

Problem Statements

1. Compute the bubble point temperature at 18 bar of the following hydrocarbon mixture (see figure) using RK-Soave property method.

Table:

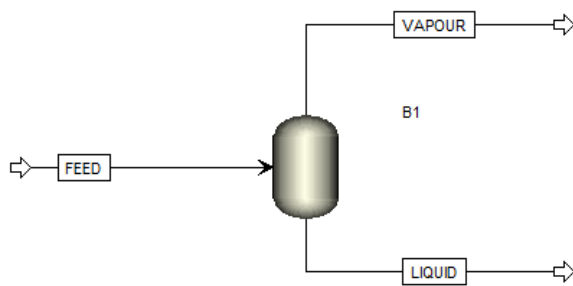
Component	Mole Fraction
C1	0.05
C2	0.1
C3	0.15
i-C4	0.1
n-C4	0.2
i-C5	0.25
n-C5	0.15

Assume the mixture inlet temperature at 25 C, Pressure of 19bar and flow rate of 120kmol/hr.

2. Compute the dew point temperature for Problem 1
3. A binary mixture, consisting of 60 mole% ethanol and 40 mole% water, is introduced into a flash chamber (Flash 2) with a flow rate of 120 kmol/hr at 1.013 bar and 70C. The chamber operates at its input conditions. Using NRTL property method.
 - a. Produce T-xy plot at a constant pressure (1.013 bar)
 - b. Product xy plot based on the data obtained in part (a)
 - c. Analyze the azeotropic behavior of ethanol-water system
 - d. Produce P-xy plot at a constant temperature (90C)
 - e. Produce P-xy plot at a constant temperature (90C) using NRTL parameters given in the DECHEMA Chemistry Data Series(Vol. I, Part 1A, p. 129) as:
 $a_{ij} = -517.9603 \text{ cal/mol}$ $a_{ji} = 1459.309 \text{ cal/mol}$ $\alpha_{ij} = 0.0878$ where i and j correspond to ethanol and water, respectively.
 - f. Find relative volatility of ethanol/water at input condition.

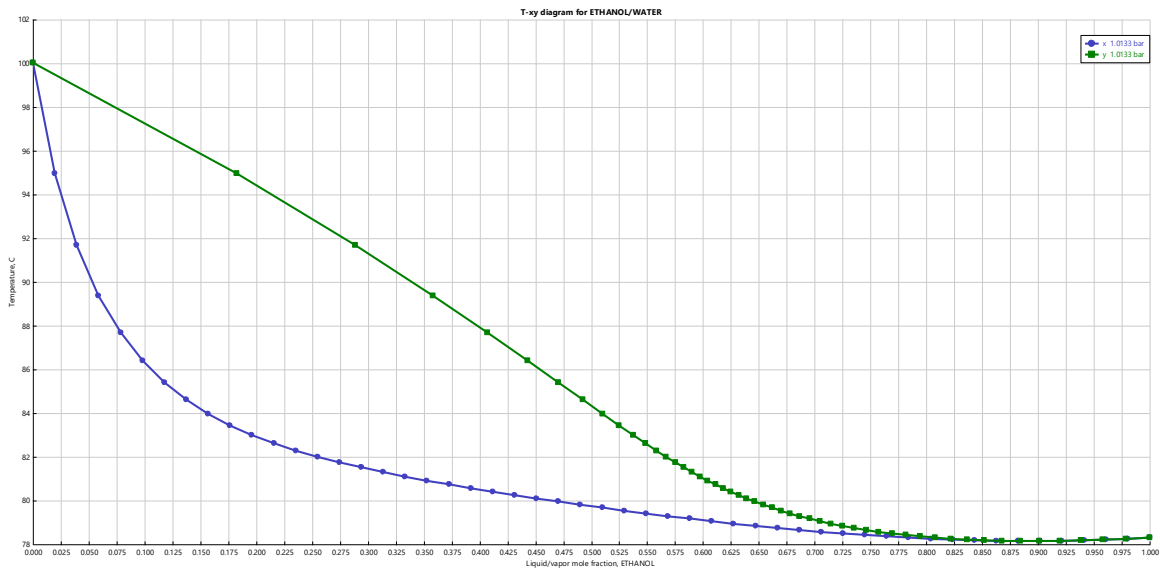
Solution:

1. The flowsheet is attached below:

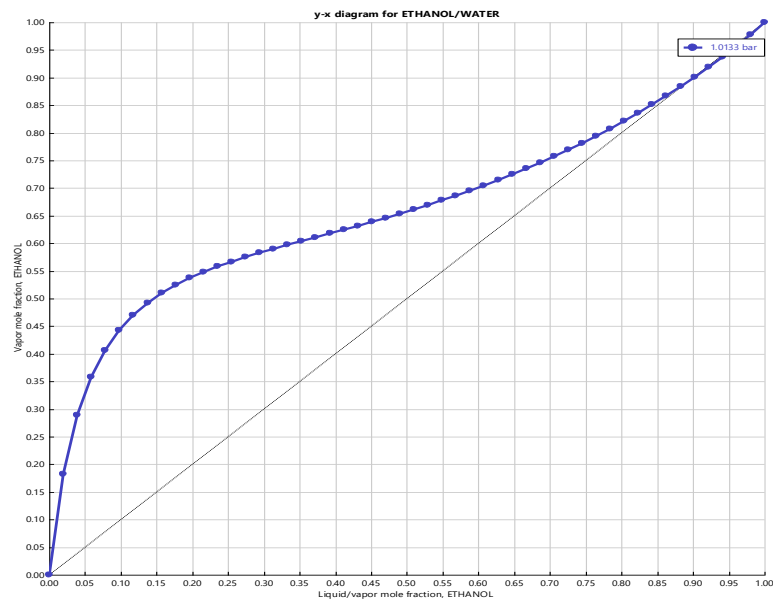


The bubble point temperature at 18 bar is 42.8344 °C

2. The dewpoint temperature is 113.223 °C
3. The answer for the various part is:
a.



b. Ans



c. Answer

AZEOTROPE SEARCH REPORT

Physical Property Model: NRTL Valid Phase: VAP-LIQ

Mixture Investigated For Azeotropes At A Pressure Of 101325 N/SQM

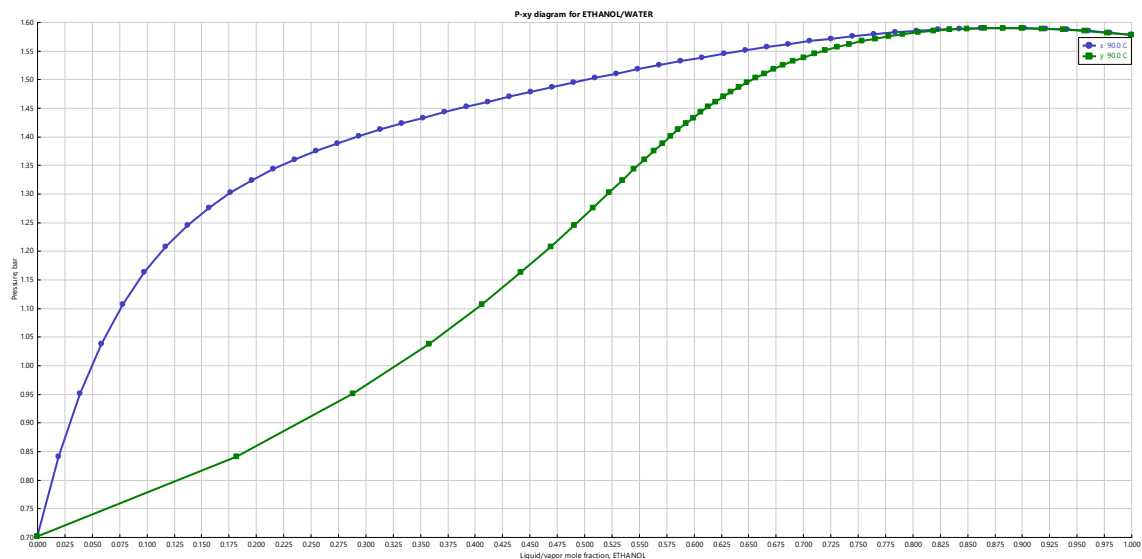
Comp ID	Component Name	Classification	Temperature
ETHANOL	ETHANOL	Stable node	78.31 C
WATER	WATER	Stable node	100.02 C

The Azeotrope

01	Number Of Components: 2		Temperature 78.15 C	
	Homogeneous		Classification: Unstable node	
			MOLE BASIS	MASS BASIS
	ETHANOL	0.8952	0.9562	
	WATER	0.1048	0.0438	

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d. Answer:



e. Answer:

