

FIELD WORK SUBMITTED

To

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

On

“DETECTION OF FOOD ADULTERANTS”



Supervised by

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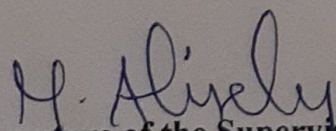
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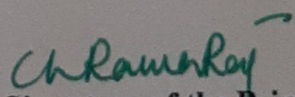
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CERTIFICATE

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. Alivelu, 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:

The Objective of this project is to study some of the common food adulterants present in different food stuffs.

Adulteration in food is normally present in its most crude form; prohibited substances are either added or partly or wholly substituted. Normally the contamination/adulteration in food is done either for financial gain or due to carelessness and lack in proper hygienic condition of processing, storing, transportation and marketing. This ultimately results that the consumer is either cheated or often become victim of diseases. Such types of adulteration are quite common in developing countries or backward countries. It is equally important for the consumer to know the common adulterants and their effect on health.

The increasing number of food producers and the outstanding amount of import foodstuffs enables the producers to mislead and cheat consumers. To differentiate those who take advantage of legal rules from the ones who commit food adulteration is very difficult. The consciousness of consumers would be crucial. Ignorance and unfair market behavior may endanger consumer health and misleading can lead to poisoning. So we need simple screening, tests for their detection. In the past few decades, adulteration of food has become one of the serious problems. Consumption of adulterated food causes serious diseases like cancer, diarrhea, asthma, ulcers, etc. Majority of fats, oils and butter are paraffin wax, castor oil and hydrocarbons. Red chilli powder is mixed with brick powder and pepper is mixed with dried papaya seeds. These adulterants can be easily identified by simple chemical tests.

Several agencies have been set up by the Government of India to remove adulterants from food stuffs. Selection of wholesome and non-adulterated food is essential for daily life to make sure that such foods do not cause any health hazard. It is not possible to ensure wholesome food only on visual examination when the toxic contaminants are present in ppm level. However, visual examination of the food before purchase makes sure to ensure absence of insects, visual fungus, foreign matters, etc.

1.1 SOME ADULTERANTS IN COMMON FOOD

Majority of adulterants used by the shopkeepers are cheap substitutes easily available. For example, adulterants in fats, oils and butter are paraffin wax, castor oil and hydrocarbons. Read chili powder is mixed with brick powder, turmeric powder is mixed with yellow lead salts and pepper is mixed with dried papaya seeds. Similarly sugar is contaminated with washing soda and other insoluble substances, milk is adulterated with starch, argemone oil is used to adulterate mustard oil, vanaspati ghee is mixed with deshi ghee, beson is mixed with khesari dal etc. These type of adulterants makes a food stuff inferior.

1.2 IMPACT OF ADULTERANTS

Every day we hear and watch live on television sets how the food items are being adulterated and this spurious, unhygienic and harmful food is entering our houses. We have seen how milk and milk products are being made from urea, soap and other harmful chemicals. We all know that vegetables are being given injections to make them grow faster and overnight. The other day we saw how steroids were being injected to chickens to make them into a hen in a very short span of time. We have also come across evidence as to how the fruits are being ripened with the use of harmful chemicals.

Adulteration of food causes several health problems in humans. Some of the health hazards include stomach ache, body ache, anemia, paralysis, and increase in the incidence of tumors, pathological lesions in vital organs, abnormalities of skin and eyes. Hence food adulteration should be given great importance due to its effect in the health significance of the public. The people are suffering from heart disease, kidney failure, skin diseases, asthma and other chronic diseases. The people are hapless victims of this adulteration industry running in full swing and unchecked.

1.3 DIFFERENT CHEMICAL TESTS FOR DETECTION OF ADULTERANTS

Food adulteration has now become a burning problem. The adulterants used are so similar to natural foodstuffs that it becomes very difficult for a common man to detect them. A few simple tests can be done to detect adulterants found in common foodstuffs.

Metanil yellow in pulses:

Shake 5 gms of the suspected pulses with 5 ml of water. Add a few drops of hydrochloric acid. A pink colour shows the presence of metanil yellow.

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 consists of three basic components which are water (about 80%), 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 sample 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 (40-60⁰ 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.

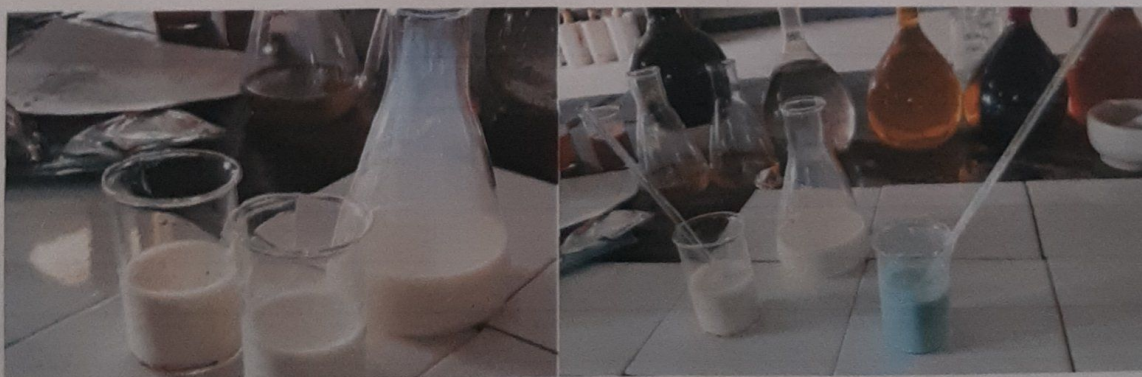
Reagents: dil. HCl.

