

Evaluation of Adulterants in Food by Different Physico-Chemical Method

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Abstract— Food is one of the fundamental needs of humans for their survival. But contamination in food and processed food causes various diseases and it also decreases the value of food. In this study we have taken different food products to detect the presence of adulterants by physical chemical method in given food sample like fat, oil, butter, sugar, chilli powder, turmeric powder, pepper, pulses, coriander powder, cumin seeds, asafoetida and wheat flour which we collected from different villages of Phagwara region. The aim of this study is to bring awareness among the students and society.

Key words: Fat, Sugar, Chilli Powder, Cumin Seeds, Turmeric Powder, Pulses, Pepper

I. INTRODUCTION

Adulteration in food is mainly present in its most crude form or prohibited substances are either added or partly substituted. The contamination 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 [1]. Such types of adulteration are common in developing countries and backward countries. The study of adulteration and various methods to analyze the presence of adulterants in food products was reported in most of the research papers [2-9]. To study some of the food adulterants present in different food products. 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 food stuffs 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 consumer would be crucial. Ignorance and unfair market behavior may endanger consumer health and misleading can lead to poisoning. So we need evaluation tests for their detection. Consumption of adulterated food causes serious diseases like cancer, diarrhoea, asthma, ulcers, etc. [10].

II. GENERAL INSTRUCTIONS

Food products like fat, oil, butter, sugar, chili powder, turmeric powder, pepper, pulses, coriander powder, cumin seeds, asafoetida and wheat flour which we collected from Phagwara region. Acetic anhydride, conc. Sulfuric acid, acetic acid, conc. nitric acid, conc. HCl, dil. HNO₃, KI solution, dil. HCl, Kesari Dal, lead chromate, Conc. HCl, CCl₄ are some chemical reagents were used in analysis of adulterants. All reagents were of analytical grade.

A. Analysis of presence of adulterants in fat, oil and butter

- Paraffin wax, hydrocarbons, dyes and argemone oil are common Adulterants and these are detected as follows:

- Detection 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 and hydrocarbon.
- Detection of dyes in fat-Heat 1ml of fat with a mixture of conc. Sulfuric acid 4ml of acetic acid. Appearance of red color indicates the presence of dye in fat.
- Detection of argemone oil in edible oil-Take small amount of oil in a test tube and add few drops of conc. nitric acid. Shake well. Appearance of red color in the acid layer indicates the presence of argemone oil.

B. Sugar is mainly adulterated with washing soda and other insoluble substances which can be detected as follows

- Detection of various insoluble substances in sugar- Take small amount of sugar in a test tube and shake it with little water pure sugar dissolve in water but insoluble impurities do not dissolve.
- Detection of chalk powder, washing soda in sugar – Take small amount of sugar in a test tube and add few drops of dil. HCl. Brisk effervescence of CO₂ shows the presence of chalk powder or washing soda.

C. The common adulterants in red chilli powder are red lead salt and brick powder. They are detected by following way:

- Detection of red lead salts- To a sample of chilli powder add dil. HNO₃. Filter the solution add 2 drops of potassium iodide solution to the filtrate. Yellow ppt. obtained indicates the presence of lead salts in chilli powder.
- Detection of brick powder- Add small amount of given red chilli powder in beaker contained water. Brick powder settled at the bottom while pure chilli powder floated over water.

D. Analysis of presence of adulterants in turmeric powder and pepper: yellow lead salt and papaya seeds are common adulterants in turmeric and pepper respectively.

- Detection of yellow lead salt- To a sample of turmeric powder and conc. HCl. Appearance of magenta colour shows the presence of yellow oxides of lead in turmeric powder.
- Detection of papaya seeds- Take 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 settled at the bottom.

E. Analysis of presence of adulterants in pulses: Common adulterants present in pulses are lathyrus sativus, lead chromate and metanil yellow. They are detected as follows

- Detection of Kesari Dal- Add 50ml of dil. HCl to small quantity of dal and keep on simmering water for about

15 mins. Pink colour obtained indicates the presence of Kesari Dal.

- Detection of Metanil yellow dye- Add conc. HCl to a small quantity of dal in a little amount
- of water immediate development of pink color indicates the presence of metanil yellow dye.
- Detection of lead chromate- Shake 5gm of pulse with 5ml of water and added few drop of HCl pink color obtained indicates the presence of lead chromate.

F. Adulteration in Bajra is analysed by physical method: Swollen and black ergot grains floats over the surface of water.

G. Sandy matter and chalk are common adulterants in wheat flour. It is detected as follows:

- Detection of sandy matter-Shake a little quantity of about 10ml of CCl₄ and allowed to stand. Grit and sandy matter collect at the bottom.
- Detection of chalk- Shake sample with dilute HCl effervescence indicates the presence of chalk as adulterant.

H. Dung powder is used as adulterant in coriander powder. It is analysed by soaking in water, dung floats over the surface of water and gives foul smell.

I. Common adulterant is present in cumin seeds is grass seed colour with charcoal dust. Its presence is detected by rubbing the cumin seeds on palms, if it turn black indicates the presence of adulterants.

J. Adulteration in Asafoetida: Common adulterants are chalk and soap stone which are detected as:

- Detection of chalk- Shake sample with CCl₄ settled down decant the top layer and add dil. HCl to the residue effervescence appeared indicates the presence of chalk in sample.
- Detection of Soap stone- Shake the little quantity of powdered sample with water some heavy particle like soap stone or earthy matter settled at the bottom.

S. No.	Food sample	Adulterant	Inference
1	Oil (fat, butter)	Paraffin wax Dye Argemone oil	- No oil floating on the surface of sample. - No appearance of red colour. - Appearance of red colour indicates the presence of adulterant.
2	Sugar	Insoluble foreign matter Chalk powder, washing soda	- Appearance of insoluble impurities. - No evolution of carbon dioxide gas.
3	Chilli Powder	Red lead salt Brick Powder	- No appearance of yellow ppt. indicated the absence of adulterant. - Not found
4	Turmeric Powder	Lead salt	- No colour change
5	Pepper	Papaya seeds	- Papaya seeds were floating over the surface of water.
6	Pulses	Kesari Dal Metanil Yellow Dye Lead Chromate	- Change in colour indicated the presence of adulterant. - No change in colour - No change in colour
7	Bajra	Black ergot seeds	- Indicated the presence of adulterant
8	Wheat Flour	Sandy matter Chalk	- Not found - No evolution of gas
9	Coriander Powder	Dung Powder	- Indicated the absence of adulterant.
10	Cumin seeds	Grass seed colour with charcoal dust	- Not found
11	Asafoetida	Soap stone	- Indicated the presence of adulterant

Table 1: Food sample & Adulterant & Inference

III. RESULTS AND DISCUSSION

The observed outcomes of various food samples are recorded in the table 1. These samples were collected from phagwara region. These tests were performed in the laboratory by different physico-chemical method as discussed in previous section. Appearance of colour, change in colour, and formation of ppt., evolution of gas and floating of foreign particles over the surface of food sample has been mentioned in table-1.

IV. CONCLUSION

The present discussion on the topic of adulteration has revealed the various adulterants which were found in food sample of different rural areas of phagwara region. The

objective of current study is to bring awareness in the society which helps to select the best and suitable food items. As we know that contamination in food is done either for financial gain or due to carelessness. It may be knowingly or unknowingly. Thus, we concluded that awareness in consumer is need of hour who are less educated.

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