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CHEMICAL CHANGES

When a chemical change takes place, something new is produced. Chemical changes happen in living matter. Chemical changes differ from physical changes in many ways. One difference is that energy is often given off during a chemical change. Energy that is given off may be in different forms, but one form that is easily measured is heat.

Strategy

You will observe chemical changes produced by living matter.
You will measure and record changes in temperature when these chemical changes take place.

Materials

clock or watch with second hand
graduated cylinder (25 mL)
hydrogen peroxide (3%)
liver (raw)
potato (raw)
8 test tubes (18 × 150 mm)
test tube rack
thermomenter

Procedure

Part A

1. Add 5 mL of hydrogen peroxide to a test tube. **CAUTION:** *Hydrogen peroxide is poisonous.*
2. Place a thermometer into the test tube. Find the temperature of the hydrogen peroxide and record this as the temperature before adding the liver. Record all of your results in Data Table 1 in Data and Observations.
3. Remove the thermometer from the test tube.
4. Add a small piece of liver to the test tube.
5. Replace the thermometer and begin to record the temperature of the liver and hydrogen peroxide every half minute for six minutes.
6. Repeat the experiment three more times. Use new hydrogen peroxide, a new piece of liver, and a clean test tube for each trial.

Part B

1. Add 5 mL of hydrogen peroxide to a test tube.
2. Find the temperature of the hydrogen peroxide. Record your results in Data Table 2 in Data and Observations.

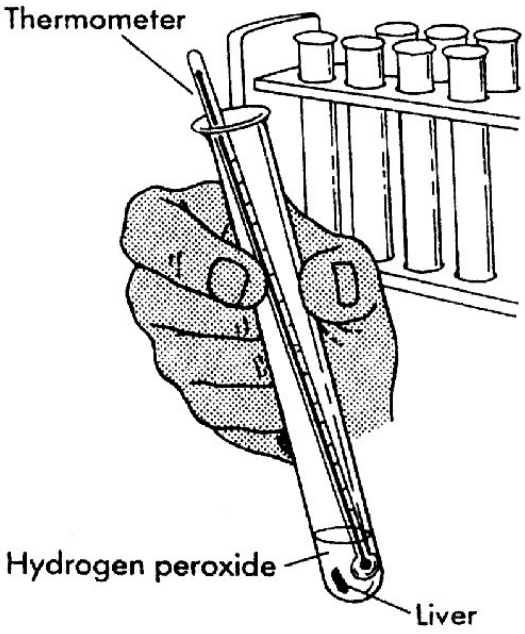

FIGURE 1.

3. Add a small piece of potato to the test tube.
4. Replace the thermometer and record the temperature of the potato and hydrogen peroxide every half minute for six minutes.
5. Repeat the procedure three more times. Use new hydrogen peroxide, a new piece of potato, and a clean test tube for each trial.

Data and Observations

1. Record your results in the data tables.
2. For each data table, total each column and find the average for each column.

Data Table 1

Trial	Starting Temperature	Temperature After Adding Liver											
		Minutes											
1													
2													
3													
4													
Total													
Average													

Data Table 2

Trial	Starting Temperature	Temperature After Adding Potato											
		Minutes											
1													
2													
3													
4													
Total													
Average													

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3. Graph your average results for each data table. Place a dot on the graph in Figure 2 for the average starting temperature and for each average temperature ½ minute through 6 minutes. Connect the dots with lines. Use different colors for each line.

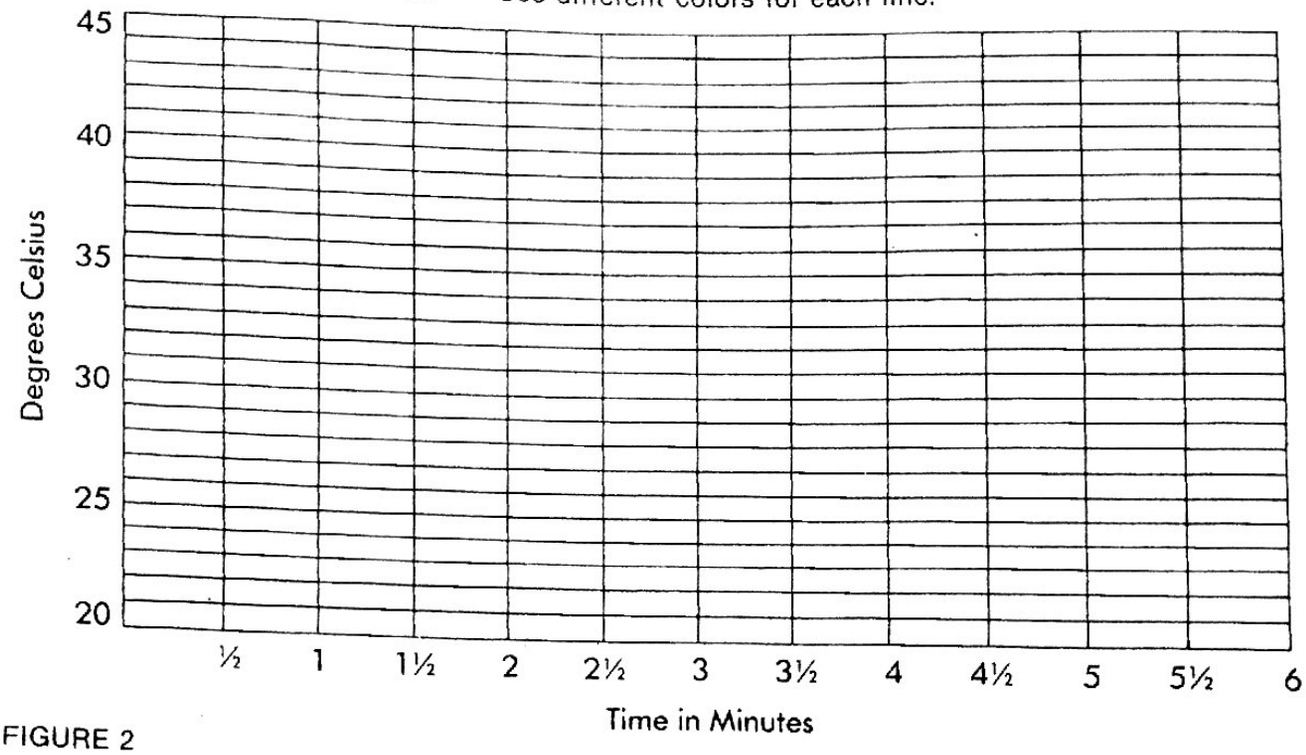

FIGURE 2

Questions and Conclusions

1. Is there any evidence that energy was given off when liver was added to the hydrogen peroxide? _____

2. What is this evidence? _____

3. Is there any evidence that energy was given off when potato was added to the hydrogen peroxide? _____

4. What is the evidence?

5. How does the evidence indicate that a physical or chemical change has taken place? _____

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6. Why were four trials used for each part of the experiment? _____

_____

_____

7. Why were both liver and potato used in the experiment? _____

_____

_____

8. Which showed the greatest temperature change, potato or liver? _____

9. During the experiment, hydrogen peroside was changed into water and oxygen. Did you see anything during the experiment that shows that oxygen was given off? _____

_____

Explain your answer. _____

_____

_____

Strategy Check

_____ Can you observe chemical changes produced by living matter?

_____ Did you measure and record changes in temperature when chemical changes took place?