

Basico-

b) Mas basico es $B_3O_3^{3-}$ puesto que no se produce H^+ , tiene $pK_a = 12$

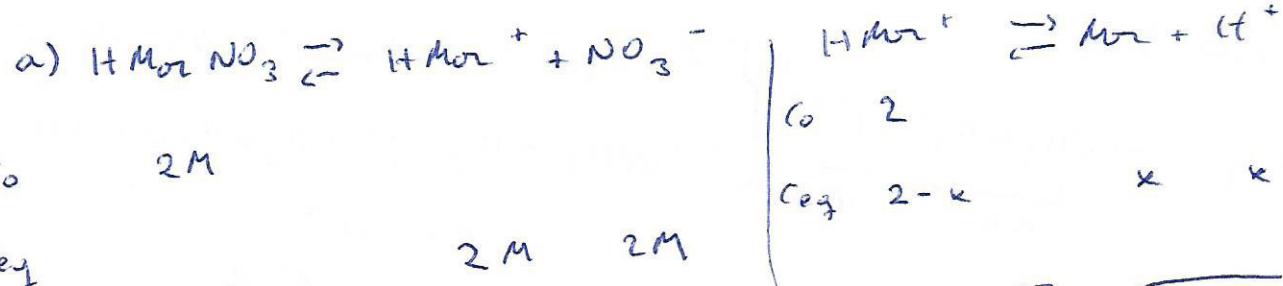
$$OH^- = \sqrt{K_b \cdot C_1} = \sqrt{10^{-2} \cdot 0.1} = 0.03 \quad pOH = 1.52$$

$$pH = 12.48$$

$$pK_a = 12$$

$$pK_b = 2$$

③ $pK_b = 5.79$



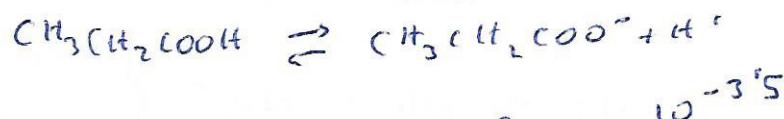
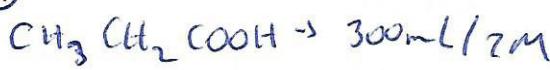
$$[\text{H}^+] = \sqrt{K_a \cdot c} = \sqrt{6.17 \cdot 10^{-9} \cdot 2} = 1.1 \cdot 10^{-4} \text{ M}$$

$$K_a = \frac{K_w}{K_b} = \frac{10^{-14}}{10^{-5.79}} = 6.17 \cdot 10^{-9}$$

$$pH = -\log [\text{H}^+] = 3.96$$

b) $\text{Mo}_2 = 1.1 \cdot 10^{-4} \text{ M} \rightarrow$ ya calcularlo ↗

④



C_0	2
C_{eq}	
C_{eq}	

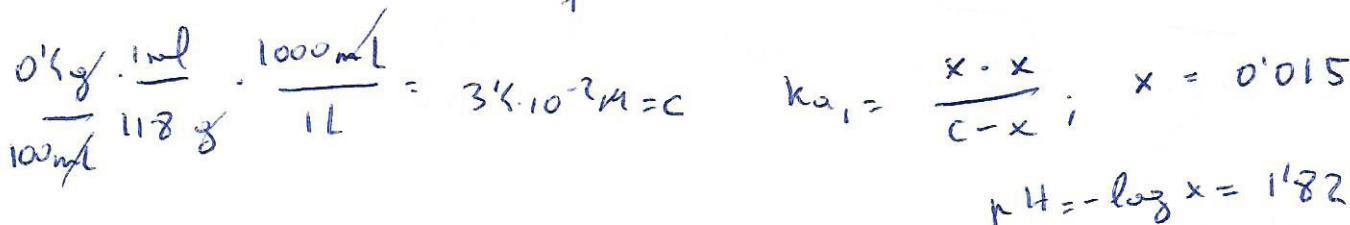
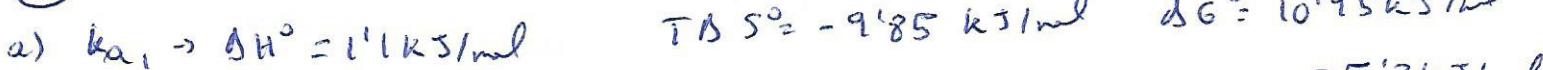
$$pH = 3.5$$

$$K_a = 1.3 \cdot 10^{-5}$$

$$[\text{CH}_3\text{CH}_2\text{COO}^-] = \frac{K_a \cdot [C_2\text{H}_5\text{COOH}]}{[\text{H}^+]} = 0.08 \text{ M}$$

$$0.08 = \frac{n}{0.3} ; n = 0.025 \text{ mol} \cdot \frac{96 \text{ g}}{1 \text{ mol}} = 2.367 \text{ g}$$

