

The Obtain of Linalool by Lavender Oil Fractionation

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Abstract: This paper propose the rectification of lavender oil for obtaining some fractions which are used in:
- experimental pharmacology due to the antimicrobial and antiinflammatory properties, with applicability in different clinical affections (asthma, rheumatism, headache, cankers and burns etc);
- the perfumes and odorants manufacturing industry;

The lavender oil it was rectified by obtaining of two different fractions, one with high amount of linalool (more than 30%) use in florist composition (lily-of-the-valley type) and one with equal amount of linalool and acetate linalic (10-12%) which give a specific flavour of lilac used in special at superior quality products by domestic domain (detergents, odorization products). The coarse oil and the fractions was analyzed by gas chromatography on a chromatograph type Dani 86.10, with a capillary column BPX-5, (15 m · 0,32 mm) and a flame ionization detector.

Keywords: linalool, lavender,

1. Introduction

Lavender is by no means new to the world markets. It is cultivated commercially in France, England, Argentina, Brazil, Bulgaria, Cyprus, Greece, Hungary, Italy, Japan, Russia, Spain, Tanganyika, Turkey, Yugoslavia, Australia, Tasmania, and New Zealand. Lavender grows wild in the south of France, Italy Corsica, and Yugoslavia. France is the largest grower with annual production varying from about fifty metric tons per year which is far from sufficient for its own needs, and even the Russian production does not cover local consumption.

Classical antique would not familiar with *Lavandula angustifolia*, but with *L. Stoechas* was, which were more usually. Hildegard von Bingen gave the first indications about the medical properties which was included in XIII century in *Physics English Cyclopaedia*. Thereafter it was used along the century in different forms for example: oils, distilled waters, dry flowers, tinctures, etc, and it was forenamed in every plants study.

Bock describe lavender as an emmenagogue diuretic, sedative for heart, antispasmodic, a remedy for speaking ability loss, an sedative for tooth, head pain, for vertigo and tongue paralysis.

In this effects list Matthioli add the observation that the lavender action over the liver and weak spleen and it useful if it add a few drops in head wash water and it help for the cranialskullbrain tension reduction. Weinmann extend the curative properties over the seeds which are very useful in difficult and dangerous births. Cadeac și Meunier discover later that the lavender oil has a narcotic effect reducing the reflex, the body temperature constraining the cardiac contractions.

Leclerc ended over the previous studies show that the lavender is useful antispasmodic mostly if it associated with

cough and it has success at asthma treatment and at laryngitis.[1] Therefore a popular medicine applications series are for lavender for example: of bath, blood congestion, vertigo, etc.

Beside the medical properties, the lavender is very valuable for perfume and it has used in the homes for the moth and insects elimination.

Most valuable product is the essential oil extract from fresh flowers or inflorescence.

Description

The flowers are ended in 6 or 10 inflorescence. Terminal leaves has 5 mm length and most often are brown or brown- violet or violet. Tubular calyx has 5 mm length, has 5 amethyst unequalled peaks and after flowering it closed. The corolla is longer with base in cylindrical form, the border is flattened, the top border is larger with 2 lobes and the below border is with 3 equal lobes. The stamens are closed in tube. The ovary has 4 carpel witch contain nectar.

The leaves, the seeds and the root: the lavender has 60 cm height, branched with much leaves with grey- greenish branch. The leaves are lanceolate and warped, the below leaves are white- russet, the top leaves are grey- greenish with glandular points underneath.

The flowers have a fresh perfume. Flowering profusely in June/July The flowers have a fresh perfume.

The plant is indigene Mediterranean region but is finder in majority of South Europe and it has cultivated extensive.

Compozition

Lavender oil is an essential oil, derived from plants by steam distillation of the flowers.

The primary components of lavender oil are linalool (51 %) and linalyl acetate (35 %) [3]. Other components

include α -pinene, limonene, 1,8-cineole, cis- and trans-ocimene, 3-octanone, camphor, caryophyllene, terpinen-4-ol and lavandulyl acetate.

