INFLUENCE OF THE NATURE OF THE ANIONS OF THE ELECTROLYTE ON THE ANODIC DISSOLUTION OF BERYLLIUM

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Considering the known data on the anodic behavior of beryllium [1-6], we obtained anodic potentiodynamic (2 V/min) polarization curves (see Fig. 1) on a rotating (5000 rpm) beryllium disc electrode on the apparatus described in [7]. Many anions activate passive beryllium. After the reaching of the potential φ_a corresponding to the given anion, the rate of dissolution of this metal begins to decrease rapidly. In neutral solutions of salts, φ_a is displaced in the positive direction in the series: Cl^-, Br^-, I^-, ClO_4^-, ClO_3^-, SO_4^{2-}, NO_3^-. In hydrochloric and especially in sulfuric acid, the anodic dissolution of beryllium begins at less positive potentials than in their salts, which is evidently associated with dissolution of the oxide film formed on the metal in air. Its thickness reaches 100 Å [8].

In 0.1 N KOH, up to a potential of +6 V, the anodic current density did not exceed 30 mA/cm^2, while in a solution of Na_2HPO_4 it was even lower. On the contrary, in a solution of NaF, in contrast to aluminum and magnesium [9], the current density of the dissolution of beryllium reaches 0.3 A/cm^2, which may be associated with the high solubility of beryllium fluoride and with complex formation [10].

The current yield in the anodic dissolution of beryllium also depends on the nature of the anions of the electrolyte, and as a rule, exceeds 100% when calculated on the basis of Be^{2+}.

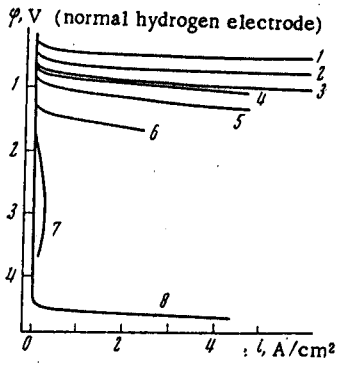

Fig. 1. Potentiodynamic polarization curves obtained on a beryllium electrode in solutions: 1) NaCl 4; 2) KBr 4; 3) KI 4; 4) $NaClO_4$ 4; 5) $NaClO_4$ 4; 6) Na_2SO_4 2; 7) sat. NaF; 8) 4 N $NaNO_3$.

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