

The following is the definition of the “equilibrium expression”.

The equilibrium expression is an equation which has the equilibrium constant on the left side of the equal sign and the reaction quotient on the right side of the equal sign. That is:

$$K = Q$$

Here are some examples:

For the equilibrium: $\text{AgCl} \rightleftharpoons \text{Ag}^+ + \text{Cl}^-$ it is:

$$K_{sp} = [\text{Ag}^+][\text{Cl}^-]$$

For the equilibrium: $\text{HF} + \text{H}_2\text{O} \rightleftharpoons \text{F}^- + \text{H}_3\text{O}^+$ it is:

$$K_a = \frac{[\text{H}_3\text{O}^+][\text{F}^-]}{[\text{HF}]}$$

For the equilibrium: $\text{CO}_2(\text{g}) + \text{CaO}(\text{s}) + \text{H}_2\text{O} \rightleftharpoons \text{Ca}^{2+} + 2\text{HCO}_3^-$

$$K = \frac{[\text{Ca}^{2+}][\text{HCO}_3^-]^2}{P_{\text{CO}_2}} \quad *$$

One must use the correct symbols for reduced solute concentrations (molarity/1M), pressures ($P/1 \text{ bar}^\#$) and for solids, liquids and solvents ($X/1$ mole fraction). In most cases of mole fraction, the value is nearly 1 and therefore need not be written.

*In some text books there are distinctions using a K_c and a K_p . These concepts are outdated (see 1989 IUPAC blue book) and the conventions concerning gasses and the standard state of 1 bar ($\sim 1 \text{ atm}$) should always be followed.

$^\# 1 \text{ bar} \approx 1 \text{ atm} (= 0.986923267 \text{ atm})$