# PEP Assignment 7

## Selected Exercises in Thermodynamics (Part I)

1) A sealed container with volume 1 $m^3$ has dry air at pressure P = 1Pa, and temperature 0°C. 3 grams of water is added into the container and the system is heated to 100° C such that all water becomes gas. What is the pressure of the container? (Hint: assume that the air + water system satisfies ideal gas law when water is turned into vapor).

2) A cup with 300 $cm^3$ of liquid A at temperature 0°C is mixed with another cup of the same liquid with volume 110 $cm^3$ and temperature 100° C. Assuming that the volume expansion coefficient of the liquid is $\beta=0.001°C^{-1}$, what is the final volume of the liquid. Neglect heat loss during the process.

3) *Estimate* the rate of gas disposal for a cylindrical funnel. Let $T_0$ and $T_1$ be the temperatures outside and inside the funnel, respectively. M is the air's molar mass, P the air pressure, L and A are the lengths and cross sectional area of the funnel, respectively and R the gas constant.

4) Consider 3 copper cubes with same volume. Cube A is at 100° C whereas cubes B and C are at 0 0°C. Derive a method to make cube A cooler than cubes B and C. Neglect heat exchange with the surrounding.

5) A 1m glass tube with open ends is half immersed in water vertically. The top end of the glass tube is covered and the glass tube is lifted out of water. What is the height *h* of water left in the tube?