

Smart Wine Analysis

Introduction:

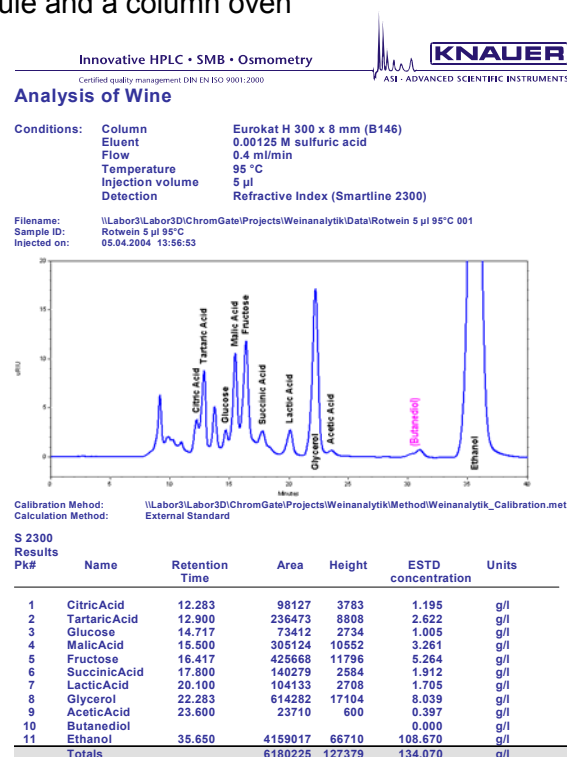
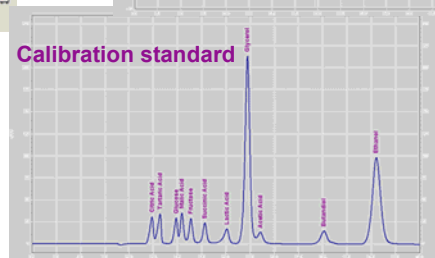
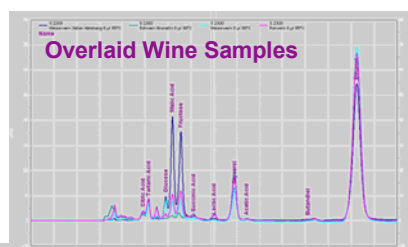
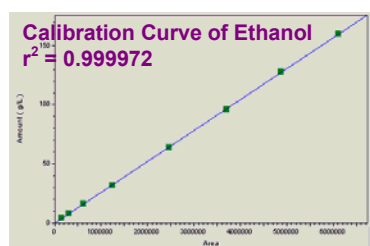
When studying the composition of wine it is advantageous to be able to simultaneously acquire information on various substances (acids, sugars, and alcohols) in as short a time as possible. This can be quickly analyzed by way of HPLC. Following parameters can be obtained from the chromatogram:

- Monitoring of the fermentation progress during wine production
- Measurement of fermentation by-products such as glycerin and butanediol
- Confirmation of the breakdown of organic biological acids
- Evaluation of wine character (sweet/dry)
- Quality control of wine through batch inspection ("fingerprint" of the wine)

Method parameters:

Column: Eurokat H 300 x 8 mm (B146) and precolumn
 Eluent: 0.00125 M sulfuric acid
 Flow rate: 0.4 ml/min
 Temperature: 95°C
 Injection volume: 5 µl / 20 µl
 Detection: Refractive index (Smartline 2300)

The **KNAUER Smartline HPLC system** for simple and fast wine analysis consists of the Pump 1000, RI Detector 2300, Autosampler 3800, Manager 5000 with degasser module and a column oven



With one injection, it is possible to obtain the concentrations of citric acid, tartaric acid, glucose, malic acid, fructose, succinic acid, lactic acid, glycerol, acetic acid, butanediol and ethanol. The calibration range is 0.2 g/l up to 10 g/l. For glycerin and ethanol a larger range from 2 g/l up to 160 g/l is tested. The named components were analyzed in various types of red and white wines.

Results:

All standards gave very good linear calibration curves with regression coefficients (r) of 0.9998 or better. The above-named substances were identified in different wines as being 12 – 13 % of the sample weight. Interestingly, white wine # 2 contained a markedly higher amount of malic acid (11.585 g/l) and fructose (12.919 g/l) and less alcohol (87.202 g/l) in comparison to all of the other wines analyzed. This result causes us to conclude that the fermentation process proceeded quickly and then was prematurely stopped.

The flavor of the wine is dependent on the tartaric acid and malic acid concentrations, as well as the total acid content comprised mainly of lactic acid, citric acid, and succinic acid. The wines analyzed gave an average total acid content of 7 – 8 g/l, with the exception of white wine # 2. The concentration of volatile acetic acid was nearly 0.36 g/l in the white wine sample and, as expected, 0.65 g/l in the red wine, twice the amount of the white wine.