

Optimisation of the ultrasonic assisted lipase catalysed reaction of acetic acid with isoamyl alcohol

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Isoamyl acetate is one of the most important esters in food industry. Since 1976, 1174 patents containing isoamyl acetate were published. Most experimental approaches used hexane or heptane as solvent which are toxic and undesirable for cosmetics and food products.[1] The high industrial demand for “green” isoamyl acetate lead to the introducing of lipase catalysed solvent-free system. In the past, isoamyl acetate, the banana flavour, was produced by extraction from natural sources[2] witch was difficult. Other alternative ways include using fermentation method, too expensive for commercial exploitation [3], chemical synthesis using strong acid and alcohol that use polluting liquid acids as catalysts, need a post treatment and are costly for industrial application [4].

A new method of esters production using lipase has been found to be more economic compared to previous methods, with mild operation conditions, high degree of purity of the products and their acceptability as green in the food industry [5]. A good method of enhancing the enzyme-catalyzed process is the use of an ultrasound assisted system. The effects of acoustic waves on enzymes are the thermal effect that can lead to lipase distortion, the effect of free radicals and the effect of shear forces caused by microstreaming.[6]

In this study we optimized the continuous process of enzymatic ultrasound assisted esterification, finding the optimal configuration for the synthesis reactor. We determined the efficiency of ultrasounds under various conditions using a method of determining the ultrasound power with para nitro phenol and we have highlighted the effects of acoustic microstreaming using a method of dissolving hardly soluble salts.

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