

Possible Use of Volcanic Ash as a Filler in Polyphenylene Sulfide Composites: Thermal, Mechanical, and Erosive Wear Properties

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It is a common practice to use particle materials as fillers to improve engineering properties of polymer composites and to lower the cost of final products. There is an obvious cost advantage of compounding volcanic ash (VA) in polymers, either to replace traditional fillers. This study is concerned with thermal, mechanical, and erosive properties of VA-filled polyphenylene sulfide (PPS) composites. Composite samples containing VA particles at various concentrations (0, 2.5, 5, 10, 15, and 20 wt%) were manufactured by twin screw extruder and injection molding machine. Thermal properties were investigated by thermogravimetric and dynamic mechanical analysis methods. Erosive wear properties were investigated by performing solid particle erosion tests at 30° and 90° impingement angles. The mechanical properties such as flexural strength and modulus of uneroded samples and residual flexural strength and modulus of eroded composite samples were determined by three-point bending tests. Results show that thermal, mechanical, and residual mechanical properties of the PPS composite were significantly improved by adding VA, although erosion resistance was decreased markedly. It was concluded that VA can be used as a reinforcement in PPS composites to improve thermal and mechanical properties and to reduce the cost of the PPS composites. POLYM. COMPOS., 00:000-000, 2014. © 2014 Society of Plastics Engineers

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