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Prepared hair oil from *Arnica montana*- Q in castor and mustard base oil in definite proportion with standardization

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Abstract

Background: Through this study formulating the *Arnica montana*- Q (Mother tincture) in base line sample of Mustard and Castor oil for Hair oil preparation as the Drug and vehicle ratio of (1:9) with standardization through UV Visible spectrophotometer, HPTLC (High-Performance Thin Layer Chromatography) and FTIR (Fourier Transform infrared Spectroscopy)

Methodology: These formulations were prepared as per the drug and vehicle ratio of (1:9) like Decimal scale (Constantine Herring), mixed and prepared by indirect heating under the Hot water bath. The samples were divided into 1. Standard samples, 2. Prepared samples, 3. Control samples.

Conclusion: Formulation prepared by standard *Arnica montana* in castor and mustard hair oil were shown effective results in the castor base and Mustard base hair oil after quality and quantitative analysis done by UV visible spectrophotometer, FTIR and HPTLC.

Keywords: UV visible spectrophotometer, FTIR and HPTLC

Introduction

Hair oils are the hair care arrangements utilized for the avoidance and treatment of sparseness or different diseases, hostility of hair. They additionally advance the lavish development of hairs. Hair oil containing natural medications are utilized as hair tonic. Hair care items are arranged into two primary class, hair tonics and hair preparing helps. These are essentially the concentrates of restorative plants in an oil base. A plenty of spices have been utilized for hair medicines. A couple of these spices are Amla, Henna, Neem, Methi, Lemon, Tulsi, Brahmi, Shikakai, Reetha, Liquorice root, Musk root, Mahabhringraj, Jantamasi, Chitraka, marigold, hibiscus, nutmeg, parsley, rosemary, thyme [1-2]. Going bald is an upsetting condition for a rising number of people. Subsequently it is of incredible significance, to foster new treatments for the treatment of balding. It is a dermatologic problem, and the flood for finding regular items with hair development advancing potential is continuous [3, 4]. Balding, or alopecia, is a typical patient grumbling and a wellspring of huge mental and physical distress [5]. Androgens are viewed as one of the main sources of alopecia separated from an assortment of other factors [6]. Regular items as homegrown plans are accessible on the lookout and are utilized as hair tonic, hair development advertiser, hair conditioner, hair-purging specialist, antidandruff specialists, as well with respect to the treatment of alopecia, dandruff and lice infection [7]. Various home-grown items have been acclaimed with hair development advancing activity [8]. The customary arrangement of medication in India recognitions various natural medications for hair development advancement. In our review, we have found that the Ethanolic concentrates of *Emblica officinalis*, *Bacopa monnieri* and *Cyperus rotundus* are helpful in treating "Indralupta" (i.e., deficiency of hair) [9, 10]. The current review was, accordingly, embraced to foster a detailing containing Ethanolic concentrates of these medications as natural hair oils in fluctuating proportions and fixations and assessing the planned oils for their hair development starting and hair development advancing action.

Arnica montana

Arnica montana is involved since hundreds of years in homeopathic arrangement of medication. It is utilized for the treatment of 66 distinct neurotic circumstances, yet habitually utilized for injury, wounds, ailment and aggravation. In right-on-time archaic texts, the name 'Arnica' was not alluded anywhere. This name was given in 1533 by the St. Hildegard's 'Physica' manager which was additionally utilized in sixteenth 100 years by Dalechamps, who thought it was gotten from Greek word *Ptarmica* which implies something that causes wheezing, furthermore, Haller and Linnaeus were the primary individuals to utilize the name 'Arnica' in both drug store and herbal science. In northern Spain, *Arnica montana* L. was named: 'Betonica de Losmontes', 'Tobaco de montana', 'Talpa' or 'Talpica', and in 1785, the plant was effectively utilized in emergency clinics for the treatment of loss of vision that happens without an evident injury influencing the eye additionally called as Amaurosis^[11].

Castor oil

Castor oil has for quite some time been utilized economically as a profoundly inexhaustible asset for the compound industry. It is a vegetable oil got by squeezing the seeds of the castor oil plant (*Ricinus communis* L.) that is for the most part developed in Africa, South America, and India. Significant castor oil-creating nations incorporate Brazil, China, and India. This oil is known to have been tamed in Eastern Africa and was acquainted with China from India roughly 1,400 years ago. India is a net exporter of castor oil, representing more than 90% of castor oil sends out, while the US, European Association, and China are the significant shippers, representing 84% of imported castor oil^[12].

