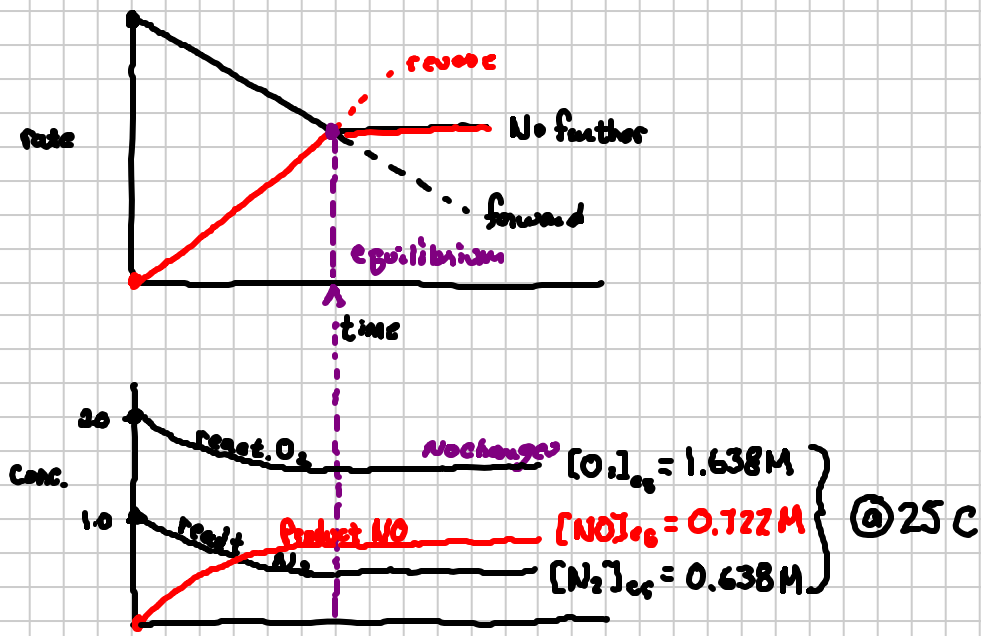
Lecture 7.2 Law of Mass Action

Note Title 9/16/2011

$$N_{2(g)} + O_{2(g)} \underset{r}{\overset{f}{\rightleftharpoons}} 2NO_{(g)}$$

initial 1.0M 2.0M 0.0M



Law of Mass Action: Equilibrium $rate_f = rate_r$

$$\underset{\text{react.}}{1N_{2(g)}} + 1O_{2(g)} \rightleftharpoons \underset{\text{prod.}}{2NO_{(g)}}$$

$$rate_f = rate_r$$

$$k_f[N_2]^1[O_2]^1 = k_r[NO]^2$$

equilibrium constant.

$$K_{eq.} = \frac{k_f}{k_r} = \frac{[NO]^2}{[N_2][O_2]}$$

products

reactants

... K_{eq} depend on temperature.

... ALL conc are equil concentrations.

$[O_2]_{eq} = 1.638M$ $[N_2] = 0.638M$

$[NO]_{eq} = 0.722M$

$$\text{L.M.A.} \quad K_{eq} = \frac{[NO]^2}{[N_2][O_2]} = \frac{(0.722\cancel{M})^2}{(0.638\cancel{M})(1.638\cancel{M})} = \underbrace{0.499 = K_{eq}}_{K_{eq}\text{ unitless}} \text{ @ } 25°C$$