$[H^+] = [H_3O^+]$

$[OH^-] = {}^-$

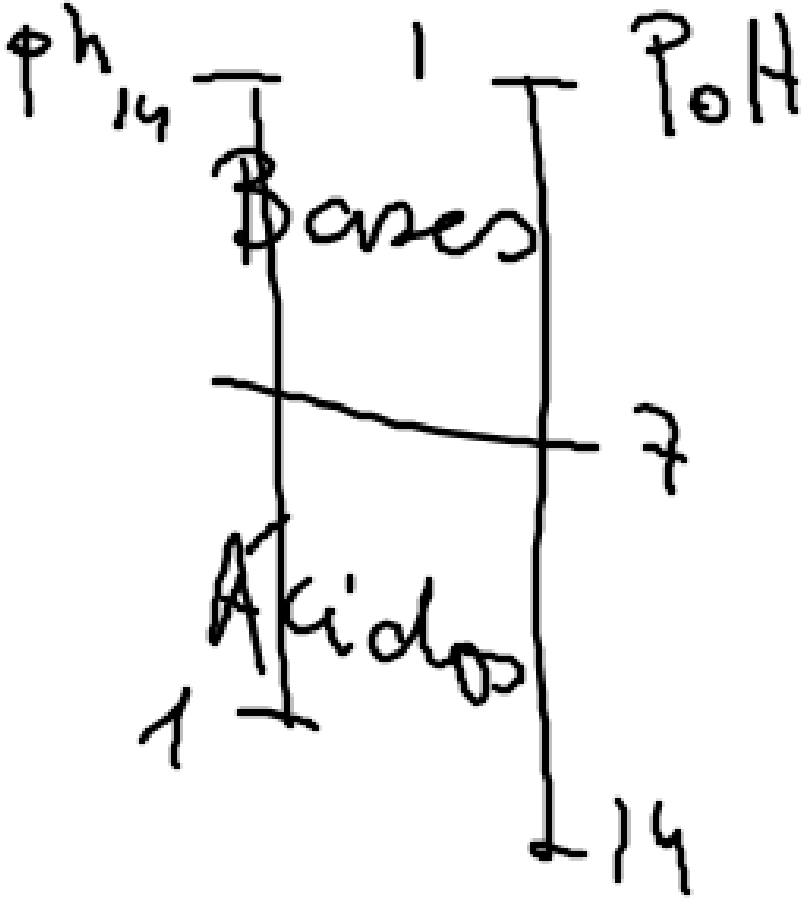
$HA + H_2O \rightleftharpoons H_3O^+ + A^-$

$NaOH \rightleftharpoons Na^+ + OH^-$

$NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$

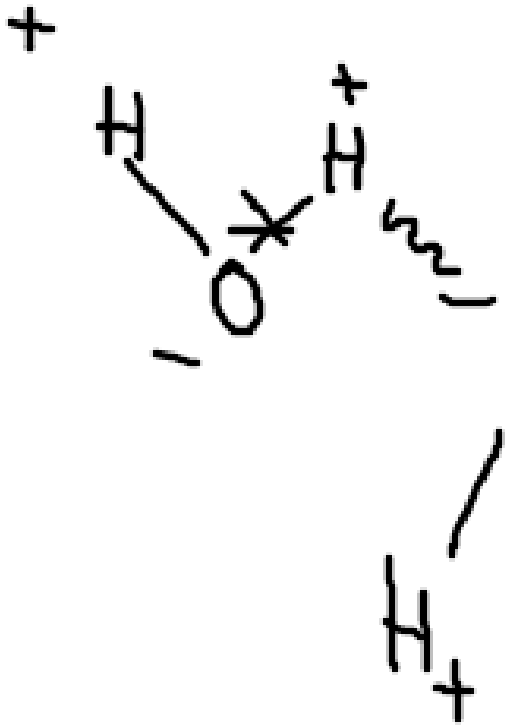
$$ph = -\log[H_3O^+] \rightarrow [H_3O^+] = 10^{-ph}$$

