Revised August 2012

HONORS LAB 11c: Le Chatelier's Principle Simulation II

Use the simulation at the following URL to answer the questions that follow;

http://bit.ly/4BxfOS

Listen to the audio that plays once the page has loaded. The audio lasts only approx. 30 seconds.

1. Click on the Change in Concentration button **and listen to the audio.**

(a) Why does the solution start out as an orange color?

(b) The thiocyanate ion, SCN^- has a charge of -1. What is the charge on the iron ion in the species, $[FeSCN]^{2+}$?

(c) Is this a REDOX reaction? Explain your answer.

2. Click on the Add NaSCN button **and listen to the audio.**

(a) What property of NaSCN makes it a good source of $SCN^-_{(aq)}$ when added to the beaker?

(b) Which of the following will cause a similar shift in the equilibrium to adding NaSCN?

(i) adding KSCN

(ii) adding $Fe(NO_3)_3$

(iii) adding $[FeSCN]^{2+}_{(aq)}$

3. Click on the Back button.

4. Click on the Remove Fe^{3+} button **and listen to the audio.**

(a) Oxalic acid can be used to remove Fe^{3+}. Write the formula for oxalic acid.

(b) What is the IUPAC name for the oxalate ion?

(c) Explain the shift in equilibrium that occurs when the Fe^{3+} Is removed.

5. Click on the Back button.

6. Click on the Change in Pressure button **and listen to the audio.**

(a) What happens to the number of gas particles present in the equilibrium system as the reaction goes from left to right?

(b) What is the name of the gas law that relates pressure and volume? Write a mathematical expression to summarize it.

7. Click on the Increase Pressure button **and listen to the audio.**

(a) Why does the reaction mixture become darker?

(b) Does the reverse reaction represent the standard enthalpy of formation of $I_{2(s)}$? Explain you answer.

8. Click on the Back button.

9. Click on the Decrease Pressure button **and listen to the audio.**

(a) Write a mathematical expression that relates the pressure, volume and number of moles of a gas to one another that allows the effect of a change in any of those variables to predict the new conditions.

(b) Which specific entahlpy change(s) does the transition $I_{2(g)}$ ➔ $2I_{(g)}$ represent? What is the sign(s) of those change(s)?

(c) Explain the shift in equilibrium that occurs when decreasing the pressure.

10. Click on the Back button.

11. Clcik on the Change in Temperature button **and listen to the audio.**

(a) Write the Kc expression for the equilibrium shown.

` (b) If the Kc for the reaction shown *in the simulation* has a value of X, what is the value for the Kc of the reaction shown below?

$$2NO_{2(g)} \leftrightarrows N_2O_{4(g)}$$

(c) If the Kc for the reaction shown *in the simulation* has a value of X, what is the value for the Kc of the reaction shown below?

$$\tfrac{1}{2}N_2O_{4(g)} \leftrightarrows 2NO_{2(g)}$$

(d) If the Kc for the reaction shown *in the simulation* has a value of X, what is the value for the Kc of the reaction shown below?

$$2N_2O_{4(g)} \leftrightarrows 4NO_{2(g)}$$

(e) If the Kc for the reaction shown *in the simulation* has a value of X, what is the value for the Kc of the reaction shown below?

$$NO_{2(g)} \leftrightarrows \tfrac{1}{2}N_2O_{4(g)}$$

12. Click on the Increase Temperature button **and listen to the audio.**

(a) What will be the effect of adding energy (heating) to an equilibrium system that is exothermic in the forward direction?

(b) What happens to the temperature of the surroundings when a system (reaction) that is endothermic, reacts?

13. Click on the Back button.

14. Click on the Decrease Temperature button **and listen to the audio.**

(a) What will be the effect of removing energy from an equilibrium system that is exothermic in the forward direction?

(b) What will be the effect of adding energy (heating) an equilibrium system that is endothermic in the forward direction?