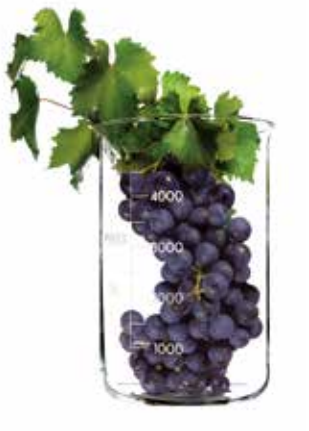
Wine Analysis Made Easy

ENOLOGY

BioSystems
REAGENTS & INSTRUMENTS



ENOLOGY

Since its inception in 1981, BioSystems has offered reliable, efficient analytical systems to laboratories worldwide.

Our head offices in Barcelona occupy 16,000 m^2 and are staffed by a young, highly qualified team of employees devoted to the research, development, production and marketing of a wide variety of instruments and reagents of utmost quality and outstanding features.

Building on our teamwork and interest in new markets and business units, **BioSystems has developed a new system for wine analysis.**

Thanks to the high-level scientific expertise of BioSystems staff, we continue to create technologically innovative products that meet the growing needs of laboratories.

We are also conducting ongoing research to improve the procedures used to obtain raw materials and optimize reagent manufacturing.

All research and manufacturing processes are governed by stringent control standards, and our quality systems are regulated by various European and international standards.

At BioSystems we stress the need for innovation and work tirelessly to gain your confidence and loyalty.

We are fully committed and determined to serve you better than anyone else, knowing that this is no easy challenge.

Your satisfaction is the reason for our work and our enthusiasm.

Sincerely yours,

Antonio Elduque
Managing Director

BioSystems
REAGENTS & INSTRUMENTS

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Acetaldehyde

Enzymatic analysis for acetaldehyde determination

ADVANTAGES

Stable working reagent for 3 weeks
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Acetaldehyde is one of the components of the oxidative chain of alcoholic fermentation. Acetaldehyde is also formed in the wine aging process by ethanol oxidation. Acetaldehyde concentration is closely related to SO_2 content. This combination is responsible for antioxidant activity.

This is the reason why acetaldehyde is one of the main quality control parameters for wine.

Acetaldehyde in the sample yields NADH (by the following reaction), which can be measured by spectrophotometry.

$$\text{Acetaldehyde} + NAD^+ \xrightarrow{\text{ALDH}} \text{Acetic Acid} + NADH + H^+$$

Kit volume:	50 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	200 mg/L
Limit of detection:	0.1 mg/L

Ref. 12820

Acetic Acid

Enzymatic method for acetic acid determination

ADVANTAGES

Stable working reagent for 1 month
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Acetic acid is produced during both alcoholic and malolactic fermentations and helps enhance flavors and aromas. When the wine is aerated or remains in contact with air, acetic acid bacteria can multiply, leading to a problem known as "acetic spoilage". The characteristic aroma of this spoilage is due to ethyl acetate.

Acetate in the sample consumes NADH (by the following reaction), which can be measured by spectrophotometry.

$$\text{Acetate} + \text{ATP} \xrightarrow{\text{AK}} \text{Acetyl Phosphate} + \text{ADP}$$
$$\text{ADP} + \text{PEP} \xrightarrow{\text{PK}} \text{ATP} + \text{Pyruvate}$$
$$\text{Pyruvate} + \text{NADH} \xrightarrow{\text{D-LDH}} \text{Lactate} + \text{NAD}^+$$

Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	1.3 g/L
Limit of detection:	0.03 g/L

Ref. 12810

Ammonia

Enzymatic method for ammonia determination

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Low nitrogen levels have been related to slow fermentation or sulfide production. Conversely, high levels can lead to microbial instability and production of ethyl carbonate.

Ammonia in the sample consumes NADH (according to the following reaction), which is then assayed by spectrophotometry.

$$NH_4^+ + \text{NADH} + H^+ + \text{2 - Oxoglutarate} \xrightarrow{\text{GLDH}} \text{Glutamate} + NAD^+$$

Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	200 mg/L
Limit of detection:	3 mg/L

Ref. 12809

Anthocyanins

Colorimetric analysis for the assay of anthocyanins

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Anthocyanins are the tinted pigments in grapes, with the word coming from the Greek root "antos" (flower) and "kyanos" (blue). These pigments are found in both the skin and the pulp. Anthocyanins can actually have other colorations based on pH and also on their interrelation with other polyphenols. These combinations with other polyphenols can help further stabilize wine color; hence, high interest in analyzing it is warranted.

Anthocyanins are water-soluble pigments that provide the characteristic red color of wine. At 520 nm and under certain conditions, the color is proportional to anthocyanin concentrations. The proposed method determines ionized and ionizable anthocyanins present in the sample. Anthocyanins polymerized with tannins or other compounds cannot be assayed with this method.

Kit volume:	100 mL
Method:	End point with reading at 520 nm
Limit of linearity:	1386 mg/L
Limit of detection:	12 mg/L

Ref. 12831

Ascorbic Acid

Enzymatic method for ascorbic acid determination

ADVANTAGES

Stable working reagent for 10 days
Ready-to-use dedicated reagent
Calibrator included in the kit. Once reconstituted, stable for 20 days

Ascorbic acid is a compound found in ripe grapes at very low levels compared with other acids (30-60 mg/L). It disappears rapidly when grapes are crushed, leading to early oxidation of must. Due to its reducing properties, ascorbic acid is used as an effective antioxidant and can be used in wines and must at amounts no higher than 100 mg/L.

