Synthesis of Cissus Quandrangular is for packed Bed Column And Its Application in RO Chamber

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Abstract- *Recent RO water Purification is common method used for drinking water. This method is very simple and gives us clean and pure water by blocking all contaminants. Then the RO systems are very compact and it require very little space and the maintenance of the system is very simple. Some of the advantages of RO systems are it does not any harmful or costly chemicals for the treatment, Energy requirement for this Process is very low compare with the other water treatment methods and this system is fully automated no need for manual operations. But it removes all the essential minerals content form the water. Major source for minerals are drinking water if we drink the RO water for continuous period of time leads to the deficiency of the minerals that's essential for our bones. To overcome this problem Cissus Quadrangularis (veld grape) is used in the RO membrane to get the mineral ions that present in it. Which is used to heal the bones as well as strengthen our bones.*

In this report, test reports shows that the increase in mineral content as well as medicinal properties like flavonoids while the RO water is treated with our Cissus Quadrangularis membrane. Amount of calcium is increased from 22mg/l to 151.3mg/l sodium content is increased to 2.12 mg/l and the total flavonoids content is 10mg/ml. From this study Cissus Quadrangularis is used as a low cost membrane and used as a good source for minerals and medicinal properties. Based on the study, Cissus Quadrangularis can be considered as low cost, locally and freely abundantly available, eco-friendly for drinking water purposes.

Keywords- Cissus Quadrangularis, Gelatin, Phytochemical analysis, Mineral analysis, SEM analysis

I. INTRODUCTION

RO water Purification is common method used for drinking water. Reverse osmosis is widely used in the desalination of sea water, some application in the medical field, water treatment and water purification, used in food industries and applied in the concentration of juices, milk and other beverages. This method is very simple and gives us clean and pure water by blocking all contaminants. Then the RO systems are very compact and it require very little space and the maintenance of the system is very simple. Some of the advantages of RO systems are it does not any harmful or costly chemicals for the treatment, Energy requirement for this Process is very low compare with the other water treatment methods and this system is fully automated no need for manual operations. But it removes all the essential minerals content form the water. Major source for minerals are drinking water if we drink the RO water for continuous period of time leads to the deficiency of the minerals that's essential for our bones. To overcome this problem Cissus quadrangularis (veld grape) is used in the RO membrane to get the mineral ions that present in it. Which is used to heal the bones as well as strengthen our bones.

1.1 REVERSE OSMOSIS PROCESS

We all know that presently the need for clean water is paramount. This water is unusable due to the presence of salt in the water. This is precisely where reverse osmosis comes into effect. Reverse osmosis helps to separate the salt particles from the contaminated water to give out pure and clean water. Reverse osmosis is a type of critical desalination process. It is used for water treatment, recycling, and it can also help in producing energy.

In the normal osmosis process, the solvent naturally moves from an area of low solute concentration (high water potential), through a membrane, to an area of high solute concentration (low water potential). The driving force for the movement of the solvent is the reduction in the Gibbs free energy of the system when the difference in solvent concentration on either side of a membrane is reduced, generating osmotic pressure due to the solvent moving into the more concentrated solution. Applying an external pressure to reverse the natural flow of pure solvent, thus, is reverse osmosis. The process is similar to other membrane technology applications.

Reverse osmosis differs from filtration in that the mechanism of fluid flow is by osmosis across a membrane. The predominant removal mechanism in membrane filtration is straining, or size exclusion, where the pores are 0.01 micrometers or larger, so the process can theoretically achieve

perfect efficiency regardless of parameters such as the solution's pressure and concentration. Reverse osmosis instead involves solvent diffusion across a membrane that is either nonporous or uses nanofiltration with pores 0.001 micrometers in size. The predominant removal mechanism is from differences in solubility or diffusivity, and the process is dependent on pressure, solute concentration, and other conditions.