The lavender oil utilizations

- dyspeptic
- circulatory problems
- inapetation
- irritability and insomnias
- anorexy/ asthma
- rheumatism
- cankers and burns

May be consumed safely when it's correctly used. Lavender flowers are composed from *Lavandula angustifolia*, harvest immediately after flowering. The medicine contains at least 1,5% of essential oil with linalil acetate, linalool, canfor, β -ocimen și 1,8-cineol as principle components.

Therefore the medicine also contains 12% Lamiaceae tannins

Indications: intern: anxiety and insomnias; for abdominal pains, meteorism; Roehmheld syndrome; for balneotherapy: circulatory affections treatment;

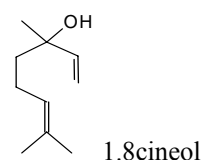
Batching: intern as tea, 1-2 tea-spoon medicine/water cup ; lavender oil : 1-4 drops (~20-80 mg) on a sugar cube, for external use- bath additive medicine for bath 20 liter.

Components of lavender oil are linalool (~20-50%), acetate de linalil, cis-ocimen, terpine-4-ol, β -cariofilen, acetate de lavandulil.

The scope of this study is to obtain superior fractions of linalool, resulted through lavender oil rectification, with tendency to use them directly in pharmaceutical and perfume industry.

2. Experimental

Linalool production has been performed through differential distillation at reduced pressure of the lavender oil using a classical rectifying plant.



The rectifying plant used at separation in components of the volatile lavender oil is composed from the following elements: three neck flask; refrigerant; distillation head; vapor thermometer; dephlegmator; filled column; packed column; polyester muff; liquid thermometer; heating nest; autotransformer; buffer flask; manometer; capillary; balloon with nitrogen; small balloons used to collect fractions; tap; electromagnet; reflux regulator; vacuum pump.

TABLE 1. The variance of the temperature depending on time in the way of rectification the lavender oil

Time	T liquid [°C]	T vapour [°C]	P [mmHg]	Reflux	Observation
0	24	24	10		
5	60	24			
7	93	24			
9	115	26			
10	125	30			
20	132	48		5:01	
26	127	78			
30	128	78			
32	129	76		3:01	
34	129	75			
35	130	79			
37	131	79			
38	131	79			
40	132	79			
41	133	78			
42	134	76			
43	135	82			
45	139	83			
47	150	85	15		
49	152	82			
50	155	92			
51	164	93			
52	175	95			
55	192	98			
58	204	94			
59	206	99			
61	208	101			
63	213	103			
66	220	105			
67	229	99			
68	229	107			
70	231	107			
72	235	108			
95	120	60	10		

