

“ Sheel, Sharir, Adhyayan ”
Aundh Shikshan Mandal, Aundh



Raja Shripatrao
Bhagawantrao
Mahavidyalaya, Aundh.
(Satara)

Experiential Learning

B.SC. PART 3 PHYSICS

TOUR
REPORT

Green Power
Sugar Industry
GOPVJ

NAME -: Varma Pritee R.



Aundh shikshan mandal's

RAJA SHRIPATRAO BHAGWANTRAO MAHAVIDYALAYA,

Aundh Tal- Khatav Dist- Satara

DEPARTMENT OF PHYSICS

TOUR REPORT

Year 2015 -16

Paper –

Name of Topic :-

.....Sugar Industry.....

Date - 20/2/2016

This is to certify that

Mr./Miss. Varma...pritee..A.....class..B.Sc-III

has satisfactorily completed the activity as 'one day tour' as prescribed by Shivaji University kolhapur and this report is attached .

Teacher incharge

Examiner

Head of Department

B.Sc III Phy

Tour Report

Green power Sugars Limited, Gopuj

DATE :- 5th February 2016

That day was Friday. The whole physics department decided to visit the sugar industry, Gopuj which is started nearly three years ago. The cane sugar supply daily to sugar industry Gopuj from surrounding villagers. We all student of N The department of Head Mr. Takale Sir & Nanavare Sir were going from R. S. B. M. Aundh. We went on two wheelers & other all students went by four wheeler, at 12:30 pm at that day we visited to sugar industry sharp 12:50 pm because. The industry was very close from our college about 5 to 6 km. We all reached in sugar industry Gopuj 1st we went to see the Godown of sugar bags which was very big under one ecor. The bags of sugar were flowing on the pally like rubber balte from packing of sugar bags towards Godown. Then we went towards ETP section where the liquid was stage plant performed. The water which used for industry & flowed through gutter into a well then this water reuse by purifying process. Then we went to Bagasse section. In that section, we saw, the solid waste products borrowed by the cane sugar without juice or syrup. at left side of Bagasse section boiler was situated. under the boiler at high temp. can sugar juice boils

Ash waste was to be come from the boiler. Then we saw distillation section, Under the distillation section there is formation of alcohol & other chemicals. Then we saw the molasses section which extract the juice or syrup from cane sugar. The biogas formation section also situated under the industry. From the solid waste the biogas formation arrived. Then we saw section 1st in which takes weights of cane sugar & transfer towards juicer. Near the Garcon section work shop section in which welding & other important works were formed about machines & other big machineries. Under the thyssenkrupp section Gurr formation & in syrup they leaves calcium phosphate & other chemicals mixed in syrup. The process of crystallization was on the syrup & sugar formed. All this process we could see with satisfaction in the industry under two hours of Then we leaved the industry under 2 hours at sharp 2:30 p.m. Then we went to home directly. We all enjoyed under the industry information collection.

Sugar Industry

Cane sugar is chemically known as sucrose. It is an important household commodity of the civilised world. Because of increasing demands for sugar and its low cost, sugar production has become an important industry in many countries. Indian sugar industry is based on sugar cane. More than half of world sugar is produced from sugar cane.

Manufacture of cane sugar:-

1) Extraction of Juice:- The cane is 1st washed to remove mud & dirt. Then cut diagonally into small pieces by rotating knives. The cane chips are then sent to milling train consisting of two rolled crusher followed by three rolled mills, usually 3 to 4 in series. Raw juice is sent to boiling house.

2) Clarification of Juice:-

The cane juice collected from milling house is acidic aqueous greenish liquid. It consists both soluble & insoluble impurities. The soluble impurities include organic matters, crystallisable sugar (glucose & fructose).

This process removes colouring pigments & inorganic salts. These impurities from cane juice is called "clarification" or "defecation".

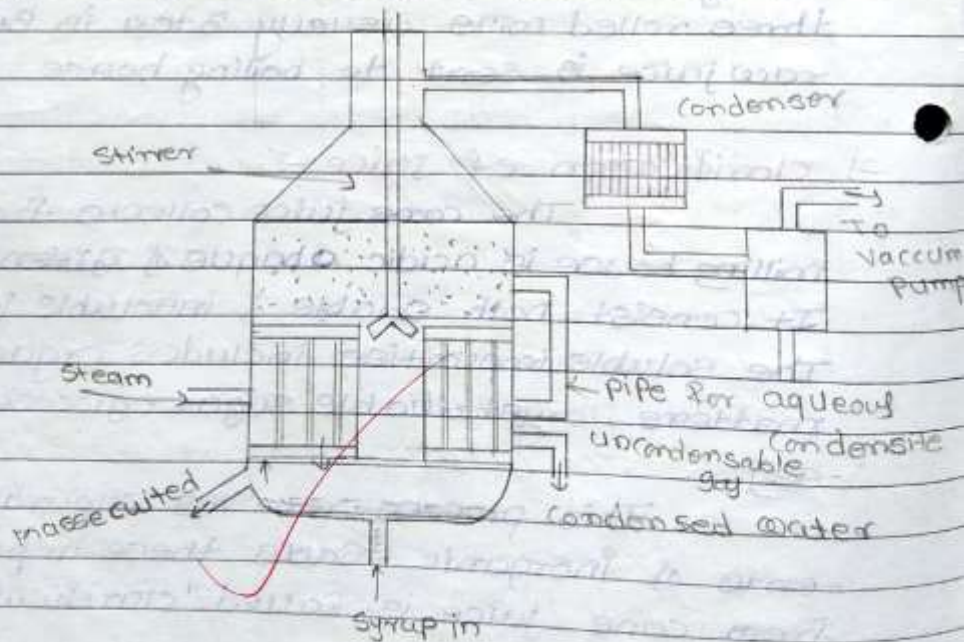
3) Concentration of juice syrup:-

The clarified juice is dilute & contains about 85% water. It is concentrated in two stages by evaporating under vacuum.

The top & bottom chambers are called juice chambers while the middle chamber is steam chamber or calandria. The juice moves up through the narrow tubes & comes down through the wider tubes. The juice circulates inside tubes & steam circulates outside the tubes.

4] Crystallization of Sugar:-

The thick syrup from multiple effect evaporator is further concentrated in the single effect vacuum pan also called as stick pan. The crystallization takes place. The crystallization takes place in two stages given below



a) Graining:- In vacuum pan the syrup is heated by steam under vacuum of sucrose concentration of syrup is raised

