Marks 5

- Equal volumes of carbon monoxide and hydrogen gas are introduced into a sealed 4.5 L flask at 1200 K and the following equilibrium is established.

$$CO(g) + 3H_2(g) \rightleftharpoons CH_4(g) + H_2O(g) \qquad \Delta H° = -205.9 \text{ kJ mol}^{-1}$$

At equilibrium, the flask contains 0.22 mol of CH_4 and the total pressure in the flask is 46.4 atm. Calculate the amount of $H_2(g)$ (in mol) that was initially introduced into the flask.

Answer:

In a separate experiment, it is determined that the reaction is in equilibrium when the same 4.5 L flask contains 0.18 mol of CH_4, 0.24 mol of H_2O, 0.82 mol of CO and 0.65 mol of H_2 at 1200 K. Calculate the concentration equilibrium constant, K_c, for this temperature.

K_c =