

Fiber Optic Asparagine Biosensor for Fruit Juices by Co-Immobilization of L-Asparaginase and Phenol Red

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Abstract : Asparagine is vital amino acid which is required for the development of brain and it regulates the equilibrium of central nervous system. Asparagine is the chief amino acid that forms acrylamide in baked food by reacting with reducing sugars at high temperature (Millard Reaction i.e. amino acids and sugars give new flavors at high temperature). It can also be a parameter of freshness in fruit juices because on storage of juices at 37°C caused an 87% loss in the total free amino acids and major decrease was recorded in asparagine contents. With this significance of monitoring asparagine, in the present work a biosensor for determining asparagine in fruit juices is developed. For the construction of biosensor L-asparaginase enzyme (0.5 IU) was co-immobilized with phenol red on TEOS chitosan sol-gel plastic disc and fixed on the fiber optic tip. Tip was immersed in a cell having 5ml of substrate and absorption was noted at response time of 5 min with 10⁻¹ - 10⁻¹⁰ M concentrations of asparagine at 538 nm. L-asparaginase was extracted and from Solanum nigrum Asparagine biosensor was applied fruit juices on the monitoring asparagine contents. L-asparagine concentration found to be present in fruit juices like Guava Juice, Apple Juice, Mango Juice, Litchi juice, Strawberry juice, Pineapple juice Lemon juice, and Orange juice. Hence the developed biosensor has commercial aspects in quality insurance of fruit juices.

Keywords : fiber optic biosensor, chitosan, teos, l-asparaginase

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