தேசிய வெளிக்கள நிலையம் தொண்டைமானாறு

இரண்டாம் தவணைப் பரீட்சை - 2024

National Field Work Centre, Thondaimanaru.

FWC

2nd Term Examination - 2024

Gr : 12 (2025) **Chemistry** Answer

1	2	6	3	11	5	16	5	21	1
2	5	7	4	12	4	17	5	22	1
3	1	8	1	13	2	18	3	23	3
4	2	9	2	14	3	19	5	24	1
5	3	10	2	15	3	20	4	25	1

CORRECTIONS

Tamil medium

* MCQ (2) 4) 10, 5) 22

MCQ(6) வினா: A, B, C, D என்ற முறையே அமைய வரைக்தமானது

MCQ(16) a இன் அமைப்புச்சூத்திரம் வினா

(2) (A) A இன் மூலகம் , அதன் மூலகம் 3 இருக்கின்றன

"Element of B has three .

(A) iv x ... y ... Z ....

(4) (B) SO_2 SO_3.

- - −296·8 −395·7

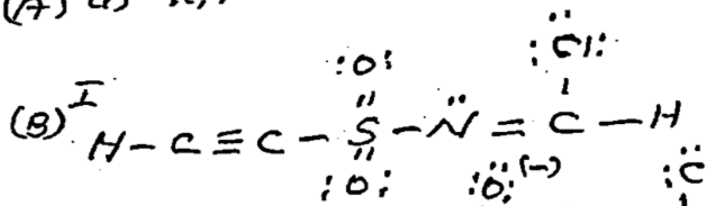
(4) (C) iii $C_2H_6(g)$.

CHEMISTRY MARKING SCHEME
2nd Term Examination 2024 Gr 12.

I (A) (i) K, F (ii) C (iii) Cl (iv) S (v) K. (vi) N

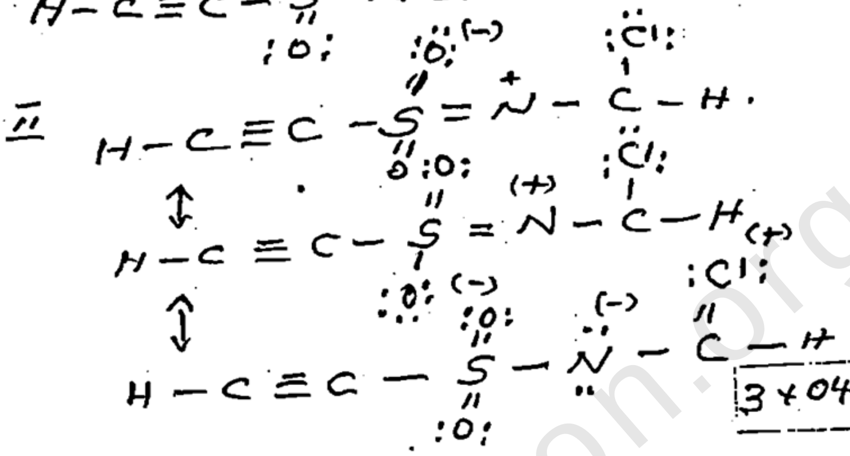
$6 \times 05 = 30$

(B) I



08

II



$3 \times 04 = 12$

III

	N^1	C^2	C^3	C^4
I	4	3	4	4
II	நான்முகி	தளமுக்கோணி	நான்முகி	நான்முகி
III	முக்கோணக் கூம்பகம்	தளமுக்கோணம்	நான்முகி	நான்முகி
IV	sp^3	sp^2	sp^3	sp^3

$16 \times 1 = 16$

(iv)

N^1 sp^3 H $1s$

N^1 sp^3 C^2 sp^2

C^2 sp^2 C^3 sp^3

C^3 sp^3 C^4 sp^3

C^5 sp^2 O^6 $sp^3/2p$

$10 \times 1 = 10$

(vi) N^1 107 ± 1 C^2 120 ± 1 C^3 109.5 ± 1

C^4 109.5 ± 1

$4 \times 01 = 4$.

(vii) $C^3 < C^4 < C^2 < N^1$ $4 \times 01 = 4$.

