Abstract

In this research, the influence of electron beam irradiation on physical and mechanical properties of wood plastic composite of wood plastic composite made from wood flour/ high density polyethylene and comparing it with other common methods of improving the properties of this composite, such as the use of compatibilizer and nanoclay, has been investigated. For this purpose, three types of composites of wood plastic were prepared. In the first combination, flour of poplar wood and polyethylene with a weight ratio of 50-50 were mixed, in the second combination 50% of poplar wood flour and 47% polyethylene plus 3% MAPE were mixed together, and in the third combination 50% of poplar wood flour along with 46% Polyethylene and 4% nano-clay were mixed together. Then the compounds prepared, were combined in the internal mixer machine and finally the plastic wood composites were made using injection molding, It was irradiated by various electron beam irradiation at various dose of 50, 100, 150, 200 and 250 kilogray to create different degrees of transverse coupling. Then mechanical tests including flexural, modulus of elasticity and tensile strength , and physical tests including water absorption and TS (thickness swelling) on the samples were performed according to ASTM standard. Also, to investigate the morphology of composites, scanning electron microscopy (SEM) and infrared spectroscopy (FTIR) were used. Overall, the results showed that increasing the dose of electron beam radiation improved all the mechanical and physical properties of the wood plastic composite, and also improved the properties of irradiation, compared with the compatibilizer and nanoclay. It can be concluded that the adhesion between the surfaces of the wood filler and the polyethylene has been significantly improved under the irradiation process due to the formation of free radical molecules and the formation of crosslinks and transverse joints in the composite components.

Keywords: Wood plastic composite, Electron beam, Compatibilizer, Nanoclay, Mechanical & Physical properties.

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The Thesis Submitted for the Degree of M.Sc
(In wood Composite products)

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November 2017