

# QUICK TEST FOR SOME ADULTERANTS IN FOOD

**INSTRUCTION MANUAL- Part II (METHODS FOR  
DETECTION OF ADULTERANTS)**

Food is essential for nourishment and sustenance of life. Adulteration of food cheats the consumer and can pose serious risk to health in some cases. The purpose of this manual is to give the consumer an opportunity to detect a few common adulterants in food

*FOOD SAFETY AND STANDARDS AUTHORITY OF INDIA*

8/6/2012

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Adulteration of food Cheats the consumer and poses a serious risk to health. A common consumer may not have sufficient knowledge about purity and quality of food articles he consumes. Mere visual inspection does not serve the purpose especially when adulteration has assumed high degree of sophistication. With this view Food Safety and Standards Authority of India has developed “QUICK TEST FOR SOME ADULTERANTS IN FOOD” which gives the consumer to screen their day to day food articles.



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**This manual provides testing methods for common adulterants which can be easily performed in schools, colleges, NGO's and at industry level.**

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## ***Food Adulteration.***

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### ***What is Adulteration?***

Food is the basic necessity of life. One works hard and earns to satisfy our hunger and relax (enjoy) later. But at the end of the day, many of us are not sure of what we eat. We may be eating a dangerous dye, sawdust, soap stone, industrial starch, and aluminum foil and so on! Contaminated foods and drinks are common sources of infection. Often, we invite diseases rather than good health.

Food adulteration is an 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 Adulteration takes into account not only the intentional addition or substitution or abstraction of substances which adversely affect nature, substances and quality of foods, but also their incidental contamination during the period of growth, harvesting, storage, processing, transport and distribution.

“adulterant” means any material which is or could be employed for making the food unsafe or sub-standard or mis-branded or containing extraneous matter.

Food is adulterated if its quality is lowered or affected by the addition of substances which are injurious to health or by the removal of substances which are nutritious. It is defined as 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 colored or otherwise treated, to improve its appearance or if it contains any added substance injurious to health.
- For whatever reasons its quality is below the Standard

Adulterated food is dangerous because it may be toxic and can affect health and it could deprive nutrients essential for proper growth and development.

Very often food is adulterated by merchants and traders who are unscrupulous and want to make a quick profit. But shortages and increasing prices, consumer demands for variety in foods, a lack of awareness, negligence, indifference and lethargy among consumers and inadequate enforcement of food laws and food safety measures

also lead to food adulteration.

Some of the common adulterated foods are milk and milk products, atta, edible oils, cereals, condiments (whole and ground), pulses, coffee, tea, confectionary, baking powder, non-alcoholic beverages, vinegar, besan and curry powder.

Types of Adulterants:

Type	Substances Added
<b>Intentional Adulterants</b>	Sand, marble chips, stones, mud, other filth, talc, chalk powder, water, mineral oil and harmful colour.
<b>Incidental adulterants</b>	Pesticide residues, droppings of rodents, larvae in foods.
<b>Metallic contaminants</b>	Arsenic from pesticides, lead from water, effluent from chemical industries, tin from cans.

### Poisonous or Deleterious Substances

Generally, if a food contains a poisonous or deleterious substance that may render it injurious to health, it is adulterated. For example, apple cider contaminated with *E. coli* O157:H7 and Brie cheese contaminated with *Listeria monocytogenes* are adulterated.

If a food contains a poisonous substance in excess of a tolerance, regulatory limit, or action level, mixing it with "clean" food to reduce the level of contamination is not allowed. The deliberate mixing of adulterated food with good food renders the finished product adulterated

### Filth and Foreign Matter

Filth and extraneous material include any objectionable substances in foods, such as foreign matter (for example, glass, metal, plastic, wood, stones, sand, cigarette butts), undesirable parts of the raw plant material (such as stems, pits in pitted olives, pieces of shell in canned oysters), and filth (namely, mold, rot, insect and rodent parts, excreta, decomposition)

### Economic Adulteration

A food is adulterated if it omits a valuable constituent or substitutes another substance, in whole or in part, for a valuable constituent (for instance, olive oil diluted with tea tree oil); conceals damage or inferiority in any manner (such as fresh fruit with food coloring on its surface to conceal defects); or any substance has been added to it or packed with it to increase its bulk or weight, reduce its quality or strength, or make it appear bigger or of greater value than it is (for example, scallops to which water has been added to make them heavier).

### Microbiological Contamination and Adulteration

The fact that a food is contaminated with pathogens (harmful microorganisms such as bacteria, viruses, or protozoa) may, or may not, render it adulterated. Generally, for ready-to-eat foods, the presence of pathogens will render the food adulterated. For example, the presence of *Salmonella* on fresh fruits or vegetables or in ready-to-eat meat or poultry products (such as luncheon meats) will render those products adulterated.

