

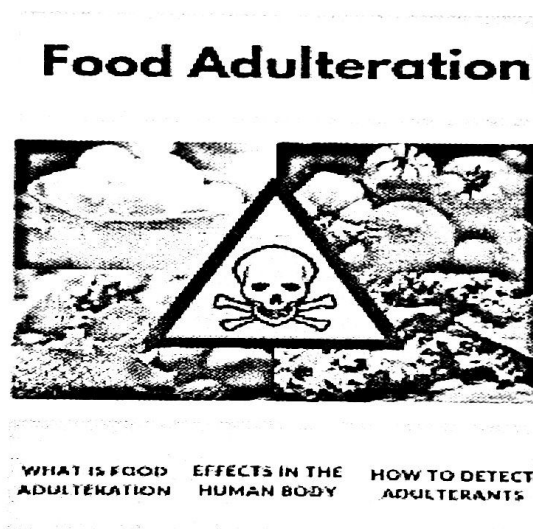
FIELD WORK-2021-22 SUBMITTED

To

**THE CHEMISTRY DEPARTMENT,
MKR GOVERNMENT DEGREE COLLEGE, DEVARAKONDA**

On

“DETECTION OF FOOD ADULTERANTS”



Supervised by

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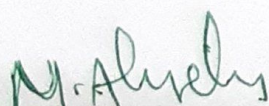
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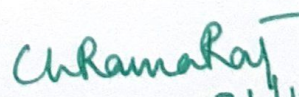
DEVARAKONDA

CERTIFICATE

This is to certify that the following mentioned students of MKR Govt. Degree College, Devarakonda, Nalgonda (dt) have done the group project in Chemistry with title: 'DETECTION OF FOODADULTERANTS' under the supervision of Dr. M. Aivelu, Assistant professor of Chemistry of this college and submitted the same to the department of Chemistry, MKR GDC Devarakonda.

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1. INTRODUCTION:

Studying some of the common food adulterants found in various food products is the goal of this project.

The most basic forms of adulteration in food typically exist; illegal chemicals are either added or partially or completely substituted. Food contamination and adulteration are typically done for financial gain, carelessness, or a lack of suitable hygienic processing, storing, transporting, and marketing conditions. In the end, this causes the consumer to either be defrauded or frequently become ill. Such forms of adulteration are particularly prevalent in emerging or underdeveloped nations. The consumer's knowledge of common adulterants and their impact on health is just as crucial.

Because there are so many food producers and so many foods are imported, producers can deceive and defraud consumers. It is quite challenging to distinguish between individuals who violate the law and those who adulterate food. It would be essential for customers to be aware. Consumer health may be at risk from ignorance and unscrupulous business practises, and incorrect information can result in poisoning. Therefore, basic screening procedures are required to find them. Food adulteration has emerged as one of the major issues in recent years. Food adulteration leads to major illnesses like cancer, diarrhoea, asthma, ulcers, and more. Castor oil, paraffin wax, and hydrocarbons make up the majority of fats, oils, and butter. Brick powder, pepper, and red chilli powder are combined.

The Government of India has established a number of organisations to eliminate adulterants from food products. It is crucial to choose healthful, unadulterated foods for everyday use to ensure that they pose no health risks. When harmful pollutants are present at ppm levels, wholesome food cannot be guaranteed based solely on visual inspection. However, a visual inspection of the food makes sure there are no insects, visible fungi, foreign objects, etc. before purchasing.

1.1 SOME ADULTERANTS IN COMMON FOOD

The majority of adulterants employed by retailers are readily accessible, inexpensive replacements. For instance, paraffin wax, castor oil, and hydrocarbons are adulterants in fats,

oils, and butter. Read pepper is combined with dried papaya seeds, turmeric powder with yellow lead salts, and chilli powder with brick powder. Similar to how milk is tainted with starch, sugar is polluted with washing soda and other insoluble particles, mustard oil is tainted with argemone oil, vanaspati ghee is combined with deshi ghee, beson is combined with khesari dal, etc. These kinds of adulterants degrade food products.

