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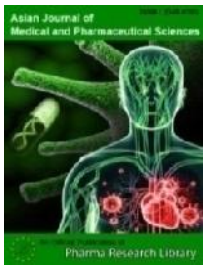

R E V I E W A R T I C L E

Micro extraction Techniques in Analysis of Drugs

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A B S T R A C T

Analytical methods comprise of a few stages including; examining, test preparation,analysis, figurings and measurable assessment of the outcomes. Among these means, test arrangement is the most time consuming. Consequence of studies demonstrated that more than 60% of examination time is spent for test planning. Test arrangement takes follows two principle points: Sample tidy up and fixation. The present pattern of micro extraction procedures is gone for a solid and precise examination of contaminants from complex examples. Micro extraction is an extraction system where the volume of the extricating stage is little in connection to the volume of the specimen, and extraction of analytes is not thorough. Among them, SPE is the most prominent for medication examination and has turned into a fundamental device in labs everywhere throughout the world. It has additionally generally supplanted more seasoned methods. The advancement of SPE has been quick and went with numerous upgrades. One of these upgrades is MIPs. Due to their particular and specific properties, their utilization will most likely be more extensive later on, particularly in scientific, clinical, pharmaceutical and biochemical investigations. The on-line TFCLC/MS technique was appropriate for TCMs pharmacokinetic learn at a low measurement level. Later on, miniaturized scale channel SPME will be connected in mechanization as the covering could be put on the internal surface of the smaller scale channel and just a little measure of test will be required. This review will attempt to provide an overview as well as a theoretical and practical understanding of the use of microextraction technologies for drug analysis.

Keywords: Analytes, affinity, microextraction, SPME, stationary phase, MIPs, TCMs.

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C O N T E N T S

1. Introduction

Principle of Extraction:

The extraction effectiveness is dictated by the partitioning of analyte between the specimen lattice and the extraction stage.

Partition coefficient k= $\frac{CONCENTRATION\ OF\ SOLUTE\ IN\ PHASE\ 1}{CONCENTRATION\ OF\ SOLUTE\ IN\ PHASE\ 2}$

The higher the fondness the analyte has for the extraction stage with respect to the example lattice, the more noteworthy the measure of analyte extracted.

Thus while the objective of miniaturized scale extraction is to extricate in view of balance dividing [i.e. the objective is to remove as close as would be prudent to 100% of the analytes from a sample].Partitioning is controlled by the physicochemical properties of the analytes, the specimen framework and the extraction stage. Where test grid and extraction stage piece are consistent, the level of parceling and consequently the rate of analyte separated will be steady. Since apportioning is not subject to analyte fixation, evaluation of test focus might be resolved from outright sum extricated.

2. Classification Micro extracton

Classification Of Micro extraction Techniques(Mets)

- Solid Phase Extraction
- Solid Phase Microextraction (SPME)
- Liquid Phase Microextraction (LPME)
- Molecularly Imprinted Polymers (MIPS)
- Turbulent Flow Chromatography (TFC)

Solid phase extraction:

Solid phase extraction (SPE) is an extraction methodthatuses a strong stage and fluid stage to seclude one or onetype of analyte from an answer. It is generally used to tidy up a specimen before utilizing a chromatographic or other logical strategy toquantifythe measure of analyte(s) in the example

Mechanism of Solid Phase Extraction Process:

The most widely recognized maintenance components in SPE depend on vander Waals powers ("nonpolarinteractions"), hydrogen holding, dipole-dipole strengths ("polar" cooperations) and cation anioninteractions ("ionic" connections). Switched stage includes a polar or reasonably polar specimen network (portable stage) and a nonpolar stationary stage. The analyte of intrigue is ordinarily mid-to nonpolar.Retention of natural analytes from polar arrangements (e.g. water) onto these SPE materials is expected essentially to the alluring strengths between the carbon hydrogen bonds in the analyte and the useful gatherings on the sorbent surface. These nonpolar – nonpolar appealing powers are generally called vander Waals strengths or scattering powers. The nonpolar dissolvable, which can disturb the forcesbetween the sorbent and compound, is utilized to elute an adsorbed compound from a switched stage SPE tube or circle. Typical stage include a polar analyte, a mid-to nonpolar lattice (e.g. CH3)2CO, chlorinated solvents and hexane) and a polar stationary stage. Maintenance of an analyte under ordinary stage conditions is essentially because of connections between polar utilitarian gatherings of the analyteand polar gatherings on the sorbent surface. These incorporate hydrogen bonding, л-л associations, among others. A compound adsorbed by these instruments is eluted by passing a dissolvable that upsets the coupling component, for the most part a dissolvable that is more polar than the specimen's framework.

