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A Review on Current Extraction Techniques Used in Medicinal Plants

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ABSTRACT

Medicinal plants are currently in considerable significance view due to their special attributes as large source of therapeutic phytochemicals that may lead to development of novel drug. The study on medicinal plants started with the pre-extraction and extraction procedure. Extraction is essential for isolation of different chemical constituents from crude drug material. Extraction depends on properties of material to be extracted. Hence, it is necessary to study the extraction methods. Generally, traditional methods are commonly used at the small research setting or at Small Manufacturing Enterprise (SME) level but, now days some modern extraction methods are developed which signify advances. These modern extraction methods increase yield at low cost.

Keywords : Soxhlet Extraction, Microwave Assisted Extraction, Ultrasound-Assisted Extraction, Supercritical-Fluid Extraction, Medicinal Plants.

I. INTRODUCTION

Medicinal plants are used for medicinal purposes. Treatment with medicinal plants is considered very safe as there is no or minimal side effects. They act as a large source of therapeutic phytochemicals that may lead to development of novel drugs. And they are used in ethno medicine treating common disease such as cold, fever, skin infection etc.

In the study of medicinal plants, two important procedures are there i.e. Pre-extraction and the Extraction procedure, which is important steps in processing of the bioactive constituents from plant materials. Traditional methods such as Maceration and Soxhlet extraction are commonly used at the small research settings. Currently Modern extraction methods are developed such as: Microwave-assisted extraction (MAE), Ultrasound-assisted extraction (UAE) and Supercritical fluid extraction (SFE) , Counter current extraction. These modern extraction methods increase yield at lower cost.

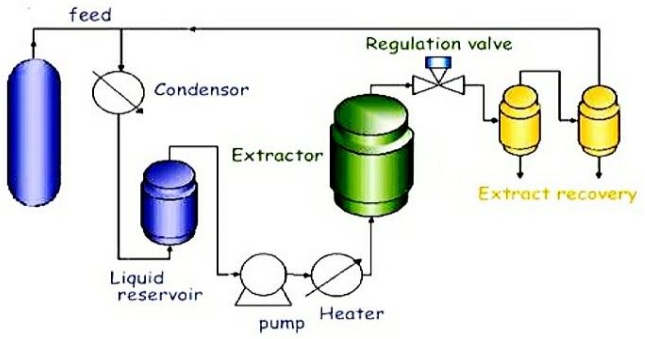
II. METHODS AND MATERIAL

Extraction is the method of removing active constituents from solid or liquid by means of liquid solvent. It is the separation of medicinally active portions of plants or animal tissues from the inactive or inert components by using selective solvent. Extraction is essential for isolation of different chemical constituents from crude drugs.

Extract can be defined as “Preparations of crude drugs which contain all the constituents which are soluble in solvent. Marc is the Solid (undissolved) residue obtained after extraction and Menstruum is the Solvent used for extraction.

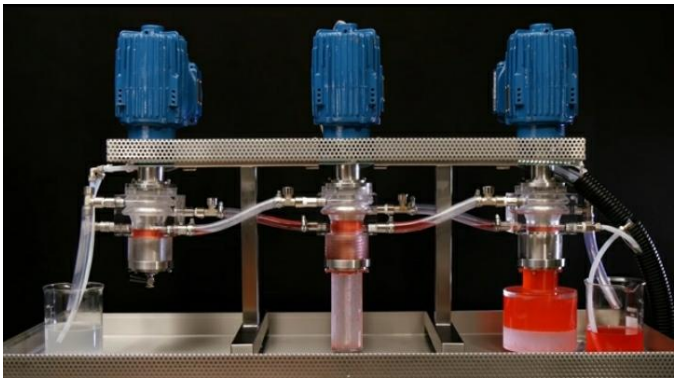
Supercritical Fluid Extraction Process (SFE) : For every substance, there is a critical temperature (Tc) and pressure (Pc) above which no applied pressure can force the substance into its liquid phase. If the temperature and pressure of the substance are both higher than the Tc and Pc for that substance, the

substance is defined as a Supercritical fluid. Supercritical fluid (SF) or also called as a dense gas is a substance that shares the physical properties of both gas and liquidat its critical point. Supercritical posses densities that are liquid like and transport properties that are gas like. SFE is the process of separating one component from using supercritical fluid as the extracting solvent. SFE can be used as a sample preparation step for analytical purposes, or on a larger scale to either strip unwanted material from a product (e.g. decaffeination) or collect a desired product. SCF is easily recoverable from the extract due to its volatility. Thermally labile compounds can be extracted with minimal damage as low temperatures can be employed by the extraction. But, in this method elevated pressure and high capital investment for equipment is required.



Counter- current extraction (CCE):

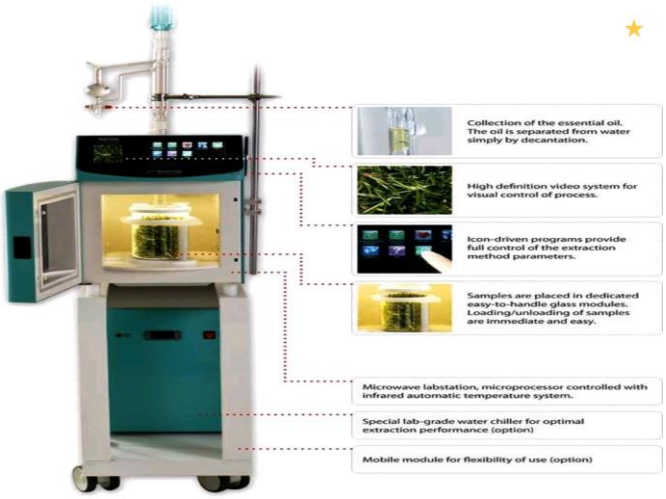
This is a method of multiple liquid- liquid extraction which permits the separation of substances with different distribution coefficients. In CCE, wet raw material is pulverized using toothed disc disintegrators to produce fine slurry.CCE is commonly done at room temperature which spares the thermolabile constituents from exposure to heat which is employed in most other techniques. The material to be extracted is moved in one direction within a cylindrical extractor where it comes in contact with extraction solvent. The further the starting material moves, the more concentrated the extract becomes. Finally sufficiently concentrated extract comes out at one end of the extractor while the marc falls out from the other end. A unit quantity of the plant material can be extracted with much smaller volume of solvent as compared to other methods like maceration, decoction and percolation. Screw extractors and carousel extractors are two types of equipments used for CCE. One of the main advantage of this method is the extraction procedure has been rated as more efficient and effective than continuous hot extraction method. CCE has applications in DNA purification, food industry,etc. An important application of CCE is citrus oil processing.



Microwave-assisted Extraction(MAE):

Microwave-assisted extraction is a procedure which uses microwave energy to warm solvents in contact with a sample so as to take out the analytes from the sample lattice into the solvent. MAE technology is now becoming an emerging technology to obtain useful compounds from plant biomass. The capacity to quickly warm the sample solvent blend is innate to MAE and the main feature of this system. MAE offers a rapid delivery of energy to a total volume of solvent and solid plant matrix with subsequent heating of the solvent and solid matrix, efficiently and homogenously. When plant material is immersed inside a microwave transparent solvent, the heat of microwave radiation directly reaches to the solid without being absorbed by the solvent, resulting in instantaneous heating of the residual moisture in the solid. Heating causes the moisture to evaporate and creates a high vapour pressure that breaks the cell wall of substrate and releases the content into solvent. MAE has been widely applied for extraction of polysaccharides, phenolic compounds, oils and proteins from terrestrial plants, algae, agricultural and food wastes and lignocellulosic biomass.It has a

shorter operational time and has a good reproducibility.



Ultrasonic-assisted extraction (UAE):

Ultrasonic-assisted extraction is generally the term used to refer the extraction processes from solid samples (typically, leaching or solid-liquid extraction). The procedure involves the use of ultrasound waves, which have frequencies higher than 20 kHz, have great effects on extraction yield and kinetics. UAE involves ultrasonic effects of acoustic cavitations. Under ultrasonic action solid and liquid particles are vibrated and accelerated and because of that solute quickly diffuses out from solid phase to solvate. One of the main advantages of UAE is that it is occasionally faster than microwave-assisted technology. It is an inexpensive, simple and efficient alternative to conventional extraction technique. It include the increase of extraction yield and faster kinetics. Ultrasound apparatus is cheaper and its operation is easier. It is used to extract bioceuticals from plants such as essential oils and lipids dietary supplements. e.g. oils from almond, apricot and rice bran.

Ultrasonication-Assisted Extraction:

III. CONCLUSION

Extraction is essential for isolation of different chemical constituent from crude drug material. Extraction depends on properties of material to be extracted. Current modern extraction methods are developed to increase yield at lower cost. Hence it is necessary to study extraction methods in detail.

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