1.2 IMPACT OF ADULTERANTS

Every day, we hear about and see live on television how food products are being tampered with and how this fake, unsanitary, and hazardous food is getting into our homes. We have observed the use of soap, urea, and other hazardous substances in the production of milk and milk products. We are all aware that plants receive injections to grow more quickly and over night. We recently witnessed the use of steroids to quickly transform birds into hens through injection. We have also found data that shows dangerous chemicals are being used to ripen the fruits.

Food adulteration affects human health in a number of ways. The increase in the frequency of tumours, pathological lesions in important organs, abnormalities of the skin and eyes, anaemia, paralysis, and stomach and body aches are a few of the health risks. Since food adulteration damages the general public's health, it should be given high priority. Heart disease, kidney disease, skin conditions, asthma, and other chronic illnesses affect the population. The people are the helpless victims of an unrestrained, full-scale adulteration enterprise.

1.3 DIFFERENT CHEMICAL TESTS FOR DETECTION OF ADULTERANTS

Food adulteration is become a serious issue. Because the adulterants utilised are so similar to natural foodstuffs, it is quite challenging for the average person to recognise them. To find adulterants in frequently consumed foods, a few straightforward tests can be carried out.

Yellow metanil in pulses:

5 gms of the suspicious pulses should be shaken with 5 ml of water. Drops of hydrochloric acid should be added. Metanil yellow can be detected by its pink colour.

Kesari Dal in Chana or Other Dals:

Add 5 ml of normal hydrochloric acid to a small quantity of dal in a glass. Keep the glass in simmering water for 15 minutes. Development of pink colour indicates the presence of Kesari dal. By visual detection-shape of dal. The kesari dal is wedge shaped.

Water in milk:

Measure the specific gravity with a lactometer. The normal values will fall between 1.030 and 1.034. Milkmen are wise to the test and may dilute the milk only to the right density, so this is only a rough test.

Starches in milk:

Add a drop of iodine solution to a small quantity of milk. Milk containing starch turns blue. Pure milk turns a coffee shade.

Vanaspati in pure ghee:

Take about one teaspoonful of melted butter with an equal quantity of concentrated hydrochloric acid in a test tube. Add 2 or 3 drops of furfural solution. Shake it well for one minute and let it stand for five minutes.

Appearance of pink colour in the lower layer of acid means that vanaspati is present in pure ghee/butter as an adulterant.

Argemone oil in mustard oil:

Heat the mixture of oils with a little amount of nitric acid for two to three minutes. A red colour will appear if argemone is present.

Chalk or any other dust or dirt in sugar:

Dissolve sugar in water, the impurities will settle down at the bottom. Etc.

2. METHODOLOGY:

2.1 Detection of Starch in Milk

Along with water, a very common adulterant of milk is starch. milk consist of three basic components which are water(about 80%0), fat(about 3.5%) and solids containing protein, lactose and mineral matters(about 8.5%). Milk is adulterated with starch to maintain the thickness of fat extracted milk or diluted milk. The presence of starch can be detected by adding iodine solution to milk.

Reagent used- Iodine solution or tincture of iodine.

Procedure- At first 5mL of milk ample is taken in a test tube and is boiled for 3-4 minutes. Then it is cooled and 1-2 drops of iodine solution is added to it and is shaken well.

Detection- Appearance of blue colour indicates the presence of starch in the sample.

Table for different samples-

| S. NO | SAMPLES | RESULT |
|-------|-----------|--------------------|
| 1. | Amul TAZA | Adulterant absent. |

| | | |
|----|-------------------|---------------------|
| 2. | Diary milk | Adulterant present. |
| 4. | Vijaya Dairy milk | Adulterant absent. |

2.2 DETECTION OF YELLOW DYE IN TURMERIC POWDER

Turmeric (haladhi) powder is a popular natural dye used in cooked food. The powder is often adulterated with rice powder, besan, wheat powder etc. which makes the colour of the turmeric pale. To make the colour bright, often lead chromate, which is a poisonous chemical or coal tar dye is added to turmeric powder.

