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Electrical Properties of Preparing Biodegradable Polymer Blends of PVA/Starch Doping with Rhodamine –B

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Abstract:

This research focuses on the characteristics of polyvinyl alcohol and starch polymer blends doping with Rhodamine-B. The polymer blends were prepared using the solution cast method, which comprises 1:1(wt. /wt.). The polymer blends of PVA and starch with had different ratios of glycerin 0, 25, 30, 35, and 40 % wt. The ratio of 30% wt of glycerin was found to be the most suitable mechanical properties by strength and elasticity. The polymer blend of 1:1 wt ratios of starch/PVA and 30% wt of glycerin were doped with different ratios of Rhoda mine-B dye 0, 1, 2, 3, 4, 5, and 6% wt and the electrical properties of doping biodegradable blends were studied. The ratio of Rhodamine-B 5% wt to the polymer blends showed high conductivity up to 1×10^{-3}. In general, the electrical conductivity was increased with high temperature, which is similar to the behavior of semi-conductive polymers.

Key words: Biodegradable polymers, Electrical conductivity, PVA, Starch.

Introduction:

Among the many essays to combine tissue-engineering essential into strategies to repair nearly all portions of the body neuronal fixing up stands out, electrical stimulation has been shown to expand the nerve regeneration procedure and this, as, a result, makes the use of electrically conductive polymer blends attractive for the manufacturing of scaffolds for nerve tissue engineering(1, 2). This is in part due to the intricacy of the nervous anatomical system, its performance and the incapability of traditional repair way, which are based on single components of either biomaterials or cells alone.

One of the most available and cheaper polysaccharide sources is starch (3), which has a good characteristic of biodegradability and it can be easily degraded in water. The augmentation of starch has led to the originality of starch/ polyvinyl alcohol blends (4). Recently, a group of decomposing polymers in nature with semi-electro conductive properties have been prepared (5, 6).Industrial and natural dyes are used to dope some polymers and polymer blends to change their properties from dielectric to semi-conductive. This method has been used to dope polymers because polymers are known for their isolation properties (7).

These blends are considered as the biodegradable materials, which diminish the accumulation of wastes (8). PVA has been little to end users despite its outstanding chemical, physical and mechanical properties to those used in which it is supplied as a solution in water (9, 10). Chemical structure of Rhodamine-B was shown in Fig. 1.

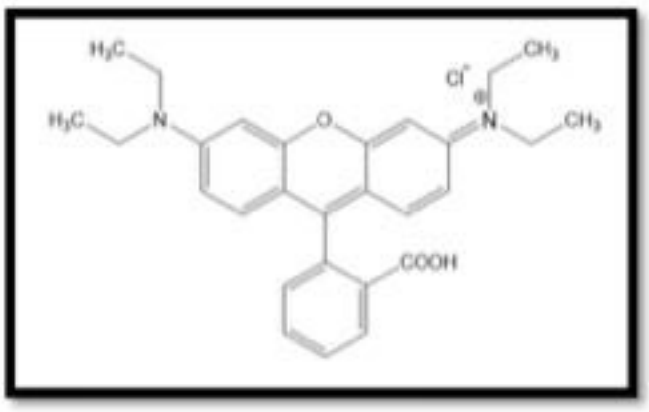

Figure 1. Chemical structure of Rhodamine-B.

This study aims to investigate the mechanical properties and electrical properties of biodegradable polymer blends of starch/PVA doped