

%

% /

PVC CA

PVC

CA

%

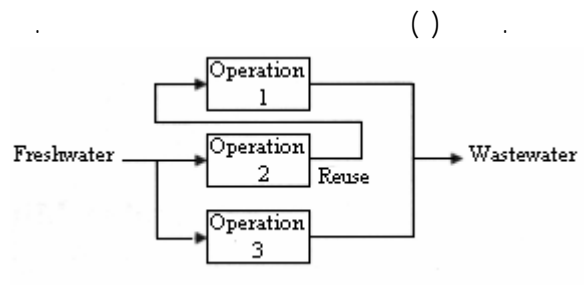


FA-406AB PVC

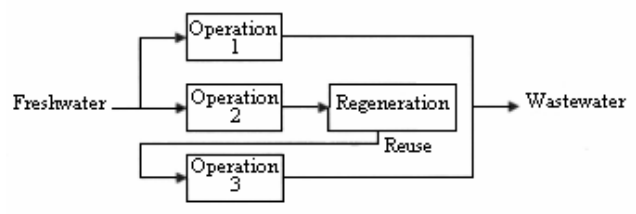
CA



-
- 1- Sealing water
 - 2- Water pinch technology
 - 3- Case study

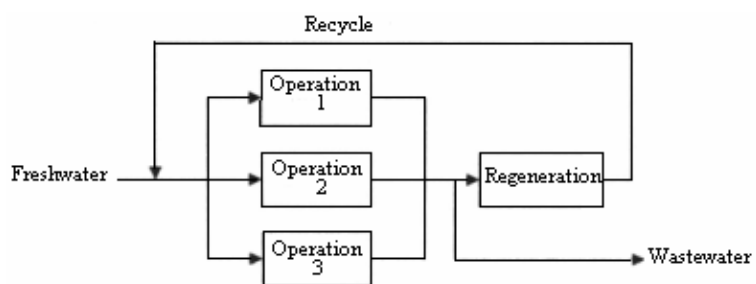


() pH



-
- 4- Water Re-Use
 - 5- Regeneration Reuse

()



BOD COD

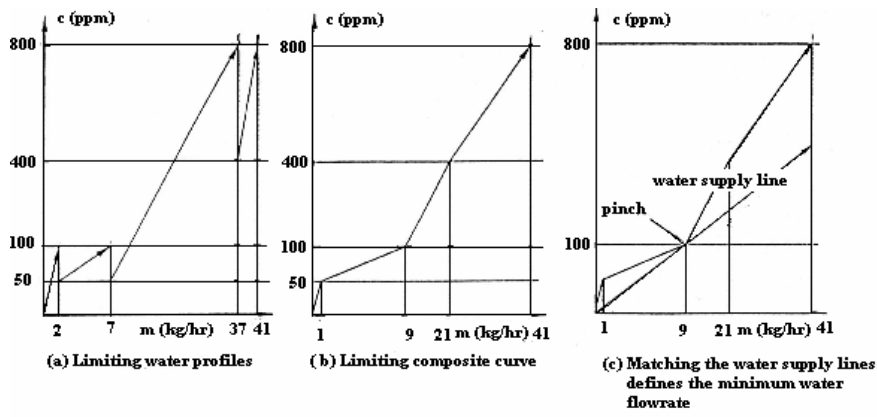
pH

-
- 6- Regeneration Recycle
 - 7- Process changes
 - 8- Conductivity

(LWP)
(WSL)

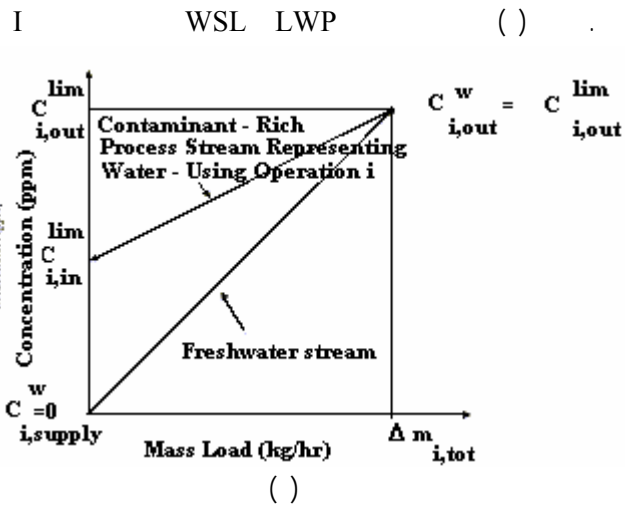
(CCC)