A. DETECTION OF LEAD CHROMATE

Reagents: Con. HCL and 1% Diphenyl carbazide in rectified spirit.

Procedure: 1g of the turmeric powder sample is taken in a test tube and 5ml of concentrated HCL is added to it. The mixture is shaken thoroughly. Now 1ml of 1% diphenyl carbazide reagent is added.

Detection: Appearance of pink to red colour indicates the presence of lead chromate, $PbCrO_4$, in the sample.

B. DETECTION OF COAL TAR DYE

Reagents: Concentrated HCL and petroleum ether (40-60° C).

Procedure: 5g of the sample is taken in a test tube and 10 mL petroleum ether is added to it. The mixture is shaken vigorously and is allowed to stand. 5 mL of conc. HCL is added and is again shaken thoroughly.

Detection: The aqueous acid becomes pink to red in colour if coal tar is present.

Table for different samples

| S.NO. | SAMPLES | RESULT |
|-------|------------------|---------------------|
| 1. | MDH Haldi powder | Adulterant absent. |
| 2. | Open sample | Adulterant present. |
| 3. | Bharat haldi | Adulterant absent. |

2.3. DETECTION OF WASHING SODA, CHALK POWDER AND WATER INSOLUBLE SUBSTANCE IN SUGAR

Chalk powder is a water insoluble substance which is often used as a common adulterant in sugar. Moreover sugar is usually contaminated with washing soda.

Detection of various insoluble substances

Reagent: concentrated H_2SO_4 , alcoholic solution of α -naphthol, dil HCl.

Procedure: A small amount of sugar is taken in a test tube and is shaken it with little water. Pure sugar dissolves in water but insoluble impurities do not dissolve.

Detection: Insoluble substances appear at the bottom of the test tube if they are present.

Detection of chalk powder, washing soda

Reagent: dil. HCl

Procedure: To a small amount of sugar taken in a test tube, a few drops of dil. HCl is added and observed.

Detection: Brisk effervescence of CO_2 shows the presence of chalk powder or washing soda in the given sample of sugar.

Table for different samples

| S.NO. | SAMPLES | RESULT |
|-------|---------------|---------------------|
| 1. | Open sample | Adulterant present. |
| 2. | Packed sample | Adulterant absent. |

2.4 DETECTION OF RED COLOURED LEAD SALTS IN CHILLI POWDER.

Chilli powder often adulterated with red are coloured lead salts and brick powders.

Reagents: Dil. HNO_3 , KI.

Procedure: To a sample of chilli powder dil. HNO_3 is added. The solution is filtered and a few drops of potassium iodide solution is added to the filtrate.

Detection: Yellow ppt. indicates the presence of lead salts in chilli powder and insoluble substances indicates the presence of brick powder in the sample.

Table for different samples

| S.NO. | SAMPLES | RESULT |
|-------|------------------------|---------------------|
| 1. | Ashirvad Chilli powder | Adulterant present. |

| | | |
|----|--------------------|---------------------|
| 2. | Open chilli powder | Adulterant present. |
|----|--------------------|---------------------|

2.5 DETECTION OF KHESARI DAL IN BESON

Beson powder is usually adulterated with khesari dal which contains butyl oxalyl alanine amine (BOAA) which causes lethargy and ultimate paralysis in lower limbs of human body on regular consumption. The detection of BOAA in beson powder indicates adulteration of it with khesari dal.

