வடமாகாணக் கல்வித் திணைக்களத்தின் அனுசரணையுடன்
தொண்டைமானாறு வெளிக்கள நிலையம் நடாத்தும்

Field Work Centre

தவணைப் பரீட்சை, நவம்பர் - 2016

FWC

Term Examination, November - 2016

தரம் :- 13 (2017)	புள்ளித்திட்டம்	இரசாயனவியல்

பகுதி - I

01)	**5**	26)	**1**
02)	**5**	27)	**3**
03)	**3**	28)	**4**
04)	**4**	29)	**1**
05)	**3**	30)	**3**
06)	**4**	31)	**2**
07)	**1**	32)	**2**
08)	**3**	33)	**4**
09)	**2**	34)	**5**
10)	**1**	35)	**4**
11)	**2**	36)	**1**
12)	**5**	37)	**5**
13)	**3**	38)	**2**
14)	**3**	39)	**5**
15)	**1**	40)	**5**
16)	**2**	41)	**4**
17)	**5**	42)	**1**
18)	**3**	43)	**2**
19)	**2**	44)	**1**
20)	**3**	45)	**1**
21)	**5**	46)	**2**
22)	**4**	47)	**2**
23)	**1**	48)	**3**
24)	**4**	49)	**2**
25)	**2**	50)	**2**

23

b)

Na_2O	Strongly basic
MgO	Basic
Al_2O_3	Amphoteric
SiO_2	Very weakly acidic
P_2O_5	weakly acidic
SO_3	Acidic
Cl_2O_7	Strongly acidic

50

c) i) $[NO_3^-] = \frac{(0.25 \times 100 + 0.5 \times 100 \times 2 + 0.1 \times 50 \times 3) \times 10^{-3} mol dm^{-3}}{250 \times 10^{-3}}$

$= 8.68 \times 10^5$ ppm

ii) $(NH_4)_2SO_4 , Fe_2(SO_4)_3 \longrightarrow 2Fe^{3+} + 4SO_4^{2-} + 2NH_4^+$

$[Fe^{3+}] = \frac{168 \times 10^{-3}}{56} mol dm^{-3}$

$= 3 \times 10^{-3} mol dm^{-3}$

$[SO_4^{2-}] = 6 \times 10^{-3} mol dm^{-3}$

$= 576$ ppm

iii) I 50

II a) $5 \times 10^4 mg m^{-3}$

b) $\frac{25 \times 10^{-3} \times 10^3}{100 \times \frac{500}{1000}} = 0.5 mol dm^{-3}$

50

$4 \times 100 = 400$

$4 \times 150 = 600$

$20 \overline{)1000}$ 50

150

22

10 a) i) $3(S_2O_8^{2-} + 2e \longrightarrow 2SO_4^{2-})$

$2Cr^{3+} + 7H_2O \longrightarrow Cr_2O_7^{2-} + 14H^+ + 6e$

ii) $3S_2O_8^{2-} + 2Cr^{3+} + 7H_2O \longrightarrow 6SO_4^{2-} + Cr_2O_7^{2-} + 14H^+$

$(Fe^{2+} \longrightarrow Fe^{3+} + e)\ 6$

$Cr_2O_7^{2-} + 14H^+ + 6e \longrightarrow 2Cr^{3+} + 7H_2O$

$6Fe^{2+} + Cr_2O_7^{2-} + 14H^+ \longrightarrow 6Fe^{3+} + 2Cr^{3+} + 7H_2O$

Requied mole of $K_2Cr_2O_7$ is $= 0.1 mol\ dm^{-3} \times \frac{12}{1000} dm^3$
$= 1.2 \times 10^{-3} mol$

$\frac{n\ Fe^{2+}}{n\ Cr_2O_7^{2-}} = \frac{6}{1}$

$nFe^{2+} = 6 \times n\ Cr_2O_7^{2-}$
$= 6 \times 1.2 \times 10^{-3} mol$
$= 7.2 \times 10^{-3} mol$

$n\ Fe^{2+}(initial) = \frac{8.52 g}{284 g mol^{-1}} = 3 \times 10^{-2} mol$

The reated mole of Fe^{2+} with $Cr_2O_7^{2-}$ in the initial solⁿ is $= 3 \times 10^{-2} - 0.72 \times 10^{-2}$
$= 2.28 \times 10^{-2} mol$

$n\ Cr_2O_7^{2-}$ in the initial solⁿ $= 2.28 \times 10^{-2} \times \frac{1}{6} mol$
$= 0.38 \times 10^{-2} mol$

$n\ Cr_2O_7^{2-} : n\ CrCl_3 = 1 : 2$

$n\ CrCl_3 = 2 \times 0.38 \times 10^{-2} mol$
$= 0.76 \times 10^{-2} mol$

$W\ CrCl_3 = 0.76 \times 10^{-2} mol$
$= 0.76 \times 10^{-2} \times 158.5 g$
$= 1.205 g$

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C. $2Fe^{3+}(aq) + 2I^-(aq) \longrightarrow 2Fe^{2+}(aq) + I_2(aq)$

$I_2(aq) + 2Na_2S_2O_3(aq) \longrightarrow Na_2S_4O_6(aq) + 2NaI(aq)$

$MnO_4^- + 8H^+ + 5Fe^{2+} \longrightarrow Mn^{2+} + 5Fe^{3+} + 4H_2O$

The number of moles of $Na_2S_2O_3$ which is titrated with $25 cm^3$ of solⁿ is

$= 0.05 \text{ mol dm}^{-3} \times \frac{20}{1000} dm^3$

$= \frac{1}{1000}$ mol

$n I_2$ in $25 cm^3$ of solution is $= \frac{1}{2} \times 1.0 \times 10^{-3}$ mol

$n I_2$ in $200 cm^3$ of solⁿ is $= \frac{1}{2} \times 8 \times 10^{-3}$ mol

$n Fe^{3+}$ in $200 cm^3$ of solⁿ is $= 8 \times 10^{-3}$ mol

$n Fe_2O_3$ in the mixture is $= 4 \times 10^{-3}$ mol

The mass of Fe_2O_3 in the mixture

is $= 4 \times 10^{-3} \text{ mol} \times 160 \text{ g mol}^{-1}$

$= 0.64$ g

$Fe_2O_3 \% = \frac{0.64}{4} \times 100\% = 16\%$

$n Fe^{2+} = 5 \times n MnO_4^-$

$n Fe^{2+}$ in $25 cm^3$ of solⁿ is $= 5 \times \frac{0.05 \times 8}{1000}$ mol

$= 2 \times 10^{-3}$ mol

$n Fe^{2+}$ in $200 cm^3$ of solⁿ is $= 16 \times 10^{-3}$ mol

$= n FeO$ in the mixture

$W FeO = 16 \times 10^{-3} \text{ mol} \times 72 \text{ g mol}^{-1}$

$= 1.152$ g

$FeO \% = \frac{1.152}{4} \times 100\% = 28.8\%$

50

(9) a)

1. Mass ratio

$Na : Cr : O = 2.3 : 2.6 : 3.2$ (03)

Mole ratio.

