

Project (BSCC3151) report

on

WATER ANALYSIS IN AQUATEC WATER PLANT AND ANALYSIS OF COSMETIC PRODUCTS

Submitted in Partial Fulfilment of the Requirement for the Degree of
B.Sc. (Hons) Chemistry

Submitted by

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May 2022

CERTIFICATE

This is to Certify that Ms. PALLAVI TYAGI has carried out his/her project work entitled “Water Analysis in Aquatec Water Plant and Analysis of Cosmetic Products” under my supervision. This work is fit for submission for the award of Bachelor Degree (Hons) in Chemistry.

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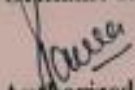
This is to certify that Ms Pallavi Tyagi a 6th semester student of B.Sc (Hons) Chemistry from Galgotias University, Greater Noida has undergone in training from **15/02/2022 to 31/05/2022** as a part of fulfillment of her course, at our factory located at B-44, Phase II, NOIDA(U.P.) in Quality Control and Quality Assurance department.

During her training period she had undertaken a project on "**Water Analysis in Aquatec water plant and analysis of Cosmetic Products**" – **An HR Perspective.**" She was found to be taking keen interest and has put in her efforts to work on the project very sincerely.

The project she has undergone, really helped us in identifying many strengths and areas of improvement in our working environment.

We wish her all the best in her future endeavors.

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CANDIDATE DECLARATION

I hereby declare that the dissertation entitled “Water Analysis in Aquatec Water Plant and Analysis of Cosmetic Products” submitted by me in partial fulfillment for the degree of B.Sc. (Hons) Chemistry to the Division of Chemistry, Department of Basic Sciences, School of Basic and Applied Science, Galgotias University, Greater Noida, Uttar Pradesh, India is my original work. It has not been submitted in part or full to this University or any other University for the award of a diploma or degree.

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List of Abbreviations

SOP: STANDARD OPERATING PROCEDURE

SMBS: SODIUM META BISULPHATE

RO: REVERSE OSMOSIS

SF: SOFTENER

AWP: AQUATEC WATER PLANT

DI WATER: DISTILLED WATER

WHO: WORLD HEALTH ORGANIZATION

OFL: OUT OF LIMIT

PLC: PROGRAMMABLE LOGIC CONTROLLER

TDS: TOTAL DISSOLVED SOLID

ACKNOWLEDGEMENT

The journey commenced as a student towards the Professional Life with the purpose in thoughts to examine the Practical element of life, ended as a memorable experience, additionally helped me to come off with flying colors.

No work may be finished without other's assist or contribution. The training of presentation of this humble painting encompasses the titanic and limitless assist and sound eleven though of innumerable people.

In the accomplishment of this project successfully many people have owned upon me their efforts thus here I show my gratitude towards them,

I am thankful to my dean Dr. A.K. Jain for showing faith in me and giving this opportunity to do a project so that we can get exposure to industrial work and environment.

I feel to acknowledge my indebtedness to my guide Dr. Pooja Agarwal for guiding me throughout the process of making project and solving all my doubts and queries helping in all ways possible.

I am immensely obliged to Dr. Lalit Prasad who is our mentor and guided me with elaborating all the things required to be kept in knowledge for making of this project.

I pay my deep sense of thankfulness to Mrs. Aradhana Dubey – Quality Assurance Manager and my project guide in Oriflame, Mr. Vipul Sharma – Bulk analyst, Mr. Jaipal Singh – Head of microbiology, Mr. Uttam Singh and Mr. Lovepreet Singh for their guidance, kind support, acceptance and friendly environment.

Last but not the least, I thank my family friends for understanding and participating in this journey which came out as a productive work.

(Signature)

Pallavi Tyagi

ABSTRACT

One of the main problems that bother people around the world is insufficient access to purified water. And, it is expected to expand worse in coming years, with water lack arise world-wide, even in those areas which are considered as water-rich now. So, considering these problems, scientists need to research more and more about this and new methods to purify water in terms of sustainable development. So, here we highlight the purification methods used in Aquatec Water Plant (AWP) is highlighted and due to more need of water, establishment of new water plant and quality check of this purified water and there are various uses of this DI water, largely used to produce medicines in science and engineering laboratories and many industries. Also, DI water is used in commercial industries. So, in this report we will analyze the use of this into cosmetic products and chemical analysis of these products.

Keywords- Aquatec water plant (AWP), Sustainable development, D I water.

CHAPTER 1
INTRODUCTION

1.INTRODUCTION

Water is the most basic need of all living creatures in the world. Everyone needs it to maintain their lives, like, plants need water for photosynthesis, as they use energy from the sun to make their own food, humans need water for many purposes, the primary purpose is to drink water as they need it to digest their food and get rid of waste. 60% of adult's weight, 80% of brain and 73% of heart are composed of water and, it is used everywhere, for drinking, bathing, cooking. Most of the amount of water is used for industrial purposes, agricultural purposes, and for electrical purposes also.

And there are many problems around the world like deforestation, climate change, lack of purified water and water pollution, air pollution, soil pollution, etc. And one of the main problems among all is the less availability of pure water. Many people are suffering due to this problem. According to some surveys, 1.2 billion people don't have safe drinking water, due to which millions of people die yearly. Impure or unsafe water also transmits many diseases in humans and also affects aquatic life. And it cannot be Calculated the no. of sick people due to this transmission of diseases.

Removal of unwanted chemicals and impurities from water is termed as water purification. So, to get rid of these problems related to water, water purifications need to be done in high amount and should be done well with different methods. The aim is to provide purified water and most of this purified water is used for human intake. Also, it is used for many different functions like for medical, pharmacological, chemical, and for business applications. The records of water purification consist of a huge form of strategy. The strategies used are filtration, sedimentation and distillation. And many filters are used for this process like pressure sand filter, Activated carbon filter.

The manufacturing of good cosmetic products needs purified water as it removes the chances of chemical contamination and microorganisms from the products.

