

11.14.

Δ_1

HCl C

pH=1

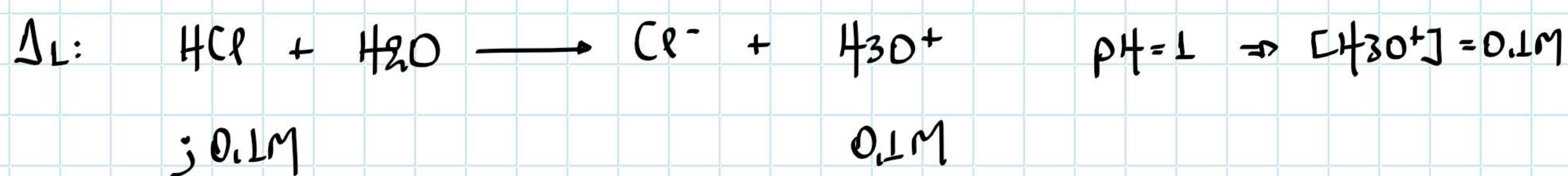
Δ_2

B (ααδ. βάση) C

$[OH^-] = 10^8 [H_3O^+]$

$K_b = ?$

a)



$$C_1 = C_2 = 0.1\text{M}$$

$$\Delta_2: K_w = [OH^-] \cdot [H_3O^+] \Rightarrow 10^{-14} = 10^8 [H_3O^+]^2 \Rightarrow [H_3O^+]^2 = 10^{-22}$$

$$\Rightarrow [H_3O^+] = 10^{-11}\text{M}$$

Η βάση B είναι αδρανής, άρα:



$$\text{ii. (M): } 0.1 - y \quad y \quad y = 10^{-3}\text{M} \quad ([H_3O^+] = 10^{-11})$$

$$K_b = \frac{y^2}{0.1 - y} \implies K_b = \frac{(10^{-3})^2}{0.1} = 10^{-5}$$

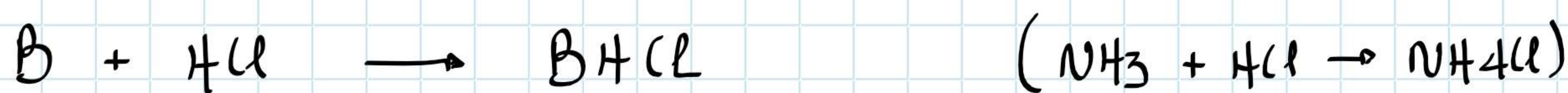
$$0.1 \gg 10^{-3} \quad 0.1 - y \approx 0.1$$

$$\beta) \Delta_1: n_1 = 0.1 \cdot V_1 \text{ mol HCl}$$

$$\Delta_2: n_2 = 0.1 \cdot V_2 \text{ mol B}$$

Δ_3 : Τα βώλια αντιδρούν μεταξύ τους. Για να προκύψει ουδέλωση

Δια ηρέσει το βώλιο B (αδρανής βάση) να αντιδράσει χερικώς.



$$\text{αρχ: } 0.1 \cdot V_2 \quad 0.1 \cdot V_1$$

$$\text{αλη: } -0.1 \cdot V_1 \quad -0.1 \cdot V_1 \quad 0.1 \cdot V_1$$

$$\text{τελ: } 0.1 \cdot V_2 - 0.1 \cdot V_1 \quad - \quad 0.1 \cdot V_1$$

Νέες συγκεντρώσεις:

$$C_B = \frac{0.1 \cdot V_2 - 0.1 \cdot V_1}{V_T} = C'_1 \quad C_{\text{BHCl}} = \frac{0.1 \cdot V_1}{V_T} = C'_2$$

$$\text{p.A} \Rightarrow \text{pH} = \text{p}K_a + \log \frac{C_B}{C_T} \Rightarrow \cancel{\text{pH}} = \cancel{\text{pH}} + \log \frac{C'_1}{C'_2} \Rightarrow 0 = \log \frac{C'_1}{C'_2}$$

$$K_{bB} = 10^{-5} \quad K_{a\text{BH}^+} = 10^{-9} \Rightarrow \log 1 = \log \frac{C'_1}{C'_2} \Rightarrow C'_1 = C'_2 \Rightarrow \dots \Rightarrow \frac{V_2}{V_1} = \frac{1}{2}$$