$Na : Cr : O = \frac{2.3}{23} : \frac{2.6}{52} : \frac{3.2}{16}$ (03)

$= 0.1 : \frac{0.1}{2} : 0.2$

$= 2 : 1 : 4$

Emperical formula Na_2CrO_4 (02)

Molecular formula $(Na_2CrO_4)_n$

$162n < 180$

$n = 1$

Molecular formula Na_2CrO_4 (02)

2. A Na_2CrO_4 (04) B $Na_2Cr_2O_7$ (04)

C $(NH_4)_2Cr_2O_7$ (04) D NH_3 (04)

E Mg_3N_2 (04) G ND_3 (04)

$(NH_4)_2Cr_2O_7(s) \xrightarrow{\Delta} N_2(g) + Cr_2O_3(s) + 4H_2O(g)$

orange to green

3. i) Yellow colour turn to orange (02)

ii) Orange colour turn to yellow (02)

$2CrO_4^{2-}(aq) + 2H^+(aq) \longrightarrow Cr_2O_7^{2-}(aq) + H_2O(l)$

Yellow Orange (02)

$Cr_2O_7^{2-} + 2OH^- \longrightarrow 2CrO_4^{2-} + H_2O$

Orange Yellow (02)

4. $3CuO + 2NH_3 \longrightarrow 3Cu + N_2 + 3H_2O$ (03)

$Cl_2 + 2NH_3 \longrightarrow N_2 + 6NH_4Cl$ (03)

Ex

$3Cl_2 + NH_3 \longrightarrow NCl_3 + 3HCl$ (02)

Ex

50

b. The compound leaves no residue on heating is $(NH_4)_2CO_3$ / or The compound that dissolves in water

$(NH_4)_2CO_3 \longrightarrow 2NH_{3(g)}\uparrow + CO_{2(g)}\uparrow + H_2O(g)\uparrow$

Heat the compounds strongly. The residue that dissolves in water is that of $SrCO_3$

$SrCO_3 \xrightarrow{\Delta} SrO(s) + CO_2(g)$

$SrO(s) + H_2O(l) \longrightarrow Sr(OH)_2(aq)$

$SnCO_3 \xrightarrow{\Delta} SnO(s) + CO_2(g)$

$MgCO_3 \xrightarrow{\Delta} MgO(s) + CO_2(g)$

Add small amount of the other two residue separately to portions of solution formed by dissolving the soluble residue in water $[Sr(OH)_2]$

The residue that dissolves in the above solution $[Sr(OH)_2]$ is formed from $SnCO_3$

$SnO + Sr(OH)_2 \longrightarrow SrSnO_2 + H_2O$

the other residue from $MgCO_3$

50

8 a) I i) $M_1(Ba)$ (03) $M_2(Ag)$ (03) $Y(H_2O_2)$ (04)

10 ~~18~~ 28

$A_1 - BaO_2$, $A_2 - SO_2$, $A_3 - H_2SO_4$

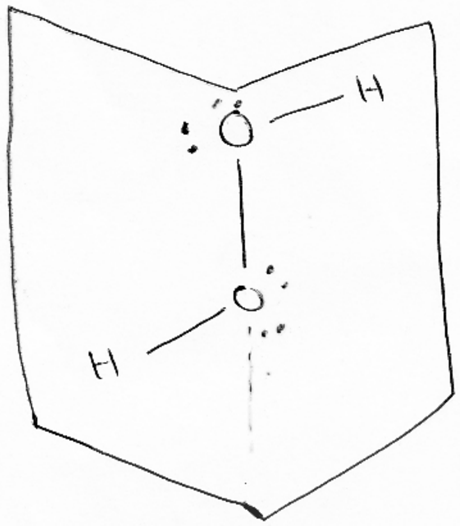
$A_4 - BaSO_4$, $A_5 - Ba(OH)_2$, $A_6 - H_2$

$A_7 - Ag_2O$, $A_8 - Ba(NO_3)_2$

$A_9 - O_2$, $A_{10} - H_2O$

$10 \times 3 = 30$

ii)



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As a bleach for textiles and human hair

Antiseptic

50

b) i) Pb^{2+} , Sb^{3+} , Fe^{3+} , Mg^{2+} $4 \times 5 = 20$

ii) $X_1 - PbCl_2$, $X_2 - Sb_2S_3$, $X_3 - Fe(OH)_3$

$X_4 - MgCO_3$ $4 \times 5 = 20$

iii) $[Fe\,SCN(H_2O)_5]^{2+}$ (10)

50

c) i) $H_2S + Cl_2 \longrightarrow 2HCl + S$ or

ii) $4NaOH + 2F_2 \longrightarrow 4NaF + O_2 + 2H_2O$ or

iii) $2H_2O + 2F_2 \longrightarrow 4HF + O_2$ or

iv) $2Mg + SO_2 \longrightarrow 2MgO + S$ or

$3Mg + SO_2 \longrightarrow 2MgO + MgS$

v) $HNO_3 + H_2SO_4 \longrightarrow H_2O + NO_2 + HSO_4^-$

C. i)

Step I $CH_3CH_2-C(CH_3)_2-Br \rightarrow CH_3CH_2-C^{+}(CH_3)_2 + Br^{-}$ (2) (2) (2)

Step II $CH_3CH_2-C^{+}(CH_3)_2 + :\ddot{O}CH_3 \rightarrow CH_3-CH_2-C(CH_3)_2-OCH_3$ (2) (2)

ii) $CH_3CH_2-C(CH_3)_2-Br \rightarrow CH_3-CH_2-C^{+}(CH_3)_2 + Br^{-}$ (5)

iii) $CH_3CH=C(CH_3)-CH_3$ (3) $CH_3CH_2-C(CH_3)=CH_2$ (2)

B or C

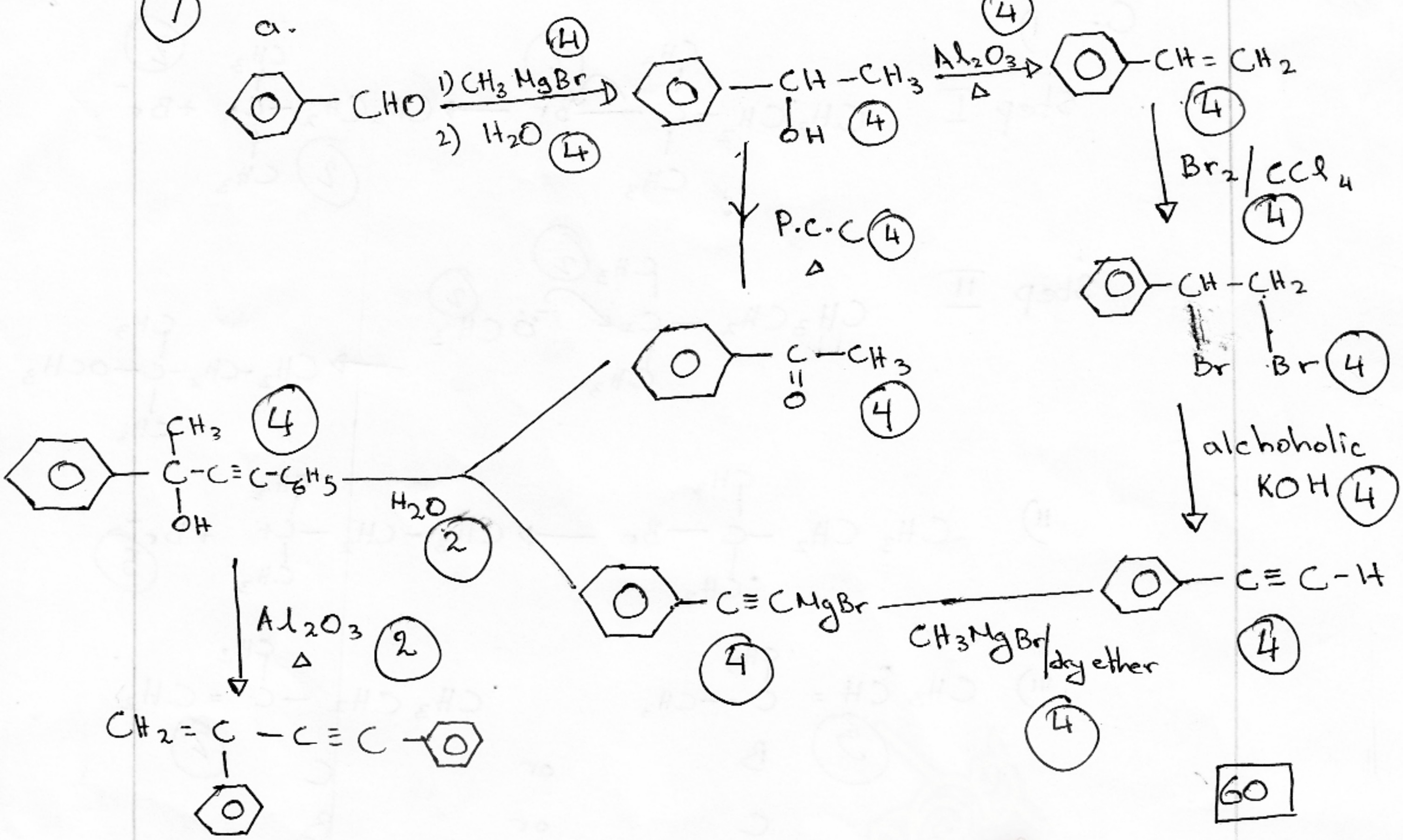
C or B

20

150

(7)

a.



b. R_1 dil H_2SO_4 Δ

R_2 $H^+/KMnO_4$
or $H^+/K_2Cr_2O_7$
or H^+/CrO_3

R_3 Con H_2SO_4 Δ
or Al_2O_3 Δ

R_4 ① $LiAlH_4$
② H_2O

R_5 Con H_2SO_4

$R_1 - R_7$ $7 \times 5 = 35$

A_1 $C_6H_5CH_2COOH$

A_2 $C_6H_5CH_2CH_2OH$

A_3 C_6H_5COOH

A_4 $C_6H_5CH_2OH$

A_5 $C_6H_5COOCH_2C_6H_5$

A_6 $C_6H_5CH=CH_2$

A_7 $C_6H_5-\underset{Br}{CH}-CH_3$

$A_1 - A_7$ $7 \times 5 = 35$

0815

(iii) Kinetic equation $PV = \frac{1}{3} mN \overline{c^2}$

mN mass of the gas.

$P = \frac{1}{3} \left(\frac{mN}{V}\right) \overline{c^2}$

$P = \frac{1}{3} d \overline{c^2}$

$\overline{c^2} = \frac{3P}{d} \Rightarrow \sqrt{\overline{c^2}} = \sqrt{\frac{3P}{d}}$

P is a constant.

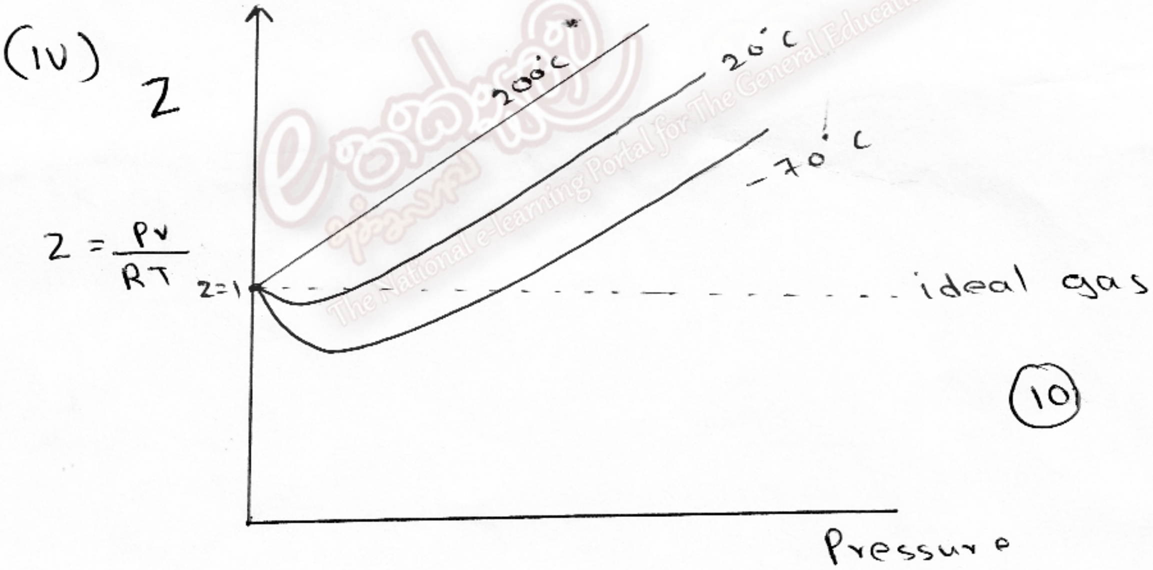
$\sqrt{\overline{c^2}} \propto \frac{1}{\sqrt{d}}$ (10)

