

SUPERCRITICAL CARBON DIOXIDE EXTRACTION OF VOLATILE AND NON-VOLATILE COMPOUNDS FROM AROMATIC PLANTS

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Abstract

Portugal and Spain are rich in aromatic plants, whose essential oils are important for the pharmaceutical and food industries.

Essential oils are traditionally obtained by hydrodistillation, although this technique has several disadvantages, due to the thermal degradation of some components of the essential oil and the possibility of hydrosolubilization and hydrolysis, which can affect its quality [1].

In recent years supercritical fluid extraction (SFE) has received increased attention as an alternative method for the extraction of volatile compounds of essential oils, since the above mentioned limitations are avoided [1]. An experimental program has been developed in our laboratory to use this technique to extract volatile compounds from aromatic plants. The carbon dioxide has been the supercritical solvent chosen, because is non-flammable, cheap and non-toxic.

A flow apparatus, with an extractor of 1 L and two separators with 0.27 L each, was built to carry out extraction studies in the temperature range of 308 to 333 K and pressures up to 30 MPa [2]. Through a fractional separation it is possible to precipitate undesirable compounds (waxes) in the first separator and the volatile compounds (oil) in the second one. However, the oil obtained by SFE is presently designated by volatile oil in order to differentiate it from the essential oil obtained from hydrodistillation.

Extraction studies of volatile oils from several aromatic plants, such as rosemary (*Rosmarius officianlis L.*), pennyroyal (*Mentha pulleginum L.*), fennel (*Foeniculum vulgare*), winter savory (*Satureja fruticosa*), savory (*Satureja montana*) and cotton lavender (*Santolina chramaecypasissus*) have been carried out. The effect of the particle size and flow rate, together with the pressure and temperature, in these extraction studies, will be discussed.

Moreover, studies on the anticholinesterase and antimicrobial activities of non-volatile compounds from aromatic plants, such as savory, obtained by SFE (at 25 MPa) and Soxhlet extraction (SE) will be also reported.

References

[1] T. Bruno, C.A.N. Castro, J.F. Hammel, A.M.F. Palavra, in J.F. Kennedy, J.M.S. Cabral (Eds), Supercritical Fluid Extraction of Biological Products. Recovery Processes for Biological Materials, J. Wiley & Sons, Chichester; 1993.

[2] E.M.C. Reis-Vasco, J.P. Coelho, A.F. Palavra, Flavour Fragr. J. 14 (1999) 156-160.