

Θέμα Α

A<sub>1</sub> δ.

A<sub>2</sub> δ

A<sub>3</sub> α

A<sub>4</sub> β

A<sub>5</sub> δ

Θέμα Β

β<sub>1</sub>)

α) γ

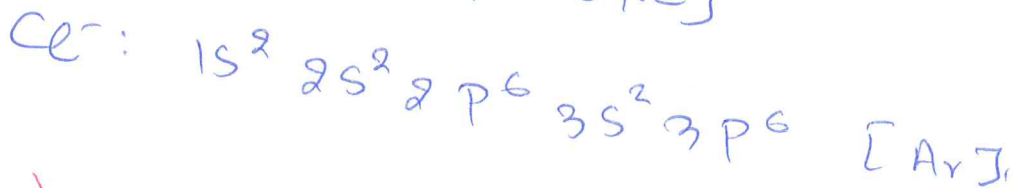
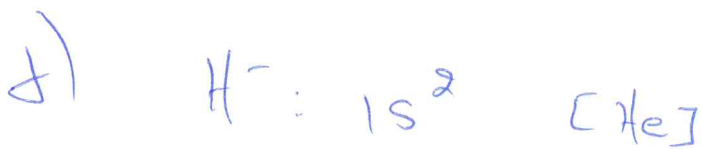
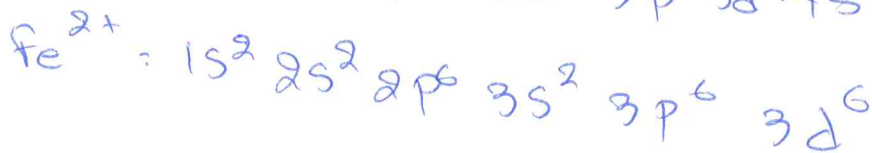
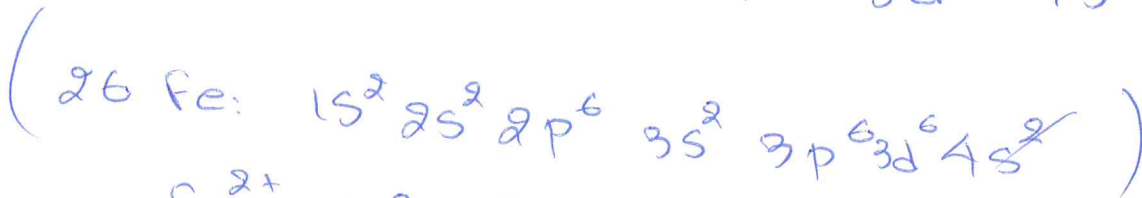
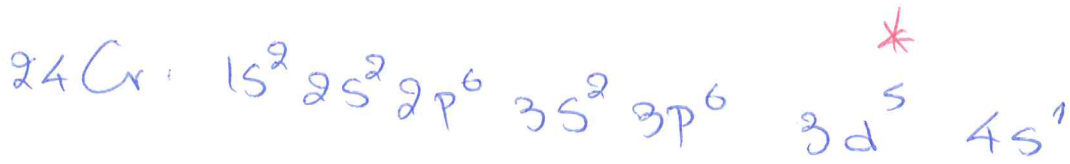
$F < N < K$

καθώς αυξάνεται ο η  
αυξάνεται μ αντίσφ.

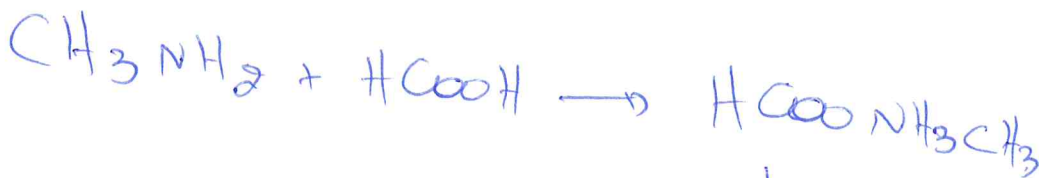


β1

β)



β2)



