



New Electrodes Based on Garlic for the Inhibition of the Free Radicals Effects

Chtaini A, Faculté des Sciences et Techniques de Béni Mellal, Université Sultan Moulay Slimane, Morocco

ABSTRACT:

A new electrode based on garlic is prepared to inhibit the effect of oxidative stress, often linked to the presence of an excess of free radicals. The electrode paste was prepared as a mixture of finely powdered of garlic together with graphite powder. The influence of variables such as the garlic loading and free radicals concentration was tested by square wave voltammetry (SWV), cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS). The obtained results were found in good correlation with garlic reputation

Introduction :

They are continuously produced by the body's normal use of oxygen such as respiration and some cell mediated immune function. At high concentrations, free radicals generate oxidative stress, a deleterious process that can damage all cell structures [1-8]. Oxidative stress can develop of chronic and degenerative diseases such as cancer, arthritis, aging, autoimmune disorders, cardiovascular and neurodegenerative diseases. Antioxidant compounds in food are found to have a health protecting factor. Primary sources of naturally occurring antioxidants are whole grains, fruits and vegetables. Garlic (*Allium sativum*) is an herb. It is best known as a flavoring for food [9]. But over the years, garlic has been used as a medicine to prevent or treat a wide range of diseases and conditions. Garlic consists of more than 250 genera and 3700 species. The potential antioxidant properties of garlic are related to its phenolic and flavonoid fractions [10]. Several amperometric biosensors have already been proposed for antioxidant capacity determination [11-14]. Most of them are based on the amperometric detection of H₂ O₂, resulting from the catalyzed dismutation of superoxide radicals (O₂⁻) in presence of superoxide dismutase. In this work we prepared and characterized the garlic modified carbon-paste electrode, which successfully exploits the favorable mechanical and electrochemical properties of carbon-paste electrodes. Our work develops the electrochemical technology of the inhibition of effects of free radicals.

Methodology:

In this work we prepared and characterized the garlic modified carbon-paste electrode, which successfully exploits the favorable mechanical and electrochemical properties of carbon-paste electrodes. Our work develops the electrochemical technology of the inhibition of effects of free radicals. Experimental Instrumentation and software Square-wave voltammetry was performed with a voltalab potentiostat (model PGSTAT 100, Eco Chemie B.V., Utrecht, The Netherlands) driven by the general purpose electrochemical systems data processing software (voltalab master 4 software) connected to Pentium III computer run under Windows 98. The electrochemical cell contains a HAp-modified carbon paste working electrode, a platinum counter electrode and a saturated calomel reference electrode (SCE). The pH-meter (Radiometer Copenhagen, PHM210, Tacussel, French) was used for adjusting pH values. Preparation of the modified electrode Garlic-CPE Garlic-modified carbon-paste electrode was prepared according the following procedure .

Conclusion :

The antioxidant capacity of the garlic approaches 100%, indicating for the same occasion, that the prepared electrode (garlic/CPE) can totally inhibit the effects of the free radicals. Conclusion For a long time, garlic has been used as an additive in food in various cultures. Garlic is a natural medicine used to treat many diseases, is a powerful stimulant of the immune system. In this work, the garlic was used as a modifier of the carbon paste electrode to inhibit the reduction reaction of hydrogen peroxide often considered a powerful free radical. The composition of the electrode materials that gave the best result is 30% garlic and 70% carbon graphite. The antioxidant capacity of the garlic was evaluated, its value exceeding 80%, and its ability to inhibit the H₂ O₂ reduction reaction may reach 100%.

Keywords:

Garlic; Oxidative stress; SWV; CV; EIS; Modified electrodes Introduction Oxidative stress