À l'équilibre $HA + H_2O \rightleftharpoons A^- + H_3O^+$

Conservation de la matière :

$$C_0 = [AH] + [A^-] \quad (1)$$

$$K_A = \frac{[A^-]\,h}{[AH]} \quad (2)$$

2 relations relient $[A^-]$ et $[AH]$

↳ % de AH en solution

$$\alpha_A = \frac{[AH]}{C_0}$$

% de A^- en solution

$$\alpha_B = \frac{[A^-]}{C_0}$$

$$(1) \rightarrow \begin{cases} 1 = \alpha_A + \alpha_B \\ [A^-] = C_0 - [AH] \end{cases}$$

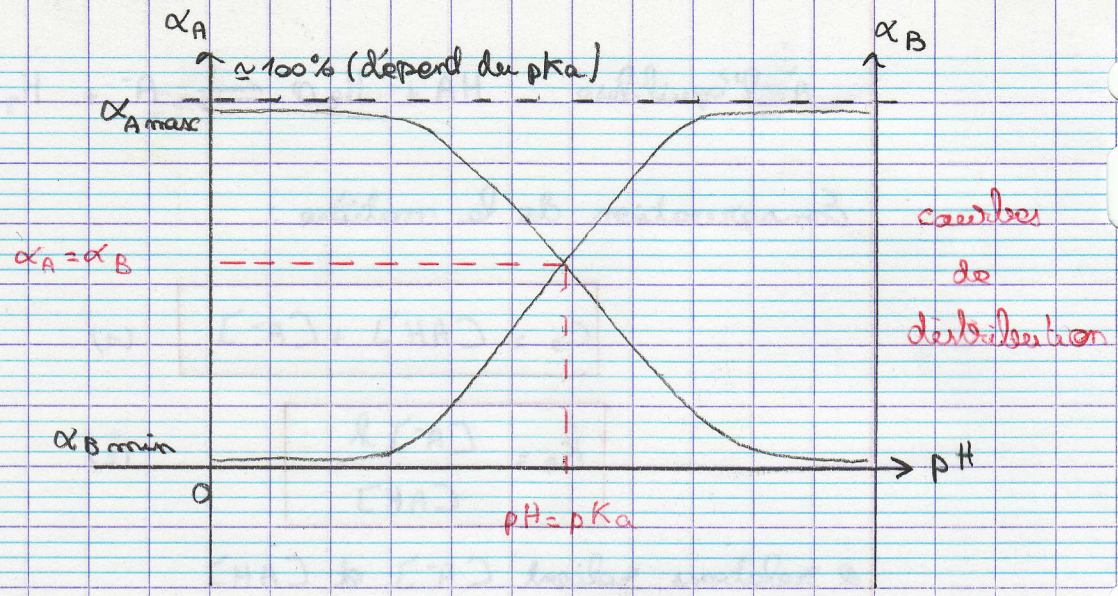
$$(2) \leftrightarrow [A^-] = C_0 - [AH] = \frac{K_a}{h}[AH]$$

$$[AH]\left(1 + \frac{K_a}{h}\right) = C_0$$

pourcentages de distribution

$$\alpha_A = \frac{1}{1 + \frac{K_a}{h}} = \frac{h}{h + K_a}$$

$$\alpha_B = 1 - \alpha_A = \frac{K_a}{h + K_a} = \frac{1}{1 + \frac{h}{K_a}}$$



$$pH = pKa + \log \frac{[A^-]}{[AH]} = pKa + \log \frac{\alpha_B}{\alpha_A}$$

donc $\boxed{\alpha_B = \alpha_A \Rightarrow pH = pKa}$