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Evaluation of Peroxidase in Herbal Medicines Based on an Electrochemical Sensor

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Editorial Note

Enzymatic browning requires the presence of phenolic substrates, enzymes, and oxygen to take place. Polyphenol oxidase, peroxidase, catalase, and superoxide dismutase are enzymes that produce enzymatic browning of plants.

Peroxidase is an oxidase that catalyses substrates by using hydrogen peroxide as an electron acceptor. It is present in plants, animals, and microbes. Most peroxidases, which are heme-binding proteins that contain iron ions, contain heme cofactors. Some peroxidases use copper, manganese, vanadium, or selenium to replace the iron in heme. Large-area, low-cost photoelectrodes are a good fit for nanoscale materials. For example, high-throughput deposition technologies like roll-to-roll manufacturing might be used to deposit affordable, solution-processed nanoparticle inks on flexible substrates.

Different tissues and organs, different growth and development stages, different physiological states, and varied plant species have different levels of peroxidase activity and number. Plant growth and development, biometabolic status, ability to adjust to the external environment, and genetic differences across types can all be reflected by peroxidases. The electrophoretic profiles of peroxidases are relatively stable under certain conditions and are as species-specific as morphological trait indicators. It has been widely used as a genetic marker in plant variety identification, genetic diversity analysis, plant disease resistance analysis, plant growth and development analysis.

Proteins are not easily denatured by non-denaturing discontinuous polyacrylamide gel electrophoresis. It fundamentally maintains protein biological activity by not disrupting protein natural structure and subunit interactions. Peroxidase differences can objectively indicate genetic differences across species. Peroxidase is a simple and effective tool for assisting in species identification. Peroxidases are involved in plant physiological responses to disease, pest, salt, and drought tolerance, as well as biotic stress resistance, according to studies. Peroxidase can be utilised as a quality control and identification indicator for herbs. For the quick detection of peroxidase in herbal remedies, an electrochemical-based test was devised. The electrode was modified with graphene to improve signal sensitivity.

The electrochemical reduction signal of H_2o_2 can be utilised as an indicator for the concentration of peroxidase in the samples since peroxidase in herbs can catalyse the electrochemical reduction of H_2o_2. The accuracy of this detection methodology is comparable to that of the colorimetric method, according to a study of 12 plants. The electrocatalytic reaction is influenced by the concentration of H_2o_2. In general, the higher the H_2o_2 concentration, the bigger the reduction current will be. However, too much H_2o_2 can deplete the peroxidase enzyme quickly, resulting in a wide range of results.

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