AN INNOVATIVE PROPOSAL: PRODUCTION AND CHARACTERIZATION OF NANOEMULSIONS FROM THE ESSENTIAL OIL OF *CROTON CAJUCARA* BENTH (BRAZILIAN RAINFOREST) AS A DRUG DELIVERY SYSTEM

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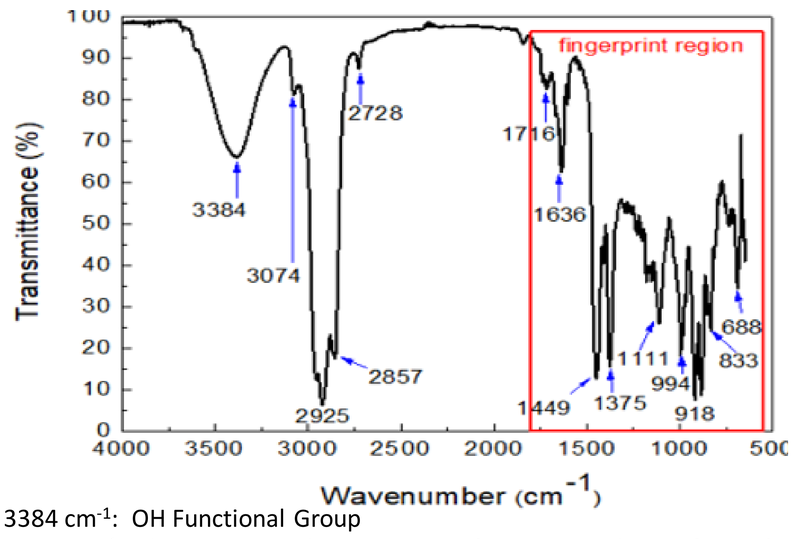
INTRODUCCION

Research in nanoscience and nanotechnology, as well as the number of research publications in these areas, has been increasing in recent years [1]. Essential oils (EOs) are highly concentrated liquids extracted from different parts of plants. Chemically, EOs have a very low molecular weight. Many of them possess therapeutic properties and are used in biomedicine. Brazil has one of the greatest biodiversity in flora in the world [2]. Croton cajucara Benth (Euphorbiaceae) is a shrub native to the Amazon region in northern Brazil, where it is popularly known as "sacaca". Phytochemical and pharmacological studies of sacaca have been guided by popular and traditional medicine, where the treatment of hepatic and gastrointestinal disorders, obesity, and hypercholesterolemia is guided through the use of essential oil-based therapy [3].

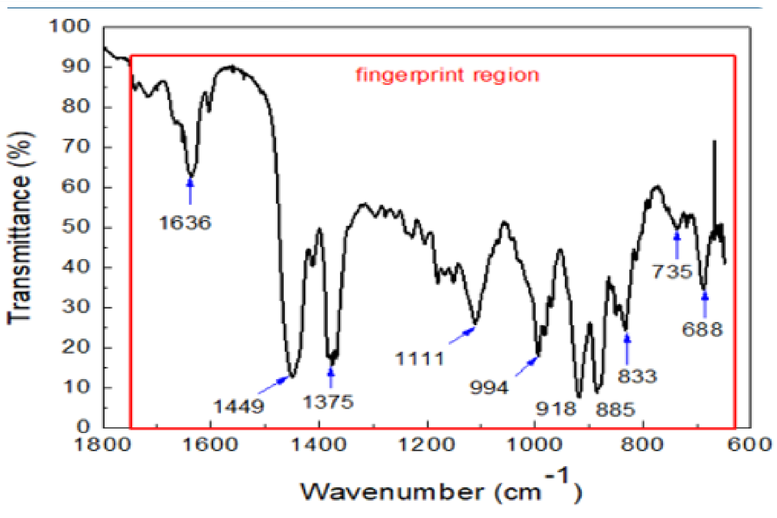
COLLECTION OF MATERIAL

The organic material was collected in the state of Rio Branco – Acre. Subsequently, a dried specimen (#4459) was prepared and deposited in the herbarium of the Botanical Laboratory of the Federal University of Acre - UFAC.

