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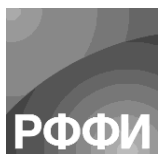
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The book contains abstracts of oral and poster reports presented at the 14th International Conference "Gas Discharge Plasmas and Their Applications" (GDP 2019). This event is a continuation of conferences on gas discharge physics held in Russia since 1984, as well as seminars and conferences on the technological application of low-temperature plasma. The conference is held every 2 years in different cities of the Russian Federation. This year, the wonderful Siberian city of Tomsk, known for its intellectual environment, was chosen as the venue. The program of the Conference covers a wide range of technical areas and modern aspects of the physical processes occurring in generators of low-temperature plasma, low and high-pressure discharges, pulsed plasma sources, surface modification, and other gas-discharge technologies.

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ABOUT CHANGES IN THE PHYSICO-CHEMICAL PROPERTIES OF AQUEOUS SOLUTIONS USED AS A LIQUID ELECTROLYTE CATHODE*

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The gas discharge between liquid electrolyte cathode and metal anode was experimentally investigated. Aqueous solutions of sodium chloride, potassium chloride, sodium sulfate, sodium hydroxide, and potassium hydroxide were used as the electrolyte cathode. The experiments used the original approach, which was proposed in paper [1].

The essence of the experiments was as follows. The discharge was ignited and its combustion was maintained at a constant current ($I = const$). Stable discharge burning was provided by the use of inverter power supplies. The decrease in the aqueous solution was compensated by the addition of distilled water (solvent). The working volume of the aqueous solution during the combustion of the gas discharge remained unchanged ($V_s = const$). The volume of solvent added ΔV was comparable to the working volume of the electrolyte V_s .

In fig. 1 as an example, some results are presented. As can be seen, the specific electrical conductivity of aqueous solutions of alkali metal salts (sodium chloride, potassium chloride, sodium sulfate) increases, and alkali (sodium and potassium hydroxides) decreases.

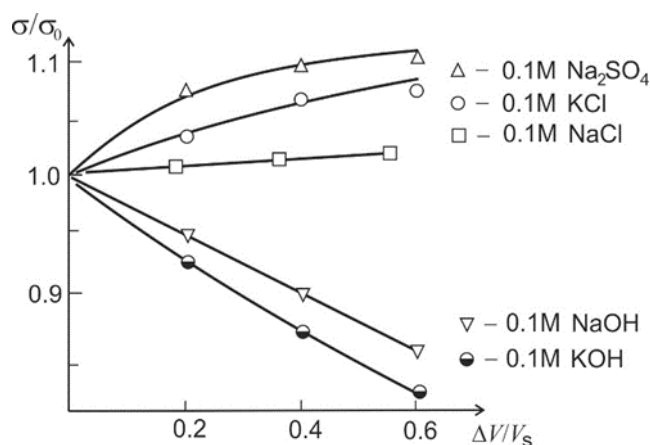


Fig. 1. Changes in electrical conductivity of aqueous solutions used as liquid electrolyte cathode. $V_s = 5.0$ l. $I = 7.5$ A.

In the experiments, alkalization of aqueous solutions of alkali metal salts (sodium chloride, potassium chloride, and sodium sulfate) was observed. The concentration of hydroxide ions in the aqueous solution increased. The solution was enriched with more mobile ions. This fact explains the increase in the electrical conductivity of aqueous solutions of alkali metal salts (sodium chloride, potassium chloride and sodium sulfate).

A decrease in the electrical conductivity of aqueous solutions of alkalis (sodium and potassium hydroxides) indicates of removing of sodium and potassium ions into discharge region.

Thus, it has been established experimentally that, despite significant solvent dilution, the specific electrical conductivity of aqueous solutions of alkali metal salts and alkalis varies slightly. The paper analyzes the mechanism of this phenomenon. The main elements of the mechanism were revealed: 1) drip removal of ions from the electrolyte due to cathode sputtering; 2) drift of positive alkali metal ions to the cathode and their return to the electrolyte; 3) alkalization of aqueous solutions of alkali metal salts.

REFERENCES

- [1] Tazmeev G.K. et al. // High Energy Chemistry. – 2018. – V. 52. – № 1. P. 99-101.

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