HYBRID SOLAR WATER HEATER: A EXPERIMENTAL DEVELOPMENT

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INTRODUCTION:

The utilizing of solar energy gives the various answers to the design and development of the solar energy technologies. Even though the efficiencies and reliabilities of the system technologies is deviated more when compared with the conventional mode. The energy available which is free of cost and if utilized taking the better concern. Hybrid Solar water heating (HSWH) is the conversion of sunlight into renewable energy for water heating using a solar thermal hating. Solar water heating systems comprise various technologies that are used worldwide increasingly.

In a "close-coupled" HSWH system the storage tank is horizontally mounted immediately above the solar collector on the roof. No pumping is required as the hot water naturally rises into the tank through thermo siphon flow. In a "pump-circulated" system the storage tank is ground- or floor-mounted and is below the level of the collectors; a circulating pump moves water or heat transfer fluid between the tank and the collectors. HSWH systems are designed to deliver hot water for most of the year. However, in winter there sometimes may not be sufficient solar heat gain to deliver sufficient hot water. In this case a gas or electric booster is used to heat the water.

OBJECTIVE:

1. To obtain the temperatures of water at the instantaneous time for the instantaneous solar intensity.
2. To measure the time taken for the rise of water for the particular period of time. To obtains the efficiency of HSWH under the effect of NC and FC mode.
3. When operating under the OC and CC analysis. To obtain the variation solar intensity with respect to time and temperature of water coming out of the HSWH
4. To check the feasibility of the HSWH system for different load conditions. To determines the performance of the system under no load and load comparing OC &CC conditions.

METHODOLOGY:

The solar water heater is designed and fabricated to have the dimensions of box 0.8m X0.6m X0.18m with a glazed surface having the transmissivity of 0.8. The four parabolic trough concentrating collectors of aperture area /dia 0.1m is placed in the designed box. The coiled copper tube of dia 0.6cm is made to pass over the trough collector for better concentration of reflected rays. he heater is placed due south with latitude of 24° inclination.
The circulation of water is ensured by providing proper pressure potential. The heater is made to operate under the open cycle mode and closed cycle this effect of natural circulation and forced circulation mode. For the NC mode thermo siphon effect circulation. FC mode need to submersible pump about 3.1728lt/m.

**Design details**

Ply wood box of dimensions 0.8x0.6x0.18 (mtrs). Copper coil tube dia 6.35m (helical shape 6cm) length 70 cm Outerglass plate of thickness0.5mm. Insulated bed of height 3 cm. parabolic trough having depth of 0.15m and width of 0.12m

**MATERIALS REQUIRED:**

Aluminum sheet & foil, copper coil, woodenbox storage tanks, alcoholic thermometer.

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**Fig1-Copper coil bending:**

**Fig2-Al sheet metal bending to parabolic shape:**

**Fig3-Brazing & black paint coating:**

**Fig4-Inserting Cu coil skeleton & Al trough under rock wool bed to the wooden box:**

**Fig5-Closing glass door for air tight:**

**Fig 6-Mounting collector box on 24deg tilted stand.**
CONCLUSION:
1. Hence by using this hybrid solar water heater we can maximum solar radiation available using parabolic coil collector and use it in heating the water. We can also utilize the apparatus fluid flow in a natural and forced convection way.
2. Lesser spatial consumption compared to solar water heater
3. Setup is economical feasible
4. Higher efficiency
5. Solar radiation is much more concentrated due to its parabolic structure.

FUTURE WORK:
1. Large collector need to supply hot water industrial purpose.
2. We can use hot water boiling for domestic purpose.
3. We can use hot water supply steam turbine