FOODQUALITY

Food and Feed Analysis

Ginper Group

BioSystems
REAGENTS & INSTRUMENTS

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- Certified Management System
- EN ISO 9001

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FOODQUALITY

Modern society demands safe foods that are readily traceable and properly labelled. Current regulations and standards (ISO, BRC, IFS) are used to safeguard food safety and ensure that consumers have quality products of high added value.

To avoid a public health risk, food hazards are tested using a variety of techniques, among them, immunoassay due to its reliability, easy management and low cost. In addition to microbiology, which plays an indisputable role in food safety, risk substances can be divided into several groups, most notably, allergens, mycotoxins, sulfites and histamine, among others. Several renowned world organizations (WHO/FAO, EFSA, FDA, etc.) also continuously review these substances to identify new hazards.

Furthermore, processed foods require comprehensive raw material and finished product testing in production plants to minimize cross-contamination. Also, sugars, organic acids, additives and other components in food and beverages are key parameters in order to control processes, quality and nutrition facts.

BioSystems, S.A., leaders in the manufacturing and distribution of reagents and instruments for the clinical diagnostic and agri-food industries, provide testing laboratories and food companies with the analytical tools and pre- and post-sales technical support needed to ensure the quality and safety of their products.

Best regards,

Antonio Elduque
CEO

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FOODQUALITY

Enzymatic / Chemical Reagents

ADVANTAGES

- Liquid Reagents*, stable until the expiry date
- Standards included in the kit
- Dedicated reagents
- Ready to use
- Automation in BioSystems instruments

Enzymatic and chemical reagents are simple and efficient methods used to measure substances in food and beverages through photometry. BioSystems reagents are a sensitive and specific way to identify sugars, organic acids, additives, cations and other components in food and beverages, in order to control processes, quality and nutrition facts.

Also, the analysis of by-products produced by microorganisms like lactic acid, acetic acid, ethanol or histamine is important to control the presence/absence of growing and thus, control the hygiene and the process of our products in a rapid and efficient way.

*Except some lyophilized components:
12810, 12820, 12825, 12828 and 12843

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Sugars

The enzymatic method is official analytical method in some cases, and is a quick, affordable, and efficient alternative compared with laborious manual methods or chromatography. Pretreatment methods for sugars in foods and beverages have been carefully validated while taking into account their biochemical nature and with the aim of maximizing extraction. All of these reagents can be automated.

	Reagent	Code
Sugars*	D-Glucose/D-Fructose	12800
	Sucrose/D-Glucose/D-Fructose	12819

*Lactose and maltose coming soon

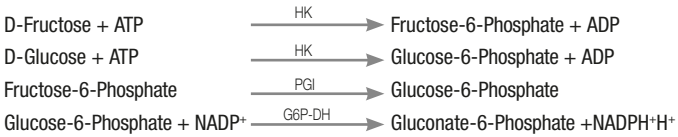
The analysis of simple **sugars** is a tool required when monitoring different food processes, in the detection of adulterations and the measurement of nutritional parameters. Given that specific populations must restrict their sugar intake (people with diabetes, intolerances, obesity, etc.), different global regulations control the correct labeling of sugars in food.

Simple sugars, monosaccharides and disaccharides, occur naturally in many foods and beverages and/or they are added artificially for various technical purposes, such as to sweeten the end product. Information on the composition of simple sugars in foods is useful with regards to product quality or for nutrition labeling purposes.

D-Glucose / D-Fructose

The D-glucose/D-fructose kit detects the most common isomer of both sugars, and therefore measures their exact content in several food matrices such as juices and beverages, vegetables, dairy and meat products, or honey.

D-fructose and **D-glucose** in the sample generate NADH (by the following reaction), which can be measured by spectrophotometry. The configuration of these reagents allows **D-glucose/D-fructose** (total sugars) to be determined if the enzyme PGI is added or **D-glucose** to be determined if it is not.

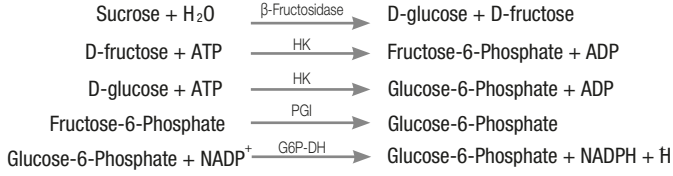


Kit Volume:	120 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	8 g/L
Limit of detection:	D-Glucose: 0,01 g/L D-Glucose/D-Fructose: 0,01 g/L

Sucrose / D-Glucose / D-Fructose

The Sucrose/D-glucose/D-fructose kit measures sucrose or the sum of the three simple sugars in different food matrices such as juices and beverages, vegetables, and dairy and meat products.