⑤



$$K_{a_1} = \frac{x \cdot x}{C-x} ; x = 0.015$$

$$pH = -\log x = 1.82$$



$$\frac{0'8\text{g}}{100\text{mL}} \cdot \frac{1\text{mol}}{162\text{g}} \cdot \frac{1000\text{mL}}{1\text{L}} = 5 \cdot 10^{-3}\text{M}$$

$$H_2A + A^{-2} \rightarrow 2HA^-$$

$$3'8 \cdot 10^{-3} \quad 5 \cdot 10^{-3} \quad \cancel{\text{et d'autre}}$$

mol.in.
mol.eq. = $1'6 \cdot 10^{-3} \quad 2(3'8 \cdot 10^{-3})$
~ / tampon

$$K_2 \text{ at } 100^\circ\text{C} \rightarrow \left(-\frac{\Delta H}{R} \left(\frac{1}{T_2} - \frac{1}{T_1} \right) \right)$$

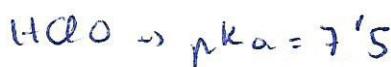
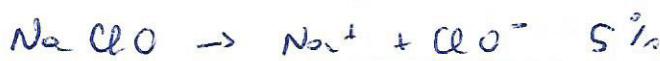
$$K_2(25^\circ\text{C}) = e^{\left(-\frac{3'6}{8 \cdot 3 \cdot 10^{-3}} \left(\frac{1}{248} - \frac{1}{373} \right) \right)} = 5'27 \cdot 10^{-7}$$

$$K_2 = e^{\left(-\frac{3'6}{8 \cdot 3 \cdot 10^{-3}} \left(\frac{1}{248} - \frac{1}{373} \right) \right)}$$

$$= 3'93 \cdot 10^{-7}$$

$$H^+ = \frac{k_a [H^+ A^-]}{[A^{-2}]} = 1'73 \cdot 10^{-6} \quad pK_a = 5'76$$

(c)



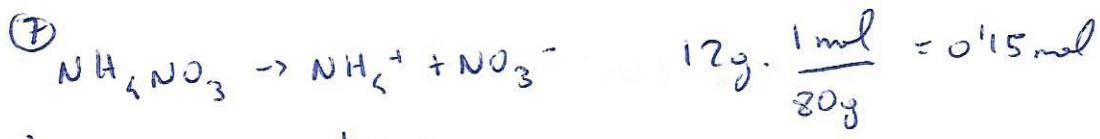
a) $\frac{100\text{g}}{100\text{mL}} \cdot \frac{5\text{g}}{100\text{g}} \cdot \frac{7'5\text{mol}}{73'5\text{g}} \cdot \frac{1000\text{mL}}{1\text{L}} = 0'67\text{M}$



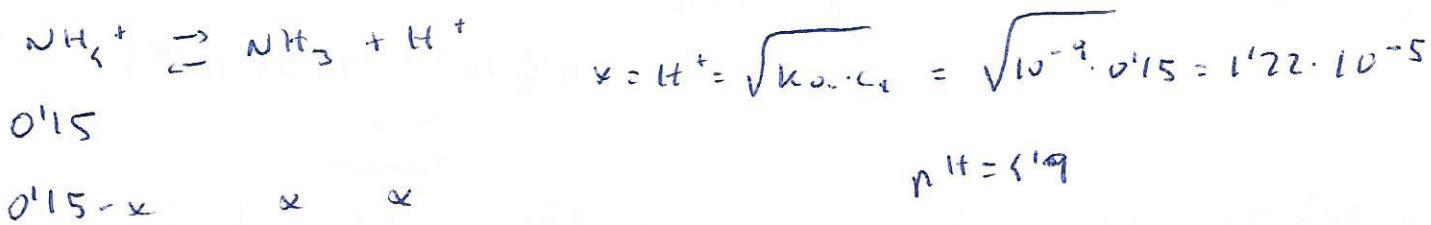
$$k_b = \frac{[H^+ \text{ClO}][\text{OH}^-]}{[\text{ClO}^-]} \quad k_b = \frac{k_w}{K_a} = 10^{-6'5}$$

c) $\downarrow pK_a$ hay que $\uparrow H^+$ & $\downarrow OH^-$, con no podemos disminuirlos
que anadir HClO nos contrarestan

