



UV Characterization of Polyblends PMMA and PVC Polymer with Potassium Thiocyanate as Electrolytes

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ABSTRACT

The solid polymer electrolyte materials like PVC (Polyvinyl alcohol), PMMA (Polymethyl methacrylate) were mixed together in THF (Tetrahydrofuran) solvent. In this miscible solution dopant like KSCN (Potassium Thiocyanate) were added by using different mole ratio method. This mixture used for crafting Polyblends thin films using thermal evaporation method. This crafted thin films was characterized by using Ultra Violet (UV) Spectroscopy. UV characterization reveals measurement of the length of conjugation in unsaturated molecules of PMMA: PVC solid electrolytes Polyblends thin films and also all curves slightly shifted toward short wavelength with increasing concentration of PVA.

Keyword: PMMA, PVA, KSCN, UV- Spectroscopy

1. Introduction

Generally, in conducting polymer conductivity due to ions; these type of polymer are classified in two type i.e. polymer electrolytes and polymer electronics. Polymer electrolytes have been found to have a great deal of advantages in replacing conventional liquid electrolytes. These advantages includes high specific energy, high energy density, leak proof, high ionic conductivity, wide electrochemical stability windows, light, solvent free condition and easy process ability [1].

Large number of host polymer i.e. PMMA (Polymethylmethacrylte), Polyethylene oxide (PEO), Polyvinylalcohol (PVA) etc. with different alkali and alkaline salt have been investigated in the past four decade. Out of these PMMA is synthetic polymer of methyl methacrylate. PMMA is most studied polymeric system. Poly (methyl methacrylate) (PMMA)-based electrolyte has a special significance because of its well-known chemistry and cheaper method of processing them as laminates. However, its low conductivity at room temperature due to the formation of crystalline precludes it from practical applications. [2]

Polyvinyl alcohol (PVA) can be classified as amorphous or semi crystalline according to the internal structure [3]. Semi crystalline PVA can be synthesized via the creation of the both a carbon amorphous and crystalline areas [4]. Poly (vinyl alcohol) (PVA) is a semi crystalline polymer, studied extensively because of its many interesting physical properties, which arise from the presence of OH groups and the hydrogen bond formation [5].

2. Materials and Experimental

2.1 Materials

All chemicals were of analytical grade. Poly (vinyl alcohol) and Poly (methylmethacrylte) were supplied by SIGMA –ALDRICH, Co., 3050 spruce street, St. Louis. MO 63103 USA 314-771-5765. Potassium Thiocyanate by (Sd fine- chem. Limited, Mumbai) and Tetrahydrofuran (THF-E-Merck India Ltd., Mumbai) is being used as a solvent for thin film crafting process. The thin films were prepared by using isothermal evaporation technique.

2.2 Experimental

Poly (vinyl alcohol) and Poly (methylmethacrylte) was dissolved in tetrahydrofuran (THF) separately once solution completely dissolve then these two solutions were mixed tighter.

Thin films of PMMA–KSCN- PVA in different mole ratios were prepared by weight % method. The 70% weight of PMMA powder is added into PVA at room temperature .The appropriate weights of KSCN and mixed solution of PMMA- PVA , were dissolved in 20 ml THF (tetrahydrofuran) followed by the addition of plasticizer. Then blend solution perfectly spread horizontally levelled on the glass plate. Then solution was allowed to evaporate for

24 hour. After 24 hours, we observe the deposition of thin film on glass plate. Then dried sample to remove the trace from the glass plate. Then studied UV characterization of sample.

3. Result and Discussion

3.1 Ultra Violet (UV) Characterization

The optical absorption (UV) spectrometric scan in 200 nm – 400 nm of pure PVA blend are shown in fig 1.1, 1.2, 1.3, 1.4. The observed spectra are characterized by a main absorption edge around 260 nm for all curves slightly shifted toward short wavelength with increasing concentration of PVA. Also PVA material can be used as material for light spectra in the visible region in contest to tradition crystalline materials. Moreover, it is possible to improve further the modified optical PVA photopolymer by the applications of an external electric field [6].

