

**Simple Step-by-Step
Guides to Solving
Chemistry Problems**

**Interconverting K_c
& K_p**



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Converting Between K_c and K_p

To convert between K_c to K_p use the following equation which is based on the relationship between molarities and gas pressures.

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

Δn is the difference in the number of **moles of gases** on each side of the balanced equation for the reaction.

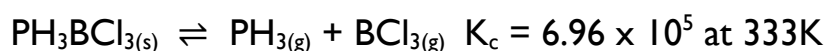
$$\Delta n = (\text{number of moles of gaseous products} - \text{number of moles of gaseous reactants})$$

Converting K_c to K_p

Step 1: calculate the difference in the number of moles of gases.

Step 2: substitute Δn , R , and T into the equation and solve.

Example 1: Calculate the value of K_p for the following reaction, at 333 K.



Calculate the difference in the number of moles of gases, Δn .

$$\Delta n = (2 \text{ moles of gaseous products} - 0 \text{ moles of gaseous reactants}) = 2$$

Substitute the values into the equation and calculate K_p .

$$K_p = (6.96 \times 10^5) \times (0.0821 \times 333)^2 = 0.052$$

Note: because we do not choose to use units for K_c and K_p , we cannot cancel units for R and T . However, be careful to use the value of R consistent with the units of pressure used in the problem, and T in Kelvin.

Converting K_p to K_c

Step 1: Calculate the change in the number of moles of gases.

Step 2: Substitute Δn , R , and T into the equation and solve.

Example 2: Calculate the value of K_c at 373 K for the following reaction:



Calculate the change in the number of moles of gases, Δn .

$$\Delta n = (2 \text{ moles of gaseous products} - 3 \text{ moles of gaseous reactants}) = -1$$

Substitute the values into the equation and calculate K_c .

$$2.40 = K_c \times (0.0821 \times 373)^{-1}$$

$$K_c = 73.5$$

Note: because we do not choose to use units for K_c and K_p , we cannot cancel units for R and T . However, be careful to use the value of R consistent with the units of pressure used in the problem, and T in Kelvin.