





Assume this is an elementary reaction

$$R_f = k_f \cdot [A]^a [B]^b$$

$$R_r = k_r \cdot [C]^c [D]^d$$

At equilibrium:

$$R_f = R_r$$

$$\frac{k_f [A]^a [B]^b}{k_r} = \frac{k_r [C]^c [D]^d}{k_r}$$

$$\frac{\left(\frac{k_f}{k_r}\right) [A]^a [B]^b}{[A]^a [B]^b} = \frac{[C]^c [D]^d}{[A]^a [B]^b}$$

$$\left(\frac{k_f}{k_r}\right) = \frac{[C]^c [D]^d}{[A]^a [B]^b}$$

$$K_c = \frac{[C]_{eq}^c [D]_{eq}^d}{[A]_{eq}^a [B]_{eq}^b}$$



$$K_f = K_f [\text{NO}_2][\text{F}_2]$$



$$K_c = \frac{[\text{NO}_2\text{F}]_{\text{g}}^2}{[\text{NO}_2]_{\text{g}}^2 [\text{F}_2]_{\text{g}}}$$

$$K_{c1} = \frac{[\text{NO}_2\text{F}]_{\text{g}} [\text{F}]_{\text{g}}}{[\text{NO}_2]_{\text{g}} [\text{F}_2]_{\text{g}}}$$

$$K_{c2} = \frac{[\text{NO}_2\text{F}]_{\text{g}}}{[\text{NO}_2]_{\text{g}} [\text{F}]_{\text{g}}}$$

$$\begin{aligned} K_{c1} K_{c2} &= \frac{[\text{NO}_2\text{F}]_{\text{g}} \cancel{[\text{F}]_{\text{g}}}}{[\text{NO}_2]_{\text{g}} [\text{F}_2]_{\text{g}}} \cdot \frac{[\text{NO}_2\text{F}]_{\text{g}}}{[\text{NO}_2]_{\text{g}} \cancel{[\text{F}]_{\text{g}}}} \\ &= \frac{[\text{NO}_2\text{F}]_{\text{g}}^2}{[\text{NO}_2]_{\text{g}}^2 [\text{F}_2]_{\text{g}}} \end{aligned}$$