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Formulation and Evaluation of *Cedrus Deodara* Loud Extract

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Abstract: Normally herbal products are free from side effects, adverse effects and they are low cost medicines, which will be beneficial for the people of many countries. Keeping this in view the plant *Cedrus deodara* wood was selected[1, 2, 3, 4]. This plant is one of the traditional medicinal plants used for fever, pulmonary complaints, urinary disorders, leprosy, anti inflammatory and antidotal treatments of snake bite etc. The main aim of this work was to formulate and evaluate the ethanolic extract of *Cedrus deodara* wood into capsule formulation along with its physicochemical characterization and screening for the antidiabetic activity. The Crude Extract of *Cedrus deodara* was blended with the various excipients for convenient to formulate as a unit dosage form.
Keywords: antidotal activity, urinary disorders, leprosy, anti inflammatory.

Introduction

The World Health Organization (WHO) estimates that 4 billion people, 80 percent of the world population, presently use herbal medicine for some aspect of primary health care. Herbal medicine is a major component in all indigenous peoples' traditional medicine and a common element in Ayurvedic, homeopathic, naturopathic, traditional oriental, and Native American Indian medicine. WHO notes that of 119 plant-derived pharmaceutical medicines, about 74 percent are used in modern medicine in ways that correlated directly with their traditional uses as plant medicines by native cultures. Major pharmaceutical companies are currently conducting extensive research on plant materials gathered from the rain forests and other places for their potential medicinal value[1, 2, 3, 4].

Material and Methods[5, 6, 7, 8]

Extraction: The research work was initiated with powdered woods of *Cedrus deodara* defatted with petroleum ether and extracted from ethanol. Further ethanol extract was subjected for phytochemical screening, chromatography studies for identification of compounds and then antidiabetic activity by *invivo* method was done, then formulated capsule and *invivo/invitro* studies was done.

Phytochemical screening: The ethanol extract of *Cedrus deodara* woods gave positive result Table 6 for presence of alkaloids, glycosides, tannins, fixed oils, flavonoids and triterpinoids. It revealed that component is present in woods of *Cedrus deodara* as principle constituents.

Preparation of Granules Dry granulation method: Calculated amount of crude extract, Micro crystalline cellulose, declaim phosphate was weighed and mixed properly and kept drying. After drying this mass transferred to sieve no. 36 form uniform granules and added preservative and lubricants. Absolute dose for man = 1120 mg/day, Dose is 190 mg per two capsule thrice a day. Capsule filled weight is 470 mg

Evaluation of Granules: PF1 and PF2 granules were not found because of stickier nature were observed when mixed with excipient.

Pre formulation studies: Pre formulation testing is the first step in the rational development of dosage forms of a drug substance. It can be defined as an investigation of physical and chemical properties of a drug substance alone and when combined with excipients. The overall objective of pre-formulation testing was to generate information useful to the formulator in developing stable and bio available dosage forms that can be man produced[9, 13].

Organoleptic properties:
Colour: A small quantity of powder was taken in butter paper and viewed in well-illuminated place - brown colour[10, 11].**Taste and odour** Bitter taste

Physical characteristics
Loss on drying:[12, 14] Determined on 1.000 g of substance drying in an oven at 100°C to 105°C for 3 hours. Dried the sample at the specified weight for constant temperature. The difference between successive weights should not be more than 0.5 mg. The loss on drying is calculated by the formula:

$$\% \text{ LOD} = \frac{(W2 - W3)}{(W2 - W1)} \times 100$$

Where, W1 = Weight of empty weighing bottle, W2 = Weight of weighing bottle + sample, W3 = Weight of weighing bottle + dried sample, % LOD PF3 = 3.7%

