

Desalination of Sea Water by Using Convex Lens

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Abstract : This study has been undertaken to investigate Conventional energy solutions are necessary in developing countries as current hot water production methods are becoming hazardous to the environment, economic development and the overall health and wealth of the population. The reason of this research paper is to create a convex lens solar water heater prototype, experimentally analyze the system and predict its characteristics when system exposed to the solar behavior of Surat, Gujarat, India. A user of solar energy minimum because cost of the product. With the merits of small structure, less weight, sharp focal length and minimum cost convex lenses are suitable for concentration of solar radiation and system improvement. The efficiency and optical property of transmitted solar radiation is improved and controlled compared to thick normal glass lenses and the solar radiation tracking accuracy need for convex lens group is less compared to other concentration methods.

Key words - Convex Lens, Solar radiation, Desalination.

I. INTRODUCTION

Water is a basic human need. There are many problems to find out drinking water in many countries. Many people, especially in developing countries, do not have access drinking water. A solar still is a device that produces clean, drinkable water from sea water using the energy from the sun. Solar energy is one of the abundant energy availability worldwide. It is freely available and environmental pollution free of alternative source of energy. On the geographical status of the places existing of solar energy varies. For water heating solar thermal energy has been using historically. Thermal energy is the 2nd largest use of energy consumption in the domestic sector and in the commercial sector is 6th largest. This inexpensive device can easily be built using local materials. The Dome type of a solar still is simple in construction, a cheap and easy method for providing fresh water. It consists of a basin, Dome, convex lens, and condenser, and collector. A solar radiation falls on to collector, collector absorbs the incident solar radiation in the form of heat and then transfers this heat to fluid used as working medium. Solar energy is used directly or indirectly to heat water. Solar energy technology is well developed and meets energy demand and also satisfies environmental rules and regulation. Solar energy technology has the huge potential to addition to the fossil fuel and electricity in all seasons. This research is to create, and fabricate test bench of convex lens solar water heating prototype model.

II. LITERATURE SURVEY

Many researchers were design a flat plate solar water heater and many analysis have been done on free circulation of solar water heating system and many conclusions and characteristics have been shown to improve the performance and efficiency of the system. Most of the natural or free circulation systems are the greater the energy observation, self-regulating and slow circulation. The component of the system is created resistance to flow of water and hot water density in the collector and pipe. Higher collector efficiency factor depend on higher flow rate factor. However, it promotes to higher mixing rate in water chamber and reduction in the overall solar water heating system capacity. The fluid natural circulation rate increases by reducing size of the riser tube and converging shape cross-sectional is used. The water temperature is more and density lighter in the converging riser, because water content in the converging area is less. Various papers reviewed they have tabulated the flow rate importance to the solar collector performance of the solar water heating system. This research, the water flow system is free circulation in Dome shape system is designed and fabricated with the objective of increasing the collector performance and efficiency and its characteristics compare with the conventional flat plate water heating system.

III. EXPERIMENTAL SETUP

The circular basin is covered with black Plastic tub in order to improve the solar energy absorption. The convex lens is fixed on the cover. A photograph of the experimental setup cover with lenses is shown in Fig. 1. The temperatures of water, and ambient temperature are measured continuously every 1hr. by thermometer. TDS (Total dissolved solids) of salty and fresher water is measured by YSI model 556 MPS with a range (0–42000 mg/l) and accuracy of ± 1 mg/l.



Fig 1 Solar Water heater by using convex lens

IV. RESULTS AND DISCUSSION

The following results are obtained and presented in tabular form.

Case 1: Convex Lenses Solar Water Heater Collector

Month: August-2019.

Capacity of Water: 2 Lts.

Time: 7am to 5pm.

