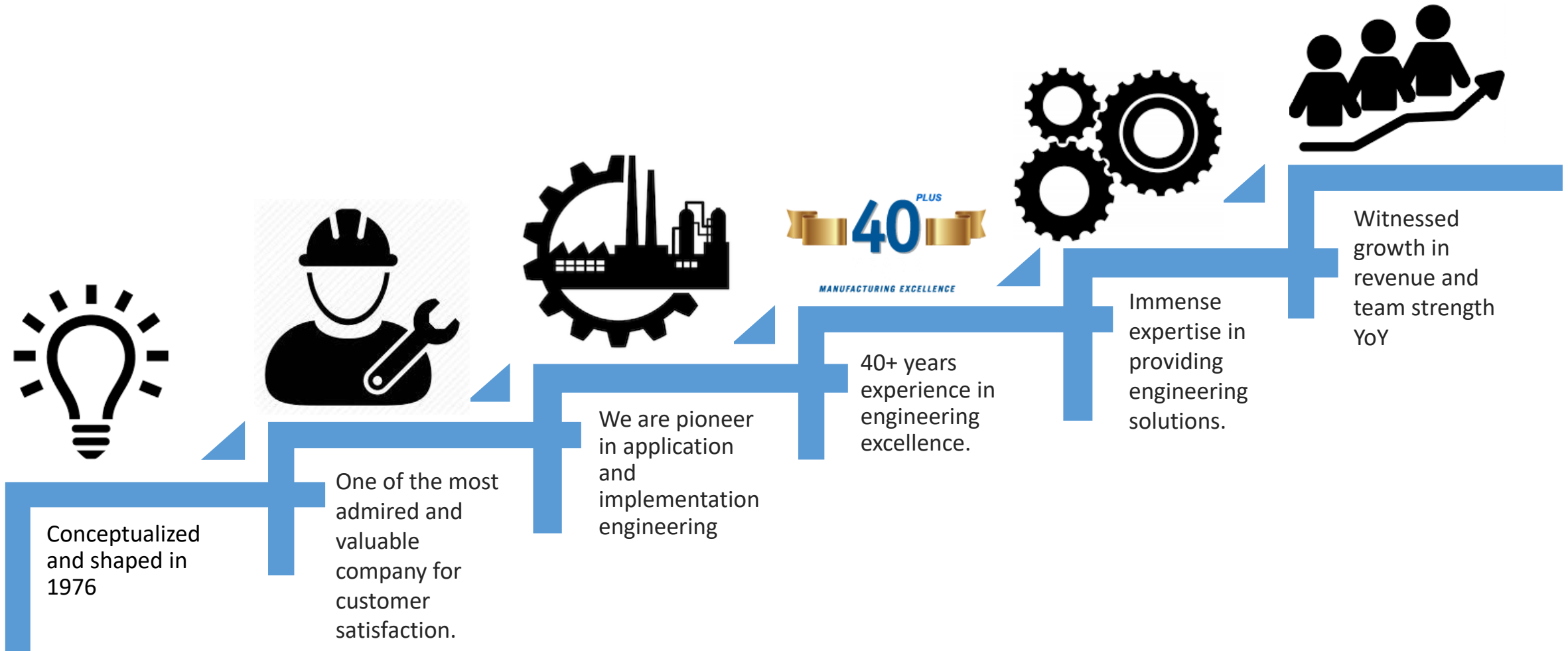


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**Complete Engineering Solutions...**

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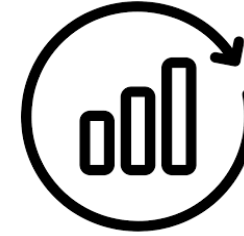
# Why We...



