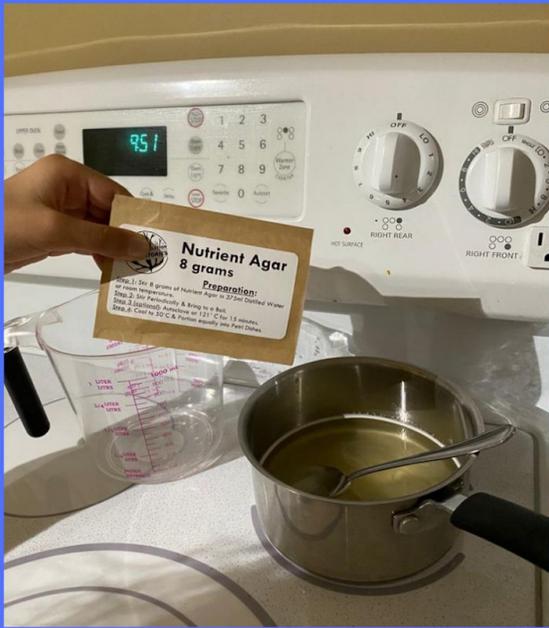


Science Fair Planning Guide

March 2021



Khalsa School Calgary 6A

Acknowledgement

I would like to express my special thanks to my teachers Mrs. Richards and Mr. Christie for their valuable guidance and time. I am very much thankful to my school principal Mr. McConney who arranged the science fair. I am extremely grateful to the science fair teacher Ms. Aulakh for introducing many new things related to CYSF.

I would like to express my profound thanks to my parents who helped me during the whole experiment by taking the pictures and paying for the petri dish kit.

Project Question: What type of cleanser/ disinfectant disinfects/ cleans your hands the best?

Key Word	Definition
Petri dish	A small dish of thin glass or plastic with a loose cover is used to grow bacteria.
Bacteria	Bacteria are single-celled organisms that can be seen under a microscope.
Bacterial colonies	Bacterial colonies are groups of multiple bacteria in the form of round dots. Colonies differ in their shape, size and colour
Agar agar	Nutrient Agar is usually in the form of powder that contains nutrients used for the growth of bacteria.
CFU	Colony-forming unit (CFU) is an app used to count bacterial colonies. We have to click a picture of a petri dish in this app and it will automatically count the colonies for us.

Research Description: This experiment deals with the effectiveness of different disinfectants /cleaners used to clean your hands. I have used the nutrient agar to find how much bacteria are left behind on your hands even after using different disinfectors/cleaners. Nutrient Agar is a material used to grow bacteria. After cleaning my hands with four cleaners (liquid sanitizer, gel sanitizer, bar soap, liquid soap) one by one, I have transferred the bacteria from my hand with a sterilized cotton swab to nutrient agar Petri dishes. Then after five days, I compared the number of bacterial colonies formed on all four Petri dishes by using manual and CFU mobile app methods. The

disinfectant with a lesser number of bacterial colonies is the best cleanser. The disinfectant with a higher number of bacterial colonies shows that it has left behind more bacteria.

Hypothesis: Liquid sanitizer is going to disinfect the best because when you put it on the smell lasts for a long time and after hours when you wash your hands to eat you can sometimes also get the taste of it. Both the smell and the taste is really strong which makes me think it would be more effective.

Variables: Disinfecters, Petri dishes, Amount of lines you make on the petri dish, Amount of colonies

Variables to keep the same: Disinfecters, Amount of lines you make on the petri dish

Variable to change: (independent variable) Amount of colonies

Procedure:

1. Take four Petri dishes and label them and their lids.
2. Take a pot and add 8 grams of nutrient agar in 375ml distilled water at room temperature.
3. Stir it well periodically and bring it to a boil.
4. Cool at 50 °C and portion equally into Petri dishes
5. Cover immediately and let the agar cool down (for 30 – 40 mins).
6. Take the **bar soap** and wash your hands with it and dry with a paper towel (make sure the soap is untouched and so are the paper towels).
7. When hands are properly dried, swab the palm of your hand.
8. Gently roll the swab on the petri dish in a zig-zag pattern.
9. Cover the petri dish with its lid.
10. Touch different surfaces and after a while repeat the same process for the **liquid soap**.

11. When you are done with the liquid soap touch the different surfaces and Spray the **liquid hand sanitizer** onto your hands.
12. When hands are properly dried, swab the palm of your hand.
13. Gently roll the swab on the petri dish in a zig-zag pattern.
14. Cover the petri dish with its lid.
15. Touch different surfaces and after a while repeat the same process for the **gel sanitizer**.
16. Put all the four labelled Petri dishes in a dark and warm place like a closet.
17. Make observations every day and keep records of what you see growing in each dish.
18. Take the final observation after 5 days and note down the results.