but constant temperature.

rate of diffusion $\propto \sqrt{\overline{c^2}}$ .... [T]

$\propto \frac{1}{\sqrt{d}}$

(iv)

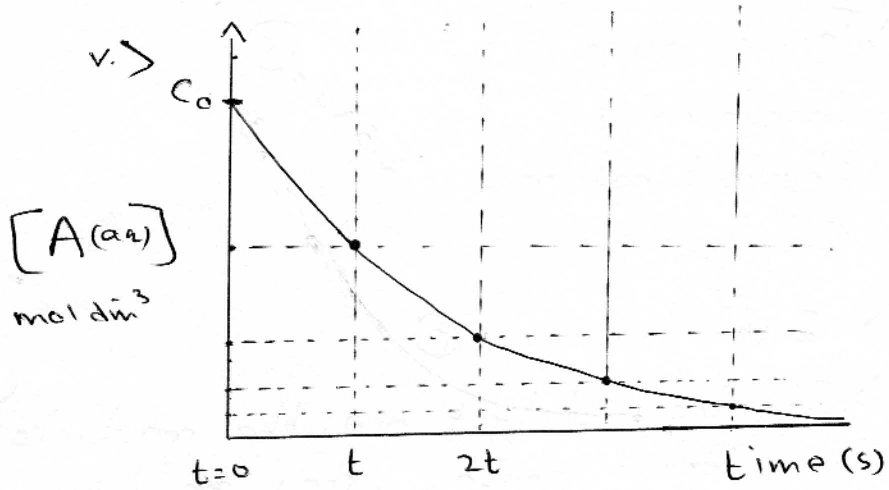


(10)

(v)

(5)

1(i)



(10)

where half life period of A is t s

b(i) Experiment (20)

(ii) Mass of the mixture $CaCO_3$ $MgCO_3$ and L = 2.00 g

Mass after heating = 1.12 g

In dolomite $n_{MgCO_3} : n_{CaCO_3}$ = 1:1

Take $n_{MgCO_3} = n_{CaCO_3} = x$ mol.

and mass of L y g (5)

$184x + y = 2.00\,g$

$$\underset{x}{MgCO_3} \xrightarrow{\Delta} \underset{x}{MgO} + CO_2$$

$$\underset{x}{CaCO_3} \xrightarrow{\Delta} \underset{x}{CaO} + CO_2$$

$L \longrightarrow x$ (5)

$96x + y = 1.12\,g$

$88n = 0.88$, $x = 0.01$ mol.

$y = 0.16\,g$, $W_{CaCO_3} = 1.00\,g$

$CaCO_3\,\% = \frac{1}{2} \times 100\% = 50\%$ (5)

$L\,\% = \frac{0.16}{2} \times 100\% = 8\%$ (5)

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6. (a) i) Temperature
Concentration
Physical nature
Catalyst

$2.5 \times 4 = 10$

ii) Experiment. (10)

iii) If the catalyst and the reactants are in different phases, they are heterogenous catalysts. (5)

$$2SO_{2(g)} + O_{2(g)} \xrightarrow[(catalyst)]{V_2O_{5(s)}} 2SO_{3(g)}$$ (5)

or

$$2H_2O_{2(aq)} \xrightarrow[(catalyst)]{MnO_{2(s)}} O_{2(g)} + 2H_2O_{(l)}$$

iv) $R = K(A_{(aq)})^n \times [B_{(aq)}]^m$ (5)

$K(1\times10^{-3}\,moldm^{-3})^n \times (2\times10^{-2}\,moldm^{-3})^m = 3\times10^{5}\,moldm^{-3}s^{-1}$ — ①

$K(2\times10^{-3}\,moldm^{-3})^n \times (2\times10^{-2}\,moldm^{-3})^m = 6\times10^{-5}\,moldm^{-3}s^{-1}$ — ②

$K(2\times10^{-3}\,moldm^{-3})^n \times (4\times10^{-2}\,moldm^{-3})^m = 6\times10^{-5}\,moldm^{-3}s^{-1}$ — ③

$K(4\times10^{-3}\,moldm^{-3})^n \times (3\times10^{-2}\,moldm^{-3})^m = R$ — ④

② ÷ ③ $\left(\frac{1}{2}\right)^m = 1$ $m=0$ order w.r.t. B is $=0$ (5)

① ÷ ② $\left(\frac{1}{2}\right)^n = \left(\frac{1}{2}\right)^{-1}$ $n=1$ " " A is $=1$ (5)

(1) Over all order $= 0+1 = 1$ (5)

(2) ① → $K(1\times10^{-3}\,moldm^{-3})^1 \times (2\times10^{-2}\,moldm^{-3})^0 = 3\times10^{-5}\,moldm^{-3}s^{-1}$

(3) $K = 3\times10^{-2}\,s^{-1}$ (5)

③ ÷ ④ $R = 12\times10^{-5}\,moldm^{-3}s^{-1}$. (5)

2. $\Delta S = \Sigma S^{\ominus}_{products} - \Sigma S^{\ominus}_{Reactants}$ (2)

$= (113.56 + 146.52)\ JK^{-1}\ mol^{-1} - 151.12\ JK^{-1}\ mol^{-1}$

$= (280.08 - 151.12)\ JK^{-1}\ mol^{-1}$ (3)

