



1) A 10.55 gram sample of SO_2F_2 liquid is placed in a sealed 1.50L container. The container is heated to 450K and the liquid first boils and then begins to break down according to the reaction given above.

a) If no decomposition had occurred what would be the pressure of the SO_2F_2 gas?

$$10.55 \text{ g SO}_2\text{F}_2 \cdot \frac{1 \text{ mol}}{102.06 \text{ g}} = 0.10337 \text{ mol}$$

$$P = \frac{0.1034 \cdot 0.0821 \cdot 450}{1.50 \text{ L}} = 2.55 \text{ atm}$$

b) The equilibrium constant for the decomposition at 450K, K_p , is $7.65 \cdot 10^{-6}$. Write the equilibrium expression for the reaction.

$$K_p = \frac{P_{\text{SO}_2} \cdot P_{\text{F}_2}}{P_{\text{SO}_2\text{F}_2}}$$

c) Once the system reaches equilibrium what will be the partial pressure of SO_2F_2 remaining in the container?

	SO_2F_2	\rightleftharpoons	SO_2	$+$	F_2
I	2.55		0		0
C	-x		+x		+x
E	$2.55 - x$		x		x

$$7.65 \cdot 10^{-6} = \frac{(x)(x)}{(2.55 - x)}$$

$$7.65 \cdot 10^{-6} = \frac{x^2}{2.55}$$

$$P_{\text{SO}_2\text{F}_2} = 2.545 \text{ or } 2.55$$

$$x = 4.42 \cdot 10^{-3} \text{ atm}$$

d) What will be the total pressure in the container at equilibrium?

$$P_T = P_{\text{SO}_2\text{F}_2} + P_{\text{SO}_2} + P_{\text{F}_2} = 2.545 + 4.42 \cdot 10^{-3} + 4.42 \cdot 10^{-3}$$

$$P_T = 2.55$$