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DESIGN AND PERFORMANCE OF SOLAR STILL

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ABSTRACT

The pure water can be obtained by distillation in the simplest solar still. Fresh water is a necessity for the ustenance of life and also the key to man's prosperity. So much people tried to improve distillate output of solar still and performance. Solar still is not so much attractive in a market due to its lower productivity. In this review paper study of design and performance of solar still. Design of solar still is some likes rectangular, circular, concentric, and other are study and performance is base on the size, Depth, G.I metallic body, basin color, Reflecting mirror width, angle and Energy storage material used, fin enhanced the rate of increment on distillate production. Regarding changes to be improve performance.

Keywords: solar still, sustenance of life, lower productivity.

I. INTRODUCTION

Solar still is a device , convert saline water into distills water today is necessary to collect the fresh water. Each and every person need for fresh drinking . in this Review paper many scientist research the solar still.A Solar still convert distills water, using the heat of the sun to evaporated, cool then collect the water, In a solar still, impure water is contained outside the collector, where it is evaporated by sunlight shining throught clear plastic or glass. The pure water vapour condenser on the cool. Inside surface and drips down, where it is collected removed. Disllation replicates the way nature makes rain. The sun's energy heats water to the point of evaporation. As the water evaporates, water vapour rains condensing into water again as it cools and can then be collected. This process leaves behind impurities , such as salts and heavy metals and eliminates microbiological organism. Advantages: Renewable energy source, free charge sun energy (during sunlight it eliminates 500 watt electric consumption per one hour of sunlight) , cost Effectiveness, We provide quality water for personal and industrial use. Disadvantages: Low production capacity, not enough for the drinking water needs of the average family,The large area tilted glass cover might be an attractive to bugs and insects. Application: For industrial process, For sterilization, For battery maintenance and radiator.

II. LITERATURE REVIEW

Muhammad Ali Samee (18 March 2005)

The actually fabricated solar still . The basin area of the still is 0.54 m2, fabricated using galvanized iron sheet of 18 gauge thickness. The bottom and sides of the basin are insulated by 3 cm thick thermo pore sheet surrounded by a wooden frame of 2 cm thickness. The surface of the basin is painted black to absorb maximum solar radiations because it is an established fact that black dye is the best solar radiation absorbing material. The cover of the still is made up of 3mm thick simple window glass, making an angle of 33.31 with horizontal, optimized for 33.31 N latitude of Islamabad. This follows the general rule of thumb that the glass cover angle should be latitude+101 for winter and latitude-101 for summer for a particular location. The fresh water is collected in a galvanized iron channel fixed at the lower end of the glass cover and is taken out through an outlet nozzle. A PVC pipe is used to supply the brackish water through the inlet nozzle. The whole system is made vapor-tight using silicone rubber as sealant, because it remains elastic for quite long time.

Performance evaluation

The solar still was tested outdoors at PIEAS, Islamabad , day-light and overnight output of the still in the month of July 2004. The average daily output was found to be 1.7 liters/day for basin area of 0.54 m2 based on data of

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8 days. The literature tells us that efficiently designed solar stills have daily output of the order of 4 liter/m2 in high insolation areas shows the total output graphically The efficiency of the solar still was calculated using the formula given in literature and it came out to be 30.56%. The solar stills installed in the different parts of the world have efficiencies of the order of 30-40% .Efficiency of the solar still can be improved by providing more efficient insulation in order to keep the heat loss to a minimum. The output of the solar still varies directly with the amount of insolation it gets and the ambient temperature. The hourly output of the solar still was measured on 4 August 2004, The hourly output is maximum in afternoon hours when the ambient temperature is at its daily peak. Another aspect which needed attention was quality of desalinated water. Three parameters are important in this regard: total dissolved solids (TDS), pH and electrical conductivity. Higher values of conductivity indicate presence of more dissolved solids and hence more salinity. Three different water samples were desalinated and tested for these parameters. Sample one was taken from drinking water supply coming from Simply Dam, located near Islamabad. Second water sample consisted of the groundwater obtained from PIEAS colony. A highly turbid and saline third sample was prepared in laboratory. All three parameters—TDS, pH and conductivity—were measured for the three samples before and after they were desalinated. According to WHO Guidelines for Drinking-water Quality, the palatability of water with a TDS level of less than 600 mg/liter is generally considered to be good; drinking water becomes significantly and increasingly unpalatable at TDS levels greater than about 1000 mg/litre. The presence of high levels of TDS may also be objectionable to consumers, owing to excessive scaling in water pipes, heaters, boilers and household appliances. However WHO does not propose any health-based guideline value for TDS. The TDS values for all three samples after desalination fall well within the 600 mg/liter level. No health-based guideline value has been proposed by WHO for pH either. Although pH usually has no direct impact on consumers, it is one of the most important operational water quality parameters. The optimum pH required varies in different supplies according to the composition of the water and the nature of the construction materials used in the distribution system, but it is usually in the range 6.5–8. The pH of the samples after desalination is not far off from these values