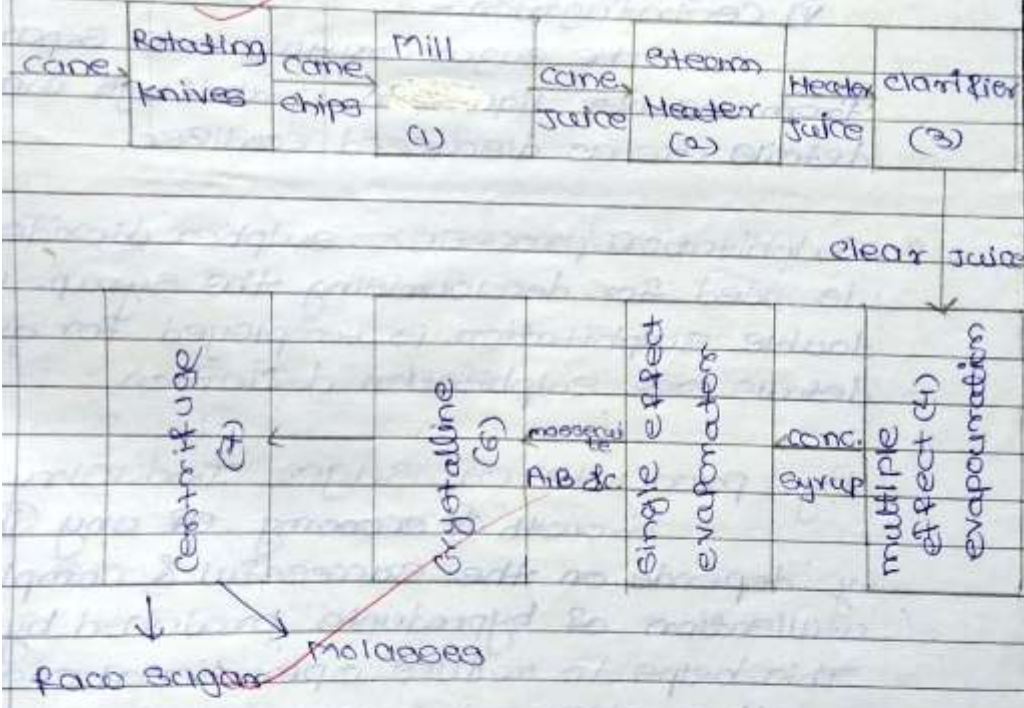
to Super Saturation.

i) Waiting method: - The syrup gradually cools down to break Super saturation.

ii) Shock treatment method - Super saturation is broken by sudden chilling. It is achieved by decreasing rate of steam flow by increase vacume

b) Growth of crystals - when graining point is reached more & more syrup is added in lots & mixed thoroughly.

Flow sheet of cane to raw sugar



- 1) Extraction of juice by combined imbibition
- 2) cane juice heated to 933K
- 3) separation of colloidal & suspended impurities by limiting the juice
- 4) concentration of cane juice to syrup
- 5) Further concentration of juice to molasses.

6) Growth of the Crystals

7) Separation of molasses from raw sugar

Manufacturing of white sugar in Industry

I] Extraction of juice

II] Clarification of juice - whitening of sugar

III] Concentration of juice :-

The clear clarified juice obtained from any of above methods is dilute, so concⁿ to syrup containing 45-50% water in triple effect vacume evaporator.

IV] Crystallization of sugar

V] Centrifugation :-

The sugar crystals are separated from mother liquor in centrifuge machine, details are as discussed earlier.

* Sulphitation process :- sulphur dioxide gas is used for decolourising the syrup. usually double sulphitation is employed for greater details see sulphitation delication.

By-products of Sugar Industry :-

Growth & economy of any industry depends on the successful & complete utilisation of byproducts produced by it. This helps to reduce operational costs, provides additional employment & reduces risk of waste management. A great deal.

The two important by products of sugar industry are baggasse & molasses.

A] Bagasse :-

It is other sources of energy like coal

& electricity are not available, it is used as fuel for raising steam. This practice is most prevalent in our country.

2) It is used for the manufacture of hard board called celotex. It is stronger than wood. It is a bad conductor of heat so has high insulating value.

3) The pith is pentosan, it is separated from the fibre, then by acid treatment it is dehydrated to furfural which is an important industrial chemical used in the manufacture of nylon intermediates.

4) After some pretreatment of mixing with nitrogenous nutrients it is used as cattle feed.

5) It may be degummed to manufacture valuable cores & gums.

6) It is used in manufacture of paper for news print & fertilizer.

B] molasses:- It is mother liquor left behind after the crystallization of sucrose, it is also called as "Black Strap".

i] It is also the manufacture of ethyl alcohol:-

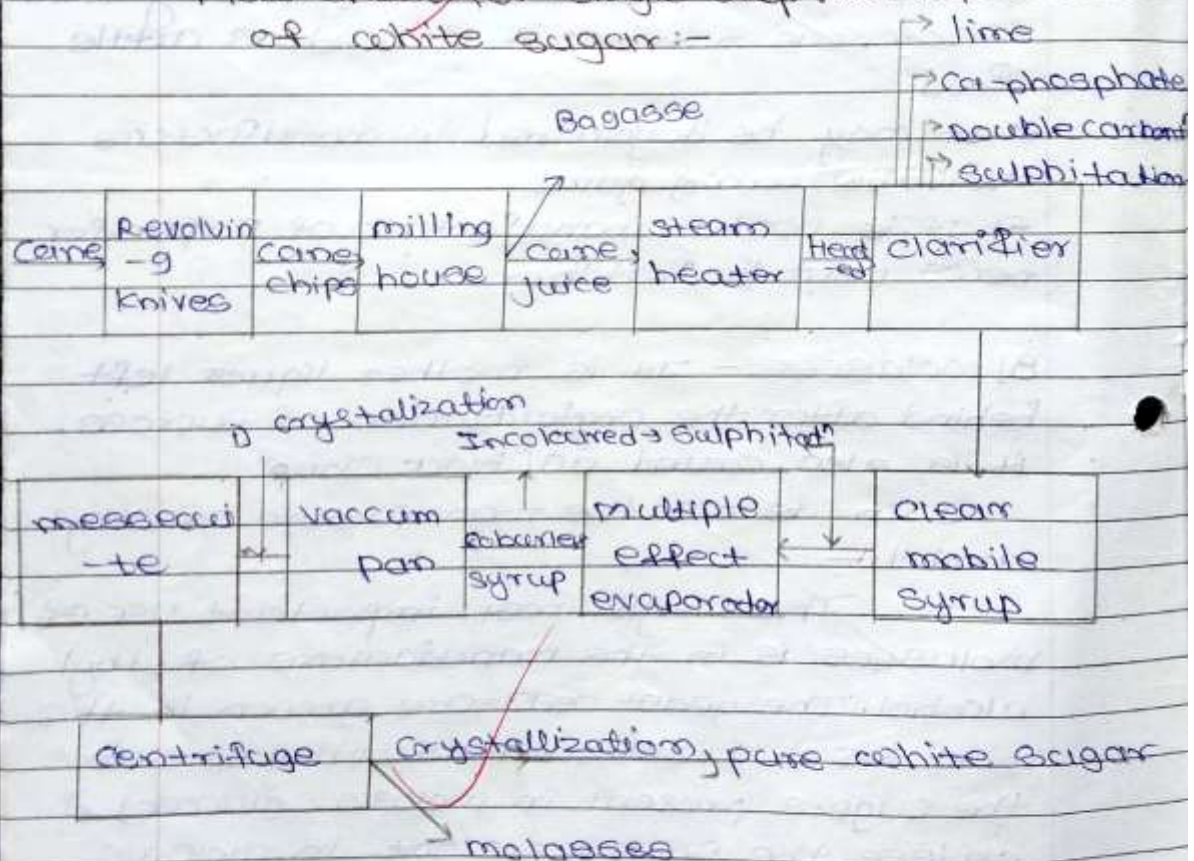
The single most important use of molasses is in the manufacture of ethyl alcohol. The yeast cells are grown in the molasses nutrient medium. They consume the sugars present in molasses (glucose) & oxidise the sugars present in molasses to produce ethyl alcohol. From the culture medium ethyl alcohol is collected by distillation. The yeast residue so obtained is used as cattle feed.

ii) In the production of other chemicals - Ethyl alcohol produced from yeast fermentation is an important raw material for the production of chemicals like acetaldehyde, acetone, acetic acid, butyl alcohol etc.

iii) molasses is a source of plenty of other rare chemicals like aconitic acid.

iv) Directly molasses can be used as an adjunct in the manufacture of animal feed.

Flow sheet for single step manufacture of white sugar:-



i) Extraction of juice by combined imbibition process

ii) Heating the juice to cook

- Page No. 119
- iii) Separation of colloidal & suspended impurities by liming by juice
 - iv) Clarification of juice by Sulphitation or double Carbonization
 - v) Concentration of clarified juice to Syrup
 - vi) Further concⁿ of Syrup to massecuite
 - vii) Growing of crystals
 - viii) Separation of crystalline sugar from molasses.

~~119~~

TOUR REPORT

Name :- Miss. Mane Seema Shankar

College Name :- R. S. B. M. Aundh

Class :- T. Y. B. Sc (Physics)

Place :- Sugar Industry, Gopuj

Year :- 2016-17

Aundh shikshan mandal's

RAJA SHRIPATRAO BHAGWANTRAO MAHAVIDYALAYA, Aundh

Aundh Tal- Khatav Dist- Satara

DEPARTMENT OF PHYSICS

TOUR REPORT

Year 2016 -17

Date -03 /02 /2017

*This is to certify that Mr./Miss..Mane..Seema..Shankar
class..T.Y.:B.Sc.. has satisfactorily completed the activity
as tour prescribed by Shivaji University ,Kolhapur and
this report is attached .*

Date - / /20

Teacher Incharge

Examiner

Head of Department
Department of Physics
R.S.B. Mahavidyalaya,
Aundh.

Name :- Miss. Mane Seema shankar

class :- T.Y. BSc

Place :- Green power sugar limited
Gopuj.

Date :- 03/02/2017

Tour Report

* Green Power Sugars Limited

Gopuj *

Date: 03/02/2017.

That day was Friday. The whole physics department decided to visit the sugar industry, Gopuj. Which is started nearly three years ago. The cane sugar supply daily to sugar industry, Gopuj from surrounding villagers. We all students & the department of head Mr. Kokale Sir & Mr. Nonaware Sir. were going from R.S.B.M. Aundh. We went on two wheelers & other all students went by four wheeler. at 12:30 pm at that day. We visited to sugar industry sharp 12:30 pm because. The industry is very close from our college about 5 to 6 km. We all reached in sugar industry Gopuj. 1st we went to see the Godown of sugar bags which was very big under the one Acozes. The bags of sugar were flowing on the pully like rubber band from packing of sugar bags towards Godown. Then we went towards ETB section where the liquid wastage plant performed. The water which used for industry & flowed through gutter into a well then this water reuse by purifying process. Then we went to Bagasse section. In that section we saw the solid waste products

borrowed by the cane sugar without juice or syrup. At left side of Bagasse section Boiler was situated. Under the boiler, at high temp. cane sugar juice boils & ash waste was taken from the boiler. Then we saw distillation section there is formation of alcohol & other chemicals. Then we saw the molasses section which extract the juice or syrup from cane sugar.

The biogas formation section also situated under the industry from the solid waste the biogas formation comes. Then we saw section 1st in which taken weights of cane sugar & transfer toward juicers. Near the Gawan section workshop section in which welding & other important works were formed about machines & other big machineries. Under the thyssenkrupp section Guad formation & in syrup the leaves calcium phosphate & other chemicals mixed in syrup. The process of crystallization was on the syrup & sugar formed. All this process we could see with satisfaction in the industry under two hours & then sharp we left the industry under 2 hours at sharp 2:30p. Then we went to home directly. We all enjoyed under the industry information collection.

Sugar Industry.

cane sugar is chemically known as sucrose. It is an important household commodity of civilised world.

Because of increasing demands for sugar & its low cost, sugar production has become an important industry. More than half of world sugar is produced from sugar cane.

Manufacture of cane sugar :-

1) Extraction of Juice :-

The cane is 1st washed to remove mud & dust. Then cut diagonally into small pieces by rotating knives. The cane chips are then sent to milling train consisting of two roller crusher followed by three roller mills, usually 3 to 4 in series. Raw juice is sent to boiling house.

2) Clarification of Juice :-

The cane juice collected from milling house is acidic opaque & greenish liquid. It consists both soluble impurities includes organic matters, crystallisable sugar (glucose & fructose).

This process removed colouring pigments & inorganic salts these impurities from cane juice is called "clarification" or "defecation".

concentration of juice syrup:-

The clarified juice is dilute & contain about 85% water. It is concentration in two stages by evaporating water.

The top & bottom chambers are called juice chambers while the middle chamber is steam chamber or calender. The juice moves up through the narrow tubes & comes down through the wider tubes. The juice circulates inside tubes & steam circulates outside the tube.

crystallization of sugar:-

The thick syrup from multiple effect evaporator is further conc. in the single effect vacuum pan also called as strick pan. The crystallization takes place in stages given below.

a) Graining:- In vacume pan the syrup is heated by steam under vacume & sucrose conc. of syrup is raised to super saturation.

i) waiting method:-

The syrup gradually cools down to break super saturation.

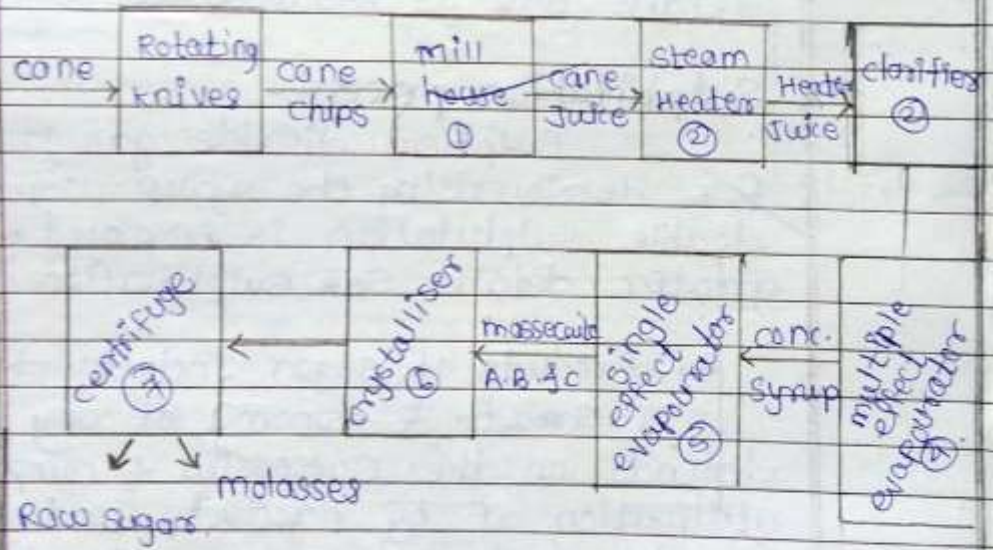
ii) shock treatment method:-

Super saturation is broken by sudden chilling. It is achieved by decreasing rate of steam flow by increase vacume.

b) Growth of crystals:-

When graining point is reached more & more syrup is added in lots & mixed throughly.

flow speed of cane to raw sugar.



- 1) Extraction of juice by combined imbibition.
- 2) cane juice heated to 333k.
- 3) Separation of colloidal & suspended impurities by limiting the juice.
- 4) concentration of cane juice to syrup.

