Sonoelectrochemical oxidation of iso-propylic alcohol.

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Utilization of ultrasounds in electrochemistry may initiate, accelerate or produce chemical reactions, which in classical electrochemistry either do not occur or carry out with negligible rate. The sonoelectrochemical oxidation was carried out at 300 K using ultrasounds of frequency of 40 KHz and 500 KHz. Classical electrochemical techniques and "face-on" geometry with large gap (40 mm) between horn and electrode surface was used in this study. The sonoelectrochemical oxidation of iso-propylic alcohol may be associated to the following reaction scheme: alcohol —¿ semiketale —¿ ketale —¿ acetone The first two reactions generating ketale takes place at 900 mV vs. SCE while the formation of acetone by elimination water is complete at 950 mV vs. SCE. The experimental data from recorded cyclic voltammograms are in good agreement with the theoretic prediction, proving that the process involved in oxidation of iso-propylic alcohol is reversible, controlled by mass transfer, with 2 electrons transferred in a single step and the calculated diffusion coefficient has a value of 1.6 0.3 10-5 cm2 sec-1. Utilization of ultrasounds with higher frequency (500 KHz) as well as simultaneously application of anode cathode potential of 840 mV result in more significant modification of the oxidation mechanism process, the ketale peak diminishes while the oxidation process is represented by semiketale —¿ acetone. We can conclude that the electrochemical oxidation of iso-propylic alcohol to acetone is accelerated in presence of ultrasounds, process evidenced in lower frequency case.