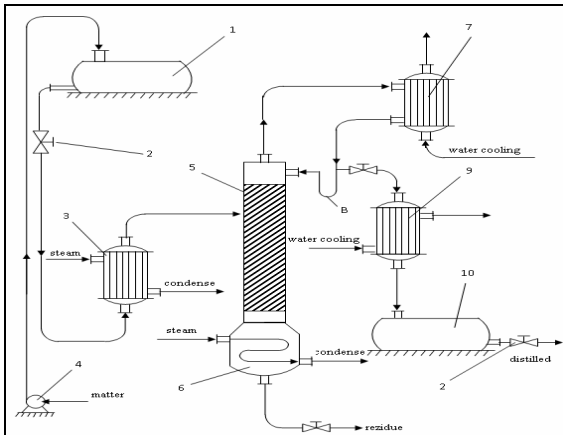


Figure 1. Design of equipment distillation

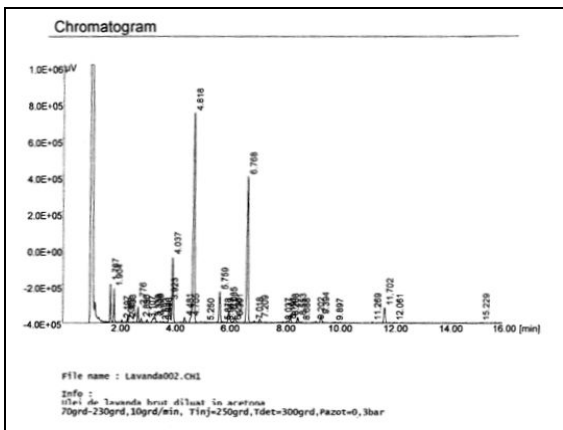


Figure 2. Chromatogram for the lavender oil

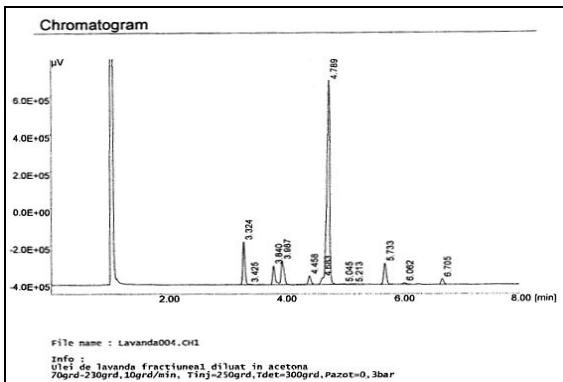


Figure 3. Chromatogram for the first fraction

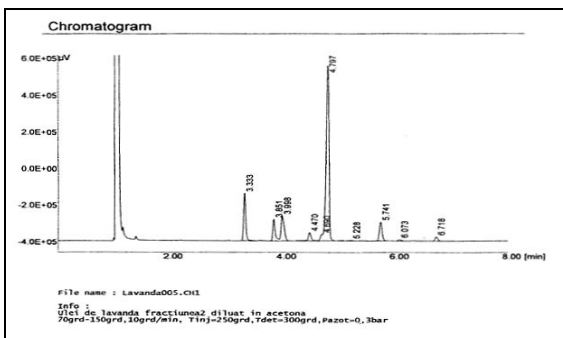


Figure 4. Chromatogram for the second fraction

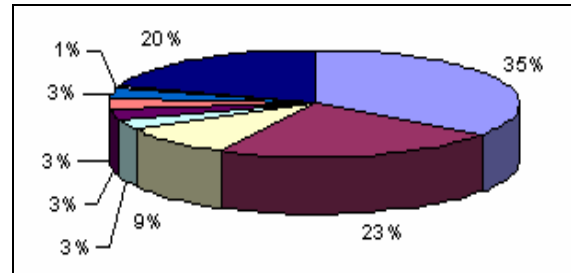


Figure 5. Lavender oil components

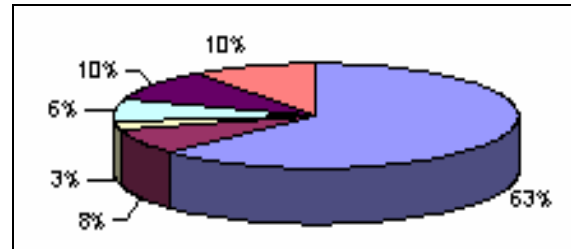


Figure 6. The first fraction collect

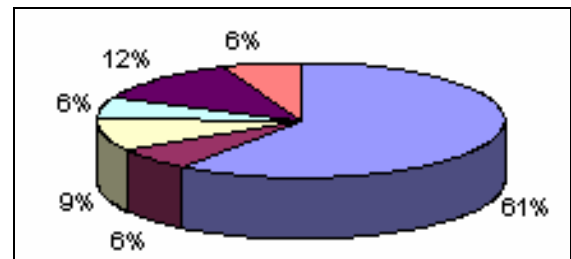


Figure 7. The second fraction collect

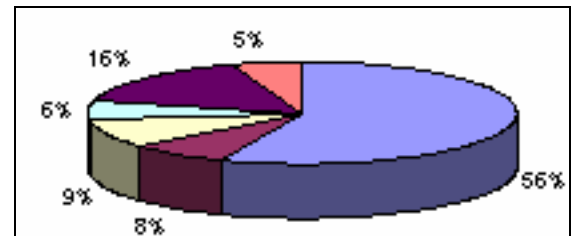


Figure 8. The third fraction collect

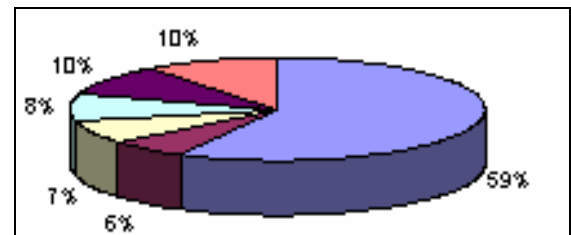


Figure 9. The fourth fraction collect

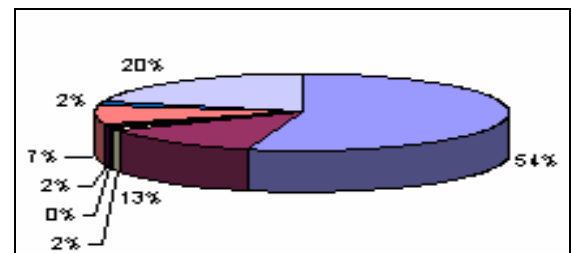


Figure 10. The fifth fraction collect

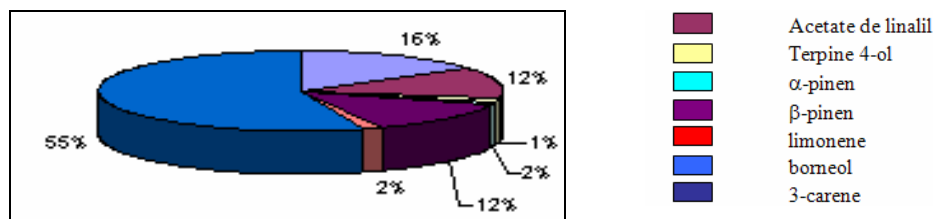


Figure 11. The sixth fraction collect

The coarse oil and the fractions was analyzed by gas chromatography on a chromatograph type Dani 86.10 , with a capillary column BPX-5, (15 m · 0,32

mm) and a flame ionization detector. The performance dates are present in the following table and in afferent chromatogram.

TABLE 2. The refractive index and density values for the collected fractions.

Fraction	1	2	3	4	5	6
refractive index (31° C)	1,6934	1,6935	1,6936	1,6940	1,6941	1,6943