Ascorbic acid in the sample lowers MTT in the presence of PMS electron carrier, forming dehydroascorbic acid and MTT-formazan that can be assayed by spectrophotometry. In a second determination, ascorbic acid is eliminated from the sample by oxidation to dehydroascorbic acid (ascorbate oxidase [AO]) and other reducing substances (Xred) are measured. The difference between the results obtained from the two reactions is the ascorbic acid concentration.[1,2]

$$\text{Ascorbic Acid} + \text{Xred} + \text{MTT} \xrightarrow{\text{PMS}} \text{Dehydroascorbic Acid} + \text{Xox} + \text{MTT-Formazan}$$

$$\text{Ascorbic Acid} + \tfrac{1}{2}\,O_2 \xrightarrow{\text{AO}} \text{Dehydroascorbic Acid}$$

Kit volume:	90 mL
Method:	Two-reagent differential, reading at 560 nm
Limit of linearity:	150 mg/L
Limit of detection:	1 mg/L

Ref. 12828

Calcium

Colorimetric analysis for calcium determination

ADVANTAGES

Stable two-reagent liquid until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Calcium is present in wine at concentrations of 6 to 165 mg/L. The concentrations may be higher, depending on the soil characteristics, some deacidification processes, etc. Instability due to calcium tartrate appears at 4 to 7 months of fermentation and depends largely on alcohol content, pH, temperature, etc. Controlling these precipitates is key to ensuring wine quality.

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

Ref. 12824

Catechins

Colorimetric analysis for the assay of catechins

ADVANTAGES

Stable liquid reagent until the expiration date
Stable working reagent for 4 months
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Catechins are phenolic compounds from the family of flavonoids belonging to the flavanol subgroup. They are reducers and prevent anthocyanin oxidation, keeping them from being precipitated. They are also responsible for the bitterness, astringency, yellow hue, structure and stability of the wine. When catechins are polymerized, they form procyanidins that gradually form complexes with proteins, peptides and polysaccharides as the wine ages. This softens and clarifies wines.

Catechins in the sample react with the chromogen 4-(dimethylamino)-cinnalmaldehyde in the presence of ethanol and an acidic medium, forming a colored complex that can be assayed by spectrophotometry.

$$\text{Catechins} + \text{DMACA} \longrightarrow \text{[Catechins -DMACA]}$$

Kit volume:	100 mL
Method:	Two-reagent differential, reading at 620 nm
Limit of linearity:	500 mg/L
Limit of detection:	12 mg/L

Ref. 12834

Citric Acid

Enzymatic method for citric acid determination

ADVANTAGES

- Stable liquid reagent until the expiration date
- Stable working reagent for 1 month
- Ready-to-use dedicated reagent
- Liquid calibrator included in the kit

Citric acid is an organic acid naturally present in wine that contributes to total wine acidity. Its content is higher in white wine, as the content in red wine drops during malolactic fermentation yielding volatile acids. The permissible legal limit is 1 g/L, and its concentration must be controlled by wine exporters.

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.

$$\text{Citrate} \xrightarrow{\text{CL}} \text{Oxaloacetate} + \text{Acetate}$$

$$\text{Oxaloacetate} + \text{NADH} + \text{H}^+ \xrightarrow{\text{L-MDH}} \text{L-Malate} + \text{NAD}^+$$

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

Ref. 12825

Color

Colorimetric analysis for color determination

ADVANTAGES

- Stable liquid reagent until the expiration date
- Ready-to-use dedicated reagent

Wine color plays a major role in the impression of quality. Color is also an important indicator in many winemaking processes. Regular use of this test allows enologists to document and confirm their own impressions.

The wine sample is diluted in a buffer solution that does not alter color-related properties. Absorbance reading at 420 nm, 520 nm and 620 nm allows the chromatic characteristics to be calculated.

Kit volume:	80 mL
Method:	One-reagent end point determination, readings at 420, 520 and 620 nm
Limit of linearity:	16.5 (A_{420}, A_{520} and A_{620})
Limit of detection:	0.113 (A_{420}), 0.144 (A_{520}) and 0.121 (A_{620})

Ref. 12816

Copper

Colorimetric analysis for copper determination

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Copper is a metal that clearly originates in the process of vinegrowing. The main source is phytosanitary treatments of vineyards to prevent mildew. During harvest, the copper content may be 4 to 6 mg/L. During fermentation its concentration decreases to 0.2-0.3 mg/L due to the formation of copper sulfides or the presence of yeasts that fix the copper contained in the medium. The International Organisation of Vine and Wine (OIV) has set a maximum acceptable limit of copper of 1 mg/L.

Any copper in the sample reacts with 4-(3,5-dibromo-2-pyridylazo)-N-ethyl-N-sulfopropylaniline (PAESA) sodium salt in acidic medium and in the presence of a reducer. The color increase is directly proportional to the copper concentration of the sample.

$$\text{Copper (Cu)} + 2\text{PAESA} \xrightarrow[\text{reducing agent}]{\text{pH=4.7}} [\text{Cu(PAESA)}_2]$$

Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 560 nm
Limit of linearity:	7 mg/L
Limit of detection:	0.4 mg/L

Ref. 12814

CO_2

Enzymatic method for CO_2 determination

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Carbon dioxide is a natural gas produced during fermentation that is dissolved in wines. The addition of CO_2 during preparation directly affects the aroma and taste of wine and can enhance freshness and acidity in the mouth, softening the sweetness. However, it can also intensify bitterness and astringency.

