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(6) 0.1 mol H_2O 0.9 ethanol

$$\Delta T_f = K_f \times m$$

$$\Delta T_f = 2 \times \frac{0.1}{0.9 \times 46} \times 1000$$

$$P_T = X_A P_A^0 + \cancel{X_B} P_B^0$$

0

$$P_T = 0.9 \times P^0_{ethanol}$$

(8) 0.9 mol H_2O 0.1 mol

$$\Delta T_b = K_b \times \frac{0.1}{0.9 \times 18} \times 1000$$

H_2O

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0 - I

(20) $\frac{P_0 - P_s}{P_s} = \frac{n}{N}$

(33) $0.15 = K_b \times m$

$\Delta T_f = K_f \times \frac{m}{2}$

(11) $\Delta T_b = K_b \times m$

$2 = 0.76 \times m$

$\frac{760 - P_s}{760}$ $\frac{P_0 - P_s}{P_0} = m \times \frac{18}{1000}$

(42) $27^\circ C$

(47) $A \longrightarrow \frac{1}{3} A_3$

$n = \frac{1}{3}$

$i = 1 + \left(\frac{1}{3} - 1\right)\alpha = \frac{1}{3}$

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44

Solvent

52

$$\frac{P_0 - P_s}{P_0} = m \times \frac{M_{solvent}}{1000} \times i$$

0.1×2 0.1×2 0.1×3

$2 : 2 : 3$

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$\Delta T_b \propto m \times i$

$\Delta T_f \propto m \times i$

$\pi \propto c \times i$

$\frac{P_0 - P_s}{P_0} \propto m \times i$

T_f

vap. pr

$$K_b = \frac{R T_b^2}{1000 \, L_v} = \frac{2 \times (373.15)^2}{1000 \times \frac{9.72 \times 10^3}{18}}$$

23

$$1.24 = 0.512 \times \frac{288/M}{600} \times 1000$$

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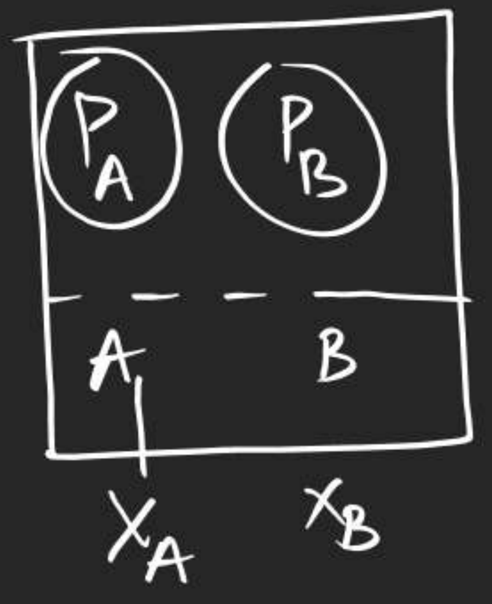
Non-ideal solution :→ An ideal sol^n is formed when intermolecular forces remain unchanged on mixing. i.e.



$$\langle A - A \rangle = \langle A - B \rangle = \langle B - B \rangle$$

This cond^n is however not fulfilled by most of the liq pairs thus they form non-ideal solution.

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Ideal sol^n	Non-ideal sol^n: -ive deviation	Non-ideal sol^n: +ive deviation
obey Raoult's law	① do not obey	do not obey
I.F. remain unchanged on mixing.	② I.F. increase on mixing	I.F. $\downarrow$es.
$P_A = X_A P_A^o$ $P_B = X_B P_B^o$	③ $(P_A)_{actual} < X_A P_A^o$ $(P_B)_{actual} < X_B P_B^o$	$(P_A)_{actual} > X_A P_A^o$ $(P_B)_{actual} > X_B P_B^o$
④ $\Delta H_{mix} = 0$	$\Delta H_{mix} < 0$ exo	> 0 endo
⑤ $\Delta V_{mix} = 0$ →	$\Delta V_{mix} < 0$	> 0
⑥ $\Delta S_{mix} > 0$	$\Delta S_{mix} > 0$	> 0
⑦ $\Delta G_{mix} < 0$	$\Delta G_{mix} < 0$	< 0
⑧ $\Delta S_{surr} = 0$	$\Delta S_{surr} > 0$	< 0
⑨ $\Delta S_{univ} > 0$	> 0	> 0

