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EXPERIMENTAL SETUP FOR STUDYING THE DRYING OF BISCHOFITE USING INFRARED RADIATION

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ABSTRACT: *A description of the experimental setup for drying bischofite using infrared radiation under various drying modes is provided. Methods for adjusting the drying parameters of bischofite are specified. The parameters that need to be monitored and recorded during experimental studies are proposed.*

KEY WORDS: BISCHOFITE, DRYING, EXPERIMENTAL SETUP, MOISTURE CONTENT

ЕКСПЕРИМЕНТАЛЬНА УСТАНОВКА ДОСЛІДЖЕННЯ СУШІННЯ БІШОФІТУ ІНФРАЧЕРВОНИМ ВИПРОМІНЮВАННЯМ

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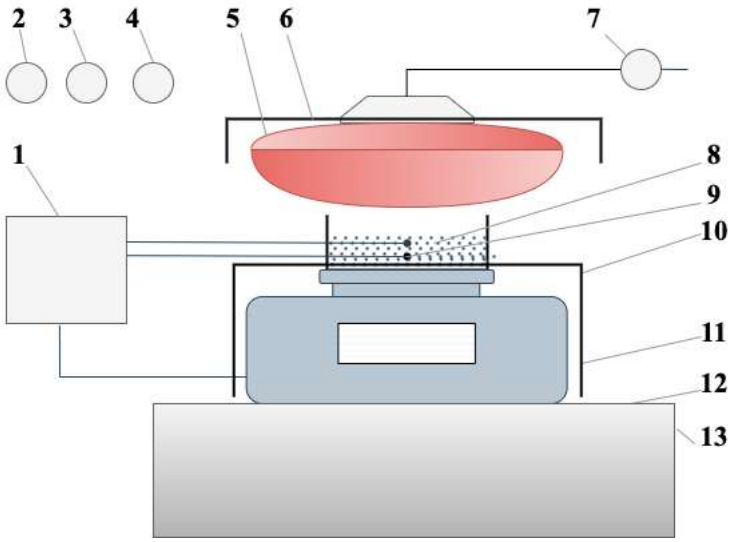
АНОТАЦІЯ: *Наведено опис експериментальної установки для сушіння бішофіту інфрачервоним випромінюванням за різних режимів сушіння. Вказано способи зміни параметрів сушіння бішофіту. Запропоновано параметри, які необхідно контролювати та фіксувати їх значення під час проведення експериментальних досліджень.*

КЛЮЧОВІ СЛОВА: БІШОФІТ, СУШІННЯ, ЕКСПЕРИМЕНТАЛЬНА УСТАНОВКА, ВОЛОГОВМІСТ

Infrared drying is a promising method for moisture removal from bischofite, classified as a radiation-based drying technique. The use of infrared radiation offers several advantages, including its ability to penetrate deep into the material without significantly heating the surrounding air (except for dispersed moisture in the air). Additionally, modern infrared panels are characterized by a high degree of thermal flow control flexibility and low inertia.

However, the effective application of infrared drying for bischofite requires a detailed study of the kinetic patterns governing this process. Understanding these patterns enables the determination of optimal technological parameters and the assessment of the feasibility of this method.

To investigate the kinetic characteristics of bischofite drying under infrared radiation, an experimental setup was developed (Fig. 1).



1 – personal computer; 2 – thermometer; 3 – barometer; 4 – hygrometer; 5 – infrared emitter; 6 – reflector; 7 – wattmeter; 8 – bischofite; 9 – temperature sensor; 10 – container; 11 – protective screen; 12 – electronic scales; 13 – vibration-resistant surface.

Figure 1. Schematic diagram of the experimental setup:

The design of the setup includes electronic scales that measure the current mass of the material in real-time. To minimize the influence of external vibrations, the

weighing module is placed on a vibration-resistant platform. A container filled with the test material—crystalline bischofite—is positioned on the working surface of the scales. Thermocouples are placed both inside the bischofite layer and on its surface to record temperature values.

The container is made of transparent material and features a scale for determining the height of the bischofite layer. Temperature readings from the thermocouples and the current mass values from the electronic scales are transmitted to a personal computer for further processing and analysis.

To record environmental parameters, a thermometer, barometer, and hygrometer are placed near the setup, providing measurements of temperature, atmospheric pressure, and humidity, respectively.

The energy source for the drying process is an infrared emitter directed toward the bischofite surface. The intensity of radiation is adjusted by varying the voltage supplied to the emitter, while the electrical power is measured using a wattmeter.

To minimize heat loss to the surrounding environment, a reflector is positioned above the emitter. The distance between the working surface of the infrared emitter and the bischofite surface is measured using a caliper.

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