↓  
 άλας που

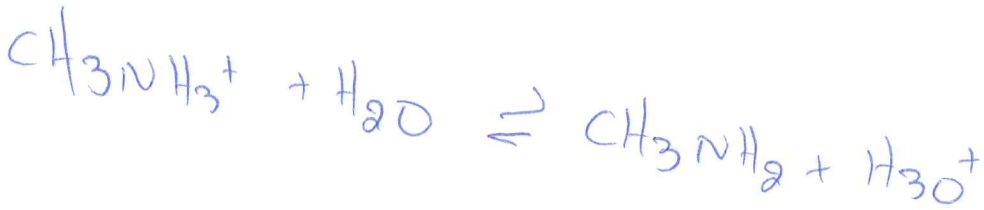
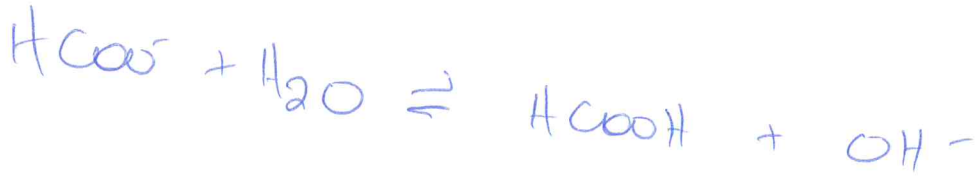
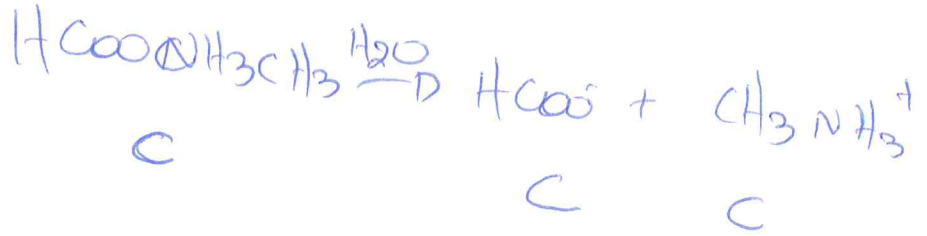
πρόκειται

από ασθενές οξύ,  
 και βάση

β)



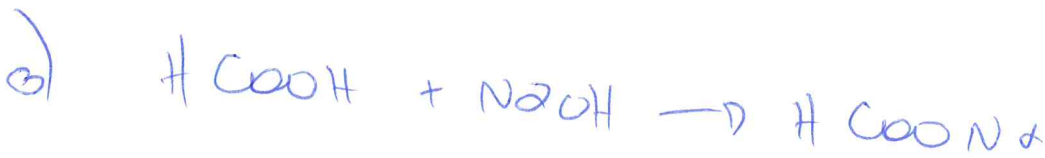
Βα αναμετα



$$K_a \text{HCOOH} = K_b \text{CH}_3\text{NH}_2 \Rightarrow K_a \cdot K_b = K_w$$

$$K_b \text{HCOO}^- = K_a \text{CH}_3\text{NH}_3^+ \Rightarrow [\text{OH}^-] = [\text{H}_3\text{O}^+]$$

ΟΥ ΔΕΤΕΡΟ ΑΛΑΧ



2 λίτρος που προέρχεται από 16 κυρία Ραβίμ κ



(3)



B3) ii

B4)

α) Εξώθερμη διότι Η προϊόντων < Η αντιδρώντων

B ii)

$$|\Delta H| = |B - A| = 139 \text{ kJ}$$

$$(\Delta H = -139 \text{ kJ})$$

-: Δηλώνει ότι  
είναι εξώθερμη!

ii)  $Q_2 = Q = 209 \text{ kJ}$

iii)  $Q' = B = 348 \text{ kJ}$



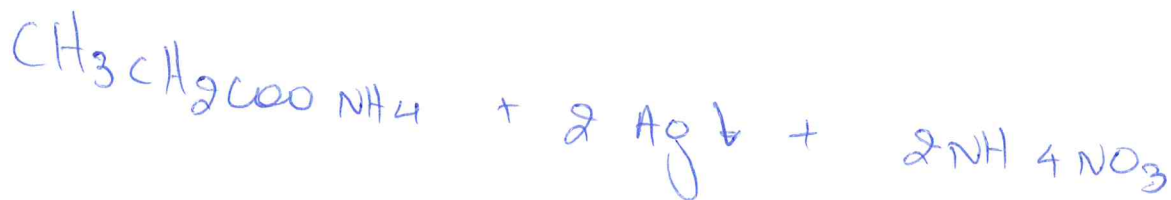
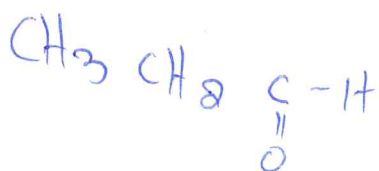
Γ1

