

The Affect of Water Temperature on Living Organisms

The definition of thermal pollution is the degradation of water quality by a process that changes ambient water temperature. Thermal pollution is usually associated with increases of water temperatures in a stream, lake, or ocean due to the discharge of heated water from industrial processes, such as the generation of electricity. As the earth ' s temperature warms, water temperature in lakes, streams and the ocean will warm. In this lab we will investigate how warming of waters can affect living organisms.

Please read the following article prior to lab.
<http://www.nrdc.org/globalWarming/ntrout.asp>

State of New Jersey Standards

NJ State standard 5.10 A1

Distinguish naturally occurring process from those believed to have been modified by human interaction or activity.

NJ State standard 5.1.B1

Select and use appropriate instrumentation to design and conduct investigations.

Objectives:

The objective is to see the possible effects of global warming on living organisms in aquatic systems.

Relevant Vocabulary:

Thermal pollution
Global warming
Greenhouse effect
Indicator species

Materials:

Distilled water
2 (400ml beakers)
125 ml beaker
U shaped glass tube with stoppers
Culture of paramecium
Ice
Hotplates
Thermometer

Procedure:

1. Research the optimum temperature range for paramecium.
2. Develop a hypothesis concerning the effect of temperature on paramecia.
3. Design an experiment using the materials provided.
4. Decide which factor is your independent and dependent variable. Plan how you will measure your variables. Make certain you have a control group.
5. Design a data table
6. Discuss your design with your teacher
7. Proceed with experiment if approved.
8. Complete a lab report including the analysis questions and going further .

Analysis questions:

1. Did the results of your experiment support your hypothesis? Explain.
2. Did the paramecium prefer one temperature over another? If so what do you believe the optimum temperature is for paramecium survival? Support this with your data.
3. Could paramecium be used as an indicator species?
4. What are some of the possible sources of error in your experiment? How might they have affected your results?

Going further:

Identify and research one fresh or salt water indicator species for temperature. Discuss how global warming will or will not affect this species.

Assessment:

Lab Report Rubric

	(4 pts)	(3 pts)	(2 pts)	(1 pt)	(0)
Introduction	1. Includes the question to be answered by the lab 2. states hypothesis that is based on research and/or sound reasoning 3. title is relevant. 4. Hypothesis (prediction) is testable.	One of the "excellent" conditions is not met	Two of the "excellent" conditions is not met	Three of the "excellent" conditions is not met	
Methods			A description or step-by-step list of how the experiment was performed	Description unclear, couldn't be repeated	
Results (data)	Results and data are clearly recorded, organized so it is easy for the reader to see trends. All appropriate labels are included	Results are clear and labeled, trends are not obvious,	Results are unclear, missing labels, trends are not obvious at all	Results are present, though too disorganized or poorly recorded to make sense of	
Analysis	The data and observations are analyzed accurately, trends are noted, enough data was taken to establish conclusion	Analysis somewhat lacking in insight, enough data, though additional data would be more powerful	Analysis lacking in insight, not enough data was gathered to establish trends, OR analysis does not follow data	Analysis poor, not enough data, inaccurate analysis	
Conclusions	1. Summarizes the essential data used to draw conclusions 2. Conclusions follow data (not wild guesses or leaps of logic), 3. Discusses applications of experiment ("real world" connections) 4. Hypothesis is rejected or accepted based on the data.	One of the "excellent" conditions is not met	Two of the "excellent" conditions is not met	Three of the "excellent" conditions is not met	
Format			Neat, organized with headings, few spelling/grammar errors	Somewhat lacking in organization, multiple spelling/grammar errors, not neat	

Citations:

<http://www.pollutionissues.com/Te-Un/Thermal-Pollution.html>

http://www.biologycorner.com/worksheets/labreport_rubric.html

Modern Biology, Holt , Rhinart, Winston, 2006. pg 456