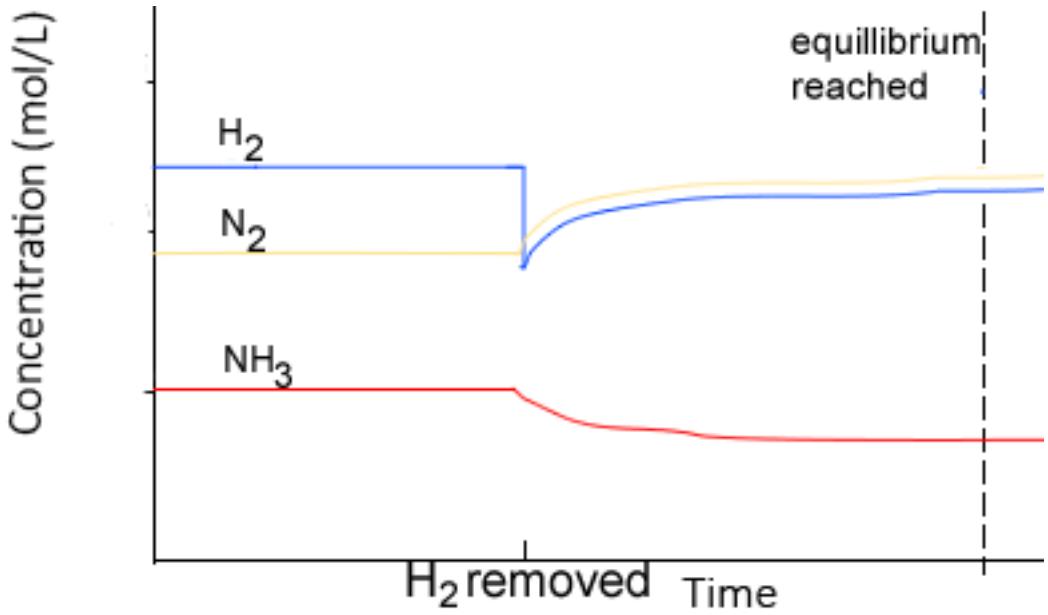
WCLN.ca

Inquiry Question

An Exercise in Stress: Applying Le Chatalier's Principle **(Lab Analysis)**

Name: _____ **Date:** _____



Le Chatalier Principle tells us that when an equilibrium system is stressed, the reaction will shift to reduce the effect of the stress and try to re-establish equilibrium. Changes in pressure, volume, concentration and temperature offer "stresses" to create the disturbance to the system. The goal of this lab is to apply your knowledge of Le Chatalier's Principle and equilibrium to interpret a Concentration vs time graph. You will use the graph and predict the stress that occurred to cause the changes in the graph. You will also calculate the k_{eq} based on equilibrium concentration read off the graph.

Procedure:

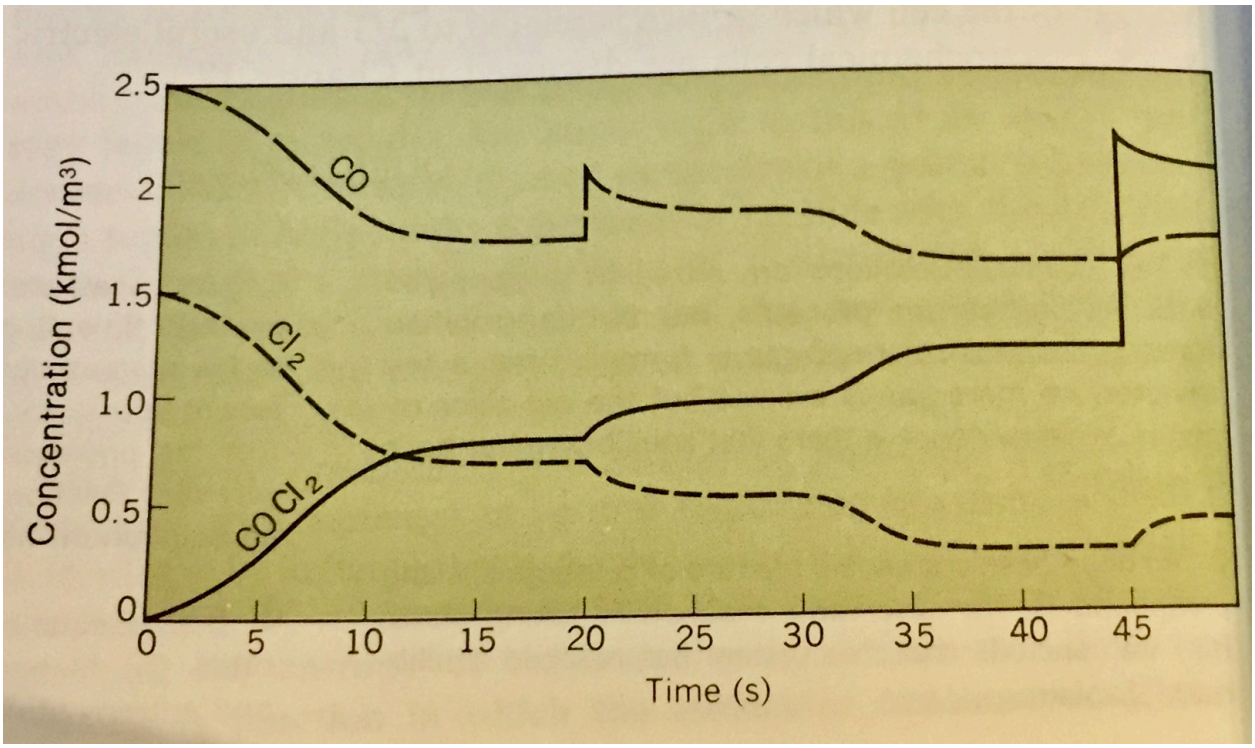
NOTE:
This activity involves analyzing data from a lab. You do NOT need to actually run this experiment.

