

Biosensors for food safety monitoring



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Food safety and quality is one of the most relevant issues regulated around the world and of increasing concern for consumers, leading producers to search for innovative technologies to control production. Biosensors are expected to revolutionise the agro-food industry as the best alternative method to monitor key parameters along the processing and supply chain in order to ensure food quality and safety. The specificity, high sensitivity, speed, easy handling and their capacity to work in real time are the most important characteristics of these devices in the detection of molecules of interest.

Biosensors are systems that incorporate a biochemical sensing element immobilised on a transducer system that relates the concentration of the analyte to the measurable signal.

BIOLAN is a Spanish Biotech SME with broad and proven experience in developing enzymatic-amperometric biosensors, combining the high specificity and the selectiveness of enzyme-analyte reactions with the high sensitive electrochemical transduction, offering unique analytical solutions to the food industry in the fields of wine production, fish/seafood and dairy products.

BIOFISH³⁰⁰

Histamine is a common biogenic amine produced by bacterial action in fish, which content may vary depending on the degree of freshness and can therefore be considered a significant spoilage indicator. In high concentrations (above 200-500mg/kg) histamine is toxic and leads to symptoms similar to severe allergic reactions. For fishery products from fish species with high amount of histidine, a limit of 200mg/kg is established by the Commission Regulation (EC) No.2073/2005.

BIOFISH 300-Histamine biosensor is applied for the specific quantification of histamine without the interference of other biogenic amines. The test method consists of a very simple aqueous extraction followed by a fast quantification by the biosensor.

Matrices	Tuna and <i>Scorbridae</i> family: raw, canned, salted.
Sample Preparation	Aqueous extraction (2-3 minutes)
Sample analysis	4 minutes
Range of analysis	10-200 mg/kg
Quantification Limit	10 mg/kg
Reference Method	HPLC
Validation	Anfaco-Cecopesca.

Sulphites are food additives that have antioxidant and preservative properties. Sulphites are recorded as allergens by the main international regulatory bodies on food safety because of their adverse health effects. Hence, sulphites maximum concentration levels in foodstuff are regulated, and must be ensured by the agro-food processing industries. For fresh, frozen and deep frozen crustaceans and cephalopods maximal sulphite (E220-E228) concentration admitted is 150mg/kg.

BIOFISH 300-Sulphite is intended for the quantification of sulphite in crustaceans. Current methods and tools widely used for sulphite level

monitoring in the agro-food industry and in the crustacean industry in particular, such as Monier Williams, are not suitable for fast, accurate and simple sulphite level monitoring. Biofish 300-Sulphite enables the combination of the accuracy of the methods such as Monier Williams with the rapidity and simplicity of onsite methodologies like test strips at an affordable price for the agro-food industry avoiding the use of harmful substances.

Matrices	Crustaceans
Sample Preparation	Maximum of 5 minutes: use of an ultraturax or ultrasonic bath for extracting the sulphite to an aqueous media.
Sample analysis	3 minutes.
Range of analysis	30-300 mg/kg
Reference Method	Monier Williams
Validation	Anfaco-Cecopesca.

BIOMILK³⁰⁰

Lactose intolerance is a common digestive problem where the body is unable to digest lactose, a disaccharide found in milk and dairy products. Replacing the sources of lactose with lactose free products produced by enzymatic hydrolysis is enough to control the symptoms. Current available determination methods, HPLC, mid-infrared detection, photometric method, enzyme assays and polarimetry are time-consuming and cannot differentiate individual carbohydrates. Therefore, accurate and simple methods are demanded to control residual lactose in dairy products.

BIOMILK 300-Lactose is a biosensor-based technology for direct determination of lactose in dairy products without interference of glucose nor galactose as a simple, reliable, lowcost and specific tool.

Matrices	Milk and dairy products
Sample Preparation	Activated carbon (3 min)
Sample analysis	5 minutes
Range of analysis	Lactose free ($\leq 0,01\%$): 0-200 mg/l Low lactose ($\leq 0,1\%$): 0- 2000 mg/l Reduced Lactose: 0-6000 mg/l
Uncertainty	$\pm 15\%$
Reference Method	HPLC
Validation	MAGRAMA

BIOLAN promotes research, development and innovation projects for taking biosensoric technology for the agrofood industry as a reference. BIOLAN offers technological services to meet the analysis requirement of the agro food industry by developing specific solutions based on biosensoric technology.

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