"Find The Bacteria Hiding In Your Milk"

This chemistry fair project is suitable for Grade 4

Purpose:

The purpose of this science fair project is to determine how much bacteria is present in the milk that you drink. It is necessary to find the amount of bacteria present in your milk to make sure that the milk is safe to drink. You can use the "Methylene Blue Test" to determine the amount of bacteria in the milk. Adult supervision is required.

Hypothesis:

Milk with the highest number of bacteria will turn from blue to white the fastest.

Variables:

- Test tube with methylene blue
- Time

Materials Needed:

- Methylene Blue Solution (Ask your science teacher for this solution)
- Refrigerated milk
- Two calibrated test tubes that have rubber stoppers
- Two medium size glass jars
- Two-hole test tube stand
- Thermometer
- Calibrated (cc) medicine dropper
- Tongs
- Watch
- Hot plate
- Saucepan

Science Fair Project Instructions:

Step #1:
The test tubes need to be sterilized to remove any presence of bacteria. You can sterilize the test tubes by boiling water in a saucepan and then use the tongs to carefully place the test tubes in the boiling water. Next place the rubber stoppers in the boiling water. Let the test tubes and stoppers to boil for one minute.

Step #2:
Carefully put the test tubes in the two-hole test tube stand. Fill each test tube with 9 cc of refrigerated milk using the medicine dropper.

Step #3:
Drop 1 cc of methylene blue into the first test tube. The first test tube will be the testing sample. Put the stopper on the test tube and shake the test tube until the methylene blue mixes with the milk. Record the time using your watch.

Note:
Add nothing to the second test tube because it will be our control sample. Put a stopper in the second test tube.

Step #4:
It is important to keep both test tubes at a temperature of 98.7 degrees Fahrenheit. To do this, put water in the saucepan and slowly heat it. Pour water into each glass jar until they are 0.75 full. Put the glass jars in the saucepan. Add additional water to the saucepan until the water level in the saucepan is the equal to the glass jars. Use the thermometer to determine when the water is at 98.7 degrees Fahrenheit.

Step #5:
Put a one test tube in each glass jar. Leave the test tubes in the jars and check them every thirty minutes for the first two hours. Then check the test tubes once every sixty minutes. Note the color of the "test" sample test tube each time to see if the blue color is disappearing. You can stop checking once the "test" sample that was blue has turned to the same color white as the "control" sample.

Make sure to record your results each time. Use the following information to determine the quality of your milk.

"Excellent Milk" takes over 8 hours to turn white. There are a variable amount of organisms per cc of milk.
"Good Milk" takes 5.5 to 8 hours to turn white. There are under 500,000 organisms per cc of milk.
"Fair Milk" takes 2 to 5.5 hours to turn white. There are approximately 500,000 to 4,000,000 organisms per cc of milk.
"Poor Milk" takes 20 minutes to 2 hours to turn white. There are 4,000,000 to 20,000,000 organisms per cc of milk.
"Very Poor Milk" takes under 20 minutes to turn white. There are over 20,000,000 organisms per cc of milk.

Summary of Results:

Quality of milk is determined by how much bacteria is present in the milk directly after processing.
Bacteria needs oxygen in order to grow.
The Methylene Blue Test tells you how much dissolved oxygen is in your milk sample.
Milk that makes the blue color disappear the fastest has the most bacteria and therefore is the lowest quality of milk.