

13 ශ්‍රේණිය - අවසාන වාර පරීක්ෂණය

පිළිතුරු පත්‍රය (රසායන විද්‍යාව - I)

| | | | | |
|--------|--------|--------|--------|--------|
| (1) 3 | (11) 5 | (21) 4 | (31) 5 | (41) 4 |
| (2) 1 | (12) 4 | (22) 3 | (32) 2 | (42) 1 |
| (3) 2 | (13) 1 | (23) 2 | (33) 1 | (43) 1 |
| (4) 5 | (14) 2 | (24) 1 | (34) 5 | (44) 1 |
| (5) 4 | (15) 3 | (25) 3 | (35) 4 | (45) 3 |
| (6) 3 | (16) 1 | (26) 3 | (36) 2 | (46) 3 |
| (7) 4 | (17) 5 | (27) 5 | (37) 5 | (47) 2 |
| (8) 2 | (18) 2 | (28) 4 | (38) 4 | (48) 5 |
| (9) 3 | (19) 3 | (29) 1 | (39) 5 | (49) 3 |
| (10) 1 | (20) 2 | (30) 4 | (40) 2 | (50) 4 |

Marking Scheme – Chemistry
ව්‍යුහගත රචනා
උතුරු මැද පලාත - අවසාන වාර පරීක්ෂණය - 2023

01.

a)

I. C

II. Li

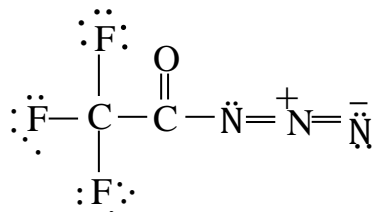
III. F

IV. N

V. O

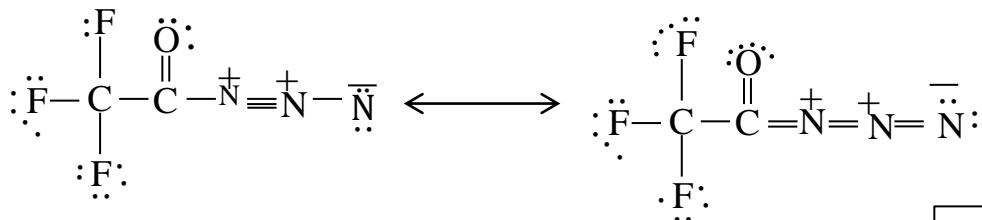
20

b) (I)



10

(II)



06

(III)

| | | | |
|----------|------------------|-----------------|-----------------|
| <u>C</u> | N ₂ | N ₃ | N ₄ |
| 2 | 3 | 3 | 4 |
| රේඛීය | තලය ත්‍රිකෝණාකාර | තලය Δ | චතුර්තලය |
| රේඛීය | කෝණික | තලය Δ | පිරමිඩය |
| SP | SP ² | SP ² | SP ³ |
| +2 | -1 | -1 | -2 |

20

(IV)

- | | |
|--------------------------------------|----------------------------------|
| (a) N ¹ - SP | C - SP |
| (b) C - SP | N ² - SP ² |
| (c) N ² - SP ² | N ³ - SP ² |
| (d) N ³ - SP ² | O - SP ³ |
| (e) N ³ - SP ³ | N ⁴ - SP ³ |

10

(V)

- | | |
|---------------------|---------------------|
| N ¹ - 2P | C - 2P |
| N ² - 2P | N ³ - 2P |

04

c)

1. $H_2S < H_2O < NF_3 < NH_3$
2. ${}^+NH_4 < NO_4^{3-} < \bar{N}O_2 < {}^+NO_2$
3. $K^+ < Na^+ < Mg^{2+} < Al^{3+}$
4. $SO_3 < SO_3^{2-} < S_2O_4^{2-} < SO_4^{2-}$

24

02.

I. X = K Y = Al

16

II. X = $1S^2 2S^2 2P^6 3S^2 3P^6 4S^1$

5

Y = $1S^2 2S^2 2P^6 3S^2 3P^1$

5

III. සහත්වය Al > K

ප්‍රතික්‍රියාශීලිතාවය K > Al

විද්‍යුත් සෘණතාවය Al > K

දෘඪතාවය Al > K

$3 \times 4 = 12$

IV. $K + O_2 \longrightarrow KO_2$

$2K + O_2 \longrightarrow K_2O_2$

12

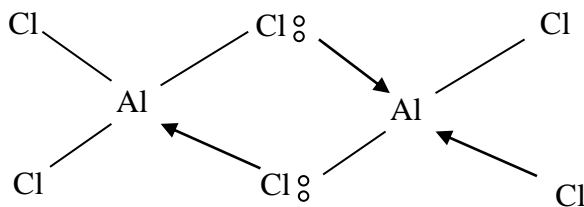
$4K + O_2 \longrightarrow 2K_2O$

V. $4Al + 3O_2 \longrightarrow 2Al_2O_3$

8

$2Al + N_2 \longrightarrow 2AlN$

VI.



