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Water Purification using Solar Energy and Nanoparticles

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Abstract: ***Now a day's water purification is an important thing. So the main aim of our project is to filter the water in multi stages and to convert into the tasty water. This project is designed with water tank, pump, ultrasonic and collecting tank. As per the estimates of the world health organization (WHO) by 2025 about half of the world's population shall inhabit water stressed areas. Water purification through usage of solar energy is a clean and lucrative option to ensure access to clean and safe drinking water. In most of the solar energy driven desalination systems, evaporation of water is one of the key processes. In this direction, we propose that addition of nanoparticles into the water could significantly enhance the evaporation rate and thus the pure water yield. In the present work, we have developed a detailed theoretically model to predict (and quantify) the evaporation rates when water/nanoparticles dispersion directly interact with solar irradiance. In order to clearly gauge the effects of adding nanoparticles, two systems have been studied under similar operating conditions. Theoretical calculations show that addition of even trace amounts of nanoparticles (volume fraction = 0.0001) into water can significantly enhance (57-58% higher than the pure water case) the evaporation rates and the pure water yield. Furthermore, a detailed parametric study involving host of parameters influencing the evaporation rate reveals that nanoparticle volume fraction, ambient temperature, and solar irradiance are the most impacting parameters.***

Keyword: ***Water purify, clean dirty water, solar energy, nanoparticles***

I. INTRODUCTION

Water purification is the process to remove the contaminants from the ground water for the specific purposes. The contaminants like as particulate matter, dissolved minerals. This are various technologies are available in the market to purify the water such as distillation, ion exchange, filtration, RO membrane filtration , ultraviolet(UV) radiation or a combination of more than one and more technology. The mostly used technology is membrane filtration and UV radiation. Due to poor quality of water and also the various chemicals are present in the surface water. Because of these water many borne diseases are spared, which cause the untold misery. In these water the various types of bacteria also present. Lead metal can cause the brain damage and it is very dangerous to human health. The RO membrane removes the particles as small as 0.0001 microns from the contaminated water or ground water. In our project we can use the solar power for the operation of purifier. In the most of rural area their lack of availability of electricity. Without electricity we cannot operate the purifier plant.

II. LITERATURE REVIEW

[1]Mr Abdul Raheem Junaidi et al. says The paper is concerned with an experimental study of parabolic trough collector with its sun tracking system designed and manufactured to facilitate rapid diffusion and widespread use of solar energy. The paper focuses on use of alternative source of energy(through suns radiation) which is easy to install, operate and maintain. The development of a solar thermal water purification, heating, and power generation system.[2]Jerome E. Johnson et al. Says Water was the working fluid and was pumped from a reservoir to an array of 2- 4 foot by 8 foot parabolic solar troughs. A flow control valve adjustable for temperature and pressure, allowed the pressure within the troughs to build, thus increasing the boiling point of the water. At a temperature greater than 100 degrees Celsius, a saturated liquid stream passed through the valve into a vessel that was positioned at the focal point of sunlight within an 8 foot, 9 inch parabolic dish. The flash evaporation occurred, caused by a reduction in pressure on the downstream side of the flow control valve.[3]R. Al-Mamun et al. Says The aim of this work was to design a solar water treatment plant for household purpose. Water purification is the process of eradicating detrimental chemicals, biological poisons, suspended solids and gases from contaminated water. In this work we have reported an investigation of compact filter which is cost effective for developing countries and ease of maintenance. We have arranged a solar water disinfection system that improves the microbiological quality of drinking water at household level. We get 14 L pure water and 16 ml water vapour within 240 min by using filtration method. 11 From our work we get hot water up to. The efficiency of the system at sunny days and cloudy days are this simple solar hybrid system helps to remove turbidity as well as chemical and pathogenic contaminants from water sources in the most and expedient manner possibly.[4]Veranda Kumar et al.

