Student worksheet: The effect of concentration on a reaction rate

Introduction

In this experiment, the effect of the concentration of sodium thiosulfate on the rate of reaction is investigated.

What to record

1. Complete the table:

<table>
<thead>
<tr>
<th>Volume of sodium thiosulfate solution/cm³</th>
<th>Volume of water/cm³</th>
<th>Time taken for cross to disappear /s</th>
<th>Original concentration of sodium thiosulfate solution/g dm⁻³</th>
<th>1/timetaken /s⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>0</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>20</td>
<td></td>
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<tr>
<td>20</td>
<td>30</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What to do

HEALTH & SAFETY: Take care not to inhale fumes. Work in a well-ventilated laboratory. Asthmatics should, if possible, use a fume-cupboard.

Reducing the volume by, for instance, using a test tube rather than a flask will be safer as less hydrogen sulphide will be produced.

1. Put 50 cm³ of sodium thiosulfate solution in a flask.
2. Measure 5 cm³ of dilute hydrochloric acid in a small measuring cylinder.
3 Add the acid to the flask and immediately start the clock. Swirl the flask to mix the solutions and place it on a piece of paper marked with a cross.
4 Look down at the cross from above. When the cross disappears stop the clock and note the time. Record this in the table.
5 Repeat this using different concentrations of sodium thiosulfate solution. Make up 50 cm³ of each solution. Mix different volumes of the sodium thiosulfate solution with water as shown in the table.
6 As soon as possible, pour the solution down the sink (in the fume cupboard if possible) and wash away.

Questions
1 Calculate the concentration of sodium thiosulfate in the flask at the start of each experiment. Record the results in the table.
2 For each set of results, calculate the value of 1/time. (This value can be taken as a measure of the rate of reaction).
3 Plot a graph of 1/time taken on the vertical (y) axis and concentration on the horizontal (x) axis.

Credits
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Health & safety checked January 2018

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