CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
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Project Number
J0510

Project Title
Catalysts

Abstract

Objectives/Goals
The objective is to determine which chemical and biological substances can function as catalysts in the decomposition reaction of hydrogen peroxide to yield oxygen gas and water,and also which substances are sensitive to temperature changes. I believe liver, yeast and rusty nail will act as catalysts and liver and yeast will be sensitive to temperature changes.

Methods/Materials
Two different methods were use to measure the amount of reaction,therefore the reaction speed. One measured the amount of oxygen gas produced and the other measured the temperature increase in reaction since it is an exothermic reaction. A gas collection device was set up with a funnel fitted into a large test tube allowing the gas produced to be collected through a rubber tubing into a test tube filled with water. Temperature is taken before and after the reaction. The reation was timed for two minutes. Five trials were done for each of the 16 samples plus the control. For each run 0.50 grams of sample and 15 mls of 3% hydrogen peroxide was use. The samples were manganese dioxide, calcium carbonate,potassium permanganate,liver, activated charcoal,potassium iodide,yeast, rusty nail, potato and sugar. Other materials needed were: wooden splints and candle for glowing splint test for oxygen, water trough, spoons, electonic balance, weighing paper,test tubes, brush and a thermometer.

Results
From the results, I see in both the oxygen and temperature testing, manganese dioxide is the best catalyst, followed by raw liver, yeast and rusty nail. Many other substances also show catalytic activity. Boiled liver and baked yeast show no reaction. Frozen liver and baked yeast showed decreased oxygen gas and temperature rise. The oxygen method is more accurate, because the temperature range in the reaction is not as large as the volume of gas collected.

Conclusions/Discussion
My conclusion is that my hypothesis was correct. Liver, yeast and rusty nail did work as catalysts, and so did many others I tested. The other catalysts were manganese dioxide, potassium iodide, potato and potassium permanganate. My experiment helped determine which samples are catalysts and which is the best catalyst. I learned that enzymes in potato,yeast and liver are sensitive to temperature changes. Enzymes are more sensitive to boiling or baking than freezing. I also learned that sugar and chalk (calcium carbonate) cannot be catalyst in this reaction.

Summary Statement
My project is to determine which chemical and biological substances can function as catalysts in the decomposition reaction of hydrogen peroxide to yield oxygen and water and which substances are sensitive to temperature changes.

Help Received
Mom helped buy samples and help borrow equipment from college. Teacher helped prove read draft.