

Electrochemical Studies on Redox and Electrocatalytic Behavior of Ferrocenyl Chalcones

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Dihydronicotinamide adenine dinucleotide (NADH) is the bodies top ranked coenzyme, as a facilitator of numerous biological reactions. It helps in multiple metabolic processes in living organisms. In its oxidized form it is the molecule responsible for the oxidation of dehydrogenase substrates. Also, NAD^+ plays a role in gene expression by nucleic acids ribosylation. Whether this coenzyme serves as an oxidant, a tag, or, a switch, its detection and activity are quite important. Because of this NADH has been the center of many researches but the oxidation at conventional electrode surfaces happens at very high over potentials and because of this an electrochemical mediator is needed. Our research looks to utilize Ferrocenyl Chalcones (FC) as this mediator. FC's represent a possibility of being viable mediator because of their resemblance to ferrocene and their intense color. Because of this we believe it is possible to create electrochemical or colorimetric array of biosensors for the detection of dehydrogenase substrates. For this we performed the electrochemical characterization of three cationic chalcones using Cyclic voltammetry (CV) to learn about their behavior and electrochemical properties. The results showed that the reaction was mostly reversible because I_{pc}/I_{pa} was between 0.7-1.3, the reaction was also electrochemically quasi reversible because the ΔE_p 's were greater than 68mV and that the redox reaction was controlled by diffusion because of the linear tendency, and because the slope of the Ln graphs was close to 0.5. After the characterization was completed Titrations of NADH into a solution of FC17 (1.000mM) were done to see the possibility of using this chalcone as a mediator in the redox reaction of NADH to NAD^+ . After completing the experimental procedures, it was observed that the FC17 solution acts as an effective mediator for the redox reaction.