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AUTOMATED CHEMICAL REACTOR SYSTEMS FOR WASTE EDIBLE OIL PROCESSING RESEARCH

Słowa kluczowe:

Przetwarzanie olejów, reaktory, oleje, automatyzacja, transestryfikacja, recykling, systemy reaktorów ciśnieniowych,

Streszczenie

Celem było wstępne przeanalizowanie procesów przetwarzania niezdatnych do spożycia olejów spożywczych i przeprowadzenie testów wybranych procesów przy użyciu zaprojektowanych i wykonanych reaktorów chemicznych, które mogą pracować kaskadowo lub w dowolnej konfiguracji w zależności od aktualnego zapotrzebowania na dany proces badawczy.

Piśmiennictwo

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Abstract

The Macierz 9 system (up to 9 reactors controlled by one software) was designed, manufactured (Figure 1), and modified for selected processes of waste cooking oils - transesterification. The design work and modifications were aimed at ensuring that the constructed reactors would meet the necessary requirements related to working with pressure systems and safety requirements. The system can be expanded with glass reactors.

The Macierz 9 system software was used to control transesterification - in the processes of processing waste and inedible cooking oils. The system is equipped with the software, enabling control and setting of process parameters and setting of programs for multi-stage processes for the entire system and each of the reactor separately and work in cascades. The software provides the possibility of setting the temperature value, stirring speed, amount of gas or liquid dosed, and control of solenoid valves, with the possibility of changes in implementation and access for different authorized groups of users. The system cooperates with various devices, including ultraprecise dosing pumps, mass flow meters, mass flow controllers, and online sampling under increased pressure.

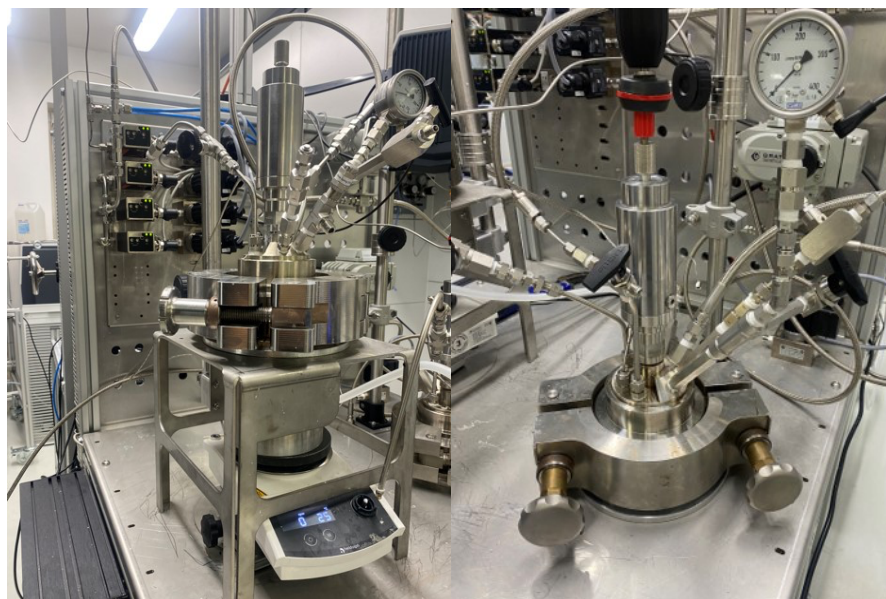


Figure 1. Part of the multi-tank pressure reactor system with dosing equipment, with the possibility of adding glass reactors, e.g. for selected transesterification stages

After primary analysis of the processing waste and inedible cooking oils, transesterification was selected as a process with potential demand for the industry in a formula developed using chemical reactors. Flexible reconfiguration according to the needs of the developed multi-step processing is a valuable source of data. Reactors in the Macierz 9 system typically operate with design pressures of up to 100-200 bar, but reactors operating up to 650 bar are possible. The maximum operating temperature is 200°C. Heating can be conducted using a standard jacket with a resistance heater or a jacket for the circulation of the heating and cooling liquid. Reaction vessels are available in volumes from 100 mL to 20 L (interchangeably, the scale can be increased to 200 L). Stirring is conducted with a mechanical stirrer, whereas in the case of smaller vessels, magnetic stirring is also possible for implementation. The product can be subjected to material analysis at each stage using analyzers, including thermal analyzers.

Informacja

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