

Voltammetry is convenient methodology for antioxidant activity determination of some cosmetic products

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The development of bioelectrochemistry shows to be successful and is conditioned by the nature of the matter, because electrochemical mechanisms make up the base of the majority of biochemical processes. Investigations on the influence of various plant extracts and cosmetic products on the process of quasi-reversible electrochemical oxygen reduction (ER O₂) and its kinetics could be treated as the modeling of antioxidant activity of the samples in vitro. The ER O₂ proceeds at the electrode in several stages with formation of the reactive oxygen-derived species (ROS). It is similar to the reduction oxygen in tissues.

Over the last few years natural antioxidants have been widely used in different fields of industry and medicine because of their ability to protect against cardiovascular diseases, cancer, deficiencies in immune response, age-related problems, etc. The use of the antioxidants or plant extracts in the cosmetic products improves their quality, leads to the cell rejuvenation and skin health. In this reason many leading cosmetic firms over the world use natural plant extracts in their products.

Antioxidant activity of 4 plant extracts and cosmetic products of the firm "Kora" with and without plant extracts have been investigated in this work together with the evaluation of their influence on the human skin.

A highly attractive, convenient and especially sensitive voltammetric approach for the study of antioxidant properties of the samples is suggested in this work [1]. It involves the recording of voltammograms of the cathodic reduction of oxygen by means of voltammetric analyzer connected with electrochemical cell, which consists of the working mercury film microelectrode; silver/silver chloride reference electrode and a nitrogen supply tube. Supporting electrolyte was 0.1 M NaClO₄ in aquatic and in non-aquatic (DMFA) mediums.

As a result a coefficient of the antioxidant activity (*K*) of the investigated samples have been determined in this work. All plant extracts as well as cosmetic products have shown excellent antioxidant activity especially clover and hop (tables I, II). Cosmetic products with plant extracts have shown most antioxidant activity (table II) as well as most effect for skin rejuvenation. Moreover we have evaluated more effective concentration (*C_{eff}*) of the plant extracts in the cosmetic products (table I).

Finally the use of the investigated cosmetic products with plant extracts of the firm "Kora" for cell rejuvenation and skin health has been recommended in this work.

1. Korotkova E.I., Karbainov Y.A., Shevchuk A.V., (2002) *J. Electroanal. Chem.*, 518, N1, 56-60.

Table I. Antioxidant activity coefficients for plant aquatic-alcohol extracts

Plant extract	<i>K</i> , ml/g	<i>C_{eff}</i> , %	<i>Sr</i>
Clover	76.92	0.6	0.03
Hop	119.30	0.23	0.04
Lucerne	42.60	1.2	0.03
Solodka	58.94	2.3	0.03

Table II. Antioxidant activity coefficients for cosmetic products

Name of Product	<i>K</i> , ml/g	<i>Sr</i>
Cream without plant extracts	15.56	0.05
Cream with plant extracts	90.69	0.04
Gel without plant extracts	2.76	0.05
Gel with plant extracts	49.80	0.04
Tonic	89.88	0.04