Salah Abdallah (11 May 2007)

1. Solar still design modifications

Various system modifications of single slope solar stills were suggested. Two different stills (i.e. step-wise basin and simple flat basin) and an electromechanical sun tracking system were designed and constructed by engineering workshops at the Applied Science University (ASU). Also, the stills components were selected from locally available materials at the workshops. The design modifications involved were: (a) fixing interior reflecting mirrors, (b) manufacturing a step-wise water basin instead of a flat basin, and (c) coupling the step-wise solar still with a sun tracking system. First of all, it was important to evaluate the performance of the traditional solar still design as a reference. This helps to measure the improvements due to the new modifications. The traditional single slope solar still has an inclined top cover of 32E made of glass (4 mm thickness), with an interior surface made of a waterproof membrane. The exterior surfaces of the still were painted black to improve absorption of the sun's rays. Water was poured into the still to partially fill the basin. The glass cover allows the solar radiation to pass into the still, which was mostly absorbed by the black basin. The water begins to heat up and the moisture content of the air trapped between the water surface and the glass cover increases. The basin also radiates energy in the infra-red region which was reflected back into the still by the glass cover, trapping the solar energy inside the still. The heated water vapor evaporates from the basin and condenses on the inside of the glass cover.

2. Automatic sun tracking system

The majority of authors used a closed loop method of control to design sun tracking systems [19–21]. In his work, the design of one axis tracking system was performed using an open loop method of control seed upon programmable logic controller (PLC). The objective for using this sun tracking system is to improve the thermal performance, and to increase the distillation productivity of the modified solar still. The block diagram of the hardware components of the tracking system is .The PLC system used was fairly simple and cheap in cost. The PLC has a programmable memory in which instructions were stored to implement the various functions used to control the tracking motors. The electro-mechanical system was designed to rotate the distiller around the vertical axis by means of a 36 V DC motor and a spur gear. The calculated required positions of the tracking surface, step-wise distiller, around the vertical axis, and γ (surface azimuth angle) were determined by computer software for the city of Amman. These positions were inserted in the PLC. The PLC controls the motor which moves the tracking surface into the required positions [22, 23]. The still would be rotated from east to west for the period of the experiment.

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Abdul Jabbar N. Khalifa (27 Jun 2009)
The simplest structure of a solar still, is a basin having a certain quantity/depth of saline water and a cover transparent to solar radiation, yet blocks the long wavelengths radiation emitted by the interior surfaces of the still. A sloped cover, which provides a cool surface for condensation of water vapor, facilitates an easy flow of the water droplets into the condensate trough. The base of the still is blackened on the interior surface to maximize absorption of solar radiation, and insulated on the exterior surface to minimize heat losses. The still could be a single or double-sloped. Regression lines were fitted to the data collected from the different investigators cited in the literature for both types as the monthly performance of both configurations show comparable performance around the year, A least square method was used; the type of the regression was chosen to give the best fit to the data, i.e. the one with the best root mean square value R2. The correlations were developed for the following parameters.

