~~CFT Mid Sem~~ ~~23110325~~

CFT-Exam 23110325

Name: Suyog Ladake.

Q.1] regular: 20% ethanol, 80% Octane] ethanol chose to 5% v/v is desired.

$$\log_{10} P^{sat} = A - \frac{B}{T+C}$$

Octane: A = 4.04867
B = 1355.126
C = -63.633

Ethanol: A = ~~4.04867~~ 5.37299
B = ~~1355.126~~ 1670.409
C = -40.191

~~Experiment~~ 01: ~~const pressure~~ 1 bar.

Assumptions:
1. Applications of Raults Law.
2. Octane and ethanol behave as ideal gas in vapour solution.

$\therefore y_i P = x_i P_i^{sat}$

~~Experiment~~

~~$V_{initial} = 100$~~

3. Volume fraction = Mole fraction.

4. $M_{ethanol} = 46.1 \text{ gm/mol}$ $M_{octane} = 114 \text{ gm/mol}$.

(5) Density required are taken at 25°C:

$(density)_{ethanol} = 0.79$ gm/lml.

$(density)_{octane} = 0.70$ gm/lml.

E $V = 1000$ml (initially)

Experiment 1: 1 bar. = P constant.

$V_2 = 500$ml

From matlab code: in beaker

Concentration of octane = 5.6143 mol/L

Volume % of ethanol in beaker = 8.5033 %.

Exp-2: Fuel maintained at const. T = 60°C & constant pressure of 1bar. Stopped once 500ml of fuel felt.

1) Concentration of ~~ethe~~ octane = 5.6026 moles/L

2) Volume % of ethanol in beaker = 9.15%.

Experiment

Flashed

From matlab

t_1 s

t_2 s

&

We can

of [t_1 s

-tions

∴ Raults

~~But we~~

∴ Comparin

ethanol i

The

in exp.

(C

(

Now com

Experimen

Experiment 03:

Flashed at 60°c & 0.5 bar.

From matlab calculations:

$t_1 sat = 334.6234$

$t_2 sat = 375.1777$

& $t_{given} = 333.15$

We can see that t_{given} is out of range of $[t_1 sat, t_2 sat] \Rightarrow$ the given flash calculations does not follow raults law.

∴ Raults law is not applicable.

~~But we can calculate~~

∴ Comparing the values of concentration of ethanol in ①, ② and ③ experiments:

The concentrain of ethanol is almost same in exp. ① and ② but it is more in ①

$(C_{ortare\ ethanol})_1 = 5.6143$ mol/L

$(C_{ortare\ ethanol})_2 = 5.6026$ mol/L

Now comparing the volume %. of ethanol. Experiment ① gives more desired results

(a) $[(\%V)_{ethanol}]_1 = 8.5833\%$

$[(\%V)_{ethanol}]_2 = 9.15\%$

} ① Exp. has %volume close to 5%.