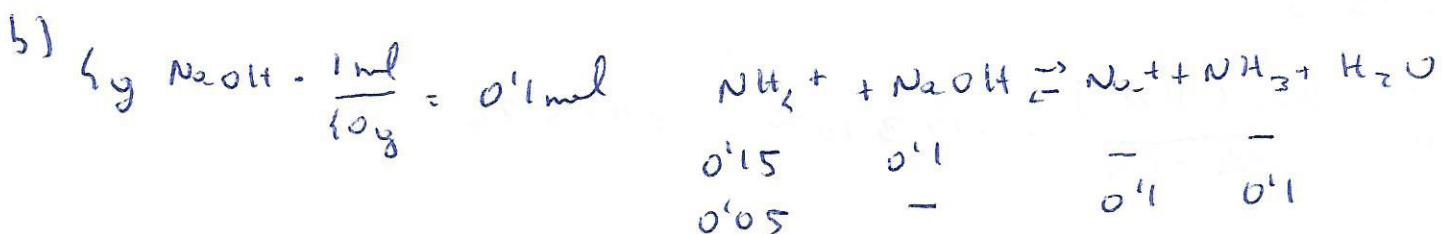
d) $pOH = 14 - pH = 7'5 \quad \frac{[\text{ClO}^-]}{[H^+ \text{ClO}]} = \frac{[\text{OH}^-]}{k_b} = \frac{10^{-7'5}}{10^{-6'5}} = 0'1$



a) $0'15\text{M}$



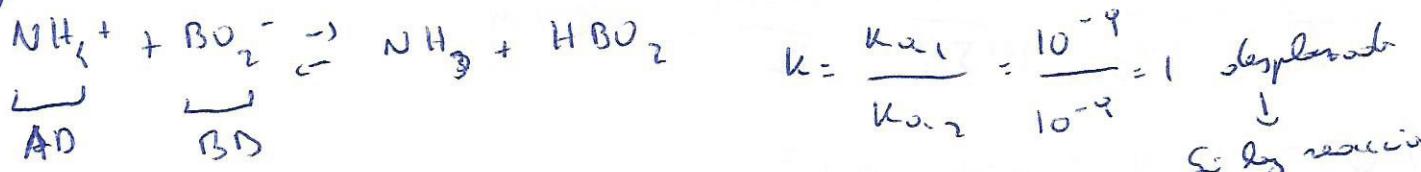
$$[\text{NH}_3] = 0'15\text{mol} \cdot \frac{18\text{g}}{1\text{mol}} = 2'7\text{g/L}$$



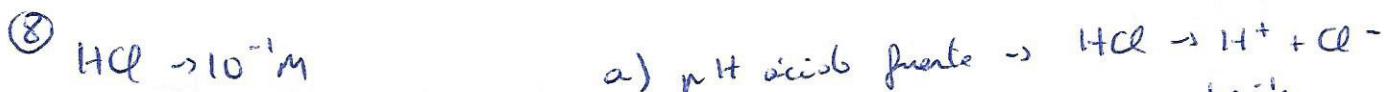
$$k_a = \frac{[\text{NH}_3^+] [\text{H}^+]}{[\text{NH}_3]} ; [\text{H}^+] = \frac{k_a [\text{NH}_3]}{[\text{NH}_3^+]}$$

$$p\text{H} = -\log [\text{H}^+] = 9'3$$

c)



✓
En principio no dice que sea base reaccionaria

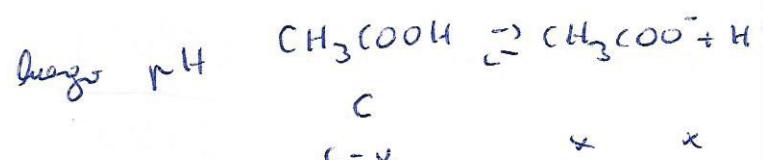


$$\text{CH}_3\text{COOH} \rightarrow 10^{-1}\text{M} \quad p\text{K}_{\text{a},1} = 5$$

$$p\text{H} = -\log [\text{H}^+] = 1$$

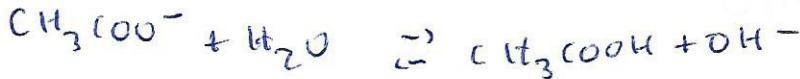


$$\begin{array}{ccccccc} 0'1 & 0'1 & - & - & & & \\ & & - & - & & & \\ & & 0'1 & 0'1 & & & \\ & & \downarrow & \downarrow & & & \\ & & \text{se agota} & \text{se agota} & & & \end{array}$$



