reverse process heat evolved is 6 J . Find work done for reverse process.
(1) Work done on the gas is 14 J .
(2) Work done by the gas is 2 J .
(3) Work done on the gas is 20 J .
(4) Work done by the gas is 12 J .

Ans. **(1)**

Sol. For process $X \rightarrow Y$
$w = -10\ J$
$q = +2\ J$
$\Delta U = q + w$
$\Delta U_{X \rightarrow Y} = 2 - 10 = -8\ J$
For reverse process :
$\Delta U_{Y \rightarrow X} = 8\ J$
$q = -6\ J$
$\Delta U = q + w$
$8 = -6 + w$
$w = 14\ J$

5. For a reaction
$xA \rightarrow yB, k = 0.3M^{-1}sec^{-1}$
(i) If the concentration of A is made 4 times then rate of reaction becomes 16 times.
(ii) The decomposition of N_2O_5 is an example of this type of reaction
(iii) The order of reaction is 2
(iv) A plot of $\ell n \frac{[A]_0}{[A]_t}$ vs t is straight line



(v) The half life of the reaction is independent of the concentration of the reactant.
Which of the following option has correct set of statement :-
(1) (i), (ii), (v) (2) (i), (iii)
(3) (iii), (iv), (v) (4) (i), (iii), (v)

Ans. **(2)**

Sol. Rate of constant $(k) = 0.3M^{-1}sec^{-1}$
$\because 1 - n = -1$ [unit of $k = M^{1-n}sec^{-1}$]
$n = 2 \Rightarrow 2^{nd}$ order reaction
rate $= k[A]^2$
(i) If concentration of A is 4 times then reaction will become 16 times.
(ii) Decomposition of N_2O_5 is example of 1^{st} order reaction
(iii) Order of reaction is 2
(iv) Graph of $\ell n \frac{[A]_0}{[A]_t}$ vs t is straight line for 1^{st} order not for 2^{nd} order reaction.
(v) Half-life of the reaction is independent of the concentration of the reactant for 1^{st} order, not for 2^{nd} order reaction.
So statement (i), (iii) are correct
So option (2) is correct option

6. 0.1 mole of H_2S is added in 1 litre of 0.1 HCl solution. Calculate concentration of HS^-.
[Given $Ka_1 = 8.3 \times 10^{-8}$ & $Ka_2 = 10^{-13}$]
(1) $8.3 \times 10^{-8}M$ (2) $10^{-13}M$ (3) 0.1 M (4) 0.05 M

Ans. **(1)**

Sol. $\underset{0.1M}{HCl} \rightarrow \underset{0.1\ m}{H^+} + \underset{0.1\ m}{Cl^-}\ \underset{0.1-x}{H_2S} \rightleftharpoons \underset{X+0.1}{H^+} + \underset{X}{HS^-}$

(Due to common ion effect x is very less)

$$Ka_1 = \frac{[H^+][HS^-]}{[H_2S]}$$

$$Ka_1 = \frac{0.1 \times [HS^-]}{0.1}$$

$$[HS^-] = Ka_1 = 8.3 \times 10^{-8}$$

7. 20 ml of $0.2MHA(K_a = 5 \times 10^{-4})$ is titrated with 10 ml of 0.2 M NaOH solution. Calculate initial & final value of pH of solution? [Given $\log 5 = 0.7$]

(1) 2,3.3 (2) 1.65,2 (3) 3.3,2 (4) 2,3.6

Ans. **(1)**

Sol. For $0.2M, 20ml$ HA solution,

$$\text{pH of weak acid} = \frac{1}{2}[pk_a - \log c]$$

$$= \frac{1}{2}[4 - \log 5 - \log 0.2]$$

$$= \frac{1}{2}[4 - \log 5 + \log 5]$$

$$= 2$$

$$HA + \overset{(LR)}{NaOH} \longrightarrow NaA + H_2O$$

20 ml, 0.2 M 10 ml, .02 M

4mmole 2mmole

2mmole – 2mmole

$[HA + NaA] \Rightarrow$ acidic buffer

$$pH = pK_a + \log\frac{\text{salt}}{\text{acid}}$$

$$pH = 3.3 + \log\frac{2}{2}$$

$$pH = 3.3$$

so, option (1) is correct

8. Which of the following are iso-structural with SF_4 ?

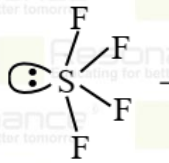
(A) $IF_4^{\oplus}$ (B) $BrF_4^{\ominus}$ (C) XeO_2F_2 (D) CH_4 (E) XeF_4