1. Brine depth,
2. Solar radiation,
3. Cover tilt angle

Z.M. Omara (14 April 2011)
In this work, three solar stills were designed and fabricated to study and compare the performance of the solar desalination systems The first one is a conventional still and the second is a finned still while the third is a corrugated still. The conventional still (a single basin) has a basin area of 1 m2 (50 cm×200 cm). High-sidewall depth is 49 cm and the low-side wall height is 20 cm, The still is made of iron sheets (1.5 mm thick). The whole basin surfaces are coated with black paint from inside to increase the absorptivity. Also, the still is insulated from the bottom to the side walls covered with a glass sheet 3 mm thick inclined at nearly 30° horizontally, which is the latitude of Kafrelsheikh city, Egypt, to maximize the amount of incident solar radiation. The whole experimental setup is kept in the south direction to receive maximum solar radiation throughout the year. The finned still has the same construction and dimensions of the conventional one in addition to the nineteen fins which are welded to the still base to increase the heat transfer surface area. The fins are made of iron sheet with a height, length and breadth of 50, 490 and 1 mm, respectively. The pitch between two successive fins is taken as 100 mm and kept constant. Also, the corrugated still has the same construction and dimensions of the conventional one except that the still base is not flat but has a corrugated form with a height of 50 mm. The angle of bending between any two successive tops or any two bottoms is 80°, and the space between any two tops is also taken as 100 mm, so the corrugated still base has nineteen tops and nineteen bottoms of corrugated form. Feed water tank of 60×60×80 cm3 is used to feed water to every conventional, finned and corrugated still. The feed water tank is connected to the main line which is divided into three feed water lines. A flow control valve is integrated at each line inlet in order to regulate the flow rate of water. The experimental setup is suitably instrumented to measure the temperatures at different points of the still (brine, absorber and glass cover temperatures), total solar radiation and the amount of distillate water. The temperatures have been measured using calibrated copper constantan type thermocouples which were integrated with a modeler programmable logic control (MPLC) to measure all temperatures of the solar stills at the same time. The solar radiation intensity is measured instantaneously by a solar meter. The digital air flow/volume meter is used to measure the wind velocity.

Yazan Taamneh (30 January 2012)
Experimental measurements were performed to evaluate the force convection effect on the performance of the solar still under the outdoors of Tafila climatic conditions. the unit consists of metallic container, occupied by the raw saline water to a certain level below the exit. The container was designed and fabricated in pyramid shape to increase the surface area of condensation. A black plate is used to cover the base of the solar still. The incident solar radiation is transmitted through a 6 mm thick pyramid-shaped glass cover with relative transmissivity of 0.88 and then the heat is absorbed by the black plate. When enough energy is absorbed by the water, the water undergoes a phase change. The water vapor then rises and comes into contact with the cooler transparent, inclined surface. Here the vapor once again goes through a phase change from vapor back to liquid. The water then condenses and runs off the transparent inclined surface into a collection channel, which is made of galvanized steel and connected to the outlet. The distillation process rids the contaminated water of any impurities and most commonly found chemical contaminants within the environment. These contaminants are left behind in the basin. Two thermocouples for measuring the basin water temperature as well as the inside air

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temperature are installed in the still side wall. In the month the average maximum temperature in Tafila City is around 35 °C and the maximum solar radiation is 1060 Wh/m2d. The tests started around 6:00 am and temperatures were taken at every 30 min time interval for approximately 12 h. Three tests for three days were performed in a typical high solar insolation month (i.e. June) in a summer season to demonstrate the still's typical maximum efficiency. The experimental results are presented to examine the effects of forced convection on the productivity of freshwater. In order to eliminate the effect of different experimental conditions, two similar solar water distillers were designed and manufactured. The solar still equipped with a small fan works with photovoltaic solar panels and low power consumption (~10 W), which mounted on one of the glass cover of the solar still. The two solar distiller was fed by saline water until the same basin depth 6 cm. It should be noted that in all experiments.