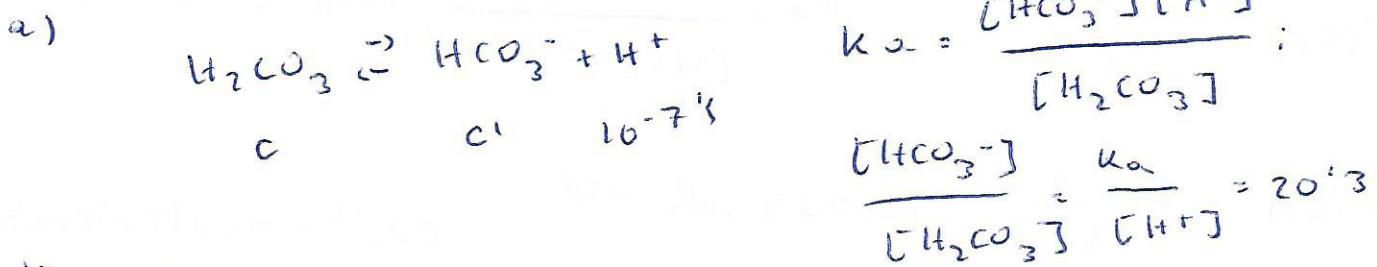
$$x = [\text{H}^+] = \sqrt{k_{\text{a},1} \cdot c} = \sqrt{10^{-6}} = 10^{-3}$$

$$p\text{H} = 3$$

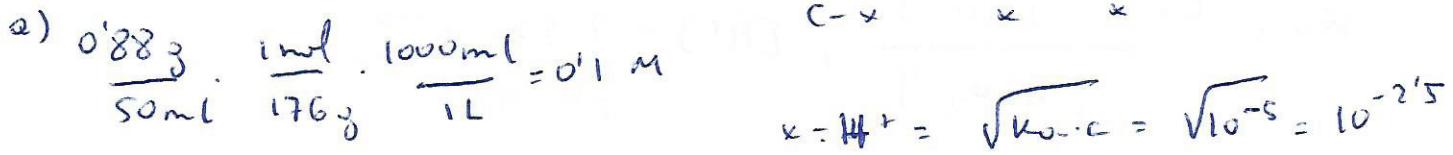
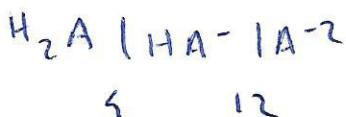


$$x = [\text{OH}^-] = \sqrt{10^{-9} \cdot 0'1} = 10^{-5} \rightarrow n_{\text{Olt}} = 5 ; n_{\text{lt}} = 9$$

⑨

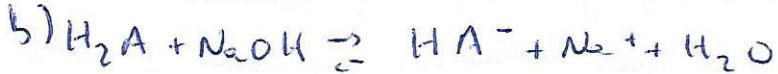


⑩



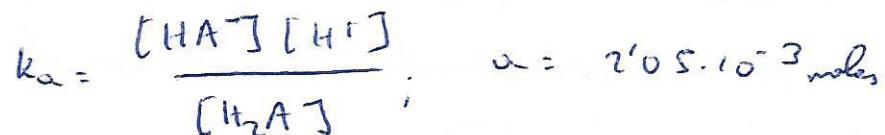
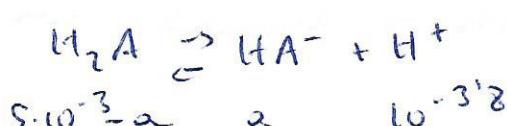
$$x = \text{H}^+ = \sqrt{K_{\text{a}} \cdot c} = \sqrt{10^{-5}} = 10^{-2'5}$$