- 5) further concentration of juice to mass
- 6) Growth of the crystals
- 7) Separation of molasses from raw sugar

* Manufacturing of white sugar in India

- i] Extraction of juice
- ii] Clarification of juice - whitening of sugar.

iii] concentration of juice.

The clear clarified juice obtained from any of above methods is dilute, concn to syrup containing 45-50% water in triple effect vacume evaporator

- iv] crystallization of sugar
- v] centrifugation

The sugar crystals are separated from mother liquor in centrifuge, more details are as discussed earlier.

* Sulphitation process:-

Sulphur dioxide gas is used for decolourising the syrup. Usually double sulphitation is employed. For greater details see sulphitation deficit

By-Products of sugar Industry \Rightarrow

Growth & economy of any industry depends on the successful & complete utilisation of by products produced by it. This helps to reduce operational cost, provides additional employment & reduces risk of waste management by products of sugar industry are bagasse & molasses

A7) Bio-Bagasse :-

- 1) When other sources of energy like coal & electricity are not available. It is used as fuel for raising steam. This practise is most prevalent in our country.
- 2) It is used for the manufacture of hard board called celotex. It is stronger than wood. It is a bad conductor of heat so has high insulating value.
- 3) The pith is pentosan. It is separated from the fibre. Then by acid treatment it is dehydrated to furfural. which is an important industrial chemical used in the manufacture of nylon intermediates.
- 4) After some pretreatment & mixing with nitrogenous nutrients. it is used as cattle feed.
- 5) It may be degummed to manufacture valuable wax & gums.
- 6) It is used in manufacture of ethyl alcohol. The paper for news print & fertilizers.

B) Molasses :-

It is mother liquor left behind after the crystallization of sucrose. It is also called as "Black strap".

1) In the manufacture of ethyl alcohol is in the single most important use of molasses is in the manufacture of ethyl alcohol. The yeast cells are grown in the molasses/nutrient medium. They consume the sugars present in molasses (glucose) & oxidize the sugars present in molasses to produce ethyl alcohol from the culture medium ethyl.

- i) Extraction of juice by combined imbibition process.
- ii) Heating the juice to 333k.
- iii) separation of colloidal & suspended impurities by liming juice.
- iv) clarification of juice by sulphitation or double carbonization.
- v) concentration of clarified juice to syrup
- vi) further concentration of syrup to massecuite.
- vii) Growing of crystals.
- viii) Separation of crystalline sugar from molasses.

ASIM

Tout Report.

Name : katkaz Jyoti chandrakant

std : T. Y. B. Sc.

Exam Seat No. - 48538

PRN.- 2015015500472204



"Sheel, Sharir, Adhyayan"
Aundh Shikshan Mandal, Aundh

Raja Shripatrao Bhagwantrao Mahavidyalaya, Aundh.
Tal- Khatav Dist- Satara


Department of Physics

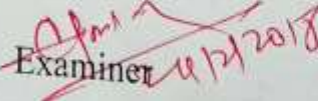
TOUR REPORT

Class B.Sc.- III (Physics)

Year - 2017 - 2018

NAME OF STUDENT-.....Katkar Jyoti Chandrakant.....


Head
Department of physics


Examiner

Tour Report

Green power Sugars Limited, Gopuj.

Date - 14-2-18.

That day was Wednesday. The whole physics department decided to visit the Sugar Industry, Gopuj which is started nearly three years ago. The cane sugar supply daily to sugar industry Gopuj from surrounding villages. We all students of the department of Head Mr. Kokale Sir & Nam Namaware Sir were going from R.S.B.M., Aundh. We went on two wheelers & others all students went by four wheeler at 12:30 pm. At that day we visited to sugar industry shop at 12:50 pm. Because the industry was very close from our college about 5 to 6 km. We all reached in sugar industry Gopuj. 1st we went to see the Godown of sugar bags which was very big under one roof. The bags of sugar were flowing on the path like rubber balls. From packing of sugar bags towards Godown. Then we went towards ETB section where the liquid waste plant performed. The water which used for industry & flowed through gutter into a well that this water reused by purifying process. Then we went to Bagasse section. In that section we saw the solid waste products borrowed by the cane sugar without juice or syrup in left side of Bagasse section boiler was situated.

under the boiler at high temp. cane sugar juice boiler & ash waste was to be come from the boiler. Then we saw distillation section under the distillation section there is formation of alcohol & other chemicals. Then we saw the molasses section which extract the juice or syrup from cane sugar. The biogas formation section also situated under the industry from the waste. The biogas formation arrived. Then we saw section 1st in which take weight of cane sugar & transfer to tower juice. Near the Crown section works section in which welding & other important works were for about machines & other big machineries under the Thyssenkrupp section. In formation of syrup they leaves calcium phosphate & other chemical mixed in syrup. The process of Crystallization was on the syrup & sugar form. All this process well could see with satisfaction. The industry under two hours & then we leave the industry under 2 hours at sharp 2:30 pm. Then we went to home directly we all enjoyed all the industry information collection.

Sugar industry.

Cane sugar is chemically known as sucrose. It is an important household commodity of civilised world. Because of increasing demands for sugar & its low cost, sugar production has become an imp. industry in many countries. Indian sugar industry is based on sugar cane more than half of world sugar is produced from sugar cane.

Manufacture of cane sugar:—

1) Extraction of juice:— The cane is 1st washed to remove mud & dust. Then cut diagonal into small pieces by rotating knives. The cane chips are then sent to milling train consisting of two rolled crusher followed by three rolled mills, usually 3 to 4 in series raw juice is sent to boiling house.

2) Clarification of juice:—

The cane juice collected from milling house is acidic aqueous & greenish liquid. It consists both soluble & insoluble impurities. The soluble impurities includes organic matters, crystallisable sugar (glucose & fructose).

This process removes colouring pigments & inorganic salts these impurities from cane juice is called "clarification" or defecation.

