Esterification of Phenolic Acids using Surfactantless Microemulsions and Relative Organogels as Matrices

A. Xenakis[1,*], T. Karandreas[1], E. Merianou[2], M. Zoumpanioti[1], H. Stamatis[2]

[1]Institute of Biological Research & Biotechnology, The National Hellenic Research Foundation Athens, Greece,

[2]University of Ioannina. Dept of Biological Applications & Biotechnology. Ioannina. Greece.

At recent years there has been an intense effort for the reduction of free radicals in human organism in order to avoid the bad effects they have in humans health. Free radicals are produced by stress, smoking, pollution and diet. Phenolic acids are natural antioxidants that cause reduction of free radicals.

Due to the antioxidant properties of phenolic acids (including cinnamic acid derivatives), they are of great importance in industry, however, their application is limited by their low solubility in fats and oil. . The modification of natural phenolic acids (including cinnamic acid derivatives) via esterification with aliphatic alcohols can be used as a tool to alter their solubility in fats and oils enhancing their usefulness as food antioxidant additives. Various anhydrous organic solvents have been tested as reaction media for the enzymatic esterification of such natural compounds.

In this work we investigated the potential of surfactantless microemulsions formed with n-hexane, 1-propanol (or tert-butanol) and water, for the use as alternative reaction media for the enzymatic esterification of various phenolic acids with alcohols having various chain lengths. The advantage of these systems, comparing to conventional microemulsions, is the presence of relatively large amounts of alcohol that enhances the solubility of the phenolic acids.

In such low water content systems lipases can catalyze the reverse reaction towards synthesis of esters[1,2].

Furthermore, the ability of organogels formed with natural polymers and surfactantless microemulsions, as media for phenolic acids esterification was investigated. In addition, a kinetic study of the esterification of m-hydroxyphenylacetic acid revealed that the reaction follows the Michaelis-Menten mechanism.

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