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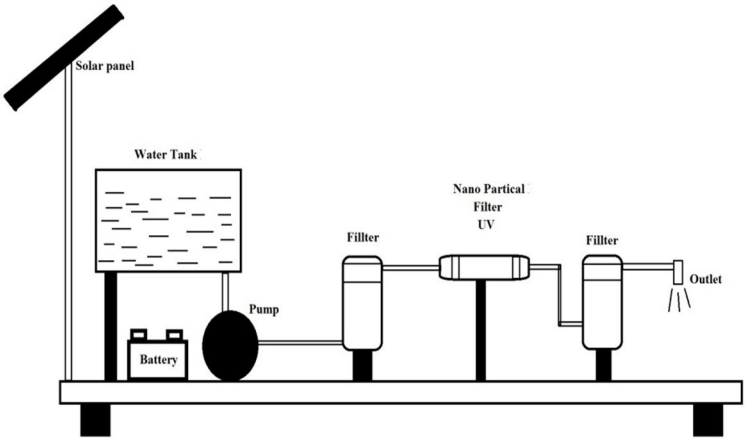
Says Solar purification proves to be both economical and eco-friendly technique particularly in rural areas. Many active distillation systems have been developed to overcome the problem of lower distillate output in passive solar stills. Solar still is a useful device that can be used for the distilling of brackish water for the drinking purposes. In this article a review has been done on different types of solar still. This article provides a detailed review of different studies on active solar distillation.[5] S. O. Ismail et al. Says In this work, dual solar water purifier was designed and developed using locally available engineering materials. Using the sun as the principal source of energy, a cheap low technological method was used to produce small quantities of safe drinking water. The sun provides heat and ultraviolet (UV) light as the two key elements that destroy pathogen in water. They aided the formulation of the water purifying models.

III. PROBLEM IDENTIFICATION

A. Solar power energy storage is expensive.
B. This water solar purification treatment method is not suitable for improving quality of large volumes of water.
C. The method is dependent on suitable climate and weather conditions.
D. Efficiency of Conventional Purifier = 30-40%

Electrical Water purifier = 45-60%

IV. EXPERIMENTAL SETUP



V. WORKING PRINCIPLE

This system consists of ultrasonic purification process where the water pH factor is brought into equilibrium stage. So water PH level must be maintained at the rate of 7.0, because in this condition water contains no acid and base. Bacteria and virus are not stable in this PH factor. Initially the water is pumping from tank to the purifier unit with the help of water pump. The purifier unit consists of the ultrasonic treatment, where the ultrasonic treatment is the process of the cleaning of water and destroying the bacteria and virus and the purified water is sent to the collecting tank.

VI. FEATURE SCOPE

The world is based on water so we make solar water purification to purify the water, In upcoming years we will update our project to convert sea water into purify water by solar energy and nanoparticles and we are planning to extract water and salt by using of solar energy

VII. CONCLUSION

The project carried out by us will make an impressing mark in the field of water purified department. It is very usefully for homes, schools, industries hotels etc. This project has also reduced the cost involved in the concern. The project has been designed to perform the required task taking minimum time.

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REFERENCES

[1] Shannon M A, Bohn P W, Elimelech M, Georgiadis J G, MarinasB J, Mayes A M. Science and technology for water purification in the coming decades. Nature, 2008, P.NO452(7185): 301–310
[2] Burheim O S, Seland F, Pharoah J G, Kjelstrup S. Improved electrode systems for reverse electro-dialysis and electrodialysis. Desalination, 2012, P.NO 285: 147–152
[3] Mei Y, Tang C Y Y. Recent developments and future perspectives of reverse electrodialysis technology: A review. Desalination, 2018, P.NO 425: 156–174
[4] Huyskens C, Helsen J, de Haan A B. Capacitive deionization for water treatment: Screening of key performance parameters and comparison of performance for different ions. Desalination, 2013, P.NO 328: 8–16
[5] Greenlee L F, Lawler D F, Freeman B D, Marrot B, Moulin P. Reverse osmosis desalination: Water sources, technology, and today's challenges. Water Research, 2009, P.NO 43(9): 2317–2348
[6] Sobana S, Panda R C. Review on modelling and control of desalination system using reverse osmosis. Reviews in Environmental Science and Biotechnology, 2011, P.NO 10(2): 139–150
[7] Alkhudhiri A, Darwish N, Hilal N. Membrane distillation: A comprehensive review. Desalination, 2012, P.NO 287: 2–18