Sucrose, D-fructose and **D-glucose** in the sample generate NADPH (by the following reaction), which can be measured by spectrophotometry. The configuration of these reagents allows sucrose or **Sucrose/D-glucose/D-fructose** (total sugars) to be determined.



Kit Volume:	60 mL
Method:	One-reagent end point or two-reagent differential determination, reading at 340 nm
Limit of linearity:	Sucrose 4 g/L, Total sugar: 8 g/L
Limit of detection:	Sucrose 0.08 g/L, Total sugar 0.07 g/L

Organic Acids

The analysis of different **organic acids** in food matrices can be used to measure additives, to detect bacterial or fungal by-products (lactic acid, acetic acid, etc.) and to monitor processes such as fermentation. Moreover, the content of different organic acids found in a given food matrix provides information about the quality of the product.

	Reagent	Code
Organic Acids	D-Lactic Acid	12801
	L-Lactic Acid	12802
	L-Malic Acid	12803
	Acetic Acid	12810
	D-Gluconic Acid/D-Gluconolactone	12811
	Tartaric Acid	12808
	Citric Acid	12825
	Ascorbic Acid	12828
	Pyruvic Acid	12826
	L-Glutamic Acid (Glutamate)	12830
	D-Isocitric Acid	12844

D-Lactic Acid

D-lactic acid is an acid produced by various microorganisms as a result of glucose metabolism. The presence of D-lactic acid is usually an indication of undesired fermentation in many foods such as juices, beverages, milk, or sugar beet, and it can be used as a very quick method of monitoring for the appearance of microorganisms in order to ensure product safety and hygiene.

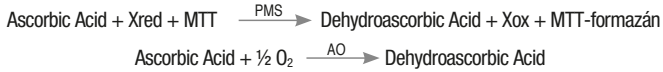
D-lactic acid in the sample yields NADH (by the following reaction), which can be measured by spectrophotometry.

Kit Volume:	120 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	0,25 g/L
Limit of detection:	0,004 g/L

Ascorbic Acid

D-ascorbic acid is an organic acid that occurs naturally in different plant-based foods (juices, vegetables, fruits, etc.), or is added artificially as a preservative (meat products, desserts, etc.). Its powerful antioxidant action stops foods from undergoing oxidative processes, while determination of D-ascorbic acid levels indicate the food's quality at source and throughout its shelf life.

Ascorbic acid in the sample lowers MTT in the presence of PMS, forming dehydroascorbic acid and MTT-formazan that can be assayed by spectrophotometry. In a second determination, ascorbic acid is eliminated by oxidation and other reducing substances (Xred) are measured. The difference between the results is the ascorbic acid concentration



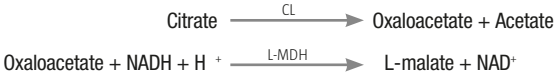
Kit Volume:	90 mL
Method:	Two-reagent differential determination reading at 560 nm
Limit of linearity:	1000 mg/L (ST1)*; 250 mg/L (ST2)*
Limit of detection:	1 mg/L (ST1)*; 2 mg/L (ST2)*

*ST: Sample Type

Citric Acid

Citric acid is an organic acid that either occurs naturally in different plant-based foods (juices, vegetables, fruits, etc.), or is added artificially as a preservative (meat products, desserts, etc.). Measurements of some organic acids (citric, malic, tartaric, or isocitric) are used to detect juice adulteration, as each fruit has a specific profile of organic acids.

Citrate in the sample yields oxaloacetate due to the action of the enzyme known as lyase citrate. All oxaloacetate from citrate in the sample is converted into L-malic acid by the enzyme L-malate dehydrogenase. This enzyme uses NADH as a coenzyme and is oxidized to NAD+. The disappearance of NADH may be read by spectrophotometry.



Kit Volume:	50 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	400 mg/L
Limit of detection:	11 mg/L

D-Isocitric Acid

D-isocitric acid is an organic acid which, together with measurements of citric and other acids, is used to determine whether juices are authentic because it serves as an indicator of adulteration. Measurements of some organic acids (citric, malic, tartaric, or isocitric) are used to detect juice adulteration, as each fruit has a specific profile of organic acids.

