US and / or MW intensification of esterification and transesterification processes using enzyme or resin catalysts

Abstract

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The main objective of this research was the study of the influence of ultrasound on enzymatic reactions. Due to the novelty of this topic, fundamental research is able to open up new possibilities for applied research.

A. The synthesis of isoamyl acetate (banana flavor) by direct esterification of acetic acid with isoamyl alcohol in the presence of enzymes and solvents as adjuvants in the reaction mass has been studied. Such a system avoids the problems of separation, toxicity, flammability of organic solvents and has the advantage of reducing the cost of the final product and allows the recovery of the product without subsequent complex stages of purification or evaporation. This type of esterification is advantageous when obtaining esters with uses in food or cosmetics.

B. In the next stage of the experimental research it was studied the esterification of acetic acid with isoamilic alcohol using ion exchange resins as catalysts and the influence of different parameters on the continuous process of ultrasonically assisted esterification was monitored.

C. The reaction of enzymatic transesterification of sunflower vegetable oil with ethyl alcohol using the enzyme immobilized on lipozyme 435 support was studied. Experiments were conducted by two methods: conventional method and ultrasound assisted methods. The ultrasonic assisted reactions took place using three different acoustic wave generation equipment: a Rheus ultrasound bath, a probe-type equipment - Vibracell and an equipment in which the generated acoustic waves are transmitted along a pipe - MMM clamp-on.