8QUALITY CONTROL AND QUALITY ASSURANCE OF SOFT DRINKS

An Industrial Training Report submitted
For the parital fulfilment of the Degree of Master Of Science

By

Dhruvishaba P. Revar
(M. Sc. Microbiology, Semester IV)

Under the supervisor of

Dr. Annie Chrisrie

QA & QC Department

SOSYO HAJOORI BEVAREAGES PRIVATE LIMITED, SURAT

DEPARTMENT OF MICROBIOLOGY

SHREE M. & N. VIRANI SCIENCE COLLAGE

'YOGIDHAM GURUKUL' KALAWAD ROAD

RAJKOT (GUJARAT) 360005

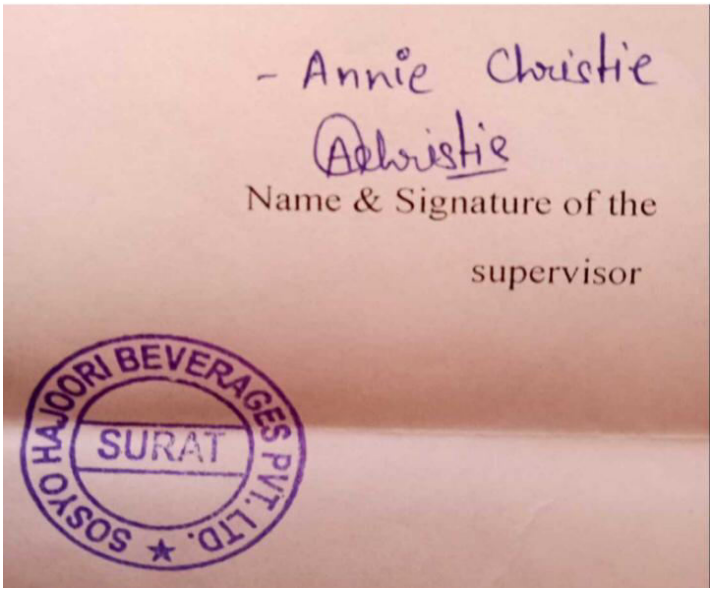
2019-21

CERTIFICATE

This is to certify that this training report entitled ".....**Quality control and quality assurance of the soft drinks..... "**was successfully. Carried out by Miss ....**Dhruvishaba Revar...** towards the partial fulfilment of requirements for the degree of Master of Science in Microbiology of Shree M & N Virani Science college, Rajkot. It is an authentic record of his/her own work, carried out by him/her under the guidance of ……**Dr.Annieangel Oscar Christie….**..... for a period of ……**2 month**….. during the academic year of ……**2019-2021**…… The Content of this report, in full or in parts, has not been submitted for the award of any other degree or certificate in this or any other University.

Name & Signature of the

Head of the Department



D E C L A R A T I O N

I hereby declare that the work incorporated in the present dissertation report entitled "quality control and quality assurance of the soft drinks " is my own work and is original. This work (in part or in full) has not been submitted to any University for the award of any Degree or a Diploma.

Date (Name and signature of student)

4th may,2021. **Dhruvishaba P. Revar**

Acknowledgments

I would like to thank SHREE MANIBHAI VIRANI AND NAVALBEN VIRANI SCIENCE COLLEGE for giving me this opportunity to execute my skills learnt during the Master of science in microbiology. It was an enriching experience to work on this project.

My special thanks to my project guide Dr. Annie Christie , without her experience ,Guidance and supervision the project may not have been a success. I take this Opportunity to show my gratitude towards the learned and experienced faculty Members of this industry. I Would also like to acknowledge all the names that are directly or indirectly were Involved in completion of my project work. I would thanks;

Ms. Rakhi Singh (HR manager)

Mr. Gopikrishna sir (HR Executive)

For their support and helping me to overcome problems during research conducted at Sosyo Hajoori beverages Pvt Ltd., Surat.

INTRODUCTION

Sosyo is an Indian aerated drink, produced and marketed mainly in the western and northern states of India; Gujarat, Maharashtra, Rajasthan Uttar Pradesh and Madhya Pradesh. It is based in Surat.

Sosyo is the product of the Swedish movement of Indian independence struggle. Mohsin Hajoori introduced Sosyo in 1927 in Surat, as an Indian option to the UK drink Vimto. Vimto was marketed in India since 1923 by Mohsin Hajoori.

Originally, Sosyo was called Whisky No, to attract alcoholics in the dry state of Gujarat, India. It was sealed with a marble in a factory in Salabatpura by Hajoori and Sons. The present name was derived from the Latin word 'Socious', since it became a social drink. The name 'Whisky No' was derived from the fact that Sosyo tastes like alcohol.

The brand has been a new contemporary look ever since it's repositioning as a specialty drink in November 1998 with a catchy base line "THE TASTE WITH A TWIST"

1.1 OVERVIEW OF THE INDUSTRY

The soft-drink industry comprises that manufacture non-alcoholic beverages and carbonated mineral water or concentrates and syrup for the manufacture of carbonated beverages. Naturally occurring bubbling and sparkling mineral water have been popular for thousands of years: the ancient Greeks believe that such water had medicinal properties and batched in them regularly; the Romans established resorts around minerals springs throughout Europe.in the 1500s the village of spa in Belgium became famous for its water, which by the early 1600s were sold, in bottles, as far away as London, England.

In India cola drinks have main in metro cities and northern state of UP, Haryana ,Punjab etc. .Orange flavoured drinks are popular in Southern state. Western market have preference towards mango flavoured drinks. Diet Coke presently constitutes just 0.7 % of the total carbonated beverage market.

The government has adopted liberalized policies for the soft drinks trade to give the industry a boast and promote the Indian brands internationally. Although the import and manufacture of internationals brands like Pepsi and Coke is enhanced in India the local brands are being stabilized by advertisements ,good qualities and low costs.

1.1 introduction to beverage industry:-

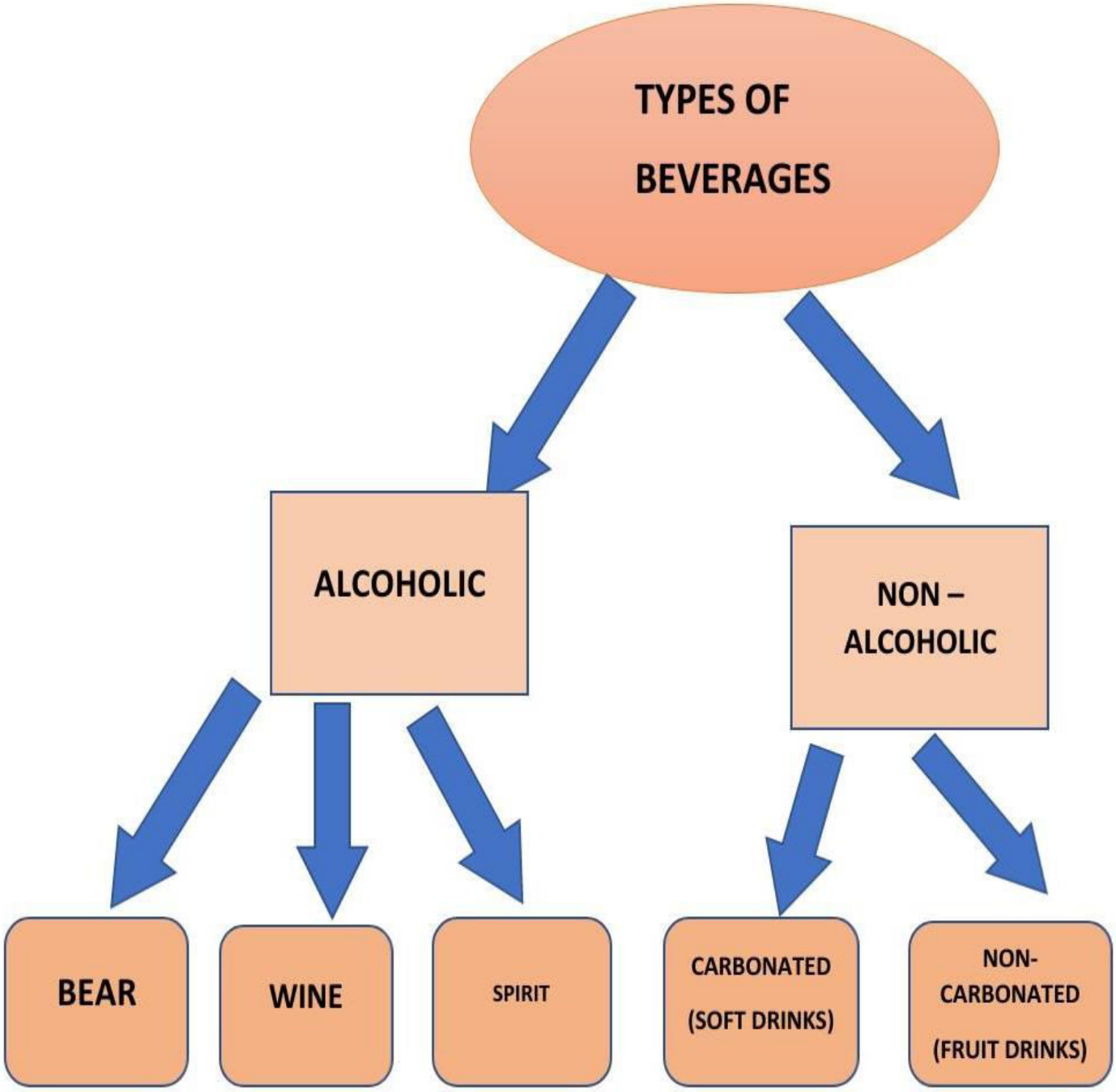
"A drink, or beverage, liquid specifically prepared for human consumption. In addition to basic needs beverage from part of the culture of human society."

In short, BEVERAGE means A FORMAL DRINK.

As we see the word beverage, the first that alcoholic drinks come into our mind but this is not the reality of beverage. A liquid to consume, usually including water is a beverage.

This may include tea, coffee, liquor,milk,beer, etc. For better understanding the term let's see the type of beverage.

- Types of beverage:
  Basically of 2 types:
  1) Alcoholic
  2)Non alcoholic



1) Alcoholic drink:-

An alcoholic drink is a drink that contains ethanol, a type of alcohol produced by fermentation of grains, fruits, or other sources of sugar.

Example:- beer ,wine, spirit, Rum, Vodka etc.

2) Non alcoholic drink :-

An alcohol-free or non-alcoholic drink, also known as a temperance drink, is a version of an alcoholic drink made without alcohol, or with the alcohol removed or reduced to almost zero.

Example:- soft drinks, lassie, milkshakes, smoothies, homemade fruit juice, etc..

3) Carbonated drink :-

Soft drink are defined as water based flavoured drinks usually with added carbon dioxide and With nutritive, no nutritive and or intense sweeteners with other permitted food additives. Due to the high sugar content in typical soft drinks, they may also be called *sugary* drinks.

- Soft drinks
- The main production of soft drink was stored in 1830's and since then from those experimental beginning there was an evolution until in 1781,when the world's first cola flavoured beverage was introduced. These drinks were called soft drinks, only to separate them from hard alcoholic drinks.
- These drinks do not contain alcohol and broadly specifying these beverages, includes a variety of regulated, carbonated soft drinks, diet and caffeine free drinks, bottled water juices, juice drinks, sport drinks and even ready to drink tea/coffee packs. So we can say that soft drinks mean carbonated drinks. Today, soft drink is more favourite refreshment drink then tea, coffee,juice,etc.
- It is said that where there is a consumer, there is a producer and this results into completion. Bigger the player, the harder it plays. In such situation, broad identity is very strong. It takes long time to make broad famous.

OVERVIEW OF THE COMPANY

Introduction

The brand name – SOSYO -was derived from the Latin word 'Socious' which is related to Society. From 'Socio' it gradually evolved in to SOSYO, a distinctive thirst quencher with a unique taste that defies definition and has been relished over generations.

The brand has been given a new, contemporary look ever since it s repositioning as a Speciality drink in January 2010 with the catchy base line "Apna Desh Apna Drink "Besides 'SOSYO – Hajoori's has other brands like,

Sosyo- Mix Fruit Flavour

Kashmira jeera -Masala Soda Flavour

Lemee Lemon – Lemon Flavour

Lemee Orange – Orange Flavour

Openers- Multi- Flavour Soda

Runner- America's Premium Energy Drink

Ginlim-Ginger, Lemon Flavour

Hajoori's Soda – Aerated Water

Sosyo Jeera Extreme- Extreme flavour of jeera

Alkaline Water-9.5 PH scale water

S'eau Water -Packaged drinking water

The various packing includes 200ml in the glass bottles and 500ml. And 1.5 litres in Pet Take away and special packing in 500ml. Glass bottles pet take away for exports.

Basic information:-

1) Name of the organization:- Hajoori and sons.
2) Year of establishment:- 1923
3) Nature of business:- leading producer and marketer of soft drinks in India.
4) Address of corporate office:- plot no.243-244, Hajoori and sons, opposite Surat – Ahmadabad transport, bhatpore, Surat.
5) NoHead office:- Surat (Ichhapore, bhatpore).
6) Other branches:- Ahmadabad, Porbandar, Rajkot, Mumbai.
7) branches :- Kamrej and Baroda
8) international distribution:-UAE, US and UK.
9) Telephone:- 0261- 2632141/43
10) Website :- www.sosyo-thesoftdrink.com

7. Products of Hajoori and sons:

1)SOSYO:-

- It's a mixed fruit flavour. Sosyo is the oldest and only Indian fizzy drink. For decades, it has retained its unique taste and ruled heart of millions all over the world.
- Sosyo is a cider-type fruity flavour drink made of apple and lemon cocktail that packs quite a punch when had absolutely chilled . It's a non-cola drink, having a unique taste.People say it looks like an alcoholic drink but it's a non – alcoholic drink.

2) KASHMIRA:-

- Jeera masala soda is very popular amongst people as a " 100% digestive drink " and has a different satisfaction after a heavy meal.
- Kashmira traditional Indian spicy flavour, having many spices.
- It has an Authentic – Ethnic, Taste Which also helps in digestion.

3)LEMEE:-

- Lemee Orange has a tangy Orange flavour, it's cool and smoothing.
- Whereas Lemee Lemon has a cloudy lemon –'n' – lime flavour which is a good thirst quencher and contains vitamin C which is good for health.

4)GINLIM:-

- Gingerly lime soda has a unique test of gingerly lemon and tonic which helps in medication.

5)RUNNER:-

- American's People say it looks like an alcoholic drink but it's a non – alcoholic energy drink to keep you pumped up, always.

6)OPENERS:-

- Open your senses and explore a whole new vibrant and refreshing world. Available in 7 exciting flavours.
- Flavours are spicy cola, ginger, ginger ale,raspberry,pineapple,tonic water and ice-cream soda.

7)HAJOORI'S SODA:-

- The soda with extra sparkle, extrabubbles,extra power, extra strong and refreshing on its own.
- **The** soda that blends with the history of the company past independent.

8)FRESH DRINK JUICY:-

- It is freshness drinks . Ready to serve fruit drink. Available in different 5 flavours.Flavours are juicy litchi, juicy apple, juicy mango juicy guava,Juicy lemon.

9) SPRACLING APPLE:-

- It is apple flavour freshness drink. It is contain apple fruit juice concentration 10.2%

10) S'eau(WATER)

- S'eau is Arabic name it's meaning is water. It is drinking water. Which has two different type based on their pH.
- S'eau purified water it's pH is 6. And second type is Alkaline water it's pH is 9.5. Alkaline water is beneficial for Acidity, fat burn, detoxination, Improve bone health, Antioxidant.

11)Ready to eat products ;-

- There are many products of ready to eat which is.
  Sauce(Mint, spice mango, samosa souce,soya,red chilli, tangy tamarind sauce),
- Syrup(kesar,Rose,Khus), squash(Mango, Musk melon, Mandarin)
- Different masala(Apna des Apna taste) smoked gravy, Butter masala gravy, surprise masala,amdawadi tawa fry, Mughlai masala)
- Hyderabadi dum biryani ,tawa pulav, Daliya upma, Schezwan Rice.

Raw Materials:-

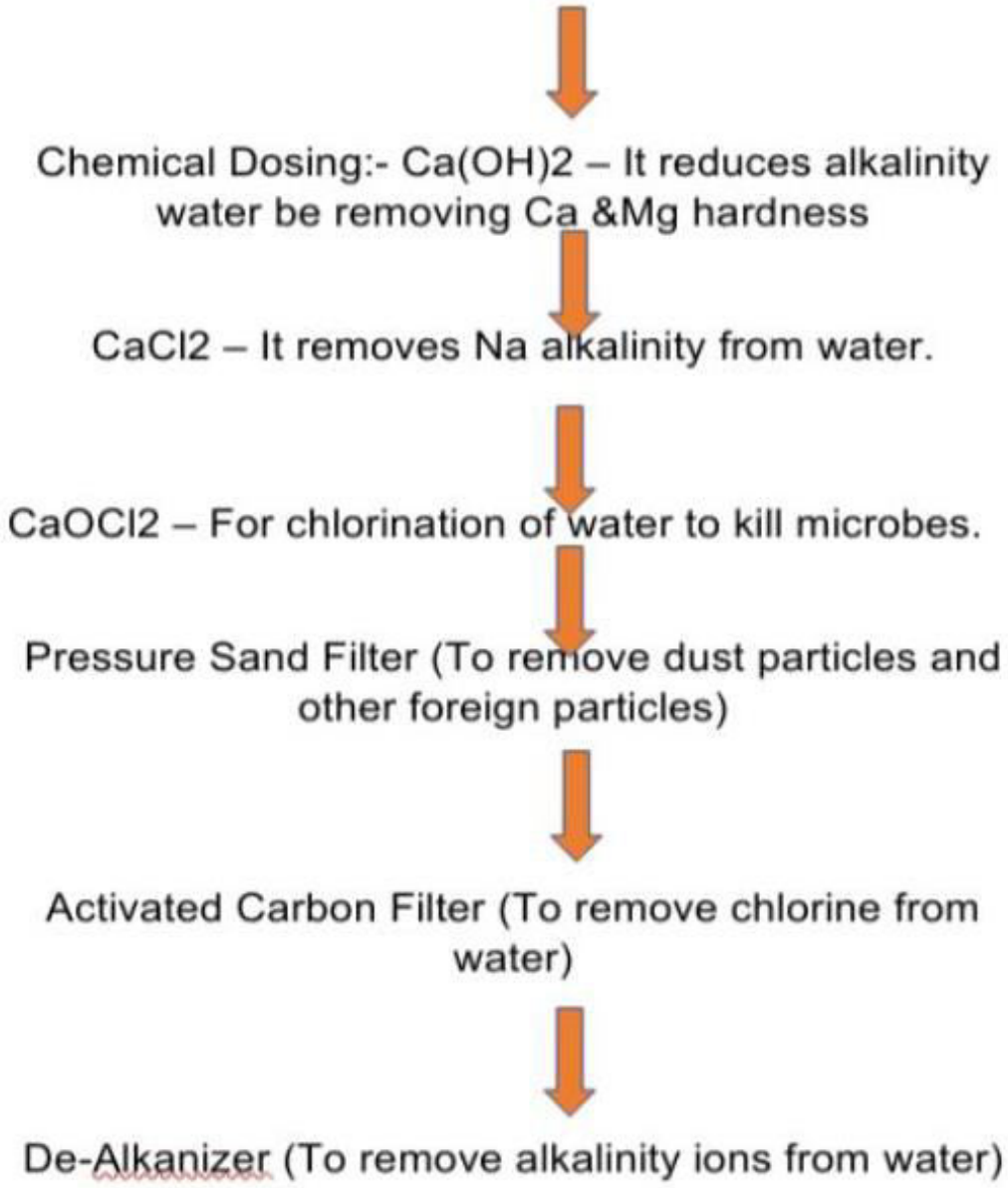
- Raw materials. Is material is used to manufacturing finished good.
- Raw materials of Hajoori and sons are Water, sugar, syrup, carbon dioxide, citric acid, crown, preform, added flavour and common colours etc.