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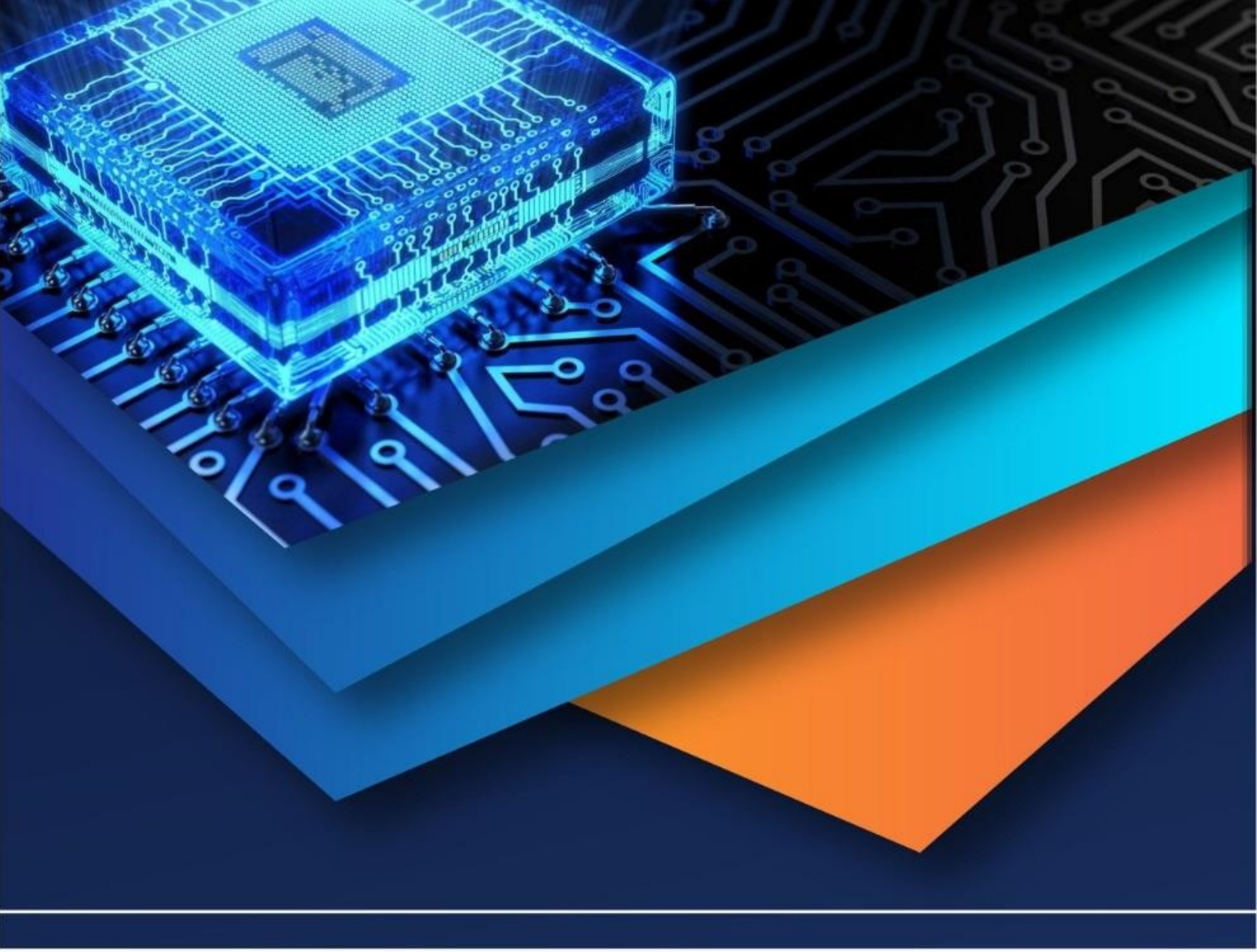

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