



FWC

Conducted by Field Work Centre, Thondamanaru In Collaboration with  
Provincial Department of Education Northern Province

வட மாகாணக் கல்வித் திணைக்களத்தின் அனுசரணையுடன்  
தொண்டமனாறு வெளிக்கள நிலையம் நடாத்தும்

First Term Examination, November 2017

முதலாம் துவணைப் பரீட்சை, நவம்பர் 2017

Grade : 13

தரம் : 13

Chemistry

கிரசாயனவியல்

02 E

### Marking Scheme

#### Distribution of marks

#### Chemistry - I

$$50 \times 2 = 100$$

#### Chemistry - II

$$\text{Part A } 100 \times 4 = 400$$

$$\text{Part B } 150 \times 2 = 300$$

$$\text{Part C } 150 \times 2 = 300$$

$$\text{total } = 1000$$

$$\text{Chemistry - II Final marks } = 1000/10$$

$$= 100$$

$$\text{Chemistry Final marks } = \frac{100 + 100}{2}$$

$$= 100$$

#### CHEMISTRY - I

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



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தரம் : 13

Chemistry IIA  
கிசையனவியல் IIA

02 E II

### Marking Scheme

#### Chemistry - II

- 1(a)(i)(I)  $H_2Te > H_2Se > H_2S > H_2O$   
 (II)  $H_2S > H_2Se > H_2Te > H_2O$   
 (III)  $H_2Te > H_2Se > H_2S > H_2O$   
 (IV)  $H_2O > H_2S > H_2Se > H_2Te$   
 (V)  $H_2Te > H_2Se > H_2S > H_2O$

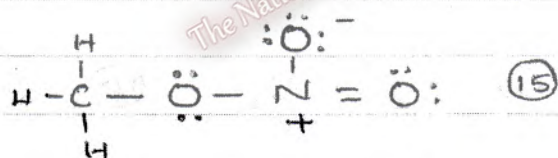
$$(05) \times 5 = (25)$$

- (ii) (I)  $NH_2^- < NH_3 < NH_4^+$   
 (II)  $C_2H_6 < C_2H_4 < C_2H_2$   
 (III)  $H_3PO_2 < H_3PO_3 < H_3PO_4$

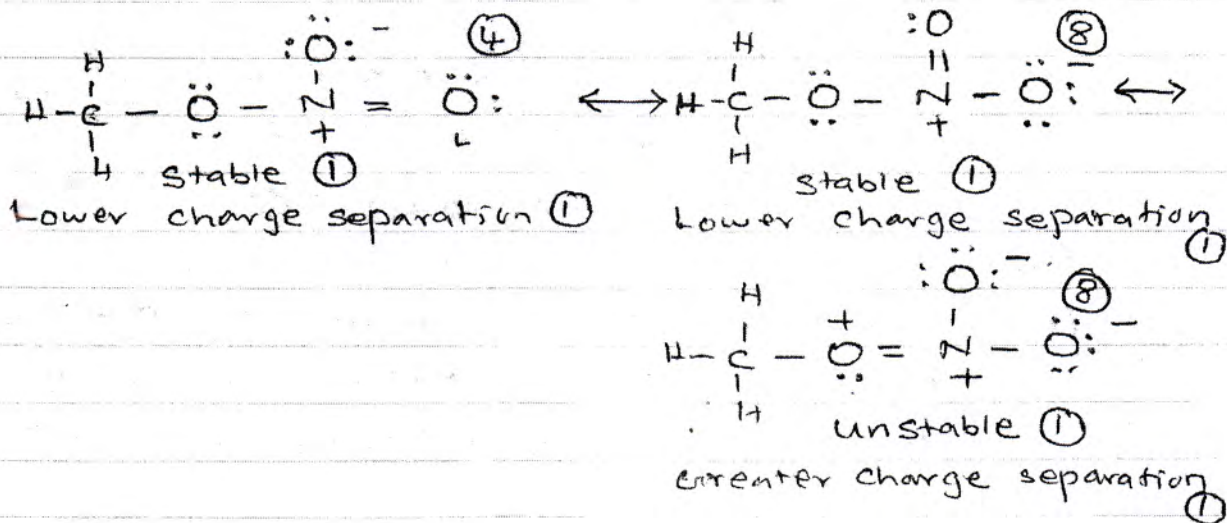
$$(05) \times 3 = (15)$$

$$1(a) \Rightarrow \underline{40}$$

(b)(i)



(ii)



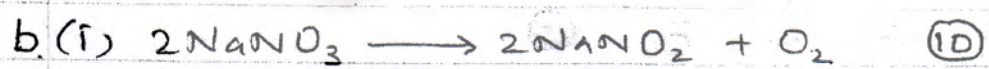
(iii)	$Cl$	$O^2$	$N^3$
(I)	Tetrahedral	Tetrahedral	Trigonal planar
(II)	Tetrahedral	Angular	Trigonal planar
(III)	$sp^3$	$sp^3$	$sp^2$
(IV)	-2	-2	+5
(V)	4	2	5
			(01) $\times 15 = 15$

(iv) (I)  $Cl: sp^3$  (h.o.)     $O^2: sp^3$  (h.o.)  
 (II)  $O^2: sp^3$  (h.o.)     $N^3: sp^3$  (h.o.)