For meat and poultry products, which are regulated by USDA, the rules are more complicated. Ready-to-eat meat and poultry products contaminated with pathogens, such as *Salmonella* or *Listeria monocytogenes*, are

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adulterated. For raw meat or poultry products, the presence of pathogens will not always render a product adulterated (because raw meat and poultry products are intended to be cooked and proper cooking should kill pathogens). Raw poultry contaminated with *Salmonella* is not adulterated.



## Methods for Detection of common adulterants in food

SNO	FOOD ARTICLE	ADULTERANT	METHOD FOR DETECTION	REMARKS
1.	Milk	Water	<p>i. The lactometer reading shall not ordinarily be less than 26.</p> <p>ii. The presence of water can be by putting a drop of milk on a polished slanting surface. The drop of pure milk either or flows slowly leaving a white trail behind it, whereas milk adulterated water will flow immediately without leaving a mark,</p>	<p>Lactometer is marked in degrees ranging from 0 — 40.</p> <p>The test is not valid if skimmed milk or other thickening material is added.</p>
2.		Starch	Add a few drops of tincture of Iodine or Iodine solution. Formation of blue colour indicates the presence of starch.	
3.		Removal of Fat	The lactometer reading will go above 26 while the milk apparently remains thick	
4.	Milk	Glucose	Take a teaspoonful of milk in a test tube. Dip a strip of <b>diastix</b> in it or 30 second. A change in colour from blue to green indicates the presence of glucose in milk.	
5.		Sugar	Take 3 ml of the milk in a test tube. Add 2 ml of the hydrochloric acid. Heat the test tube after adding 50 mg of resorcinol. The red colouration indicates the use of sugar in the milk.	
6.		Sodium-bi-carbonate/ Neutralizer.	Take 3 ml of the milk in a test tube and add 5 mL of rectified spirit to it. Then add 4 drop of rosalic acid solution. The appearance of red/ rosy colouration indicates the presence of sodium- bi- carbonate in the milk.	
7.		Urea	Take a teaspoon of milk in a test tube. Add ½ teaspoon of soybean or arhar powder. Mix up the contents thoroughly by shaking the test tube. After 5 minutes, dip a red litmus paper in it. Remove the paper after	

		½ a minute. A change in colour from red to blue indicates the presence of urea in the milk.	
8.	Boric acid	Take 3 ml of milk in a test tube. Add 20 drops of hydrochloric acid and shake the test tube or mix up the contents thoroughly. Dip a yellow paper- strip, and remove the same after 1 minute. A change in the colour from yellow to red, followed by the change from the red to green , by addition of ammonia drop solution, indicates that the boric acid is present in the milk (to prepare the yellow paper-strip, dips strips of filter paper in an aqueous solution of the turmeric, and dry it up).	
9.	Vanaspati	Take 3 ml of milk in a test tube. Add 10 drops of hydrochloric acid. Mix up one teaspoonful of sugar. After 5 minutes, examine the mixture. The red colouration indicates the presence of vanaspati in the milk.	
10.	Formalin	Take 10 ml of milk in a tests tube and add 5 ml of con sulphuric acid from the sides of the wall without shaking. If a violet or blue ring appears at the intersection of two layers then it shows presence of formalin.	Formalin enhances the life of milk and thus is added for preservation purpose.
11.	Detergent	Shake 5-10 ml. of sample with an equal amount of water lather indicates the presence of detergent.	
12.	Sodium chloride	Take 2 ml of milk in a test tube. Add 0.1 ml of 5% potassium chromate solution and 2.0 ml of 0.1 N silver nitrate. Appearance of red precipitate indicates the presence of sodium chloride in milk.	
13.	Milk	Synthetic milk	Synthetic milk has a bitter after taste, gives a soapy feeling on rubbing between the fingers and turns yellowish on heating.
14.	Synthetic milk- test for protein		The milk can easily be tested by <b>Urease strips</b> (available in the Medical stores) because Synthetic milk is devoid of protein.
15.	Test for Glucose/ inverted sugar/ sugar syrup.	Milk does not contain glucose /invert sugar, if test for glucose with urease strip found positive. It means milk is adulterated.	If it is made synthetically by adding white colour water paint. Oils, alkali, urea and

			detergent etc. Glucose, inverted sugar syrup is added in milk to increase the consistency and test
16.		Sodium Chloride	Take 2 ml of milk in a test tube, add 2 drops of 5% Potassium chromate solution and 2 ml of 0.1 N silver nitrate solutions to it. The appearance of a red precipitate indicates the absence of dissolved chloride in milk and appearance of yellow colour indicates the presence of dissolved chloride.

