

# CHEMISTRY OF BIOMOLECULES LABORATORY (CHE 203L)

## Experiment 4: Detection Of Adulteration in Milk

### Purpose

To detect various adulterants present in milk using specific biochemical tests.

### Introduction

Quality control tests for milk are very important to assure adulterant free milk for consumption. Adulteration of milk reduces the quality of milk and can even make it hazardous. Adulterants like soap, acid, starch, table sugar and chemicals like formalin may be added to the milk. Most of the chemicals used as adulterants are poisonous and cause health hazards. Adulterants are mainly added to increase the shelf life of milk. Some of the preservatives like acid and formalin are added to the milk as adulterants, thereby increasing the storage period of milk. Generally, water is added to the milk to increase the volume content of the milk. Some of the common adulterants found in milk and their detection are discussed.

### Starch:

Milk contains relatively large amount of fat. Addition of carbohydrate to milk increases its solid content. There by reducing the amount of fat present in the milk. Starch is one such component that is added to adulterate milk. The test to detect starch in milk uses iodine solution, addition of which turns the milk solution to blue black color due to the formation of starch –Iodo complex, in the presence of starch.

### Soap:

Soap is added to milk to increase the foaming of milk and thus to have thick milk. Addition of such chemicals will cause health problem especially related to stomach and kidneys. Soap can be detected by adding phenolphthalein indicator to the adulterated milk. A pink color will be observed if soap is present as the alkali will be neutralized by the acidity of the milk when phenolphthalein indicator is added.

### Formalin:

Formalin is a preservative and can preserve milk for long period of time. Due to its high toxicity, it is considered to cause liver and kidney damage. Formalin reacts with Sulphuric acid and ferric chloride to give a purple colored ring at the junction of the milk layers, thereby indicating the presence of formalin adulterated in milk.

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## Materials Required:

1. Milk
2. Test tubes
3. test tube holder
4. Water bath
5. 1% iodine solution
6. Conc. H<sub>2</sub>SO<sub>4</sub>
7. Ferric chloride
8. Phenolphthalein indicator

## Procedure

### *Detection of Starch:*

Measure out 3ml milk into a test tube. The test tube is then kept for incubation in boiling water bath for 5 minutes. After incubation, the test tube is then cooled and few drops of 1% iodine solution and mix the contents well. Appearance of blue black color indicates presence starch in milk.

### *Detection of Soap:*

Measure out 10ml milk into a test tube. Add 10ml of hot water into the test tube containing milk. Now add 1-2 drops of phenolphthalein indicator solution into the test tube. Gently mix the contents of the test tube. Development of pink color on addition of phenolphthalein indicator confirms the presence of soap in milk.

### *Detection of Formalin:*

Measure out 2ml milk into a test tube. Gently add 2ml of 90% Sulphuric acid and ferric chloride mixture into the test tube. Formation of purple color ring at the interface of two layers indicates that the milk is adulterated with formalin.

## Results

Observations			
	Starch	Soap	Formalin
Sample A			
Sample B			