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Chemically Modified β-Cyclodextrins Useful in Developing Biosensors of Agricultural and Food Relevance

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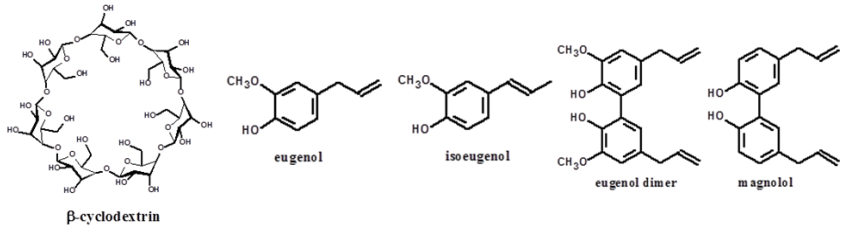
β-cyclodextrin (β-CD), a natural, non-toxic cycloeptaamilose macrocycle, is a useful biomatrix for immobilizing enzymes on a biosensor surface because of the affinity of its cavity for hydrophobic guest molecules (e.g., aminoacids) (1). Unfortunately β-CD as itself bears no chemical groups suitable to grafting on the transducer surface. Some studies reported poly-carboxylic acids (PCAs) as crosslinkers of cellulose (2) and cotton (3); also Martel *et al.* analyzed reaction parameters (4) of grafting.
Aiming at preparing new biosensors with reduced toxicity and improved permeselectivity, chemical modifications on selected natural compounds were carried out according to guidelines of Sustainable Chemistry.
In this work β-CD has been successfully modified with different poly-carboxylic acids (PCAs) including 1,2,3,4-butanetetracarboxylic acid. Time activation, pH, pressure and stoichiometry were optimized in order to achieve selected substitutions on the macrocycle hydroxy groups. The modified β-CDs, prepared under mild conditions, are completely water-soluble and could be grafted on a biosensor surface.
It is well documented the ability of eugenol, a natural antioxidant phenol, to form permselective films when electropolymerized on a Pt electrode (5). In order to improve biosensor performance C_2-symmetric dehydrodieugenol has been synthesized and its electrocoating ability was assayed both in cyclic voltammetry and constant potential amperometry with the related natural compounds as eugenol, isoeugenol and magnolol.



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