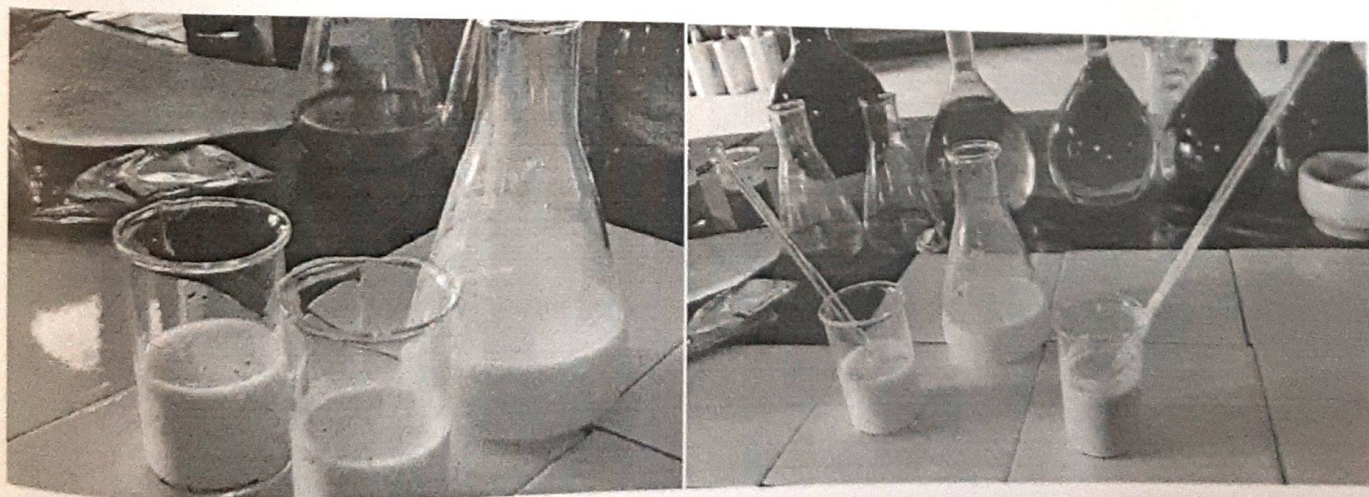
Reagents: dil. HCl.

Procedure: To 1g of the beson sample is taken in a test tube and 10 mL of 70% HCl is added to it. The content is boiled for some time.

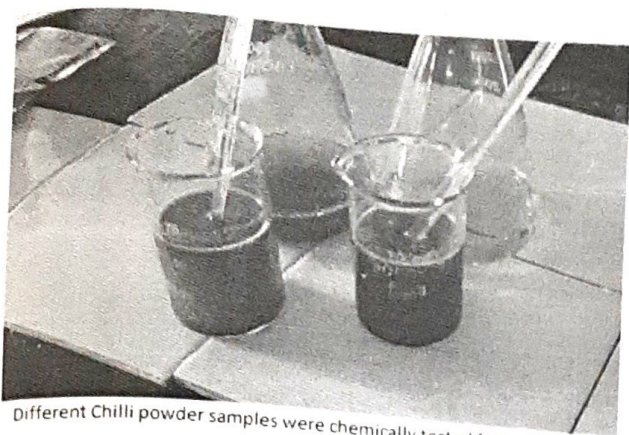
Detection: Development of pinkish colour indicates adulteration of bason with khesari dal.

Table for different samples

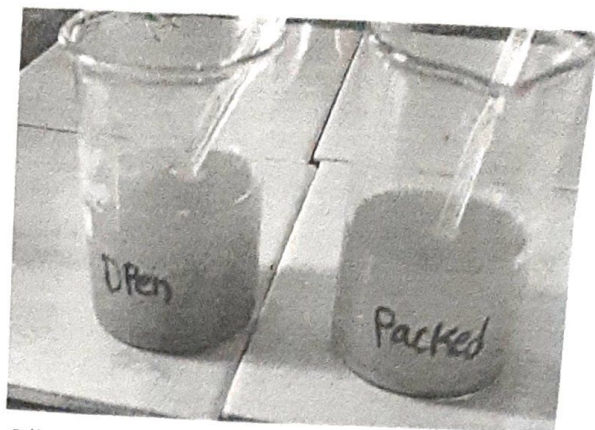
| S.NO. | SAMPLES | RESULT |
|-------|---------------|---------------------|
| 1. | Open sample | Adulterant present |
| 2. | Packed sample | Adulterant present. |