D-isocitric acid in the sample generate, by means of the reaction described below, oxoglutarate, CO_2 and NADPH that can be measured by spectrophotometry

Kit Volume:	100 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	1000 mg/L
Limit of detection:	8 mg/L

Cations

	Reagent	Code
Cations	Iron	12817
	Calcium	12824
	Copper	12814
	Potassium	12823

Calcium

Calcium is a metal cation that occurs naturally in various foods such as dairy products, or is added artificially to enrich products because of its beneficial properties for the human body.

Calcium in the sample reacts with 2,7-[bis(2-arsonophenylazo)]-1,8-dihydroxynaphthalene-3,6-disulfonic acid (Arsenazo III). The color increase is directly proportional to the calcium concentration of the sample.

$$\text{Calcium (Ca)} + \text{Arsenazo III} \xrightarrow{\text{pH = 6,5}} \text{[Ca-(Arsenazo III)]}$$

Kit volume:	80 mL
Method:	Two-reagent differential determination reading at 635 nm
Limit of linearity:	180 mg/L
Limit of detection:	2 mg/L

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Sulfite

	Reagent	Code
Sulfite	Total Sulfite	12806
	Free Sulfite	12813
	Sulfite	12845
	Sulfite Control	12827

Sulfites are preservatives added artificially to different foods such as meat products, shellfish, jams, cookies, or beverages. They can cause hypersensitivity in some people, and as such they are regulated as both allergens (Food Labeling Regulation 1169/2011) and additives, and their maximum permitted limits by food group are established in Regulation 1129/2011.

Sulfite in the sample reacts with 4,4'-(4-iminocyclohexa-2,5-dienyli-denemethylene) dianiline chromogen (pararosaniline; PR) and formaldehyde (F) in acid medium. In a second reaction, free sulfite is removed by oxidation and the rest of substances (I) that are able to react with the chromogen are measured. The difference between the results obtained from the two reactions is the sulfite concentration.

Kit volume:	300 mL
Method:	Two-reagent differential determination reading at 560 nm
Limit of linearity:	50 mg/L
Limit of detection:	0,92 mg/L

Ref. 12845

$SO_2 + PR + I \xrightarrow{pH = 0,9 / F} [PR\text{-}F\text{-}SO_2] + [PR\text{-}F\text{-}I]$

$SO_2 + PR + I \xrightarrow[+Oxidizer - SO_2]{pH = 0,9 / F} [PR\text{-}F\text{-}I]$

Phosphated and Nitrogenous Substances

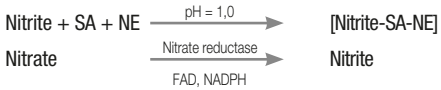
	Reagent	Code
Phosphated and Nitrogenous* Substances	Ammonia	12809
	Nitrite	12842
	Nitrate/Nitrite	12843
	Phosphate (Phosphorus)	12877

*Urea coming soon

Nitrates and nitrites are substances that can be found naturally in certain vegetables and are added to meat products (sausages, cured meats, cooked meats, fresh meats, etc.) to act as preservatives. They are essential additives because of the protection they offer against *Clostridium botulinum*. They also improve the organoleptic properties of some foods. However, under certain circumstances they produce nitrosamines, which have potentially harmful effects.
Given the risk they may pose to human health, their maximum limits are regulated.

Nitrite in the sample react with sulfanilamide (SA) and naphtylethylenediamine(NE) in an acid media generating a compound measured spectrophotometrically. In a second reaction, **nitrate** is reduced to nitrite by nitrate reductase, NADPH and FAD and initial nitrites and nitrates reduced to nitrites are measured. The difference between the results obtained from the two reactions is the nitrate concentration

Ref. 12843



Kit volume:	120 mL
Method:	Two-reagent differential determination reading at 560 nm

Limit of linearity and detection:
Nitrite
- Limit of detection: 0,05 mg/L (1,7 mg/Kg)
- Limit of linearity: 6,00 mg/L (200 mg/Kg)

Nitrate
- Limit of detection: 0,18 mg/L (6 mg/Kg)
- Measurement interval: 0,18-6,00 mg/L (6-200 mg/Kg)

