

# Abstracte

This work focuses on the preparation of hybrid polymer matrix composite materials by (Hand Lay-Up) method, where the composite material was prepared from the unsaturated polyester resin (UP) as a matrix reinforced by bidirectional woven glass fiber kind (E-glass) with a fixed volume fraction of (10%) and graphite particles as the first group of samples and the second group of samples reinforced with bidirectional woven kevlar fiber kind (49) with a fixed volume fraction of (10%) instead of glass fiber.

This work includes studying the effect of selected volume fractions (5% , 10% , 15% , 20% ) of graphite particles with different particle size of (25  $\mu\text{m}$ –106  $\mu\text{m}$ ) on the properties of the prepared composite materials, And also this work includes studying the effect of selected particle size (25 < P.S  $\leq$  75, 75 < P.S  $\leq$  90 , 90 < P.S  $\leq$  106 ) of graphite particles with a fixed volume fraction of (10%) on the properties of the samples reinforced by glass fiber and graphite particles as the third group of samples and other samples reinforced by kevlar fibers instead of glass fiber as the fourth group.

Number of mechanical tests were done and these include (Tensile, Compression, Impact, Bending, Flexural Strength, Shear Stress and Hardness), In addition of number of physical tests which they are two tests (Thermal Conductivity, Density), which all were done at room temperature.

Result of the work shows that the values of (Tensile stress, Tensile elastic modulus, Bending elastic modulus, Fracture Toughness, Hardness,

Thermal Conductivity Coefficient, Specific Gravity) increase with the increase of graphite particle volume fraction for both types of fibers that used in reinforced. As will as the values of the (Compression elastic modulus, Flexural strength, Shear stress) increase with the low values of graphite particles volume fraction and decrease with the higher values of graphite particles volume fraction for both types of fibers that used in reinforced but the values of Impact Strength decreased with the increases of volume fraction of graphite particles for both types of fibers that used in reinforced. and also results show that (Tensile stress, Tensile elastic modulus, Bending elastic modulus, Fracture Toughness, Hardness, Compression elastic modulus, Flexural strength, Shear stress, Specific Gravity) increase with the decreasing of graphite particle size but the values of Thermal Conductivity Coefficient increase with the increasing graphite particle size for both kinds of fibers that used in reinforced.