

Unit 7 – Chapter 13: Chemical Equilibrium

Name KEY - JUST ANSWERS

Experiment 20 Conclusion questions

Period _____

1. Calculate
- K_c
- at 303 K for:

 $K_p = 34.5$ at this temperature

$$K_c = 858$$

2. The equilibrium constant for the reaction

 $K_p = 1.48 \times 10^4$ at 184°C

- a) Calculate K_p for the reverse reaction $K_p = 6.76 \times 10^{-5}$
 b) Does the equilibrium favor the production of NO and O_2 or does it favor NO_2 at this temperature?

→ (PRODUCTION OF NO_2)

3. A mixture of 1.374 g of
- H_2
- and 70.31 g of
- Br_2
- is heated in a 2.00-liter vessel at 700 K. The substances react as follows:

At equilibrium the vessel is found to contain 0.566 g of H_2 .

- a) Calculate the equilibrium concentrations of all the reactants and products
 b) Calculate the value of K_c .

a) $\text{H}_2 = .141 \text{ M}$
 $\text{Br}_2 = .1020 \text{ M}$
 $\text{HBr} = .400 \text{ M}$

b) 57

4. At
- 100°C
- ,
- K_c
- for the following reaction is
- 2.0×10^{-4}



Calculate the concentrations of all the species at equilibrium for each of the following original mixtures: 2.0 moles of CO, 2.0 mol of O_2 in a 5-liter container.

$\text{CO} = .396 \text{ M}$
 $\text{O}_2 = .396 \text{ M}$
 $\text{CO}_2 = .103 \text{ M}$

5. Using the equilibrium equation in #4, calculate the direction the reaction will go at the following concentrations: $[CO] = 1.94 M$, $[O_2] = 0.78 M$, $[CO_2] = 0.007 M$

$$Q = 1.67 \times 10^{-5} < K_c \therefore \rightarrow$$

6. A mixture of $0.36 M H_2$ and $0.30 M Br_2$ is heated at $600 K$. The equilibrium reaction is:



$$K_c = 4.2 \times 10^{-5}$$

Calculate the equilibrium concentrations of all reactants and products.

$$[H_2] = .359 M$$

$$[Br_2] = .299 M$$

$$[HBr] = .00212 M$$

7. A mixture of 0.200 moles of CO_2 , 0.100 moles of H_2 , and 0.160 moles of H_2O is placed in a 2.00 -liter vessel. The following equilibrium is established at $500 K$.



- Calculate the initial pressures of CO_2 , H_2 , and H_2O (Hint: Use $pV = nRT$)
- At equilibrium $P_{H_2O} = 3.51 \text{ atm}$, calculate the equilibrium partial pressures of CO_2 , H_2 , and CO .
- Calculate K_p for the reaction.

$$a) P_{CO_2} = 4.10 \text{ atm}$$

$$P_{H_2} = 2.05 \text{ atm}$$

$$P_{H_2O} = 3.28 \text{ atm}$$

$$b) CO_2 = .387 \text{ atm}$$

$$H_2 = 1.82 \text{ atm}$$

$$CO = .23 \text{ atm}$$

$$H_2O(\text{GIVEN}) = 3.51 \text{ atm}$$

$$c) K_p = .11$$