Chem 112 Spring 2020 Quiz 4 **Whelan**

SID ☐☐☐☐☐☐☐☐ Last Key First Answer

Question 1
2 Points

The reaction between ammonia and nitrous oxide is given below:

$$2\ NH_3(g) + 3\ N_2O(g) \longrightarrow 4\ N_2(g) + 3\ H_2O(g)$$

We therefore know that **which of the following reactions can also occur?**

- ☐ $4\ NH_3(g) + 6\ NO(g) \longrightarrow 8\ N_2(g) + 6\ H_2O(l)$
- ☑ $4\ N_2(g) + 3\ H_2O(g) \longrightarrow 2\ NH_3(g) + 3\ N_2O(g)$
- ☐ $5\ N_2(g) + 6\ H_2O(l) \longrightarrow 4\ NH_3(g) + 6\ NO(g)$
- ☑ $NH_3(g) + 3/2\ N_2O(g) \longrightarrow 2N_2(g) + 3/2\ H_2O(g)$

Question 2
4 Points

Consider the following reaction where **K_c = 0.159** at 723 K:

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

A reaction mixture was found to contain **4.11×10^{-2}** moles of **$N_2(g)$**, **3.99×10^{-2}** moles of **$H_2(g)$** and **5.64×10^{-4}** moles of **$NH_3(g)$**, in a **1.00 Liter** container.

Indicate **True** (T) or **False** (F) for each of the following:

a) In order to reach equilibrium **$NH_3(g)$** must be **produced**. T

b) In order to reach equilibrium **K_c** must **decrease**. F

c) In order to reach equilibrium **$N_2(g)$** must be **consumed**. T

d) **Q** is **less** than **K**. T

Question 3
2 Points

Consider the following equilibrium: $NH_4I(s) \rightleftharpoons NH_3(g) + HI(g)$

Circle the statement that is correct with respect to Kc and Kp for this equilibrium.

☐ $K_c = K_p$ ☐ $K_c > K_p$ ☑ $K_c < K_p$

Question 4
2 Points

The equilibrium constant, K_c, for the following reaction is **2.76** at 698 K.

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

Calculate K_p at this temperature for the following reaction:

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

R = 0.0821 L.atm.mol^{-1}.K^{-1}

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

$$K_c = \frac{1}{2.76} = 0.362$$

$$K_p = 0.362(RT)^{2-4}$$
$$= 0.362\,(RT)^{-2}$$
$$= \frac{0.362}{(0.0821 \times 698)^2}$$
$$= 1.10 \times 10^{-4}$$

K_p = 1.10×10^{-4}