Quercetin loaded PVP microparticles production by supercritical CO_2 assisted electrospray

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Supercritical assisted electrospray, in which supercritical CO_2 is added to the polymeric solution for the gas expanded liquid formation, is proposed in this work for the production of polyvynilpyrrolidone (PVP) particles loaded with quercetin (Q). The effect of the main operative parameters, such as voltage (from 10 to 30 kV) and pressure (from 80 to 160 bar), on the particle morphology and mean diameter, was studied; whereas, PVP concentration and Q loading were fixed at 3% w/w and 3.5% w/w, respectively. Loaded PVP particle mean diameter reduced by increasing applied voltage and operative pressure. In particular, working at 30 kV and varying pressure from 80 to 160 bar, particle mean diameter ranged from 2.80 ± 1.17 µm to 0.65 ± 0.15 µm, respectively. Moreover, the voltage increase favored the production of more regular and spherical microparticles. The synergistic effects of the disgregative forces, like pressure and applied voltage, coupled with the mixing of supercritical CO_2 in the polymeric solution at the beginning of the experiment, improved the electrospray performance: solution cohesive forces (i.e., viscosity and surface tension) were reduced, and the jet break up was potentiated, producing smaller and regular quercetin loaded PVP microparticles.