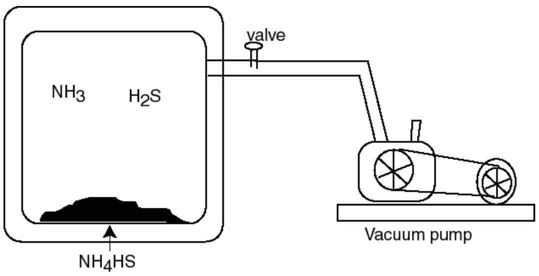
Lecture Notes K: Chemical Equilibrium III

Problem



A sample of solid ammonium hydrogen sulfide (NH_4HS) is placed in a container and all of the air is pumped out. Later on, the pressure inside the container is found to be 0.659 atm. The temperature of the system is 25°C. Assume that ammonium hydrogen sulfide is decomposing according to the reaction shown below. What is ΔG^o for this reaction.

$$NH_4HS_{(s)} \leftrightarrow NH_{3\,(g)} + H_2S_{\,(g)}$$

Problem

0.360 atm of SO_2(g) and 0.534 atm of SO_3(g) are mixed together in a constant-volume container at 1000°K. At equilibrium, the total pressure is 0.995 atm. What is the equilibrium constant for the following reaction, at 1000°K.

$$SO_2(g) + \quad {}^1/_2O_2(g) \quad \leftrightarrow \quad SO_3(g)$$

Problem

Consider the binding between a dye molecule and DNA:

$$\text{Dye} + \text{DNA} \leftrightarrow \text{DNA-Dye} \qquad K_{binding} = 4000$$

You mix 5.0 ml of a solution containing DNA at a concentration of 1.0×10^1 μM with 1.0ml of a solution that contains dye with a concentration of 0.0050 M. At equilibrium, what percent of the DNA is bound to the dye?