## Answer on the Question #68350, Chemistry / General chemistry

Consider the equilibrium

N2(g)+O2(g)+Br2(g)⇌2NOBr(g)

Calculate the equilibrium constant Kp for this reaction, given the following information (at 300 K ):

2NO(g)+Br2(g)⇌2NOBr(g)Kc=2.0
2NO(g)⇌N2(g)+O2(g)Kc=2.3×1030

## Solution:

1) $2NO(g)+Br_2(g)\rightleftharpoons 2NOBr(g) K_c=2.0$
2) $2NO(g)\rightleftharpoons N_2(g)+O2(g),\ K_c=2.3\times10^{30}$

If we divide 2 reactions we will get wanted reaction:

$$\frac{[NOBr]^2}{[NO]^2[Br]}\cdot\frac{[NO]^2}{[N_2]\,[O_2]}=\frac{[NOBr]^2}{[N_2]\,[O_2][Br]}$$

So if 1) divided by 2) gives you the ratio you want, then $K_{c1}$ / $K_{c2}$ give us the $K_c$ for the studied reaction:

$$K_c=\frac{K_{c1}}{K_{c2}}=\frac{2.0}{2.3\cdot10^{30}}=8.7\cdot10^{-31}$$

The Kc can be converted to Kp by the ratio in which RT will be in the dominator:

$$K_p=\frac{K_c}{RT}=\frac{8.7\cdot10^{-31}}{8.314\cdot300}=3.5\cdot10^{-34}$$