

Bubble Point and Dew Point Calculations

Bubble Point
Given x 's

Raoult's Law

$$y_A P = x_A P_A^{\text{sat}}(T)$$

$$y_B P = x_B P_B^{\text{sat}}(T)$$

\vdots

Dew Point
Given y 's

Solve for T_{bubble}

$$1 = x_A \frac{P_A^{\text{sat}}(T)}{P} + x_B \frac{P_B^{\text{sat}}(T)}{P} + \dots$$

T_{bubble}

Solve for y 's

$$y_A = x_A \frac{P_A^{\text{sat}}(T)}{P}$$

$$y_B = x_B \frac{P_B^{\text{sat}}(T)}{P}$$

\vdots

Solve for T_{dew}

$$y_A \frac{P}{P_A^{\text{sat}}(T)} + y_B \frac{P}{P_B^{\text{sat}}(T)} + \dots = 1$$

T_{dew}

Solve for x 's

$$y_A \frac{P}{P_A^{\text{sat}}(T)} = x_A$$

$$y_B \frac{P}{P_B^{\text{sat}}(T)} = x_B$$

\vdots

Plot $x_A, y_A, T_{\text{bubble}}$

Txy Diagram
(Binary Mixture Only)

Plot x_A, y_A, T_{dew}

