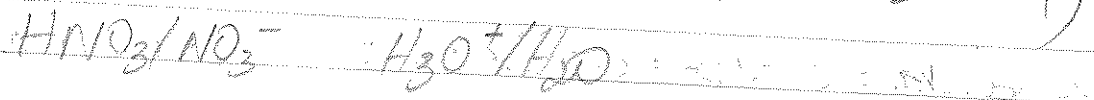
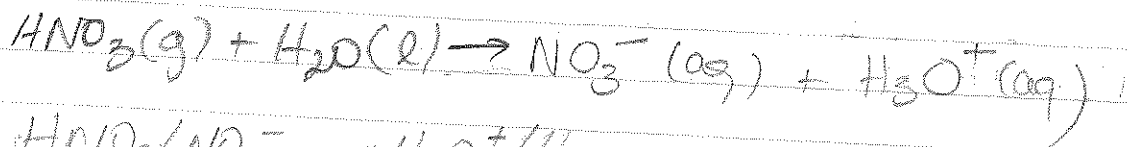
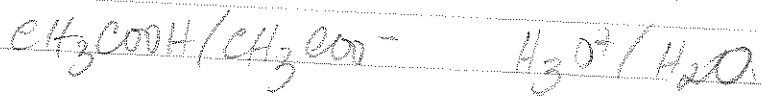
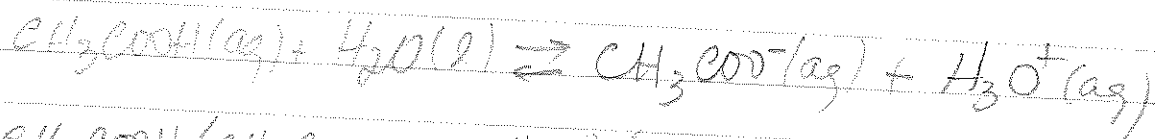


Ficha de trabalhos 2.º8

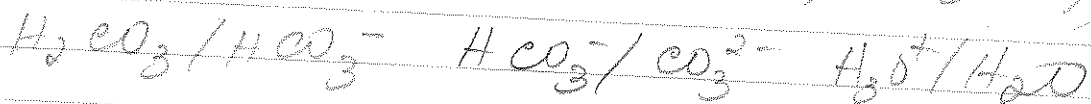
1) ácido nítrico



ácido acético



ácido carbónico



$$2) [\text{H}_3\text{O}^+] = 5,5 \times 10^{-4} \text{ mol/dm}^3$$

$$\text{pH} = -\log 5,5 \times 10^{-4} = 3,3$$

$$\text{pH} = -\log [\text{H}_3\text{O}^+]$$

$$3) \text{pH} = 7,3$$

$$[\text{H}_3\text{O}^+] = 10^{-\text{pH}} = 10^{-7,3} = 5 \times 10^{-8} \text{ mol/dm}^3$$

$$4) 10^\circ\text{C} \quad K_w = 1 \times 10^{-12}$$

$$\text{Neutra} \quad [\text{OH}^-] = [\text{H}_3\text{O}^+] = x$$

$$x^2 = 1 \times 10^{-12}$$

$$x = \sqrt{1 \times 10^{-12}}$$

$$K_w = [\text{OH}^-][\text{H}_3\text{O}^+]$$

$$x = 1 \times 10^{-6} \text{ mol/dm}^3$$

$$\text{pH} = -\log 1 \times 10^{-6} = 6$$

⑤ 1 cm^3 água 25°C

$\text{pH} = 7$ neutra (25°C)

$$[\text{H}_3\text{O}^+] = 10^{-7} = 1 \times 10^{-7} \text{ mol/dm}^3$$

$$c = \frac{n}{V} \Leftrightarrow n = c \times V = 1 \times 10^{-7} \times 1 \times 10^{-3} = 1 \times 10^{-10} \text{ mol}$$

$$Np = n \times N_A = 1 \times 10^{-10} \times 6,022 \times 10^{23} = 6,022 \times 10^{13}$$

⑥ 6.1

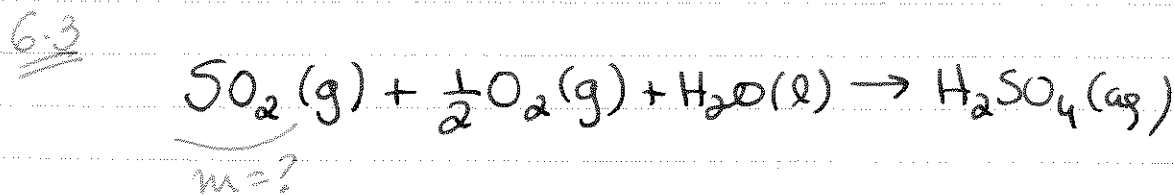
$$\frac{[\text{H}_3\text{O}^+]_r}{[\text{H}_3\text{O}^+]_{\text{ref}}} = \frac{10^{-3,5}}{10^{-5,5}} = 100$$

