

UDK. 678.744:628.4

**DEVELOPMENT OF TECHNOLOGY FOR OBTAINING VALUABLE COMPONENTS
BASED ON THE USE OF POLYETHYLENE TEREPHTHALATE WASTE**

Salohiddinov Ilhom Ikrom o'g'li
ilhombeksalohiddinov770@gmail.com

Abstract. The article describes the scientific foundations and practical aspects of the technology for obtaining a valuable component - plasticizer - based on the utilization of polyethylene terephthalate (PET) waste. The study analyzed the physicochemical properties of PET waste, and carried out an aminolytic degradation process using a mixture of amino alcohols. The resulting oligomers and plasticizer products were analyzed using modern physicochemical methods. The results show that the developed technology increases the efficiency of PET waste recycling, reduces environmental problems, and can be practically applied in the polymer industry.

Keywords. Polyethylene terephthalate (PET), waste recycling, aminolytic degradation, plasticizer, polymer technology, environmental safety.

Login. Currently, the increasing amount of polymer waste in the world is a global problem as one of the factors polluting the environment. In particular, polyethylene terephthalate (PET) waste is one of the most common polymer wastes due to its widespread use in the food industry, beverage production and household appliances. The biodegradation period of PET waste is hundreds of years, and it pollutes soil and water resources, so the need to develop effective methods for their recycling is sharply increasing. According to scientific sources, one of the most promising areas of PET waste recycling is the aminolytic degradation process. The products obtained as a result of this process can be used as plasticizers and other valuable components in the polymer industry. Based on this, the main goal of the research is to develop a technology for obtaining a valuable component based on the utilization of PET waste.

Materials and methods. The object of the study was polyethylene terephthalate waste from local industrial enterprises. The aminolytic degradation process was carried out using a mixture of amino alcohols. A series of experiments were conducted in laboratory conditions to determine the optimal parameters of the process. The following methods were used to analyze the composition and properties of the products:

- Infrared (IR) spectroscopy;
- Thermogravimetric analysis (TGA);
- Differential scanning calorimetry (DSC);

-Chromatographic methods. The experimental results were processed on a computer using mathematical and statistical methods, and correlations were identified.

Results and discussion. According to the results of the study, the physicochemical properties of PET waste were determined and their suitability for the aminolytic degradation process was proven. As a result of the process, oligomers and plasticizer products were formed. Their structural structure was determined using spectroscopic methods, and the possibility of

their use in polymer processing was demonstrated. As a result of optimizing the technological parameters of the aminolytic degradation process, the following conclusions were drawn:

- The reaction temperature in the range of 180–200 °C gives the most optimal result;
- The yield of the plasticizer is high when the reaction duration is 90–120 minutes;
- The concentration of the amino alcohol mixture directly affects the efficiency of the process. The obtained plasticizer products were tested in the process of polymer processing. The test results showed that they have high plasticization properties, which confirms the practical significance of the developed technology.

Conclusion

Based on the conducted research, the following scientific and practical conclusions were made. It was proven that it is possible to obtain a valuable component - a plasticizer - through aminolytic degradation of polyethylene terephthalate waste. The optimal technological conditions of the process were determined, and high efficiency was achieved. The possibility of using the obtained plasticizer in the process of recycling polymers was confirmed experimentally. The proposed technology is environmentally friendly, cost-effective and recommended for implementation in industry.

References:

1. Salohiddinov I.I. Polietilentereftalat chiqindilarini utilizatsiya qilish asosida qimmatbaho komponentlar olish texnologiyasi. Magistrlik dissertatsiyasi. Qarshi davlat texnika universiteti, 2025.
2. Shabarova U.N. va boshqalar. Polimer chiqindilarini qayta ishlashning zamonaviy usullari. Ilmiy maqolalar to'plami, 2023.
3. Al-Sabagh, A.M., Yehia, F.Z., Eshaq, G. et al. Greener routes for recycling of polyethylene terephthalate. Egyptian Journal of Petroleum, 2016