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# Solar stills system design: A review

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ABSTRACT

The fresh water requirement is tremendously increasing in the present society with all kinds of industrial and factory growth leading to more and more pollution of natural resources. On the other hand, there are many arid and desert regions in the world where there are less frequent rainfalls and ground water shortage. Most of the water bodies like rivers, lakes and so forth throughout the world are saline and brackish which are not suitable for domestic, irrigation and especially for drinking purposes. Solar desalination is proven to be eco-friendly and economical way of producing the fresh water to cater to the needs of rural population. Much research has already been done in the field of single effect passive and active solar stills which produces low quantity of fresh water. In recent years, attention has been focused on developing multi-effect solar stills coupling with flat plate and concentrating collectors in order to overcome the drawback of single effect stills. In the present study, a detailed review of all the solar stills both single and multi-effect type with passive and active configuration is presented. The present study aims at describing the design specifications and highlighting the merits and demerits of various solar stills upon which research has been done till recent past. Also a discussion on future scope is given with some recommendations in the field of solar stills improvement to economically produce sustainable potable water.



**Contents**



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## 1. Introduction

Water is one of the most important constituent for the sustenance of mankind. It is useful for many purposes like agriculture, irrigation and domestic purposes like cooking and so on. Fresh water is the most important issues of health hazard in today's world. More than two-thirds of earth's surface is covered with water of which around 97% is salty, 2.6% is present as icebergs and only less than 1% of fresh water is within human reach. With the increase in population and pollution due to the technological industrial development, transportation etc., the fresh water sources which are fixed on earth's surface are now getting depleted at a much faster rate [1]. Also in the desert, rocky and arid regions of the world, there is infrequent rainfall leading to acute ground water shortage. With these reasons, desalination is found to be most challenging task and the only viable solution to derive fresh or potable water from the available brine and saline water resources all over the world [2]. The same basic principle that is involved in the production of rainfall through the hydrological cycle which occurs in nature is implemented in all the man-made desalination systems in order to produce fresh water from the salty resources. The removal or separation of salts from the water cannot be achieved automatically but it is done in desalination systems by the aid of some energy source [3].

In general, desalination technologies are broadly classified into two categories based on the principle of separation of salts and fresh water from the saline water solution. In evaporative or thermal desalination technologies, the extraction of fresh water is obtained through phase change by the addition of heat to the saline water

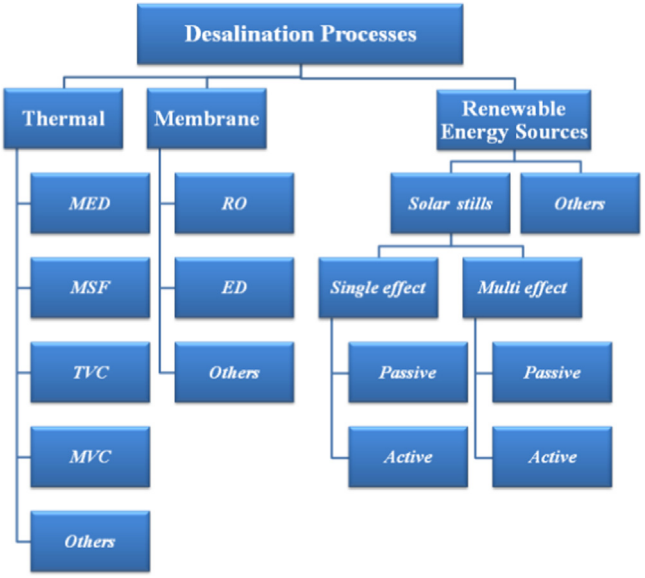


**Fig. 1.** Desalination processes.

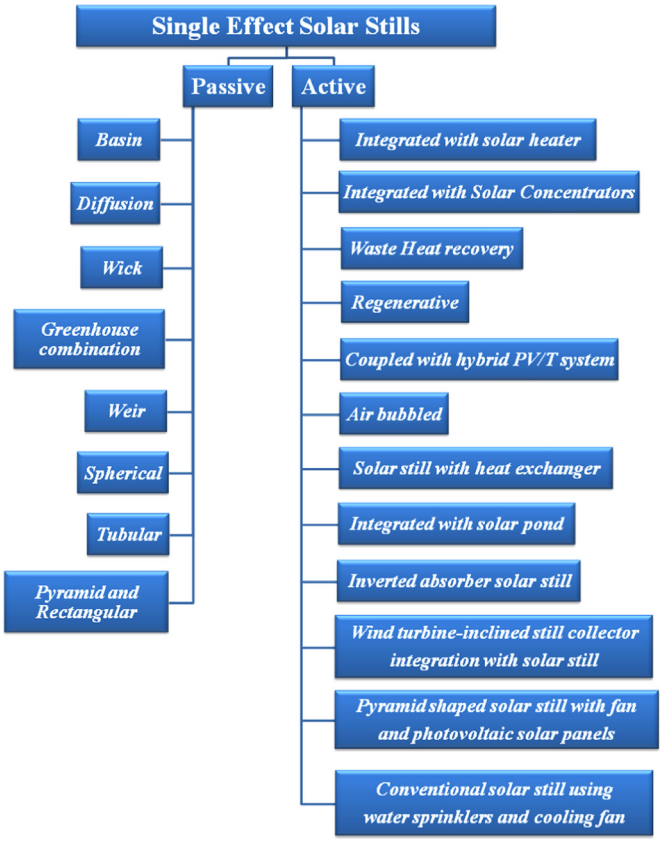


**Fig. 2.** Various designs of single effect passive and active solar stills.