Mustard oil

Mustard seed contain about 24 – 40% oil, 17 – 26% protein and 19% hull. Mustard seeds are processed for oil extraction and the residue obtained is called mustard cake. Mustard oil accounts for 18% of Indian edible oil consumption and has characteristic pungent taste. The proportionate increase in per-capita edible oil consumption and awareness on health benefits of mustard oil has lead to increase in demand of later. These conditions are bound to produce increased by-product, mustard cake which is a rich source of protein. The need of utilizing the cake has driven research in various foci. This review attempts to present a compendium on this aspect highlighting mustard seed production, its products and by-product utility^[13].

Materials & Methodology

The main embodiment of the present invention is making formulation of hair oil prepared by standard homeopathic mother tincture (Procure from Pharmaceutical company) in a definite proportion of drug and vehicle ratio i.e (1:9), where 1 part is taken as Drug substance and remaining 9 part is taken as Vehicle (Baseline sample medium). Thereafter these formulations were analyzed by the UV-Visible spectrophotometer and HPTLC (High-performance thin layer Chromatography) in perspective of qualitative and quantitative aspect.

Formulation prepared by

1. Standard *Arnica montana*-Q

2. Mustard oil
3. Castor oil

Site of study

Centre of Research and Development of Parul University (CR4D)

Investigational tool

UV- Visible spectrophotometer
FTIR- (Fourier-transform infrared spectroscopy)
HPTLC (High-performance thin-layer Chromatography)

Drug and Vehicle Ratio

While formulation the drug and vehicle ratio were made as (1:9)

Standard *Arnica montana*- 1gm
Oil- 9 ml

Medicinal product

Arnica montana- Q were purchased from Pharmaceutical Pvt. LTD.

Preparation of Formulation of hair oil:

The formulation of hair oil takes place in following stages; such as;

1. Measurement
2. Mixing
3. Mother sample
4. Filtration
5. 1st Dilution sample
6. Filtration

Measurement

In this step measuring the volume of Drug (*Arnica montana*) as 1 part and Vehicle (Mustard or castor oil) in 9 parts in measuring cylinder.

Mixing

In this step the vehicle part is going to added in the drug part as (1:9) as per the Decimals scale (Constantine Hering) in sterile, clean measuring cylinder. After mixing wait for 5 minutes for saturation of two different liquid medium.

Mother sample

For this we prepared the base sample of Hair oil by indirect heating of first sample of drug and vehicle in (1:9) proportion under Hot water bath for 15 Minutes at 50 °C

Filtration

After completion of Heating wait for again 15 minutes to cool down the temperature of sample and do single filtration (125 mm diameter) to clear the solution.

1st Dilution sample

After Filtration now prepare the 1st dilution sample of hair oil by taken 1 part of mother sample as a drug sample and mixed with 9 parts of the oil as followed by the Decimal scale.

Filtration

At the final stage again repeat the procedure of Filtration to clear up the solution by filter paper of diameter 125 mm.

Sampling testing

The samples were divided into three main categories, such as

Standard sample

Arnica montana- Q

Main sample

Arnica montana Mustard oil
Arnica montana Castor oil

Control sample

Mustard oil
 Castor oil

These group of samples were passed under the UV- visible spectrophotometer (Double beam), FTIR (Fourier transform Infrared spectroscopy) & HPTLC (High-Performance Thin Layer Chromatography)

Results

These samples were passed under the FTIR (Fourier transform Infrared Raman spectroscopy) in which maximum transmission of Standard *Arnica montana*- Q obtained at the wavelength of 2980.88 nm, 3398.23 nm, 3655.13 nm., maximum transmission of *Arnica montana* Mustard hair oil

at the wavelength of 2924.64 nm, maximum transmission of *Arnica montana* Castor hair oil at the wavelength of 2927.15 nm, 3010.26 nm, maximum transmission of Castor oil at the wavelength of 3014.03 nm, 2926.13 nm and maximum transmission of Mustard oil at the wavelength of 1746.13 nm.