According to the coupled reactions described below, carbon dioxide (CO_2) in the sample consumes NADH analogue cofactors that can be assayed by spectrophotometry at 405 nm.

$$\text{Phosphoenolpyruvate} + HCO3 \xrightarrow{\text{PEPC}} \text{Oxaloacetate} + H2PO4^-$$

$$\text{Oxaloacetate} + \text{Analogue NADH} \xrightarrow{\text{MDH}} \text{Malate} + NAD^+ \text{ Analogue}$$

Kit volume:	50 mL
Method:	Single-reagent fixed time, reading at 405 nm
Linearity:	1500 mg/L
Limit of detection:	55 mg/L

Ref. 12832

D-Gluconic Acid / D-Gluconolactone

Enzymatic method for D-gluconic acid / D-gluconolactone determination

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

D-gluconic acid is an indicator of grape deterioration and sanitary condition.

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

$$\text{D-Gluconate} + ATP \xrightarrow{GK} \text{D-Gluconate-6-P} + ADP$$

$$\text{D-Gluconate-6-P} + NADP^+ \xrightarrow{\text{6-PGDH}} \text{Ribulose-5-P} + NADPH + CO_2 + H^+$$

D-gluconolactone can be determined according to the same principle after alkaline hydrolysis.

$$\text{D-Gluconolactone} + H_2O \xrightarrow{\text{pH11}} \text{D-Gluconate}$$

Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	2 g/L
Limit of detection:	0.003 g/L

Ref. 12811

D-Glucose / D-Fructose

Enzymatic method for D-glucose / D-fructose determination

ADVANTAGES

Stable liquid reagent until the expiration date
Working reagent stable until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

This test indicates the best moment for grape harvesting and allows alcoholic fermentation to be monitored. It is widely used to determine the dryness of the wine before bottling.

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.

$$\text{D-Fructose} + \text{ATP} \xrightarrow{\text{HK}} \text{Fructose-6-Phosphate} + \text{ADP}$$
$$\text{D-Glucose} + \text{ATP} \xrightarrow{\text{HK}} \text{Glucose-6-Phosphate} + \text{ADP}$$
$$\text{Fructose-6-Phosphate} \xrightarrow{\text{PGI}} \text{Glucose-6-Phosphate}$$
$$\text{Glucose-6-Phosphate} + \text{NADP}^+ \xrightarrow{\text{G6P-DH}} \text{Gluconate-6-Phosphate} + \text{NADPH} + \text{H}^+$$

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

Ref. 12800

D-Lactic Acid

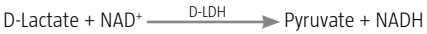
Enzymatic method for D-lactic acid determination

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

The excess of bacteria that are producing D-Lactic acid can inhibit alcoholic fermentation, converting some sugars into D-lactic acid. This is one of the main problems in the winemaking process. Levels above 0.3 g/L of D-lactic acid indicate bacterial contamination.

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



Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	0.25 g/L
Limit of detection:	0.004 g/L

Ref. 12801

Free Sulfite

Colorimetric analysis for free sulfite determination

ADVANTAGES

Stable liquid reagent until the expiration date
Stable working reagent for 9 months
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Most sulfur dioxide added to the must or wine combines with different organic compounds. This is the predominant fraction in wine; however, there is another fraction that is not combined, namely, free SO2. Although it is present in lower amounts, its antiseptic and antioxidant properties are superior to those of combined sulfite.

Any free sulfites in the sample react with 4,4'- (4-iminocyclohexa-2,5-dienylidene) methyl) dianiline (pararosaniline) dye in the presence of formaldehyde and in acidic medium. The color increase of the sample is directly proportional to the free sulfite concentration.

Kit volume:	400 mL
Method:	Two-reagent differential determination reading at 560 nm
Limit of linearity:	150 mg/L
Limit of detection:	3 mg/L

Ref. 12813

Glycerol

Colorimetric analysis for glycerol determination

ADVANTAGES

Stable one-reagent liquid until expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Glycerol is an indicator of the quality of finished wine and is extremely important for the mouthfeel. High glycerol concentrations add sweetness, body and fullness to the wine.

Glycerol in the sample yields (by the following reaction), a colored complex that is assayed by spectrophotometry.

$$\text{Glycerol} + \text{ATP} \xrightarrow{\text{glycerol kinase}} \text{Glycerol-3-P} + \text{ADP}$$

$$\text{Glycerol-3-P} + O_2 \xrightarrow{\text{G-3P-oxidase}} \text{Dihydroxyacetone-P} + H_2O$$

$$2\,H_2O_2 + \text{4-Minoantipyrine} + \text{4-Chlorophenol} \xrightarrow{\text{peroxidase}} \text{Quinone-Imine} + 4\,H_2O$$

Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 500±20 nm
Limit of linearity:	20 g/L
Limit of detection:	0.24 g/L

Ref. 12812

Histamine

Enzymatic method for the assay of histamine

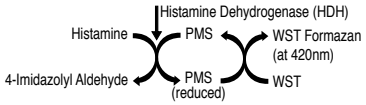
ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Histamine is a biogenic amine, a chemical compound formed by the action of microorganisms on amino acids present in foods.

Histamine is present particularly in fermented foods such as wines, cheese and meats, as well as fish. High amounts of histamine in food can cause organoleptic alterations as well as trigger undesirable effects once consumed and, therefore, histamine concentrations should be controlled. Although it is true that there are currently no global regulations, acceptable limits for histamine concentrations in wines are around 10 ppm, even though lower amounts are recommended in the case of export to other countries.

By means of the coupled reactions described, histamine in the sample yields a colored complex that is quantitated by spectrophotometry[1, 2, 3].



Kit volume:	100 mL
Method:	Two-reagent differential, reading at 420 nm
Limit of linearity:	2.1 a 160 mg/L
Limit of detection:	2.1 mg/L

Ref. 12829

Iron

Colorimetric analysis for iron determination

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Metal components in wine can originate in grapes or the machinery used to make wine. A high iron content can cause clouding due to a lack of solubilization, thus affecting the color and clarity of the wines.

