

Electrolytic ESR - Time and Voltage dependence for Anthraquinone anion-

Product used : Electron Spin Resonance spectrometer (ESR)

Electrolytic ESR

Electrolytic ESR is a method for detecting ESR of the organic radicals or the paramagnetic transition metal ions that are produced by electrolytic oxidation (or reduction) by applying voltage to the sample solution. The electrolytic cell allows *in situ* ESR measurement of the organic radical species or the paramagnetic transition metal ions resulting from the electrolytic oxidation (or reduction) of the sample in the cavity, which is also advantageous to the detection of unstable radicals.

The helix electrode electrolytic cell (ES-EL30) was used in this study. Please refer to the application note ER090001E for more information on this cell.

Electrolysis time and voltage dependence

The sample was prepared by mixing the following reagents.

Sample : Anthraquinone 2 mM

Supporting Electrolyte : Tetrapropylammonium Bromide 100 mM

Solvent : Acetonitrile

The time dependence of the ESR signal was observed at the voltage of 1.3 to 1.5V. Then ESR signal intensity (A in Figure 1) was plotted against electrolysis time at each voltage, as shown in Figure 2. At 1.35 V or more, ESR signal was almost saturated within about 30 minutes.

This result shows that a small difference in voltage can make a big difference in the reaction rate.

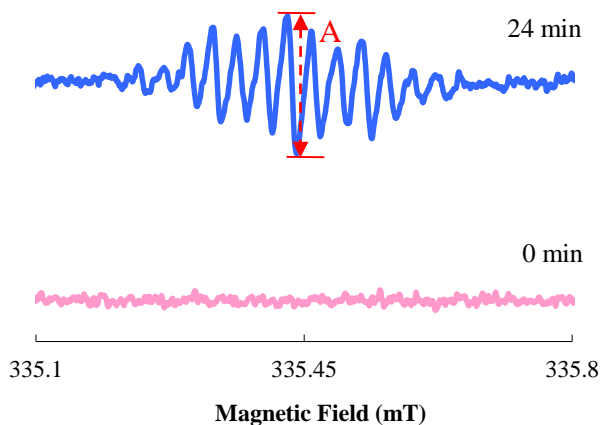


Figure 1. ESR spectra of Anthraquinone anion radical (Voltage: 1.3V).

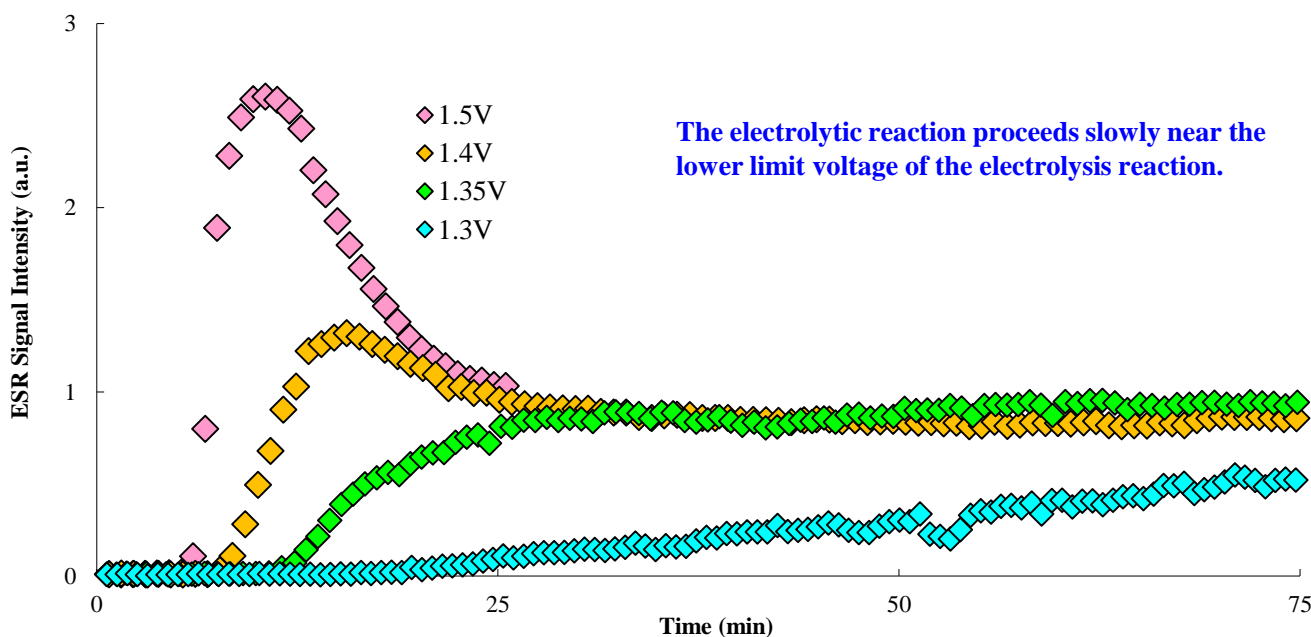


Figure 2. Time dependence of the ESR signal intensity at each voltage.

The electrolytic reaction proceeds slowly near the lower limit voltage of the electrolysis reaction.

