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SALIKAH AZEEN
5th STANDARD

PROJECT TITLE

"Detection and Comparative Analysis of Milk Adulteration in Different Types of Milk"

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Aim of the project

The aim of this experiment is to study the various types of milk adulteration and develop effective methods to detect them through simple chemical tests. Milk is a vital part of the human diet, especially for children, as it is rich in essential nutrients like calcium, protein, and vitamins. However, due to high demand and economic motives, milk is often adulterated with harmful substances such as water, starch, detergent, urea, formalin, and synthetic compounds to increase its quantity or improve its appearance. These adulterants not only reduce the nutritional quality of milk but also pose serious health hazards, including food poisoning, kidney damage, and long-term chronic diseases. This project aims to raise awareness about the growing issue of milk adulteration and empower consumers with the knowledge to detect such practices using easy-to-perform chemical tests.

Objectives

- To study and understand the common types of adulterants added to milk. (e.g., water, starch, detergent, urea, synthetic milk, etc.)
- To raise awareness about the harmful effects of milk adulteration on human health.
- To identify and select simple, cost-effective chemical tests to detect various adulterants.

- To perform and analyze these tests on different milk samples to detect the presence of adulterants.
- To compare the quality of raw, packaged, and local milk samples based on test results.
- To demonstrate the effectiveness of each test method in identifying specific adulterants

Abstract

Milk is a vital part of the human diet, especially for growing children and the elderly, as it is rich in essential nutrients like calcium, protein, and vitamins. Unfortunately, due to high demand and commercial greed, milk is often adulterated with harmful substances such as water, starch, detergent, urea, and even synthetic milk. These adulterants not only lower the nutritional value of milk but also pose serious health risks ranging from digestive issues to long-term kidney and liver damage. The aim of this project is to detect the presence of such adulterants in milk using simple and easily available chemical tests. In this study, different milk samples — including packaged milk, powdered milk and local vendor milk — were tested for common adulterants using various qualitative methods. Each test is based on a specific chemical reaction that indicates the presence of an adulterant through a visible color change or precipitate. For example, iodine solution is used to detect starch, while bromothymol blue is used to identify urea. The tests were easy to conduct, cost-effective, and provided reliable results.

Keywords : Milk, Adulterants, Tests etc.,

Introduction

Milk is often considered a complete food, as it contains essential nutrients like calcium, protein, vitamins, and minerals that are crucial for the growth and development of the human body. It plays an important role in the daily diet of people of all age groups, especially children, pregnant women, and the elderly. Because of its high nutritional value and widespread consumption, milk is one of the most commonly sold food products in the world. Milk is often called a "complete food" because it contains almost all the nutrients the human body needs. It offers several health benefits, especially when consumed regularly as part of a balanced diet: Milk is rich in calcium and vitamin D, which help in building and maintaining strong bones and teeth. It reduces the risk of bone-related diseases like osteoporosis. Milk contains high-quality proteins that help in muscle development, making it especially important for growing children, athletes, and people recovering from illness. The carbohydrates (mainly lactose) in milk provide energy, while the fats in whole milk serve as a longer-lasting energy source. Milk contains vitamins like A and B12, as well as zinc and selenium, which help boost the immune system and protect the body against infections. Milk contains potassium, which helps maintain a healthy blood pressure by balancing out the negative effects of sodium.

However, the growing demand for milk has unfortunately led to the rise of a very serious problem — **milk adulteration**. Adulteration is the process of adding unwanted or harmful substances to food items to increase quantity or improve appearance, often for financial gain. In the case of milk, substances like water, starch, detergent, urea, and even synthetic milk are sometimes added. These adulterants can be dangerous and harmful to health, especially when consumed

regularly. For example, detergent and urea can cause severe damage to internal organs, while excess water reduces the nutritional value of milk. The most concerning fact is that adulterated milk often looks and tastes the same as pure milk, making it difficult for the average consumer to identify. This project is aimed at detecting such adulteration in milk using simple and cost-effective chemical tests. These tests can help identify the presence of various adulterants and bring awareness to the seriousness of the issue.

Materials required

Samples of milk

- Packaged milk (branded),
- Powdered milk and
- Local vendor milk.

