# THERMOPHYSICAL AND ELECTROPHYSICAL PROPERTIES OF ELECTRODE COKE

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The purpose of this work is to study the thermophysical and electrophysical characteristics of electrode coke obtained by mixing Shubarkol Komir pitch and Karmet pitch in a ratio of 1:2 at a temperature of 1000 °C and a coking time of 6 hours. For the first time, a comprehensive analysis of the temperature dependence of the specific heat capacity was performed for electrode coke, a phase transition was revealed at 373 K, the parameters of semiconductor conductivity (band gap ~0.67 and ~0.55 eV) were determined, and the values of permittivity reaching 109 were recorded. It should be emphasized that the phase transition at 373 K on the curve of the dependence of heat capacity on temperature can be attributed with some reservation to the temperature of the transition from semiconductor to metallic conductivity on the curve of the dependence of electrical resistance on temperature, which also indicates the nature of this phase transition.

The temperature dependence of the heat capacity of a sample of electrode coke obtained from the pakes of the Shubarkol Komir and Karmet coke chemical plants was measured using an IT-S-40 serial calorimeter. The study of electrophysical properties (permittivity and electrical resistance) was carried out by measuring the electrical capacity of samples on a serial device LCR-800. The temperature dependence of the heat capacity of the electrode coke sample was studied according to the procedure described above. At each temperature (after 25 K), five parallel experiments were performed and their results were averaged by determining the standard deviation ($\delta$ ) for the specific heat.

It can be seen from the experimental data that the material (electrode coke obtained from a mixture of Shubarkol and Karmet pitches in a ratio of 1:2) demonstrates temperature-dependent conductivity. In the range of 293-373 K, the resistance decreases with increasing temperature (semiconductor behavior), increases at 373-393 K (metallic), and decreases again at 393-483 K, indicating a return to the semiconductor type of conductivity. The type II phase transition at 373 K (100 °C), confirmed both calorimetrically (peak heat capacity) and electrophysically (change of type of conductivity from semi-conductor to metallic and vice versa), may indicate a profound restructuring of the electronic structure of the material. Gigantic dielectric constant ($\varepsilon \sim 108\text{-}109$ at $T > 393$ K), characteristic of materials with strong interface polarization. This property opens up prospects for the use of coke not only as an electrode, but also in microelectronics, sensors and energy-intensive devices.

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