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Advanced Herbal Technology

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Abstract:-

Due to their numerous advantages, people have recently started to show increased interest in herbal medicines. Today, many people successfully treat a range of conditions with herbal medicines. More than 80% of the world's population relies on herbal medications and goods for a healthy lifestyle, despite the fact that the majority of these operations are unorthodox. The rising use of herbal goods has also resulted in a range of inventive abuses and product manipulation, which have angered buyers and producers and, in some cases, had disastrous outcomes. The development of actual logical systems that can precisely define the phytochemical composition, including quantitative studies of marker/bioactive composites and other essential elements, is a serious challenge for scientists. Setting guidelines is a crucial first step in creating creating a Standardization is an essential initial step in the creation of a harmonious natural effort, a harmonious chemical profile, or even just a quality assurance programme for the production of herbal medicines. Both colourful old designs and more recent innovations are described in the current review composition. The fields of DNA characteristics, metabolomics fashion, discrimination palpitation paleography, chemometrics, X-ray diffraction, etc. have all seen recent advancements. Additionally, it has been claimed that chromatographic and capillary electrophoresis techniques are useful for standardising herbal remedies. **Key Words:** Herb, Extraction, chromatographic methods , Standardization

1.Recognize raw materials as the origin of herbal medicines from civilization to finished products.
2.Be familiar with the WHO and ICH standards for evaluating herbal remedies.
3. Understand natural sweeteners, nutraceuticals, and herbal cosmetics.
4. Support GMP and the patenting of herbal medicines.

Introduction:

Herb identification: What is this herbs?

They are short plants, with green and the delicate stem. Compared to other plants, these plants have very few branches and comes off easily from the soil. Grass, Mint, and wheat are a few examples of herbs.

Different method of identification of plant :

(1).Expert Determination: The best method of identification is expert determination in terms of reliability or accuracy. In general the experts have prepared treatments (monographs, revisions, synopses) of the group in question, and it is probable that the more recent floras or manuals include the expert's concepts of taxa. Experts are typically found in botanical gardens, herbaria, museums, colleges, universities, etc. However, although of great reliability, this method presents problems of requiring the valuable time of experts and creating delays for identification.

(2) Recognition:It approaches expert determination in reliability. This is based on extensive, past experience of the identifier with the plant group in question.

(3)Comparison: A third method is by comparison of an unknown with named specimens, photographs, illustrations or descriptions. Although this is a reliable method, it may be very time consuming or virtually impossible due to the lack of suitable materials for comparison.

(4) The Use of Keys and Similar Devices (Synopses, Outlines, etc.):This is by far the most widely used method and does not require the time, materials, or experience involved in comparison and recognition.

Authentication of plant :

Herb authentication is a quality assurance process that ensures the correct plant species and plant parts are used as raw materials for herbal medicines. The proper authentication of herbal raw materials is critically important to the safety and efficacy of herbal medicines.

1.) **Macroscopic examination:** Visual inspection of physical characteristics such as leaf, shape color and overall morphology aids in initial identification.

2.) **Microscopic analysis:** Microscopic examination of plant tissues such as stomata and the trichrome, can provide a distinguishing feature for authentication.

3.) **Chemical profiling:** chromatographic techniques like high- performance liquid chromatography (HPLC) and thin layer chromatography (TLC)are used to identify and quantify by the specific chemical marker.

4.) **Molecular technique:** DNA barcoding involves analyzing specific DNA regions to confirm the species. Polymerase chain reaction (PCR) and DNA sequencing contribute to accurate identification.

5.) **Spectroscopy:** Infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy provide insights into the molecular composition of herbs, aiding in authentication.

6.) **Organoleptic evaluation:** Sensory analysis, including the taste and smell is utilized in traditional and modern settings. To assess the characteristic qualities of herbs.

7.) **Isotope analysis:** stable isotope analysis can help determine the geographical origin of herbs, adding a layer of authenticity verification.

8.) **Radiographic techniques:** X-ray imaging or radiography can reveal internal structures, assisting in the identification of certain botanical features.

9.) **Digital tools:** Image recognition software and apps enable quick visual comparison, aiding in herb identification based on photographs.

10.) **Notification by the geographical indication (GI):** Recognizing herbs on their geographical origin and unique environmental condition, protecting products with specific qualities linked to their origin.

11.) **Block chain technology:** utilizing block chain for a transparent and tamper-proof record of the

12.) **Regulatory standards:** Compliance with pharmacopoeia standards and regulations set by authorities ensure that herbal products meet defined quality parameters.

Extraction Methods :

Herbal extraction is a process that involves obtaining bioactive compounds from plant material. The term extraction is used to isolate and concentrate specific substances, such as essential oils, antioxidants or beneficial compounds, for various applications. The extracted substance may be further used for processing in

any dosage form such as tablets or capsules, emulsion, cream etc. Thus, extraction procedures contribute significantly to standardization of quality of herbal drug.

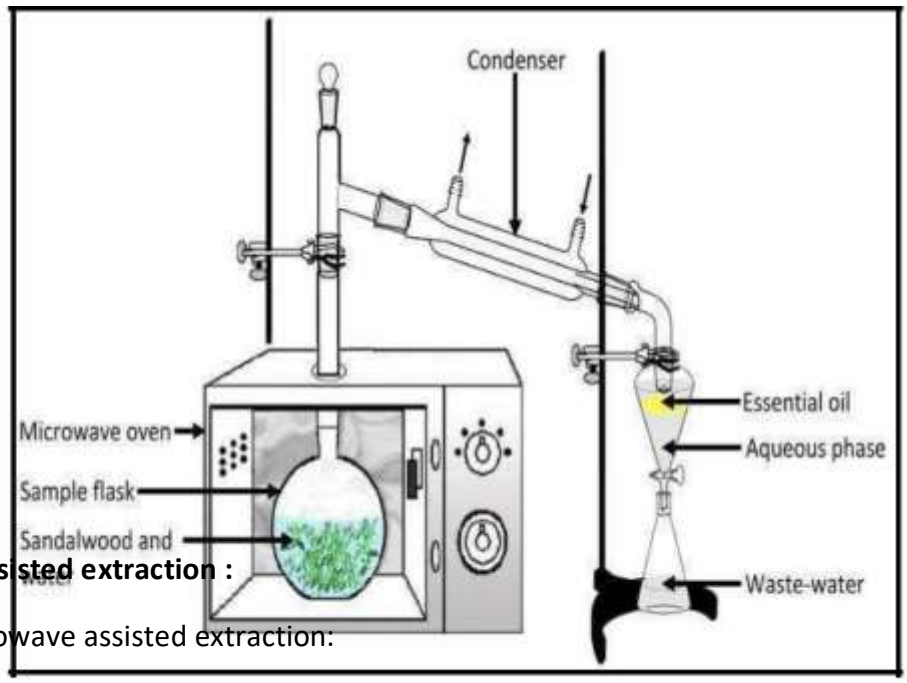
The extraction process includes the following steps:-

1. **Selection of plant material:** select the specific part of the plant containing the desired compound, such as leaves, roots, flowers etc.
2. **Preparation:** wash and clean of plant parts and remove the impurities and unwanted substances.
3. **Crushing or Grinding**: it help to increase the surface area of the plant material to facilitate the extraction process.
4. **Selection of solvent**: select the solvent based on the nature of the compounds you want to extract. solvent such as used mostly water, ethanol, methanol, or the organic solvent
5. **Extraction:** the process of isolation of soluble material from an insoluble residue, which may be liquid or solid by treatment with solvent based on the physical nature (solid or liquid) of crude drug to be extracted.
6. **Filtration:** filtration means separation of liquid extract from solid plant material to obtain a crude extract

   concentration: remove the solvent from extract to concentrate the desired compounds. This can do through methods like evaporation or distillation.
7. **Purification:** further refine the extract to remove undesirable components.
8. **Storage**: Preserve the final extract in suitable conditions to maintain its stability and efficacy.

Different extraction methods including advanced extraction techniques like supercritical fluid : Extraction can be defined as the removal of soluble material from an insoluble Residue, either liquid or solid, by treatment with a liquid solvent. It is therefore, a solution Process and depends on the mass transfer phenomena. The controlling factor in the rate of Extraction is normally the rate of diffusion of the solute through the liquid boundary layer at The interface. The principle methods of extraction are –

- Maceration
- Percolation
- Digestion
- Infusion
- Decoction



1.Microwave assisted extraction :

Principle of microwave assisted extraction:

Microwaves are part of electromagnetic spectrum of light with a range of 300 MHz to 300 GHz and wavelengths of theses waves range from 1cm to 1m (Mandal et al., 2007). These waves are made up of two perpendicular oscillating fields which are used as energy and information carriers. First application of microwaves includes its interaction with the specific materials which can absorb a part of its electromagnetic energy and can convert it into heat. Commercial microwaves use 2450 MHz of energy for this purpose which is almost equivalent to 600-700W (Afoakwah et al., 2012).

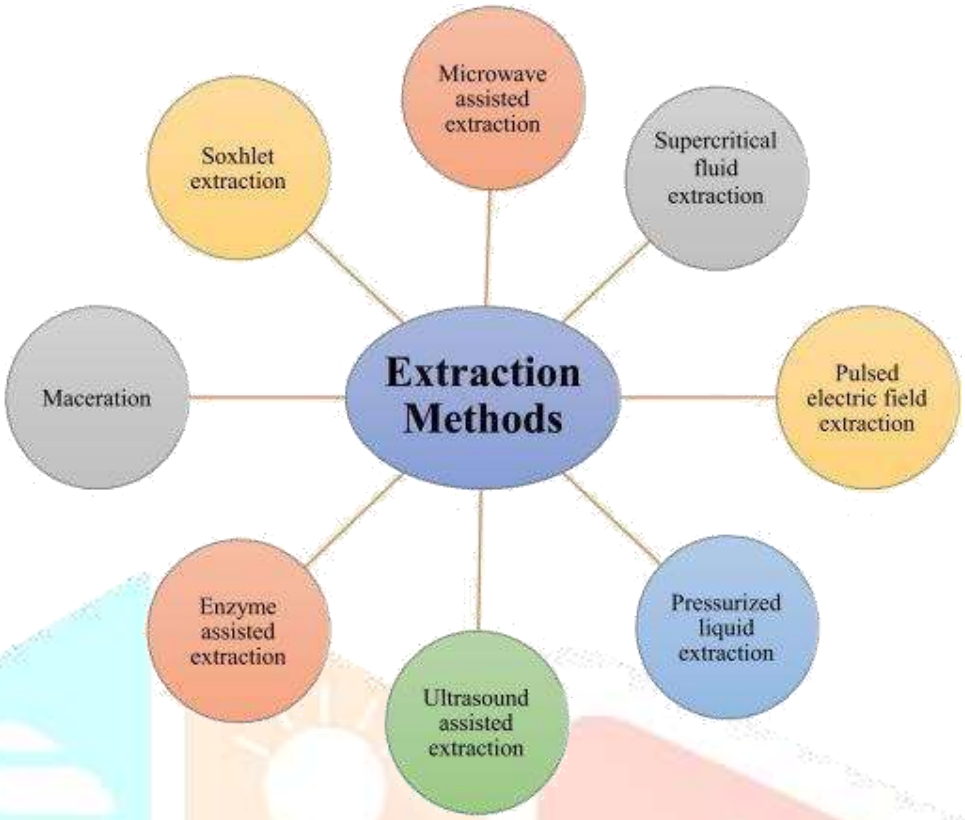


Fig . Microwave Assisted Extraction

2. Supercritical Fluid Extraction:

Supercritical Fluid Extraction (SFE) is a method in which separation of components takes place from the matrix by using Super critical fluid as extracting solvent .A Super critical fluid is any substance at a temperature and pressure above its critical points where distinct to liquid and gas phases do not exist .It can be diffuse through solid like a gas but dissolve phytoconstituents like liquids .

Advantages :

1.SFE provides the advantage of selectivity. With the alteration in pressure and temperature the properties of SCF can be altered thus improving the selectivity. A pressure of about 100 bar is used in order to extract volatile oils from plants where as in conventional lipids will also get extracted along with the volatile oils in order to extract lipid the extraction is carried out at high pressure.

2. The extraction process is completed with an hour. Disadvantages:

1.As the process carried under high pressure and high temperature it increases the operational cost of the extraction process .

2.Due to the non polar nature of CO2 additional used of modifiers becomes mandatory in order to extract polar phytoconstituents .

Fig .Supercritical Fluid Extraction

3. **Pressurized liquid Extraction (PLE):**

Pressurized liquid Extraction (PLE) is also known as accelerated solvent extraction pressurised fluid extraction enhance solvent extraction and high pressure solvent extraction .In this method the extraction solvent is kept at elevated temperature and pressure to increase the extraction efficiency. The extraction process is carried out at slightly above the normal boiling point of extracting solvent at the same time pressure is applied to keep the solvent in liquid state.

1.Higher temperature causes faster diffusion rates .this means that the phytoconstituent more quickly from boundary layer to surface of the matrix from which they are extracted to bulk solvent at elevated temperature

.

2.higher temperature reduces viscocity of extracting solvent which means that solvent can easily penetrate the pores of the plant material.

3.Increased temperature can easily disrupt the strong solute-matrix interactions caused by van der waals force hydrogen bonding and dipole attraction and remove the phytoconstituent very easily from the plant

.

Pressurized Liquid extraction is a solid–liquid extraction technique that employs temperatures and pressures ranging from 50 to 200 °C and 35 to 200 bar, respectively. In this process, solvents are near the supercritical region, where higher temperatures produce high solubility and solute diffusion rates. High pressures increase the force and speed with which liquids penetrate solid matrices (Costa et al., 2020).

PLE is faster, automated, and uses less solvent than traditional extraction methods. Solvents like water, propane, and dimethyl ether are typically used for PLE (Grosso et al., 2015).

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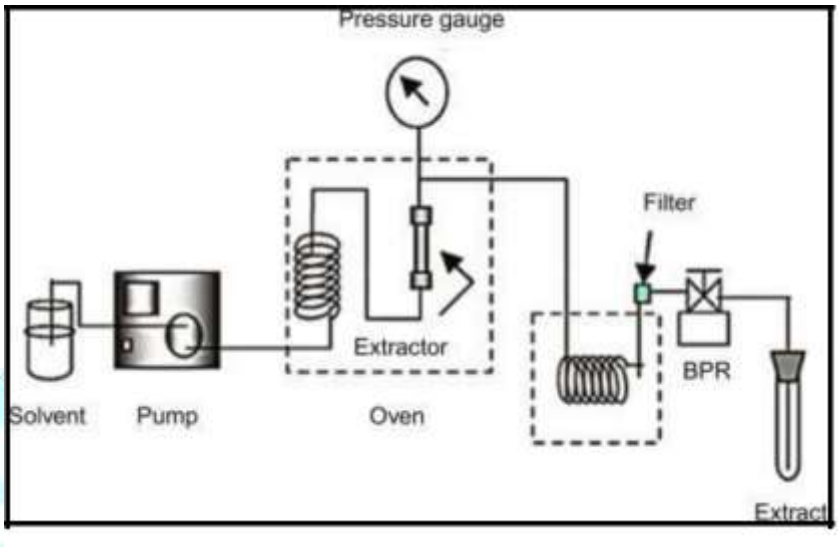


Fig . Pressurised Liquid Extraction

4. Ultrasonic Extraction :

Ultrasonic extraction is the preferred technique to isolate bioactive compounds from botanicals. Sonication achieves a complete extraction and thereby superior extract yields are obtained in a very short extraction time. Being such an efficient extraction method, ultrasonic extraction is cost- and time-saving, whilst resulting in high-quality extracts, which are used for food, supplements and pharmaceuticals. Ultrasonic Extraction Ultrasonic extraction is used in the food, nutritional supplement and pharmaceutical industry to release bioactive compounds such as vitamins, polyphenols, polysaccharides, cannabinoids and other phytochemicals from botanicals. The ultrasound-assisted extraction is based on the working principle of acoustic or ultrasonic cavitation.

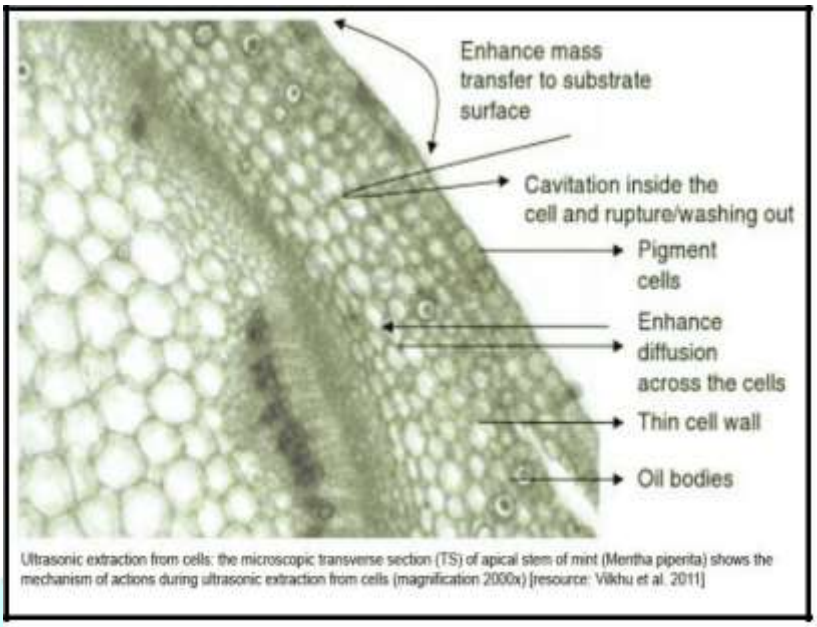
Reference : https://www.hielscher.com/ultrasonic-extraction-and-its-working-principle.html

Effects of Ultrasonic Extraction Ultrasonic :

Cell Disruption and Increase of Mass Transfer Ultrasound can assist extraction processes both through cell disruption and by enhancing mass transfer in the boundary layer surrounding the solid matrix. Sonoporation, the perforation of cell walls and membranes, enhances the permeability of the cell walls and membranes and is often an intermediate step before cells are disrupted completely by sonication.

The mechanical effects of ultrasound-induced cavitation, such as heat and pressure differentials, shock waves, shear forces, liquid jets and micro streaming, intensify the penetration of the solvent into the cell

interior and improves the mass transfer between cell and solvent so that the intercellular materials are transferred into the solvent.



Ultrasonic extraction from cells: the microscopic transverse section (TS) of apical stem of mint (Mentha piperita) shows the mechanism of actions during ultrasonic extraction from cells (magnification 2000x) [resource: Vilkhu et al. 2011]

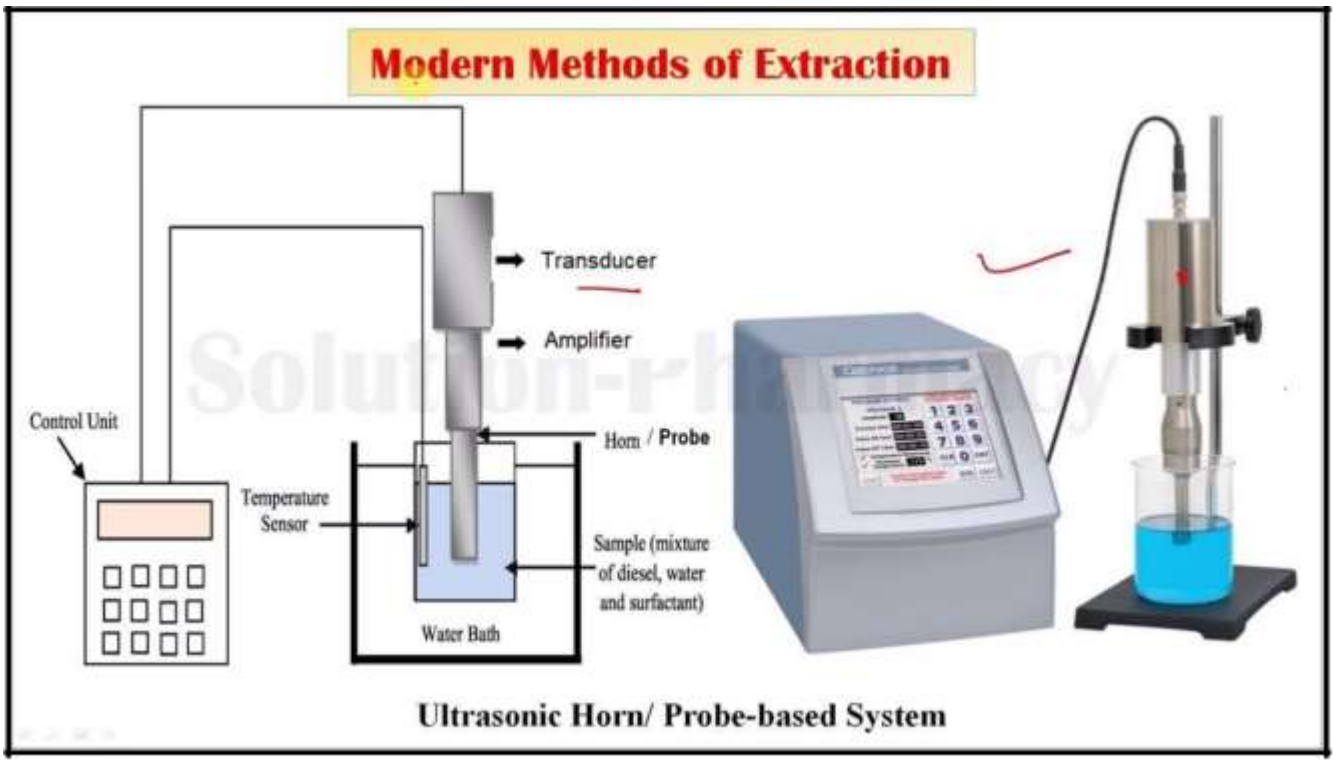


Fig. Ultrasonic Extraction Method

5. Maceration :

Maceration is a convenient, simple inexpensive, and favorable technique, especially in the case of small-scale extraction, such as that at laboratory scale. It is based on the induction of the mass transfer with shaking until the solid/liquid equilibrium is reached. However, this technique usually requires second step for the concentration of the extract. Maceration is also a well-known technique used for the preparation of the tonics. It is carried out in closed vessels with the occasional mixing and involves several consecutive steps: grinding of the plant material, immersion of grinded material into solvent, removing the solvent, and pressing of the sample in order to recover crude extract. Those steps are performed for (Azmir et al., 2013):

•Increasing diffusion of desired compounds from plant material to solvent.
•Removing concentrated solution from the surface of plant material which actually increases extraction yield.

Despite its simplicity, maceration possesses many disadvantages. They acquire solvents for the extraction which are usually toxic and environmentally non-friendly. Extraction processes are usually long with the possibility of degradation of the compounds of interest due to their thermolability and/or due to the oxidation. The technique is insufficiently selective and requires additional steps for separa tion and/or purification of the compounds of interest. Final extracts usually contain solvents' residues whose presence is not desirable due to health and product's safety issues.

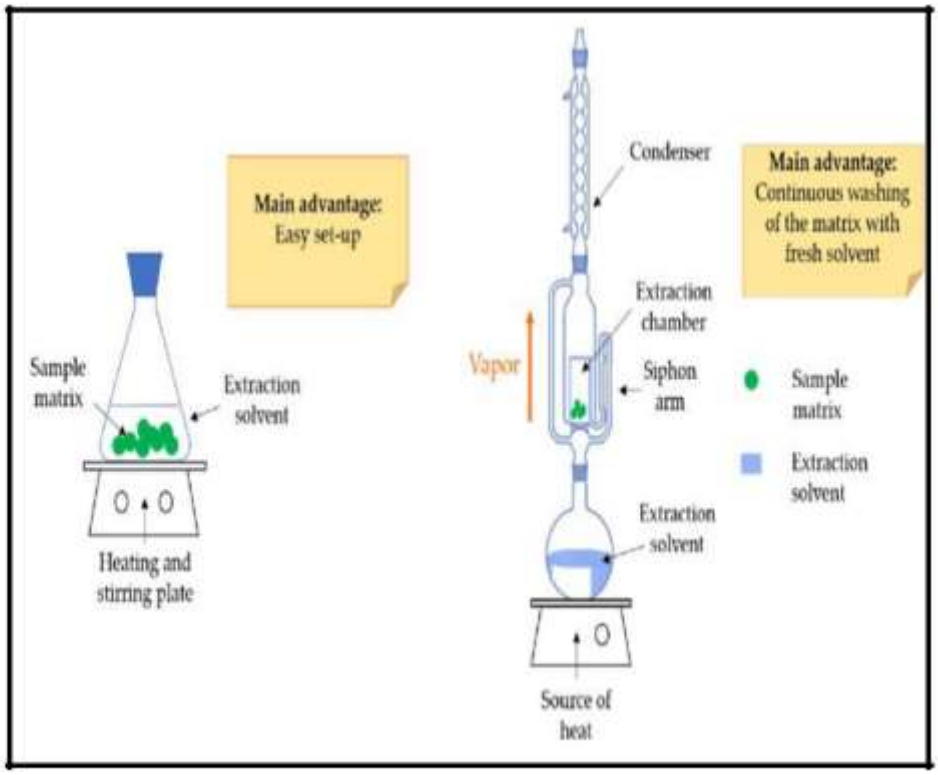


Fig. Maceration

6. Soxhlet Extraction :

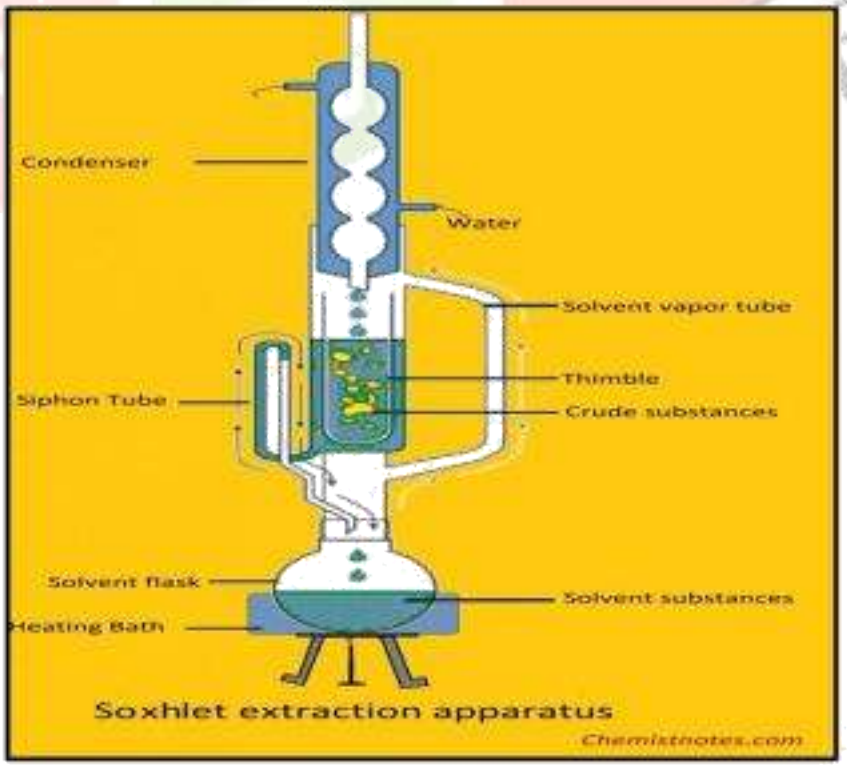
Soxhlet extraction is an advanced extraction technique that involves repeatedly circulating the same solvent through the extractor. In 1879, Franz Ritter von Soxhlet, professor of agricultural chemistry at the Technical University of Munich, developed this extraction technique. This is a very useful technique for preparative goals in which the analyte is concentrated from the matrix as a whole or separated from specific interfering substances.

Principle:

The Soxhlet extraction method uses a small amount of solvent and is very cost-effective. The Soxhlet extraction uses the solvent reflux and siphon principle to continuously extract the solid matter by pure solvent, which saves the solvent extraction efficiency and high efficiency. The sold sample is placed on a thimble-shaped filter paper, positioned into the Soxhlet extractor, and the device is assembled. The solvent is added to the solvent reservoir flask and mounted onto a heating mantle. After heating, the condensed vapours of the solvent come in contact with the sample powder, and the soluble part of the powder gets mixed with the solvent for extraction. When the solvent surface exceeds the maximum height of the siphon, the solvent containing the extract is siphoned back. The flask is repeated, extracting a portion of the material each time so that the solid material is constantly used as a pure solvent and the extracted material is concentrated in the flask.

Soxhlet Extraction Procedure :

The crude substance is placed in a thimble-shaped filter paper which is then kept in a glass cylinder. This cylinder is provided with a siphon tube and an inlet tube. A water condenser is attached to the cylinder at the top. This entire assembly is fitted into the neck of a round bottom flask containing the solvent.



The flask is heated in a water bath or sand bath. The solvent vapours reach the cylinder through the inlet tube and conduce on passing upward into the condenser. The condensed solvent comes in contact with

the crude organic substance and dissolves it. As soon as the solution reaches the top end of the siphon tube. In this way, a continuous supply of solvent vapours is maintained in the cylinder, and the dissolved organic compound flows back into the flask. Finally, the heating is stopped and the solution in the flask is distilled to recover the solvent, While the organic compound is left behind.

Advantages :

1 .The Process is automatic and continuous.

2. This system uses same portion of solvent repeatedly which is being passed through the sample every time. Thus, the process saves solvent by recycling it over the sample .

3. Process is time saving .To prepared the extract of about 500mg of drug ,thus duration required is less than 24 hrs.

Disadvantages:

1. In thus process ,the extracted phytoconstituent in the round bottom flask are continuously boiled along with solvent . This may produced detrimental effect on thermo labile phytoconstituents .
2. The total amount of certain substances extracted will exceed there solubility in that particular solvent . Because of these , such types of constituents may precipitate out in the lower container and will require a higher volume of solvent for subsequent dissolution .
3. Method is not suitable for solvent with highly boiling point like water, since the whole apparatus below the condenser needs to be at this temperature for effective movement of solvent vapours.

Uses:

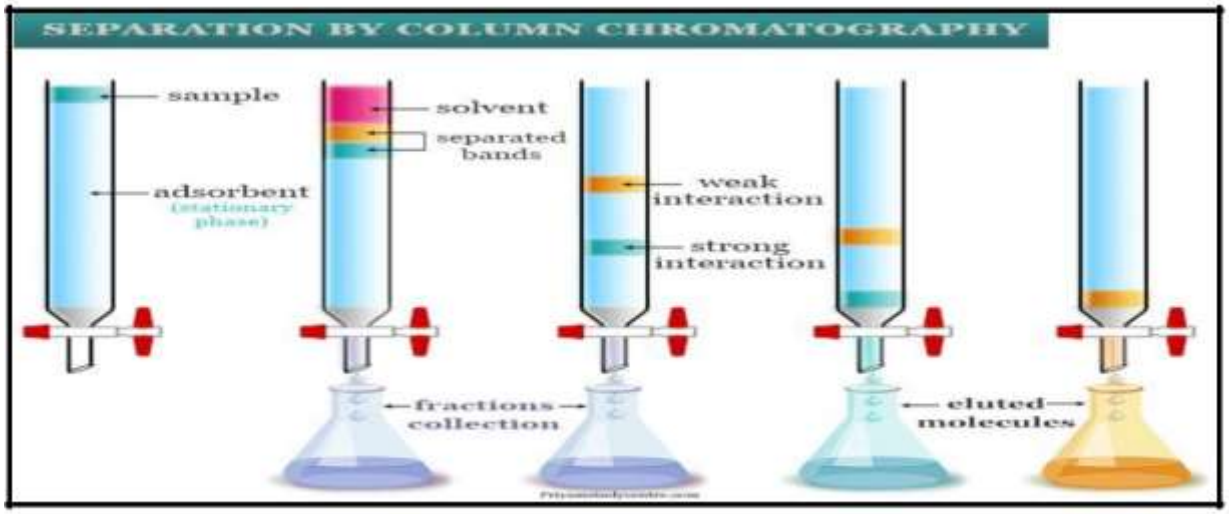
1. The soxhlet extraction process is the most useful technique for solid-liquid extraction in many fields like Agriculture, pharmaceuticals, foodstuffs, and also in the environment.
2. Soxhlet apparatus is allow for continuous treatment of a sample with a solvent over a period of hours or days to extract the compound of interest.
3. This technique is useful to determine the lipid and fat contents of animal and plant tissue.

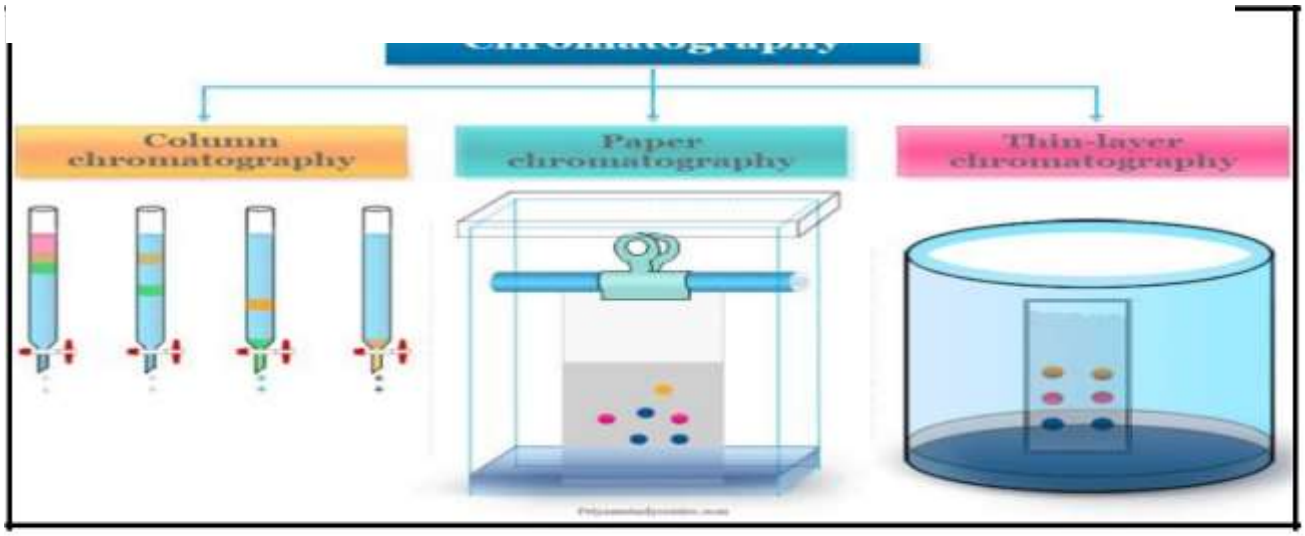
Chromatographic Technique:

Introduction:

Chromatography- People on all continents have used hundreds to thousands of indigenous plants for treatment of ailments since prehistoric times. Many plants synthesize substances that are useful to the maintenance of health in humans and other animals. These include aromatic substances, most of which are phenols or their oxygen-substituted derivatives such as tannins [1]. Sick animal Tend to forage plants rich in secondary metabolites, such as tannins and alkaloids. Since these phytochemicals often have antiviral, antibacterial, antifungal and anthelminthic properties, a plausible case can be made for self-medication by animals in the wild [2]. According to an estimate of the World Health Organization (WHO), about 80% of the world population still uses herbs and other traditional medicines for their primary health care needs. Herbal medicine products are dietary supplements that people take to improve their health and are sold as tablets, capsules, powders, teas, extracts and fresh or dried plants. Herbals are traditionally considered harmless and increasingly being consumed by people without prescription.

CHROMATOGRAPHIC TECHNIQUES IN HERBAL DRUG ANALYSIS





1) Column Chromatography :-

Column chromatography in chemistry is a chromatography method used to isolate a single chemical compound

from a mixture. Chromatography is able to separate substances based on differential adsorption of compounds

to the adsorbent; compounds move through the column at different rates, allowing them to be separated into fractions. The technique is widely applicable, as many different adsorbents (normal phase, reversed phase, or otherwise) can be used with a wide range of solvents. The technique can be used on scales from micrograms up

to kilograms. The main advantage of column chromatography is the relatively low cost and disposability of the stationary phase used in the process. The latter prevents cross contamination and stationary phase degradation due to recycling. Column chromatography can be done using gravity to move the solvent, or using compressed gas to push the solvent through the column.

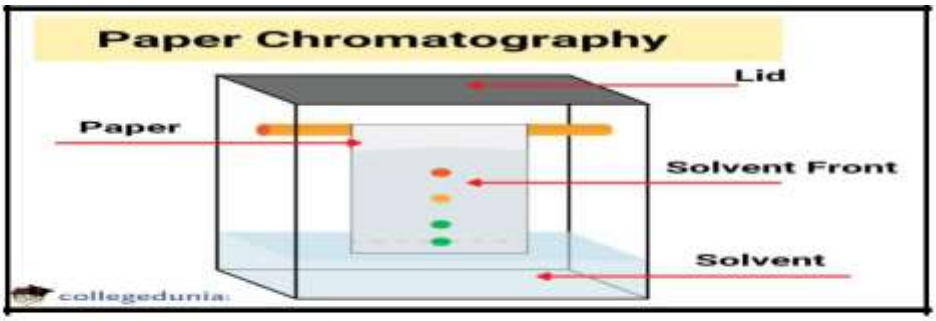


Fig . Column Chromatography

2) Paper Chromatography :-

The solvent penetrates the paper by capillary action and, in passing over the sample spot, carries along with it the various components of the sample. The components move with the flowing solvent at velocities that are dependent on their solubilities in the stationary and flowing solvents. Separation of the components is brought

about if there are differences in their relative solubilities in the two solvents. Before the flowing solvent reaches the farther edge of the paper, both solvents are evaporated, and the location of the separated components is identified, usually by application of reagents that form coloured compounds with the separated substances. The separated components appear as individual spots on the path of the solvent. If the solvent flowing in one direction is not able to separate all the components satisfactorily, the paper may be turned 90° and the process

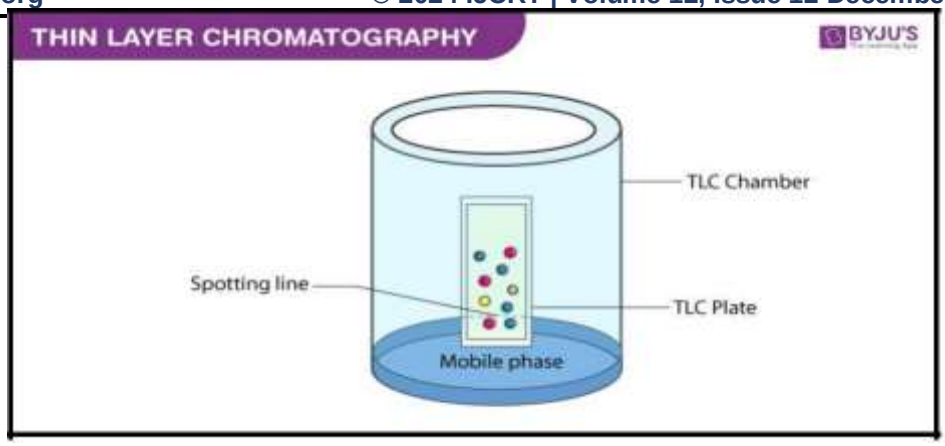
repeated using another solvent. Through capillary action, the solvent permeates the paper and, as it passes over the sample spot, carries the various components of the sample with it. Depending on how soluble each component is in the stationary and moving solvents, the components move with the flowing solvent at different

speeds. If the components' respective solubilities in the two solvents differ, separation of the components results

3) Thin Layer Chromatography :- Introduction: -

Chromatography is a technique used to extract and study biomolecules from a complicated combination. A stationary phase and a mobile phase make up this separation process. The combination that needs to be separated makes up the mobile phase and passes through the stationary phase. Solid-liquid, liquid-liquid, or gas liquid phases are all possible for these two phases.

A polar absorbent serves as the stationary phase in thin layer chromatography (TLC), a solid-liquid form of chromatography in which the mobile phase can be either a single solvent or a mixture of solvents. Chromatography is a technique in which compounds in a mixture are separated based on differing affinities between a mobile phase and a stationary phase.



4) High Performance Thin Layer Chromatography (HPTLC): -

HPTLC technique is widely employed in pharmaceutical industry in process development, identification and Detection of adulterants in herbal product and helps in identification of pesticide content, mycotoxins and in quality Control of herbs and health Food. It has been well reported that several samples can be run simultaneously by use of A smaller quantity of mobile phase than in HPLC. It has also been reported that mobile phases of pH 8 and above Can be used for HPTLC. Another advantage of HPTLC is the repeated detection (scanning) of the chromatogram with the same or different conditions. Consequently, HPTLC has been investigated for simultaneous assay of several Components in a multicomponent formulation. With this technique, authentication of various species of plant is Possible, as well as the evaluation of stability and consistency of their preparations from different manufactures. Various workers have developed HPTLC method for phytoconstituents in crude drugs or herbal formulations such as Bergenin, catechine and gallic acid in Bergenia cilliata and Bergenia lingulate.

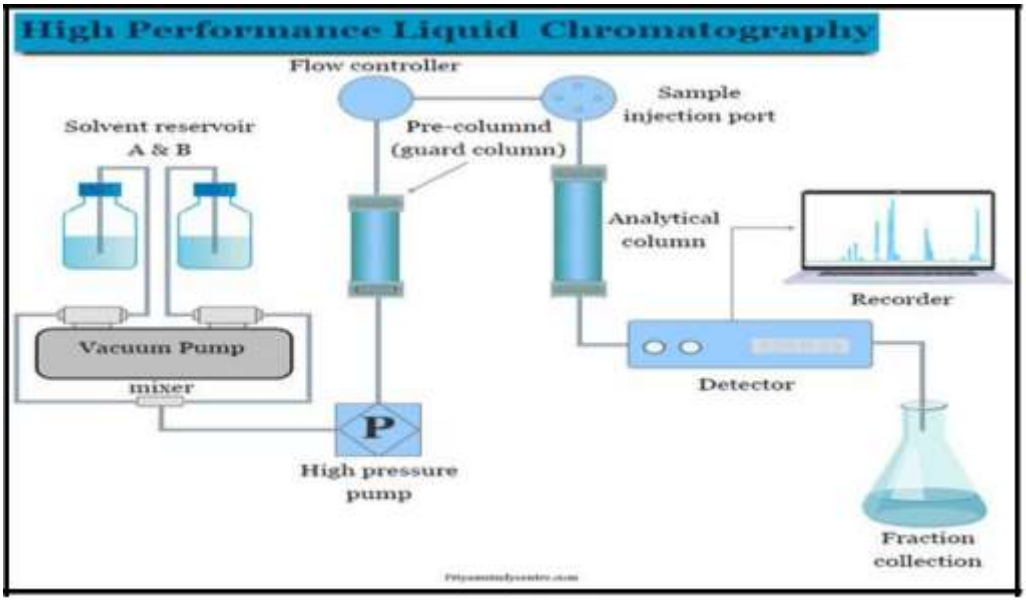
Stationary phase	Mobile phase	Method
Solid	Liquid	Column, thin-layer, ion exchange, High performance liquid chromatography
Liquid	Liquid	Column, thin-layer, HPLC, paper chromatography
	Gas	Gas – Liquid Chromatography

5) High performance liquid chromatography (HPLC) :-

The separation principle of HPLC is based on the distribution of the analyte (sample) between a mobile phase (eluent) and a stationary phase (packing material of the column). Depending on the chemical structure of the analyte, the molecules are retarded while passing the stationary phase. The specific intermolecular interactions between the molecules of a sample and the packing material define their time "oncolumn" Hence, different constituents of a sample are eluted at different times. Thereby, the separation of the sample ingredients is achieved. A detection unit (e.g. UV detector) recognizes the analytes after leaving the column. The signals are converted and recorded by a data management system (computer software) and then shown in a chromatogram. After passing the detector unit, the mobile phase can be subjected to additional detector units, a

fraction collection unit or to the waste. In general, a HPLC system contains the following modules: a solvent reservoir, a pump, an injection valve, a column, a detector unit and a data processing unit. The solvent (eluent)

is delivered by the pump at high pressure and constant speed through the system. To keep the drift and noise of the detector signal as low as possible, a constant and pulseless flow from the pump is crucial. The analyte (sample) is provided to the eluent by the injection valve.



METHODS FOR STANDARDIZATION OF HERBAL DRUGS Importance of Standardization:

A. Standardization of Herbal Formulation

Application of Good Manufacturing Practices is required for standardising herbal formulation (GMP). Additionally, it is deemed crucial to research a variety of parameters, including pharmacodynamics, pharmacokinetics, dose, stability, self-life, toxicity evaluation, and chemical profiling of herbal formulations. Aflatoxine level, heavy metal contamination, and Good Agricultural Practices (GAP) in herbal medication standardisation are a few more aspects that are equally important.

B. Standardization of Polyherbal Formulation

As polyherbal formulations combine more than one herb to achieve the desired therapeutic effect, standardisation is crucial for maintaining and evaluating the product's quality and safety. Standardization reduces batch-to-batch variation and guarantees the polyherbal formulations' acceptability, safety, efficacy, and quality. The standardisation of several commercially available herbal and polyherbal Madhumehari Churna (Baidynath) formulations, which comprise a blend of eight herbs. A traditional remedy called dashamularishta is used to restore physiological processes to normality following childbirth. The identity, purity, and potency of the polyherbal formulation, as well as setting criteria for this Ayurvedic formulation, were determined using TLC and HPTLC fingerprint profiles.

C. Standardization and Quality Control of Herbal Crude Drugs – Parameters

Standardization and quality control of herbals, according to WHO (1996a and b, 1992), is the process involved in the physicochemical evaluation Of crude drug covering aspects, such as selection and handling of crude material, safety, efficacy, and stability assessment of finished product, documentation of safety and risk based on experience, provision of product information to Consumer, and product promotion. Normal attention is given to quality indicators such.

Morphology and Organoleptic Evaluation

Morphological characteristics are crucial for discriminating in the case of entire drugs. It usually consists of things like colour, smell, taste, form, and size. Details like as fractures, texture, and venation are included.

Microscopic and Histologic Evaluation

These are beneficial in both whole and powdered form. It focuses mostly on the examination of traits including trichomes, calcium oxalate crystals, vascular bundle patterns, stomata, fibres, and parenchyma.

Quantitative Microscopic Study

Microscopic measurements such as fibre size, palisade ratio, stomatal index, stomatal number, and vein termination number. Such research aids in separating closely related species.

Physical Evaluation

Physicochemical parameters such as moisture content, solubility, viscosity, refractive index, melting point, optical rotation, ash values, extractives, and foreign organic matter are studied. fibre size and palisade ratio Such research aids in separating closely related species.

Qualitative Chemical Evaluation

This includes identifying and classifying crude drugs according to their phytochemical components. It uses several analytical methods to find and isolate the active ingredients. Identification of the botanical components, extraction with the appropriate solvents, purification, and characterisation of the active components of medicinal value are all steps in phytochemical screening approaches.

Quantitative Chemical Evaluation to calculate the volume of the main component classes. Toxicological studies: These serve to identify pesticide residues, possibly hazardous substances, safety tests in animals such the LD50, and microbial assays to assess whether potentially dangerous bacteria are present or absent.

Microbiological Parameters

It contains the entire amount of viable, the entire mould count, and the entire coliforms count. Limiters can be used as a quantitative or semiquantitative instrument to measure and manage the level of impurities, such as solvents, contaminants sent straight from the manufacturer, and reagents used in the extraction of various herbs.

3.1 Convectional Method

This section deals with the identification and categorization of crude drugs in terms of their phytochemical components. In order to find and isolate the active ingredients, it uses several analytical techniques. The identification of plants, their extraction using the right solvents, purification, and characterization of the pharmaceutically significant active ingredients are all steps in the phytochemical screening process.

Quantitative Chemical Evaluation to calculate the
amounts of the main component classes.

Toxicological Studies

This aids in establishing pesticide residue levels, potentially poisonous substances, safety tests on animals such the LD50, and microbial assays to establish the presence or absence of potentially harmful microorganisms.

Microbiological Parameters

It covers the entire viable content as well as the complete mould and coliform counts. Limiters are a quantitative or semiquantitative instrument that may be used to measure and limit the amount of impurities, such as solvents, reagents used in the extraction of different herbs, and contaminants that are sent directly from the production process.

3.2 Problem of Advance Herbal Technology

Although herbal medicine has a very strong history of traditional applications and a worldwide restructuring, there are still many obstacles to its promotion, particularly in wealthy countries. The following issues must be resolved before traditional herbal knowledge is promoted globally.

- **Quality Issues:** The primary issues that diminish the efficacy of herbal preparations and can be regarded as important variables impacting the quality and purity of herbal medicines include adulteration, misidentification of plants, poor collecting and preparation, and inappropriate formulation processes.
- **Processing And Harvesting Issues:** Inadequate pre and post harvest processes, indiscriminate harvesting, poor agricultural and propagation methods, and a lack of processing skills all contribute to the inferior quality of herbal medications.
- **Quality Control Related Issues:** The biggest obstacles to maintaining the quality of herbal pharmaceuticals include standardisation, inadequate quality control practises, and a lack of Good Manufacturing Practices (GMP). In small and medium-sized companies, it is also common for farmers and manufacturers to be unaware of the guideline, and for the guideline to not be implemented or regulated.
- **Administrative Issues:** Lack of effective monitoring and regulating, as well as a lack of regulatory and governing power in the herbal sector, are necessary need for the quality of medicines. Infrastructure-related problem: The main issues are a lack of processing skills, skilled workers, advanced equipment, the use of contemporary procedures, and local instrument fabrication facilities.

monitor adverse responses, contraindications, combinations with other medications, foods, and traditional drugs.

- **Clinical Trial:** Clinical trials are required to establish the safety and efficacy of these treatments before introducing them in the worldwide market because safety is still a major concern when using herbal remedies.
- **IPR And Biopiracy:** Because safety is still a big worry when utilising herbal medicines, clinical trials are necessary to demonstrate the safety and efficacy of these therapies before putting them into the global market.
- **Irrational Use:** Unfortunately, contrary to popular belief, herbal products do have negative effects and interactions. Therefore, the inappropriate use of these pharmaceuticals can result in a number of issues that could impede their promotion.
- **R&D:** The primary necessity for any drug is research and development on dose, processing, and procedures, although compared to allopathic medicine, it is far less in the herbal business. Nevertheless, the tendency has changed in recent years. Research is required to comprehend the mechanism of action and pharmacokinetics phenomena, as well as to improve/create monographs and reference standards for marker-based analysis. Another issue for a sustainable, socio-culturally equitable, and safe supply of herbal medicines is the significant gap between current ethnopharmacological and contemporary medicinal plant research.

SELECTION CRITERIA FOR SUBSTANCES OF HERBAL ORIGIN , RELEVANT FOR STANDARDIZATION AND QUALITY CONTROL OF HERBAL MEDICINES

General Considerations In The Standardization And Quality Control Of Herbal Materials, Herbal Preparations and Herbal Medicines

Herbal ingredients, herbal concoctions, and herbal products in their completed forms are highly complicated. This can make it exceedingly difficult to identify and quantify herbal medications and make it very difficult to detect adulteration. It should be made clear that utilising markers to identify herbal medicines and measuring the amount of marker compounds present in herbal medicines do not, by themselves, ensure the quality of herbal medicines. Good agriculture and collecting procedures (GACP) and good manufacturing practises (GMP) (such as those mentioned in references 1 and 4), when necessary, must be used in conjunction with quality control to cover all stages of production. the selection of reference materials and the control of quality criteria It is important to consider that different constituents in herbal medicines may have varying degrees of effect on their ultimate quality, safety, and efficacy. Because of this, the principles listed below should be followed while choosing the chemicals for identification and quantification. If components have been found to have recognised therapeutic action (activities), they should be employed as markers.

If situation number one is not true but known constituents with established pharmacological action (activities) should be employed as markers. If the aforementioned scenarios don't apply, the production process and analysis of marker substance(s) including additional distinguishing constituents can be used to determine the identity and amount of herbal materials, preparations, and medications (s). Note that utilising the appropriate reference sources and descriptions, microscopic, macroscopic, or DNA analytical techniques may be used to identify herbal ingredients, as well as, to a lesser extent, herbal preparations and completed herbal products.

Conclusion :

This subject is focused on mainly Herbal Extraction Techniques. Plants, herbs, and ethnobotanicals have been used since the early days of humankind and are still used throughout the world for health promotion and treatment of disease. Plants and natural sources form the basis of today’s modern medicine and contribute largely to the commercial drug preparations manufactured today. About 25% of drugs prescribed worldwide are derived from plants. Still, herbs, rather than drugs, are often used in health care. For some, herbal medicine is their preferred method of treatment. For others, herbs are used as adjunct therapy to conventional pharmaceuticals. However, in many developing societies, traditional medicine of which herbal medicine is a core part is the only system of health care available or affordable. Regardless of the reason, those using herbal medicines should be assured that the products they are buying are safe and contain what they are supposed to, whether this is a particular herb or a particular amount of a specific herbal component. for the good end product various extraction process like TLC, HPLC, and Column Chromatography. Consumers should also be given science-based information on dosage, contraindications, and efficacy. To achieve this, global harmonization of legislation is needed to guide the responsible production and International Journal of Research Publication and Reviews, Vol 4, no 4, pp 219-222 April 2023 222 marketing of herbal medicines. If sufficient scientific evidence of benefit is available for an herb, then such legislation should allow for this to be used appropriately to promote the use of that herb so that these benefits can be realized for the promotion of public health and treatment of disease.

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