

THERMAL ENERGY ANALYSIS OF SOLAR POWERED VAPOUR ABSORPTION COOLING SYSTEM

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ABSTRACT

Solar energy is one of the most efficient, clean and affordable energy alternatives available today. With the current concerns about global warming and ever increasing energy rates, countries are seriously looking for domestic and industrial usage of solar energy. The aim of this work was to evaluate the performance of a 5 kW LiBr-H₂O vapour absorption cooling system driven by 147 m² heat pipe evacuated tube collectors, by analyzing the COP. The results from this study showed that actual average COP of the system was 0.49 while the maximum and minimum values were 0.84 and 0.20 respectively. The rate of thermal energy supplied at generator ranged from 30.03 to 59.92 kW, 31.01 to 60.69 kW, 40.99 to 70.91 kW, 35.14 to 57.34 kW, 42.4 to 51.75 kW and 42.80 to 66.19 kW during the months of October, November, December- 2014 and January, February and March- 2015. The refrigerating effect produced by SVAR system in different month ranged 10.9 to 17.86 kW, 11.19 to 22.31 kW, 13.41 to 27.05 kW, 17.89 to 27.88 kW, 17.62 to 33.53 kW and 22.96 to 38.12 kW in respective months. The values of heat rejection rate at condenser ranged from 33.18 to 62.47 kW, 48.28 to 73.79 kW, 59.26 to 93.68 kW, 54.61 to 78.59 kW, 62.30 to 70.94 kW and 71.57 to 93.36 kW during six months of study. These results were obtained based on the average solar collector's efficiency at an ambient temperature of 32 °C.

KEYWORDS: Thermal Energy, Refrigeration Effect, Heat Supplied at Generator, Heat Rejected at Condenser, Vapour Absorption Cooling