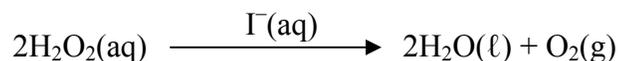
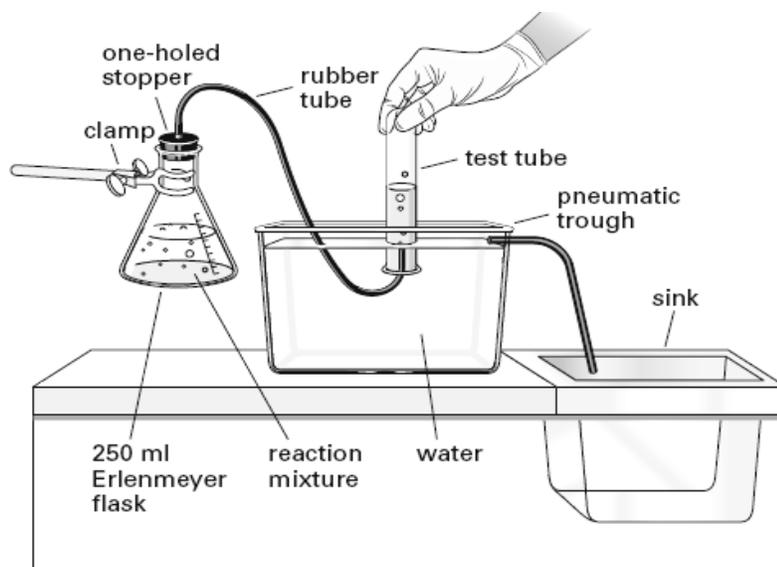


CHAPTER 11	Investigation 11.A: The Effect of a Catalyst on the Decomposition of Hydrogen Peroxide, $\text{H}_2\text{O}_2(\text{aq})$	BLM 11.2.2
HANDOUT		

Hydrogen peroxide, $\text{H}_2\text{O}_2(\text{aq})$, can be purchased as a dilute solution in a pharmacy or supermarket. It is used as a topical antiseptic for minor cuts, among other things. In this investigation, you will investigate the effect of the $\Gamma(\text{aq})$ ion as a catalyst on the decomposition of $\text{H}_2\text{O}_2(\text{aq})$. Hydrogen peroxide decomposes as shown in the equation below:



The gas produced can be measured as a decrease in mass of the system (caused by the release of oxygen gas) or by the downward displacement of water, as shown.



The downward displacement of water: To invert a test tube filled with water, place a piece of paper over the mouth of the filled test tube before inverting it.

Prediction

Predict how the addition of a catalyst will affect the rate of decomposition of hydrogen peroxide.

Safety Precautions



- The reaction mixture will get hot. Handle all glassware with care.
- 6% hydrogen peroxide, $\text{H}_2\text{O}_2(\text{aq})$, is an irritant. Wear safety glasses, gloves, and a laboratory apron.

CHAPTER 11	Investigation 11.A: The Effect of a Catalyst on the Decomposition of Hydrogen Peroxide, $\text{H}_2\text{O}_2(\text{aq})$ (cont'd)	BLM 11.2.2
HANDOUT		

Materials

- 60 mL 6% (m/v) $\text{H}_2\text{O}_2(\text{aq})$
- 60 mL 1.0 mol/L $\text{NaI}(\text{aq})$
- masking tape or grease pencil
- 100 mL beakers
- 10 mL graduated cylinders
- 250 mL Erlenmeyer flask
- clock with a second hand or stopwatch
- water
- one-holed stopper, fitted with a piece of glass tubing (must be airtight)
- rubber tubing to fit glass tubing (must be airtight)
- large test tube
- pneumatic trough or large beaker
- electronic balance accurate to 0.001 g

Experimental Plan

1. From your prediction, provide a list of variables (manipulated, responding, and controlled).

2. Using these variables, write a detailed procedure to test your prediction. Your procedure should:
 - control all necessary variables
 - provide sufficient data for analysis
 - use no more than the quantities of materials provided

CHAPTER 11	Investigation 11.A: The Effect of a Catalyst on the Decomposition of Hydrogen Peroxide, $\text{H}_2\text{O}_2(\text{aq})$ (cont'd)	BLM 11.2.2
HANDOUT		

3. Design a data table to record your observations.
4. Check your plan to ensure that all safety requirements are addressed.
5. Ensure that the manipulated variable is the only one that changes during the experiment.
6. Ensure that the responding variable is measurable.
7. Check to see that the variables that should be controlled are kept constant throughout the experiment.
8. If you need a control experiment, ensure that it is included in the plan.
9. Be sure to collect sufficient data (perform enough trials).
10. Be sure that you have sufficient materials to complete the trials.

CHAPTER 11	Investigation 11.A: The Effect of a Catalyst on the Decomposition of Hydrogen Peroxide, $\text{H}_2\text{O}_2(\text{aq})$ (cont'd)	BLM 11.2.2
HANDOUT		

Data and Observations

11. Perform the experiment and record your data.

Analysis

1. How did the addition of a catalyst affect the volume or mass of gas produced (as measured by a decrease in the mass of the system)? How does this relate to the rate of reaction?
2. Construct a graph illustrating the effect of a catalyst on the rate of reaction.
3. What changes or additions would you make to your procedure if you were to repeat this experiment? Why?

Conclusion

4. Describe the effect of iodide on the rate of the decomposition of hydrogen peroxide. Be as specific as possible.

CHAPTER 11	Investigation 11.A: The Effect of a Catalyst on the Decomposition of Hydrogen Peroxide, $\text{H}_2\text{O}_2(\text{aq})$ (cont'd)	BLM 11.2.2
HANDOUT		

Application

5. The rate of decomposition of $\text{H}_2\text{O}_2(\text{aq})$ can be increased using other catalysts, such as $\text{Mn}^{2+}(\text{aq})$ and $\text{Fe}^{2+}(\text{aq})$. How do you expect ΔH for the decomposition reaction to change if different catalysts are used?

Extension

6. Perform an Internet search to verify your findings. **ICT**