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No.	Name of the Experiment	Page No.	Date of Experiment	Date of Submission	Remarks
1.)	To study and identify the stages of gamete development i.e. TS of testis	01	12-4-18		
2.)	To study and identify the stages of gamete development i.e. LS of ovary through permanent slide	03	4-5-18		
3.)	study of entamoeba histolytica, plasmodium vivax and Ascaris lumbricoides	05	16-7-18		
4.)	To study TS of blastula through permanent slide	10	17-8-18		
5.)	study of plants and animals found in xerophytic conditions	12	18-9-18		
6.)	To test the presence of inorganic salts in different soil samples	14	28-9-18		



INVESTIGATORY  
PROJECT  
ON  
FOOD  
ADULTERATION

# CERTIFICATE

This is to certify that Prashant Kumar of class XII has successfully completed the investigatory project on the Topic "FOOD ADULTERATION" under my Guidance During the year 2018-2019 in the partial fulfillment of the Chemistry Practical Examination conducted by C.B.S.E.

Teacher's Signature



# ACKNOWLEDGEMENTS

I am indebted to a member of people who have to various stages helped and motivated me to bring out this project. I would like to thank our chemistry teacher who not only guided me but also provided relevant information and materials.

The contribution of my friends and family also deserves a mention. Last but not the least I would like to thank the Almighty without whose grace the work would not have been a success.

Prashant Kumar

# PREFACE

It was a great opportunity for me to put forth my views about common food adulterants through this project. It is strictly based on the syllabus provided by the CBSE Board for the year 2018-2019. This fulfilled task enhanced my knowledge about adulterants and their ill effects.

Even a small amount of adulterant can prove hazardous to our health. I have tried to highlight on this topic, remedial measures and a few methods of detection of presence of adulterants in food. This shall create awareness and improve our health. A healthy person can only reach the pinnacle of success.

I hope that this honest effort of mine is appreciated by all.

Prashant Kumar



# CONTENTS

S.No	Topic	Page no
1.	Study of Adulterants	04
2.	Danger signal to Health	05
3.	Common Food Adulterants	07
4.	Remedial Measures	08
5.	Survey in Bihar	09
6.	Experiments	
	(i) Butter	12
	(ii) Fat and oil	13
	(iii) Sugar	15
	(iv) chilli powder	17
	(v) pepper	18
	(vi) Turmeric powder	19

# Study of Adulterant

## INTRODUCTION

There are three basic necessities of man:  
(i) food (ii) clothing (iii) shelter

Considering the importance of food as one of our basic requirements, the food we consume should be healthy and nutritious. But it was true only in ancient times when there was plenty of healthy nutrition. Today with exploding population, the scenario has totally changed. There is an acute shortage in the supply of common food stuff.

To keep pace with the increasing needs of food, some traders resort to food adulteration. Deliberate contamination of food material with low quality, cheap, inedible, toxic substances is called food adulteration.

Food adulteration leads to serious health problems. Also leads to increase in price index. Besides it has made well balanced food, out of reach of common people.



Although purposely degrading the quality of food, by adulteration is punishable by law many anti-social elements practice it basically due to lack of awareness among people.

## DANGER SIGNAL TO HEALTH

Adulteration is responsible for many diseases like Cancer, Diarrhoea, Asthma, ulcers etc which can sometimes be fatal. When these adulterated food stuff reach our body they affect the metabolism. The chemical used for skimming, curdling of milk in summer is responsible for many diseases in colon and Duodenum. Rice and wheat is adulterated with stones. Arhar dal with material yellow. Pigeon pea is adulterated with Lathyrus sativus when taken causes lathyrism. Both human beings and live stock are susceptible to lathyrism, and severe epidemics have been reported in the past from Bihar, M.P and some other districts. of Eastern U.P. Lathyrism is characterized by lesions on the lower spinal segments, followed by permanent crippling of the lower limbs and finally leads to partial or complete paralysis.

The Toxic principle has been identified as anicno popionitrite ( $C_8H_{13}O_3N_3$ ) which is present in concentration varying from 58 to 160 mg/100gm and selenium which interfere with methionine metabolism.



