Disappearing Cross

Transcript

Collision theory explains how a chemical reaction occurs. For a reaction to occur, firstly: Particles must collide with a minimum energy, known as the activation energy.

Several factors can affect rate of reaction, such as concentration, pressure or surface area of a reactant, the temperature of the reaction, or the presence of a catalyst

To investigate how concentration of reactants affects rate of reaction, you can study the disappearing cross reaction. In this reaction, an acid reacts with sodium thiosulfate. One of the products is solid sulfur, which turns the reaction mixture opaque.

A mark, usually a cross, is placed on the bottom of the reaction vessel. The cross is observed through the reaction mixture. The time taken for the cross to disappear as the reaction proceeds is recorded.

The rate of the reaction is calculated as one divided by time.

Here are the materials and apparatus you will need to collect the data. Draw a results table to record your experimental data.

To make your data collection efficient, set up your practical area as follows:
• Place the reaction box in the centre of your work area. Add water until the box is one third full. This water will help maintain a constant temperature of reaction.
• Place the acid vial in the left-hand hole and the reaction vial in the right-hand hole.
• Set up the timer on the left of your reaction box.
• Set up your thiosulfate and water solutions behind you reaction box. Be particularly careful when labelling the thiosulfate and water so you don't mix up these two clear colourless solutions
• Set up your stop flask to the right of your reaction box.

First measure out 5 cm^3 of water into the reaction vial.
Second, measure out 5 cm^3 of sodium thiosulfate into the reaction vial.
Third, measure out 1 cm^3 of hydrochloric acid using the dropping pipette.
Finally, at the same time, add the acid to the reaction vial and start the timer.

As the reaction proceeds, the solution will become increasingly opaque. When you can no longer see the cross on the bottom of the vial, stop the timer.

Pour the reaction mixture into the Stop Flask. This prevents further release of the toxic sulfur dioxide. Rinse the reaction vial with tap water and leave the vial to drain upside down on paper towels for a minute. Record your measured time in your results table and calculate your rate of reaction.

Now carry out the reaction again, changing the volume of water and thiosulfate each time. Use the volume values from your results table.

Once you have completed all the reactions, you can draw a graph of concentration of thiosulfate against rate of reaction. This will allow you to visualise the relationship between these two variables.

Pour the unused acid into the stop flask to neutralise the acid. Then pour all solutions down the sink with additional water. Rinse the glassware with tap water.