



## SYNTHESIS, CHARACTERIZATION AND BIO-MEDICAL APPLICATION OF ESSENTIAL OIL LOADED PVA FILM

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### ABSTRACT

The current day studies functions that a bi-layered technique is also wont to produce a poly vinyl alcohol [PVA] *Azadirachta-indica* [neem] mix nanofibrous mat below best process circumstances. The created pattern became examined for medication activity. Fourier rework infrared spectrum analysis (FTIR) became want to verify the presence of PVA, neem tree parts, and displaying the appearance of element bonds among them. The utilization of neem tree extracts progressed the thermal balance of the merchandise. For dental healing purpose, a double layer mucoadhesive buccal moving picture comprising nanocarriers.

**Keywords: Electrospinning, neem extract, Poly vinyl alcohol**

### 1. INTRODUCTION:

#### 1.1 PVA [POLY VINYL ALCOHOL]

Poly Vinyl Alcohol, that is generated from the reaction of poly vinyl acetate, is wide used in variety industries, including food and medical applications. due to its distinctive qualities of nontoxicity, hydrophilicity, biocompatibility and biodegradability, researchers square measure progressively inquisitive about victimization it in medical applications like

soft contact lenses, eye drops, gradual unharness, tissue adhesion barriers, and artificial animal tissue. However, its restricted mechanical strength, sensitivity to wetness and water-solubility stop it kind getting used additional. This has been plenty of labour done and variety of answer bestowed to resolve issues delineated higher than [1]. PVA is additionally normally utilized in the assembly of paper

product. PVA is employed as a size and coating agent within the same manner that it's in textiles. It provides these product stiffness, which makes it valuable in tube winding, cartonse and board lamination. Latex paint and typical home white glue, as well as different sticky mixtures like remoistenable labels, use PVA as a thickening ingredient [2]. However, PVA is that the most studied chemical compound non-conductor material thanks to its versatile properties like high solubility in water, low cost, simply processable, non-toxicity, good film forming, nice insulating properties and also the most vital high permittivity of non-conductors. The higher than properties qualify PVA as favourable organic material for lay layer dielectrics [3]. PVA stands for poly vinyl alcohol and could be an artificial petroleum-based polymers. PVA contains one c-c bond still as hydroxyal teams (OH) coupled to the alkane series carbon. Between the chemical compound and metal oxides, the American state teams creates element bonding. PVA has been shown to enhance the distribution of metal oxides in polymers in many recent studies [4, 5]. The restricts its usage as a wound dressing. as a result of PVA could be a non-hazardous, perishable, and has sensible physical qualities as a carrier chemical compound for electrospinning and wound dressing purpose, it ought to be

avoided thanks to the environmental impact [6].



Figure 1: PVA (Poly vinyl alcohol)

Due to its synergistic impact in physical, chemical, and mucoadhesive qualities, PVA composite film is introduced as a decent mucoadhesive film for buccal medication delivery. In different word, in comparison to the qualities of the separate parts, PVA composite film provide advantages like improved stability, swelling and mechanical strength. [7] Poly vinyl alcohol could be a water soluble artificial chemical compound.  $[\text{CH}_2\text{CH}(\text{OH})]_n$  is that the idealised formula. It has no odour less and colorless (white) [8]. pvapolyvinyl acetate [PVA] vinyl chemical compound vinyl resin polyvinyl resin could be a wide used thermoplastic polymer that's nontoxic and harmless. polyvinyl acetate PVA chemical compound vinyl resinpolyvinyl resinperishable polymer with hyperbolic reaction degradability thanks to the presence of radical teams on the atom. it's deliquescent. several polymers, together with PVA, has completely different rates and condition for degradation [9, 10]. personal HNT addition and crosslinking of

PVA for numerous medicine application are mentioned, demonstrating the potential accessibility, character modification, and goals undergoing the PVA mixing method [11].

### 1.2 AZADIRACHTA (neem leaf)

In the current research, the green synthesis of nanomaterials using various parts of plant extract is a growing field in nanoscience, with accent to avoid the usage of toxic chemicals. In the green synthesis method, the plant extract used in the synthesis of antibacterial act as a reducing agent [12]. It grows best in tropical and semi-tropical climates. Its fruits and seeds provides a spread of nutrients [13]. The role of *Melia Azadirachta* in polygenic disorder. *Melia Azadirachta* acts as a cell stimulant, increasing native hypoglycaemic agent synthesis. that liquid extract has glyceemic management capabilities, with a decrease in acid phosphate activity and a rise in different substance [14, 15]. The leaves and their past have historically been accustomed treat allergic skin reaction additionally as little pox and chicken pox the leaves juice is employed as a tonic to spice up craving and find obviate internal organ entozoon [16]. The medicine activity of the leaf extract against dental infection is employed the rapeutically. Additionally, the chosen plant is employed to cure protozoal infection fever within the ayurvedic medical system [17].