Table 1: Convex lenses Solar Water Heater

Sr no.	Date	Max. temperature	Min. temperature	Water inlet temperature	Water temperature at 1.00 p.m	Water temperature at 5.00 p.m
1	21-08-2019	33°	26°	24°	45°	41°
2	22-08-2019	34°	26°	25°	46°	43°
3	23-08-2019	34°	26°	25°	46°	43°
4	24-08-2019	34°	26°	25°	47°	44°
5	25-08-2019	34°	26°	25°	46°	43°
6	26-08-2019	29°	26°	23°	41°	39°
7	27-08-2019	30°	24°	22°	43°	39°
8	28-08-2019	32°	25°	25°	44°	41°
9	29-08-2019	33°	26°	25°	45°	42°
10	30-08-2019	35°	27°	27°	48°	46°

From the above table we can observe that by using convex lenses solar heater system we can rise temperature up to 12°-13°C and Convex Lenses Solar Water Heater Collector On by using Convex Lenses Solar Water Heater collector with using concentrating medium and without insulating water chamber collector there is a gradual increase of temperature but however there is a decrease in temperature after certain time.

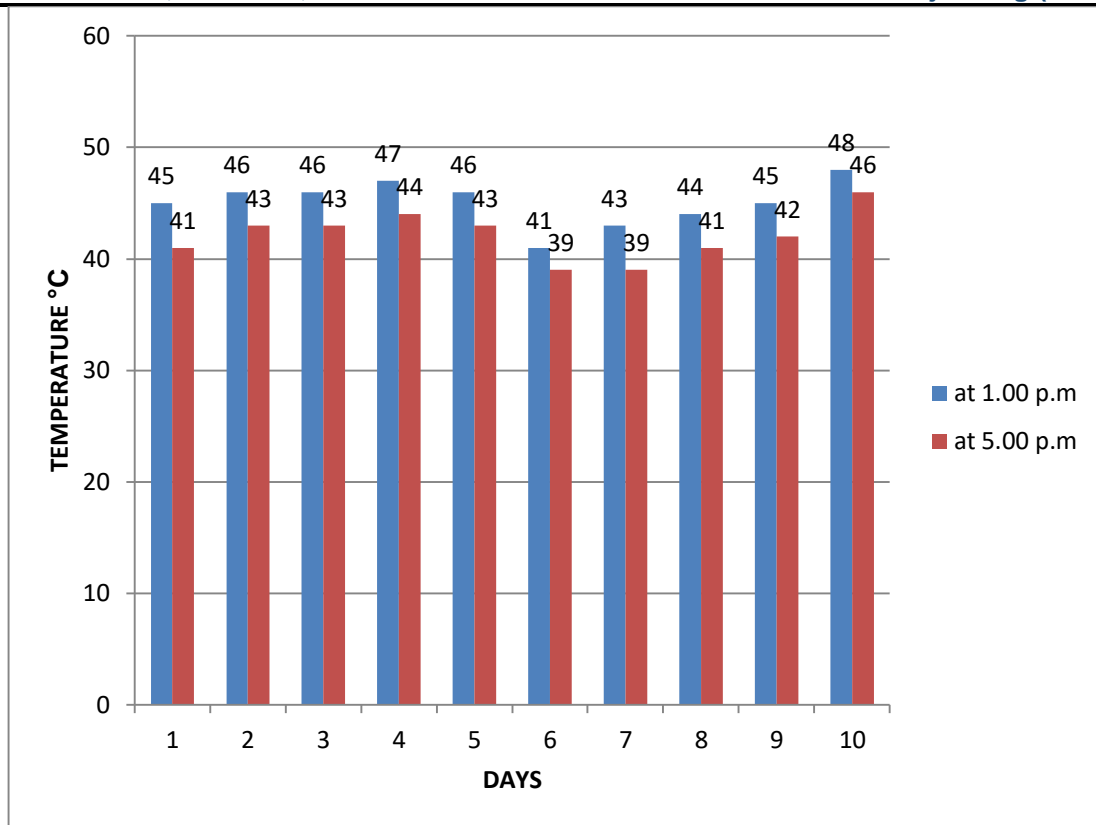


Chart:1 Variation of temperature in Convex Lenses Solar Water Collector

Case 2: Ordinary Collector
Month: August-2019.
Capacity of Water: 2 Lts.
Time: 7am to 5pm.

