Rate of Reaction of H$^+$ with S$_2$O$_3$$^{2-}$

Background Information:
You are to investigate the effect of either **temperature** or **concentration** on the rate of a chemical reaction, by observing a colour change (from colourless to white) over time.

Chemicals provided:	• 0.25 mol L^{-1} sodium thiosulfate solution, $Na_2S_2O_{3(aq)}$ • 2 mol L^{-1} hydrochloric acid, $HCl_{(aq)}$
Demonstrated procedure:	1. Measure 25 mL sodium thiosulfate solution into a conical flask 2. Add 25 mL distilled water to the conical flask 3. Add 5 mL hydrochloric acid solution and swirl once
Reaction equation:	$S_2O_3{}^{2-}{}_{(aq)} + 2H^+{}_{(aq)} \rightarrow H_2O_{(l)} + SO_{2(g)} + S_{(s)}$
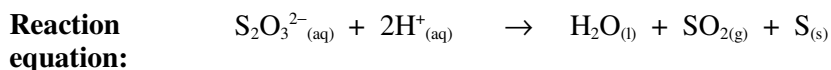
Instructions for investigation:

1. Write a hypothesis to investigate the effect on rate of one of the following
   a. Concentration
   b. Temperature
   Explain how this hypothesis was reached, using the concepts of particle theory.

2. Refine the demonstrated procedure to produce greater precision, and extend it to investigate either 'a' or 'b' above, by completing the attached worksheet.

3. Perform the experiment after receiving feedback.

4. Write a report including the following sections:
   • Aim
     ◦ Identify the independent and dependent variables and quantities held constant
   • Hypothesis
     ◦ Include conceptual explanation for hypothesis
   • Procedure
   • Manipulation and Collaboration
   • Results and Calculations
     ◦ Present data in table(s) and include two graphs, one for time and one for rate (1/t)
   • Analysis and Evaluation
     ◦ Discuss possible sources of error and evaluate the procedure, suggesting improvements
   • Conclusion

NAME:_____

Experimental Design

Hypothesis_____

_____

Explanation for hypothesis_____

_____

_____

_____

Independent variable_____

Dependent variable _____

Other factors held constant _____

_____

_____

Procedure