MICROWAVE ASSISTED EXTRATION OF GRAPE MARC: COMPARISON TO CONVENTIONAL PROCESS AND ECONOMIC EVALUATION

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The extent worldwide production of grapes and wine has to deal with the disposal of 9 tonnes grape residue. This residue is rich in valuable compounds such as polyphenols, flavonoids, anthocyanins and stilbene derivatives, to which positive antioxidant and antimicrobial effects are attributed. The extraction of these compounds and their commercialization can give added value to the reused industrial residue.

To recover such components, mild extraction techniques can be used with long extraction times, involving large amount of solvent as ethanol. These conditions require bulky equipment size and large stock of unmarked ethanol, which cause an important economic issue in the process.

Microwave assisted extraction (MAE) is shown here compared to the conventional extraction technique to overcome these problems by shortening the required time and solvent consumption in the process. Grape marc (mixture of grape skin and seed) was obtained from local winery (Grupo Matarromera, Valladolid) with an approximate moisture content of 85 wt%. As extraction solvent, 50% ethanol/water mixture was used with 5 ml/g solid to solvent ratio during 3 hours at 40°C. Polyphenol and anthocyanin content were analysed through the process, and were modelled by first order kinetics to obtain the final extraction yield and the initial extraction rate.

Microwave assisted extractions were performed in a laboratory device (CEM Discovery), where different solid/solvent ratios (0.10, 0.25, 0.50) were used. After a short pre-treatment under microwave irradiation, where close to boiling temperature was achieved at atmospheric pressure, the temperature was lowered to 40°C and extraction was followed in a conventional way.

Such short treatment times at high temperatures allowed a fourfold faster extraction of the phenolic compounds avoiding the thermal degradation of anthocyanins, as the most thermo sensitive compounds of interest.

The viability of such novel technique can be demonstrated by an additional economic evaluation, which takes into account the time, space and solvent stock saving beside the necessary energy input due to the microwave application at larger scale.