1(b) 60

- 2 a. (i) (I) M:- Ca (10)  
 (II) B:-  $CaCO_3$  (5)    C:-  $Ca(OH)_2$  (5)  
 (III) D:-  $CO_2$  (5)  
 (IV) E:-  $Ca(HCO_3)_2$  (5)  
 (V)  $CaCO_3 + CO_2 + H_2O \rightarrow Ca(HCO_3)_2$  (10)

- (ii) (I) F:-  $Ca_3N_2$  (5)  
 (II) G:-  $NH_3$  (5)  
 (III)  $Ca_3N_2 + 6H_2O \rightarrow 3Ca(OH)_2 + 2NH_3$  (10)  
 2(a) 60



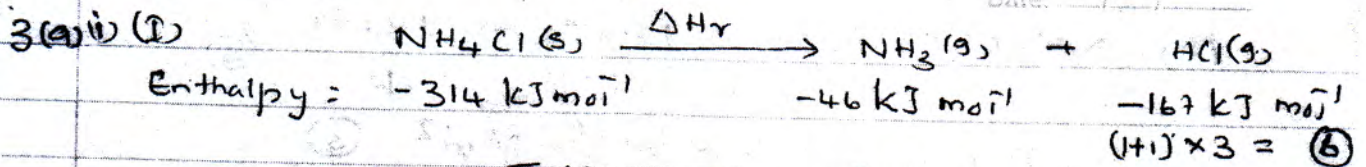
(ii)  $n = PV/RT$  (4)

$$n_{O_2} = \frac{6 \times 10^4 \text{ N m}^{-2} \times 0.8314 \times 10^{-3} \text{ m}^3}{8.314 \text{ N m mol}^{-1} \text{ K}^{-1} \times 300 \text{ K}} (1+1) 4 = 8$$

$$= 0.02 \text{ mol} (2+1) \Rightarrow 3$$

(iii) amount of composed  $NaNO_3 = \frac{1}{2} n_{O_2} = \frac{1}{2} \times 0.02 \text{ mol}$  (5)  
 mass of composed  $NaNO_3 = 0.01 \text{ mol} \times 85 \text{ g mol}^{-1}$  (5)  
 mass of uncomposed  $NaNO_3 = 4.25 \text{ g} - 0.85 \text{ g} = 3.4 \text{ g}$  (5)

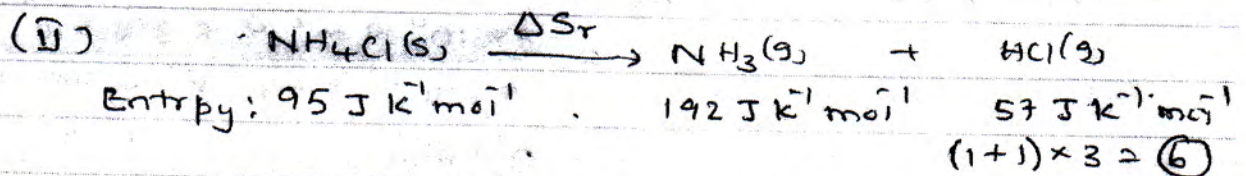
2(b) 40



$$\Delta H_r = \sum H_f^{\text{Products}} - \sum H_f^{\text{Reactants}} \quad (2)$$

$$= (-46 \text{ kJ mol}^{-1} - 167 \text{ kJ mol}^{-1}) - 314 \text{ kJ mol}^{-1} \quad (5)$$

$$= 101 \text{ kJ mol}^{-1} \quad (2)$$



$$\Delta S_r = \sum S_{\text{Products}} - \sum S_{\text{Reactants}} \quad (2)$$

$$= (192 \text{ J K}^{-1} \text{ mol}^{-1} + 57 \text{ J K}^{-1} \text{ mol}^{-1})$$

$$- 95 \text{ J K}^{-1} \text{ mol}^{-1} \quad (5)$$

$$= 154 \text{ J K}^{-1} \text{ mol}^{-1} \quad (2)$$

(ii)  $\Delta G = \Delta H - T\Delta S \quad (5)$   
 $= 101 \text{ kJ mol}^{-1} - 300 \text{ K} \times 154 \text{ J K}^{-1} \text{ mol}^{-1} \quad (5)$   
 $= 54.9 \text{ kJ mol}^{-1} \quad (5)$

(iii)  $\Delta G = \Delta H - T\Delta S$   
 $= 101 \text{ kJ mol}^{-1} - 700 \text{ K} \times 154 \text{ J K}^{-1} \text{ mol}^{-1} \quad (5)$   
 $= -6.8 \text{ kJ mol}^{-1} \quad (5)$

Since  $\Delta G < 0 \Rightarrow \text{NH}_4\text{Cl}(s)$  complete decomposition  
 at  $429^\circ\text{C} \quad (5)$

3(a)  $\Rightarrow$  60

(b)(i)  $P \propto T \quad (3)$

$P_{He} \propto 700 \text{ K} \quad - (1) \quad (3)$

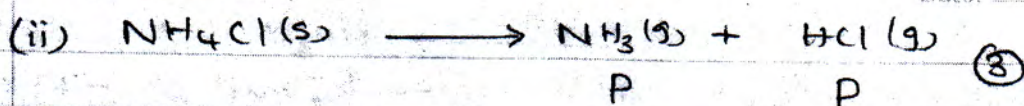
$6 \times 10^4 \text{ N m}^{-2} \propto 300 \text{ K} \quad - (2) \quad (3)$

(1)  $\div$  (2)  $\Rightarrow \frac{P_{He}}{6 \times 10^4 \text{ N m}^{-2}} = \frac{700 \text{ K}}{300 \text{ K}} \quad (3)$

