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Simplified wine analysis for walkaway efficiency

Thermo Scientific Gallery discrete analyzers and Thermo Scientific Gallery system reagents

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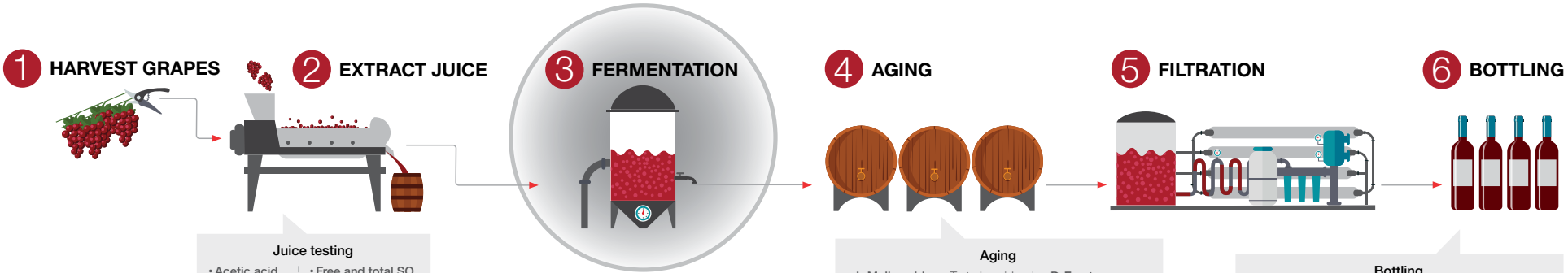
Wine analytics, vinification process critical parameters

Effective quality monitoring during different production stages improves productivity and ensures consistent product. For this reason and for effective vinification process control, a tight quality control through an in-house laboratory is recommended. The ability to measure and manage the levels of wine spoilers in juice or wine ensures a good final product. Whether you make white wine, red wine, rosé wine, sparkling wine, or grape juice, routine multiparameter measurement gives accurate information on the spot and just when you need it. A new wealth of analytical data allows oenologists to track wine production more closely at every stage, from grape juice all the way to bottling and shipping, and to make any necessary process optimization at the right moment.



From the juice to the bottling stage, many different process critical parameters must be continuously monitored to maintain the brand signature and fulfill regulatory requirements. Monitoring and controlling the chemical reactions in the winemaking process is part of the science and artistry of producing an exceptional balanced product. From grape to glass, great winemaking starts with a commitment to quality. Wine's unique attributes, like color, taste, and flavor, are all highly dependent on a series of chemical reactions and equilibriums throughout the various stages of winemaking.