### MILK AND MILK PRODUCTS

1.	Sweet Curd	Vanaspati	Take 1 teaspoon full of curd in a test tube. Add 10 drops of hydrochloric acid. Mix up the contents shaking the test tube gently. After 5 minutes, examine the mixture. The red colouration indicates the presence of vanaspati in the curd.
2.	Rabdi	Blotting paper	Take a teaspoon of rabri in a test tube. Add 3 ml of hydrochloric acid and 3 ml of distilled water. Stir the content with a glass rod. Remove the rod and examine. Presence of fine fibres to the glass rod will indicate the presence of blotting paper in rabri.
3.	Khoa and its products	Starch	Boil a small quantity of sample with some water, cool and add a few drops of Iodine solution. Formation of blue colour indicates the presence of starch
4.	Chhana or Paneer	Starch	Boil a small quantity of sample with some water, cool and add a few drops of Iodine solution. Formation of blue colour indicates the presence of starch.
5.	Ghee, cottage cheese, condensed milk, khoa,	Coal Tar Dyes	Add 5 ml of dil. $H_2SO_4$ or conc. HCL to one teaspoon full of melted sample in a test tube. Shake well. Pink colour (in case of $H_2SO_4$ ) or crimson colour (in case of HCL)

	milk powder etc,		indicates coal tar dyes. If HCl does not give colour dilute it with water to get the colour.	
6.	Ghee	Vanaspathy or Margarine	Take about one tea spoon full of melted sample of Ghee with equal quantity of concentrated Hydrochloric acid in a stoppered test tube and add to it a pinch of sugar. Shake for one minute and let it for five minutes. Appearance of crimson colour in lower (acid) of Vanaspati or Margarine.	<p>The test is specific for sesame oil which is compulsorily added to Vanaspati and Margarine. Some coal tar colours also give a positive test.</p> <p>If the test is positive i.e. red colour develops only by adding strong Hydrochloric acid (without adding crystals of sugar) then the sample is adulterated with coal tar dye. If the crimson or red colour develops after adding and shaking with sugar, then alone Vanaspati or Margarine is present</p>
7.		Mashed Potatoes, Sweet Potatoes and other starches.		

			<p>The presence of mashed potatoes and sweet potatoes in a sample of ghee can easily be detected by adding a few drops of Iodine, which is brownish in colour turns to blue if mashed potatoes/sweet potatoes/other starches are present.</p>	
8.	Butter	Vanaspati or Margarine	<p>Take about one teaspoon full of melted sample of butter with equal quantity of concentrated Hydrochloric acid in a stoppered test tube and add to it a pinch of sugar. Shake for one minute and let it for five minutes. Appearance of crimson colour in lower (acid) layer shows presence of Vanaspati or Margarine.</p>	<p>The test is specific for sesame oil which is compulsorily added to Vanaspati and Margarine. Some coal tar colours also give a positive test.</p> <p>If the test is positive i.e. red colour develops only by adding strong Hydrochloric acid (without adding crystals of sugar) then the sample is adulterated with coal tar dye. If the crimson or red colour develops after adding and shaking with sugar, then alone Vanaspati or Margarine is present</p>
9.		Mashed potatoes other starches	<p>The presence of mashed potatoes and sweet potatoes in a sample of butter can easily be detected by adding a few drops of iodine (which is brownish in colour), turns to blue.</p>	

## OILS AND FATS

1.	Oils and fats	Argemone oil	Take small quantity of oil in a test tube. Add equal quantity of concentrated Nitric acid and shake carefully. Red to reddish brown colour in lower (Acid) layer would indicate the presence of Argemone oil	Colourless (not yellowish) Nitric acid may be used. Artificial colour if present will usually be a bright shade of colour, generally red or pink. The test may sometimes give misleading result. The test may not respond if the Argemone oil is present in small quantity.
2.		Mineral oil	Take 2 ml of the oil sample and add an equal quantity of N/2 Alcoholic potash. Heat in boiling water bath (dip in boiling water) for about 15 minutes and add 10 ml of water. Any turbidity shows presence of mineral oil.	If mineral oil is present in small quantity this test may not be positive.
3.		Castor oil	Take about one ml of the oil, add 10 ml of acidified petroleum ether and mix well, Add a few drops of ammonium molybdate reagent. Immediate appearance of white turbidity indicates the presence of castor oil.	If castor oil is present in small quantity, this test may be positive
4.		TOCO (Tri- ortho-cresyl-phosphate)	Take 2 ml of suspected sample of oil. Add a little butter yellow crystal. Immediate formation of red colour indicates presence of TOCP.	
5.	Mustard oil	Cotton seed oil	Take about 3 ml of mustard oil in a test tube. Add 2 ml of amyl alcohol in it and 1 ml of carbon di -sulphide and a little amount of	

