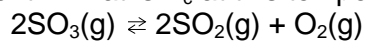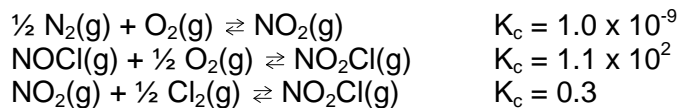Complete the following problems. Write your final answers in the blanks provided.

1. At $25^{o}C$, 0.760 mol SO_3 is placed in an otherwise empty 5.00 L container. When equilibrium is reached, 0.160 mol of O_2 is present. What is K_c at this temperature? (8 points)

$$2SO_3(g) \rightleftharpoons 2SO_2(g) + O_2(g)$$

Answer_____

2. Determine K_c for the reaction: $2NOCl(g) \rightleftharpoons N_2(g) + O_2(g) + Cl_2(g)$ from the following data at 298K: (8 points)

$\frac{1}{2} N_2(g) + O_2(g) \rightleftharpoons NO_2(g)$ $K_c = 1.0 \times 10^{-9}$
$NOCl(g) + \frac{1}{2} O_2(g) \rightleftharpoons NO_2Cl(g)$ $K_c = 1.1 \times 10^{2}$
$NO_2(g) + \frac{1}{2} Cl_2(g) \rightleftharpoons NO_2Cl(g)$ $K_c = 0.3$

Answer_____

3. Phosphorus pentachloride decomposes according to the chemical equation below. A 0.280 mol sample of $PCl_5(g)$ is injected into an empty 4.00 L reaction vessel held at 250°C. Calculate the concentrations of $PCl_5(g)$ and $PCl_3(g)$ at equilibrium. (9 points)

$$PCl_5(g) \rightleftarrows PCl_3(g) + Cl_2(g) \qquad K_c = 1.80 \text{ at } 250°C$$
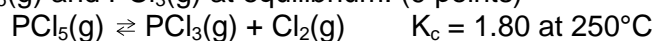
Answer_____

Possibly Useful Information

$\text{slope} = m = \dfrac{\Delta y}{\Delta x} = \dfrac{y_2 - y_1}{x_2 - x_1}$	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	$R = 0.08206 \text{ L atm mol}^{-1} \text{ K}^{-1}$ $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$
$pV = nRT$	$\Delta G = -RT\ln K$	$K_p = K_c(RT)^{\Delta n}$