

Problem of the Day 24 CHEM 1252

1. The reaction given below has an equilibrium constant, K_c , equal to 1.80 at 250°C.



a) Write the equilibrium expression.

| | |
|---------|---|
| $K_c =$ | 4 |
|---------|---|

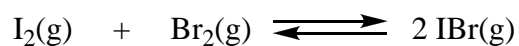
b) If 0.500 mol PCl_5 is added to a 5.00-L vessel, fill in the table below with appropriate concentrations and/or variables.

| | $\text{PCl}_5(\text{g})$ | \rightleftharpoons | $\text{PCl}_3(\text{g})$ | + | $\text{Cl}_2(\text{g})$ |
|-------------|--------------------------|----------------------|--------------------------|---|-------------------------|
| initial | 1 | | 1 | | 1 |
| change | 1 | | 1 | | 1 |
| equilibrium | 1 | | 1 | | 1 |

c) Calculate the concentrations of PCl_5 , PCl_3 , and Cl_2 at equilibrium at 250°C. *Hint: Check to see if x is negligible.*

| | | | |
|--------------------|--------------------|-------------------|----|
| $[\text{PCl}_5] =$ | $[\text{PCl}_3] =$ | $[\text{Cl}_2] =$ | 12 |
|--------------------|--------------------|-------------------|----|

2. The equilibrium constant, K_c , for the reaction below is 280. at 150°C .



a) Write the equilibrium expression.

$K_c =$

4

b) Suppose that 0.500 mol IBr in a 1.00-L flask is allowed to reach equilibrium at 150°C . Fill in the table below with the appropriate concentrations and/or variables.

| | $\text{I}_2(\text{g})$ | $+$ | $\text{Br}_2(\text{g})$ | \rightleftharpoons | $2 \text{IBr}(\text{g})$ |
|-------------|------------------------|-----|-------------------------|----------------------|--------------------------|
| initial | | | | | |
| change | | | | | |
| equilibrium | | | | | |

c) What are the equilibrium concentrations of I_2 , Br_2 , and IBr?

$[\text{I}_2] =$

$[\text{Br}_2] =$

$[\text{IBr}] =$

12