

AP Chemistry Daily Videos

7.4 Calculating the Equilibrium Constant

Video #1

1. Describe what K is in your own way using the term ratio.
2. Under what conditions does K change?
3. How did you do with your calculations in example problem #1?

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4. There is an error in example 2. What is it?

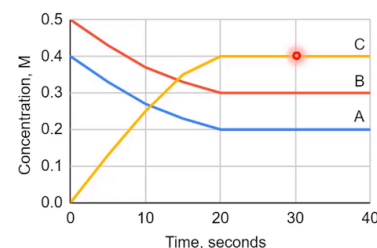
A graph of concentration versus time for the reaction $A + B \leftrightarrow 2C$ at 285 K is depicted at right.

- A) Write the equilibrium constant expression, K_c , for the reaction.

$$K_c = \frac{[C]^2}{[A][B]}$$

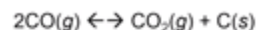
- B) Calculate the value of the equilibrium constant, K_c , at 295 K.

$$K_c = \frac{(0.4)^2}{(0.2)(0.3)}$$



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5. Try following the problem before the explanation and answer is given. Evaluate how you did and identify any errors.



The reaction above takes place at 300 K and is allowed to reach equilibrium. The equilibrium concentrations of CO_2 and CO are 2.50 M and 0.350 M, respectively.

- a) Write the equilibrium constant expression, K_c , for the reaction.
- b) Calculate the value of K_c at 300 K.
- c) In a separate trial also conducted at 300 K, the equilibrium concentration of CO_2 is 1.25 M. Which of the following best approximates the equilibrium concentration of $\text{CO}(g)$, and why?
 - I. $[\text{CO}]_{\text{eq}} = 0.175 \text{ M}$, because the concentration of CO_2 was decreased by half, so $[\text{CO}]_{\text{eq}}$ must also decrease by half.
 - II. $[\text{CO}]_{\text{eq}} = 0.525 \text{ M}$, because the concentration of CO_2 was decreased by half, so $[\text{CO}]_{\text{eq}}$ must increase by half.
 - III. $[\text{CO}]_{\text{eq}} = 0.248 \text{ M}$, because the ratio of $[\text{CO}_2] : [\text{CO}]^2$ must remain constant.
 - IV. $[\text{CO}]_{\text{eq}} = 0.061 \text{ M}$, because the ratio of $[\text{CO}_2] : [\text{CO}]$ must remain constant.

6. What is the unit of K ? Explain.

7. Evaluate your work in example problem #4?

8. Summarize key points for calculating K .

a.

b.

c.

d.