Any iron in the sample reacts with 3-(2-pyridyl)-5,6-bis (4-phenyl-sulfonic)-1,2,4-triazine (ferrozine) sodium salt in acidic medium and in the presence of a reducing agent. The color increase is directly proportional to the iron concentration of the sample.

$$\text{Iron (Fe)} + \text{Ferrozine} \xrightarrow[\text{reducing agent}]{\text{pH=4.1}} \text{[Fe-Ferrozine]}$$

Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 560 nm
Limit of linearity:	30 mg/L
Limit of detection:	0.4 mg/L

Ref. 12817

L-Lactic Acid

Enzymatic method for L-lactic acid determination

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

L-lactic acid is the product of the metabolism of malic acid during the malolactic fermentation. L-lactic acid is perceived as less acidic and softer on the palate compared to malic acid.

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

$$\text{L-Lactate} + \text{NAD}^+ \xrightarrow{\text{L-LDH}} \text{Pyruvate} + \text{NADH}$$

Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	3 g/L
Limit of detection:	0.02 g/L

Ref. 12802

L-Malic Acid

Enzymatic method for L-malic acid determination

ADVANTAGES

- Stable liquid reagent until the expiration date
- Stable working reagent for 4 months
- Ready-to-use dedicated reagent
- Liquid calibrator included in the kit

L-malic acid is responsible for the sharply acidic, green apple flavor in wine. It's fermentation yields L-lactic acid and causes perceived acidity to soften.

L-malic acid in the sample yields NADH (by the following reaction), which can be measured by spectrophotometry. The equilibrium of this reaction moves toward L-malic acid formation. The enzyme glutamate-oxaloacetate transaminase (GOT) causes the equilibrium to shift by eliminating oxaloacetate, which is converted into L-aspartate in the presence of L-glutamate.

$$\text{L-Malate} + NAD^+ \xrightarrow{\text{L-MDH}} \text{Oxaloacetate} + NADH$$

$$\text{Oxaloacetate} + \text{L-Glutamate} \xrightarrow{\text{GOT}} \text{Aspartate} + \text{2-Oxoglutarate}$$

Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	4 g/L
Limit of detection:	0.016 g/L

Ref. 12803

Polyphenols

Colorimetric analysis for polyphenols determination

ADVANTAGES

- Stable liquid reagent until the expiration date
- Ready-to-use dedicated reagent
- Liquid calibrator included in the kit

Phenol components significantly enhance the antioxidant properties, color and mouthfeel of red wines. The importance of these phenol components in sensory perception requires assay at all stages of the winemaking process.

Any polyphenols in the sample react with Folin-Ciocalteu´s reagent in basic medium. The color increase is directly proportional to the polyphenols concentration of the sample.

$$\text{Polyphenols} + \text{Folin-Ciocalteu's Reagent (RF)} \xrightarrow{\text{pH=10.9}} \text{[Polyphenols - FC]}$$

Kit volume:	80 mL
Method:	Two-reagent differential determination reading at 670 nm
Limit of linearity:	3000 mg/L
Limit of detection:	60 mg/L

Ref. 12815

Potassium

Enzymatic method for potassium determination

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

The amount of potassium in grape must varies between 600 and more than 2500 mg/L in certain varieties of red wine. During véraison, soil potassium moves toward the fruit where it forms soluble potassium bitartrate. Alcohol and low temperatures can reduce its solubility, leading to precipitation.

Potassium in the sample consumes NADH (by the following reaction), which can be measured by spectrophotometry.

$$\text{Phosphoenolpyruvate} + \text{ADP} \xrightarrow[\text{PK}]{K^+} \text{Pyruvate} + \text{ATP}$$

$$\text{Pyruvate} + \text{NADH} + H^+ \xrightarrow{\text{LDH}} \text{Lactate} + NAD^+$$

Kit volume:	80 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	1500 mg/L
Limit of detection:	8 mg/L

Ref. 12823

Primary Amino Nitrogen (PAN)

Colorimetric analysis for primary amino nitrogen determination

ADVANTAGES

Stable liquid reagent until the expiration date
Stable working reagent for 12 months
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Nitrogen compounds (molecules containing a primary amine nitrogen) in must and wine play a key role in fermentation and the potential of microbial stability.

Any molecules in the sample that contain a primary amino nitrogen react with o-phthaldialdehyde (OPA) in the presence of a reducing agent in basic medium, yielding a chromogen that is assayed spectrophotometrically.

$$\text{OPA} + NH_2R \xrightarrow[\text{reducing agent}]{\text{pH=9.5}} \text{OPA} - NH_2R$$

Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	400 mg/L
Limit of detection:	1 mg/L

Ref. 12807

Pyruvic Acid

Enzymatic method for pyruvic acid determination

ADVANTAGES

Stable liquid reagent until the expiration date
Stable working reagent for 2 months
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Pyruvic acid is an organic acid naturally present in wine and one of the acids that most influences its body and mouthfeel. Pyruvic acid is a result of the fermentation process and contributes to the organoleptic properties of wine, but must be controlled because selective sulfite-binding shortens the life of the wine.

