

Answer on Question #79400 – Chemistry – General Chemistry

Part A: $K_p = 2.7 \times 10^{-4}$

At 25°C the reaction from Part A has a composition as shown in the table below.

Substance Pressure (atm):

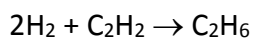
$C_2H_2(g)$ 4.35

$H_2(g)$ 3.75

$C_2H_6(g)$ 1.25×10^{-2}

What is the free energy change, ΔG , in kilojoules for the reaction under these conditions?

Solution:



$$K_p = \frac{[C_2H_6]_p}{[H_2]^2 [C_2H_2]} = \frac{1.25 \times 10^{-2}}{(3.75)^2 4.35} = 2.04 \times 10^{-4}$$

$$\Delta G = -RT(\ln K_p) = -(8.314 \text{ J/mol}\cdot\text{K}) \times (298 \text{ K}) \times \ln(2.04 \times 10^{-4})$$

$$\Delta G = 21048 \text{ J/mol} = 21.05 \text{ kJ/mol}$$