ULTRASOUND ASSISTED ENZYMATIC SYNTHESIS OF ISO-AMIL ACETATE

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A method for intensification of enzymatic esterification is the use of a ultrasound assisted system. The effects of acoustic cavitation on enzyme are thermal effect, that can lead to the enzyme denaturation, the forming of free radicals which can attack the cellular materials and the shear forces produced can deactivate the enzyme and modify the conformational structure of enzymes. But using low ultrasound frequencies the conformational structure of enzymes can be changed from the closed conformation to the opened one, allowing the easy access of the reagens. [1,2]

In the present paper a systematic study on the effects of ultrasounds on the enzymatic esterification for aroma esters preparation is described. Thus, by ultrasound assisted enzymatic esterification i-amyl acetate was obtained. The esterification process was carried out with acetic acid and *i*-amyl alcohol in the presence of an enzyme, Lipozyme 435. The equipment used for the ultrasound assisted process in this study consists of a Vibracell 750 processor. We studied the effect of temperature, ultrasonic power and duty cycle on the esterification reaction. The concentration of i-amyl acetate formed from the esterification process was determined by gas cromatography analysis. Significant improvements were obtained in comparison to conventional method. The results show a favorable perspective of the ultrasound technique to improve the process efficiency.

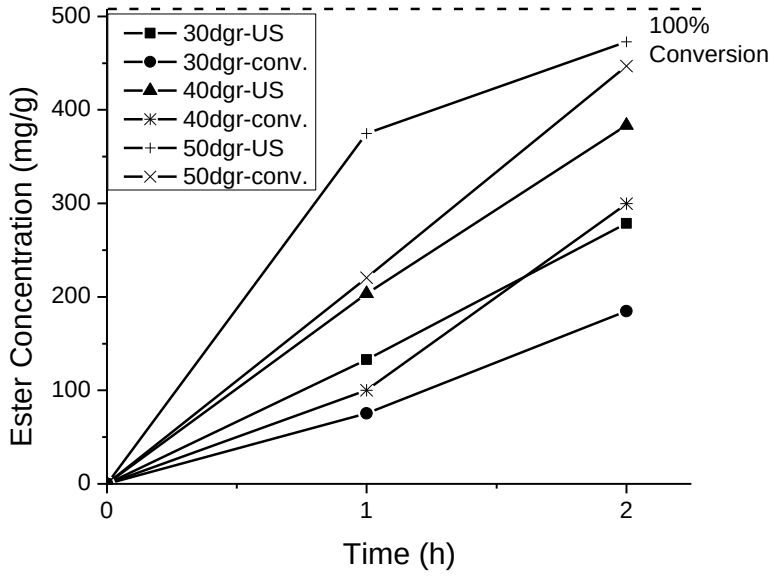

Fig. 1: Evolution of the ester concentration for the conventional and US-intensified esterification reaction at different reaction temperatures: 30°C, 40°C, 50°C, 1:2 acid:alcohol molar ratio, 0.16 ml / min, reactor, 0.047g enzyme/g mixture, pulse: 3sec on / 3sec off, probe at 4.5 cm from the reactor

[1] Delgado-Povedano M.M., Luque de Castro M.D., Analytica Chimica Acta, volume (889), 1-21, 2015.
[2] Sancheti S.V., Gogate P.R., Ultrasonics Sonochemistry, volume (36), 527-543, 2017.