Name: _____ SCH 4U/P Date: _____

3.3 Changing Equilibrium

How does equilibrium react when we change the concentration, temperature, or pressure of a system? Let's ask our friend Henry Louis Le Châtelier.

A. Le Châtelier's Principle

State Le Châtelier's principle in your own words:

Complete the table (from 7.3 in textbook)

Variable	Change	Response
Concentration	Increase	
	Decrease	
Temperature	Increase	
	Decrease	
Volume	Increase (decrease in pressure)	
	Decrease (increase in pressure)	
Catalysts	None	
Inert Gases	None	

Practice: Pg 457#1-4, Pg 459 #2-4, 6

B. The Reaction Quotient – Q (from 7.5 in textbook)

Q is calculated the same way as K. The only difference is that K is calculated with equilibrium concentrations and Q is calculated with any concentration. We use Q to find out where the reaction is with respect to equilibrium. For example:

If Q = K,

If Q > K,

If Q < K,

3.3 Calculations Practice:

Use the example problems as guidance if you get stuck.

- ☐ Comparing K and Q — Pg 465 #1-2
- ☐ Calculating missing equilibrium concentrations — Pg 466 #3-4
- ☐ Calculating equilibrium concentrations from a K value — Pg 472 #5-6
  - This may require some algebra skills
- ☐ Calculating equilibrium concentrations when the equations aren't quadratic — Pg 476 #7-8
  - I won't ask you to solve these equations on a test but you should be able to solve them if you have taken advanced functions
  - If you haven't taken advanced functions, use Wolfram Alpha to solve the equations
- ☐ Calculating equilibrium concentrations when the equations are quadratic — Pg 480 #9-10
  - You can use the quadratic formula to solve these, or just plug the a,b and c values into a scientific calculator. Remember to check for extraneous roots!

General process for solving for equilibrium concentrations:

1. Check which direction the reaction happens in by calculating Q and comparing it to K
2. Create and complete a RICE table
3. Plug the final concentrations into the equilibrium law for the equation
4. Solve for x (if you find more than one value for x, check for extraneous roots)
5. Substitute x in to find the equilibrium concentrations
6. You can check your answer by plugging the concentrations into the equilibrium law and comparing them to K

More Practice: Pg 481 #1-8