Solid Phase Extraction Process

The SPE procedure can give tests that are in arrangement, free of meddling framework parts and thought enough for identification. Solid phase extraction is accomplished through the collaboration of three parts: the sorbent, the analyte and the dissolvable. The analyte must be pulled in more emphatically to the sorbent than to the framework. The best strong stage extraction instrument and systems are: characterized by the qualities of the analyte in the specimen.

The SPE process can be performed in a two ways:

On-line-In disconnected SPE eluate from the cartridge is brought into the chromatograph by method for an infusion valve.

Off-line-In on-line SPE the extraction cartridge is embedded as a component of chromatographic equipment,as circles or high weight stream of the portable stage.

Steps of Solid Phase Extraction Process:

Step 1: Select the proper SPE tube or Disk, Selecting SPE tube size

Table-1: Criterion for the selection of SPE tube size

If your sample size is<1ml	Use tube size 1ml
1mL to 250mL and the extraction speed is not critical	3ml
10mL to 250mL and higher sample capacity is needed	12, 20 or 60 ml
1mL to 250mL and a fast extraction procedure is required	6 ml

Table 2: Criterion for the selection of SPE disk size

If Your Sample is 100mL to 1 liter	Use Disk Size 47nm
>1 liter and higher sample capacity is needed	90 mm

Selecting an SPE tube: Bed weight Reversed stage, ordinary stage, and adsorption-sort methods .The mass of the mixes to be separated ought not be more than 5% of the mass of the pressing in the tube. As it were, whether you are utilizing a 100mg/1mL SPE tube, don't stack more than 5mg of analytes.

Step 2:
Condition the SPE tube or Disk -To condition the SPE tube pressing, flush it with up to one tube-brimming with solventbefore removing the specimen. For circles, utilize a volume of 5-10 ml.

Step 3:
Add the specimen -Precisely exchange the specimen to the tube or supply, utilizing a volumetric pipette, micropipette. The example must be in a shape that is perfect with SPE.

Step 4:
Wash the pressing -In the event that mixes of intrigue are held on the pressing, wash off undesirable, un-held materials utilizing an indistinguishable arrangement from a part of which the specimen was broken up, or another arrangement that won't expel the sought mixes. Normally close to a tube volume of wash arrangement is required, or 5-10 ml for SPE circles.

Step 5: Elute the mixes of intrigue- Flush the pressing with a little volume (normally 200µl to 2 ml contingent upon the tube size, or 5-10 ml relying upon the plate size) of an answer that evacuates mixes of intrigue, however abandons any pollutions not expelled in the clothes washer step. Gather the elute and further get ready as suitable.

Applications ofSPE

Biological liquids - Various papers in the zone of SPE–HPLC report that it is a settled system. Eg. Assurance of methylated arsenic species in human pee.

Waters - Different poisons were resolved in fluid examples after SPE or SPME.

Food, refreshments and rural -The utilization of SPE in the assurance of different chemicals in sustenance has expanded quickly in the most recent decade and SPE strategies have supplanted a significant number of the customary techniques for test pretreatment. For instance, the majority of lipid substance of fats and oil in sustenances has confounded the examination of pesticide deposits and also other compound contaminants. The late cases of sustenance investigation for unstable flavor mixes indicate continuous utilization of SPE– GC strategies however particularly an expansion in the utilization of SPME–GC.

Air and gas -The investigation of air and vaporous examples can be subdivided into examination of unpredictable mixes (VOCs) and of particulate matter (PM).

Solid Phase Microextraction (SPME)

Microextraction strategies have beenregardedas themost appealing for thepretreatment ofcomplex test networks priorto chromatographic andcapillary electrophoresis processesbecausethey empower quick investigation atlowoperatingcosts and with no environmentalpollution. Therecent incline in samplepreparation processesfocusesonhowto scale down the procedure andwhich medium touseforthe extraction and pre-centralization of sample components.

