Name: ______________________________ Date: _________________________

Equilibrium Practice Test

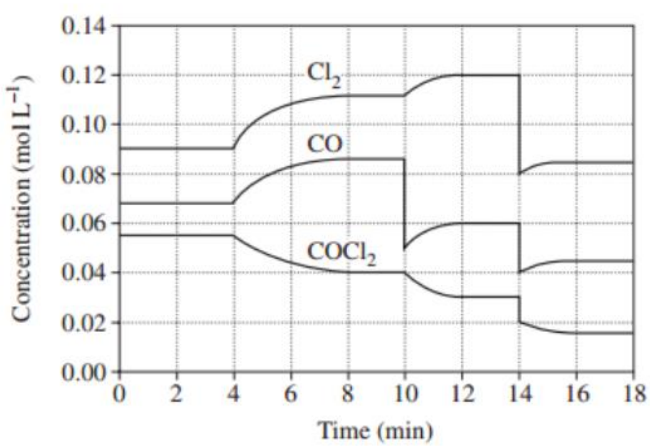
1. Explain what is meant by the term "chemical equilibrium".
2. Sketch two concentration-time graphs: one for an irreversible reaction and one for a reversible reaction. Explain why they are different.
3. Explain why equilibrium cannot exist in an open system, using an example.
4. Determine which way the following reaction will shift. Write your response as "left" or "right". Show all work, if necessary.

$$A\ (s) + 2\ B\ (g) \rightleftharpoons C\ (g) + 2\ D\ (l) \qquad K_{eq} = 25.0;\ \Delta H = -85\ kJ$$

   a. The temperature is increased
   b. More of gas C is added to the system
   c. The pressure of the system is decreased
   d. An inert gas is added to the system, in a variable volume container.
   e. The system initially has 1.50 g of A, [B] = 0.24 M, [C] = 3.23 M and 1.17 L of D

5. Identify which stresses are being put on the equilibrium system how the system shifts to accommodate the stress.

$$COCl_2(g) \rightleftharpoons Cl_2(g) + CO(g) \qquad \Delta H = +108\ kJ$$



6. The following reaction is allowed to reach equilibrium in a closed vessel:

$$2\ X\ (g) + Y\ (g) \rightleftharpoons Z\ (g)$$

   A vessel initially contains 0.111 M of X and 0.325 M of Y.
   a. Write the equilibrium constant expression for this reaction.
   b. Create an ICE table for this reaction. (Do not solve!)

7. A 2.00 L vessel is set up with 0.428 mol of A and 1.78 mol of B. The system is allowed to reach equilibrium, and the amount of A is measured to be 0.221 mol. What is the equilibrium constant for the reaction?

$$2\ A\ (aq) + 3\ B\ (aq) \rightleftharpoons C$$

8. The following reaction is allowed to reach equilibrium in a closed vessel:

$$X\ (g) + 2\ Y\ (s) \rightleftharpoons Z\ (g) \qquad K_{eq} = 1.20$$

   A vessel is set up that originally contains 0.650 M of Z. What is the final concentration of X?

9. For the following reaction:

$$2NH_3\ (g) \leftrightharpoons N_2\ (g) + 3H_2\ (g),\ K_{eq} = 2.63 \times 10^{-9}$$

   Create an ICE table <u>without solving</u> for the reaction given the initial concentrations:
   $[NH_3]$ = 2.78 M $[N_2]$ = 1.24 M $[H_2]$ = 0.179 M