Organizers
Slovak Chemical Society
Slovak Vacuum Society
in cooperation with
Department of Analytical Chemistry, Faculty of Natural Sciences, Comenius University in Bratislava

Organizing Committee
Andrea Staňová
Róbert Bodor
Radoslav Halko
Marián Masár

Symposium Secretariat
14th ISSSB
Department of Analytical Chemistry
Faculty of Natural Sciences
Comenius University in Bratislava
Mlynská dolina CH-2
SK-84215 Bratislava
Slovakia
E-mail: 14isssb@gmail.com
Phone: +421 2 602 96 379
Fax.: +421 2 602 96 706

Editors
Marián Masár
Róbert Bodor
Andrea Staňová
Radoslav Halko

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Foreword

It is our great pleasure to welcome you to the 14th International Symposium and Summer School on Bioanalysis (14th ISSSB) that will be mainly held at the SAS Congress Centre Smolenice between 28th of June and 6th of July 2014.

The event is organized in the frame of CEEPUS CIII-RO-0010-08-1314 network. The 14th ISSSB provides an overview of a broad range of interdisciplinary subjects in bioanalysis. Its main purpose is to offer an opportunity for young researchers to learn more about the current progress in the analytical techniques.

The symposium focuses on the application of bioanalytical methods in chemical and pharmaceutical research, and related topics. The scientific program will include oral lectures and poster presentations as well as practical courses on bioanalysis.

Bratislava, June 2014

Marián Masár
Symposium chair
LECTURES
Influence of Vinification Practices on the Elements Concentration in Vranec wines studied by ICP-OES

Violeta Ivanova-Petropulos¹*, Katerina Bačeva², Elena Bogeva³, Goran Milanov⁴, Trajče Stafilov²

¹Faculty of Agriculture, University “Goce Delčev”, Krste Misirkov bb, 2000 Štip, Republic of Macedonia

²Institute of Chemistry, Faculty of Natural Sciences and Mathematics, University “Ss. Cyril and Methodius”, Arhimedova 5, 1000 Skopje, Republic of Macedonia

³Elenov Winery, 1422 Demira Kapija, Republic of Macedonia

⁴Institute of Agriculture, University “Ss. Cyril and Methodius”, bul. Aleksandar Makedonski bb, 1000 Skopje, Republic of Macedonia

*e-mail: violeta.ivanova@ugd.edu.mk

The presence of metals (i.e. Al, Zn, Cu, Fe, Pb) in wine is important for efficient alcoholic fermentation and for its sensorial characteristics (flavor, aroma, freshness). Certain metal ions, such as Fe, Cu and Mn participate in destabilization of wine and in their oxidative evolution, whereas Cu, Fe, Al, Zn and Ni contribute to haze formation and undesirable changes of aroma and taste. The element composition of the wines may be influenced by many factors such as elemental levels in the soil, fertilization practices, wine processing equipment and vinification [1,2].

In this study, Vranec wines produced with different maceration times (4, 7, 14 and 30 days) in presence of enzyme and oak chips during fermentation were studied in order to determine the influence of vinification conditions on the elements concentration. Analysis was performed with inductively coupled plasma – optical emission spectrometry (ICP-OES) for accurate determination of the concentration of 18 elements (Al, Ba, Bi, Ca, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, P, S, Sr, V, Zn). The results demonstrate that Mg and P increased during maceration, while the other elements content was not affected by the maceration time duration. Wines macerated for 7, 14 and 40 days, fermented in presence of oak chips showed highest content of Al, Ba, Fe, K, Mn, and P. The Student–Newman–Keuls test was applied to ascertain possible significant differences between the studied wines, and factor analysis was employed showing separation of the wines mainly according to the oak chips treatment.

