Solutions for wine and winemaking

Capillary electrophoresis systems Capel

- Full production cycle control
- Short analysis time (2-10 min)
- Simple sample pre-treatment
- Determination of multiple components in one run
- Low reagent consumption
- High level of accuracy

The modern wine and beverages industry has different analytical tasks:
- safety and quality control of raw material and final products;
- authentication and counterfeit detection;
- quality control of water used for production of beverages;
- process control of beverage production.

Capillary electrophoresis (CE) is becoming more common among other conventional methods. It has a wide range of applications and benefits for the analysis such as fast and accurate measurements and low analysis cost thanks to very low sample and reagent consumption. CE method was included in the list of analytical methods recommended to be used in oenology by the **International Organization of Vine and Wine (OIV)** to determine organic acids (tartaric, malic and lactic) and sulfates (OIV MA–AS313–19); sorbic acid (OIV MA–AS313–19); and lysozyme (OIV-MA-AS315-24).

Lumex Instrument has been developing and manufacturing CE systems Capel that can be a perfect addition to a winery lab. It is successfully used for measuring various components in wines, wine materials, brandy, spirits, wood extracts, liqueurs, juices, beer, and other alcoholic and non-alcoholic beverages.

The instrument comes with kits – relevant analytical protocols and all necessary reagents according to the customer's request. With these solutions, you can determine:
- organic acids (tartaric, malic, succinic, citric, acetic, lactic, formic, oxalic, etc.);
- aromatic aldehydes (coniferaldehyde, sinapaldehyde, syringaldehyde, vanillin);
- inorganic cations either in water used for beverage production or directly in wine (ammonium, potassium, sodium, magnesium, calcium, etc.);
- inorganic anions either in water used for beverage production or directly in wine (chloride, bromide, nitrite, nitrate, sulphate, fluoride, phosphate);
- biogenic amines (cadaverine, putrescine, histamine, tyramine);
- preservatives and antioxidants (sorbic acid, benzoic acid, ascorbic acid);
- amino acids;
- sugars (glucose, saccharose, fructose);
- synthetic dyes;
- pesticides.

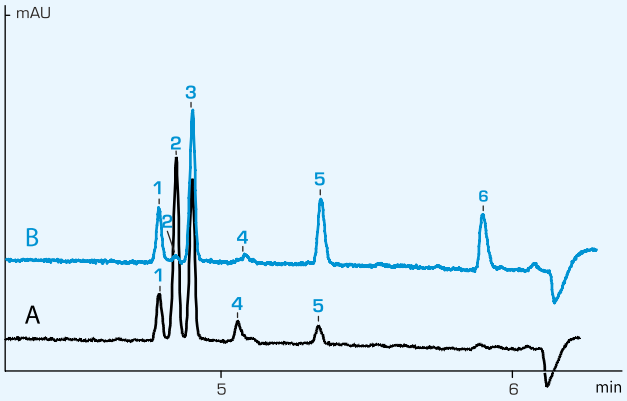
ORGANIC ACIDS, VOLATILE ACIDITY

Organic acids profile in wines at different production stages can be highly informative since it reveals the important features of technological process. Alcoholic fermentation, malolactic fermentation, wine maturation, bacterial contamination are processes that can be followed by analyzing organic acids profile. Besides, it is one of the most important criteria of wine authentication.

Lumex Instruments offers an **Organic acids chemical kit** with analytical protocol, which gives complete information about almost all organic acids in just 5–6 minutes. The kit also allows simultaneous determination of some preservatives like benzoic and sorbic acids.

As volatile acidity in wines can be attributed by more than 98% to the amount of acetic and formic acids, this parameter can be quantified with this kit just as well by quantifying the corresponding acids. This eliminates the very laborious and time-consuming distillation stage required for the «classic» analysis of volatile acids.

Lumex Instruments analytical protocol for the analysis of organic acids was acknowledged by the French Accreditation Committee COFRAC.



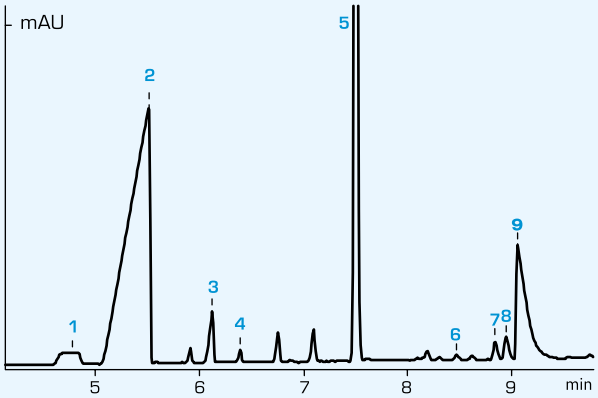
Sample:
A – rose wine from Bordeaux region
Detected acids, mg/l:
1 – succinic (470)
2 – malic (2200)
3 – tartaric (1900)
4 – citric (190)
5 – acetic (330)

B – red wine from Bordeaux region
Detected acids, mg/l:
1 – succinic (660)
2 – malic (85)
3 – tartaric (2100)
4 – citric (49)
5 – acetic (1400)
6 – lactic (1600)

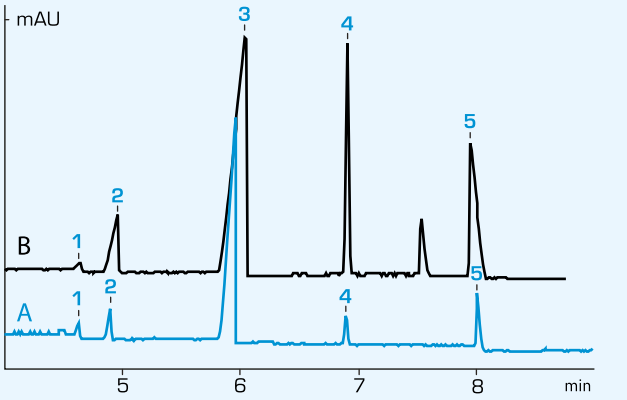
INORGANIC CATIONS AND ANIONS

Cations analysis chemical kit and Anions analysis chemical kit provide determination of all most important inorganic ions either directly in wine and brandies or in water used for the production of alcoholic beverages. Detailed information about the ion content is highly important, since it helps in proving the authenticity or falsification of the product and can point out deviation in production technology. Furthermore, it helps estimate the capability of the final product to avoid precipitation, thereby predicting the safety storage time.

