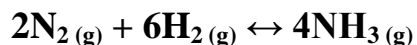




Below are some chemistry problems and solution steps to help you succeed in science.

## Question #1:

The equilibrium constant for the chemical equation is  $K_p = 0.00307$  at  $262\text{ }^\circ\text{C}$ . Calculate the value of the  $K_c$  for the reaction at  $262\text{ }^\circ\text{C}$ .



## Solution steps:

- ⇒ To begin this problem, you should keep in mind that the question just included words like equilibrium constant,  $K_p$ , and  $K_c$  so this means we may need to use the formula  $K_p = K_c (RT)^{\Delta n}$ .
- ⇒ Using the formula:

$$K_p = K_c (RT)^{\Delta n}$$

$K_c$  = is known as molar concentrations, this is subject to change.

$K_p$  = is known as partial pressure, this is subject to change.

R, is a constant, in this case, =  $0.0821\text{ L}\cdot\text{atm}/(\text{mol}\cdot\text{K})$

T, is temperature. In cases like these, it's best to convert Celsius ( $^\circ\text{C}$ ) to Kelvin's (K).

$\Delta n$  = the difference of the gas moles, in other words, moles of gas products minus the moles of gas reactants.

Now we plug in what we already know in the formula. Please take your time in doing so because this is a very important step:

Notice that  $K_p$  is already given as  $0.00307$  so is temperature at  $262\text{ }^\circ\text{C}$ , and we know what is R. Before you plug in the temperature you should convert it to Kelvin's.

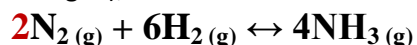
$$\Rightarrow 262\text{ }^\circ\text{C} + 273 = 535\text{ K}$$

$$\Rightarrow \text{Thus far, we have for } K_p = K_c (RT)^{\Delta n}$$

$$\bullet 0.00307 = K_c [(0.0821)\cdot(535)]^{\Delta n}$$

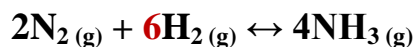
- ⇒ Now we need to find out what is delta n (also known as  $\Delta n$ ). As mention before  $\Delta n$  is the moles of product gas minus the moles of reactant gas.

Referring back to the equation, which is crucial to our answer, we see that there are 2 N's (also known as nitrogen), in the reactants side. See below.

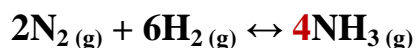




We have 6 H's (also known as hydrogen), in the reactants side. See below.



For the product side, we see that there are 4 moles. See below.



⇒ As we were trying to, which is find delta n ( $\Delta n$ ), we take the moles of product gas minus the moles of reactant gas and it would give us:

[moles of the product gas – moles of the reactant gas]

$$4 - (8) = -4$$

⇒ Now we know  $\Delta n$ , which is -4.

⇒ We now plug in all the numbers to solve for  $K_c$ .

$$K_p = K_c [(0.0821) * (535)]^{\Delta n}$$

- $0.00307 = K_c [(0.0821) * (535)]^{-4}$
- $0.00307 = K_c [43.9235]^{-4}$
- $0.00307 = K_c [2.69 * 10^{-7}]$
- $0.00307 / (2.69 * 10^{-7}) = K_c$
- $11412.6 = K_c$

⇒ There we have it my beloved brothers and sisters, our answer, finally:

$$K_c = 11412.6$$

We hope you found this to be helpful. We wish you the best and more success. God bless you all. Enjoy chemistry. Learn more chemistry to increase our chances to find cures for numerous diseases and save lives!

For more science educational literature, tutorials, solution steps, videos, and others, please kindly contact Olivos Motion Picture Productions, or visit [www.OlivosMotionPictureProductions.com](http://www.OlivosMotionPictureProductions.com)

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