

Green Extractions in the Food Industry

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Abstract

Most companies in the food industries use conventional extraction methods such as those using solvents, or steam and hydro-distillation. Recent trends in extraction techniques have largely focused on minimizing the use of petroleum-based solvents. Recently, more efficient extraction methods, such as subcritical water extraction (SWE), supercritical fluid extraction (SFE), and microwave assisted extraction (MAE) have been used for the isolation of organic compounds from various plants. These extraction techniques are not only cheaper and faster, but being considered environmentally-friendly, they would also enable these products to claim a green label. Having a green label is desirable to many customers.

SWE as a method, is non-toxic, non-flammable, fast, cheap, readily available, safe, environmentally friendly and uses a green solvent. The extraction of phenolic compounds, flavonoids, flavor, fragrances and essential oils have been carried

out using SWE and both qualitative and quantitative results obtained.

SFE of essential oils with carbon dioxide has certain advantages over steam distillation. Steam distillation can lead to thermal degradation and partial hydrolysis of some essential oil compounds. Supercritical CO₂ extraction is relatively fast due to the low viscosity, high diffusivity, and tunable solvent power of the supercritical fluid. SFE is considered a safe and green technology.

MAE is a relatively new extraction technique that combines microwave and traditional solvent extraction. Microwaves are applied to heat the solvents and plant tissues in the extraction process, which increases the kinetics of extraction. MAE has a number of advantages over traditional extraction methods, e.g., shorter extraction time, less solvent, higher extraction rate and lower cost.