

How safe is your food?

Food adulteration can be defined as the intentional addition, substitution, or abstraction of substances which adversely affect the nature, substance and quality of foods. Adulteration can be intentional or incidental.

According to the Prevention of Food Adulteration Act of 1954, any article of food shall be deemed adulterated if:

- (1) It is not of the nature, substance and quality which it is ought to be.
 - (2) It contains, or processing has produced in it, injurious ingredients.
 - (3) It contains added inferior or cheaper substance.
 - (4) If any constituent has been abstracted from it partly or wholly.
 - (5) If it has been prepared, packed or kept under insanitary conditions.
 - (6) If it is insect infested.
 - (7) If it is obtained from a diseased animal.
 - (8) If it contains poisonous ingredients or anything which renders it injurious to health.
 - (9) If the container renders it poisonous or deleterious and injurious to health.
 - (10) If it contains unpermitted colour or any excessive amount of permitted ones.
 - (11) If it contains prohibited preservatives or an excessive amount of permitted ones.
 - (12) If it does not satisfy the prescribed standards laid down by the authorities.
- (This act came into force on 1st June, 1955 and the rules have been amended in 1968 and 1973).



The adulterants can endanger the normal functions of the body leading to serious health implications. Let us look at the health hazards caused by a few adulterants:

- **Sand, marble chips, earth and filth**, may be found in food grains, spices, pulses. These can break the teeth or have an adverse effect on the soft lining of the digestive tract.
- **Talc stone and chalk powder** are usually found in wheat flour and spices. Talc is hydrated magnesium silicate. Sandstone, mud, earth are also silicates which the human system cannot digest. They impair the normal smooth functioning of the digestive system in various ways. They may give rise to stomach cancer.
- **Excessive lime** is found in dry ginger. It makes the gastric lining rough and dry.
- **Excessive salt** is present in ready to use spices, *chat masala* and curry powder, because it is cheaper and increases the weight and margin of profit.
- **Starch** is added to *barfi* and other *khoya* preparations. When it is coloured with toxic pigments like lead chromate, it is harmful.
- **Rancid oil** Sometimes oils which have become rancid (old) are sold in the same state or mixed with good oil, to mask the unpleasant odour. Thus foodstuffs cooked in this oil lose their vitamin content.
- **Mineral oil** mixed with edible oil when taken in sufficient quantity causes gastrointestinal disturbances and vomiting. Mineral oils are petroleum derivatives and are much cheaper than edible oils. Small amounts interfere with the absorption of fat-soluble vitamins such as vitamin A.
- **Argemone seeds** are mixed with mustard seeds. The seeds have been proved to be dangerously toxic in the form of oil and seeds. The toxic factors are due to two

alkaloids. These are obtained from *Argemone mexicana* (the yellow flowered poppy plant with bluish silver-veined leaves). The seeds closely resemble mustard seeds in appearance although their surface is rough and uneven. The only difference is that the argemone seeds have a little tail at one end. There were reports of argemone poisoning in cities like Calcutta, Bombay and Madras. Gujarat, Bihar and West Bengal have topped the list of reported cases. Regular consumption of this oil gives rise to epidemic dropsy (resembling wet beri-beri) Water fluid is collected in the tissues of the body causing swelling. It starts with gastro-intestinal disturbance, irregular fever with rashes on exposed parts of the body and low pulse. Swelling feet and legs follow leading to oedema. As the disease progresses, glaucoma (eye disease which causes blindness), enlargement of the liver, cancer and respiratory distress are possible. It may even lead to fatal cardiac arrest.

- **Lathyrus (kesari dal)** is often mixed with (1) whole pulses like *black masoor*, *black Bengal gram*(2) Split pulses such as *arhar* and *chana dal*.(3)*Besan* hence in all preparations made out of *besan*. Excessive consumption of kesaridal produces lathyrism (a form of crippling paralysis of both lower limbs).
- **Toxic colourings:** Colour plays an important role in food acceptability. The common non-permitted colours used are mineral pigments like lead chromate, red or yellow earth colour dyes like metanil yellow, Rhodamine B. Metanil yellow is the most widely used colour which has carcinogenic effect. Intake of these colours produces various abnormalities of bones, eyes, skin, lungs ovaries, testicles, mental retardation, anaemia and accumulation of lead in the body and blood.



Following are some quick tests to detect adulterants in food. However, any firm conclusion about the presence of adulterant can be drawn only after a detailed analysis in a competent laboratory.

S No.	Name of Food article	Adulterant	Simple method for detection or adulteration
1	Pure ghee or butter	Vanaspati Mashed potatoes, other starches	Take 1 teaspoonful of melted ghee or butter with equal quantity of con. Hydrochloric acid in a test tube and add to it a pinch of cane-sugar. Shake well for one minute and let stand for 5 minutes. Appearance of crimson colour in lower (acidic) layer shows the presence of "vanaspati" Add a drop of tincture iodine to some ghee. Blue colour indicates presence of starch.
2	Milk	Water Starch	Put a drop of milk on a polished vertical surface. The drop of pure milk either stops or flows slowly leaving a white trail behind it, whereas milk adulterated with water will flow immediately without leaving a mark Add a drop of tincture iodine. If it turns blue, indicates presence of starch.
3	Mustard oil	Argemone seeds	Mix equal quantities of concentrated nitric acid to the sample mustard oil and shake

			well. Reddish brown colour in acid layer indicates the presence of argemone oil.
4	Sweet meat, ice-cream	Metanil yellow(non-permitted coaltar dye)	Extract colour with luke-warm water from food article. Add a few drops of concentrated hydrochloric acid. If magenta red colour develops, presence of metanil yellow indicated.
5	Dals	Kesari dal	Add 50 ml of diluted Hydrochloric acid to dal. Keep simmering water for 15 minutes. Pink colour indicates presence of kesari dal.
6	Sugar	Chalk powder	Dissolve in a glass of water, chalk will settle down at the bottom.
7	Silver foil	Aluminium foil	On ignition, genuine silver foil burns away completely leaving glistening white spherical ball of the same mass whereas aluminium foil is reduced to ashes of dark grey blackish colour.
8	Turmeric	Coloured saw dust	Take a teaspoonful of turmeric powder in a test tube. Add a few drops of concentrated hydrochloric acid. Instant appearance of violet colour, which disappears on dilution with water, shows the presence of turmeric. If the colour persists, presence of metanil yellow (a non-permitted dye) is indicated.
9	Honey	Molasses sugar	A cotton wick dipped in pure honey burns when ignited with a match stick. If adulterated, presence of water will not allow the honey to burn. If it does, it will produce a crackling sound.
10	Common salt	White powdered stone, chalk	Stir spoonful of sample of salt in a glass of water. The presence of chalk will make the solution white and other insoluble impurities will settle down
11	Rice	Marble or other stones	Place a small quantity of rice on the palm of the hand and gradually immerse the same in water. The stone chips will sink
12	Pithi Sakkar (jaggery powder)	Washing soda	Add a few drops of hydrochloric acid. Effervescence will indicate adulteration.
13	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 chicory powder particles leave behind them a trail of colour, due to large amount of caramel they contain.

(Sources: *Quick Tests for some Adulterants in Food* by Prevention of Food Adulteration Delhi Administration, Delhi, and *Food and Nutrition* by Gulati et.al.)

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