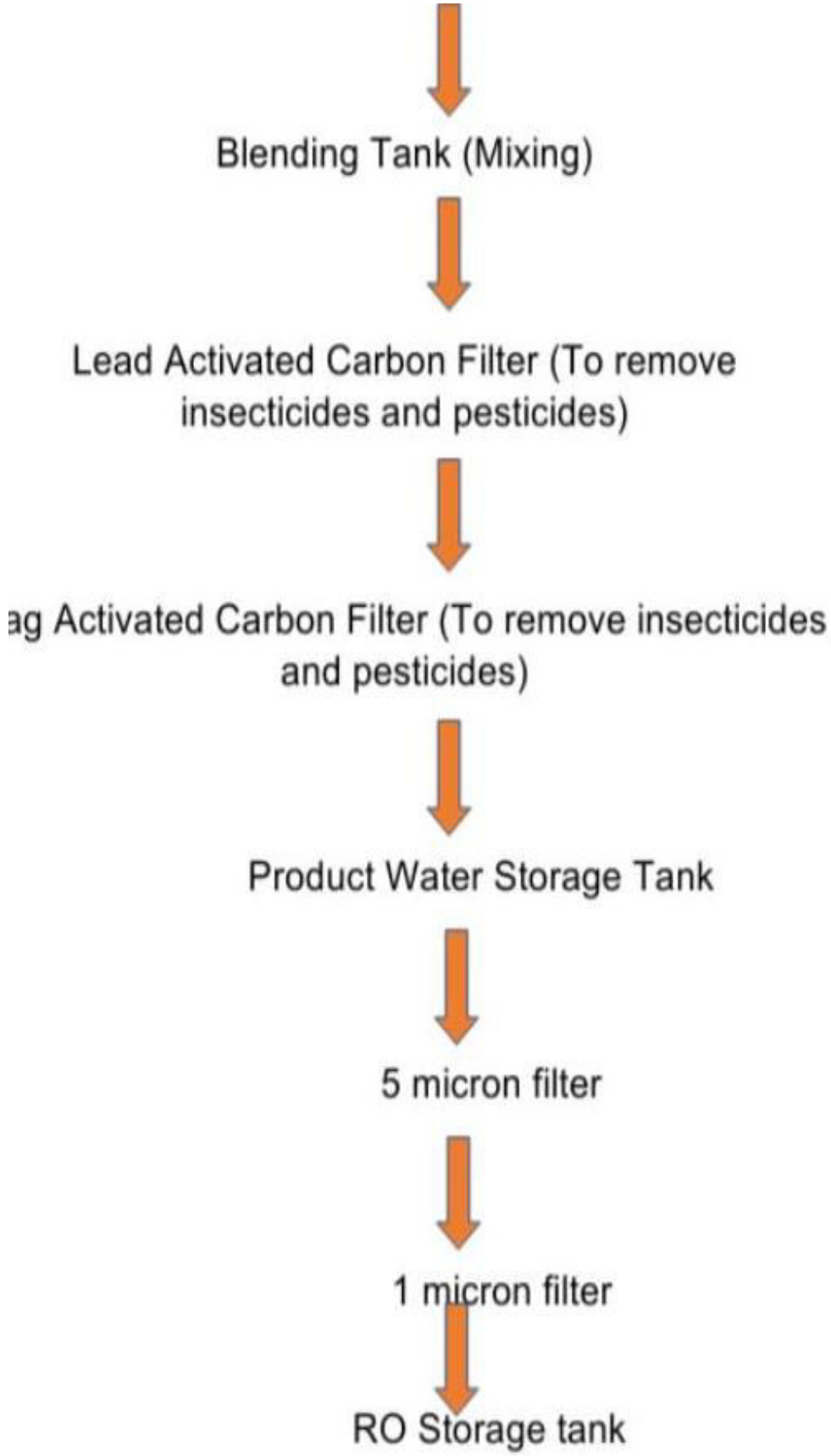
1) Water:-

There are two types of water used in our industry.

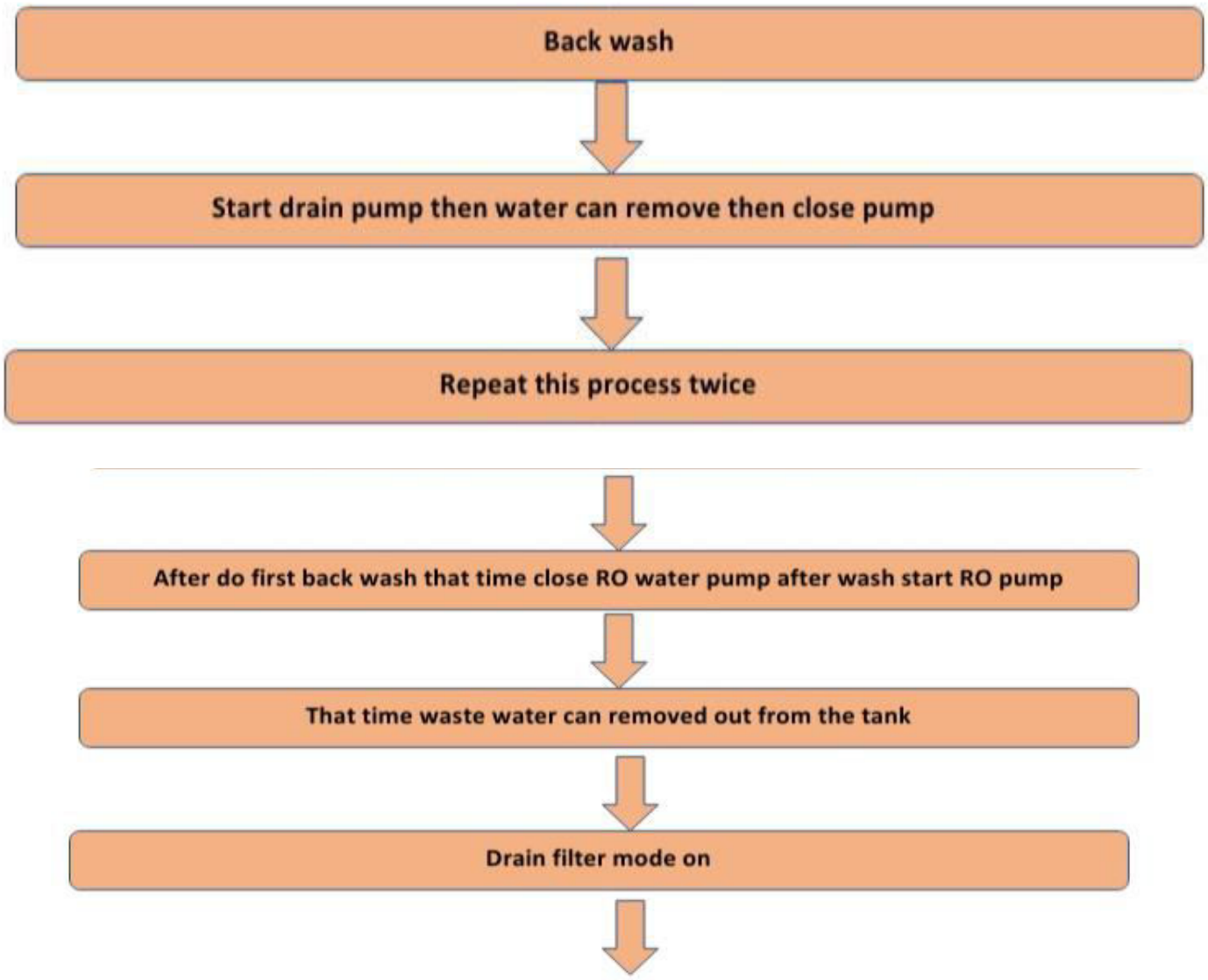
- SMC water- concerted into RO Water and then used in soda production.
- Borewell Water:- used into bottles washing and CIP process.

2.1 RAW WATER STORAGE TANK




Blending Tank (Mixing)
Lead Activated Carbon Filter (To remove insecticides and pesticides)
ag Activated Carbon Filter (To remove insecticides and pesticides)
Product Water Storage Tank
5 micron filter
1 micron filter
RO Storage tank

- RO back wash :
  Filters cleaned by a process called back washing. In this process flow of water is reversed from the normal flow. Back washing is done by using chlorine and steam. Sludge collected after back washing is drained.



2) Sugar

It is Raw material of syrup, which is used in SOSYO and KASHMIRA flavoured soda.

- **Syrup Preparation:-**

- Raw Syrup Preparation: The raw syrup prepared separately in the raw syrup room. Here, the sugar Prepared which is being used for CSD syrup preparations. It forms an important part of the Whole production. The sugar being used in the raw preparation is kept in the sugar warehouse.
- In syrup production ratio of sugar and water is 1:1.
- Ready Syrup Preparation: The raw syrup preparation is pumped into the ready syrup tank. CSD preparations Syrup which is as follows:

- CSD Section (continuous sugar dissolve): The raw syrup is pumped into the ready syrup the concentrate is prepared In mixer tank by adding base and treated water to it. This is mixed well with the help of Agitator and this is prepared concentrate is then pumped in to the ready syrup tank. In This tank, the raw syrup and the concentrate are mixed with the help of agitator. The brix Is then checked of the syrup prepared. After making up the required volume, the ready Syrup is then pumped into premix of the CDS section with the help of pump.

- **<u>Syrup Tests:</u>**

1. **Colour and Odour:-**

• Raw syrup is taken from the sampling point.
• Raw syrup is taken in a beaker.
• The colour should be observed visually that it should be transparent and There is no Browning Occur.
• Odour should also be observed that there should not be cooked odour.

2. **Brix Test:-**

• Take sample in beaker and with the help of dropper, pour distilled water in The refractometer .
• After this, pump sample in to the refractometer and the brix value on the Screen.

3) Carbon Presence Test:-

• Take a 0.45 micron filter paper and place it on the filter assembly.
• Pour the sample collected in a beaker in the assembly.
• Dry the filter paper after filtration.
• Check for any presence of carbon particle on the filter paper.
• This test is performed during the filtration process of raw syrup is going on.

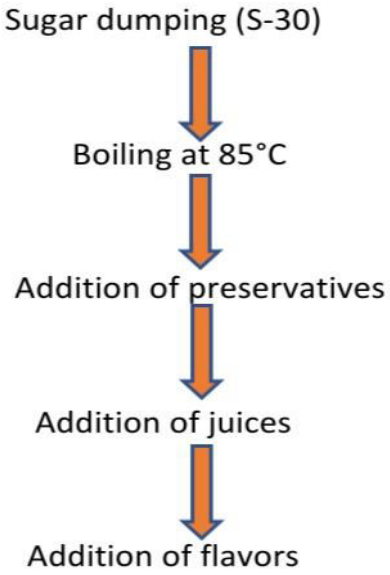


Figure shows:- flow chart of syrup production.

3) **Flavour:-**
   It's used concentrated juice because it's remove sweet from juice without heat.
4) **Colour:**
   It's give colour appearance ,Thickness provides And it's add colour it's change the quality of the product.
5) **Preservative**
   - What is preservatives?