Principle of Solid Phase Micro extraction:

SPME depends on an altered syringe whichcontains stainless steel microtubing inside itssyringe needle. This microtubing has an about1-cm. melded silica fiber tip which is covered withan natural polymer. The covered silica fiber canbe moved between two positions, inside andoutside the needle, with a plunger as in thecase of a typical syringe the measurement of thesyringe needle lodging the microtubing andcoated silica fiber is very little expanded incomparison with an ordinary GC syringe. Thus,by method for this straightforward hardware severalsteps of test readiness are consolidated inone gadget.

Extraction and improvement of theanalyteis finished by the covering in theposition outside the syringe needle.Penetration of the septum of a GC injection port is conceivable if the fiber was pulled back intothe syringe needle. Desorption of the analyteand exchange to the slim is performed after again moving the fiber to the position outsidethe syringe

Advantages of Solid-Phase Micro extraction:

- Simplicity, rapidity, dissolvable end.
- High affectability
- Small test volume
- Low cost.

Design of SPME Device-SPME is an adjusted syringe-like instrument. The combined silica fiber, having asmall estimate and round and hollow shape, is connectedto stainless-steel tubing that is utilized to provideadditional mechanical quality to the fiberassembly for rehashed examining. Thisstainless-steel tubing is associated toaspecially composed syringe-like instrument. Thefused silica fiber is covered with a generally thinfilm of a few polymeric stationary stages. The fiber gathering is reusable andreplaceable. Thesmall estimate and round and hollow geometry of fiber hassomeadvantages, for example, simple position of the sorbentfibercoating into a specimen orheadspace above thesample toextricate theanalytes; likewise it can be easilyplaced indesorption load of GC or interphaseof theHPLC with no alteration of GC orHPLC. Plunger development and timing must becontrolled painstakingly to performadsorption anddesorption accurately. It is essential forfield examining to forestall loss of analyte duringtransport.To do this, the needle opening ofSPME devise mustbe fixed by utilizing aseptum or potentially by cooling theneedle.

Working With SPME Device :

Amid the SPME operation, the fiber is first drawn into the syringe needle, then loweredinto the vial (which is fixed with a septum sort top) by squeezing the plunger. The fusedsilica fiber of appropriate covering is utilized which is needy upon the way of the analyte. Thefiber ought to be cleaned before breaking down any specimen in order to evacuate contaminants thatdesorptionchamber of HPLC by running dissolvable. Presently the cleaned fiber covering is presented to a samplematrix for a foreordained, settled period, which brings about the adsorption of the analyte on thefiber covering. This extraction can be performed in twoways ;

- Headspace SPME or HS-SPME where fiber is uncovered in the vapor stage over a vaporous, fluid, or strong example.
- Direct Immersion DI-SPME, where the fiber is specifically immersedin fluid tests.

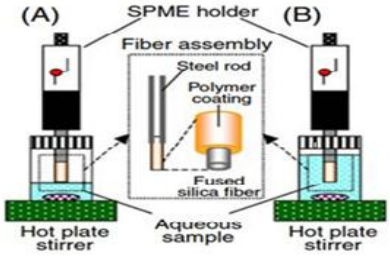

Fig 1:SPME (A) HS-SPME. (B)DI-SPME

Applications of SPME Iin Various Fields:

Environmental applications-In the early formative time frame the majorityof applications were in ecological science. For the most part natural mixes have been considered, and pesticides, herbicidesand other organically dynamic mixes inaqueous tests.

Applications in food chemistry -Nourishment investigation is essential for the assessment ofnutritional esteem, for quality control of crisp andprocessed items and the checking of foodadditives and other harmful contaminants. Ingeneral, flavor is delicate to compositional adjustments on account of nourishment (natural product, wine,etc.).

Applications to biological fluids-Test arrangement is a standout amongst the most criticalsteps in the investigation of organic liquids andcompounds in natural networks.