Correct option is _____

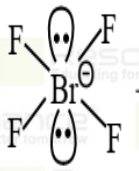
(1) A, B & E (2) A, C & E (3) A & C only (4) B & E only

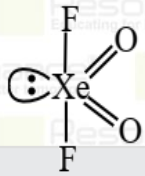
Ans. **(3)**

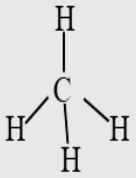
Sol. **Species** **Structure / Shape**

SF_4  → see-saw

$IF_4^{\oplus}$  → see-saw

$BrF_4^{\ominus}$  → square planar

XeO_2F_2  → see-saw

CH_4  → Tetrahedral

XeF_4  → square planar

9. The correct set that contains all kinds of oxides (Basic, acidic, amphoteric and neutral) is :-

(1) $Na_2O, N_2O, Al_2O_3 \& CO$ (2) $Al_2O_3, As_2O_3, CO, \& NO$

(3) $K_2O, Cl_2O_7, As_2O_3 \& NO$ (4) $Na_2O, K_2O, Al_2O_3 \& As_2O_3$

Ans. **(3)**

Sol. Basic Oxides : Na_2O, K_2O

Acidic Oxides : Cl_2O_7

Neutral Oxides : N_2O, NO & CO

Amphoteric Oxides : Al_2O_3, As_2O_3

10. Statement 1 : The correct order of 2^{nd} ionization energy for boron family elements is: $B > Al > Ga$.

Statement 2 : The correct order of 1^{st} ionization energy for carbon family elements is : $Si > Ge < Pb < Sn$.

Choose the correct option :

(1) Both statement 1 and statement 2 are correct

(2) Statement 1 is correct and statement 2 is incorrect

(3) Statement 1 is incorrect and statement 2 is correct.

(4) Both statement 1 and statement 2 are incorrect

Ans. **(4)**

Sol. Order of II ionization energy for boron family elements is :

$$\underset{(2427\ KJ/mol)}{\mathbf{B}} > \underset{(1979\ KJ/mol)}{\mathbf{Ga}} > \underset{(1816\ KJ/mol)}{\mathbf{Al}}$$

Order of I ionization energy for carbon family elements is :

$$\underset{(786\ KJ/mol)}{\mathbf{Si}} > \underset{(761\ KJ/mol)}{\mathbf{Ge}} > \underset{(715\ KJ/mol)}{\mathbf{Pb}} > \underset{(708\ KJ/mol)}{\mathbf{Sn}}$$

11. Which of the following compounds shows coordination isomerism.

(A) $[Fe(NH_3)_6][Co(CN)_6]$
(B) $[Cr(NH_3)_6][Co(CN)_6]$
(C) $[Co(NH_3)_6][Co(CN)_6]$
(D) $[Ag(NH_3)_2][Ag(CN)_2]$
(E) $[Fe(NH_3)_6][Cr(CN)_6]$

(1) A, B & C only (2) A, B & D only
(3) A, B C & E only (4) D only

Ans. **(3)**

Sol. Compound, $[Ag(NH_3)_2][Ag(CN)_2]$ cannot show coordination isomerism.

12. Arrange the following complexes in increasing order of C.F.S.E. (Δ_0)

(a) $[Co(H_2O)_6]^{2+}$
(b) $[Co(H_2O)_6]^{3+}$
(c) $[Co(en)_3]^{3+}$

(1) $b > c > a$ (2) $c > a > b$ (3) $c > b > a$ (4) $a > b > c$

Ans. **(3)**

Sol. C.F.S.E. is proportional to charge on central metal ion.
For same charge on central atom ; C.F.S.E. is proportional to strength of ligand.