- Preservatives keep food from spoiling and maintain freshness and colour or flavour foods. They are often added to baked goods, meats, jellies and beverages.
- Different chemicals are added to different canned Juices as preservative These chemicals increase shelf life of juices and enhance its taste and nutrients quality. Some of these chemicals may have negative impacts on health.
- Name of the preservatives:-
- Preservatives include ascorbic acid, citric acid, sodium benzoate, calcium propionate, vitamin E, BHA and BHT. Calcium propionate is a chemical preservative used in cheeses, and citric acid is used as a buffer and neutralizer in dressings, cheeses and canned fruit juices. BHA (butylated hydroxytoluene) and BHA (butylated hydrocyanic) are antioxidants commonly used in breakfast cereals to help prevent change in colour, odour or flavour.

6) **Bottle:-**
   There are two types of bottles

a. Glass bottle

- Glass bottle production is not regularly, it is reused by washing every time.

b. Bottle

- PET bottle is produced by two type in our industry,
  i. Automatically
  ii. Manually

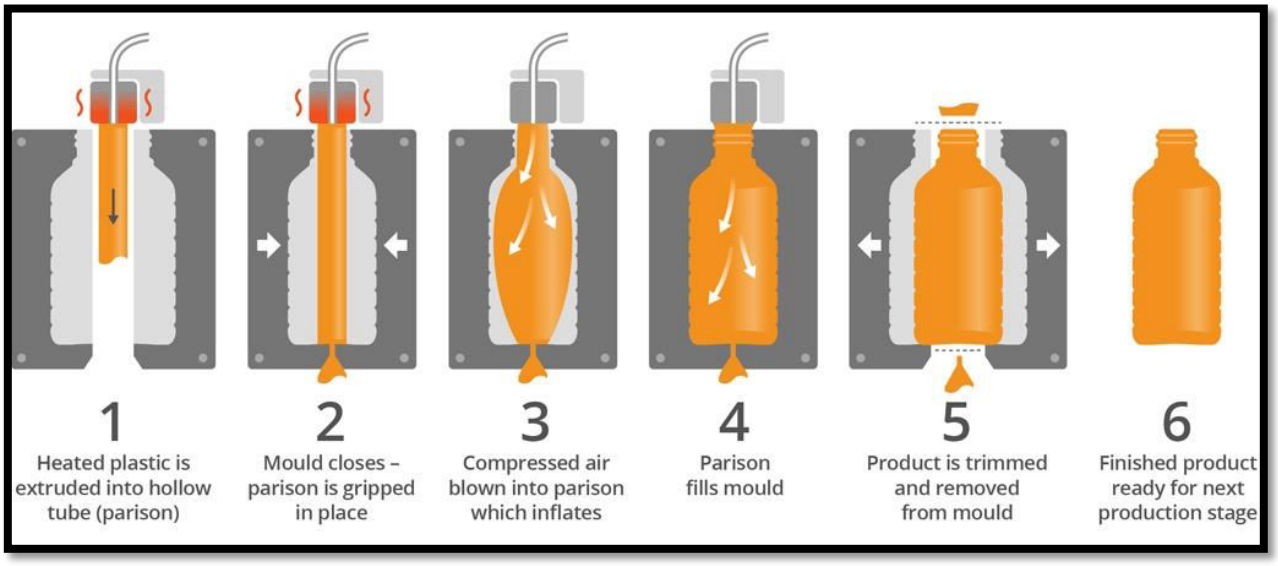


Image shows process of PET bottles formation.

7) Can

- The most sustainable beverage container
  As the most valuable package in the bin, aluminium cans are, by far, the most recycled beverage container. The average can contains 70 percent recycled metal.
- Shipping efficiency: the weight advantage
- Aluminium cans are lightweight and easily stacked. This provides storage and shipping efficiencies and limits overall transportation carbon emissions through logistics and supply chains.
- True closed loop recycling.
- Aluminium cans are recycled over and over again in a true “closed loop” recycling process. Glass and plastic are typically “down-cycled” into products like carpet fibre or landfill liner.

8) Crown

- A **bottle cap** or **bottle top** seals the top opening of a bottle. A cap is typically colourfully decorated with the logo of the brand of beverage. Plastic caps are

used for plastic bottles, while metal with plastic backing is used for glass; plastic caps are commonly made from Polyethylene or Polypropylene. whilst metal caps are usually either steel or aluminium .Plastic caps may have a pour spout. Flip-Top caps like Flapper closures provide controlled dispensing of dry products. Caps for plastic bottles are often made of a different type of plastic from the bottle.

Image shows the crown of glass bottle and plastic capper of PET bottle.

9) Manufacturing process:

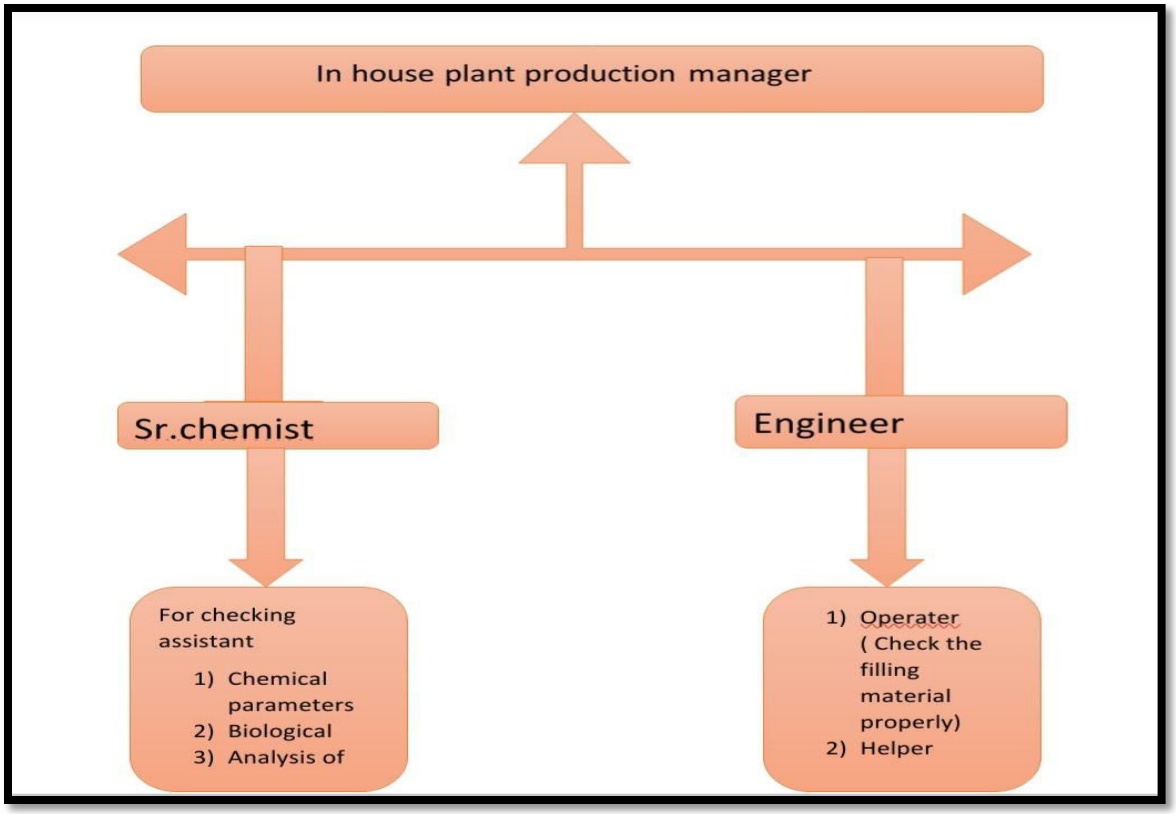
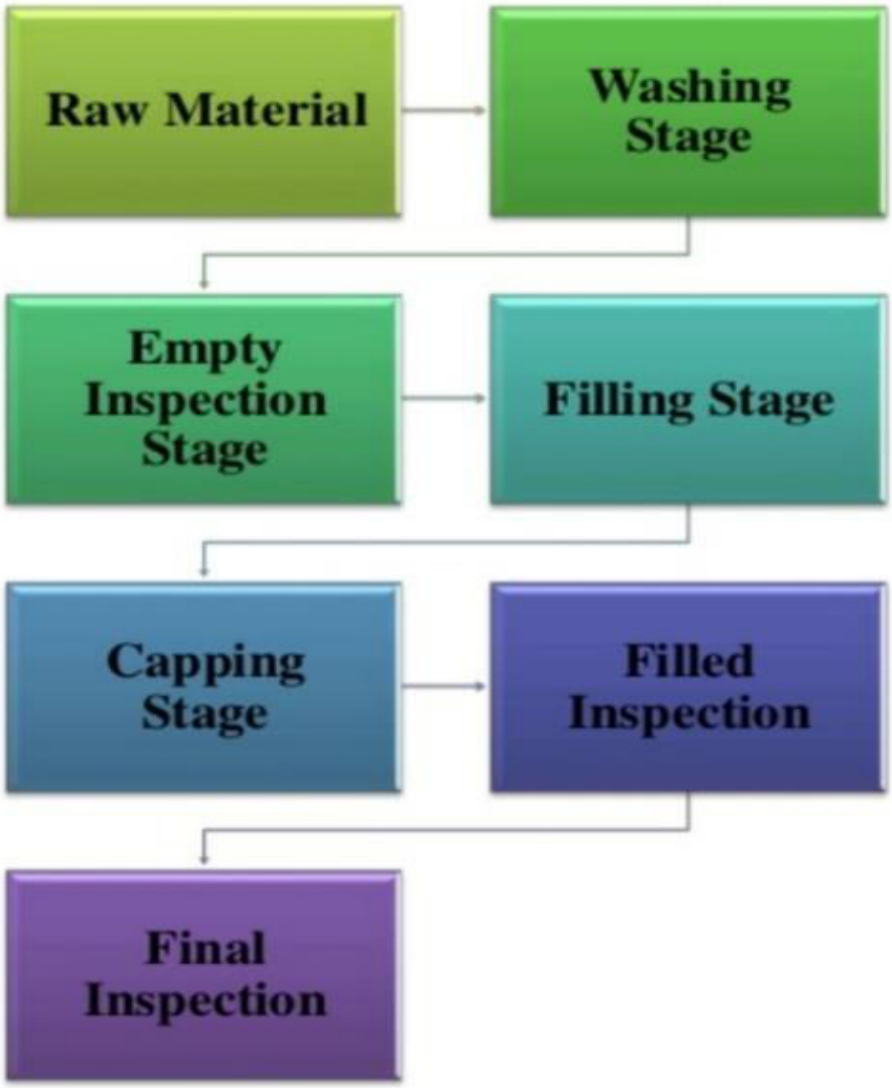


Image shows:- In house plant production management.

