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Automated pH and Conductivity measurements

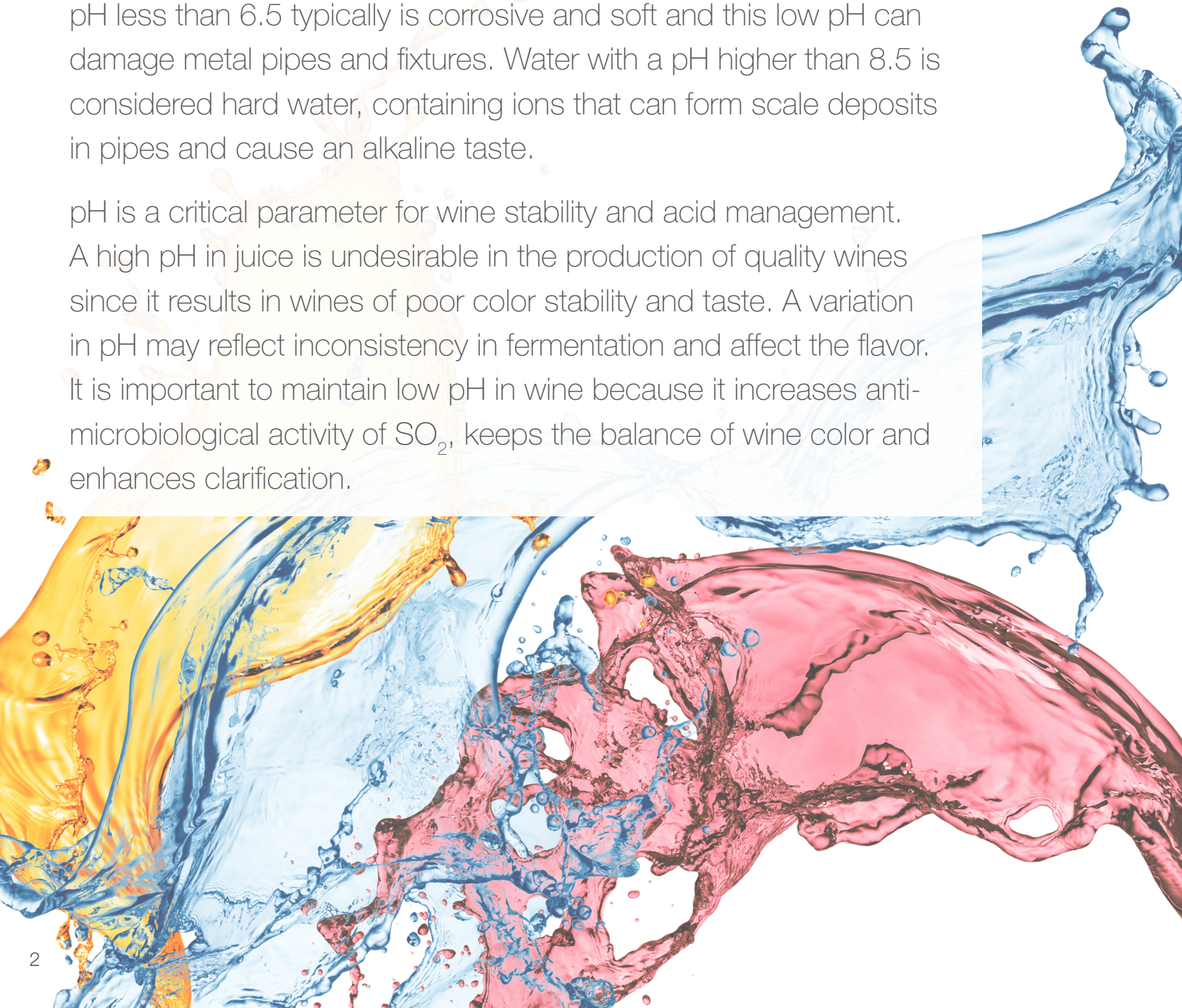
Thermo Scientific Gallery discrete industrial analyzers with the ECM module

ThermoFisher SCIENTIFIC

Monitoring water purification systems, fermentation processes and flavor

Conductivity estimates the total amount of dissolved ions in water such as chloride, nitrate, sulfate and phosphate anions or sodium, magnesium, calcium, iron and aluminum cations. The measurement of conductivity is a traditional way of monitoring the performance of water purification systems. Surface waters typically range from pH 6.5 to 8.5 while groundwater ranges from pH 6 to 8.5. Water with a pH less than 6.5 typically is corrosive and soft and this low pH can damage metal pipes and fixtures. Water with a pH higher than 8.5 is considered hard water, containing ions that can form scale deposits in pipes and cause an alkaline taste.

pH is a critical parameter for wine stability and acid management. A high pH in juice is undesirable in the production of quality wines since it results in wines of poor color stability and taste. A variation in pH may reflect inconsistency in fermentation and affect the flavor. It is important to maintain low pH in wine because it increases anti-microbiological activity of SO_2, keeps the balance of wine color and enhances clarification.