**Highly Customized  
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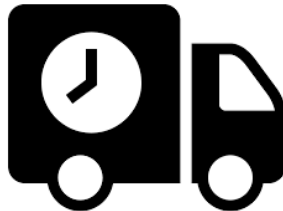
**Adherence  
to Standards**



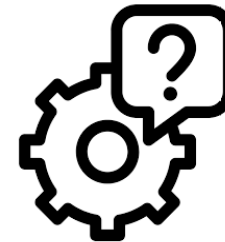
**Cost Effective  
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**Sound  
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**Timely  
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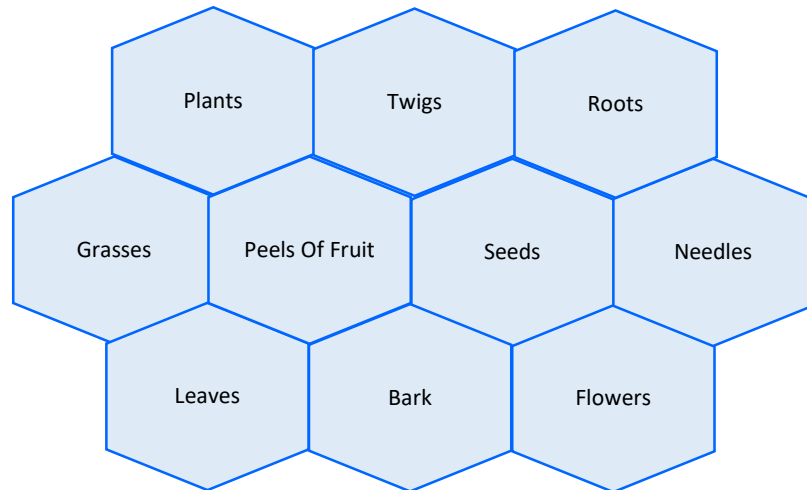