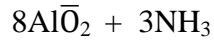
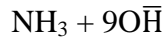
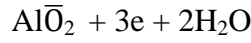
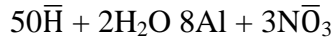
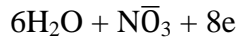
8

VII. $2Al + 2OH^- + 6H_2O \longrightarrow 2[Al(OH)_4]^- + 3H_2$

10

VIII. අවර්ණ වායු ඔබ්බේ පිට වීම.

4



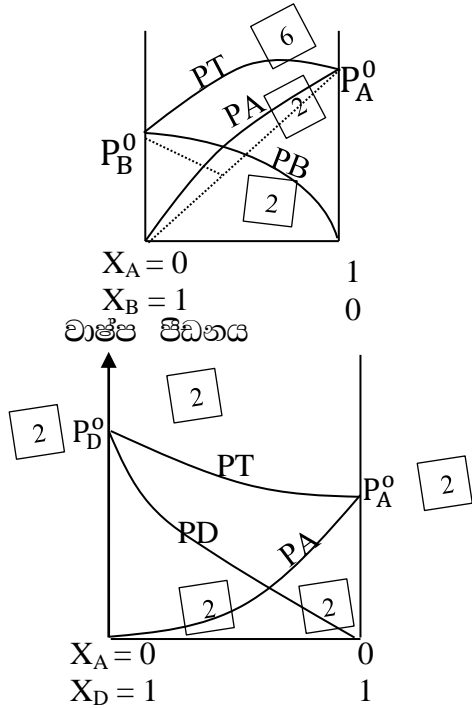
| |
|---|
| 6 |
| 6 |
| 8 |

03.

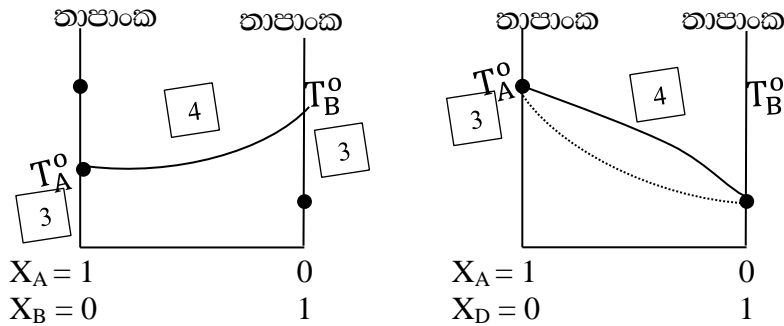
- I. A – B ද්‍රාවණය (+) අපගමනය
 A – C ද්‍රාවණය පරිපූර්ණ
 A – D ද්‍රාවණය (-) අපගමනය

18

II. වාෂ්ප පීඩනය වාෂ්ප පීඩනය වාෂ්ප පීඩනය වාෂ්ප පීඩනය



III.



$$\text{IV. } P_A = P_A^0 \chi_A \quad \boxed{3} \quad P_C = P_C^0 \chi_C$$

$$P_A = 2 \times 10^4 \frac{0.2}{0.6} \quad \boxed{2} \quad 1.6 \times 10^4 \times \frac{0.4}{0.6} \quad \boxed{2}$$

$$= \frac{2}{3} \times 10^4 \text{ Pa} \quad \boxed{4} \quad P_B = \frac{2}{3} \times 10^4 \text{ Pa} \quad \boxed{4}$$

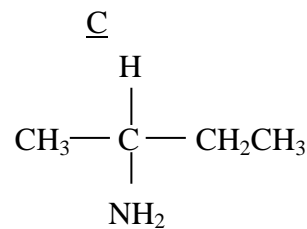
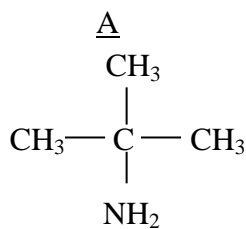
$$P_C = P_T Y^1 C \quad \boxed{2}$$

$$\frac{3.2 \times 10^4}{3} = \frac{5.2 \times 10^4}{3} Y^1 C \quad \boxed{4+1}$$

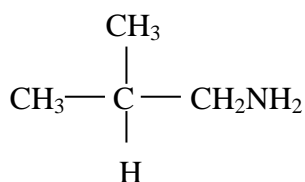
$$0.615 = Y^1 C \quad \boxed{10}$$

04.

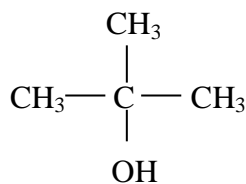
I.



D



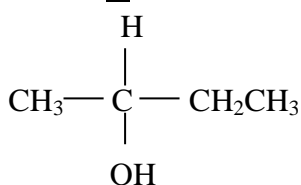
E



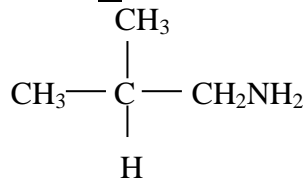
F



G

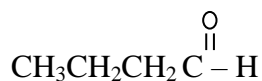


H

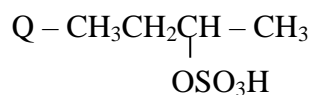
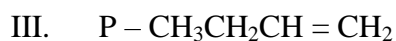
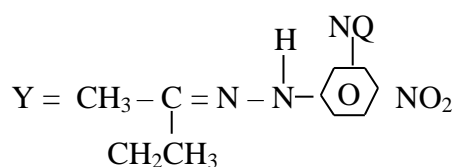
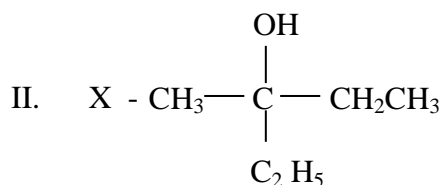
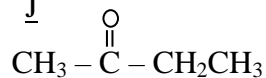


