



Application Note AN-NIR-147

近外光法定葡萄酒中的乙醇含量

Rapid determination of alcohol levels in wine with NIRS

Ethanol content is an important parameter to determine in wine—during the fermentation process, for quality control, and for other legal requirements of alcoholic beverages. Traditional time-consuming methods like gas chromatography (GC) can be used for the determination of ethanol content in wine. However, measuring the alcohol content in wine can

be done easily without sample preparation by using near-infrared spectroscopy (NIRS).

NIRS is a fast, easy to use, and chemical-free analysis method. The NIRS solution can be used either atline during the wine fermentation process or in a quality control laboratory.

EXPERIMENTAL EQUIPMENT

Samples of red wine and white wine with varying alcohol content were measured on an OMNIS NIR Analyzer Liquid (1000–2250 nm). Measurements were performed in transmission mode with a 2 mm flow-through cell and corresponding holder for flow-through cells. The built-in peristaltic pump on the OMNIS Sample Robot S was used for liquid transfer (Figure 1). OMNIS Software was used for all data acquisition and prediction model development.



Figure 1. OMNIS NIR Analyzer Liquid and OMNIS Sample Robot S – WSM (1T/2P).

Table 1. Hardware and software equipment overview.

Equipment	Article number
OMNIS NIR Analyzer Liquid	2.1070.0010
NIRS 12.5 mm quartz cuvette flow 2 mm	6.7401.320
Holder OMNIS NIR, flow-through cells	6.07401.100
OMNIS Stand-Alone license	6.06003.010
OMNIS Stand-Alone: 1 instrument license	6.06002.010
Software license Quant Development	6.06008.002
OMNIS Sample Robot S – WSM (1T/2P)	2.1010.1120
OMNIS Sample rack, 25 x 75 mL (PP)	6.02041.040
Gripper fingers 28-48 mm	6.02601.040

RESULT

The obtained NIR spectra of wine (Figure 2) were used to create a prediction model for ethanol content. A leave one out validation procedure was applied. A correlation diagram showing the relation between

the NIR prediction and the reference values is shown in Figure 3 together with the respective figures of merit (FOM).

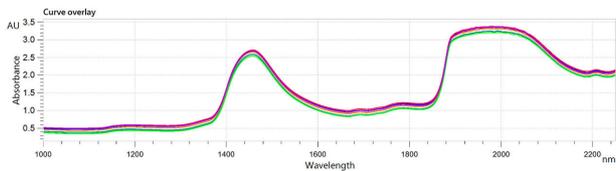


Figure 2. NIR spectra of different wine samples measured on an OMNIS NIR Analyzer Liquid with a 2 mm flow-through cell.

Result ethanol content in wine

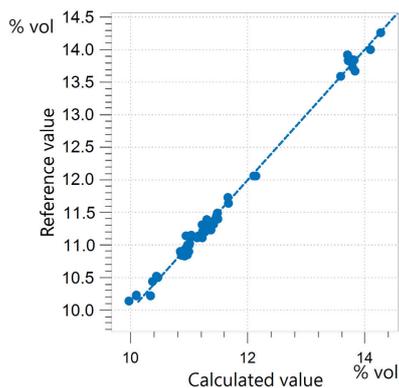


Figure 3. Correlation diagram and the respective figures of merit for the prediction of ethanol in wine. The determination of ethanol content in wine using gas chromatography was performed for reference values.

R^2	SEC (% vol)	SECV (% vol)
0.995	0.080	0.082

CONCLUSION

This Application Note shows the feasibility of using NIR spectroscopy for testing ethanol content in wine. The analysis can be conducted within seconds. No

chemicals are used, saving costs. Automation possibilities with the OMNIS platform allow the unattended measurement of up to 175 samples.

CONTACT

117702
100085

marketing@metrohm.com.cn

CONFIGURATION



OMNIS NIR Analyzer Liquid

OMNIS NIR Analyzer (NIRS) , OMNIS Software NIR

OMNIS NIR Analyzer Liquid :

- 10
- 25°C – 80°C
-
- ,()
-



NIRS 12.5 mm 2 mm

200 nm - 2500 nm 80%

:

0.5 mm , = 175 L(:**67401300**)

1 mm , = 350 L(:**67401310**)

2 mm , = 700 L(:**67401320**)

5 mm , = 1750 L(:**67401330**)

10 mm , = 3500 L(:**67401340**)

: x x = 35 mm x 12.5mm x 12.5 mm

= 8.5 -15 mm

XDS Rapidliquid Analyzer NIRS DS2500 Liquid Analyzer DS2500



OMNIS NIR

OMNIS NIR Analyzer

(6.7401.300; 6.7401.310; 6.7401.320; 6.7401.330;
6.7401.340)

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OMNIS

允机版 OMNIS 件在一台 Windows™ 计算机上行。

特性:

- 可已含有一 OMNIS 可。
- 通万通可授平台行激活。
- 不可再外计算机上使用。

OMNIS Stand-Alone1

1 器可,用于 OMNIS Stand-Alone 行外一台 OMNIS 器。

支持以下器:

- OMNIS 器
- Metrohm USB
- RS-232 器(例如:天平)

Quant Development

用于在独立 OMNIS Software 安装套件中写和量化模型的件可。

OMNIS Sample Robot S – WSM (1T/2P)

OMNIS Sample Robot S – WSM 配 1 个 OMNIS Workstation Module,包括 2 台用于清和抽吸感器及品容器的、1 个工作站、棒式拌器以及富的全自滴定直接入附件。系的 2 个品架提供了容 32 只品杯,每只 120 mL 的位置。套模化系在完整安装状下提供,因此可以在最短内。根据要求可以系升外 2 台蠕以及一个工作站,以使吞吐量加倍。如果需要其它工作站,Sample Robot S 可升 L 尺寸的 OMNIS Sample Robot,可以在最多 4 个工作站上同加工 7 个品的品,到四倍品吞吐量。



OMNIS 25 x 75 mLPP

OMNIS 品架,用于 OMNIS Sample Robot Pick&Place,配 25 个品杯。以下品杯均可使用:6.01402.000、6.01402.003、6.1459.400。

塑料:聚丙烯 (PP)



28-48 mm

OMNIS Sample Robot Pick&Place 的抓手指,用于抓取外直径 28-48 mm 的品杯。