To Detect an Adulteration Present in Milk

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Abstract: **Milk and milk products form a significant part of the diet and a substantial amount of our food expenditures goes on milk and other dairy products. Milk is very valuable food, readily digested and absorbed. It consists of nutrients, which are needed for proper growth and maintenance of body. Milk may contain some harmful microorganisms like bacteria along with some potentially beneficial microbes. Microbiological analysis of milk is carried out to determine the degree of bacterial contamination in milk and to understand the chemical changes brought in milk as a result of microbial action. Pasteurization is done to destroy such harmful bacteria. If pasteurization of milk is not carried out properly there will be presence of larger count of bacteria in the milk.**

Milk contains many other nutrients and the carbohydrate lactose. An emulsion is a suspension of droplets of one liquid into another liquid. Milk is an emulsion of fat in water. Butter is an emulsion of water in fat. Milk is a pale liquid produced by the mammary glands of mammals. It is the primary source of nutrition for young mammals before they are able to digest other types of food. Early-lactation milk contains colostrums, which carries the mother's antibodies to its young and can reduce the risk of many diseases. This paper detects various types of adulteration present in the milk.

Keywords: **Types of adulterants and adulterations etc.**

I. INTRODUCTION

The solute is known as the dispersed phase and the solvent is known as the continuous phase. Other examples of emulsions include margarine, mayonnaise, cream, and salad dressing. A colloidal solution is when matter exists in a state of division in between a true solution, which is sugar in water, and a suspension, which is chalk in water. The characteristics of a colloid are small particle size, electrical charge, and affinity of the particles for water molecules. In milk, the whey proteins are in colloidal solution.

In Pakistan, milk is transported from the point of production to consumers and processing plants by middlemen called "Gawalas". They don't maintain proper hygienic conditions during this transport, which leads to increase the total viable bacterial count. They also adulterate milk to increase their profit margin by several chemicals like urea, starch, flour, cane sugar, vegetable oils, detergents etc. Various preservatives like formalin and some antibiotics are also added in milk to increase its shelf life. This addition decreases the nutritive value of milk. These adulterants, preservatives and drugs in milk cause very serious health related problems.

Methylene blue Reduction test is used to detect the presence of bacteria in milk. This test works on the principle that the methylene blue indicator is present in an oxidized form, but in the presence of bacteria, leads to the reduction of this indicator in a comparatively short span of time. The blue color developed on addition of the indicator to the milk will change to white color within a short period indicates the presence of bacteria in the milk and thus denotes improper pasteurization. This paper detects various types of adulteration present in the milk.

II. WHAT IS ADULTERATION?

Adulteration:

Noun contamination, corruption, degradation, deterioration, fraudulence, infection, perversion, pollution, spuriousness.

Associated concepts: drugs, food, purity of food
See also: contaminate, defilement, detriment, dissolution

Adulteration: This term denotes the act of mixing something impure with something pure, as, to mix inerior liquor with wino; au inferior article with coffee, tea, .and the like.

Full definition of adulterate:

1) Transitive verb

2) To corrupt, debase, or make impure by the addition of a foreign or inferior substance or element; especially*:* to prepare for sale by replacing more valuable with less valuable or inert ingredients

Adulteration" is a legal term meaning that a food product fails to meet federal or state standards. Adulteration is an addition of another substance to a food item in order to increase the quantity of the food item in raw form or prepared form, which may result in the loss of actual quality of food item. These substances may be other available food items or non-food items. Among meat and meat products some of the items used to adulterate are water or ice, carcasses, or carcasses of animals other than the animal meant to be consumer.

III. MATERIALS AND METHODS

(1) Detection of Sodium Chloride in Milk:

Take 2.0 ml of milk and add 1.0 ml of 5% potassium chromate, 2.0 ml of 0.1N silver nitrate. Appearance of red

precipitate indicates the absence of dissolved chloride in milk and appearance of yellow colour indicates presence of dissolved chloride.

(2) Test for Presence of Saccharin

Curdle an aliquot of the diluted milk sample (about 25 ml) with dilute acetic acid. Shake well and filter. Acidify the clear filtrate with 2.0 ml of concentrated hydrochloric acid, and extract with two 25 ml portions of diethyl ether. Draw off the aqueous layers and wash the combined ether extract with three successive portions of 5 ml of water, evaporate the ether extract on a water bath, add a drop or two of water mix well with glass rod and taste a little. A characteristic sweet taste indicates the presence of saccharin. Confirm by heating with NaOH and detecting Salicylic acid from thereby.

Conversion to Salicylic Acid:

Acidify about 20- 25 ml of filtrate obtained above and extract with three portions of ether as above. Wash ether extract with two 5 ml portions of water, evaporate greater portion of ether in porcelain dish on steam bath, let remainder evaporate spontaneously and add 1 drop of 0.5% (v/v) neutral FeCl3 solution. Violet colour indicates Salicylic acid.

(3) Test for Presence of Dulcin

Extract 25 ml of milk (made alkaline with 10% NaOH) with 90 ml of diethyl ether in 3 portions. Evaporate ether on a boiling water bath. Moisten dry residue with nitric acid and add one drop of water. Presence of dulcin is indicated by orange red colour precipitate. Alternatively expose dry residue to HCl gas for 5 minutes and add 1 drop of anisaldehyde. Presence of Dulcin is indicated by orange red to blood red colour.

(4) Test for the Presence of Foreign Fat in Milk:

Extract Fat From The Milk Sample By Rose-Gottlieb Method:

Take the Butyro-refractometer reading (BRR) at 40^0C of the extracted fat. If the BR reading differs from the prescribed limit of variability, presence of foreign fat in the milk may be suspected. Butyro refractometer reading of 1-100 corresponds to the refractive index between 1.4220- 1.895 and the refractive index can be read to the fourth decimal place. The temperature of the refractometer should be controlled to within 40^0C plus / minus 0.1 ^{0} C by using a thermostatically controlled water bath to circulate water through the refractometer. The refractometer should be calibrated with a glass plate of known refractive index by placing it on the prism with a drop of alpha bromonapthalene as the contact liquid. In the absence of butyro refractometer use Abbes Refractometer which can be standardised with distilled water. The refractive index of distilled water at 20 ^{0} C is 1.3330 and at 40 ^{0} C is 1.3306. Further check for presence of extraneous fat can be done by checking the fatty acid profile of the extracted fat by GLC.

(5) Detection of Neutralizers:

Rosalic Acid Test for Presence of Carbonate:

To 10 ml of milk add equal volume of 95% alcohol in a test tube. Add a few drops of 1% alcoholic solution (w/v) rosalic acid. If alkali is present a rose red colour appears whereas pure milk shows only a brownish colour.

Alkalinity of Ash:

Neutralisation with lime water/sodium bicarbonate/ caustic soda increases ash content and alkalinity of ash. Take 20 ml of milk in a silica dish, evaporate on a water bath and keep in muffle furnace at 550℃ to get white ash. Dissolve the ash obtained in 10 ml of water and titrate with 0.1N HCl. The titre of more than 1.2 ml indicates the presence of neutralizers in milk.

IV. CONCLUSION

Adulterated Milk and Milk Products are dangerous to any leaving organism. Knowledge of adulteration of any food is essential for each and every leaving organism.

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