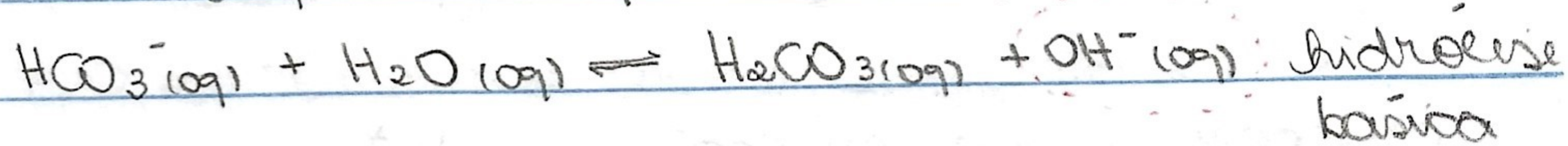
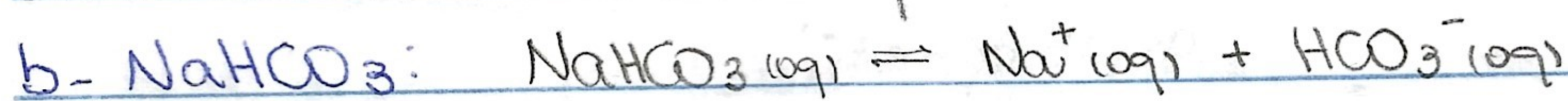


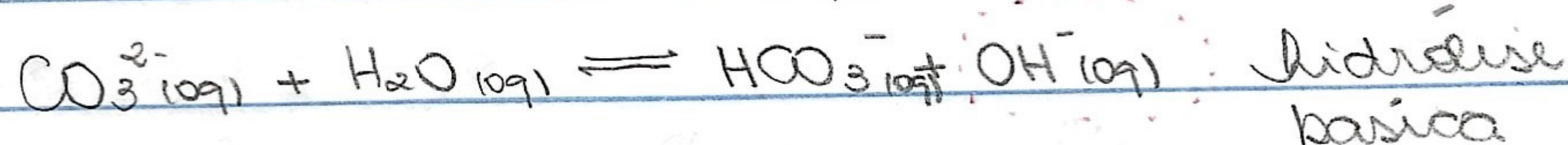
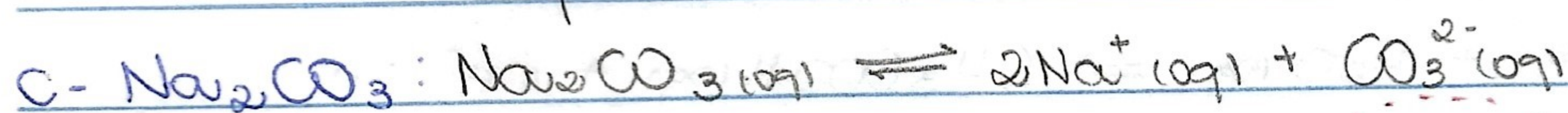
## Hidrólise

01

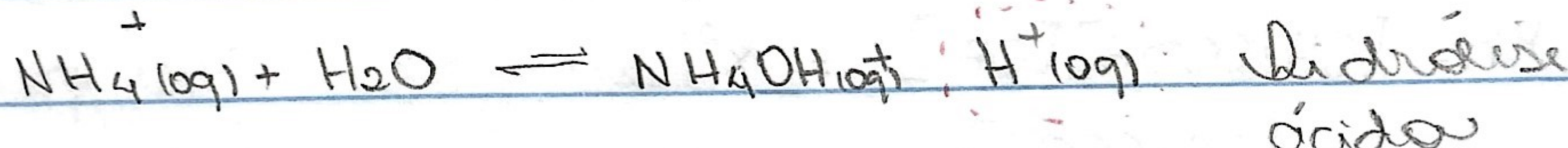
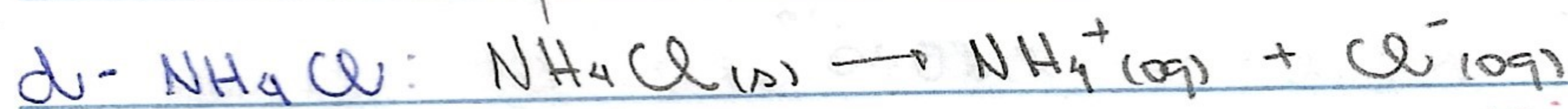
a- KCl: sal neutro ( $\text{pH} = 7$ ), pois ambos os íons são provenientes de bases e ácidos fortes  $\text{KCl}_{(s)} \rightarrow \text{K}^+_{(aq)} + \text{Cl}^-_{(aq)}$



