CORRECTION SUJET N°2

Épreuve : Procédés de Traitement des eaux

Exercice 1 (08 pts)

1) Calcul de Φ_F :

$$\Phi_F = \Phi_{eb} + \Phi_{rec} \quad (1{,}5)$$

A.N : $\Phi_F = 350 + 130$

$$\boxed{\Phi_F = 480 \text{ L/h}} \quad (0{,}5)$$

2) Calcul du taux de conversion Y :

$$Y = \frac{\Phi_p}{\Phi_{eb}} \quad (0{,}5) \quad \text{ou} = \frac{\Phi_p}{\Phi_{ali}} \quad (0{,}5)$$

A.N : $Y = \frac{300}{350} = 85{,}7\,\%$ (0,5)

ou $Y = \frac{300}{480} = 62{,}5\,\%$ (0,5)

} les 2 solutions sont indispensables

3) R_m ? P_s ? F_c ?

Il faut établir un certain nombre d'équations de bilans de matière :

$$\begin{cases} \Phi_{ali} = \Phi_{eb} + \Phi_{Rec} & (0{,}5) \\ \Phi_{eb} = \Phi_c + \Phi_p \Rightarrow \Phi_c = \Phi_{eb} - \Phi_p & (0{,}5) \end{cases}$$

A.N : $\Phi_c = 350 - 300 = 50$ L/h (0,25)

Par rapport aux flux :

$$\Phi_{rec} \times C_{Rec} + \Phi_c \times C_c + \Phi_p \times C_p = \Phi_{Ali} \times C_{Ali} = C_{eb} \times C_{eb} + \Phi_{Rec} \times C_{Rec}$$

$$C_C = \frac{\Phi_{eb} \times C_{eb} + \Phi_p \times C_p}{\Phi_C} = \frac{350 \times 1,5 - 300 \times 10^{-2}}{50} = 10,44 \text{ mol/L}$$

(0,5) (0,5)

$$C_{Ali} = \frac{\Phi_{eb} \times C_{eb} + \Phi_{Rec} \times C_{Rec}}{\Phi_{Ali}} = \frac{350 \times 1,5 + 130 \times 10,44}{480}$$

(0,5)

$$= 3,92 \text{ mol/L}$$ (0,5)

$$R_m = 1 - \frac{C_p}{C_{Ali}} = 1 - \frac{0,01}{3,92}$$ (0,5)

$$\boxed{R_m = 99,75\%}$$ (0,5)

$$P_s = \frac{C_p}{C_{Ali}} = \frac{0,01}{3,92} = 0,25\%$$ (0,5) (0,5)

$$\boxed{P_s = 0,25\%}$$

$$F_c = \frac{C_{Rc}}{C_{Ali}} = \frac{10,44}{3,9} = 2,66$$ (0,5) (1,5)

$$\boxed{F_c = 2,66}$$

Exercice 02 (06 pts)

2) $\Phi_m = \frac{[PO_4^{3-}]}{M(PO_4^{3-})} \times \Phi = \frac{10,32}{95} \times 528 = 57,35 \text{ mol/h}$ (01) (0,5)

$\frac{Fe}{P} = 1,5 \Rightarrow Fe = 1,5 \times P$ (01)

on : $Fe = 1,5 \times PO_4^{3-}$ (0,5)

Flux de $Fe = 1,5 \times$ Flux de P (01)

$= 1,5 \times 57,5 = 86,02 \text{ mol/L}$ (0,5)

Le chlorure présente un [ ] en Fe^{3+} =

$\frac{\text{Densité} \times \text{pureté}}{} = \frac{1540 \times 0,435}{} = 3,57 \text{ M}$ (01)

$$\Phi_{pompe} = \frac{\text{Flux de } Fe^{3+}}{[Fe^{3+} \text{ dans le tank}]} \Rightarrow \Phi_{pompe} = \frac{86,04}{3,57}$$

$$\boxed{\Phi_{pompe} = 24,1 \text{ L/h}} \quad (0,5)$$

1) Réaction: $PO_4^{3-} + Fe(SO_4)Cl \longrightarrow$

Exercice 03 (6pts) $PO_4Fe \downarrow + Cl^- + SO_4^{2-}$ (0,5)

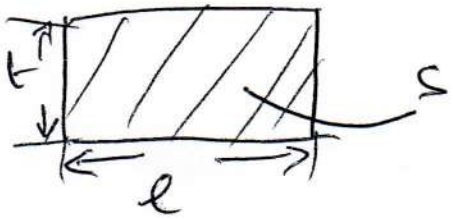
$$\begin{cases} \Phi_p = C_p \times \Phi_m & (01) \\ C_p = 1,5 + \frac{2,5}{\sqrt{\Phi_m}} & (01) \end{cases} = 1,5 + \frac{2,5}{\sqrt{34,72}} = 1,924 \quad (0,5)$$

$$\Phi_p = 1,924 \times 125 = 240,5 \text{ m}^3/\text{h} \quad (0,5)$$

$$\Phi_p = 0,0688 \text{ m}^3/\text{s} \quad (0,5)$$

$$S = \frac{\Phi_p}{V.O.C} \quad (0,5) = \frac{0,0688}{0,5 \times 0,555 \times 0,5} = 0,48 \text{ m}^2 \quad (0,25)$$

$$\begin{cases} O = \frac{2,5}{2,5+2} = 0,555 & (0,25) \\ V = 0,5 \text{ m/s} \\ C = 0,5 \end{cases}$$



$$S = t \times l \quad (0,25)$$

$t = 0,4$ m en prenant $1 \text{ E.H} = 200 \text{ L/j}$ (0,5)

$$\boxed{l = \frac{S}{t}} = \frac{0,48}{0,4}$$

$$\boxed{l = 1,2 \text{ m}} \quad (0,25)$$