**Clock Reaction Challenge: Factors Affecting Reaction Rate**

Background

Kinetics is the study of the rates of chemical reactions. As reactants are transformed into products in a chemical reaction, the amount of reactants will decrease and the amount of products will increase. The rate of the reaction describes how fast the reaction occurs. The greater the rate of the reaction, the less time is needed for a specific amount of reactants to be converted to products. Some of the factors that may affect the rate of a chemical reaction include temperature, the nature of the reactants, their concentrations, and the presence of a catalyst. For the purposes of this experiment, you can take the reaction equation to be:

$$A + B \rightarrow \text{Blue Product}$$

The purpose of this guided-inquiry activity is to observe reaction, and then manipulate the various variables (concentration, temperature, catalyst) in order to change the reaction rate and cause the reaction to occur in a time specified by your teacher.

Materials

Solution A: 0.050 M $KIO_3$                          DI water                          beakers

Solution B: 0.025 M $Na_2S_2O_5$ (with starch indicator)          ice water bath          thermometer

Solution C: 0.10 M $H_2SO_4$ (catalyst)                  graduated cylinders          hot water bath

timer/stopwatch                              disposable pipettes

Procedure

Observe the control reaction demonstrated by your teacher (this can be re-run as needed for your purposes). This will be the baseline mixture from which you will experiment to determine what factors to change in order to achieve the required reaction time. Note the quantities, conditions, and time recorded. Record the assigned target time given in class below.

Work with quantities of 5.0 mL of each solution or less for each mixture. Be sure to stir / mix each trial in a consistent way. Be sure to create a running data table of your trials and observations.

Once you have determined the conditions that achieve the desired time, write a brief paragraph explaining your methods/measurements and why you made the changes you did in terms of collision theory and how each factor you changed affected the reaction rate. Be prepared to demonstrate and defend your results in front of the class should you be called upon to do so.

TARGET TIME: _____ seconds