$$\text{Mr: } 12v + 2v + 16 = 58$$

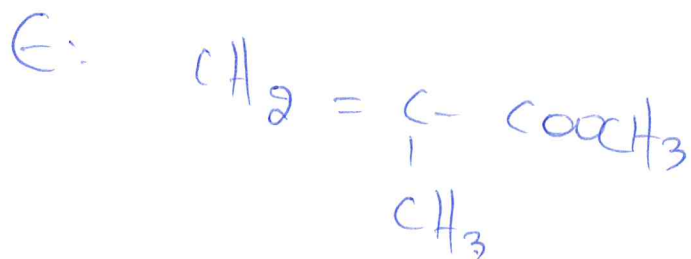
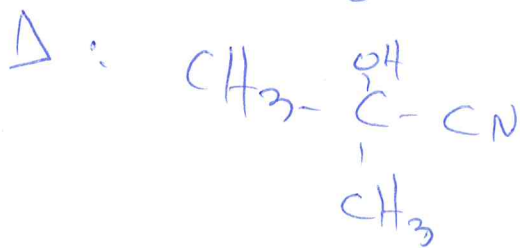
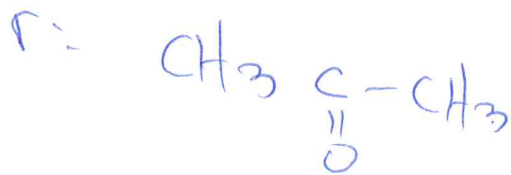
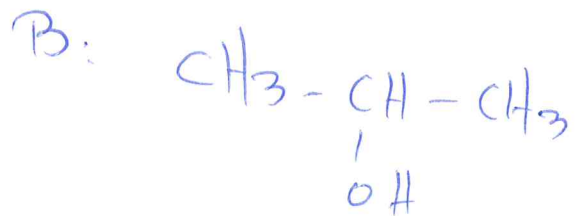
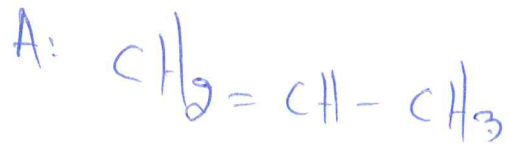
$$14v = 42$$