13. Which of the ions show positive Borax Bead test and has the largest ionization energy :

(1) Zn^{2+} (2) Fe^{3+} (3) Fe^{2+} (4) Co^{2+}

Ans. **(2)**

Sol. Zn^{2+} does not show Borax Bead Test.
Among remaining ions; Fe^{3+} has maximum ionization energy.

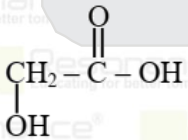
14. Identify code of amino acid and iodine derivative hormone in given option

Code	**Hormone**
(1) Y	Insuline
(2) T	Thyroxine
(3) Y	Thyroxine
(4) T	Insuline

Ans. **(3)**

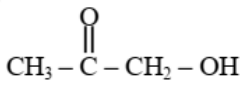
Sol. Thyroxine is derivative of Tyrosine and single letter symbol of Tyrosine amino acid is Y .

15. Organic compound $+KOH \xrightarrow{H^{\oplus}}$ gives product (X)
$\left(\begin{array}{c}\text{having same molar}\\ \text{ratio of } C:H:O\end{array}\right)$
' P '. Identify product ' P '

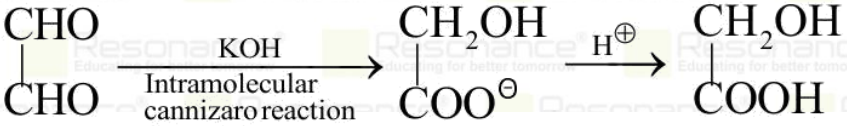
(1) 

(2) $CH_3 - COOH$

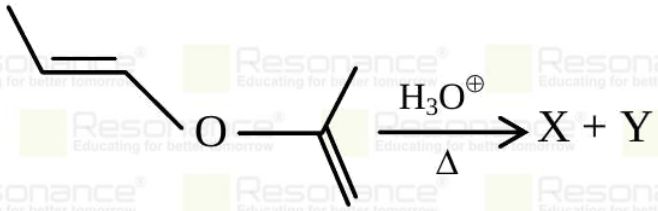
(3) $CH_2 = CH - COOH$

(4) 

Ans. **(1)**

Sol. 

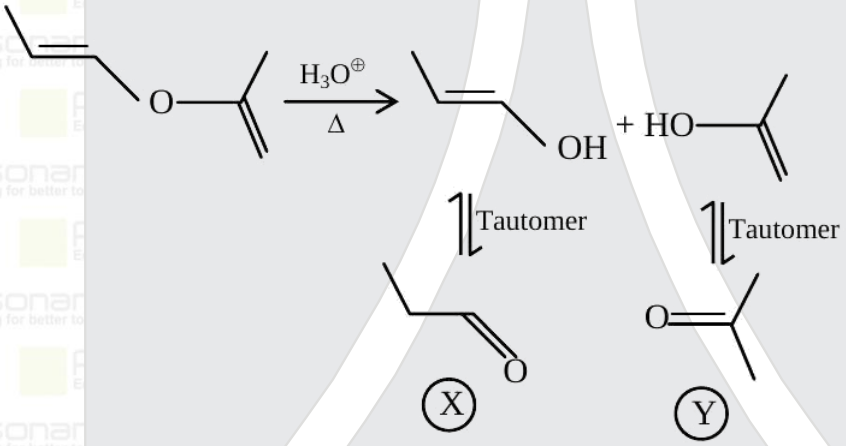
16.



Correct statement about product X and Y ?
(a) They can be differentiated by $NaHCO_3$ test.
(b) They both gives 2,4-DNP test
(c) They both have same molecular mass.
(d) They both react with same rate with HCN
(1) Statement a and b are correct
(2) Statement b and c are correct
(3) Statement c and d are correct
(4) Statement a and d are correct

Ans. **(2)**

Sol.