Reverse osmosis is most commonly known for its use in drinking water purification from seawater, removing the salt and other effluent materials from the water molecules. Reverse osmosis is the process of forcing a solvent from a region of high solute concentration through a semipermeable membrane to a region of low-solute concentration by applying a pressure in excess of the osmotic pressure. The largest and most important application of reverse osmosis is the separation of pure water from seawater and brackish waters; seawater or brackish water is pressurized against one surface of the membrane, causing transport of salt-depleted water across the membrane and emergence of potable drinking water from the low-pressure side.The membranes used for reverse osmosis have a dense layer in the polymer matrix either the skin of an asymmetric membrane or an inter facially polymerized layer within a thin-film-composite membrane where the separation occurs. In most cases, the membrane is designed to allow only water to pass through this dense layer while preventing the passage of solutes (such as salt ions). This process requires that a high pressure be exerted on the high-concentration side of the membrane, usually 2– 17 bar (30–250 psi) for fresh and brackish water, and 40–82 bar (600–1200 psi) for seawater, which has around 27 bar (390 psi) natural osmotic pressure that must be overcome. This process is best known for its use in desalination (removing the salt and other minerals from sea water to produce fresh water), but since the early 1970s, it has also been used to purify fresh water for medical, industrial and domestic applications.

1.1.1 Drinking water purification

Around the world, household drinking water purification systems, including a reverse osmosis step, are commonly used for improving water for drinking and cooking. Such systems typically include a number of steps:

- a sediment filter to trap particles, including rust and calcium carbonate
- optionally, a second sediment filter with smaller pores
- an activated carbon filter to trap organic chemicals and chlorine, which will attack and degrade certain types of thin-film composite membrane
- a reverse osmosis filter, which is a thin-film composite membrane
- optionally, an ultraviolet lamp for sterilizing any microbes that may escape filtering by the reverse osmosis membrane
- optionally, a second carbon filter to capture those chemicals not removed by the reverse osmosis membrane

In some systems, the carbon pre filter is omitted, and a cellulose triacetate membrane is used. CTA (cellulose triacetate) is a paper by-product membrane bonded to a synthetic layer and is made to allow contact with chlorine in the water. These require a small amount of chlorine in the water source to prevent bacteria from forming on it. The typical rejection rate for CTA membranes is 85– 95%.

The cellulose triacetate membrane is prone to rotting unless protected by chlorinated water, while the thin-film composite membrane is prone to breaking down under the influence of chlorine. A thin-film composite (TFC) membrane is made of synthetic material, and requires chlorine to be removed before the water enters the membrane. To protect the TFC membrane elements from chlorine damage, carbon filters are used as pre-treatment in all residential reverse osmosis systems. TFC membranes have a higher rejection rate of 95–98% and a longer life than CTA membranes.

Portable reverse osmosis water processors are sold for personal water purification in various locations. To work effectively, the water feeding to these units should be under some pressure (280 kPa (40 psi) or greater is the norm). Portable reverse osmosis water processors can be used by people who live in rural areas without clean water, far away from the city's water pipes. Rural people filter river or ocean water themselves, as the device is easy to use (saline water may need special membranes). Some travelers on long boating, fishing, or island camping trips, or in countries where the local water supply is polluted or substandard, use reverse osmosis water processors coupled with one or more ultraviolet sterilizer

1.1.2 IN THE PRODUCTION OF MINERAL WATER

The water passes through a reverse osmosis water processor to remove pollutants and microorganisms. In European countries, though, such processing of natural mineral water (as defined by a European directive[11]) is not allowed under European law. In practice, a fraction of the living bacteria can and do pass through reverse osmosis membranes through minor imperfections, or bypass the membrane entirely through tiny leaks in surrounding seals.

Thus, complete reverse osmosis systems may include additional water treatment stages that use ultraviolet light or ozone to prevent microbiological contamination.

Membrane pore sizes can vary from 0.1 to 5,000 nm depending on filter type. Particle filtration removes particles of 1 µm or larger. Microfiltration removes particles of 50 nm or larger. Ultrafiltration removes particles of roughly 3 nm or larger. Nanofiltration removes particles of 1 nm or larger. Reverse osmosis is in the final category of membrane filtration, hyperfiltration, and removes particles larger than 0.1 nm.

1.1.3 SOLAR-POWERED REVERSE OSMOSIS

A solar-powered desalination unit produces potable water from saline water by using a photovoltaic system that converts solar power into the required energy for reverse osmosis. Due to the extensive availability of sunlight across different geographies, solar-powered reverse osmosis lends itself well to drinking water purification in remote settings lacking an electricity grid. Moreover, solar energy overcomes the usually high-energy operating costs as well as greenhouse emissions of conventional reverse osmosis systems, making it a sustainable freshwater solution compatible to developing contexts. For example, a solar-powered desalination unit designed for remote communities has been successfully tested in the Northern Territory of Australia.

1.1.4 WASTE WATER PURIFICATION

Rain water collected from storm drains is purified with reverse osmosis water processors and used for landscape irrigation and industrial cooling in Los Angeles and other cities, as a solution to the problem of water shortages.