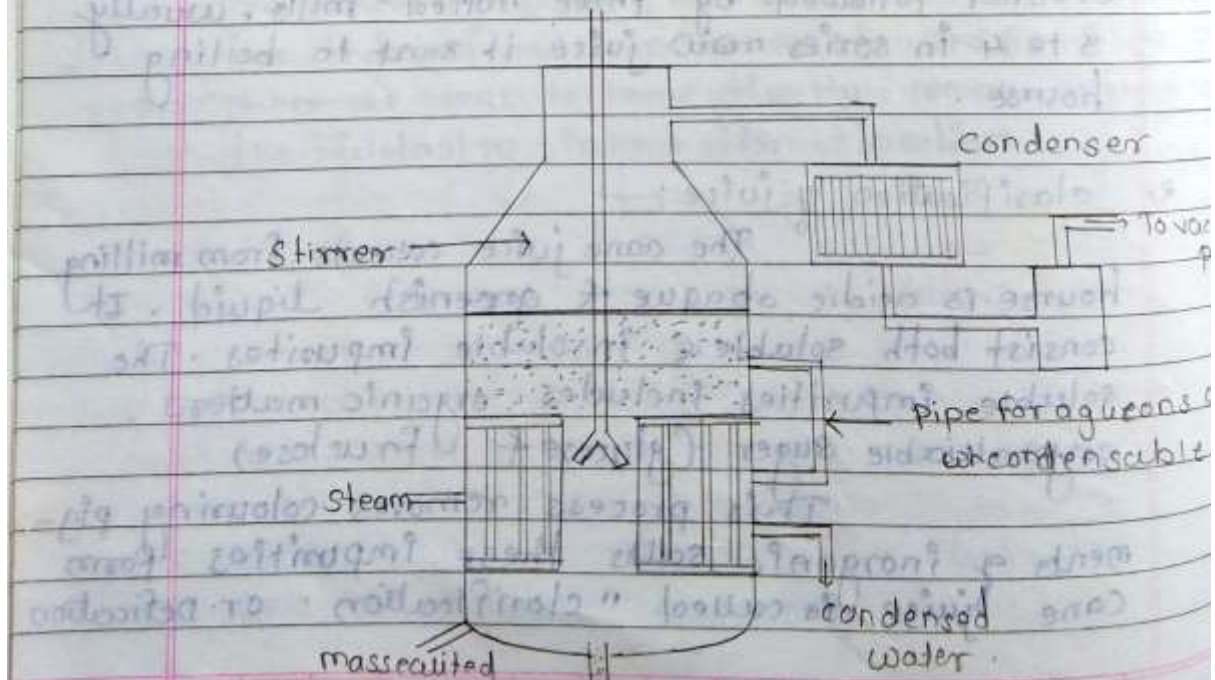
3) Concentration of juice syrup: —

The clarified juice is dilute & containing about 85% water. It is concentrated in two stages by evaporating water.

The top & bottom chambers are called juice chambers while the middle chamber is steam chamber or calandria. The juice moves up through the wider tubes. The juice circulates inside tubes & steam circulates outside tubes.

4) Crystallization of sugar: —

The thick syrup from multiple effect evaporator is further concentrated in the single effect vacuum pan also called as strike pan. The crystallization takes place. The crystallization takes place in two stages given below.



a) Graining:— In vacuume pan the syrup is heated by steam under vacuume & sucrose concentration of syrup is raised to supersaturation.

i) Waiting method:— The syrup gradually cools down to break Super saturation.

ii) shock treatment method:— super saturation is broken by sudden chilling. It is achieved by decreasing rate of steam flow by increase vacuume.

b) Growth of crystals:— when graining point is reached more & more syrup is added in lots & mixed throughly.

Flow sheet of cane to raw sugar.

cane	Rotating knives	cane chips	mill (1)	cane Juice	stem Heater (2)	Heater Juice	clarifier (3)
------	-----------------	------------	----------	------------	-----------------	--------------	---------------

↓
clear juice

centri-fuge (7)	←	crystalline (6)	mass juice A/B etc	single effect evaporati on (5)	← cane syrup	multiple effect evaporation (4)
-----------------	---	-----------------	--------------------	--------------------------------	--------------	---------------------------------

Raw sugar molasses.

1) Extraction of juice by combined imbibitation.

2) cane juice heated to 533k.

3) separation of colloidal & suspended impurities by limiting the juice.

4) concentration of cane juice to syrup.

A) Bagasse: - 1) when other sources of energy like coal & electricity are not available it is used as fuel for raising steam. This practice is most prevalent in our country.

2) It is used for the manufacture of hard board called celotex. It is stronger than wood. It is a bad conductor of heat so. has high insulating value.

3) The pith is pentosan. It is separated from the fibre then by acid treatment it is dehydrated to furfural which is an important industrial chemical used in the manufacture of nylon intermediates.

4) After some pretreatment & mixing with nitrogenous nutrient, it is used as cattle feed.

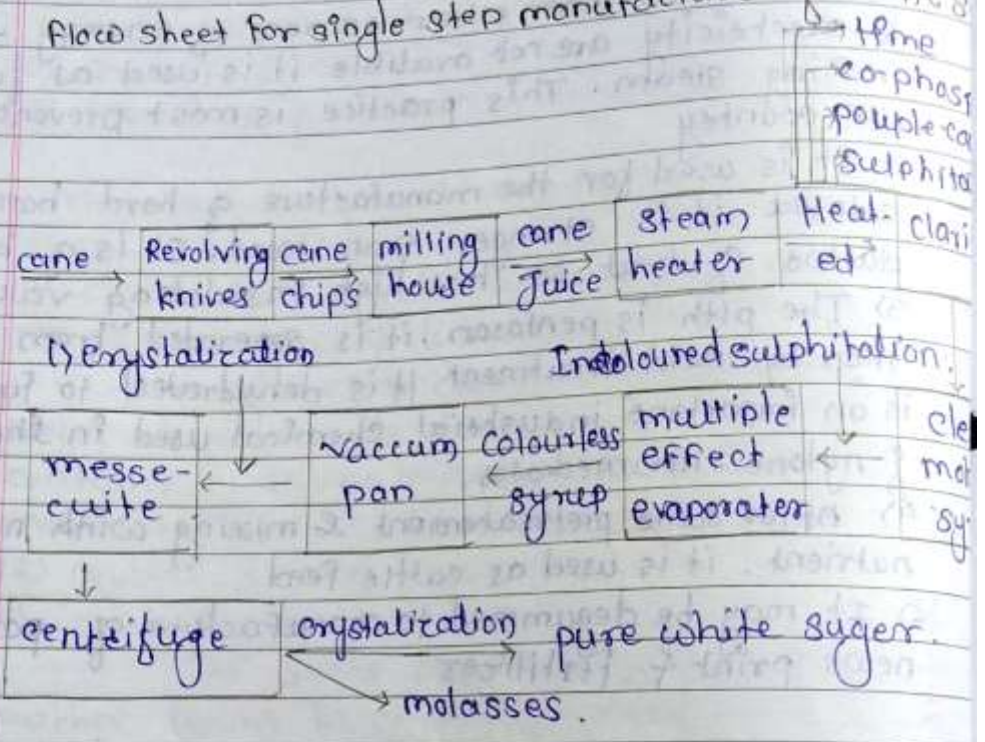
5) It may be degummed to manufacture of paper for news print & fertilizers.

B) Molasses: - It is mother liquor left behind after the crystallization of sucrose. It is also called as Black Strap.

Alcohol - The single most imp. use of molasses is in the manufacture of ethyl alcohol. The yeast cells are grown in the molasses nutrient medium. They consume the sugars present in molasses (glucose) & oxidize the sugar present in molasses to produce ethyl alcohol from the culture medium. Ethyl alcohol is formed from the culture medium. Ethyl alcohol is collected by distillation. The yeast residue so obtained is used as cattle feed.

ii) In the production of other chemicals: - ethyl alcohol produced from yeast fermentation is an imp. raw material for the production of chemicals like acetaldehyde, acetone, acetic acid, butyl alcohol, etc. iii) molasses is a source of plenty of other rare chemicals like acetic acid.

Flow sheet for single step manufacture of white sugar



- 1) Extraction of juice by combined imbibition process
- 2) Heating the Juice to 333K.
- 3) Separation of colloidal & suspended impurities by liming by juice.
- 4) Clarification of juice by sulphitation or double carbonization.
- 5) Concentration of clarified juice to syrup.
- 6) Further concentration of syrup to masecuite.
- 7) Gassing of crystals.
- 8) Separation of crystalline sugar from molasses.

Aundh shikshan mandal's

RAJA SHRIPTRAO BHAGWANTRAO MAHAVIDYALAYA,

AUNDH

Aundh Tal – Khatav Dist – Satara

DEPARTMENT OF PHYSICS

TOUR REPORT

Year 2018- 19

Date - 27/ 2 / 2019

This is certify that Mr. / Miss Mali Shital Dadasa.....

