Enzyme Lab

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Data

Procedure A

Time (s)	0	15	30	45	60	75	90	105	120
H_2O_2/H_2O	24.2	21.6	20.5	20.4	20.3	20.3	20.1	20.1	20.1
H_2O_2/lj	23.5	29.1	29.9	29.3	29	29	28.8	28.2	28.2

Table 1: Table of Measurements over Time for Procedure A and Procedure B

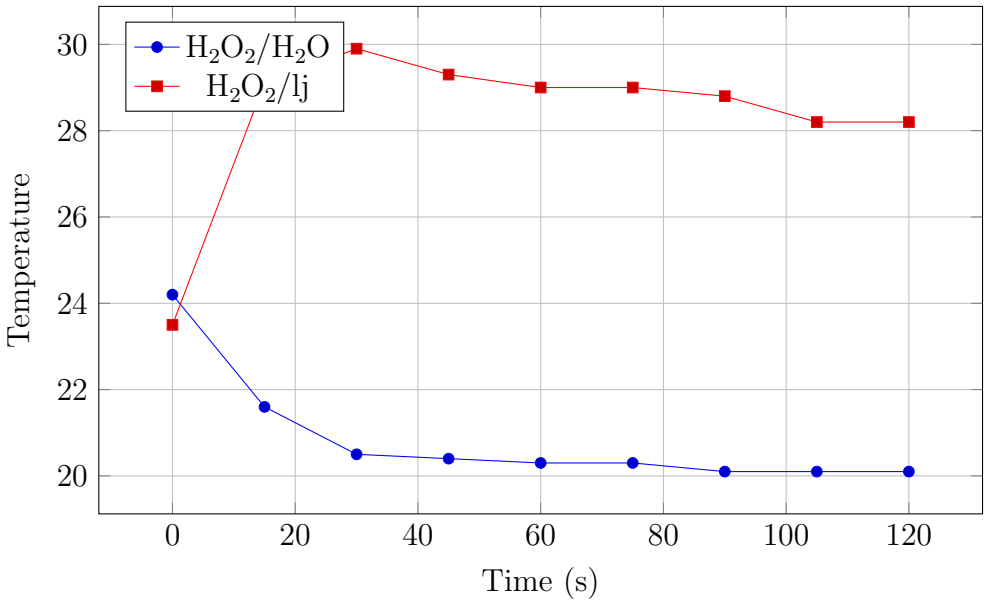

Figure 1: Graph of Measurements over Time for Procedure A and Procedure B

Time (s)	0	15	30	45	60	75	90	105	120
H_2O_2/boiled lj	22	20.5	20.1	20.1	20	20.2	20.2	20.1	20.2
H_2O_2/acid lj	22	21.5	21.5	21	21	21	21.1	21	20.9
H_2O_2/base lj	22	21.2	21.2	21.3	21.2	21.5	21.6	21.8	21.9
H_2O_2/salt lj	23	23.2	24.5	26.9	28.9	31	31.5	31.9	31.7
Boiled H_2O_2/lj	23	31	38	41	41	41	39	38	37.5

Table 2: Table of Measurements over Time for Procedure B

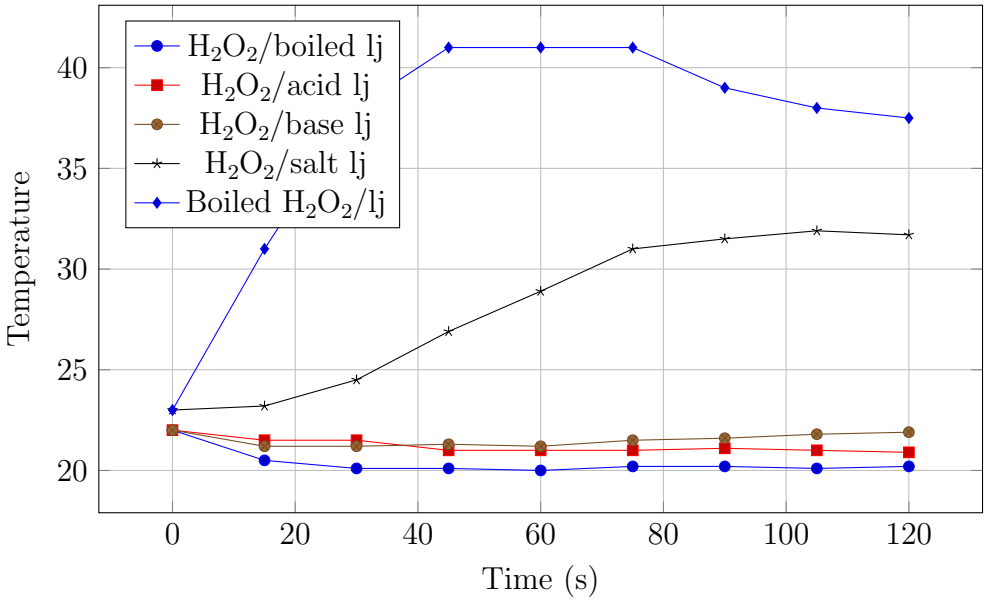

Figure 2: Graph of Measurements over Time for Procedure B

Procedure B

Procedure C

Data Analysis

Question 2

(a) The test tube with water and H_2O_2 saw a slight decrease in temperature because the water was stored colder than room temperature. This test tube serves as a control. It is to show the speed of reaction and temperature increases without enzymes, confirming that the temperature increase we saw was due to the liver juice catalyzing the decomposition of H_2O_2.

