

CANE SUGAR PROCESSING

Sugar is a vital ingredient in most of dairy consumption. For example: soft drink, juices etc.

Sugarcane under goes many processing in order to produce sugar. These processing steps are as follows-

1. Collecting sugar cane:

At first collecting sugar cane for cane sugar processing.



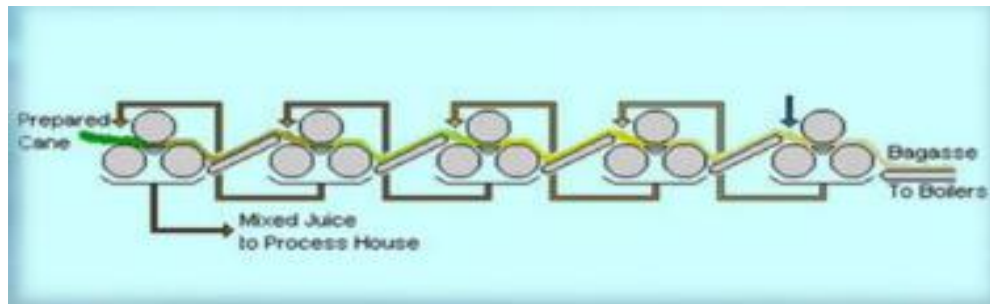
2. Washing, cutting of canes, Shredding:

- Washing the sugarcane before processing i.e. removing dirty.
- Cutting operation is the first operation in industry.
- Cutters are mechanical equipment which is used to cut the canes into desired size.
- Shredder is used to remove leaves and undesired solid particles from cane.



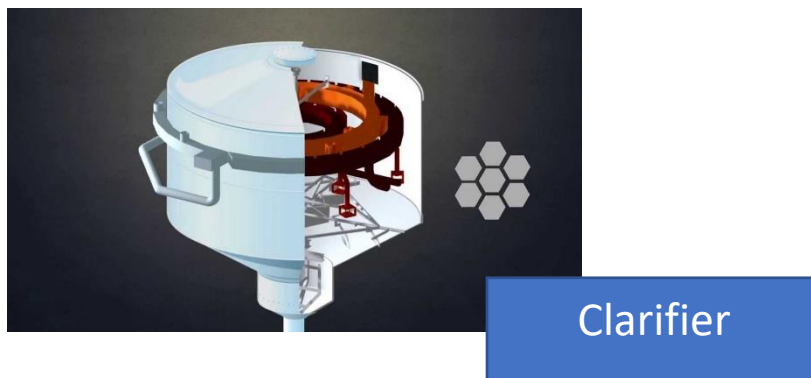
3. Milling:

- Milling is process of crushing the sticks of sugar cane to extract the juice.
- The shredded cane is fed through a series of crushing mills to extract the sugar rich juice. Consists of three roller mills connected in series:
 - Top roller
 - Feed roller
 - Discharge roller
- These used to extract the juice from crushing sticks.
- To make the mill process more efficient, the poor juices of the subsequent millings are reprocessed (mashing process) and hot water is applied in the last milling to increase the extraction.
- Bagasse is produce as a by product.



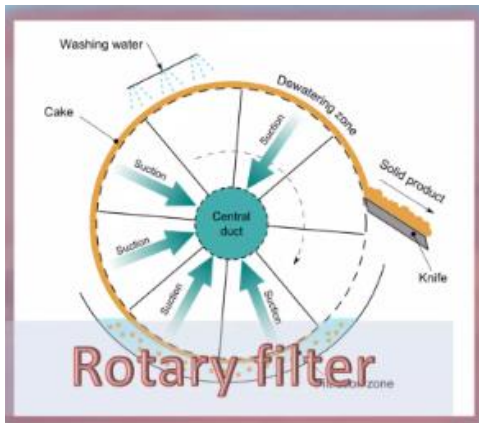
4. Clarification:

- In clarification process sludge, mud, suspended & colloidal particles are removed by some chemical compounds.
- Raw cane juice are filled in clarifier (conical shape vessel), where phosphoric acid, lime & sulphur dioxide are mixed with the help of agitator.
- When these chemicals are mixed, suspended and colloidal particles are collect in flock and resulting settled down.
- Neat and clean juice comes out from the upper section of clarifier, sludge and mud are collect in bottom and drainage to rotary filter.
- Calcium phosphate: as flocculent Lime and SO₂: acts as bleaching agent and maintain pH approx. 7.