- The company has very simple production process. It is divided four stages stated below.

    1. Plant start up.
    2. Washing stage
    3. Inspection stage
    4. Filling and sealing stage
    5. Final inspection

Plant start-up:-


Raw Material
Washing Stage
Empty Inspection Stage
Filling Stage
Capping Stage
Filled Inspection
Final Inspection

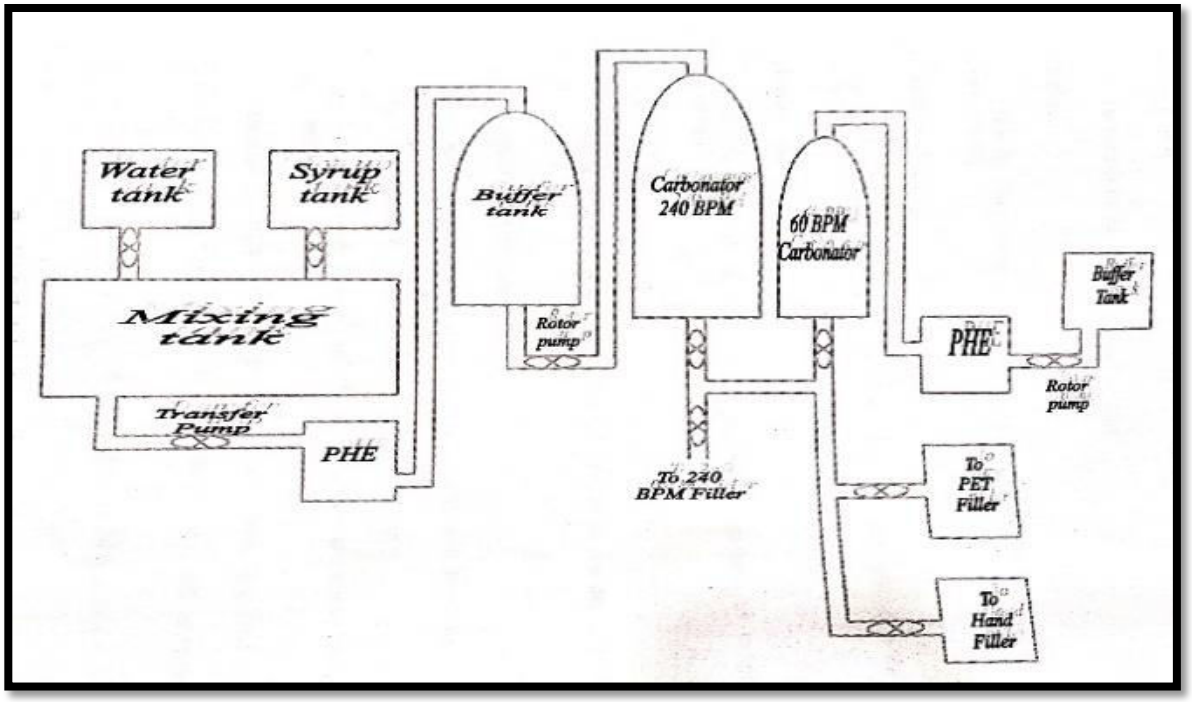


Figure shows:- plant start-up layout.

The plant should be started in the following order:

1) Boiler:

Fire boiler after ensuring water and fuel generator steam and start heating bottle washer solutions.

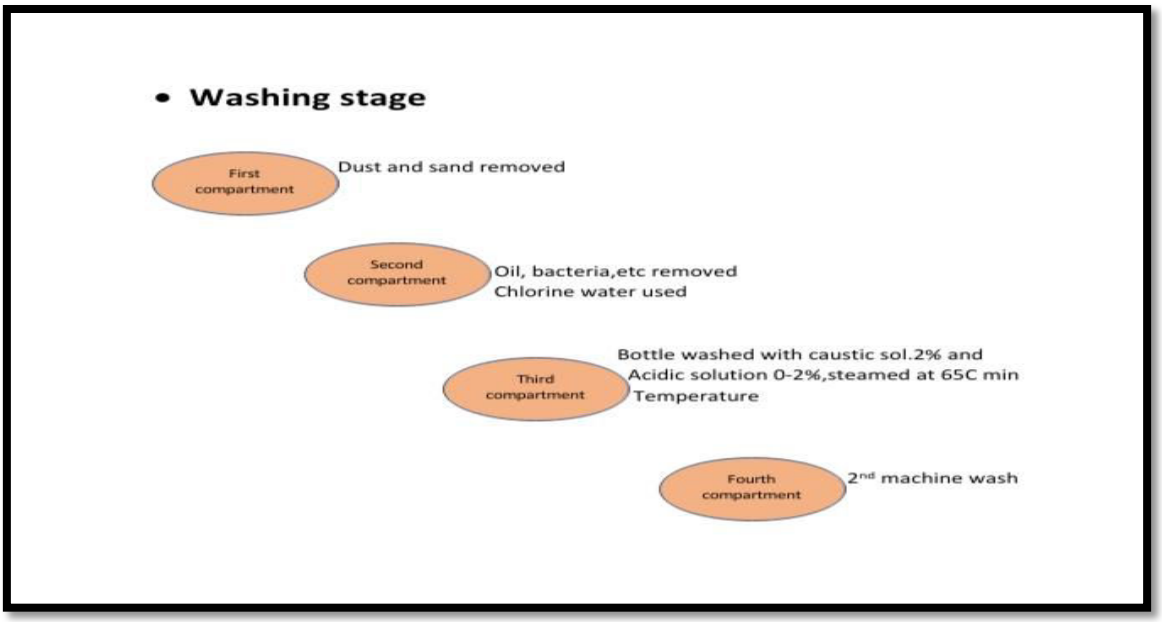
2) Water:
   Start the water pump and rinse the filters and ensure stock solution in the chlorinator.
3) Bottle washer:
   Start all the pumps and drive checks the caustic percentage, jets in all compartments.
4) Syrup:
   Agitate the syrup for 5 minutes, half an hour before production, and then connect to line.
5) Start air compressor, exhaust fans,etc.
6) Rinse all pipes lines and equipment to remove residual chlorine / sanitizing agents.
7) Lubricate all conveyors with soap and machineries with oil and grease.
8) Start loading bottle in bottle washer after ensuring right temperature in all compartments.
9) Start refrigeration plant after ensuring enough water in cooling shower/ spray pond.
10) Rinse chiller and flood carbonator and filter with chilled water check for proper temperature.
11) Take CO2 pressure in the carbonator and flush the carbonator and filler, through the filler.
12) Start the proportioning unit check syrup and water supply and adjust the Brix.

13) Pump the syrup into the chiller.
14) Take syrup and water into the carbonator.
15) Pressurize the filler and then take the beverage from the carbonator into it.
16) Ensure crowns in the crowner hopper. Check the crown crimping.
17) Illuminate filled and empty inspection stations.
18) Switch on conveyors and collecting tables.
19) Unload the bottle washer and check for caustic carryover.
20) Start filling and check the final product quality.

Washing stage:

Production process starts with the loading of the empty bottle in the washing machine. Before the empty bottles are taken from carat and are placed on the conveyor which reaches the washing machine. Bottle is arranged properly and enters the machine in lot of 10 bottles. In the washing machine bottle are passing through 5 compartments:

I. In the first compartment all the dust and the sand is removed with the plan water.
II. In the second compartment the oil, bacteria etc. In the bottles are removed with the chlorine water.
III. In the third compartment bottles gets washed with caustic solution 2%, acidic solution 0-2%, acidic solution 0-2% and gets steamed at 65 C minimum temperature.
IV. In the fifth compartment the second time machine is done with the plane water.



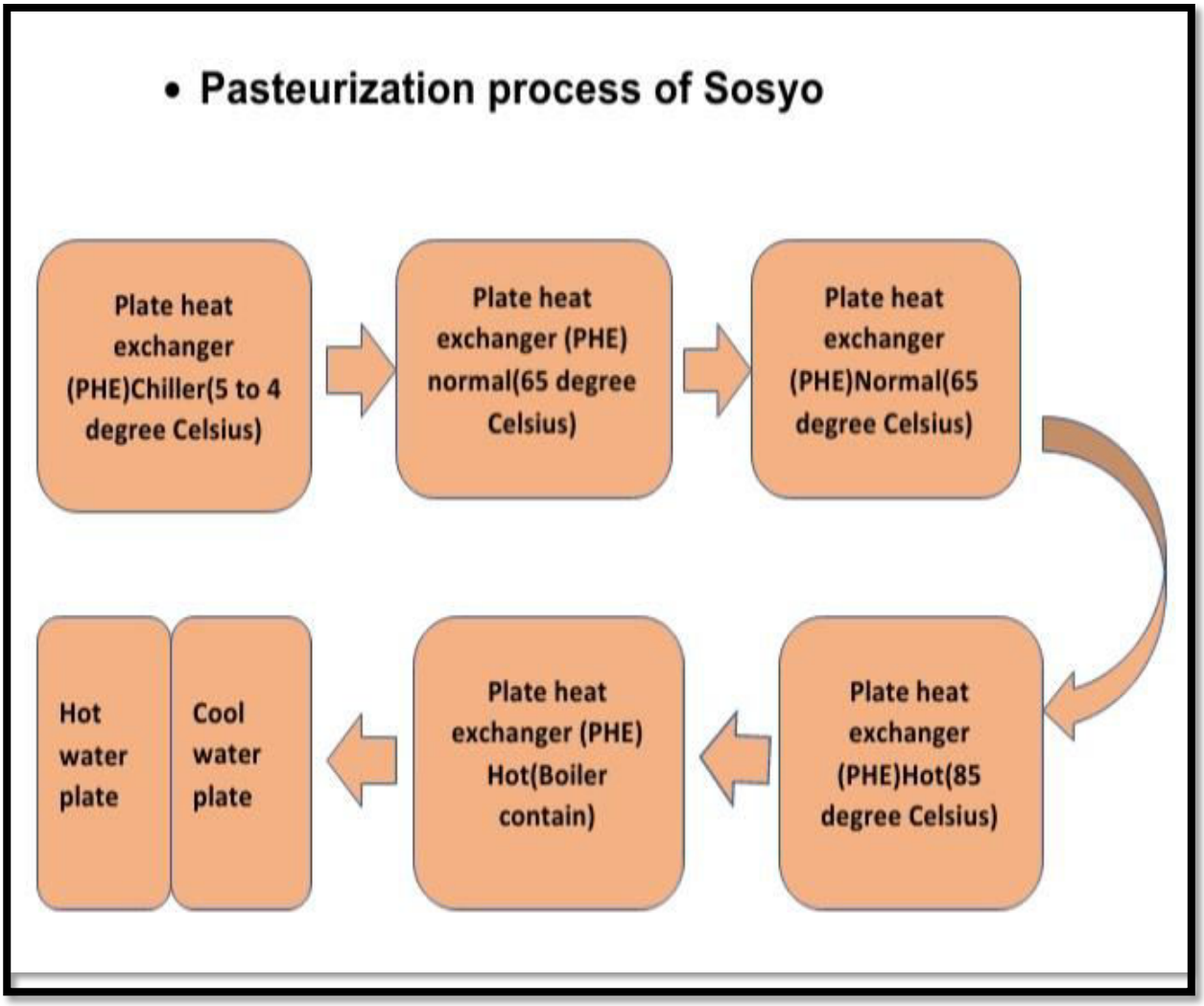
After that the bottles comes out of the machine from the other end in the lot of 10 bottles. The come out on the conveyor and moves further for next stage.