$= +98.96\ JK^{-1}\ mol^{-1}$ (5)

3. $\Delta G^{\ominus} = \Delta H^{\ominus} - T\Delta S^{\ominus}$ (3) (2)

$= +28.74\ kJ\ mol^{-1} - 298\ K \times 98.96 \times 10^{-3}\ kJK^{-1}\ mol^{-1}$

$= (+28.74 - 29.49)\ kJ\ mol^{-1}$

$= -0.75\ kJ\ mol^{-1}$ (3)

$\therefore$ NH_4NO_3 spontaneously dissolve in water. (2)

(3) $:N \equiv N^{+} - \ddot{O}:^{-} \leftrightarrow {}^{-}\ddot{N} = N^{+} = \ddot{O}$

$\leftrightarrow {}^{2-}:\ddot{N} - \overset{+}{N} \equiv \ddot{O}^{+}$ unstable

$N \equiv N + \frac{1}{2} O = O \longrightarrow \overset{-}{N} = \overset{+}{N} = O$

$\Delta H^{\ominus}_{f(cal)}$ = Breaking bonds (+) forming bonds (−)

$= (N \equiv N) + \frac{1}{2}(O = O) - (N = N) - (N = O)$

$= (+946 + \frac{1}{2} \times 498)\ kJ\ mol^{-1} - (418 + 607)\ kJ\ mol^{-1}$

$= 170\ kJ\ mol^{-1}$.

$\Delta H^{\ominus}_f$ (observed) $= 82\ kJ\ mol^{-1}$

$\Delta H^{\ominus}_f$ (calculated) $= 170\ kJ\ mol^{-1}$ ΔH (observed) $- \Delta H^{\ominus}_f$

Resonance energy $= 82 - 170 = -88$

150

$$k_p = \frac{(3.75 \times 10^5\ Pa)^2}{1.25 \times 10^5\ Pa}$$

$$= 1.125 \times 10^6\ Pa \quad (5)$$

$$k_p = k_c (RT)^{\Delta n} \quad (5) \quad \text{Where } \Delta n = 2-1 = 1$$

$$k_p = k_c RT$$

$$k_c = \frac{k_p}{RT} = \frac{1.125 \times 10^6\ Pa}{5000\ J\ mol^{-1}} \quad (5)$$

$$= 215\ mol\ m^{-3}$$

or

$$= 0.215\ mol\ dm^{-3} \quad (5)$$

iv) 1. No effect to the equilibrium as A is a solid. (5)

ii. According to the Le Chatelier principles the equilibrium shifts to the right. (5)

90

b. (1) 1. $\frac{1}{2} Cl_{2(g)} + e \longrightarrow Cl^-_{(g)}$ $\Delta H^\circ_{EA} = -364\ kJ\ mol^{-1}$

2. $Ca_{(s)} \longrightarrow Ca_{(g)}$ $\Delta H^\circ_S = +193\ kJ\ mol^{-1}$

3. $\frac{1}{2} Cl_{2(g)} \longrightarrow Cl_{(g)}$ $\Delta H^\circ_A = +121\ kJ\ mol^{-1}$

4. $Mg^{2+}_{(g)} + 2Br^-_{(g)} \longrightarrow MgBr_{2(s)}$ $\Delta H^\circ_L = -2440\ kJ\ mol^{-1}$

5. $C_{17}H_{35}COOH_{(s)} + 26\ O_{2(g)} \longrightarrow 18CO_{2(g)} + 18H_2O_{(l)}$

5x4=20

(2) 1. $\Delta H^\ominus = \Sigma H^\ominus_{products} - \Sigma H^\ominus_{Reactants}$ (2)

$= (-132.71 + -204.195)\ kJ\ mol^{-1} - (-366.4)\ kJ\ mol^{-1}$ (3)

$= +28.74\ kJ\ mol^{-1}$ (5)

(5) a. (10)

i) Relationship (10)

ii) $Fe^{3+}_{(aq)} + SCN^{-}_{(aq)} \rightleftharpoons [Fe(SCN)]^{2+}_{(aq)}$ (10)
(blood red)

iii) $K_p = \frac{P^2_{D(g)}}{P_{B(g)}}$ (5)

iv) $A_{(g)} + B_{(g)} \rightleftharpoons 2D_{(g)}$

	$A_{(g)}$	$B_{(g)}$	$2D_{(g)}$	
Initial Mol	Ex	0.25 mol		
Reacted/formed mol	x	x	$2x$	(5)
At eq^m mol	–	$0.25 - x$	$2x$	

Total number of moles $n_{TOT} = 0.25 - x + 2x = (0.25 + x)$ mol (3)

Apply $PV = nRT$, assume ideal behavior.

$n = \frac{PV}{RT} = \frac{5\times10^5 \text{ Nm}^{-2} \times 4\times10^{-3} \text{ m}^3}{5000 \text{ Nm mol}^{-1}}$ (3)

$= 0.4$ mol

$0.25 + x = 0.40 \quad \therefore x = 0.15$ mol. (5)

Mole of D at equilibrium $2x = 0.30$ mol

" " B " " $0.25 - x = 0.10$ mol.

$P_{D(g)} = X_{D(g)} P_T$

$= \frac{0.30}{0.40} \times 5.0\times10^5$ Pa (2)

$= 3.75\times10^5$ Pa (5)