Flow properties[13, 14, 15]
Angel of repose: A funnel was kept vertically in a stand at a specified height above a paper placed on a horizontal surface. The funnel bottom is closed and 10 gm of sample powder is filled in funnel. Then funnel was opened to release the powder on the paper to form a smooth conical heap, is found by measuring in different direction. The height of the heap was measured by using scale. The values of angle of repose are calculated by using the following formula: tan □ = h/r Where, h is height of the heap and r is radius of the heap.
Bulk density: A known quantity of powder was poured into the measuring cylinder carefully level the powder with out compacting, if necessary and read the unsettled apparent volume, Vo, to the nearest graduated unit. Calculate the bulk density, in gm per ml, by the formula. Bulk density = Bulk Mass/ Bulk Volume.
Melting point: A small quantity of powder was placed into a fusion tube. That tube is placed in the melting point determining apparatus containing castor oil. The temperature of the castor oil was gradual increased automatically and read the temperature at which powder started to melt and the temperature when all the powder gets melted.
Filling of Capsule by hand filling method: After preformulation studies selected capsule and filled in hand filling method. Capsule size = 00, Capsule Content weight = 450 mg, Labeled claim = 190 mg, Empty capsule weight = 120 mg, Total weight of the filled capsule = 570 mg **Evaluation of Capsule: Weight Variation Test:** Twenty tablets were randomly selected and weighed to determine the average weight and were compared with individual tablet weight. The percentage weight variation was calculated. As per Indian Pharmacopoeial Specification, tablets with an average weight between 80 – 250 mg, the percentage deviation should not more than ± 7. 5 % and tablets with an average weight more than 250 mg should not be more than ±10 %.

Dissolution Method: Medium: pH 7.2 Phosphate Buffer, Volume: 900 ml, Apparatus: USP II Paddle, Rpm: 100 rpm, Time: 60 minutes, No. of capsule: 5 capsules + 1empty capsule, Temperature: 37.5oC $\pm$ 0.5°C 10 ml sample was withdrawn at 30, 45, and 60 time interval and replaced by same quantity of fresh buffer solution. The absorbance of samples was measured at 263 nm. The amount of drug released was calculated and then percentage release was determined.
Preformulation Studies PF1, PF2 were failed at granulation, PF3 formulation was shown satisfactory granules and for the evaluation test was carried out and release rate was found to be 75.97% from these evaluations PF3 was considered as basic formula.

Results and Discussion

This present work has been desired to "Formulation and Evaluation of *Cedrus deodara* loud extract for its antidiabetic activity".
The plant *Cedrus deodara* wood was collected from Bharath Trading Company, Chennai, Tamil Nadu, India and authenticated from Central Research Institute for Siddha, Arumbakkam, Chennai – 600 106. The plant wood was used in order to carry out the research work.

Preformulation studies: Preformulation studies were carried out for the investigation of physicochemical character of a drug substances alone and when combined with excipients. The overall objective of preformulation testing was to generate information useful in developing stable and bio available dosage form. In preformulation studies, the formula was designed (PF1, PF2, PF3) with different concentration of excipients. In PF1 (with lactose) and PF2 (with starch) granules were not found. Formulation PF3 (with microcrystalline cellulose) shown formation of granules and granules were further evaluated for physical character and *invitro* studies. The *invitro* drug release studies of formulation PF3 showed 80.56 ± 1.06% of drug release.

IR spectrum of *Cedrus deodara* loud extract and formulation PF3: The peaks observed in FTIR spectrum of *Cedrus deodara* loud extract was may due to active principle compound present in the peak. The same peak observed in formulation PF3 it indicates may be no interaction of active principle compound with excipients the result concluded for PF3 was optimized formula.

12.3.4 Formulation development: To increase the *invitro* drug release of formulation PF3 was further developed by changing the concentration of excipient (formulation F1, F2, F3). The *invitro* drug release of formulation (F1-88.39±0.47%, (F2-90.46±0.94%, F3-

93.61±0.55%) was obtained after 1 hour. From the *invitro* drug release study F3 was found best formula.

Conclusion

The object of the present study was to find out new natural antidiabetic compound from *cedrus deodara* wood extract. The selected natural wood was successfully extracted with ethanolic solvent the yield was 36.45% w/w. The characterization of phytochemical properties was studied. Phytochemical analysis revealed the presence of two major active components (via alkaloids and terpenoids). The *Cedrus deodara* wood extract were, then made into capsule with various pharmaceutical excipients and then evaluated. The formulation F3 (per capsule: crude extract 190 mg, micro crystalline cellulose 159 mg, dicalcium phosphate 71.4 mg, methylparaben sodium 6.6 mg, propyl paraben sodium 5 mg, magnesium stearate 11 mg, talc 7 mg) was selected as best formulation compare to the other formulations. The capsule prepared from the wood extract of *cedrus deodara* above mentioned formula was subjected to *in vivo* studies, such as, acute toxicity and antidiabetic which revealed that the study had a vital role in the management of diabetes.

