Sociedade Brasileira de Química (SBQ) Foz do Iguaçu–2018

Área: ELE Inscrição: 00615

Influence of the Electrode and Chaotropicity of the Electrolyte on the Oscillatory Behavior of the Electrocatalytic Oxidation of SO_2

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PalavrasChave: *SO_2 oxidation, H_2 generation, Oscillatory Behavior, Chatropicity dependence*

Highlights

Oscillatory behavior dependent on the catalyst and electrolyte
Au in kosmotropic media does not oscillate
Au in chaotropic media oscillates

Resumo/Abstract

The SO_2 is an atmospheric pollutant of high toxicity. But, it is possible mitigate the impact of this mortal gas: oxidizing the SO_2 to H_2SO_4, while the counter reaction is the production of H_2, E_0= 0.157 V. This process presents advantages over the traditional electrochemical method is water electrolysis, E_0= 1,23V. The use of SO_2 is too more environmental friendly than to produce H_2 by means of catalytic reform of organic compounds. To apply this system is necessary to utilize a metallic electrocatalyst. Cyclic voltametric studies show different profiles for Pt and Au and that current density for gold is one order of magnitude higher than platinum. Tests with different electrolytes showed that just for Au electrode in ClO_4^-, a chaotropic anion, current and potential oscillations were observed. Potential steps revealed that these oscillations were observed from 1.0V. When the electrolyte was HSO_4^-, a kosmotropic anion, it has presented only fluctuations in the current. The same behavior was observed for current steps, just for Au in chaotropic media and just when the electrode could reach potentials as positive as 1.00 V. Therefore, it can classify oscillatory behavior as a HNDR (hidden negative differential resistor).This implies the presence of at least, two catalytic poisons that block surface of electrode. The cleaning of the surface occurs with de oxygen evolution reaction. The mechanism of electroxidation of the sulfur dioxide is dependent of the material of the electrode and the chaotropicity of the anion in solution.