(c)

	[illegible]	[illegible]	[illegible]
(i)	அயன் பிணைப்பு	கவர்ச்சி நேர்மின் ஏற்ற மறை ஏற்றம்	கடத்தி.
(ii)	பங்கீட்டுப் பிணைப்பு	வண்டர்வால்ஸ் விசை	கடத்தியலி.
(iii)	உலோகப் பிணைப்பு	இலத்திரன் கடல் கவர்ச்சி	கடத்தி
(iv)	பங்கீட்டு வலுப் பிணைப்பு	ஐதரசன் பிணைப்பு − 4	கடத்தி

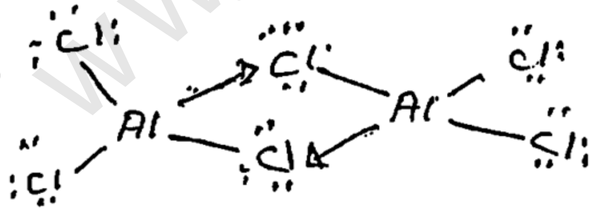
$4 \times 3 = 12$

100

02) (i) A : $AlCl_3$, B : CCl_4, C : NCl_3
D : PCl_5

$4 \times 5 = 20$

(ii)



(iii) a) $NCl_3 + H_2O \longrightarrow NH_3 + 3HOCl$

b) (i) $PCl_5 + H_2O \longrightarrow POCl_3 + 2HCl$

(ii) $PCl_5 + 4H_2O \longrightarrow H_3PO_3 + 5HCl$

$5 \times 03 = 15$.

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(iv) $[Al(H_2O)_6]^{3+}$ = X ; Y = $Al(OH)_3$ (3)

Z = $NaAlO_2$

3 × 4 = 12.

(v) $[Al(H_2O)_5(OH)]^{2+}$ (P) $[Al(H_2O)_4(OH)_2]^{+}$ Q.

H_3O^+ (R)

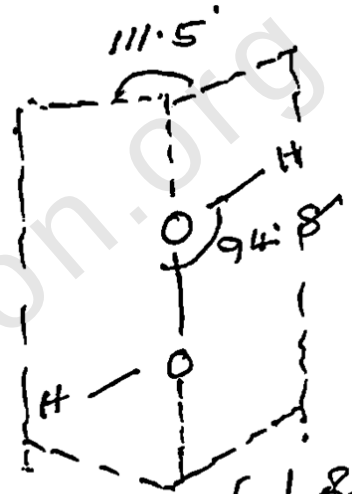
3 × 04 = 12

(B) (i) O (oxygen)

(ii) Y = H_2O, Z = H_2O_2

(iii) Y

இரண்டுவகை



வடிவம் / கீழ்நோக்கி - வகுவம்.

(iv) Suitable Examples

(v) $H_2O + HCl \longrightarrow H_3O^+ + Cl^-$

Base.

$H_2O + NH_3 \longrightarrow NH_4OH$

acid

9 × 04 = 36

100

(3) (i) $MnO_4^- + 8H^+ + 5e \longrightarrow Mn^{2+} + 4H_2O$ (4)

(ii) $Sn^{2+} \longrightarrow Sn^{4+} + 2e$.

$C_2O_4^{2-} \longrightarrow 2CO_2 + 2e$.

$SnC_2O_4 \longrightarrow Sn^{4+} + 2CO_2 + 4e$.

(iii) $4MnO_4^- + 32H^+ + 5SnC_2O_4 \longrightarrow 4Mn^{2+} + 16H_2O + 5Sn^{4+} + 10CO_2$.

(iv) $n_{MnO_4^-} = 0.5 mol\,dm^{-3} \times 200 \times 10^{-3}\,dm^3$.

$= 0.1 mol$ //

$n_{SnC_2O_4} = \frac{5}{4} \times 0.1\ mol$

$= 0.125 mol$ //

$M_{SnC_2O_4} = 0.125 mol \times 207\ g\,mol^{-1}$

$= 25.875\ g$ //

(v) உதாரணம் நியமமான மாதிரி.

