Use of Ultra High Pressure Fluids on Industrial-Scale

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Extraction of substances from biomass, their in-situ formulation in products with specific properties is a known but still promising application of supercritical fluids. The number of products being produced with this technology is still growing, steadily. Supercritical fluids can also be used to reduce unwanted ingredients from liquid, solid or pasty raw materials. In many cases both, extract and raffinate are considered as a valuable product. One of the advantages of using supercritical fluids is the tuneable selectivity for specific components and the possibility of fractionating separation. In recent industrial-scale applications the practical tuning range has been increased due the use of higher pressures allowing to efficiently extract rather polar ingredients previously efficiently extracted only by using co-solvents or traditional extraction methods.

CO_2 is often used as supercritical fluid due to the high quality, solvent free final products which can be achieved. For the basic process engineering of industrial plants fundamental phase equilibrium data for the system extract / CO_2 have to be determined. Also, lab-scale extraction experiments are helpful and were usually performed using fractionating separation of the extracts. Based on all obtained lab- or pilot-scale experimental data the process design for a production-scale plant can be executed followed by the detail engineering, fabrication of the components and site installation. Several examples of recently realized and commissioned industrial-scale systems using supercritical fluids at ultra high pressure will be presented.