# ELECTROCHEMICAL DETECTION OF SUPEROXIDE RADICAL ANION

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Superoxide radical anion ($O_2^{\cdot-}$) is a short-lived, extremely reactive species formed upon one-electron reduction of ground state triplet oxygen. $O_2^{\cdot-}$, in the aqueous medium abstracts a proton to produce $HO_2$ which disproportionates to give $H_2O_2$ and hydroxyl radicals ($OH^{\cdot}$). All these species are good oxidants that can attack organic pollutants in the aquatic systems. The formation and the role of $O_2^{\cdot-}$ in the biological systems are also of great concern in terms of the cytotoxicity of $O_2^{\cdot-}$ towards many cellular constituents. $O_2^{\cdot-}$ also involves in the defense against viral and bacterial attacks. Therefore, a development of a quantitative method to determine $O_2^{\cdot-}$ in solution is very important.

In this respect we have tested several quinone type compounds as mediators for the design and development of an electrochemical method for the detection of $O_2^{\cdot-}$. Listed below are some of the materials we have investigated in acetonitrile.

| Compound | Formal electrode potential/V |
|---|---|
| Anthrone | - 0.84 |
| 1,4-benzoquinone | - 0.45 |
| Anthraquinone-2-sulfonic acid | - 0.87 |
| 1,2,3-triketohydrindene hydrate | - 0.49 |
| 3,4-dihydroxy-9, 10-dioxo-2-anthraquinone-2-sulfonic acid | - 0.75 |
| Phenanthroquinone | - 0.64 |

As can be seen from the above table, 1,2,3-triketohydrindene hydrate is a promising $O_2^{\cdot-}$ quencher similar to that of 1,4-benzoquinone. Detailed mechanistic studies reveal that the compound reacts immediately with $O_2^{\cdot-}$, once formed, and therefore, acts as a mediator for the detection of $O_2^{\cdot-}$.

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