

## BANNER SP 34

### Analytical methodology for the determination and separation of phenolic compounds in the bio-oil

C. Tessini<sup>1\*</sup>, M. Diaz<sup>1\*</sup>, B. Vivanco<sup>1</sup>, L. Gamboa<sup>1</sup>, C. Segura<sup>2</sup> and F. Thomet<sup>3</sup>,

<sup>1</sup> Av. España 1680, Valparaíso, Laboratory of de Analytical Chemistry and Electroanalysis, Chemistry Department, Universidad Técnica Federico Santa María, Chile, [Catherine.tessini@usm.cl](mailto:Catherine.tessini@usm.cl)

<sup>2</sup> Av. Cordillera 2634, Coronel Unidad de Desarrollo Tecnológico, Chile

<sup>3</sup> Av. España 1680, Valparaíso, Chemistry Department, Universidad Técnica Federico Santa María, Valparaíso, Chile

**Keywords:** Bio-oil, phenolic compounds, HPLC

Currently, bio-oil is being used as a platform for the production of chemicals products, considering that the bio-oil can be obtained from different biomass, the implementation of analytical methods is a challenge to the knowledge of this matrix. In this work, the bio-oil corresponds to the product of the pyrolysis of insoluble tannins of pine bark, where it is possible to obtain a bio-oil rich in phenolic compounds of varied molecular mass.

From the analytical point of view, it remains an extremely complex matrix, product of its heterogeneous composition, the objective of this work is to characterize and quantify phenolic compounds in bio-oil and implement an analytical method to separate these compounds, according to their molecular weight. By HPLC-DAD in reverse phase and without sample treatment, it is possible quantify: catechol, 4-methylcatechol, phenol, p-cresol and guaycol.

For determination of possible polymers of these phenolic compounds in bio-oil, were implemented spectrophotometric techniques (vanillin/HCl and methylcelulose method) for the determination of total tannins, finding percentages between 4.9% and 5.8% (w/w) as equivalent catechin.

To know the structure of the tannins in bio-oil, using complementary techniques (FT-IR, MS or other), the extraction method in solid phase was optimized, to separate these phenolic compounds from the bio-oil according to their degree of polymerization. The results of the implementation and optimization of the method were: C-18 cartridge (500 mg), after loading the bio-oil, elution of the catechol is obtained with 10 ml of water, the other polyphenols in the second elution with 10 mL phosphate buffer and acetonitrile (50:50 v/v) and the larger polyphenols in the third extraction with 3 mL of methanol.

**Acknowledgements:** The authors thank the internal project USM PI-L-17-03 and LabQI.

#### References:

B. Sun, C. Leandro, J. M. Ricardo da Silva, and I. Spranger, "Separation of Grape and Wine Proanthocyanidins According to Their Degree of Polymerization," *J. Agric. Food Chem.*, vol. 46, no. 4, pp. 1390–1396, 1998.