$\text{pH} > 7$



$\text{pH} > 7$



$\text{pH} < 7$

02



0,35 - x

x

x

$K_h = K_w = 10^{-14} = 2,5 \cdot 10^{-5}$

$K_h = [\text{HCN}][\text{OH}^-]$

$K_a = 4 \cdot 10^{-10}$

0,35 - x

0,35 > 100

$K_h = \frac{x^2}{0,35} \rightarrow x = \sqrt{2,5 \cdot 10^{-5} \times 0,35}$

2,5 · 10

0,35

$x = 2,96 \cdot 10^{-3} \text{ mol/L } ([\text{OH}^-])$

$\text{pOH} = -\log 2,96 \cdot 10^{-3}$

$\text{pOH} = 2,53$

$\text{pH} = 14 - 2,53$

$\text{pH} = 11,47$

25/07/20

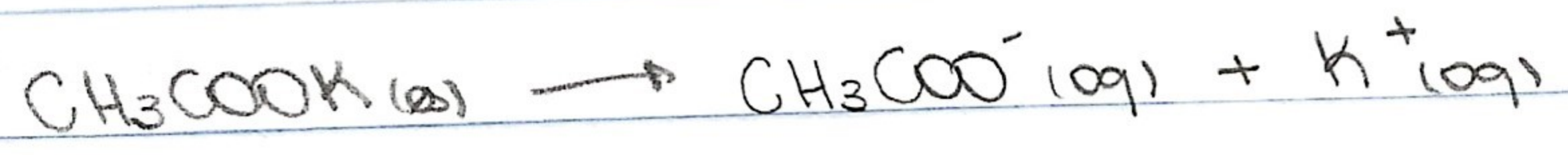
b- CH<sub>3</sub>COOK

m = 2,34g

v = 0,250 l

c = 9,36 g/l

c (mol/l) =  $\frac{9,36 \text{ g/l}}{98,15 \text{ g/mol}^{-1}} = 0,095 \text{ mol/l}$



0,095 - x

x

x

$K_h = \frac{K_w}{K_a} = \frac{10^{-14}}{1,8 \cdot 10^{-5}} = 5,56 \cdot 10^{-10}$ ,  $\frac{0,095}{5,56 \cdot 10^{-10}} > 100$

$K_h = \frac{[CH_3COOH][OH^-]}{[CH_3COO^-]} = \frac{x^2}{0,095}$

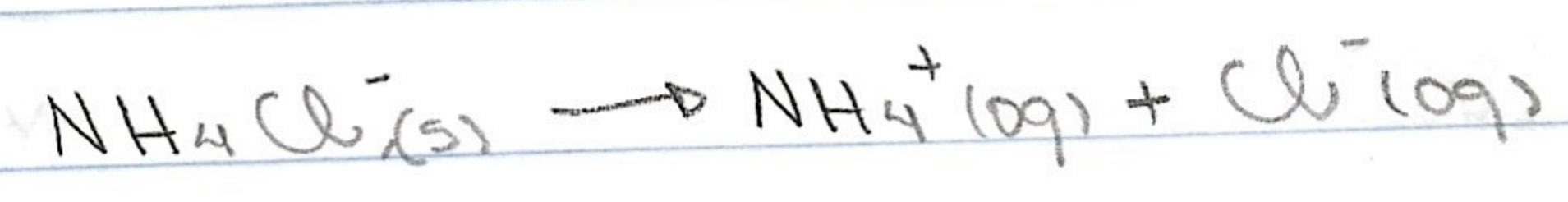
$x = \sqrt{5,56 \cdot 10^{-10} \cdot 0,095} = 7,27 \cdot 10^{-6} \text{ g/mol } [OH^-]$

pOH = -log 7,27 · 10<sup>-6</sup> g/mol

pOH = 5,14

pH = 8,86

c- NH<sub>4</sub>Cl



0,25 - x

x

x

$K_h = \frac{K_w}{K_b} = \frac{10^{-14}}{1,1 \cdot 10^{-4}} = 9,09 \cdot 10^{-11}$ ,  $\frac{0,25}{9,09 \cdot 10^{-11}} > 100$

