Laboratory Investigation Name ____________________

Chemistry: Form L7.1A Date ____________ Period ___

Simulating Equilibrium

based on a concept by *Kathleen Davies*

PROBLEM

What happens to the rate of the forward and reverse reactions as they move toward equilibrium?

INTRODUCTION

Reactions are often reversible. Reactants form products, but products can also react to form the original reactants. Reversible reactions occur only when the all the reactants and products stay in contact with each other. Equilibrium is reached when the rate of the forward reaction is equal to the rate of the reverse reaction. Before equilibrium, however, the rates are not equal. This means the reaction rates must be changing as the forward and reverse reactions move toward equilibrium. In this laboratory investigation you will gather data to simulate equilibrium in order to understand how the reaction rate changes as equilibrium is approached.

MATERIALS *(per group)*

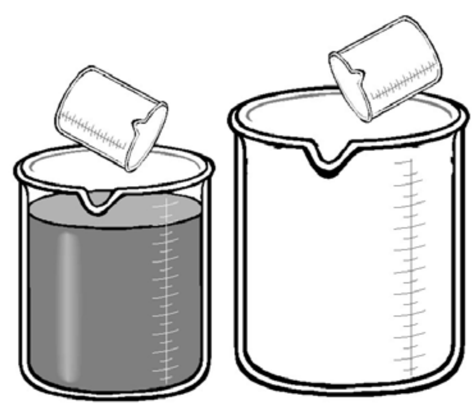
1000 mL beaker (graduated); 800 mL beaker (graduated); 100 mL beaker (2); wax pencil

PROCEDURE

1. Work in teams of at least two. Using a wax pencil, label the 800 mL “Reactants,” and the 1000 mL beaker “Products.”

2. Put 500 mL of water in the 800 mL beaker. Leave the 1000 mL beaker empty. Record the volume of water in each beaker in your data table on the next page (Trial 1).

3. One member of the team will be in charge of the forward reaction. Using a 100 mL, this team member will scoop as much water as possible from the 800 mL beaker. A second member of the team will be in charge of the reverse reaction. Using a 100 mL, this team member will scoop as much water as possible from the 1000 mL beaker.



4. Pour the liquid removed from the 800 mL beaker into the 1000 mL beaker. Pour the liquid removed from the 1000 mL beaker into the 800 mL beaker. Record the volume of water in each for the next trial.

5. Repeat steps 3 and 4 until the volume appears to remain constant in both containers for several trials. In any case, do at least 10 trials.

6. Prepare a graph with trial number on the X-axis and volume on the Y-axis. Plot the points for both beakers. Then draw the best curves through them. (Two separate curves)

OBSERVATIONS

Trial	Reactant Volume (mL) *[800 mL beaker]*	Product Volume (mL) *[1000 mL beaker]*
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Trial	Reactant Volume (mL) *[800 mL beaker]*	Product Volume (mL) *[1000 mL beaker]*
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

CONCLUSIONS

1. What is the initial volume in the product beaker? What would you expect the rate of the reverse reaction to be at this point? ____

____

2. What happens to the amount of product over time? ______________________________

3. Based on the graph, what happens to the rate of the reverse reaction over time? ______

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4. Based on the graph, what happens to the rate of the forward reaction over time? ______

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5. How do the forward and reverse reaction rates become equal over time? ____________

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