

Study of adulterants in food stuff



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Certificate of Authenticity

This is to certify that a student of class 12th has successfully completed the research project on the topic “ Study of adulterants in food-stuffs” under the guidance of This project is absolutely genuine and does not indulge in plagiarism of any kind. This reference taken in making this project has been declared at the end of this project.

I feel proud to present my investigatory project in Chemistry on the topic “ Study Of Adulterants in food-stuffs”. This project would not have been feasible without the proper rigorous guidance of chemistry teacher Who guided me throughout this project in every possible way! An investigatory project involves various difficult lab experiments, which have to obtain the observations and conclude the reports on a meaningful note. Thereby, I would like to thanks for guiding me on a systematic basis and ensuring that in completed all my research with ease. Rigorous hard work has put in this project to ensure that it proves to be the best. I hope that it proves to be the best. I hope that this project will prove to be a breeding ground for the next generation of students and will guide them in every possible way.

Food adulteration is the act of intentionally debasing the quality of food offered for sale either by the admixture or substitution of inferior substances or by the removal of some valuable ingredient. Food is declared adulterated if: a substance is added which depreciates or injuriously affects it cheaper or inferior substances are substituted wholly or in part any valuable or necessary constituent has been wholly or in part abstracted it is an imitation it is coloured or otherwise treated, to improve its appearance or if it

contains any added substance injurious to health Food-preservatives have a very extensive use, which often constitutes adulteration. Salt is the classic preservative, but is seldom classified as an adulterant.

Salicylic, benzoic, and boric acids, and their sodium salts, formaldehyde, ammonium fluoride, sulphurous acid and its salts are among the principal preservatives. Many of these appear to be innocuous, but there is danger that the continued use of food preserved by these agents may be injurious. Some preservatives have been conclusively shown to be injurious when used for long periods.

Coal-tar colours are employed a great deal, pickles and canned vegetables are sometimes coloured green with copper salts; butter is made more yellow by anatta; turmeric is used in mustard and some cereal preparations. Apples are the basis for many jellies, which are coloured so as to simulate finer ones. In confectionery, dangerous colours, such as chrome yellow, prussian, blue, copper and arsenic compounds are employed. Yellow and orange-coloured sweets are to be suspected. Artificial flavouring compounds are employed in the concoction of fruit syrups, especially those used for soda water. Milk is adulterated with water, and indirectly by removing the cream. The addition of water may introduce disease germs. Cream is adulterated with gelatin, and formaldehyde is employed as a preservative for it. Brick dust in chilli powder, coloured chalk powder in turmeric, injectable dyes in watermelon, peas, capsicum, brinjal, papaya seeds in black pepper etc. Butter is adulterated to an enormous extent with oleomargarine, a product of beef fat.

Contaminated foods and drinks are common sources of infection. Among the more common infections that one can get from contaminated foods and drinks are typhoid fever Escherichia coli infections, shigellosis or bacillary dysentery, giardiasis, cryptosporidiosis, other salmonellosis, cholera, rotavirus infections, also a variety of worm infestations. Many of the infectious diseases transmitted in food and water can also be acquired directly through the faecal-oral route.

Bacteria:

Bacteria are a common cause of food borne illness. Toxins for bacterial infections are delayed because the bacteria need time to multiply. Their symptoms are usually not seen until 12-72 hours or mainly the day after it is ingested and digests completely, more after eating contaminated food.

Enterotoxins:

In addition to disease caused by direct bacterial infection, some food borne illnesses are caused by enterotoxins (an exotoxin targeting the intestines). Enterotoxins can produce illness even when the microbes that produced them have been killed. It occurs mainly in cooked and processed foods due to competition with other biota in raw foods, and humans are the main cause of contamination as a substantial percentage of humans are persistent carriers of S. Aureus Mycotoxins and alimentary mycotoxicoses:

The term alimentary mycotoxicoses refers to the effect of poisoning by Mycotoxins (The term 'mycotoxin' is usually reserved for the toxic chemical products produced by fungi that readily colonize crops) through food

consumption. Some research has shown that the toxins can be easily cross-contaminated between grain commodities, suggesting that manufacturing and storage of grain commodities is a critical practice.

Viruses:

Viral infections make up perhaps one third of cases of food poisoning in developed countries. Food borne viral infections are usually of intermediate (1-3 days) incubation period, causing illnesses which are self-limited in otherwise healthy individuals; they are similar to the bacterial forms described above. Hepatitis A is distinguished from other viral causes by its prolonged (2-6 week) incubation period and its ability to spread beyond the stomach and intestines into the liver. It often results in jaundice, or yellowing of the skin, but rarely leads to chronic liver dysfunction. The virus has been found to cause infection due to the consumption of fresh-cut produce which has faecal contamination.

1. AIM: To detect the presence of adulterants in fat, oil and butter. Test-tube, conc. HCl, furfural, acetic anhydride, conc. H₂SO₄, acetic acid, conc. HNO₃.

PROCEDURE: Common adulterants present in ghee and oil are paraffin wax, hydrocarbons, dyes and argemone oil. (1) Adulteration of vegetable ghee in desi ghee (Bandouin test). Take small amount of desi ghee in a test-tube and add to it 1 ml of HCl and 2-3 drops of 2% alcoholic solution of furfural. Shake the contents vigorously. Appearance of red colour in the acid layer shows that vegetable ghee has been mixed as an adulterant to desi ghee. (2) Adulteration of paraffin wax and hydrocarbon in vegetable ghee. Heat small amount of vegetable ghee with acetic hydride. Droplets of oil floating on the

surface of unused acetic anhydride indicate the presence of wax or hydrocarbon. (3) Adultration of dyes in fat. Heat 1 ml of fat with a mixture of 1 ml of conc. sulphuric acid and 4 ml of acetic acid. Appearance of pink or red colour indicates presence of dye in fat. (4) Adultration of argemone oil in edible oils. To small amounts of oil in a test-tube, add few drops of conc. HNO_3 and shake. Appearance of red colour in the acid layer indicates presence of argemone oil.

2. AIM: To detect the presence of adultrants in sugar. REQUIREMENTS: Test-tubes, conc. H_2SO_4 , alcoholic solution of α -naphthol, dil HCl. Sugar is usually contaminated with washing soda and other insoluble substances which are detected as follows: (1) Adultration 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. (2) 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 CO_2 shows the presence of chalk powder or washing soda in the given sample of sugar.

3. AIM: To detect the presence of adulterants in samples of chilli powder, turmeric powder and pepper. Test-tubes, conc. HCl, dil. HNO_3 , KI solution. Common adulterants present in chilli powder, turmeric powder and pepper are red coloured lead salts, yellow lead salts and dried papaya seeds : (1) Adulteration of red lead salts in chilli powder: To a sample of chilli powder, add dil. HNO_3 . 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. (2) 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. (3) Adulteration of brick powder in red chilli powder: Add small amount of red chilli powder in beaker containing water. Brick powder settles at the bottom while pure chilli powder floats over water. (4) Adultration of dried papaya seeds in pepper: Add 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.

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.