$$n_{\text{H}} = 2'5$$

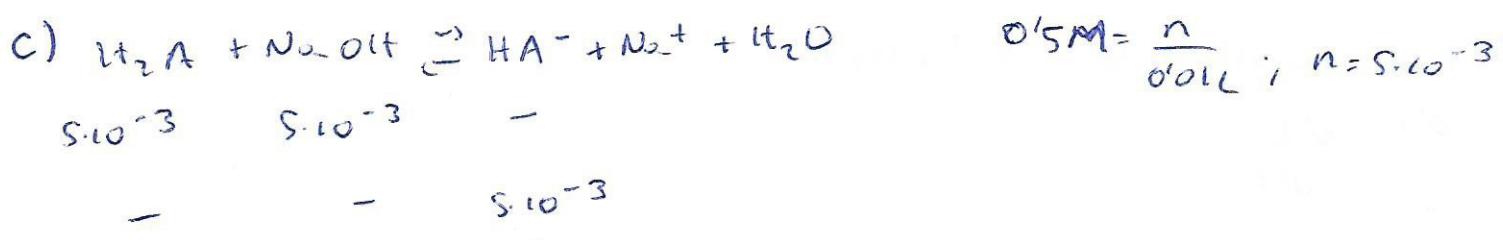


mles $5 \cdot 10^{-3} \text{ a}$

mles eq $5 \cdot 10^{-3} - a \quad a - \quad a$



$$10^{-3'8} = \frac{2'05 \cdot 10^{-3}}{1 - 2'05 \cdot 10^{-3}}$$



$$0'5\text{M} = \frac{n}{0'01\text{L}} ; n = 5 \cdot 10^{-3}$$

Se rompe el tanque \rightarrow pH de un anfótero

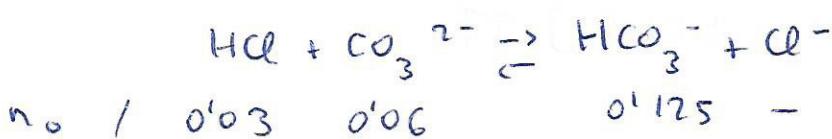
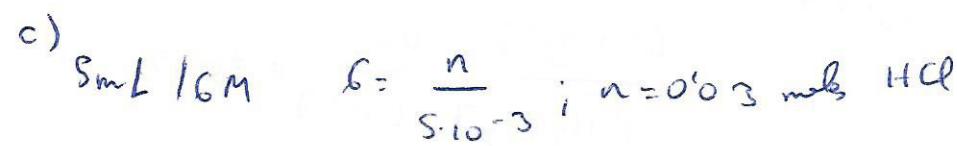
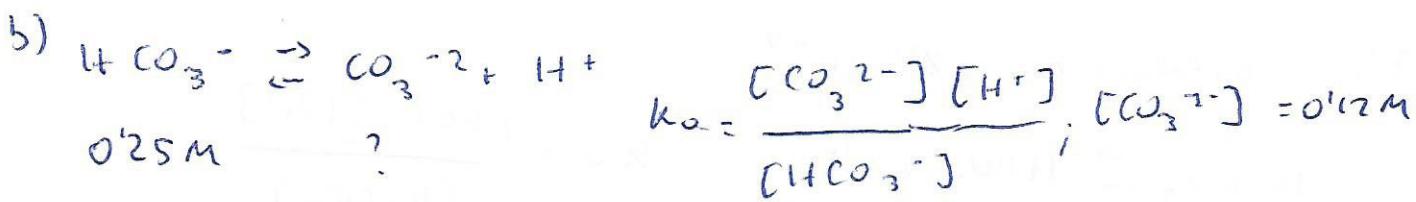
$$\text{H}^+ = \sqrt{k_{\text{a}_1} \cdot k_{\text{a}_2}} = \sqrt{10^{-5} \cdot 10^{-8}} = 10^{-8} \quad \text{pH} = 8$$

(11) a) con NaHCO_3 , Na_2CO_3 y H_2O

* con NaHCO_3 , NaOH y H_2O

* con Na_2CO_3 , HCl y H_2O

En las 3 situaciones los contenidos iniciales son suficientes



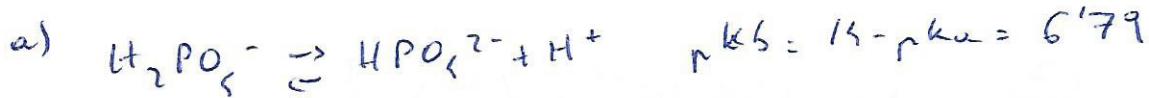
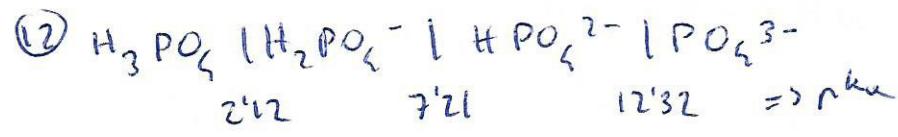
$$\text{CO}_3^{2-} \rightarrow n = 0'12 \cdot 0'5 = 0'06$$

