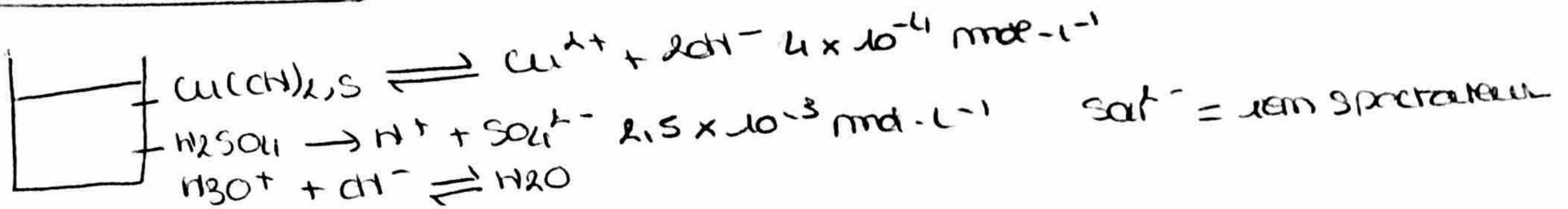


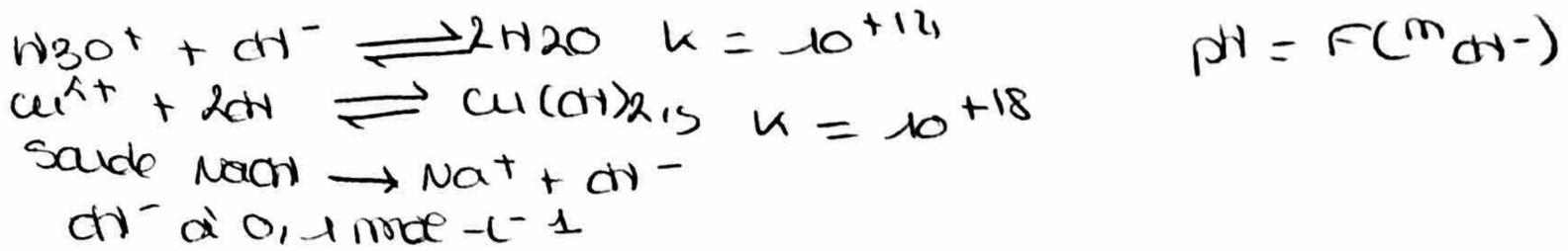
TP 3 = précipitation =

②

1^{er} solution =

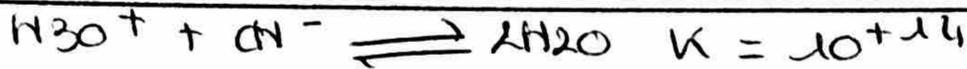


Réactions à considérer =



$\text{pH} = f([\text{OH}^-])$

1^{er} Réaction = neutralisation de H_3O^+ par OH^- (saude) =



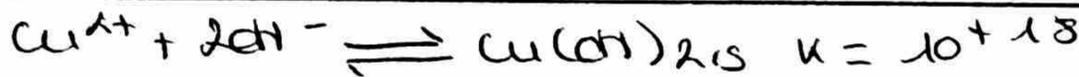
2H^+ = double c° à $2,5 \times 10^{-3} \rightarrow$ en double mb de mols de OH^-
 $= 5 \times 10^{-3} \text{ mol} \cdot \text{L}^{-1}$

1^{er} équivalence = n_{H^+} à écher = n_{OH^-} versé

$5 \times 10^{-3} = [\text{OH}^-]_{\text{burette}} \times V_{\text{eq} 1}$

$V_{\text{eq} 1} = \frac{5 \times 10^{-3}}{0,1} = 0,05 \text{ L} = 50 \text{ mL}$