()



()

CCC LWP WSL



$$f_i (\text{te / hr}) = \frac{\Delta m_{i,\text{tot}} (\text{kg / hr})}{\Delta C_i (\text{ppm})} * 10^3 = \frac{1}{\text{slope}} * 10^3 \quad ()$$

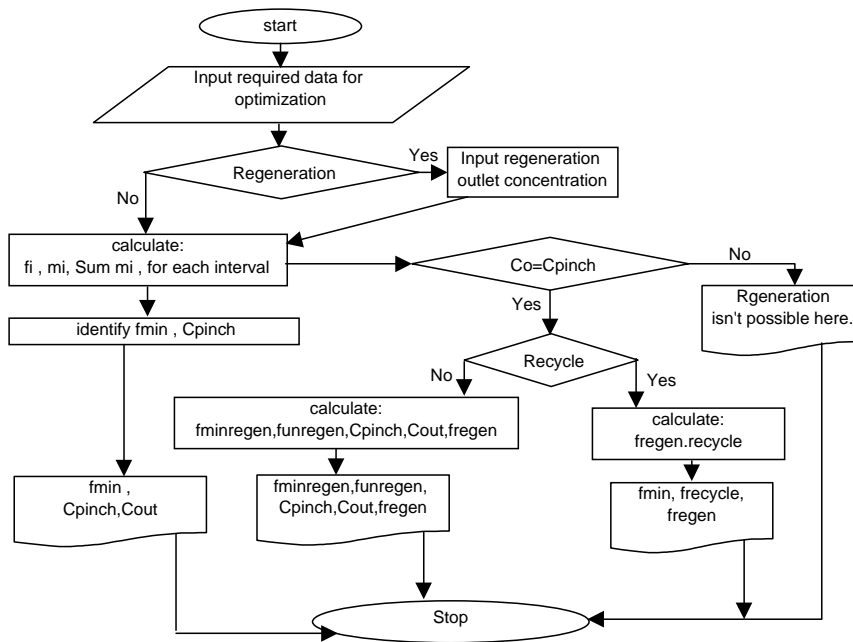
$$m_{i,k} (\text{kg / hr}) = \frac{(\sum_i f_i^{\text{lim}}) (\text{te / hr}) (C_{k+1}^* - C_k^*) (\text{ppm})}{10^3} \quad ()$$

$$\Delta m_k = \sum_k m_{i,k} \quad ()$$

$$f_k (\text{te / hr}) = \frac{\Delta m_k (\text{kg / hr})}{C_k^* (\text{ppm})} * 10^3 \quad ()$$

CCC

()



()

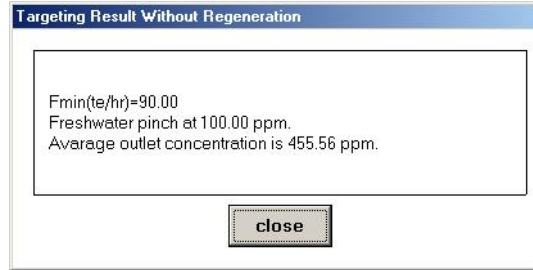
F_i^{lim} (te/hr)	C_{out}^{lim} (ppm)	C_{in}^{lim} (ppm)	$\Delta m_{i,tot}$ (kg/hr)	

Concentration	Flow rate	Mass Load	Cumulative	Flow rate
0			0	0
	F1=20	1		
50		8	1	20
	F1+f2+f3=160			
100			9	90
	F3=40	15		
400			24	60
	F3+f4=50	20		
800			44	55

() ()

Concentration (ppm)	Flowrate in each interval (te/hr)	Mass load (kg/hr)	Cumulative mass load (kg/hr)	Flowrate (te/hr)
0	20	1	0	0.00
50	160	8	1	20.00
100	40	12	9	90.00
400	50	20	21	52.50
800	50	20	41	51.25

()

