Oef 5.5

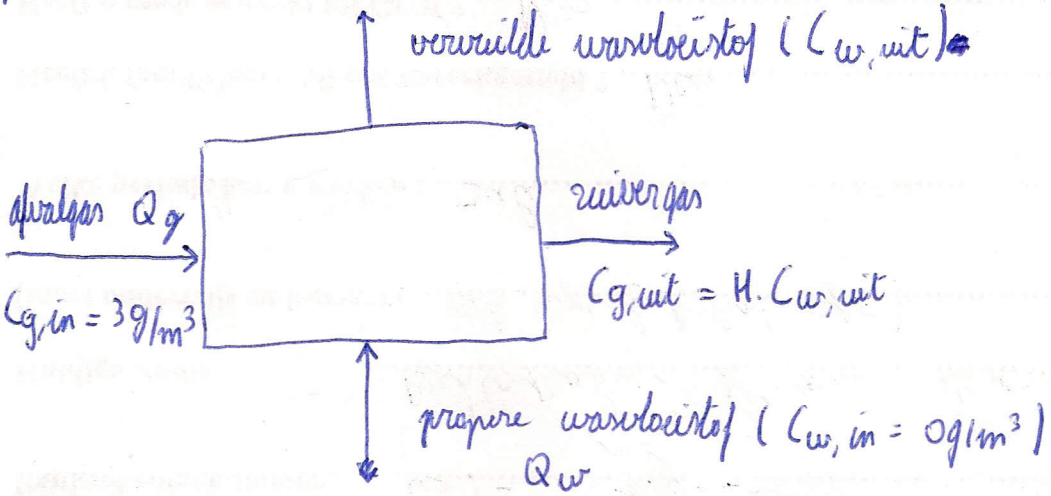
$C_{g,in} = C_{tolueen} = 3\ g/m^3$

$\frac{V_g}{V_w} = 1000$

$C_{w,in} = 0\ g/m^3$

Continu proces:

a)



$m_{in} = m_{uit}$

$H = \frac{C_{g,uit}}{C_{w,uit}}$

$Q_g \cdot \underbrace{C_{g,in}}_{=3\ g/m^3} + Q_w \cdot \underbrace{C_{w,in}}_{=0\ g/m^3} = Q_g\, C_{g,uit} + Q_w\, C_{w,uit}$

$3\,Q_g = Q_g\, C_{g,uit} + Q_w\, C_{w,uit}$

→ bepaling H v. Tolueen (idem als bij 1 en 3)

dampdruk bij 6,4°C	10 mm Hg	→ lineaire regr.	$a = 19,288$
" bij 20°C	22 mm Hg		$b = 4746$

$$\ln(P_s) = a - \frac{b}{T}$$

$$\ln(P_s) = 19{,}288 - \frac{4746}{298} = 3{,}363$$

$$P_s = 28{,}876 \text{ mm Hg} = 3849{,}9 \text{ Pa}$$

$$H' = \frac{P_s}{S_{max}} = \frac{3849{,}9 \text{ Pa}}{550 \text{ g/m}^3} = 7 \frac{\text{Pa} \cdot \text{m}^3}{\text{g}}$$

$\downarrow$

$\rho_g = 0{,}55 \text{ g/L} = 550 \text{ g/m}^3$ 92 g/mol

$$H = \frac{H'}{R \cdot T} \cdot M_G = \frac{7}{8{,}31 \cdot 298} \cdot M_G = 0{,}26$$

$\rightarrow$ $3 Q_g = Q_g C_{g,ut} + Q_w \cdot C_{w,ut}$ ($C_{w,ut} = \frac{C_{g,ut}}{H}$)

$$3 V_g = V_g C_{g,ut} + V_w \cdot \frac{C_{g,ut}}{H}$$

$$3 \cdot 1000 \cdot V_w = \left(1000 V_w + \frac{V_w}{H}\right) C_{g,ut}$$

$$C_{g,ut} = \frac{3 \cdot 1000 \cdot V_w}{1000 V_w + \frac{V_w}{H}}$$

$$\eta = 1 - \frac{C_{g,ut}}{C_{g,in}} = 1 - \frac{3 \cdot 1000 V_w}{3\left(1000 V_w + \frac{V_w}{H}\right)} = 1 - \frac{1000}{1000 + \frac{1}{0{,}26}} = 0{,}38\%$$

b) Idem als a), wel C_w vervangen door C_o ! Dus vgl wordt:

$$Q_g \cdot \underbrace{C_{g,in}}_{3g/m^3} + Q_w \cdot \underbrace{C_{o,in}}_{0g/m^3} = Q_g \cdot C_{g,uit} + Q_w \cdot C_{o,uit}$$

$C_{o,uit} \downarrow$

$K_{ow} \cdot C_{w,uit} \downarrow$

$\frac{C_{g,uit}}{H}$

$$\Rightarrow 3Q_g = Q_g \cdot C_{g,uit} + Q_w \cdot K_{ow} \cdot \frac{C_{g,uit}}{H}$$

$$3V_g = \left(V_g + \frac{V_w \cdot K_{ow}}{H}\right) C_{g,uit}$$

$$3 \cdot 1000 V_w = \left(1000 V_w + \frac{V_w \cdot K_{ow}}{H}\right) C_{g,uit}$$

$$C_{g,uit} = \frac{3 \cdot 1000 \cdot V_w}{1000 V_w + \frac{V_w \cdot K_{ow}}{H}}$$

$$\eta = 1 - \frac{C_{g,uit}}{C_{g,in}} = 1 - \frac{3 \cdot 1000 \cancel{V_w}}{3\left(1000 \cancel{V_w} + \frac{\cancel{V_w} \cdot K_{ow}}{H}\right)}$$

$H = 0{,}26$ (zie ⓐ)

$K_{ow} = 10^{2{,}69} = 489{,}78$

$$= 1 - \frac{1000}{1000 + \frac{489{,}78}{0{,}26}} = \underline{\underline{65{,}32\,\%}}$$