$$\boxed{05 \times 10 = 50}$$

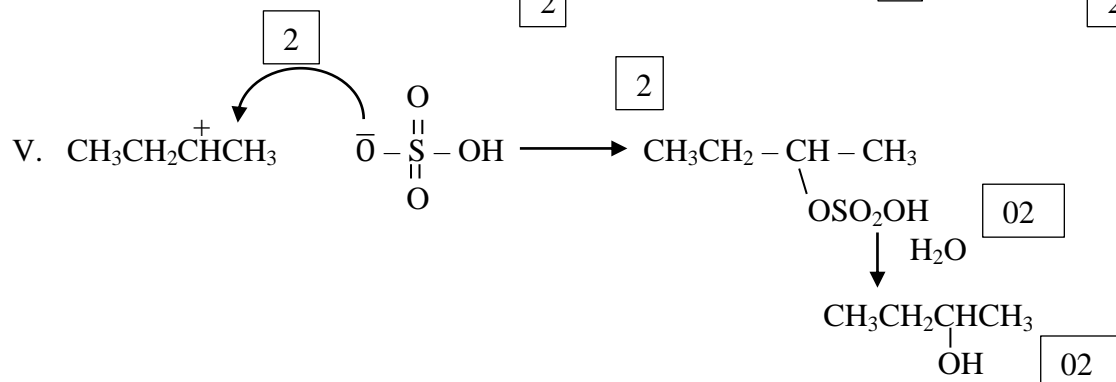
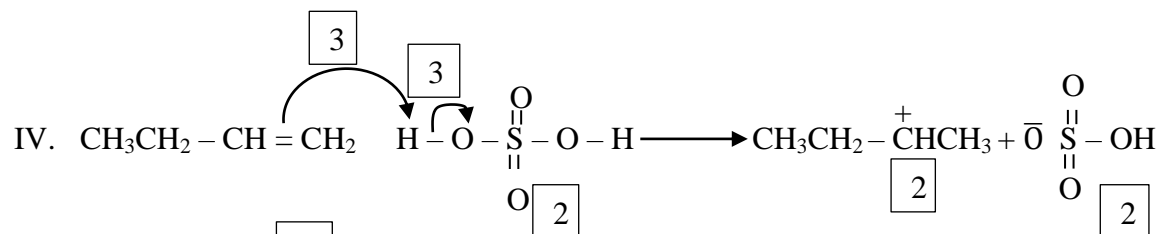
I



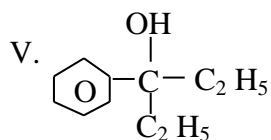
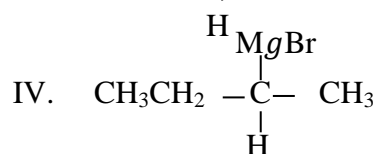
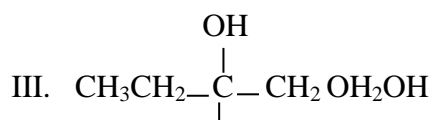
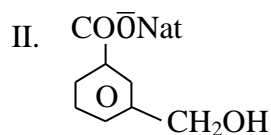
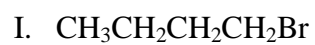
J



$$\boxed{3 \times 4 = 12}$$



b.



04 x 5 = 20

රචනා

05.

a.

I. D වායුවට

$$\frac{P_1}{T_1} = \frac{P_2}{T_2} \quad \boxed{3}$$

$$\frac{3.6 \times 10^5 Pa}{300 K} = \frac{P_2}{500 K} \quad \boxed{4 + 1}$$

$$6 \times 10^5 Pa = P_2 \quad \boxed{4 + 1}$$



$$\begin{array}{ccc} 6 \times 10^5 Pa & - & - \\ (6 \times 10^5 - P_1) & (P_1 - 2P_2) & P_1 \end{array} \quad \boxed{4}$$



$$\begin{array}{ccc} P_1 & - & - \\ (P_1 - 2P_2) & P_2 & P_2 \end{array} \quad \boxed{4}$$

$$K_P = \frac{P_G \times P_H}{P_E^2} = \frac{P_2^2}{(P_1 - 2P_2)^2} = 0.25$$

$$P^1 = 4P_2 \quad \boxed{4}$$

$$P_T = P_D + P_E + P_F + P_G + P_H$$

$$1 \times 10^6 Pa = (6 \times 10^5 - P_1) + (P_1 - 2P_2) + P_1 + P_2 + P_2$$

$$4 \times 10^5 Pa = P_1 \quad \boxed{4 + 1}$$

$$P_2 = 1 \times 10^5 Pa \quad \boxed{4 + 1}$$

$$P_D = 2 \times 10^5 Pa \quad \boxed{4 + 1}$$

$$P_G = 1 \times 10^5 Pa \quad \boxed{4 + 1}$$

$$P_E = 2 \times 10^5 Pa \quad \boxed{4 + 1}$$

$$P_H = 1 \times 10^5 Pa \quad \boxed{4 + 1}$$

$$P_F = 4 \times 10^5 Pa \quad \boxed{4 + 1}$$

III. D වායුවට

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{1 \times 10^5 Pa}{500 K} = \frac{P_G}{400 K} \quad \boxed{3 + 1}$$