INSPECTION STAGE:

In the inspection stage the bottles are checked three persons. First person checks the bottles when they come out of washing machine. They see whether there is any breakage or defective bottles. Then the second person checks the bottles from the bottom. The person sees if there is any dirt particles stuck to the bottom of the bottle in the mirror placed below the conveyor. Thereafter the third person checks the body portion of the bottle in the light behind the bottle. If anyone finds any mistake in bottle then they pick it up from conveyor and keep it aside and allow the other bottle to move for next stage.

PASTEURIZATION:

Pasteurization extends the shelf life of carbonated beverages by removing microbes that cause them to ferment or deteriorate in other ways. This is especially important in beverages such as sodas which have high amounts of sugar.



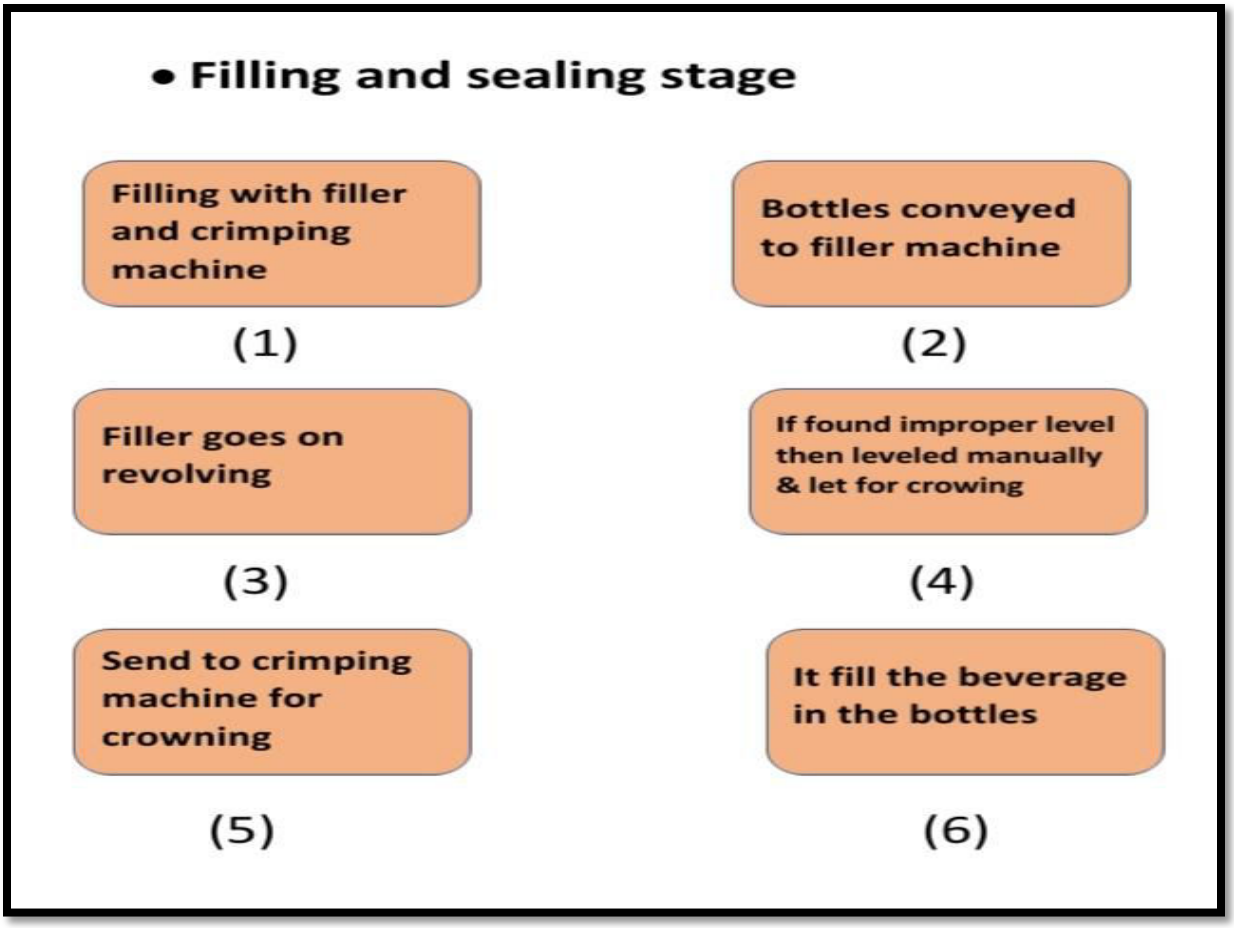
FILLING AND SEALING STAGE:

The filling and sealing to the bottle is done with help of filter machine and crimping machine. It is a combined activity. The bottles are conveyed to the filler machine through conveyor. The Filler machine goes on revolving. It fills the beverage in the bottle and then sends to crimping machine for crowning where the bottles are sealed with crown. When the bottles are being conveyed from filler to crimping machine and if operator finds improper level then the bottle manually and let the bottle go for crowning. Thereafter the bottle moves for next stage.

FINAL INSPECTION STAGE

After crowning again the bottles are checked whether there is any dirt particles present in the bottle. One person after crowning process checks the bottle in the light. If any dirt particles are found then that bottle is immediately disposed off are else are allowed to move further on conveyor.

Material handling equipment's used



The company uses different types of material handling equipment like conveyors, Trolley, pipelines, Carats and trucks for moving their products from one place to the other. It can be further explained as below.

A. Conveyor:-

- The company has different types of conveyors to carry the bottles to be processed into different machines. Right from the starting of production process the bottles are moved to the next process through conveyor. Company has motor driven conveyor that has one metallic belt on the rolling wheels and those conveyor that works on gravity I.e. no electric motor is need to run them.

B. Pipelines:-

- Pipeline is also treated as material handling equipment as it carry liquid and gaseous material. It is used to transfer the C02 from cylinder in the go down to the cylinder in the manufacturing unit where it is compressed to make it is compressed to make it in the liquid from, then to shift it in the mixer where all the material are mixed and then the

final liquid is prepared separately is brought from the main syrup tank and then to a filler machine through pipelines.

C. Trolleys:-

- Trolleys are mainly used for transferring heavy cerates loaded with bottles from the store to the trucks. Also when the cerates are unloaded from trucks and moved from one place to another trolley is used. For convenience trolleys are manually run by workers to carry heavy loads.

D. Cerates:-

- Cerates is a very important material handling equipment as it is used to carry the bottles in the lot of 24. Cerates is mainly used for safety purpose so as to prevent the breakage of bottles. So when the bottles are to be taken from one place to another it is kept in cerates and then taken. It is also convenient to carry bottles in the group.

E. Trucks:-

- Trucks can also be considered as the material handling equipment as it is used for transporting finished products. They carry cerates from the manufacturing place to the whole seller and retailers and also to the port for the export through steamers in the foreign countries.

For the preparation of soda

- The same process is followed but soda does not syrup as material. It only contains water and C02 which mixes and goes to fillers machine and further process remains same.

Material requirements plan

- The company does not keep large stock of raw material and the company follows "just in time " inventory control systems. So the material requirement planning is not very tedious process. So the company purchases material for vary short period of time because now a days all material are available easily.
- MRP requires some inputs like production plan and inventory status files. Once the production plan is conveyed, then it is cleared that what is current requirement of material of material needed for specified numbers of bottles to be processed.
- The next step is to check the inventory status that is to consider the quantities of various items in stock. In Hajoori & Son's mostly, raw material are purchase on daily basis.
- All the information is called from the register from storekeeper and inventory status files.

A. Sugar

- The company gives an order of 25 gunny bags of sugar and after that use if for production for coming days. So when 20 bags are used and 5 remain then the company places a new order for further requirement.

B. CO2

- Here also the same process is followed say. E.g. If certain number of gas cylinders are ordered and after used when it is about to finished then a new order is placed for further requirements.

C. Water

- As water is easily available for SMC, it is not the matter of worry. But then also regular storage of water is done and as per the requirement the water is processed for next stages.
- Similarly all other raw materials like caramon colour, crown, bottles, citric acid, caustic soda etc. are also planned and purchase order is given as per the requirement.
- Also in the cause or any other external factor like natural calamity, riots, floods etc. The purchase order is increased or decreased. Seasonal demand, price, export orders also affect the material requirement planning and purchase order.
- **Quality control**

A. <u>Glass checking test</u>

Equipment: 250 ml glass beaker, taste test glasses.

Method of testing:

- Fill the beaker with water and observe for any off **Water quality checking test**

B. <u>Taste, odour and appearance</u>

- appearance and colour

against white back ground.

- Pour water in taste testing glass after observing appearance.
- Smell and taste the sample.
- Observe for any off taste / off odour.

C. <u>P-value (phenolphthalein alkalinity)</u>

Equipment: automatic burette, flasks, graduated measuring cylinder.

Chemical: T-solution, phenolphthalein indicator, N/50 H_2SO_4.

