

7.1 FOOD ADULTERATION

Adulteration is defined as the process by which the quality or the nature of a given substance is reduced through

- (I) the addition of a foreign or an inferior substance and
- (II) (ii) the removal of a vital element

A good example for the first one is addition of water to milk and that for the second is removal of fat from milk.

Adulteration of food may endanger health if the physiological functions of the consumer are affected due to either addition of a deleterious substance or the removal of a vital component.

7.1.1 TYPES OF ADULTERATION

Adulteration may be intentional or unintentional. The former is a willful act on the part of the adulterator intended to increase the margin of profit. Incidental contamination is usually due to ignorance, negligence or lack of proper facilities.

a. Intentional adulteration

Intentional adulterants are sand, chips, stones, mud, powder, water, mineral oil and coaltar, dyes. These adulteration cause harmful effects on the body.

Table 7.1 gives methods of identification of adulterants in different foods.

Name of the food article	<i>Adulterant</i>	Simple method for detection of adulterant
Ghee or Butter	Vanaspati	Take about one teaspoonful of melted ghee or butter with equal quantity concentrated Hydrochloric Acid in a test tube and add to it a pinch of cane sugar. Shake well for one minute and test after 5 minutes. Appearance of crimson colour in lower (acidic) layer shows the presence of 'vanaspathi'. This test is specific for sesame oil which is compulsorily added to vanaspathi. Some of coaltar dyes also gives a positive test
	Mashed potatoes, sweet potato and	Add a drop of tincture of iodine. Iodine which is brownish in colour turns to blue if mashed potatoes/sweet potatoes/other starches are

	other starches	present.
Milk	Water	The lactometer reading should not ordinarily be less than 1.026.
		The presence of water can be detected by putting a drop of milk on a polished vertical surface. The drop of milk either stops or flows slowly leaving a white trail behind it; whereas milk adulterated with water will flow immediately without leaving a mark.
	Starch	Add tincture of iodine, indication of blue colour shows that the presence of starch This test is not valid if skimmed milk or other thickening material is added..
Khoa	Starch	Add a tincture of iodine. Iodine of blue colour shows the presence of starch.
Edible oils	Argemone oil	Add concentrated nitric acid to a sample and shake carefully. Red to reddish brown colour in acid layer would indicate the presence of argemone oil.
	Mineral oil	Take two ml of edible oil and add a quantity of N/2 alcoholic potash. Heat in boiling water both for 15 minutes and add 10 ml of water. Any turbidity within 5 minutes indicates the presence of mineral oil
	Castor oil	Dissolve some oil in petroleum ether in a test tube and cool in a ice salt mixture. Presence of turbidity within 5 minutes indicates the presence of oil. (This test is not for minute traces.)
Sweet meat, Ice cream, Sherbet	Metanil yellow (a non permitted coal	Extract colour with luke warm water from food article. Add few drops of conc. Hydrochloric acid. If magenta red colour develops the presence of

	tar dye)	metanil yellow is indicated.
Dals	Kesari dal	Add 50ml of dilute Hydrochloric acid to dal and keep on simmering water for about 15 minutes. The pink colour if develops indicates the presence of kesari dhal.
	Clay, stones, gravels lead chromate	Visual examination will detect these adulterants. Shake five grams of dhal with five ml of water and add few drops (yellow) of Hydrochloric Acid. A pink colour shows the presence of colour.
Hing	Soap stone (pumice stone) or other earthly matter.	Shake with water, soap stone or other earthy matter will settle to the bottom.
	Starch	Same test as in the case of Milk
Tea leaves	Exhausted tea or black or bengal gram dal husk with colour	tea leaves sprinkled on wet filter would immediately release added colour.
		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 dye. In the case of genuine tea, there will be only a slight greenish yellow colour due to chlorophyll which appears after sometime.
Saffron	Dyed tendrils of maize cob.	Genuine saffron will not break easily like artificial. Artificial saffron is prepared by soaking maize cob in sugar and colouring it with coal tar dye. The colour dissolves in water if artificially coloured. A bit of pure saffron when allowed to dissolve in water will continue to give its saffron colour so long as it lasts.

Wheat, bajra and other food grains	Ergot (fungus containing a poisonous substance)	Purple black longer size grains in bajra show the presence of ergots.
		Put some grains in a glass containing 20% salt solution. Ergot floats over the surface while sound grains settle down.
	Dhatuira-seeds	Dhatuira seeds resemble chillies seeds with blackish brown colour which can be separated out by close examination.
Sugar	Chalk powder	Dissolve in a glass of water, chalk will settle down at the bottom.
Black pepper	Dried seeds of papaya fruit	Papaya seeds can be separated out from pepper as they are shrunken, oval in shape and greenish brown or brownish black in colour. The suspected papaya seed in black pepper sample is distinguishable by its characteristics repulsive flavour quite distinct from the bite of black pepper.
	Light berries	Light berries float on spirit
Silver leaves	Aluminium leaves	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. The silver foil is very thin and if crushed between two fingers, crumbles to powder. Aluminium foil is comparatively thicker and only breaks to small shreds when passed similarly.
Turmeric	Coloured saw dust metanil yellow	Take a teaspoon full of turmeric powder in a test tube. Add a few drops of conc. Hydrochloric Acid. Instant appearance of violet colour which disappears on dilution with water. If the colour

		persists metanil yellow (an artificial dye) non permitted coal tar dye is indicated.
		This test is only for metanil yellow
Chilli powder	Stones	Any grittiness that may be felt on tapping the sediment at the bottom of glass confirms the presence of brick powder or sand. Smooth white residue at the bottom indicates the presence of soapstone.
Jaggery Powder	Chalk powder	Add few drops of HCl. Effervescence indicates adulteration. Stir a spoonful sample of sugar in a glass of water. The chalk settles down.
Cloves	Volatile oil extracted cloves	Exhausted cloves can be identified by its small size and shrunken appearance. The characteristics pungent taste of genuine cloves is less pronounced in exhausted cloves.
Rawa	Iron filling	By moving a magnet through it, iron fillings can be separated.
Rice	Marble or other stones	A simple test is to place a small quantity of rice on the palm of the hand and gradually immerse the same in water. The stone chips will sink
Wheat flour (maida)	Atta from which maida suji has been extracted	When dough is prepared from resultant wheat flour, more water has to be used and chapaties prepared out of this blow out. The normal taste of chapaties prepared out of this blow out wheat is some what sweetish whereas those prepared out of adulterated wheat flour will taste insipid.
Common salt	White powdered stone, chalk	Stir a spoonful of simple salt in a glass of water. The presence of chalk will make the solution white and other insoluble impurities will settle down.

Mustard seeds	Argemone Seeds	Mustard seeds have smooth surface. The argemone seeds have grainy and rough surface and are blacker hence can be separated out by close examination.
Honey	Molasses (sugar and water)	A cotton wick dipped in pure honey when lighted with a match stick burns. If adulterated the presence of water will not allow the honey to burn. If it does it will produce a cracking sound.
Supari	Colour and sachharin	Colour dissolves in water. Saccharin gives excessive and lingering sweet taste.
Pulses (green peas)	Colour dye stuffs and dals	Sample is kept immersed in water for about half an hour and stirred. Colour separation indicates adulteration.
Cinnamon	Cassia bark	Cinnamon barks are very thin. Cassia barks are thick and stiff, Cinnamon barks can be rolled
Coffee	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 behind them a trail of colour due to large amount of caramel they contain.
	Tamarind or date-seed powder	Sprinkle the suspected coffee powder on white blotting paper and spray over 1% sodium carbonate solution. Tamarind and date-seed powder will, If present, stain blotting paper red.