In industry, reverse osmosis removes minerals from boiler water at power plants. The water is distilled multiple times. It must be as pure as possible so it does not leave deposits on the machinery or cause corrosion. The deposits inside or outside the boiler tubes may result in under-performance of the boiler, reducing its efficiency and resulting in poor steam production, hence poor power production at the turbine.

It is also used to clean effluent and brackish groundwater. The effluent in larger volumes (more than 500 m^3/day) should be treated in an effluent treatment plant first, and then the clear effluent is subjected to reverse osmosis system. Treatment cost is reduced significantly and membrane life of the reverse osmosis system is increased.

The process of reverse osmosis can be used for the production of deionized water.

Reverse osmosis process for water purification does not require thermal energy. Flowthrough reverse osmosis systems can be regulated by high-pressure pumps. The recovery of purified water depends upon various factors, including membrane sizes, membrane pore size, temperature, operating pressure, and membrane surface area.

In 2002, Singapore announced that a process named NEWater would be a significant part of its future water plans. It involves using reverse osmosis to treat domestic wastewater before discharging the water back into the reservoirs.

In addition to desalination, reverse osmosis is a more economical operation for concentrating food liquids (such as fruit juices) than conventional heat-treatment processes. Research has been done on concentration of orange juice and tomato juice. Its advantages include a lower operating cost and the ability to avoid heat-treatment processes, which makes it suitable for heat-sensitive substances such as the protein and enzymes found in most food products.

Reverse osmosis is extensively used in the dairy industry for the production of whey protein powders and for the concentration of milk to reduce shipping costs. In whey applications, the whey (liquid remaining after cheese manufacture) is concentrated with reverse osmosis from 6% total solids to 10–20% total solids before ultrafiltration processing. The ultrafiltration retentate can then be used to make various whey powders, including whey protein isolate. Additionally, the ultrafiltration permeate, which contains lactose, is concentrated by reverse osmosis from 5% total solids to 18–22% total solids to reduce crystallization and drying costs of the lactose powder.

1.2 BIOLOGICAL PROPERTIES OF CISSUS QUADRANGULARIS (VELD GRAPE)

Cissus quadrangularis reaches a height of 1.5 m (4.9 ft) and has quadrangularsectioned branches with internodes 8–10 cm (3–4 in) long and 1.2–1.5 cm (0.5–0.6 in) wide. Along each angle is a leathery edge. Toothed trilobe leaves 2–5 cm (0.8–2.0 in) wide appear at the nodes. Each has a tendril emerging from the opposite side of the node. Racemes of small white, yellowish, or greenish flowers; globular berries are red when ripe.

Cissus quadrangularis is an evergreen climber growing to 5 m (16 ft) by .5 m (1.6 ft) at a fast rate. It is hardy to zone (UK) 10. Suitable for: light (sandy), medium (loamy)

and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: acid, neutral and basic (alkaline) soils and can grow in very acid and very alkaline soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

1.3 PROPERTIES OF CISSUS QUADRANGULARIS (VELD GRAPE)

Cissus quadrangularis L. is a succulent plant of family Vitaceae usually found in tropical and subtropical xeric wood. It is a beefy desert plant like liana generally utilized as typical nourishment in India. It finds application in medicine. Experts have made efforts to test the plant's suitability using rational analysis. Some of the pharmacological use of the plant are linked to cell reinforcement, free radical search, hostile to microbials, bone regeneration, ulceration, pain relief, mitigation and diuretics.

1.4 CHEMICAL CONSTITUENTS OF THE PLANTS

The plant consists various constituents such as flavanoides like quercetin, daidzein and genistein, triterpenoids like friedelin, vitamin 'C', stilbene derivatives like quadrangularin-A, resveratrol and piceatannol, iridoids like 6-0-meta-methoxybenzozyl catapol, picroside and pallidol and phytosterols like β- sitosterol and calcium were identified as major constituents of the plant. The stem parts of plant contains A and β-amyrins, β-sitosterol, ketosetosterol, phenols, tannins, vitamin, carotene, Calcium oxalate, 31 methyl tritiacontanoic acid, taraxeryl acetate, taraxerolisopentadecanoic acid, Calcium ions and phosphorus. The Aerial parts of the plant contain new asymmetric tetracyclic triterpenoid 7-Oxo-Onocer-8-ene-3 β 21-α diol. Leaves contain Resveratrol, piceatanon, pallidol, parthenocissus and alicyclic lipids. Root powder often provides a steady source of minerals.