$$\text{HCO}_3^- \rightarrow n = 0'25 \cdot 0'5 = 0'125$$

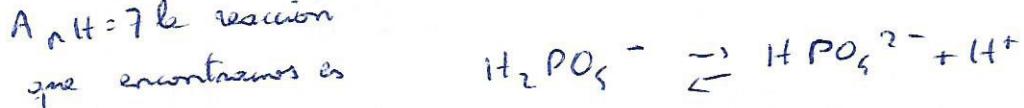
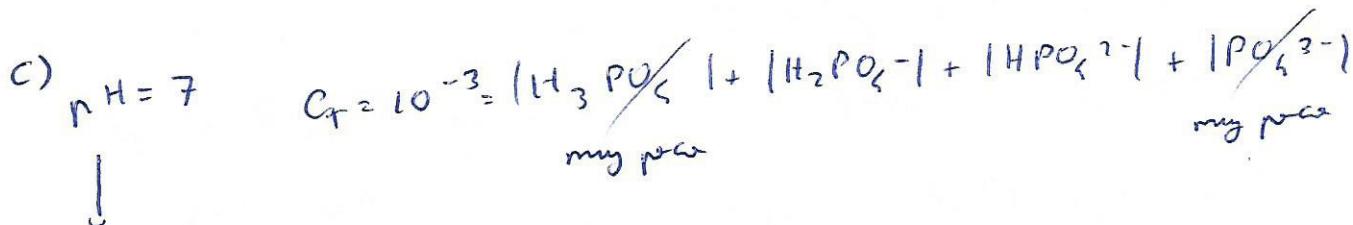
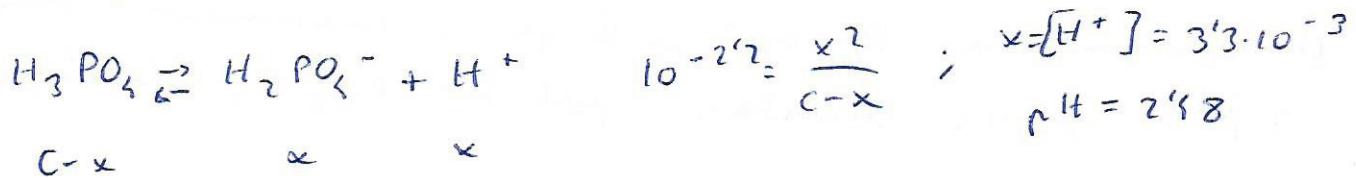
$$k_{\text{a}_2} = \frac{[\text{CO}_3^{2-}][\text{H}^+]}{[\text{HCO}_3^-]} ; [\text{H}^+] = 2'47 \cdot 10^{-10}$$

$$\text{pH} = 9'61$$

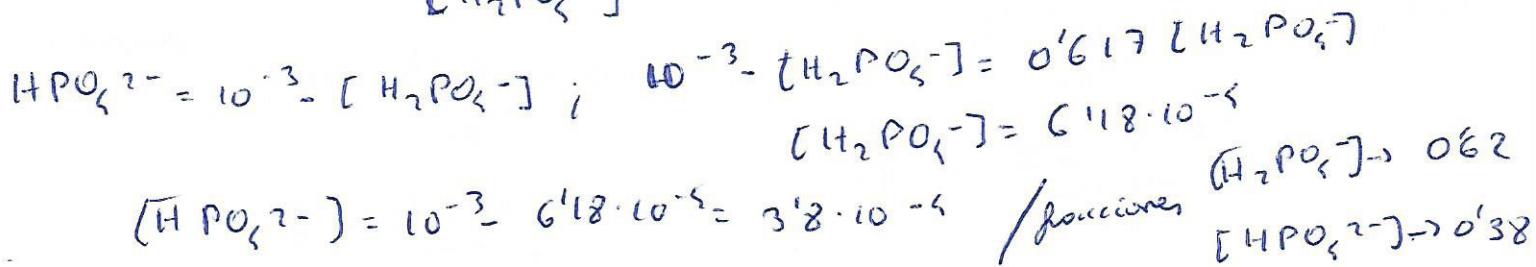
d) En el caso de preparar con NaHCO_3 y Na_2CO_3 necesitará la cantidad necesaria de cada producto en una balanza, echando ambas cantidades en un matraz y añadiendo $0'5\text{L}$ de H_2O con un frasco bivalv. En el caso de emplear NaOH o HCl mediría los ml. necesarios con una pipeta, posteriormente los echaría al matraz y envasaría con H_2O hasta los $0'5\text{L}$.



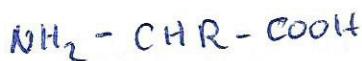
b) $\frac{1g}{1\text{mL}} \cdot \frac{0'05\text{g}}{100\text{g}} \cdot \frac{1000\text{mL}}{1\text{L}} \cdot \frac{1\text{mol}}{98\text{g}} = 5'1 \cdot 10^{-3}\text{M} = C$



$$\frac{[\text{HPO}_4^{2-}]}{[\text{H}_2\text{PO}_4^-]} = \frac{k_{21}}{[\text{H}^+]} = \frac{10^{-7'21}}{10^{-7}} = 0'617$$



(3)