8×05 = 40

(B) (i) $[H_2SO_4] = \frac{49}{100} \times \frac{1.80 \times 10^3\ g\,dm^{-3}}{98\ g\,mol^{-1}}$ — 10

$= 9 mol\,dm^{-3}$ //

(ii) Sulfuric acid, or sulphuric acid. — 5

(iii) $C_1V_1 = C_2V_2$ — 5

$9 mol\,dm^{-3} \times V_1 = 5 mol\,dm^{-3} \times 250 cm^3$ — 5

$V_1 = 138.89 cm^3$ // — 5

Accurately measured $138.89 cm^3$ of $5 mol\,dm^{-3}$ H_2SO_4 solution was transfered into a $250 cm^3$ volumetric flask which was contain 1/3 of distilled water. After that

distilled water was added upto the marked level of the volumetric flask. — 5

(iv) $H_2SO_{4(aq)} + Na_2CO_{3(aq)} \longrightarrow Na_2SO_{4(aq)} + H_2O + CO_2$

$n_{H_2SO_4} = 5 mol\,dm^{-3} \times 100 \times 10^{-3}\,dm^3$

$= 0.5 mol$ — 05

$\therefore n_{Na_2CO_3} = 0.5 mol$ — 02

$m_{Na_2CO_3} = 0.5 mol \times 106\,g\,mol^{-1}$

$= 53\,g$ — 03

30

(05) (i) potassium dihydrogen phosphate
(ii) hydrogen perchlorate
(iii) dinitrogen trioxide
(iv) mercurous chloride.

4 × 05 = 20

(04) $PV = nRT$ — 06

P- Pressure of the gas.
V- volume of the gas = volume of the container.
n- number of moles
R- universal gas constant.
T- absolute temperature / Kelvin Temperature

5 × 02 = 10

(ii) $PV = nRT$

$V = \frac{N \times RT}{N_A P}$

At constant $[T, P]$ $\left(\frac{RT}{PN_A}\right)$ is a constant ——— (5)

$V \propto N \ [T, P]$ ——— (5)

(iii) (1) $PV = nRT$

$n = \frac{PV}{RT} = \frac{0.3 \times 10^5 \text{ Pa} \times 15 \times 10^{-3} \text{ m}^3}{8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300 \text{ K}}$ (5)

$= 0.18 \text{ mol}$ // — (5)

(2) $m_{N_2} = 0.18 \text{ mol} \times 28 \text{ g mol}^{-1}$

$= 5.04 \text{ g}$ // (4)

(B) (i) $\Delta H^\ominus = \Sigma H_P^\ominus - \Sigma H_R^\ominus$ — (2)

$= 2 \times (-395.7 \text{ kJ mol}^{-1}) - [2 \times (-296.8) \text{ kJ mol}^{-1}]$ (3)

$= [-791.4 + 593.6] \text{ kJ mol}^{-1}$

$= -197.8 \text{ kJ mol}^{-1}$ // — (5)

(ii) $\Delta S^\ominus = \Sigma S_P^\ominus - \Sigma S_R^\ominus$ — (5)

$= 2 \times (256.8) \text{ J mol}^{-1} \text{ K}^{-1} - [2 \times 248.2 \text{ J mol}^{-1} \text{ K}^{-1} + 205.1 \text{ J mol}^{-1} \text{ K}^{-1}]$ — (3)

$= 513.6 - [496.4 + 205.1]$

$= 513.6 - 701.5$

$= -187.9 \text{ J mol}^{-1} \text{ K}^{-1}$ — (5)

(iii) $\Delta G^{\ominus} = \Delta H^{\ominus} - T\Delta S^{\ominus}$. — (2)

$= -197.8\ KJ\ mol^{-1} - 298K(-0.1879\ KJ\ mol^{-1}K^{-1})$

$= (-197.8 + 55.726)\ KJ\ mol^{-1}$ — (3)

$= -142.074\ KJ\ mol^{-1}$ // — (5)

(iv) Spontaneous reaction. — (10)

(C) (i) $2C_{(s)} + 3H_{2(g)} + \frac{1}{2}O_{2(g)} \longrightarrow C_2H_5OH_{(l)}$.

