Practical Exercise 13

Preservation of milk samples for chemical analysis

Objective: *In this chapter we will learn how to preserve milk samples for chemical analysis*

The minimum requirements for a suitable chemical milk sample preservative are:-

1. It must assure "Testability of sample" The milk sample maintains its original composition from the time of milking to the time of analysis.
2. Efficient minimum inhibitory level: The preservative should be effective to low concentrations in milk to minimizing sample dilution and costs.
3. High water solubility: Because the average milk sample is about 87% water.
4. Stability: Must be stable under most storage conditions.
5. Presence of color: It imparts some color to the milk as indicator for safety purposes.
6. Compatibility: Should be suitable for high fat as well as low fat milk sample.
7. Shelf-life activity: Should be effective for more than three days.
8. Toxicity and Disposability: Should be no allergic and exhibit no toxicity toward handlers and it should not become an environmental hazard after disposal.
9. Economy: The cost should be minimal (cheap).

Contents/procedure

Chemical preservatives

1. Hydrogen peroxide(H_2O_2)

It inhibit microbial proliferation and milk spoilage

1 ml of a 23% H_2O_2 solution in 300 ml raw milk is capable of maintaining decreased bacterial counts during 6 days storage at 10 Cp

2. Mercuric chloride ($Hgcl_2$)

It is corrosive to metal containers, it is a violent poison

As a precaution the tablets are colored pink or green as indicator for safety purposes.

There are two sizes of tablets are packaged (weighing 1 &0.5 gram) containing respectively an average 0.45 and 0.225 gram of pure $Hgcl_2$.

Use of $Hgcl_2$ as a milk preservative was discontinued due to the perception of environmental hazards after its disposal. Also its relatively high toxicity.

3. Formaldehyde

If the milk samples are analyzed for solids and ash, it is necessary to use a liquid preservative Formalin (CH_2O) is satisfactory for this purpose.

1 ml is sufficient to preserve 160-180 ml sample for two weeks.

It has a very toughening effect on the casein and extra agitation of the milk and acid is necessary to dissolve it. Formalin is 40 % solution of formaldehyde, made by mixing the formaldehyde which is gas at ordinary temperature in distilled water.

4. Potassium dichromate ($K_2Cr_2O_7$)

In recent years $K_2Cr_2O_7$ has been used extensively in dairy herd improvement.

It appears as a bright orange-red due to the formation of the dichromate Ion ($Cr_2O_7^{=}$)

It contains hexavalent chromium which is irritant in some people and has cause rhinitis and allergic dermatitis.It is poisonous to health when ingested.

5. Chloroform ($CHCl_3$)

The only preservative permitted for samples to be tested for phosphatase activity is chloroform,only phenol-free stoppers can be used on the sample battles containing milk for phosphatase test.Chloroform when inhaled it will send a person to a deep sleep.

Among the above preservatives only formaldehyde/formalin is allowed to be added in to the milk for chemical preservation before its analysis as per the FSSAI.

*** These** chemical preservatives are very harmful to the body.

STUDY QUESTIONS

1. What do you mean by preservatives?
2. What is formalin?
3. What is the role of preservative in milk?
4. What is the effect of preservatives on humans?