$P_{He} = 1.4 \times 10^5 \text{ N m}^{-2} \quad (3)$

No: \_\_\_\_\_

Date: / /



$$2P + P_{\text{He}} = 2.8 \times 10^5 \text{ N m}^{-2} \quad (3)$$

$$2P + 1.4 \times 10^5 \text{ N m}^{-2} = 2.8 \times 10^5 \text{ N m}^{-2} \quad (2)$$

$$P_{\text{NH}_3} = P = 7 \times 10^4 \text{ N m}^{-2} \quad (2)$$

$$(iii) n_{\text{NH}_4\text{Cl}} = n_{\text{NH}_3} = \frac{PV}{RT} \quad (2)$$

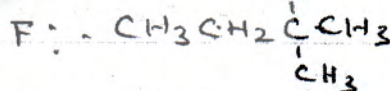
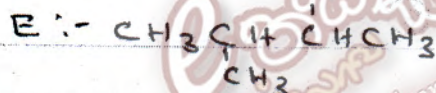
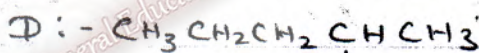
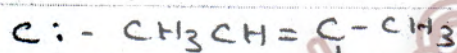
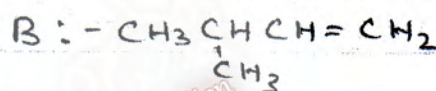
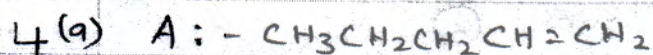
$$= \frac{7 \times 10^4 \text{ N m}^{-2} \times 8.314 \times 10^{-3} \text{ m}^3}{8.314 \text{ N m mol}^{-1} \text{ K}^{-1} \times 700 \text{ K}} \quad (8)$$

$$= 0.1 \text{ mol}$$

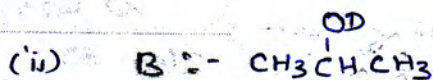
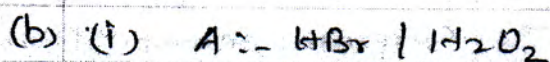
$$w_{\text{NH}_4\text{Cl}} = 0.1 \text{ mol} \times 53.5 \text{ g mol}^{-1} \quad (3)$$

$$= 5.35 \text{ g} \quad (2)$$

$$3(b) \Rightarrow \underline{40}$$



$$4(b) \Rightarrow (10) \times 7 = \underline{70}$$



$$4(b) \Rightarrow (6) \times 5 = \underline{30}$$



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Chemistry IIB & C  
கிரசாயனவியல் IIB & C

02 E II



$$n_{\text{HCl}} = n_{\text{NaOH}} \quad (2)$$

$$\text{for } 25 \text{ cm}^3 \quad n_{\text{HCl}} = 0.14 \text{ mol dm}^{-3} \times \frac{10}{1000} \text{ dm}^3 \quad (3)$$

$$\text{for } 250 \text{ cm}^3 \quad n_{\text{HCl}} = 0.14 \times \frac{10}{1000} \times \frac{250}{25} \quad (3)$$

$$= 0.014 \text{ mol} \quad (2)$$

(ii) initial  $n_{\text{HCl}} = 0.12 \text{ mol dm}^{-3} \times \frac{125}{1000} \text{ dm}^3 = 0.015 \text{ mol} \quad (2)$



$$n_{\text{NH}_3} = 0.015 \text{ mol} - 0.014 \text{ mol} = 0.001 \text{ mol} \quad (2)$$

(iii)  $P = nRT \quad (4)$

$$P_{\text{NH}_3} = \frac{0.001 \text{ mol} \times 8314 \text{ Nm mol}^{-1} \text{ K}^{-1} \times 300 \text{ K}}{24.942 \times 10^{-3} \text{ m}^3} \quad (5)$$

$$= 100 \text{ Nm}^{-2} \quad (3)$$

(iv)  $P_{\text{CO}_2(g)} = \frac{1}{2} \times P_{\text{NH}_3(g)} = \frac{1}{2} \times 100 \text{ Nm}^{-2} = 50 \text{ Nm}^{-2} \quad (3)$

$$K_p = P_{\text{NH}_3(g)}^2 \times P_{\text{CO}_2(g)} \quad (3)$$

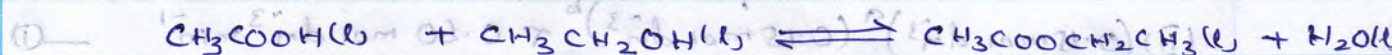
$$= (100 \text{ Nm}^{-2})^2 (50 \text{ Nm}^{-2}) \quad (3)$$

$$= 5 \times 10^5 \text{ N}^3 \text{ m}^{-6} \quad (3)$$

(v)  $K_p = K_c(RT)^{\Delta n} = K_c(RT)^3 \quad (3)$

$$K_c = \frac{K_p}{(RT)^3} = \frac{5 \times 10^5 \text{ N}^3 \text{ m}^{-6}}{(2500 \text{ J mol}^{-1})^3} = 3.2 \times 10^{-5} \text{ mol}^3 \text{ m}^{-9} \quad (3)$$

(b) (i) (I)  $K_c = \frac{[\text{CH}_3\text{COOCH}_2\text{CH}_3(l)][\text{H}_2\text{O}(l)]}{[\text{CH}_3\text{COOH}(l)][\text{CH}_3\text{CH}_2\text{OH}(l)]} \quad (5)$



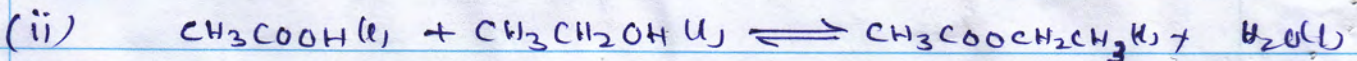
at initial 0.8 mol 0.5 mol 0.5 mol 0.4 mol

at eq<sup>m</sup> 0.4 mol 0.5 mol - 0.4 mol 0.4 mol

$$= 0.1 \text{ mol} \quad (3)$$

$$K_p = \frac{\left(\frac{0.4}{V} \text{ mol dm}^{-3}\right) \left(\frac{0.4}{V} \text{ mol dm}^{-3}\right)}{\left(\frac{0.4}{V} \text{ mol dm}^{-3}\right) \left(\frac{0.1}{V} \text{ mol dm}^{-3}\right)} \quad (5)$$

$$= 4 \quad (5)$$



at initial	6 mol	2.25 mol	0	0
at eq <sup>m</sup>	$\frac{6-x}{V} \text{ mol dm}^{-3}$	$\frac{2.25-x}{V} \text{ mol dm}^{-3}$	$\frac{x}{V} \text{ mol dm}^{-3}$	$\frac{x}{V} \text{ mol dm}^{-3}$

