CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
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Project Number
J1325

Project Title
Bacteria Be Gone!

Abstract

Objectives/Goals
To determine the effectiveness of household substances in killing bacteria.

Methods/Materials
1.25 ml ea: -toothpaste in 1.25 ml water; -salt in 1.25 ml water; -chlorine bleach; -antibacterial liquid soap; -isopropyl alcohol; -hydrogen peroxide; -distilled vinegar; -baking soda dissolved in 1.25 ml water. 10 Petri dishes w/agar; heat lamp; measuring spoon; eye dropper; 10 cups; graduated cylinder; thermometer; gloves.
1)Wash hands; 2)Put 10 mm saliva in cylinder; 3)Put 1 mm saliva in each dish; 4)Put dishes/thermometer under lamp; 5)Turn on lamp and leave for 6 days; 6)Each day check that temp is 37 degrees C; 7)On day 6, after bacteria have grown, gather 1.25 ml of ea substance; 8)Stir 1.25 ml water & baking soda to dissolve; 9)Repeat step 8 for salt & toothpaste; 10)Put baking soda & toothpaste mixtures & salt water in separate dishes; 11)Put 1.25 ml each bleach, soap, alcohol, hydrogen peroxide & vinegar in separate dishes (use gloves with bleach); 12)Leave one dish without any substance; 13)Turn lamp off; 14)Each day for a week, check for decrease in bacteria; 15)Compare w/dish w/o substance.

Results
Percentage bacteria killed:
Soap 91%; Bleach 88%; Toothpaste 82%; Alcohol 81%; Hydrogen peroxide 68%; Salt 65%; Baking soda 52%; Vinegar 4%.

Conclusions/Discussion
No substance killed bacteria more quickly than others--some just killed more bacteria. Hydrogen peroxide didn't kill many bacteria because it's a weak acid--only 3% in solution. Alcohol killed many bacteria because it disrupts the function of the bacterial membrane. Once alcohol is in a cell, it causes proteins to stop functioning, which causes the cell to stops functioning. Vinegar didn't kill much bacteria because it is a weak 5% acid. Bleach killed many bacteria since chlorine inhibits bacterial growth by causing a chemical reaction. Toothpaste killed a lot of bacteria because of monofluorophosphate, which protects enamel from being attacked by cavity-causing bacteria. The soap killed many bacteria because of triclosan, which poisons an enzyme vital for survival of bacteria. Triclosan prevents the making of fatty acids (which bacteria need for cell structure), by disrupting production of enoyl-acyl carrier-protein reductase. Baking soda didn't kill many bacteria because it didn#t dissolve well in water. Although salt is 60% chlorine, there was not enough salt to kill the bacteria.

Summary Statement
In my experiment, I tested the effectiveness of different household substances in killing bacteria.

Help Received
Teacher ordered Petri dishes; parents contributed saliva; mother set up heat lamp.