$$\boxed{v = 3}$$

Αφού αναστρα με  $\text{AgNO}_3 / \text{NH}_3$   
είναι οξείδωση

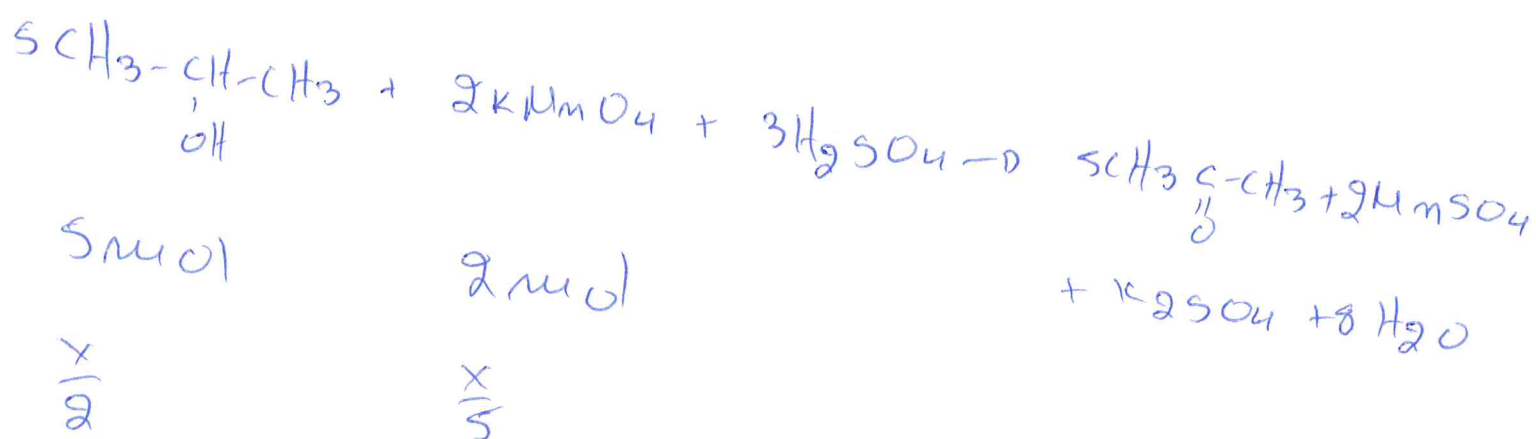
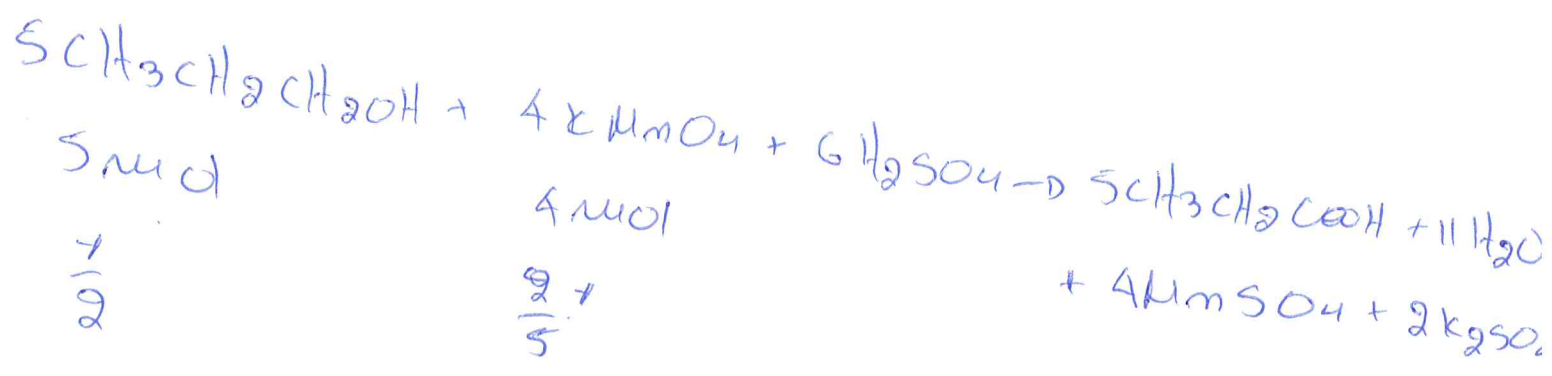


Γ<sub>2</sub>



Γ3 Συνεχίδ.

$$\chi \mu \mu \text{O}_4 : m = c \cdot v = 0,01 \cdot 2,8 = 0,028 \mu\text{mol}$$



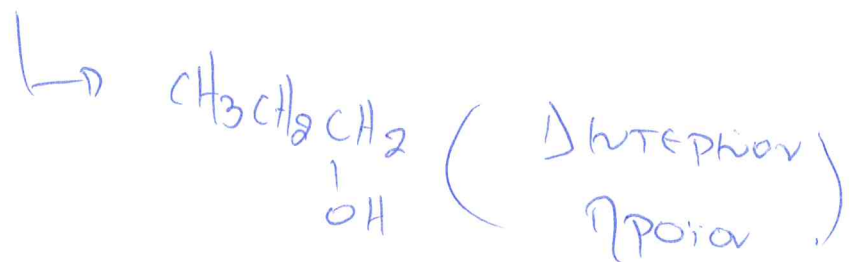
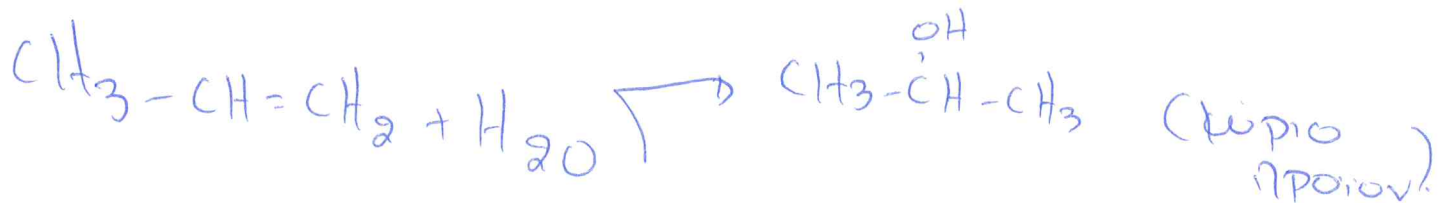
$\chi \mu \mu \text{O}_4$  γνωστικά κατανοηθέντων

