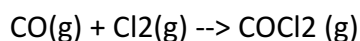


Answer on the question #62513, Chemistry / General Chemistry

Question:

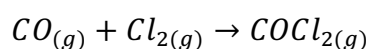
The K_p for the reaction below is 1.49×10^8 at 100.0 C :



in an equilibrium mixture of the three gases, $P_{\text{CO}} = P_{\text{Cl}_2} = 4.44 \times 10^{-4}\text{ atm}$. The partial pressure of the product, phosgene (COCl_2), is ___ atm.

Solution:

For the equilibrium



The equilibrium constant is defined in terms of partial pressure:

$$K_p = \frac{p_{\text{COCl}_2}}{p_{\text{CO}}p_{\text{Cl}_2}} \Rightarrow p_{\text{COCl}_2} = K_p p_{\text{CO}} p_{\text{Cl}_2}$$

Introducing the numerical data given for partial pressure of carbon monoxide p_{CO} and chlorine p_{Cl_2} , also the value for equilibrium constant:

$$p_{\text{COCl}_2} = 1.49 \cdot 10^8 \cdot 4.44 \cdot 10^{-4} \cdot 4.44 \cdot 10^{-4} = 29.4 \text{ (atm)}$$

Answer: The partial pressure of the product, phosgene (COCl_2), is 29.4 atm .