Liquid Phase Micro extraction(LPME)

Test readiness can incorporate cleanup techniques for exceptionally intricate (filthy) specimens. This progression should likewise convey the analytes to asuitable focus level.LPME is asolvent-minimized samplepretreatmentprocedure of LLE, in which just a few lLit ofsolvent are required to think analytesfrom different specimens instead of hundreds ofml required intraadditional LLE. It is compatiblewith slender gas chromatography (GC),capillary electrophoresis (CE) and HPLC. InLPME, extraction typically happens into asmall measure of a water-immiscible solvent(acceptor stage) from a fluid samplecontaining analytes (giver stage).

Advantages

- It is a quick, straightforward, dissolvable free and sensitive strategy for the extraction of analytes;
- It is a straightforward, effective adsorption/desorption method;
- It is good with analyte separation and recognition by high performance liquid chromatography with bright identification (HPLC - UV);
- It gives straight outcomes to a wide range of convergences of analytes;
- It has a little size, which is convenient for outlining convenient gadgets for field examining; and,
- It gives exceptionally reliable, quantify able results from low fixations of analytes.

Disadvantages

- Relatively low recommended operating temperature (by and large in the extend 240–2800C);
- Their insecurity and swelling in organic solvents (incredibly limiting their use with HPLC);
- Fiber breakage;
- Stripping of coatings; and,
- The twisting of needles and theirexpense.

Types of Liquid Phase Micro extraction

It can be isolated into three primary classes

(1) Single-drop micro extraction (SDME)

(2) Dispersive liquid–liquid micro extraction (DLLME)

(3) Hollow-fiber micro extraction (HF-LPME).

Single-Drop Miniaturized Scale Extraction (SDME):

SDME, utilizing regularly 1–8µL of an organicsolvent at the tip of a small scale syringe, hasevolved from LPME. Afterextraction, the microdrop is withdrawn again into the syringe andtransferred for further examination.

By and by, two primary methodologies can be used to perform SDME:

a) Direct drenching (DI)- SDME

b) Headspace (HS)- SDME

a) Direct immersion (DI)-SDME

In DI-SDME, a drop of a water-immisciblesolvent is suspended specifically from the tip of amicro syringe needle inundated in the aqueoussample.

(b) Headspace (HD)-SDME

In HS-SDME, a small scale drop of appropriate solvent is put in the headspace of thesample arrangement or in aflowing air samplestream to concentrate unstable analytes.

Advantage: A more extensive assortment of solvents to look over. Extraction and infusion must be performed independently, utilizing diverse contraption.

Dispersive Fluid Micro extraction (DLLME)

Thissystem that uses1Lit volumes ofextraction dissolvable alongside a couple ml of dispersive solvents. Inthis strategy, a cloudysolution is get shaped when anappropriatemixture of extraction and dispersive solventsisinjected into a fluid specimen containing the analyte of intrigue. Hydrophobic solutesare rich in the extraction dissolvable, which isdispersed into the mass watery arrangement. Aftercentrifugation, analytes in the settled phasecan be dictated by utilizing conventionalanalytical techniques.In DLLME, the dispersive dissolvable plays a key role that helps extraction dissolvable frame finedroplets in fluid examples, representingabout 97–99% of the aggregate volume of theextraction blend. Contrasted with othermethods, bounteoussurface contact betweenfine beads and the analyte in DLLME accelerates the mass exchange procedures of analytesfrom oceanic stage to natural stage, whichnot just enormously improves extraction productivity additionally, defeats the issue of the time taken.

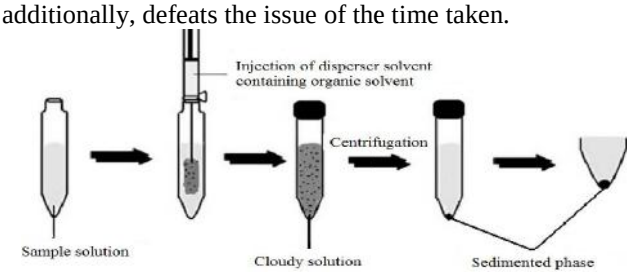

Fig 2: Different steps of DLLME

Advantages

- Simplicity of operation
- Rapidity
- Low cost
- High recuperation

- High advancement calculate
- Very short extraction time (a few moments).

Hollow Fiber Micro extraction (HF-LPME):

They utilized the fundamental standard of supportedliquid layer (SLM), surprisingly, insimple, reasonable, dispensable extractionunits for the fluid microextraction (LLLME) using polypropylene HFs as themembrane.

