Άσκηση 9.18.

Δι

HA 0,1M $K_{a_1} = 9 \cdot 10^{-6}$

HB 0,1M $K_{a_2} = 10^{-6}$

pH =;

$HA + H_2O \rightleftharpoons A^- + H_3O^+$

$0,1-x$ x $x+y$

$HB + H_2O \rightleftharpoons B^- + H_3O^+$

$0,1-y$ y $y+x$

$$K_{a_{HA}} = \frac{x \cdot (x+y)}{0,1-x} \xrightarrow[\frac{K_a}{0,1} < 10^{-2}]{} 0,1-x \simeq 0,1$$

$$K_{a_{HB}} = \frac{y \cdot (y+x)}{0,1-y} \simeq \frac{y \cdot (y+x)}{0,1}$$

$$\Rightarrow K_{a_{HA}} = \frac{x \cdot (x+y)}{0,1} \Rightarrow 9 \cdot 10^{-6} = \frac{x \cdot (x+y)}{0,1}$$

$$\Rightarrow 10^{-6} = \frac{y \cdot (y+x)}{0,1}$$

$$\Rightarrow x \cdot (x+y) = 0,9 \cdot 10^{-6} \quad (1)$$

$$\Rightarrow y(y+x) = 0,1 \cdot 10^{-6} \quad (2)$$

$$(1):(2) \Rightarrow \frac{x \cdot (x+y)}{y\,(y+x)} = \frac{0,9 \cdot 10^{-6}}{0,1 \cdot 10^{-6}} \Rightarrow \frac{x}{y} = \frac{9}{1} \Rightarrow x = 9 \cdot y$$

Αρα: $[H_3O^+]_{o\lambda} = x + y = 9y + y = 10y = ?$

όπου (1): $9y(9y+y) = 0,9 \cdot 10^{-6} \Rightarrow 9y \cdot 10y = 0,9 \cdot 10^{-6} \Rightarrow 90y^2 = 0,9 \cdot 10^{-6} \Rightarrow$

$$\Rightarrow y^2 = \frac{9 \cdot 10^{-7}}{9 \cdot 10^{+1}} = 10^{-8}$$

$$\Rightarrow y = 10^{-4}$$

και $x = 9 \cdot 10^{-4}$

οπότε: $[H_3O^+]_{o\lambda} = 10y = 10 \cdot 10^{-4} = 10^{-3} M$ άρα pH = 3

$$\alpha_{HA} = \frac{x}{0,1} = \frac{9 \cdot 10^{-4}}{10^{-1}} = 9 \cdot 10^{-3} \qquad \alpha_{HB} = \frac{y}{0,1} = \frac{10^{-4}}{10^{-1}} = 10^{-3}$$