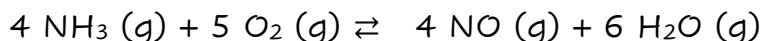


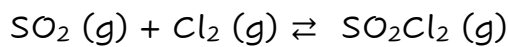
## $K_c$ and $K_p$

1. Write both  $K_p$  and  $K_c$  for the following reaction.



$$K_c = \frac{[\text{NO}]^4 [\text{H}_2\text{O}]^6}{[\text{NH}_3]^4 [\text{O}_2]^5} \quad K_p = \frac{P_{\text{NO}}^4 P_{\text{H}_2\text{O}}^6}{P_{\text{NH}_3}^4 P_{\text{O}_2}^5}$$

2. The following reaction has  $K_c = 18.7$  at  $28.0^\circ\text{C}$ . Calculate  $K_p$  at the same temperature. Once equilibrium has been reached, are products or reactants favored?



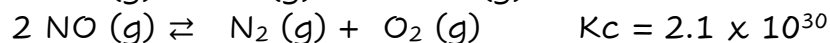
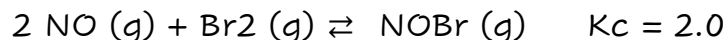
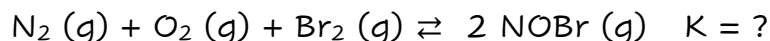
$$K_p = K_c (RT)^{\Delta n} \quad R = 0.0821 \frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}} \quad \Delta n = 1 \text{ mol} - 2 \text{ mol} = -1$$

$$T = 28.0^\circ\text{C} + 273.15 = 301.15 \text{ K}$$

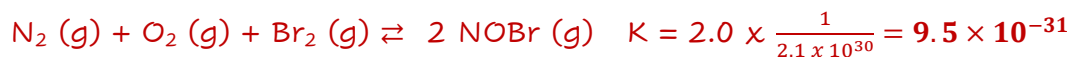
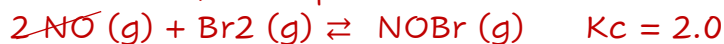
$$K_p = 18.7 (0.0821 \frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}} \times 301.15 \text{ K})^{-1} = \mathbf{0.756}$$

**$K_c = 18.7$ , and products are favored.  $K_p$  is less than 1, therefore the reactants are favored due to  $\Delta n$  being equal to  $-1$ .**

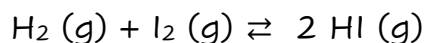
3. Use the data below to calculate  $K$  for the following reaction at  $25.0^\circ\text{C}$ .



Leave the first equation alone and reverse the second equation.



4. The following reaction has  $K_p = 49$  at  $729 \text{ K}$ . Calculate  $K_c$ .



$$K_c = \frac{K_p}{(RT)^{\Delta n}} \quad \Delta n = 0, \text{ therefore } (RT)^0 = 1 \text{ and } \mathbf{K_p = K_c = 49}$$