Class BSc.M(Physics) has satisfactorily completed the activity as tour prescribed by Shivaji University, Kolhapur and this report is attached.

Date - 27 / 2 / 2019

5/08/19
Teacher Incharge

AKR
Examiner

AKR
Head of department

13 - 3 - 2019

Tour Report

Green Power Sugars Limited, Gopuj

Date - 27th February 2019

That day was Friday. The whole physics department decided to visit the sugar Industry, Gopuj which is started nearly six years ago. The cane sugar supply daily to sugar Industry Gopuj from surrounding villagers. We all students & the department of Head Mr. Kokale Sir & Nanaware Sir were going from R.S.B.M. Aundh. We went on all students went by four wheeler, at 12:30 pm at that day. We visited to sugar Industry shop at 12:50 pm because the industry is very close from our college about 5 to 6 km. We all reached in sugar industry, Gopuj. 1st we went to see the Godown of sugar bags which was very big under one roof. The bags of sugar were flowing on the pulley like trolley band from packing of sugar bags towards Godown. Then we went towards FTB section where the liquid wastage plant performed. The water which used for industry & flowed through

Gutter into a well then this water reuse by purifying process. Then we went to Baggase section. In that section we saw the solid waste products borrowed by the cane sugar without juice boiler's & ash waste was to be come from the boiler. Then we saw distillation section under the distillation section there is formation of alcohol & other chemicals. Then we saw the molasses section which extract the juice or Syrup from cane sugar.

The biogas formation section also situated under the industry from the solid waste the biogas formation created. Then we saw section 1st in which taken weights of cane sugar & transfer towards juices. Near the Gawan section workshop section in which welding & other important works were formed about machines & other big machineries under the thyssenkrupp section our formation & in syrup they leaves calcium phosphate & other chemicals mixed in Syrup. The process of crystallization was on the Syrup & sugar formed. All this process we could see with satisfaction in the industry under two hours & then sharp we leaved the industry under two hours at sharp 2:30 pm. Then we went to home directly. We all enjoyed under the industry information collection.

Sugar Industry

Cane sugar is chemically as sucrose. It is an important household commodity of civilised world. Because of increasing demands for sugar & its low cost, sugar production has become an important industry in many countries. Indian sugar industry is based on sugarcane, more than half of world sugar is produced from sugar cane.

Manufacture of cane sugar :-

1. Extraction of Juice :-

The cane is 1st washed to remove mud & dirt then cut diagonally into small pieces by rotating knives. The cane chips are then sent to milling train consisting of two rolled crusher followed by three rolled mills, usually 3 to 4 in series, raw juice is sent to boiling house.

2. Clarification of Juice :-

The cane juice collected from milling house is acidic opaque & greenish liquid. It consists both soluble impurities includes organic matters, crystallisable sugar (glucose & fructose).

This process removes colouring pigments & inorganic salt these

impurities from cane juice is called "Clarification of Defecation".

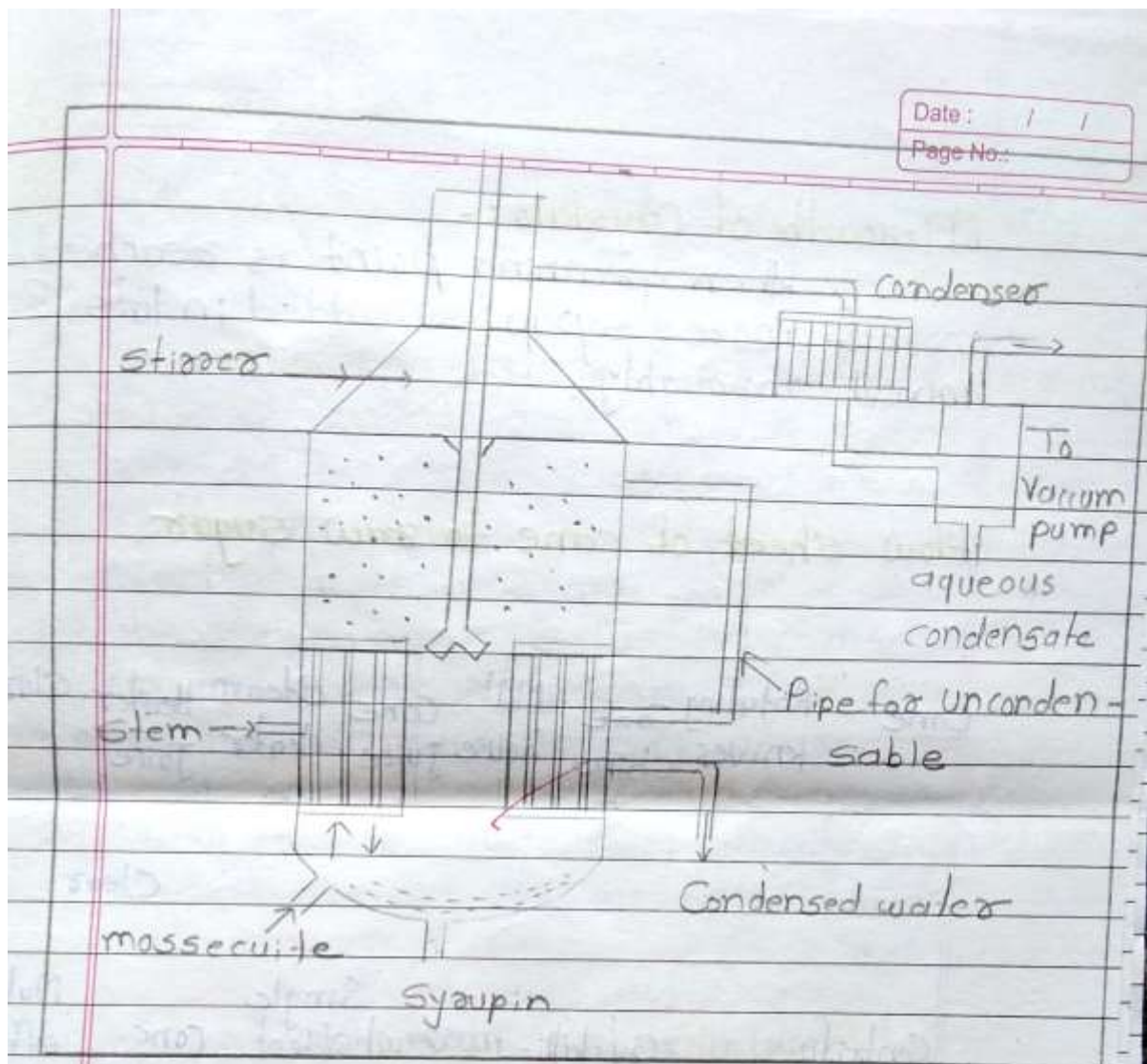
3. Concentration of Juice Syrup :-

The clarified juice is dilute & contain about 85% water. It is concentration in two stages by evaporating water.

The top & bottom chambers are called juice chambers while the middle chamber is steam chamber of Calenderia. The juice moves up through the narrow tubes & comes down through the wider tubes. The juice circulates inside tubes & steam circulates outside the tubes.

4. Crystallization of Sugar :-

The thick syrup from multiple effect evaporator is further concentrated in the single effect vacuum pan also called as strick pan. The crystallization takes place in two stages given below.



a) Crystallizing :- In vacuum pan the syrup is heated by steam under vacuum & sucrose concentration of syrup is raised to super saturation.

i) Waiting Method :-

The syrup gradually cools down to break super saturation.

