TECHNOLOGY OF OBTAINING PRODUCTS IN A "SOLAR OVEN" DEVICE

Khojimatov Islombek Turg‘unboy o‘g‘li

Alijonova Oydin Akmaljon qizi

Andijan state technical institute

ixojimatov0420@gmail.com

Abstract: The increasing global shift towards renewable energy sources has highlighted the importance of solar energy as a sustainable alternative to traditional hydrocarbon fuels. Solar furnaces, which utilize concentrated solar energy to achieve high temperatures, have emerged as innovative devices for conducting high-temperature processes in industries such as metallurgy, chemistry, and ceramics. This study explores the working principles of solar furnaces, the stages of product production, and their economic and environmental benefits.

Keywords: solar furnace, renewable energy, high-temperature processes, sustainable technology, material synthesis, solar energy utilization, environmental benefits, industrial applications.

Introduction

Today, countries around the world are moving away from traditional hydrocarbon fuels and increasingly adopting renewable energy sources. Solar energy is one of the most promising among these sources [1-3]. A solar furnace is an innovative device that utilizes solar energy to carry out high-temperature technological processes and is widely used in metallurgy, the chemical industry, and ceramic production. The aim of this research is to study the working principles of solar furnaces, the stages of product production, and their economic and environmental benefits. The global energy landscape is undergoing a significant transformation as countries increasingly shift from traditional hydrocarbon fuels to renewable energy sources. This transition driven by the urgent need to reduce greenhouse gas emissions, combat climate change, and ensure sustainable energy security. Among renewable energy sources, solar energy stands out as one of the

most abundant and environmentally friendly options. Solar energy can be harnessed in various ways, including photovoltaic systems for electricity generation and solar thermal systems for heating and industrial processes.

Methods

The solar furnace consists of a short-focus helioconcentrator, a solar energy receiver (furnace) [4], and an automatic system for tracking the sun's movement. The device focuses sunlight using parabolic mirrors or lenses, generating temperatures of up to 3000°C. The research process involved the following steps:

1. Material Placement: Solid or liquid materials were placed in the furnace.
2. Physicochemical Changes: The physical and chemical changes of the materials at high temperatures observed.
3. Product Extraction: The finished product extracted, and its properties and shape were determined.

The study examined the effects of the solar furnace on various materials and its application in high-temperature processes. The solar furnace used in this study is a state-of-the-art device designed to concentrate solar energy and achieve high temperatures for industrial and research applications [5,6]. The furnace consists of three main components: a short-focus helioconcentrator**,** a solar energy receiver (furnace chamber), and an automated sun-tracking system. The helioconcentrator is equipped with parabolic mirrors or lenses that focus sunlight onto a small focal point, where the furnace chamber is located. The automated tracking system ensures that the concentrator continuously aligns with the sun's position, maximizing energy capture throughout the day.

Results

The research results demonstrated that high-temperature processes can be effectively carried out using a solar furnace [7-9]. The following outcomes achieved:

- High-quality oxides produced, which can be use in the glass industry.
- The durability of materials enhanced through radiation treatment.

- Heat and electrical energy generated from solar energy.
- Hydrogen synthesis and laser beams produced using high-tech processes.
- High-temperature ceramics and nanopowders manufactured.

Additionally, the safety advantages of the solar furnace identified. The device operates without electricity and does not require fire, making it suitable for long-term use in environments without power supply.

Discussion

The solar furnace offers numerous advantages for heating materials and conducting high-temperature processes. It is environmentally friendly and causes less harm to the environment compared to traditional energy sources. Furthermore, the solar furnace can be widely used in the production of high-temperature materials, including ceramics and nanopowders.

However, due to the high temperatures achieved by the solar furnace, regular monitoring and safety precautions are necessary. Improper use of cooking vessels in parabolic furnaces, for example, can lead to the risk of explosion.

In the future, further development and widespread adoption of solar furnace technology can enhance the use of renewable energy sources.

Conclusion

The solar furnace is a convenient and environmentally friendly device for conducting high-temperature technological processes. It enables the production of high-quality materials, as well as the generation of heat and electrical energy. The safety advantages of the solar furnace make it suitable for use in environments without long-term power supply. Further development and broader application of this technology can significantly increase the use of renewable energy sources.

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