Thereafter analysis done by UV- visible spectrophotometer which states that the absorbance of Standard *Arnica montana*- Q obtained at the wavelength 524 nm is 0.997, absorbance of *Arnica montana* Mustard oil is obtained at the wavelength of 471.00 is 4.00, absorbance of *Arnica montana* Castor oil is obtained at the wavelength of 600.00 is 0.987, absorbance of Mustard oil is obtained at the wavelength of 408.00 is 0.995 and absorbance of Castor oil is obtained at the wavelength of 259 nm is 0.991.

Analysis done by HPTLC Shows that Rf Value of *Arnica montana* Castor oil is 0.489 with X is 15.0 mm and Y is 3.2 mm. Rf Value of *Arnica montana* Mustard oil is 0.792 with X is 41.8 mm and Y is 65.0 mm, The Rf value of Castor oil is 0.660 with X is 68.6mm and Y is 55.5 mm and Rf Value of Mustard oil is 0.792 with X is 82.0 mm and Y is 65.0 mm.

UV- visible spectrophotometer Analysis (Double beam)

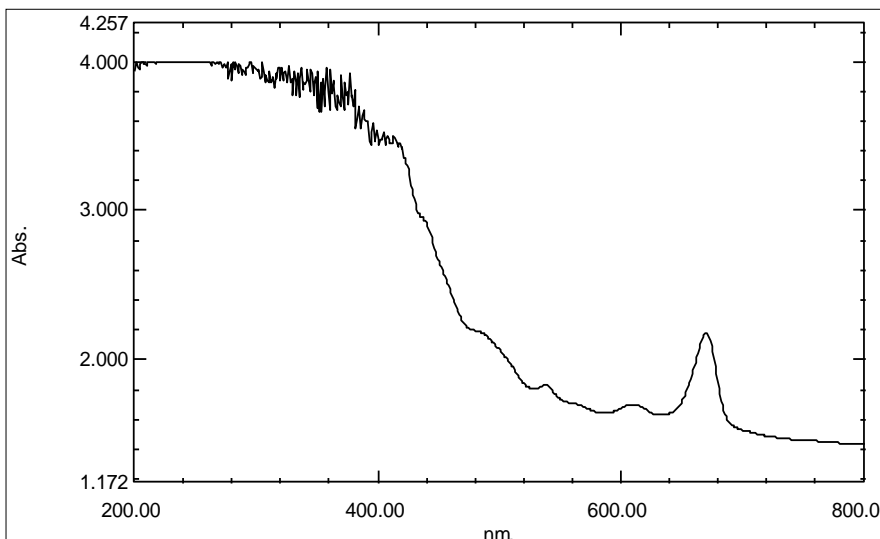


Fig 1: *Arnica montana* (Castor base) Hair oil

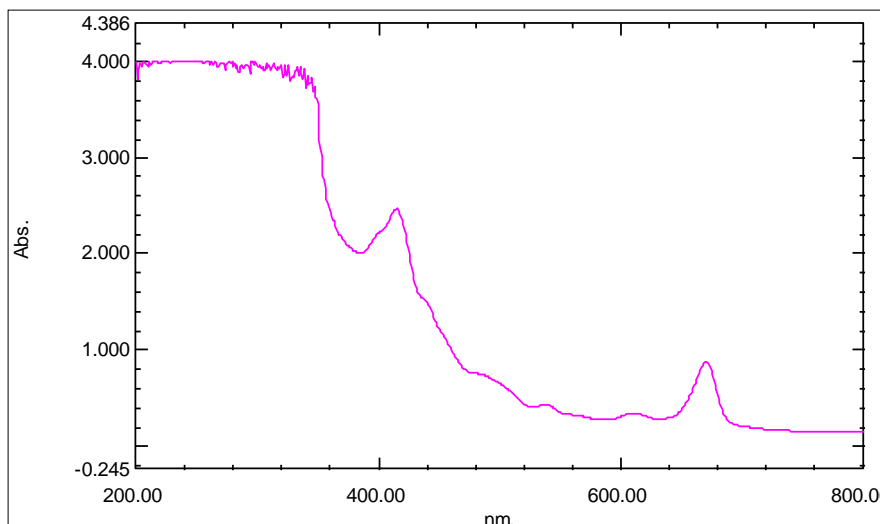


Fig 2: Base sample of Castor oil

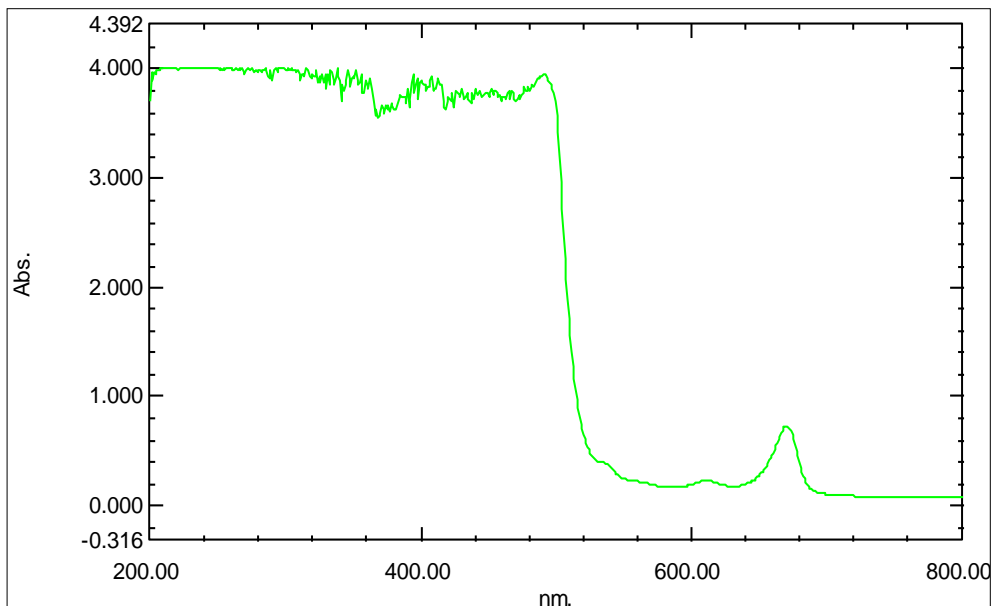


Fig 3: Base sample of Mustard Oil

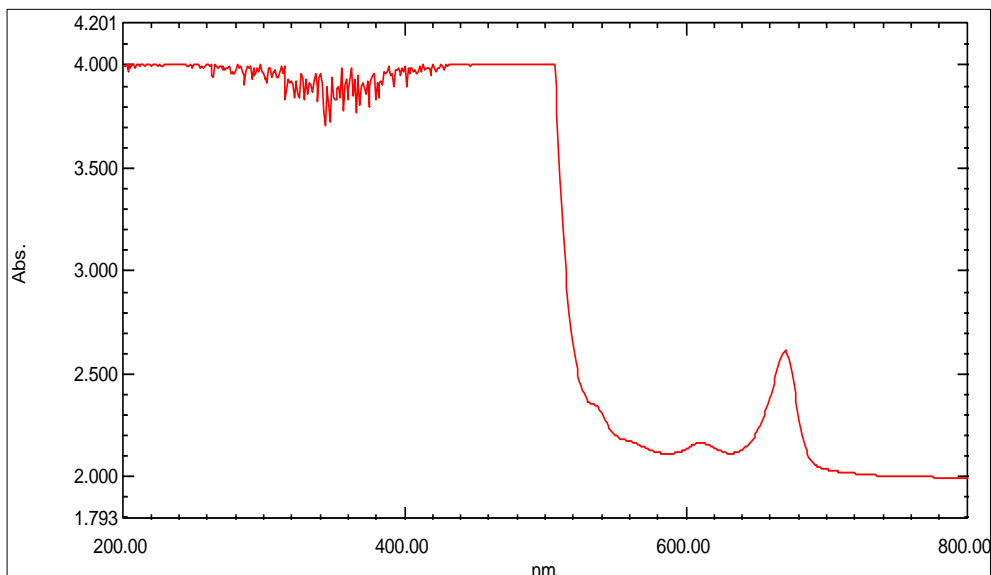


Fig 4: Base sample of *Arnica montana* Mustard Oil

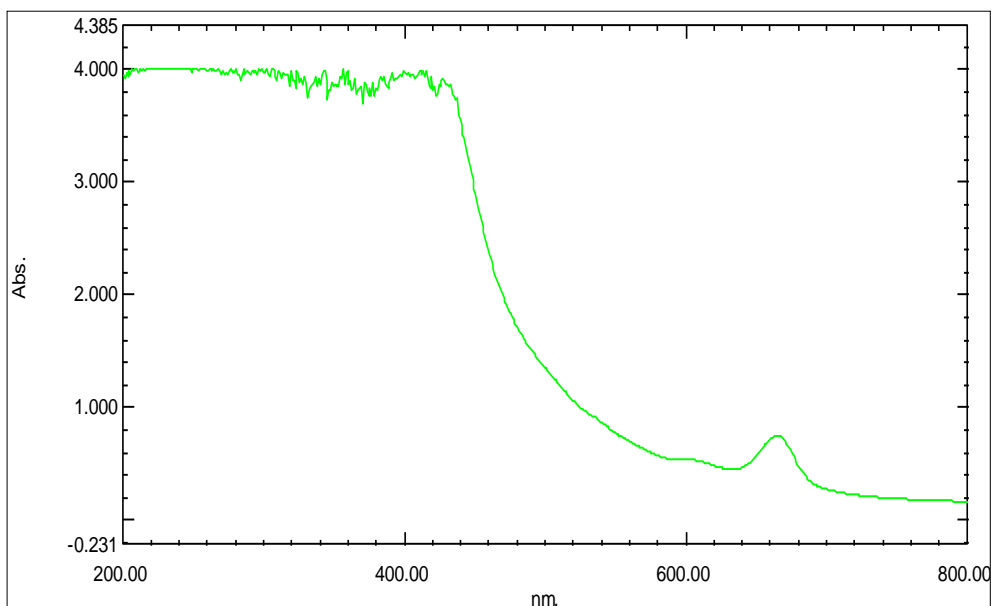


Fig 5: Base sample of *Arnica montana*- Q (MT)

HPTLC (High-performance thin-layer chromatography) analysis**Table 1:** Chromatography Plate

Plate layout:	
Stationary phase	Merck, HPTLC Silica gel 60 F ₂₅₄
Plate format	100 x 100 mm
Application type	User
Application	Position Y: 8.0 mm, length: 8.0 mm, width: 0.0 mm
Track	First position X: 15.0 mm, distance: 13.4 mm
Solvent front position	80 mm
Notes	

Table 2: Chamber of Chromatography

Tank	TTC 10x10