1.5 UTILITY OF THE PLANT

Cissus quadrangularis is used for diabetes, obesity, high cholesterol, bone fractures, allergies, cancer, stomach upset, painful menstrual periods, asthma, malaria, wound healing, peptic ulcer disease, weak bones, weak bones (osteoporosis) and as body building supplements as an alternative to anabolic steroids.

- The herb is used for osteoarthritis, rheumatoid arthritis and osteoporosis.
- The roots and stems are used to treat fractures of the bones.
- The stem paste boiled in limewater is given for asthma.
- The herb powder is administered in treatment of hemorrhoids and certain bowl infections.
- Stem juice is used for scurvy, debilitating menstrual disorders, otorrhoea and epistaxis.
- The herb is fed to cattle to stimulate milk flow.
- The strong fleshy quadrangular stem is traditionally used to treat acid reflux of gastritis, eye disorders, piles and anemia.

1.6 PHARMACOLOGICAL PROPERTIES

1. BONE HEALING PROPERTIES
   The anabolic steroid from the cissus quadrangularis plants showed a marked influence in the rate of facture healing by early generation of all connective tissue. Cissus quandrangularis contains vitamins and steroids, which are found to have specific effect on bon fracture healing.
2. ANTI OBESITY ACTIVITY
   A Study was performed using a cissus quandrangularis formulation called cyalris. The study had a double blind, placebo-control design. Results showed test subject had decreased waist circumference body mass index reduced serum liquid levels.
3. ANTI-ULCERATIVE ACTIVITY
   The anti-ulcerative effect of cissus quadrangularis extract on enzyme H+ K+ -ATPase that is deemed responsible for producing acidity in stomach is observed.
4. ANTI-DIABETIC ACTIVITY
   Anti diabetic property of cissus quadrangularis was noted in a study where dry powder of cissus quadrangularis is obtained through ethyl acetate extraction and tested for diabetes in in vitro studies.
5. ANTI OXIDANT AND FREE RADICAL ACTIVITY
   Methanol extract of cissus quadrangularis exhibits strong antioxidant and free radical scavenging activity in in vitro and in vivo systems mainly due to the presence of carotene.
6. GASTRO PROTECTIVE ACTIVITY
   It have a significant source of carotenoids, triterpenoids and ascorbic acid, cissus quadrangularis is used for the gastrointestinal diseases in traditional medicine and has gained significant recognition on human nutrition. Numerous studies demonstrated the impact of cissus quadrangularis extract on gastrointestinal toxicity and gastro protective effect. This is together with its function underpinning the clinical intervention toward aspirin-induced gastric mucosal damage.
7. CENTRAL NERVOUS SYSTEM ACTIVITY
   The root extract possesses stimulant CNS function suggested by decreasing exploratory actions. Methanol

roots extract comprises saponins that exhibit powerful sedative action and also suppress spontaneous motor action.

8. ANALGESIC, ANTI INFLAMMATORY ACTIVITY
   Methanol extract has analgesic, non-inflammatory and venotonic impacts with hemorrhoids, non- inflammatory activity attributable to flavonoids and -sitosterol. sitosterol. In methanol extract does have the potential to reduce MPO enzymes. This indicates a significant decreases in the influx of neutrophils into the inflamed tissues. Ethanol extract has beneficial effect on neutrophils triggered by aspirin induced tissue damage.

1.6 GELATINE

Gelatin or **gelatine** (from Latin: *gelatus* meaning "stiff" or "frozen") is a translucent, colorless, flavorless food ingredient, commonly derived from collagen taken from a nimal body parts. It is brittle when dry and rubbery when moist. It may also be referred to as hydrolyzed collagen, collagen hydrolysate, gelatine hydrolysate, hydrolyzed gelatine, and collagen peptides after it has undergone hydrolysis. It is commonly used in food, beverages, medications, drug and vitamin capsules, photographic films and papers, and cosmetics.

Substances containing gelatin or functioning in a similar way are called **gelatinous substances**. Gelatin is an irreversibly hydrolyzed form of collagen, wherein the hydrolysis reduces protein fibrils into smaller peptides; depending on the physical and chemical methods of denaturation, the molecular weight of the peptides falls within a broad range. Gelatin is in gelatin desserts, most gummy candy and marshmallows, ice creams, dips, and yogurts. Gelatin for cooking comes as powder, granules, and sheets. Instant types can be added to the food as they are; others must soak in water beforehand.