Purified water is used in 90% of cosmetic products. This purified water or distilled water (DI water) can be found in most of the products like body creams, shower gels, Deodorants, Intimate washes, shampoos, conditioners, sugar scrubs, foot creams, foundations, etc.

DI water can be used as a solvent in these products as this helps the ingredients to dissolve properly. One of the properties of water is that it forms emulsions in which oil and water components of products are combined to form creams and lotions, and it is scientifically proven that only pure water (toxin-free, pollutants-free) is used to make cosmetic products.

CHAPTER- 2
LITERATURE REVIEW

2. LITERATURE REVIEW

Groundwater is the basic natural resource which can be used for many purposes, basically, used for human activities [1], 47-50. Nowadays, in this 21st century, there is a lot pressure of human activity on nature like urbanization and industrialization, due to which the Groundwater is depleting increasingly; hence, the natural water contains pollutants and toxic substances and the main problem which needs to be considered is pollution, which is increasing day by day and it is increasing due to human needs. In many regions of the world, the concentration of fluoride in groundwater affects health and creates health-related issues. A large part of India has a pretty accurate distribution of fluoride-infected groundwater [2]. According to UNICEF, in the world, 20% of fluoride-affected villages are in India. And out of this 20%, 10% are from Rajasthan, which is a matter of high concern. In peninsula and in arid to semi-arid regions of north-western India, fluoride is present in high amount [3]. Sanganeer, Tehsil of Jaipur district, of Rajasthan district. The samples of drinking water were collected in plastic containers. The sample is collected from tube wells, open wells, hand pumps and other sources. And some parameters are analyzed like pH, F⁻, EC, TDS, Ca, Mg, TH, Cl, NO₃⁻. Alkalinity by the help of techniques available in laboratory [4].

After the testing, the result shows that the water quality of Sanganeer Tehsil is very poor and it can be used for drinking and cooking purposes after water treatment only, especially, we can't ignore the concentration of NO₃⁻, which is higher than its limit, due to which, it causes a disease called "Methemoglobinemia" or also called "blue-baby syndrome". And, it is particularly occurring in babies up to 6 months [5]. And, to maintain the quality, continuous observation of parameters should be done.

OBJECTIVE

- Analyze the purification methods of water in Aquatec Water plant.
- To check the quality of purified water using some important parameters such as pH, TDS and conductivity.
- Analysis of purified water into cosmetic products.
- To check the quantity of bulk using parameters like pH, SG and Viscosity.

CHAPTER-3
METHOD AND METHODOLOGY

3. METHOD AND METHODOLOGY

Aquatec Water Plant

Aquatec is a water purification systems and wastewater treatment technology for industrial and infrastructure markets.

3.1 Methods used for purification

- 1. Boiling** -It is mostly used as we can do that at home also. This method is the cheapest and safest method of all purification method.
- 2. Filtration**- It is productive way to purify water and there are many different filters used here are such as Pressure sand filter, Activated carbon filter, Cartridge filter, etc.
- 3. Chlorination**- The process in which we add chlorine or its compounds to water for purification is called chlorination and here in aquatic plant, we do 3% dosing of chlorine, which kills bacteria's, viruses and microbes from water.
- 4. Disinfection**- It means killing of pathogenic microorganism. If it will not be done then this will cause people fall ill while we intake that purified water.

3.2 METHODOLOGY

3.2.1 OPERATION OF AQUATECH WATER TREATMENT PLANT

Water Treatment Plant consists of following: -

TABLE 1 - COMPONENTS OF OLD WATER PLANT

QTY.	NAME	DESCRIPTION
2	BORE WELLS	-
1	UNDERGROUND TANK	Capacity – 18 m ³
1	PRESSURE SAND FILTER	Normal flow – 6 m ³ /hr.
1	ACTIVATED CARBON FILTER	Normal flow – 6 m ³ /hr.
2	SOFTENERS	Normal flow – 6 m ³ /hr.
1	R. O. FEED STORAGE TANK	Capacity – 6m ³ /hr.
1	PUMP	Flow – 2 m ³ /hr.
2	R.O. Membrane	Permeate Flow – 2/1 m ³ /hr. (First stage) 1/0.5 m ³ /hr. (second stage)
1	HOT SOFT WATER STORAGE TANK WITH PUMP	Capacity – 3m ³
1	PUMP	Flow – 4 m ³ /hr.
1	PROCESS WATER STORAGE TANK WITH PUMP	Tank capacity=4.0 m ³ Pump capacity= 3.0 m ³ /hr.
1	BOILER MAKE-UP WATER STORAGE TANK WITH PUMP	Tank capacity=1000 Ltrs Pump capacity= 1.0 m ³ /hr.

3.2.2 AUTO OPERATION

- Switch on Main Panel
- Switch on process master PLC
- Switch ON PLC and select AUTO mode.
- Check the level of underground tank, if low then start bore well pump No. 1 or No 2 and start NaOCl dosing of 3 % concentration and rate of Dosing is 6 LPH (Ltr 1 hour) (Approx. consumption 60 Ltrs / day)
- Back wash of Pressure sand filter and Activated carbon filter will take place for 40 mins
- Softener is ready for NORMAL OPERATION. The level of Toilet tank will operate between LOW and OK. The level of R.O. feed storage tank will operate between 40 % to 85 %. The level of Hot Soft Water tank will operate between 40% to 90 %.
- Regeneration of Softeners will start after the cycle of 8 hours.
- Check the level of RO, feed storage tank, if level above 40 % then press F13 KEY ON PLC
- Start Booster pump.
- SMBS Dosing is of 100 kg with 0.1% concentration will start automatically (Approx. cons 2 Ltr/hr. max)
- ALKALINE Dosing solution of 100 kg with of 1% concentration will start automatically (Approx. cons 63 Ltr/hr.) will start
- Start High Pressure Pump –
- Load RO. - I reject drain valve for 4 Kg/cm²
- Start High Pressure Pump – II.
- Adjust the RO - 1 and RO. II reject drain valve for product output for 0.5 m³/hr.