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			<p>sulphur. Plug the mouth of the test tube and heat it on the flame of a spirit lamp for 3 minutes. A red colouration indicates the presence of cotton seed oil in the mustard oil.</p>	
6.	Edible oil	Prohibited colour	<p>Take 20 drops of the edible oil in each of the four test tubes. Make 3 different solutions, mixing up 1 part of distilled water, 3 parts of distilled water and 4 parts of distilled water. Add 2 ml of each solution in each of the test tubes and add 2 ml of hydrochloric acid in the mixture of any tube, indicates the presence of prohibited colour in the edible oil.</p>	
7.		Rancidity	<p>Take 3 ml of the edible oil in a test tube. Add 3 ml of hydrochloric acid, in it. Close the mouth of the test tube. Mix up the content. Add 3ml of 0.1% Phloroglucinol solution in it. Shake the test tube vigorously for 2 minutes and keep it aside. Examine the test tube after 30 minutes. A pink or red colouration in acid layer indicates that, the oil sample is rancid.</p>	
8.		Karanja oil (Pungam oil).	<p>To two drops of the oil add a solution of 40 % antimony trichloride in chloroform. Appearance of yellow to orange colour immediately shows the presence of Karanja oil.</p>	
9.	Coconut oil	Any other oil	<p>Place a small bottle of oil in refrigerator. Coconut oil solidifies leaving the adulterant as a Separate layer.</p>	
10.		cyanide	<p>Take 3ml of the edible oil in a test tube. Add 10 drops of alcoholic potash and heat the tube on the flame of a spirit lamp. Make an addition of a little amount of each of the ferrous sulphate and ferric chloride in the test tube, and shake it to mix up the contents thoroughly. Add 3 ml hydrochloric acid. The blue colouration indicates the presence of hydro cyanide acid, which gets produced due to presence of cyanide in edible oil.</p>	

**SWEETENING AGENTS**

1.	Sugar	Chalk powder		
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			Dissolve 10 gm of sample in a glass of water, allow settling, Chalk will settle down at the bottom.	
2.		Urea	On dissolving in water it gives a smell of ammonia.	
3.	Pithi Sugar	Washing Soda	Add few drops of Hydrochloric acid, effervescence (give off bubbles) will indicate the presence of washing soda.	
4.		Chalk powder	Dissolve 10 gm of sample in a glass of water, allow to settle, chalk will settle down at the bottom.	
5.		Yellow colour (Non-permitted)	Take 5 ml in a tests tube from the above solution and add a few drops of conc. Hcl. A pink colour in lower acid layers shows the presence of non- permitted colour.	
6.	Honey	Sugar solution	A cotton wick dipped in pure honey when lighted with a match stick burns and shows the purity of honey. If adulterated, the presence of water will not allow the honey to burn, If it does; it will produce a cracking sound.	This test is only for added water.
7.	Jaggery	Sodium bi carbonate	Take ¼ of a tea spoon of the jaggery in a test tube. Add 3 ml of Muratic acid. The presence of sodium carbonate effects effervescence.	
8.		Metanil yellow colour	Take ¼ of a teaspoon of the jaggery in a test tube. Add 3 ml of alcohol and shake the tube vigorously to mix up the content. Pour 10 drops of hydrochloric acid in it. A pink colouration indicates the presence of metanil yellow colours in jaggery.	
9.	Jaggery	Washing soda	Add a few drops of solution HCL. Effervescence shows presence of washing soda.	
10.	jaggery	Chalk powder	Dissolve a little amount sample in water in a test tube, chalk powder settles down. -Or- Add a few drops of conc Hcl solution,	

			effervescence indicates the presence of adulterant.
11.	Honey	Invert sugar/ Jaggery	Fiehe's Test: Add 5 ml. Of solvent ether to 5 ml. of honey. Shake well and decant the ether layer in a Petri dish. Evaporate completely by blowing the ether layer. Add 2 to 3 ml. Of resorcinol (1 gm. Of resorcinol resublimed in 5 ml. Of conc. HCl.) Appearance of cherry red colour indicates presence of sugar/ jaggery.
12.		Sugar solution	Add a drop of honey to a glass of water, if the drop does not disperse in water it indicates that the honey is pure. However, if the drop disperses in water it indicates presence of added sugar.
13.	Bura sugar	Washing soda	Add 1 ml of HCl to a little of bura sugar. Effervescence occurs if washing soda is present. Dissolve 2 gm of sugar in water; dip a red litmus paper in the solution. If washing soda is present, it will turn blue.
12.	Sweetmeats, Ice-cream and beverages	Metanil yellow (a non-permitted coal tar colour)	Extract colour with luke-warm from food articles. Add few drops of concentrated Hydrochloric acid. If magenta red colour develops the presence of metanil yellow is indicated.
13.		Saccharin	i. Taste a small quantity. Saccharin leaves a lingering sweetness on tongue for a considerable time and leaves a bitter taste at the end.
			ii. Take two spoons of liquid sample or about 5 to 10 gins of solid sample with little quantity of water in a test tube, add few drops of Hydrochloric acid and 10 ml of solvent ether. Shake well. Decant the ether layer into a test tube or a beaker, evaporate the ether spontaneously. Add one drop of water (warm) to the residue and taste. Sweet taste will indicate the presence of saccharin

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**FOOD GRAIN AND THEIR PRODUCTS**

