

# REVIEW ON VARIOUS TECHNIQUES OF SOLAR WATER DISTILLATION

Akash S. Bidwaik, Iqbal Mujawar

Department of Mechanical Engineering

TCET, Kandivali

**Abstract:** Clean, safe drinking water is deficient. Today, most of the people from the corner of the world have no access of the pure drinking water. Water is the base of life. Scientists have been working to find way to purify water efficiently and cause less damage to environment, solar water still was found to be economical and eco-friendly way to tackle water shortage problem especially in remote areas. This article provides a review of different types of passive and active solar stills which gives us glimpse of different technologies which are been used in different parts of the world and also highlights their benefits and disadvantages. A passive solar still relies on external heat capturing materials, such as wax, oil, sawdust to capture, store solar energy. An active solar still do not dependent on external devices, in fact it works on principle of greenhouse effect, solar energy captures sunrays through glass windows that absorb and store heat. This review would also throw light on further research and use of appropriate solar still for particular location.

**Keywords:** Solar still, Active solar still, passive solar still, ecofriendly

## I. INTRODUCTION

About 97 percent of the earth's water hold by the oceans, and remaining 2.5 percent is brackish water, leaving only 0.5 percent as fresh drinkable water. Therefore all around the world many people do not have privilege to approach of potable water which leads to population concentration and lowers the standard of living. So, it is rather economical to use the simple device to capture the heat energy from the sun for solar distillation and purify water. Solar distillation is an important process used for water purification & heat energy from the Sun is used for the distillation process. Solar distillation is a simple method to convert saline water to pure water. The heat energy from the sun heats water and the water gets evaporated. When the water evaporates, water vapors

goes up and condensed on the inclined glass surface and the condensed water collected from the trough which is attached to the glass. Only pure water evaporates. This process removes impurities, such as salts and eliminates microbiological organisms. Finally we will get the clean water which is pure than the rain water.

## II. REVIEW

The following data throws light on various water distillation techniques by using active and passive solar stills

**Miqdam T. Chaichan , Hussian A. Kazem[1]** investigated usage of thermal energy storage extracted from distillation .Paraffin wax was selected as PCM and it was used to store solar energy as latent heat and this was used at night yo purify water. Tests were performed at Baghdad, 2013. In this case without PCM but using tracker to detect sun by concentrating dish. Increase in efficiency of system 41.63%, increase in heating efficiency 37.33%, and productivity 180%. In the case with PCM and solar concentrator working time increase about 3hours, concentration efficiency 21.64%, heating efficiency was increased by 36.33%, productivity 53.21%.In case of PCM with tracking the sun by concentrating dish was working tine 5 hours , concentrating efficiency 64.07% , heating efficiency 112.87% , productivity 3075.4%.

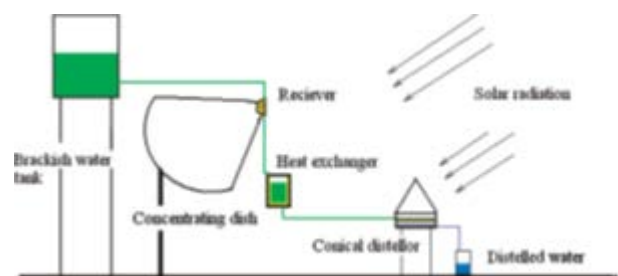


Fig.1 Experimental setup of solar still with PCM with solar tracker

**Jinesh S. Machale ,Prachi D. Thakur , Piyush S. Lalwani and Gayatri M. Apte.[2]** investigated the increasing the low yield and reducing the high initial solar power technology to realize a small scale single slope solar still for personal use.It produces water of high quality maintenance is almost negligible. The system will not require electricity to operate .The cost of constructions of prototype is Rs. 800 the experimental values of water were under standard.