6.2 $V = 89,0 \text{ cm}^3$ $\text{pH} = 5,0$

$$[\text{H}_3\text{O}^+] = 10^{-\text{pH}} = 10^{-5} \text{ mol/dm}^3$$

$$c = \frac{n}{V} \Leftrightarrow n = c \times V = 1 \times 10^{-5} \times 89,0 \times 10^{-3} = 8,9 \times 10^{-7} \text{ mol}$$

$$8,9 \times 10^{-7} \times 10^3 = 8,9 \times 10^{-4} \text{ mmol}$$



$$[\text{H}_3\text{O}^+] = 10^{-5,5} = 3,16 \times 10^{-6} \text{ mol/dm}^3$$

$$\text{pH} = 5,5$$

$$n = c \times V = 3,16 \times 10^{-6} \times 100 \times 10^{-3} = 3,16 \times 10^{-7} \text{ mol}$$



$$x = 1,58 \times 10^{-7} \text{ mol}$$

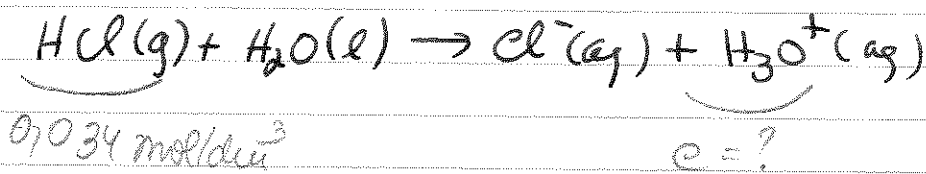


$$x \text{ — } 1,58 \times 10^{-7} \text{ mol}$$

$$x = 1,58 \times 10^{-7} \text{ mol SO}_2$$

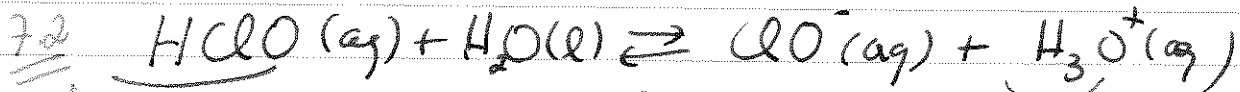
$$m = n \times M = 1,58 \times 10^{-7} \times 64,07 = 1,01 \times 10^{-5} \text{ g}$$

7.1



$$[\text{HCl}] = [\text{H}_3\text{O}^+] = 0,034 \text{ mol/dm}^3$$

$$\text{pH} = -\log [\text{H}_3\text{O}^+] = -\log 0,034 = 1,47$$



ini	$0,034 \text{ mol/dm}^3$		
eq	$0,034 - x$	x	x

$$K_a = \frac{[\text{ClO}^-][\text{H}_3\text{O}^+]}{[\text{HClO}]}$$

$$3,0 \times 10^{-8} = \frac{x^2}{(0,034 - x)}$$

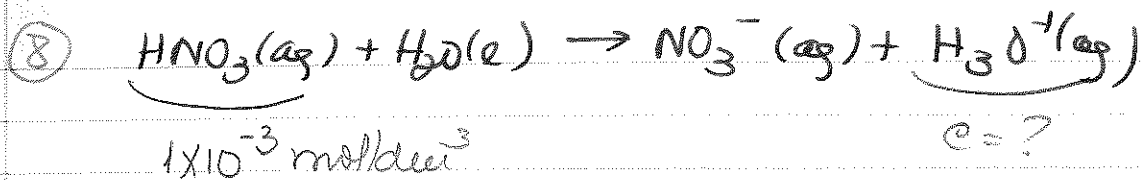
$$\text{pH} = -\log 3,2 \times 10^{-5}$$

$$\text{pH} = 4,5$$

$$1,02 \times 10^{-9} - 3 \times 10^{-8} x - x^2 = 0$$

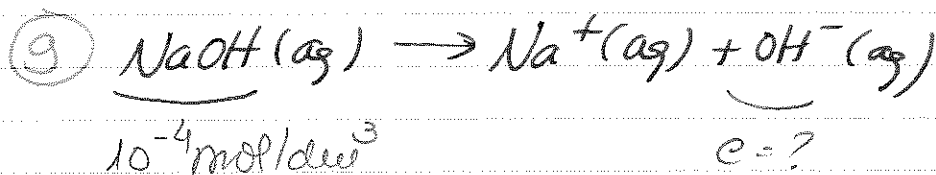
$$x = \frac{3 \times 10^{-8} \pm \sqrt{(3 \times 10^{-8})^2 - 4 \times (-1) \times 1,02 \times 10^{-9}}}{2 \times (-1)}$$