Cations analysis chemical kit can also determine some amines and two important amino acids simultaneously with inorganic cations. Amount of biogenic amines (putrescine, cadaverine, histamine, and thyramine) is very informative as its presence reveals severe deviations in production technology and indicates the product spoiling.

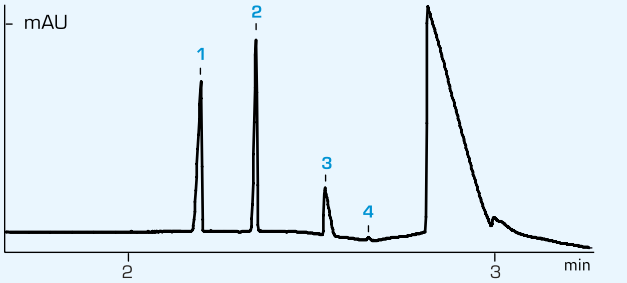


Sample: red wine
Detected, mg/l:
1 – ammonium (21.2)
2 – potassium (1090)
3 – sodium (18)
4 – histamine (0.3)
5 – magnesium (105)
6 – manganese (0.5)
7 – lysine
8 – arginine
9 – calcium (63)



Sample:
A – cognac
Detected, mg/l:
1 – ammonium
2 – potassium (3.46)
3 – sodium
4 – magnesium
5 – calcium (2.55)

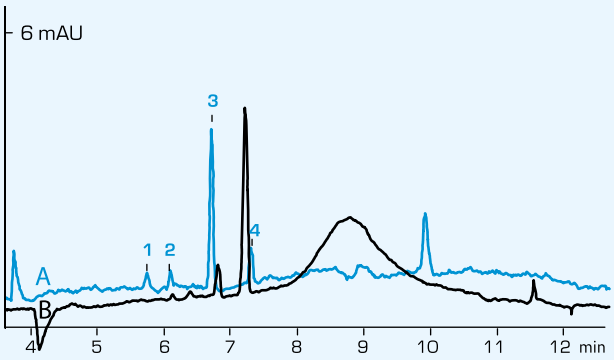
B – cognac (precipitation by storage)
Detected, mg/l:
1 – ammonium
2 – potassium (23.2)
3 – sodium
4 – magnesium
5 – calcium (21.1)



Sample: tap water for brandy production
Detected, mg/l:
1 – chloride (31)
2 – sulphate (35)
3 – nitrate (45)
4 – fluoride (0.07)

AROMATIC ALDEHYDES

Aromatic aldehydes are very important nonvolatile components of brandy, cognac, whiskey, rum, etc. Their quantity in cognacs can serve as the age criteria of the product, since their accumulation is due to the storage of corresponding spirits in oak barrels. As all four aldehydes must be always present in cognac and as the ratio between two of them (syringaldehyde and vanillin) is known to be within certain range, this analysis helps significantly with identifying of counterfeit. Lumex analytical protocol enables aldehydes determination with the sensitivity better than that of the HPLC method.

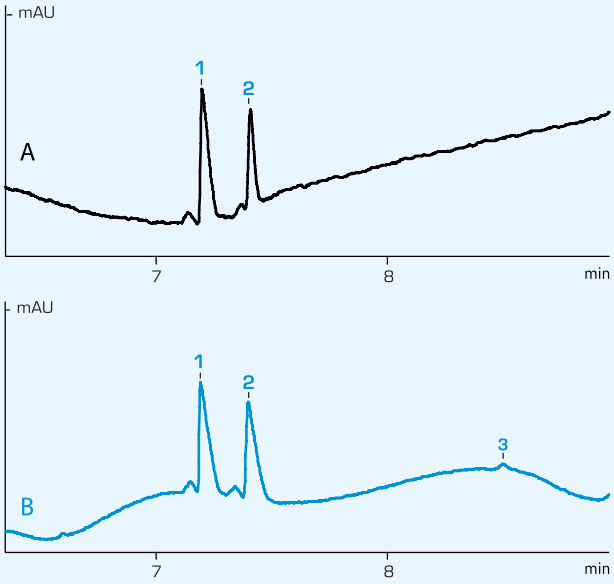


Sample:
A – cognac
Detected, mg/l:
1 – synapaldehyde
2 – coniferaldehyde
3 – syringaldehyde
4 – vanillin
Syringaldehyde / vanillin ratio is 3:1

B – falsified brandy
Syringaldehyde / vanillin ratio is 1:5

SUGARS

The content of sugars is one of the most significant oenological parameter. Its level in wines and spirits is regulated by many international standards. All three important sugar species – glucose, fructose and saccharose – can be determined in one run using Lumex Instruments analytical protocol. Other sugars like xylose, maltose, and lactose can be also quantified within this analysis.



Sample:
A – Cognac XO
Detected, g/l:
1 – fructose (5.2)
2 – glucose (5.5)

B – sweet wine Muscat
Detected, g/l:
1 – fructose (18.0)
2 – glucose (18.6)
3 – saccharose (0.75)