$$8 \times 10^5 Pa = P_G \quad \boxed{3 + 1}$$

$$\text{IV. } P_D = 2 \times 10^5 \times \frac{4}{5} \text{ Pa} \\ = 1.6 \times 10^5 \text{ Pa} \quad \boxed{3+1}$$

$$P_E = 2 \times 10^5 \times \frac{4}{5} \\ = 1.6 \times 10^5 \text{ Pa} \quad \boxed{3+1}$$

$$P_F = \frac{4 \times 10^5 \times 4}{5} \\ = 3.2 \times 10^5 \text{ Pa} \quad \boxed{3+1}$$

$$\text{V. } D(g) \longrightarrow E(g) + F(g) \\ 1.6 \times 10^5 \text{ Pa} \quad - \quad - \\ (1.6 \times 10^5 + P_3) \quad (1.6 \times 10^5 - P_3) \quad (3.2 \times 10^5 - P_3) \\ P_T = P_D + P_E + P_F + P_G + P_H \\ 7.4 \times 10^5 \text{ Pa} = (1.6 \times 10^5 + P_3) + (1.6 \times 10^5 - P_3) + (3.2 \times 10^5 - P_3) + 8 \times 10^4 + 8 \times 10^4 \text{ Pa} \\ 6 \times 10^4 \text{ Pa} = P_3 \quad \boxed{2+1}$$

$$P_D = 2.2 \times 10^4 \text{ Pa} \quad \boxed{02}$$

$$P_F = 2.6 \times 10^5 \text{ Pa} \quad \boxed{02}$$

$$P_E = 1 \times 10^5 \text{ Pa} \quad \boxed{02}$$

$$\text{VI. } K_p = \frac{P_E \times P_F}{P_D} = \frac{1 \times 10^5 \text{ Pa} \times 2.6 \times 10^5 \text{ Pa}}{2.2 \times 10^5 \text{ Pa}} \quad \boxed{02+1}$$

$$= 1.2 \times 10^5 \text{ Pa} \quad \boxed{1+1}$$

$$\text{VII. } K_p = K_c (RT)^{\Delta n}$$

$$1.2 \times 10^5 \text{ Pa} = k_c \times (8314 \text{ J mol}^{-1} \text{ K}^{-1} \times 400 \text{ K}) \quad \boxed{3+1}$$

$$36 \text{ mol m}^{-3} = k_c \quad \boxed{1+1}$$

b.

$$\text{I. } R = K [A(g)]^a [B(g)]^b [C(g)]^c \quad \boxed{3}$$

$$\text{II. } 5 \times 10^{-4} = K (0.05 \text{ mol dm}^{-3})^a (0.05 \text{ mol dm}^{-3})^b (0.05 \text{ mol dm}^{-3})^c \quad \text{①} \quad \boxed{2+1}$$

$$1.5 \times 10^{-3} \text{ mol dm}^{-3} \text{ s}^{-1} = K (0.15 \text{ mol dm}^{-3})^a (0.05 \text{ mol dm}^{-3})^b (0.05 \text{ mol dm}^{-3})^c \quad \text{②} \quad \boxed{2+1}$$

$$4.5 \times 10^{-3} = K (0.15 \text{ mol dm}^{-3})^a (0.15 \text{ mol dm}^{-3})^b (0.05 \text{ mol dm}^{-3})^c \quad \text{③} \quad \boxed{2+1}$$

$$9.5 \times 10^{-3} = K (0.15)^a (0.15)^b (0.1)^c \quad \text{④} \quad \boxed{2+1}$$

$$\frac{\text{①}}{\text{②}} \quad \frac{0.5}{1.5} = \frac{0.05^a}{0.15^a} \quad \frac{\text{②}}{\text{③}} \quad \frac{1}{3} = \left(\frac{1}{3}\right)^b$$

$$1 = a \quad \boxed{4}$$

$$1 = b \quad \boxed{4}$$

$$\frac{\text{④}}{\text{③}} \quad 2 = \left(\frac{0.1}{0.05}\right)^c$$

$$1 = c \quad \boxed{4}$$

III. 3 5

IV. $K = \frac{5 \times 10^{-4} \text{ moldm}^{-3} \text{ s}^{-1}}{5 \times 10^{-2} \times 5 \times 10^{-2} \times 5 \times 10^{-2}}$ 4 + 1

$= 4 \text{ mol}^{-2} \text{ dm}^6 \text{ s}^{-1}$ 4 + 1

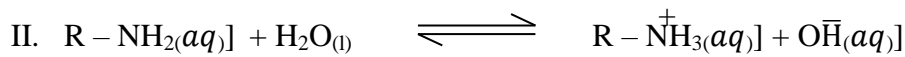
V. $t \frac{1}{2} = \frac{0.693}{K} = \frac{0.693}{4}$ 3

0.173 s 4 + 1

06.

a.

