

It is known that thallium is used as a catalyst in the obtaining of special alloys, optical lenses, jewelry, and the creation of low temperature thermometers. Thallium compounds are also used as medicines against rodents and insecticides [4-6]. It should be noted that the high toxicity and volatility of thallium compounds are not fundamental obstacles for the use of compositions based on it in engineering. In modern production and technology, the obtaining and use of particularly pure and ultrapure substances play an important role. Obtaining thallium of high purity is a complex technological task requiring the use of complex technological schemes, including both physical and chemical methods of purification. To determine the amount of impurities or the detection of traces of foreign matter in various materials, it is possible to successfully apply electrochemical methods, in particular, the method of electrochemical refining [7]. Therefore, the physical-chemical study of processes in the refining of thallium is very relevant.

This is characterized by the simplicity of appliance design and the possibility of effectively conducting the process at medium temperatures and pressures, yet with high performances. However, it is quite difficult to obtain high-purity thallium by electrolysis due to the similarity of chemical properties and very close position of electrode potentials of thallium and other metal impurities. The authors demonstrated previously [8-12] the principles of possible electrochemical thallium refining through the dissolution stage of anodically-deposited thallium(III) oxide.

As a result, this work aimed the establishing the regularities during precipitation and dissolution of thallium(III) oxide, for the selective electrochemical deposition of a rare metal.

## RESULTS AND DISCUSSION

In order to optimize the purification process of rough thallium, the studies were carried out in a volumetric electrolysis cell with a potential of 1.5 V. A glassy carbon plate was used as cathode, platinum served as anode, and a silver chloride electrode as reference, respectively. In addition to the deposition of thallium ( $Tl^{+} + 1e^{-} \rightarrow Tl^{0}$ ) on the cathode, the platinum plate at the anode was covered at  $pH > 2$  with a dark brown precipitate that corresponds to the trivalent thallium oxide [13]. Thus, the following process takes place on the anode:

