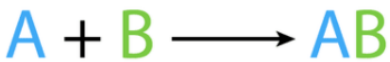
AP Chemistry Daily Videos

7.6 Properties of the Equilibrium Constant

Video #1

1. **Write K value for the forward and reverse direction of the following reaction:** 

2. **If K in the above reaction equals 3, what is K_{rev}?**

3. **Write a generic example, not used in the video, of how you'd calculate an overall K from a series of reactions.**

4. **What rule would you state happens to K as the coefficient changes, based on the example:**

Suppose [B] = 5 and [A] = 1.

A → B	$K_1 = \frac{[B]}{[A]}$	$K_1 = \frac{5}{1} = 5$
2A → 2B	$K_2 = \frac{[B]^2}{[A]^2}$	$K_2 = \frac{5^2}{1^2} = 25$
½ A → ½ B	$K_3 = \frac{[B]^{1/2}}{[A]^{1/2}}$	$K_3 = \frac{5^{1/2}}{1^{1/2}} = \sqrt{5} = 2.23$

5. **How is Q different than K? Which one is used if you are <u>not</u> at equilibrium?**

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6. **Try to complete this problem before the answer is given. Evaluate how you did and identify any errors you made.**

$2\ S(s) + 2\ O_2(g) \rightleftarrows 2\ SO_2(g)$ $\quad K_1 = 2 \times 10^{105}$

$2\ SO_2(g) + O_2(g) \rightleftarrows 2\ SO_3(g)$ $\quad K_2 = 7 \times 10^{24}$

Given the value of the equilibrium constants, K_1 and K_2, for the reactions represented above, what is the value of the equilibrium constant, K_3, for the following reaction?

$2\ S(s) + 3\ O_2(g) \rightleftarrows 2\ SO_3(g)$ $\quad K_3 = ?$

a) 1×10^{130}
b) 3×10^{80}
c) 1×10^{65}
d) 2×10^{40}
e) 7×10^{24}

5:09

7. **Try to complete this problem before the answer is given. Evaluate how you did and identify any errors you made.**

Considering the reactions below:

Reaction 1: $NO(g) + \frac{1}{2} Br_2(g) \leftrightarrow NOBr(g)$ $\quad K_1 = \frac{[NOBr]}{[NO]\ [Br_2]^{1/2}}$

Reaction 2: $2NO(g) \leftrightarrow N_2(g) + O_2(g)$ $\quad K_2 = \frac{[N2]\ [O_2]}{[NO]^2}$

Which of the following expressions would allow us to calculate the equilibrium constant, *K*, for the following overall reaction?

$$N_2(g) + O_2(g) + Br_2(g) \leftrightarrow 2NOBr(g)$$

A) $2K_1 + \frac{1}{K_2}$ C) $2K_1 \times \frac{1}{K_2}$

B) $K_1^2 + \frac{1}{K_2}$ D) $K_1^2 \times \frac{1}{K_2}$

8. **Summarize the 4 key takeaways.**

   a.

   b.

   c.

   d.