Pyruvate in the sample yields oxalacetate due to the action of the enzyme known as D-lactate dehydrogenase. This reaction consumes NADH that is oxidized to NAD+ and the disappearance of the latter can be measured by spectrophotometry.

$$\text{Pyruvate} + \text{NADH} \xrightarrow{\text{D-LDH}} \text{Oxaloacetate} + \text{NAD}^+$$

Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 340 nm
Limit of linearity:	400 mg/L
Limit of detection:	6 mg/L

Ref. 12826

Sucrose / D-Glucose / D-Fructose

Enzymatic method for sucrose or total sugar determination

ADVANTAGES

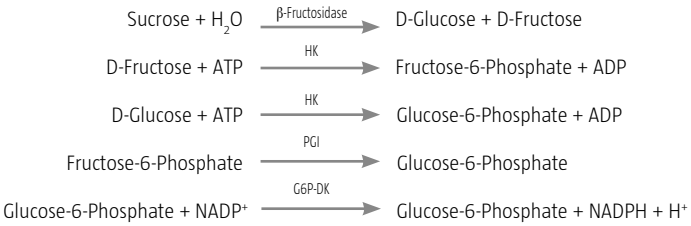
- Stable liquid reagent until the expiration date
- Stable working reagent for 3 months
- Ready-to-use dedicated reagent
- Liquid calibrator included in the kit

Precise analysis of sucrose or total sugar is important for many winecellars in two winemaking operations.

Sparkling wine (cava, champagne, etc.) production: the process may vary according to the method used, but basically consists of adding sucrose once alcoholic fermentation has been carried out in order to achieve a secondary fermentation that produces CO2, which is retained in the wine.

Chaptalization: a technique that consists of adding sucrose to the must when, for various reasons, the grape does not ripen sufficiently and lacks glucose/fructose. This enhances alcoholic fermentation and yields a product with a higher alcohol content. This technique is not approved in all countries.

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

Ref. 12819

Tartaric Acid

Colorimetric analysis for tartaric acid determination

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Tartaric acid is the main acid of wine that can become insoluble, forming various salts. This acid produces the fruity aromas and freshness of wines and is the most commonly used acidifier.

Any tartaric acid in the sample reacts with vanadium salt in acidic medium, forming a colored complex that is assayed by spectrophotometry.

$$\text{Tartaric Acid (TART)} + \text{Vanadium Salt (V)} \xrightarrow{\text{pH=2.5}} [\text{TART-V}]$$

Kit volume:	100 mL
Method:	Two-reagent differential determination reading at 520 nm
Limit of linearity:	0.06 to 6 g/L
Limit of detection:	0.06 g/L

Ref. 12808

Total Acidity

Colorimetric analysis for the assay of total acidity

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Total acidity should be determined in must to ensure good fermentation, as well as in wine after fermentation because it is a key factor for the storage and stability of wine over time. Low acidity means that microbial alterations and wine with defects and of poorer quality is more likely. Low acidity can cause microbial instability that results in wine defects and overall decrease in quality. Wine should have an adequate total acidity value consistent with the other components to achieve good balance. This value can be between 3 and 7 g/L.

Total acidity is the sum of assayable acids in wine or must, such as malic acid, tartaric acid, lactic acid, etc., except for carbonic acid and sulfurous acid. Th is reagent determines the total acidity, expressed as g/L of tartaric acid. Acids in the sample modify the pH in the reaction mixture that, in the presence of the bromothymol blue (BTB) indicator, can be measured spectrophotometrically.

Kit volume:	100 ml
Method:	Two-reagent differential determination reading at 620 nm
Linearity:	12 g/l

Ref. 12846

Total Sulfite

Colorimetric analysis for total sulfite determination

ADVANTAGES

Stable liquid reagent until the expiration date
Ready-to-use dedicated reagent
Liquid calibrator included in the kit

Sulfite is the main preservative of wines and musts, due to its antiseptic properties on yeasts and bacteria; it also has antioxidant properties. According to Council Regulation (EC) No 1493/1999 and Council Regulation (EC) Nº 1622/2000, the sulfur dioxide content of wine is limited, as it is considered to be a slightly toxic substance from the point of view of its effects on human physiology.

Total sulfites in the sample react with 5-5'-dithio-2-nitrobenzoic (DTNB) acid in basic medium. Cleavage of the disulfide bond (R-S-S-R) of DTNB by a sulfite molecule yields the 5-mercaptan-2-nitrobenzoate molecule, which absorbs at 405 nm. The color increase of the sample is directly proportional to the total sulfite concentration of the sample.

$$SO_2 + R\text{-}S\text{-}S\text{-}R\ (DTNB) \xrightarrow{pH=8.2} R\text{-}S\text{-}SO_2 + S\text{-}R$$

Kit volume:	200 mL
Method:	Two-reagent differential determination reading at 405 nm
Limit of linearity:	400 mg/L
Limit of detection:	1 mg/L

Ref. 12806

Control Wine (white and red)

Multiparameter control

Control Wine (white and red) is a wine (10 x 5 mL) that contains various components at adequate concentrations for quality control in laboratories. The product is designed for intra-laboratory quality control and is supplied with acceptable value intervals.

Traceability is only ensured when the reagents and measurement procedures recommended by BioSystems are used.

Component	U
Acetic acid	g/L
Ammonia	mg/L
D-Gluconic acid	g/L
D-Glucose/D-Fructose	g/L
D-Glucose	g/L
Glycerol	g/L
L-Lactic acid	g/L
L-Malic acid	g/L
Primary Amine Nitrogen	mg/L
Polyphenols	mg/L
Tartaric acid	g/L
Calcium	mg/L
Citric acid	mg/L
Histamine	mg/L
Iron	mg/L

Ref. 12821 Ref. 12822

Sulfite Control

Sulfite (I and II) Control is a synthetic liquid material that contains stabilized sulfite at adequate concentrations for quality control in laboratories. It does not contain preservatives that could interfere with the measurements.