$\Delta_f H^{\ominus}[C_2H_5OH_{(l)}]$

(ii) $C_2H_{6(g)} + \frac{7}{2}O_{2(g)} \longrightarrow 2CO_{2(g)} + 3H_2O_{(l)}$

$\Delta_c H^{\ominus}[C_2H_{6(g)}]$

(iii) $NH_{3(g)} \longrightarrow N_{(g)} + 3H_{(g)}$

$\Delta H_D^{\ominus}[NH_{3(g)}]$

(iv) $NaCl_{(s)} \longrightarrow Na^+_{(g)} + Cl^-_{(g)}$

$\Delta H_L^{\ominus}[NaCl_{(s)}]$.

4×05 = 20

100

(5) a)(ii) $PV = nRT$ ... (5)

$n = \frac{PV}{RT}$.

$n_T = n_A + n_B + n_C$ ... (5)

$\frac{P_T V}{RT} = \frac{P_A V}{RT} + \frac{P_B V}{RT} + \frac{P_C V}{RT}$

$\therefore P_T = P_A + P_B + P_C$ // ... (5)

A, B, C are three ideal-behaviour gases. at constant T and- ... (5)

20

(ii) $n = \frac{PV}{RT}$.

$n_{He} = \frac{1.2 \times 10^5 Pa \times 10 \times 10^{-3} m^3}{8.314 J mol^{-1} K^{-1} \times 298 K}$. ... (5)

$= 0.484 mol$ // ... (5)

$n_{Ne} = \frac{0.8 \times 10^5 Pa \times 15 \times 10^{-3} dm^3}{8.314 J mol^{-1} K^{-1} \times 298 K}$ ... (5)

$= 0.484 mol$ // ... (5)

ii. $n_T = (0.484 + 0.484) mol$

$= 0.968 mol$ // ... (5)

iii. To the system $PV = nRT$.

$P = \frac{nRT}{V} = \frac{0.968 mol \times 8.314 J mol^{-1} K^{-1} \times 298 K}{25 \times 10^{-3} m^3}$ ... (5)

$= 9.593 \times 10^4 Pa$. ... (5)

(iv) $P_{He} = X_{He} P_T$. ... (5)

$= \frac{0.484}{0.968} \times 9.593 \times 10^4 Pa$.

$= 4.7965 \times 10^4 Pa$ // ... (5)

mole of gases at container B is n_1 mol

" " " " " A is $(0.968 - n_1)$ mol

$$\frac{(0.968 - n_1) \times R \times 298\ K}{10 \times 10^{-3}\ m^3} = \frac{n_1 \times R \times 400K}{15 \times 10^{-3}\ m^3} \quad (5)$$

