

Chemical Equilibrium



#2

Solid calcium carbonate is charged in an evacuated vessel at 800 K.



At equilibrium the partial pressure of $\text{CO}_2(\text{g})$ is 0,220 bar.

- Calculate K_p
- Calculate K_c

Solution

a)

$$K_p = P_{\text{CO}_2(\text{g})}^{\text{eq}}$$

$$K_p = 0,220$$

b)

$$K_c = [\text{CO}_2(\text{g})]_{\text{eq}}$$

$$PV = nRT \Leftrightarrow P = \frac{n}{V}RT = [\dots]RT \Leftrightarrow [\dots] = \frac{P}{RT}$$

$$K_c = [\text{CO}_2(\text{g})]_{\text{eq}} = \frac{P_{\text{CO}_2(\text{g})}^{\text{eq}}}{RT} = \frac{K_p}{RT} = \frac{0,220 \text{ bar}}{8,314 \frac{\text{J}}{\text{mol.K}} \times 800 \text{ K}} = \frac{0,220 \times 10^5 \frac{\text{N}}{\text{m}^2}}{8,314 \frac{\text{N.m}}{\text{mol.K}} \times 800 \text{ K}} = 3,31 \left(\frac{\text{mol}}{\text{m}^3} \right)$$

$$K_c = 3,31 \times 10^{-3} \left(\frac{\text{mol}}{\text{L}} \right)$$