Method of testing:

- Take 100ml of water sample in clean dry conical 250ml flask.
- Add 2-3 drops of 0.1 N T- solution.
- Then add 2-3 drops of phenolphthalein indicator. Pink color develops.
- Titrate, pink colored solution against N/50 H_2SO_4 solution contained in

automatic burette till end point is not achieved.

End point: pink to colorless.

Calculation: P-Value (in PPM) =10 x Burette reading

D. <u>M-value (methyl orange alkalinity):</u>

Equipment: Automatic burette, flasks, graduated measuring cylinder.

Chemical: Methyl orange indicator, H_2SO_4 solution

Method of testing:

- First calculate p-value.
- Proceed further by adding 2-3 drops of methyl orange indicator to the colourless solution.

E. <u>Total hardness</u>

Equipment: Flasks, measuring cylinders, stirring rod, burette.

Chemicals: Ammonia buffer, Total hardness indicator tablets, N/50 EDTA solution.

Method of testing:

- Take 100ml of water sample in clean dry 250 ml conical flask.
- Add 2ml of ammonia buffer.
- Take one tablet of total hardness indicator tablet. Crush it and add it to the water sample and mix well.Reddish violet colour develops.
- Titrate it against N/50 EDTA solution.

End point: Reddish violet colour to royal blue.

Calculation: TH (PPM) = 10xburette reading

F. <u>Calcium hardness:</u>

Equipment: Flasks, measuring cylinders, stirring rod, burette.

Chemicals: 0.1 N NaOH, Calcium hardness indicator tablets, N/50 EDTA solutions.

Method of testing:

- Take 100ml of water sample in clean dry 250ml conical flask.
- Add 2-3 drops of 0.1 N NaOH solution.
- Add one tablet of Ca hardness indicator, Crush and dissolve the tablet in water. Pinkish colour develops.

A. Titrate it against N/50 EDTA solution.

End point: Pinkish to violet.

Calculation: CaH (PPM) = 10x burette reading

G. <u>Ph.:</u>

Equipment: p^H meter, beaker.

Method of testing:

- Take water in 100ml beaker.

- Dip electrode of calibrated p^H-meter in beaker and swirl without touching the walls or surface of the beaker.
- Press "read ˝button on the "read ˝take the reading of the water sample.
- Wait till the reading becomes stable which is indicated by "lock ˝indicator on the screen of p^H-meter.
- Note down the p^H and the corresponding temperature.

  p^H= reading of p^H-meter.

H. Chlorine testing:

Lovibond Comparator method:

Equipment: Lovibond comparator, sampling cells, beaker.

Chemical: DPD-1 tablets

Method of testing:

- Take 5ml of water sample in each of the two sample cells.
- Add one crushed DPD-1 or DPD-4 tablet to one sample cell.
- DPD-1 is used for free chlorine & DPD is used for total chlorine.
- Dissolve the tablet and take second sample cell as a blank.
- Put cells in lovibond comparator.
- Compare the colour developed with lovibond comparator by rotating the disc to find suitable color match between the two sample cells.

Reading: Cl_2 (PPM) =reading of lovibond comparator.

I. Iron testing:

Equipment: Iron testing kit, spectrophotometer, beaker, cuvette, pipette.

Chemical: Reagent Fe-1

Method of testing:

- Pipette out 5ml of water sample into beaker.
- Add 3 drops of reagent Fe-1 into water sample.
- Leave to stand for 3mins.
- Fill the sample in to cuvette and measure in the spectrophotometer.
- Note the reading in mg/l.

J. Chlorides:

Equipment: burette, pipette, flasks, graduated measuring cylinder.

Chemical: 0.02N Silver Nitrate solution, 5% Potassium chromate,

K. <u>phenolphthalein indicator.</u>

Method of testing:

- Take 50ml of water sample in flask.
- Add 2-3 drops of phenolphthalein indicator.
- If pink colour appears titrate with 0.02N sulphuric acid otherwise add 5 drops of potassium chromate.
- Yellow colour will appear.
- Titrate with 0.02N sulphuric acid solution.

End point: yellow to reddish brown.

Calculation: Chloride (PPM) = [(Titration value -0.2) x 0.02x 58.44x1000]/volume of sample

L. Total Dissolved solids:

Equipment: TDS Meter, beaker.

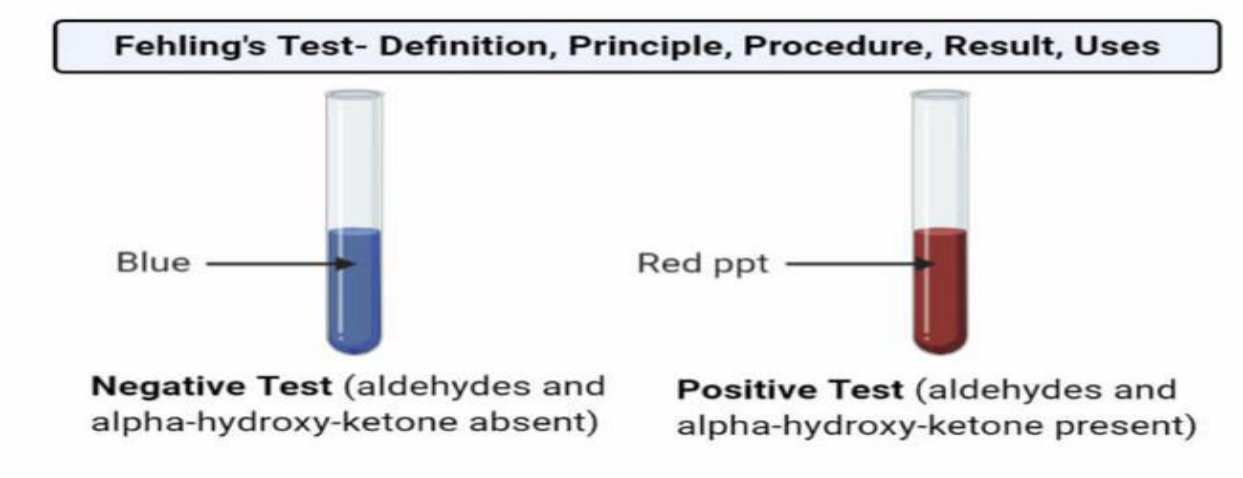
Method of testing:

- Fill the beaker with water.
- Dip calibrated TDS meter probe in beaker ensuring that it does not touches surface and walls of beaker.
- Switch ON TDS meter and press "read ˝button to make TDS meter take the reading of the water sample.
- Wait till the reading becomes stable which is indicated by "lock ˝indicator on the screen of TDS meter.
- Note down the TDS.

TDS =Reading of TDS meter in mg/l.

M. **Sugar checking test**

- **Fehling's test**
- Take 1 ml of a given sample in a clean, dry test tube. The concentration of the test samples should be 5% (w/v).
- Take control of 1 ml of distilled water in another tube.
- Add about 2-3 drops of Fehling's reagent to both the tubes and mix them in a vortex.
- Keep the test tubes in the water bath for 1-2 minutes.
- Observe the appearance of color in the test tubes.
- Note down the appearance of color seen in the test tubes.



- The appearance of a reddish-brown precipitate indicates a positive result and the presence of reducing sugars.
- The absence of the reddish precipitate or the appearance of deep blue color indicates a negative result and lack of reducing sugars.
- **Bottle checking**

1. Prefrom
2. Heat
3. Equal weight distribution
4. Bottel blow
5. Bottel quality test
   a) capacity
   b) Shape
   c) Print
   d) Weight

6. Diameters

   a) vernier

   b) caliper

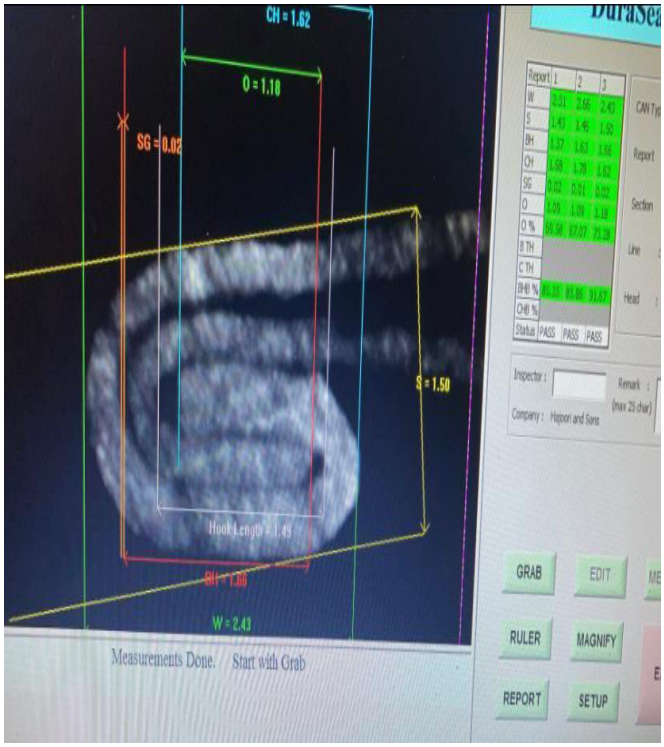
c) body diameter

d) upper diameter

7. cut into three part

As per ratio:-40:40:20=Upper, middle,lower part

- **Plastic Bottle checking test**
  1) Drop test
  2) Stress test
- **Glass bottle checking**
  1) Bottel quality check
     a) Weight
     b) Neck
     c) Bottom
     d) Length
  2) Crown
     Gonogo process
  3) Crimping process
     a) Over crimping
     b) Under crimping
     c) Perfect crimping
- **Can checking**
  1) Can quality checking
     a) Body Hooke
     b) Percentage overlapping
     c) Width
     d) Cover hooke



Perfect can fail

- **Filling process:-**
  - Filling process steps
    - Water and syrup can mix
    - Then adding co2 . If it's carbonated
    - Value can fill up the soft drinks
    - Then capper
    - After crown check
- **Water + syrup mix:-**
  - In the filling of the pet bottle it's automatically machine can fill up.
  - In glass and cann is manually set for water and syrup.
- **Gas volume:-**
  - In the gas volume most important to the check
  - The ration of gas is 3.9-4% pressure
  - If gas volume is high chances to break the bottle.
  - If gas volume is low then soft drink shelf life is low.
- **Valves:-**
  - It is the different valves for different filling
  - Glass bottle filling valves is -8 valves
  - Pet bottle filling valve-16 valves
  - For the can filling-6 valves
- **Capper and crown:-**

- In the glass bottle it crown can fit after check it's can properly crown capping check with the gonogo meter used.
- In the pet bottle it used capper after capping check the trok machine.
- In the can fix the lead of the can, in the can it's check the lead can or seam gap of the can.