I. $K_b = \frac{[\text{RH}_3^+(aq)] [\text{OH}^-(aq)]}{[\text{R-NH}_2(aq)]}$ 5



0.1 moldm⁻³ - -

(0.1 - x) moldm⁻³

x

x

4 + 1

$K_b = \frac{x^2}{(0.1-x)} = 1 \times 10^{-9} \text{ moldm}^3$

(0.1 - x) = 0.1 02

$x^2 = 1 \times 10^{-10}$

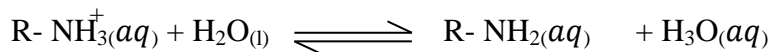
$[\text{OH}^-] = x = 1 \times 10^{-5} \text{ moldm}^3$ 4+1

POH = 5 05

PH = 9 03

III. සමකතා ලක්ෂ්‍යයේ දී $[\text{R-NH}^+] = \frac{0.1}{1000} \times 25 \frac{1000}{50} \text{ moldm}^{-3}$

$= 0.05 \text{ moldm}^{-3}$ 4 + 1



(0.05 - x) -

x

x

3 + 1

$K_a = \frac{[\text{R-NH}_2(aq)][\text{H}_3\text{O}^+(aq)]}{[\text{R-NH}_3^+]}$ $= \frac{K_w}{K_b}$

$\frac{x^2}{(0.05-x)} = \frac{1 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-6}}{1 \times 10^{-9} \text{ moldm}^{-3}}$ 4 + 1

(0.05 - x) = 0.05 01

$x^2 = 50 \times 10^{-8} \text{ moldm}^{-6}$

$[\text{H}_3\text{O}^+] = x = 7.01 \times 10^{-4} \text{ moldm}^{-3}$ 4 + 1

PH = ly (7 × 10⁻⁴)

= 3.16 4 + 1

b.



I. ආරම්භක CH_3COOH මවුල $= \frac{2}{1000} \times 20 = 4 \times 10^{-2} \text{ mol}$ $\boxed{3+1}$

ප්ලීය ස්ඵරයේ 100cm^3 ක CH_3COOH මවුල $= \frac{0.5}{1000} \times 8$
 $= 4 \times 10^{-3} \text{ mol}$ $\boxed{2+1}$

20cm^3 ක CH_3COOH මවුල $= 8 \times 10^{-5} \text{ mol}$ $\boxed{3+1}$

CCl_4 20cm^3 CH_3COOH මවුල $= (4 \times 10^{-3} - 8 \times 10^{-5})$
 $= 32 \times 10^{-3} \text{ mol}$ $\boxed{3+1}$

CCl_4 10cm^3 ක CH_3COOH මවුල $= 16 \times 10^{-3} \text{ mol}$

අවශ්‍ය NaOH මවුල $= 16 \times 10^{-3} \text{ mol}$ $\boxed{3+1}$

NaOH පරිමාව $= \frac{16 \times 10^{-3} \text{ mol}}{0.5 \text{ mldm}^{-3}}$ $\boxed{3+1}$

P $= 32 \text{ cm}^3$ $\boxed{3+1}$

II. $K_D = \frac{[\text{CH}_3\text{COOH}]_{\text{aq}}}{[\text{CH}_3\text{COOH}]_{\text{CCl}_4}} = \frac{4 \times 10^{-3} \times 1000 \text{ mol dm}^{-3}}{\frac{10}{6 \times 10^{-3} \times 1000 \text{ mol dm}^{-3}}}$ $\boxed{3+1}$
 $= \frac{1}{4}$ $\boxed{4+1}$

III. බෝතල් (2) සඳහා CH_3COOH මවුල $= \frac{2}{1000} \times 15 = 30 \times 10^{-3} \text{ mol}$ $\boxed{2+1}$

කලාප දෙකටම අවශ්‍ය NaOH පරිමාව $= \frac{1000}{0.5 \text{ mol}} \times 30 \times 10^{-3}$
 $= 60 \text{ cm}^3$ $\boxed{3+1}$

$\frac{Q}{R} = 0.25$ — ① $\boxed{2}$

$2Q + 2R = 60$ — ② $\boxed{2}$

$2 \times 0.25 + 2R = 60$

$0.5R + 2R = 60$

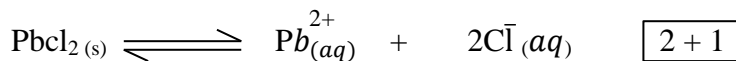
$R = 24\text{cm}^3$ $\boxed{02+1}$

$Q = 6\text{cm}^3$ $\boxed{02+1}$

IV. පිනෝප්තැප්ලින් / බ්‍රෝමොනයිමෝල්ඩාල $\boxed{05}$

c.