Density[kg/m ³]	0,79	0,8	0,86	0,821	0,85	0,866

TABLE 3. The collected fractions for various components

Drip	Aassumption	Retention time	Raw oil	F1	F2	F3	F4	F5	F6
1	Linalool	4.818	34.7	62.9	60.1	56.2	57.9	54.1	15.6
2	Acetat de linalil	6.768	22.9	-	-	-	-	12.8	12.4
3	Terpine 4 -ol	4.037	9.1	8	6.1	7.8	6.3		1.1
4	α pinen	1.767	3.4	-	-	-	-	1.5	-
5	β pinen	1.904	3.3	-	-	-	-	0.4	-
6	Limonen	3.923	3.3	2.6	9.3	8.7	7.2	1.5	1.8
7	Borneol	3.336	2.7	6.4	6.1	6	8.3	7.1	12.4
8	3-carene	6.078	0.7	10	12	16.1	9.9	2.2	1.8
9	Alti compusi	-	19.9	10.1	6.4	5.2	10.4	20.4	54.9

3. Conclusion

The lavender oil it was rectified by obtaining of two different fractions, one with high amount of linalool (more than 30%) use in florist composition (lily-of-the-valley type) and one with equal amount of linalool and acetate linalic (10-12%) which give a specific flavour of lilac used in special at superior quality products by domestic domain (detergents, odorization products). The accomplished separation it's approach fairly of these references but separation capacity think that it may be improve by using another thermic behaviour (an heating much slowly and a

larger duration of rectification) and using inert gas at raiser barbotage rate but keeping same depression.

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