Applications per sector

		Enology	Vegetables and juices	Dairy products	Meat products	Fish products	Cereal products	Sweets	Other food	Biotech Industries
Sugars	Glucose / Fructose	●	●	●	●		●	●	●	●
	Sucrose	●		●	●		●	●	●	
Organic Acids	D-Lactic	●	●	●				●		●
	L-Lactic	●	●	●			●	●		●
	L-Malic	●	●							
	L-Ascorbic	●	●	●	●		●	●	●	●
	Citric	●	●	●	●		●	●	●	●
	Acetic	●	●	●			●	●	●	●
	Tartaric	●	●							
	Gluconic	●			●					
	Pyruvic	●								
	Glutamic				●		●		●	●
	D-isocitric		●							
Alcohol	Etanol	●	●							
	Glicerol	●	●							●
Phosphated and Nitrogenous Substances	Ammonia	●	●	●	●		●	●		●
	PAN	●	●					●		
	Nitrite	●	●							
	Nitrite/Nitrate	●	●		●					
	Phosphate/Phosphorus		●	●	●	●				
Sulfite	Free Sulfite	●	●							
	Total Sulfite	●	●							
	Sulfite				●	●	●	●	●	
Cations	Iron	●								
	Calcium	●	●	●			●			
	Copper	●					●			●
	Potassium	●								
Other parameters	Polyphenols	●	●							
	CO_2	●	●							
	Acetaldehyde	●								
	Histamine	●		●	●	●				
Allergens	Milk (Beta-Lactoglobulin)		●	●	●		●	●		
	Milk (casein)	●	●	●	●		●	●		
	Total Milk	●	●	●	●		●	●		
	Egg White (Ovomucoid)				●		●			
	Egg (Ovoalbumin)	●								
	Egg (Lysozyme)	●		●						
	Fish	●				●			●	
	Crustacean					●				
	Soy			●	●		●	●	●	
	Cashew				●		●	●		
	Lupin		●		●		●	●	●	
	Almond			●			●	●		
	Hazelnut		●				●	●		
	Peanut			●			●	●		
	Walnut			●			●	●		
	Pistachio			●			●	●		
	Coconut			●			●	●		
	Mustard			●	●				●	
	Sesame			●	●		●		●	
	Gluten	●		●	●		●	●	●	

Other parameters and Multicalibrators

	Reagent	Code
Other parameters	Acetaldehyde	12820
	Glycerol	12812
	Polyphenols (Folin-Ciocalteau)	12815
	Histamine	12829
	Anthocyanins	12831
	Ethanol	12847
Multicalibrators	Multical	12818
	Ions Multical	12841
Pretreatments	Carrez Reagent	12837

Ethanol

Ethanol is the type of alcohol produced when any sugars present in a sample are fermented by yeasts, which are generally *Saccharomyces*. These yeasts occur naturally in fruits and can be transferred to the corresponding juices during processing. If ethanol is observed in a juice, then it means the presence of these undesired microorganisms can be indirectly monitored and it offers the opportunity to ensure the total absence of any alcohol, thus guaranteeing product hygiene or a zero alcohol content that is necessary in certain diets, e.g., Halal.

Ethanol in the sample reacts with alcohol dehydrogenase in the presence of NAD^+ in a basic media generating a compound measured spectrophotometrically

$$\text{Ethanol} + NAD^+ \xrightarrow{\text{ADH}} \text{Acetaldehyde} + NADH$$

Kit volume:	60 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	2000 mg/L
Limit of detection:	25 mg/L

BioSystems Instruments

Robust, easy-to-use, highly reliable instruments for photometric analysis

350

Semi-Automatic Analyzer LED Technology

LED range: 280, 340, 405, 420, 505, 520, 620, 635, 750
Preprogrammed enzymatic and chemical methods,
validated by the R&D Department
User friendly software
USB port for data export
Minimal reagent consumption
Can be used in fieldwork
Low maintenance
User configurable accessories: batteries, flow-cuvettes, etc.