A will give positive fehling's test
Molar mass of $[X](C_3H_6O) = 58$
Molar mass of $[Y](C_3H_6O) = 58$

17. Identify correct statement(s)
(i) $Ar - Cl$ and $R - Cl$ shows similar chemical properties.

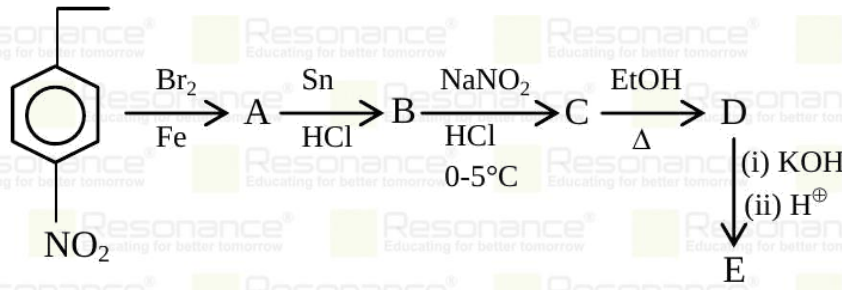
(ii) Rate of S_N1 $C_6H_5CH_2 - Cl < C_6H_5 - \underset{\displaystyle Cl}{\underset{|}{CH}} - C_6H_5$

(iii) Alcohol is more polar than water so alcoholic KOH show elimination reaction.
(iv) Vinyl alcohol is an alkene whereas allyl alcohol is an alkyne.
(v) Alcohol with $SOCl_2$ gives alkyl halide but phenol does not gives.
(1) i, ii, iii statements are correct (2) i, iii, iv statements are correct
(3) ii and v statements are correct (4) ii and iv statements are correct

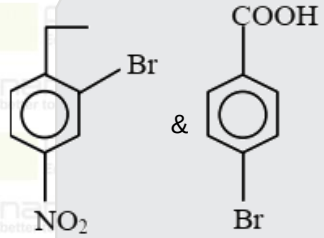
Ans. **(3)**

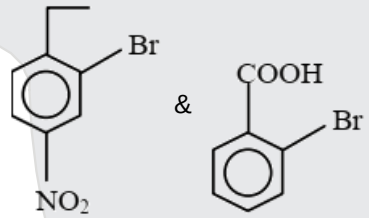
Sol. (i) Ar-Cl and R-Cl shows different chemical properties
(ii) Rate of $S_N1 \propto$ stability of first formed carbocation
Stability : $C_6H_5 - \overset{\oplus}{C}H_2 < C_6H_5 - \overset{\oplus}{C}H - C_6H_5$
(iii) Water is more polar than alcohol
(iv) vinyl alcohol, allyl alcohol, both are unsaturated alcohols
(v) $R - OH \xrightarrow{SOCl_2} R - Cl$
Phenol does not give $Ph - Cl$ with $SOCl_2$.

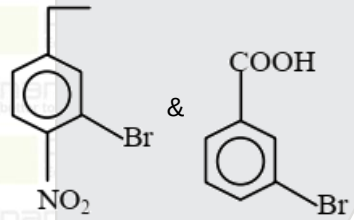
18.

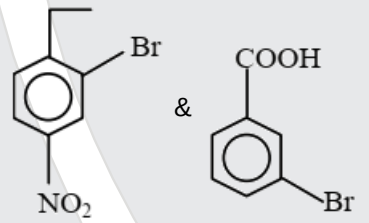


Identify A and E

(1) 

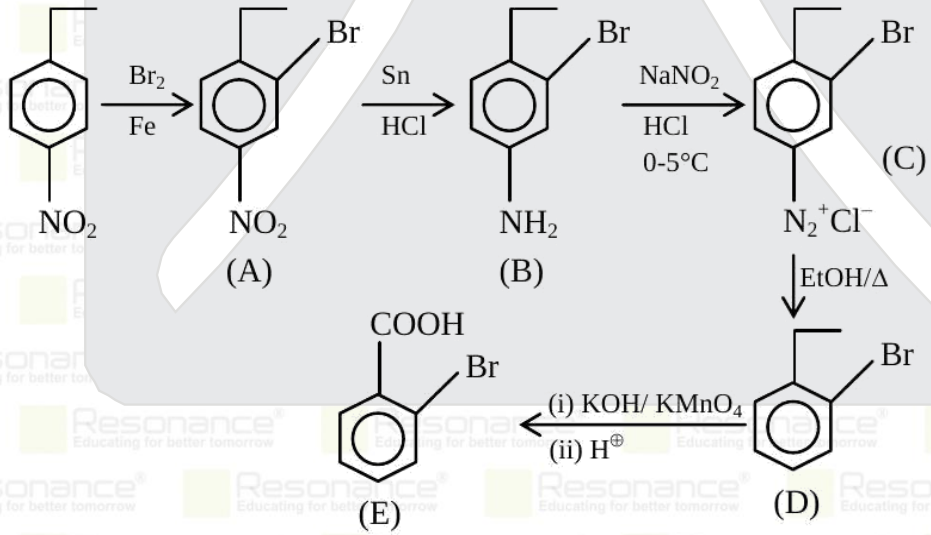
(2) 