Mobile phase	methanol (10 v)
Saturation time	20 min
Use saturation pad	True
Use smart ALERT	False
Volume front through	5 ml
Volume rear through	10 ml
Drying time	5 min
Drying temperature	Room temperature
Notes	

Table 3: *Arnica montana* Castor Base hair oil

Substance A1 (R _F 0.483 +/- 0.047):			
Track	R _F	X (mm)	Y (mm)
1	0.489	15.0	43.2

Table 4: *Arnica montana* Mustard Base hair oil

Track	R _F	X (mm)	Y (mm)
3	0.792	41.8	65.0

Table 5: Castor Base hair oil

Substance A5 (R _F 0.610 +/- 0.050):			
Track	R _F	X (mm)	Y (mm)
5	0.660	68.6	55.5

Table 6: Mustard Base hair oil

Peak #	Start		Max			End		Area		Manual peak	Substance Name
	R _F	H	R _F	H	%	R _F	H	A	%		
1	0.000	0.0000	0.022	0.0202	17.25	0.050	0.0017	0.00044	4.59	No	
2	0.406	0.0000	0.487	0.0482	41.24	0.565	0.0253	0.00486	50.75	No	
3	0.811	0.0001	0.899	0.0485	41.50	0.988	0.0089	0.00428	44.66	No	