The example vial is loaded with the aqueoussample. A short bit of a permeable HF may be either a pole with a shut base or a u-shapewhere both finishes are associated with guidingtubes.

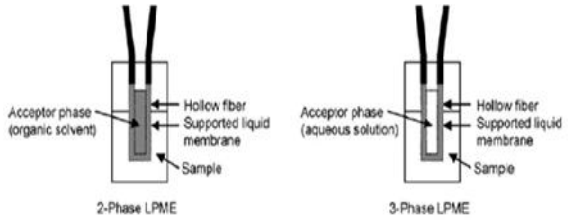

Fig 3:2-phase and 3-phase LPME

Before extraction, the HF is first dippedin the natural dissolvable for a couple times toimmobilize dissolvable in the pores, and excesssolvent is expelled. The dissolvable is immisciblewith water to guarantee that it stays inside thepores amid the extraction with no spillage tothe fluid example. The natural solventforms a thin layer inside the mass of the HF.The extraction dissolvable must be compatiblewith the HF so that the pores in the mass of theHF can be filled completely.The acceptor arrangement then fills the lumen ofthe HF. This acceptor arrangement can be anorganic dissolvable (the same as that utilized for theorganic dissolvable as a part of HF pores) bringing about a twophaseextraction framework, or the acceptorsolution might be an acidic or soluble aqueoussolution, bringing about a three-stage extraction system. In the two-stage LPMEframework, thetarget analytes are separated from the aqueoussample and into the natural dissolvable (acceptorsolution) introduce both in the permeable divider and inside the lumen of the HF.

Applications

All LPME strategies can be used successfully for extraction of target analytes from different example arrangements.

Table 3: Choosen Applications For Medication Examination Utilizing LPME And Other Related Micro extraction Procedures

Analyte	Matrix	Extraction mode	Analytical method
Anti-fouling agent	Water	DI-SDME	GC-ECD
Hypericin, Hyperforin	Plasma , Serum	DI-SDME	HPLC-UV-FLD
Local anaesthetic	Urine , Plasma, Serum	DI-SDME	HPLC-UV
Fentanyl	Urine , Plasma, Serum	DI-SDME	HPLC-UV
Cocaine and its metabolites	Saliva	HF-LPME	GC-PDHID
Basic drugs	Plasma , Urine	HF-LPME	GC-NPD
Anti-malarial agents (Chloroquine)	Urine, Tablet	DI-SDME	HPLC-UV

Molecularly Imprintedpolymers (MIPS)

Molecularly engraved polymers (MIPs) arepolymers arranged in nearness of a templatethat serves as a shape for the development oftemplate reciprocal restricting locales. Thus,MIPs can beprogrammed to perceive a largevariety of target structures with counter acting agent likeaffinities and selectivities.MIP is based onthe arrangement of a complex between an analyte(template) and a practical monomer. In thepresence of a vast abundance of a cross-linking agent, a three-dimensional polymer networkis framed. After polymerization handle, thetemplate is expelled from the polymer leaving particular acknowledgment destinations reciprocal inshape, size and substance usefulness to thetemplate atom. More often than not, intermolecularinteractions like hydrogen bonds, dipole–dipole and ionic connections between thetemplate particle and useful groupspresent in the polymer framework drive themolecular acknowledgment marvels. Along these lines, theresultant polymer perceives and bindsselectively just the layout particles.

Molecular Engraving Process

Format plan and monomer choice aretwo of the mostcritical elements of the Atomic engraving process. For analyticalapplications, the "MIP Rule of 6" ought to befollowedwhen conceivable:

Never utilize the analyte as a templateunless there is totally no alternative.

Make levelheaded decisions about whichregions of an analyte are likely tocommand the best sorts of interactionin a low dielectric medium (organicsolvent) and after that fuse theseelements in a simple of the analytemolecule

Select monomers that are likely toform solid connections in the chosensolvent (e.g., Bronsted acids orbases/H-benefactors or acceptors/nonpolargroups, and so on.)— this will increasecapacity and impact homogeneity of the restricting pits.

