2a) $p = \frac{RT}{V_m - b} - \frac{a}{V_m^2}$ $\quad b = \frac{-RT}{p + \frac{a}{V_m^2}} + V_m$

$a = 0{,}5\ m^6\ Pa/mol^2 = 500\ dm^6\ kPa/mol^2$

$V_m = 0{,}5\ dm^3/mol$

$p = 3{,}0\ MPa = 3{,}0 \cdot 10^3\ kPa$

$R = 8{,}314\ J/(mol \cdot K)$

$T = 273 K$

$b = \frac{-8{,}314 \cdot 273}{3{,}0 \cdot 10^3 + \frac{500}{0{,}5^2}} + 0{,}5 = 0{,}0461\ dm^3/mol$

$b = 46\ cm^3/mol$

b) $Z = \frac{p \cdot V_m}{R \cdot T}$ $\quad V_m = 0{,}64\ dm^3/mol \quad T = 323\ K$

$Z = \frac{3{,}0 \cdot 10^3 \cdot 0{,}64}{8{,}314 \cdot 323} = 0{,}714$

$Z = 0{,}71$

3a) vergelijking: $\log(p) = 14{,}25 - \frac{4{,}8 \cdot 10^3}{T}$

$\frac{d\log(p)}{dT} = \frac{4{,}8 \cdot 10^3}{T_{vap}^2}$

Clausius-Clapeyron: $\frac{d\log(p)}{dT} = \frac{\Delta_{vap}H^\circ}{R \cdot T_{vap}^2}$

$\frac{\Delta_{vap}H^\circ}{R \cdot T^2} = \frac{4{,}8 \cdot 10^3}{T_{vap}^2}$

$4{,}8 \cdot 10^3 = \frac{\Delta_{vap}H^\circ}{R}$

$\Delta_{vap}H^\circ = 4{,}8 \cdot 10^3 \cdot 8{,}314 = 39907{,}2\ J/mol$

$\Delta_{vap}H^\circ = 40\ kJ/mol$

b) vergelijking: $\log(p) = 10{,}89 - \frac{3{,}08 \cdot 10^3}{T_{vap}}$

bij atmosferische druk, dus $p = 1{,}00\ atm$.

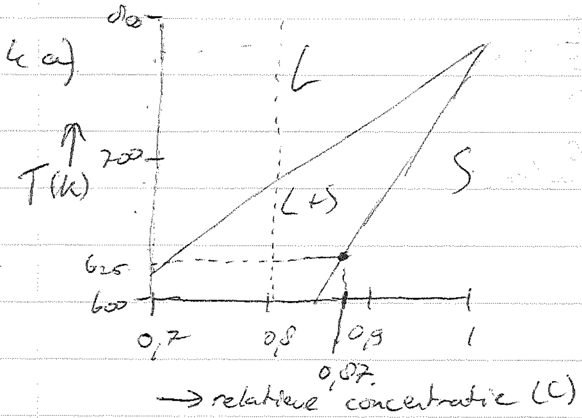
$0 = 10{,}89 - \frac{3{,}08 \cdot 10^3}{T}$

$10{,}89 = \frac{3{,}08 \cdot 10^3}{T}$

$T = 282{,}03\ K$

$T = 9{,}68\ °C$

4 a)

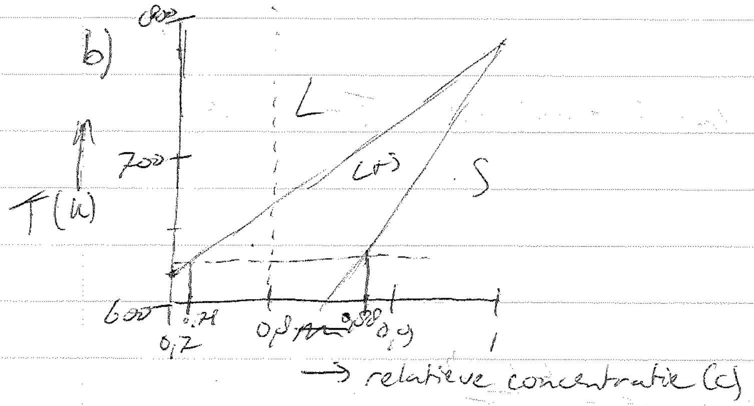


bv concentratie = 0,81

T = 625,1 K

de relatieve concentratie van de vaste fase is dus 0,87.

b)



bv concentratie = 0,8

T = 629,5 K

$$\frac{V_l - V}{V - V_s} = \frac{x_s}{x_l}$$

$x_s + x_l = 1$

$x_s = 1 - x_l$

$$\frac{V_l - V}{V - V_s} = \frac{1 - x_l}{x_l}$$

$V_l = 0,71$

$V_s = 0,88$

$V = 0,8$

$$\frac{1 - x_l}{x_l} = \frac{0,71 - 0,8}{0,8 - 0,88}$$

$1 - x_l = 1,125\, x_l$

$$x_l = \frac{1}{2,125} = 0,47$$

$x_l = 0,47$