



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Zoe J.F. Altenberg	Project Number J1101
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Project Title
Wastewater Purification using Evaporation and Capillary Action: Part 1

Objectives/Goals
The purpose of this project is to investigate the potential of using capillary action and gravity and strips of fabric to increase the rate of water evaporation. Ultimately, this will lead to a passive water evaporation system that uses capillary action to separate the water from the waste.

Abstract

Methods/Materials
Twenty 200mL beakers, Five 400mL beakers, Four square meters of polyester and cotton, One 250mL graduated cylinder, Food dye, Shelf structure.

Section 1

1. Cut 1 cm, 3 cm and 9 cm strips of cotton and polyester.
2. Fill 250mL beakers with 200mL of colored water.
3. Hang strips with the end of the strip in the water in the beakers. Use four beakers as controls.
4. After three days, measure each beaker's remaining water.

Section 2

1. Cut 150cm long 3cm wide cotton strips.
2. Fill 400mL beakers with 400mL of water.
3. Hang the 150 x 3 cm strips from the 400mL beakers on the top shelf to beakers on the bottom shelf.
4. When the water levels in the top beakers are below 100mL, measure the water in the bottom beakers; then pour the water back into the top beakers. Repeat as many times as necessary.
5. Measure the remaining water in the top and bottom beakers.

Results
Cotton is more efficient than polyester, and a greater number of thinner strips is more efficient than a smaller number of larger strips. The best combination of material type and width I found is 1 cm cotton. In the second section of this project, the strips of fabric were 150 cm long, rather than 45 cm long. I only tested 3 cm cotton long strips, which I found to be about 327 % more efficient than 3 cm cotton short strips.

Conclusions/Discussion

Section 1
I found polyester to be less efficient than cotton in evaporating water. I thought the polyester would work better because the weave is tighter and the water will be able to wick more easily. However, cotton worked better, so I hypothesize that a tight weave actually constricted the water wicking.

Section 2

Summary Statement
This project explores the most efficient methods of using capillary action and evaporation to passively separate water from solid wastes in wastewater, thereby greatly reducing the mass and volume of the waste and reclaiming purified water.

Help Received
Father helped me to use Microsoft Excel.