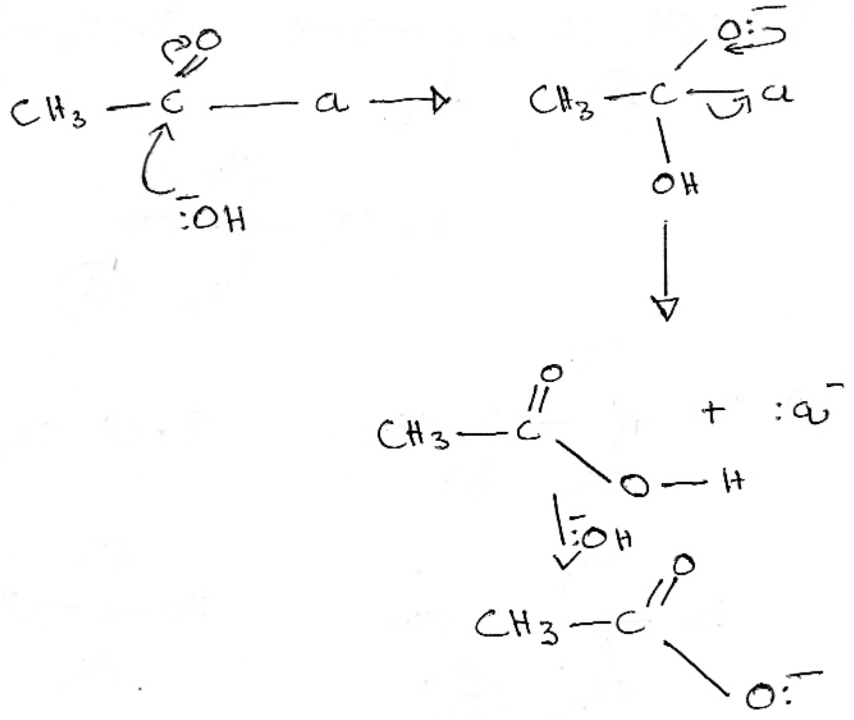
$P_{B(g)} = X_{B(g)} P_{TOT}$

$= \frac{0.10}{0.40} \times 5.0\times10^5$ Pa

$P_{B(g)} = 1.25\times10^5$ Pa. (5)

10

C. $NaOH_{(aq)} \longrightarrow Na^{+}_{(aq)} + {}^{-}OH_{(aq)}$



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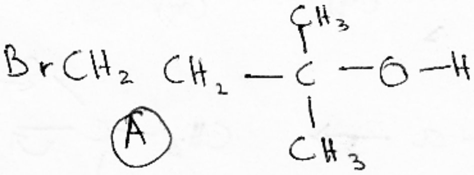
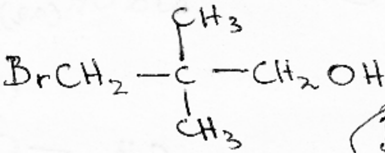
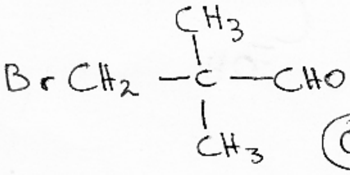
100

④

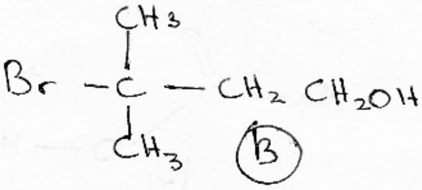
a. i)


(A)

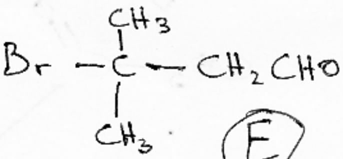

(D)

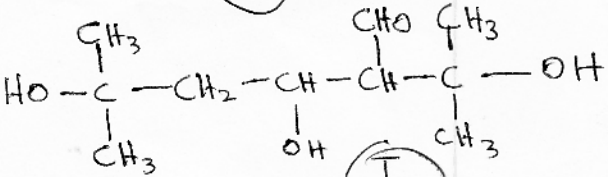

(G)

ii)


(B)

$BrCH_2CH_2CH_2CH_2CH_2OH$ (C)


(E)

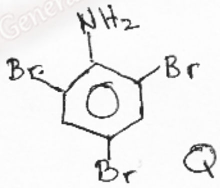

(I)

$BrCH_2CH_2CH_2CH_2CHO$ (F)

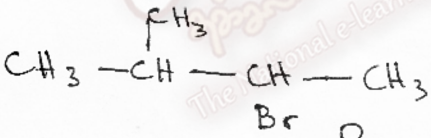
8×05 = 40

b. i) $CH_3CH=CHCH_2CH_3$ P

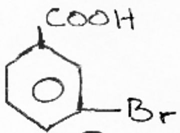
ii)


Q

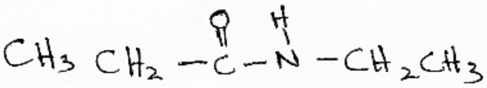
iii)


R

iv)

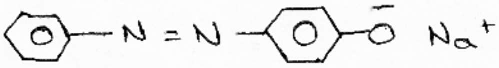

S

v)

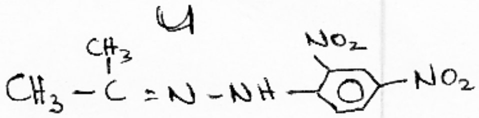

T

vi) $CH_3CH_2COO^-$ U

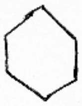
vii)



viii)



ix)



x) CH_3CH_3

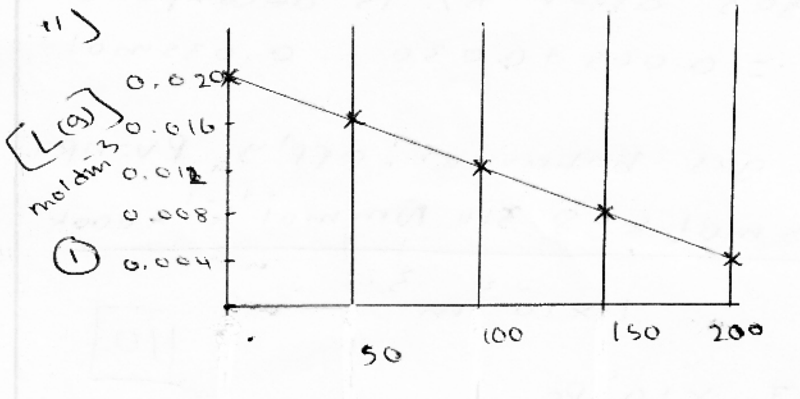
10×04 = 40

b.

Time	L(g) mol dm^{-3}
0.0	0.020
50.0	0.016
100.0	0.012
150.0	0.08
200.0	0.004

$2 \times 5 = 10$

ii)



10

iii) $Rate = K[L(g)]^n$ ⑧

iv) $n = 0$ ⑤ gradiant is constant ⑤
rate is independent of $[L(g)]$

v) $Rate = K[L(g)]^0 = K$

$K = Rate$

$K = \left(\frac{0.016 - 0.008}{100 s}\right) mol dm^{-3}$ (any two points) ⑩

$= \frac{0.008}{100} = 8 \times 10^{-5} mol dm^{-3} s^{-1}$

Note :- any two points should be indicated in the above diagram Otherwise do **not** award marks

50

03

3(b) VI)

$$L(g) \longrightarrow 2T(g)$$

	$L(g)$	$2T(g)$
Initial	0.020 mol	0 mol
Reacted/formed	0.015	0.030
	0.005	0.030

Amount of gas after 75% is decomposed

$= 0.005 + 0.030 = 0.035 \text{ mol}$

Assuming ideal gas behaviour apply $PV = nRT$

$$P = \frac{0.035 \text{ mol} \times 8.314 \text{ N m mol}^{-1} \text{K}^{-1} \times 400 \text{K}}{1 \times 10^{-3} \text{ m}^3}$$

$= 1.167 \times 10^5 \text{ Pa}$

10

4.

