Answer on Question #57590 – Chemistry – Other
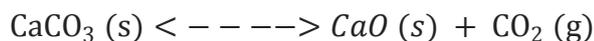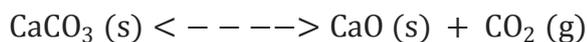
Write down the expressions for K_p and K_c for the following reaction. How are they related?

$$CaCO_3\ (s) <----> CaO\ (s)\ +\ CO_2\ (g)$$

Solution:

$$CaCO_3\ (s) <----> CaO\ (s)\ +\ CO_2\ (g)$$

The equilibrium constant is given by

$$K_c' = \frac{[CaO][CO_2]}{[CaCO_3]} \qquad \begin{array}{l} [CaCO_3] = \text{constant} \\ [CaO] = \text{constant} \end{array}$$

$$K_c = [CO_2] = K_c' \times \frac{[CaCO_3]}{[CaO]} \qquad K_p = P_{CO_2}$$

The concentration of solids and pure liquids are not included in the expression for the equilibrium constant.

The relationship between K_c and K_P is

$$K_P\ =\ K_c(RT)^{\Delta n}\ =\ K_c(0.0821T\ )^{\Delta n},$$

Δn = moles of gaseous products – moles of gaseous reactants.

For $CaCO_3\ (s) <----> CaO\ (s)\ +\ CO_2\ (g)$ Δn = 1 - 0 = 1, we have

$$K_P = K_c(0.0821T).$$

Answer:

$K_P = K_c(0.0821T).$