$K_h = \frac{[NH_4OH][H^+]}{[NH_4^+]} = \frac{x^2}{0,25}$

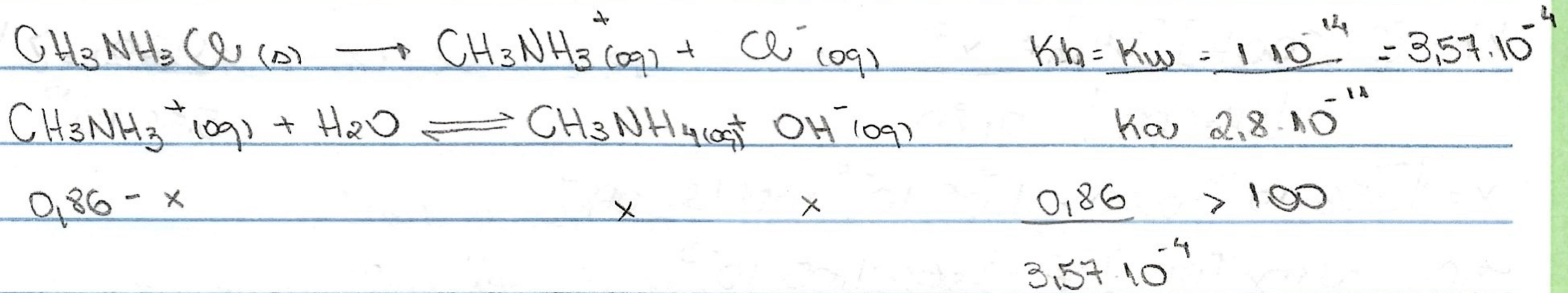
$x = \sqrt{9,09 \cdot 10^{-11} \cdot 0,25} = 4,77 \cdot 10^{-6} \text{ mol/l } ([H^+])$

pH = -log H<sup>+</sup> = -log 4,77 · 10<sup>-6</sup>

pH = 5,61

1 / 1

d-  $\text{CH}_3\text{NH}_3\text{Cl}$      $m = 25,5 \text{ g}$      $c(\text{mol/l}) = 56,67 \text{ g.l}^{-1}$   
     $v = 0,450 \text{ l}$      $66 \text{ g.mol}^{-1}$   
     $c(\text{g/l}) = 56,67$      $C = 0,86 \text{ mol.l}^{-1}$



$$K_h = \frac{[\text{CH}_3\text{NH}_4][\text{OH}^-]}{[\text{CH}_3\text{NH}_3]} = x^2$$

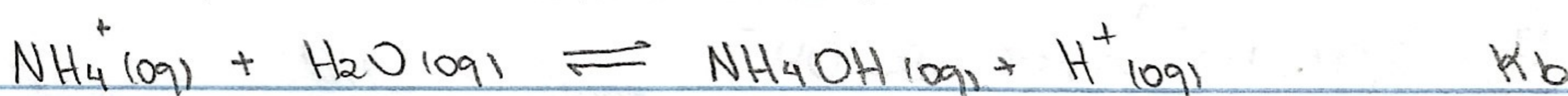
$$x = \sqrt{3,57 \cdot 10^{-4} \cdot 0,86} = 0,018 \text{ mol.l}^{-1} \text{ OH}^-$$

$$\text{pOH} = -\log \text{OH}^- = -\log 0,018$$

$$\text{pOH} = 1,74$$

$$\text{pH} = 12,26$$

e-  $\text{NH}_4\text{Br}$      $m = 1,16 \text{ g}$      $c(\text{mol.l}^{-1}) = \frac{2,90 \text{ g.l}^{-1}}{98 \text{ mol.l}^{-1}} = 0,030$   
     $v = 0,400 \text{ l}$   
     $C = 2,90 \text{ g.l}^{-1}$