(3) 

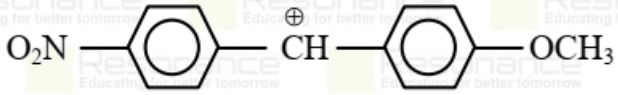
(4) 

Ans. **(2)**

Sol.

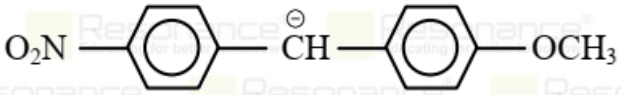


19. **Statement I :**



carbocation stable by $\oplus$ R effect of $-OCH_3$ group.

Statement II :



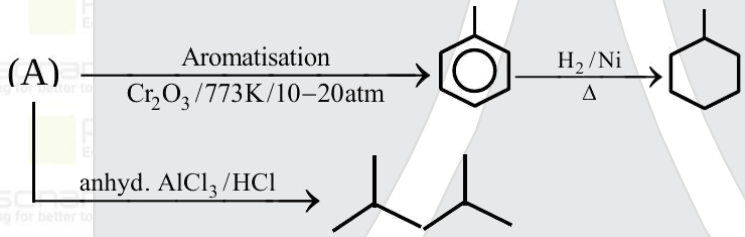
carbanion stable by $\ominus$R effect of $-NO_2$ group.

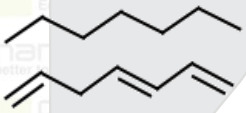
(1) Both statement 1 and statement 2 are correct
(2) Statement 1 is correct and statement 2 is incorrect
(3) Statement 1 is incorrect and statement 2 is correct.
(4) Both statement 1 and statement 2 are incorrect

Ans. **(1)**

Sol. Both statements are correct

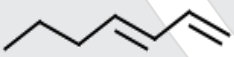
20. (A) is hydrocarbon



(1) 

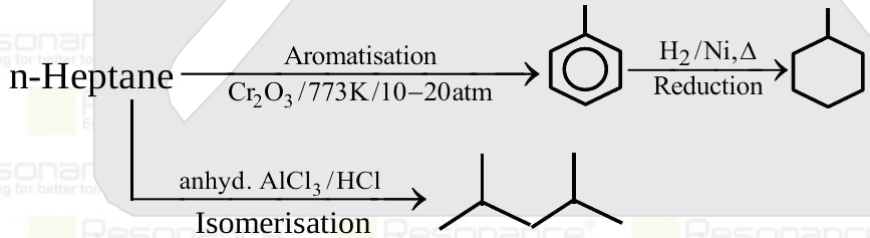
(2) 

(3)

(4) 

Ans. **(1)**

Sol.



21. For first order reaction;

$2\,A(g) \rightarrow 4\,B(g) + C(g)$

Total pressure at $t = 30$sec and $t = \infty$ are 300 torr and 600 torr respectively. Calculate pressure of $C(g)$ at 30 sec (in torr).

Ans. **(20)**

Sol.

$$2A(g) \rightarrow 4B(g) + C(g)$$

	p°		
$t = 30$ sec	$p^\circ - 2x$	$4x$	x
$t = \infty$	–	$2p^\circ$	$p^\circ/2$

$p_\infty = 2p^\circ + p^\circ/2 = 600$

$5p^\circ/2 = 600$

$P^\circ = 240$ torr

At $t = 30$ sec, $p = 300 = p^\circ - 2x + 4x + x$

$300 = 240 + 3x$

$3x = 60$

$x = 20$

Pressure of $C(g) = 20$ torr.