$$K_c = \frac{\left(\frac{x}{V} \text{ mol dm}^{-3}\right) \left(\frac{x}{V} \text{ mol dm}^{-3}\right)}{\left(\frac{6-x}{V} \text{ mol dm}^{-3}\right) \left(\frac{2.25-x}{V} \text{ mol dm}^{-3}\right)} = 4 \quad \text{--- (6)}$$

$$3x^2 + 33x + 54 = 0 \quad \text{--- (6)}$$

$$(x-2)(3x-27) = 0$$

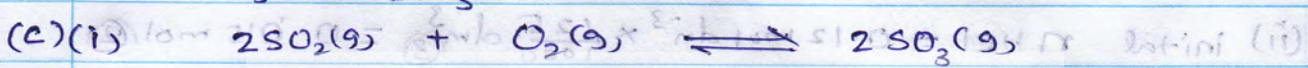
$$x = 2 \text{ or } 9 \quad \text{--- (6)}$$

$$x \neq 9 \quad (\because x < 2.25)$$

$$\therefore x = 2$$

$$n_{\text{CH}_3\text{COOCH}_2\text{CH}_3} = 2 \text{ mol} \quad \text{--- (6)}$$

5b 50

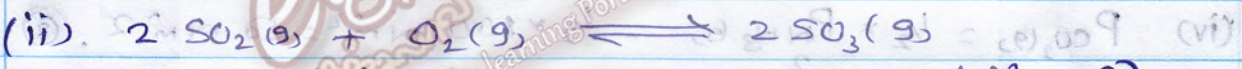


$$\frac{n}{10} \text{ mol dm}^{-3} \quad \frac{2n}{10} \text{ mol dm}^{-3} \quad \frac{n}{10} \text{ mol dm}^{-3} \quad \text{--- (6)}$$

$$K_c = \frac{[\text{SO}_3(g)]^2}{[\text{SO}_2(g)]^2 [\text{O}_2(g)]} = \frac{\left(\frac{n}{10} \text{ mol dm}^{-3}\right)^2}{\left(\frac{2n}{10} \text{ mol dm}^{-3}\right)^2 \left(\frac{n}{10} \text{ mol dm}^{-3}\right)} = 100 \text{ mol}^{-1} \text{ dm}^3 \quad \text{--- (6)}$$

$$n = 0.1 \quad \text{--- (6)}$$

$$n_{\text{O}_2} = 0.1 \text{ mol} \quad \text{--- (2)}$$



$$2n/10 \text{ mol dm}^{-3} \quad n/10 \text{ mol dm}^{-3} \quad n/10 \text{ mol dm}^{-3} \quad \text{--- (6)}$$

$$K_c = \frac{\left(\frac{2n}{10} \text{ mol dm}^{-3}\right)^2}{\left(\frac{n}{10} \text{ mol dm}^{-3}\right)^2 \left(\frac{n}{10} \text{ mol dm}^{-3}\right)} = 100 \text{ mol}^{-1} \text{ dm}^3 \quad \text{--- (6)}$$

$$n = 0.4 \quad \text{--- (6)}$$

$$n_{\text{O}_2} = 0.4 \text{ mol} \quad \text{--- (2)}$$

5c 40

$$6(a) \text{ (i) } R = k [\text{NO}(g)]^a [\text{Cl}_2(g)]^b \quad \text{--- (6)}$$

$$\text{(1) } (0.15 \text{ mol dm}^{-3})^a (0.15 \text{ mol dm}^{-3})^b \propto 0.60 \text{ mol dm}^{-3} \text{ min}^{-1} \quad \text{--- (1)}$$

$$(0.15 \text{ mol dm}^{-3})^a (0.30 \text{ mol dm}^{-3})^b \propto 1.20 \text{ mol dm}^{-3} \text{ min}^{-1} \quad \text{--- (2)}$$

$$(0.30 \text{ mol dm}^{-3})^a (0.15 \text{ mol dm}^{-3})^b \propto 2.40 \text{ mol dm}^{-3} \text{ min}^{-1} \quad \text{--- (3)}$$

$$\text{(2)} \div \text{(1)} \Rightarrow \left(\frac{0.30}{0.15}\right)^b = \frac{1.2}{0.6} = 2 \quad \text{--- (6)}$$

$$2^b = 2^1$$

$$b = 1 \quad \text{--- (3)}$$

$$(3) \div (1) \Rightarrow \left(\frac{0.30}{0.15}\right)^2 = \frac{2.4}{0.6} = 4$$

$$2^2 = 2^2$$

$$a = 2 \quad (3)$$

$$(IV) \text{ overall order} = 2 + 1 = 3 \quad (5)$$

$$(V) R = k [NO(g)]^2 [Cl_2(g)]^1 \quad (5)$$

$$(VI) (3) \Rightarrow k (0.3 \text{ mol dm}^{-3})^2 (0.15 \text{ mol dm}^{-3}) = 2.4 \text{ mol dm}^{-3} \text{ min}^{-1} \quad (5)$$

$$k = 1.8 \times 10^2 \text{ mol}^{-2} \text{ dm}^6 \text{ min}^{-1} \quad (5)$$

$$(VII) 0.36 \text{ mol dm}^{-3} \text{ min}^{-1} = 1.8 \times 10^2 \text{ mol}^{-2} \text{ dm}^6 \text{ min}^{-1} \times 0.1 \text{ mol dm}^{-3} \times [Cl_2(g)] \quad (5)$$

$$[Cl_2(g)] = 0.2 \text{ mol dm}^{-3} \quad (5)$$

$$(VIII) R = 1.8 \times 10^2 \text{ mol}^{-2} \text{ dm}^6 \text{ min}^{-1} (0.1 \text{ mol dm}^{-3})^2 (0.1 \text{ mol dm}^{-3}) \quad (5)$$