$$3(0.968 - n_1)298 = 2n_1 \times 400$$

$$865.392 = 800n_1 + 894n_1$$

$$1694n_1 = 865.392$$

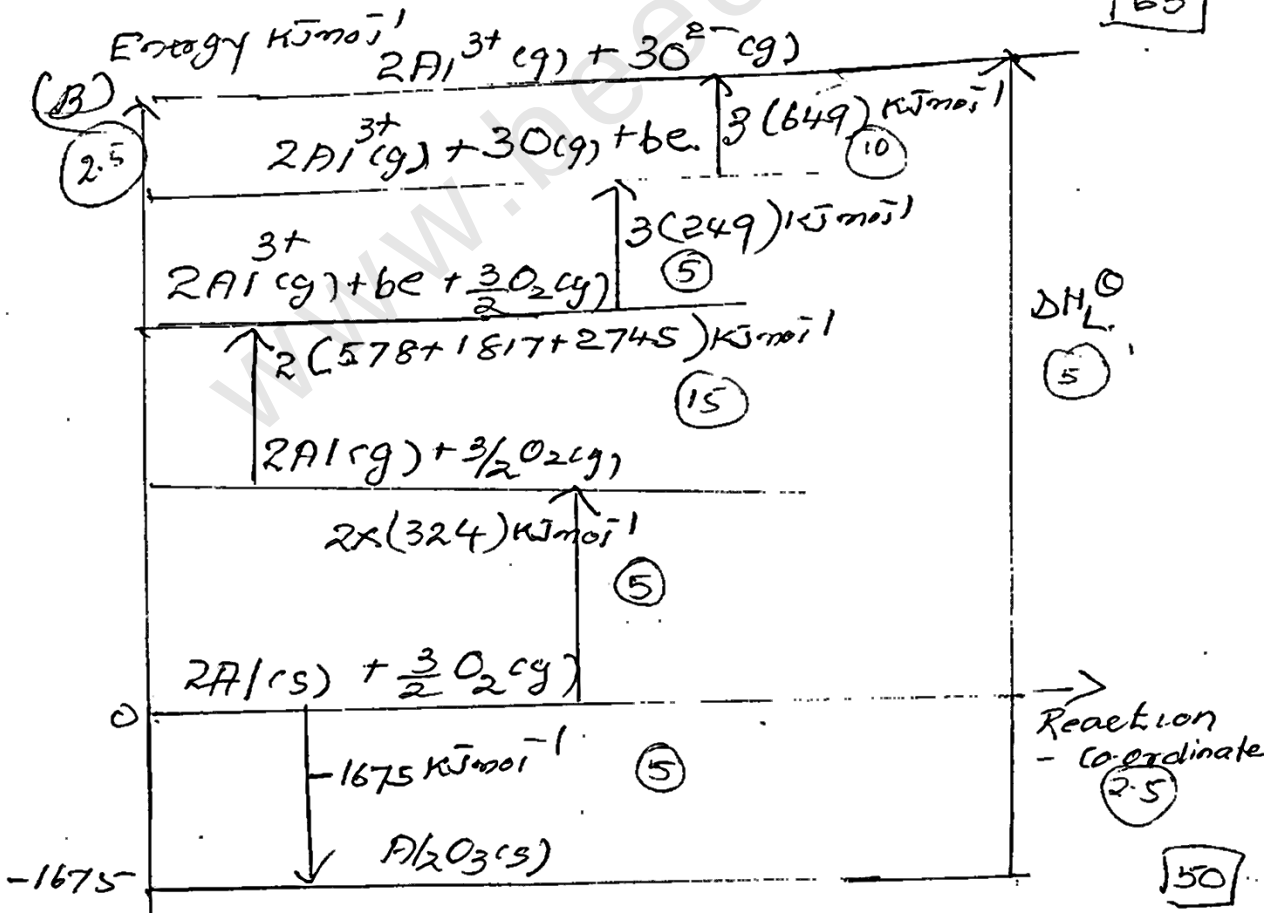
$$n_1 = 0.511\ mol \quad (5)$$

$$P = \frac{n_1 RT}{V}$$

$$= \frac{0.511\ mol \times 8314\ J\,mol^{-1}K^{-1} \times 400K}{15 \times 10^{-3}\ m^3} \quad (5)$$

$$= 1.133 \times 10^5\ Pa \quad (5)$$

65



$-1675\ kJ\ mol^{-1} + \Delta H_L^\ominus = (648 + 10,280 + 7471 + 1947)\ kJ\ mol^{-1}$ — (10)

$\Delta H_L^\ominus = (13,622 + 1675)\ kJ\ mol^{-1}$

$= 15,297\ kJ\ mol^{-1}$ — (5)

150

06 (A) $[Mn(H_2O)_6]^{2+}$

B $[Co(H_2O)_6]^{3+}$

C $[Co(H_2O)_6]^{2+}$

D $[Zn(H_2O)_6]^{2+}$

E $[Fe(H_2O)_6]^{3+}$

F $[Cu(H_2O)_6]^{2+}$

P – $Mn(OH)_2$

Q – $[Co(NH_3)_6]^{3+}$

R – $[CoCl_4]^{2-}$

S – $[ZnCl_4]^{2-}$

T – $Fe(OH)_3$

U – $[Cu(NH_3)_4]^{2+}$

$12 \times 05 = 60$

(B) I. K. — (5)

II $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$ — (5)

III K_2O, K_2O_2, KO_2.

(−2) (−1) (0, −1) $6 \times 02 = 12$

(N) e

1 dil KOH + $Cl_2 \xrightarrow[cool]{} KOCl + KCl + H_2O$

2 conc KOH + $3Cl_2 \xrightarrow{hot} KClO_3 + 5KCl + 3H_2O$

(3) $KOH + SO_2 \longrightarrow KHSO_3$.

$2KOH + SO_2 \longrightarrow K_2SO_3 + H_2O$

(4) $2KOH + H_2S \longrightarrow K_2S + 2H_2O$

$5 \times 05 = 25$

50

(c) I Sodium tetrachloridocobaltate(II)

II hexaamminenickel(II) chloride.

