Name_____

Introduction to Reaction Rates

Data Table

Part A. Effect of Temperature

Temperature, °C				
Reaction Time, sec				

Part B. Effect of Concentration

Test Tube	1	2	3
Reaction Time, sec			
Temperature, °C			

Post-Lab Questions

1. How did the reaction time change as the temperature was changed in Part A?

2. How is the rate of a reaction related to the time of reaction?

3. What effect does temperature have on the rate of the "blue bottle" reaction?

4. According to a general "rule of thumb" for chemical reactions, the rate of a reaction will roughly double for every 10 °C increase in temperature. Do the kinetics of the "blue bottle" reaction fit this general rule?

5. On a separate sheet of paper, make a graph of the results in Part A by plotting the reaction time in seconds on the y-axis versus the temperature in kelvins on the x-axis.

6. Using the graph, estimate how long it would take for the reaction to occur at 275 K and at 325 K. Discuss ways the graph could be improved to give better estimates.

7. Use the "dilution" equation ($M_1V_1 = M_2V_2$) to calculate the concentration of potassium hydroxide in each test tube #1–3 in Part B.

M_1 = concentration of KOH before mixing V_1 = volume of KOH before mixing
M_2 = concentration of KOH after mixing V_2 = volume of KOH after mixing

Sample calculation for test tube #1:

$$M_2 = \frac{(3.0 \text{ M})(1.0 \text{ mL})}{(6.0 \text{ mL})} = 0.50 \text{ M}$$

8. The concentration of methylene blue in Part B is approximately 2.0×10^{-4} M. Divide the concentration of methylene blue by the reaction time in seconds to calculate the average rate of the reaction in units of M/sec for each test tube #1–3.

9. Does the rate of the "blue bottle" reaction depend on the concentration of potassium hydroxide? Discuss in general terms the effect of reactant concentration on the rate of a chemical reaction.

10. How much did the rate of the reaction change when the concentration of KOH was doubled (test tubes #1 and 2) or tripled (test tubes #1 and 3)?