2^{eme} Réaction = neutralisation de Cu^{2+} par OH^- (saude) =



2^{eme} équivalence = $n_{\text{Cu}^{2+}}$ à écher = n_{OH^-} versé

$\frac{n_{\text{Cu}^{2+}}}{1} = \frac{n_{\text{OH}^-}}{2}$

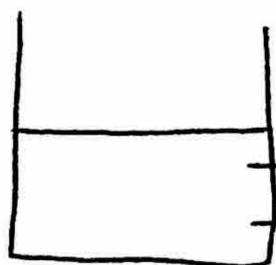
$4 \times 10^{-4} = [\text{OH}^-]_{\text{burette}} \times V_{\text{eq} 2}$

$4 \times 10^{-4} = \frac{1}{2} \times 0,1 \times V_{\text{eq} 2}$

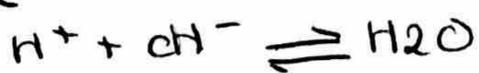
$V_{\text{eq} 2} = \frac{2 \times (4 \times 10^{-4})}{0,1} = 0,008 = 8 \text{ mL}$

$\text{ent} \text{ tot} = 50 + 8 \text{ mL} = 58 \text{ mL}$

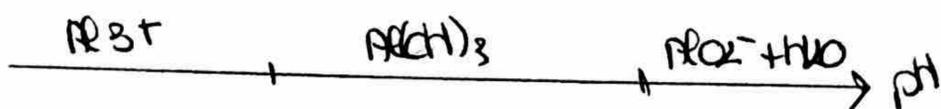
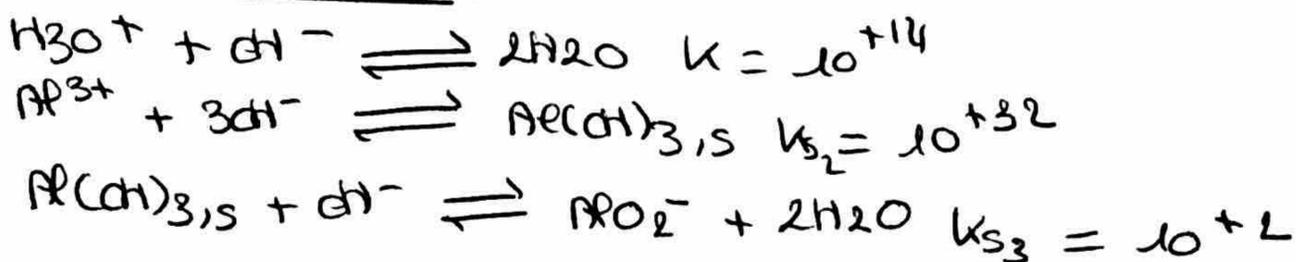
2eme solution =



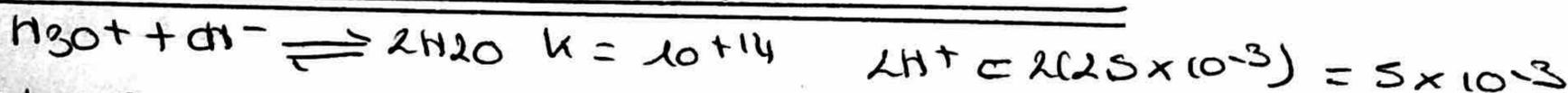
Al^{3+} à 4×10^{-4} mol
 $H_2SO_4 \rightarrow 2H^+ + SO_4^{2-}$ à $2,5 \times 10^{-3}$ mol L^{-1}
 SO_4^{2-} = ion spectateur



Réactions à considérer =



1er Réaction neutralisation de H_3O^+ par OH^- (seule) =



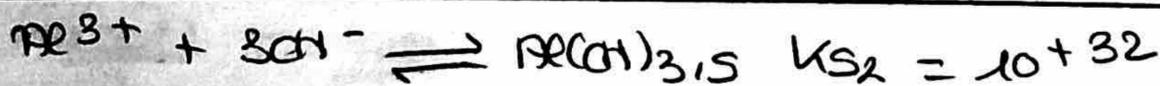
1er équivalence = n_{H^+} bécher = n_{OH^-} versé