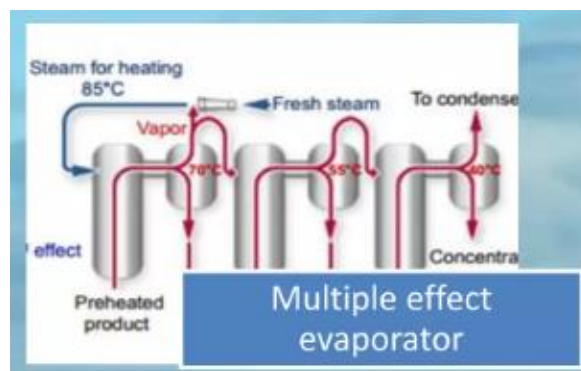
5. Filtration:

Clarified mud from the clarifier further filtered in rotary filter. Mud & sludge are stick on the periphery of rotating drum by the action of suction. Solid cake removes from the drum by doctor blade.



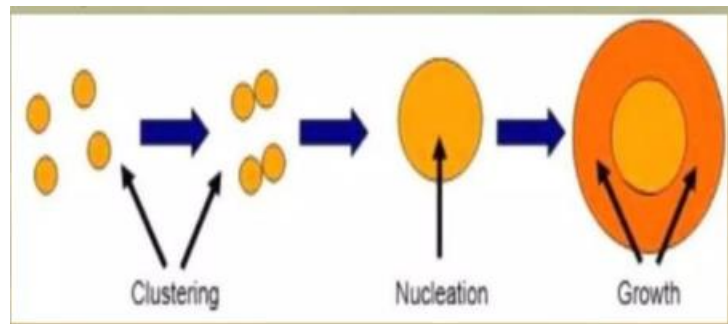
6. Evaporation:

- Evaporators are used in process industry to concentrate liquids.
- The operation is performed normally by use of low pressure, dry & saturated steam.
- The evaporator consist a heat exchanger in inner section.
- In the evaporator feed interred at upper section and concentrated thick liquor exit at bottom section.
- Multiple effect evaporator increase quality.



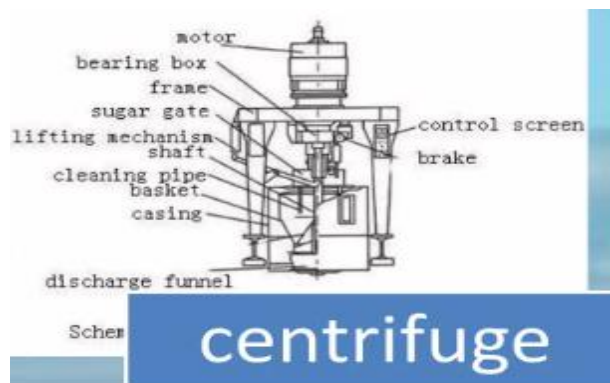
7. Crystallization:

- In the field of engineering crystallization process considered as mass transfer operation.
- Purest form of substance is obtained.
- The object of the process is usually the recovery of the solute (crystals) from the solvent.
- Process consist 3 major events:
 1. Clustering
 2. Nucleation
 3. Growth



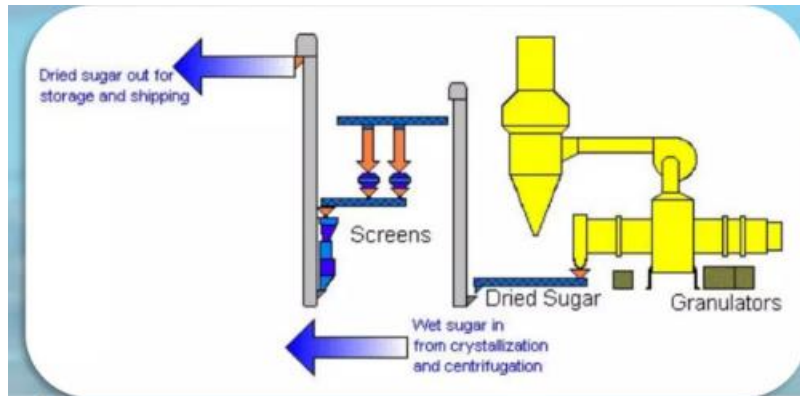
8. Separation / Centrifugation:

- Separate sugar from molasses /mother liquor
- Centrifuge operates at 100-1800 rpm
- Molasses pass through perforations
- . Sugar crystals are washed with 85°C water
- Raw sugar and mother liquor produced.



