How Does Temperature Affect Respiration Rates of Fish?

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GRADE LEVEL

7

CONTENT TOPICS

Biology
Life Science
Science

DESCRIPTION

This experiment helps students see the effect of temperature on fish respiration rates. It can be expanded to show the relationship between temperature, dissolved oxygen and respiration rate. Instructional materials include a student worksheet and photographs of student investigations.

SUGGESTED STANDARDS CONNECTIONS

NGSS	MS-LS1 From Molecules to Organisms: Structures and Processes MS-PS3 Energy in Chemical Processes and Everyday Life

How Does Temperature Affect Respiration Rates of Fish?

Introduction: In this lab you will slowly change the water temperature of a fish and determine how changing the temperature affects the fish's respiration rate

Prediction: How do you think the temperature affects breath rate?

As the temperature increases,the rate will:

increase, decrease, or stay the same. (circle)

Procedure:

1. The goldfish will start at room temperature (15-20 C). You will check the temperature and record the number of breaths the fish takes at room temperature.

2. Use an empty bowl and add cold, icy water. Place the fish beaker in the ice bath. (see picture)

3. Place a thermometer in the fish's beaker and watch as the temperature slowly changes. When the temperature is in the 10-14 C range, record the respiration rate again.

4. Record the respiration rate again, when the fish beaker reaches 5-9 C.

5. Change the ice water bath to a warm water bath and repeat the above steps, recording data for the various temperature ranges on the table.

6. Consult with other groups to finish the table, including 3 other group's fish data, and determine the average respiration rate for each temperature range.

Data

Record the number of breaths your fish takes at each of the following temperature ranges. Also, record data from other groups near you so that you can compare your fish and get an average. Use your data to create a LINE graph. Use one line to represent YOUR FISH, and another line to represent the AVERAGE.

Temperature	Your fish	Fish 2	Fish 3	Fish 4	Average
26-30 C					

Temperature	Your fish	Fish 2	Fish 3	Fish 4	Average
26-30 C					
21-25 C					
15-20 C (room)					
10-14 C					
5-10 C					

Fish Respiration Rates at Various Temperatures

Analysis

1. Describe how the fish's respiration rate is affected by the temperature. Be detailed.

2. What other factors (besides temperature) may have affected the breathing rate?

3. How did your fish compare to the average. Which reading is probably more accurate?

4. Why do scientists often take lots of data and look at the AVERAGE? Why do you think you did that in this experiment.

5. Design an experiment that will test how a fish's respiration rate is affected by light. Explain your design below.

6. Was your prediction at the beginning of the lab correct or incorrect?

7. Propose an explanation for your experimental results. Why do you think fish react this way as their environmental temperature changes.