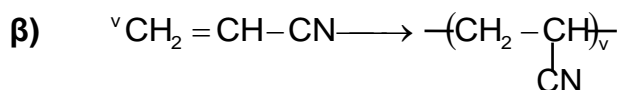
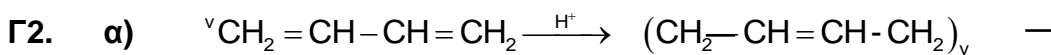
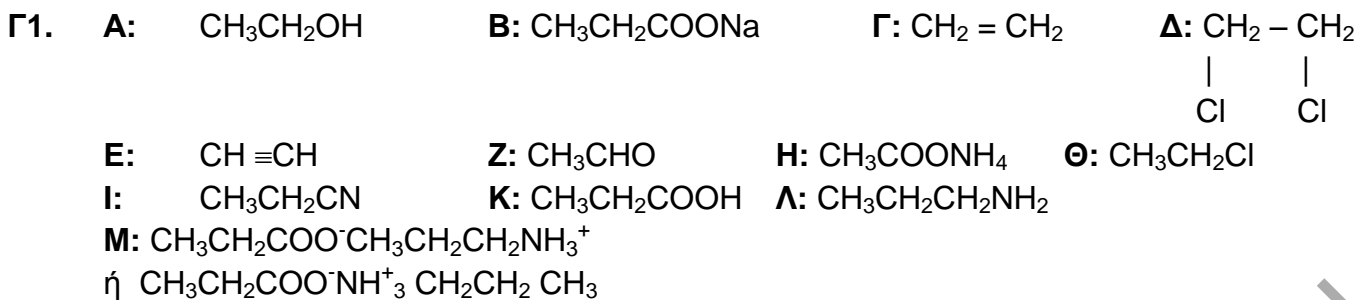




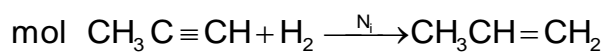
## ΘΕΜΑ Γ



Γ3.  $n_{\text{CH}_3\text{C}\equiv\text{CH}} = \frac{m}{M_r} = \frac{8}{40} = 0,2 \text{ mol}$

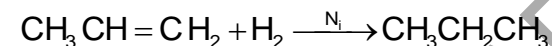
$M_r = 3 \cdot 12 + 4 \cdot 1 = 40$

$n_{\text{H}_2} = \frac{V}{V_m} = \frac{6,72}{22,4} = 0,3 \text{ mol}$



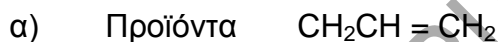
Αρχ.    0,2      0,3      -

Τελ.    -      0,1      0,2

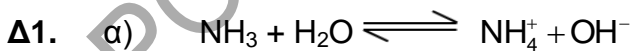


Αρχ.    0,2      0,1      -

Τελ.    0,1      -      0,1



## ΘΕΜΑ Δ

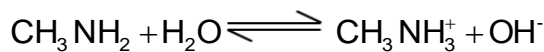


$c_1 - x \qquad \qquad \qquad x \qquad x$

$\text{pH} = 11 \Rightarrow \text{pOH} = 3 \Rightarrow [\text{OH}^-] = 10^{-3} \text{ M}$

Άρα  $x = 10^{-3} \text{ M}$        $\alpha = \frac{x}{c_1} = \frac{10^{-3}}{0,1} = 10^{-2}$

$$\beta) \quad K_{b_1} = \frac{x^2}{c_1} = \frac{10^{-6}}{0,1} \Rightarrow K_{b_1} = 10^{-5}$$



$$c_2 - y \qquad \qquad \qquad y \qquad \qquad y$$

$$\alpha = \frac{y}{c_2} \Rightarrow 2 \cdot 10^{-2} = \frac{y}{1} \Rightarrow y = 2 \cdot 10^{-2} \text{M}$$

$$K_{b_2} = \frac{y^2}{c_2} \Rightarrow K_{b_2} = \frac{4 \cdot 10^{-4}}{1} \Rightarrow K_{b_2} = 4 \cdot 10^{-4}$$