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

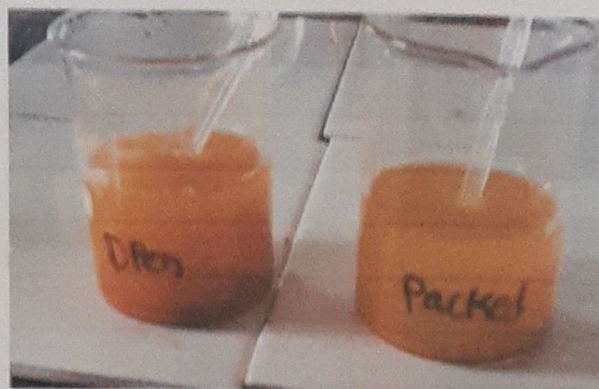
S.NO.	SAMPLES	RESULT
1.	Open sample	Adulterant present
2.	Packed sample	Adulterant present.



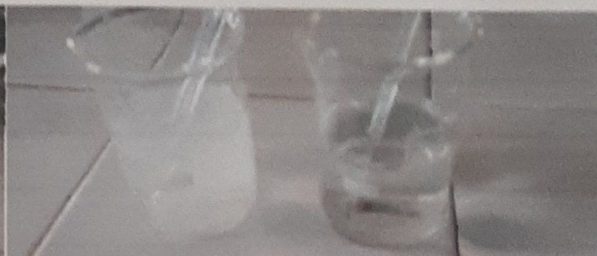
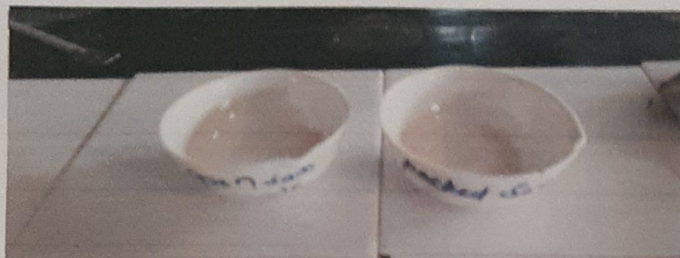
Different milk samples were chemically tested for food adulterants.



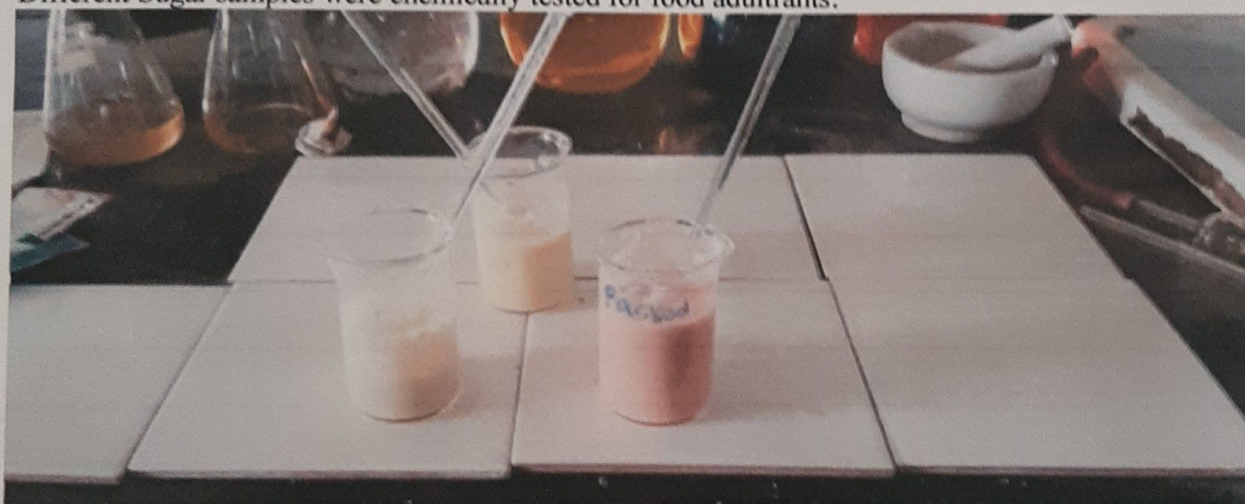
Different Chilli powder samples were chemically tested for food adultrants



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 reactions studied involving in the process of detection of different adulterants in different food items. These experiments were performed for the purpose of detecting various adulterants present in common food. The results obtained during these experiments have been shown in this project. The experiments have been performed by common laboratory methods. Packed samples are far better than open samples as in open samples, possibility of contamination with food adulterants is more.

4. Suggestions:

1. At the time of food purchase consumer needs thorough examination and it can be of great help.
2. 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.
3. The consumer should avoid taking food from an unhygienic place and food being prepared under unhygienic conditions.
4. It is always better to buy certified food from reputed shop.

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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 20,22,23,24,26 of July 2021)

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