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Double Slope Solar Still with Vacuum Pump and An External Condenser

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ABSTRACT: An attempt is made to enhance the production of fresh water from the double slope single basin solar still with vacuum pump and an external condenser, which yield an increase in day time distilled water productivity. The experiment is also carried out by using vacuum pump which sucks the vapour of water to condense in the external condenser. The storage tank was implemented for the purpose of passing the excess water in the condenser to circulate into the storage still for the continuous productivity of the double slope single basin solar still using vacuum pump and an external condenser were analysed and studied.

I. INTRODUCTION

WATER, ENVIRONMENT AND ECONOMY:

Water is an essential nutrient and plays a key role in the human body. Clean water is essential for good health which influence the social and economic development of any nation. People who use contaminated water are prone to water borne diseases, they cannot engage themselves in an active process. Financial resources that could have been allocated to the developmental projects are channelled to disease curing efforts. consequently, ill health contributes to the retardation of economic growth. There is a limited access to drinking water that meets acceptable standard levels of biological, chemical and physical constituents. Over 97% of water available on the earth's surface is salty and environmental pollution caused predominantly by anthropogenic activities is also contributing to the degradation of fresh water resources. The reports shows that 78% and 96% of the rural and urban populations used clean drinking water in 2006 on a global scale respectively. So, 4 billion cases of diarrhoea are reported annually, with 88% of them being ascribed to the use of unclean water, and insufficient sanitation and hygiene. Water quality degradation is mostly a result of diffuse-source contaminants and the spatial and temporal variability associated with these sources. Water is a basic resource that guarantees the life of all living beings on the planet .

II. OBJECTIVES

The main objective of our project is to improve the distillate productivity of the double slope solar still with vacuum pump and external condenser. The usage of double slope is, it can absorb abundant radiation from time during morning to evening which has its effect on increasing the evaporation rate by increasing the productivity. The water used in the condenser is circulated into the still there by acquiring the continuous flow of water for the evaporation purpose to run the still without stopping of work. So the water is supplied in the way of heated form. The supply of water in the heated form makes it easier to evaporate more quantity of water. The way of passing heat water has its

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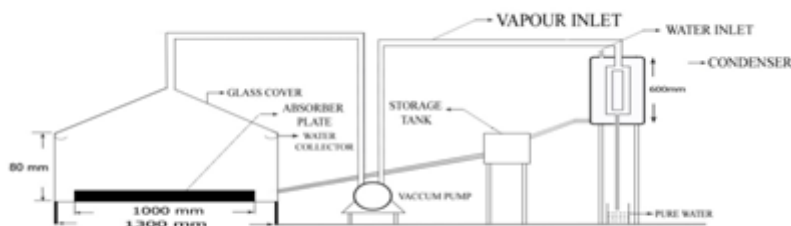
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effect on increasing the productivity. By using the vacuum pump, the productivity will be resulted in an improved form at great extent.

III. WORKING PRINCIPLE

The water in the absorber plate of the solar still is evaporated by the radiation from the sun. The vapor which gets evaporated is then sucked by the vacuum pump of specification 2900rpm, 0.75KW and 1HP. The steam which is sucked is then proceeded to the condenser for the condensation process. It makes the condensation process in a linear way by providing the external condenser. By using the Vacuum pump the productivity will rise than using the conventional solar still. The water which is used for the condensation process to condensate the steam is supplied to the storage tank . Then, the water is circulated to the absorber plate for providing the continuous way of yield.



SCHEMATIC DIAGRAM OF THE EXPERIMENTAL SET UP

Figure 1. Double slope solar still with vacuum pump and an external condenser

IV. MATERIALS USED

S.NO	MATERIALS	SPECIFICATION / QUALITY
1	Mild Steel	70 kg
2	Fabrication	Solar Still, Condenser, Storage Tank
3	Vacuum Pump	1 HP, 0.75 KW , 2900 rpm
4	Wire Extension	40 m
5	Tube	6 m

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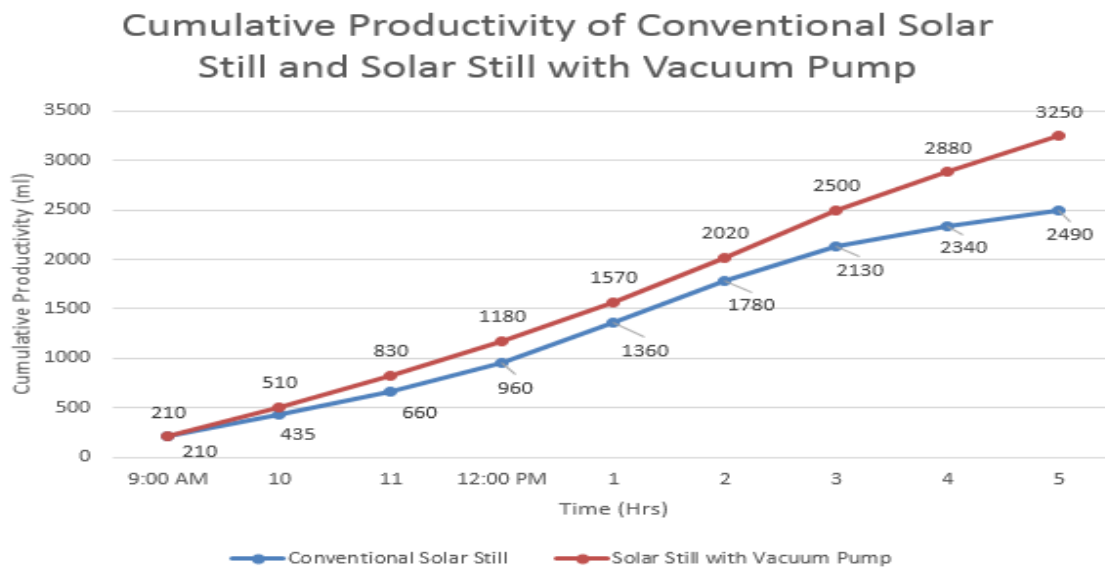
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6	GI Pipe	5 m
7	Coupling	2 Quantity
8	Glass	2
9	Thermistor	6

V. VARIATION IN PRODUCTIVITY OF CONVENTIONAL SOLAR STILL AND DOUBLE SLOPE SOLAR STILL WITH VACUUM PUMP AND AN EXTERNAL CONDENSER



VI. APPLICATION

- It gives high yield.
- It can provide high productivity in less time.
- It can be used in any places providing high range of heat.
- It can be worked in home, office and institutions.

VII. CONCLUSION

In this study, the aim of the present investigation is to develop a double slope single basin solar still that would assist in increasing the availability of clean water in remote areas. To achieve this goal the double slope solar still was connected with the vacuum pump and an external condenser and derived the readings with productivity at Francis Xavier Engineering College, Tirunelveli. The experiments were carried out in actual solar still condition to get the

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productivity. The experiments conducted in the period of March 2020. Performance of the double slope solar still was experimented by connecting it to the vacuum pump and the external condenser. From this experimentation, the normal experimentation regarding the double slope solar still gave the productivity of about 2.5 lit/ day and by connecting it to the vacuum pump the productivity was about 000lit/day.

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