$$ph + poH = 14$$



P235] Ionización del agua

$$H_2O + H_2O \rightleftharpoons H_3O^+ + OH^-$$



$$[H_3O^+] = [OH^-] = 10^{-7}$$

$$[H_3O^+] \cdot [OH^-] = 10^{-14}$$

$$[H_3O^+] < \frac{10^{-14}}{[OH^-]}$$

$$[OH^-] < \frac{10^{-14}}{[H_3O^+]}$$

$$NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$$

$$K_b = \frac{[NH_4^+]\cdot[OH^-]}{[NH_3]}$$

$$K_a = \frac{[NH_3]}{[NH_4^+]\cdot[OH^-]}$$

Par ácido base

$$\boxed{K_a \cdot K_b = 10^{-14}} = K_w$$

$$K_a = \frac{10^{-14}}{K_b}$$

$$K_b = \frac{10^{-14}}{K_a}$$

12] $NaOH \rightleftharpoons Na^+ + OH^-$ 0'1 M

V = 100 ml = 0'1 L

0'1 — 0'1 0'1

a) $pOH = -\log[OH^-] = -\log 0'1 = 1$

$\boxed{pH = 14 - pOH = 14 - 1 = 13}$

De otra manera

$[H_3O^+] = \frac{10^{-14}}{[OH^-]} = \frac{10^{-14}}{0'1} = 10^{-13}$

$pH = -\log[H_3O^+] = -\log[10^{-13}] = 13$

b) $V = 250 ml = 0'25 l$

Nº moles en a)

$$M = \frac{n}{V} \rightarrow 0'1 = \frac{n}{0'1} \rightarrow n = 0'1 \cdot 0'1 = 0'01 \text{ moles NaOH}$$

Molaridad en 250 ml

$$M = \frac{0'01}{0'25} = 0'04 M$$

$$pOH = -\log [OH^-] =$$

$$pOH = -\log [0'04] = 1'4$$

$$ph = 14 - 1'4 = 12'6$$

13) $HCOOH + H_2O \rightleftharpoons HCOO^- + H_3O^+$

C_0 0'1

C_e 0'1-0'0041=0'0959 0'0041 0'0041

a) ph=2'38 (con el ph tenemos $[H_3O^+]$

$[H_3O^+] = 10^{-ph} = 10^{-2'38} = 0'0041$

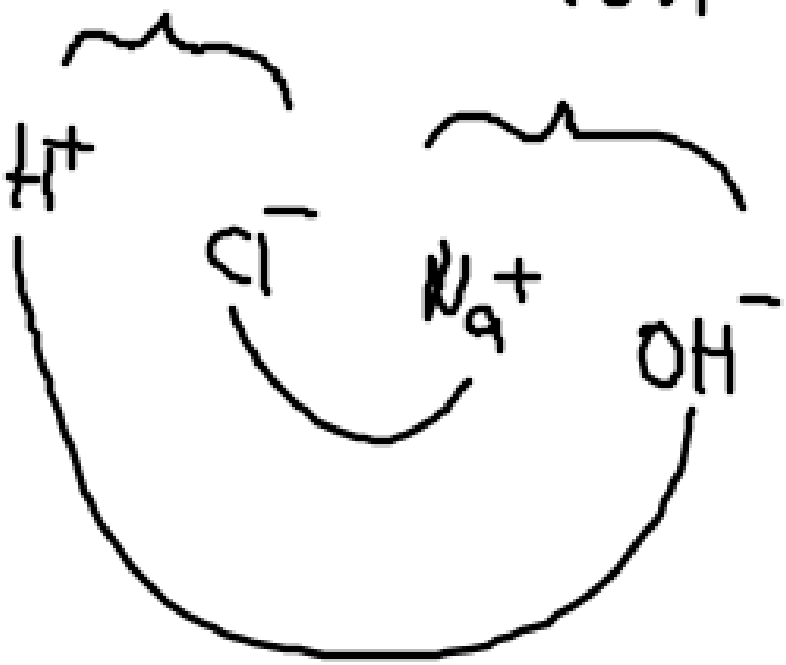
$$K_a = \frac{[HCOO^-]\cdot[H_3O^+]}{[HCOOH]} = \frac{0'0041\cdot 0'0041}{0'0959} = 1'8\cdot 10^{-4}$$

Neutralizaciones

Ácido + base $\rightleftharpoons$ sal + agua

Fuertes

$HCl + NaOH \rightarrow NaCl + H_2O$



$H_2SO_4 + 2\,NaOH \rightarrow Na_2SO_4 + 2\,H_2O$

1- Ajustar

2- Calcular cuantos moles de H_2SO_4 tengo y cuanto NaOH necesito.

3- Calcular el volumen necesario de NaOH

2 Cuanto volumen de NaOH 0'5M hace falta para neutralizar 50ml de H_2SO_4 3M ?

Moles H_2SO_4 $M = \frac{n}{V}$

14,15,16,17

$\frac{x^2}{x+3}$

$n = M \cdot V = 3 \cdot 0'05 = 0'15$ moles

$0'15 \text{ moles } H_2SO_4 \cdot \frac{2 \text{ moles NaOH}}{1 \text{ mol } H_2SO_4} = 0'3 \text{ moles NaOH}$

Calculo el volumen de NaOH

$V = \frac{n}{M} = \frac{0'3}{0'5} = 0'6 \text{ L} = 600 \text{ ml}$