- white wine
- red wine
- rosé wine
- sparkling wine
- grape juice

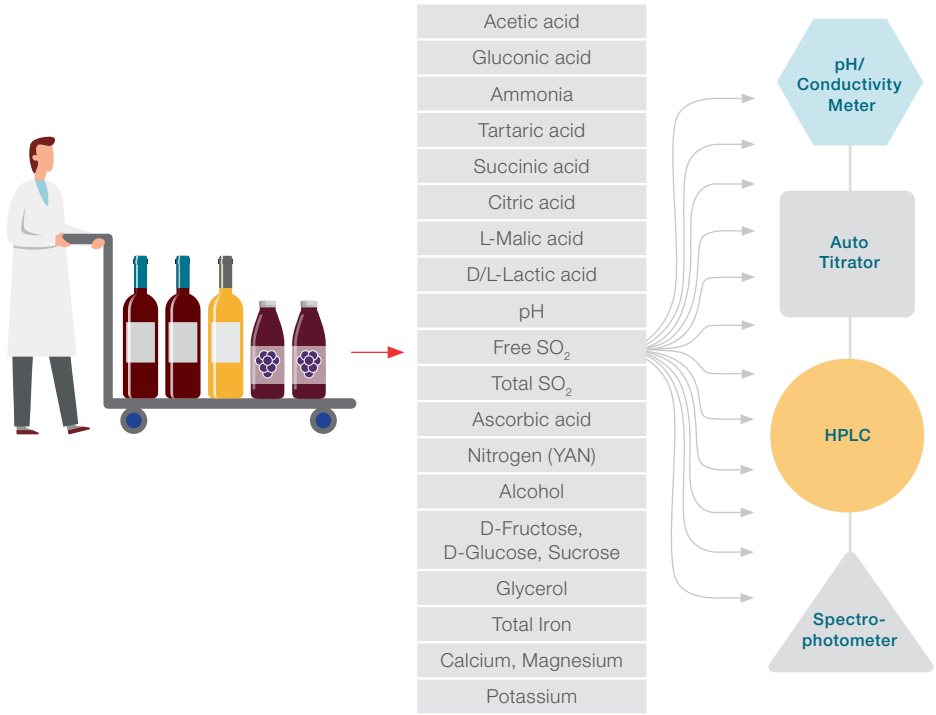
- **pH**—Since pH plays a critical role in wine making, measurements are taken throughout the winemaking process, from juice to finished wine.
- **Organic acids**—Organic acids are an important component in wine and contribute to its crisp, tart flavor. Alcohol, sugars, minerals, and other components balance the sourness of the acids (tartaric, malic, and citric acids), are naturally present in grapes and provide the freshest, purest tastes. Monitoring acid levels during various production stages improves productivity and ensures a high-quality finished product.
- **Nitrogen compounds**—Nitrogen compounds in juice, must, and wine affect not only the fermentation, but the clarification, aroma, and final chemical composition of the wine.
- **Titratable acidity (TA)**—TA is a measure of the organic acid content in wine, juice, or must. These organic acids come from the grapes, the fermentation, and the bacterial activity. The acidity can affect the flavor, color, and stability of the wine.
- **Sugars**—Monitoring of sugar levels at each stage of the winemaking process helps producers to make decisions that will influence the final composition and texture of the wine and when to stop the fermentation.
- **Malolactic process**—Malolactic fermentation, in which L-Malic acid is consumed to form L-Lactic acid and carbon dioxide is important in wine making. The concentration of L-Malic acid is, in turn, very important for the starting of the malolactic process. The course of malolactic fermentation is monitored by following the falling level of L-Malic acid and the increasing level of L-Lactic acid. The production of D-Lactic acid can indicate wine spoilage.
- **Free and total SO_2**—Sulphites occur naturally as a by-product of yeast fermentation. Sulphites are used as an essential additive in the control of microbial contamination during aging and also to protect the wine against detrimental oxidative and enzymatic browning.

Wine analytics importance and challenges

Quality can only be achieved by more demanding and thorough analytical control. The list of necessary parameters for the oenologist is very long and getting all the information needed to make critical decisions can involve a lot of time and equipment. Wet chemical methods involve the use of various instruments such as pH meter, auto titrator, spectrophotometer, segmented flow analyzers, chromatographic techniques like high performance liquid chromatography (HPLC), ion chromatography (IC) and gas chromatography (GC). Highly skilled workers with specialization in chemistry and instrumentation is necessary to perform sample handling, calibration, troubleshooting, and carrying out routine maintenance with these sophisticated instruments. Maintaining staff knowledgeable enough to run those instruments is unrealistic in wineries and wine testing labs.

For wineries, it is important to maintain their brand signature, product quality, expand their customer base, and increase profitability through well-established in-house control. However, the wineries encounter unique challenges. Traditional wet chemical analysis requires multiple techniques, instruments, and highly-skilled operators-adding time, cost, and complexity to the wine production process.

Multiple parameters, multiple instruments



Wineries and wine analysis lab challenges

Need:

- Establish in-house quality control
- Many samples from juice to bottling
- Multiparameter testing per sample
- Faster turnaround time during crushing season

Problem:

- Capital budget
- Lack of skilled operators
- Samples to external labs:
  - Delayed results
  - Very high cost per analysis
  - Lack of flexibility
  - Delayed process decisions

Solution—a versatile and flexible instrumentation that offers:

- Accurate and reproducible results
- Low cost of ownership
- Rapid multiparameter analysis
- Easy to train, use and maintain
- Low cost per analysis

Wineries need a reliable analytical instrumentation for multiparameter analysis that enables lab personal without technical or chemistry knowledge to carry out the routine wine analysis. Consolidated multiparameter discrete analysis now offers a solution to these difficulties. The Thermo Scientific™ Gallery™ and Gallery™ Plus discrete analyzers, together with the ready-to-use enzymatic reagents, enable walkaway productivity from juice to wine bottling testing.