γ) Επειδή  $K_{b_1} < K_{b_2}$  άρα  $\text{CH}_3\text{NH}_2$  ισχυρότερη

$$\Delta 2. \quad n_{\text{NH}_3} = C_1 V_1 = 0,1 \cdot 0,2 = 0,02 \text{mol}$$

$$n_{\text{HCl}} = C \cdot V = 0,05 \cdot 0,2 = 0,01 \text{mol}$$



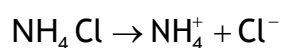
$$\text{Αρχ.} \quad 0,02 \quad 0,01 \quad -$$

$$\text{Α/Π} \quad -0,01 \quad -0,01 \quad 0,01$$

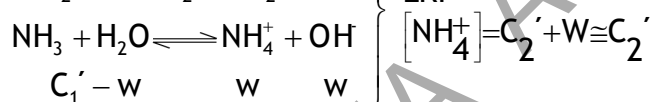
$$\text{Τελ} \quad 0,01 \quad - \quad 0,01$$

$$\text{Άρα} \quad [\text{NH}_3] = C_1' = \frac{0,01}{1} = 0,01 \text{M}$$

$$[\text{NH}_4\text{Cl}] = C_2' = \frac{0,01}{1} = 0,01 \text{M}$$



$$C_2' \qquad C_2' \qquad C_2'$$



$$K_{b_1} = \frac{C_2' \cdot w}{C_1'} \Rightarrow 10^{-5} = \frac{0,01 \cdot w}{0,01} \Rightarrow w = 10^{-5} \text{M}$$

$$[\text{OH}^-] = 10^{-5} \text{M} \quad \text{άρα} \quad \text{pOH} = 5 \quad \text{και} \quad \text{pH} = 9$$

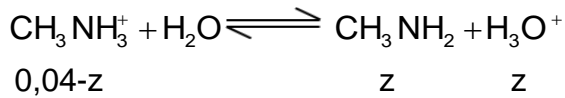
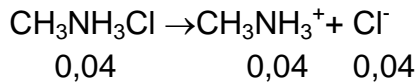
$$\Delta 3. \quad n_{\text{CH}_3\text{NH}_2} = C_2 V_2 = 1 \cdot 0,01 = 0,01 \text{ mol}$$

$$n_{\text{HCl}} = 0,01 \text{ mol}$$



$$\text{Τελ} \quad - \quad - \quad 0,01 \text{ mol}$$

$$[\text{CH}_3\text{NH}_3\text{Cl}] = \frac{0,01}{0,25} = 0,04 \text{ M}$$



$$K_a = \frac{K_w}{K_b} = \frac{10^{-14}}{4 \cdot 10^{-4}} = \frac{1}{4} \cdot 10^{-10}$$

$$K_a = \frac{z^2}{0,04} \Rightarrow \frac{1}{4} \cdot 10^{-10} = \frac{z^2}{0,04} \Rightarrow z^2 = 10^{-12} \Rightarrow z = 10^{-6} \text{ M}$$

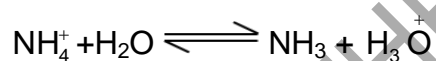
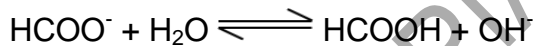
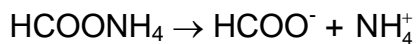
$$\text{Άρα } [\text{H}_3\text{O}^+] = 10^{-6} \text{ M} \quad \text{άρα } \text{pH} = 6$$

$$\Delta 4. \quad n_{\text{NH}_3} = C_1 V_1 = 0,1 \cdot 0,1 = 0,01 \text{ mol}$$

$$n_{\text{HCOOH}} = 0,1 \cdot 0,1 = 0,01 \text{ mol}$$



$$\text{τελ} \quad - \quad - \quad 0,01$$



Από την σύγκριση των  $K_a$  και  $K_b$  προκύπτει

$$K_{a_{\text{HCOOH}}} = 10^{-4} \qquad K_{b_{\text{HCOO}^-}} = \frac{K_w}{K_{a_{\text{HCOOH}}}} = \frac{10^{-14}}{10^{-4}} = 10^{-10}$$

$$K_{b_{\text{NH}_3}} = 10^{-5} \qquad K_{a_{\text{NH}_4^+}} = \frac{K_w}{K_{b_{\text{NH}_3}}} = \frac{10^{-14}}{10^{-5}} = 10^{-9}$$

Άρα  $K_{a_{\text{HCOOH}}} > K_{b_{\text{NH}_3}}$  και  $K_{a_{\text{NH}_4^+}} > K_{a_{\text{HCOOH}}}$

Άρα το pH του  $\text{HCOONH}_4$  είναι όξινο.