

1.4-4. Antoine

: $P=12.0 \text{ mmHg}$ ($1.316 \times 10^{-3} \frac{\text{atm}}{\text{mmHg}}$,

$P = 1.316 \times 10^{-3} \frac{\text{atm}}{\text{mmHg}} \cdot 12.0 \text{mmHg} = 0.0158 \text{atm}$, Antoine equation

$$\log P_A = -2250 \cdot \frac{1}{T} + 9.05$$

가

$$P_A = 12.0 \text{mmHg}$$

$$\frac{1}{T} = \frac{\log P_A + 9.05}{2250}$$

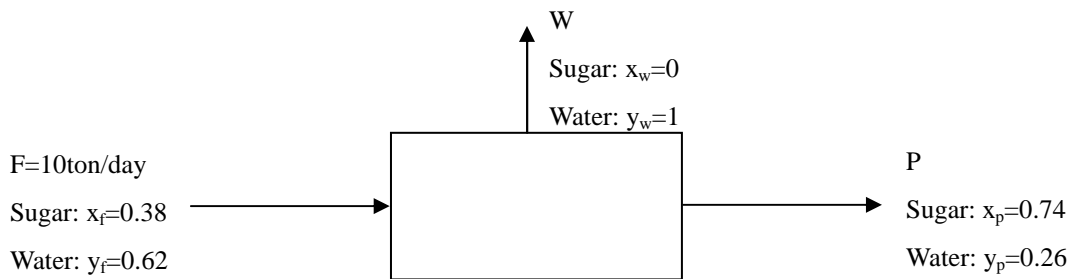
$$T = \frac{2250}{9.05 - \log P_A}$$

$$T = 282.3 \text{K}$$

1.5-1

(W)

(P)



$$F = W + P \tag{1-5-1-1}$$

$$Fx_f = Wx_w + Px_p \tag{1-5-1-2}$$

(1-5-1-2)

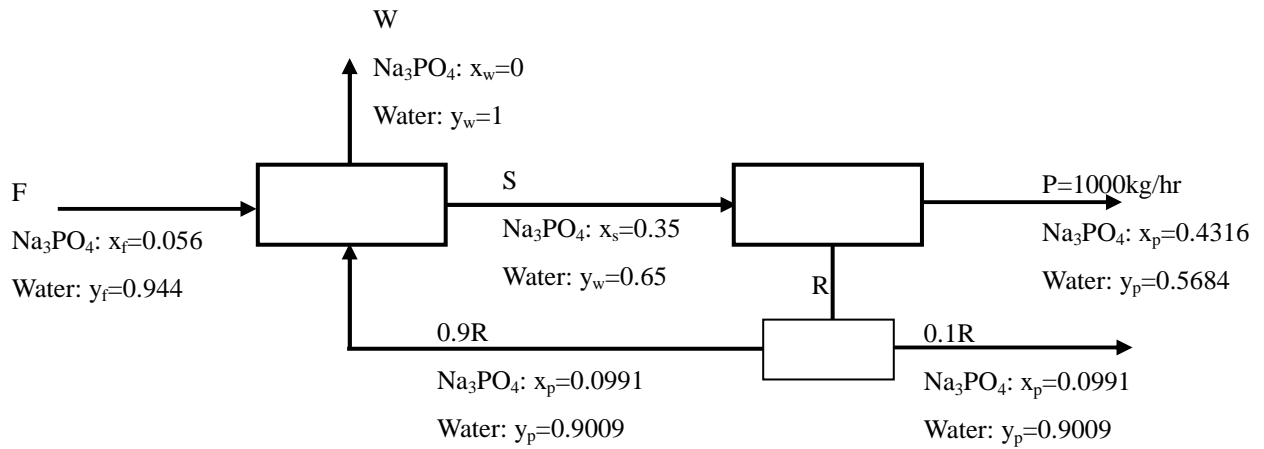
$$P = \frac{Fx_f - Wx_w}{x_p} = \frac{10 \frac{\text{ton}}{\text{day}} \cdot 0.38 - W \cdot 0}{0.74} = 5.135 \text{ton/day} \tag{1-5-1-3}$$

(1-5-1-3) (1-5-1-1)

$$W = F - P = 10 \text{ton/day} - 5.135 \text{ton/day} = 4.865 \text{ton/day}$$

1.5-9

(, 164 g/mol)



(F), (W), (R)
(S), (P)