<b>1.</b>	<b>Wheat, Rice, Maize, Jawar, Bajra, channa, Barley etc.</b>	<b>Dust, pebble, stone, straw, weed seeds, damaged grain, weevilled grain, insects, rodent hair and excreta</b>	<b>These may be examined visually to see foreign matter, damaged grains, discoloured grains, insect, rodent contamination etc.</b>	<b>Damaged / discoloured grains should be as low as possible since they may be affected by fungal toxins, argemone seeds, Dhatura seeds etc. In moderately excessive amount can result in risk to health, Discard the damaged undesirable grains before use</b>
<b>2.</b>	<b>Ergot (a fungus containing poisonous substance)</b>	<b>(i) Purple black longer sized grains in Bajra show the presence of Ergots. (ii) Put some grains In a glass tumbler containing 20 per cent salt solution Ergot floats over the surface while sound grains settle down.</b>		

3.		<b>Dhatura</b>	Dhatura seeds are flat with edges with blackish brown colour which can be separated out by close examination.
4.		<b>Karnel Bunt</b>	The affected wheat kernel have a dull appearance, blackish in colour and rotten fishsmell,
5.	<b>Sella Rice (Parboiled Rice)</b>	<b>Metanil yellow (a non-permitted coal tar colour)</b>	Rub a few grains in the palms of two hands. Yellow would get reduced or disappear. Add a few drops of dilute Hydrochloric acid to a few rice grains mixed with little water, presence of pink colour indicates presence of Metanil yellow
6.		<b>Turmeric (colouring for golden appearance)</b>	(i) Take a small amount of sample in a test tube, add some water and shake. Dip Boric acid paper (filter paper dipped in Boric acid solution) If it turns pink turmeric is present. (ii) Take some rice and sprinkle on it a small amount of soaked lime for some time, grains will turn red if turmeric is present.
7.	<b>Parched rice</b>	<b>Urea</b>	Take 30 numbers of parched rice in a test tube. Add 5ml of distilled water in it. Mix up the contents thoroughly, by shaking the test tube. After 5 minutes, filter the water-contents, and add ½ teaspoon of powder of arhar or soybean in it. Leave it for 5 minutes, and then dip a red litmus paper in the mixture. Take out the litmus paper after 30 seconds and examine it. A blue colouration indicates the presence of urea in the parched rice.
8.	<b>Maida/ Rice</b>	<b>Boric Acid</b>	Take a small amount of sample in a test tube, add some water and shake. Add a few drops of HCl. Dip a turmeric paper strip if it turns red, boric acid is present.
9.	<b>Maida</b>	<b>Resultant atta or cheap flour</b>	When dough is prepared from resultant or left out atta, more water has to be used. The normal taste of chapattis prepared out of wheat is somewhat sweetish whereas those prepared out of adulterated wheat will taste insipid.
10.	<b>Food grains</b>	<b>Hidden insect</b>	Take a filter paper impregnated with

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		infestation	Ninhydrin (1% in alcohol.) Put some grains on it and then fold the filter paper and crush the grains with hammer. Spots of bluish purple colour indicate presence of hidden insects infestation	
11.	Wheat flour	Excess bran	Sprinkle on water surface. Bran will float on the surface.	
12.	Wheat flour	Chalk powder	Shake sample with dil. HCl Effervescence indicates chalk.	Chalk powder is used as an adulterant due to its weight.
13.	Wheat flour	Excessive sand and dirt	Shake a little quantity of sample with about 10 ml. Of Carbon tetra chloride and allow to stand. Grit and sandy matter will collect at the bottom.	
14.	Dal whole and spilt	Khesari Dal	(i) Khesari dal has edged type appearance showing a slant on one side and square in appearance in contrast to other dals.	
15.			(ii) Add 50 ml of dilute Hydrochloric acid to the sample and keep on simmering water for about 15 minutes. The pink colour developed indicates the presence of Khesari dal.	The test is only for Khesari dal. (Metanil yellow if present will give a similar colour immediately even without simmering).
16.		Clay, stone, gravels, webs, insects, rodent hair and excreta	Visual examination will detect these adulterants	Reject if the number of Insects is large or if the odour is unpleasant and taste bitter or gritty
17.		Metanil yellow (a non permitted coaltar colour)		

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			Take 5 gms of the sample with 5 ml. of water in a test tube and add a few drops of concentrated Hydrochloric acid. A pink colour shows presence of Metanil yellow	
18.	Atta, Maida Suji (Rawa)	Sand, soil, insects, webs, lumps, rodent hair and excrete	These can be identified by visual examination.	
19.		Iron filings	By moving a magnet through the sample, iron filings can be separated.	
20.	Bajra	Ergot infested Bajra.	Swollen and black Ergot infested grains will turn light in weight and will float also in water	
21.	Sago	Sand or talcum	Put a little quantity of sago in mouth, it will have a gritty feel, if adulterated. Burn the sago, if pure, it will swell and leave hardly any ash. Adulterated sago will leave behind appreciable quantity of ash.	
22.	Besan	Metanil Yellow	Take ½ teaspoon of the besan in a test tube. Pour 3 ml of alcohol in the test tube. Mix up the contents thoroughly by shaking the test tube. Add 10 drops of hydrochloric acid to it. A pink colouration indicates presence of metanil yellow in the gram powder.	
23.		Khesari Flour	Add 50 ml of dilute Hydrochloric acid to 10 gms. of sample and keep on simmering water for about 15 minutes. The pink colour, if developed, indicates, the presence of Khesari flour	The test is only for Khesari del (Metanil yellow, if present will give a similar colour even without simmering).
24.	Pulses	Lead Chromate	Shake 5 gm. Of pulse with 5 ml. Of water and add a few drops of HCl. Pink colour indicates Lead Chromate.	

