

Measurement of the electric field strength in a discharge channel with a liquid electrolyte cathode

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Liquid cathode discharges have prospects for practical application in new methods of water purification, modification of high-molecular compounds, sterilization of aqueous solutions, analysis of solutions for metal content, biomedical applications and many others. One of the most important parameters of an electric discharge plasma is the electric field strength in the discharge. In this work, the electric field strength in the discharge channel with a liquid electrolyte cathode at atmospheric pressure in the air in the current range of 20–90 mA is measured. The measurements were carried out in a flow discharge cell, the temperature of the solution at the entrance to the discharge cell was 14 C. Solutions with an electrical conductivity of 0.3 mSm/cm, but with different compositions and different pH values, were used for the experiments. As the measurement results showed, the field strengths for all solutions for currents in the range of 20–90 mA coincide with the accuracy of the determination error. Thus, we can talk about some averaged field strength for a discharge with a liquid cathode at a given electrical conductivity of the solution, independent of its composition. It was found that the dependence of such an average electric field strength on the discharge current for a liquid cathode discharge in the current range of 20–90 mA is well approximated by a quadratic dependence. The study was supported by a grant from the Russian Science Foundation (project No. 21-79-30062).