Figure 2: Neem Powder

## 2. MATERIAL AND METHODS:

**2.1 Material:** PVA (Poly vinyl alcohol), Distilled water, methanol, neem leaf powder.

**2.2 Preparation of neem leaves powder:** take neem leaves were washed in distilled water and dried in oven. After that, the dried leaves crushed in mortal pastel till an uniform powder was obtain. The powder store in an airtight zipper bag.

**2.3 Preparation of neem extract:** 5 gm of neem (*azadirachta indica*) powder was placed in containing 50ml of methanol and were kept for a period of 72 hours under suitable laboratory condition for proper extraction of neem leaves.

**2.4 Preparation of PVA film:** A film - forming solution was prepared by dissolving 5 gm PVA powder is preheated at 40 °C in an oven to make a 5% w/w solution of PVA in water. without stirring ,95 ml of double distilled water is preheated at 80° C on a hot plate. To make a 100 ml solution, preheated 5g PVA was dissolved in preheated 95 ml double distilled water. to obtain 5% w/w PVA solution, steady magnetic stirring is performed at 70° C for

2.5 hours until the PVA is completely dissolved. 5ml of hot aqueous homogeneous solution was cast on to 5 cm diameter glass petri dish and dried in a hot air oven.

### 2.5 Preparation of PVA film with neem

**extraction:** 10 ml 5% PVA and 10 ml neem extract were blend and cast in petri dish was dried in oven at 70° C for 24 h.



Figure 3: Essential oil loaded PVA film

## 3. RESULT AND DISSCUTION:

**3.1 FT-IR ANALYSIS:** Fourier rework infrared associate degree analysis spectrum analysis spectrographic analysis chemical analysis qualitative analysis (FT-IR) is an improbably versatile materials analysis technique, serving to determine organic and a few inorganic materials that might be the supply of product contamination or cause a malfunction. As a result, we frequently advocate FTIR to our shoppers because the commencement within the testing method. The fourier rework infrared spectrum analysis (FTIR) analysis of this sample film was performed employing a FT-IR spectrum five hundred cm one (@ Parul university). The analysis was meted out in vary from 4000 to 500 cm one with a 4 cm

one resolution of scans. The FTIR spectra were recorded in transmit-tance mode.

The stretching vibration of -OH cluster incorporates a wider peak of roughly 3400 cm one within the FT-IR spectrum of polyvinyl resin because of intra-and further molecule H bonding. 2850-3000(C-H stretching) 1550-1570(N=O stretching) 1300-1410 (O-H bending) 3200-3600(O-H stretching) 1100-1170(C-O stretching) 600-700 (C-H bending) (**Figure 4**).

### 3.2 Antibacterial activity:

Neem has long been regarded as one of the most versatile therapeutic herbs, with antibacterial, antidiabetic and anticancer effects.

The antibacterial activity test result of film by disc method it was found that the neem leaves extract was performed against human pathogenic bacteria *E.coli*. After a 24-hour incubation period, inhibition zones of the neem leaf extract were found. The antibacterial activity of methanol extract shown to be most effective against germs in zones of inhibition of 9-11mm.

The result of antibacterial activity was shown in **Figure 5**.

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**3.3 Swelling study:**

Swelling is defined as a rise in the volume of a gel or solid associated with the uptake of a liquid or gas. Swelling is the first phase in the intreraction between liquid molecule and poiymeric network in polymer dissolution and it is frequently followed by solvation of polymer chain.

PVA composite film were soaked in pf solution for 30 min and then take out from pf solution and dried it. And then checked its actual weight. Then start same process 3 or 4 times (**Table 1**).

