ELECTROCHEMICAL PROPERTIES OF SULFUR AND NITROGEN CONTAINING NEW NAPHTHOQUINONE COMPOUNDS

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Numerous quinones play vital roles in the biochemistry of living cells and exert relevant biological activities. Their cytostatic and antimicrobial activities emerge due to their ability to act as potent inhibitors of electron transport [1], as uncouplers of oxidative phosphorylation [2], as intercalating agents in the DNA double helix, as bioreductive alkylating agents of biomolecules [3] and as producers of reactive oxygen radicals, by redox cycling, under aerobic conditions. In all these cases, the mechanism of action, in vivo, requires the bioreduction of the quinones as the first activating step.

In our study, we synthesized new N, S-Substituted naphthoquinone compounds. Their structures were determined by using micro analysis, FT-IR, $^1$H-NMR, $^{13}$C-NMR, MS, UV-Vis. Electrochemical study, cyclic voltammetry was performed in an aprotic medium and the unsubstituted quinones 2,3-dichloro-1,4-naphthoquinone was used as standards. Cyclic voltammetry measurements were performed at room temperature in an airtight three-electrode cell by using a glassy carbon electrode (GCE) with a 0.071 cm$^2$ surface area as the working electrode, a platinum wire served as the counter electrode and a Ag/AgCl (in a saturated KCl solution) reference electrode. The cell was driven with a computer controlled system of a Gamry Reference 600 Model potentiostat/galvanostat. The solutions were deoxygenated by bubbling nitrogen through them for approximately 5 min. The surface of the working electrode was polished with deagglomerated alumina before each run. The voltammetric data of N, S-Substituted naphthoquinone compounds; cathodic peak potentials ($E_{pc}$), anodic peak potentials ($E_{pa}$) versus glassy carbon electrode (GCE), half-wave peak potentials ($E_{1/2}$), the difference between the first oxidation and reduction processes ($AE_p$) and cathodic vs. anodic peak current ratio ($i_{pc}/i_{pa}$) were determined.

Figure 1. The Cyclic voltammogram of N, S-substituted naphthoquinone compound.

References