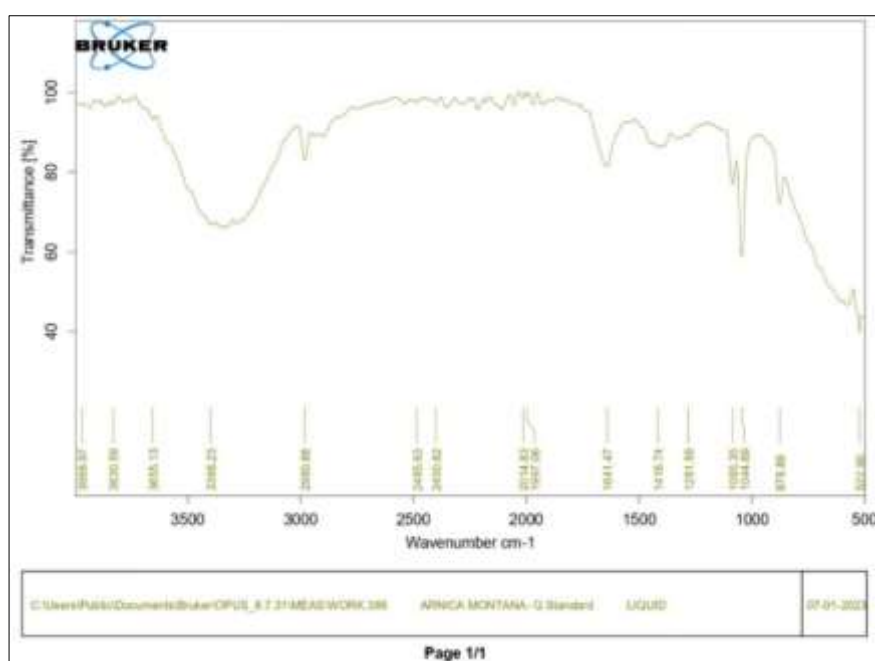
**Fig 6:** FTIR of *Arnica montana* Q

Table 7: *Arnica montana* Mustard Base hair oil

Peak #	Start		Max			End		Area		Manual peak	Substance Name
	R _F	H	R _F	H	%	R _F	H	A	%		
1	0.760	0.0000	0.792	0.0195	23.77	0.813	0.0020	0.00041	8.42	No	
2	0.842	0.0000	0.918	0.0626	76.23	1.000	0.0003	0.00443	91.58	No	

Table 8: Castor base hair oil

Peak #	Start		Max			End		Area		Manual peak	Substance Name
	R _F	H	R _F	H	%	R _F	H	A	%		
1	0.006	0.0000	0.025	0.0180	26.86	0.060	0.0006	0.00034	7.70	No	
2	0.833	0.0013	0.915	0.0490	73.14	1.000	0.0002	0.00409	92.30	No	

Table 9: *Arnica montana* Q FTIR

<i>Arnica montana</i>	
Θ	Assignment
3398.23	OH group Str vibration mode, N – H Str, Broad band for water, Primary & secondary amines, Organic acids, Phenols, Alkynes
2980.88	Str C=CH ₂ , C – H Str (Aliphatic), Methyl, Methylene, Methyne groups
	Str (CH ₂)
1658	*C=O stretching, N=O Str. Organic Nitrite compound
1641.47	Acrylate, Substituted benzene ring vibration of CH ₃ , C=O stretching vibration for Lactones/ ketone
1416.74	Conjugated C=C of aromatic groups, δ(CHγ), H-C-H bending, C=O stretching vibration for Lactones/ ketone
1281.59	Bending mode of CH ₃ , CH deformation vibration, H-C-H Bending
1326	H-C-H bending, C – O stretching
	ω (CHβ) of methyl group
1085.35	Skeletal Aromatic ring vibration
1044.69	Str mode of benzene ring, Ester group
876.89	C – H deformation
522.90	Substituted benzene skeleton