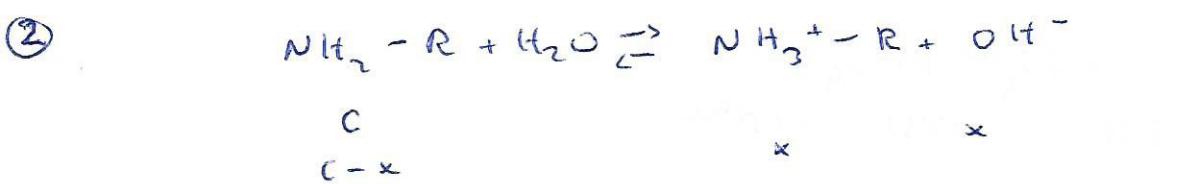


$$\text{pK}_1 = 5$$

$$\text{pK}_2 = 8$$



$$\frac{[\text{COO}^-]}{[\text{HCOO}^-]} = \frac{x^2}{0'1-x} ; \quad x = 9'95 \cdot 10^{-5} = [\text{COO}^-]$$



$$\begin{array}{l} \text{pK}_{\text{a}2} = 8 \\ \text{pK}_{\text{b}} = 6 \end{array} \quad k_b = \frac{x^2}{0'1-x}; \quad x = 3'16 \cdot 10^{-5} = [\text{NH}_3^+]$$



H^+ reacciona con $\text{R}-\text{COO}^-$, por lo que su concentración disminuirá y $\text{pK}_{\text{a}1}$, $\text{pK}_{\text{a}2}$ aumentarán puesto que K_1 y K_2 disminuyen.

(15) glicina - $\text{pK}_{\text{a}1} = 2'35$
 $\text{pK}_{\text{b}} = 5'5 \rightarrow \text{pK}_{\text{a}2} = \cancel{8'68}$
 $\text{pK}_{\text{a}2} = 8'6$

a) $\text{pH} = \frac{\text{pK}_{\text{a}1} + \text{pK}_{\text{a}2}}{2} = 5'47$

2+	+	2	-
2'18	9'06	10'55	

b) lisina - $\text{pK}_{\text{a}1} = 2'18$
 $\text{pK}_{\text{a}2} = 9'06$
 $\text{pK}_{\text{a}3} = 10'55$

$$\text{pH} = \frac{9'06 + 10'55}{2} = 9'8$$

pH será menor

(15) $\text{H}_2\text{A} \rightarrow 2'9g / 250\text{mL} \cdot \frac{1\text{mol}}{116g} \cdot \frac{1000\text{mL}}{1\text{L}} = 0'1\text{M}$

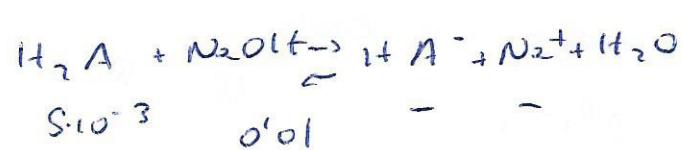


$$1'9 \quad 6'3$$

$$0'1-x \quad x \quad x$$

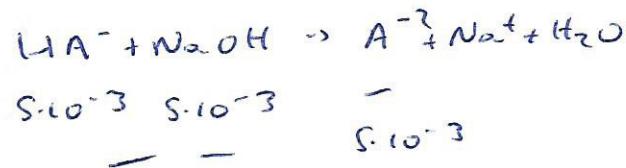
$$\frac{k_a}{10^{-11.9}} = \frac{x^2}{0'1-x}; \quad x = 0'03; \quad \text{pH} = 1'95$$

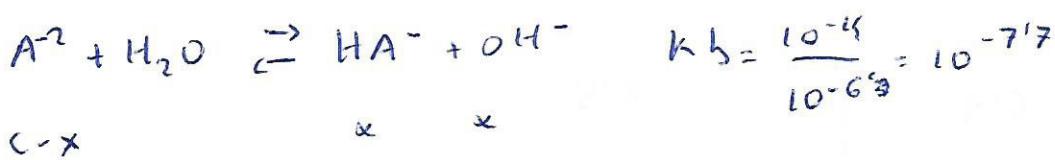
b) $0'1\text{M} = \frac{n}{0'05}; \quad n = 5 \cdot 10^{-3}$



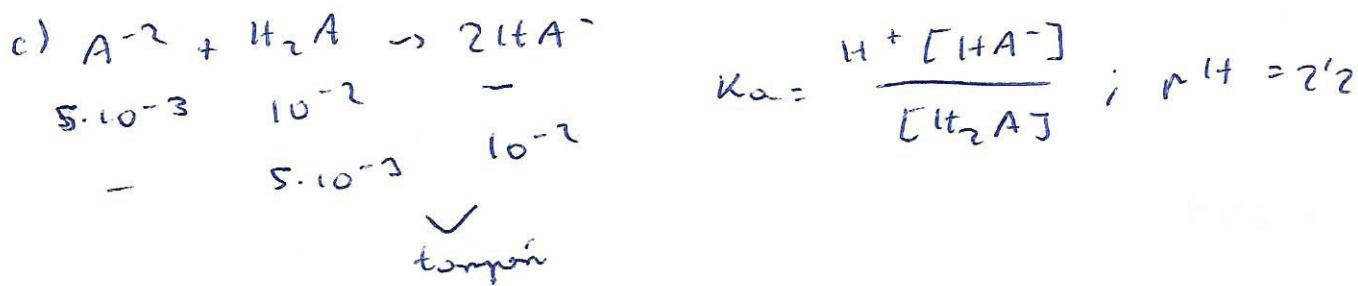
$$y = \frac{y}{0'1}; \quad y = 0'1 \cdot \frac{1\text{mol}}{500} = 0'01\text{mol Na}_2\text{Olt}$$