$$\boxed{\frac{2\gamma}{5} + \frac{\chi}{5} = 0,028} \quad \text{①}$$



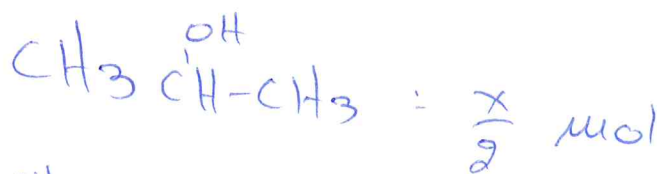
Γ3

$$C_3H_6 \quad n = \frac{m}{M_r} = \frac{6,3}{42} = 0,15 \text{ mol}$$



Έστω ότι από τα 0,15 mol του  $C_3H_6$  μετατρέπονται  $x$  mol σε  $CH_3\underset{OH}{\underset{|}{C}}H-CH_3$   
 $\rightarrow y$  mol σε  $CH_3CH_2\underset{OH}{\underset{|}{C}}H_2$

Α' μέρος



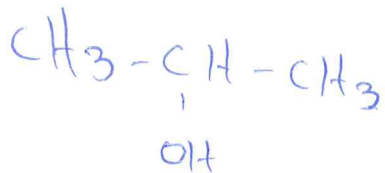
Αντιδρών και οι 2 με  $KMnO_4/H^+$

(8)

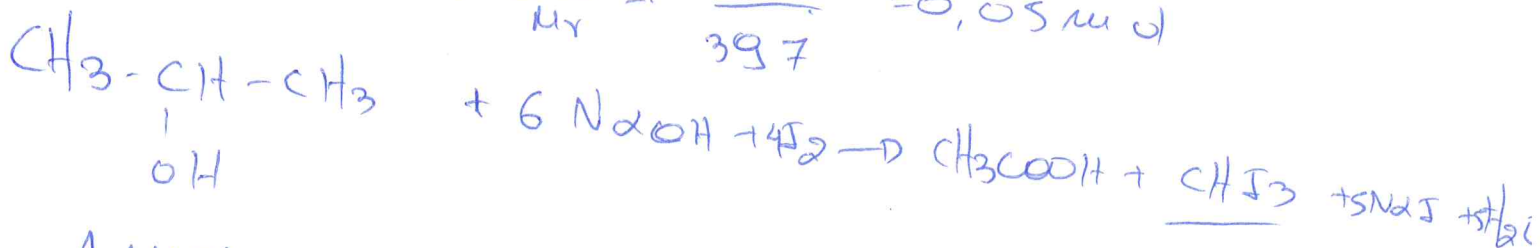


Γ3  
Β μέρος

Αν ζυγιά μόνο η μέση αλκοόλη.



$$\text{CH}_3\text{I} \quad \mu = \frac{\mu}{\mu_r} = \frac{19.7}{397} = 0,05 \mu \text{ολ}$$



1 μολ  
x  
2

1 μολ  
0,05 μολ

$$x = 0,1 \mu \text{ολ}$$

Από ζυν ①

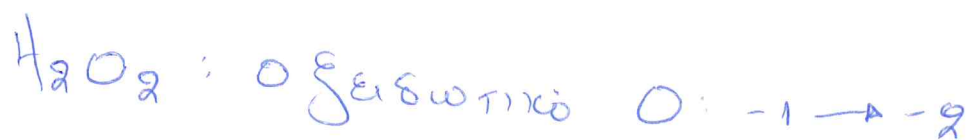
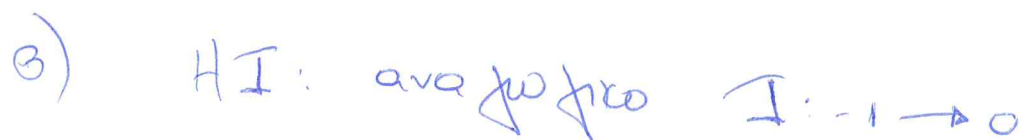
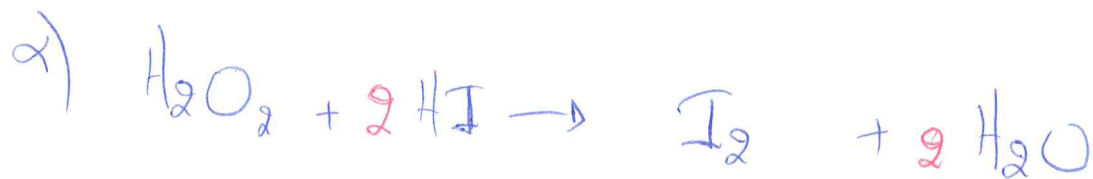
$$y = 0,02 \mu \text{ολ}$$