e.g

n-hexane & n-haptane

Benzene + Toluene

C_2H_5Cl + C_2H_5Br

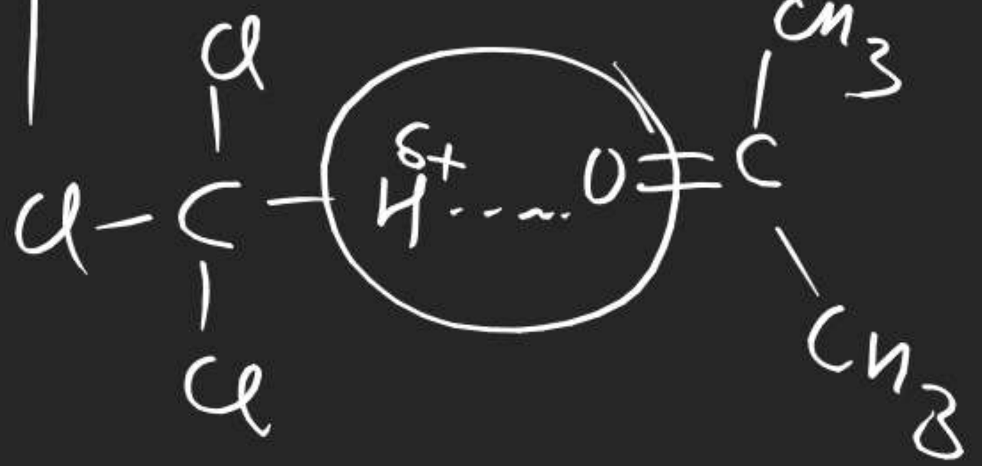
C_6H_5Cl + C_6H_5Br

HNO_3 + H_2O

HCl + H_2O

C_6H_5OH + $C_6H_5NH_2$

$CHCl_3$ + CH_3COCH_3



CH_3OH + H_2O

C_2H_5OH + H_2O

CS_2 + acetone

CS_2 + CCl_4

Benzene + CCl_4

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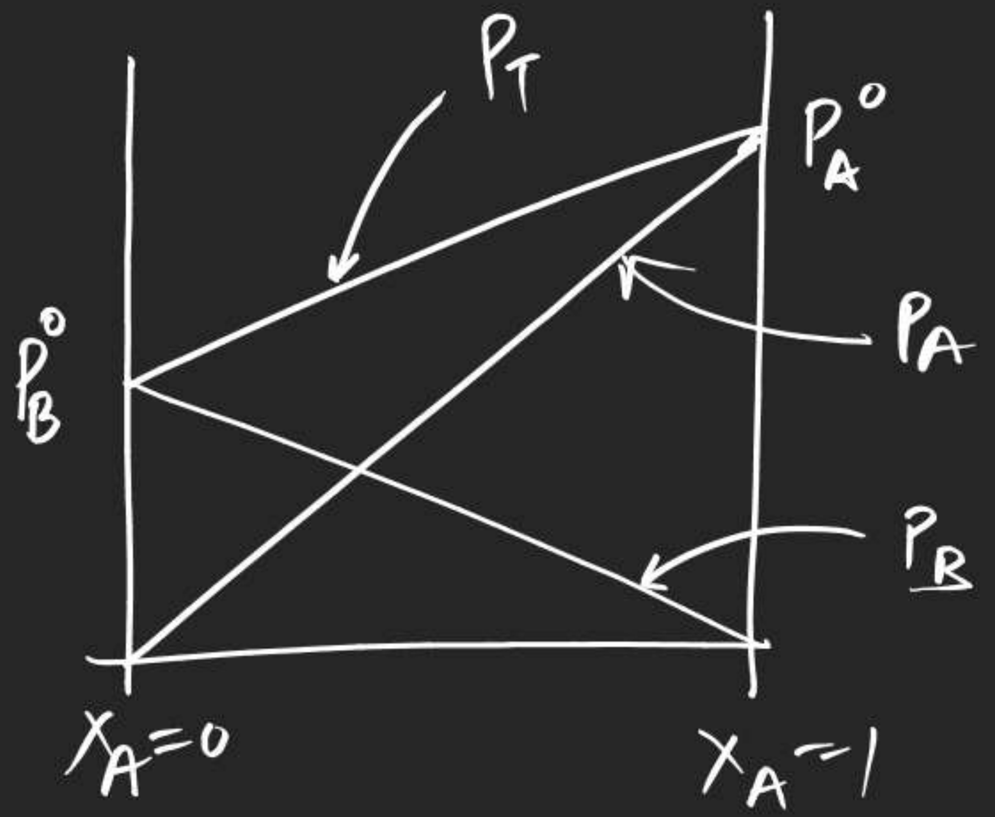