References

INFLUENCE OF VINIFICATION PRACTICES ON THE ELEMENTS CONCENTRATION IN VRANEC WINES STUDIED BY ICP-OES

Violeta Ivanova-Petropulos
Faculty of Agriculture, University “Goce Delčev” - Štip, Republic of Macedonia

Katerina Bačeva, Elena Bogeva, Goran Milanov, Trajče Stafilov
Aim of the work

1. To analyse the elemental composition of Vranec wines

2. To study the influence of vinification conditions on the elements concentration

- Applying ICP-OES for analyses
**Wine samples**
12 wine samples from Vranec variety

- Different maceration time: 4, 7, 14 and 30 days

- Application of:
  - Enzume
  - Oak chips

**ICP-OES analysis**
Instrumental techniques for elements analysis

ICP-OES-Varian 715-ES

ICP-OES analysis
- wines were directly injected
- Varian 715-ES with CETAC USNebulizer 5000⁺
**EXPERIMENTAL**

Instrumentation and operating conditions for the ICP-OES (Varian, 715-ES) system

<table>
<thead>
<tr>
<th><strong>RF generator</strong></th>
<th></th>
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<tbody>
<tr>
<td>Operating frequency</td>
<td>40.68 MHz free-running, air-cooled RF generator</td>
</tr>
<tr>
<td>Power output of RF generator</td>
<td>700–1700 W in 50 W increments</td>
</tr>
<tr>
<td>Power output stability</td>
<td>Better than 0.1 %</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Introduction area</th>
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</thead>
<tbody>
<tr>
<td>Sample nebulizer</td>
</tr>
<tr>
<td>Spray chamber</td>
</tr>
<tr>
<td>Peristaltic pump</td>
</tr>
<tr>
<td>Plasma configuration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Spectrometer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical arrangement</td>
</tr>
<tr>
<td>Polychromator</td>
</tr>
<tr>
<td>Echelle grating</td>
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<tr>
<td>Polychromator purge</td>
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<tr>
<td>Megapixel CCD detector</td>
</tr>
<tr>
<td>Wavelength coverage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Conditions for program</strong></th>
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<tbody>
<tr>
<td>RFG power</td>
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<tr>
<td>Pump speed</td>
</tr>
<tr>
<td>Plasma Ar flow rate</td>
</tr>
<tr>
<td>Stabilization time</td>
</tr>
<tr>
<td>Auxiliary Ar flow rate</td>
</tr>
<tr>
<td>Rinse time</td>
</tr>
<tr>
<td>Nebulizer Ar flow rate</td>
</tr>
<tr>
<td>Sample delay</td>
</tr>
<tr>
<td>Background correction</td>
</tr>
<tr>
<td>Number of replicates</td>
</tr>
</tbody>
</table>
RESULTS AND DISCUSSION

- 18 elements quantified in Vranec wines

Al, Ba, Bi, Ca, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, P, S, Sr, V and Zn

<table>
<thead>
<tr>
<th>Elements</th>
<th>Al</th>
<th>As</th>
<th>Ba</th>
<th>Bi</th>
<th>Ca</th>
<th>Cd</th>
<th>Co</th>
<th>Cr</th>
<th>Cu</th>
<th>Fe</th>
<th>K</th>
<th>Li</th>
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</thead>
<tbody>
<tr>
<td>LOD µg/L</td>
<td>0.25</td>
<td>10</td>
<td>0.5</td>
<td>1</td>
<td>0.5</td>
<td>0.1</td>
<td>1</td>
<td>1</td>
<td>0.25</td>
<td>0.12</td>
<td>100</td>
<td>1</td>
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</table>

<table>
<thead>
<tr>
<th>Elements</th>
<th>Mg</th>
<th>Mn</th>
<th>Mo</th>
<th>Na</th>
<th>Ni</th>
<th>P</th>
<th>Pb</th>
<th>S</th>
<th>Sr</th>
<th>Tl</th>
<th>V</th>
<th>Zn</th>
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</thead>
<tbody>
<tr>
<td>LOD µg/L</td>
<td>0.5</td>
<td>0.03</td>
<td>4</td>
<td>50</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>50</td>
<td>0.5</td>
<td>10</td>
<td>1</td>
<td>0.06</td>
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