Why operate multiple analyzers when you can do all your essential testing with one?

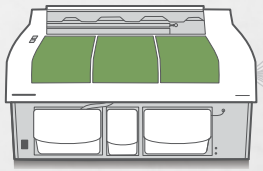
The Gallery discrete analyzers with ready-to-use system reagents are optimized for speed, flexibility, and precision for juice and wine analysis that enables oenologists to improve quality control through consolidated testing.

The Gallery discrete analyzer consolidates and simultaneously tests for up to 20 parameters—using a single instrument with a single operator. It is a fully-integrated walkaway solution. The testing workflow is easy to learn and can be left unattended, improving throughput, system uptime, and staff productivity. Frequent multiparameter analysis results from the Gallery discrete analyzer provides virtually everything a winery or wine testing lab needs for routine analysis in one unit.

The unique discrete cell technology allows laboratories to measure multiple analytes simultaneously while reducing total analysis and operator time. The unique low volume cuvette design accommodates small reagent volumes, minimizes reagent waste, and as a result, reduces reagent costs.

While traditional analysis requires multiple wet chemistry methods, and therefore multiple samples, the Gallery discrete analyzer consumes a maximum of 300 µL of sample per test, can test for up to 20 parameters per sample, and runs up to 200 tests per hour. As a result, the cost per analysis is 10 to 20 times less than traditional wet chemistry methods. Gallery analyzers with optional electrochemistry unit (ECM) can measure up to 67 samples per hour for pH parallel with other photometric tests. The workflow is robust with good repeatability and low cost of entry.

Single instrument, multiple parameters



- Acetic acid
- Gluconic acid
- Ammonia
- Tartaric acid
- Succinic acid
- Citric acid
- L-Malic acid
- D/L-Lactic acid
- pH
- Free SO_2
- Total SO_2
- Ascorbic acid
- Nitrogen (YAN)
- Alcohol
- D-Fructose, D-Glucose, Sucrose
- Glycerol
- Total Iron
- Calcium, Magnesium
- Potassium

Reduce hands-on sample time

Multiparameter wine analysis with discrete analyzer technology ensures high product quality and throughput, while reducing cost, waste, and hands-on sample time. Gallery discrete analyzers assure fast, reliable, and repeatable results by utilizing specific enzyme reactions, and robust robotics to streamline laboratory analysis during critical times of the year, like harvest. The Gallery discrete analyzers are easy to use, automated systems that allow laboratories to simplify their testing with the dual benefits of time and cost savings. All necessary analysis steps are automated, providing true walkaway time for the operator.

Gallery discrete analyzer workflow

Load cuvettes

Insert samples

Insert reagents

Ready-to-use system reagents

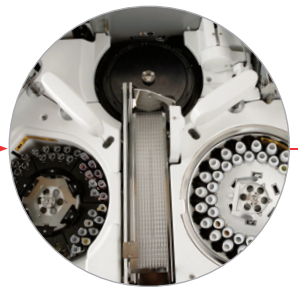
Calibrators

Run analytes

Import sample table from LIMS

Create run table

Start analysis



Parallel pH/conductivity

Dispensing

Mixing

Incubation

Photometric measurement

Consolidated report

PDF

LIMS export

Spreadsheet

Walk away from Gallery discrete analyzer

Gallery and Gallery Plus discrete analyzers features and benefits

Automate labor-intensive and time-consuming multiparameter wet chemical analysis with a single instrument

Gallery discrete analyzer

The Gallery discrete analyzer includes a combined sample and reagent disk for a maximum capacity of 90 samples and 30 reagents, with the ability to run up to 200 tests per hour.

