Detection of Adulteration Present In Milk Products

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Abstract: **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. 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. 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.**

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. 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.

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I. INTRODUCTION

Milk is a complex mixture and a liquid food, which can easily be adulterated. According to PFA-1954 (prevention of food adulteration act) definition, "Milk is the normal mammary secretion derived from complete milking of healthy milk animal without either addition there to or extraction there from. There are many methods known for detection of adulteration in milk but the methods discussed below are simple but rapid and sensitive methods to detect adulteration. in Milk contains more than 100 substances that are either in solution, suspension or emulsion in water, the important being casein -the major protein of milk, lactose - milk sugar, whey and mineral salts.

Milk is an almost ideal food. It has high nutritive value. It supplies body building proteins, bone forming minerals and health giving vitamins and furnishes energy giving lactose and milk fat. Besides supplying certain essential fatty acids. A national survey in India has revealed that almost 70% of the milk sold and consumed in India is adulterated by contaminants such as detergent and skim milk powder, but impure water is the highest contaminant. According to National Survey on Milk Adulteration conducted by FSSAI (India) in 2011, water is the most common adulterant followed by detergent in milk. A survey by FSSAI in 2012, 68% milk samples was found to be adulterated in which 31 % were from rural areas of these 16.7 % were packet or branded milk and rest were loose milk samples from dairies. In the urban areas, 68.9 % milk was found to be adulterated with water, detergent, urea and skim milk powder.

In Gujarat, 89% milk was found to be adulterated. Despite the Jivraj Makadiya et al/Int.J. Pharm Tech Res. 2015,8(4),pp 602-607.603 laws governing the quality and sale of milk existing in India for decades, the adulteration of milk has not been checked completely. Water is an adulterant in milk which is often always added to increase the volume of milk which in turn decreases the nutritive value of milk which if contaminated poses a health risk especially to infants and children. Detergents are added to emulsify and dissolve the oil in water giving a frothy solution, the characteristic white color of milk.

Detergents cause gastro –intestinal complications. Urea is added to milk to provide whiteness, increase the consistency

of milk and for leveling the contents of solid-not-fat (SNF) as are present in natural milk. The presence of urea in milk overburdens the kidneys as they have to filter out more content from the body. Hydrogen Peroxide is also added to milk to prolong its freshness, but peroxides damages the gastro intestinal cells which can lead to gastritis and inflammation of the intestine. Starch, cereal flours or arrowroot are added to make up the density of milk to prevent detection of added water. Starch is also used as an adulterant and if high amounts of starch are added to milk this can cause diarrhea due to the effects of undigested starch in colon. Its accumulation in the body may prove very fatal for diabetic patients. Carbonates and bicarbonates are added to milk too, this can cause disruption in hormone signaling that regulate development and reproduction. Cane Sugar is added to raise the density to prevent detection of extraneous water.

Sodium chloride (common salt) is added to make up the density (lactometer reading) of watered milk. Like urea, ammonium sulphate is a chemical fertilizer, which Is added to milk to raise the density of watered milk. Neutralizers such as caustic soda, caustic potash sodium carbonate, sodium bicarbonate and lime water etc. are commonly added to milk to neutralize the developed acidity in milk. Some of these chemicals (neutralizers) are also ingredients of detergents which are major components of synthetic milk. Sodium and potassium nitrates are oxidizing agents and hence act as preservative Pond water also contains appreciable quantities of nitrates and such water is usually mixed with milk by rural milk producers. This paper detects various types of adulteration present in the milk products.

II. 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) Presence of Starch in Dahi:

Take about 5 ml of sample in a test tube. Bring to boiling condition and allow the test tube to cool to room temperature. Add 1-2 drops of iodine solution to the test tube. Development of blue colour indicates presence of starch which disappears when sample is boiled and reappears on cooling. The limit of detection of method is 0.02%.

(2) Detection of Gelatine in Cream:

Gelatine may be detected by Stokes Test. Mix together 10 ml cream, 20 ml water and 20 ml of Stokes reagent (Dissolve mercury in twice its weight of concentrated nitric acid and dilute to 25 times the volume with water). To the filtrate add an equal volume of saturated picric acid solution. Yellow precipitate is produced in presence of considerable amount of gelatine; smaller amounts are indicated by cloudiness.

(3) Presence of Starch in Cream:

Take about 5 ml of sample in a test tube. Bring to boiling condition and allow the test tube to cool to room temperature. Add 1-2 drops of iodine solution to the test tube. Development of blue colour indicates presence of starch which disappears when sample is boiled and reappears on cooling. The limit of detection of method is 0.02%.

(4) Presence of Sucrose in Khoa:

Take about 5 ml of prepared sample of khoa in a test tube. Add 0.2 ml of iodine solution to the test tube and mix well. Development of blue colour indicates presence of starch and control sample remains yellow. The limit of detection of method is 0.05%

IV. CONCLUSION

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

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