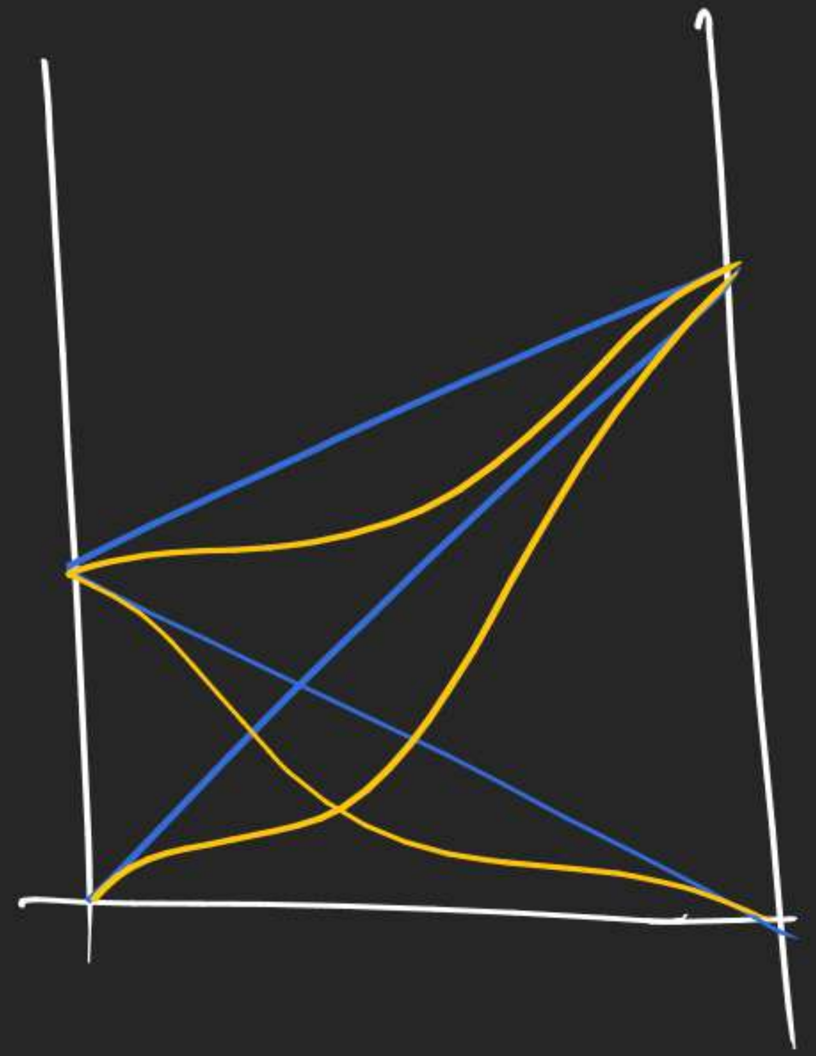

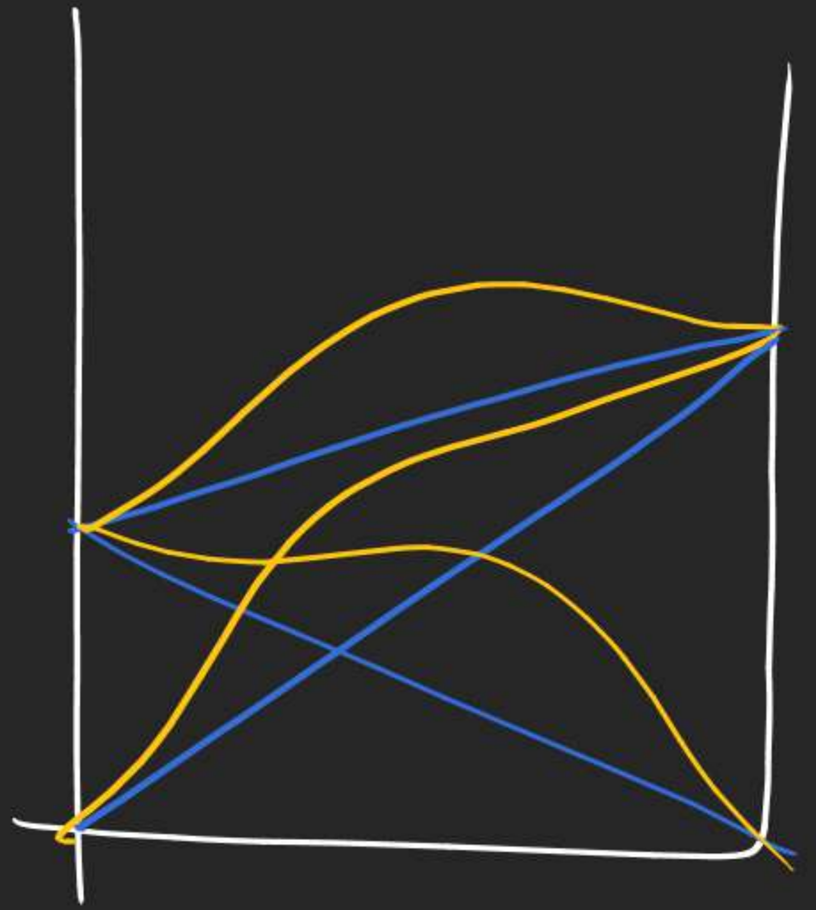

