

INTRODUCTION

ABOUT MILK

Milk may be defined as the whole, fresh, clean, lacteal secretion obtain by the complete milking of one or more healthy milch animal excluding that obtained within 15 days before or 5 days after calving.



Composition of milk

Constituents	Percent
Water	87.34%
Fat	3.75%
Milk sugar	4.70%
Casein	3.00%
Albumin	0.40%
Ash	0.75%
Other constituents	0.06%

1. What is adulteration?

➔ An addition or subtraction of some of legally prohibited substances into or from a more valuable genuine product.

2. What is adulterant of milk?

➔ Any material which is or could be employed for making the milk unsafe or misbranded is known as adulterant of milk.



3. What is adulteration of milk?

➔ Milk adulteration may be define as any change caused in the natural level of milk ingredients. These changes may be brought about by addition of some foreign matter to milk or by removing some more valuable ingredients eg.fat.



MILK ADULTERANT

- Urea
- Milk whey

Non
Protein
Nitrogen

Increase
Product
Shelf life

- Hydrogen peroxide
- Formaldehyde
- Salicylic acid

Diluents

Fat
amount

- Water
- Cane sugar
- Starch

- Animal fat
- Vegetable oil

1. Detection of Addition of Starch in Milk

Aim:

To Detect the addition of starch in milk.

Relevant information:

Iodine solution gives intense blue colour with starch due to formation of an unstable complex starch compound.



Material Required:

Milk, 1% Iodine solution,

Apparatus:

Test tube, pipette.

Procedure:



1. Take about 3 ml of pure milk sample, rice flour mixed milk sample & defected milk sample in three different test tubes.



2. Boil the milk over a Burner.



3. Cool & add few drops of iodine solution.

4. Adulterated milk will turn blue.

Adulterant - Starch



Boil milk with water, cool & add few drops of iodine solution. Adulterated milk will turn blue.



2.Detection of addition of cane sugar in milk

Aim:

To detect addition of cane sugar milk.

Principle:

Resorcinol products red colour solution with sucrose in acidic media



Material Required :

Milk, sugar(powder) ,conc.HCL, resorcinol powder.

Apparatus:

Water bath.



Procedure :



1) Take 10.0ml of milk in a test tube.



2) Add 1.0ml of concentrated hydrochloric acid & mix well.



3) Add 0.1 gm of resorcinol powder and mix thoroughly





4) Place the tube in boiling water bath for 5 min.



5) Observe the colour of the contents.



6) Development of red colour indicates presence of cane sugar in milk.

Detection of Cane Sugar in Milk

Modified Seliwanoff Method:

Principle:

Fructose + resorcinol in HCl \longrightarrow red colour

Procedure:

milk + conc. HCl $\xrightarrow{\text{std for 10 min}}$ filter

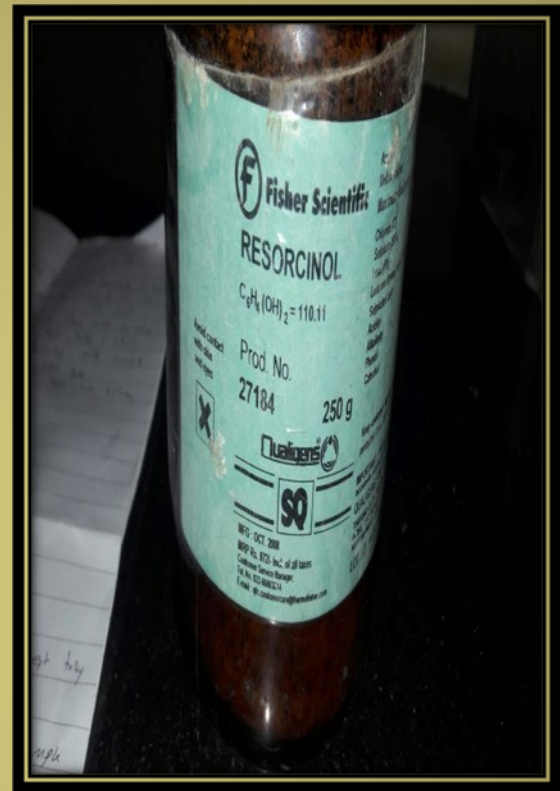
1 ml filtered milk serum &
5 ml modified resorcinol - HCl reagent

water bath for exactly 1 min

Withdraw the tube & observe the colour

\downarrow

red colour



3. Detection of addition of skim milk, milk powder or partial

Aim:

To detect addition of skim milk, milk powder or partial removal of fat from milk.

