

Investigation of antioxidant properties of pharmaceuticals by voltammetry

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Over the last few years antioxidants have been widely used in different fields of industry and medicine. The problems of oxygen metabolism in humans constantly attract the attention of medics, chemists and biochemists, especially now that it is obvious that the excess of oxygen and its reactive species cause radical-chain oxidation processes in cellular tissues, resulting in fast aging, cell destruction and incurable diseases. The antioxidants interrupt these processes and form low activity radicals, which are easily removed from the organism. This improves general health, helps cell rejuvenation and prevents cancer[1].

Investigations on the influence of various plant extracts and some pharmaceuticals 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.

Antioxidant activity of 7 pharmaceuticals have been investigated in this work. A number of the investigated samples are well-known as excellent hepatoprotectors, which have been widely used in medicine. For example extract of saltwort (*Salsola collina Pall.*) is effective for prophylactic and therapeutic purposes against hepatitis and cirrhosis. Extract of *Maackia amurensis Rupr. Et Maxim.* reproduces liver function, it is used as antitoxic and hepatic pharmaceutical. Oxazepam and its derivative (7-chloro-5-phenyl-1H-1,4-benzodiazepine-2,3-dione) belong to the tranquillizers of 1,4-benzodiazepines group. They have anticonvulsive and sedative effects.

A highly attractive, convenient and especially sensitive voltammetric approach for the study of antioxidant properties of the samples is suggested in this work [2]. It involves the recording of voltammograms of the cathodic reduction of oxygen by voltammetry.

As a result a coefficient of the antioxidant activity (K) of the investigated samples have been determined in this work. As expected all plant extracts as well as pharmaceuticals have shown antioxidant activity (table I, II). *Maackia*, *Tanacetum* and oxazepam have demonstrated excellent antioxidant activity in comparison with the standard antioxidant – methyl-2,6-di-tert-butyl-phenol.

Table I. Antioxidant activity coefficients of plant extracts

Plant extract	K, ml/g	S _r
<i>Tanacetum</i>	652.00	0.98
<i>Chelidonium</i>	142.50	0.61
<i>Salsola</i>	22.07	0.23
<i>Maackia</i>	604.35	0.74
<i>Calamus</i>	281.60	0.67

Table II. Antioxidant activity coefficients of pharmaceuticals

Pharmaceutical	K, ml/g	S _r
Oxazepam	567.40	0.72
7-Chloro-5-phenyl-1H-1,4-benzodiazepine-2,3-dione	263.30	0.58
Methyl-2,6-di-tert-butyl-phenol	494.70	0.63

Reference

1. Korotkova E.I., Karbainov Y.A., Shevchuk A.V., (2002) *J. Electroanal. Chem.*, 518, N1, 56-60.
2. Korotkova E.I., Karbainov Yu.A., Avramchik O.A., (2003) *J. Anal. Bioanal. Chem.*, 375, N3, 465-468.