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Simultaneous Determination of Thermal Conductivity, Thermal Diffusivity and Specific Heat of Polymers by the Hot Wire Technique

*Wilson Nunes dos Santos

*Federal University of Sao Carlos, Department of Materials Engineering,
Via Washington Luiz, km 235, CP 676, Sao Carlos, SP, Brazil CEP 13565-905*

The nature of the molecular structure of the plastics makes the properties of such materials markedly temperature dependent. Thermal conductivity, thermal diffusivity and specific heat, namely the thermal properties, are the three most important physical properties of a material that are needed for heat transfer calculations. Those properties are observed when heat is added or removed from a material, and they become important in any project that must function in any thermal environment. Temperature, density, crystallinity, size of branching or substituent, crosslinking, addition or removal of materials, application of stress are factors that affect the thermal properties of polymers. So measurements of such properties may also be used to understand the polymer structure/property relationships. Recently, transient techniques have become the preferable way for measuring the thermal properties of any material. In this work, the hot wire technique is employed in the simultaneous determination of thermal conductivity, thermal diffusivity and specific heat of some selected polymers. Experimental results obtained are then checked against data found in literature, as well as those ones obtained by other techniques. The hot wire technique mostly employed in the determination of thermal properties of ceramics may also be considered as a suitable method for measuring thermal properties of solid and melt polymers.