0,030 - x    x    x     $\frac{0,030}{2,44 \cdot 10^{-11}} > 100$

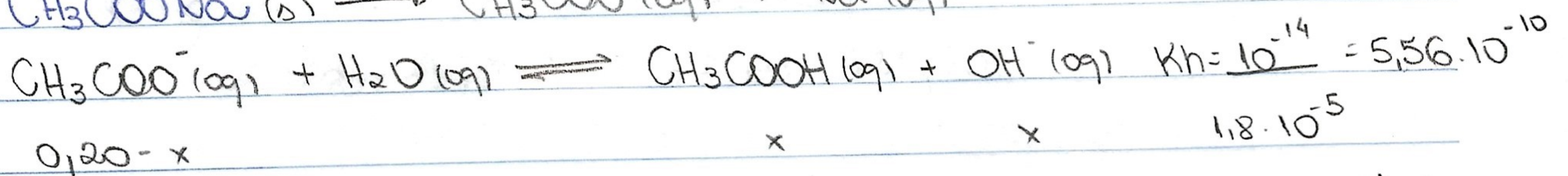
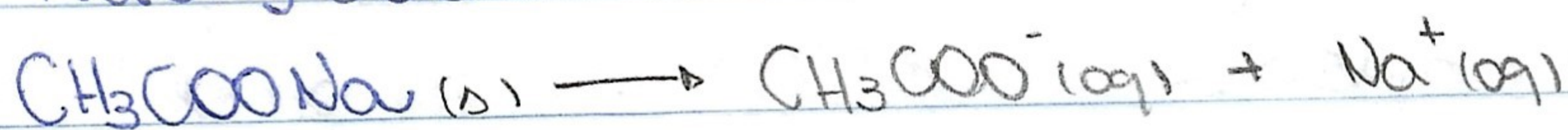
$$K_h = \frac{[\text{NH}_4\text{OH}][\text{H}^+]}{[\text{NH}_4^+]} = x \cdot x$$

$$x = \sqrt{2,44 \cdot 10^{-11} \cdot 0,030} = 8,56 \cdot 10^{-7} \text{ mol.l}^{-1} \text{ de H}^+$$

$$\text{pH} = -\log [\text{H}^+] = -\log 8,56 \cdot 10^{-7}$$

$$\text{pH} = 6,07$$

f-  $\text{NaCH}_3\text{COO}$



$$K_h = \frac{[\text{CH}_3\text{COOH}][\text{OH}^-]}{[\text{CH}_3\text{COO}^-]} = \frac{x^2}{0,20 - x}$$

$$\frac{0,20}{5,56 \cdot 10^{-10}} > 100$$

$$x = \sqrt{5,56 \cdot 10^{-10} \cdot 0,20} = 1,05 \cdot 10^{-5} \text{ mol/l OH}^-$$