Gallery Plus discrete analyzer

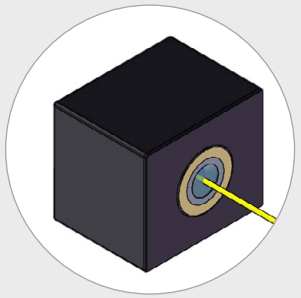
The Gallery Plus discrete analyzer can accommodate 108 samples and 42 reagents in separate sample and reagent disks, with the capability to run up to 350 tests per hour.

Unique disposable DECACELL

- Thermo Scientific™ DECACELL™ cuvettes used are 10 independent reaction cells mounted together for truly discrete analysis
- No need for washing to prevent carryover
- Minimal or no carry over—improved result reliability

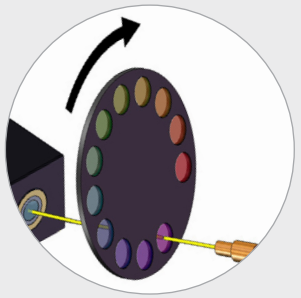
Low volume cuvette

- Reduced sample and reagent consumption: 2–240 µL
- Lowest waste generation and disposal cost
- Reduced cost per analysis



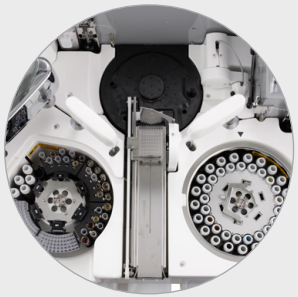
Xenon source lamp

- Long-life
- No frequent replacement
- Savings over lifetime of the instrument
- Sensitivity to the ppb level



More filters—more chemistries

- 12 different filters
- Up to 20 different chemical parameters per sample
- Wide wavelength coverage: 340–880 nm



Fully-integrated multiparameter analyzer

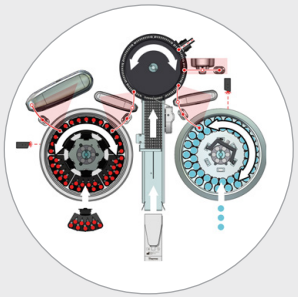
- Capable of performing simultaneous photometric, and electrochemistry (pH and conductivity) measurements

High throughput analyzer

- Capable of performing up to 350 tests per hour
- Parallel pH and conductivity testing
- True walkaway solution

LIMS

- Bi-directional LIMS connection
- Easy sample table import and workflow optimization



Robust analyzer

- Minimal moving parts—less maintenance
- Effective mixing and reproducible results
- Calibration curve stability

Flexible system

- Versatile to modify an existing method
- Up to 4 different reagent additions
- Easy to transfer existing FIA or spectrophotometric methods
- Variable incubation temperature from 25 °C–60 °C

Auto analysis

- Automated calibration from single stock standard
- Automatic dilution of over range samples
- Auto start up and shutdown

Ease of use

- Workflow based operation—suitable for all users' levels
- Built-in barcode readers for samples and reagents—no manual errors; full traceability

ECM unit

- Integrated pH and conductivity
- Parallel analysis:
  - pH range 2 to 12
  - Conductivity: 20 µS/cm–112 mS/cm

Ready-to-use reagent kits

- More than 40 different chemistries
- Only µL consumption per test
- Bar-coded reagent vials provide easy and reliable identification:
  - Lot, expiration date, and vial size
  - Real-time reagent monitoring

Ready-to-use reagents and assay kits

Gallery discrete analyzers together with ready-to-use Thermo Scientific™ Gallery™ system reagents make the overall wine analysis simple, accurate, and reliable. The ready-to-use wine reagents are specifically developed for rapid and cost-effective analysis of juice and wine. Enzymatic assay kits are designed to be accessible for any user, including those without a specialized scientific background. Gallery system reagents take away the guess work for the oenologist and provides walkaway efficiency. The barcode reader improves the traceability and continuously monitors the reagent consumptions and provides real-time reagent information.

