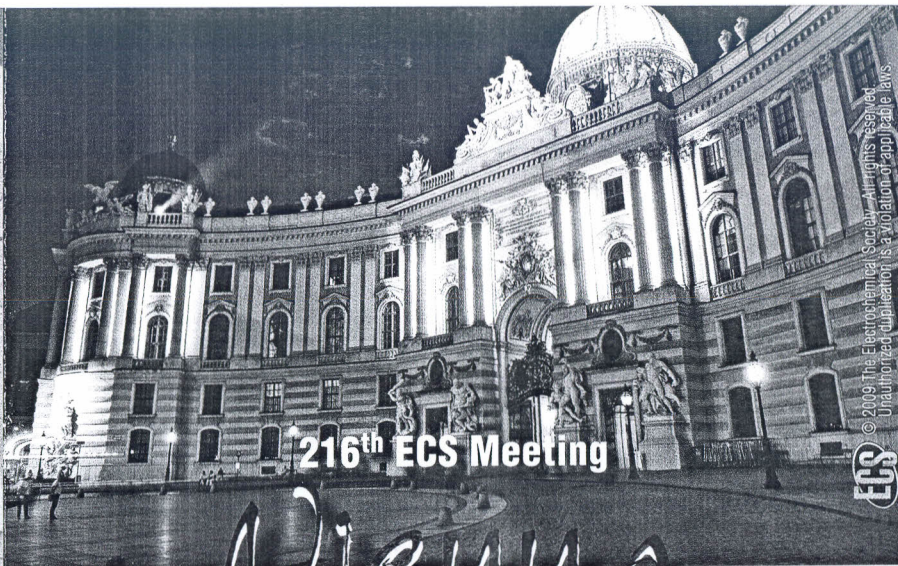




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DESIGN AND PERFORMANCE OF A LOW FIELD NMR-ELECTROCHEMISTRY CELL FOR *IN SITU* MEASUREMENTS

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Abstract: The work present the design and performance of a electrochemical-NMR cell (EC-NMR) for in situ measurements of paramagnetic species, $[\text{Cu}(\text{sorb})_2]^{2-}$ in solution. The cell consists of a glass cylinder of 2.2 cm in diameter and 5 cm in height. The NMR saddle coil (2.3 x 2 cm) was assembled around the bottom and the three electrochemical electrodes on the top of the cell and outside of the coil region. The NMR spectrometer was based on a 2.1 Tesla and a Tecmag console and the potentiostat was a Palm Sens. With this cell it was possible to study free and complex paramagnetic ions in aqueous medium, without mutual interference between the techniques. One of the experiments performed with this cell was the electrochemical reduction of $[\text{Cu}(\text{sorb})_2]^{2-}$ in solution and the measurement of the NMR transverse relaxation time, T_2 , using the Carr-Purcell-Meiboom-Gill sequence.

It was study 0.006M $[\text{Cu}(\text{sorb})_2]^{2-}$ + sorbitol 0.012 M solution ($T_2 = 1.10 \pm 0.07$ s) by potentiostatic transient ($E = -0.15$ V), Figure 3(a), and was verified decrease of current from $-1025 \mu\text{A}$ to $-800 \mu\text{A}$ in 210s. This is attribute to variation of concentration provoked by applied electrochemistry potential. This reduction of the $[\text{Cu}(\text{sorb})_2]^{2-}$ in solution was monitored by the increase of T_2 to 1.19 ± 0.07 s. The T_2 value correspond to a reduction of 10% in the initial $[\text{Cu}(\text{sorb})_2]^{2-}$ concentration, demonstrating for the first time an in situ electrochemistry and low field NMR measurement.

Keywords: *electrochemistry-NMR, in situ techniques, instrumentation*

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