



## **Supercritical fluids as a tool of process intensification and sustainable technologies**

**Knez Hrnčič M. , Škerget M., Knez Ž.**

*University of Maribor, Faculty of Chemistry and Chemical Engineering, Smetanova 17, 2000 Maribor, Slovenia*

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**Abstract:** Using supercritical fluids (SCF) as solvents in chemical processes means an advantage in many points of view. It offers health, safety, environmental and also chemical benefits. Commonly SCFs are termed as green solvents. Using high pressure as a processing tool surpasses legal limitations for solvent residues and restrictions on use of conventional solvents in chemical processes. Additionally, particulate products can be also achieved by means of SCF processing. The contribution will give a limited overview of applications of sub- and supercritical fluids and will present energy savings compared to conventional production methods. Considering above mentioned facts, supercritical fluids could certainly be applied as a substitution of conventional solvents in extractive and non-extractive processes as a nontoxic, inexpensive, nonflammable, and nonpolluting solvents. Many applications such as high pressure sterilization, jet-cutting, thin film deposition for microelectronics, and the separation of value-added products from fermentation broths in the biotechnology field have been fully developed and commercialized. Particle formation processes using high pressures in presence of supercritical fluids may overcome several drawbacks of conventional particle size reduction processes.

**Corresponding author:**

Željko Knez

**E-mail:**

zeljko.knez@um.si

Tel: +386 2 229 400

Fax: +386 2 2516750

### **Sažetak**

Korištenje superkritičnih fluida (SCF) kao otapala u kemijskim procesima ima veliki broj prednosti u odnosu na ostale metode. Pored uloge u samim hemijskim procesima, SCF nisi toksični, sigurni su za korištenje i okoliš. Obično se SCF nazivaju zelena otapala. Korištenje konvencionalnih rastvarača u procesima je i zakonski limitirano za razliku od SCF. Osim toga, ciljani proizvodi mogu biti formirani pomoću u zavisnosti od prerade SCF. Ovdje će biti prezentirani neki primjeri upotrebe superkritičnih fluida, a predstaviti će se i primjeri ušteda energije u usporedbi s konvencionalnim metodama proizvodnje. S obzirom na gore navedene činjenice, superkritični fluidi mogu biti primijenjeni kao zamjena konvencionalnih otapala u procesima ekstrakcije i ostalim reakcijama jer su neotrovnost, jeftina, nezapaljiva i nezagađujuća otapala. Mnoge aplikacije kao što su sterilizacija visokim tlakom, rezanje mlazom, depozicija tankog filma u mikroelektronici, i odvajanje proizvoda iz fermentacijskih smjesi u biotehnologiji su u potpunosti razvijeni i komercijalizirani. Formiranje čestica pomoću visokog pritiska u prisutnosti superkritičnih fluida može imati značajne prednosti u odnosu na konvencionalne postupke za usitnjavanje čestica.