

## Inhibition effect of magnesium and calcium chloride additives on anodic chlorine evolution at platinum electrode in concentrated potassium chloride aqueous electrolytes

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The effect of  $\text{MgCl}_2$  and  $\text{CaCl}_2$  additives on kinetic parameters of  $\text{Cl}^-$  anodic oxidation in an acidified KCl solution (pH 2) at platinum electrode with reduced ( $\text{Pt}_{\text{red}}$ ) and oxidized ( $\text{Pt}_{\text{ox}}$ ) surface has been studied. Pretreatment of the electrode surface included 20-fold cycling of the electrode potential ( $E$ ) from  $-0.3$  to  $+1.6$  V followed by its fixation at  $E = -0.3$  V ( $\text{Pt}_{\text{red}}$ ) and  $+1.6$  V ( $\text{Pt}_{\text{ox}}$ ). The addition of calcium and magnesium cations to 4 M KCl electrolyte was found to lead to 1.17 and 1.45-fold decrease in the exchange current ( $i_0$ ) at the  $\text{Pt}_{\text{red}}$  electrode after replacement of the equivalent part of KCl to 1.24 M  $\text{MgCl}_2$  and 1.28 M  $\text{CaCl}_2$ . Correspondingly, on the  $\text{Pt}_{\text{ox}}$  surface the addition of  $\text{MgCl}_2$  and  $\text{CaCl}_2$  results in 1.21 and 1.66-fold  $i_0$  drop. At the same time the coefficient  $b$  in Tafel equation increases from 55 to 68 mV at  $\text{Pt}_{\text{red}}$  and from 47 to 64 mV at  $\text{Pt}_{\text{ox}}$  in the presence of  $\text{MgCl}_2$ , and does not change in  $\text{CaCl}_2$ -containing electrolyte. The main reasons of the inhibition effect of  $\text{MgCl}_2$  and  $\text{CaCl}_2$  additives seem to be deviations of  $\text{Cl}^-$  ion activity in an electric double layer and a specific adsorption of calcium and magnesium cations on the platinum surface.