Complete Engineering Solutions...
Who are we...

- Conceptualized and shaped in 1976
- One of the most admired and valuable company for customer satisfaction.
- We are pioneer in application and implementation engineering.
- 40+ years experience in engineering excellence.
- Immense expertise in providing engineering solutions.
- 40+ years of manufacturing excellence.
- Witnessed growth in revenue and team strength YoY.
We are accredited by...

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- Recognized and Rated by CRISIL
- CRISIL Verified
- Member of A.M.P.E.R.E. (Europe)
- ASCB(E) Certification for Best practice

Why We...

- Highly Customized Product
- Adherence to Standards
- Cost Effective Solutions
- Sound Infrastructure
- Timely Delivery
- Great After Sale Support
Extraction of Essential Oils

- Essential oils are the liquids that are isolated from plants
- The plants are introduced to solvents and then preserved in liquefied versions of the plants

Essential oils are natural aromatic extracts from

![Diagram showing various parts of plants and their corresponding essential oils.]

Application of Essential oils

- Detergents
- Soaps
- Cosmetics
- Pharma
- Distilled alcoholic beverages
- Insecticides
- Perfumes
- Confectionery food products
- Toilet products
- Soft drinks
Methods of Extraction of Essential Oils

- Steam Distillation
- Solvent Extraction
- CO2 Extraction
- Maceration
- Enfleurage
- Cold Press Extraction
- Water Distillation
Why Microwave for Oil Extraction ...

- Microwave is not alone an extractor however its is combined with other conventional techniques with the aim of improving and optimizing the extraction process.

- Microwave-assisted hydrodistillation is an advanced hydrodistillation technique utilizing microwave oven in the extraction process.

- High and fast extraction performance ability with less solvent consumption and protection offered to thermolabile constituents.

- Microwave offers better conditions for the extraction of highly delicate essential oils from plants, which make it more crucial.

- Microwave in separation and extraction processes has shown to reduce both extraction time and volume of solvent required, minimizing environmental impact by emitting less CO2 in atmosphere and consuming only a fraction of the energy used in conventional extraction methods such as steam distillation, SD.
Electromagnetic Spectrum...

- Microwave heating systems are members of the Electromagnetic heating family.
- Microwaves have a frequency of 2.45 GHz and 950 MHz.
- Microwave is generated from a small device known as a Magnetron.
- Microwave heating systems have the property to heat from within.
- Microwave heating systems heat the volume of material, hence also known as 'Volumetric Heating'.
Microwave Heating

Dielectric Properties

- Indicator of how material will heat
- Tool in developing microwave heating processes

Polarizability and Dielectric Properties as Function of Frequency

Dielectric Loss increases with Temperature

Effective loss factor as a function of frequency due to dipolar relaxation and Maxwell-Wagner or ionic conduction mechanisms.
Microwave heating system is generates the heat very fast within material.

Conventional heating system have slow heating rate, heat is transferred via means of air.

Heating of materials are due to molecule movements hence no chamber warm up time is required.

Instance heating does not take place, it requires warm-up of surrounding.

Environmental friendly and green heating solution, no carbon emission.

Produces carbon or toxic gases hence not much environmental friendly heating solutions.

100% energy utilization, as heating takes place within the material.

100% energy utilization is not possible, as material is heated by surrounding hot air.

Better floor utilization index as it doesn't require chamber area.

Poor floor utilization index as it require bigger chamber area for material to rotate.

No Temperature loss in surrounding, ambient workplace.

Surrounding air temperature rises with rise in heater temperature.
Features of Microwave in Oil Extraction…

- Efficient Heating
- Rapid Heat Transfer
- Equipment Size Reduced
- Faster Response To The Control
- Reduction Of Extraction Time
- Reduction In Solvents
- Selectivity Heating
- Reduced Thermal Gradients
- Quick Start
- Selective Heating
- Volumetric Heating
- Higher Production Rate
- Faster Response To The Control
- Higher Production Rate
- Reduction Of Extraction Time
- Reduction In Solvents
- Volumetric Heating

Graph showing yield (% of w/w dry wt) vs time (min) for MAHD 500W and HD.
Microwave Based Extraction Techniques

Microwave-assisted Ionic Liquids Treatment Followed By Hydro-distillation (MILT-MHD)

Vacuum Microwave Hydrodistillation (VMHD)

Solvent-free Microwave Extraction (SFME)

Compressed Air Microwave Distillation (CAMD)

Microwave-accelerated Steam Distillation (MASD)

Microwave Hydrodiffusion And Gravity (MHG).
Microwave Application in Oil Extraction

- Microwave-assisted Extraction
- Steam Distillation Extraction
- Essential Oils Chemical Composition
Trusted Partner of following consultants…

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Serving Across Borders...