Choose formats and monomers thatwill be dissolvable in the porogenic solventto be utilized as a part of the polymerization-thismay appear glaringly evident yet it sometimesrequires doing dissolvability tests

Ensure quite far that thetemplate–monomer blend is stableand does not experience side reactionsunder the polymerization conditions.

Consider the way of the grid fromwhich the analyte will in the end be extracted while selecting the cross linking monomer - a scope of di-or triune saturatedcross connecting

monomerswith changing sciences are availableto make the permeable natural system material.

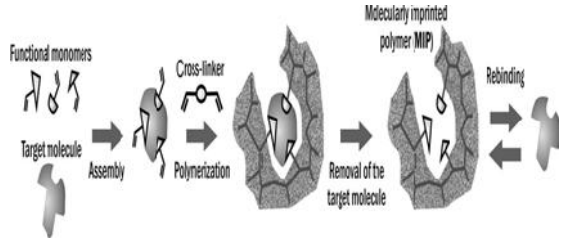

Fig 4: Procedure of readiness ofMIPs

1. Their utilization as tailor-made separationmaterials,
2. Their utilization in natural combination andenzyme innovation as catalyticallyactive polymers or compound copies.
3. As sensors in biosensor-likeconfiguration
4. Plot sketching out the principle applications conceived for MIPs is appeared in figure.

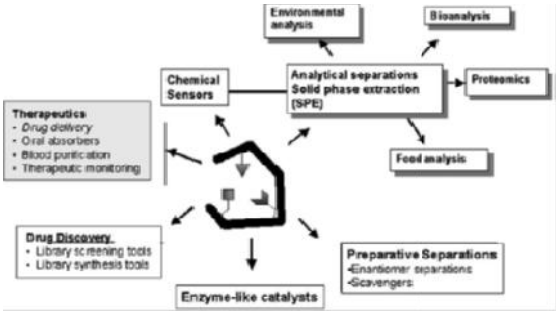

Fig 5: Scheme outlining the main application Envisaged for MIPs

Turbulent Flow Chromatography (TFC)

Turbulent Flow Chromatography (TFC) is atechnique that joins high-throughput andhigh reproducibility by method for separatinganalytes from different frameworks with reducedsample taking care of.

Principle of TFC –

Turbo Flow techniques depend on the directinjection of organic examples without previousextraction or treatment a section pressed withlarge particles. These vast particles have anadditional level of selectivity by means of the stationaryphase science added to them. After thesample is infused onto a Turbo Flow columnthe high stream rate (cf. 1.5 – 5.0ml/min)generates turbulent stream conditions inside thecolumn. Since 100% watery versatile buffersare utilized, the little analyte atoms areretained by means of dissemination into the molecule pores,while the proteinaceous material is washed towaste. Once the mixes of intrigue areextracted from the organic network, they areeluted from the Turbo Flow segment onto theanalytical segment with a volume of solvent,which has been put away in a holding circle. Theholding circle ought to have a volume no less than ten times that of the Turbo Flow section and istypically loaded with natural portable stage (foreversed stationary stage) or pH bufferedsolutions (for particle exchangephases). As the analytes are discharged from the Turbo Flowcolumn they are exchanged with the pumpingsolvent (at an impressively bring down stream rate thanthat utilized amid stacking) through the tee rotor seal in the second valve and blended with thepumping dissolvable from the investigativesystem.

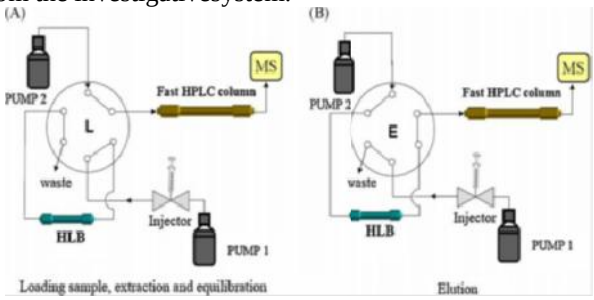

Fig 6: Schematic representation of on-line turbulent-flow column-switching

Online Turbulent-Flow Column-Switching:

A schematic chart of the on-line TFCLC/MS instrument set-up in view of columnswitchingand quick HPLC is appeared in Fig.A pump was utilized to convey a high flowthrough a hydrophilic–lipophilic balanced(HLB) turned around stage section to load and wash the specimen, and in this manner to flushand equilibrate the extraction segment. SolventA was utilized as the dissolvable for this pump. AnAgilent 1100 HPLC framework (furnished with abinary pump, an on-line degasser, an autoplate-sampler, and a thermostaticallycontrolled section compartment) was utilized todeliver an angle stream to elute the analytesfrom the extraction segment and to perform theseparation on a quick HPLC segment. Two Rheodyne six port exchanging valves were usedfor the section exchanging purposes. The L andE in the focal point of the every six-port valvedesignate "stack" or "elute" positions for theflow way.