Sabah A. Abdul-Wahab (23 August 2013)
An experimental setup of the IASS and the RIASS was installed at College of Engineering, Sultan Qaboos University, Oman. The location was at latitude of 23° 37′ N and longitude of 58° 35′ E., respectively. The IASS is fabricated by using a galvanized iron sheet of 5/16 inch thickness. The size of the solar still is 400 mm in length and 200 mm in width. The whole assembly of the inverted solar still is positioned inside an enclosure. This enclosure is made of glass of 5/16 inch thickness. The size of the enclosure is 1000 mm in length and 1000 mm in width. The left and right sides of enclosures are insulated by a 5 cm thick Styrofoam and the cooling system is implemented on the top of enclosure. The basin is colored black in order to absorb solar radiation. In addition ,mirrors are placed under the basin (i.e., under the glass enclosure) to heat the basin also from its bottom surface. These mirrors will concentrate the solar radiation onto the lower surface of the metallic basin which thereafter transfers heat to the feed saline water. In order to maintain the condensing glass cover at very low temperature, a flow of coldwater is used uniformly over the outer side of the glass enclosure to cool the cover of the still. For this effect, a main water tank is used together with a water pump of 0.5 HP with 0.75 inch inlet and 0.5 inch outlet (i.e., for circulation the water). This flow of coldwater increases the temperature difference between the feed saline water and the condensing glass cover and thus the condensation of the water vapor is expected to be more intense. The output from the still is collected through a channel, fixed at the end of the smaller vertical side of the basin. A plastic pipe is connected to this channel to drain the distillated water to an external measuring jar. Also, the base of the inverted solar still is provided with a drain valve for cleaning the base of the still after each experiment. The refrigerated inverted absorber solar still consists of two main parts: an inverted absorber solar still (IASS) as mentioned earlier and a refrigeration cycle. The refrigeration cycle part of the RIASS consists of a 1/4 HP compressor with 134-a refrigerant, a condenser, an expansion device, and an evaporator. In addition a flexible duct with in line fan is used to remove the heat rapidly from the condensing surface. Combing the inverted solar still with refrigeration cycle will have two significant effects: (a) addition of an extra thermal energy that will be fed into the basin and it will be used to vaporize the feed saline water by using the waste heat of the condensation of refrigerant inside the condenser coil, and (b) increase in the rate of the condensation of produced fresh water by removing rapidly the heat of the condensation from the condensing surface. The compressor of the refrigeration cycle has a refrigerant inlet line (low side pressure) and refrigerant outlet line (high side pressure). The compressor will cause the refrigerant to flow in a cycle from the condenser to the evaporator. The refrigerant will flow into the condenser coil which is placed inside the basin of the inverted solar still, where the feed water will undergo distillation. The condenser will reject heat (results from the condensation of the gas refrigerant) to the feed saline water of the solar still. After the rejection of all heat by the condenser, the refrigerant turns back to liquid. At the same time, this rejection heatwill be used as an additional energy input to evaporate the feed saline water. The liquid will flow then to the evaporator. Evaporator is a heat exchanger that absorbs heat so the liquid refrigerant will be transformed into a gas vapor. The energy required for the evaporation of the refrigerant will be taken from the mixture of air–vapor just under the cover of the still by using the flexible air duct. Through this flexible duct, the mixture of air vapor just under the glass enclosure of the solar still will flow to the evaporator. The heat of this air inside the evaporator will be used to evaporate the liquid refrigerant. The cold flow rate of air induced by the fan was constant. Air will then leave the evaporator to re-circulate it again under the glass enclosure of the solar still. This arrangement of air transport will ensure that the heat dissipates from condensing water will be removed rapidly from the condensing surface and also ensure from decreasing the temperature of the condensation surface.

Mohamed A. Eltawil (16 june 2014)
The experiments were carried out in the premises of Kafrelsheikh University, Egypt which lies at latitude 31.07°N and longitude 30.57°E during summer 2013. A schematic diagram of a symmetrical single sloped solar still. which explains different components of the experimental setup. A photograph of the fabricated hybrid