SPICES

1.	Whole spices	Dirt, dust, straw, insect, damaged seeds, other seeds, rodent hair and excrete	These can be examined visually	
2.	Black pepper	Papaya seeds	Papaya seeds can be separated out from pepper as they are shrunken, oval in shape and greenish brown or brownish black in colour.	
3.		Light black berries.	Float the sample of black pepper in alcohol (rectified spirit). The black pepper berries sink while the papaya seeds and light black pepper float.  (ii) Press the berries with the help of fingers light peppers will break easily while black berries of pepper will not break.	
4.		Coated with mineral oil	Black pepper coated with mineral oil gives Kerosene like smell.	
5.	Cloves	Volatile oil extracted (exhausted cloves)	Exhausted cloves can be identified by its small size and shrunken appearance. The characteristic pungent of genuine cloves is less pronounced in exhausted cloves	
6.		Coated with mineral oil	Cloves coated with mineral oil gives kerosene like smell	
7.	Mustard seed	Argemone seed	Mustard seeds have a smooth surface The argemone seed have grainy and rough surface and are black and hence can be separated out by close examination. When Mustard seed is pressed inside it is yellow while for Argemone seed it is white	Use magnifying glass for identification.
8.	Powdered spices	Added starch	Add a few drops of tincture of Iodine or Iodine solution. Indication of blue colour shows the presence of starch.	Iodine test for added starch is not applicable for turmeric

				powder.
9.		Chalk powder, yellow soap, stone powder.	Take one gm of powdered spices in a test tube and add 5 ml of carbon- tetra- chloride solvent. Shake well and leave for some time. Impurities will settle at the bottom, while the spice powder will float on the surface.	
10.		Common Salt	Taste for addition of common salt.	
11.	Turmeric powder	Coloured saw dust	Take a tea spoon full of turmeric powder in a test tube. Add a few drops of concentrated Hydrochloric acid. Instant appearance of pink colour which disappears on dilution with water shows the presence of turmeric. If the colour persists, metanil yellow (an artificial colour) a now permitted coal tar colour is present.	This test is only for Metanil yellow
12.		Chalk powder or yellow soap stone powder	Take a small quantity of turmeric powder in a test tube containing small quantity of water. Add a few drops of concentrated Hydrochloric acid, effervescence (give off bubbles) will indicate the presence of chalk or yellow soap stone powder	
13.	Turmeric powder	Starch of maize, wheat, tapioca, rice	A microscopic study reveals that only pure turmeric is yellow coloured, big in size and has an angular structure. While foreign/added starches are colourless and small in size as compared to pure turmeric starch.	
14.	Turmeric whole	Lead chromate	Appears to be bright in colour which leaves colour immediately in water.	
15.	Chillie powder	Brick powder, salt powder or talc. powder		This test is only for earthy material

			<p>Take a tea spoon full of chillies powder in a glass of water. Coloured water extract will show the presence of artificial colour. Any grittiness that may be felt on rubbing the sediment at the bottom of glass confirms the presence of brick powder/sand, soapy and smooth touch of the white residue at the bottom indicates the presence of soap stone.</p> <p>To a little powder of chilli add small amount of conc HCl and mix to the consistency of paste, dip the rear end of the match stick into the paste and hold over the flame, brick red flame colour due to the presence of calcium slats in brick powder.</p>	
16.		<b>Artificial colours</b>	Sprinkle the chilli powder on a glass of water. Artificial colorants descend as coloured streaks.	
17.		<b>Oil soluble coal tar colour</b>	Take 2 gms of the sample in a test tube, add few ml of solvent ether and shake. Decant ether layer into a test tube containing 2 ml of dilute Hydrochloric acid (1 ml HCL plus 1 ml of water). Shake it, the lower acid layer will be coloured distinct pink to red indicating presence of oil soluble colour	
18.		<b>Water soluble synthetic colour</b>	Water soluble artificial colour can be detected by sprinkling a small quantity of chillies or turmeric powder on the surface of water contained in a glass tumbler. The water soluble colour will immediately start descending in colour streaks	
19.	<b>Chilli powder</b>	<b>Sudan III</b>	Take 1 g of suspected chilli powder in a test tube and add 2ml of hexane to it shake well. Lt it settles for some time and decant the clear solution to another test tube. Ad 2 ml of aceto- nitrile reagent and shake well. The appearance of red colour in the lower aceto- nitrile layer is an indication of the presence of Sudan III.	Sudan III is an artificial colour which finds much use in wax polishes.