9. Drying:

- Drying is very essential mass transfer operation in processing sugar cane into sugar.
- The wet raw sugar from centrifuges goes to rotary drier to remove the water from the wet sugar to reduce moisture content to 0.5-2%; using hot air at 110°C which flow counter currently with sugar.
- Dried sugar out for storage and shipping.

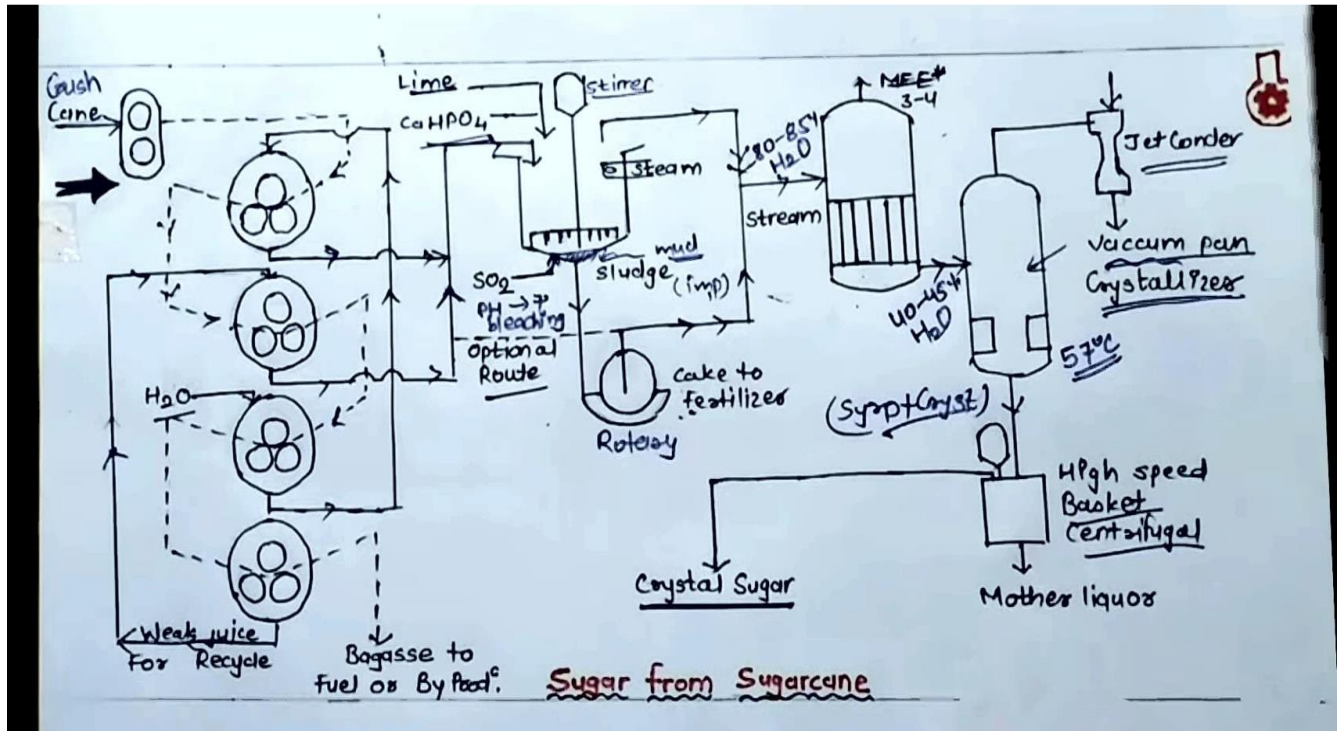


10. Storage / packaging:

- packing is final process of sugar manufacturing process.
- Containers opaque, airtight, moisture/odor proof
- Glass canning jars or cans for liquid sugars
- Factors affecting sugar storage-
 1. Temperature
 2. Moisture
 3. Quality of sugar
 4. Light
 5. Grain size and distribution etc.



FLOW DIAGRAM OF CANE SUGAR PROCESSING:



Use of Bagasse, mud and mother liquor:

- **Bagasse:**
 - a. It is used as a fuel for the production of heat, energy and electricity.
 - b. Manufacturing of pulp and building material.
- **Mud:**

Used as a fertilizer.
- **Mother liquor:**

Used in ethyl / alcohol preparation.