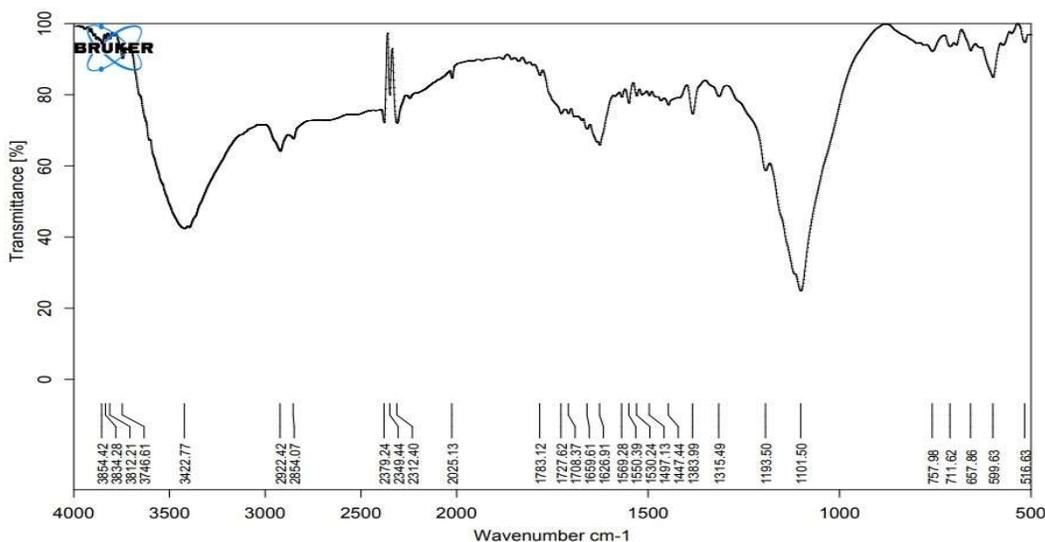


Figure 4: (FT-IR SPECTRA OF PVA FILM)

Peak frequency (cm <sup>-1</sup> ) for PVA film	
Frequency (cm <sup>-1</sup> )	Functional group
3422.77	O-H (Stretching)
2922.42	C-H (Stretching)
1569	N=O (Stretching)
1383.99	O-H (Bending)
1101.50	C-O (Stretching)
657.86	C-H (Bending)

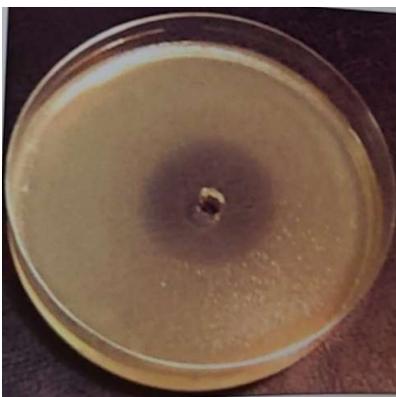


Figure 5: Antibacterial activity of essential oil loaded PVA film

Table 1: of swelling study

TIME	SR=(Mt-Mo)/Mo		
	5%PVA FILM	6%PVA FILM	4%PVA FILM
0	1	1.2	1.1
30	1.2	1.5	1.3
60	1.6	1.7	1.8
90	1.9	2.2	1.8
120	2.1	2.2	1.8

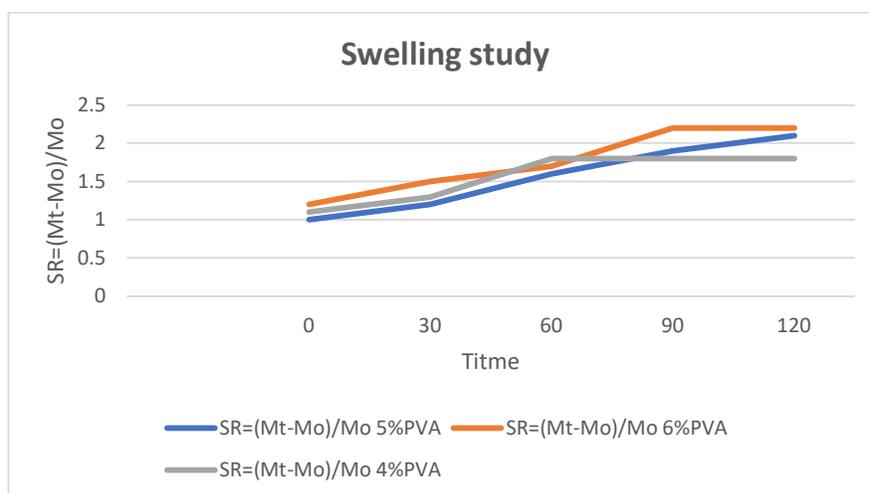


Figure 6: Swelling study

**4. CONCLUSION:** I created a neem extract-loaded PVA composite film that showed excellent antibacterial activity against *E.coli*, and we can see that PVA is present in the composite film using FT-IR spectra. I also performed swelling study to determine the materials kind, phase and crystalline characteristics.

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