Evaluation of the Thermo Scientific Gallery, automated, discrete photometric analyzer

Glucose-Fructose, L-Lactic acid, L-Malic acid, Acetic acid and pH in wine samples

Huguenin B, Ploy J, Blin A

• Centre OEnologique de Bourgogne, 6 rue du 16e Chasseurs – 21200 Beaune, France

Overview

The purpose of this study was to evaluate the performance of the Thermo Scientific Gallery system and to demonstrate the suitability of the analyzer for wine analysis.

Introduction

Thermo Scientific Gallery is a new compact, automated analyzer especially designed for industrial and environmental analysis. Gallery covers a wide range of application areas, e.g. in food, beverage, water and soil testing and industrial quality control. In this study Glucose-Fructose, L-Lactic acid, L-Malic acid, Acetic acid and pH were evaluated in wine samples.

Methods

Instruments

The Thermo Scientific Gallery (manufactured by Therrmo Fisher Scientific Oy, Finland), a new discrete photometric analyzer, is fully automated bench-top system. Gallery provides an integrated platform for two measurement techniques, photometric and electrochemical (ECM), which can be run in parallel. Discrete cell technology allows for measurement of several different tests for the same sample simultaneously without method changeover time. Each individual reaction cell is isolated and temperature-stabilized. Ready-made system applications are offered for colorimetric, enzymatic and electrochemical tests. Samples, reagents and consumables can be loaded any time without interrupting the analysis in progress. Sample pretreatment is minimal; generally centrifugation or filtration is adequate to prepare the samples. Result are ready within few minutes. Gallery is able to achieve very low detection levels, and its sophisticated dilution features help to manage a wide concentration range without user intervention.

The methods of the Gallery analyzer were compared with those used by the Thermo Scientific Konelab 60 analyzer, and in case of pH the method was compared with the pH meter method.

Reagents

Glucose-Fructose, L-Lactic acid, L-Malic acid and Acetic acid were analyzed using an enzymatic method. A new optional electro-chemical (ECM) unit uses ion selective electrodes for pH measurement. The ECM unit also supports the conductivity measurement over a broad range.

TABLE 1. Thermo Scientific ready-to-use system reagents and pH electrode used in the evaluation

Reagent	Ordering code	Lot number
Glucose-Fructose	984314	2538
L-Lactic acid	984308	3077
L-Malic acid	984310	2565
Acetic acid	984318	3190
pH electrode	984997	n/a
Reference electrode	984999	n/a

Results

TABLE 2. Precision of evaluated methods

Reproducibility					
Analyte	n	Mean	S_r	S_R	R
Glucose-Fructose (g/L)	10	1,73	0,0122	0,0382	0,1069
	10	6,16	0,0488	0,1233	0,3452
L-Lactic acid (g/L)	13	1,00	0,0085	0,0551	0,1542
	13	2,19	0,0157	0,1174	0,3288
L-Malic acid (g/L)	12	0,93	0,0131	0,0194	0,0544
	12	1,46	0,0211	0,0303	0,0849
Acetic acid (g/L)	13	0,37	0,0073	0,0093	0,0261
	13	0,88	0,0198	0,0261	0,0732

Repeatablity			
Analyte	n	S_r	r
Glucose-Fructose (g/L)	59	0,0132	0,0369
L-Lactic acid (g/L)	67	0,0097	0,0270
L-Malic acid (g/L)	63	0,0098	0,0273
Acetic acid (g/L)	38	0,0112	0,0315
pH	40	0,0171	0,0479

n = Number of analysis
S_r = Repeatability
r = Repeatability limit
S_R = Reproducibility
R = Reproducibility limit

FIGURE 1. Method comparison (n= 36) of Glucose-Fructose between Gallery and Konelab 60 analyzers

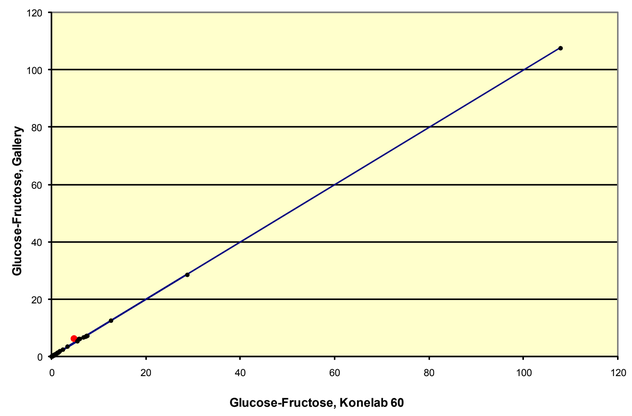


FIGURE 2. Method comparison (n= 40) of L-Lactic acid between Gallery and Konelab 60 analyzers

