

- * III-1 _____C _____NC
 ** III-2 _____C _____NC

**Chemistry 152
Worksheet 2**

Name: _____

- *A. (1.0 pts) For the reaction $2 \text{N}_2\text{O}(\text{g}) \rightleftharpoons 2 \text{N}_2(\text{g}) + \text{O}_2(\text{g})$, an equilibrium mixture at 450°C was found to contain 0.250M O_2 , 0.33M N_2 , and $0.684\text{M N}_2\text{O}$. Calculate the value for the equilibrium constant K_c for this reaction at 450°C .
- **B. (2.0 pts.) The following equilibrium has a K_c value of 24.5 at 650°C . Determine the equilibrium concentrations of all species if 5.00 moles of HCl are placed in a 1.00 liter reaction vessel at 650°C .
- C. (1.0 pts.) Write expressions for the equilibrium constant, K_c , for each of the following equilibria.
1. $2 \text{NO}(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons 2 \text{NOCl}(\text{g})$
 2. $2 \text{Fe}(\text{s}) + 3 \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{Fe}_2\text{O}_3(\text{s}) + 3\text{H}_2(\text{g})$
- D. (1.0 pts.) Consider the equilibrium $\text{Cl}_2(\text{g}) + 3 \text{F}_2(\text{g}) \rightleftharpoons 2 \text{ClF}_3(\text{g})$. Initially, 0.100 moles of Cl_2 and 0.200 moles of F_2 were placed in a 1.00L container at 250°C . At equilibrium, the $[\text{ClF}_3]=0.060\text{M}$. Determine the value of K_c for this equilibrium at 250°C .
- E. (2.0 pts.) Consider the following reaction at equilibrium:



Indicate the effect of each of the following applied stresses upon the position of the equilibrium (shift to right, shift to left, no effect) and upon K_c (increase, decrease, no effect).

<u>Stress Applied at Equilibrium</u>	<u>Effect on position of Equilibrium</u>	<u>Effect on K_c</u>
Decrease V at constant T	_____	_____
Add $\text{H}_2(\text{g})$	_____	_____
Remove $\text{CO}(\text{g})$	_____	_____
Increase T at constant V	_____	_____
Add a catalyst	_____	_____

F. (3.0 pts.) at 950K, $K_c=0.195$ for the equilibrium $\text{COCl}_2(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + \text{Cl}_2(\text{g})$. A reaction mixture contains $[\text{COCl}_2]=0.397\text{M}$, $[\text{CO}]=0.485\text{M}$, and $[\text{Cl}_2]=0.407\text{M}$ at 950K.

1. Determine the value for the reaction quotient, Q .
2. Indicate the direction the reaction will occur to the greater extent.
3. Determine the final equilibrium concentration of COCl_2 .