3.2.3 MANUAL OPERATION

- First, we have to switch on control panel.
- Then, we need to on PLC and select MANUAL mode.
- **Pressure Sand Filter**
 - a) Open Back wash IN and Back wash OUT valves for 15 minutes
 - b) Open Inlet and Rinse valves for 5 minutes
 - c) Then use Pressure Sand Filter in Normal mode with Inlet and Outlet valves open
- **Activated Carbon Filter**
 - d) Open Back wash IN and Back wash OUT valves for 15 minutes.
 - e) Open Inlet and Rinse valves for 5 minutes.
 - f) Then use Pressure Sand Filter in Normal mode with Inlet and Outlet valves open
- Regeneration of Softeners
- Open Inlet and Outlet valves of Softener 1 & 2.
- Check the level of RO. Feed storage tank, if the level is low then OPEN Inlet valve. If the level is above 40% then OPEN Recycle valve.
- Check the level of Process Water tank, if level low then START RO Plant.
- Check the level of Hot Soft Water tank, if level low then OPEN the valve.
- Check the level of Underground tank, if low then start borewell pump No. 1 or No. 2 and start NaOCl dosing of 1 % concentration (Approx. consumption 3 Ltrs / day).
- Start Raw water pump.
- Start R.O. feed pump

3.2.4 PREPARATION OF SOLUTIONS

Some chemicals are added to purifying water at different stages, few of them are listed below.

Chlorine is a tremendously powerful approach of disinfection. However, at the same time as withinside the pipes it produces small quantities of chemicals (called “disinfection by-products”) if the supply water has better stages of dust or germs that can react with chlorine. Chlorine is delivered to raw water to get rid of algae and different types of aquatic existence from the water.

Caustic soda will increase the pH of water and might without difficulty change hard water to a much closer approximation to neutral when injected into the water treatment system. Caustic soda decreases the solubility of risky metals, which include lead and copper.

In water treatment plants, **Sodium metabisulfite (SMBS)** is generally used for elimination of loose chlorine and as a biostatic. Other chemical lowering agents exist (e.g., sulfur dioxide), however they may be now no longer as cost-effective as SMBS. SMBS Dosing Tank is shown below (figure 1)

TABLE 2: DESCRIPTION OF SOLUTION PREPERATION FOR PURIFYING WATER IN OLD WATER PLANT

AREA	CHEMICAL NAME	DOSING QTY.	SPECIFICATION OF SOLUTION PREPARATION
Raw water	Chlorine	3%	3 ltr liquid chlorine (8%-10%) with 100ltr of water
RO water	Caustic	1%	1kg in 100 ltr of water
RO water	SMBS	1%	1kg in 100 ltr of water

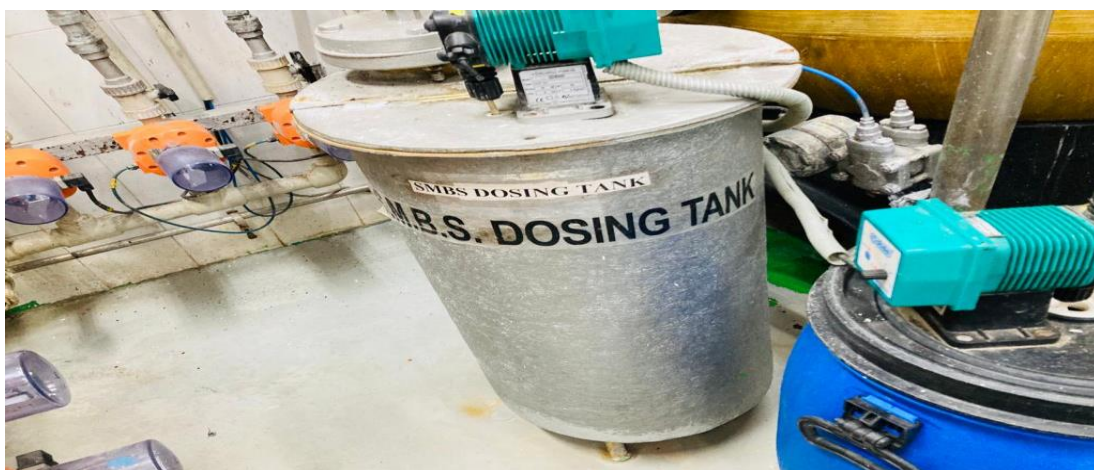


Figure 1 SMBS DOSING TANK

PROCEDURES OF MEMBRANE AND FILTERS

- Membrane will be replaced or clean in of running or else if differential pressure of inlet and outlet exceed 15 kg/cm^3 whichever is earlier depends on condition of water conductivity ($<10 \text{ us/cm}$).
- Filters will be cleaned / changed within 15 days or else if differential pressure of inlet and outlet exceed 1.5 kg/cm^3 whichever is earlier.

3.2.5 Functions of different filters

1) PRESSURE SAND FILTER-

Vessel used- structural composite pressure vessel is used.

Volume- 310 liter

Pressure operated- 10 kg/cm^2

Required operated- 3 kg/cm^2

Function- The function of the filter consists of trapping any solid particles (abraded particles, swarf, dust, ...) and water present in the oil. The pressure filter should preferably be fitted immediately downstream of the pump in order to protect any hydraulic elements downstream, is shown below (figure 2)



Figure 2 PRESSURE SAND FILTER

2) ACTIVATED CARBON FILTER

Vessel used- structural composite pressure vessel

Volume- 310 liter

Pressure operated – 10 kg/cm^2

Required operated- 3 kg/cm^2

Function- Activated carbon filtration is one of many processes commonly used in water treatment to remove contaminants such as organic materials, and since it also can remove odor-causing contaminants, it's often used to make drinking water more palatable, is shown below (figure 3)



Figure 3 Activated Carbon Filter

3) SOFTENER 1

Vessel used- structural composite pressure vessel

Volume- 310 liter

Pressure operated – 10 kg/cm^2

Required operated- 3 kg/cm^2

Function- softener 1 is used to convert hard water into soft water, is shown below (figure 4)



Figure 4 SOFTENER -1

4) SOFTENER 2

Vessel used- structural composite pressure vessel

Volume- 310 liter

Pressure operated – 10 kg/cm²

Required operated- 3 kg/cm²

Function- This is to maintain the hardness.

