Name:_____

Equilibrium Calculations-ICE TABLES Solve each problem and show all of your work.

1. If the initial $[H_2]$ = 0.200 M, $[I_2]$ = 0.200 M and Keq = 55.6 at 250°C calculate the equilibrium concentrations of all molecules.
   H_2 (g) + I_2 (g) ⇄ 2HI (g)

2. 1.60 moles CO and 1.60 moles H_2O are placed in a 2.00 L container at 690 °C (Keq = 10.0). **CO (g) + H_2O (g) ⇄ CO_2 (g) + H_2 (g)**
   Calculate all equilibrium concentrations.

3. $\mathbf{SO_{3(g)} + NO_{(g)} \rightleftarrows NO_{2(g)} + SO_{2(g)}}$

K_{eq} = 0.800 at 100°C. If 4.00 moles of each reactant are placed in a 2.00L container, calculate all equilibrium concentrations at 100°C.

4. Consider the following equilibrium system: $2NO_{2(g)} \rightleftharpoons N_2O_4$

Two sets of equilibrium data are listed for the same temperature.

Container 1	2.00 L	0.12 moles NO_2	0.16 moles N_2O_4
Container 2	5.00 L	0.26 moles NO_2	? moles N_2O_4

Determine the number of moles N_2O_4 in the second container. Get a Keq from the first container and use it for the second container.

5. Consider the following equilibrium: $2SO_{2\ (g)} + O_{2\ (g)} \rightleftarrows 2SO_{3\ (g)}$
When a 0.600 moles of SO_2 and 0.600 moles of O_2 are placed into a 2.00 litre container and allowed to reach equilibrium, the equilibrium $[SO_3]$ is to be 0.250 M. Calculate the Keq value.

6. $H_{2(g)} + S_{(s)} \rightleftarrows H_2S_{(g)}$ Keq= 14
0.60 moles of H_2 and 1.4 moles of S are placed into a 2.0L flask and allowed to reach equilibrium. Calculate the $[H_2]$ at equilibrium.

7. Keq = 0.0183 for the reaction: $2HI_{(g)} \rightleftarrows H_{2(g)} + I_{2(g)}$

If 3.0 moles of HI are placed in a 5.00L vessel and allowed to reach equilibrium, what is the equilibrium concentration of H_2?

8. Consider the equilibrium: $I_{2\,(g)} + Cl_{2\ (g)} \rightleftarrows 2ICl_{(g)}$ Keq= 10.0

The same number of moles of I_2 and Cl_2 are placed in a 1.0L flask and allowed to reach equilibrium. If the equilibrium concentration of ICl is 0.040 M, calculate the initial number of moles of I_2 and Cl_2.

9. Consider the equilibrium: $2ICl_{(g)} \rightleftarrows I_{2\,(g)} + Cl_{2\ (g)}$ Keq= 10.0
If x moles of ICl were placed in a 5.0 L container at 10 ^{o}C and if an equilibrium concentration of I_2 was found to be 0.60 M, calculate the number of moles ICl initially present.

10. A student places 2.00 moles SO_3 in a 1.00 L flask. At equilibrium $[O_2]$ = 0.10 M at 130 ^{o}C. Calculate the K_{eq}. $2SO_{2(g)} + O_{2(g)} \rightleftarrows 2SO_{3(g)}$