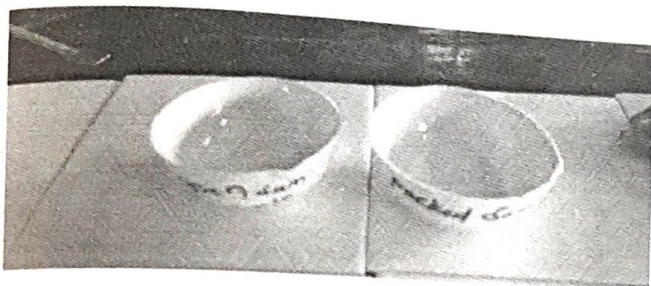
Different milk samples were chemically tested for food adultrants.



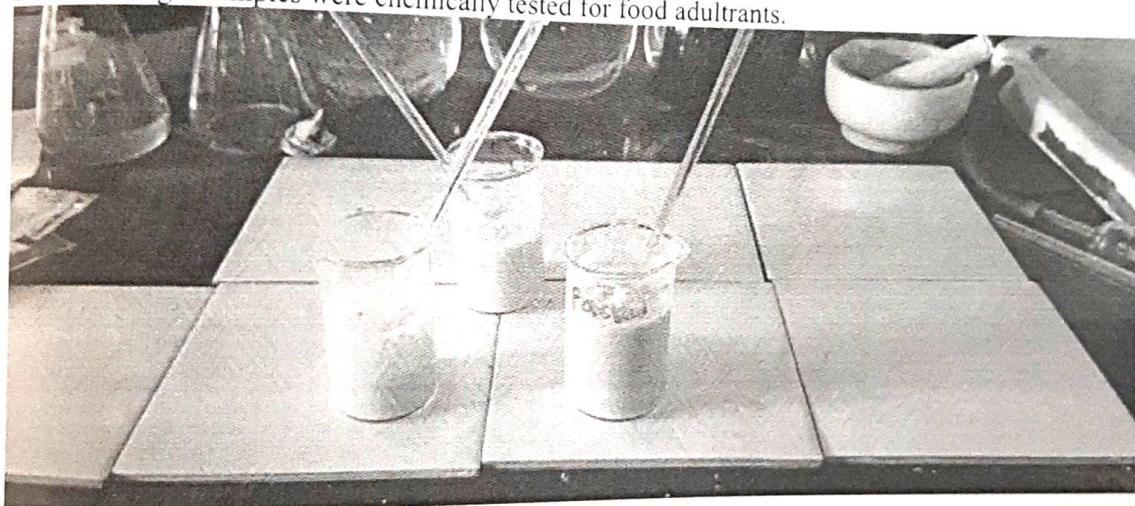
Different Chilli powder samples were chemically tested for food adultrants



Different Haldi powder samples were chemically tested for food adultrants.



Different Sugar samples were chemically tested for food adultrants.



Different Besan samples were chemically tested for food adultrants.

3. CONCLUSION

Different chemical processes that are involved in the process of finding various adulterants in various food items have been researched. These tests were run to look for different adulterants that might be present in everyday food. These tests' findings have been presented in this project. Common laboratory techniques have been used to conduct the tests. Packed samples are much better than open samples since the likelihood of food adulterants contamination is higher in open samples.

Suggestions:

1. It is always better to buy certified food from reputed shop.
2. At the time of food purchase consumer needs thorough examination and it can be of great help.
3. The consumer should avoid taking food from an unhygienic place and food being prepared under unhygienic conditions.
4. Label declaration on packed food is very important for knowing the ingredients and nutritional value. It also helps in checking the freshness of the food and the period of best before use.

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3. Senior Secondary Practical Chemistry, Dr. KAMALESH CHOUDHURY, Dr. SATYENDRA KUMAR CHOUDHURY, Cotton College Guwahati.

ATTENDANCE FOR FOOD ADULTRATION FIELD WORK (from 01,02,03,04,05 of February 2022)

IV SEM MPSC E/M 2021-22

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