



SOLAR ENERGY BASED WATER PURIFICATION SYSTEM

1 BHAVANI M, 2 DEEKSHITH D R, 3 KISHORE J, 4 SANJANA A, 5 Prof. VARSHA V.

1Student(4VM18EE008), ELECTRICAL AND ELECTRONICS ENGINEERING, VVIET, MYSORE, INDIA

2Student(4VM18EE013), ELECTRICAL AND ELECTRONICS ENGINEERING, VVIET, MYSORE, INDIA

3Student(4VM18EE021), ELECTRICAL AND ELECTRONICS ENGINEERING, VVIET, MYSORE, INDIA

4Student(4VM18EE065), ELECTRICAL AND ELECTRONICS ENGINEERING, VVIET, MYSORE, INDIA

5Faculty, ELECTRICAL AND ELECTRONICS ENGINEERING, VVIET, MYSORE, INDIA

Abstract: A renewable energy resource-such as solar energy is constantly replenished and will never run out. Reverse osmosis is one of the processes that makes desalination (or removing salt from seawater) possible. Beyond that, reverse osmosis is used for recycling, wastewater treatment, and can even produce energy. Here in this project we use solar energy to actuate the reverse osmosis process. The project uses 18V solar panel and 18V battery (12V*4-series) to store the solar power. So that during night time we won't be running out of power. These solar or water systems can purify water from any source. Water from river, pond or bore well, these solar or systems can deliver safe drinking water anywhere you need; in addition, these systems are highly suitable for military camps, village areas and fairs and tourist places where arrangement of temporary drinking water is a prime requisite at minimal price. Since RO systems becomes cheaper and easier to handle the latest developments are to combine proven photovoltaic technology (PV) with proven RO technology. The result is an economical solution that provides always clean water on a decentralized and renewable basis.

Keywords: RO, Carbon filter, Sediment filter, Solar panel, Battery, Charge controller, Inverter, Solenoid filter, Motor, Water tank.

• INTRODUCTION

Solar energy is universal energy which is renewable source of energy. The sun creates its energy through a thermonuclear process that converts about 650,000,00 tons of hydrogen to helium every second. The process creates heat and electromagnetic radiation. The heat remains in the sun and is instrumental in maintaining the thermonuclear reaction. The electromagnetic radiation (including visible light, infra-red light, and ultra-violet radiation) streams out into space in all directions.

Methods of collecting and storing solar energy vary depending on the uses planned for the solar generator.

The three types of collectors:

1. Flat-plate collectors
2. Focusing collectors
3. Passive collectors

Flat-plate collectors are the more commonly used type of collector today.

In this project flat plate collectors are used to produce electricity through solar energy. Most of our tools are designed to be driven by electricity, so if can create electricity through solar power, it can run almost anything with solar power. The solar collector converts radiation into electricity. Among the renewable resources, only in solar power do we find the potential for an energy source capable of supplying more energy than is used. Unpredictable negative environmental effects: If all the solar collectors were placed in one or just a few areas, they would probably have large effects on the local environment, and possibly have large effects on the world environment. The problem lies in the change of temperature and humidity near a solar panel; if the energy producing panels are kept non-centralized, they should not create the same local, mass temperature change that could have such bad effects on the environment.

Water is fundamental human need. Each person on earth requires at least 20 to 50 liters of clean and safe water a day for drinking, cooking and safely keeping themselves clean. Polluted water is not dirty it is deadly. In 2018 2439 people died because of water borne diseases such as cholera, diarrhea, typhoid and viral hepatitis. In all more than 1.3 corer people were diagnosed with these diseases. In the past five years 11768 people have died due to these diseases by seeing above problems it is necessary to be having system which gives us pure and clean water with minerals. The available water in many areas in the country is brackish, saline or impure. Salinity is a major problem in the coastal areas of thane and Mumbai district. RO is the system available for water purification, and sunlight is one of the source of energy that can be utilized in our system as energy source. RO system is most reliable method for purification of contaminated water the RO system has semi permeable membrane that filters excessive minerals and other soluble presents in the water. Particles as small as 0.0001microns are effectively removed by the system. Solar based purifier use only the free pure power of the sun, thereby making system more efficient.

