CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Jamie J. Tian

Project Number
S0711

Project Title
The Effect of Surface Area and Volume on the Temperature and pH in a Tide Pool

Abstract

Objectives/Goals
The purpose of this project was to find out if the surface area and volume of a tide pool affect the temperature and pH and how much the temperature and pH of a tide pool changes over a short period of time.

Methods/Materials
During the experiment, the dimensions, depths, temperatures, and pH of 40 tide pools were measured. The approximate surface areas and volumes of each tide pool were calculated and relationships between surface area, volume, temperature, and pH were observed. The temperature and pH of one specific tide pool was recorded every 30 minutes over a 2 hour period.

Results
As surface area and volume increased, the temperature decreased. There was no relationship between either surface area and pH or volume and pH. The tide pool studied for 2 hours experienced a decrease in temperature and little change in pH. The % deviations within the trials were small, showing that the experiment was precise.

Conclusions/Discussion
The hypothesis that a tide pool with larger surface area and volume would have a lower temperature is supported. The hypothesis that a tide pool with larger surface area and volume would have higher pH is not supported. The hypothesis that the temperature and pH of a tide pool would both increase over a short period of time is not supported. Smaller, shallow tide tools are heated by air temperature and sun rays and heat up more quickly than large, deep tide pools. There seemed to be no relationship between surface area and pH or volume and pH which may have been because all of the tide pools had different amounts of plants which means that there was a different amount of photosynthesis occurring in each tide pool, affecting the CO(2) level and changing the pH. The lack of change in pH in the study of the specific tide pool over the 2 hour period was probably due to the fact that the tide pool was mostly rocky and had few plants so there was no photosynthesis and therefore no change in CO(2) or pH. The reason that the temperature dropped over time instead of increasing like expected was probably because the experiment was conducted in the late afternoon and during that time, the sun was beginning to set and the air temperature was dropping.

Summary Statement
The purpose of my project was to study the relationships between surface area and temperature, surface area and pH, volume and temperature, and volume and pH in a tide pool.

Help Received
Father helped take pictures