**Great After  
Sale Support**

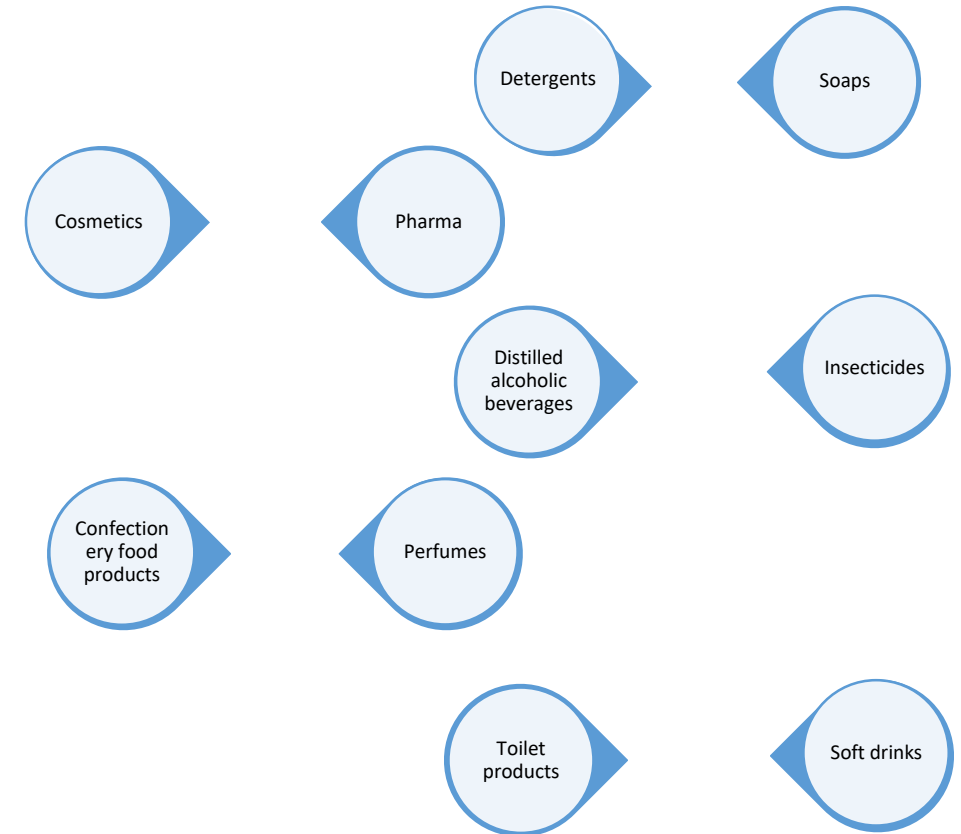
# Extraction of Essential Oils

- 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**

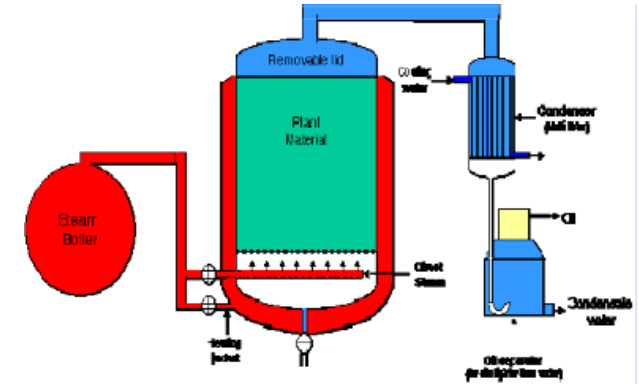
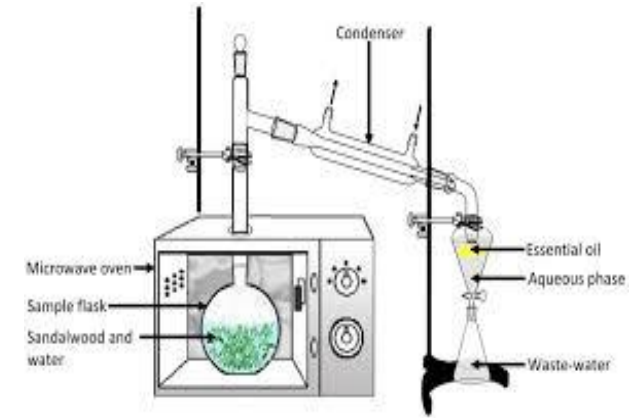
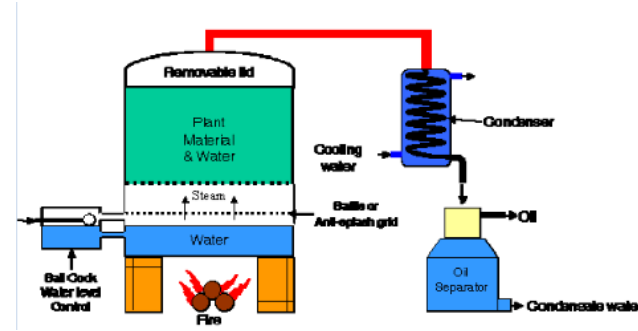


## Application of Essential oils



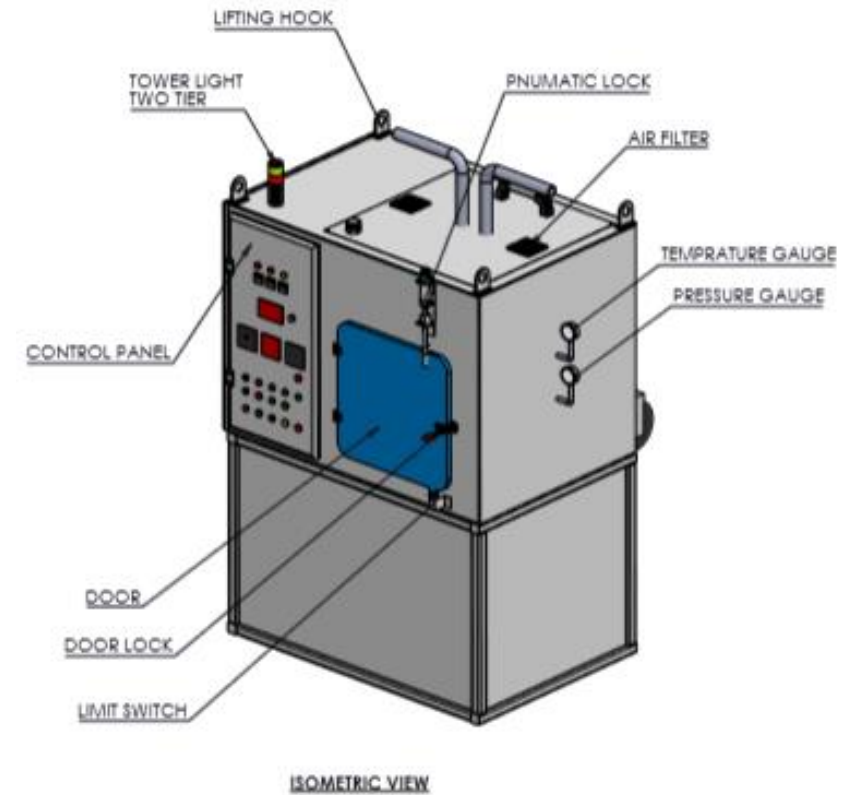
# Methods of Extraction of Essential Oils

- Steam Distillation
- Solvent Extraction
- CO<sub>2</sub> Extraction
- Maceration
- Enfleurage
- Cold Press Extraction
- Water Distillation

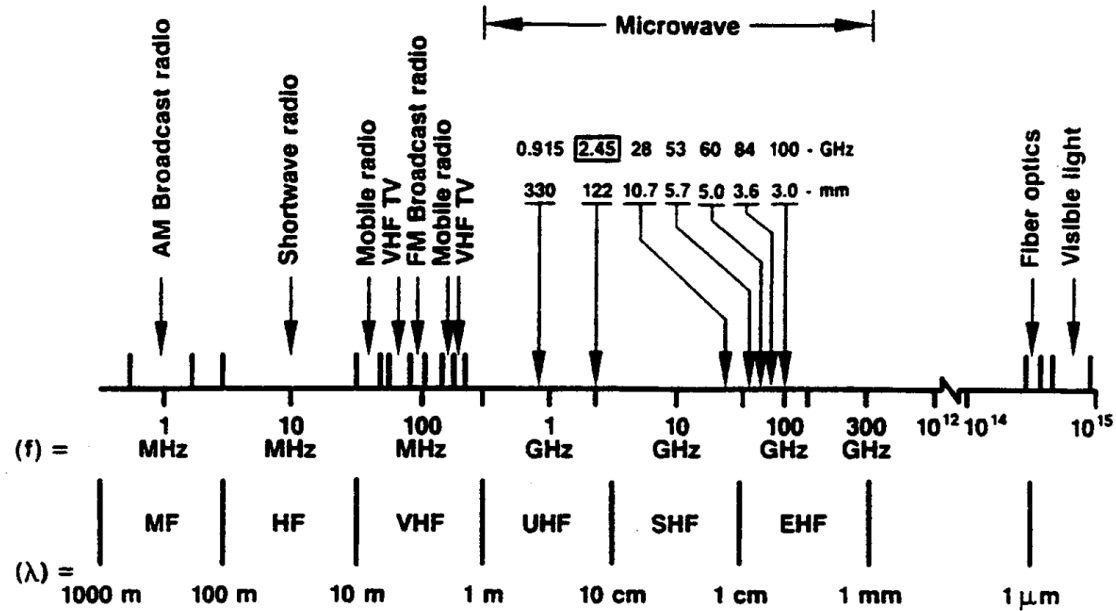


# Why Microwave for Oil Extraction ...

- 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 CO<sub>2</sub> 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 member of Electromagnetic heating family.

Microwaves has frequency of 2.45Ghz and 950Mhz.

Microwave is generated from small device known as Magnetron.

Microwave heating system has property to heat from within.

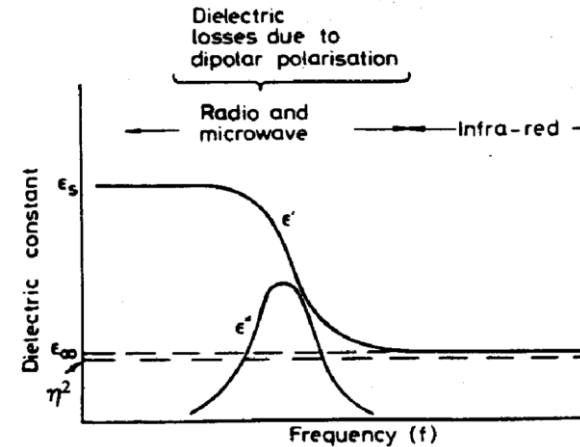
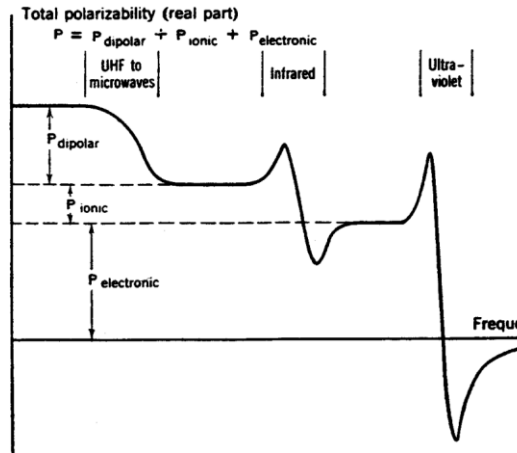
Microwave heating systems heats volume of material hence also known as 'Volumetric Heating'.



# Microwave Heating

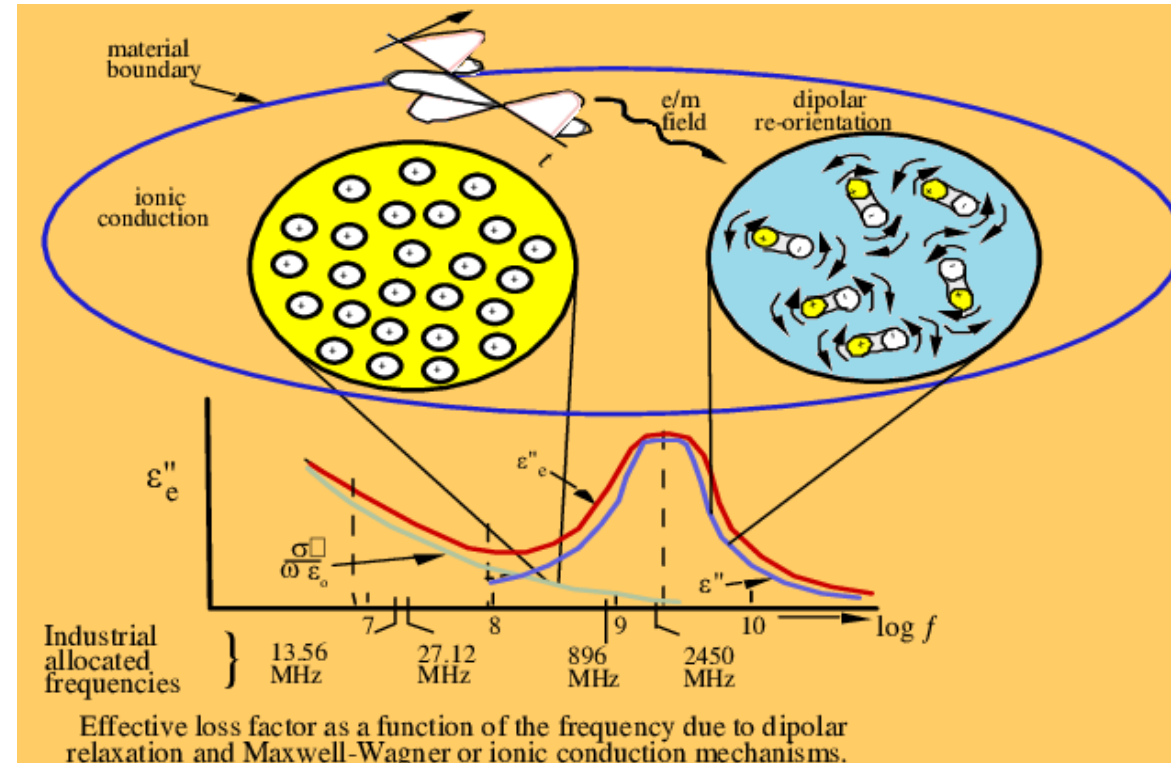
## Dielectric Properties

- 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



# Microwave Heating in Rescue...



## Microwave Heating System

Microwave heating system generates the heat very fast within material.

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

Environmental friendly and green heating solution, no carbon emission.

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