$$[\text{A}^{2-}] = \frac{5 \cdot 10^{-3}}{0'15} = 0'033\text{M}$$

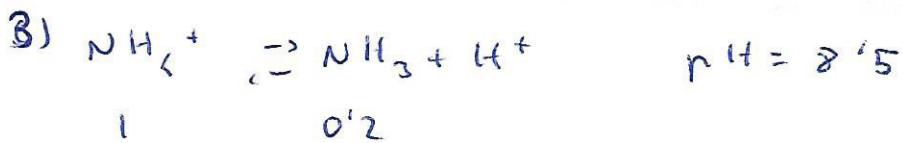
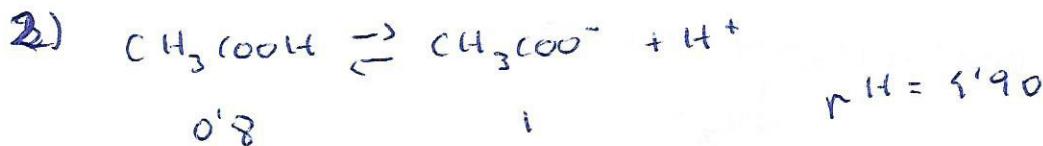
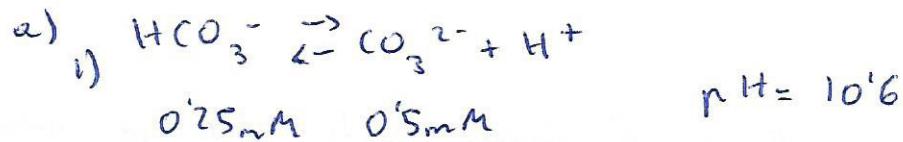




$$OH^- = \sqrt{10^{-7.7} \cdot 0.033}; \quad pOH = 8.6; \quad pH = 9.4$$



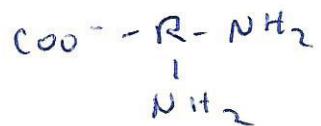
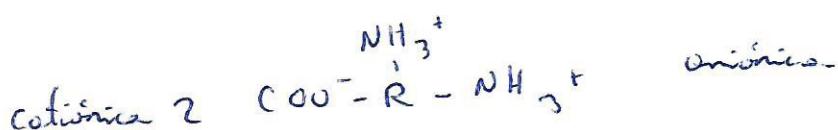
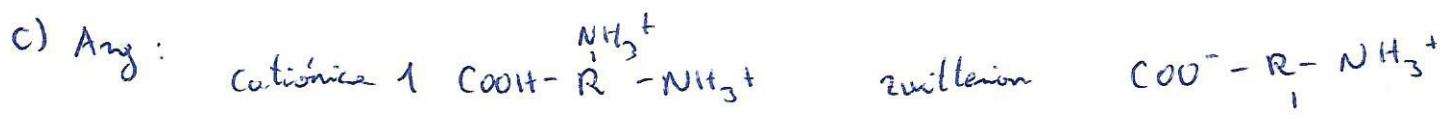
(16)



b) Glu $\rightarrow pK_a = \frac{2.3 + 9.8}{2} = 6.05$

Ac glutamine $\rightarrow pK_a = \frac{2.1 + 3.9}{2} = 3$

Arg $\rightarrow pK_a = \frac{9.2 + 12.5}{2} = 10.85$



Las otras 2 especies se tienen de forma similar

d)	10'6		5'9		8'5
Gli	- sale	,	+ sale		+ sale
Alglu	- sale	,	- sale		- sale
Arg	+ sale	,	+ queda		+ queda

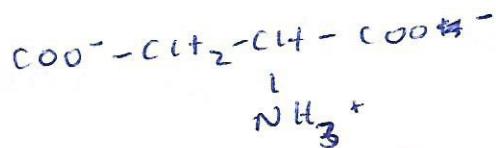
(17)

a) Gli = 6'09

Asp = 2'945

b) = c) del 16

c) Asp a pH = 6'1 se mueve hacia el amino grupo que se encuentra en la forma



Gli no se mueve ya que está en su tautómero