5) CATRIDGE FILTER

A cartridge clear out is a bit of tubular filtration system that may be used throughout numerous industries for an array of filtration requirements. A cartridge is encased inside a housing or a casing and used to do away with undesirable particles, pollutants, and chemical substances from liquids, is shown below (figure 5)



Figure 5 CATRIDGE FILTER

6) RO FEED

It is used to purify water and it is highly-efficient, capable of removing bacteria and unwanted particles from water. It can remove 99% waste particles from water to purify it.

As shown below (figure 6)



Figure 6 RO FEED

7) BOOSTER PUMP

Reverse osmosis (RO) booster pump is used to increase pressure of water when it is less to produce good quality of water. Here, SMBS Dosing is done SMBS Dosing is sodium metabisulphite dosing), it reduces chlorine content in water for larger RO.

It is cheap and efficient but, it easily oxidizes which has several disadvantages. Then, we use UV 1009 to disinfect water and it is even used for wastewater treatment because UV disinfection is a physical process and there is no need to add chemicals to water to clean it, this is the safe option and also effective. UV light reduces the occurrence of parasites, that can be unaffected even to chemical disinfection.

8) RO STAGE I

This is highly purified as compared to raw water and this is the second last stage of purification process. It is an advanced treatment than pressure sand filtration, Activated carbon filtration. RO reduces the TDS of water to under 25 ppm. The membrane in this RO removes impurities of small atoms and provides fresh water. As shown below (figure 7)



Figure 7 RO STAGE - I

9) RO STAGE II

This is the most purified water having maintained PH and TDS and Conductivity which is required. As shown below (figure 8)



Figure 8 RO STAGE-II

3.3 REQUIREMENT OF NEW RO PLANT

Due to more need of water in the company, new plant is set up which have some new features than old plant, this plant contains only one softener to convert hard water to soft water. Rest methods are same used to purify the water. As shown below (figure 9)



Figure 9 NEW WATER PLANT

3.3.1 Components of New Water Plant

TABLE 3: COMPONENTS OF NEW WATER PLANT

QTY.	NAME	DESCRIPTION
2	BORE WELLS	-
1	UNDERGROUND TANK	Capacity – 18 m ³
1	PRESSURE SAND FILTER	Normal flow – 6 m ³ /hr.
1	SOFTENER	Normal flow – 6 m ³ /hr.
1	R. O. FEED STORAGE TANK	Tank Capacity – 0.5 m ³ Pump Capacity – 20 m ³ /hr.
1	PUMP	Flow – 2 m ³ /hr.
7	R.O. Membrane	Permeate Flow – 2/1 m ³ /hr. (First stage) 1/0.5 m ³ /hr. (second stage)
1	PROCESS WATER STORAGE TANK WITH PUMP	Tank capacity=4.0 m ³ Pump capacity= 3.0 m ³ /hr.
1	BOILER MAKE-UP WATER STORAGE TANK WITH PUMP	Tank capacity=1000 Ltrs Pump capacity= 1.0 m ³ /hr.

3.3.2 CONTROL PANEL USED TO OPERATE NEW WATER PLANT

In this new plant also, there is an auto operation (The functioning of systems, equipment, or strategies in a preferred way on the right time beneath manipulate of mechanical or digital gadgets that function without human intervention) and manual operation.



Figure 10 CONTROL PANEL OF NEW WATER PLANT

3.3.3 PREPARATION OF SOLUTIONS

TABLE 4: DESCRIPTION OF SOLUTION PREPERATION FOR PURIFYING WATER IN NEW WATER PLANT

AREA	CHEMICAL NAME	DOSING QTY.	SPECIFICATION OF SOLUTION PREPARATION
Raw water	Chlorine	3%	3 ltr liquid chlorine (8%-10%) with 100ltr of water
RO water	caustic	1%	1kg in 100 ltr of water
RO water	SMBS	1%	1kg in 100 ltr of water

3.3.4 PURIFICATION OF NEW RO PLANT

In this new plant also, the purification is done by much similar methods as old plant, it goes to many similar stages like:

- 1) Pressure sand filter
- 2) Resin(softener)
- 3) RO Feed
- 4) RO I
- 5) RO II

So, after purification of water, we need to do testing of this purified water. Need to check some important parameters like PH, TDS, Conductivity and Hardness that are required so that this purified water will use in cosmetic products. So, there are mainly two instruments used to test the purification of water.

3.3.5 INSTRUMENT USED FOR ANALYSIS OF PURIFIED WATER

○ CONDUCTIVITY METER

Conductivity meter (figure 11) lets in us to degree the extent of conductivity in solutions. Conductivity is a capacity of substances (solutions, metals or gases) to by skip an electric powered current. It is likewise used to degree TDS i.e. (Total Dissolved Solid) is natural and inorganic substances which might be dissolved in water.

A conductivity machine measures conductance with the aid of electronics linked to a sensor immersed in a solution. The analyzer circuitry impresses an alternating voltage at the sensor and measures the dimensions of the ensuing signal, that's linearly associated with the conductivity. Conductivity dimension is a flexible device in manner control. The dimension is straightforward and fast, and maximum superior sensors require most effective a bit maintenance.

The measured conductivity analyzing may be used to make diverse assumptions on what's occurring withinside the manner. In a few instances it's far viable to expand a version to calculate the awareness of the liquid.

BENEFITS

The conductivity meter presents excessive precision conductivity readings without guide calculations of mobileular constant. It is an auto-ranging kind meter which selects the variety automatically, but guide choice of conductivity levels for a selected software is likewise possible.