# REMEDIAL MEASURES

To combat the rising menace of food adulteration by unscrupulous traders the government of India has issued the PREVENTION OF FOOD ADULTERATION ACTS AND RULES & FOOD PRODUCTS ORDERS which serve following functions

- (i) Laying minimum manufacturing standards for the quality of food.
- (ii) Specifying the hygienic condition under which the food products should be manufactured.
- (iii) Making it mandatory for the manufacturers to indicate on the tin or wrapper of the food product the date of manufacture of the product, its expiry date, the weight or volume of the food content and the retail price of the product.

The Bureau of India Standards issues certificates of eligibility to the food manufacturers and food processing units after a thorough inspection of their factory and testing of their product.

The FPO mark on the bottles of squashes, Soup pack, achi and other ready to eat canned food "Agmark" and ISI symbol on food products such as spices, bottles, ghee, edible oil and powdered milk, testify their high purity and good quality.



we should ensure that they buy only those food stuffs that bear either of these Quality Symbols. In recent years food testing laboratories have been set up in all big cities across the country. The local health Department periodically collects samples of various food stuffs such as edible oils, spices, butter and pulses and conducts tests to detect adulteration.

## SURVEY IN BIHAR

Survey for this problem has been made in Bihar for recent years. For the purpose samples of different food stuffs were taken from different parts of Bihar. The samples were analysed at the Government Public Laboratory Bihar. The results found were rather disappointing and disgusting.

- About 4,09,200 samples were taken out of which 1,03,044 were found to be adulterated. Now the Central Food and Technological Research Institute Mysore is engaged in giving information about the food adulteration.

# METHOD OF DETECTION..

No	Type of food	Common Adulterant	How to Detect
1.	Dosi Ghee X Butter	Vanaspoti, Powdered sweet potato, Starchy matter	<p>(i) A little Sugar and HCl is Added to a small amount of melted ghee or butter and shaken for five minutes. presence of pink colour in the aqueous layer is indication of vanaspoti in the sample.</p> <p>(ii) About 2ml of water in ghee or butter is added and boiled. A drop of iodine or tincture of iodine is Added after cooling. Appearance of blue colour indicates presence of starch matter in the sample.</p>
2.	Mustard oil	Argemone oil	<p>Ans- About 5ml of the oil, few drops of conc HNO<sub>3</sub> is Added and shaken carefully. Orange or red colour indicates the presence of argemone oil.</p>
3.	Salt	chalk powder	<p>A little salt is Added to water. <u>chalk powder will settle down.</u></p>



No	Type of Food	Common Adulterant	How to Detect
4.	Sugar	Washing Soda or chalk powder	About 2ml of dil HCl is added to small amount of sample Effervescence in addition of acid show the presence of chalk or washing soda in the sugar sample.
5.	Red chilli's powder	Brick powder or colours	A small amount of the sample is added to glass full of water. The contents are stirred for 2 minutes. Brick powder settles at bottom.
6.	pepper	Dried papaya seed	A small amount of sample is added in a glass full of water. Dried papaya seeds float over water while the pepper settle down.
7.	Rice	stone chips resembling him	Rice is added to a glass full of water stone chips will settle down at the bottom first.
8.	Arhar & Gram Dal	Khesarri Dal	A little amount of HCl is added to sample and heated. Pink colour indicates the Khesarri Dal.
9.	Turmeric Dal	yellow chalk powder	About 2ml of dil HCl is added to the sample Effervescence indicates in the sample.



# EXPERIMENT No. 1

## AIM OF THE EXPERIMENT :-

To detect the presence of adulterant in - Fat, oil and Butter.

## THINGS REQUIRED :

Test Tube, Conc HCl, furfural, acetic anhydride, Conc.  $H_2SO_4$ , acetic acid,  $HNO_3$

## PROCEDURE:

Common adulterant present in ghee and oil are Paraffin wax hydrocarbon, Styr and argemone oil. These are detected as follows.