III hexaaquacopper(II) ion

IV tetrachloridozincate(II) ion $5 \times 08 = 40$

150

(07) $MnO_4^-(aq) + 8H^+(aq) + 5e \longrightarrow Mn^{2+}_{(aq)} + 4H_2O_{(l)}$ $\times 2$

$C_2O_4^{2-}(aq) \longrightarrow 2CO_{2(g)} + 2e$ $\times 5$

$2MnO_4^-(aq) + 16H^+(aq) + 5C_2O_4^{2-}(aq) \longrightarrow 2Mn^{2+}(aq) + 10CO_{2(g)} + 8H_2O$ (1) (5)

$SO_3^{2-}(aq) + H_2O \longrightarrow SO_4^{2-}(aq) + 2H^+(aq) + 2e$ $\times 5$

$2MnO_4^-(aq) + 6H^+(aq) + 5SO_3^{2-}(aq) \longrightarrow 2Mn^{2+}(aq) + 5SO_4^{2-}(aq) + 3H_2O_{(l)}$ (2) (5).

$n_{MnO_4^-} = 0.1\ mol\ dm^{-3} \times 40 \times 10^{-3}\ dm^3$ (5)

$= 4 \times 10^{-3}\ mol$ (5)

(a) $BaCl_{2(aq)} + SO_4^{2-}(aq) \longrightarrow BaSO_4\downarrow + 2Cl^-_{(aq)}$ (5)

$n_{BaSO_4} = \frac{699\times10^{-3}\ g}{233\ g\ mol^{-1}}$

$= 3\times10^{-3}\ mol$ (5)

$n_{SO_4^{2-}} = n_{SO_3^{2-}} = 3\times10^{-3}\ mol$ (5)

$\therefore$ mole of MnO_4^- reacted with SO_3^{2-}

$= \frac{2}{5}\times 3\times10^{-3}\ mol$ (5)

$= 1.2\times10^{-3}\ mol$ (5)

$\therefore$ mole of MnO_4^- reacted with $C_2O_4^{2-}$

$= (4\times10^{-3} - 1.2\times10^{-3})\ mol$

$= 2.8\times10^{-3}\ mol$ (5)

$\therefore \because\ n_{C_2O_4^{2-}} = \frac{5}{2}\times 2.8\times10^{-3}\ mol$

$= 7\times10^{-3}\ mol$ (5)

$[SO_3^{2-}(aq)] = \frac{3\times10^{-3}\ mol}{20\times10^{-3}\ dm^3}$ (5)

$= 0.15\ mol\ dm^{-3}$ (5)

$[C_2O_4^{2-}(aq)] = \frac{7\times10^{-3}\ mol}{20\times10^{-3}\ dm^3}$ (5)

$= 0.35\ mol\ dm^{-3}$ (5)

75

(b) (i) when heated.

No solid residue was obtained.

So compound $(NH_4)_2CO_3$ is identified. (5)

Black or dark brown solid residue was obtained. Ag_2CO_3 was identified. (5)

So No change or other one was Na_2CO_3. (5)

(ii) one of the given solution was taken randomly. Then it was transfered to other two solutions. Both solution give white precipitate. ∴ The taken solution is $Pb(NO_3)_2$.

After the two separate ~~Precipi~~ Precipitate with solution were heated. one of the precipitate was dissolved and give - clear solution. So HCl is identified. Other one is H_2SO_4 $\boxed{5 \times 3 = 15}$

(Other suitable answers give marks)

(iii) heat with NaOH(aq) ∅

* one of this solution is not librate gas / Pungent smell gas. So $NaNO_3$ is identified. After that

* ~~Two the remai~~ Al powder was added to other two solutions then heated. once again Pungent smell gas was librated NH_4NO_3 is identified, Other one is NH_4Cl $\boxed{5 \times 3 = 15}$

c N_2O dinitrogen monoxide +1

NO nitrogen monoxide +2

N_2O_3 dinitrogen trioxide +3.

NO_2 nitrogen dioxide +4

N_2O_4 dinitrogen tetroxide +4

N_2O_5 dinitrogen pentoxide +5

$15 \times 2 = 30$

150