ScienceCube

Decomposition of Hydrogen Peroxide

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1. **You can observe the changes in gas pressure and temperature during the decomposition of hydrogen peroxide.**
2. **You can understand the changes in the reaction rate through the experimental results.**

Fundamental Concept

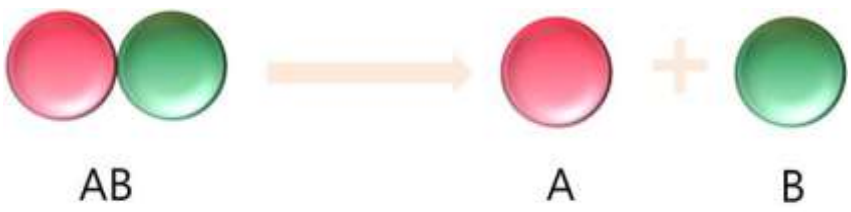
1. Types of Chemical Reactions

(1) A chemical reaction refers to a reaction where chemical changes occur..

(2) Depending on the arrangement of particles, chemical reactions can be classified into combination, decomposition, displacement, etc..

2. Decomposition

(1) Model



(2) Types of Decomposition

Decomposition can be classified into thermal decomposition, electrolysis, and catalytic decomposition depending on the method used to decompose the substance..

Category	Decomposition Method
Thermal Decomposition	Heating
Electrolysis	Passing electric current
Catalytic Decomposition	Adding a catalyst

(3) Examples of Decomposition

Decomposition of Sodium Bicarbonate:
 Sodium carbonate Water Heated to decompose. Sodium bicarbonate decomposes into sodium carbonate, water, and carbon dioxide when heated..

Decomposition of Hydrogen Peroxide
 Hydrogen peroxide Water Oxygen Decomposed using a catalyst. (Catalyst: A substance that aids in a chemical reaction without changing itself.) When a catalyst is added to hydrogen peroxide, it quickly decomposes into water and oxygen.

Experiment

Materials Needed

Interface, Science# Program, temperature sensor, gas pressure sensor (B), 500 mL flask with a side arm, 250 mL beaker, one-hole rubber stopper, silicone tube, hydrogen peroxide, manganese dioxide, dropper (syringe), small spoon, marker, gloves

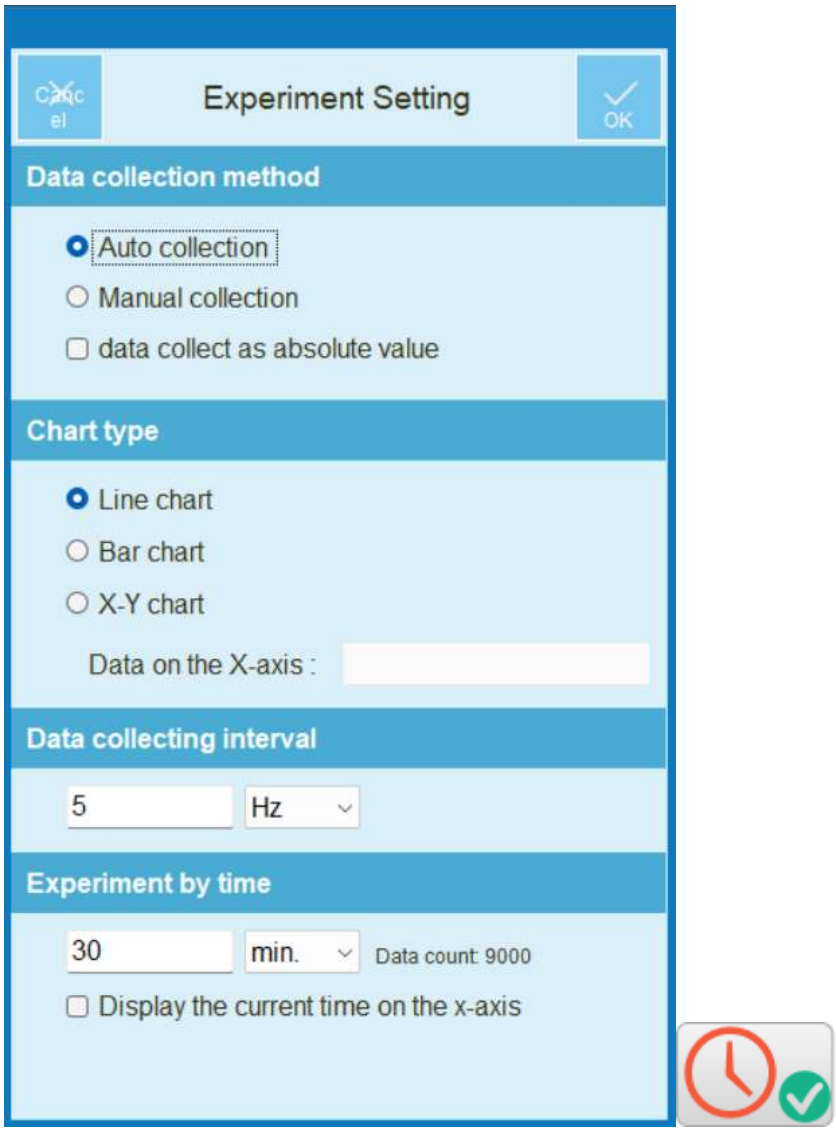
* Note: Be careful not to let hydrogen peroxide contact the skin as it can cause a stinging sensation due to oxidation..

Preparation of Experimental Apparatus

1. Attach the silicone tube to the side arm of the 500 mL flask and connect it to the gas pressure sensor..
2. Add 200 mL of water to the flask and one spoon of manganese dioxide.
3. Insert the temperature sensor into the hole of the rubber stopper and close the flask. Ensure the temperature sensor does not touch the bottom of the flask.
4. Mark the position where the rubber stopper is inserted with a marker.
5. Pour a small amount of hydrogen peroxide into the beaker and fill 1 mL of hydrogen peroxide in the dropper or syringe.

Interface Setup

1. Run the Science# program..
2. Connect the temperature sensor and gas pressure sensor to the interface.
3. Click to set up the experimental environment as shown below or click to automatically set up.



4. Click to zero the gas pressure sensor..

Data Collection

1. Click  to start collecting data.
2. Carefully remove the rubber stopper from the flask, add 1 mL of hydrogen peroxide, and quickly close the flask with the rubber stopper, pressing it to the marked position.
3. The experiment will automatically end once the set data collection time is reached.

Data Analysis

Recording

1. Graph and explain how the temperature and pressure inside the flask change over time..

2. Describe how the slope of the pressure change graph changes over time and what the slope signifies.

Data Application

1. Explain why the pressure inside the flask changed as it did according to the experimental results.

2. Explain the role of manganese dioxide in the reaction of hydrogen peroxide..

3. Household hydrogen peroxide solution used as a disinfectant is a 3% hydrogen peroxide solution. When applied to a wound, it produces a lot of bubbles, but it does not produce bubbles when applied to unbroken skin. Think about and explain the reason for this..


Report
(For Teachers)
Report
(For Students)