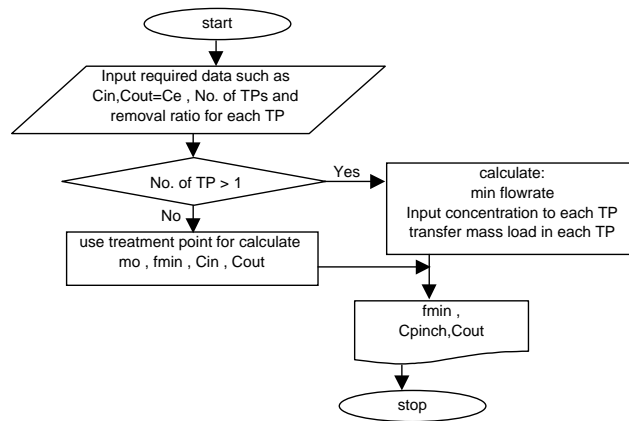
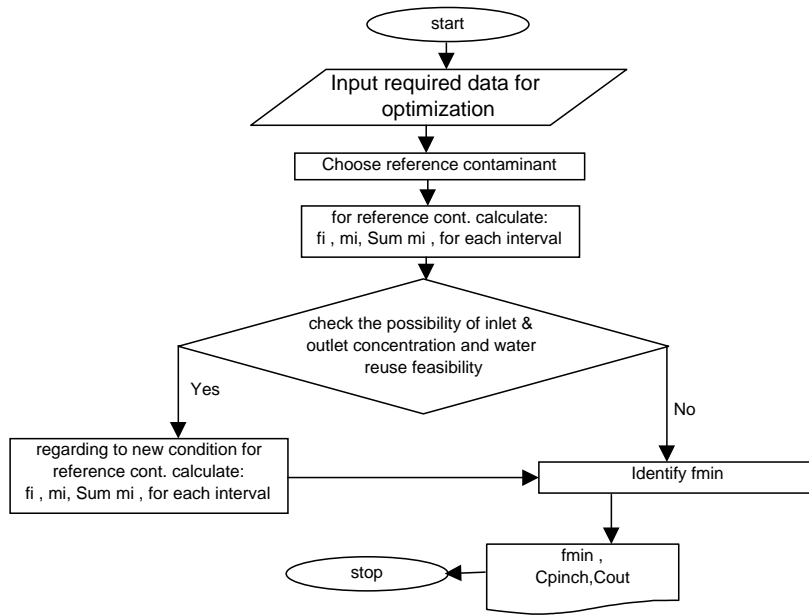


$$\Delta m_{\text{pinch}} = f_{\text{min}} * C_{\text{pinch}} + f_{\text{min}} (C_{\text{pinch}} - C_0) \quad ()$$

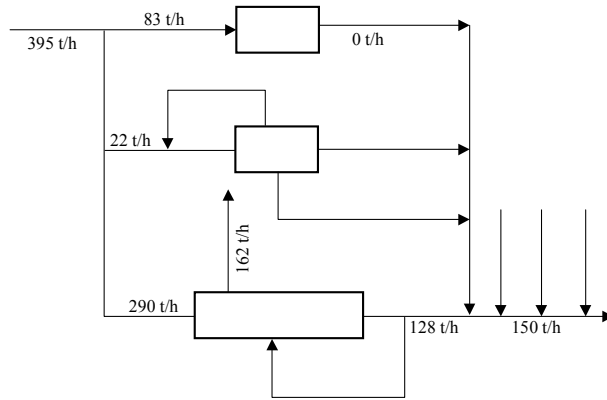
$$f_{\text{regen}} = \frac{\Delta m_{\text{pinch}} - \Delta m_{\text{regen}}}{C_{\text{pinch}} - C_0} = \frac{\Delta m_{\text{pinch}} - (f_{\text{min}} C_{\text{pinch}} / 10^3)}{C_{\text{pinch}} - C_0} * 10^3 \quad ()$$

$$\frac{C_{i,A,\text{out}} - C_{i,A,\text{in}}}{C_{i,B,\text{out}} - C_{i,B,\text{in}}} = \frac{m_{i,A}}{m_{i,B}} \quad ()$$

9- Transfer Ratio



CA



()

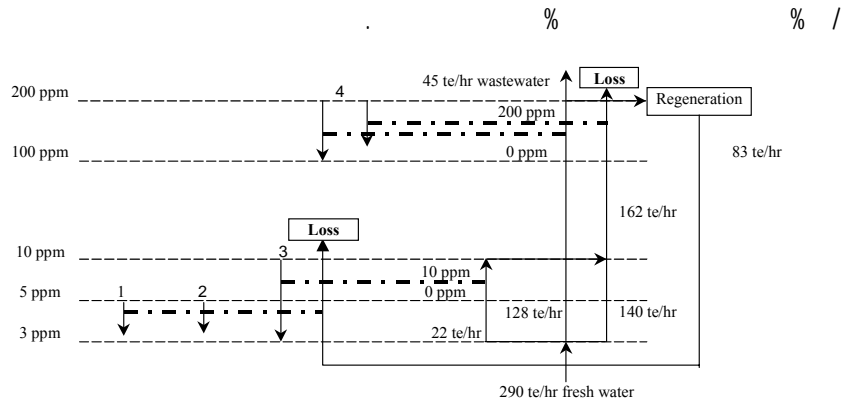
()