I. PbCl_2 අවක්ෂේප වීම සඳහා අවශ්‍ය අවම $[\text{Pb}^{2+}]$ සෙවීම.

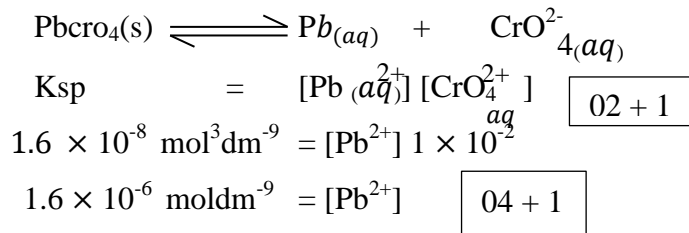


$K_{sp} = [\text{Pb}^{2+}] + [\text{Cl}^-(aq)]$ $\boxed{2+1}$

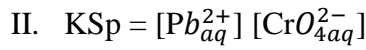
$1.7 \times 10^{-5} \text{ moldm}^{-3} = [\text{Pb}^{2+}] (1 \times 10^{-2} \text{ moldm}^{-3})^2$ $\boxed{02+1}$

$1.7 \times 10^{-1} \text{ moldm}^{-3} = [\text{Pb}^{2+}]$ $\boxed{02+1}$

c. I.



අඩු $[\text{Pb}^{2+}]$ අවශ්‍ය PbCrO_4 බැවින් PbCrO_4 පළමුව අවක්ෂේප වේ. $\boxed{04}$



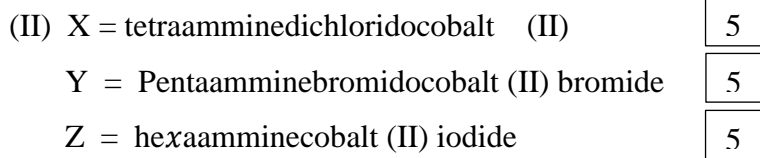
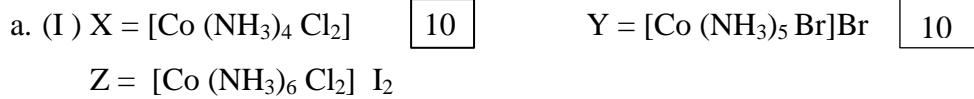
$$1.6 \times 10^{-8} \text{ mol}^3 \text{dm}^{-6} = 1.7 \times 10^{-1} \text{ mol} \text{dm}^{-3} [\text{CrO}_4] \quad \boxed{3 + 1}$$

$$0.94 \times 10^{-8} \text{ mol} \text{dm}^{-6} = [\text{CrO}_4^{2-}]$$

$$9.4 \times 10^{-8} \text{ mol} \text{dm}^{-6} = [\text{CrO}_4^{2-}] \quad \boxed{3 + 1}$$

III. $\text{Pb}(\text{NO}_3)_2$ එකතු කිරීමේ දී ද්‍රාවණයේ උෂ්ණත්වය හා පරිමාව වෙනස් නොවන බව $\boxed{02}$

07.

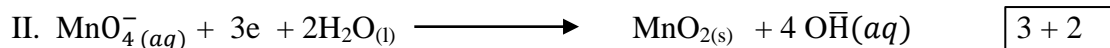
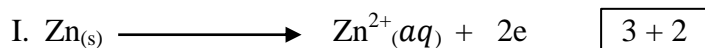


(III) AgNO_3 එකතු කිරීම.



50

b.



III. $E_{\text{Q11}}^{\ominus} = E_{\text{C}}^{\ominus} - E_{\text{A}}^{\ominus} \quad \boxed{2 + 1}$

$= 0.60 \text{ V} - (-0.76 \text{ V}) \quad \boxed{2 + 1}$

$= 1.36 \text{ V} \quad \boxed{3 + 1}$

IV. Zn ඉලෙක්ට්‍රෝඩයේ සිට MnO₂ දක්වා 4

V. ඉලෙක්ට්‍රෝන 3mol කින් ලැබෙන MnO₂ මවුල = 1 mol

I. 9650 × 3c කින් ලැබෙන MnO₂ මවුල = 1 mol 4

$$Q = It$$

$$= 965 \text{ A} \times 15 \times 60\text{S} \quad \boxed{4+1}$$

$$= 868500\text{C} \quad \boxed{4+1}$$

II. 868500 C කින් ලැබෙන MnO₂ ස්කන්ධය = 87 g × 868500

$$96500 \times 3c \quad \boxed{4+1}$$

$$= 216 \text{ g} \quad \boxed{4+1}$$

c.

I. CH₃COOH(aq) + NaOH(aq) \longrightarrow CH₃COONa(aq) + H₂O(l) 3

$$\text{වැය වූ NaOH මවුල} = \frac{0.1}{1000} \times 15 \text{ mol} \quad \boxed{3+1}$$

$$100\text{cm}^3 \text{ ක CH}_3\text{COOH මවුල} = \frac{0.1}{1000} \times 15 \times \frac{100}{20} \text{ mol} \quad \boxed{8}$$

$$= 0.75 \times 10^{-2} \text{ mol} \quad \boxed{3+1}$$

II. විනාකිරී 100cm³ ක CH₃COOH මවුල = 0.75 × 10⁻² mol

$$\text{විනාකිරී } 100\text{cm}^3 \text{ ක CH}_3\text{COOH mol} = \frac{0.75 \times 10^{-2} \times 1000}{10} \quad \boxed{4+1}$$

