**Production of Diatomite Reinforced Polyester Composite and**

**Investigation of Its Thermophysical Properties**

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| **Abstract**  In this study, composite materials have been improved by reinforcing diatomite soil into unsaturated polyester. Diatomite in the particle size range of 297 to 149 microns is used as a filler after drying at 105 °C. Diatomite reinforced polyester composites at different ratios by mass (0 %, 1 %, 3 %, 5 %, and 7 %) are produced at room temperature under open conditions to the atmosphere. In the experimental studies, the homogeneity of unsaturated polyester (UP) and the filler is provided first. Then, after methyl ethyl ketone peroxide (MEKP) and cobalt octoate (Co Oc) catalysts are added to the mixture, mixing is done at 1000 rpm for 2 min [1-3]. After the polyester composite is cured for 24 hours under laboratory conditions, necessary tests and analyzes are performed. The chemical bond structure of the obtained polyester composite is determined by Fourier transform infrared (FTIR) spectroscopy. The surface morphology of the composite material is examined by scanning electron microscopy (SEM). As the mass ratio of diatomite soil in the mixture raises, the porosity of the obtained composite increases. In the results, it has been observed that the density of the polyester composite decreases as the ratio of diatomite in the mixture by mass increases. Diatomite reinforcement changes the thermal conductivity coefficient of the polyester composite between 0.056 W/m·K and 0.079 W/m·K. Besides, Shore D hardness of the polyester composite varies between 78.0 and 81.5. It is observed that diatomite reinforcement tends to increase both the thermal conductivity and Shore D hardness of the polyester composite. Also, thermal decomposition experiments are carried out in a PID-controlled system in an inert environment between 25 °C and 605 °C. In the thermal decomposition experiments of polyester composites, it has been determined that the filler reinforcement increases the activation energy. Activation energy values are calculated using Coats-Redfern method when the temperature rise is 10 °C/min and the conversion rate (α) is between 0.1 and 0.9. Therefore, increasing the activation energy improves the thermal stability of the composite [4-6]. |
| Keywords: Diatomite, Polyester Composite, Density, Hardness, Thermal Conductivity |

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