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INVENTORS

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GREEN TECHNOLOGY SOLVENTLESS EXTRACTION OF BENEFICIAL ESSENTIAL OIL

Patent Filling Number: PI 2012001977

PRODUCT DESCRIPTION

Essential oils are recognized for their aromatic smell and possess antioxidant, antimicrobial, anti-inflammatory, antifungal, anticancer and bio pesticide properties. Due to these intriguing biological activities, essential oils are widely applied in the cosmetic industry producing various cologne waters, bathing essences, hair lotions and shampoos and as a component of disinfectant and insecticides. As a result, the market demand for these valuable products has increased remarkably. This has driven researchers and manufacturers to search for new methods of extraction in order to improve the yield without alteration of the qualitative traits of the products extracted. Thus, the extraction of essential oils under solventless essential oil extractor has been invented as one of the upcoming extraction techniques that can offer high reproducibility in shorter times, simplified manipulation, reduced solvent consumption and lower energy input.

PROCESS FLOW

Raw materials for extraction

Solventless extraction process

Essential oil produced

Analysis of the essential oil

NOVELTIES

- New method for extraction of essential oil without using any chemical solvents or water
- Extraction process can be done at lower temperature even at room temperature under reduced pressure
- Extraction process was done in a closed system, prevent the loss of volatile compound

RESULTS

SCANNING ELECTRON MICROSCOPE (SEM)

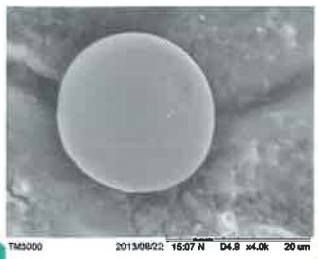

Figure 1: Essential oil gland (oil cell) before extraction

Figure 2: Ruptured essential oil gland after extraction

GAS CHROMATOGRAPHY (GC)

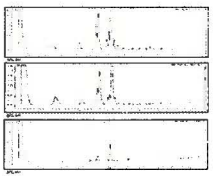

Figure 1: Effect of different temperatures (30°C, 50°C, 70°C) on the chemical components in the essential oil

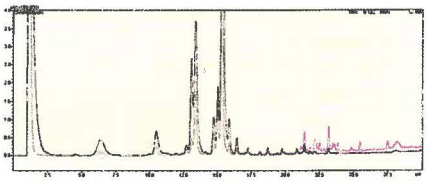

Figure 2: The superimposed graph between the solventless vacuum extraction techniques indicated by black line and the extraction by hydro-distillation by pink line.

GAS CHROMATOGRAPHY MASS SPECTROSCOPY (GCMS)

Table 1: Major constituent of *Chromalaena odorata* essential oil from GCMS analysis

Technique	Solventless extraction technique		Hydro-distillation technique	
Major component of essential oil from *Chromolaena odorata*	β –Pinene	(0.050 ppm)	α -Caryophyllene	(4.884 ppm)
	β –Myrcene	(0.039 ppm)	α –Cubebene	(2.559 ppm)
	D- Limonene	(0.042 ppm)	Caryophyllene oxide	(0.284 ppm)
	β –Ocimene	(0.285 ppm)	Ledol	(0.226 ppm)
	Geranyl Nitrile	(0.080 ppm)	α –Terpene	(0.052 ppm)
	α –Terpene	(0.325ppm)		
	α –Cubebene	(7.673 ppm)		
	Caryophyllene oxide	(0.270 ppm)		
	α – Caryophyllene	(9.049 ppm)		
	Ylangene	(3.216 ppm)		
	Ledol	(0.763 ppm)		

PRODUCT ADVANTAGES

- Simple and easy to assemble
- Low energy consumption
- No purification steps needed
- High quality of oil produced
- Environmental friendly
- Zero solvent waste
- Fast and efficient

COMMERCIAL POTENTIAL

- The process requires shorter period of time, reduced operational cost
- Essential oil produced is pure, no purification step needed
- Can be widely used as medicinal purpose as there are no residual solvents or impurities, safe to be used for people with sensitive skin or allergies
- Suitable for heat-sensitive plant material
- The principle can be applied to any type of plant species that have sublimation properties