STRESZCZENIE W JĘZYKU ANGIELSKIM

The aim of this study was to investigate the possibility of conducting a one-step recrystallization of ammonium perrhenate to obtain crystals meeting industrial purity standards. A literature review showed that recrystallization is a commonly used method for purifying ammonium perrhenate, but it requires a multi-step process to achieve the desired purity level. The research focused on the elimination of potassium, which forms poorly soluble potassium perrhenate. The objective was to select appropriate process conditions, particularly the phase equilibrium of the multicomponent system, by adding various ammonium salts to the recrystallized ammonium perrhenate solution. It was hypothesized that the addition of a selected ammonium salt would alter the equilibrium in the system, causing potassium retention and allowing the production of a high-purity product, supported by the conducted studies. The studies determined the physicochemical properties of standard ammonium perrhenate and potassium perrhenate salts, such as solubility and density of saturated solutions in the temperature range of 10℃ to 60℃. Using ammonium perrhenate synthetically contaminated with potassium, preliminary recrystallization trials were conducted with the addition of six different ammonium salts: ammonium nitrate, ammonium chloride, ammonium sulfate, ammonium thiosulfate, ammonium acetate, and ammonium carbonate. The comparison criterion for ammonium salts was the effectiveness of potassium elimination and the efficiency of the recrystallization process. Based on the results, three ammonium salts were selected for further studies. Subsequently, using the isothermal saturation method, phase diagrams were prepared showing the mutual solubility of ammonium perrhenate in solutions of the three selected ammonium salts at 20℃. Using phase diagrams, which are a helpful tool in the crystallization process, the effect of the addition of a common ammonium ion on the final potassium content in the product and the efficiency of the process was investigated. Key process parameters, such as the type and amount of added ammonium salt, the initial amount of ammonium perrhenate, and the degree of potassium contamination, affecting the product's purity were determined. In the final part of the study, the morphology of the purified salt crystals was measured, examining the effect of stirring speed and cooling rate of the solution on the structure and size of ammonium perrhenate crystals.