

Consuming Fruits Ripened Artificially by Calcium Carbide may pose Health Problems:

Fruits are one of the best natural food usually consumed raw. Now a days fruits are deliberately being contaminated by chemicals causing serious health hazard. Among the pre-treatments, which are mostly followed for fruits intended for better consumer acceptance and facilitating better marketing is artificial fruit ripening. Artificial ripening is done to achieve faster and more uniform ripening characteristics.

However, ripening, in general, is a physiological process which makes the fruit edible, palatable and nutritious. In nature fruits ripen after attainment of proper maturity by a sequence of physiological and biochemical events and the process is irreversible. Whether fruits ripen on the plant or after harvest, the general changes associated with ripening process is softening of fruit, change in colour and development of characteristic aroma and flavour. There is also reduction in sourness and increase in sweetness of the fruit. Usually fruits produce ethylene gas, a plant hormone, naturally that ripens the fruits.

What is Artificial Ripening?

Unsaturated hydrocarbons such as acetylene, ethylene etc. can promote ripening and induce colour changes effectively. Although the cosmetic quality of such artificially ripened fruits was found to improve, organoleptic quality was impaired especially when harvested fruits are subjected to treatment without considering their maturity status. Besides, the quantity of ripening agent required to induce ripening for better cosmetic quality, including appearance will be much more than conventional dose, when properly mature fruits are not used for such purposes.

What is Calcium Carbide?

With the development of fruit trade the fruits are sent to distant places, requiring several days in ordinary or refrigerated transportation and only firm and mature fruits are least damaged during marketing. The fruits are ripened at the destination markets before retailing and hence artificial ripening has become essential. The most commonly used chemical for artificial ripening is Calcium Carbide (CaC_2) and is popularly known as 'Masala', though banned under PFA Rules, 1955 and also under Food Safety and Standards(Prohibition and Restrictions on Sales) Regulations, 2011 made thereunder. Calcium Carbide is colourless when pure, but greyish-white to black in colour otherwise, with garlic like odour. When it reacts with water, it produces acetylene gas (popularly referred to as carbide gas) which is an analogue to ethylene and quickens the ripening process. Calcium Carbide contains traces of arsenic and phosphorous hydride.

$\text{CaC}_2 + 2\text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_2 + \text{Ca}(\text{OH})_2$ and said to have the same effect as ethylene the natural ripening hormone. However, acetylene is not nearly as effective for ripening as is ethylene and acetylene is not a natural hormone as ethylene.

A strong reactive chemical, Calcium Carbide has carcinogenic properties and is used in gas welding. Being cheap and easily available in the local markets, CaC_2 is indiscriminately being used in preference to other recommended practices of inducing ripening in fruits.

Effects of Calcium Carbide on Fruit Quality

Fruits ripened with Calcium Carbide are overly soft, are inferior in taste and flavour. They also have a shorter shelf life. The fruit ripened with Calcium Carbide may develop uniform attractive surface colour, but the tissue inside would not be ripe or may remain green or raw. When Calcium Carbide is used in very raw fruit, the amount of the chemical needed to ripen the fruit has to be increased. This results in the fruit becoming even more tasteless, unhealthy and possibly toxic.

Potential Health Effects associated with Calcium Carbide

Calcium Carbide is a dangerous and corrosive chemical. Carbide ripened fruits on consumption cause several harmful effects to human health. As discussed earlier, CaC_2 has cancer causing properties and contains traces of arsenic and phosphorous hydride. The early symptoms of arsenic or phosphorous poisoning include vomiting, diarrhoea with or without blood, burning sensation of chest and abdomen, thirst, weakness, difficulty in swallowing, irritation or burning in the eyes and skin, permanent eye damage, ulcers on the skin, sore throat, cough and shortness of breath. Higher exposure may cause a build-up of fluids in the lungs.

Consumption of fruits ripened with Calcium Carbide causes stomach upset because the alkaline substance is an irritant that erodes the mucosal tissues in the stomach and disrupts intestinal functions. As CaC_2 imitates acetylene gas, it may affect the neurological system by inducing prolonged hypoxia (low oxygen reaching the blood and tissues). The fast ripened fruits contain harmful properties because CaC_2 contains traces of arsenic and phosphorus and the production of acetylene gas has a hazardous effect on human. It may affect the neurological system by inducing prolonged hypoxia which causes headache, dizziness, mood disturbances, sleepiness, mental confusion, memory loss, cerebral oedema (swelling in the brain caused by excessive fluids) and seizure. CaC_2 is banned in many countries because it has carcinogenic properties and hazardous effects.

Examples of fruits and vegetables where artificial ripening by use of Calcium Carbide is generally practised in case of Mango, Banana, Papaya and sometimes for Sapota (Chiku), dates and tomatoes.

