

## **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 ( $\text{CaC}_2$ ) 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,  $\text{CaC}_2$  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,  $\text{CaC}_2$  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  $\text{CaC}_2$  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  $\text{CaC}_2$  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.  $\text{CaC}_2$  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.



### Identification of Calcium carbide Ripened Fruits

Qualitative parameters	Types of fruits	
	Artificially ripened fruit by Calcium carbide	Naturally ripened fruit
Weight per fruit	Fair	Good
Texture	Not very attractive but uniformly coloured	Attractive but not uniformly coloured
Aroma	Mildly good	Good
Firmness	Fair	Fair
Taste	In-core sour, mildly pleasant	Sweet, pleasant
Shelf-life	Shorter, black blotches appear on the skin of the fruit in two to three days	Longer

### Where and How to report a problem related to safety of food?

Anyone can report a problem relating to safety of food to the concerned Food Safety Commissioners of the States.

### Legal Provisions under Food Safety and Standards Act, 2006 and Food Safety and Standards Regulations, 2011 made thereunder:

1. As per Food Safety and Standards Regulations, 2011, 2.3.5 of Food Safety and Standards Regulations, (Prohibition and Restriction on sales) Regulations, 2011:

Prohibition of use of carbide gas in ripening of fruits: No person shall sell or offer or expose for sale or have in his premises for the purpose of sale under any description, fruits which have been artificially ripened by use of acetylene gas, commonly known as carbide gas.

2. As per Section 50 of Food Safety and Standards Act, 2006, Penalty for selling food not of the nature or substance or quality demanded.

Any person who sells to the purchaser's prejudice any food which is not in compliance with the provisions of this Act or the Regulations made thereunder, or of the nature or substance or quality demanded by the purchaser, shall be liable to a penalty not exceeding five lakh rupees.

3. As per Section 59 of Food Safety and Standards Act, 2006, Punishment for unsafe food.

Any person who, whether by himself or by any other person on his behalf, manufactures for sale or stores or sells or distributes or imports any article of food for human consumption which is unsafe, shall be punishable,-

- (i) where such failure or contravention does not result in injury, with imprisonment for a term which may extend to six months and also with fine which may extend to one lakh rupees;

- (ii) where such failure or contravention results in a non- grievous injury, with imprisonment for a term which may extend to one year and also with fine which may extend to three lakh rupees;
- (iii) where such failure or contravention results in a grievous injury, with imprisonment for a term which may extend to six years and also with fine which may extend to five lakh rupees;
- (iv) where such failure or contravention results in death, with imprisonment for a term which shall not be less than seven years but which may extend to imprisonment for life and also with fine which shall not be less than ten lakh rupees;

#### **Precautions to be taken by the Consumers**

- Wash the fruits thoroughly before consumption under potable running water for few minutes, so that the chemicals are washed away.
- While eating mangoes and apples, it is better to cut the fruit into pieces, rather than consuming them directly.
- As far as practically possible, peel off the fruits before consumption.

#### **References**

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