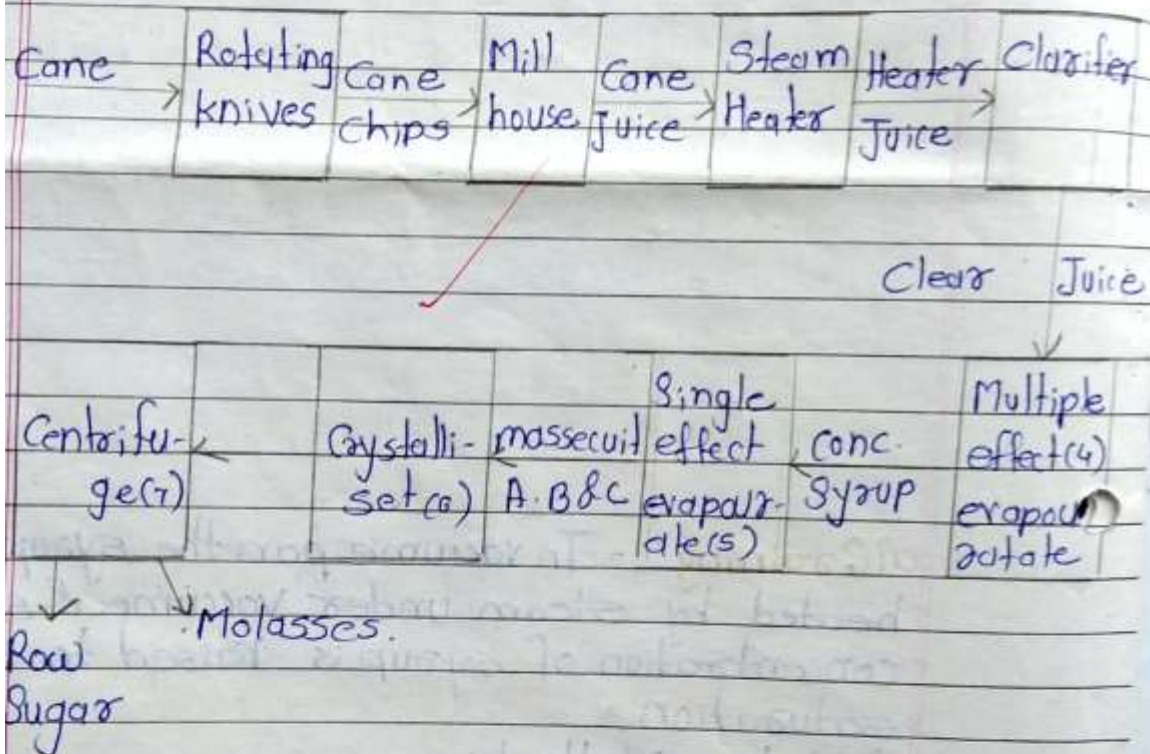
ii) Shock treatment Method :-

Super saturation is broken by sudden chilling. It is achieved by decreasing rate of steam flow by increase vacuum.

b] Growth of crystals :-

When grain point is reached, more & more syrup is added in lots & mixed thoroughly.

Flow sheet of cane to raw sugar.



- ① Extraction of juice by combined π imbibition
- ② Cane juice heated to 333K
- ③ Separation of colloidal & suspended impurities by limiting the juice
- ④ Concentration of cane juice to syrup
- ⑤ Further concentration of juice to masscuite
- ⑥ Growth of the crystals

Manufacturing of White Sugar in Industry

- ① Extraction of juice.
- ② Clarification of juice - whitening of sugars.
- ③ Concentration of juice.
- ④ The clear clarified juice obtained from any of above methods is dilute, so concentration of syrup containing 45-50% water in triple effect vacume evaporator.
- ④ Crystallization of sugar.
- ⑤ Centrifugation.

The sugar crystals are separated from mother liquor in centrifuge machine, details are as discussed earlier.

Sulphitation Process :-

Sulphate dioxide gas is used for decolourising the syrup. usually double sulphitation is employed for greater details see sulphitation defication.

By-Products of Sugar Industry →

Growth & economy of any industry depends on the successful & complete utilisation of byproducts produced by it. This helps to reduce operational cost, provides additional employment & reduces risk of waste management by products of sugar industry are baggose & molasses.

A] Bagasse :-

1. When other sources of energy like coal & electricity are not available, it is used as fuel for raising steam. This practice is most prevalent in our country.
2. It is used for the manufacture of hard board called cslotex. It is stronger than wood. It is a bad conductor of heat so has high insulating value.
3. The pith is pentosan, it is separated from the fibre. Then by acid treatment, it is dehydrated to furfural which is an important industrial chemical used in the manufacture of nylon intermediates.
4. After some pretreatment & mixing with nitrogenous nutrients it is used as cattle feed.
5. It may be degummed to manufacture valuable wax & gums.
6. It is used in manufacture of paper for news print & fertilizer.

B] Molasses :-

It is mother liquor left behind after the crystallization of sources it is also called as "Black strap".

1. In the manufacture of the ethyl alcohol is in the. The single most important use of molasses is in the manufacture of ethyl alcohol the yeast.

cells are grown in the molasses nutrient medium. They consume the sugars present in molasses (glucose) & oxidise the sugars present in molasses to produce ethyl alcohol from the culture medium. Ethyl alcohol from the culture medium is collected by distillation. The yeast residue so obtained is used as cattle feed.

2. In the production of other chemicals ethyl alcohol produced from yeast fermentation is an important raw material for the production of chemicals like acetaldehyde, acetone, acetic acid, butyl-alcohol etc.

3. Molasses is a source of plenty of other rare chemicals like aconitic acid.

4. Directly molasses can be used as an adjunct in the manufacture of animal feed.



Aundh Shikshan Mandal Aundh

RAJA SHRIPATRAO BHAGWANTRAO MAHAVIDYALAYA, AUNDH

Tal- Khatav Dist -Satara

DEPARTMENT OF PHYSICS

YEAR 2019-2020

TOUR REPORT

This is to certify that Mr./Miss. *Nikam...Shweta...Mahipati...*
class *Ty...B.Sc...* has satisfactorily completed the activity as
prescribed by Shivaji University Kolhapur and the report is
attached .

Date:- 05 /02 /2020

2/3/2020
Teacher in charge

12/3/2020
Examiner

[Signature]
Head of Department
R.S.B. Mahavidyalaya,
Aundh.

DATE _____

A Review Of Solar Water Heating System.

On 3rd Jan 2020 we went to the study tour at Mahabaleshwar reported as follows:

A review of solar water heating system for domestic and industrial applications is presented. They are grouped into two broad categories, as passive and active solar water heating systems. Each of them operates in either direct or indirect mode. Their performances, uses and applications, and factors considered for their selection are reported. The active systems generally have higher efficiencies, their values being 35% to 80% higher than those of the passive system. They are more complex and expensive.

Generally more research and development work are needed to further improve the existing level of efficiency for it to serve effectively as a visible alternative to the conventional means of hot water generation. The actual field testing experiences, together with the prospects and economic problems that affect popularization of the systems, are also presented. Their possible solutions are suggested.

Introduction

Hot water is essential both in industries and homes. It is required for taking baths, washing cloths and utensils, and other domestic purposes in both the urban and rural areas. Hot water is also required in large quantities in hotels, hospitals, hostels, and industries such as textile, paper, food processing, dairy and edible oil. In fact, Hot water is required mainly for purposes of hygiene. Hot water demands appear to be highest within the periods of the day when electric energy demands for other purposes is high.