$$\text{pOH} = -\log [\text{OH}^-] = -\log 1,05 \cdot 10^{-5}$$

$$\text{pOH} = 4,98$$

$$\text{pH} = 9,02$$

g-  $\text{NaHSO}_3$

$$m = 0,55 \text{ g}$$

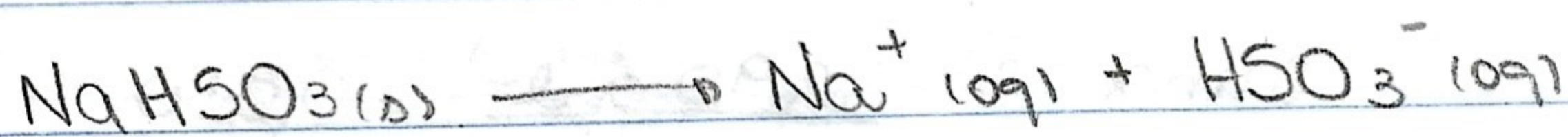
$$V = 0,05 \text{ l}$$

$$\text{MM} = 104,061 \text{ g/mol}$$

$$c = \frac{11 \text{ g/l}}{104,061 \text{ g/mol}}$$

$$104,061 \text{ g/mol}^{-1}$$

$$c = 0,11 \text{ mol/l}$$



$$K_h = \frac{10^{-14}}{1,3 \cdot 10^{-2}} = 7,69 \cdot 10^{-13}$$



$$1,3 \cdot 10^{-2}$$

$$0,11$$

x

x

$$\frac{0,11}{7,69 \cdot 10^{-13}} > 100$$

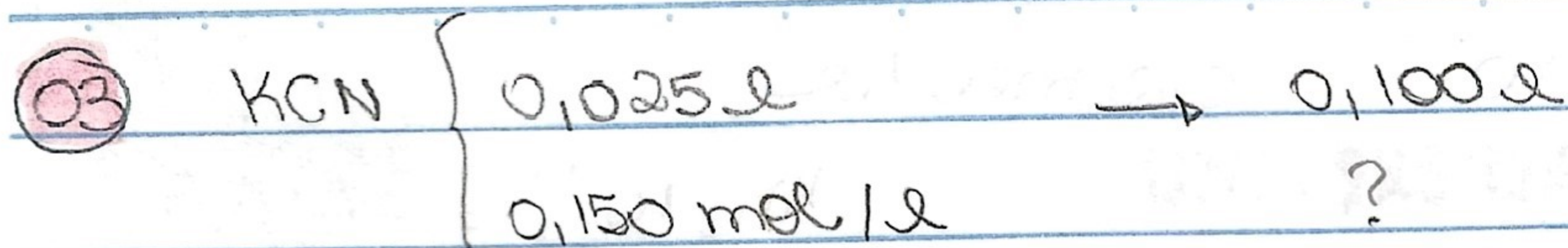
$$K_h = \frac{[\text{H}_2\text{SO}_3][\text{OH}^-]}{[\text{HSO}_3^-]} = \frac{x^2}{0,11}$$

$$7,69 \cdot 10^{-13}$$

$$x = \sqrt{0,11 \cdot 7,69 \cdot 10^{-13}} = 2,91 \cdot 10^{-7} \text{ mol/l OH}^-$$

$$\text{pOH} = -\log 2,91 \cdot 10^{-7} = 6,53$$

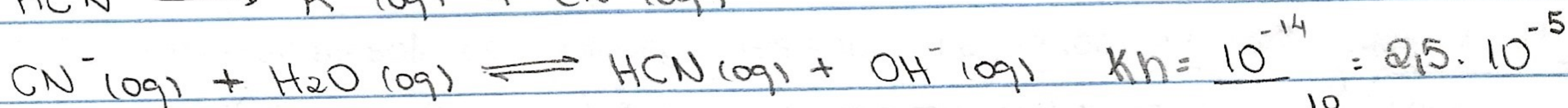
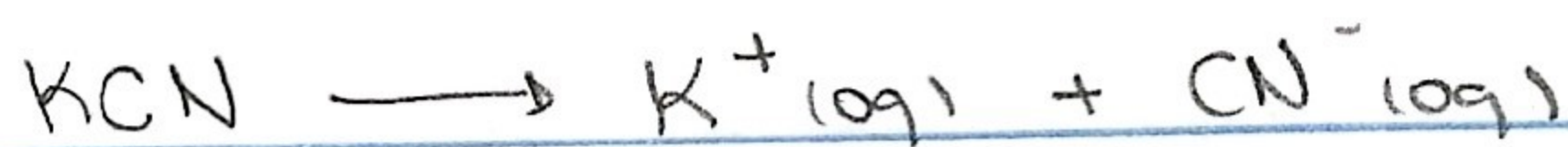
$$\text{pH} = 7,47$$



$$C \cdot V = C \cdot V$$

$$C \cdot 0,100 \text{ l} = 0,150 \text{ mol/l} \cdot 0,025 \text{ l}$$

$$C = 0,0375 \text{ mol/l}$$



$$0,0375 - x \quad \quad \quad x \quad \quad \quad x \quad \quad \quad 4 \cdot 10^{-10}$$

$$K_h = \frac{[\text{HCN}][\text{OH}^-]}{[\text{CN}^-]} = \frac{x^2}{0,0375}$$

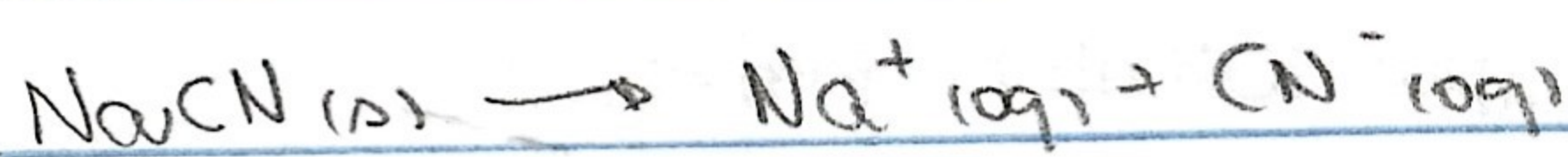
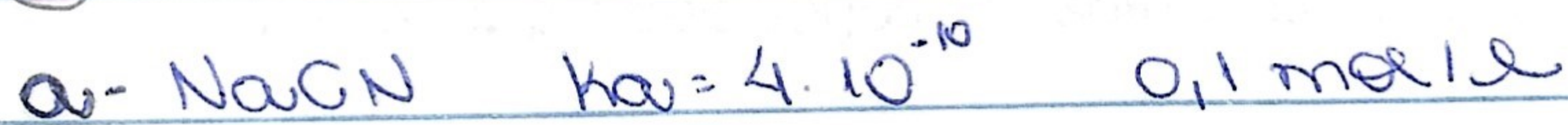
$$\frac{0,0375 > 100}{2,5 \cdot 10^{-5}}$$

