Name: _____ (Key)   ID # _____

1- Liquid nitrogen boils at temperature of -196 °C when the pressure is one atmosphere. A silver coin of mass $1.5*10^{-2}$ Kg and temperature 30 °C is dropped into the liquid. What mass of nitrogen boils off as the coin cools to − 196°C. [Take the specific heat of silver = 235 J/Kg/K and latent heat of vaporization for liquid nitrogen is $2.0*10^5$ J/Kg.

$$Q_{lost} + Q_{gained} = 0$$

$$m_{Ag} \, C_{Ag} \, (T_f - T_i) + m_N \, L_v = 0$$

$$\left(1.5 \times 10^{-2}\right)\left(235 \, \frac{J}{kg \, K}\right)\left(-196 - 30\right) + m_N\left(2 \times 10^5 \, \frac{J}{kg}\right) = 0$$

$$m_N = \frac{1.5 \times 10^{-2} \, (235)(226)}{2 \times 10^5} \simeq \boxed{4 \times 10^{-3} \, kg}$$

2- One mole of an ideal gas is taken through the cyclic process ABCA as shown. What is the net heat transfer during the cycle?

$$\Delta E_{int} = 0 = Q - W$$

$$\Rightarrow Q = W = -(\text{area enclosed})$$

$$= -\frac{1}{2}(2)(1 \times 10^3)$$

$$= \boxed{-1000 \, J}$$

P (kPa)