Table 1: Preformulation

Ingredient mg / capsule	Preformulation		
	PF1	PF2	PF3
Crude extract	190	190	190
Micro crystalline Cellulose	-	-	135
Dicalcium phosphate	-	-	95.4
Lactose	135	-	-
Starch	-	160	-
Calcium carbonate	93.5	95	-
Methylparaben Sodium	-	-	6.6
Propyl paraben Sodium	-	-	5
Magnesium stearate	-	-	11
Talc	-	-	7

Table 2: Dissolution study of pre formulation (PF3)

Time in minutes	Percentage drug release PF_3 (%)
30	50.47 $\pm$ 0.575
45	65.77 $\pm$ 0.480
60	80.56 $\pm$ 1.06

Table 3: Formulation Batch F_1 F_2 and F_3

Ingredient mg / capsule	Formulation		
	F_1	F_2	F_3
Crude extract	190	190	190
Microcrystalline Cellulose	143.01	151.02	159.04
Dicalcium phosphate	87.4	79.4	71.4
Methylparaben Sodium	6.6	6.6	6.6
Propyl paraben Sodium	5	5	5
Magnesium stearate	11	11	11
Talc	7	7	7

Table 4: Preformulation studies data of Batch F_1, F_2, F_3

Studies	Formulation		
	F_1	**F_2**	**F_3**
Organoleptic properties Color	Brown	Brown	Brown
Taste	Bitter	Bitter	Bitter
Loss on drying (%)	3.50	3.57	3.48
Angle of repose (n=3)	$30.88^{o} \pm 0.28$	$30.72^{o} \pm 0.26$	$31.26^{o} \pm 0.659$
Bulk density (gm/ml) (n=3)	0.6675 ± 0.005	0.6620 ± 0.004	0.6623 ± 0.001
Weight variation (mg) (n=3)	571.9 ± 0.7	570.3 ± 1.3	570.33 ± 0.404
Assay (%) (n = 3)	100.53 ± 0.945	98.46 ± 0.94	98.5 ± 0.94
Dissolution (%) (n=5)	88.39 ± 0.47	90.45 ± 0.94	93.64 ± 0.55

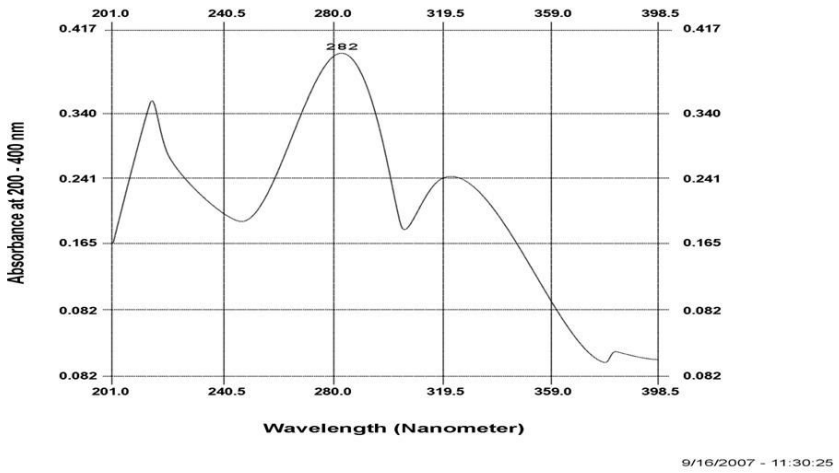
Table 5: Dissolution study of *Cedrus Deodara* Wood Capsule

Capsule No :	**Formulation**								
	F_1	**F_2**	**F_3**	**F_1**	**F_2**	**F_3**	**F_1**	**F_2**	**F_3**
	30 min (%)	45 min (%)	60 min (%)	30 min (%)	45 min (%)	60 min (%)	30 min (%)	45 min (%)	60 min (%)
1	58.52	75.28	88.07	60.72	78.52	90.82	65.72	80.17	93.75
2	58.17	74.27	87.91	61.01	79.10	90.52	66.12	82.27	94.17
3	59.01	75.97	88.27	60.92	78.12	91.73	65.10	81.50	92.97
4	57.25	74.97	89.10	61.15	79.72	89.17	64.98	80.97	94.07
5	58.17	75.17	88.64	60.85	78.99	90.05	65.27	82.15	93.10
Empty caps	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
Average (%)	58.22 ± 0.64	75.13 ± 0.61	88.39 ± 0.47	60.93 ± 0.16	78.89 ± 0.60	90.45 ± 0.94	65.43 ± 0.47	81.41 ± 0.869	93.61 ± 0.551