Applications of TFC

- In sustenance and ecological investigation.
- In the treatment of natural samplescontaining a lot of proteins, such as blood plasma.
- Isolation of veterinary medications andgrowth promoters from sustenance.
- A arrangement that has increased wide use, particularly in the clinical field, toincrease throughput on suchsystem.

3. Future Trends

Micro extractiontechniques-To enhance the execution of micro extraction techniques, computerization should be brought into test arrangement, and will be a noteworthy research subject later on. Computerization may bring about better reproducibility contrasted with manual strategies. At present, a few computerized strategies have been created in plant tests, including direct drenching and headspace SPME,and SPME combined with chromatographic analysis, and so on. Later on, micro channel SPME will be connected in mechanization as the covering could be set on the inward surface of the micro channel and just a little measure of test will be required. In any case, full robotization of micro extraction procedures gives off an impression of being extremely troublesome for plant tests. This is because of the way that specific specimen

pretreatments are vital preceding micro extraction of plant tests at present, and that robotization of these example pretreatment forms (mixing, homogenization, filtration, and centrifugation) is extremely troublesome. Keeping in mind the end goal to enhance mechanization, future work will concentrate on direct micro extraction examination of plant tests, for example, saffron without pretreatment steps.

4. Conclusion

It is outstanding that specimen planning is a standout amongst the most basic strides in the assurance of follow contaminations in various ecological frameworks. As of late, example arrangement strategies have been altogether moved forward. As the utilization of pharmaceuticals is expanding, more specimen planning methods are being created. The scaling down of examining strategy and the need to decrease testing time and dissolvable volume has prompted to the improvement of different microextraction strategies. The presentation of ionic fluid based and sol-gel arranged ionic fluid extraction stage, which can be utilized for all the micro extraction strategies will give a superior enhancement calculate, higher recuperation, low location confine and higher extraction throughput because of their remarkable properties, for example, unimportant vapor weight, great warm dependability, and high consistency.

Among them, SPE is the most well-known for medication examination and has turned into a fundamental device in labs everywhere throughout the world. It has additionally to a great extent supplanted more seasoned methods. The advancement of SPE has been quick and went with numerous enhancements. One of these changes is MIPs. Due to their particular and specific properties, their utilization will most likely be more extensive later on, particularly in measurable, clinical, pharmaceutical and biochemical investigations. All LPME methods can be used viably for extraction of target analytes from different example arrangements. Engraved polymers are currently entrenched as materials for sub-atomic acknowledgment, chromatographic partition, and systematic example advancement yet their utilization as dynamic biomedical gadgets is still in the early phases of improvement. The on-line TFCLC/MS strategy was reasonable for TCMs pharmacokinetic learn at a low measurements level.

5. Acknowledgement

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6. References

[1] ArthurCL, Pawliszyn J. Solid phasemicroextraction with thermaldesorption using fused silica opticalfibers. Anal. Chem. 1990; 62:2145.

[2] Murray DAJ. Rapid Microextraction procedure for analyses of traceamounts of organic compounds inwater by gas chromatography andcomparisons with macroextractionmethods. J. Chrom.1979; 177:135–140.

[3] Thielen DR, Olsen G, Davis A, BajorE, Stefanovski J, Chodkowski J. Anevaluation of microextraction/capillarycolumn gas chromatography formonitoring industrial outfalls. J.Chromatogr.Sci.1987; 25:12–16.

[4] Arthur CL, Pawliszyn J. Solid phasemicroextraction with thermaldesorption using fused silica opticalfibers. Anal. Chem. 1990; 62:2145–48.

[5] Eisert R, Pawliszyn J.Automated in tubesolid phase Microextraction coupled to high performance liquidchromatography. Anal.Chem.1997; 69:3140–47 .