- **LITERATURE SURVEY**

Hassan in 1990 studied the contact aeration for iron removal method. The iron removal process utilized the catalytic effect of ferric iron. Again in this experiment it was theoretically demonstrated that by keeping high concentration of ferric iron, the volume of the aeration tank can be significantly reduced and it was according to the oxygenation rate equation. Ferric iron is very much effective in decreasing the reactor volumes at lower pH values. It is proposed to recycle the ferric sludge to maintain the high ferric iron concentrations in the reactor. William, et al. in 1992 studied the impact of dissolved organic carbon on the removal of iron during water treatment. He used the iron removal process by oxidation and coagulation method. Hemic and folic acids, tannic acid and oxalic acid were estimated in the organic content. Potassium permanganate, chlorine dioxide and free chlorine were used as oxidizing agent. Catherine in 1988 studied the control of biological iron removal from

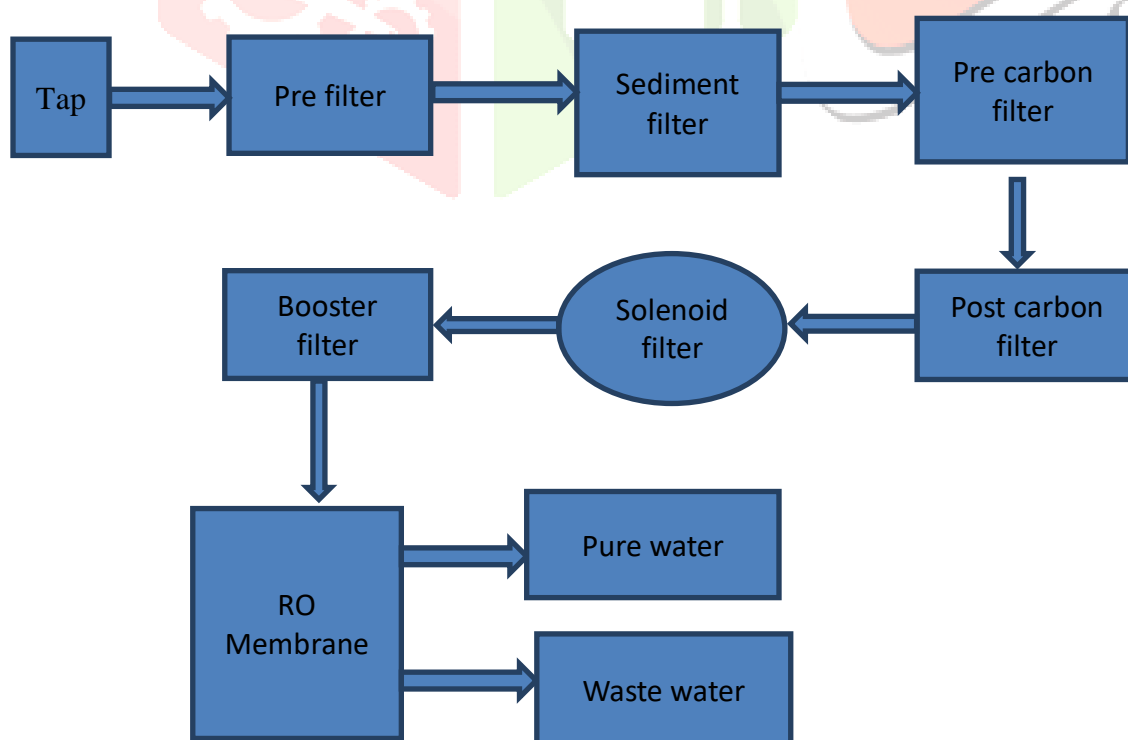
drinking water using oxidation-reduction potential. In this study a pilot plant was used for treating raw water with pH 5.7 for biological removal of iron to produce drinking water. Here oxidation-reduction potential was used as a tool for evaluation and determination of relationship with dissolved oxygen and residual iron concentration in the infiltrate by using a biological filter.

• PROBLEM STATEMENT

1. Unavoidable cost of bottling and transportation.
2. Not all bottled water is verified by independent agency.
3. Non-biodegradable waste.
4. Wait for bottled water delivery or go to the market for buying.

➤ METHODOLOGY

The solar radiations are collected by solar panel. This energy is then stored in a battery through a charge controller. The charge controller prevents the battery from getting overcharged. The battery is connected to the purification unit through an electromagnetic relay. The battery is also connected to a voltage regulator. The voltage regulator converts 24V to +5V, which is required by the microcontroller. The purification unit consists of high pressure motor, reverse osmosis system and the water tank. The high pressure creates the necessary pressure required to carry out reverse osmosis. The microcontroller 8051 keeps a watch to the level of water in the water tank and prevents it from over flow. Through this process we obtain the purified water in the water tank.