Accurate EC measurements alongside photometric testing

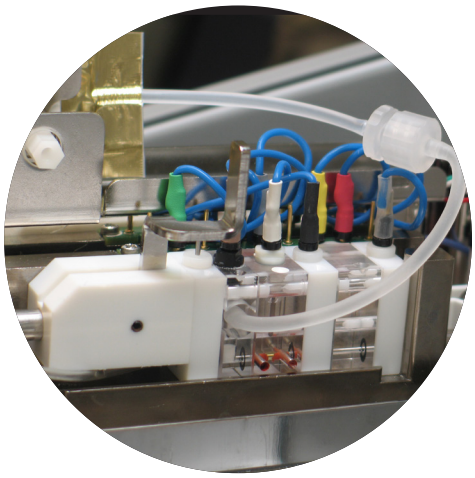
Electrochemical measurement of pH and electrical conductivity from beverage and water samples is accurate using the automated Thermo Scientific™ Gallery™ analyzers, Gallery and Gallery Plus. Electro Chemical Measurement (ECM) is an integrated unit into the benchtop discrete photometric analyzer. It is capable to simultaneously measure both pH and conductivity alongside the photometric testing. Sample types can vary from water samples, like natural water, waste water and drinking water to beverage samples, like wine, juice, sparkling and still water.

pH measurement

pH is a measure of the acidity or alkalinity of a solution. In the ECM unit, pH is measured using a two-electrode galvanic cell consisting of an indicator pH electrode and a reference electrode.

Conductivity measurement

Conductivity is the ability of a material to conduct electric current. The conductivity measurement is performed via two electrodes in the ECM unit.



Sample is moved to the electrode block where the measurement takes place. Sample conductivity is measured first immediately followed by the pH measurement from the same sample.

Temperature compensation

Both conductivity and pH are measured at 37 °C in the Gallery. However, results can be reported in different temperatures, e.g., at 25 °C, because the discrete analyzer software has a robust system with which the sample result may be correlated to a reference analyzer result automatically.

Reduce hands-on time

Gallery and Gallery Plus 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 walk-away time for the operator. Both Gallery instruments provide an integrated platform for two measurement techniques, photometric and electrochemical (pH and conductivity) which can be run simultaneously. Parallel determination of several analytes from a single sample as well as the presence of several automated features ensures analytical efficiency.

