Chem 112 **Spring 2020** **Quiz 5** **Whelan**

SID | | | | | | | | | **Last** Key **First** Answer

Question 1 (6 Points)

Consider the following system at equilibrium where ΔH° = **198 kJ**, and **Kc** = **2.90×10^{-2}**, at 1150K. $2\ SO_3(g) \rightleftharpoons 2\ SO_2(g) + O_2(g)$

When **0.27 moles of $SO_3(g)$ are removed** from the system at equilibrium at **1150K:**

The value of **Kc**
- ☐ Increases
- ☐ Decreases
- ☒ Remains the same

[SO_2]
- ☐ Increases
- ☒ Decreases
- ☐ Remains the same

The **value of Q**
- ☒ Is **greater** than Kc
- ☐ Is **less than** Kc
- ☐ Is **equal to** Kc

Question 2 (6 Points)

Consider the following system at equilibrium where ΔH° = **16.1 kJ**, and **Kc** = **6.50×10^{-3}**, at 298 K. $2\ NOBr(g) \rightleftharpoons 2\ NO(g) + Br_2(g)$

If the **TEMPERATURE** on the equilibrium system is suddenly **increased**:

The value of **Kc**
- ☒ Increases
- ☐ Decreases
- ☐ Remains the same

[Br_2]
- ☒ Increases
- ☐ Decreases
- ☐ Remains the same

The **value of Q**
- ☐ Is **greater** than Kc
- ☒ Is **less than** Kc
- ☐ Is **equal to** Kc

Question 3 (5 Points)

Consider the following system at equilibrium where **Kc** = **77.5** and ΔH° = **-108 kJ/mol** at 600 K. $CO(g) + Cl_2(g) \rightleftharpoons COCl_2(g)$

The **production of $COCl_2(g)$ is favored by**:

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

a) **Decreasing** the **temperature**. T

b) **Decreasing** the **volume**. T

c) **Removing $COCl_2$**. T

d) **Removing Cl_2**. F

e) **Decreasing** the **pressure** (by changing the volume). F

Question 4 (3 Points)

a) What is the **conjugate acid** of **HSO_4^-** H_2SO_4

b) What is the **conjugate base** of **HSO_4^-** SO_4^{2-}

c) Write a **net ionic equation** to show that **ammonia** behaves as a **Brønsted-Lowry base** in water.

$NH_3(aq) + H_2O(l) \Leftrightarrow OH^- + NH_4^+$

= **or** ⇔