Chemical equilibrium worksheet 5

1) Consider the following equilibrium
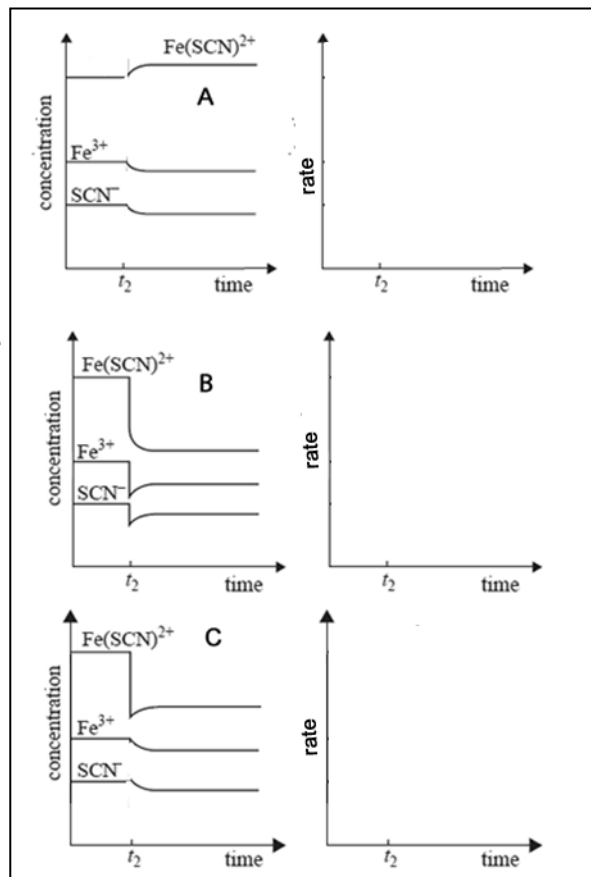 $Fe^{3+}(aq) + SCN^-(aq) \rightleftharpoons FeSCN^{2+}(aq)$ $\Delta H = positive$
   Explain what has happened at t2 in each of the three
   concentration vs time graphs A, B and C shown on the
   right.
   Complete the rate vs time graph for each. Indicate in
   red the rate of the reverse reaction and in blue the rate
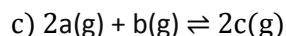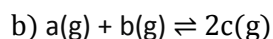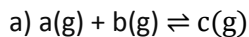   of the forward direction.
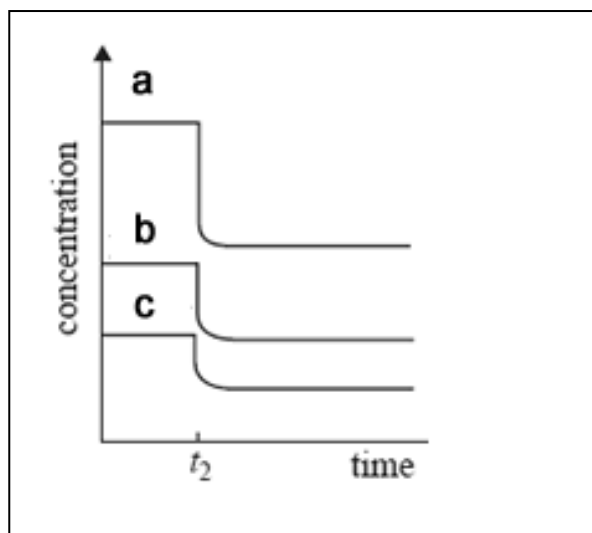   A)

   B)

   C)

2) Consider the following equilibrium systems
   a) $a(g) + b(g) \rightleftharpoons c(g)$
   b) $a(g) + b(g) \rightleftharpoons 2c(g)$
   c) $2a(g) + b(g) \rightleftharpoons 2c(g)$
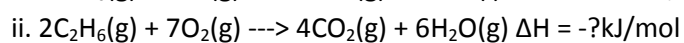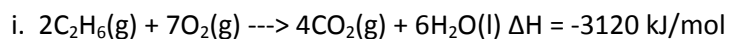   i. What happened at t2?

   ii. Which equilibrium system is depicted in the
   diagram on the right?

   Explain

   iii. How has the equilibrium constant changed at t2?

3) *Consider the two equations below. They show ethane burning in atmospheric oxygen.*

i. $2C_2H_6(g) + 7O_2(g) \longrightarrow 4CO_2(g) + 6H_2O(l)$ ΔH = -3120 kJ/mol

ii. $2C_2H_6(g) + 7O_2(g) \longrightarrow 4CO_2(g) + 6H_2O(g)$ ΔH = -?kJ/mol

a) Will the magnitude of the ΔH of equation ii) be greater, equal or less than 3120kJ/mol ? Explain.

b) Why do the equations above never reach equilibrium but rather go to completion?

c) A pure 0.300 gram sample of ethane is placed in an open reaction vessel with 16.40 grams of pure oxygen gas. The reaction proceeds as shown below.

$2C_2H_6(g) + 7O_2(g) \longrightarrow 4CO_2(g) + 6H_2O(l)$ ΔH = -3120 kJ/mol
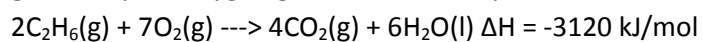
The energy from this reaction is used to heat 200.0 grams of water at 25.0°C. Assuming no energy loss, calculate the final temperature of the water.