

# CHEMISTRY PROJECT WORK

## INVESTIGATORY PROJECT

### *STUDY OF ADULTERANTS IN FOOD-STUFFS*



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# Investigatory Project Work

# BONAFIDE CERTIFICATE

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# OBJECTIVE

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



# STUDY OF ADULTERANTS IN FOOD STUFFS

# INTRODUCTION

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.



# THEORY

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, diarrhoea, 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.

AGMARK - acronym for agricultural marketing....this organization certifies food products for their quality. Its objective is to promote the Grading and Standardization of agricultural and allied commodities.

# EXPERIMENT 1

*To detect the presence of adulterants in fat, oil and butter.*

## REQUIREMENTS

Test-tube, acetic anhydride, conc.  $\text{H}_2\text{SO}_4$ , acetic acid, conc.  $\text{HNO}_3$ .

## PROCEDURE

Common adulterants present in ghee and oil are paraffin wax, hydrocarbons, dyes and argemone oil. These are detected as follows :

- (i) *Adulteration of paraffin wax and hydrocarbon in vegetable ghee*  
Heat small amount of vegetable ghee with acetic anhydride. Droplets of oil floating on the surface of unused acetic anhydride indicates the presence of wax or hydrocarbons.
- (ii) *Adulteration of dyes in fat*  
Heat 1mL of fat with a mixture of 1mL of conc. sulphuric acid and 4mL of acetic acid. Appearance of pink or red colour indicates presence of dye in fat.
- (iii) *Adulteration of argemone oil in edible oils*  
To small amount of oil in a test-tube, add few drops of conc.  $\text{HNO}_3$  and shake. Appearance of red colour in the acid layer indicates presence of argemone oil.

# EXPERIMENT 2

*To detect the presence of adulterants in sugar*

## REQUIREMENTS

Test-tubes, dil. HCl.

## PROCEDURE

Sugar is usually contaminated with washing soda and other insoluble substances which are detected as follows :

- (i) *Adulteration of various insoluble substances in sugar*  
Take small amount of sugar in a test-tube and shake it with little water. Pure sugar dissolves in water but insoluble impurities do not dissolve.
- (ii) *Adulteration of chalk powder, washing soda in sugar*  
To small amount of sugar in a test-tube, add few drops of dil. HCl. Brisk effervescence of  $\text{CO}_2$  shows the presence of chalk powder or washing soda in the given sample of sugar.

# EXPERIMENT 3

*To detect the presence of adulterants in samples of chilli powder, turmeric powder and pepper*

## REQUIREMENTS

Test-tubes, conc. HCl, dil. HNO<sub>3</sub>, KI solution

## PROCEDURE

Common adulterants present in chilli powder, turmeric powder and pepper are red coloured lead salts, yellow lead salts and dried papaya seeds respectively. They are detected as follows :

- (i) *Adulteration of red lead salts in chilli powder*  
To a sample of chilli powder, add dil. HNO<sub>3</sub>. Filter the solution and add 2 drops of potassium iodide solution to the filtrate. Yellow ppt. indicates the presence of lead salts in chilli powder.
- (ii) *Adulteration of yellow lead salts to turmeric powder*  
To a sample of turmeric powder add conc. HCl. Appearance of magenta colour shows the presence of yellow oxides of lead in turmeric powder.
- (iii) *Adulteration of brick powder in red chilli powder*  
Add small amount of given red chilli powder in beaker containing water. Brick powder settles at the bottom while pure chilli powder floats over water.
- (iv) *Adulteration of dried papaya seeds in pepper*  
Add small amount of sample of pepper to a beaker containing water and stir with a glass rod. Dried papaya seeds being lighter float over water while pure pepper settles at the bottom.

# RESULT

EXPT. NO.	EXPERIMENT	PROCEDURE	OBSERVATION
1.	Adulteration of paraffin wax and hydrocarbon in vegetable ghee	Heat small amount of vegetable ghee with acetic anhydride. Droplets of oil floating on the surface of unused acetic anhydride indicate the presence of wax or hydrocarbon.	Appearance of oil floating on the surface.
2.	Adulteration of dyes in fat	Heat 1mL of fat with a mixture of 1mL of conc. $\text{H}_2\text{SO}_4$ and 4mL of acetic acid.	Appearance of pink colour.
3.	Adulteration of argemone oil in edible oils	To small amount of oil in a test tube, add few drops of conc. $\text{HNO}_3$ & shake.	No red colour observed
4.	Adulteration of various insoluble substances in sugar	Take small amount of sugar in a test tube and shake it with little water.	Pure sugar dissolves in water but insoluble impurities do not dissolve.
5.	Adulteration of chalk powder, washing soda in sugar	To small amount of sugar in a test tube, add a few drops of dil. $\text{HCl}$ .	No brisk effervescence observed.
6.	Adulteration of yellow lead salts to turmeric powder	To sample of turmeric powder, add conc. $\text{HCl}$ .	Appearance of magenta colour
7.	Adulteration of red lead salts in chilli powder	To a sample of chilli powder, add dil. $\text{HNO}_3$ . Filter the solution and add 2 drops of $\text{KI}$ solution to the filtrate.	No yellow ppt.
8.	Adulteration of brick powder in chilli powder	Add small amount of given red chilli powder in a beaker containing water.	Brick powder settles at the bottom while pure chilli powder floats over water.
9.	Adulteration of dried papaya seeds in pepper	Add small amount of sample of pepper to beaker containing water and stir with a glass rod.	Dried papaya seeds being lighter float over water while pure pepper settles at the bottom.

## CONCLUSION

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. Therefore, due care taken by the consumer at the time of purchase of food after thoroughly examining can be of great help. Secondly, 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. The consumer should avoid taking food from an unhygienic place and food being prepared under unhygienic conditions. Such types of food may cause various diseases. Consumption of cut fruits being sold in unhygienic conditions should be avoided. It is always better to buy certified food from reputed shop.

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