Table 6: Percentage Drug Release *Cedrus Deodara* Wood Capsule

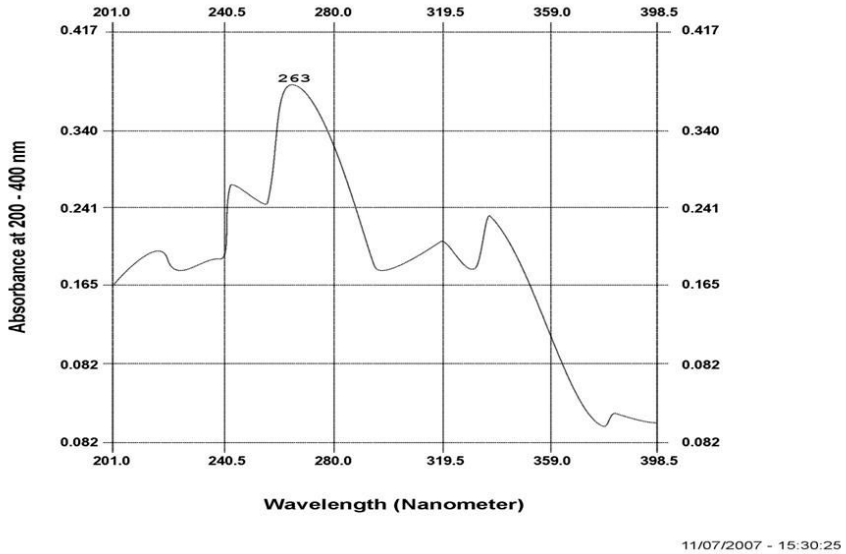
Time(Min)	(%)CDR	(%)CDR	(%)CDR
	F_1	F_2	F_3
30	58.22 ±0.64	60.93 ±0.16	65.43 ±0.47
45	75.13 ± 0.61	78.89 ± 0.6	81.41 ± 0.86
60	88.39 ± 0.47	90.46 ± 0.94	93.61 ± 0.55