(b) We could tell a reaction was occuring in test tube B because the temperature increased, as shown by the thermometer. Additionally, bubbles comprised of oxygen gas were

Time (s)	0	15	30	45	60	75	90	105	120
1.5% H_2O_2	22	26.1	26.9	28.9	26.5	26.2	26.2	26.1	26
3% H_2O_2	23	29.1	30	29.9	29.1	29	28.9	28.5	28.2
6% H_2O_2	23	34	37	36.5	36	35.1	34.9	34.1	33.9
10% H_2O_2	23	38	43	42	41	40	39	38	37.5

Table 3: Table of Measurements over Time for Procedure C

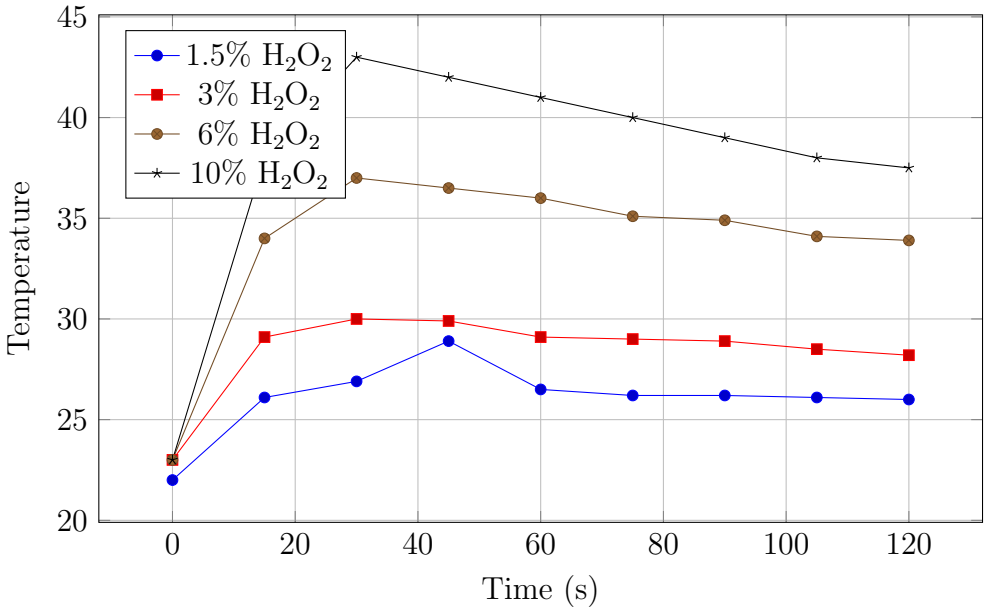

Figure 3: Graph of Measurements over Time for Procedure C

quickly released, overfilling the test tube.

(c) Before we added the enzyme, the reaction was occuring at an extremely slow rate.

(d) When we added the enzyme, the reaction rate increased significantly because the enzyme was able to catalyze the decomposition of H_2O_2 into water and oxygen gas.

(e) Induced fit. The energy hill diagram below illustrates how catalase speeds up the reaction by lowering the activation energy required for the decomposition of H_2O_2 into water and oxygen gas.

The boiled H2O2 reacted faster because the water molecules are removed, thus increasing the concentration of H2O2.

The R groups sticking out of the catalayse are polar, which ...

The products don't bind very well with the enzymes. On the other hand, H2O2, specifically, it transitional state, binds best with the enzymes. However, they are unstable, which means they eventually break down.

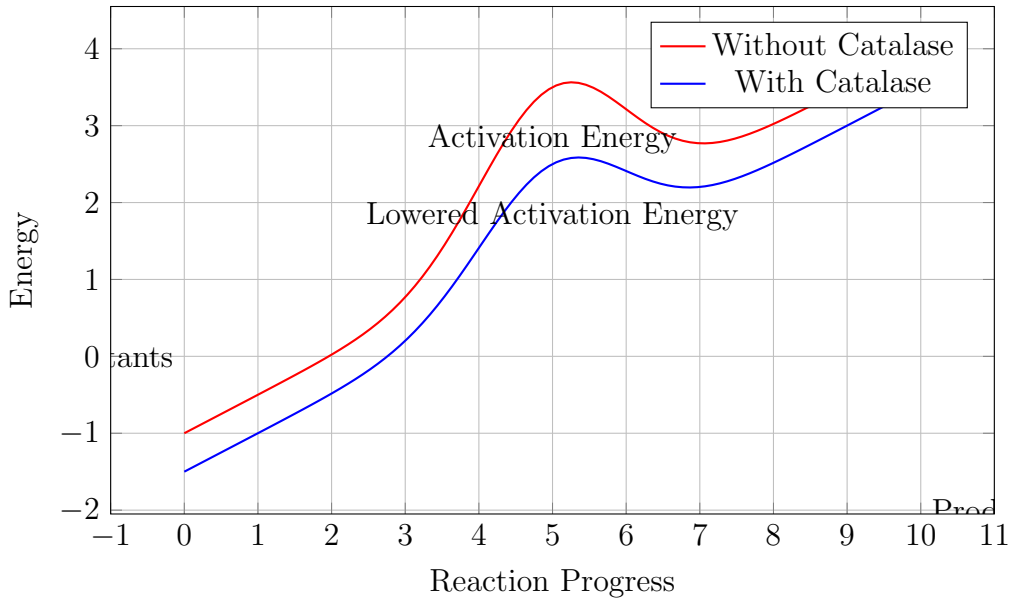

Figure 4: Energy Hill Diagram Showing the Effect of Catalase on the Reaction

The products aren't very harmful.

The 15 percent salt solution was not enough to denature the enzymes.