Examine the Concentration vs Time Plot and label each of the following:
Initial Conditions
Equilibrium (4)
Stresses applied (3)
Make an ICE table for each change and calculate the keq for each equilibrium

This lab analysis will look at the equilibrium of:

$$CO_{(g)} + Cl_{2(g)} \Leftrightarrow COCl_{2(g)}$$

Data:

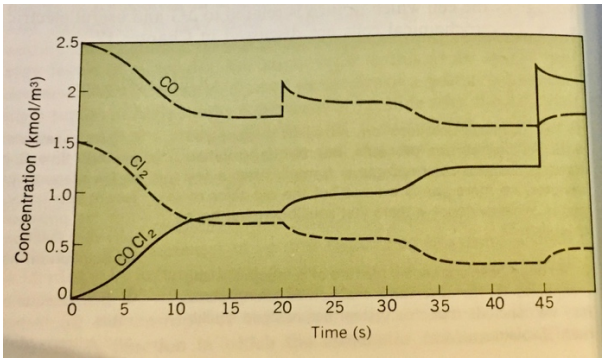


Questions and Analysis:

(Be specific, show all calculations)

Region 1 to the First Equilibrium:

1. Look at the initial conditions and the changes. Set up an ICE table for the first region up to the first equilibrium.

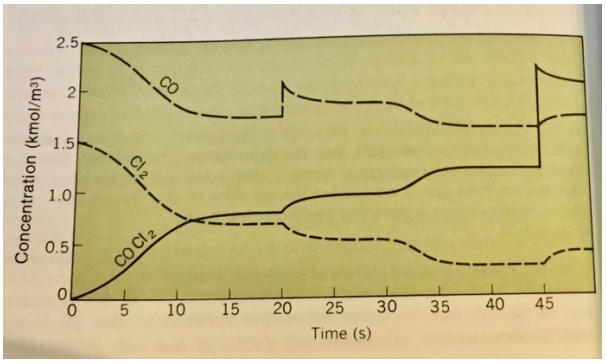


	$CO_{(g)}$ +	$Cl_{2(g)}$ ⇔	$CoCl_{2(g)}$
I (Initial)			
C (Change)			
E (Equilibrium)			

2. Calculate k_{eq} at the first equilibrium.

Region 2 to the Second Equilibrium:

3. Look at the initial conditions and the changes. Set up an ICE table for the first region up to the first equilibrium.



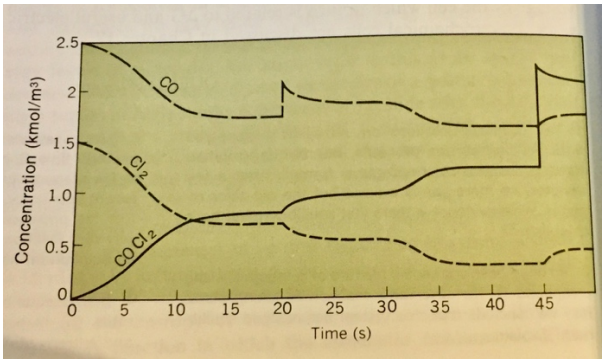
	$CO_{(g)}$ +	$Cl_{2(g)}$ ⇔	$CoCl_{2(g)}$
I (Initial)			
C (Change)			
E (Equilibrium)			

4. Calculate k_{eq} at the first equilibrium.

5. What type of stress do you think occurred? Explain your reasoning

Region 3 to the Third Equilibrium:

6. Look at the initial conditions and the changes. Set up an ICE table for the first region up to the first equilibrium.



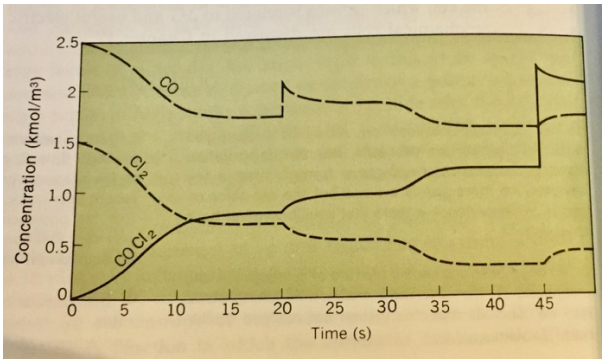
	$CO_{(g)}$ +	$Cl_{2(g)}$ ⇔	$CoCl_{2(g)}$
I (Initial)			
C (Change)			
E (Equilibrium)			

7. Calculate k_{eq} at the first equilibrium.

8. What type of stress do you think occurred? Explain your reasoning

Region 4 to the Fourth Equilibrium:

9. Look at the initial conditions and the changes. Set up an ICE table for the first region up to the first equilibrium.



	$CO_{(g)}$ +	$Cl_{2(g)}$ ⇔	$CoCl_{2(g)}$
I (Initial)			
C (Change)			
E (Equilibrium)			

10. Calculate k_{eq} at the first equilibrium.

11. What type of stress do you think occurred? Explain your reasoning

12. How would k_{eq} change in each region if a catalyst was added to the system

13. What could have caused all the keq values to be different in this equilibrium system?

Taking it further:

List changes you would make to this system if you wanted to maximize the production of $CoCl_2$.