1.6.1 CHARACTERISTICS

PROPERTIES

Gelatin is a collection of peptides and proteins produced by partial hydrolysis of collagen extracted from the skin, bones, and connective tissues of animals such as domesticated cattle, chicken, pigs, and fish. During hydrolysis, some of the bonds between and within component proteins are broken.

Its chemical composition is, in many aspects, closely similar to that of its parent collagen. Photographic and pharmaceutical grades of gelatin generally are sourced from cattle bones and pig skin. Gelatin is classified as a hydrogel. Gelatin is nearly tasteless and odorless with a colorless or slightly yellow appearance. It is transparent and brittle, and it can come as sheets, flakes, or as a powder. Polar solvents like hot water, glycerol, and acetic acid can dissolve gelatin, but it is insoluble in organic solvents like alcohol. Gelatin absorbs 5–10 times its weight in water to form a gel. The gel formed by gelatin can be melted by reheating, and it has an increasing viscosity under stress (thixotropic). The upper melting point of gelatin is below human body temperature, a factor that is important for mouthfeel of foods produced with gelatin. The viscosity of the gelatin-water mixture is greatest when the gelatin concentration is high and the mixture is kept cool at about 4 °C (39 °F). Commercial gelatin will have a gel strength of around 90 to 300 grams Bloom using the Bloom test of gel strength. Gelatin's strength (but not viscosity) declines if it is subjected to temperatures above 100 °C (212 °F), or if it is held at temperatures near 100 °C for an extended period of time.

Gelatins have diverse melting points and gelation temperatures, depending on the source. For example, gelatin derived from fish has a lower melting and gelation point than gelatin derived from beef or pork.

COMPOSITION

When dry, gelatin consists of 98–99% protein, but it is not a nutritionally complete protein since it is missing tryptophan and is deficient in isoleucine, threonine, and methionine. The amino acid content of hydrolyzed collagen is the same as collagen. Hydrolyzed collagen contains 19 amino acids, predominantly glycine (Gly) 26–34%, proline (Pro) 10–18%, and hydroxyproline (Hyp) 7– 15%, which together represent around 50% of the total amino acid content. Glycine is responsible for close packing of the chains. Presence of proline restricts the conformation. This is important for gelation properties of gelatin. Other amino acids that contribute highly include: alanine (Ala) 8– 11%; arginine (Arg) 8–9%; aspartic acid (Asp) 6–7%; and glutamic acid (Glu) 10–12%. CHAPTER 3 MATERIALS AND METHODOLOGY

3.1 MATERIALS AND EQUIPMENTS

1. Cissus Quadrangularis (veld grape)
2. Hot Air oven
3. Ball mill
4. TDS meter
5. Water bath
6. Mechanical stirrer

CISSUS QUADRANGULARIS (VELD GRAPE)

Cissus quadrangularis is used as the source of minerals. It can be dried by using the Hot air oven then it will be powdered using the thumbling mill. Cissus quadrangularis is the source of mineral provide essential minerals to the drinking water and also increase the medicinal properties of the water.

HOT AIR OVEN

Hot air ovens are electrical devices which use dry heat to sterilize. They were originally developed by Pasteur. Generally, they use a thermostat to control the temperature. Their double walled insulation keeps the heat in and conserves energy, the inner layer being a poor conductor and outer layer being metallic. There is also an air filled space in between to aid insulation. An air circulating fan helps in uniform distribution of the heat. These are fitted with the adjustable wire mesh plated trays or aluminium trays and may have an on/off rocker switch, as well as indicators and controls for temperature and holding time. The capacities of these ovens vary. Power supply needs vary from country to country, depending on the voltage and frequency (hertz) used. Temperature sensitive tapes or biological indicators using bacterial spores can be used as controls, to test for the efficacy of the device during use. BALL MILL

A ball mill is a type of grinder used to grind or blend materials for use in mineral dressing processes, paints, pyrotechnics, ceramics, and selective laser sintering. It works on the principle of impact and attrition: size reduction is done by impact as the balls drop from near the top of the shell. A ball mill consists of a hollow cylindrical shell rotating about its axis. The axis of the shell may be either horizontal or at a small angle to the horizontal. It is partially filled with balls. The grinding media are the balls, which may be made of steel (chrome steel), stainless steel, ceramic, or rubber. The inner surface of the cylindrical shell is usually lined with an abrasion-resistant material such as manganese steel or rubber lining. Less wear takes place in rubber lined mills.