$$[\text{CH}_3\text{COOH}] = 0.75 \text{ moldm}^{-3} \quad \boxed{4+1}$$

III. 1dm³ ක CH₃COOH ස්කන්ධය = 0.75 mol × 60 mol⁻¹

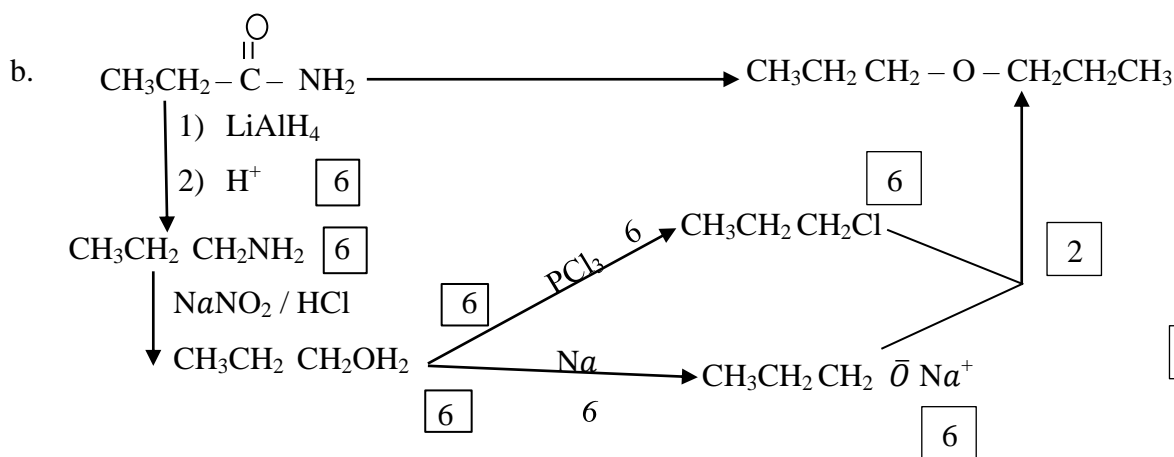
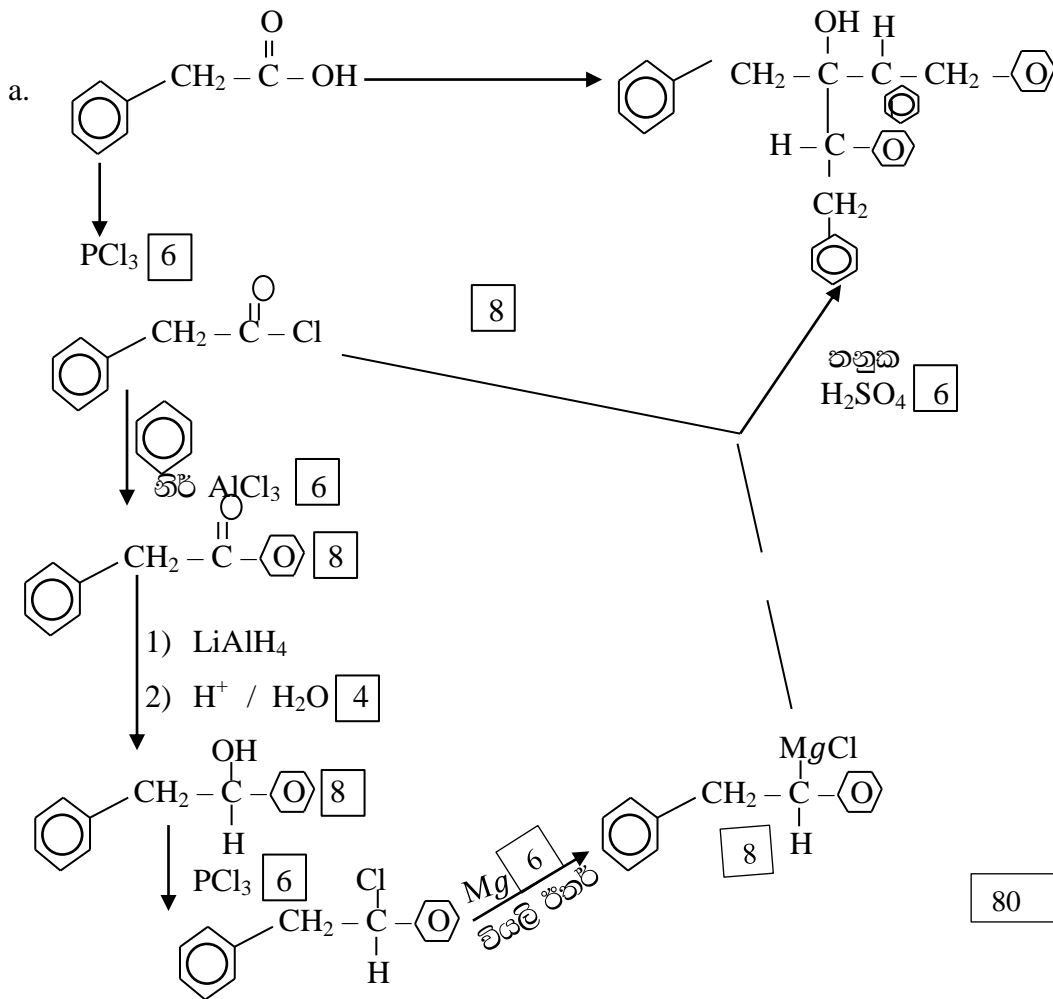
$$45\text{g} \quad \boxed{4+1}$$

