

Abstract

Steroid substances are an integral part of the human organism, such as bile acids, steroid hormones, vitamins. The most important sterol in whole organism is cholesterol, which is cornerstone of the all cell membranes. It is involved in important processes in the body, but its storage in blood vessels in the form of low-density lipoprotein (LDL) is crucial of reason serious health diseases as atherosclerosis, myocardial infarction and others.

7-dehydrocholesterol is a precursor of cholesterol and another sterol compound studied by me, cholecalciferol, also known as a vitamin D₃. Deficiency of 7-dehydrocholesterol reductase is the main indicator of the possible genesis of Smith-Lemli-Opitz syndrome. One of the goals of this thesis was developed a suitable electrochemical method to facilitate the diagnosis of this syndrome from plasma and amniotic fluid in the prenatal and postnatal phases of pregnancy.

Within the framework of this thesis were developed electrochemical methods in a batch and flow arrangement for detection of the above-mentioned sterols, namely cholesterol, 7-dehydrocholesterol and cholecalciferol. It was worked in the medium contain perchloric acid or its salt sodium perchlorate in acetonitrile as supporting electrolyte. It was worked in the wide range of working disc electrodes as well as in the printed chip eplatinum electrode. A non-aqueous referent electrode by Pleskov (Ag/AgNO₃) was employed in the batch arrangement, and the argentochloride referent electrode of the second type (Ag/AgCl) was used in the flow arrangement.

Samples of dairy products, an artificial serum and amniotic fluid were extracted by different liquid-liquid extraction mechanism.