FTIR ESSENTIAL OIL

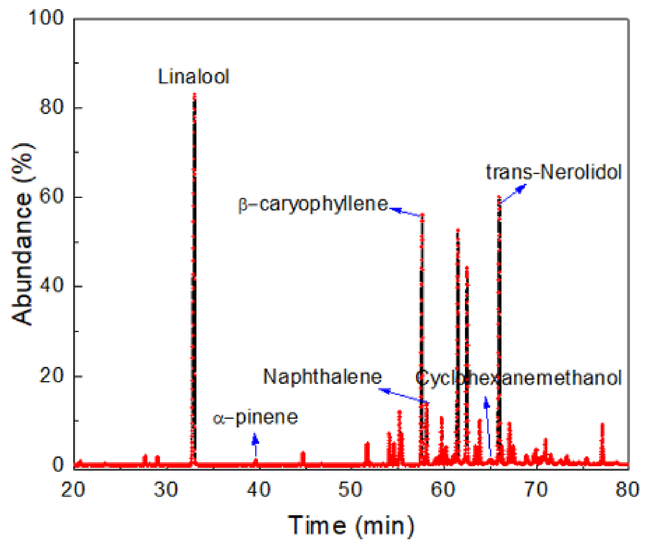


3384 cm^{-1}: OH Functional Group
1636 cm^{-1}: This suggests the presence of water on the surface of the sample.
833 cm^{-1}: Associated with the symmetrical elongation of the C-C functional alkane
994 cm^{-1} e 918 cm^{-1}: Aliphatic alcoholic groups
1636 cm^{-1}: It can be attributed to the alkene functional group (C=C).



1375 cm^{-1} e 1458 cm^{-1} : CH bonds related to the vibration of alkane groups.
The spectrum of the α,β-unsaturated ketone (C=O, ~ 1670 cm^{-1} and C=C, ~1620 cm^{-1})

GAS CHROMATOGRAPHY COUPLED TO MASS GCMS ESSENTIAL OIL



Constituent	Formula	*RT (min)	Mass (%)
Monoterpenes			
Linalool	$C_{10}H_{18}O$	32.976	22.15
α pinene	$C_{10}H_{16}$	39.630	0.20
Sesquiterpenes			
β-caryophyllene	$C_{15}H_{24}$	57.605	12.64
trans-Nerolidol	$C_{15}H_{26}O$	65.971	12.46
Others			
Cyclohexanemethanol	$C_6H_{11}CH_2OH$	65.104	0.21
Naphthalene	$C_{10}H_8$	58.113	2.53

*RT = Retention Time

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Article

Antioxidant and Antimicrobial Activities of 7-Hydroxy-calamenene-Rich Essential Oils from *Croton cajucara* Benth.

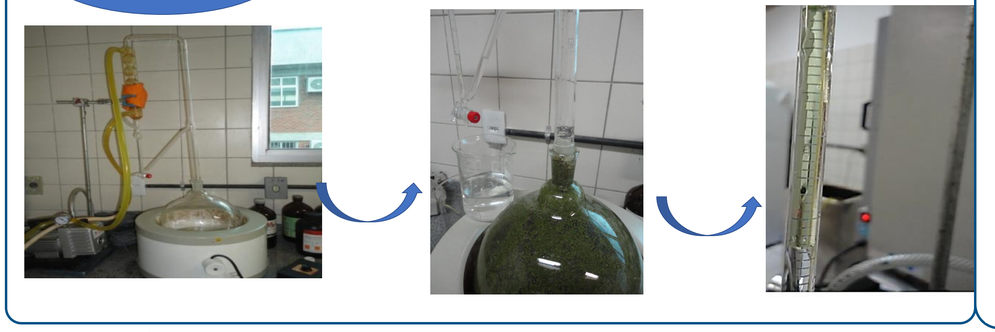
Mariana M. B. Azevedo [1,*], Francisco C. M. Chaves [2], Catia A. Almeida [3], Humberto R. Bizzo [4], Rafael S. Duarte [3], Galba M. Campos-Takaki [5], Celuta S. Alviano [3] and Daniela S. Alviano [3]

Table 1. Main components from *C. cajucara* essential oils.