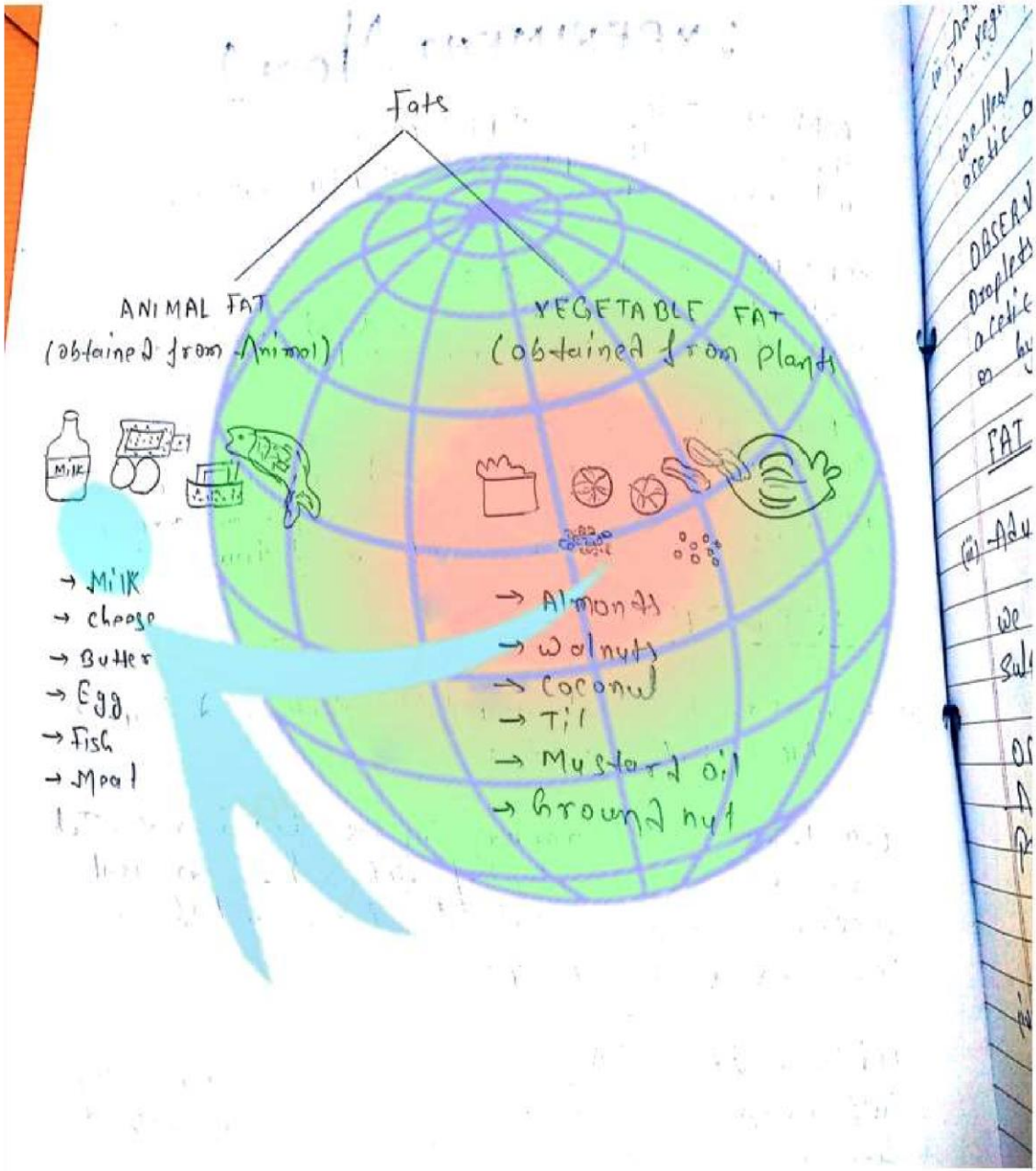
## BUTTER

### (i) Adulteration of Vegetable ghee in desi ghee [BARODUIN TEST]

We take small amount of desi ghee in a test Tube and add to it 1ml of HCl and 2-3 drops of 2% Alcoholic Solution of furfural and shake the contents vigorously.

## OBSERVATION

Appearance of red colour in the acid layer shows that vegetable ghee has been mixed as an adulterant to desi ghee.





(ii) Adulteration of Paraffin wax and hydro carbon in vegetable oil

We Heat a small amount of vegetable ghee with acetic anhydride

#### OBSERVATION

Droplets of oil floating on the surface of unused acetic anhydride indicates the presence of wax or hydro carbon

#### FAT

(iii) Adulteration of Dye in fat

We Heat 1ml of fat with a mixture of 3ml conc. Sulphuric acid and 4ml of acetic acid.