Graph 2

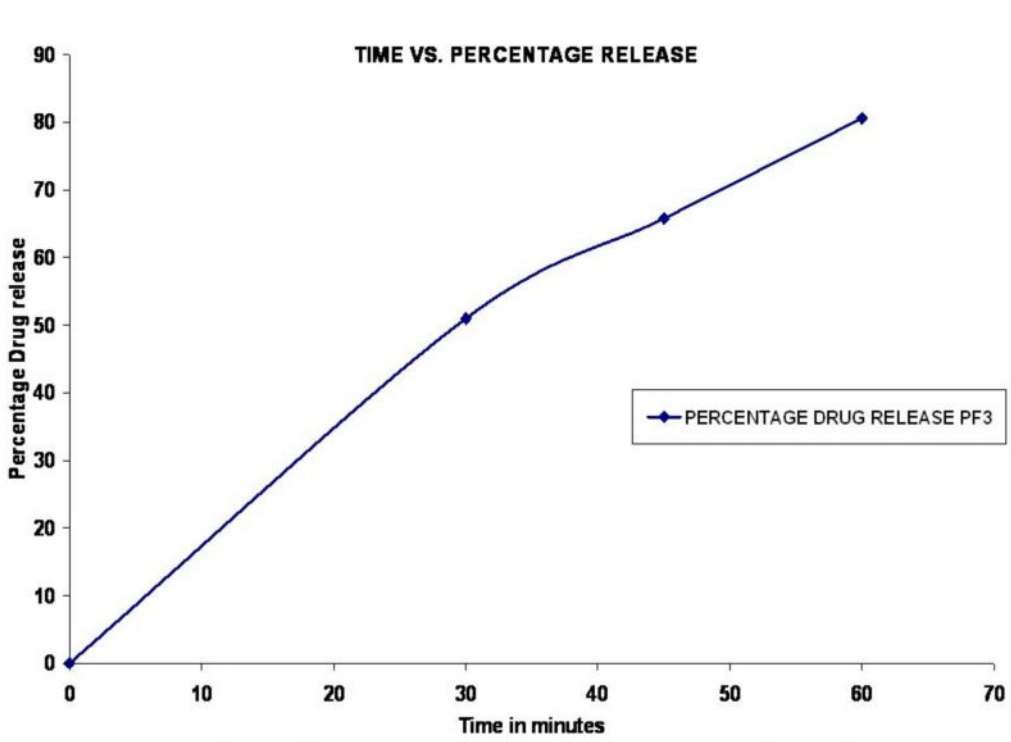


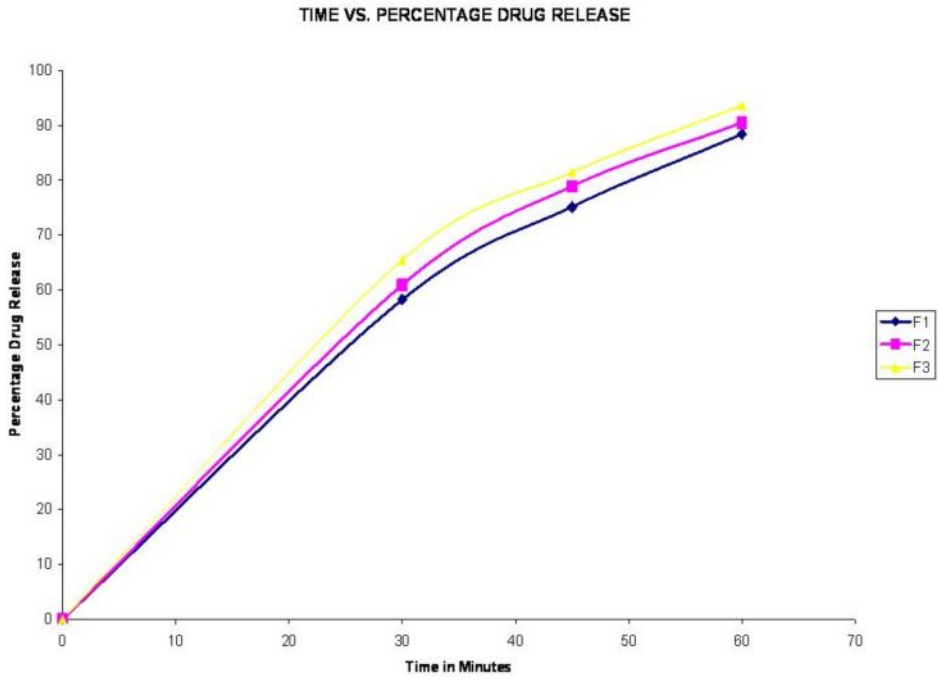
Sample : *Cedrus deodara* Wood Extract (Conc. 50 μg ml^{-1})
Reference : Ethanol
Remarks : Peak Observed at 223, 282, 321 nm

