



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) <p align="center">Juliesen E. Jaime</p>	Project Number <p align="right">36250</p>
Project Title <p align="center">The Effectiveness of Active Ingredients in Hand Sanitizers</p>	
<p align="center">Abstract</p> <p>Objectives/Goals This project was designed to discover whether ethyl alcohol, benzalkonium chloride, or benzethonium chloride would kill the most bacteria on human hands. Ten subjects were recruited and swabbed for bacteria before and after each of the hand sanitizers were applied. Data was collected after the dishes were placed in an incubator for a week. The three active ingredients were compared to determine which was the most effective at eliminating bacteria. Results showed that benzalkonium chloride was the most effective.</p> <p>Methods/Materials Materials:30 petri dishes,Purell Sanitizing Wipes, Wet Ones Hand Wipes, Purell Liquid Sanitizer, marker,30 swabs, incubator, liquid agar,tape</p> <p>Prepare 30 petri dishes,label the dishes with the active ingredient, the subject #, and the date. Draw a line down the middle and label #before# and #after# on each half. Recruit 10 subjects (each will test 3 times) Swab the subject's palm and transfer the bacteria collected from the swab onto the petri dish on the #before# side. Apply one hand sanitizer product on the subject (rub for 30 seconds). Then, swab their palm and transfer it on the #after# side of the dish. Seal the dish with tape and place it in the incubator. Repeat using the other 2 products(2 days in between). After one week in the incubator, remove the dishes and count the number of bacteria by using a 5 by 5 grid, which estimates the percentage of bacteria present. Record the data.</p> <p>Results Results of this experiment show that benzalkonium chloride is more effective at eliminating bacteria from human hands than ethyl alcohol and benzethonium chloride. The total percentage of bacteria killed from ethyl alcohol= 47.90%; the total percentage from benzalkonium chloride=67.90%; the total percentage from benzethonium chloride= 42.22%.</p> <p>Conclusions/Discussion The hypothesis for this experiment was:ethyl alcohol will kill more bacteria on human hands than benzalkonium chloride and benzethonium chloride. Results proved that benzalkonium chloride killed more bacteria than ethyl alcohol and benzethonium chloride. Therefore, the hypothesis was incorrect.In the future, researchers should conduct experiments comparing the concentration of each active ingredient, as well as which active ingredient works most effectively at killing the different types bacteria.</p>	
Summary Statement I tested three hand sanitizers that had different active ingredients (ethyl alcohol, benzalkonium chloride, and benzethonium chloride) to find out which worked most effectively at killing bacteria on human hands.	
Help Received My teacher, Ms. Griffith, helped me understand how an incubator works, the proper way to safely transfer bacteria onto a petri dish, and how to count/estimate the amount of bacteria in each petri dish.	