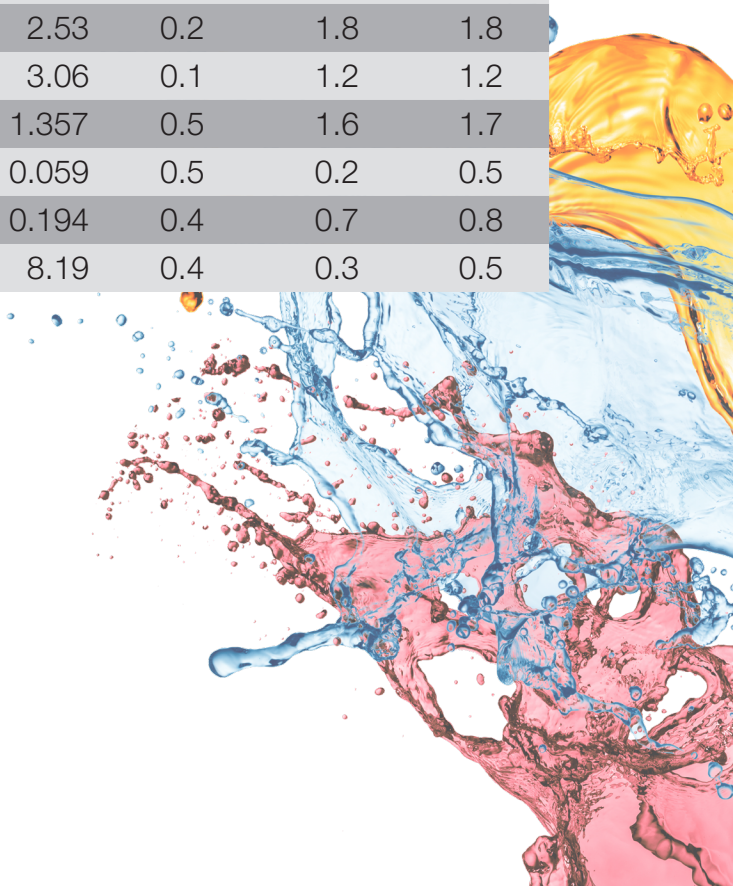
Measuring ranges

pH	2 -12
Conductivity	20 µS/cm—112 mS/cm

Proven performance for various sample matrices

		pH (RSD%)				Conductivity (RSD%)		
	Value (pH)	Within run	Between run	Total	Value (mS/cm)	Within run	Between run	Total
Wine	3.3	0.02	0.15	0.16	2.53	0.2	1.8	1.8
Juice	3.4	0.03	0.20	0.20	3.06	0.1	1.2	1.2
Sparkling water	5.3	0.39	0.27	0.48	1.357	0.5	1.6	1.7
Drinking water	6.8	0.29	0.27	0.39	0.059	0.5	0.2	0.5
Natural water	7.8	0.78	0.09	0.79	0.194	0.4	0.7	0.8
Waste water	6.6	0.03	0.08	0.08	8.19	0.4	0.3	0.5

Wine and juice precision studies were performed on the Gallery Plus discrete analyzer in three batches of 10 replicates per sample with the total number of replicates being 30. Water precision studies were performed on the Gallery discrete analyzer in two batches of 10 replicates per sample with the total number of replicates being 20.



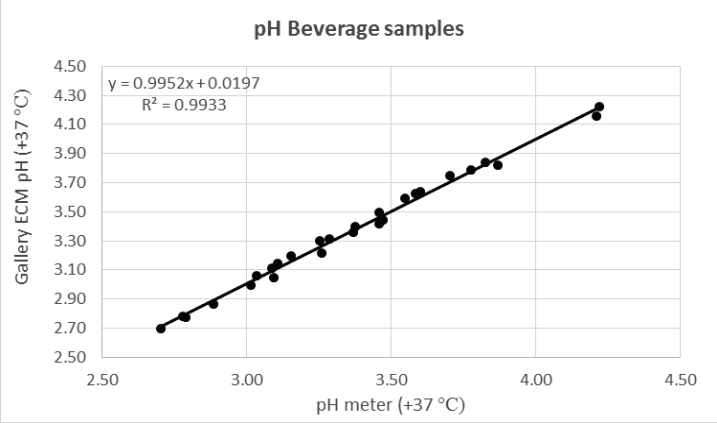


Figure 1. pH method comparison of beverage samples (n=27) containing white, red, rose and sparkling wine, berry and fruit juices.

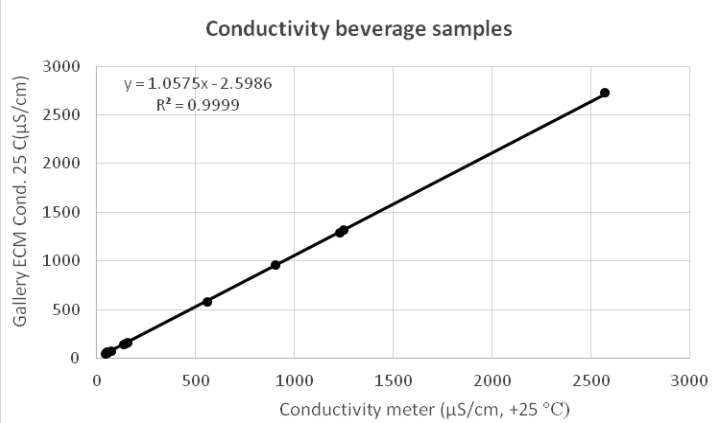


Figure 2. Conductivity method comparison of beverage samples (n=23) containing still and sparkling water. ECM Conductivity 25C method was used with predefined temperature conversion factor of 0.793.

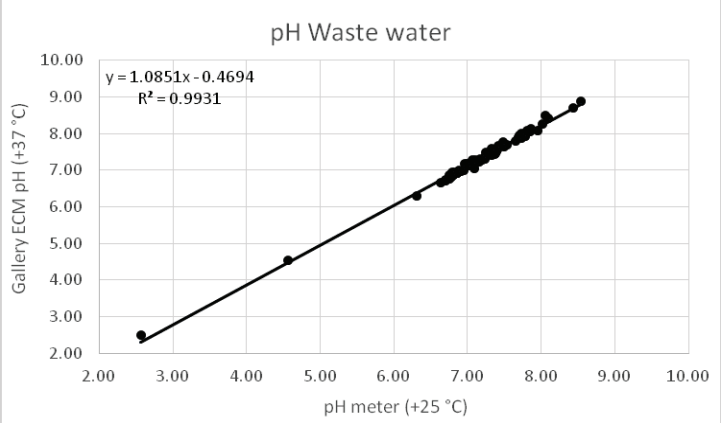


Figure 3. pH method comparison of waste water samples (n=67) containing influents, effluents and industrial waste waters.

