Preparation and Studying the Fracture Toughness of Laminate Composites

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ABSTRACT

Binary polymer blend was prepared by the mechanical mixing of epoxy resin (EP) with polycarbonate (PC) in different weight ratios of (0, 5, 10, 15 and 20%). Charpy impact test was carried out on these blends to determine the values of impact strength (I.S). It was found that the blend of the ratio (20wt. %) of PC has the highest (I.S) compared with other ratios. For this reason, this percentage of mixing was selected to fabricate the composite materials. Hand lay-up method was utilized to synthesize the (single and hybrid) laminate composites with fiber volume fraction (Φ=15%). Glass and Kevlar fibers were used to reinforce the epoxy and its polymer blend with different sequences of skin and core layers of the composite. The values of Young's modulus (E), impact characteristics (I.S, Gc, Kc) and hardness were determined for these composites. It is found that the values of (E) and hardness decrease while the values of material toughness (Gc) increase with increasing the blending ratio of the polymer blend. It can also be noticed that the composite reinforced with Kevlar fibers records the highest value of (Gc) compared with other composites.

Keywords: Polymer blends, Epoxy, Polycarbonate, Laminate Composites.