**Question 1 – (10 Marks)** Consider the following equilibrium reaction at 160.00 °C.

$$H_{2(g)} + O_{2(g)} \rightleftharpoons H_2O_{2(g)} \qquad (K_C = 7.109 \ \boldsymbol{note: this\ is\ NOT\ K_P})$$

a) If 0.420 atm of $H_2O_{2(g)}$ is initially present, calculate the equilibrium partial pressures in atm of $H_{2(g)}$, $O_{2(g)}$, and $H_2O_{2(g)}$. (Hint: You need a value from the important information section to solve this). **This is a gas phase reaction, with initial conditions given in partial pressure, so $K_p$ will be more useful.**

$$\boldsymbol{K_p = K_c(RT)^{\Delta n}}$$

$$\boldsymbol{K_p = (7.109)(0.08206 \times (273.15 + 160.00))^{(1-2)}}$$

$$\boldsymbol{K_p = (7.109)(0.08206 \times (433.15))^{(-1)}}$$

$$\boldsymbol{K_p = \frac{7.109}{35.54} = 0.200}$$

**To find equilibrium concentrations, we will need an ICE table**

| | $\boldsymbol{H_{2(g)}}$ | + | $\boldsymbol{O_{2(g)}}$ | $\rightleftharpoons$ | $\boldsymbol{H_2O_{2(g)}}$ |
|---|---|---|---|---|---|
| **I** | 0 | | 0 | | 0.420 |