

## **Micronization, characterization and in-vitro dissolution of shellac from PGSS supercritical CO<sub>2</sub> technique**

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### **Abstract**

The purpose of this investigation was to determine whether shellac, a naturally occurring material with enteric properties, could be processed in supercritical CO<sub>2</sub> (sc-CO<sub>2</sub>) using the particles from gas saturated solution (PGSS) process and how process parameters affect the physico-chemical properties of shellac. In-situ attenuated total reflection fourier transform infra-red (ATR-FTIR) spectroscopy showed that CO<sub>2</sub> dissolves in shellac with solubility reaching a maximum of 13% (w/w) at 300bar pressure and 40°C and maximum swelling of 28%. The solubility of sc-CO<sub>2</sub> in shellac allowed for the formation of porous shellac structures of which the average pore diameter and pore density could be controlled by adjustment of operating pressure and temperature. In addition, it was possible to produce shellac microparticles ranging in average diameter from 180 to 300µm. It was also shown that processing shellac in sc-CO<sub>2</sub> resulted in accelerated esterification reactions, potentially limiting the extent of post-processing "ageing" and thus greater stability. Due to additional hydrolysis reactions enhanced by the presence of sc-CO<sub>2</sub>, the solubility of shellac at pH 7.5 was increased by between 4 and 7 times, while dissolution rates were also increased. It was also shown that the in-vitro dissolution profiles of shellac could be modified by slight adjustment in operating temperatures.