

## ABSTRACT

*The development of materials that inhibit the growth of fungi has become the concentration of many industrial sectors due to the negative impact caused by fungi such as *Aspergillus niger*. Polymeric materials have longer effectiveness and durability than their constituent monomers. This research focuses on the modification of copolymer eugenol-divinyl benzene with nitro group substitution as an antifungal agent. This research focuses on the modification of eugenol-divinylbenzene copolymer through the substitution of nitro groups as antifungal agents. The research commenced with the synthesis of polyeugenol (PE) and eugenol-divinylbenzene copolymer (PEDVB) via cationic addition polymerization using  $BF_3O(C_2H_5)_2$  as a catalyst. Nitro eugenol-divinylbenzene copolymer (NPEDVB) was synthesized by introducing nitronium ions into PEDVB through an electrophilic aromatic substitution reaction. The resulting PE, PEDVB, and NPEDVB were subjected to physical property analysis and characterization. The antifungal activity was evaluated using the well diffusion method by measuring the inhibition zones formed. PE synthesis produced a brownish orange powder with a yield of 71.62%, a melting point of 80-84 °C, and a molecular weight of 9432.44 Daltons. The synthesis of PEDVB produced orange powder with a yield of 97.4%, a melting point of 105-110°C, and a molecular weight of 58238.5 Dalton. PE and PEDVB are soluble in methanol, ethanol, diethyl ether, ethyl acetate, dimethyl sulfoxide, and chloroform. Synthesis of NPEDVB produced brown powder with a nitration degree of 78.28%, a yield of 60.36%, a melting point 165-170°C, and a molecular weight of 70240.13 Daltons. NPEDVB is soluble in methanol, ethanol, ethyl acetate, and dimethyl sulfoxide. NPEDVB was successfully formed as evidenced by the absorption region at 1359 and 1561  $cm^{-1}$ , which showed the N=O group, and the C-N group was shown at 1275  $cm^{-1}$ . The TGA results of NPEDVB showed 10% degradation at 145.02 °C and 50% degradation at 536.89 °C. The antifungal activity of NPEDVB showed better resistance and inhibition effectiveness than eugenol, PE, and PEDVB based on the inhibition zone formed.*

**Keywords:** *eugenol-divinylbenzene copolymer, nitration, antifungal agent*