The concentration values assigned to each level are shown in the attached tables. The values are traceable to the unit of mass. Traceability is ensured only by using the measurement reagents and procedures recommended by BioSystems. The acceptable ranges suggested have been prepared based on prior experience in interlaboratory variability and are provided only as a guideline, as each laboratory should establish its own precision parameters.

Component	Level	Value	Limits	Unit
Sulfite	I	40	36-44	mg/L
(free and total)	II	80	72-88	mg/L

Ref. 12827

Multical

Multiparameter calibrator

MULTICAL is a multiparameter calibrator with five synthetic matrix liquid levels (5 x 10 mL). It contains various analaytes at adequate concentrations for the calibration of the measurement procedures.

The traceability of the results in samples to reference materials or systems of higher metrological hierarchy is only ensured when the reagents and measurement procedures recommended by BioSystems are used.

Parameter	U	1	2	3	4	5
Acetic acid	g/L	0.15	0.30	0.60	0.90	1.20
Ammonia	mg/L	23	45	90	135	180
Citric acid	mg/L	45	90	180	270	360
D-Gluconic acid	g/L	0.20	0.40	0.80	1.20	1.60
D-Glucose	g/L	0.90	1.80	3.60	5.40	7.20
D-Glucose/D-Fructose	g/L	0.90	1.80	3.60	5.40	7.20
Glycerol	g/L	0.113	0.225	0.450	0.675	0.900
D-Lactic acid	mg/L	0.028	0.056	0.113	0.169	0.225
L-Lactic acid	g/L	0.34	0.68	1.35	2.03	2.70
L-Malic acid	g/L	0.45	0.90	1.80	2.70	3.60
PAN	mg/L	45	90	180	270	360
Total sugar	g/L	0.90	1.80	3.60	5.40	7.20

Traceability: aqueous reference standard

Ref. 12818

Ions Multical

Multiparameter calibrator

IONS MULTICAL. 5 levels with 10 mL. Multiparameter calibrator with five synthetic matrix liquid levels that contain various metals at adequate concentrations to calibrate the measurement procedures.

The concentration values assigned to each component and their traceability is ensured by using the reagents and measurement procedures recommended by BioSystems.

Parameter	U	1	2	3	4	5
Calcium	mg/L	20.3	40.5	81.0	121.5	162.0
Copper	mg/L	0.8	1.6	3.2	4.7	6.3
Iron	mg/L	3.4	6.8	13.5	20.3	27.0
Potassium	mg/L	34	68	135	203	270

Traceability: aqueous reference standard

Ref. 12841

Casein

ELISA method

ADVANTAGES

Fast, standard method
High sensitivity
Liquid reagent, stable until the expiration date
Easy sample preparation

BioSystems has addition solutions (spike solutions) to validate the method or to be used as controls.

Ref. 14151 Casein Spike Solution

Casein is an allergenic protein present in cow's milk and dairy products made from cow's milk. The presence of traces of these proteins must be labeled due to the risk it poses to the health of people with allergies, as set forth in the legislation. In addition to foods that naturally contain casein, there may be traces of these proteins in processed foods due to cross-contamination or the use of additives. Caseins are used as clarifier or fining agent in the winemaking process.

Casein reagent is a sandwich enzyme-linked immunosorbent assay (ELISA) for the quantitative analysis of casein traces in samples of wine, juice, cookies, meat products, chocolate and other food products. Any casein in the sample binds to an antibody fixed on the surface of the wells. In a second incubation, another peroxidase-conjugated antibody binds to the casein previously bound to the well. A final incubation with a peroxidase substrate (TMB) develops color based on the presence of the analyte. The reaction is stopped with sulfuric acid or stop solution. The resulting absorbance change is read at 450 nm and is proportional to the casein concentration present in the sample.

Presentation:	96 wells
Method:	Sandwich ELISA
LOD:	0.04 ppm
Range of measurement:	0 - 0.2 - 0.6 - 2 - 6 ppm

Ref. 14113

"High-Sensitivity" Histamine

ELISA method

ADVANTAGES

High sensitivity
Liquid reagent, stable until the expiration date
Easy sample preparation

Histamine is a biogenic amine present in certain food with high concentrations of protein or foods exposed to fermentation processes. Histamine is created by certain microorganisms that affect the amino acid histidine. Histamine intake by sensitive individuals produces undesireable effects, such as headaches or skin reactions; hence, it should be controlled.

High-sensitivity ELISA of histamine is a competitive enzyme-linked immunoabsorbent assays for the quantitative analysis of histamine in wine, fish, cheese and meat.

Histamine in the sample is quantitatively derivatized to N-acylhistamine by using an acylating reagent. The microplate wells are coated with histamine. In a first incubation, acylated histamine in the sample or reference standard competes with fixed histamine to bind to anti-histamine antibodies.

In a second incubation, a peroxidase-labeled immunoglobulin conjugate binds to antibodies previously bound to the surface of the wells. Lastly, tetramethylbenzidine (TMB) is added to each well as a substrate for the enzyme and, once color develops, the enzyme reaction is stopped with sulfuric acid or stop solution. The product formed is measured at 450 nm and is inversely proportional to histamine concentrations in the sample.

Presentation:	96 wells
Method:	Competitive ELISA
LOD:	0.15 ppb
Range of measurement:	0 - 0.5 - 1.5 - 5 - 15 and 50 ppb

Ref. FCE3100

Lysozyme

ELISA method

ADVANTAGES

- Fast, standard method
- High sensitivity
- Liquid reagent, stable until the expiration date
- Easy sample preparation

BioSystems has addition solutions (spike solutions) to validate the method or to be used as controls.