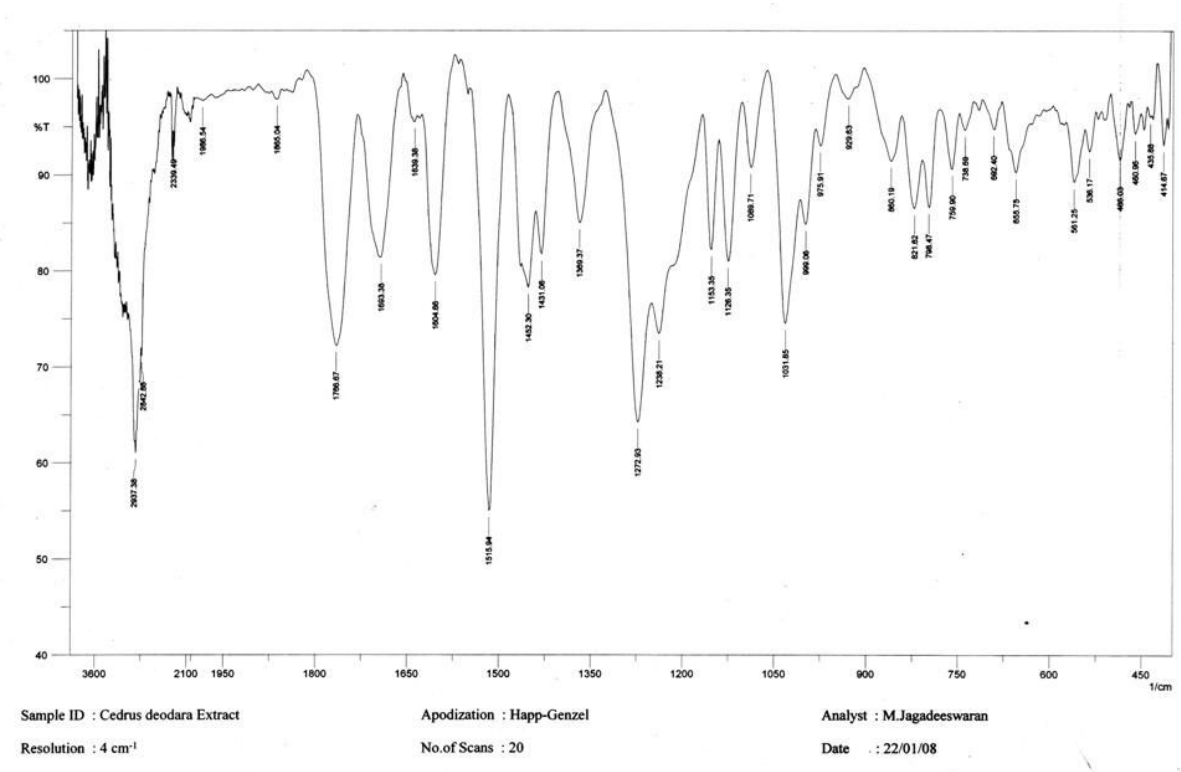
Graph 3



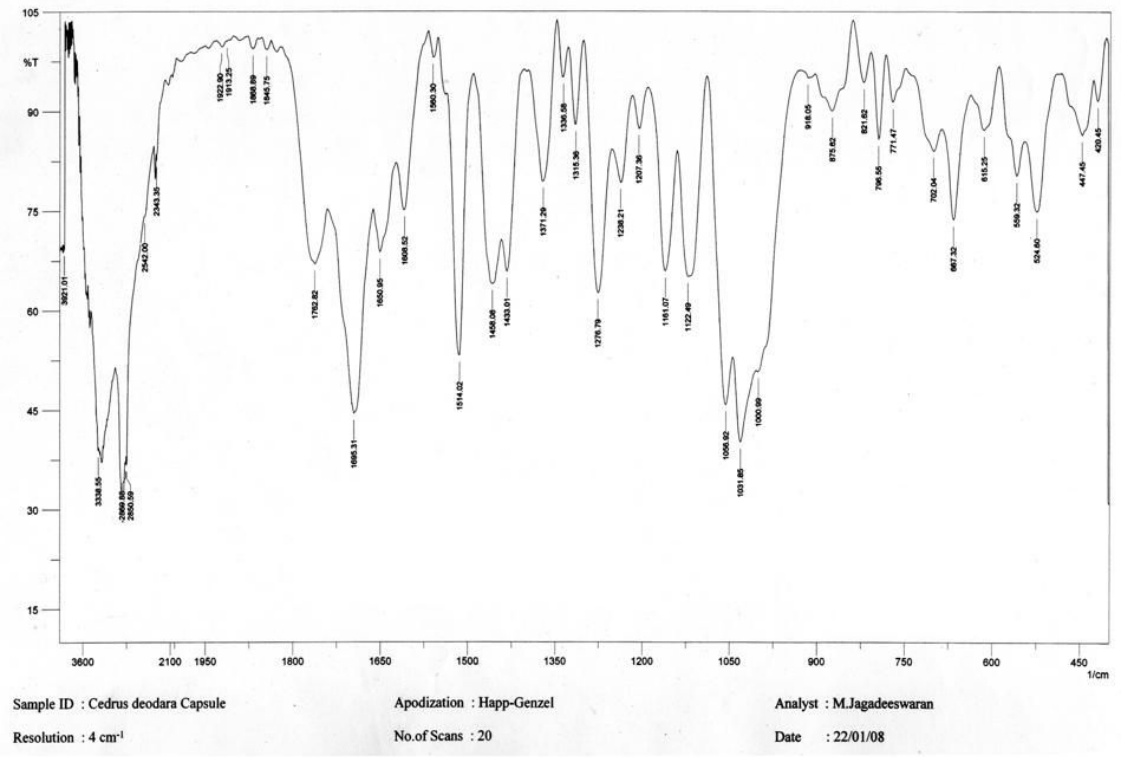
Sample : *Cedrus deodara* Wood Extract (Conc. 60 μg ml^{-1})
Reference : Phosphate Buffer, pH 7.2
Remarks : Peak Observed at 242, 263, 320 and 343 nm


TIME VS. PERCENTAGE RELEASE
Percentage Drug release
Time in minutes
PERCENTAGE DRUG RELEASE PF3
0
10
20
30
40
50
60
70
80
90


TIME VS. PERCENTAGE DRUG RELEASE
Percentage Drug Release
Time in Minutes
F1
F2
F3
0
10
20
30
40
50
60
70
80
90
100



IR Spectrum Of *Cedrus Deodara* Wood Extract



IR Spectrum Of *Cedrus Deodara* Wood Extract Formulation (PF3)

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