5

(b) A. $CuSO_4$ B. $AgNO_3$

C. $Mg(NO_3)_2$ D. $CrCl_3$ $5\times5=25$

E. $CdSO_4$

ii) $Cu(OH)_2 + NH_3(aq) \longrightarrow [Cu(NH_3)_4]^{2+}\ 2OH^-(aq)$
(Ex)

$Ag_2O + H_2O + 4NH_3(aq) \longrightarrow 2[Ag(NH_3)_2]^+\ 2OH^-(aq)$

$Cr(OH)_3 + NaOH \longrightarrow Na[Cr(OH)_4]$
Ex
or $NaCrO_2 \cdot 2H_2O$ $4\times5=20$

$Cd(OH)_2 + 4NH_3(aq) \longrightarrow [Cd(NH_3)_4]^{2+}\ 2OH^-(aq)$

100

(3) i) BE Positive deviation from Raoult's law (04)
BT Ideal solution (04)
EW Negative deviation from Raoult's law (04)

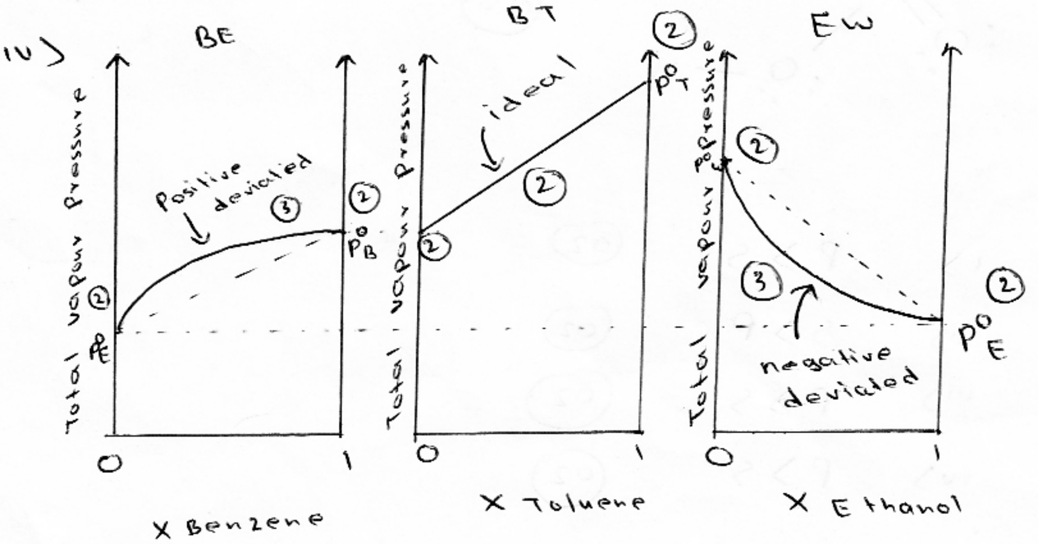
ii) $f_{E-E} > f_{B-E} < f_{B-B}$ (04)

$f_{B-T} = f_{B-B} = f_{T-T}$ (04)

$f_{W-W} < f_{E-W} > f_{E-E}$ (04)

iii) $p^o_E < p^o_B < p^o_W < p^o_T$ (06)

iv)



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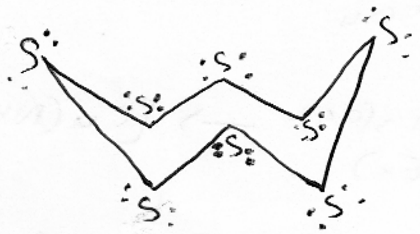
(2) a)

i) Aluminium (05)

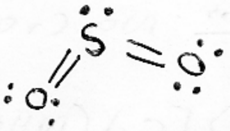
ii) $1s^2 2s^2 2p^6 3s^1 3p^3 3d^1$ (05)

iii)

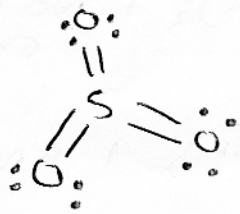


(05)

iv) (D_1) SO_2 (03) (D_2) SO_3 (03)



(03)



(03)

v) $2H_2O + 2Al + 2KOH \longrightarrow 2KAlO_2 + 3H_2$ (03)

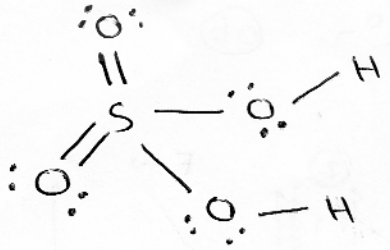
vi) $8Al + 3KNO_3 + 5KOH + 2H_2O \longrightarrow 8KAlO_2 + 3NH_3$ (03)

vii) $2mnO_4^- + 5SO_2 + 2H_2O \longrightarrow 2mn^{2+} + 5SO_4^{2-} + 4H^+$ (03)

$2kmnO_4 + 5SO_2 + 2H_2O \longrightarrow 2mnSO_4 + 2H_2SO_4 + K_2SO_4$ (03)

viii) Prodution of SO_2 / SO_3 / H_2SO_4 to make CS_2, valcanizing of rubber (04)

ix)



(04)

x) i) P > S (02)

ii) S > P (02)

iii) P > S (02)

iv) P > S (02)