- **Result and discussion**

Concepts are being developed for drinking water filtration systems in automobiles, which would collect outside air and water, run it through filtration systems and deliver it to drivers, chilled, at the dashboard. And of course, on-the-go bottles with filtration systems offer consumers instant portability with their choice of filtration options. The future of drinking water treatment systems is advanced technologies in designer packaging.

Drinking water treatment systems that are either integrated into appliances or as stand-alone appliances have already heavily penetrated the consumer market. Product design and functionality are no longer second to product performance; in a consumer's mind, product design often takes first precedence for purchasing decisions and may even reshape product performance definitions.

Advantages

1. Public oriented company with a focus of providing safe water by cost effective water purification system.
2. Provide environmental friendly products and services for improved and preventive health of life.
3. Dependable and socially responsible Research and Development is based on quality standards.
4. Maintain and work continuously for best possible relationship with Customers, Employees, Shareholders and Vendors.
5. Reverse osmosis is the best method for water softening.
6. It gives clean and pure water by blocking all contaminants.

Disadvantages

1. Water purification system must be maintained regularly.
2. During purification, it may not remove pesticides.
3. It may not remove some contaminants: Although water purification systems remove many contaminants, certain pesticides and chemicals may remain in purified water depending on the type of purification used.
4. Water purification systems are home-made and are always effective in providing safe drinking water.
5. Sometimes reverse osmosis leads to clogging of the whole system.

Application

1. Solar water distillation uses a solar still to condense pure water vapour and settle out harmful substances to make clean, pure drinking water.
2. Purified water is widely used for oral and topical products and in granulation processes for tablets and capsules.
3. It also feed water for the production of water for injection (WFI) and for pharmaceutical grade clean steam.
4. Purified water can also be prepared by reverse osmosis.

5. Reverse osmosis is a process which is used to remove dissolved chemical products from water. It is highly used in desalinating sea water.
6. It has critical applications in medical fields. It is used to purify water to prevent any diseases.

- **CONCLUSION**

The solar radiations are collected by solar panel. This energy is then stored in a battery. The battery is connected to the purification unit through a electromagnetic relay. The purification unit consists of high pressure motor , reverse osmosis system and the water tank. The high pressure creates the necessary pressure required to carry out reverse osmosis. The microcontroller 8051 keeps a watch to the level of water in the water tank and prevents it from over flow. Through this process we obtain the purified watering the water tank. As solar energy is being used for the purification of water, which is cheap and abundant, it can be used everywhere where electricity is not available. Here, the microcontroller which is used also prevents the water from overflowing. Moreover, reverse osmosis is a good disinfectant process .This project has only capital cost and almost no running cost. Hence, It will prove to be useful in the near future.

REFERENCES

1. Nimal, R.J.G.R., Hussain, J.H., Effect of deep cryogenic treatment on EN24 steel, International Journal of Pure and Applied Mathematics, V-116, I-17 Special Issue, PP113-116, 2017
2. Parameswari, D., Khanaa, V., Deploying lampont clocks and linked lists, International Journal of Pharmacy and Technology, V-8, I-3, PP-17039-17044, 2016
3. Parameswari, D., Khanaa, V., Case for massive multiplayer online role-playing games, International Journal of Pharmacy and Technology, V-8, I-3, PP-17404-17409, 2016
4. Parameswari, D., Khanaa, V., Deconstructing model checking with hueddot, International Journal of Pharmacy and Technology, V-8, I-3, PP-17370-17375, 2016
5. Dr.S.Prakash,Deepak Toppo,"Solar Energy Based Water Purification System"International Journal of Pure and Applied Mathematics,Volume 119 No.12 , 7863-7873
6. Mohd Shaikh, Santosh B. Waghmare an Sirajuddin,com Review Paper on Electricity Generation from Solar Energy Volume 5 Izssue IX, September 2017 [3] International Advanced Research Journal in Science, Engineering and Technology (IARJSET) National College, Ghaziabad Conference on Renewable Energy and Environment (NCREE-2015) IMS Engineering ,Vol May 2015. 2, Special Issue 1
7. Drake, Human Powered Reverse Osmosis for Producing Potable Water for Developing Countries, Ninth LACCEI Latin American and Caribbean Conference(LACCEI'2011), Engineering for a Smart Planet, Innovation, Information Technology and Computational Tools for Sustainable Development, Medellin, Colombia, 1(9), August 3-5, 2011, 1-6
8. Garud R. M. and Kulkarni G. S ''A Short Review on Process and Applications of Reverse Osmosis'' Universal Journal of Environmental Research and Technology Shivaji University, Kolhapur, Maharashtra, 1(1), 2011, 233-238.