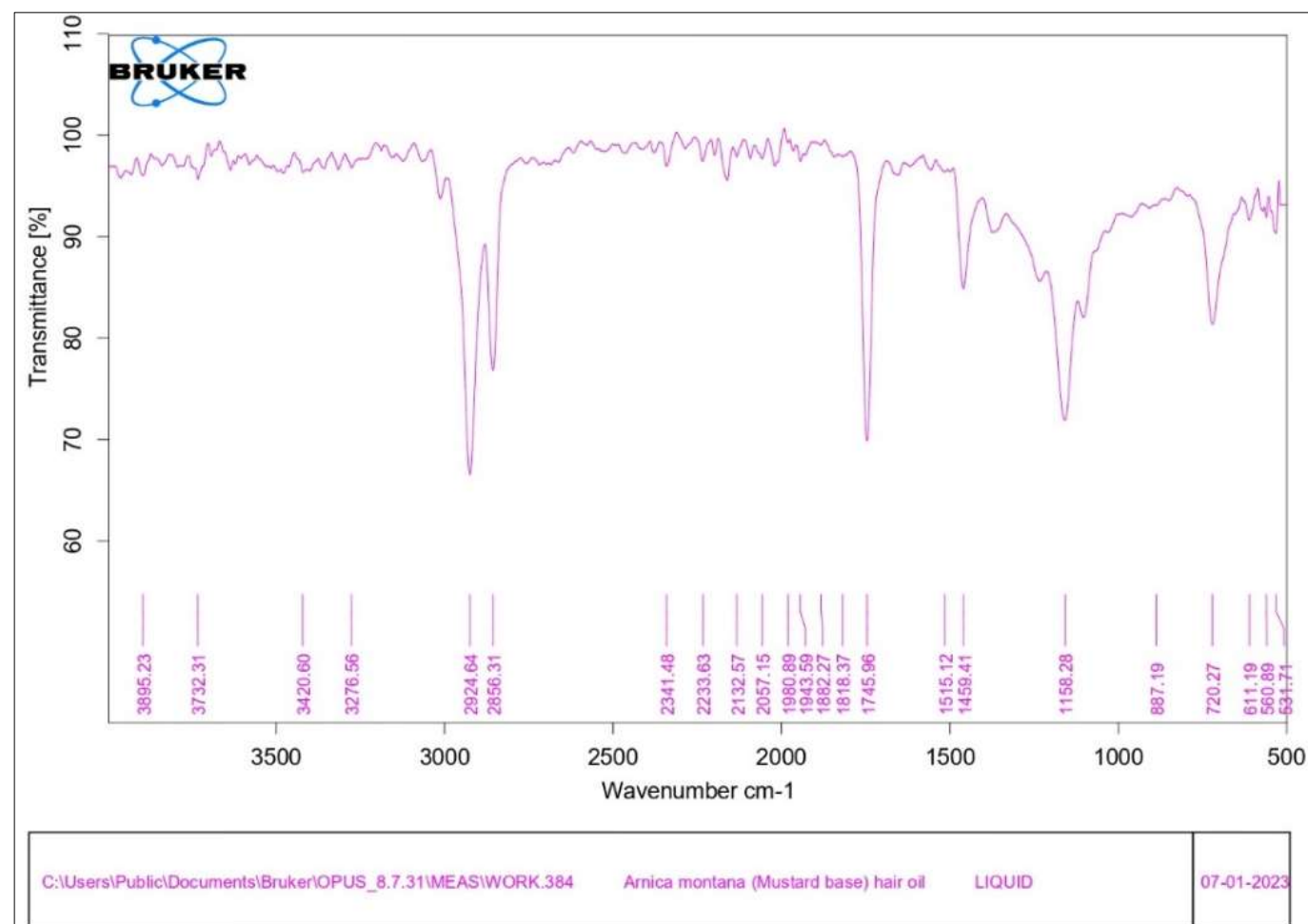
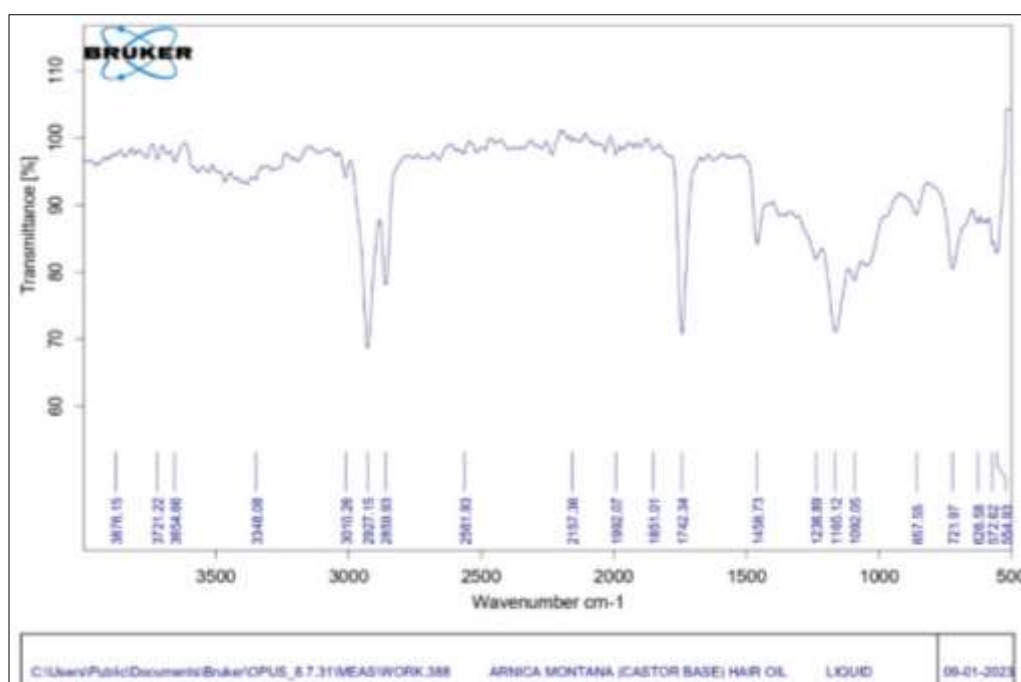
**Fig 7:** *Arnica montana* Mustard base hair oil