The length of the mill is approximately equal to its diameter.

TDS METER

Electrical, or specific, conductivity of water is directly related to the concentration of dissolved ionized solids in the water. Ions from the dissolved solids in water create the ability for that water to conduct an electric current, which can be measured using a conventional conductivity meter or **TDS meter**. When correlated with laboratory TDS measurements, conductivity provides an approximate value for the TDS concentration, usually to within ten- percent accuracy.

WATER BATH

A water bath is laboratory equipment made from a container filled with heated water. It is used to incubate samples in water at a constant temperature over a long period of time. Most water baths have a digital or an analogue interface to allow users to set a desired temperature, but some water baths have their temperature controlled by a current passing through a reader. Utilisations include warming of reagents, melting of substrates or incubation of cell cultures. It is also used to enable certain chemical reactions to occur at high temperature. Water baths are preferred heat sources for heating flammable chemicals, as their lack of open flame prevents ignition. Different types of water baths are used depending on application. For all water baths, it can be used up to 99.9 °C.

MECHANICAL STIRRER

Mechanical stirrer it's laboratory equipment consisting of an electric motor that drives the blades ended metal rod immersed in the mixed liquor. Laboratory mechanical stirrers are commonly used in industrial laboratories, research, cosmetic mixing and dispersing solid and liquid material, mixing at liquid-liquid system with different viscosities – from low to high. Mixers are available with different speed and advancement, equipped with a digital display or without display- depending on the requirements and needs of the client.We offer a high speed mechanical stirrer AM-S series which could have rotation speed display or without display, digital mechanical stirrer AML-H series with display and a mechanical economic stirrer AML-P series which have display, designed for basic applications in the laboratory.

3.2 CHEMICAL USED

3.2.1 GELATINE

It is commonly used as a gelling agent in food, beverages, medications, drug and vitamin capsules, photographic films and papers, and cosmetics.

- Substances containing gelatin or functioning in a similar way are called **gelatinous substances**. Gelatin is an irreversibly hydrolyzed form of collagen, wherein the hydrolysis reduces protein fibrils into smaller peptides; depending on the physical and chemical methods of denaturation, the molecular weight of the peptides falls within a broad

range. Gelatine is mixed with cissus quadrangularis using hot water then its converted into colloidal substance then it casted using casting equipment.

3.4 COLLECTION OF RAW MATERIAL

Raw materials are collected from the garden and from nearby markets. Especially directly from the natural environment. This includes activities such as Harvesting.

Roots, stems and leaves have to collect separately.

3.5 SCREENING

A typical sieve analysis uses a column of sieves with wire mesh screens of graded mesh size. A representative weighed sample is coat into the top sieve which has the largest screen openings each lower sieve in the column has smaller openings than the one above at the base is a pan called the receiver.

The column is typically placed in the mechanical shaker, which shakes the column usually for a set period, to facilitate exposing all of thee material to the screen openings so that particles small enough to fit through the holes can fall through the next layer. After the shaking is complete the material on each sieve is weighed. The mass of the sample in each sieve is than divided by the total mass to give a percentage retained on each sieve the size of the average particle on each sieve is than analyzed to get a cut off point or specific size range, which is than captured on a screen
mass to give a percentage retained on each sieve the size of the average particle on each sieve is than analyzed to get a cut off point or specific size range, which is than captured on a screen.

3.6 CISSUS QUADRANGULARIS TREATED WITH GELATINE

Distilled water is heated with the use of water bath at 100 C for 15 minutes after water started to boil gelatin will added to it and mixed well until the fine slurry is formed than the screened cissus quadrangularis powder is added and than mixed finely with the mechanical agitator for 10minutes for proper mixing of cissus quadrangularis and gelatine.

3.6.1 CASTING OF MEMBRANE

Membrane is casted by gel based sample that prepared from the cissus quadrangularis and gelatin. The gel based sample is poured into the casting apparatus then the casting is to be done and leave it for drying around 30 hours. Then the membrane is separated out from the casting apparatus.

3.7 TREATMENT METHOD

Cissus quadrangularis is collected and washed then it will chopped by using the chopper before that peels of the cissus quadrangularis is removed. Chopped cissus quadrangularis is weighed using weighing balance and then the moisture content is removed by hot air oven at 80 C for 12 hours after removal of moisture content from the cissus quadrangularis is crushed and grinded into powder using ball mill then screened using sieve after that powdered form of cissus quadrangularis is obtained.

