Hydrogen can be made as shown: $CH_4(g) + H_2O(g) \rightleftharpoons 3H_2(g) + CO(g)$ $\Delta H = +206 \text{ kJ mol}^{-1}$

5.0 moles of methane was mixed with 5.0 moles of steam. At equilibrium, there was found to be 6.0 moles of hydrogen. The total pressure was 1500 kPa.

a Write an expression for K_p for this equilibrium. ....

....

b State the units of K_p. ....

c Calculate the moles of each gas at equilibrium.

hydrogen = ...   carbon monoxide = ...   methane = ...   steam = ...

d Calculate the partial pressure of each gas.

hydrogen = ...   carbon monoxide = ...   methane = ...   steam = ...

e Calculate K_p for this equilibrium.

....

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....

....

f Explain what would happen to the position of the equilibrium and the value of K_p if the temperature of gases was increased?

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g Explain what would happen to the position of the equilibrium and the value of K_p if the total pressure of gases was increased?

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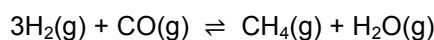
h Calculate K_p and state the units for this equilibrium at the same temperature and pressure as the original mixture at the start of the question.

$$3H_2(g) + CO(g) \rightleftharpoons CH_4(g) + H_2O(g)$$

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