At present hot water demands are met mainly by the use of electric heaters. Unfortunately, rising energy cost, environmental concerns and the depleting nature of the current primary energy sources in use have made electric heaters less attractive. This is because the primary energy sources of electric energy utilized are mainly the fossils fuels.

The Passive Solar Hot Water Systems.

The PSHWSs generally transfer heat by natural circulation as a result of buoyancy due to temperature difference between two regimes; hence they do not require pumps to function. They are the most commonly used solar water heaters for domestic application and have been designed and investigated by different researchers. They could either be open loop or closed loop in operation. The open loop systems circulate service water through the collector while the closed loop systems use a heat-transfer fluid to pick-up solar energy from the solar collector and subsequently transfer it to the storage tank containing the service water. Natural circulation flow rate is often controlled by the insolation level.

The thermosyphon systems and the integrated collector storage (ICS) systems generally fall within this category. However, the open and closed loop types can only be applied to the thermosyphon system.

A. The Thermosyphon Solar Hot Water Systems.

In this type of SHWS, the facility for harvesting solar energy and the hot water storage tank are separate components, with the hot water tank usually placed at a level higher than the solar collector. The thermosyphon hot water heating system can be classified into two types that is thermosyphon SHWS using phase change materials and thermosyphon SHWS without phase change materials.

The Active Solar Hot Water Systems.

This category of SHWSs are those having an assembly of collectors, storage, device, and transfer fluid which converts solar energy into thermal energy and in which energy in addition to solar input is used to accomplish the transfer of thermal energy. Active solar water heating systems use electric pumps, valves, and controllers to circulate water or other heat-transfer fluids through the collectors. Thus they are more complex and usually more expensive than passive systems. This apparent disadvantage is, however, countered by the fact that they are more efficient. Since they use pumps to circulate fluid, they do not suffer the restrictions of where to locate their storage tanks as is the case with the passive systems that demand their tanks installed either close to or on top of the collector.

The active SHWSs may use any of the known collector configuration depending on the load and hot water draw off pattern. Since pumps are used, they are basically forced circulation systems and could either be direct or indirect in operation.

Solar Water Heating System Progress

The earliest work on solar water heating system focused more on establishing the technical feasibility using different configuration. This is evidenced by the large number of patents filed in the USA and Japan in the early 20th century. Soon after the first patent of SHWS in 1891. These early systems tested, basically of the ICS type, were soon discovered to suffer substantially from heat losses to ambient, particularly at night and during periods when solar heating is not going on. This was due to their constructions which comprised simply of exposed tanks left out to warm in the sun. Consequently the thermosyphon SHWS gained prominence and eventually displaced the ICS SHWS in the late 19th century. More detailed description of the early SHWS is given in reference.

In general, technical advances in SHWS have been very rapid in the past 50 years and these advances are mainly on flat plate solar collectors.

Conclusion

A review of solar water heating systems has been undertaken. From this study, the following are evident.

i) The passive systems are more common than the active systems with the ICS enjoying the most attention for R and D. This is followed by the thermosyphon system and then the active SHWSs.

ii) The best efficiencies of PHWSs are in the range of 30% - 50%. Those of the ICS are of the order of 30% while those of the thermosyphon systems are of the order of 50%.

iii) Efficiency of active SHWSs is about 30% - 30% higher than that of the passive systems.

iv) SHWSs have very high potentials to significantly contribute to hot water requirement.

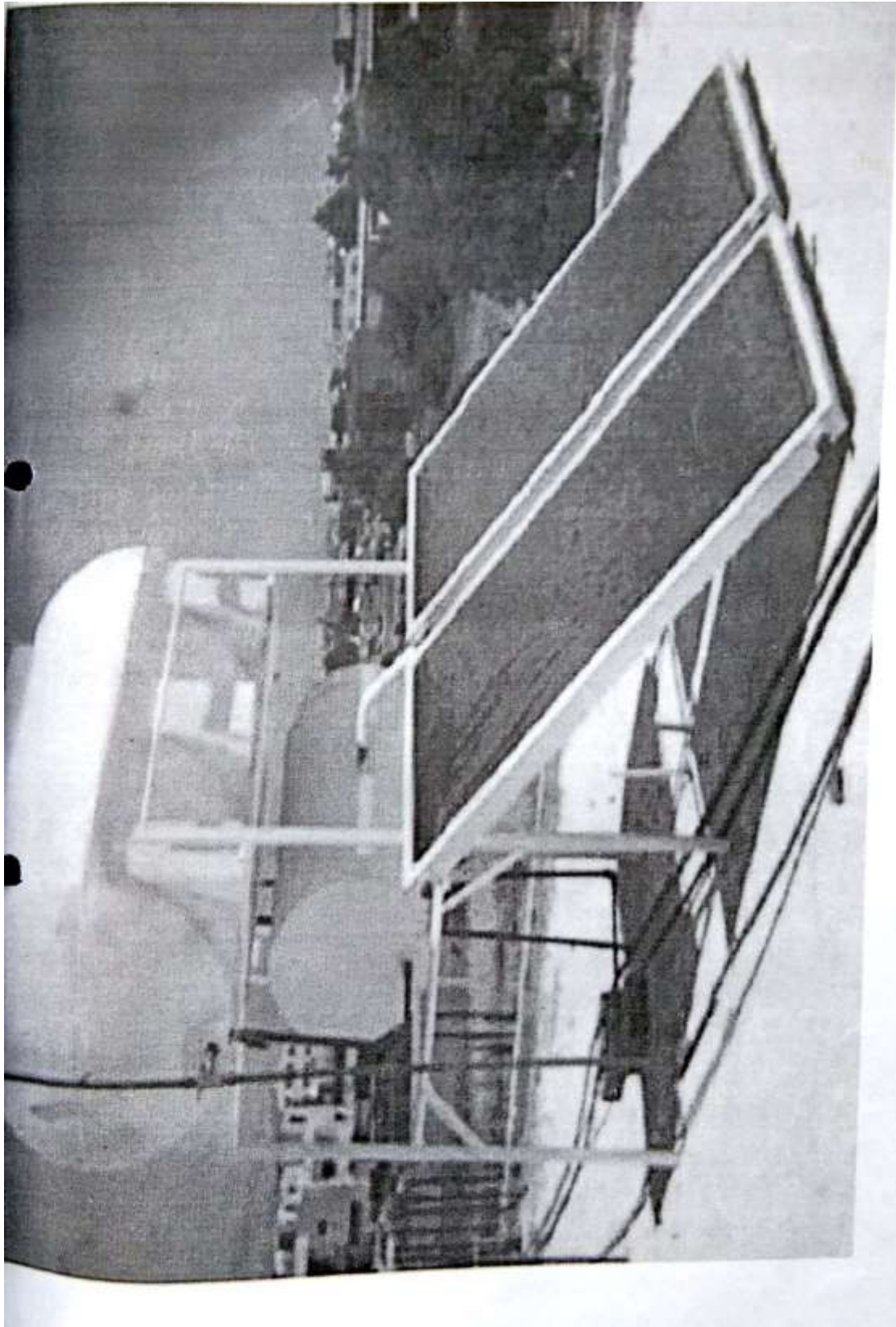


FIG. 1 A typical single phase thermocouple CHW/C