The integrated process of supercritical CO_2 extraction from *Helichrysum italicum* and supercritical impregnation of biocompatible polymers with the obtained extract

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The coupling of supercritical fluid extraction and supercritical solvent impregnation processes has been proved to be convenient in cases where the active substance, to be incorporated in the solid carrier, is supercritical extract. The integrated process enables minimizing the loss of the extract by directly using the supercritical CO_2-extract solution leaving the extractor vessel for the impregnation and avoidance of the intermediate decompression step in the separate processes (decompression after extraction), and consequently leads to energy and time savings.

The objective of this work was to examine the application of the integrated process for impregnation of chitosan/alginate and corn starch xerogels and aerogels with *Helichrysum italicum* supercritical CO_2 extract. For that purpose, first chitosan/alginate and starch hydrogels were prepared by sol-gel method. Thereafter hydrogels were transformed into alcogels by water exchange with ethanol or acetone. Xerogels and aerogels were produced by air and supercritical CO_2 drying of the alcogels or acetogels, respectively. Finally, impregnation of the xerogels and aerogels was performed in the laboratory unit for the integrated processes.

Both chitosan/alginate and starch xerogels and aerogels showed significant affinity for the incorporation of active principles from *H. italicum* which was confirmed by FTIR method. SEM method indicated significant differences in materials' porosity. One of the reason for this is pore collapse phenomenon associated the formation of the xerogels. Obtained results confirmed that it is possible to impregnate chitosan/alginate and starch xerogels and aerogels with *H. italicum* extract by the integrated process of supercritical CO_2 extraction and impregnation.

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