4) Από ζα 0,15 μολ C<sub>3</sub>H<sub>6</sub> σε προϊόντα μετατρέπονται x+y  
0,12 μολ

Από ζα 100 μολ // // α

$$a = 80$$

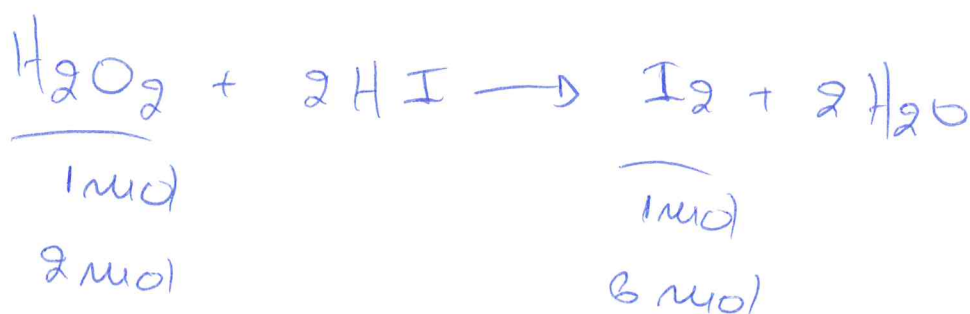
(9)



$$\begin{array}{r} 17\% \text{ H}_2\text{O}_2 \text{ σε } 100\text{ml} \text{ δ/τος} \\ \times \\ \text{ } \text{σε } 400\text{ml} \text{ δ/τος} \end{array}$$

$$x = 68 \text{ g}$$

$$\text{H}_2\text{O}_2: n = \frac{m}{M_r} = \frac{68}{34} = 2 \text{ mol}$$



(10)

$$\boxed{b = 2 \text{ mol H}_2}$$

Δ3

α) ΔN μεταβάλλεται

β) C σταθερά = 2 σταθερά

T : σταθερά

V : σταθερός αρθ P : σταθ

οι παραπάνω ως Ισοστροφός Διααλλήλων

Δ4



αρχ 0,1

αυτή -x

ΙF 0,1-x

x x  
x x

pH = 11  $[\text{NH}_3] = 10^{-11}$

$[\text{OH}^-] \cdot [\text{NH}_3] = 10^{-14}$

$[\text{OH}^-] = 10^{-3} \text{ M} = x$

$$K_b = \frac{[\text{NH}_4^+] \cdot [\text{OH}^-]}{[\text{NH}_3]} = 10^{-5}$$

$$K_b = \frac{x^2}{0,1-x} \sqrt{\frac{K_b}{0,1}} \frac{(10^{-3})^2}{10^{-1}}$$

$K_b = 10^{-5}$

(11)



# Δ4 βωχεία



HI:  $n = 5$  οξυ Ι6 χωρο

$NH_3$ :  $n = 0,1 \cdot 0,1 = 0,01$  μολ

εξωδετερωσθ.

$$pH' = pH - 2 = 11 - 2 = \boxed{9}$$

$n$ μολ	$NH_3$	+	$HI$	$\rightarrow$	$NH_4I$
αρχ	0,01		$n$		
απ/παρ	- $\omega$		- $\omega$		+ $\omega$
τελική	0,01- $\omega$		$n-\omega$		$\omega$

## Διερήσθ

1) Έστω  $n = 0,01 = \omega$

τότε προκύπτει  $NH_4I$  : οξυνο άραιο  
Απορριπτήτα

2) Έστω  $n > 0,01$

↑ υπάρχει περίσσεια οξυος HI }  $pH < 7$   
και  $NH_4I$  } απορριπτήτα

3) Αρχ  $0,01 > n$   $n = \omega$

$n$ μολ	$NH_3$	+	$HI$	$\rightarrow$	$NH_4I$
αρχ	0,01		$n$		
απ/η	- $n$		- $n$		$n$
τελική	0,01- $n$		0		$n$