$$= 0.18 \text{ mol dm}^{-3} \text{ min}^{-1} \Rightarrow \text{initial rate of disappearance of } NO(g) = 2 \times 0.18 \text{ mol dm}^{-3} \text{ min}^{-1} \quad (5)$$

$$= 0.36 \text{ mol dm}^{-3} \text{ min}^{-1} \quad (5)$$

$$(ii) (I) K_c = \frac{[NOCl_2(g)]}{[NO(g)][Cl_2(g)]} \quad (5) \quad \text{--- (1)}$$

$$(II) R = k' [NOCl_2(g)] [NO(g)]^{-2} \quad (5) \quad \text{--- (2)}$$

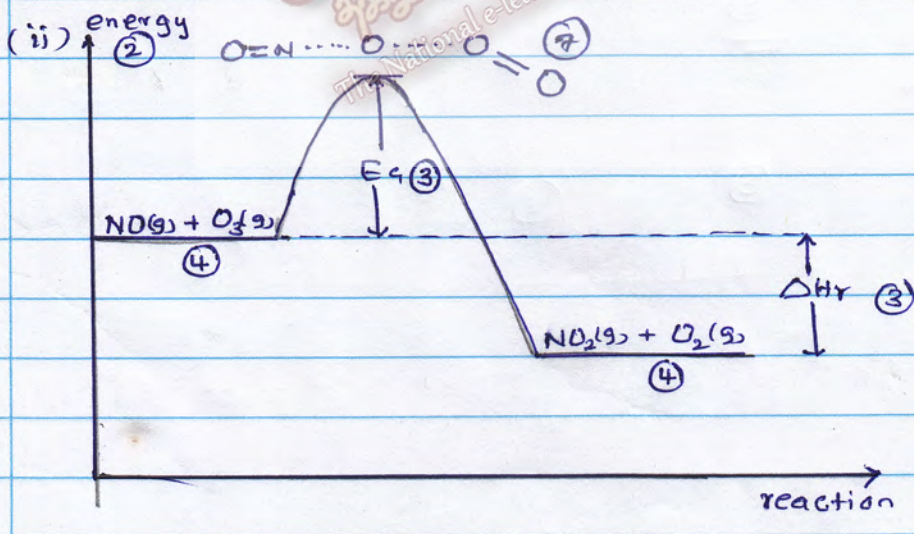
$$(III) (2) \div (1) \Rightarrow \frac{R}{K_c} = k' [NO(g)] [Cl_2(g)] [NO(g)] \quad (5)$$

$$R = K_c k' [NO(g)]^2 [Cl_2(g)] \quad (5)$$

$$R = k [NO(g)]^2 [Cl_2(g)]$$

$$(b) (i) R = k [NO(g)] [O_3(g)] \quad (5)$$

$$6(b) = \underline{90}$$



(c) (i) The time required for a reactant to reach half of its original concentration. (5)

$$(ii) (I) R = k [A]^0 = k \quad (5)$$

$$III \quad t = \frac{[A]_0 - [A]_t}{k}$$

$$(II) R = - \frac{([A]_t - [A]_0)}{t} \quad (5)$$

$$k = - \frac{([A]_t - [A]_0)}{t} = \frac{[A]_0 - [A]_t}{t} \quad (5)$$

$$t_{1/2} = \frac{[A]_0 - [A]_{1/2}}{k} \quad (5)$$

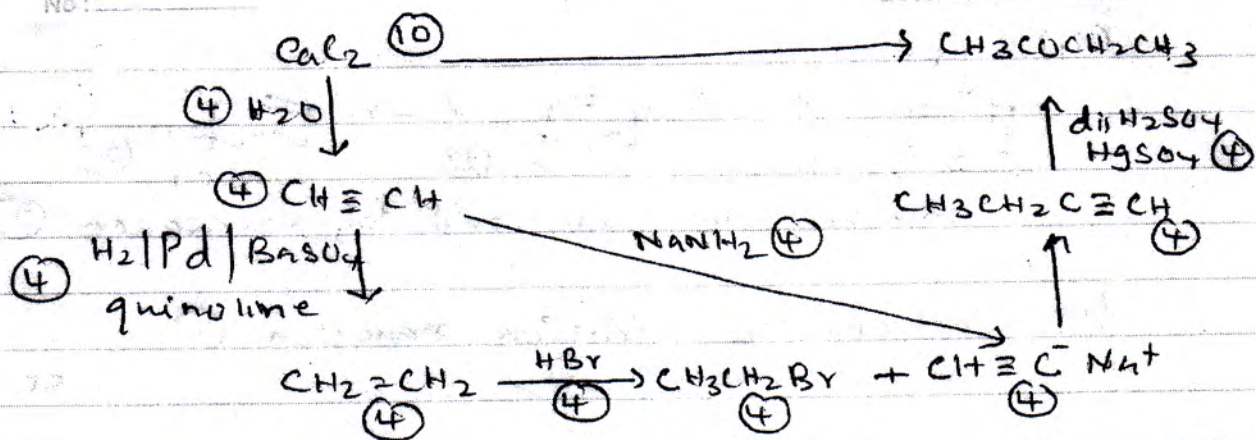
$$t = \frac{[A]_0 - [A]_t}{k} \quad (5)$$