Figure 11 CONDUCTIVITY METER

○ pH METER

A pH meter (figure 12) is a tool used to degree acidity or alkalinity of a solution - additionally realize as PH. It is the unit of degree that describes the diploma of acidity or alkalinity. It is measured on a scale of zero to 14. A hard indication of pH may be acquired the usage of pH papers or signs, which alternate color because the pH stage varies. These signs have boundaries on their accuracy, and may be hard to interpret efficaciously in colored or murky samples. More correct pH measurements are acquired with a virtual pH meter. A pH tester gadget includes 3 parts: a pH probe, a reference pH electrode, and an excessive enter impedance meter.

BENEFITS

Provides excessive precision readings without guide calculations. With push button operations and a custom designed liquid crystals show dedication of Ph.



Figure 12 pH METER

SENSITIVITY OF PH METER

PH meter is highly sensitive, it seems to be little overstated. As said previously, a sensitivity of 0.001 pH for maximum pH meters appears to be a touch exaggerated without thinking about barriers of the glass electrode because of many parameters surrounding the glass surface, interface, double and triple layers, etc. [6]

3.3.6 USES OF PROCESS WATER IN PRODUCTS

Process water is used for the manufacturing of products-

1. Hot water is used in cream.
2. Cold water is used in shampoo.

○ **Body cream**

For making this product:

- 1) To make this product first we will take 90.0 kg DI water.
- 2) Then we add Carbopol which is used as a thickener and the temperature is between 4degrees and 70degree
- 3) Then again, we will add 608.0355 kg of DI water
- 4) Then add Methylparaben (Preservative) and then add Disodium EDTA and glycerin MB grade (Humectant) and butylene glycol and some color solution to give the color to the cream and then we mix it well and some more products
- 5) We add 9kg DI water and then add sodium hydroxide which works as pH adjuster and then we mix it well for 10 to 15 minutes
- 6) Again, we add 9 kg of DI water and then we add Imidazolidinyl Urea (preservative) and then we add some product for fragrance or flavor.

○ **Men Deodorant**

For making this product:

- 1) We first take 81.12kg of D I water at temperature of 72degree Celsius.
- 2) Then we add STEARETH-2 SURFACTANT, EUMULGINS21(emulsifier), COSMACOL ELI and mix well at 75degree Celsius at fast speed.
- 3) Now we add chlorophyll at temperature 45 degree.
- 4) Add DI WATER 5.07 kg and glycerin mb grade and menthol racemic and mix at 40degree. After mixing add some more products at 38degree Celsius.

○ **Shower Gel**

For making this product:

- 1) We first take 326.5150kg DI water along with CARBOPOL AQUA SF-1, GLYCERINE MB GRADE and some color liquid at temperature 40-degree Celsius.
- 2) After some time, we add 7.6 kg of DI water along with BROMO NITRO PROPANE at 35 degrees.
- 3) After some time of mixing, we again add 7.6 kg of D I water with sodium hydroxide.
- 4) Then we add 23.788 kg of D I water with SODIUM CHLORIDE at 35-degree temperature.

- **Face Wash**

For making this product:

- 1) We take 517.15 kg of D I water along with GLYCERINE MB GRADE, PHENOXYETHANOL, DI SODIUM EDTA and CITRIC ACID at 50-degree Celsius temperature.
- 2) Then we add 39 kg of D I water along with SODIUM COCO SULFATE
- 3) Now we add 7.8 kg of D I water with SALICYLIC ACID
- 4) After mixing for some time, we add 7.8 kg of D I water with organic honey, SINE ADIPE LAC at 35 degrees.
- 5) Now we add 23.4 kg of D I water along with SODIUM CHLORIDE.

- **Face Cream**

For making this product:

- 1) We take 102.8 kg of D I water along with CARBOPOL 980 at 41 degrees.
- 2) Then we add 308.5 kg of D I water along with GLYCERINE MB GRADE, PHENOXYETHANOL at 78 degrees Celsius temperature.
- 3) Now we add 51.4 kg of D I water with SODIUM HYDROXIDE at 77 degrees.
- 4) Now temperature drops to 45 degrees with the addition of 5.14 kg of D I water with IMIZADOLIDINYL UREA.

- **Hand and body cream**

For making this product:

- 1) We take 535.35 kg of D I water along with GLYCERINE MB GRADE, BUTYLENE GLYCOL, METHYL PARABEN at 75 degrees.
- 2) Then we add 38.25 kg of D I water along CARBOPOL (ULTREJ 10) at 64-degree Celsius temperature.
- 3) Now we add 7.65 kg of D I water with SODIUM HYDROXIDE at 63 degrees.
- 4) Now we add 7.65 kg of D I water with DISODIUM EDTA at 50 degrees.
- 5) Now we add 7.65 kg of D I water with IMIDAZOLIDINYL at 39 degrees.
- 6) Now with addition of 15.3 kg of D I water with SINE ADIPE LAC mixing continues.
- 7) Now add 11.475 kg of D I water with ORGANIC HONEY at 38 degrees.

- **Intimate Wash**

For making this product:

- 1) We first take 279.8635 kg of D I water at temperature of 42degree Celsius.
- 2) Add POLYQUATERNIUM along with 18.4kg of D I water at temperature 40 degree.
- 3) Add PLANTACARE 1200 UP MASS BALANCE AT 62 degree and some more products with temperature decreased to 36 degrees.
- 4) Add SODIUM BENZOATE and 4.51kg D I water at 35 degree.
- 5) After adding some more products, we add 4.51kg of DI water again along with ALPHA GLUCAN OLIGOSACCHARIDE at temperature 32 degrees.
- 6) At last, we add SODIUM CHLORINE along with 37.6586kg of DI water.

○ **Sugar Scrub**

For making this product:

- 1) First, we add 274.5795 kg of DI water along with GLYCERINE, CARBOPOL ULTREZ, QUINOLINE YELLOW and many more products at 44degree temperature and mix it fast.
- 2) Then we add 7.5kg of DI water with BENZOPHENONE-4 at 43degree temperature.
- 3) Then we add 7.5 kg of DI water again with 2-BROMO-2 NITROPROPANE-1,3-DIOL at 42degree temperature.
- 4) Then we add 7.5kg of DI water along with ORGANIC HONEY at 42 degree and mixing continues.
- 5) Some more crucial products are added and the temperature drops to 34degree Celsius.
- 6) Now SODIUM HYDROXIDE and SINE ADIPE LAC is added along with 15 kg of DI water at temperature 32 degree.

