

LeChatelier and Volume

When a system is at equilibrium, $Q = K$. Changing the volume occupied by a **gaseous system** at equilibrium will change the concentrations of reactant and product gases and will change the pressure. This **MAY** cause the reactant quotient, Q , to change. Volume changes for systems that have **no gases** have **no effect** on the equilibrium.

The equilibrium will shift to the side of the reaction with:

... **fewer** moles of gas if the **volume is reduced**, thus offsetting the increased pressure.

... **more** moles of gas if the **volume is increased**, thus offsetting the reduced pressure.

The equilibrium will **remain unchanged** if the number of moles of gas is the same on both sides of the reaction.

The difference between the number of moles of gaseous products and gaseous reactants will tell you how a system behaves when the volume is changed.

$$\Delta n_{\text{gas}} = (\text{moles product gas} - \text{moles reactant gas})$$

If $\Delta n_{\text{gas}} < 0$, fewer moles of product gases. Decrease V , the reaction runs forward to reduce the pressure.

If $\Delta n_{\text{gas}} > 0$, fewer moles of reactant gases. Decrease V , the reaction runs backward to reduce the pressure.

If $\Delta n_{\text{gas}} = 0$, same number of moles of reactant and product gases. Changing V has no effect on the equilibrium.