developed solar still (DSS) as well as conventional solar still (CSS) is depicted in, both of the solar stills are in single slope. Each single basin has a basin area of 0.50 m2 (1.0 m × 0.50 m-inside dimensions).The basins of solar stills were made of galvanized steel sheets of 2 mm thickness. The lower and higher wall heights (south–north) have been kept at 0.16 m and 0.45 m, respectively. Interior surfaces of the basins were coated with matt black paint to increase the absorptivity of solar radiations. The top of the basin was covered with commercial glass of 3 mm thickness, inclined at 30° horizontally (the latitude of Kafrelsheikh, Egypt) and oriented towards south direction. In general the transmittance of glass is about 90%. The rubber gasket was placed between the basin top and glass cover. Further, it was sealed using window putty to prevent outside vapor leakage. The basin was insulated from the bottom and side walls with low thermal conductivity fiber glass of 5.0 cm thick. The whole base set was painted with corrosion resistant paint. The condensed water was collected in a galvanized iron channel fixed at the lower end side of the glass cover (collection trough). The channel was terminated with a small plastic pipe which drained the fresh water into an external graded jar installed bellow the distillation model level. An inlet pipe was also fixed in the side wall to feed the brackish water into the basin. A constant head tank of 0.20 × 0.20 × 0.15mwas used to control the brine level of water inside the solar still by a float type regulating valve. A polyethylene plastic feeding tank of 100 l capacity was used to compensate the still water on a daily basis. A hole in the basin side wall allows inserting the wires of thermocouples to measure the different temperatures. The DSS consists of single sloped solar still, PV system, AC water pump, water spraying units, plastic solar collector (hot air collector),AC air pump, perforated tubes and flat plate collector .The specifications of different devices are presented in One fabricated flat plate solar collector was connected with the basin of DSS by using insulated pipes. The connection between the flat plates collector and DSS could be changed in a controlled way by two check valves provided .The collector has an effective area of 1.0 m2. The whole absorber was made of corrugated galvanized steel sheet of 1 mm thick and encased in a wooden box with 0.10 m wooden sawdust insulation at the base and sides to reduce thermal losses. The toughened glasses of 0.003 m thick are fixed on the top of the box using steel frame. The rubber seal was placed between the wooden box and glass cover, as well as between the glass and metallic frame. Nine copper tubes of 18mmdiameter each were kept in between the corrugated absorber sheet and connected from the bottom with a copper tube of 25 mm diameter (inlet) and from top with a similar tube (outlet of 25 mm diameter). The distance between the absorber plate and glass cover was 70 mm. The copper tube and the absorber plate were painted with black paint. The solar radiations passing through the collector were utilized to heat the water flowing through the riser tubes through the collector. The whole system was made vapor tight using silicone rubber sealant, as it remains elastic for a long time Two water spraying units were made of stainless steel and fixed in the back longitudinal side wall (higher wall) at 0.60 m apart .The spraying surface was porous with holes about 0.5 mm diameter each. Water flow rate was controlled using control valve and delivered from top to bottom with a flow rate of 10 l/min. The AC water pump of 34Wwas used to circulate the water in forced mode of operation. The pump was driven directly by the AC power generated by the PV system. The pump operates only during sunshine hours, to avoid reverse heat flow from water during off sunshine hours. Two temperature sensors were kept at flat plate collector exit towards solar still and solar still exit towards collector to control the operation.

Bhupendra Gupta (8 April 2016)

Two geometrically identical solar stills were designed and fabricated at Government Engineering College, Jabalpur(Latitude 3◦.18_N, Longitude 79◦.98_E) India. Two sets of experimentation were conducted for conventional solar still and modified conventional still. The experiments were car-ried out on dated 24 April 2015 from 07 AM to 06 PM. Various operating and ambient parameters have been recorded hourly. An actual photograph of the experimental setup(modified and conventional solar still) Both the solar stills were fabricated in similar way and identical in geometry. These have basin area of 1 m2, height of back-side wall is 527 mm and height of front-side wall is100 mm. Basins of stills are made from galvanised iron sheet having a thickness 1 mm. The bottom and the side wall sare insulated with layer of glass wool (20 mm thickness)to reduce the heat loss from the solar still to atmosphere. Experimental setup of solar stills. Ply-wood of 15 mm thickness is used for making outer layer of solar still. The top of both the stills have been covered by glass of 4 mm thickness. It is inclined at 23◦to the horizontal which is latitude of the Jabalpur. Leakage of heat and water vapor from space between glass cover and sides edges of solar still are prevented by filling glass putty. Modified single slope solar still have following alteration:(i) all vertical internal walls are painted with white colourup to water level to increase reflectivity of solar radiation which increases the utilisation of solar energy. (ii) Water sprinkler is fitted at the top of the glass to reduce the glass temperature which enhances the rate of condensation. The basin was black painted up to water level to absorbed maximum solar energy like in conventional solar still. In the conventional solar still, all the side walls and bottom surface were painted black. As per the literatures water flow rate was kept 0.0001 kg/s during the experimentation to avoid the wastage of water. The water flow rate is

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adjusted in such a manner that the water gets evaporated during the path off low on the glass surface. Little amount of water is ab leto reach at the bottom of the glass. Global solar radiation was observed at inclined glass surface on hourly basis. The temperature has been observed with the help of K-type ther -mocouples at five different places are: water, inside glass, outside glass, vapor field and ambient. The water depth of 05 cm is kept in both the solar stills. The hourly distil-late from both solar stills are also collected and measured hourly during sunshine hours. The distillate output after sun-set is measured collectively on next day morning up to 6 AM. Observed parameters were used for performance analysis of solar stills.