#### OBSERVATION

Appearance of pink or red colour indicates presence of dye in fat.

#### OIL

(iv) Adulteration of argemone oil in vegetable oil

We add a few drops of conc. HNO<sub>3</sub> to a small amount of oil in a test-tube & then shake it.

FAT  
Plank



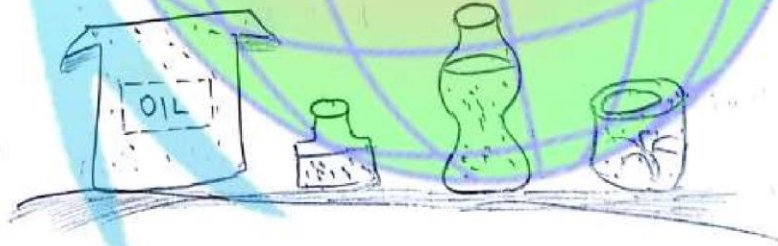


## OILS

Fats are generally solid at  $20^{\circ}\text{C}$ . But if they are liquid at this temperature, they are called "Oils" or "Fatty Acids".

There are two types of fatty acids:-

- (i) unsaturated fatty acids  
e.g. - Fish oil and vegetable oil
- (ii) Saturated fatty acids  
e.g. - Coconut oil and Palm oil



OBSER.  
Increase  
presence

As a whole  
Cause  
lower  
in so

they are  
"Oils" is

OBSERVATION

Appearance of red colour in the acid layer indicates presence of argemone oil

Adulteration of edible oil of argemone seeds cause Dropsy which is characterized by swelling of lower limbs and renal failure. This can be detected in serious cases.



## EXPERIMENT No ~ 2

Dist. fine white sand and Gava are mixed with sugar to adulterate it

### AIM OF THE EXPERIMENT

To Detect the presence of - Adulterants in sugar

### THINGS REQUIRED

Test Tube, conc  $H_2SO_4$ , alcoholic solution of  $\alpha$ -naphthol, dil HCl

### PROCEDURE

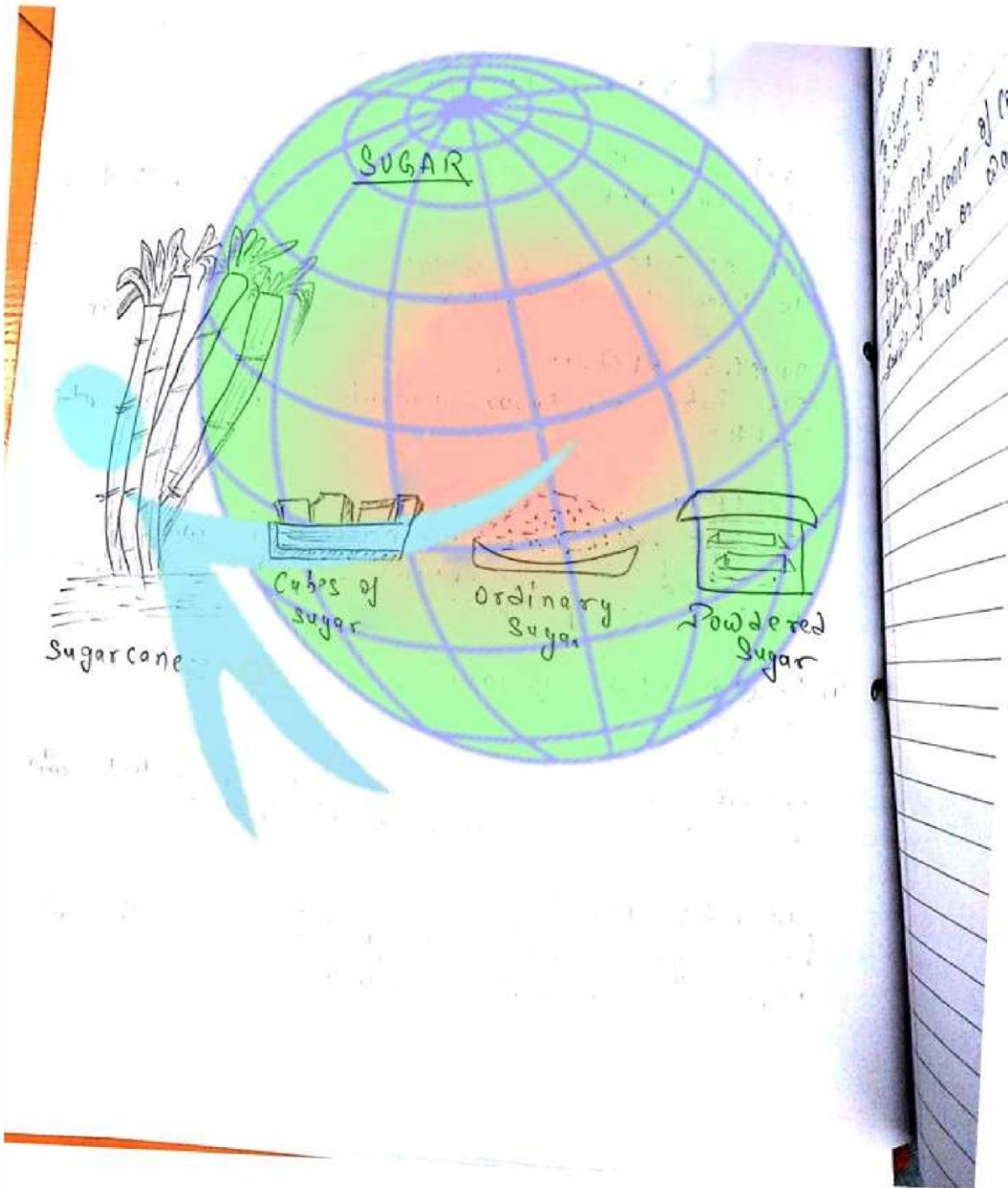
Sugar is usually contaminated with washing soda and other insoluble substances which are detected as follows:

- (i) Adulteration of various insoluble substances in sugar

we take a small amount of sugar in a test tube and shake it with a little water.

### OBSERVATION

Pure sugar dissolved in water but insoluble impurities do not dissolve.





(iii) Adulteration of chalk powder, washing soda in sugar  
To a small amount of sugar in a test tube, add a few drops of  $\text{HCl}$

**OBSERVATION**  
Brisk effervescence of  $\text{CO}_2$  shows that presence of chalk powder or washing soda in the given sample of sugar

Adulteration  
Sugar

## EXPERIMENT No-3

### AIM OF THE EXPERIMENT

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

### THINGS REQUIRED

Test Tube, conc. HCl, dil HNO<sub>3</sub>, Iodine solution.

### PROCEDURE

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

### CHILLI POWDER

(i) Adulteration of lead lead salts in chilli powder

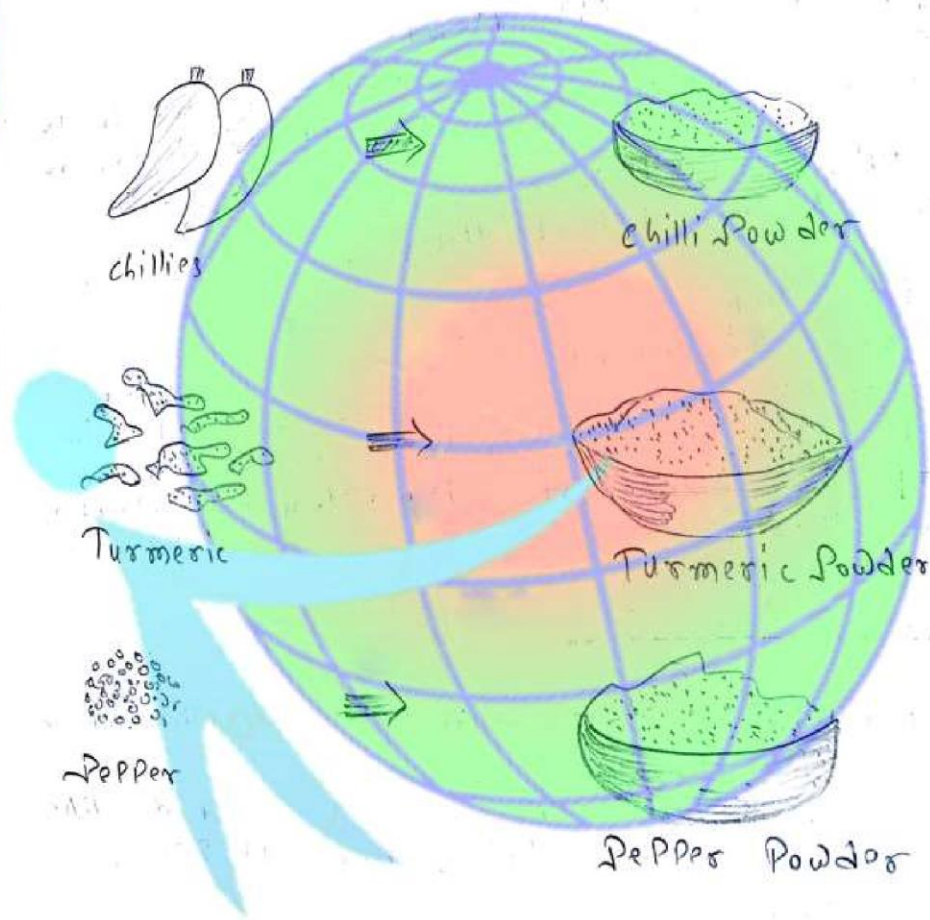
To a sample of chilli powder, we add dil HNO<sub>3</sub>. Then we filter the solution and add 2 drops of KI solution to it.