Table 10: *Arnica montana* Mustard base hair oil

<i>Arnica montana</i>	
Wavelength	Assignment
3420.60	OH group Str vibration mode, N – H Str, Broad band for water, Primary & secondary amines, Organic acids, Phenols, Alkynes
2924.64	Str C=CH ₂ , C – H Str (Aliphatic), Methyl, Methylene, Methyne groups
	Str (CH ₂)
1658	*C=O stretching, N=O Str. Organic Nitrite compound
1641	Acrylate, Substituted benzene ring vibration of CH ₃ , C=O stretching vibration for Lactones/ ketone
1459.41	Conjugated C=C of aromatic groups, δ (CH ₃), H-C-H bending, C=O stretching vibration for Lactones/ ketone
1382	Bending mode of CH ₃ , CH deformation vibration, H-C-H Bending
1326	H-C-H bending, C – O stretching
1086	Skeletal Aromatic ring vibration
1044	Str mode of benzene ring, Ester group
887.19	C – H deformation
733	C – H deformation
720.27	C – H Str
703	C – H deformation
693	C – H deformation
611.19	Substituted benzene skeleton

Table 11: *Arnica montana* Castor base hair oil

<i>Arnica montana</i>	
Wavelength	Assignment
3348.08	OH group Str vibration mode, N – H Str, Broad band for water, Primary & secondary amines, Organic acids, Phenols, Alkynes
2927.15	Str C=CH ₂ , C – H Str (Aliphatic), Methyl, Methylene, Methyne groups
	Str (CH ₂)
1658	*C=O stretching, N=O Str. Organic Nitrite compound
1641	Acrylate, Substituted benzene ring vibration of CH ₃ , C=O stretching vibration for Lactones/ ketone
1458.73	Conjugated C=C of aromatic groups, δ (CH ₃), H-C-H bending, C=O stretching vibration for Lactones/ ketone
1236.89	Bending mode of CH ₃ , CH deformation vibration, H-C-H Bending
1326	H-C-H bending, C – O stretching
1086	Skeletal Aromatic ring vibration
1044	Str mode of benzene ring, Ester group
857.55	C – H deformation
733	C – H deformation
721.97	C – H Str
703	C – H deformation
693	C – H deformation
626.58	Substituted benzene skeleton

**Fig 8:** *Arnica montana* Castor base hair oil

Conclusion

Formulation prepared by standard *Arnica montana* in castor and mustard hair oil were shown effective result in the castor base and Mustard base hair oil after quality and quantitative analysis done by UV visible spectrophotometer, FTIR and HPTLC.

Discussion

Arnica montana is involved since hundreds of years in homeopathic arrangement of medication. It is utilized for the treatment of 66 unique obsessive circumstances, however regularly utilized for injury, wounds, ailment and aggravation. In ahead-of-schedule middle age texts, the name 'Arnica' was not alluded Anyplace. This name was given in 1533 by the St, Hildegard's 'Physica' supervisor which was additionally utilized in sixteenth hundred years by Dalechamps, who thought it was gotten from Greek word *Ptarmica* which implies something that causes sniffing, what's more, Haller and Linnaeus were the main individuals to utilize the name 'Arnica' in both drug store and organic science. In northern Spain, *Arnica montana* L. was named as: 'Betonica de los Montes', 'Tobaco de montana', 'Talpa' or 'talpica', and in 1785, the plant was effectively utilized in clinics for the treatment of loss of vision that happens without an Eviden injury influencing the eye likewise called as Amaurosis.

The main aspect of this invention is preparing formulation of standard *Arnica montana* mother tincture purchase from Standard Pharmaceutical Company with the base line sample medium of Mustard and Castor oil in a (1:9) proportion. Whereas, 1 part is *Arnica montana*- Q and remaining 9 parts is oil.

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