Nitrogen reacts with hydrogen as shown: \[ 3\text{H}_2(g) + \text{N}_2(g) \rightleftharpoons 2\text{NH}_3(g) \quad \Delta H = -76 \text{ kJ mol}^{-1} \]

10.0 moles of hydrogen was mixed with 5.0 moles of nitrogen. At equilibrium, there was found to be 3.0 moles of ammonia. The total pressure was \( 2.0 \times 10^7 \) Pa.

a Write an expression for \( K_p \) for this equilibrium.

b State the units of \( K_p \).

c Calculate the moles of hydrogen and nitrogen at equilibrium.

\[
\text{hydrogen} = \quad \text{nitrogen} =
\]

d Calculate the partial pressure of each gas.

\[
\text{hydrogen} = \quad \text{nitrogen} = \quad \text{ammonia} =
\]

e Calculate \( K_p \) for this equilibrium.

f Explain what would happen to the position of the equilibrium and the value of \( K_p \) if the total pressure of gases was decreased?

g Explain what would happen to the position of the equilibrium and the value of \( K_p \) if the temperature of gases was decreased?