

One of the most important challenges for humanity today is the constant pursuit of sustainable development in all areas of life, and above all, reducing the consumption of fossil fuels and conducting effective waste management. One of the main goals of sustainable development is to reduce energy losses. There is a large problem of energy loss in the construction industry, therefore, in recent years, new thermal insulation materials with better properties, which will also be environmentally friendly, have been searched for. Rigid polyurethane foams perfectly meet these requirements, because they have a lower thermal conductivity than traditionally used thermal insulation materials (mineral wool, polystyrene), but also have good mechanical properties and chemical and biological inertness.

Polyurethane foams are the result of an exothermic reaction of a polyol premix with an isocyanate. A major problem in the production of foams is that the polyol is obtained from crude oil. Extraction and processing of crude oil causes many unfavorable phenomena in the environment. Additionally, there has been a recent crisis in the fuel market. All these factors meant that new sources of polyol production were sought. Among the raw materials used up to date for the production of ecological polyols, vegetable oils are the most frequently indicated. However, their use in the polyurethane industry may increase demand, thus increasing food prices, but also aggravating the problem of hunger in the world, because they are edible raw materials. Waste fatty substances are an excellent alternative to the production of bio-polyols.

With the above problems and challenges facing the polymer industry in the coming years, the main goal of the smaller project is to develop innovative bio-polyols from waste fats that will be separated from sewage sludge. During the research, fats will be characterized, then the bio-polyols produced from these fats will be characterized as well. At the same time, the aim of the research will be to design a rigid polyurethane foam system by partially replacing petrochemical polyol with bio-polyol produced from waste material. Rigid polyurethane foams will be produced and then characterized in terms of the most important properties. The influence of the addition of this type of bio-polyol on the most important production parameters of polyurethane foams - the foaming process and on the physical, mechanical properties, structure and flammability of the foams will be determined. The thermal stability of rigid polyurethane foams will also be tested. Figure 1 shows the stages of the project implementation.

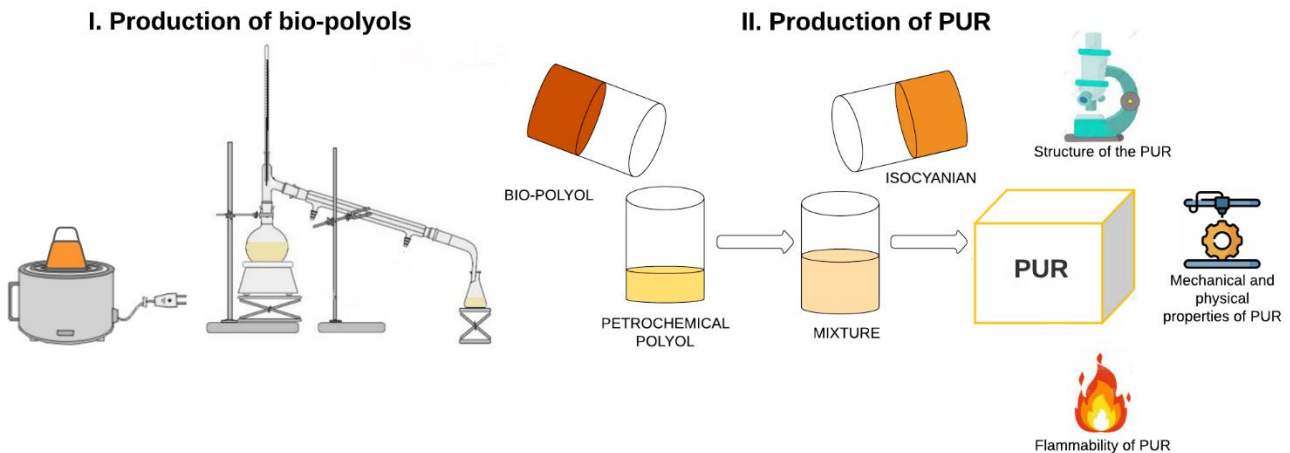


Figure 1. Stages of implementation and main assumptions of the project

The results obtained in the project will provide new knowledge on the production technology of organic polyols. At the same time, they will contribute to the development of a new method of managing fats from sewage sludge. The innovation of this project is also the introduction of this type of bio-polyols to the system of rigid polyurethane foams. As a result, the content of petrochemical substances in polyurethane foams is reduced.