[6] Liu H, Dasgupta PK. Analyticalchemistry in a drop. Solvent extractionin a micro drop. Anal. Chem.1996; 68; 1817–21 .

[7] Jeannot MA, Cantwell FF. Solventmicroectraction into a single drop.Anal Chem. 1990; 68; 2236–40.

[8] Pedersen-Bjergaard S, RasmussenKE. Liquid-liquid microextraction forsample preparation of biological fluidsprior to capillary electrophoresis.Anal.Chem.1999; 71; 2650–56.

[9] Kataoka H. Recent Developments and Applications of MicroextractionTechniques in Drug Analysis. Anal. Bioanal. Chem. 2010, 396: 339-364.

[10] ArthurCL, Pawliszyn J. Solid phase microextraction with thermaldesorption using fused silica optical fibers. Anal. Chem. 1990; 62:2145.

[11] Louch D, Motlagh S, Pawliszyn J. Anal.Chem. 1992; 64:1187.

[12] Istvan B, Kiado B, Kezirat L.Modernanalytical techniques in thepharmaceutical &bioanalysis.2011; 3126-31.

[13] Zwir-Ferenc A, Biziuk M. Solid PhaseExtraction Technique –Trends, Opportunities andApplications. Polish J. of Environ.Stud.2006; 15:677

[14] Urbe I, Ruana J. J. Chromatogr.1998; 778:337.

[15] SupelcoBulletinGuide to Solid PhaseExtraction, Sigma-Aldrich Co910; 1998.

[16] Sabikh, Jeannot R., Rondeaub. Multiresiduemethods using solidphaseextraction techniques formonitoring priority pesticides,including triazines and degradation products, in groundwater. J. Chromatogr.2000; 885:217.

[17] Walles M, Mullett WM, Levsen K,Borlak J, Wunsch G,Pawliszyn J.J Pharm. Biomed. Anal.,2002; 30; 307.

[18] Kataoka H, Lord HL, PawliszynJ.Application of solid phasemicroextraction in foodanalysis.J. ofChromatography2000; 880:35–62.

[19] Zhang Z, Pawliszyn J. Quantitativeextraction using an internallycooledsolid phase

Microextraction device. Anal. Chem. 1995; 67:34–43.

[20] Annamma, KM, Mathew B. Design of2, 4-dichlorophenoxyaceticacid imprinted polymer withhighspecificity and selectivity. Mater. Sci.Appl. 2011; 2:131–140.

[21] Aprea, E.; Gika, H.; Carlin, S.; Theodoridis, G.; Vrhovsek, U.; Mattivi, F. Metabolite profiling on apple volatile content based on solid phase microextraction and gas chromatography time of flight mass spectrometry. J. Chromatogr A 2011, 1218, 4517–45283.

[22] Bryant, R. J.; McClung, A. M. Volatile profile of aromatic and non-aromatic rice cultivars using SPME/GC-MS. Food Chem. 2011, 124, 501–513.

[23] Louw, E. D.; Theron, K. I. Volatile dynamics during maturation, ripening and cold storage of three Japanese plum cultivars (Prunus salicina Lindl).Postharvest Biol. Tech. 2012, 70, 13–24.

[24] Duval, C. J.; Sok, N.; Laroche, J.; Gourrat, K.; Prida, A.; Lequin, S.; Chassagne, D.; Gougeon, R. D. Dry vs soaked wood: Modulating the volatile extractible fraction of oak wood by heat treatments. Food Chem. 2013, 138, 270–277.

[25] Drew, D. P.; Rasmussen, S. K.; Avato, P.; Simonsen, H. T. A comparison of headspace solid-phase microextraction and classic hydrodistillation for the identification of volatile constituents from Thapsia spp. provides insights into guaianolide biosynthesis in Apiaceae. Phytochem. Anal. 2012, 23, 44–51.

[26] Ishizaki, A.; Saitoa, K.; Hanioka, N.; Narimatsu, S.; Kataoka, H. Determination of polycyclic aromatic hydrocarbons in food samples by automated on-line in-tube solid-phase microextraction coupled with high-performance liquid chromatography-fluorescence detection. J. Chromatogr A. 2010, 1217, 5555–5563.