

Development of Basin Solar Still by Providing Magnetic Treatment Unit and Double Glass Cover

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Abstract: *In the recent years, we are facing severe water problems. There is little pure water left on earth and nearly all of this is polluted by both pollutants and toxic chemicals. Single basin solar still is a popular solar device used for converting available brackish or waste water into potable water. Because of its lower productivity, it is not popularly used. The yield of the single basin solar still is very less compared to that of other conventional desalination methods. The basin solar still was developed by adding a magnetic treatment unit and double glass cover. The study was conducted by testing the solar still by using magnetic treatment unit with single and double glass cover, non-magnetic treatment unit with single and double glass cover. Parameters like temperature in the basin solar still, glass cover surface temperature, ambient temperature, productivity, efficiency and other properties will be calculated and compared for all the above mentioned tests.*

Keywords: Solar Still, Basin, Magnetic treatment Unit, Double Glass Cover.

1. Introduction

Water is the basic necessity for human along with food and air. Adequate quality and reliability of drinking water supply is a fundamental need. Without potable or fresh (less than about 500 parts per million (ppm) of salt) human life is not possible. Industries and agriculture also need fresh water without they cannot function or thrive. Water is, therefore, the key to man's prosperity; it is intimately associated with the evolution of civilization and hence it is aptly said that water is everybody's business. Fresh water which has obtained from rivers, lakes and ponds in plenty is becoming scarce because of industrialization and population explosion. There is almost no water left on earth that is safe to drink without purification after 20-25 years from today. Only 1% of Earth's water is in a fresh, liquid state. Moreover, these potable water sources are being polluted constantly by industrial wastes and large amount of sewage. It is said that presently 2000 million people are not getting potable water which leads to many diseases inhibits the development. For this reason, purification of water before consumption is extremely important.

With the present steep escalation of energy costs serious efforts are being made to use the freely available solar energy. Solar desalination is one of the cheapest methods used for producing distilled water. Solar still is widely used in the solar desalination. Single basin solar still is a popular solar device used for converting available brackish or waste water into potable water. Because of its lower productivity, it is not popularly used. The yield of the single basin solar still is very less compared to that of other conventional desalination methods.

The proposed method is to develop a basin solar still by providing magnetic treatment unit and double glass cover. The still productivity and efficiency depends on parameters like location, solar radiation intensity, atmospheric temperature-basin water depth, glass cover material, thickness and its inclination, wind velocity and the heat

capacity. It is a technology that is not only capable of removing a very wide variety of contaminants in just one step, but is simple, cost-effective, and environmentally friendly. That is use of solar energy.

1.1. About Solar Energy

The sun radiates the energy in the form of electromagnetic waves uniformly in all direction. When absorbed by body, it increases body temperature. It is a clean, inexhaustible, abundantly and universally available renewable energy [1]. Solar energy has the greatest potential of all the sources of renewable energy and if only a small amount of this form of energy could be used, it will be one of the most important supplies of energy, especially when other sources in the country have depleted. 3.8×10^{24} joules of solar radiation is absorbed by earth and atmosphere per year. Solar power where sun hits atmosphere is 1017 watts and the total demand is 1013 watts. Therefore, the sun gives us 1000 times more power than we need. If we can use 5% of this energy, it will be 50 times what the world will require. The energy radiated by the sun on a bright sunny day is 4 to 7 kWh per m² [2].

2. Design and Operation

The proposed model of the basin solar still with magnetic treatment unit and double glass cover is as shown in the Fig 1, 2a,b and c. Apparatus consists of basin of the solar still is made of stainless steel box. The bottom and sides of the basin are insulated by 1cm thick thermocol surrounded by wooden frame of 2 cm thickness. Magnetic treatment unit is connected besides the tank, consists of two round magnets of pipe size of outer diameter of 0.84 inches. Magnets (BX8X02) of field strength 1145 gauss are used. Magnetic treatment unit produces water of low surface tension which increases the rate of evaporation, and increases productivity. Balance tank was setup besides the solar still to control on water level in the basin. Aluminium foil is used as the reflector in the inner wall of basin to reflect sun rays in the

