

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, $[\text{FeSCN}]^{2+}$?
- (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 $\text{SCN}^-_{(\text{aq})}$ 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 $\text{Fe}(\text{NO}_3)_3$
 - (iii) adding $[\text{FeSCN}]^{2+}_{(\text{aq})}$



3. Click on the Back button.

Back

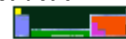
4. Click on the Remove Fe³⁺ button **and listen to the audio.**

Remove Fe³⁺

- (a) Oxalic acid can be used to remove Fe³⁺. 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 Fe³⁺ is removed.



5. Click on the Back button.

Back

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

Change in
Pressure

- (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.**

Increase Pressure

- (a) Why does the reaction mixture become darker?
- (b) Does the reverse reaction represent the standard enthalpy of formation of $I_{2(s)}$? Explain your answer.



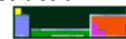
8. Click on the Back button.

Back

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

Decrease Pressure

- (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 enthalpy change(s) does the transition $I_{2(g)} \rightarrow 2I_{(g)}$ 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.

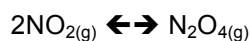
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11. Click on the Change in Temperature button **and listen to the audio.**

Change in
Temperature

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

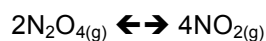
(b) If the K_c for the reaction shown *in the simulation* has a value of X , what is the value for the K_c of the reaction shown below?



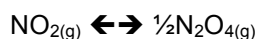
(c) If the K_c for the reaction shown *in the simulation* has a value of X , what is the value for the K_c of the reaction shown below?



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



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





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

Increase Temperature

- (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.

Back

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

Decrease Temperature

- (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?