➢ **Quality assurance**

#plate test
#yeast count test
#colifrom test
#Mold test

- **Microbial test**

Total plate count method-microbiology techniques is plate counting which is used To determineg the number of viable cells in a soft drinks.

Agar- Nutrient agar plate
Ph- 6.6-7.0
Incubate 35-37 degree in 24-48hrs.
Colony range less than 21 colonies
Results – By performing test I can observe the few colonies in the soft drinks

Yeast and mold test- Yeast and mold counts are used to detect and quantify the amount of the fungal growth In the soft drinks.

Agar- glucose yeast extract agar
Ph-6.80-7.20
Incubation at 35-38C for 28-48hrs
Colony range less than 5 colonies
Results -By performing this test I can observe the some time colonies and Some time can not find any colonies.

Colifrom test- It is used for detection of colifrom bacteria in water or product. Beacause it is harmful for the health.

Agar- MacConkey agar
Ph-7.4
Incubation at 35C for 24-48 hrs
Colony range 0-1
Results – By perfoming this test we can not observe any colony but some time can obsery

Method name	Sosyo (CFU)	Kasmira (CFU)	Hajoori soda (CFU)
Total plate count	14	17	12
Yeast and mould count	3	2	0
Coliform Count	0	0	0

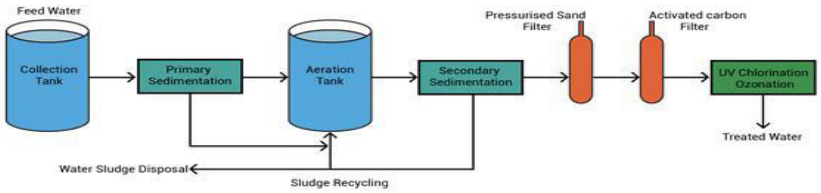
Some soft drink microbial, physical,chemical test results

Characrteristics	Sosy	Kashmira	Hajoori soda
Flavour	Mixed fruit	Spicy	No flavour
Brix	15.5	10.0	-
Gas volume	4.0	4.0	5.2
Ph	2.7	2.75	-
Acidity	0.32	0.24	-

- **Effluents treatment plants(ETP):-**

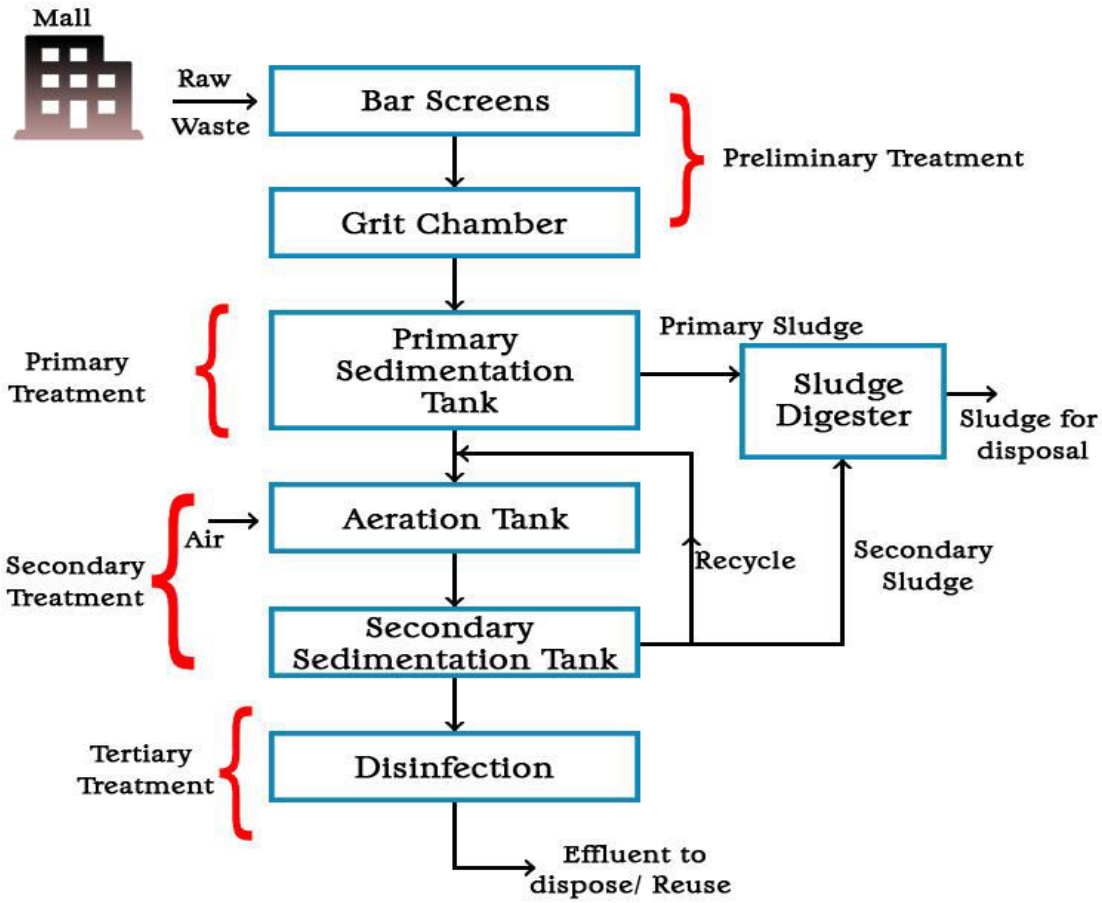
- ETPis most cost Effective & technically proven system to remove the unwanted, hazardous chemicals from the wastewater to meets the statutory pollution control requirements, especially for chemicals, pharmaceuticals, phosphating and electroplating wastewaters.
- An ETP is therefore designed to remove the physical, chemical and biological materials present in the effluent. Depending on the level of treatment the wastewater requires, an ETP is divided into four different levels each designed to remove a certain type of material in the effluent.

1. **Preliminary level**
   This aims at the removal of physical waste present in the effluent. This level involves physical processes such as sedimentation, filtration, aeration, flow equalization, clarification and screening.
2. **Primary level**:
   Aims at the removal of large solids and organic matter. It involves both physical and chemical processes. The same physical processes mentioned in the first level are utilized. The chemical process involves the addition of certain chemicals to improve the quality of the wastewater. This chemical processes include chemical coagulation, pH control by addition of HCl or sodium carbonate, chemical precipitation, flocculation and dissolved air flotation.
3. **Secondary level:**
   I the removal of biodegradable organic materials and suspended matter. This level uses biological and chemical processes. The chemical processes are similar to level 2. Biological processes involved are the suspended-growth process and the attached-growth/fixed-film process. The two biological processes can be used together or either one can be chosen.
4. **Tertiary level:-**
   This level entails the removal of suspended and dissolved materials using the physical, chemical and biological process utilized together. The processes are as discussed in previous levels. Effluent treatment plants are a critical part of the manufacturing industries and other wastewater treatment plants. They keep the environment safe from hazardous
   materials through strict treatment protocols.



ETP back wash

- In terms of water treatment, including water purification and sewage treatment, backwashing refers to pumping water backwards through the filters media, sometimes including intermittent use of compressed air during the process. Backwashing is a form of preventive maintenance so that the filter media can be reused.



Clean in place (CIP):-

- As a food, dairy, or beverage processor, you understand the importance of maintaining a hygienic process environment to ensure product quality and purity. That's where a good Clean-in-place (CIP) System comes in.
- CIP Systems pump cleaning, rinsing, and sanitizing solutions through the same piping path as the product to eliminate product soil from all internal surfaces.
- CIP cycles are typically run either after a processing run that has produced normal soiling or when changing over a processing line from one product to another.
- Every CIP cleaning cycle has its own unique set of parameters, so there's really no such thing as a "typical" CIP cycle
- Mostly industry used 5step CIP or 7!steps CIP.

STEP 1: PRE-RINSE

- The pre-rinse is a very important step in the CIP process because a well-monitored and well-executed pre-rinse makes the rest of the wash cycle predictable and repeatable.
- The pre-rinse cycle:
- Wets the interior surface of the lines and tanks
- Removes most of the remaining residue
- Dissolves sugars and partially melts fats
- Provides a non-chemical pressure test of the CIP flow path
- Use potable plant water, de-ionized water (DI), water that has been processed through reverse osmosis (RO), or re-use the final rinse solution from the previous cleaning sequence. A Turbidity Sensor may be used to verify that the pre-rinse effectively removes all solids.
- Pre-Rinse

STEP 2: CAUSTIC WASH – (140° – 185° F)

- Caustic washes soften fats, making them easier to remove. Also known as caustic soda, sodium hydroxide or NaOH, the alkali used in caustic washes have a very high pH in a concentration range of 0.5-2.0%. Concentrations as high as 4% may be used for highly soiled surfaces.
- Caustic is typically used as the main detergent in most CIP wash cycles. A non-foaming formulation can help reduce pump cavitation and increase efficiency. It will also prevent tanks from overfilling with foam when the system starts to recirculate.
- Water Saving Tip: In many cases, the caustic wash can be returned to its tank and re-used multiple times, which significantly reduces water, chemical, and energy costs over a single tank system.

STEP 3: INTERMEDIATE RINSE

- Fresh water flushes out residual traces of detergent remaining from the caustic wash.
- Use proper instrumentation during each step of the CIP Cycle, including rinsing, ensures proper cleaning.
- Level Transmitters and Probes monitor tank levels of wash and rinse tanks.
- Flow Transmitters ensure optimum flow for spray devices to precisely control wash and rinse steps.
- Conductivity Transmitters ensure chemical levels are hitting predetermined set point.
- Spray Ball Display
- Clean-in-place System

STEP 4: FINAL RINSE

- Rinse with either DI, RO, or city water to flush residual cleaning agents.
- In many systems, the final rinse water may be recovered and reused as the pre-rinse solution for the next cleaning cycle. The residual heat and chemicals it retains from the final rinse will help make the next pre-rinse more effective and economical.

STEP 5. SANITIZING RINSE

- May be required to help kill microorganisms before starting the next production run.
- For many years, various hypochlorite solutions (potassium, sodium or calcium), also known as “hypo,” have been used as sanitizers in many CIP cycles.
- The active ingredient in a sanitizing rinse is chlorine (bleach), which is Relatively inexpensive to use.