22. A metal of work function 2.3 eV is irradiated with radiation of wave-length $y \times 10^2$ nm. $(KE)_{max}$ of ejected electron is 2.8×10^{-20} J, then calculate y .
(in nearest integer)

Ans. **(5)**

Sol. KE of electron $= 2.8 \times 10^{20}$ J

$$= \frac{2.8 \times 10^{-20}}{1.6 \times 10^{-19}} = 0.175\text{eV}$$

$$\because (KE)_{max} = \left[\frac{1240\text{eV.nm}}{\lambda(\text{innm})} - \phi\right]$$

$$= 0.175 = \frac{1240}{\lambda} - 2.3$$

$$\lambda = \frac{1240}{2.475}$$

$\lambda = 501.01$ nm

$\lambda = 5.01 \times 10^2$ nm

23. A cell is formed using below half-cell reactions and cell is working with 80% efficiency. Work obtained is utilised for isothermal expansion of gas against external pressure of 1 kPa . Find $\Delta V(\text{inm}^3)$

$1/2O_2 + 2H^+ + 2e^- \rightarrow H_2O; E^\circ = 1.23$ V

$6H^+ + CO_2 + 6e^- \rightarrow CH_3OH + H_2O E^\circ = 0.02$ V

Ans. **(560)**

Sol. $\Delta G^\circ = -6 \times 96500 \times 1.21$ J

$$W = \frac{80}{100} \times \Delta G^\circ = -P\Delta V$$

$0.8 \times 6 \times 96500 \times 1.21 = 1 \times 10^3(\Delta\ V)$

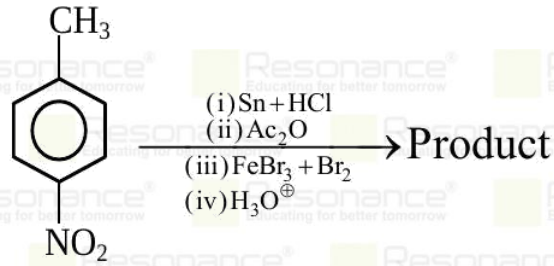
$\Delta V = 560.472\ m^3$

24. How many of the following are paramagnetic :
$Lu^{3+}, Yb^{2+}, Gd^{2+}, Ce^{4+}, La^{3+}, Zn^{2+}, Cu^{2+}, Mn^{2+}, Sc^{3+}$ and Ti^{4+}

Ans. **(3)**

Sol. Paramagnetic species are : Gd^{2+}, Cu^{2+} and Mn^{2+}

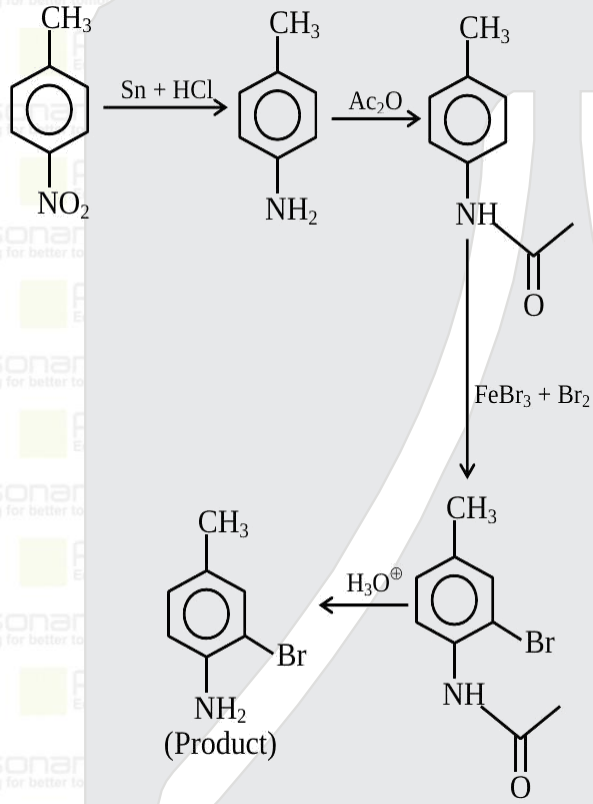
25.



What will be mass of AgBr obtained when 1 gm of product treated with $AgNO_3$ in Carius method.

Ans. **(1)**

Sol.



Molar mass of product = 186

Mass of AgBr $= \frac{1}{186} \times 188 \approx 1$