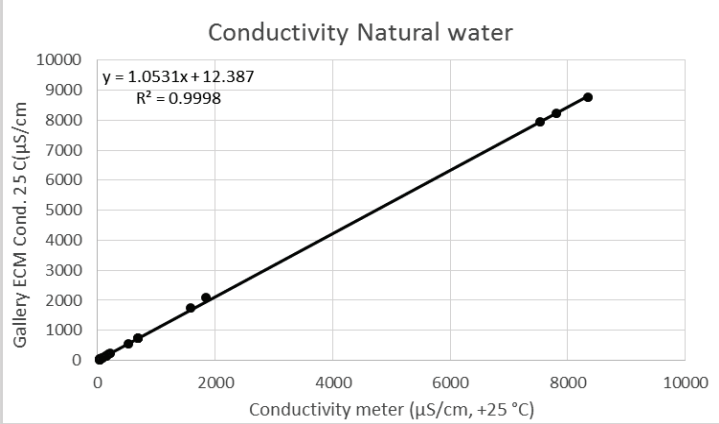


Figure 4. Conductivity method comparison of natural water samples (n=20) containing ground and surface water. ECM Conductivity 25C method was used with predefined temperature conversion factor of 0.793.

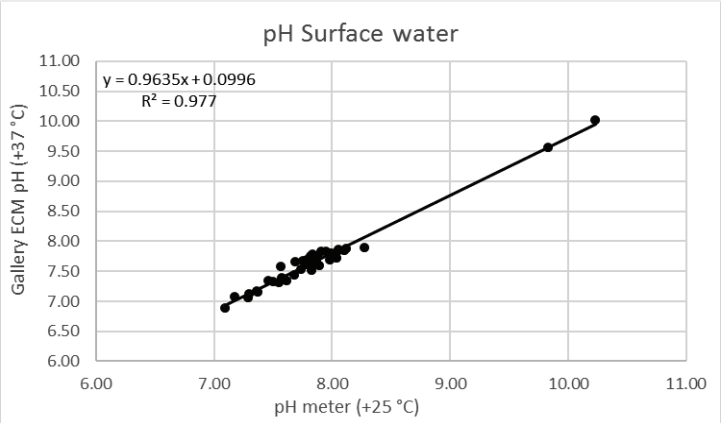


Figure 5. pH method comparison of surface water samples (n=41) containing lake, river and brackish waters.

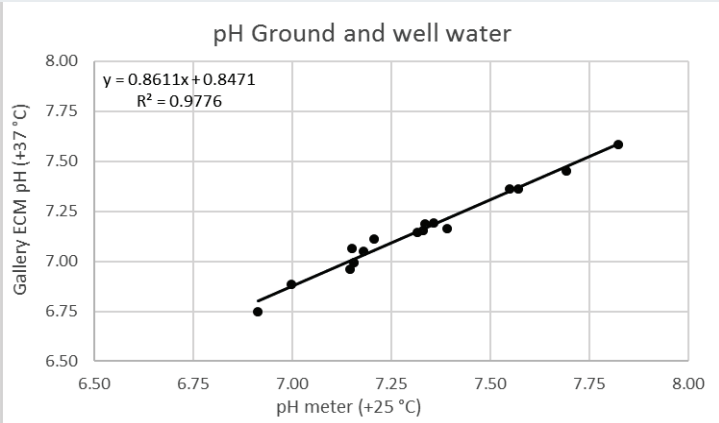


Figure 6. pH method comparison of ground and well water samples (n=16).

Analyzer	Gallery	Gallery Plus
Capacity	Up to 200 photometric tests per hour 67 or more ECM tests per hour	Up to 350 photometric tests per hour 67 or more ECM tests per hour
Sample Capacity	Maximum of 90 using five 9- or 18-position sample racks and one 6-position reagent rack	Maximum of 108 using six 9- or 18-position sample racks
Reagent Capacity	Maximum of 30 using one 9- or 18-position sample rack and five 6-position reagent racks	Maximum of 42 reagent positions
Walk-away Time	Up to 2 hours	Up to 3 hours
Water Consumption	1.5 liters per hour	2.5 liters per hour
Dimensions	75 cm W × 70 cm D × 62 cm H (closed) 75 cm W × x 70 cm D × 130 cm H (open) 27.5 in W × 27.6 in D × 24.4 in H (closed) 27.5 in W × 27.6 in D × 57 in H (open)	94 cm W × 70 cm D x 62 cm H (closed) 94 cm W × 70 cm D x 130 cm H (open) 37 in W × 27.6 in D x 24 in H (closed) 37 in W × 27.6 in D x 51 in H (open)
Weight	85 kg (187 lbs)	110 kg (242 lbs)
Additional Features	Continuous access to samples, reagents, and cuvettes without interrupting the test cycle. Spectral range from 340–880 nm with different filter configurations available. Bi-directional LIMS connection available.	

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

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