$V_{\text{τελ}} = 0,1$  L

$P \cdot \Delta$   $NH_3 / NH_4^+$

$\omega \beta = [NH_4^+] = \frac{n}{0,1}$

$C_B = [NH_3] = \frac{0,01 - n}{0,1}$

$pH = pK_a + \log \frac{C_B}{\omega \beta}$

$9 = 9 + \log C_B$

$$\log \frac{C_B}{C_{0B}} = 0$$

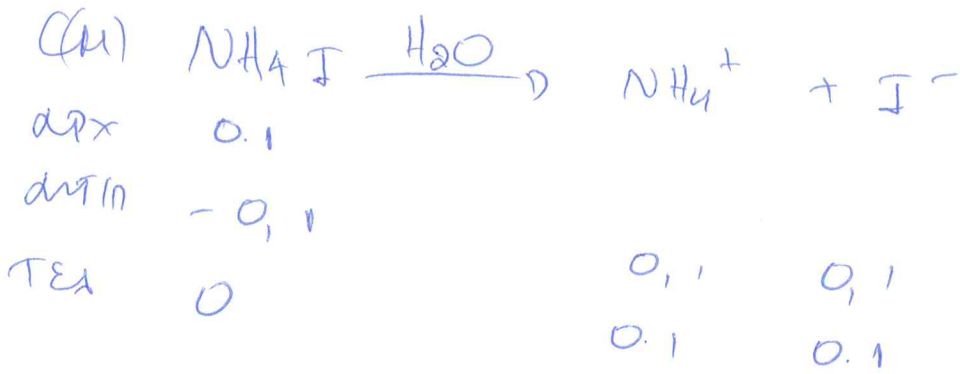
$$C_B = C_{0B}$$

$$0,01 - n = n$$

$$n = 0,005 \text{ mol/L}$$

$\Delta 5$

$$[NH_4I] = \frac{n}{V} = 0,1M.$$



xpx 0,1  
 dupln - B  
 TEA 0,1-B

B            B  
 B            B

$$K_{ac} = \frac{[NH_3] \cdot [H_3O^+]}{[NH_4^+]}$$

$$K_{ac} = \frac{B^2}{0,1-B}$$

$$10^{-9} = \frac{B^2}{0,1}$$

$$B^2 = 10^{-10}$$

$$B = 10^{-5}$$

$$K_{ac} = \frac{K_w}{K_b NH_3} = \frac{K_w}{10^{-5}} = 10^{-9}$$

$$[H_3O^+] = 10^{-5} M$$

$$pH = -\log [H_3O^+] = \boxed{5}$$

(14)

β)

$\text{pH} = 9$

$\rightarrow [\text{H}_3\text{O}^+] = 10^{-9} \text{ M}$

$\rightarrow [\text{OH}^-] = 10^{-5} \text{ M}$

$\text{NH}_4\text{I} : n = 0,01 \text{ mol}$

$\text{NaOH} : n_1 \text{ mol}$

$n(\text{mol})$	$\text{NH}_4\text{I}$	+	$\text{NaOH}$	$\rightarrow$	$\text{NH}_3$	+	$\text{NaI}$	+	$\text{H}_2\text{O}$
ααx	0,01		$n_1$						
αα/η	-β		-β		β		β		
τελικό	$0,01 - \beta$		$n_1 - \beta$		β		β		