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20.		Sawdust	Sprinkle chilli powder on the Sawdust will float on water and added surface of water	
21.	Chilli powder	Rhodamine B	Take ¼ the teaspoon of the red chilli powder in a test tube. Add 3 ml of distilled water in it, and 10 drops of carbon- tetra- chloride. Vigorously shake the tube to mix up the contents. The red colour will disappear as the result of shake, and if the red colour reappears with the addition of a drop of hydrochloric acid, the adulteration of rhodamine B colour in the chilli powder is positive	
22.	Asafoetida (Hing)	Soap stone or other earthy mailer	Shake little portion of the sample with water and allow to settle. Soap stone or other earthy mailer will settle down at the bottom.	In compounded hing due to presence of starch, a slight turbid solution may be produced. However, this will settle down after keeping
23.		Starch	Add tincture of iodine, appearance of blue colour shows the presence of starch.	Compound of asafoetida contains starch which is declared on the label. This test is not applicable for compound asafoetida.
24.		Foreign resin	Burn on a spoon, if the sample burns like camphor, it indicates the sample is pure.	Pure hing burns like aromatic camphor
25.	Spices	Powdered bran and saw dust	Sprinkle on water surface. Powdered bran and sawdust float on the surface.	
26.	Cinnamon	Cassia bark	Cinnamon barks are very thin and can be rolled. It can be rolled around a pencil or pen. It has a distinct smell. Whereas cassia ark comprise of several layers in between the rough outer and inner most smooth layers. On examination of the ark loosely, a clear distinction can be made.	
27.	Cumin seeds	Grass seeds coloured with charcoal dust	Rub the cumin seeds on palms. If palms turn black adulteration is indicated.	
28.	Green chilli	Malachite green	Take a cotton piece soaked in liquid	

	and green vegetables.		paraffin and rub the outer green surface of a small part of green vegetable. If the cotton turns, green, we can say the vegetable is adulterated with malachite green.	
29.	Green peas	Artificially coloured	Take a little amount of green peas in a 250 ml beaker add water to it and mix well. Let it stand for half an hour. Clear separation of colour in water indicates adulteration.	
30.	Saffron	Coloured tendrils maizecob Dried of	Genuine saffron will not break easily like artificial. Artificial saffron is prepared by soaking maize cob in sugar and colouring it with coal tar colour. Genuine saffron will not break easily like spurious saffron. The colour dissolves in water if artificially coloured. A bit of pure saffron when allowed to dissolved in water will continue to give its saffron colour so long as it lasts	
31.	Powdered food stuff like betelnut spices, etc.	Sand, dirt, earth, gritty matter	Take a little amount of the sample in a test tube and add 10 ml of carbon tetrachloride to it. Shake well and allow standing for 5 minutes. Sand, dirt, earth, gritty matters, etc. will settle down at the bottom of the test tube.	

MISCELLANEOUS PRODUCTS

1.	Common salt	White powdered	Stir a spoonful of sample of salt in a glass of water. The presence of chalk will make solution white and other insoluble impurities will settle down.	
2.	Iodized salt	Common salt	Cut a piece of potato, add salt and wait minute and add two drops of lemon juice. If iodized salt blue colour will develop. In case of common salt, there will be no blue colour.	
3.	Tea		Take a filter paper and spread a few tea leaves. Sprinkle with water to wet the filter	

	leaves	Exhausted tea	<p>paper. If coal tar colour is present it would immediately stain the filter paper. Wash the filter paper under tap water and observe the stains against light</p> <p>Spread a little slaked lime on white porcelain tile or glass plate; sprinkle a little tea dust on the lime. Red, orange or other shades of colour spreading on the lime will show the presence of coal tar colour. In case of genuine tea, there will be only a slight greenish yellow colour due to chlorophyll, which appear after some time</p>	
4.		Iron fillings	By moving a magnet through the sample, iron filling can be separated.	
5.	Coffee powder	Cereal starch	Take ¼ teaspoon of coffee powder in a test tube and add 3 ml of distilled water in it. Light a spirit lamp and heat the contents to colorize. Add about 33 ml of potassium permanganate solution and muriatic acid (1:1) to decolorize the mixture. The formation of blue colour in the mixture, when adding a drop of 1% aqueous solution of iodine indicates adulteration with starch.	
6.		Chicory	Gently sprinkle the coffee powder sample on the surface of water in a glass. The coffee floats over the water but chicory begins to sink down within a few seconds. The falling chicory powder particles leave behind them a trail of colour, due to large amount of caramel	
7.		Tamarind seed/ date	Sprinkle the suspected coffee powder on white filter/blotting paper and spray 1 per cent sodium carbonate solution on it. Tamarind and date seed powder will, if present, stain blotting paper/filter paper red.	