$$= \frac{[A]_0 - [A]_{1/2}}{k}$$

$$6(c) = \underline{30}$$

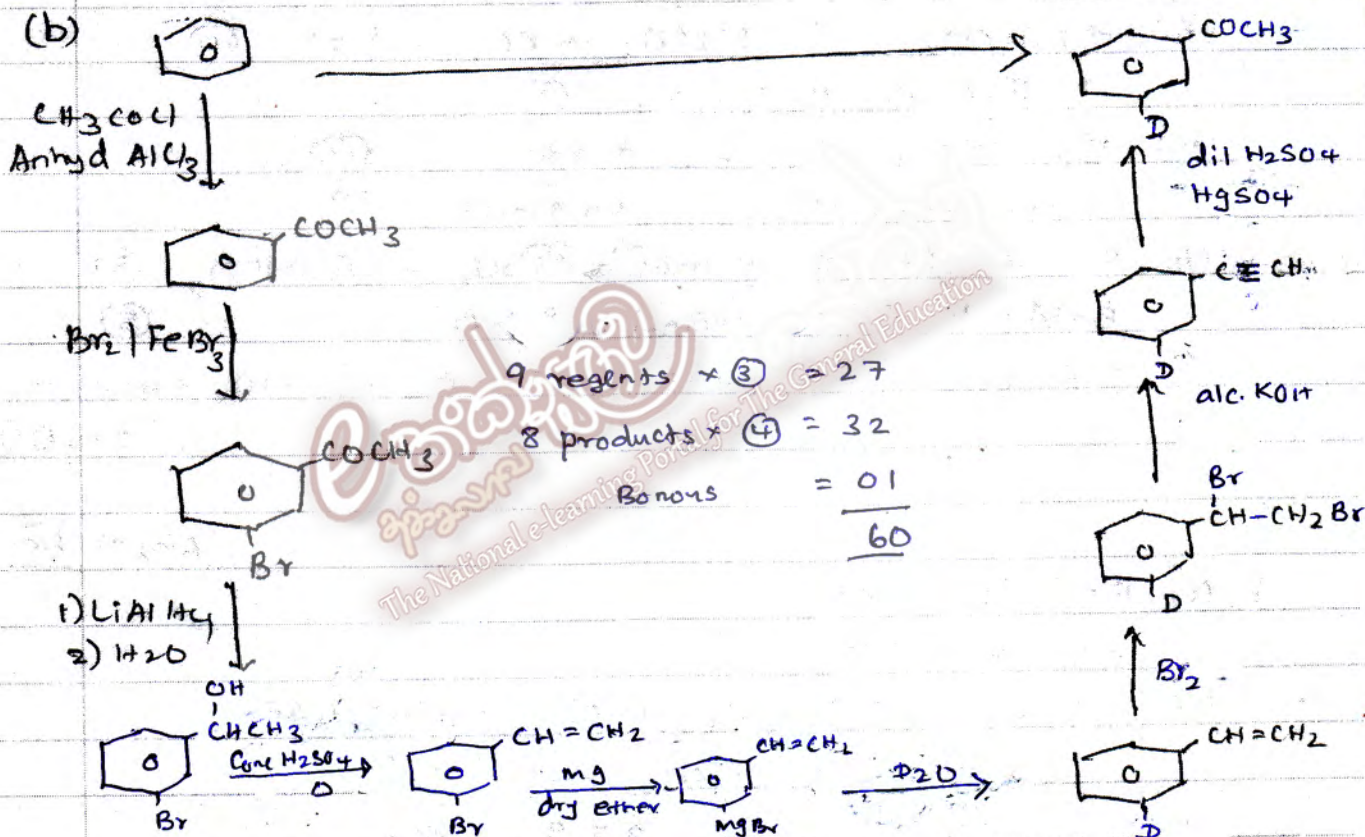


7(a)

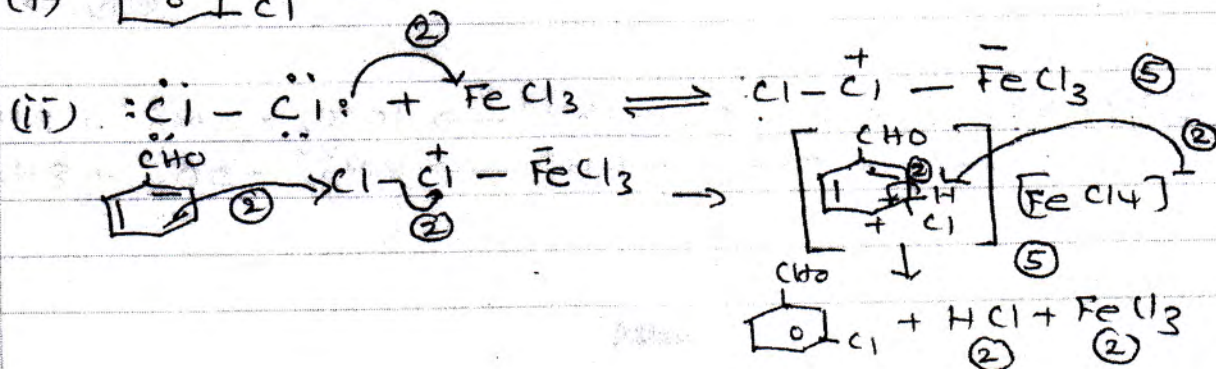
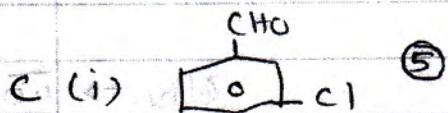


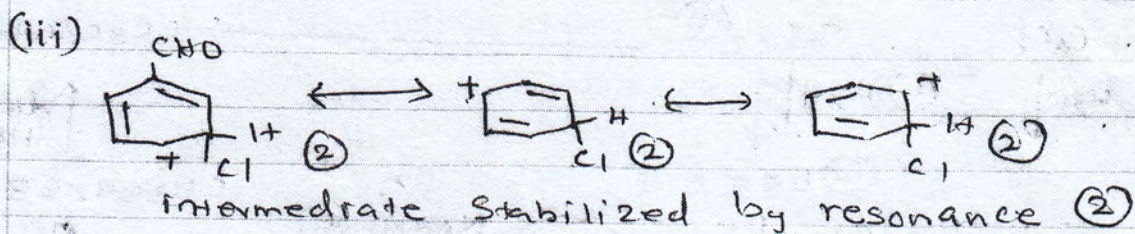
5(a) => 50

(b)