Code: **80176**

15

Random Access Automatic Analyzer

150 test/hour
Wavelengths: 340, 405, 420, 520, 560, 600, 620, 635, 670
Preprogrammed enzymatic and chemical methods,
validated by the R&D Department
User-friendly software
Minimal reagent consumption
Innovative design

Code.: **83106**

Allergens

ADVANTAGES

ELISA

· Rapid and standard methods (20' + 20' + 20')
· Easy handling, low cost
· Reliable results
· High sensitivity
· Validated in different matrices
· Spike solutions available

RAPID TEST

· Results in 10 minutes
· Realiable results
· Easy Handling
· Low cost
· High sensitivity

Food allergens are protein substances from different sources that can cause mild-to-severe immune reactions when consumed by sensitive individuals, even at low concentrations. Potentially allergenic foods are listed in Annex II of Regulation (EU) 1169/2011 and in bodies of regulation around the world, and labelling is compulsory.

It is estimated that 2% to 4% of adults and 6% of children have some kind of food allergy, a trend on the rise in recent years. Consequently, these substances must be detected in raw materials and finished products to ensure consumer safety.

The ELISA allergen test kits are a rapid, efficient tool for analyzing the presence of these substances at very low concentrations, due to the specificity of antigen-antibody binding reactions.

Also rapid tests detect the presence of these substances in a fast and reliable way (screening).

	Allergens	Presentation	Code
Allergens ELISA [1,2]	Milk (ß-lactoglobulin)	96 wells	14112
	Milk (Casein)	96 wells	14113
	Milk Total	96 wells	14123
	Egg White	96 wells	14117
	Ovalbumin	96 wells	14125
	Lysozyme	96 wells	14122
	Fish	96 wells	14118
	Crustaceans (Tropomyosin)	96 wells	14116
	Almond	96 wells	14111
	Cashew	96 wells	14114
	Lupine	96 wells	14121
	Hazelnut	96 wells	14120
	Peanut	96 wells	14126
	Walnut	96 wells	14130
	Pistachio	96 wells	14127
	Mustard	96 wells	14124
	Sesame	96 wells	14128
	Soy	96 wells	14129
	Coconut	96 wells	14115
Allergens Rapid Test	Milk	10 test	14210
	Egg White	10 test	14209
	Fish	10 test	14211
	Crustaceans	10 test	14208
	Soy	10 test	14215
	Almond	10 test	14214
	Hazelnut	10 test	14212
	Peanut	10 test	14213
	Mustard	10 test	14216

1. Sulfite reagent available (see Enzymatic/Chemical reagents)
2. Spike solutions available for each allergen

Gluten

ADVANTAGES

ELISA
· Rapid methods
· Easy handling, low cost
· Reliable results
· High sensitivity

RAPID TEST
· Results in 15 minutes
· Easy handling, low cost
· Reliable results
· High sensitivity
· R5 Antibody
· All items needed for on-site testing, included

Gluten is the protein portion of various cereal grains (wheat, rye, barley and oats). Continuous consumption by people affected by celiac disease will cause the condition to worsen and become chronic. Consequently, it is included in the allergic substances annex of Regulation 1169/2011 and must be listed on the label.

Because the condition is common, a legal limit has been set for the labelling of gluten-free products (20 ppm) to inform consumers and provide products that improve their quality of life.

The ELISA Sandwich kit is used to determine the substance in various raw materials and finished products quickly and efficiently. The rapid kits are used to detect gluten on surfaces and in foods and include all items needed for on-site gluten testing, in accordance with current legislation.

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	Gluten	Presentation	Code
Gluten ELISA	Gluten Sandwich (Gliadin)	96 wells	14119
Gluten R5 Rapid Test	Gluten R5 Flow Through (Food)	10 tests	14206
	Gluten R5 Flow Through (Surfaces)	10 tests	14207

Histamine

ADVANTAGES

ELISA

- Rapid and sensitive methods
- Validated in different matrices
- Easy handling, low cost
- Reliable results
- Detection limits in compliance with current legislation

Biogenic amines are produced by microorganism action on amino acids present in foods. The substances cause some odors and can trigger adverse effects for health at high concentrations.

Histamine – a biogenic amine present in fish, wine and cheese – is the result of bacterial decarboxylation of histidine, an amino acid which causes headaches, vasodilation and increased temperature at high concentrations, an effect also known as histamine shock. The maximum limit for histamine in fish has been set at 100 to 200ppm, according to the body of legislation.

