

**Q.1.**

What is the minimum number of  $m^3$  of dry air at  $20\text{ }^\circ\text{C}$  and 100 kPa that are necessary to evaporate 6 kg of ethyl alcohol if the total pressure remains constant at 100 kPa? Mol. wt of ethyl alcohol = 46; vapor pressure of alcohol at  $20\text{ }^\circ\text{C}$  = 5.93 kPa

**Q.2.**

The weather reported on the radio on a specific day was that the temperature in the afternoon would reach  $49\text{ }^\circ\text{F}$ , the relative humidity would be 43%, the barometer reading 29.67 in Hg. How many pounds of water vapor would be in  $1\text{ mi}^3$  of afternoon air? What would be the dew point of this air? Vapor pressure of water at  $94\text{ }^\circ\text{F}$  = 1.61 in Hg.

**Q.3.**

By absorption in silica gel you are able to remove 0.93 kg of the  $\text{H}_2\text{O}$  from the moist air at  $15\text{ }^\circ\text{C}$  and 98.6 kPa. The same air measures 1000  $m^3$  at  $20\text{ }^\circ\text{C}$  and 108 kPa when dry. What was the relative humidity of the moist air? Vapor pressure of water at  $15\text{ }^\circ\text{C}$  = 1.7 kPa

**Q.4.**

Calculate the bubble point (BP) temperature and composition of a vapor in equilibrium with a liquid that is 50mol% benzene and 50 mol% toluene at 1 atmosphere pressure.

*Data (Antonie constants):*

*Benzene: A=6.89272; B=1203.531; C=219.888*

*Toluene: A=6.95805; B=1346.773; C=219.639*

*In Antonie equation use T in  $^\circ\text{C}$ , and P in mmHg*

*(NBP<sub>Benzene</sub>=80  $^\circ\text{C}$ , NBP<sub>Toluene</sub>=110  $^\circ\text{C}$ )*