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

No Temperature loss in surrounding, ambient workplace.

## Conventional Heating System

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

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

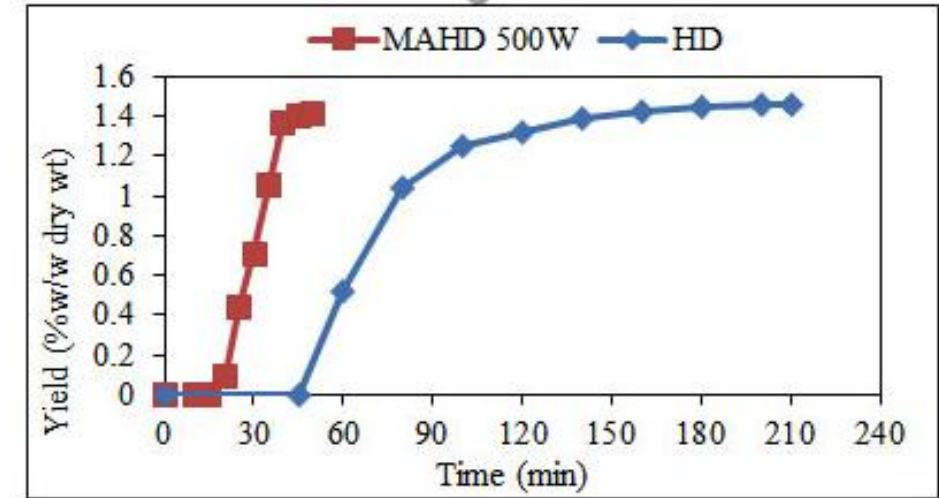
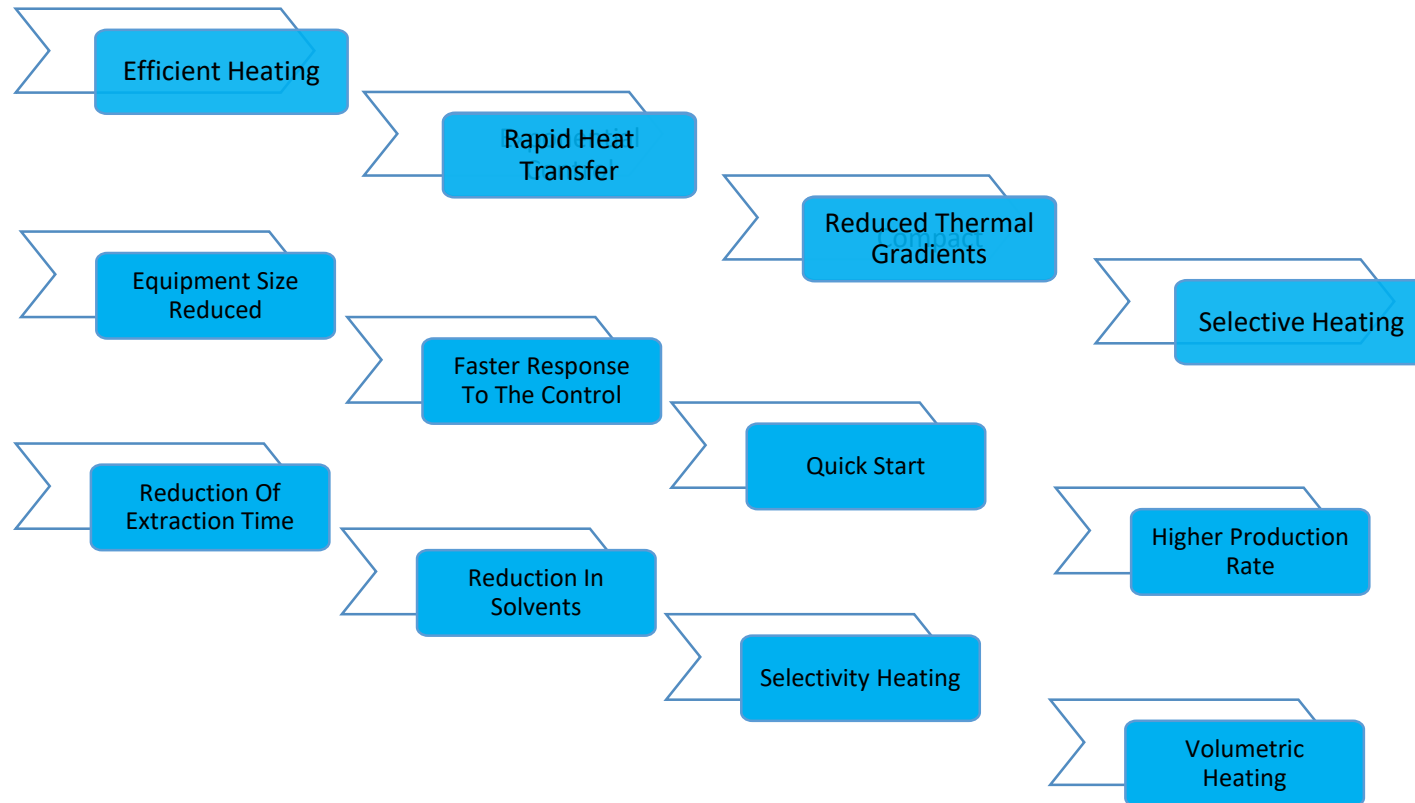
Produces carbon or toxic gases hence not much environmental friendly heating solutions.