Table 2: Ordinary Collector

Sr no.	Date	Max. temperature	Min. temperature	Water inlet temperature	Water temperature at 1.00 p.m	Water temperature at 5.00 p.m
1	21-08-2019	33°	26°	24°	34°	32°
2	22-08-2019	34°	26°	25°	34°	33°
3	23-08-2019	34°	26°	25°	35°	33°
4	24-08-2019	34°	26°	25°	35°	32°
5	25-08-2019	34°	26°	25°	33°	31°
6	26-08-2019	29°	26°	23°	29°	27°
7	27-08-2019	30°	24°	22°	31°	29°
8	28-08-2019	32°	25°	25°	33°	32°
9	29-08-2019	33°	26°	25°	35°	33°
10	30-08-2019	35°	27°	27°	37°	35°

From the above table Ordinary Collector without using any concentrating medium, we can rise temperature up to 1°-2°C there is a gradual increase of temperature but however there is a decrease in temperature after certain time.

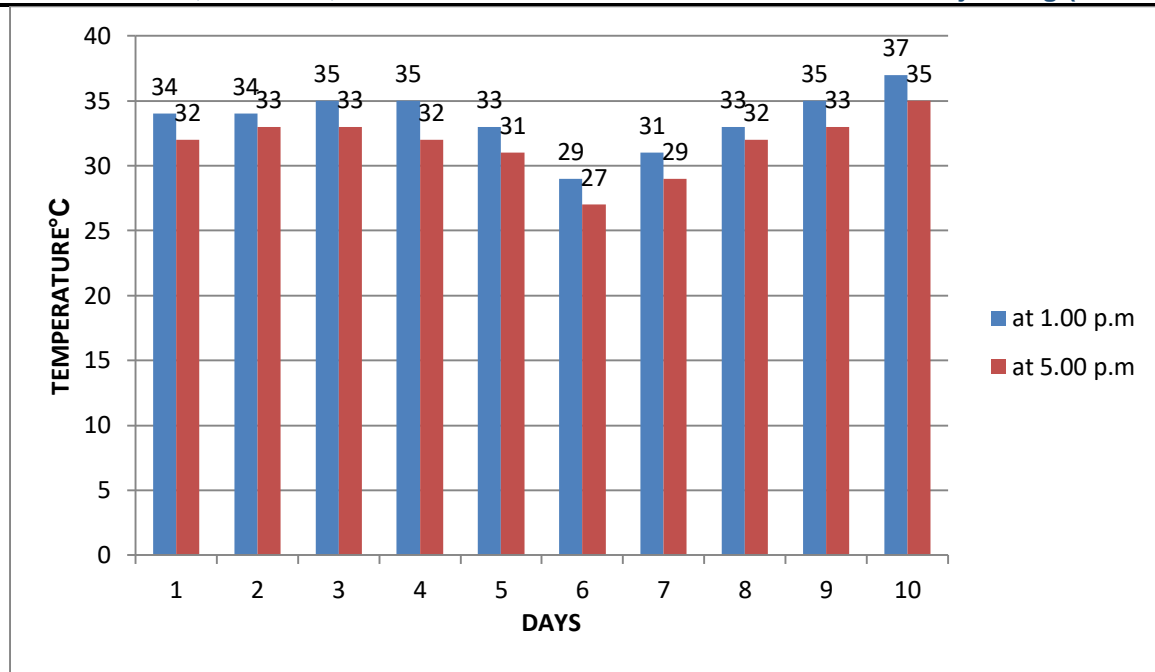


Chart.2 Variation of temperature in Ordinary Collector.

V. CONCLUSION

Convex lenses solar water heater is being fabricated with low cost. The effects of mass water in a tank on the solar still performance have been considered. By using this system will be produce clean and portable water. Safety of system is also not major problem by ventilation of over head pipe with normal safety measures.

VI. REFERENCES

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