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SOLAR WATER DISTILLATION

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ABSTRACT:- *In this work, Number of stepped type solar stills with varying depth of water and other design parameters like thickness of glass cover, insulation thickness, condensing cover material, shape of the absorber surface, absorbing material provided over the basin surface, angle of inclination of the still etc. being fixed have been selected for experimentation. The depth of water provided in solar stills is 5 mm. Thus, as depth of water goes on increasing, the distillate yield produced per unit area of absorber surface goes on decreasing. Also, an economic analysis was made.*

Keywords: *- Stepped Type Solar Still; Depth of Water; Distillate Yield; Thermal Performance*

I. INTRODUCTION

Water is one of the prime elements responsible for life on earth. It covers three-fourths of the surface of the earth. However, most of the earth's water is found in oceans as salt water, contains too much of salt, cannot be used for drinking, growing crops or most industrial uses. The remaining earth's water supply is fresh water. Most of this is locked up in glaciers and ice caps, mainly at the north and south poles. If the polar ice caps were to melt, the sea level would rise and would flood much of the present land surfaces in the world. The rest of the world's supply of fresh water is found in water bodies such as rivers, streams, lakes, ponds and in the underground. Our drinking water today, far from being pure, contains some two hundred deadly commercial chemicals, toxins and impurities. So there is an important need for clean and pure drinking water.

In many coastal areas where sea water is abundant but potable water is not available, solar water distillation is one of the many processes that can be used for purification as well as desalination. Solar still is the widely used solar desalination device. But the productivity of the solar still is very low. To augment the productivity of the single basin type solar still, much research works has been carried out. The work is summarized as follows. The effect of depth of water on the performance of a single basin type solar still has been studied by a number of investigators around the globe but its effect on a stepped type solar has not been studied have studied the effect of water depth on daily yield of a single basin type solar still using transient analysis.

In this communication, analytical transient expressions for water and glass temperatures and hourly yield of the still as a function of initial brine temperature, water depth, solar intensity and ambient temperature etc. are presented. For the evaluation of water and glass temperatures, evaporative, convective and radioactive heat transfer coefficients from water to glass have been considered as temperature dependent parameters.

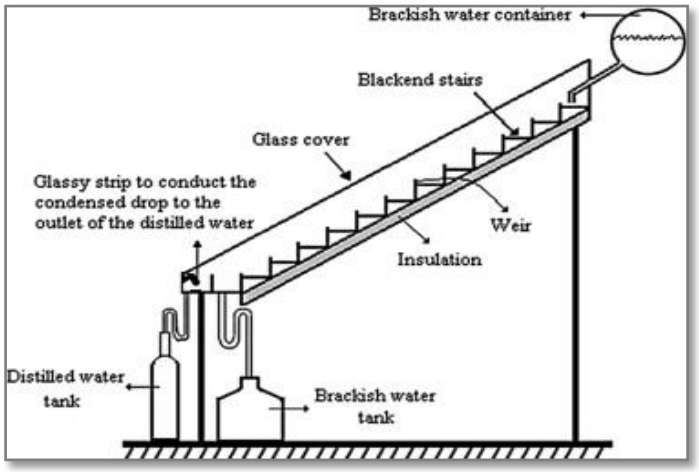

Figure 1.1 Concept of solar still (distillation)

2. METHODS AND MATERIAL

2.1 solar water Distillation Method

The one of the methods to purify the polluted water called solar water distillation system and it can be call as solar still. It is a system used to distillation of water. In my project I am constructed both black and white coated solar stills and find out the coating which gives more efficiency by experiments. The glass at the basin used to allow the sunlight to pass through it to attain the water.

The analysis made with the distillate showed that removal of salts is compatible with a distillation of common water, From the water, salt content was removed, which reached values greater than 80%. The performance evaluation carried out on the fabricated Solar Still has shown that it can be used for the salty water desalinization.

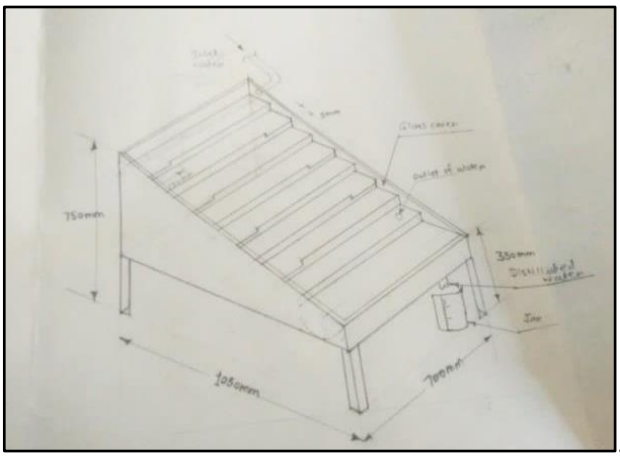

Figure 2.1 Design of Solar Distillation

The aim and objective of this research study were achieved as an improved solar water purifier was designed and developed by improving the efficiency of the solar stills which having efficiencies between 38% and 47%. The percentage of pure water testing has an average rate of 65%. Double basin solar still coupled with evacuated tubes was constructed and tested. Several experiments have done to enhance the distillate output of a solar still. The performance of alone double basin solar still was compared with that of still coupled with evacuated tubes with and without coating of black.

Figure 2.2 Stair Type Solar Distillation

2.2 Material

Sr. No.	Material	Quantity
1	Angles	35kg
2	C.I. Sheet	17.2kg
3	Glass	1
4	Tank	1
5	Pump	1
6	Leak-proof solution	1kg
7	Black Paint	1

3. RESULT

The performances characteristics of stair type solar still with depths of water are analysed in terms of productivity. Number of stepped type solar stills with depths of water in the basin were installed and tested. Solar still has 5 mm depth of water. It has been observed that the distillate yield of solar still decreases as the depth of water in the basin increases. For the given set of design and climatic conditions, the minimum depth of water resulting in the maximum distillate yield is found to be 5 mm. Also, an economic analysis was made. It was observed that the volumetric efficiency of the system is 27.33% for an input of 30 litres of water per day. Increase time of circulating of water, maximum amount of vapour in form close basin.

4. CONCLUSION

It can be seen that the temperature of the stair basin plate is the maximum followed by the temperature of water contained in the basin; which is heated due to incident rays. Then the temperature of the inner glass; where the condensation of vapours takes place and then the outer glass that transmits the incident rays and it is in contact with the surrounding. The ambient temperature is the least one out of all these temperatures. The maximum basin plate temperature occurs between the hours of 12.30 pm to 3.30 pm. It ranged between 600C and 700C. Ambient temperatures for all were in the range of 220C to 380C.

The distillate yield of solar still with 5 mm depth of water is observed to be 1230 ml during the period from 10 am to 5 pm. This is due to the fact that at lower water depths, the specific heat capacity of water is less due to decreased water mass. This results in increase in water temperature causing faster evaporation of water in the basin. Hence, the distillate yield increases at lower water depth.

5. REFERENCES

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