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

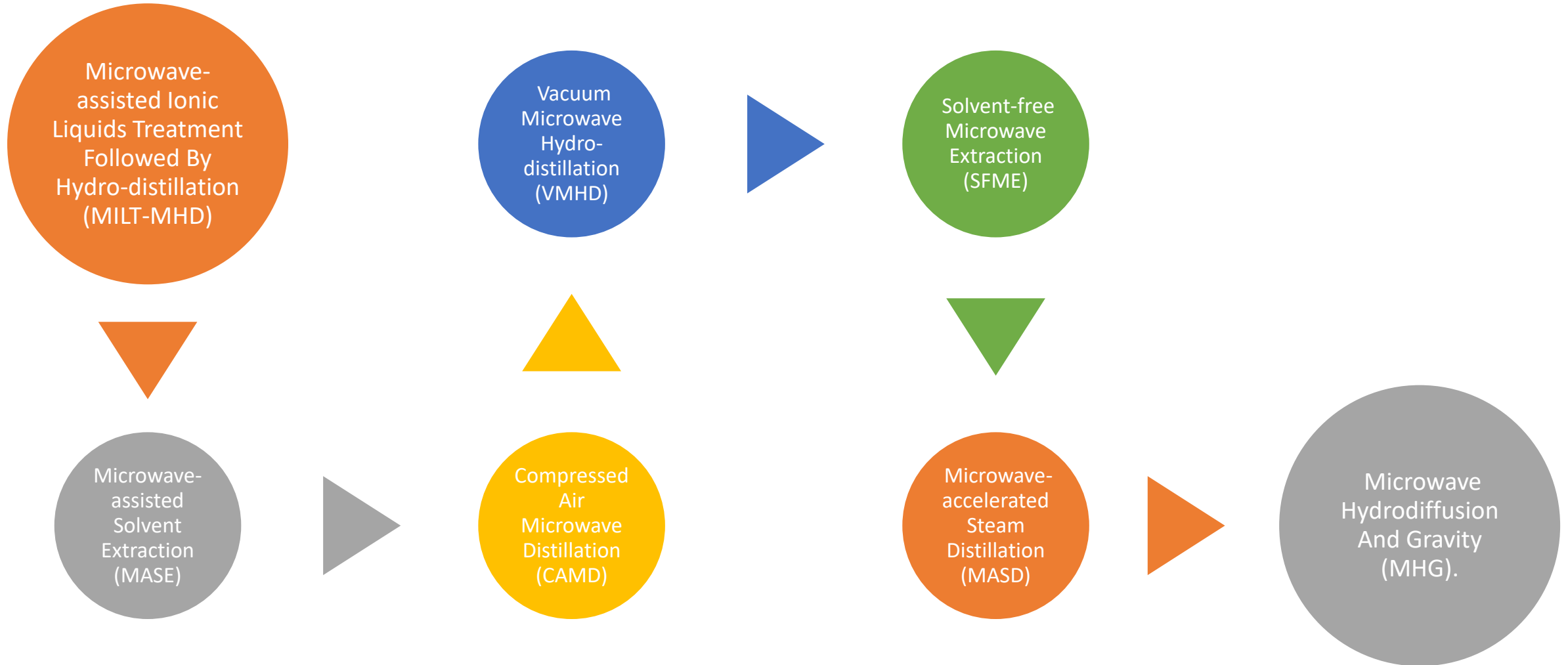
Poor floor utilization index as it require bigger chamber area for material to rotate.

Surrounding air temperature rises with rise in heater temperature.

# Features of Microwave in Oil Extraction...



# Microwave Based Extraction Techniques



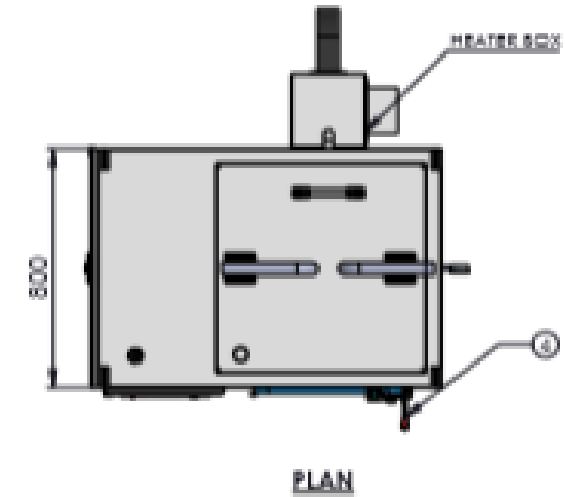
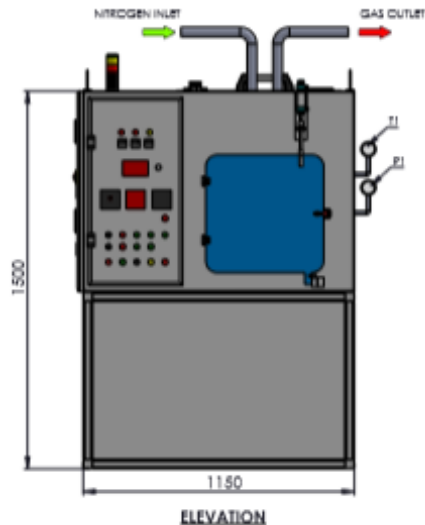
# Microwave Application In Oil Extraction



Microwave-assisted  
Extraction

Steam  
Distillation  
Extraction

Essential Oils  
Chemical  
Composition



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