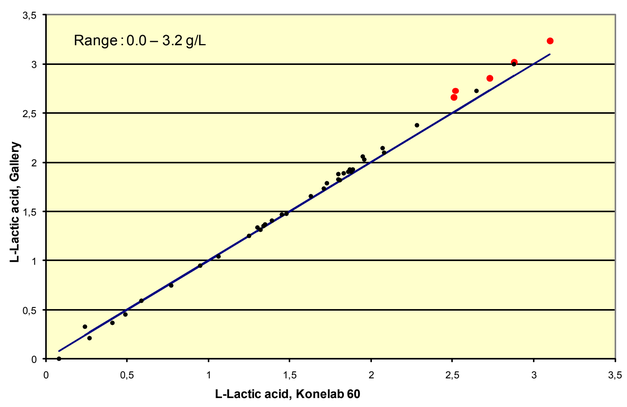


FIGURE 3. Method comparison (n= 37) of L-Malic acid between Gallery and Konelab 60 analyzers

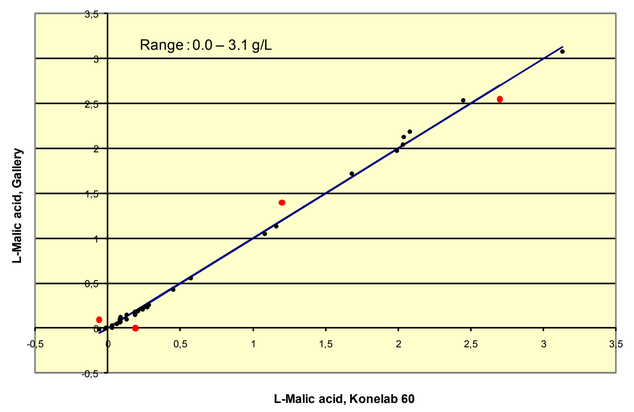


FIGURE 4. Method comparison (n= 38) of Acetic acid between Gallery and Konelab 60 analyzers

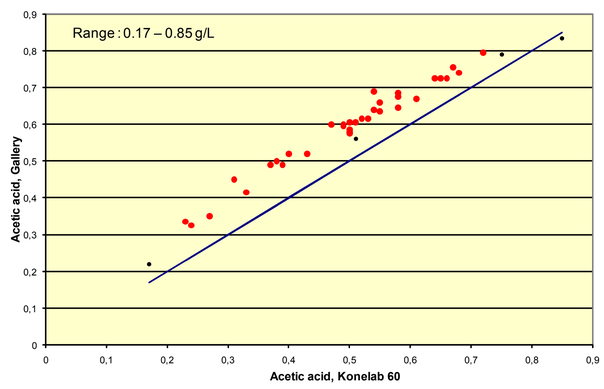
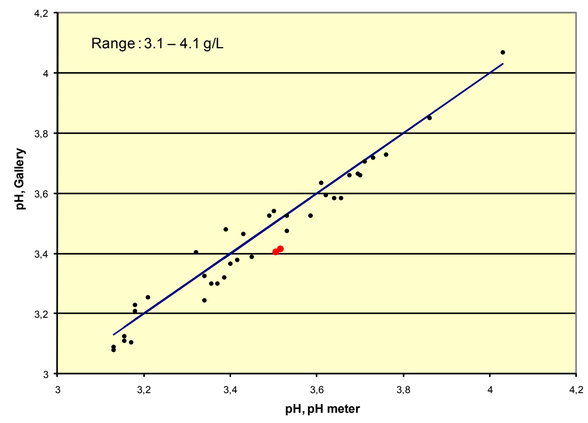


FIGURE 5. Method comparison (n= 40) of pH between Gallery and pH meter



Conclusions

The Thermo Scientific Gallery is an automated, compact, easy-to-use system, which software is clearly laid-out. Comparisons between the evaluated and routine methods showed good correlation for all other analytes except for Acetic acid. Repeatability and reproducibility data turned out to be good through the evaluation. The results together demonstrate that the Gallery is a precise and reliable analyzer for Glucose-Fructose, L-Lactic acid, L-Malic acid and pH methods in wine analysis. Acetic acid method needs further optimization and validation.