8.	Coffee Powder	Corched persimmon	Take 1 tsp of coffee powder and spread it on a moisturized blotting paper. Pour 3 ml of 2% aqueous solution of sodium carbonate slowly and carefully on it. A red coloration indicates the presence of the powder of scorched persimmon stones in the coffee powder.	
9.	Supari Pan Masala	Colour	Colour dissolves in water immediately.	
10.		Saccharin	Saccharin gives excessive and lingering sweet taste and leaves bitter taste at the end.	
11.	Catachu powder	Chalk	Chalk gives effervescence (gives off bubbles) with concentrated Hydrochloric acid	This test is only for Chalk.
12.	Processed foods, sweets and syrups	Rhoda mine B	If this chemical colour is present in the food, it is very easy to detect. Because it shines very brightly under the sun. Also it can be detected by a more precise method. Take ½ teaspoon of the sample in a test tube. Pour 3 ml of carbon tetra chloride and shake the test tube to mix the contents. The mixture turns colourless and addition of a drop of hydrochloric acid brings the colour back, when food contains Rhodamine b colour.	
13.	Lemonade soda	Mineral acid	Pour 2 drops of the lemonade soda on a metanil yellow paper- strip. A violet coloration indicates the presence of mineral acid in aerated water. The colour impression gets retained even after drying the paper (you can prepare metanil yellow paper strips by soaking filter paper strips in 0.1 % aqueous solution and then drying the	

			paper – strips).	
14.	Sweet Potato	Rhodamine B colour	Take a cotton piece soaked in liquid paraffin, and rub the outer red surface of the sweet potato. If the cotton absorb colour, it indicates the use of Rhodamine B colours on the outer surface of the sweet potato.	
15.	Pulses	Lead Chromate	Shake 5 gm. Of pulse with 5 ml. Of water and add a few drops of HCl. Pink colour indicates Lead Chromate.	
16.	Silver leaves	Aluminium leaves	(i). On ignition, genuine silver leaves burn away completely, leaving glistening white spherical ball of the same mass whereas aluminium leaves are reduced to ashes of dark grey blackish colour. (ii), Take silver leaves in test tube, add diluted Hydrochloric acid. Appearance of turbidity to white precipitate indicates the presence of silver leaves. Aluminium leaves do not give any turbidity or precipitate. (iii) Take a small portion of metal leaves and add a few drops of concentrated Nitric acid. Silver leaves will completely dissolve whereas aluminium leaves will remain undisclosed.	
17.	Vinegar	Mineral Acid	Test with the Metanil yellow indicator paper, in case, the colour changes from yellow to pink, mineral acid is present	

## ANNEXURE I

### Reagents in Instruction manual Part II



Reagent No	Chemical name
1.	0.1 N silver Nitrate.
2.	5% Potassium chromate
3.	Acetonitrile.
4.	Alcohol.
5.	Alcoholic potash
6.	Ammonium Molybdate
7.	Amyl alcohol
8.	Antimony Trichloride
9.	Boric acid
10.	Carbon di sulphur
11.	Caron tetrachloride
12.	Chloroform.
13.	Diastix strip
14.	Dilute hydrochloric acid
15.	Ferric chloride
16.	Ferrous sulphate
17.	Hexane
18.	Hydrochloric acid
19.	Iodine/Tincture of iodine
20.	Liquid paraffin
21.	Metanil yellow powder.
22.	Muratic acid
23.	Ninhydrin (1% in alcohol)
24.	Nitric acid
25.	Petroleum ether
26.	Phloroglucinol
27.	Potassium Hydroxide
28.	Potassium permagnate
29.	Rectified sprit
30.	Red litmus paper
31.	Resorcinol
32.	Rosalic acid
33.	Slake lime
34.	Sodium bi carbonate

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- 35. Sodium Carbonate
- 36. Solvent ether
- 37. Solvent ether
- 38. Urease strip

## Apparatus in the Instruction Manual Part II

- 1. Magnifying Glass
- 2. Spatula
- 3. Magnet
- 4. Forcep
- 5. Lactometer
- 6. Beaker
- 7. Petri dishes
- 8. Dropper
- 9. Reagent Bottles
- 10. Spirit lamp
- 11. Test tube ordinary
- 12. Test tube stoppered
- 13. Glass rod
- 14. Test tube holder.
- 15. Small plastic tray white
- 16. Porcelain tile white
- 17. Glass Cylinder
- 18. Glass Marking Pencil
- 19. Filter Paper
- 20. White silk cloth
- 21. Cotton.
- 22. Magnet.

**Annexure II**  
**PRECAUTIONS TO BE TAKEN**

- All the chemicals should be used after taking necessary precautions.
- Always keep the chemicals away from the reach of children.
- In case of spillage of chemical reagents on body or cloth, wash with plenty of cold water till the reagent is completely washed away.