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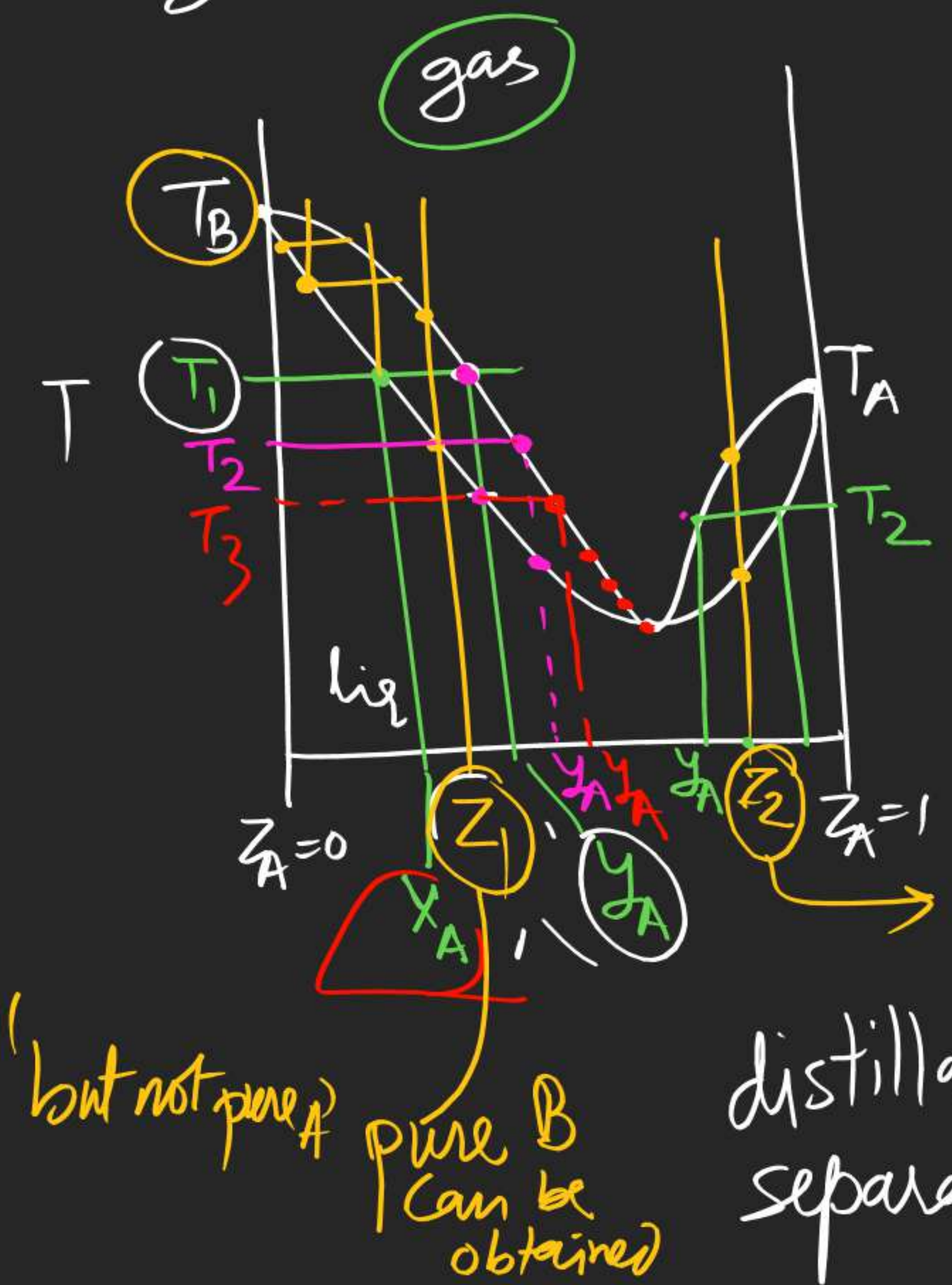
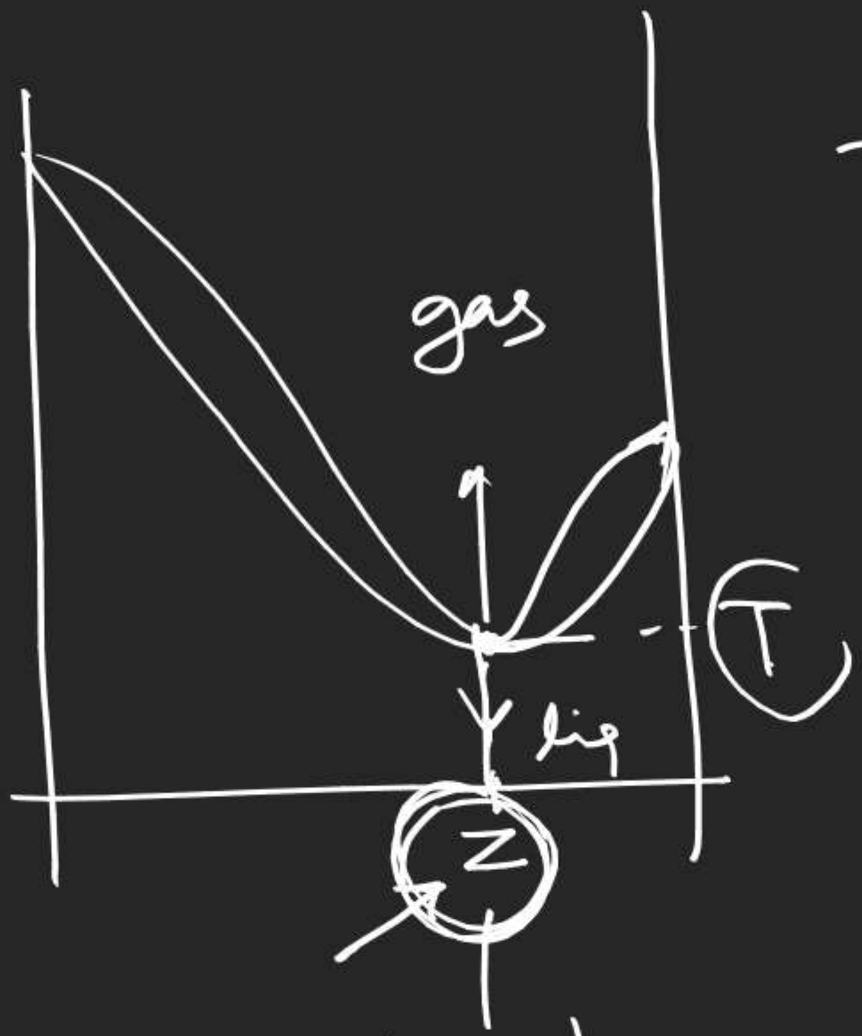
Azeotrope





