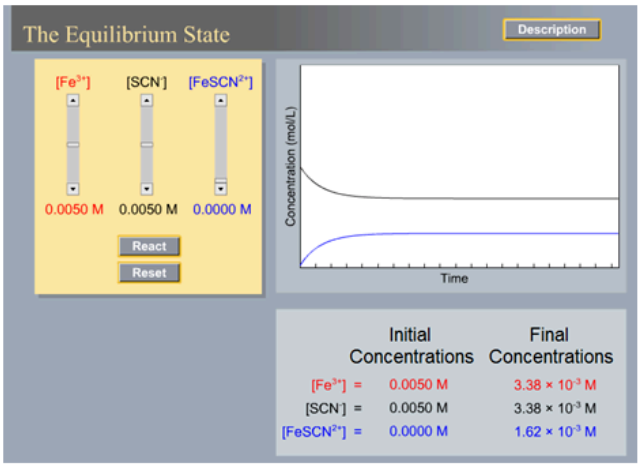
Simulation- The Equilibrium State

$$Fe^{3+}(aq) + SCN^{-}(aq) \rightarrow FeSCN^{2+}(aq)$$



$$Fe^{3+}(aq) + SCN^{-}(aq) \leftrightarrow FeSCN^{2+}(aq)$$

$$Rate_{for} = k_f[Fe^{3+}][SCN^{-}] \qquad Rate_{back} = k_b[FeSCN^{2+}]$$

- *Equilibrium:* when $Rate_{forward} = Rate_{backward}$

$$PCl_3(g) + Cl_2(g) \rightleftharpoons PCl_5(g)$$

$$3\,O_2(g) \rightleftharpoons 2\,O_3(g)$$

$$SO_2(g) + \tfrac{1}{2}\,O_2(g) \rightleftharpoons SO_3(g)$$

$$HCN(aq) + H_2O(l) \rightleftharpoons H_3O^{+}(aq) + CN^{-}(aq)$$

$$Pb^{2+}(aq) + 2\,Cl^{-}(aq) \rightleftharpoons PbCl_2(s)$$

Clicker questions:

What is the equilibrium expression for $CO_2(g) + Cl_2(g) \leftrightarrow COCl_2(g)$

1. $K = \frac{[COCl_2]}{[CO][Cl_2]}$
2. $K = \frac{[COCl_2]^2}{[CO][Cl_2]^2}$
3. $K = \frac{[CO][Cl_2]}{[COCl_2]}$
4. $K = \frac{[CO][Cl_2]^2}{[COCl_2]^2}$

What is K for the reaction

$Br_2(g) + Cl_2(g) \leftrightarrow 2BrCl(g)$?

Equilibrium concentrations are:

$[Br_2] = 2.3 \times 10^{-3}M$ $[Cl_2] = 1.2 \times 10^{-2}M$ $[BrCl] = 1.4 \times 10^{-2}M$

1. $K = \frac{2[1.4x10^{-2}]}{[2.3x10^{-3}][1.2x10^{-2}]}$
2. $K = \frac{[2.3x10^{-3}][1.2x10^{-2}]}{[1.4x10^{-2}]}$
3. $K = \frac{[1.4x10^{-2}]^2}{[2.3x10^{-3}][1.2x10^{-2}]}$
4. $K = \frac{[2.3x10^{-3}][1.2x10^{-2}]}{[1.4x10^{-2}]^2}$

What is the reaction described by $K = \frac{[HCl]^2}{[H_2][Cl_2]}$

1. $H_2 + Cl_2 \leftrightarrow 2HCl$
2. $2H_2 + 2Cl_2 \leftrightarrow 2HCl$
3. $H_2 + Cl_2 \leftrightarrow HCl$
4. $2H_2 + 2Cl_2 \leftrightarrow 2HCl$