Answer on the question #62727, Chemistry / Physical Chemistry

Question:

NH4HS(s) evaporates in an evacuated container at 298 K as follows:
NH4HS(s) = NH3(g) + H2S(g)
What will be the pressure of each gas at equilibrium if Kp = 1.10 · 10^9Pa^2 at 298 K

Solution:

Equilibrium constant for the reaction above is defined as follows:
$$K_p = p_{NH_3} \cdot p_{H_2S}$$
According to the reaction stoichiometry, $p_{NH_3} = p_{H_2S}$. Then, the pressure of each gas is:

$$p_{NH_3} = p_{H_2S} = \sqrt[2]{K_p} = \sqrt[2]{1.10 \cdot 10^9 \ (Pa^2)} = 3.3 \cdot 10^4 \ Pa$$

Answer: $p_{NH_3} = p_{H_2S} = 3.3 \cdot 10^4 \ Pa$