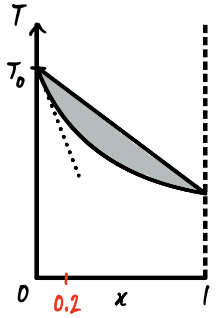
M18T.3 (Distillat^{n})

(a)



At a mass fract^{n} of $x_i = \frac{M_A}{M_A + M_B} = 0.2$, ē liquid mixture w/ A approaches ē lower phase boundary & enters ē coexistence reg^{n}, where now A transit^{n}s to ē gaseous phase at const. temperature.

Thus, we require $T_{liq} = T_{gas}$ at ē regime of coexistence.

Sett^{g} these equal yields: $T_0 - T_1 x_{gas} = T_0 - 3T_1 x_{liq} \implies x_{gas} = 3x_{liq}$

Thus, at coexistence, $x_{gas} > x_{liq} \implies x_{liq}$ decreases as more heat is added.

(b) We started w/ $x_{liq}^{(i)} = 0.2$ and increased T to coexistence.

Know^{g} some fract^{n} f of $x_{liq}^{(i)}$ is boiled away into gas, we have:

$$x_{liq}^{(i)} = x_{liq}^{(f)}(1-f) + x_{gas} f \quad (*)$$

$$= (1-f)x_{liq}^{(f)} + 3f x_{liq}^{(f)}$$

$$= (2f+1)x_{liq}^{(f)}$$

We are given ∄ x is changed by a factor of 2, & we know x_{liq} decreases, so $x_{liq}^{(f)} = 0.1$.

$\implies f = \frac{1}{2}$

Thus, ē remain^{g} fract^{n} is simply half of ē initial.

(*) is ē answer to ē last bit, w/ $f = \frac{1}{2}$ //.