

Classification of Red Wines by Near Infrared Transflectance Spectroscopy

W. Guggenbichler¹, C.W. Huck^{1*}, M. Popp², G.K. Bonn¹

¹*Institute of Analytical Chemistry and Radiochemistry, Leopold - Franzens University, Innrain 52a, 6020 Innsbruck, Austria*

²*Bionorica GmbH, Kerschensteinerstraße 11-15, 92318 Neumarkt / Oberpfalz, Germany*

During the recent years, wine analysis has played an increasing role due the health benefits of phenolic ingredients in red wine [1].

On the other hand there is the need to be able to distinguish between different wine varieties. Consumers want to know if a wine is an adulterated one or if it is based on the pure grape. Producers need to certificate their wines in order to ensure compliance with legal regulations. Up to now, the attempts to investigate the origin of wines were based on high-performance liquid chromatography (HPLC), gas chromatography (GC) and pyrolysis mass spectrometry (PMS) [1,2,3].

These methods need sample pretreatment, long analysis times and therefore lack of high sample throughput. In contradiction to these techniques using near infrared spectroscopy (NIRS), no sample pretreatment is necessary and the analysis time for one sample is only about 10 seconds.

Hence, a near infrared spectroscopic method is presented that allows a fast classification of wine varieties in bottled red wines. For this, the spectra of 50 bottles of Cabernet Sauvignon, Lagrein and Sangiovese (Chianti) were recorded without any sample pretreatment over a wavelength range from 1000 to 2500 nm with a resolution of 12 cm⁻¹. 10 scans were used for an average spectrum. In order to yield best reproducibility, wines were thermostated at 23° C and a optical layer thickness of 3 mm was used. All recorded spectra were partitioned into a calibration and validation set (70 % and 30 %).

Finally, a 3d scatter plot of the different investigated varieties allowed to distinguish between Cabernet Sauvignon, Lagrein and Sangiovese (Chianti). Considering the short analysis times this NIRS-method will be an interesting tool for the quality control of wine verification and also for experienced sommeliers.

1. G. Stecher, C.W. Huck, M. Popp, G.K. Bonn
Fresenius J. Anal. Chem., in press (2001)
2. L. Montanarella, M. R. Bassani and O. Breas
Rapid Commun. Mass Spectrom., 9 (1995) 1589
3. K. Sivertsen, B. Holen, F. Nicolaysen and E. Risvik
J. Sci. Food Agric., 79 (1999) 107