

# Food and Beverages

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## Antioxidant activity-the potential relationship between diet and health

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Free radical oxidation ensures regular metabolism in the body, but in case of oxidant/antioxidant misbalance free radical oxidation may lead to oxidation of lipids, membrane destruction and changes in DNA. Many diseases are the consequences and reasons of the Oxidative Stress (OS) appearing. Tracing of Antioxidant/Oxidant Activity (AOA/OA) of food, nutrients, blood, blood fractions, semen and skin will enable the doctor to choose effective diet and therapy. Proposed by authors' new hybrid variant of potentiometric method of determining (AOA/OA) of solutions and skin was used. It was chosen as fully corresponding with the nature of the OS, because the inductor of oxidative stress is an overall deficit of electrons accessible to cells, and reactions of antioxidants with active oxygen species are of electrochemical nature. The source of information is the electrode potential shift observed when the analyzed sample is inserted into the medium containing the mediator system. The possibilities of the method were demonstrated in AOA determination of some vegetative foodstuffs (fresh juices from crush fruits and vegetables, juices and nectars of industrial manufacturing, some grades of tea, beer and wine), nutrients, blood, sperm and skin. Comparative research of water and ethanol extracts obtained from some herbs, fruits and vegetables has been carried out. Antioxidant activity of ethanol extracts was higher than this in water extracts due to the fact that phenols have better solubility in ethanol. Hence, they are more full taken from a vegetative material by ethanol. Two approaches (invasive and noninvasive) are proposed and used. A pronounced increase in AOA of plasma and erythrocyte mass of blood after intake of fruit juices is demonstrated. In this case, the same effect is observed on the skin. The indicator of antioxidant activity may be not only a source of information about the danger, freshness and authenticity of plant products, but also provide information for a new look at the assessment of their quality. Future investigations of AOA in the chain blood fractions/skin-diet/therapy will make a significant contribution to the selection of effective ways to improve health and food technologies.

### Recent Publications

1. Brainina Kh Z, Ivanova A V, Sharafutdinova E N, Lozovskaya E L and Shkarina E I (2007) Potentiometry as a method of antioxidant activity investigation. *Talanta*, 71(1):13-8.
2. Kh Z Brainina, L V Alyoshina, E L Gerasimova, Ya E Kazakov, A V Ivanova, Ya B Beykin, S V Belyaeva, I Usatova and M Ya Khodos (2009) New electrochemical method of determining blood and blood fractions antioxidant activity. *Electroanalysis*, 21(3-5):618-624.
3. Khiena Z Braininaab, Elena L Gerasimovaab, Olga T Kasaikinac and Alla V Ivanovad (2011) Antioxidant activity evaluation assay based on peroxide radicals generation and potentiometric measurement. *Analytical Letters* 44(8):1405-1415.
4. Kh Brainina, L Galperin, E Gerasimova and M Khodos (2012) Noninvasive potentiometric method of determination of skin oxidant/antioxidant activity. *Sensors Journal*, IEEE, 12(3):527-532.
5. V Ivanova, E L Gerasimova and Kh Z Brainina (2015) Potentiometric study of antioxidant activity: development and prospects. *Critical Reviews in Analytical Chemistry*, 45:311-322.

### Biography

Khiena Z Brainina, Prof., Dr.Sc., Ural State Economic University, Honored Scientist of RF, Member-correspondent of Academy of Natural Science of RF. Education in Chemistry: Ural State University, Dr.'s Degree in Chemistry in Ural State University, Dr.Sc. Degree in Chemistry in Moscow State University, Professor in Chemistry. She worked for Research Oil Institute in Ufa, Chemical Factory in Ekaterinburg, Research Institute for chemical Reagents in Donetsk (USSR). From 1968 till now, she works for Ural State Economic University in Ekaterinburg (RF). In 1990, she worked as Visiting Scientist at La Trobe University, Australia. Her research interests include "Electrochemical sensors, stripping voltammetry, environmental monitoring, and nanostructured materials electrochemical characterization". She published more than 500 papers and abstracts in Russian and international journals and five books in stripping analysis in chemistry.

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