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The Effects of Polymeric Molar Mass, Concentration, and Adding of Different Surfactants on The Electrospun Poly(Vinyl Alcohol) Nanofibers

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***SUMARY*. The aim of the study is to produce nanofibers using electrospinning with aqueous poly(vinyl alcohol)(PVA) solutions. Effect of PVA molar mass and concentration and effect of surfactants on the properties of PVA solutions and on the diameter size of electrospun PVA nanofibers were examined. It was shown that the viscosity of the polymer solution was increased by increasing PVA molar mass and concentration. To obtain the nanofiber structure, optimum $PVA_{18.000}$ (molar mass = 18,000 g/mol) and $PVA_{50.000}$ (molar mass = 50,000 g/mol) concentrations were found to be 30% w/w and 20% w/w, respectively. With the addition of anionic and cationic surfactants, the viscosity and the electrical conductivity of the polymer solutions were increased while the surface tension and fiber diameters of the nanofibers were decreased ($p < 0.05$). However, nonionic surfactants have shown no statistically significant effect ($p > 0.05$). As a result, electrospun nanofibers were produced using PVA and water and the diameters and properties of nanofibers can be modified by controlling the parameters examined in the study.**

RESUMEN. El objetivo del estudio es producir nanofibras utilizando electrohilado con soluciones acuosas de alcohol polivinílico (PVA). Se examinaron el efecto de la masa molar de PVA y la concentración y el efecto de los surfactantes sobre las propiedades de las soluciones de PVA y sobre el tamaño del diámetro de las fibras de PVA electrohiladas. Se demostró que la viscosidad de la solución de polímero se incrementó al aumentar la masa molar de PVA y la concentración. Para obtener la estructura de nanofibras, se vio que las concentraciones óptimas de $PVA_{18.000}$ (masa molar = 18.000 g/mol) y $PVA_{50.000}$ (masa molar = 50.000 g/mol) eran del 30 y 20% p/p, respectivamente. Con la adición de surfactantes aniónicos y catiónicos, la viscosidad y la conductividad eléctrica de las soluciones de polímeros aumentaron, mientras que la tensión superficial y los diámetros de las fibras de las nanofibras disminuyeron ($p < 0.05$). Sin embargo, los surfactantes no iónicos no han mostrado un efecto estadísticamente significativo ($p > 0.05$). Como resultado, las nanofibras electrohiladas se produjeron utilizando PVA y agua, y los diámetros y las propiedades de las fibras se pueden modificar mediante el control de los parámetros examinados en el estudio.

KEY WORDS: conductivity, electrospinning, electrospun nanofiber, poly(vinyl alcohol) (PVA), surface tension, viscosity.

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