Materials: Petri dishes, Nutrient Agar-Agar, cotton swabs, liquid sanitizer, gel sanitizer, bar soap, liquid soap, paper towels, CFU app, mobile phone, Zipper bag, Pot for heating agar, gas stove.

Data

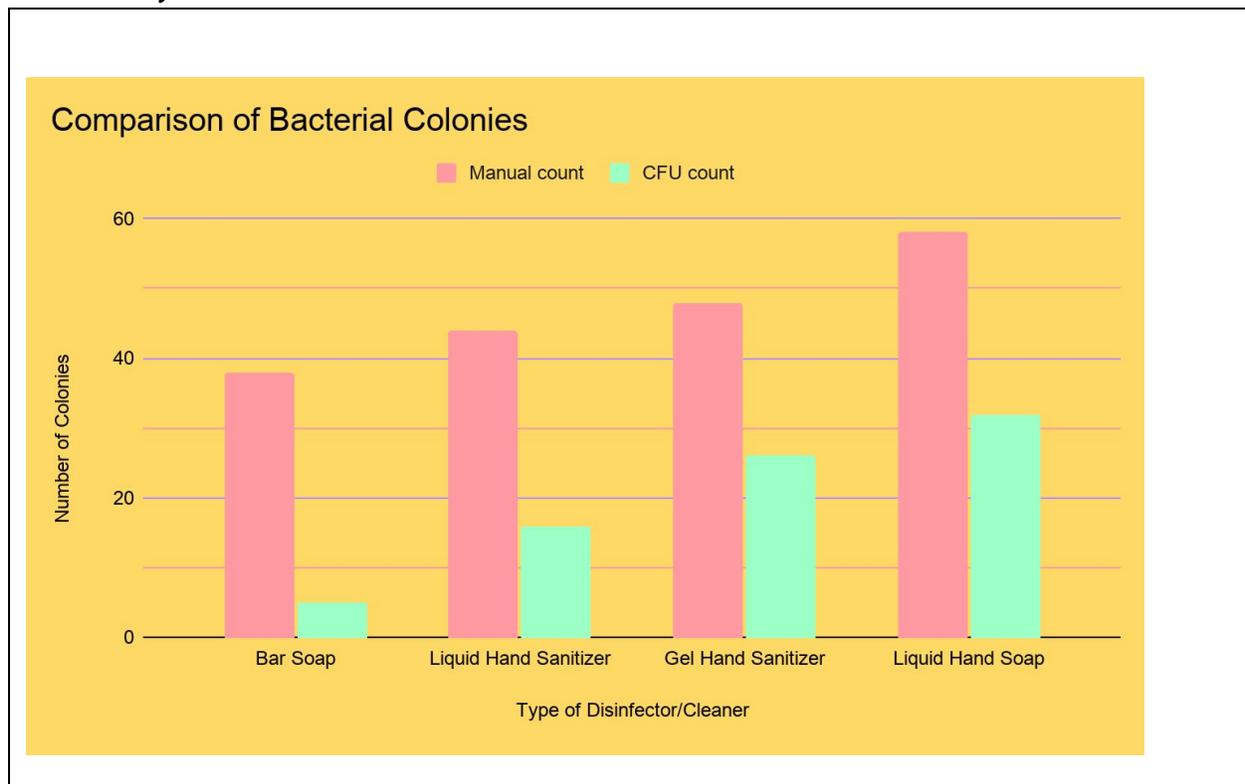
Disinfecters / Cleansers	Manual Count	CFU Count
Bar Soap	38	5
Liquid Hand Sanitizer	44	16
Gel Hand Sanitizer	48	26
Liquid Hand Soap	58	32

Observations

I have made the observation using two methods one is manual counting and the other is using an app

called "CFU"(Colony Forming Unit). Most of the bacterial colonies were white and some of them were orange and yellow. Some colonies are individual and some of them are merged. Most of the colonies were in a circular shape. Even though both the counting methods had different results the placing was still the same. In the manual method, I have counted each dot once as a single colony visible with naked eyes. In CFU App methods I have installed the app on my mobile phone and clicked a picture. Then this app automatically counted the number of bacterial colonies for me but it didn't count the merged and coloured colonies. According to both of the observation methods, the bar soap has the least colonies that means it disinfects/cleans the best. After bar soap, it comes with liquid hand sanitizer. The third place is gel hand sanitizer and last but not least is liquid hand soap.

Results (Graph or Chart)



Results (Paragraph)

After counting the colonies manually and by using CFU I have found out that the bar soap cleans your hands the best. With manual counting, it has 38 colonies and according to CFU, it has 5 colonies.

In the second place is the liquid hand sanitizer. With manual count, it has 44 colonies and according to CFU, it has 16 colonies.