$F_{out,i}^{lim}$ (te/hr)	$F_{in,i}^{lim}$ (te/hr)	C_{out}^{lim} (ppm)	C_{in}^{lim} (ppm)	
				()
				()

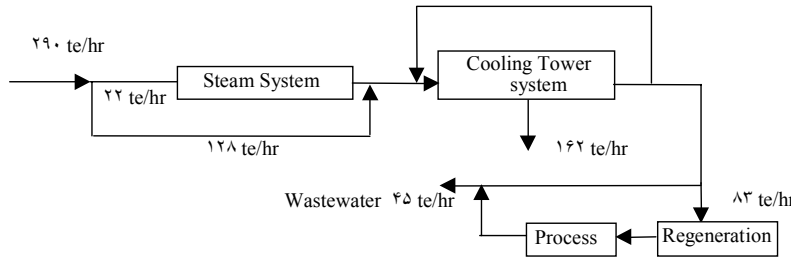


$$f_T = \max \{f_{\min}, f_i\} \quad ()$$

$$f_{req2} = f_{\min} + \sum f_{loss} - \sum f_{gain} \quad ()$$



CA



CA

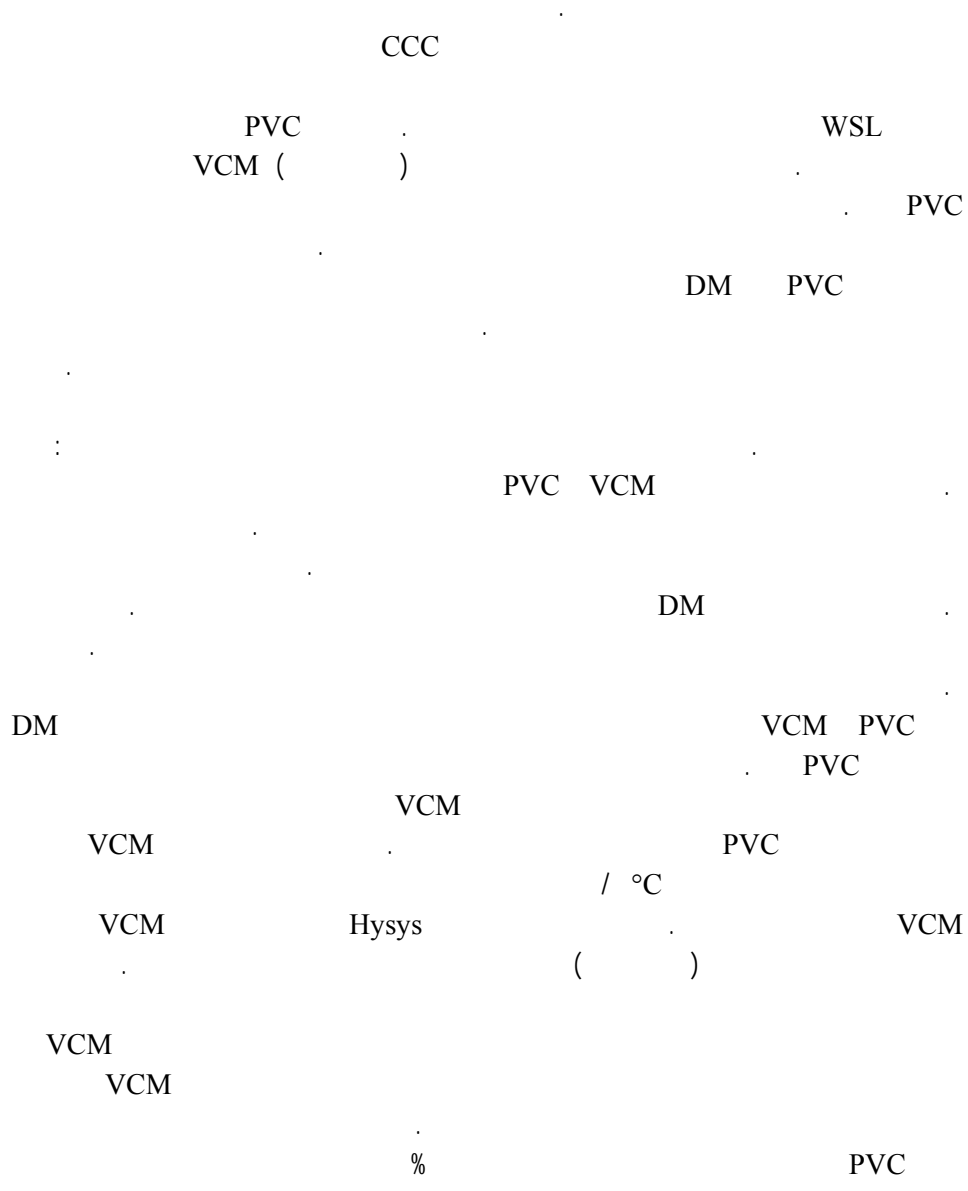
PVC

/ m³/hr

PVC

m³/hr

FA-406 A/B



10- Flash

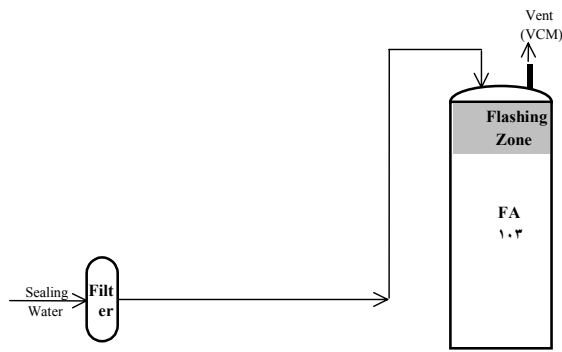
PVC
%

VCM

VCM

/ m²

()



FA-406
PVC
%
... (Ca(OH)₂)

/
m³/hr
PVC

11- Antioxidant

()

DM

PVC

PVC

PVC

() / m³/hr

PVC

PVC

PVC

PVC

PVC

PVC

FA-406

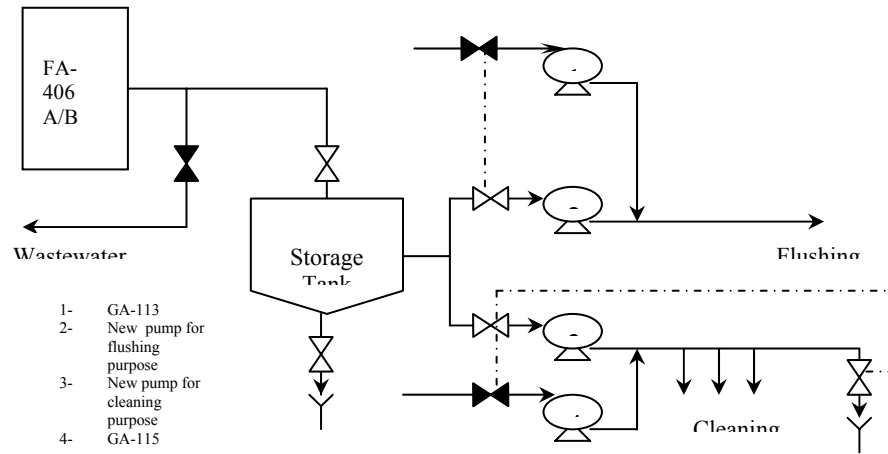
PVC

PVC

% /

/
% /
()





CA

CA PVC

PVC

CA

PVC

%

% /

/

(ppm)

$C_{i,in}^{lim}$

(ppm)

$C_{i,out}^{lim}$

(ppm)

$C_{i,in}^{\omega}$

(ppm)

$C_{i,out}^{\omega}$

(ppm) k

C_k^*

(ppm)

C_{pinch}^*

(ppm)

C_{regen}

(ppm)

C_e

(ppm)

C_0

(te/hr)

f_i^{lim}

(te/hr)

f_{min}

(te/hr)

f_{regen}

(kg/hr) i

$\Delta m_{i,tot}$

(kg/hr) k

Δm_k

(kg/hr)

Δm_{pinch}

(kg/hr)

Δm_{regen}

(kg/hr) x

m_0^i

() i

r^i

(Chemical Oxygen Demand)

COD

(Biochemical Oxygen Demand)

BOD

(Limiting water profile)

LWP

(Water supply line)

WSL

(Limiting Composite Curve)

LCC

(Fresh Water Pinch)

FWP

(Concentration Composite Curve)

CCC

(Treatment Process)	TP	
(Concentration Interval Diagram)		CID
(Poly vinyl chloride)	PVC	
(Chloro Alkali)	CA	

-
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 - 5- Kuo, W.C.J. and Smith, R.; "Effluent treatment system Design", Chem.Eng.Sci. ,23 ;4273-4290 ,1997
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