Membrane is prepared by using the food grade gelatine. 50ml of Water is heated by using Water bath at 100 C when the Water is started to boil 20gm of gelatine is added and stirred using mechanical stirrer until fine slurry mixer is formed then finally the cissus quadrangularis powder is added the poured into the casting apparatus then allow to dry for a whole day at laboratory temperature.

Prepared membrane is coated into the spun filter which is used in the RO membrane process and covered the spun filter using the spun housing then used in the RO treatment process.

Total flavonoid content was measured with the aluminium chloride colorimetric assay. 1ml of aliquots and 1ml standard quercetin solution (50 mg/ml) was positioned into test tubes and 4 ml of distilled water and 0.3 ml of 5 % sodium nitrite solution was added into each. After 5 minutes, 0.3 ml of 10 % aluminum chloride was added. At 6th minute, 2 ml of 1 M sodium hydroxide was added. Finally, volume was making up to 10 ml with distilled water and mix well. Orange yellowish color was developed. The absorbance was measured at 510 nm spectrophotometer using UV-visible instrument. The blank was performed using distilled water. Quercetin was used as standard. The samples were performed in triplicates. The calibration curve was plotted using standard quercetin. The data of total flavonoids of polyherbal formulation were expressed as mg of quercetin equivalents/ 100 g of dry mass

TEST FOR MINERALS

1. CALCIUM ANALYSIS

A known volume (50ml) of the sample is pipetted into a clean conical flask, to which 1ml of sodium hydroxide and 1ml of iso-propyl alcohol is added. A pinch of murexide

indicator is added to this mixture and titrated against EDTA until the pink color turns purple.

2. TOTAL HARDNESS

Exactly 50ml of the well-mixed sample is pipetted into a conical flask, to which 1ml of ammonium buffer and 2-3 drops of Eriochrome black -T indicator is added. The mixture is titrated against standard 0.01M EDTA until the wine red colour of the solution turns pale blue at the end point.

3. MAGNESIUM HARDNESS

Magnesium hardness can be calculated from the determined total hardness and calcium hardness.

4. DIGITAL PHOTO CALORIMETER

A laboratory colorimeter, also referred to as a digital colorimeter, is an instrument used to measure the absorbance of wavelengths of light at a particular frequency (color) by a sample. Digital colorimeters are widely used across different work areas including, environmental testing, clinical diagnostics, pharmaceutical analysis, and biochemistry. In particular, a portable colorimeter can be used for on-site environmental analyses. Similar to spectrophotometers, laboratory colorimeters are used to determine the concentration of a known solute in a sample since the concentration of a solute is proportional to the absorbance. The wavelength filter used is very important since the wavelength of light that is transmitted by the colorimeter has to be same as that absorbed by the sample.

5. POTASSIUM

The filter of the flame photometer is set at 766.5nm (marked for Potassium, K) the flame is adjusted for blue colour. The scale is set to zero and maximum using the highest standard value. A standard curve of different concentration is prepared by feeding the standard solutions. The sample is filtered through the filter paper and fed into the flame photometer. The concentration is found from the standard curve or as direct reading.

6. SODIUM

The filter of the flame photometer is set to 589nm (marked for Sodium, Na). By feeding distilled water the scale is set to zero and maximum using the standard of highest value. A standard curve between concentration and emission is prepared by feeding the standard solutions. The sample is filtered through filter paper and fed into the flame photometer and the concentration is found from graph or by direct readings.

3.9 ANALYSIS OF MEMBRANE

1. SCANNING ELECTRON MICROSCOPE

A scanning electron microscope (SEM) is a type of electron microscope that produces images of a sample by scanning the surface with a focused beam of electrons. The electrons interact with atoms in the sample, producing various signals that contain information about the surface topography and composition of the sample. The electron beam is scanned in a raster scan pattern, and the position of the beam is combined with the intensity of the detected signal to produce an image. In the most common SEM mode, secondary electrons emitted by atoms excited by the electron beam are detected using a secondary electron detector (Everhart–Thornley detector). The number of secondary electrons that can be detected, and thus the signal intensity, depends, among other things, on specimen topography. Some SEMs can achieve resolutions better than 1 nanometer.

Specimens are observed in high vacuum in a conventional SEM, or in low vacuum or wet conditions in a variable pressure or environmental SEM, and at a wide range of cryogenic or elevated temperatures with specialized instruments.