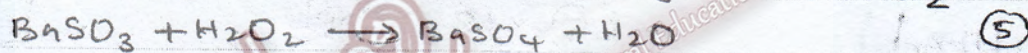
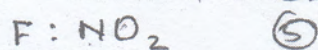
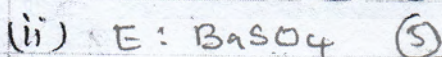
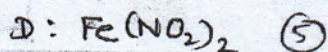
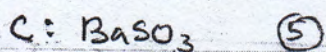
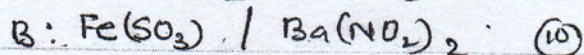
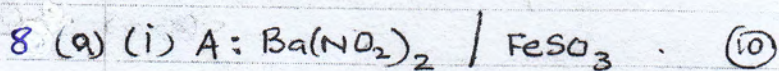
5(b) => 60



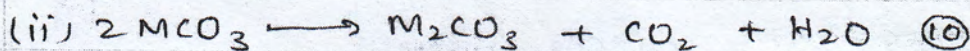
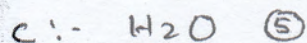
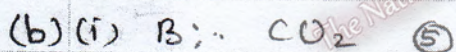


(iv) Electrophilic addition reaction (3)

C ⇒ 40

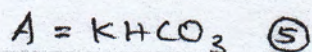


8(a) ⇒ 60

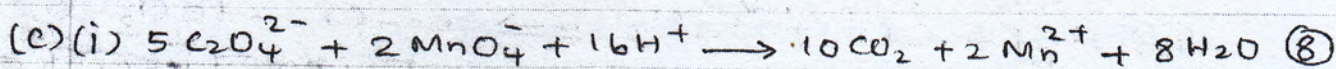


$$\frac{109}{M + 61 \text{ g mol}^{-1}} = 2 \times \frac{2 \cdot 2 \text{ g}}{44 \text{ g mol}^{-1}} \quad (10)$$

$$M = 39 \text{ g mol}^{-1} \quad (5)$$



8(b) ⇒ 40



$$(ii) n_{C_2O_4^{2-}} = \frac{1.349}{134 \text{ g mol}^{-1}} = 0.01 \text{ mol} \quad (4)$$

amount of  $C_2O_4^{2-}$  in  $10 \text{ cm}^3$ .

$$n_{C_2O_4^{2-}} = 0.01 \text{ mol} \times \frac{10}{500} = 2 \times 10^{-4} \text{ mol} \quad (5)$$

$$n_{MnO_4^-} = \frac{2}{5} \times n_{C_2O_4^{2-}}$$

$$= \frac{2}{5} \times 2 \times 10^{-4} \text{ mol}$$

$$= 8 \times 10^{-5} \text{ mol} \quad (5)$$

$$c_{MnO_4^-} = \frac{8 \times 10^{-5} \text{ mol}}{8 \times 10^{-3} \text{ dm}^3}$$

$$= 0.01 \text{ mol dm}^{-3} \quad (5)$$

$$(iii) n_{MnO_4^-} = 0.01 \text{ mol dm}^{-3} \times \frac{10}{1000} \text{ dm}^3 = 10^{-4} \text{ mol} \quad (5)$$

$$n_{H_2O_2} = \frac{5}{2} \times n_{MnO_4^-}$$

$$= \frac{5}{2} \times 10^{-4} \text{ mol}$$

$$= 2.5 \times 10^{-4} \text{ mol} \quad (5)$$

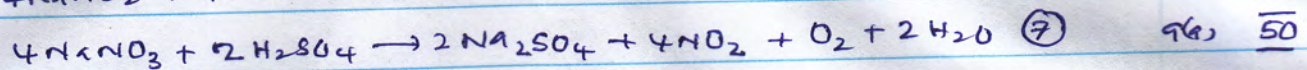
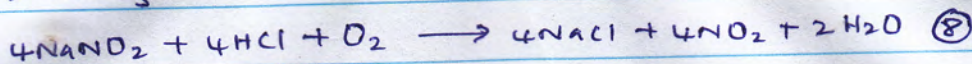
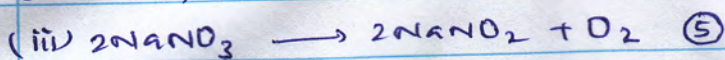
$$c_{H_2O_2} = \frac{2.5 \times 10^{-4} \text{ mol}}{25 \times 10^{-3} \text{ dm}^3}$$

$$= 0.01 \text{ mol dm}^{-3} \quad (5)$$

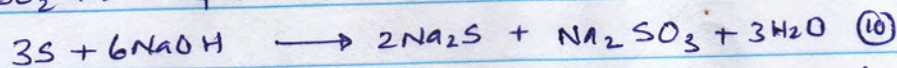
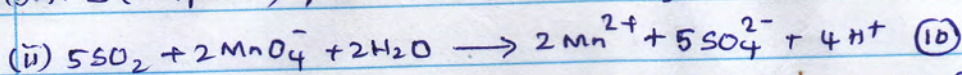
8(2) 50

9. (a) (i) A:  $NaNO_3$  (5)

(ii) B:  $O_2$ , C:  $NaNO_2$ , D:  $Na_2SO_4$ , E:  $NO_2$ , F:  $NaCl$   $5 \times (5) = 25$

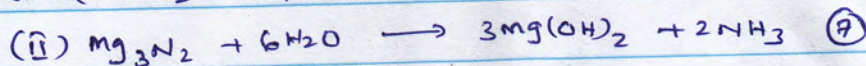
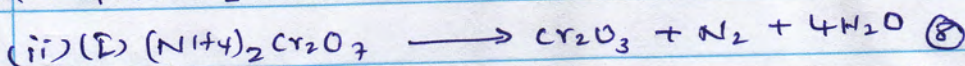


