Name:_____

SCH 4U – Qualatitive Equilibrium

1. The following equilibrium is the equilibrium that occurs within a can of pop (when sealed):

   $CO_2(g) + H_2O(l) \rightleftharpoons H_2CO_3(aq)$ ΔH = negative value

   The carbon dioxide gas will dissolve in water and react with water molecules to form carbonic acid. Suggest two ways in which the concentration of $H_2CO_3(aq)$ can be maximized. Explain your choices clearly using Le Chatelier's Principle.

2. List six criteria that must be met before one can be certain that a given reaction is an equilibrium reaction. Order is not important

1.	
2.	
3.	
4.	
5.	
6.	

3. $CO(g) + Cl_2(g) \rightleftharpoons COCl_2(g)$

Explain the effect on the concentration of carbon monoxide gas and the K_{eq} value for this equilibrium when:
a) the volume is increased

b) the temperature is increased

4. Write the equilibrium expression for each of the following:

a) $AlCl_3(s) \rightleftharpoons Al^{3+}(aq) + 3Cl^{1-}(aq)$

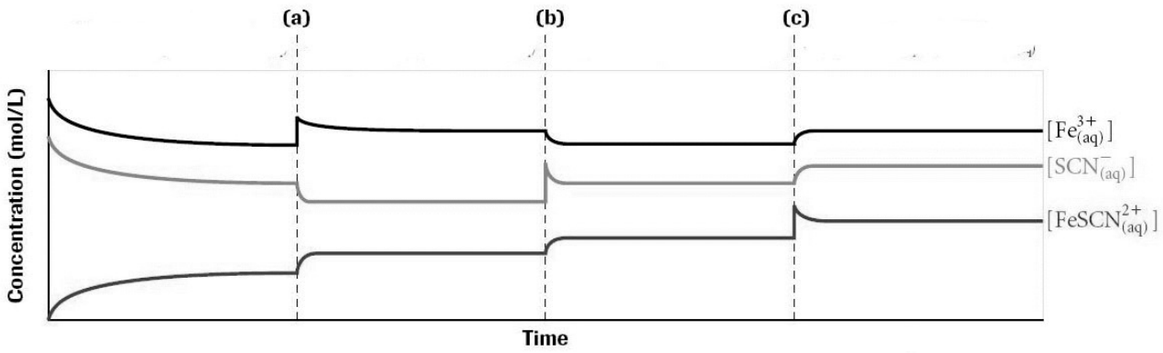
b) $4NH_3(g) + 5O_2(g) \rightleftharpoons 4NO(g) + 6H_2O(g)$

c) $2Fe_2O_3(s) + 6Cl_2(g) \rightleftharpoons 4FeCl_3(s) + 3O_2(g)$

5. The concentration vs time curve shown below is for the equilibrium studied in class with the help of the overhead projector:

$$FeSCN^{2+}(aq) \rightleftharpoons Fe^{3+}(aq) + SCN^{1-}(aq)$$

If you recall, this equilibrium was produced by mixing a solution made from $Fe(NO_3)_3(s)$ to a solution made from KSCN(s)



Answer the following questions:

a) In general, how can you tell if the system is at equilibrium (as apposed to on the way to equilibrium)?

b) What may have happened at a)

c) What may have happened at b)

d) What was the initial $[FeSCN^{2+}(aq)]$ at time = 0 and how is this possible given the above equilibrium reaction equation

e) What is the equilibrium expression for this equilibrium

f) How could one prove that this entire concentration curve was performed at a constant temperature