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## Study of some Mechanical Properties and Erosive Behavior by Taguchi Method for Hybrid Nano Composites

**Abstract-** The aim of this research is study the effect Nano TiO<sub>2</sub> powder on impact strength, fracture toughness, hardness shore (D) and erosive wear behavior of polymer composites materials are prepared by simple hand lay-up technique. The specimens was prepared by adding (1%, 2%,3%,4%,5% & 6%) weight fraction of nano powder (TiO<sub>3</sub>) has average size of (16 nm) to unsaturated polyester resin reinforcement with (5%) weight fraction of carbon fiber. The value of erosive wear rate for polymer composite materials can be obtaining after (15 hours) and under effect various parameters such as impingement angle (30°, 45°, 60°, 90°), erodent size of sand silica (300, 400 ,500,600 μm) and stand-off distance (17, 19, 21,23 cm). Also in this research study effect of parameters on erosive wear rate by the used of Taguchi orthogonal arrays L16. The results show the maximum value of impact strength , fracture toughness and hardness (shore D) was founded at specimen (89% UP +5% C.F+6% TiO<sub>2</sub>) also this specimen has the best resistance to erosive wear rate under parameters (23cm stand- off distance , 300 μm erodent size of sand silica , 60° impact angle) than other specimens. From analysis of variance (ANOVA) the filler content and impingement angle factor have more effect on erosive rate while the stand-off distance and erodent size of sand less effect on erosive wear rate .

**Keywords-** Nano composites, Impact strength, fracture toughness, Hardness, Erosive wear, Taguchi design.

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