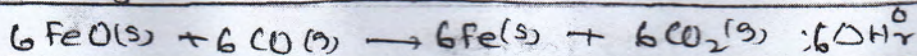
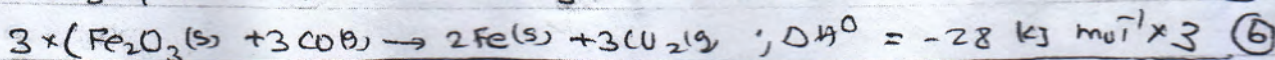
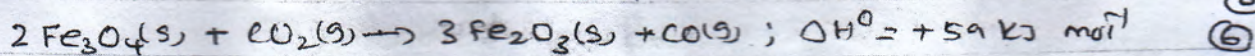
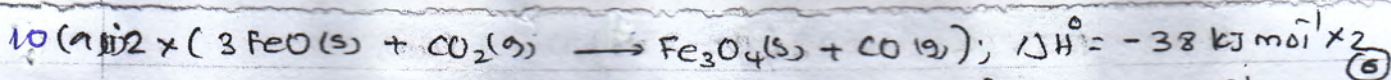
(b) (i) A: S (sulphur), B:  $SO_2$ ; C:  $H_2SO_3$ , D:  $SO_3$ , E:  $H_2S$ ; F:  $Na_2SO_3$ ; G:  $Na_2S$ .



(iii) Bleaching agent / Antibacterial agent / sulphuric acid production - any one (5)

(c) (i) Q:  $(NH_4)_2Cr_2O_7$ , R:  $Cr_2O_3$ ; S:  $N_2$ , T:  $Mg_3N_2$ , U:  $NH_3$   $5 \times (5) = 25$

9(2) 40

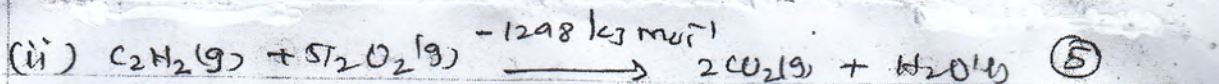


$$6 \Delta H^\circ = 2 \times -38 \text{ kJ mol}^{-1} + 59 \text{ kJ mol}^{-1} + 3 \times -28 \text{ kJ mol}^{-1} \quad (6)$$

$$= -101 \text{ kJ mol}^{-1}$$

$$\Delta H^\circ = \frac{-101 \text{ kJ mol}^{-1}}{6}$$

$$= -16.83 \text{ kJ mol}^{-1} \quad (6)$$



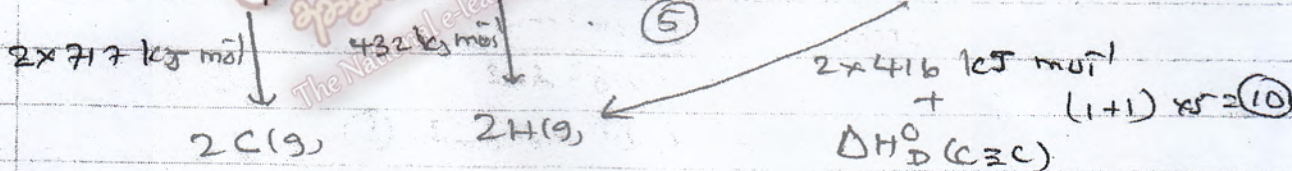
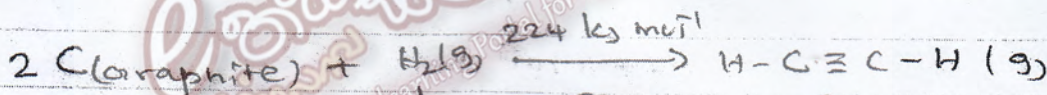
$$H/ \Delta H_f^\circ(\text{C}_2\text{H}_2) \quad (5) \quad 2 \times -394 \text{ kJ mol}^{-1} - 286 \text{ kJ mol}^{-1}$$

$$\Delta H^\circ = \sum H_f^\circ \text{Product} - \sum H_f^\circ \text{Reactants} \quad (1+1) \text{ or } 2 \quad (5)$$

$$-1298 \text{ kJ mol}^{-1} = (2 \times -394 \text{ kJ mol}^{-1} - 286 \text{ kJ mol}^{-1})$$

$$-(\Delta H_f^\circ(\text{C}_2\text{H}_2) + 0) \quad (5)$$

$$\Delta H_f^\circ(\text{C}_2\text{H}_2) = 224 \text{ kJ mol}^{-1} \quad (5)$$



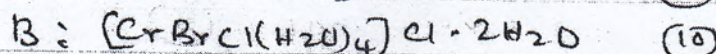
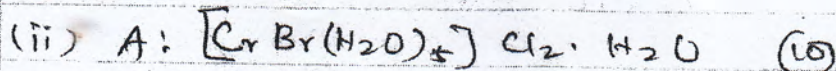
$$224 \text{ kJ mol}^{-1} + 2 \times 416 \text{ kJ mol}^{-1} + \Delta H_D^\circ(\text{C}\equiv\text{C})$$

$$= 2 \times 717 \text{ kJ mol}^{-1} + 432 \text{ kJ mol}^{-1} \quad (10)$$

$$\Delta H_D^\circ(\text{C}\equiv\text{C}) = 810 \text{ kJ mol}^{-1} \quad (5)$$

$$10(a) \Rightarrow \underline{90}$$

b (i)  $\text{Cl}^- \quad (4)$

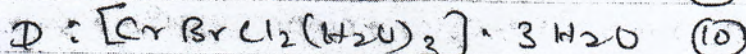
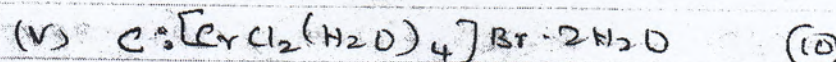


(iii) A: +3  $(4)$

B: +3  $(4)$

(iv) A: NO  $(4)$

B: 2  $(4)$



$$10(b) \Rightarrow \underline{60}$$