Ref. 14155 Lysozyme Spike Solution

Lysozyme is an allergenic protein contained in eggs and egg products. As set forth by law, the presence of traces of this protein should be labeled due to the risk posed to the health of allergic individuals. In addition to foods that naturally contain lysozyme, there may be traces of this protein in processed foods due to cross-contamination or the use of additives. Lysozyme is used as a preservative in the winemaking process.

Lysozyme reagent is a sandwich enzyme-linked immunosorbent assay (ELISA) for the quantitative analysis of casein traces in wine and cheese samples. The lysozyme in the sample binds to an immobilized antibody on the surface of the wells. In a second incubation, another peroxidase-conjugated antibody binds to the lysozyme previously bound to the well. A final incubation with a peroxidase substrate (TMB) develops color based on the presence of the analyte. The reaction is stopped with sulfuric acid or stop solution. The resulting absorbance change is read at 450 nm and is proportional to the lysozyme concentration present in the sample.

Presentation:	96 wells
Method:	Sandwich ELISA
LOD:	2 ppb
Range of measurement:	0 - 25 - 50 - 100-250 ppb

Ref. 14122

Ovalbumin

ELISA method

ADVANTAGES

- Fast, standard method
- High sensitivity
- Liquid reagent, stable until the expiration date
- Easy sample preparation

BioSystems has addition solutions (spike solutions) to validate the method or to be used as controls.

Ref. 14154 Ovoalbumin Spike Solution

Ovalbumin is an allergenic protein contained in eggs and egg products. As set forth by law, the presence of traces of this protein should be labeled due to the risk posed to the health of allergic individuals. In addition to foods that naturally contain ovalbumin, there may be traces of this protein in processed foods due to cross-contamination or the use of additives. Ovalbumin is used as a clarifier finding agent in the winemaking process.

Ovalbumin reagent is a sandwich enzyme-linked immunosorbent assay (ELISA) for the quantitative analysis of casein traces in wine and food samples. Ovalbumin in the sample binds to an immobilized antibody on the surface of the wells. In a second incubation, another peroxidase-conjugated antibody binds to the ovalbumin previously bound to the well. A final incubation with a peroxidase substrate (TMB) develops color based on the presence of the analyte. The reaction is stopped with sulfuric acid or stop solution. The resulting absorbance change is read at 450 nm and is proportional to the ovalbumin concentration present in the sample.

Presentation:	96 wells
Method:	Sandwich ELISA
LOD:	4 ppb
Range of measurement:	0 - 25 - 100 - 250 - 500 ppb

Ref. 14125

Y15 / Y25 / Y350 are Open Analyzers.

In conjunction with the reagent line, the BioSystems Analyzers make it possible to monitor the entire vinification process. The system adjusts to the various sample types that the enologist needs to analyze.

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TECHNICAL SPECIFICATIONS

Ref. 83106

Random Access Automatic Analyzer.
Direct photometric reading on the reaction rotor.

Test rate	150 tests/hour
Number of rack positions	4
Number of samples per rack	24
Maximum number of samples	72
Sample tubes	ø13 mm, ø15 mm (max. height 100 mm)
Pediatric vials	ø13 mm
Number of reagents per rack	10
Max. number of reagents	30
Reagent bottles	20 mL and 50 mL
Programmable reagent volume	10 µL - 600 µL
Programmable sample volume	2 µL - 80 µL
Removable methacrylate rotor	
Number of wells	120
Automatic pre- and post-dilutions	
Dilutions using a single calibrator	
Reaction volume range	180 µL - 800 µL
Measurement range	De – 0.05 to 3.6 A
Basic filter drum setting	340, 405, 420, 520, 560, 600, 620, 635, 670 nm
Dimensions	840 x 670 x 615 mm (L x W x H)
Weight	45 kg

25

TECHNICAL SPECIFICATIONS

Ref. 83107

Random Access Automatic Analyzer.
Direct photometric reading on the reaction rotor.

Test rate	240 tests/hour
Cooled reagent positions	30
Positions for uncooled racks	3 (multipurpose rack)
Number of samples per rack	24
Maximum number of samples	72
Sample tubes	Ø 13 mm, Ø 15 mm (max. height 100 mm)
Pediatric vials	Ø 13 mm
Number of reagents per rack	10
Max. number of uncooled reagents	20
Reagent bottles	20 mL and 50 mL
Programmable reagent volume	10 µL – 440 µL
Programmable sample volume	2 µL – 40 µL
Removable methacrylate rotor	
Number of wells	120
Automatic pre- and post-dilutions	
Dilutions using a single calibrator	
Reaction volume range	180 µL – 800 µL
Measurement range	De – 0.05 A to 3.6 A
Basic filter drum setting	340, 405, 420, 520, 560, 600, 620, 635, 670 nm
Dimensions	1080 x 695 x 510 mm (L x W x H)
Weight	73 kg

350

TECHNICAL SPECIFICATIONS

Ref. 80176

Optical Systems

Range of measurment: 0-3.5 A all wavelengths
Wavelengths: 280, 340, 405, 420, 505,
520, 560, 620, 635, 670, 750 nm
Light Source: LEDs
Settings: monochromatic and bichromatic

Thermostat System

Peltier system from 25-40 °C

Fluidic System

Continuous flow system with peristaltic
pump incorporated
Stepper motor pump operation
Sipping volume can be programmed
from 100 µL to 5 mL
Automatic adjustment of sample volumen
Automatic adjustment of sample position

Printer Screen and Keyboard

Thermic printer
Screen: graphic LCD lighted screen 320 x 240 px
Keyboard: tactile membrane