3.4 Methods of testing of bulk samples

- 1) **Micro-testing** - It is carried out to discover microbiological quality of bulk which includes: count of mesophilic aerobic microorganisms. Most probably number (MPN) of overall coliforms. Count of molds and yeasts. Absence/presence of staphylococcus aureus probe.
- 2) **Bulk- testing** - It is used when it's now no longer realistic or consultant to check an individual sample as an entire or thing piece- the product sample is tested 'in bulk'.

3.4.1 Determination of viscosity of the sample

Apparatus used

- 1) LV Brookfield digital viscometer (figure 13)
- 2) S-shaped spindle (from S1 to S5) and T- shaped spindle (depending on the thickness of the product).

PRINCIPLE OF VISCOMETER

Viscometers work under the theory of 'rotational viscometry,' which means they test viscosity by sinking a specially chosen spindle in a sample of the bulk product, then measuring the torque used to rotate the spindle at a fixed speed when submerged in the bulk sample. Since the torque needed is equal to the number of viscous forces on the spindle, this gives a measurement of the viscosity of bulk material in centipoise units (cP).



Figure 13 VISCOMETER

PROCEDURE

- 1) 250 ml of sample is adjusted to a temperature of 20°- 25° centigrade and then we use the viscometer and according to the standard specifications the unit is set up and then the spindle is fixed with the viscometer.
- 2) The spindle is placed very carefully inside the jar containing the sample so that no bubbles are formed in the sample as the formation of a bubble in the sample may hinder the reading.
- 3) When the spindle is fixed the motor of the viscometer turns on and runs for the time according to the setup and gives the reading.
- 4) It may give wrong readings which do not match to the standards then we need to manage the temperature by putting the sample to freeze or to an incubator at fixed temperatures.

3.4.2 Determination of Specific Gravity of Bulk

Apparatus Used:

- 1) Weighing balance
 - 2) Spatula
 - 3) Pycnometer
- As shown below (figure 14)

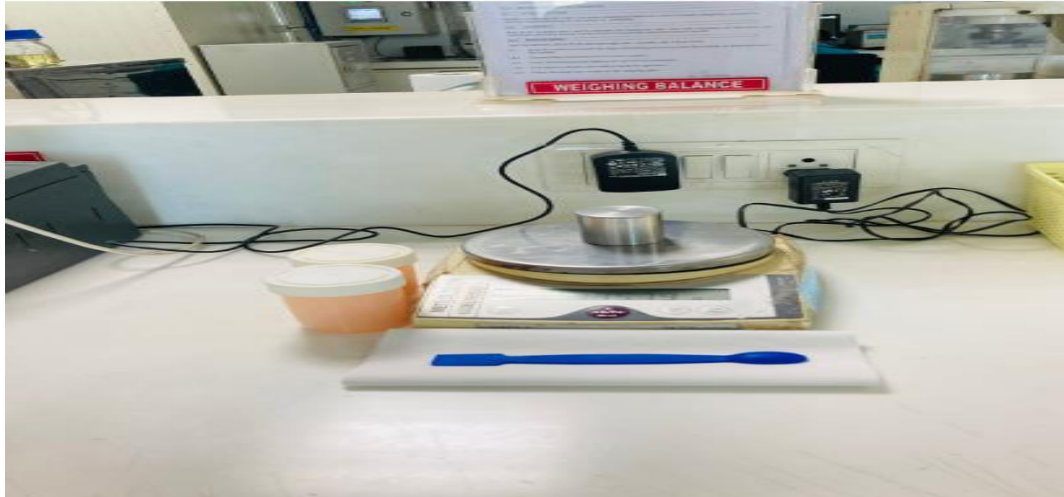


Figure 14 WEIGHING BALANCE

First of all, we need to weigh empty weight of pycnometer and then we need to fill the sample in it and then weigh it. we have to Subtract the tare weight of the pycnometer from the filled weight of the pycnometer and divide the load found through the Water component and like this we decide the S.G of the sample.

3.4.3 Determination of pH of the Bulk Sample

Apparatus used

- 1) pH meter

Procedure

First, we need to Calibrate the pH meter with Buffer solutions of pH 4.01 and pH 7 and pH 10.01 and then we will find out the pH of bulk samples according to the standards given in the report

CHAPTER- 4
RESULT AND DISCUSSION

4.RESULT AND DISCUSSION

First, water samples (figure 15) are collected from different sampling points and then test them and find different parameters such as Ph, TDS (Total Dissolved Solid), Conductivity.

