This lab activity is suitable for **Planning(a)**
Planning(b)
Data Collection

RATES OF REACTIONS

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Hydrochloric acid and sodium thiosulphate react according to the following equation:

$$2\ HC1(aq) + 3\ Na_2S_2O_3(aq) \longrightarrow 4\ S(s) + 2\ Na_2SO_4(aq) + H_2O\ (l) + 2\ NaC1(aq)$$

When colourless solutions of the reagents are combined, the mixture starts to turn cloudy as finely divided sulfur is formed. If the reaction is carried out in a beaker, placed on a paper with a black mark on it, the mark will at first be visible through the solution, and later be obscured by the cloudiness of the mixture as the reaction proceeds. This provides a way of comparing the rates of the reaction under different conditions. You will investigate how changes in concentrations of the reagents affect the rate of this reaction.

Materials needed

2.0 M HC1
0.17 M sodium thiosulfate solution ($Na_2S_2O_3$)
50 cm^3 beaker measuring cylinder
watch or clock, measuring time in seconds

Procedures

1. Take 25 cm^3 of sodium thiosuiphate solution in a beaker and put it on a piece of white paper with a dark mark on it. Add 2.5 cm^3 of HCl and note the time of addition of the acid. Swirl or stir the mixture briefly and let it stand. Note the time when the black mark is no longer visible.

2. List the main factors which might affect the rate of the reaction. Formulate hypotheses and design experiments to test each of the following:
   (a) the effect of HC1 concentration on the rate of the reaction
   (b) the effect of sodium thiosulfate concentration on the rate of the reaction
   (c) what conditions give a rate of reaction half that of part 1 above?

Conclusions

Briefly give pertinent conclusions and justify them by your experimental evidence.