$$x = \sqrt{0,0375 \cdot 2,5 \cdot 10^{-5}}$$

$$x = 9,68 \cdot 10^{-4} \text{ mol/l}, \quad x = [\text{HCN}]$$

$$\boxed{[\text{HCN}] = 9,68 \cdot 10^{-4} \text{ mol/l}}$$

04



$$K_h = \frac{10^{-14}}{4 \cdot 10^{-10}} = 2,5 \cdot 10^{-5}$$



$$4 \cdot 10^{-10}$$

$$0,1 - x$$

$$x$$

$$x$$

$$\frac{0,100 > 100}{2,5 \cdot 10^{-5}}$$

$$K_h = \frac{[\text{HCN}][\text{OH}^-]}{[\text{CN}^-]} = \frac{x^2}{0,1}$$

$$2,5 \cdot 10^{-5}$$

$$x = \sqrt{0,1 \cdot 2,5 \cdot 10^{-5}} = 1,58 \cdot 10^{-3} \text{ mol/l}$$

$$\text{pOH} = -\log 1,58 \cdot 10^{-3}$$

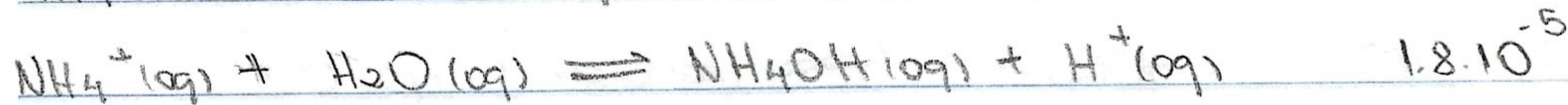
$$\text{pOH} = 2,80$$

$$\boxed{\text{pH} = 11,20}$$

$$\% \text{ H} = \left( \frac{[\text{OH}^-]}{[\text{NaCN}]} \right) \cdot 100 = \left( \frac{1,58 \cdot 10^{-3} \text{ mol/l}}{0,100 \text{ mol/l}} \right) \cdot 100$$

$$\boxed{\% \text{ H} = 1,58}$$

b-  $\text{NH}_4\text{Cl}$   $K_b = 1.8 \cdot 10^{-5}$  0,2 mol/l



$$0,2 - x \quad \quad \quad x \quad \quad \quad x \quad \quad \quad \frac{0,2}{5,56 \cdot 10^{-10}} > 100$$

$$K_h = \frac{x^2}{0,2} \Rightarrow x = \sqrt{0,2 \cdot 5,56 \cdot 10^{-10}} \quad 5,56 \cdot 10^{-10}$$

0,2

$$x = 1,05 \cdot 10^{-5} \text{ mol/l } [\text{H}^+]$$

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

$$\boxed{\text{pH} = 4,98}$$

$$\% \text{H} = \left( \frac{[\text{H}^+]}{[\text{NH}_4\text{Cl}]} \right) \times 100 = \left( \frac{1,05 \cdot 10^{-5} \text{ mol/l}}{0,2 \text{ mol/l}} \right) \cdot 100$$

$$\boxed{\% \text{H} = 0,00525}$$

c-  $\text{NaClO}$  0,01 mol/l  $K_b = 3,2 \cdot 10^{-8}$



$$0,01 - x \quad \quad \quad x \quad \quad \quad x$$

$$x = 5,59 \cdot 10^{-5} \text{ mol/l } [\text{OH}^-]$$

$$\text{pOH} = 4,25$$

$$\boxed{\text{pH} = 9,75}$$

$$\boxed{\% \text{H} = 0,56}$$

d-  $\text{NaCl}$

$$\boxed{\text{pH} = 7}$$