AP Chemistry Lab
Rates of Chemical Reactions

Pre Lab Questions

1) Determine the concentration of solutions A and B in each of the five reactions(answer in a nice table).

2) What is starch used to indicate the presence of?

3) Why is it necessary to use distilled water and not tap water in these reactions?

4) What do you plot to get a straight line for a first order reaction? What about a second order reaction?

5) What is the difference between reaction time and reaction rate?

Procedure

Record all data and observations directly in your lab notebook in ink.

Solution A is 0.024 M KIO_3. Solution B is 0.016 M $NaHSO_3$ in an acidic starch environment. The presence of starch in Solution B may make the mixture appear somewhat cloudy.

Obtain about 500 mL of Solution A in a clean, dry 600-mL beaker. Keep covered with plastic wrap to minimize evaporation. Obtain about 150 mL of Solution B in a clean, dry 250-mL beaker. Also keep covered. Label both beakers

Effect of Concentration

Label a 100 mL graduated cylinder for solution A and a 25 mL one for solution B. Clean these well and rinse with distilled water. Contamination of the solutions in today's lab can have a very negative effect on the results. Use one beaker consistently for the reactions. Keeping your glassware straight is very crucial for this lab.

The table below shows the mixtures that you will be using for this experiment. You can add the water to the 100 mL cylinder along with solution A. Mix the volumes of the solutions in a beaker and time how long it takes for each reaction to change color. A blue/black color should appear but mark the time for any color change that happens. The solutions should be measured out in graduated cylinders that are clean and have been rinsed with distilled water.

Table of Kinetic Runs

Run	mL Solution A	mL distilled water	mL Solution B
A	10.0	80.0	10.0
B	20.0	70.0	10.0
C	30.0	60.0	10.0
D	40.0	50.0	10.0
E	50.0	40.0	10.0

Temperature Dependence
Test Run E at a temperature approximately 10 degrees above and ten degrees below room temperature. Do each of these twice.

Data
Concentration Runs

Time required for I_2 color to appear	First trial	Second trial
Run A (10 mL Solution 1)		
Run B (20 mL Solution 1)		
Run C (30 mL Solution 1)		
Run D (40 mL Solution 1)		
Run E (50 mL Solution 1)		

Design your own table for the temperature dependence trials. Make sure you have time and temperature for each trial.

Analysis
Construct a plot of time required for reaction (vertical axis) versus concentration of iodate ion (horizontal axis). Construct a second plot, in which you plot the *reciprocal* of the time required for reaction on the vertical axis versus the concentration of iodate ion.

Questions

1) Why was it necessary to keep the total volume of the reagents after mixing constant in all the kinetic runs?

2) Why was it necessary that the two solutions to be mixed be at the same temperature before mixing?

3) What is the order of reaction with respect to iodate ion, is it first or second order?

4) Describe why raising and lower the temperature of the reactions has the effect it does on reaction time?

5) Determine the value of K for your data.