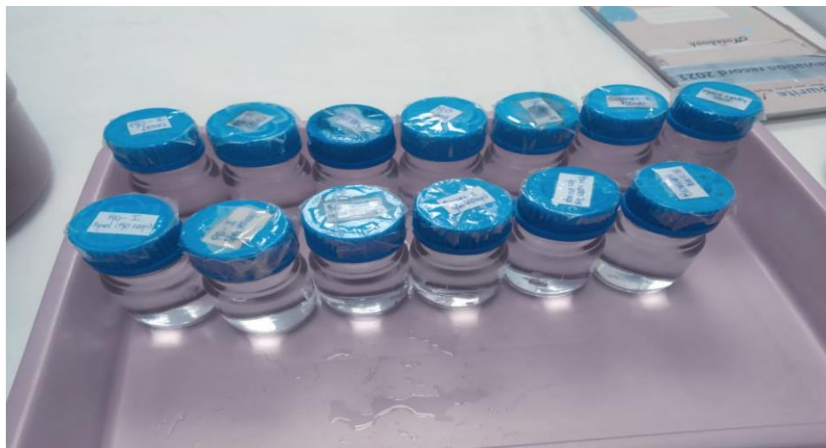


Figure 15 WATER SAMPLES

WATER ANALYSIS SHEET

➤ OLD PLANT-

TABLE 5: WATER ANALYSIS SHEET OF OLD WATER PLANT

SAMPLE	COLOUR	ODOUR	APPEARANCE	PH	CONDUCTIVITY	TDS
RO-I	Colorless	Odourless	Clear liquid	6.27	140.51 uS/cm	75 mg/l
RO-II	Colorless	Odourless	Clear liquid	6.09	5.1 uS/cm	3 mg/l
RO TANK	Colorless	Odourless	Clear liquid	6.15	5.3 uS/cm	3 mg/l
RO FEED	Colorless	Odourless	Clear liquid	6.59	4.91 ms/cm	OFL
SOFTNER-1	Colorless	Odourless	Clear liquid	6.55	4.91 ms/cm	OFL
	Colorless	Odourless	Clear liquid	6.56	4.92 ms/cm	OFL
RAW WATER TANK	Colorless	Odourless	Clear liquid	7.00	4.69 ms/cm	OFL
BOREWELL BACK II	Colorless	Odourless	Clear liquid	7.23	4.24 ms/cm	OFL

➤ **NEW PLANT**

TABLE 6: WATER ANALYSIS SHEET OF NEW WATER PLANT

SAMPLE	COLOUR	ODOUR	APPEARANCE	PH	CONDUCTIVITY	TDS
RO-I	Colorless	Odourless	Clear liquid	6.27	140.51 uS/cm	75 mg/l
RO-II	Colorless	Odourless	Clear liquid	6.09	5.1 uS/cm	3 mg/l
RO TANK	Colorless	Odourless	Clear liquid	6.15	5.3 uS/cm	3 mg/l
RO FEED	Colorless	Odourless	Clear liquid	6.59	4.91 ms/cm	OFL
SOFTNER-1	Colorless	Odourless	Clear liquid	6.55	4.91 ms/cm	OFL
	Colorless	Odourless	Clear liquid	6.56	4.92 ms/cm	OFL
RAW WATER TANK	Colorless	Odourless	Clear liquid	7.00	4.69 ms/cm	OFL
BOREWELL BACK II	Colorless	Odourless	Clear liquid	7.23	4.24 ms/cm	OFL

➤ **DISCUSSION**

1) pH

In history, Ph denotes as “potential of hydrogen”. The Ph term is derived from “p”, which is mathematical symbol for negative logarithm, and “H”, the chemical symbol for hydrogen. It is a measure of acidity and basicity of water i.e., how much acidic/ basic water is. The range lies from 0 to 14, pH which is less than 7 indicates acidity, and the pH which is greater than 7 indicates basicity and the pH of 7 is neutral. Basically, it is a measure of relative amount of free hydrogen and hydroxyl ions in the water. It is unitless as defined as mathematical definition, a value calculated using logarithmic scale cannot have an associated unit, hence, it is expressed as a unitless number. PH is an important measurement of water. And here the criteria for ph are between 5 to 7 i.e., if the purified water is in the range, then we will use this water to make cosmetic products.

2) TDS

TDS is Total dissolved solids, it is the quantity of metals, organic material, minerals and salts that are mixed in a definite water volume which is expressed in mg/L which is same as ppm. The amount of TDS tells us about the purity and quality of water.

Total dissolved solids may be suspended in forms such as:

- Molecular
- Ionized
- Micro-granular (colloidal sol)

The levels of total dissolved solids affect all that lives in, drinks or uses water. Thus, it needs to be measured to ensure the quality of drinking water and the performance in industrial settings involving pipes, valves and other equipment. In the readings OFL means out of limit. The limit to calculate.

TDS is 2000 mg/l for this conductivity meter and the TDS of RO Feed, Softener I and Softener II, Raw water tank shows OFL because their water quality is bad.

3) CONDUCTIVITY

The tendency of water to pass electric current is known as conductivity as the salts dissolved and other chemicals conduct current.

Unit- micro-Siemens (uS/cm)

Conductivity might also additionally refer to: Electrical conductivity, a degree of a fabric's capacity to behavior an electric powered current Conductivity (electrolytic), the electric conductivity of an electrolyte in solution Ionic conductivity (stable state), electric conductivity because of ions transferring function in a crystal lattice Hydraulic conductivity, a assets of a porous material's capacity to transmit water Thermal conductivity, an extensive assets of a fabric that suggests its capacity to behavior heat.

BULK ANALYSIS REPORT OF INTIMATE WASH

TABLE 7: BULK ANALYSIS REPORT OF INTIMATE WASH

TEST	SPECIFICATIONS	RESULT
COLOUR	COLOURLESS	COMPLIES
ODOUR	FRUITY	COMPLIES
APPEARANCE	CLEAR GEL	COMPLIES
PH	4.5-5.2	4.66
SG (SPECIFIC GRAVITY)	1.00-1.04	50.58/50.02=1.011
INITIAL VISCOSITY S3 12 RPM	2000-4000	NA
FINAL VISCOSITY S3 12 RPM	2000-4000	2167 cps

BULK ANALYSIS REPORT OF SUGAR SCRUB

TABLE 8: BULK ANALYSIS REPORT OF SUGAR SCRUB

TEST	SPECIFICATIONS	RESULT
COLOUR	GOLDEN	COMPLIES
ODOUR	SWEET	COMPLIES
APPEARANCE	GOLDEN SCRUB AREATED GEL	COMPLIES
PH	5-6	5.62
SG (SPECIFIC GRAVITY)	1.00-1.007	51.66/50.08=1.031
INITIAL VISCOSITY TE 3 RPM	70000-130000	NA
FINAL VISCOSITY TE 3 RPM	70000-130000	108000 cps