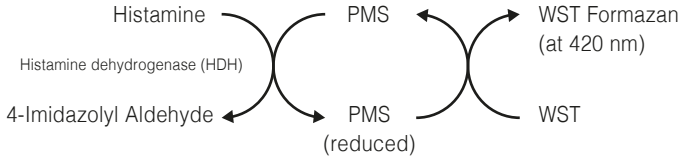
The histamine kits provide efficient histamine testing in a variety of matrices, using different formats (rapid tests, ELISA and enzymatic kits).

	Histamine	Presentation	Code
Histamine	Histamine Enzymatic*	100 mL	12829
	Histamine High Sensitivity	96 wells	FCE3100
	Histamine Fast	48 wells	FCE3600
	Histamine Rapid Test	24 tests	FCL3200

*Automation in BioSystems Instruments

Histamine Enzymatic

Histamine in the sample originates, by means of the coupled reactions described below, acoloured complex that can be measured by spectrophotometry



Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 420 nm
Limit of linearity:	200 mg/Kg
Limit of detection	1,43 mg/Kg

Histamine Enzymatic has been validated by ANFACO-CECOPESCA in front of official method HPLC-UV

Mycotoxins

ADVANTAGES

ELISA
· Rapid and standard methods
· Easy handling, low cost
· Reliable results
· High sensitivity
· Validated in multiple matrices

RAPID TEST
· Results in 10 minutes
· All items needed for on-site testing, included
· Easy handling, low cost
· Reliable results
· Cut-off in compliance with current regulation

Mycotoxins are toxins produced by fungi from the Fusarium, Aspergillus and Penicillium genera. These molds colonize a wide variety of products, such as cereals, nuts, dried fruits, grapes, coffee and cocoa, and have carcinogenic or neurotoxic effects. They are highly stable to processes used in the food industry and pose a high risk to health and, therefore, must be tested, as established in current regulations.

Mycotoxins are highly stable to food industry treatments and represent a huge risk to human health. Regulation UE 1881/2006 and other legislation around the world stablish the maximum level permitted in different foodstuff.

ELISA kits and rapid tests to determine mycotoxins are a rapid, efficient tool to analyze the presence of these substances at the levels required by the legislation and have been validated in various matrices.

Mycotoxins	Cereals	Dairy	Nuts	Feed	Coffee	Beverages	Spices	Honey
Mycotoxins ELISA								
Aflatoxin B1	●		●	●				●
Aflatoxin B1 Sensitive	●		●	●			●	
Total Aflatoxin	●		●	●			●	
Aflatoxina M1		●						
Deoxynivalenol (DON)	●			●		●		●
Fumonisine B1	●							
Ochratoxin A	●				●	●	●	
T-2 Toxin	●							
Zearalenone	●	●		●				
Mycotoxins Rapid Test								
Aflatoxin B1	●		●					●
Aflatoxin Total	●		●					
Ochratoxin A	●				●	●		
Zearalenone	●							
Deoxynivalenol (DON)	●							

	Mycotoxins	Tests	Code
Mycotoxins ELISA	Aflatoxin B1	96 wells	14100
	Aflatoxin B1 Sensitive	96 wells	14101
	Total Aflatoxin	96 wells	14104
	Aflatoxin M1 Fast	96 wells	14102
	Aflatoxin M1 Sensitive	96 wells	14103
	Deoxynivalenol (DON)	96 wells	14105
	Fumonisin	96 wells	14106
	Ochratoxin A	96 wells	14108
	T-2 Toxin	96 wells	14109
	Zearalenone	96 wells	14110
Mycotoxins Rapid Test	Aflatoxin B1	10 tests	14200
	Total Aflatoxin	10 tests	14201
	Ochratoxin A	10 tests	14202
	Ochratoxin A in wine	10 tests	14203
	Zearalenone	10 tests	14204
	Deoxynivalenol (DON)	10 tests	14205

ELISA Instruments

Robust, easy-to-use, highly reliable equipment for ELISA plate washing and reading

50TS: ELISA plate washer

The Bio-Tek plate washer automates plate washing processes and includes a dispensing mode.

Cód.: **E76159**

800TS: ELISA plate reader&SW Gen5

The Bio-Tek plate reader is based on absorbance reading at the wavelengths used in ELISA assays (405, 450, 490, 630). The reader comes with user-friendly advanced software (Gen5) to facilitate data management as well as to obtain and adjust concentrations to various calibration curves.

Software Gen5 data management (included): Flexible, robust and efficient software. Used together with ELISA reader, Gen5 optimizes time and allows the management of the obtained data.

Cód.: **E76158**