$[OH^-] = 0,1$ mol L^{-1}

$5 \times 10^{-3} = [OH^-]_{\text{beurette}} \times V_{eq1}$

$V_{eq1} = \frac{5 \times 10^{-3}}{0,1} = 50$ mL

2eme Réaction = neutralisation de Al^{3+} par OH^- (seule) =



2eme équivalence = $\frac{n_{Al^{3+}}}{1} = \frac{n_{OH^-}}{3}$ $[Al^{3+}] = 4 \times 10^{-4}$ mol/L
 $[OH^-] = 0,1$ mol/L

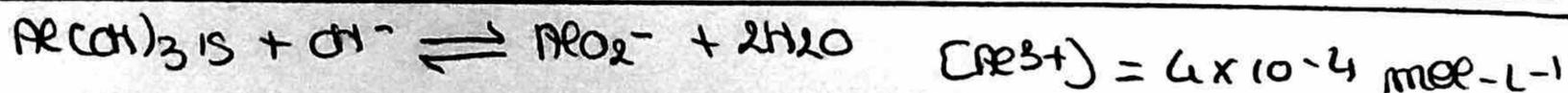
$4 \times 10^{-4} = [OH^-]_{\text{beurette}} \times V_{eq2}$

$4 \times 10^{-4} = \frac{1}{3} \times 10^{-1} \times V_{eq2}$

$V_{eq2} = \frac{3 \times (4 \times 10^{-4})}{0,1} = 12$ mL

en tout = 62 mL

3eme Réaction = neutralisation de $Al(OH)_3 + OH^-$ (redissout) par OH^- (seule)



3eme équivalence = $n_{Al(OH)_3} = n_{OH^-}$ (à 1/3 V_{eq1})
 $[OH^-] = 10^{-1}$ mol L^{-1}

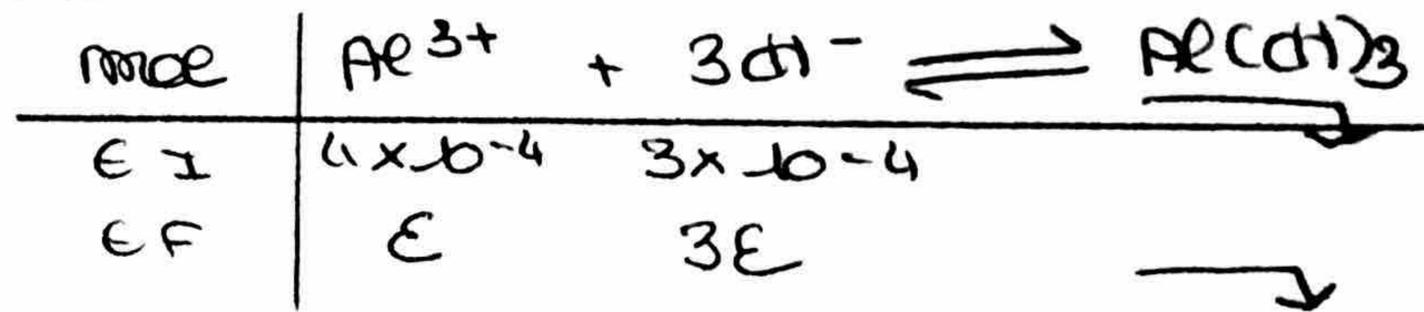
$4 \times 10^{-4} = [OH^-]_{\text{beurette}} \times V_{eq3}$

$V_{eq3} = \frac{4 \times 10^{-4}}{10^{-1}} = 0,004 = 4$ mL

en tout = 62 + 4 = 66 mL

Au double de la dernière équivalence, 66 + 4 mL

A la 2^{eme} equivalence =



$$K_S = 10^{-32} = [Al^{3+}][OH^{-}]^3 = \frac{E}{V} \times \frac{(3E)^3}{V^3}$$

$\Rightarrow 10^{-32} \times ($