Methods of Calculation

Absorbance
End Point
Differential Mode
Fixed Time
Kinetic

Calibration

Factor
Calibrator
Calibration Curve

Calibration Curve

Up to 8 Calibration points
Up to 3 replicates per point

Quality Control

2 controls per test
Levey-Jennings control chart
Westgard´s Rules

Installation Characteristics

Voltage: 100V-240 V
Frequency: 50/60 Hz
Maximum power: 30 W
Temperature: 10-35 °C
Max Rel humidity: 75 %
Height: <2000 m
Dimensions: 420 x 350 x 216 mm
Weight: 4 kg

Accessories

Battery Pack
- Capacity 2000 mAh
- Duration: 2 hrs
0,2, 1 and 10 mm flow quartz cuvette
10 mm flow glass cuvette
1 mm glass cuvette + adapter
10 mm quartz cuvette

BA400 is a high-capacity instrument (400 tests/hour) that sets the standard for a new generation of analyzers based on an LED optical system and smart functionality that offers top-notch performance for large enology laboratories.

BA400
LED TECHNOLOGY

TECHNICAL SPECIFICATIONS

Ref. 83400

Speed

400 tests/hour

Capacity

135 samples (90 with automatic barcode reading)

88 reagent bottles (refrigerated

Removable blade with 120 reaction cuvettes (autowashable)

Fluid System

Reagent 1 volume 90 to 450 ul

Reagent 2 volume 10 to 300 ul

Sample volume of 2 to 40 µL

Reaction volume of 180 to 600 µL

Level and clot detector

Optical System

LED + Hard Coating Filter

Main photodiode + reference photodiode

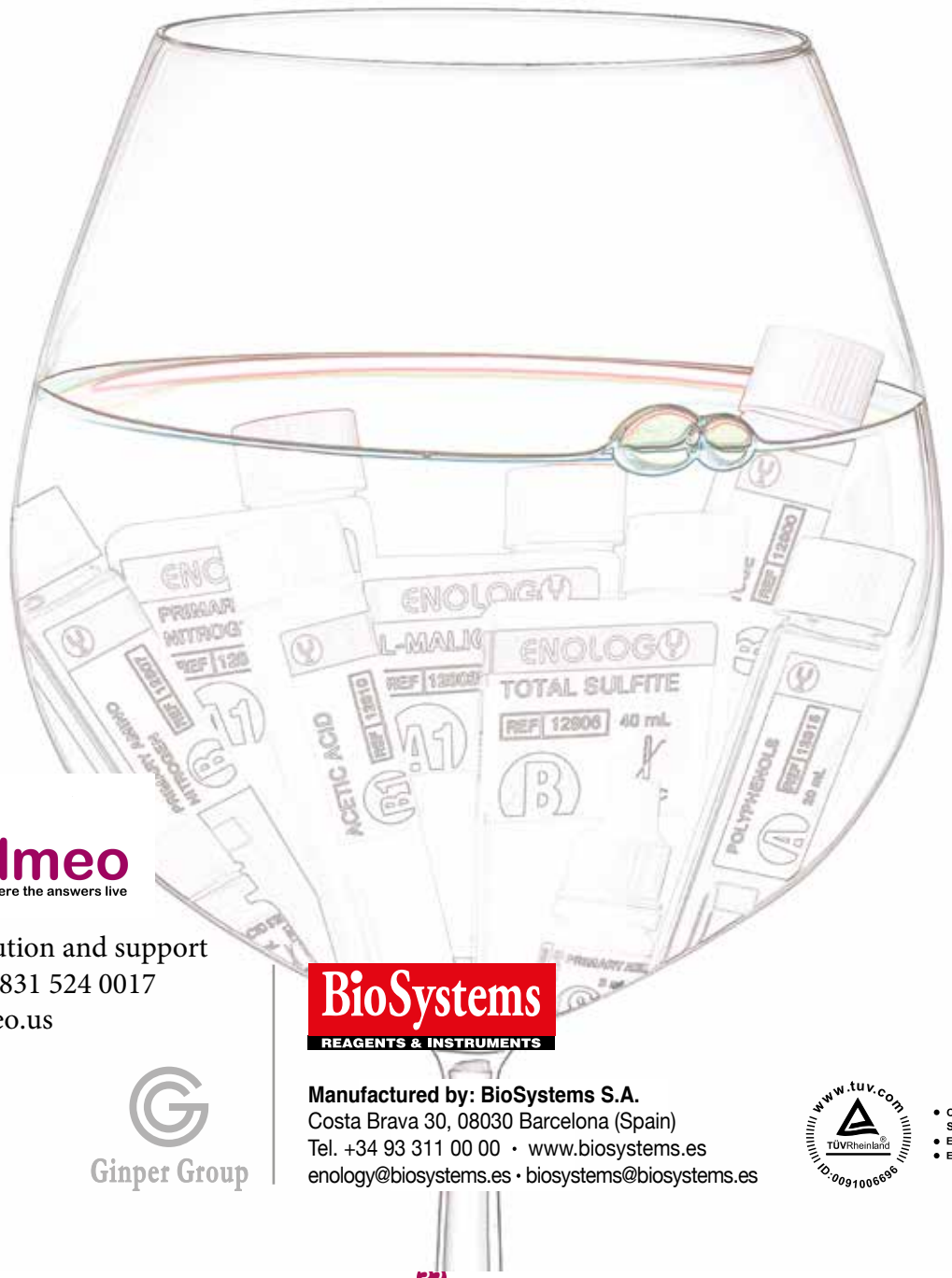
Wavelengths

340, 405, 505, 535, 560, 600, 635, 670 nm

Other Characteristics

Dimensions 1200 x 720 x 1258 mm

210 kg



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