for an azeotrope

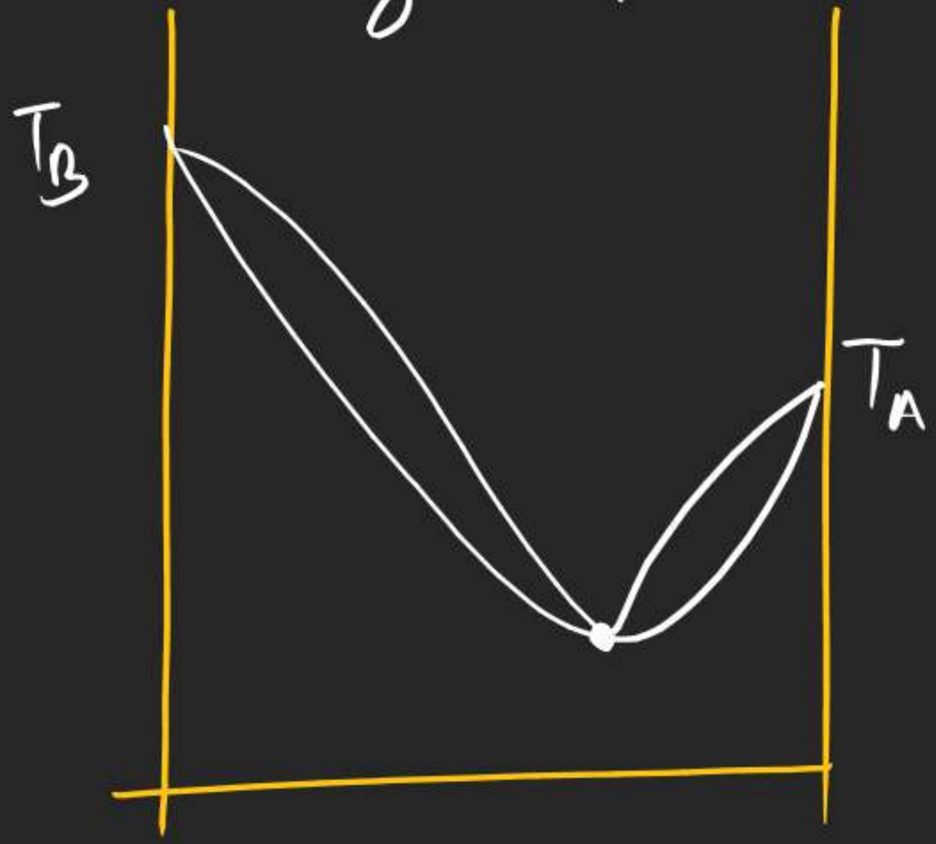
$$x_A = y_A$$

$$x_B = y_B$$

Azeotrope: It has sharp bpt like pure liq

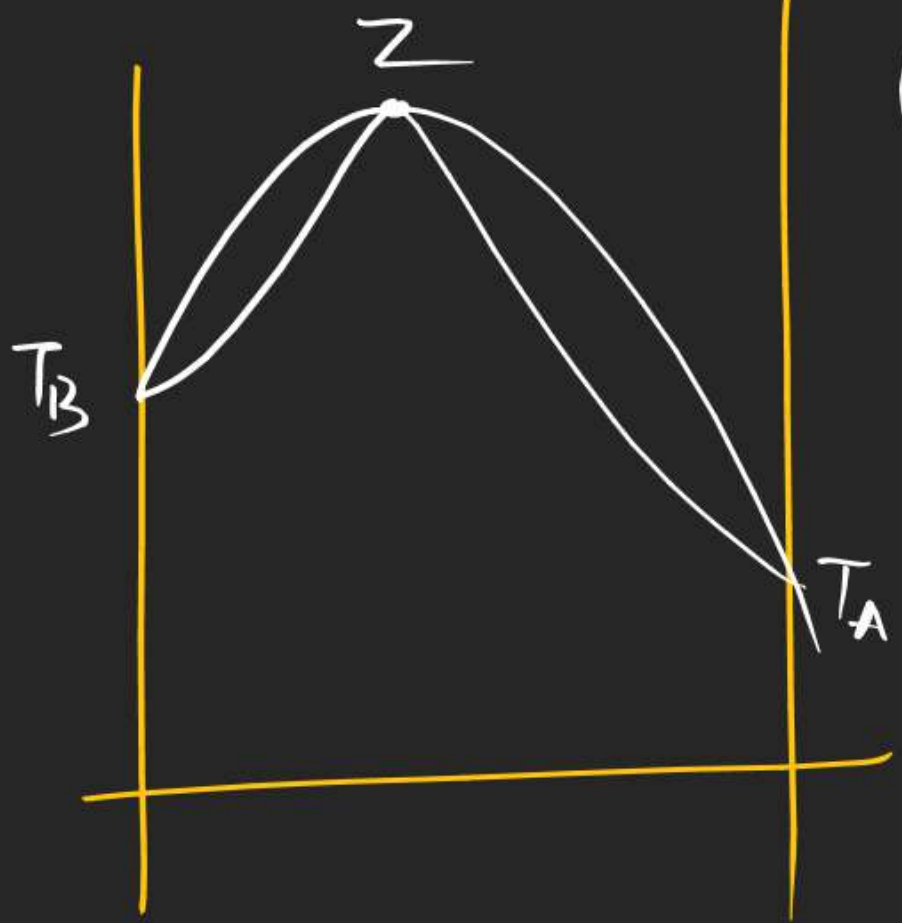
distillation method can not be used to separate the components of azeotrope.

minimum b.pt
azeotrope



+ive

max b.pt



−ive deviation

0-1

53-75