Analysis of Jaggery

What is Jaggery?

- Jaggery (also called as jaggeree) is a traditional, unrefined, non-centrifugal, whole cane-sugar consumed in Asia, Africa, Latin America and the Caribbean.
- Jaggery or "Gur" or whole sugar is a pure, wholesome, traditional, unrefined, whole sugar.
- It contains the natural goodness of minerals and vitamins inherently present in sugarcane juice & this crowns it as one of the most wholesome and healthy sugars in the world.
- It is a concentrated product of cane juice/date juice without separation of the molasses and crystals, and can vary from golden brown to dark brown in color.

Composition of Cane Jaggery

- Approximately 60-85% sucrose
- 5-15% glucose and fructose
- 0.4% of protein
- 0.1 g of fat
- 0.6 to 1.0 g of minerals (8 mg of calcium, 4 mg of phosphorus, and 11.4 mg of iron).
- Traces of vitamins and amino acids
- 100 g of jaggery gives 383 kcal of energy
Use of Jaggery

- Jaggery is used as an ingredient in both sweet and savory dishes across India and Sri Lanka. For example, a pinch of jaggery is sometimes added to sambar, rasam and other gravies which are staples in India.
- Jaggery is also added to lentil soups (dal) to add sweetness to balance the spicy, salty and sour components, particularly in Gujarati called (gaur) add in cooking.
- Jaggery is also molded into novelty shapes as a type of candy.
- Other uses include jaggery toffees and jaggery cake made with pumpkin preserve, cashew nuts and spices.
- Jaggery may also be used in the creation of alcoholic beverages.
- Jaggery is also considered auspicious in many parts of India, and is eaten raw before commencement of good work or any important new venture.
- It is a rich source of iron due to the process involved, using iron utensils.

More-over Jaggery is also used as:

- **Sweetening Agent**
- **Energy Food** (Because it contains Carbohydrates, which gives us energy on oxidation)
- **Cleansing Agent** (It effectively cleans the respiratory tracts, lungs, food pipes, stomach and intestines. It pulls out dust and unwanted particles from the body. It also helps in giving relief from constipation, perhaps due to presence of fiber in it.)
- **Digestive Agent** (In India, it is recommended to take a few grams of jaggery after a heavy meal of after eating meat. This facilitates digesting. What happens is that jaggery activates the digestive enzymes and itself changes to acetic acid in the stomach. This speeds up digestion.)
- **Source of Minerals** (Unlike sugar, Jaggery is very rich in minerals, predominantly iron with traces of other mineral salts. While most of the iron in it comes through processing in iron vessels, the other minerals come right from the sugar cane juice, since this juice does not undergo refining or bleaching of any kind. So, jaggery is a very good source of minerals for the body.)
Manufacturing Process - Manual

Crush Sugarcane using a crusher and Extract Juice out of it.

Pour the Juice in large shallow but thick IRON vessels / pan (kadhai) and made to boil over Earthen ovens

Stir continuously using large ladles to avoid sticking at the bottom of the vessel.

Stir and Boil for hours until most of the water from the juice is vaporized and the juice starts to thicken, as the concentration of sugar increases in it.

The juice is further clarified during the boiling stage. It is mostly done by using lime (calcium hydroxide). Lime addition simultaneously increases the normal pH of juice, i.e. 5.2-5.4 to around 6.0 to 6.4. Addition of lime also improves the consistency of jaggery.

Slowly it becomes super saturated and assumes a golden to golden brown thick paste form.

Now, this needs a lot of experience to decide the right moment when the jaggery is done, because any under doing or over doing may ruin the taste.

Some manufacturers also add sodium bi carbonate (Edible Soda) and juice of Lady's Finger to improve the color.

Now, the thick paste obtained is poured in various molds, pertaining to different quantities.

On further condensation, the jaggery solidifies and is taken out of the molds, kept for Cooling, wrapped in paper and packed in jute or plastic bags.
- Sometimes a local herb (locally known as Veranda in Bengali) to give the jaggery a granular texture respectively.

- The color and taste depends upon the degree of boiling. Some people prefer dark jaggery to light ones and vice versa.

- After packaging process, local agents or businessmen collect this jaggery from farmers and sell in local markets. This is why you never see a company tag on any jaggery sold in India.

- Jaggery making is a popular activity in several parts of India, especially Maharashtra and Uttar Pradesh; however, the technology used by the manufacturers is quite old.

- There have been little improvements done in the manufacturing process to enhance the productivity of the process. However, some work is now being carried out at Sugarcane and Jaggery Research Center in Kolhapur, TIDE in Bangalore and IIT Bombay.

**Manufacturing by Automated Plants**

- This method of jaggery manufacturing is still in its infancy and is being used in very few countries.

  1. Pour in sugar cane juice from one end
  2. Set the plant at required temperature and time
  3. Wait for the jaggery blocks to come out from the other end

- The best advantage of using an automated plant over manual method is that you get uniformly processed jaggery, of same color and taste, in uniformly packed quantities.

- This method is used only for sugar cane jaggery. So far, there has not been any instance of using this method for Date Palm Jaggery and Palmyra Jaggery.
Analysis of Jaggery

1. Metanil Yellow Color Chemical Test:
   - Take 1/4th part of a teaspoon of the jaggery in a test tube.
   - Add 3 ml of alcohol and shake the tube vigorously to mix up the contents.
   - Pour 10 drops of Hydrochloric Acid in it.
   - A pink coloration indicates the presence of Metanil Yellow color in Jaggery.

2. Determination of Moisture

3. Determination of extraneous matter insoluble in water

4. Determination of Ash

5. Determination of Ash insoluble in dilute HCl

6. Determination of Sulphur Di-oxide from Jaggery