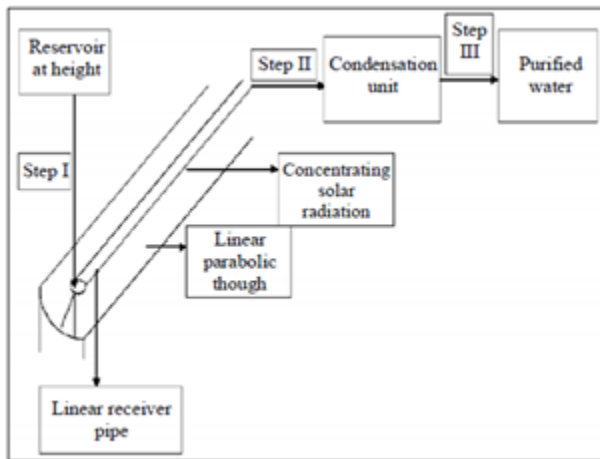


Fig 2. Flow diagram of the setup

**Ozuomba J.O. , Edebeatu C.C. , Opearu M.F. , Udoye M.C. , Okonkwo N.A.[3]** were fabricated and tested a roof top solar water distillation still under the environment condition of Urualla. The solar still system consists of four major components, a rectangular basin, an absorber surface, and a glass roof and condensate channel. The RSWD was able to achieve 2.3m<sup>3</sup> of distilled water in six days. The highest condensate of 78 ml was recorded at 5 pm and the maximum temperature was 40°C. The result was obtained nearly same for remaining five days around the same time in evening. Several kits can be made to fulfill the human requirement of water and as the kit is very cheap to make and components are easily available this can be achieved successfully.

**Giorgio Nebbia [4]** deigned Solar stills to build with simple and local materials in areas where solar power is abundant. In this paper problems related with corrosion, maintenance of still, cleaning of trays, improving taste, especially on the use of ethanol as fuel has been discussed. The most satisfactory results of twenty yrs. of experimental work on solar stills were of the tilted tray design; they gave highest yields of fresh water per unit area. In best results were obtained in summer days, with a solar radiation intensity of 20 MJ/m<sup>2</sup> reached 4-5

L/m<sup>2</sup>. In order to avoid corrosion, the tray containing the saline water should be made of metals.

**Marcio Claudio Cardoso da Silva, Mauricio Luiz Sens, Clarissa Soares, Cicero infore de Andrade Neto[5]** experimented on solar still with salt water and saline water and produce drinking water by solar distillation. The main aim of this experiment was to get the pure water for rural or isolated areas with a simple technology and with low cost material. Tests on face slopes of 15°, 25°, 30° and 45° presented effectiveness in the condensate flow runoff. The solar water purifier is effective in treating brackish and salty water. The pyramidal structure facilitates the uptake of solar radiation.

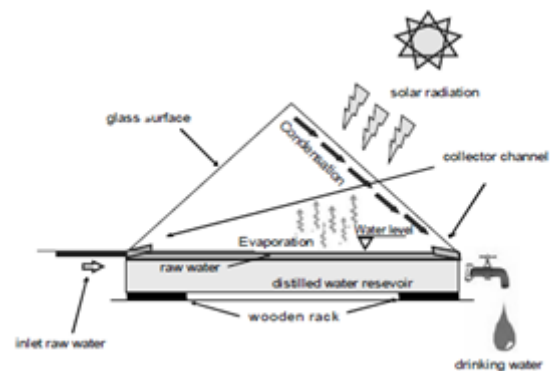


Fig.3. Experimental setup of solar still design



Fig.4. Experimental setup of solar still

**Ali A.F.Al-Hamandani, S.K.Shukla, Alok Dwivedi [6]** investigated the experimental analysis of solar still with Phase change material.. From the experiment it was found that the heat loss was decreased to great extent and overall efficiency of the system was increased by adding phase change material in solar still.

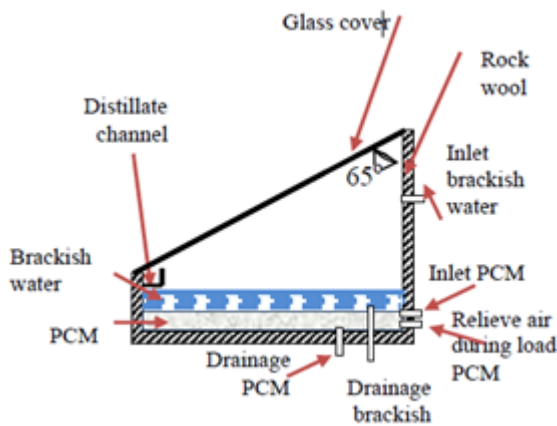


Fig.5 Experimental setup and design of solar still with PCM

### III. CONCLUSION

From the above reviews various techniques of solar water distillation are developed to produce pure water. These methods help to achieve the demand of fresh and pure water. Now a days conventional systems are used for the water purification which takes electricity but the non-conventional systems like solar still purifies brackish water into pure water at very low cost. Such systems can be used for the domestic purposes.

### IV. REFERENCES

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