Διεργασία ώστε να προκύψη γs  $\text{pH} = 9$

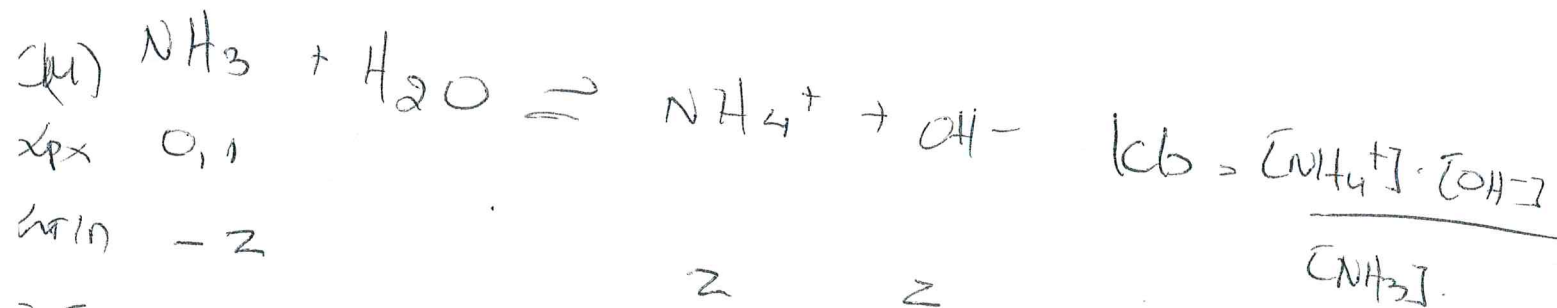
1) η αντίδραση

$0,01 = n_1 = \beta$

Αρα τελικό

$\text{NH}_3 : \beta \text{ mol}$

$[\text{NH}_3] = \frac{\beta}{0,1} = \frac{0,01}{0,1} = 0,1 \text{ M}$



ααx	0,1			
αα/η	-z			
τελ	$0,1 - z$			

$z \quad z \quad 10^{-5} = \frac{z^2}{0,1}$   
 $z = 10^{-3}$

$[\text{OH}^-] = 10^{-3} \text{ M}$   
 $[\text{H}_3\text{O}^+] [\text{OH}^-] = 10^{-14}$   
 $[\text{H}_3\text{O}^+] = 10^{-11}$

$\text{pH} = 11$  αμεπίσθητα

2) 2 M περίπτωση

$$n_{KI} = 0,01$$

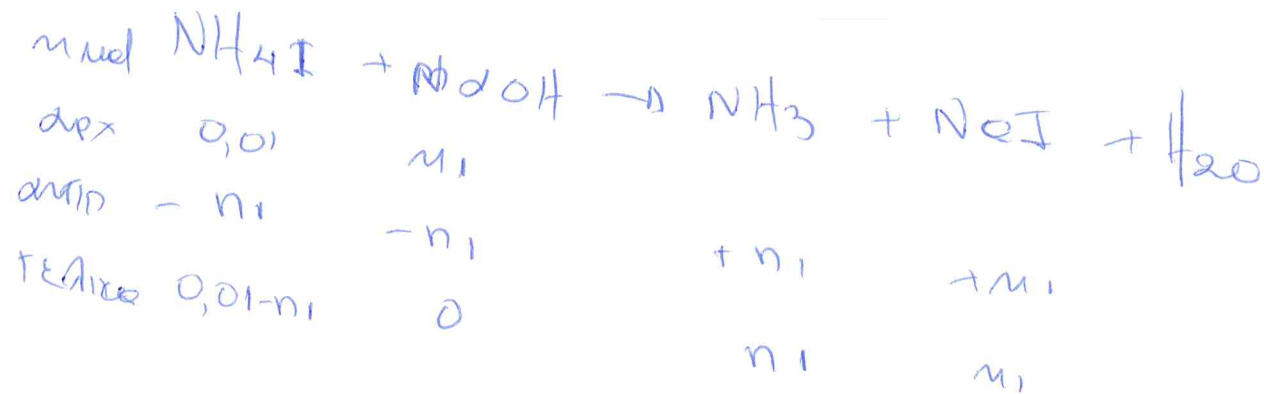
$$\beta = 0,01$$

↑ αντίστροφη περίπτωση βόσκης NaOH

Αρα  $pH \uparrow$

$pH > 11$  άνοση πτηνά

3) Αρα  $0,01 < n_1$   
 $\beta = 0,01$



$V_{TEA}$

↑ προκύπτει  $pH$   $NH_3/NH_4^+$

$$C_B = [NH_3] = \frac{n_1}{V_{TEA}}$$

$$C_{O\xi} = [NH_4^+] = \frac{0,01 - n_1}{V_{TEA}}$$

$$pH = pK_a + \log \frac{C_B}{C_{O\xi}}$$

$$9 = 9 + \log \frac{C_B}{C_{O\xi}}$$

(16)

$$C_B = C_{O\xi}$$

$$n_1 = 0,01 - n_1$$

$$n_1 = 0,005 \text{ mol}$$

$NaOH \quad n_1 = 0,005 \text{ mol}$