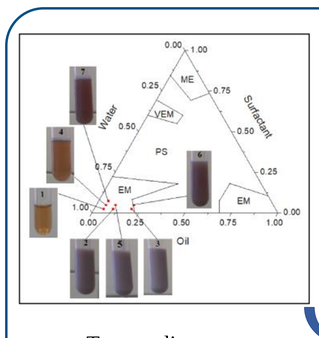
Components	Samples (in%)				
	SV001	SV002	SV003	SV004	SV005
α-Pinene	7.5	24.7	0.1	0.5	t
Linalool	6.3	11.6	11.0	9.9	13.2
7-Hydroxycalamenene	37.5	n.d.	28.4	30.9	32.9
β-Caryophyllene	4.1	5.7	2.8	4.0	2.6

OBTAINING ESSENTIAL OIL

Hydrodistillation



PREPARATION OF THE NANOEMULSION



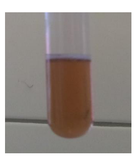
Ternary diagram

Sonicator – High energy method

Nanoemulsion system

	Tween 80%	Óleo%	Água%	Tween 80(g)	Óleo (g)	Água (g)	Peso total (5g)
amostra 1	10	5	85	0.5	0.25	4.25	5
amostra 2	10	10	80	0.5	0.5	4	5
amostra 3	10	20	70	0.5	1	3.5	5
amostra 4	12.5	5	82.5	0.625	0.25	4.125	5
amostra 5	12.5	10	77.5	0.625	0.5	3.875	5
amostra 6	12.5	20	67.5	0.625	1	3.375	5
amostra 7	15	5	80	0.75	0.25	4	5

Sample 2

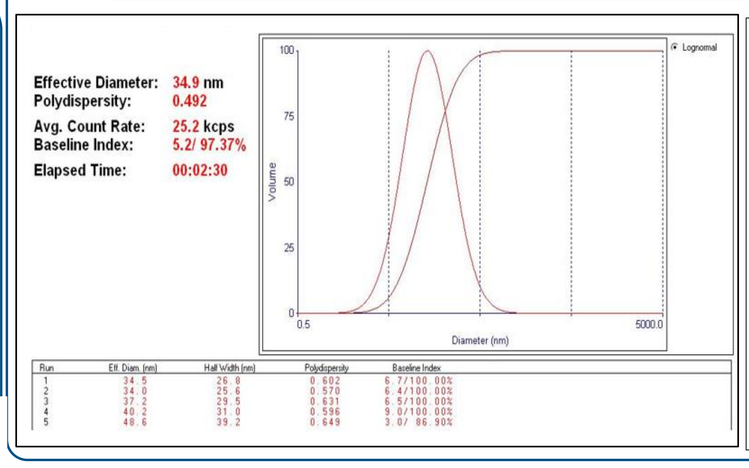


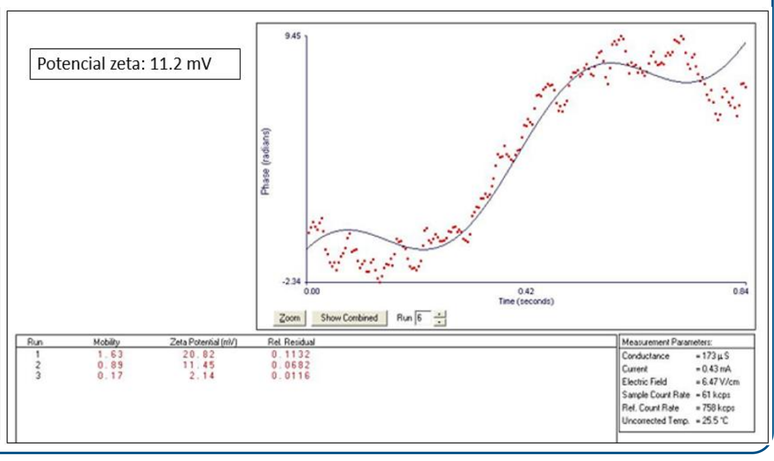
Sample 5

Sample 6

Sample 3

ZETASIZER – POTENCIAL ZETA OF THE NANOEMULSION





CONCLUSIONES:

- It was shown that the CCB species is an alternative source of linalool, obtained through the extraction of essential oil from its leaves by hydrodistillation.
- The results obtained represent a contribution to a better understanding of the essential oil of CCB specimens and reinforce the need to conduct tests that confirm the phytotherapeutic activities of nanoemulsions obtained from the essential oils of therapeutic plants in the region.
- A nanoemulsion with a size below 100 nm was satisfactorily obtained using the high-energy method with a sonicator.
- The nanoemulsions made from the essential oil of the CCB species showed stability and an average size that allows for functionalization with other drugs, aiming at new alternatives in the treatment of gastric disorders.

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