S. Varun raj (2016)

Single basin solar still were fabricated and tested under natural solar radiation condition. The basin liner is made of galvanized iron sheet of 0.5 1 m2 with maximum height of 288mm, and 1.4 mm thickness. The basin surfaces are painted with black paint to absorb the maximum amount of solar radiation incident on them. The condenser surface of the still is made of glass with 4mm thickness and angle of inclination is 10° with horizontal. There are certain specifications needed for the used glass cover in the still, and they are (a) Minimum amount of absorbed heat, (b) Minimum amount of reflection for solar radiation energy, (c) Maximum transmittance for solar radiation energy, and (d) high thermal resistance for heat loss from the basin to the ambient. Glass covers have been framed with wood and sealed with silicon rubber which plays an important role to promote efficient operation as it can accommodate the expansion and contraction between dissimilar materials. A collecting trough made by G.I. sheet is used in the still to collect the distillate condensing on the inner surfaces of the glass covers and to pass the condensate to a collecting flask. Steel rule is fixed along with inside wall for measuring water levels. The bottom and sides are insulated with 25mm thick thermo cool and 12.5mm thick wood with thermal conductivity 0.015 W/mK and 0.055 W/mK respectively The solar still is oriented with their long axis in the E-W direction and glass surface is facing north side. The experiments on the still were carried out during January to March 2009 under the same climatic conditions. During experiments, the solar radiation intensity, ambient temperature, water temperature, basin liner temperature, inner wall temperatures, outer wall temperatures, bottom side temperature and wind velocity were recorded every 60minutes. The hourly productivity of fresh water is collected through a graduated flask. The daily productivity is obtained as a summation of day and night productivity. The night productivity is the total collection from the end of test to start of test in the next day.

Mohammad Al-harahsheh (7 September 2017)

The solar desalination setup used in this work is shown in It consists of four main parts: solar basin, solar collector, double glass cover, and tubes filled with PCM immersed in distilled water. The basin front side is facing south and inclined at an angle of 35_.It is made from stainless steel and painted black to improve absorption of the solar energy. It has a square bottom with an area of 1 m2, while, its height from front and back are 0.16 and 0.92 m, respectively. Water to be distilled is placed at the bottom of the basin to a certain level. The basin has a double glass cover made of two glass layers placed 1 cm apart. Coolant water is passed through the double glass cover to lower the inner glass temperature. Lowering the glass temperature, increases vapor condensation and increases the driving force between the evaporation and condensation processes taking place in the same chamber. The condensate slips on the inner glass surface and falls into an inclined tray attached to the inner glass and ends in a collection tube, and then it is withdrawn as fresh water. Water in the basin is supplied via adjustment water tank (20 L);the tank has a float so that water in the adjustment tank and the basin are both at the same level. Additionally, the level of basin water can be controlled via the float. A heat exchanger, which is an aluminum coil with 1 cm diameter, is submerged in the basin water and is connected to an external rectangular solar collector, model DSC 25 with a collector area of 2.5 m2 and dimensions: 2005 mm length, 11225 mm width and 90 mm m depth. The inner bottom surface of the solar collector is made from highly selective material to maximize solar energy absorption. It consists of 10 parallel copper tubes of 8 mm diameter laid on the bottom surface of the solar collector. These tubes are spaced 10 cm apart and are covered with 4 mm specular glass. The maximum working pressure of this collector is 6 bars and the steady temperature at 1000 W/m2 and 30 _C is 110 _C. Water circulates through the tubes of the solar collector and the heat exchanger in the basin in a closed loop. Water circulation occurs by natural convection or by forced convection using a pump .A stainless steel tub of distilled water (7 cm height, 70 cm length and 60 cm width) is attached to the bottom of the solar still. This tub contains 15 plastic tubes (2.5 cm outside diameter, 0.2 cm material (Sodium Thiosulfate penta hydrate (STSPH)). This inorganic salt was selected to be used in this study as PCM material because of several attractive features including its high latent heat of fusion per unit volume, small volume change at melting point, availability and low cost compared to other competitive PCM materials In terms of thermal conductivity it is known that inorganic salts PCMs have much higher value compared to

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those of organic origin (such as paraffin) The thermo-physical properties of STSPH used in the current work is given in More details about the selection criteria of the PCM material is reported in.

III. FUTURE SCOPE

The main reason of low productivity in a solar still is the low heat transfer inside the unit itself therefore, a thoroughly modification on solar still design is presented based on the scope of increasing the heat transfer process inside the unit. The performance of a solar still is increase in addition to different design modifications is investigated. The Solar still modification is design, water depth, reflector mirror glass cover, size. Energy storage material, basin area, size, color. use fin are study and performance of solar still.

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