

The speed at which chemical reactions occur varies. Some reactions occur within a fraction of a second, while others may take days or even years. Sometimes it is necessary or convenient to speed up a chemical reaction.

This report is divided into three parts:

1. A risk assessment based on the chemicals used in the practical (10 marks)
2. Your research on reaction rates (approximately two A4 pages, you decide on the format)(20 marks)
3. Your experimental data on reaction rates (30 marks)

### PART 1 – RISK ASSESSMENT (10 Marks)

A *risk assessment* identifies the potential hazards of an experiment and gives protective measures to minimise the risk. Most of the information used in a risk assessment is obtained from the chemical's *material safety data sheet* (MSDS).

Your experiment will determine how changing the concentration of a reactant affects the rate of a chemical reaction. In order to do this experiment in a safe manner it is necessary to complete a risk assessment of the chemicals that you will use. Your tasks are:

1. Use the internet to search for an MSDS on the following chemicals:

Sodium Thiosulfate ( $\text{Na}_2\text{S}_2\text{O}_3$ )

Another chemical selected by your teacher

2. Use the MSDS complete a risk assessment for each chemical.

An example of a risk assessment for hydrochloric acid is given. You need to locate the relevant information on the MSDS and transfer it to the relevant areas of the risk assessment table.

REACTANT	HS	DG	CLASS	MSDS	UN	HAZCHEM
HYDROCHLORIC ACID 2M	Y	Y	8		1789	2R
<b>Risks</b> <ul style="list-style-type: none"> <li>• Harmful if swallowed</li> <li>• Toxic by inhalation</li> <li>• Causes severe burns</li> <li>• Risk of serious damage to the eyes</li> <li>• Wear suitable protective clothing</li> <li>• If contact occurs wash with running water</li> <li>• SEEK MEDICAL ADVICE</li> </ul>		<b>Safety</b> <ul style="list-style-type: none"> <li>• Wear suitable eye/face protection</li> <li>• Recommended use of exhaust hood</li> <li>• Keep container tightly closed</li> <li>• Exposure may produce irreversible damage</li> <li>• Do not breathe gas/fumes/vapour/spray</li> <li>• Remove any contaminated clothing immediately</li> </ul>				
<b>FIRST AID</b>						
<b>Swallowed</b>	Contact doctor or poisons centre. Give glass of water.					
<b>Eye</b>	Wash with running water (15 minutes). Medical attention.					
<b>Skin</b>	Flood body with water. Remove contaminated clothing. Wash with soap and water.					
<b>Inhaled</b>	Fresh air. Rest, keep warm. If breathing shallow, give oxygen. Medical attention.					

REACTANT	HS	DG	CLASS	MSDS	UN	HAZCHEM
SODIUM THIOSULFATE						
<b>Risks</b>		<b>Safety</b>				
<b>FIRST AID</b>						
<b>Swallowed</b>						
<b>Eye</b>						
<b>Skin</b>						
<b>Inhaled</b>						

REACTANT/CHEMICAL	HS	DG	CLASS	MSDS	UN	HAZCHEM
<b>Risks</b>		<b>Safety</b>				
<b>FIRST AID</b>						
<b>Swallowed</b>						
<b>Eye</b>						
<b>Skin</b>						
<b>Inhaled</b>						

## **PART 2 - RESEARCH ON REACTION RATES (20 marks)**

Your research is to be directed by the following:

a) *Define what is meant by rates of reaction?*

[Definition present and correct = 1 mark]

b) *List three different reactions that differ in their reaction rate?*

[At least 3 examples of different reactions having significantly different reaction rates = 3 marks]

c) *Describe and explain the factors that affect the rate of a reaction (excluding catalysts).*

[Each of the 3 factors described with explanation of how they affect reaction rate = 6 marks]

d) *What are catalysts?*

[Definition present and correct = 1 mark]

e) *How do catalysts work?*

[Accurate description provided = 2 marks]

f) *Describe examples of catalysts that are used in industry, living things and everyday life (not from a textbook)*

[At least one example from each area which includes a description of the reaction it affects = 6 marks]

g) *Where did you obtain your information i.e. bibliography (excluding textbook)?*

[References shown and not just textbook or Wikipedia = 1 mark]

## **PART 3 – EXPERIMENTAL DATA ON REACTION RATES (30 marks)**

You will be given an experimental method that aims to determine the relation between the reaction rate and the concentration of a reactant. You can complete the experiment in groups of 2-3 but your report will be your own work.

You will be expected to write an experimental report that contains:

a) Aim & Hypothesis

b) Variables

c) Results (including table and graph)

d) Discussion

e) Conclusion

Your experimental technique and safety will also be assessed

A mark scheme is shown on the next page.