BULK ANALYSIS REPORT OF MEN-DEODRANT

TABLE 9: BULK ANALYSIS REPORT OF MEN DEODRANT

TEST	SPECIFICATIONS	RESULT
COLOUR	WHITE	COMPLIES
ODOUR	SWEET FLORAL	COMPLIES
APPEARANCE	WHITE SLIGHTLY VISCOUS CREAM	COMPLIES
PH	4-5	4.01
SG (SPECIFIC GRAVITY)	1.06-1.10	53.84/50.08=1.075
INITIAL VISCOSITY S3 12 RPM	300-3000	NA
FINAL VISCOSITY S3 12 RPM	800-5000	1317 cps

BULK ANALYSIS REPORT OF BODY CREAM

TABLE 10: BULK ANALYSIS REPORT OF BODY CREAM

TEST	SPECIFICATIONS	RESULT
COLOUR	WHITE	COMPLIES
ODOUR	SWEET/FLORAL	COMPLIES
APPEARANCE	SMOOTH WHITE EMULSION	COMPLIES
PH	5.5—6.5	5.85
SG (SPECIFIC GRAVITY)	0.96-1.02	49.81/50.04=0.99
INITIAL VISCOSITY TF 12 RPM	30000-60000	NA
FINAL VISCOSITY TF 12 RPM	40000-80000	46667 cps

BULK ANALYSIS REPORT OF SHOWER GEL

TABLE 11: BULK ANALYSIS REPORT OF SHOWER GEL

TEST	SPECIFICATIONS	RESULT
COLOUR	RED WITH GREEN BEADS	COMPLIES
ODOUR	SWEET FRUITY	COMPLIES
APPEARANCE	RED WITH GREEN BEADS	COMPLIES
PH	6.3 - 6.8	6.55
SG (SPECIFIC GRAVITY)	0.98-1.04	50.89/50.02=1.017
INITIAL VISCOSITY TE 6 RPM	18000-40000	NA
FINAL VISCOSITY TE 6 RPM	18000-40000	20833 cps

BULK ANALYSIS REPORT OF FACE CREAM

TABLE 12: BULK ANALYSIS REPORT OF FACE CREAM

TEST	SPECIFICATIONS	RESULT
COLOUR	LIGHT PINK	COMPLIES
ODOUR	ORIENTAL, FRUITY	COMPLIES
APPEARANCE	VISCOUS CREAM	COMPLIES
PH	5.0 – 6.0	5.67
SG (SPECIFIC GRAVITY)	0.96-1.0	49.53/50.06=0.989
INITIAL VISCOSITY TF 3 RPM	150000-25000	NA
FINAL VISCOSITY TF 3 RPM	150000-300000	223000 cps

BULK ANALYSIS REPORT OF FACE WASH

TABLE 13: BULK ANALYSIS REPORT OF FACE WASH

TEST	SPECIFICATIONS	RESULT
COLOUR	YELLOW-ORANGE	COMPLIES
ODOUR	VANILLA	COMPLIES
APPEARANCE	CLEAR SURFACTANT GEL	COMPLIES
PH	5.0- 6.0	5.71
SG (SPECIFIC GRAVITY)	1.0-1.04	51.33/50.06=1/025
INITIAL VISCOSITY TF 12 RPM	4500-13000	NA
FINAL VISCOSITY TF 12 RPM	4500-13000	4967 cps

BULK ANALYSIS REPORT OF HAND & BODY CREAM

TABLE 14: BULK ANALYSIS REPORT OF HAND AND BODY CREAM

TEST	SPECIFICATIONS	RESULT
COLOUR	PALE YELLOW	COMPLIES
ODOUR	FRESH, SWEET	COMPLIES
APPEARANCE	VISCOUS CREAM	COMPLIES
PH	5.5—6.5	5.94
SG (SPECIFIC GRAVITY)	0.98-1.02	49.54/50.06=0.989
INITIAL VISCOSITY TF 12 RPM	20000-60000	NA
FINAL VISCOSITY TF 12 RPM	30000-60000	53333 cps

CHAPTER- 5
CONCLUSION

5. CONCLUSION

In this report, I came to know about purification methods of water in Aquatec water plant using different filters such as pressure sand filter, activated carbon filter, RO's and many necessary things we use while purifying water like dosing (mainly SMBS and Chlorine dosing) and requirement of new plant and testing of new plant thrice in a day continues for a week to use this new plant water also. And quality check of purified water by checking some important parameters we need to know to use this water into cosmetic products like pH, TDS, conductivity and hardness.

CHAPTER-6
FUTURE SCOPE

6. FUTURE SCOPE

The need of purified water is increasing as the contaminants are affecting the quality of water rapidly. Due to which the need to develop the new and effective methods of water purification increase.

In the coming decades, water shortage can be a watchword that activates action starting from wholesale populace migration to war, except new ways to deliver smooth water are found. Fortunately, a current flurry of hobby in water remedy research gives wish in mitigating the effect of impaired waters round the world. Conventional techniques of water disinfection, decontamination and desalination can cope with a lot of those issues with first-rate and deliver.

However, those remedy techniques are frequently chemically, energetically and operationally extensive, centered on big systems, and therefore require large infusion of capital, engineering expertise and infrastructure, all of which precludes their use in lots of the world. Even in enormously industrialized countries, the charges and time had to expand contemporary traditional water and wastewater remedy centers make it laborious to cope with all the issues.

Furthermore, extensive chemical treatments (together with the ones involving ammonia, chlorine compounds, hydrochloric acid, sodium hydroxide, ozone, permanganate, alum and ferric salts, coagulation and filtration aids, anti-scalants, corrosion manage chemicals, and ion change resins and regenerants) and residuals on account of remedy (sludge, brines, poisonous waste) can upload to the issues of infection and salting of freshwater sources. Moreover, chemically extensive remedy techniques in lots of areas of the arena cannot be used due to the shortage of suitable infrastructure. The function of the beauty enterprise in day-by-day human activities can't be over-emphasized. They have various features on programs to the human outside body (epidermis, hair system, nails, lips, and outside genital organs) which consists of Cleaning, Perfuming, and converting look as properly as preserving an outlook of the body.[7]

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