가 4 , 4

P Na₃PO₄·12H₂O 1:12
(=164g/mol)

$$x_p = \frac{Na_3PO_4 \text{ mass}}{\text{total mass}} = \frac{164}{164 + 12 \times 18} = 0.4316$$

i) (S R)

$$S = R + P \quad (1-5-9-1)$$

$$S = R + 1000 \text{ kg/hr}$$

$$Sx_s = Rx_r + Px_p \quad (1-5-9-2)$$

$$0.35S = 0.0991R + 0.4313 \cdot 1000 \text{ kg/hr}$$

(1-5-9-1) (1-5-9-2) , S R

$$\begin{matrix} S - R = 1000 \\ 0.35S - 0.0991R = 431.3 \end{matrix} \Rightarrow \begin{pmatrix} 1 & -1 \\ 0.35 & -0.0991 \end{pmatrix} \begin{pmatrix} S \\ R \end{pmatrix} = \begin{pmatrix} 1000 \\ 431.3 \end{pmatrix}$$

$$\begin{pmatrix} S \\ R \end{pmatrix} = \begin{pmatrix} 1 & -1 \\ 0.35 & -0.0991 \end{pmatrix}^{-1} \begin{pmatrix} 1000 \\ 431.3 \end{pmatrix} = \begin{pmatrix} 1324 \\ 324 \end{pmatrix}$$

ii) (F W)

$$F + 0.9R = W + S \quad (1-5-9-3)$$

$$F + 0.9 \cdot 324 = W + 1324$$

$$Fx_f + 0.9Rx_r = Wx_w + Sx_s \quad (1-5-9-4)$$

$$0.056F + 0.9 \cdot 324 \cdot 0.0991 = W \cdot 0 + 1324 \cdot 0.35$$

(1-5-9-4) F .

$$F = \frac{1324 \cdot 0.35 - 0.9 \cdot 324 \cdot 0.0991}{0.056} = 7759 \text{ kg/hr}$$

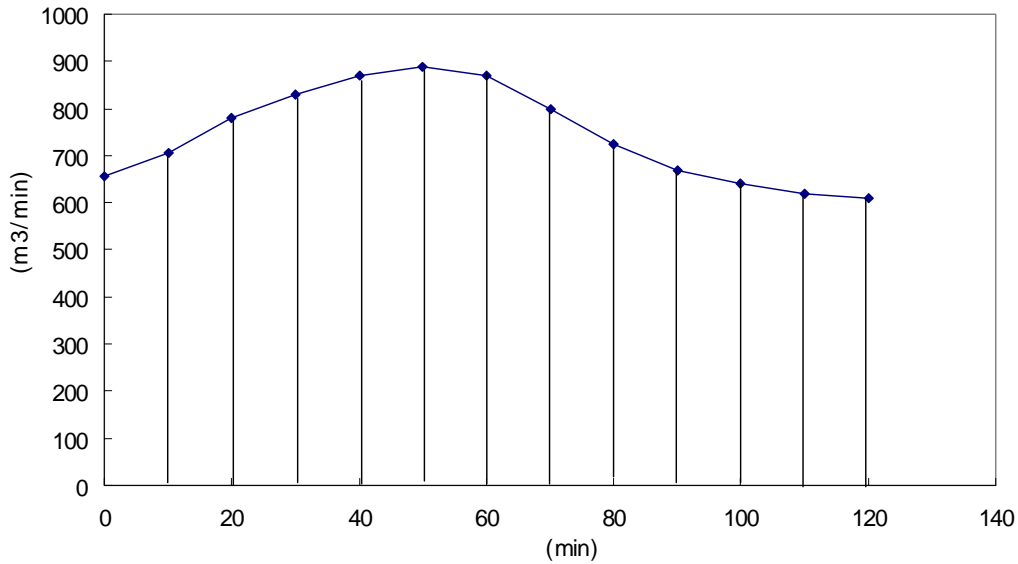
(1-5-9-3) W .

$$\begin{aligned} W &= F + 0.9 \cdot 324 - 1324 \\ &= 7759 + 0.9 \cdot 324 - 1324 \\ &= 6726.6 \text{ kg/hr} \end{aligned}$$

, (F) 7759kg/hr , (W) 6726.6 kg/hr .

1.8-2 (m³)

MS Exel .



$$S = \sum_{i=1}^{12} \Delta s_i = \sum_{i=1}^{12} \frac{1}{2} (y_i + y_{i+1}) \Delta x$$

60

120

ms Exel .

(min)	(m3/min)	120		60	
0	655	ds1	6800	ds1	6800
10	705	ds2	7425	ds2	7425
20	780	ds3	8050	ds3	8050
30	830	ds4	8500	ds4	8500
40	870	ds5	8800	ds5	8800
50	890	ds6	8800	ds6	8800
60	870	ds7	8350		
70	800	ds8	7625		
80	725	ds9	6975		
90	670	ds10	6550		
100	640	ds11	6300		
110	620	ds12	6150		
120	610				
		Sum	90325m³	Sum	48375m³