$$x = \frac{3 \times 10^{-8} \pm 6,4 \times 10^{-5}}{-2} \Rightarrow x = -3,2 \times 10^{-5} \vee x = 3,2 \times 10^{-5} \text{ mol/dm}^3$$



$$[\text{HNO}_3] = [\text{H}_3\text{O}^+]$$

$$\text{pH} = -\log 1 \times 10^{-3} = 3$$

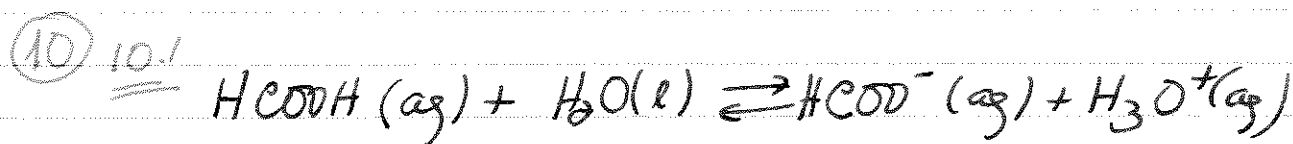


$$[\text{NaOH}] = [\text{OH}^-] = 1 \times 10^{-4} \text{ (mol/dm}^3)$$

$$\text{pOH} = -\log [\text{OH}^-] = -\log 1 \times 10^{-4} = 4$$

(temperatura per 25°C) $\text{pH} + \text{pOH} = 14$ (25°C)

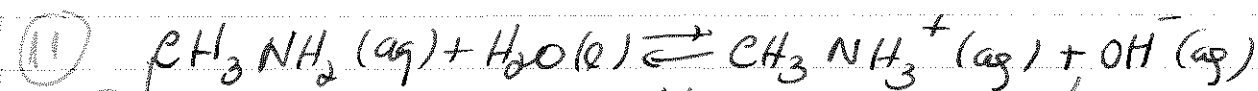
$$\text{pH} = 14 - 4 = 10$$



10.2 $\text{HCOOH} / \text{HCOO}^-$ 25°C

$$K_a \cdot K_b = K_w$$

$$K_b = \frac{1 \times 10^{-14}}{1,8 \times 10^{-4}} = 5,6 \times 10^{-11}$$



<u>11.1</u>	?	/	x	/	x
-------------	---	---	---	---	---

$$K_b = \frac{[\text{CH}_3\text{NH}_3^+][\text{OH}^-]}{[\text{CH}_3\text{NH}_2]}$$

$$pH = 10,5 \quad [H_3O^+] = 10^{-10,5} = 3,16 \times 10^{-11} \text{ mol/dm}^3$$

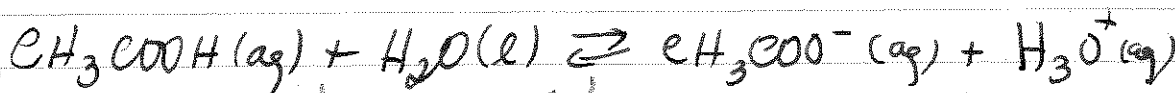
$$[H_3O^+] \cdot [OH^-] = K_w$$

$$3,16 \times 10^{-11} \times [OH^-] = 1 \times 10^{-14}$$

$$[OH^-] = 3,16 \times 10^{-4} \text{ mol/dm}^3$$

$$[CH_3NH_3^+] = [OH^-] = 3,16 \times 10^{-4} \text{ mol/dm}^3$$

12



I	EQ	a	/	x	x
---	----	---	---	---	---

$$pH = 4 \quad [H_3O^+] = 10^{-4} = 1 \times 10^{-4} \text{ mol/dm}^3$$

$$K_a = \frac{[H_3O^+][CH_3COO^-]}{[CH_3COOH]}$$

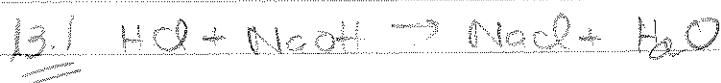
$$1,7 \times 10^{-5} = \frac{(1 \times 10^{-4})^2}{a}$$

$$a = 5,9 \times 10^{-4} \text{ mol/dm}^3$$

13

HCl
20 mL
0,100 mol/dm³

25 mL
NaOH



$$n(HCl) = n(NaOH)$$

$$0,100 \times 20 \times 10^{-3} = c \times 25 \times 10^{-3}$$

$$c = 0,08 \text{ mol/dm}^3$$

13.2 pH no pts de equivalencia e' 7
logo o indicador deve ficar, a zone
de viragem deve indicar o pH no pts de equivalencia.

Vermelho de fenol