CHM152	Quiz 4	25 Pts	Spring 2020	Name: _	
Due March	1 1th at the	REGIN	NING of CLA	CC Δ11 xx	ork must be shown in detail

1. For the reaction given below, 2.00 mol of A and 3.00 mol of B are placed in a 6.00-L container.

$$A(g) + 2B(g) \rightleftharpoons C(g)$$

At equilibrium, the concentration of A is 0.232 mol/L. What is the concentration of B at equilibrium?

2. A sample of ammonia gas was allowed to come to equilibrium at 400 K.

$$2NH_3(g) \rightleftharpoons N_2(g) + 3H_2(g)$$

At equilibrium, it was found that the concentration of H_2 was $0.0555 \, M$, the concentration of N_2 was $0.0185 \, M$, and the concentration of N_3 was $0.388 \, M$. What was the initial concentration of ammonia?

3. Nitrogen trifluoride decomposes to form nitrogen and fluorine gases according to the following equation:

$$2NF_3(g) \Longrightarrow N_2(g) + 3F_2(g)$$

When 2.92 mol of NF₃ is placed in a 2.00-L container and allowed to come to equilibrium at 800 K, the mixture is found to contain 0.0271 mol of N₂. What is the value of K_p at this temperature? You must first solve for K_c and then convert to K_p .

4. $CS_2(g) + 3Cl_2(g) \rightleftharpoons CCl_4(g) + S_2Cl_2(g)$

At a given temperature, the reaction above is at equilibrium when $[CS_2] = 0.050 M$, $[Cl_2] = 0.25 M$, $[CCl_4] = 0.15 M$, and $[S_2Cl_2] = 0.35 M$. What will be the direction of the reaction when the reactants and products have the following concentrations: $CS_2 = 0.16$ M, $Cl_2 = 0.21 M$, $CCl_4 = 0.28 M$, and $S_2Cl_2 = 0.37 M$? You must show calculations to support your answer.

5. Carbon monoxide is toxic because it can successfully compete with oxygen for hemoglobin (Hb) sites according to the following equilibrium:

 $Hb(O_2)_4(aq) + 4CO(g) \rightleftharpoons Hb(CO)_4(aq) + 4O_2(g)$

From Le Châtelier's principle, how is CO poisoning is reversed by

A) increasing the O_2 pressure.

- D) decreasing the amount of Hb.
- B) increasing the CO pressure.
- E) increasing the amount of Hb.
- C) increasing the CO_2 pressure.

6. Which of the following equilibria would be affected by volume changes at constant temperature?

1.
$$2NO(g) + 3F_2(g) \Longrightarrow 2F_3NO(g)$$

2.
$$PCl_3(g) + Cl_2(g) \Longrightarrow PCl_5(g)$$

3.
$$O_3(g) + NO(g) \Longrightarrow NO_2(g) + O_2(g)$$

$$\mathbb{C}$$
) 3 only

Explain your reasoning:

7. Consider the following equilibrium:

$$2NH_3(g) \rightleftharpoons N_2(g) + 3H_2(g); \Delta H = 92 \text{ kJ}$$

What change should be made in order to increase the value of K_p for this reaction?

- A) Increase the temperature.
- D) Decrease the pressure.
- B) Decrease the temperature.
- E) Nothing; K_p cannot be changed.

C) Increase the pressure.

Explain your reasoning:

8.	What is the pH, pOH, hydroxide ion concentration and the hydronium-ion concentration of a $0.0014M$ Ba(OH) $_2$ solution?
9.	What is the pH of the final solution when 25 mL of $0.025~M$ HCl has been added to 35 mL of $0.037~M$ HCl at 25° C?
10.	A 0.10 M solution of a weak monoprotic acid has a hydronium-ion concentration of $7.2 \times 10^{-4} M$. What is the acid-ionization constant, K_a , for this acid?