1cm³ CH₃COOH ස්කන්ධය = 45 × 10⁻³ g × 100

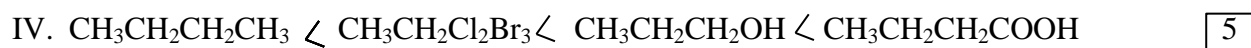
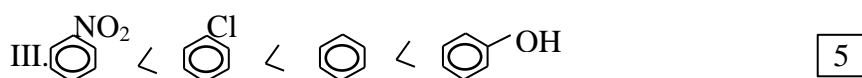
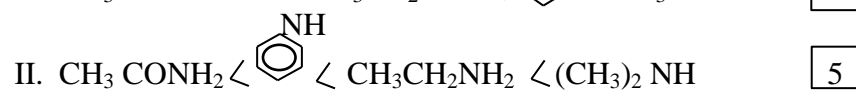
$$0.9 \quad \boxed{4+1}$$

$$5\% \quad \boxed{5}$$

08.



c.

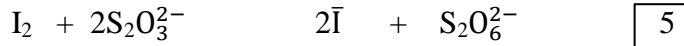
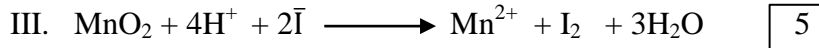
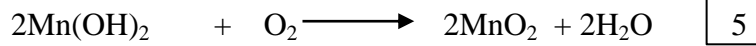


10.

a.

I. පිණිස 5

II. $Mn(OH)_2$ 5



IV. වැයවූ $Na_2S_2O_3$ මවුල $= \frac{0.01}{1000} \times 40 \text{ mol}$ 4 + 1

$I_2 \text{ mol} = \frac{0.01}{1000} \times 40 + \frac{1}{2} \text{ mol}$ 4 + 1

$O_2 \text{ mol} = \frac{0.01}{1000} \times 40 \times \frac{1}{2} \times \frac{1}{2} \text{ mol}$
 $= 0.1 \times 10^{-3} \text{ mol}$ 4 + 1

$[O_2] = \frac{0.1 \times 10^{-3}}{50} 10^3 \text{ moldm}^{-3}$
 $= 2 \times 10^{-3} \text{ moldm}^{-3}$ 2 + 1

$O_2 \text{ Ppm වලින්} = 2 \times 10^{-3} \text{ moldm}^{-3} \times 32 \times 10^3$ 2 + 1
 $= 64 \text{ Ppm}$ 4

b.

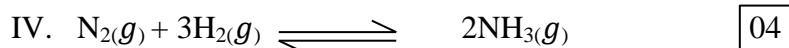
I. මුහුදු ජලය 02

II. ක්‍රියාවලිය I $Ca^{2+}, Mg^{2+}, SO_4^{2-}$ ඉවත් කිරීම. 2

ක්‍රියාවලිය II = භාගික ආසවනය 02

III. $P_1 = NaOH$ $P_2 = Cl_2$ $P_3 = H_2$ $P_4 = N_2$

$P_5 = NH_3$ $P_6 =$ සබන් 04 × 06 = 24



02 450 - 500°C (250 - 300) atm 02

Fe උත්ප්‍රේරක 2

K_2O හා Al_2O_3 උත්ප්‍රේරක වර්ධක 1 + 1

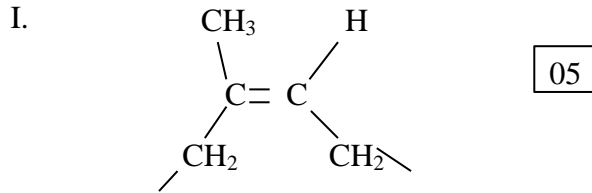
V. සැපොනිකරණය

අතුරු ඵලය වූ ග්ලසරින් ඉවත් කිරීම. 02 × 4 = 8

සබන් පිරිපහදු කිරීම

නිමි සබන් බවට පත් කිරීම.

c.

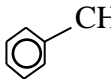


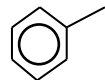
II. රබර් වලට බර අනුව 1% – 3% අතර සල්ෆර් ප්‍රමාණයක් යොදා රත් කිරීම. 06

III. පොලි එනිලින් $\text{CH}_2 = \text{CH}_2$ 05

PVC = CH_2CHCl 05

$\text{CH}_2 = \text{CHCl}$ 05

 = CH_2 05

පොලිස්ටයිරීන්  $\text{CH}_2 = \text{CH}_2$ 05

PTFE $\text{CF}_2 = \text{CF}_2$ 5

IV. $\dot{\text{Cl}} + \text{O}_3 \longrightarrow \text{O}_2 + \dot{\text{O}}\text{Cl}$ 4

$\text{O}_3 \longrightarrow \text{O}_2 + \dot{\text{O}}$ 3

$\dot{\text{O}}\text{Cl} + \dot{\text{O}} \longrightarrow \text{O}_2 + \dot{\text{Cl}}$ 2

V. NO, වාෂ්පශීලී හයිඩ්‍රොකාබන සුර්යාලෝකය 15°C ට වැඩි උෂ්ණත්වය 8

VI. මිනීමාටා රෝගය, මොලයට හානි, වකුගඩු ආබාධ 2