### OBSERVATION

yellow ppt. obtained indicates the presence of lead salts in chilli powder.



# SPICES



(iii) Adulteration of brick powder in red chilli powder

we add a small amount of red chilli powder in beaker containing water

#### OBSERVATION

Brick's powder settles at the bottom while pure chilli powder floats over water.

(iii) Adulteration of chilli powder with colour

we mix some amount of water and a small amount of chilli powder in a test tube

#### OBSERVATION

water becomes coloured which indicates the presence of colour in chilli powder

### PEPPER

(iv) Adulteration of dried papaya seeds in pepper

we add a small amount of sample of pepper to a beaker containing water and stir with a glass rod.

#### OBSERVATION

Dried papaya seeds being lighter float over water while pure pepper settles at the bottom.



(iii) Adulteration of brick powder in red chilli powder

we add a small amount of red chilli powder in beaker containing water

#### OBSERVATION

Brick's powder settles at the bottom while pure chilli powder floats over water.

(iii) Adulteration of chilli powder with colour

we mix some amount of water and a small amount of chilli powder in a test tube

#### OBSERVATION

water becomes coloured which indicates the presence of colour in chilli powder

### PEPPER

(iv) Adulteration of dried papaya seeds in pepper

we add a sugar amount of sample of pepper to a beaker containing water and stir with a glass rod.

#### OBSERVATION

Dried papaya seeds being lighter float over water while pure pepper settles at the bottom.

## TURMERIC POWDER

(vi) Adulteration of yellow lead salts (lead chromate) to turmeric powder.

To a sample of Turmeric powder, we add conc HCl

### OBSERVATION

Appearance of magenta colour shows the presence of yellow oxides of lead in turmeric powder.

(vii) Adulteration of turmeric powder with wheat or sorghum powder

We dissolve small amount of turmeric powder in water and some iodine solution to it.

### OBSERVATION

Blue colour is produced due to starch in this wheat or sorghum flour thereby indicating their presence.

Lead chromate added to turmeric powder being yellow in colour is very toxic. It can cause ANAEMIA, stiffness in limbs, paralysis, mental retardation and brain damage. It is also known to induce abortion in pregnant women.



# CONCLUSION

This Project helped me to felicitate with more and more knowledge about the common food adulterant and their ill effects. It was a fun-filled experience for me. I would like to express my gratitude towards all who have contributed in the completion of this project. I have made this project strictly in accordance with the CBSE board for the year 2018-2019 and hope for the approval of the same.

→ By  
Prashant Kumar  
XII

# BIBLIOGRAPHY

This chemistry Project involves a lot of Research and hard work. It consists of Materials gathered from a vast number of Books. The Books used by me are:

- (i) physical chemistry (XII)
- (ii) Lab Manual (XII)
- (iii) India Today
- (iv) Frontline
- (v) Outlook





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