Gallery system reagents are ready-to-go, saving the technician's time and reducing errors. The unique low volume cuvette design guarantees small reagent volumes, minimizes reagent waste, and as a result, reduces reagent costs. Optimized kit sizes and on-board stability further minimize the amount of waste produced and increase cost efficiency.

Gallery system reagents for wine analysis offer:

- Accurate and reproducible results
- Reduces preparation errors
- Saves operator time
- Ease of use

Gallery discrete analyzers with ready-to-use system reagents offer:

- Walkway efficiency
- Reduced reagent consumption
- Reduced cost per analysis
- Reduced sample consumption
- Reduced waste disposal cost
- Fully-traceable results
- Real time reagent consumption information

Gallery platform also accommodates the in-house or third party reagents

The Gallery system reagents for automated discrete analyzers cover over 50 analytes. The ready-to-use reagents are easy to work with by eliminating extra preparation steps and saving time and money. Our instruments give you the information you need to minimize the waste of natural resources and optimize your business. Intelligent information management can turn existing production into efficient processes that generate less waste, bigger yields, and higher quality.

- Each vessel is bar coded with all the necessary data including reagent identification, volume, lot, and expiration date
- Continuous monitoring gives real-time reagent information
- Volume optimized system kits minimize waste
- Required reagent volumes can be up to 15 times smaller when compared to manual methods
- A wide range of calibration standards ensure traceable results

Gallery system reagents and standards for juice and wine analysis

Ensuring confidence in the quality of results, the methods used for analysis in the Gallery discrete analyzers are well known enzymatic and colorimetric chemistries optimized to the result levels established in international reference methods, OIV, AOAC, DIN, ISO, and EBC.

Organic Acids

- Acetic acid
- Ascorbic acid
- Citric acid
- D-Gluconic acid
- D-Isocitric acid
- D-Lactic acid
- Formic acid*
- Gluconic acid
- Glycolic acid
- L-Ascorbic acid
- L-Lactic acid
- L-Glutamic acid
- L-Malic acid
- Oxalic acid
- Succinic acid
- Tartaric acid
- Aspartic acid
- ß-Hydroxybutyric acid
- D-Malic acid

Process Critical Parameters

- Acetaldehyde
- Glycerol
- Total polyphenol*
- Iron
- Alcohol by volume (low)
- NOPA
- Total acidity
- pH
- Color
- Free and total SO_2
- Ammonia
- Calcium
- Magnesium
- Potassium
- Copper*
- Total Protein
- D-Fructose
- D-Glucose
- Sucrose

* Third party reagents.

In-house testing—a smart investment

For effective control of the vinification process, it is highly recommended to carry out all necessary wet chemical analyses through an in-house laboratory with an easy-to-use system, so that oenologists can make rapid and timely decisions.

The analysis timeline is critical in winemaking to assure the quality of the finished product.

Five ways the Gallery discrete analyzer can help you with wine testing

Accurate and reproducible results

- Disposable cuvettes—no carry over
- Ready-to-use reagents eliminate manual errors
- Fully-automated liquid handling—calibration, sample dilution, and over range sample re-analysis
- Full instrument validation using dispensing kit

Easy to use walkaway solution

- Suitable for all users' levels
- Easy to train, use and maintain
- Automated startup, calibration, and shutdown
- Quick startup

Simultaneous multiparameter analysis

- Many wine samples, many stages, many parameters, many methods—single instrument
- Parallel pH measurement
- High throughput

Low cost of ownership

- Single instrument that covers wide range of parameters
- Lowest cost per analysis
- Long-life Xenon lamp
- Free-up lab resource

Cost per analysis

- 10 to 20 times lower than traditional methods
- Unique small volume cuvette
- Lowest reagents consumption—lowest cost per analysis

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Unity™ Lab Services provides a single source for integrated lab service, support, and supply management. Our customized service offerings and world-class service experts have the flexibility and experience to effectively address your laboratory's business needs. We provide a complete portfolio of services and support solutions designed to help you improve productivity, reduce total cost of ownership, and ensure performance throughout your laboratory—from instrument and equipment acquisition to disposition.

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Find out more at **thermofisher.com/discreteanalysis**

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