Material Required:

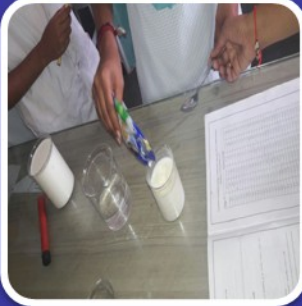
Pure milk, defatted milk, skim / milk powder.

Apparatus:

Lactometer, Thermometer.



Procedure:



Take well mixed pure milk sample (control) in a jar.



Note the temperature of milk.



Note the lactometer reading at the temperature





Found out the corrected lactometer reading.

- On similar line take lactometer reading & temperature of the given sample of milk.

Calculate corrected lactometer reading of the given sample of milk.

- Compare the C.L.R. of the milk sample.

Calculation:

1) Corrected Factor(CF):

$CF = 0.1 \times \text{difference in temperature of milk \& room temperature}$

2) Corrected Lactometer Reading(CLR):

$CLR = \text{mean of lactometer reading} + \text{Corrected Factor}$

3) Specific gravity(Sg):

$\text{Specific gravity} = CLR/1000 + 1$





4. Detection of Addition of urea in milk

Aim:

To detect addition of urea in milk.

Material Required:

Milk sample, paradimethyl amino benzaldehyde reagent,.

Apparatus:

Test tube, pipette.



Procedure:

1) Take 2 ml of milk in test tube.



2) Add 2ml of urea reagent i.e. para- dimethyl amino benzaldehyde.



3) Shake it well.

Observed dark yellow color = urea present

Light yellow color = urea absent

Urea is generally added in the preparation of **synthetic milk** to raise the SNF value.



Detection of added Urea in Milk

- 5 ml of milk is mixed with 5 ml of 1.6 % of **p -Dimethyl amino benzaldehyde** (DMAB) is added **Distinct yellow colour** observed in milk containing added urea.
- The control (normal milk) shows a **slight yellow** colour due to presence of natural urea.



Adulterant - Synthetic milk



Synthetic milk has a bitter after taste, and feels soapy on rubbing between fingers.

THIS IS HOW YOU SPOT

NATURAL

Taste Slightly sweet

Colour White

Texture No Soapy feeling if rubbed between fingers

Effects of heating No changes, remains white

Effect on storage No change in colour

If urea present Weakly positive (light yellow)

SYNTHETIC

Bitter

White

Soapy feeling if rubbed between fingers

Turns yellowish when boiled

Turns yellowish after a while

Highly positive (intense yellow)



5. Detection of buffalo milk in cow milk

Aim:

To detect addition of buffalo milk in cow milk.

Material Required:

Water, milk, antiserum

Apparatus:

Test tube, pipette.

(Antiserum is developed by injecting buffalo milk proteins into rabbits)

Procedure:

1) Take one ml of milk in test tube & add four ml of water.



2) Add one ml of antiserum in a sample.



3) The characteristic precipitation reaction indicates the presence of buffalo milk in the sample taken.

6. Detection of Addition of Detergents in milk

Aim:

To Detect the addition of detergent in milk.

Material Required:

Bromocresol purple solution.

Apparatus:

Test tube.



Procedure:

1) Take five ml of milk in test tube.



2) Add 0.1 ml of bromocresol purple solution.



3) Appearance of violet colour indicates the presence of detergent in milk. Unadulterated milk samples show a faint violet colour.


References:

1. Manual of Vth Semester of Technology of Milk & Milk Products.
2. Textbook of Practical Dairy Chemistry by P.K. Ghatak & A.K. Bandyopadhyay.
3. Textbook of Dairy Chemistry M.P. Mathur,
4. D. Datta Roy, P. Dinakar.



Some advance adulteration detection technique developed are as follows

Ksheer-Scanner



It detects adulteration in just 40-45 seconds & costs less than 50 paise per sample.

Developed by :- Dr. Harshvardhan Vice President of Council for Scientific and Industrial Research(CSIR)