3

(iii) Deduce Shape

N_1

O_1

N_2

$3 \times 4 = 12$

(iv) electronpair

1) N_1

2) O_1

3) N_2

$3 \times 4 = 12$

(v) hybridization

1) N_1

2) O_1

3) N_2

$3 \times 4 = 12$

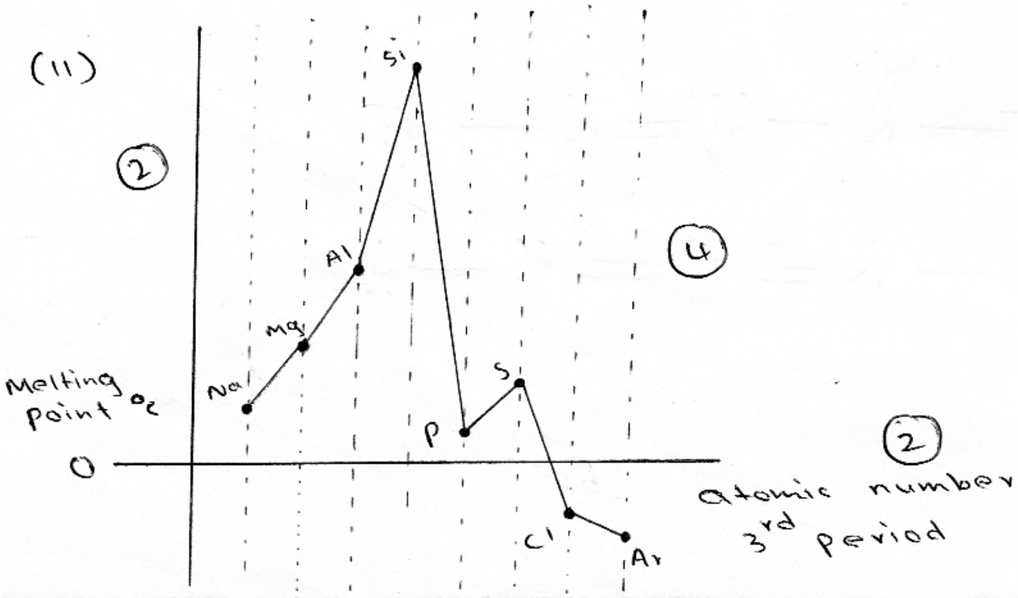
(vi) atomic orbital I (04)

II (04)

(c) (i)

Substance	Primary	Secondary
ICl	Polar covalent (2)	London (2)
F_2		
Ag		
Ba_3P_2		
H_2O (s)	Polar covalent (2)	
$SiCl_4$	Polar covalent (2)	

(ii)



Chemistry Marking Scheme

F.W.C Year 13 November 2016

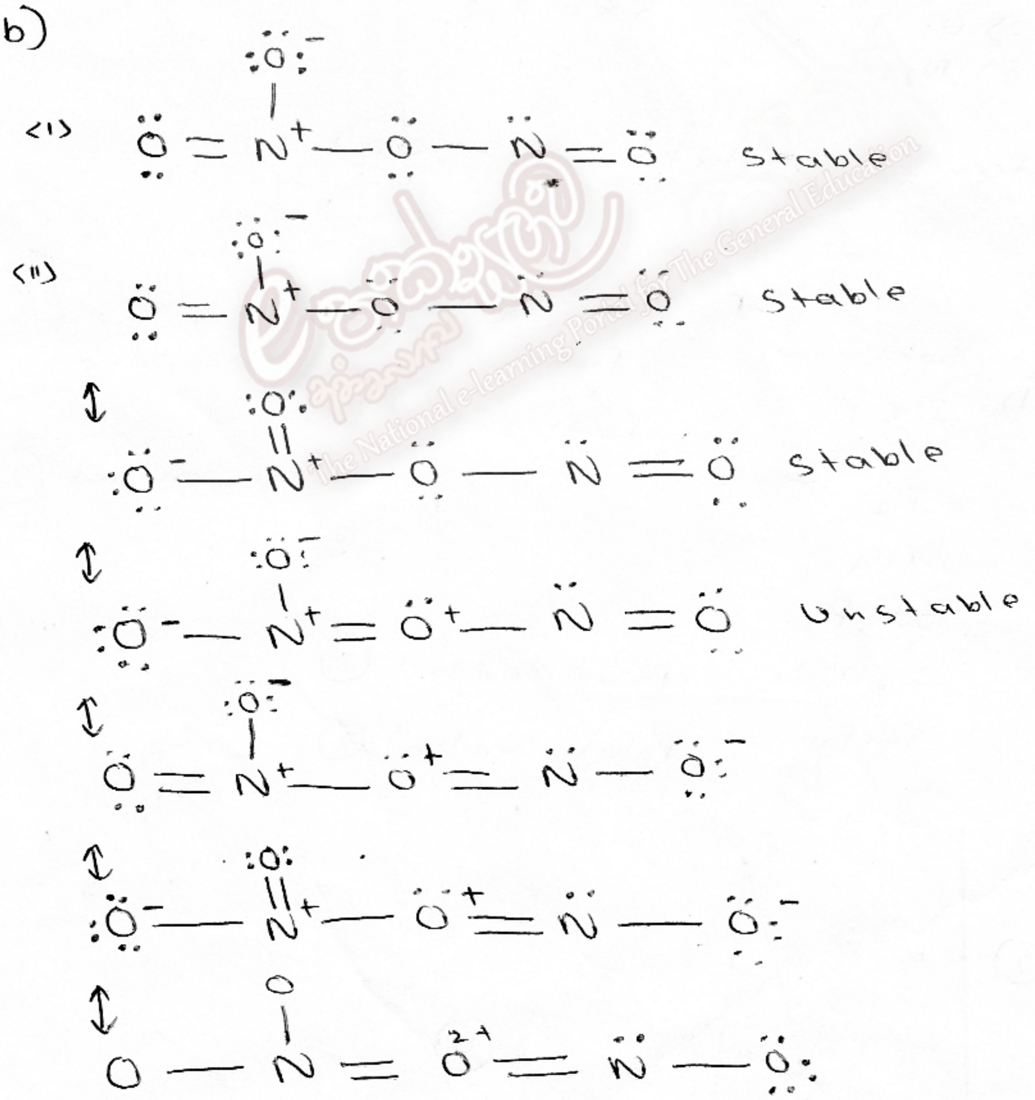
Part A, Structure

1) (a)

1. $Al(OH)_3 < Mg(OH)_2 < Ca(OH)_2 < NaOH$
2. $K < Zn < Mn < Sc < V$
3. $Al < P < Cl < Na < Li$
4. $CH_4 < HCl < NH_3 < HF < H_2O < H_2O_2$
5. $NH_2 < NH_3 < NOF < [N(CH_3)_4]^+ < NH_4^+$

$5 \times 4 = 20$

(b)



$5 \times 4 = 20$