IV. RESULT AND DISCUSSION

4.1 ANALYSIS OF TOTAL DISSOLVED SOLIDS (TDS)

Electrical, or specific, conductivity of water is directly related to the concentration of dissolved ionized solids in the water. Ions from the dissolved solids in water create the ability for that water to conduct an electric current, which can be measured using a conventional conductivity meter or TDS meter. When correlated with laboratory TDS measurements, conductivity provides an approximate value for the TDS concentration, usually to within ten-percent accuracy.

1. TRIAL-1

- 400 ml RO water
- 4g of “Cissus Quadrangularis”
- 1:100 ratio for 10 minutes
- Repeat this Test for 10 times to get Average TDS value

Average TDS at 1:100 ratio is **100.5** approx **101mg/l**

2. TRIAL-2

- 400 ml RO water
- 6g of "Cissus Quadrangularis"
- 0.66:100 ratio for 10 minutes
- Repeat this Test for 10 times to get Average value

4.2 ANALYSIS OF FLAVANOIDS

Total flavonoid content was measured with the aluminium chloride colorimetric assay. 1ml of aliquots and 1ml standard quercetin solution (50 mg/ml) was positioned into test tubes and 4 ml of distilled water and 0.3 ml of 5 % sodium nitrite solution was added into each. After 5 minutes, 0.3 ml of 10 % aluminum chloride was added. At 6th minute, 2 ml of 1 M sodium hydroxide was added. Finally, volume was making up to 10 ml with distilled water and mix well. Orange yellowish color was developed. The absorbance was measured at 510 nm spectrophotometer using UV-visible instrument. The blank was performed using distilled water. Quercetin was used as standard. The samples were performed in triplicates. The calibration curve was plotted using standard quercetin. The data of total flavonoids of polyherbal formulation were expressed as mg of quercetin equivalents/ 100 g of dry mass.

The total flavanoids content was present in the extract sample (RO-F) was found to be
0.10 g/ml.

4.3 ANALYSIS OF MINERALS

CALCIUM HARDNESS

A known volume (50ml) of the sample is pipetted into a clean conical flask, to which 1ml of sodium hydroxide and 1ml of iso-propyl alcohol is added. A pinch of murexide indicator is added to this mixture and titrated against EDTA until the pink color turns purple.

CALCULATIONS

Calcium as Ca = 50ml , Sample taken
Hardness=151.3 (mg/L as $CaCO_3$) Sample taken, ml

TOTAL HARDNESS

Exactly 50ml of the well-mixed sample is pipetted into a conical flask, to which 1ml of ammonium buffer and 2-3 drops of Eriochrome black -T indicator is added. The mixture is titrated against standard 0.01M EDTA until the wine red colour of the solution turns pale blue at the end point.

POTASSIUM

The filter of the flame photometer is set at 766.5nm (marked for Potassium, K) the flame is adjusted for blue colour. The scale is set to zero and maximum using the highest standard value. A standard curve of different concentration is prepared by feeding the standard solutions. The sample is filtered through the filter paper and fed into the flame photometer. The concentration is found from the standard curve or as direct reading.

Concentration of Potassium is **0.01 mg/l**

SODIUM

The filter of the flame photometer is set to 589nm (marked for Sodium, Na). By feeding distilled water the scale is set to zero and maximum using the standard of highest value. A standard curve between concentration and emission is prepared by feeding the standard solutions. The sample is filtered through filter paper and fed into the flame photometer and the concentration is found from graph or by direct readings Concentration of sodium is **2.12 mg/l**

RO water Purification is common method used for drinking water. Reverse osmosis is widely used in the desalination of sea water, some application in the medical field, water treatment and water purification, used in food industries. This method is very simple and gives us clean and pure water. But it removes all the essential minerals content form the water. Major source for minerals are drinking water if we drink the RO water for continuous period of time leads to the deficiency of the minerals that's essential for our bones. To overcome this problem Cissus quadrangularis (veld grape) is used in the RO membrane to get the mineral ions that present in it. Which is used to heal the bones as well as strengthen our bones.

Experimental results shows that the increase in mineral content as well as medicinal properties like flavonoids while the RO water is treated with our cissus Quadrangularis membrane. Amount of calcium is increased from 22mg/l to 151.3mg/l sodium content is increased to 2.12 mg/l and the total flavonoids content is 10mg/ml. From this study cissus quadrangularis is used as a low cost membrane and used as a good source for minerals and medicinal properties. Based on the study, cissus quadrangularis can be considered as low cost, locally and freely abundantly available, eco- friendly for drinking water purposes.