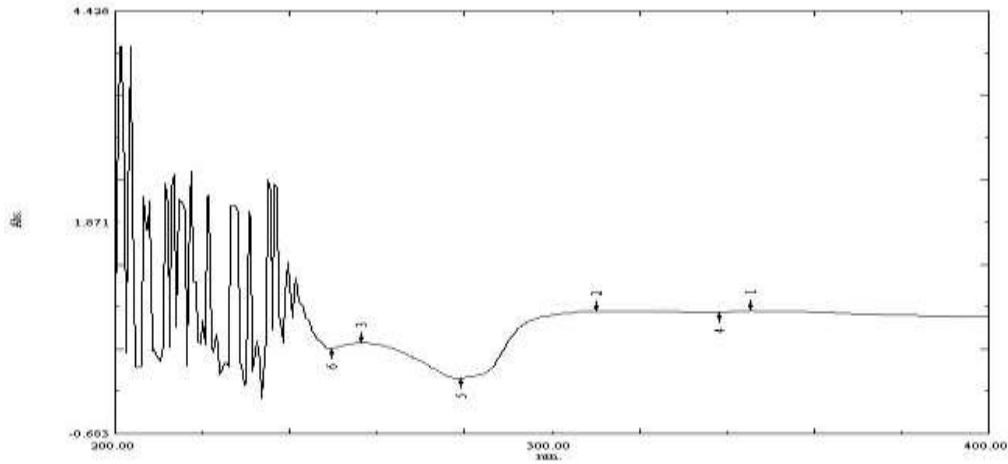


Figure: 1.1 UV Absorption Spectra of 0% wt PVA

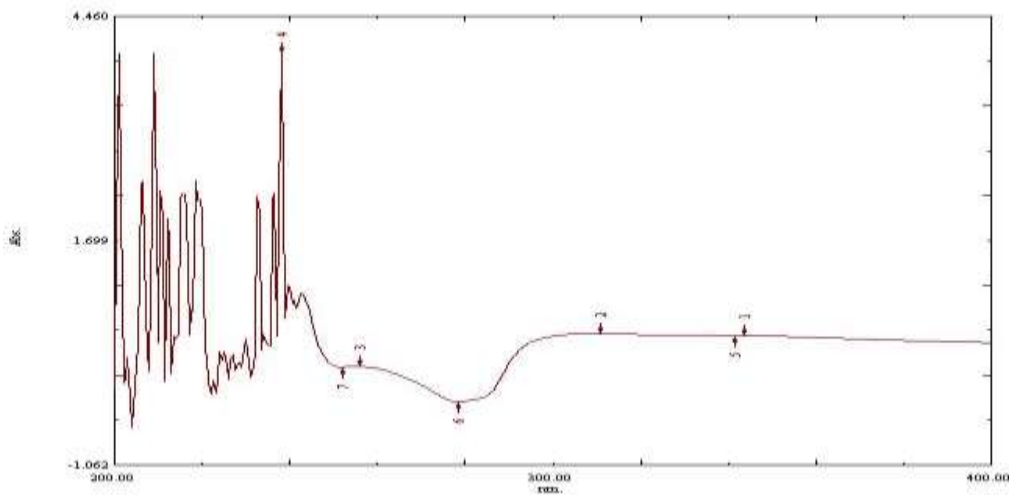


Figure: 1.2 UV Absorption Spectra of 47 % wt PVA.

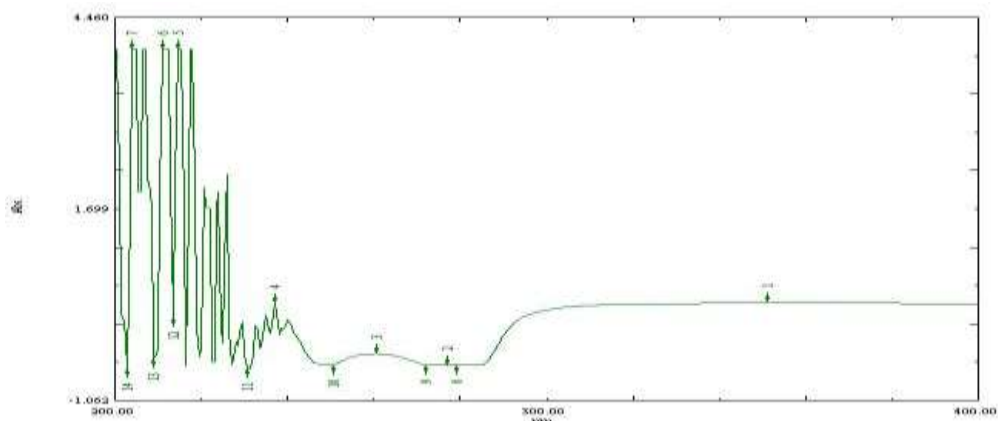


Figure: 1.3 UV Absorption Spectra of 50 % wt PVA.

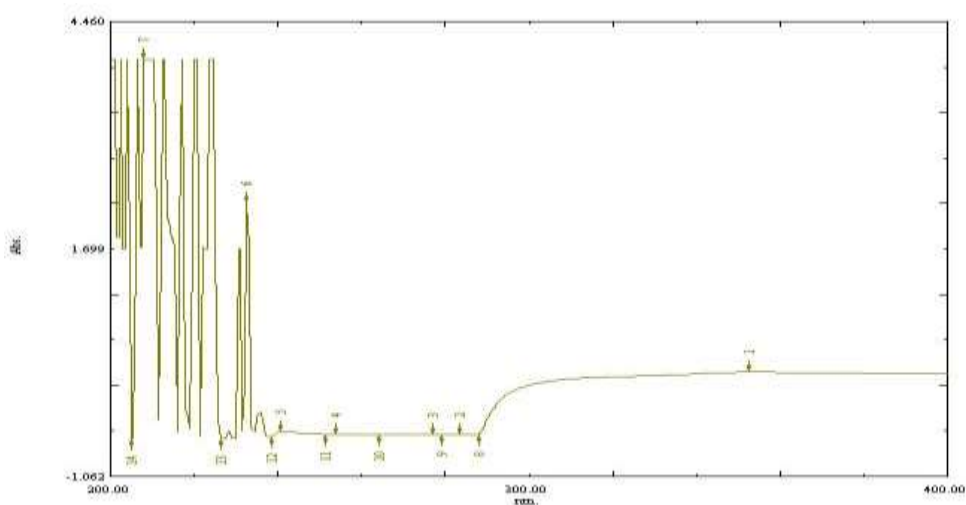


Figure: 1.4 UV Absorption Spectra of 53% wt PVA.

4. Conclusion:

The complex formation in PMMA- KSCN-PVA system has been confirmed from UV studies. UV analysis showed that the intensity of shoulder around 200 nm to 265 nm increases with increasing Concentrations of PVA.

Conflict-of Interest

The authors have no conflict of interest to declare. All co- authors have seen and agree with the contents of the manuscript.

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