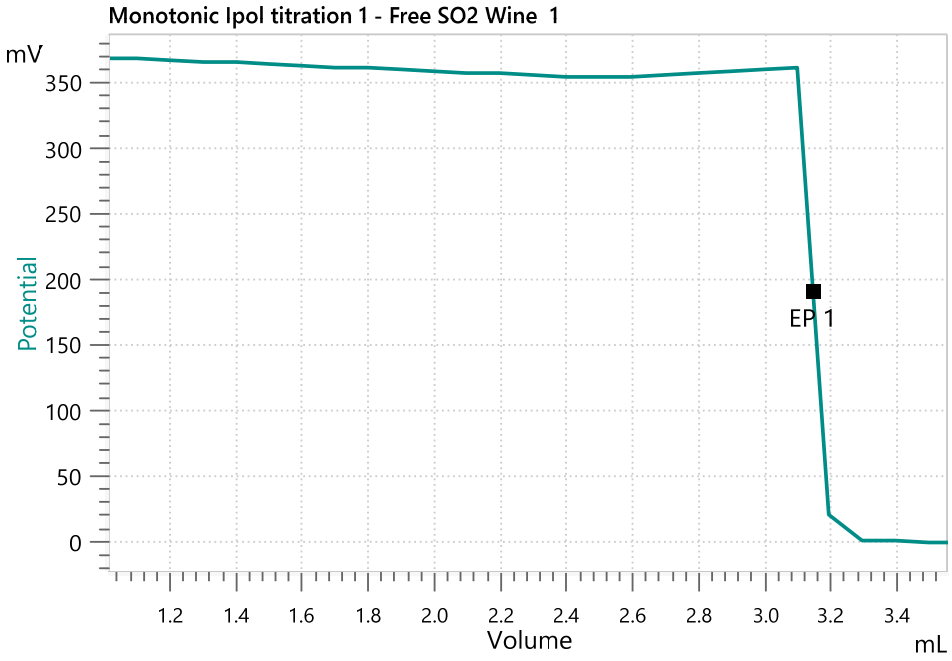
Titration Application Note T-211

Fully automated wine analysis

Determination of free and total sulfurous acid, reductants, total acidity and pH value according to OIV



The analysis of the reductants, free and total sulfurous acid, pH and total acidity of wine can be performed fully automated on an OMNIS system based on the directive OIV-MA-AS323-04B, OIV-MA-AS313-01 and OIV-MA-AS313-15.

Added components like SO_2 have preserving properties and affect the microbiological environment (anti-microbacterial and enzyme-deactivating), they trap fermentation byproducts such as acetaldehyde and suppress a coloring into brown. The bound and free sulfurous acid are in an equilibrium with each other and can be determined via iodometric titration. Iodometric titration is also the method of choice to quantify other reductants, such as dyes, tanning agents, degradation products of carbohydrates and ascorbic acid. Finally, the acidity of wine is an important quality parameter, which affects the color and taste of wines. The total acidity and the pH of wine can be determined on the same system. Hence, Metrohm offers an all-in-one solution for the analysis of these mentioned key parameters.

Metrohm

Method description

Sample

White wine

Red wine

Sparkling wine

Sample preparation

No sample preparation is required.

Configuration

Flat membrane electrode with Pt1000	6.9902.148
Double Pt sheet electrode	6.0309.100

Analysis

On one Pick&Place module, all determinations using iodine as titrant are carried out. Meanwhile the pH value and total acidity are determined parallel on a second Pick&Place module.

For the analysis of the free and total sulfurous acid, 50 mL wine is pipetted into a 120 mL beaker. The free sulfurous acid is directly determined with iodine as titrant. Immediately afterwards, sodium hydroxide is added to start the hydrolysis what allows the determination of the total sulfurous acid content. After a reaction time of 10 min, the sample is acidified with sulfuric acid and then titrated with iodine solution

To determine the reductants, again 50 mL wine is pipetted into a 120 mL beaker. The free SO_2 is masked with glyoxal. After a reaction time of 10 min, the sample is titrated with iodine.

For the pH value and acidity determination approximately 50 mL of wine is transferred into a 120 mL beaker. The sample is then automatically degassed by purging nitrogen through the sample or by stirring. In case of sparkling wine, the wine was degassed by careful stirring. After the degassing, the pH value is determined. Afterwards, 10 mL of the degassed wine sample is pipetted automatically into a second beaker. Here, the total acidity is determined by titration with sodium hydroxide.

Results

Reductants

Sample (n = 6)	As ascorbic acid (mg/L)	As sulfurous acid (mg/L)	s(rel)
Red wine	65.25	23.74	3.5%
White wine	46.76	17.01	0.0%
Sparkling wine	199.81	72.68	2.6%

Free SO_2

Sample (n = 6)	Free SO_2 (mg/L)	s(rel)
Red wine	48.97	1.6%
White wine	51.03	0.0%
Sparkling wine	96.65	1.9%

Total SO_2

Sample (n = 6)	Total SO_2 (mg/L)	s(rel)
Red wine	111.03	0.6%
White wine	108.79	1.2%
Sparkling wine	129.38	3.6%

pH value

Sample (n = 6)	pH value	s(rel)
Red wine	3.57	0.0%
White wine	3.33	0.2%
Sparkling wine	3.07	0.1%

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Method description

Total acidity

Sample (n = 6)	Total acid (g tartaric acid / L)	s(rel)
Red wine	5.065	0.1%
White wine	5.985	1.6%
Sparkling wine	5.790	4.3%

Summary

A fully automated wine analysis according to OIV directives was performed on an OMNIS system to determine the free and total sulfurous acid content, the amount of reductants, the total acidity and the pH. The procedure is fast and allows a high sample throughput. Working on two Pick&Places allow to carry out the iodometric determinations (reductants and sulfurous acid) and pH and total acidity at the same time. The determination of the total acidity requires a degassing of the sample, which can be achieved by stirring or purging nitrogen through the sample via a degasser unit.

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