Chemicals required

- Iodine solution (for starch test)
- Detergent solution test (foaming test)
- Sodium hydroxide (NaOH) & Benedict's solution (for glucose test)
- Litmus paper (to check acidity)
- Test tubes and droppers

Procedure

Test for Starch

- Using a clean dropper or pipette, transfer 5 ml of the milk sample into a clean, dry test tube.
- Add 2 to 3 drops of iodine solution to the milk.
- Gently swirl or shake the test tube to ensure thorough mixing of the iodine with the milk.
- Observe the color change in the solution.

Test for Detergent

- Pipette 5 ml of the milk sample into a clean test tube.
- Add an equal volume (approximately 5 ml) of distilled water to the test tube.
- Close the open end of the test tube with a thumb or stopper, and shake the mixture vigorously for about 30 seconds.
- Place the test tube in an upright position and observe the foam formation.

Test for Glucose

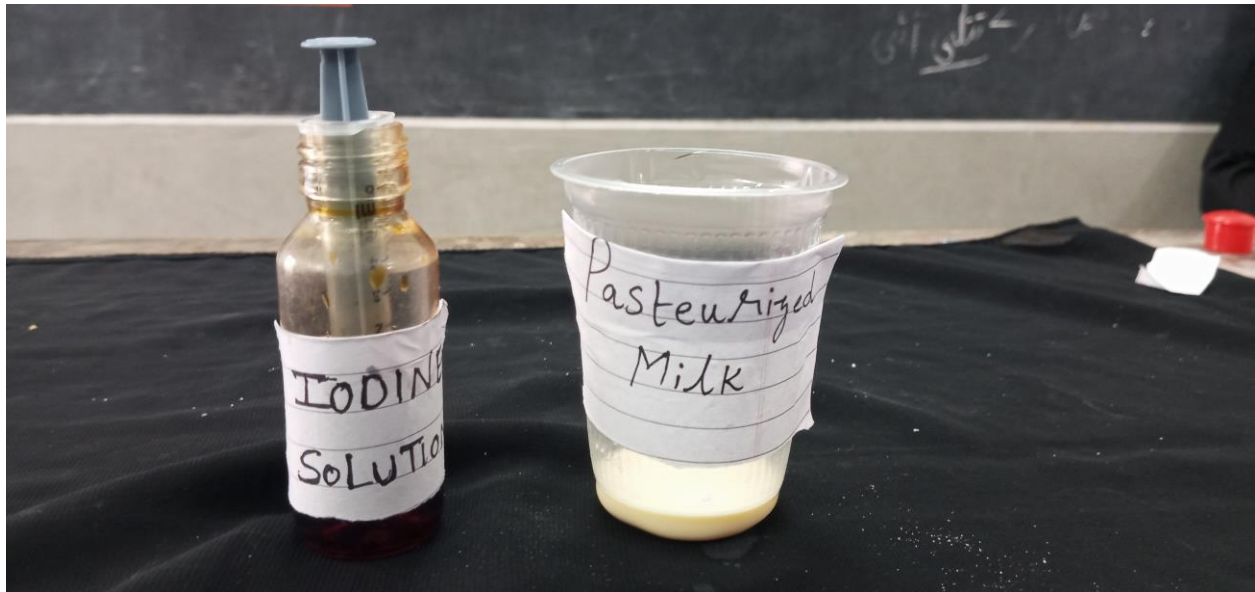
- Transfer 5 ml of the milk sample into a clean test tube using a pipette.
- Add 2 ml of Benedict's solution to the milk.
- Mix the contents gently by swirling the test tube.
- Place the test tube in a boiling water bath for 5–8 minutes, or heat directly using a spirit lamp with caution.

- Carefully remove the test tube and observe the color of the precipitate formed.

Test for Acidity (Synthetic Milk)

- Pour a small quantity (about 5 ml) of the milk sample into a clean watch glass or beaker.
- Dip a strip of red litmus paper into the milk sample using clean forceps or a glass rod.
- Observe any color change on the red litmus paper.
- Similarly, dip a strip of blue litmus paper into the sample and observe.

Results & Discussion



BISMILLAH Multiplication



IODINE

Powdered
Milk

**Experiments are being conducted and the results will
be added after data analysis.**