In third place is gel hand sanitizer. With manual count, it has 48 colonies and according to CFU, it has 26 colonies.

Last is liquid hand soap. With manual count, it has 58 colonies and according to CFU, it has 30 colonies.

The least bacterial colonies were made in the bar soap petri dish so therefore it is the best disinfectant/cleaner.

Conclusions: In conclusion, the bar soap best disinfects your hands.

Answer to your original question: The bar soap disinfects/cleans your hands the best.

Was your hypothesis correct or incorrect? If incorrect, why?

My hypothesis was incorrect because the bar soap petri dish had the least colonies and the liquid hand sanitizer was second.

If you were to complete this experiment again, what changes would you make? How would you improve this experiment?

If I get another chance to complete the same experiment then I will use the serial dilution method to count the number of bacteria colonies with more accuracy rather than the manual and CFU method.

Abstract

Introduction:

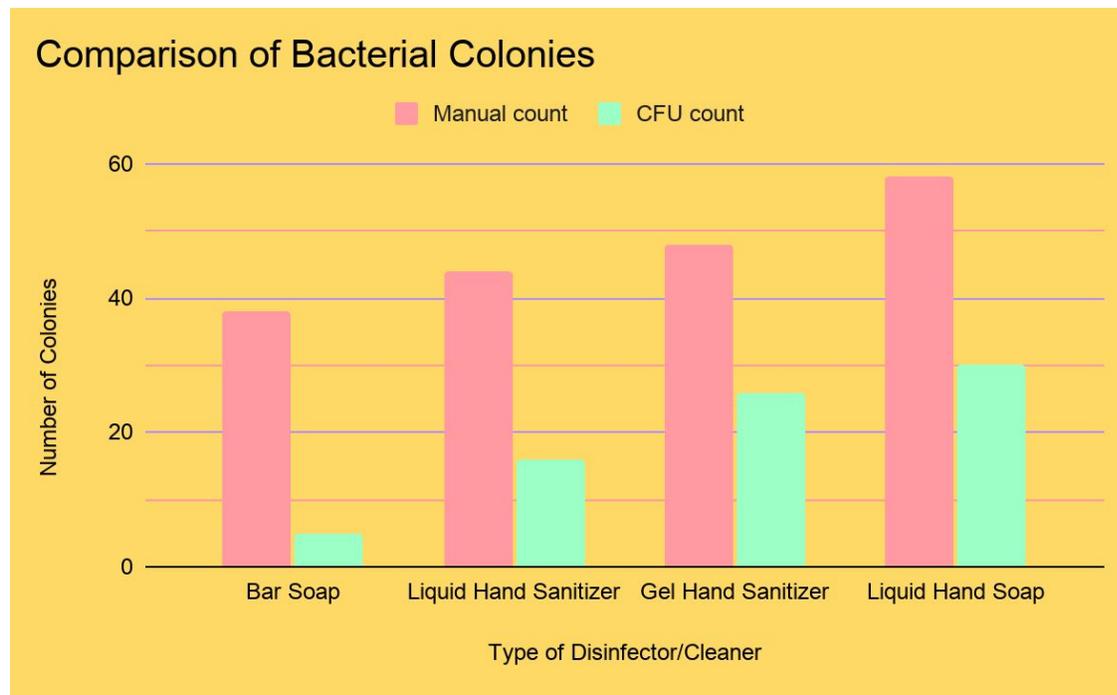
We are going through the global Covid 19 pandemic and here clean hands play an important role to keep infections and viruses away. After considering this importance I have decided to perform this cleansers/ disinfectors comparison experiment. Although some expensive sanitizers and soaps say that it kills 99.9 % of germs but my experiment shows that it leaves behind many of them so our right choice can save money and keep us healthy..

Project question: What type of cleanser/ disinfector cleans/disinfects your hands the best?

Procedure:

1. Take four Petri dishes and label them.
2. Boil 8 grams of nutrient agar in 375ml distilled water and pour it into Petri dishes when it reaches 50° C.
5. Let it cool down for 30 mins.
6. Clean your hands with **bar soap, liquid soap, liquid hand sanitizer, gel hand sanitizer** one by one.
7. Touch the various surfaces to make your hands dirty before using each cleanser/ disinfector.
8. When hands are properly dried after using a cleanser/ disinfector, swab the palm of your hand.
9. Roll the swab on agar in a zig-zag pattern for all four cleansers/disinfectors one by one and cover the petri dish with its lid.
10. Put all the Petri dishes in a dark and warm place.
11. Take observation after 5 days.

Results:



Conclusion: The least bacterial colonies were made in the bar soap petri dish so, in conclusion, the bar soap best disinfects/ cleans your hands.

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