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Modern Oil Extraction Methods for Medicinal Plants

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Introduction-

Medicinal plants, also called medicinal herbs, have been discovered and used in traditional medicine practices since prehistoric times. Plants synthesize hundreds of chemical compounds for functions including defense against insects, fungi, diseases, and herbivorous mammals. Numerous phytochemicals with potential or established biological activity have been identified.

Medicinal plants are the richest bioresource of drugs for traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs.

Modern Extraction Methods-

Supercritical fluid extraction (SFE) is one of the most efficient extraction methods. This separation technology is extensively used in the food, cosmetic, and pharmaceutical sectors to isolate and purify active ingredients from natural and synthetic raw materials and on laboratory and industrial scales. The complete lack of residual solvents in the final product, the high throughput as compared with traditional liquid extraction, and the ability to tweak the dissolving power of the supercritical solvent over comparatively broad pressure and temperature limits facilitate successful implementation of SFE. Existing examples of SFE implementation in industry are focused mainly on the first two cited advantages of this technology. However, the ability to adjust the dissolving power is just as interesting from a scientific viewpoint. This is one of the key properties of supercritical fluids that is missing for traditional liquids and liquefied subcritical gases. Its use could provide key technological advantages for stimulating a transition to SFE technology. shows a conceptual diagram of a CO2 extractor. The most well-known tunable property of supercritical fluids is the ability to control the dissolving power by using pressure and, more rarely, temperature to change the fluid density. Unnecessary constituents can be rejected and target products can be selectively extracted and concentrated by tuning the density. For example, the dissolving power of a supercritical extractant for plants with essential oils can be selected so that target volatile terpenes responsible for the valuable aromatic properties of such extracts are readily extracted whereas heavy waxes and carotenoid pigments, which are usually considered undesired impurities in aromatic extracts, will not appear in the final product. An alternative strategy based on using this property could be simultaneous extraction of all constituents at high extractant densities followed by their separation using stepwise pressure drops. This approach is interesting when the MPM being processed contains several target constituents with significantly different solubilities in the supercritical fluid. All constituents dissolve in the extractant at high densities. Then, the solution is transferred to the first separator where the pressure is dropped not completely to atmospheric but to a value at which the heaviest target fraction becomes insoluble and

Microwave extraction is a promising method for enhancing heat and mass transfer. It could be used to increase the rate and completeness of BAC extraction from plant raw material. Microwave extraction is usually conducted in closed autoclaves using special equipment from several companies. shows an example of a microwave extractor. Sample preparation systems for microwave extraction perform not only extraction but also preliminary drying in addition to rapid evaporation of the extract to remove up to 98% of the solvent. Microwaves can give high degrees of extraction in shorter times (15 – 30 min). Solvent consumption is significantly decreased. Time is saved by increasing the solvent boiling point, which allows the reaction temperature to be increased, and stirring constantly. Finer control of the reaction parameters (temperature and time) can give more reproducible results .

Vibrocavitation extraction

Use of vigorous mixing that increases considerably the interfacial area of the mixed components, concentrates a significant amount of energy in small volumes, and can in several instances mix media of different viscosities in a single type of equipment are currently important thrusts for the improvement of existing extraction technologies. Efficient vibrocavitation extraction technology (dispersion) of liquid components over a broad range of viscosities was developed in consideration of this trend. This technology provides multistep material processing, i.e., first, preliminary mixing; then, dispersion and homogenization to disperse-phase particle sizes 5 m

Two-phase extraction

MPM acting as the source for manufacturing phyto preparations contains a variable BAC complex. Extracts obtained by traditional methods contain a BAC complex that is incomplete when compared to the native complex because of differences in the physicochemical properties of the BACs in the MPM [1, 8]. An analysis of the literature revealed a serious deficiency in MPM extraction by, e.g., only aqueous alcohol or an oily extractant, i.e., a significant amount of BACs without affinity for the extractant remains in the pulp. Therefore, a critical technology development area for rational use of medicinal plants is the updating and development of new resource-conserving technologies that enable the BAC complex to be extracted as fully as possible.