# ANALYSIS OF THE THERMAL CHARACTERISTICS OF A SOLAR HEAT SUPPLY SYSTEM WITH THERMOSIPHON CIRCULATION

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**Abstract.** This article examines the thermal characteristics performance of thermosiphons in South Kazakhstan. Thermosiphon systems use solar energy to heat water, using natural convection to circulate liquid without the need for external pumps. For research, we have equipped a specially designed thermosiphon system with thermocouples for temperature control and a data logger for data collection. The system consisted of a solar collector, a tank and plug-in plumbing. The results of the experiment showed that under optimal conditions, the temperature effect of the Collector reached 75 °C, the maximum time was about 1.5 hours after the start of solar radiation. The upper layer of water in the storage tank reached a temperature of 60°C during sunny periods. The system will be effective even on winter days. The thermal characteristics measured by performance analysis showed good cohesion. This indicates the possibility of optimization by using preheated water in the tank. We hope that this study will provide valuable insight into the performance of vertical thermosiphon systems in the south of Kazakhstan. The system uses solar energy efficiently to heat water with high efficiency even in the winter months. Optimization strategies such as preheating water can further improve system performance. The results contribute to the development of effective and sustainable solar heating solutions for regions with similar climatic conditions.

**Introduction.** Research on solar heaters has been discussed.

In a study in the Article [1] a solar heater based on collector lift configurations for clear and cloudy skies was investigated. To increase efficiency, a solar supply system has been developed [2]. For purified vacuum devices, different colors were used, adsorption studies were carried out. Thermophysical solutions have been developed using various absorbent surfaces [3], and absorbent panels have been studied for optimal heat transfer. A protruding plate was also introduced into the air. Efficiency indicators for collectors were determined together with the coefficient of efficiency when changing the shape of the absorber surfaces [4]. A new water heater was introduced that uses used engine oil as an absorber and coolant for maximum absorption of solar radiation [5]. The results showed satisfactory performance, reaching the optimal heating temperature in less than three hours with an average efficiency of 65% and a maximum of 80%..

**Materials and methods.**

The solar heat supply system is shown in Figure 1.

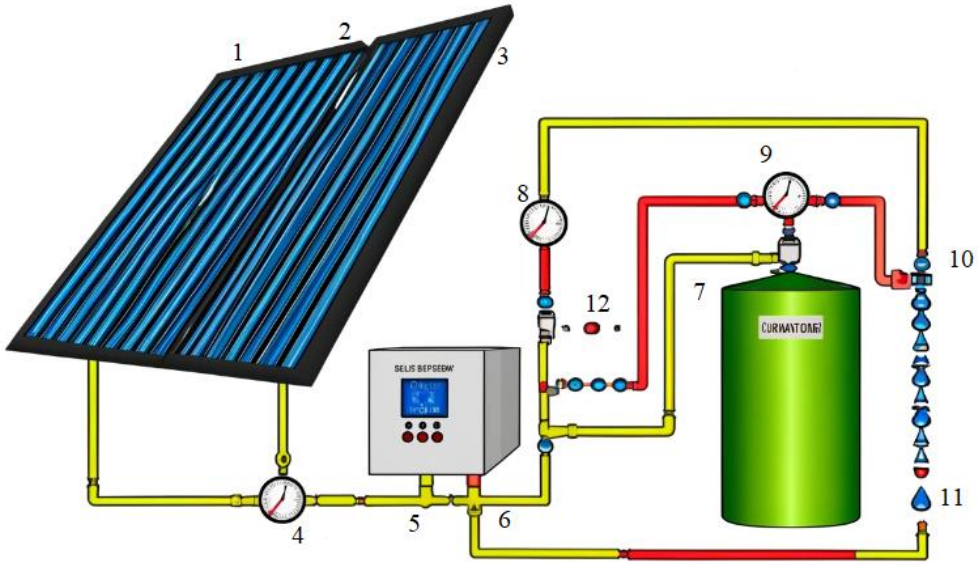


Figure 1. The main diagram of the solar heat supply system is shown.

This figure 1 has a thermally insulated Housing (1), transparent cover (2), tank absorber (3), Rotary Pump (4), heat pump (5), pipe (6), heat exchanger (7), thermometers (8, 9) for measuring the temperature at the inlet and outlet of the tank absorber and in the environment (10), autotransformer (11), tank accumulator (12) and a controller set of electrical measuring instruments in the there is a collector. The refrigerant used is a stainless thin-walled wavy pipe. The SOLAR JET heats the solution in the coils and then prevents the Collector. The cold liquid from the siphon of the sorting tank affects the space, resulting in systematic heat circulation. This system allows you to monitor the expiration date through the siphon, which depends on the size of the siphon head and its geometric parameter. As the water pressure increases, the hydraulic resistance of the siphon also increases, leading to an increase in the speed of this fluid. When the heat transfer to the heat carrier causes a temperature difference in the circuits of the thermosiphon solar system, natural convection begins. This convection moves the heated liquid upwards into the structure, at the same time, replacing it with a less heated one.

**Conclusion.** This article examines the characteristics of a thermosiphon solar-based water radiator prepared with a vertical distribution tank in the conditions of

mild winters in the southern region of Kazakhstan. Several thermocouples have been prepared for measuring and collecting information. With the help of a pyranometer and a thermometer, the temperature of the solar collector was recorded on a clear day and inside the tank. On a sunny day, the temperature of the upper water layer in the tank with a capacity was 60°C. When you think about it, it is taken into account that the sudden drop in the sun is aimed at insolation approximately, 13:30 was recognized on the security panel with a delay of one hour. When the maximum temperature in the protective plate reaches 85°C, it is 15:00. On this day, the maximum viability that falls on the defense plane is 1000%. The increase in power is explained by the lack of optical power. Research studies have confirmed that losses during the passage of solar energy through glass, as well as resistance to heat flow, are significantly reduced.

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