

Abstract

Strain Rate Effects in the Tensile Behavior of Commercial Thermoplastics [†]

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The behavior of materials is strongly influenced by the loading conditions to which they are subjected. Factors such as temperature, humidity and strain rate, for example, are among the most significant. In the case of polymeric materials, the strain rate can affect behavior, sometimes more ductile, sometimes more fragile, depending on whether the rate of deformation is lower or higher.

The addition of modifying agents, such as plasticizers, fillers, reinforcing particles, additives to facilitate processing or others are added to commercial plastics and may eventually change the expected behavior when these commercial plastics are subject to variations in the deformation rate due to the nature of the efforts to which in service may be submitted.

Using four commercial thermoplastics (HDPE, PC, PMMA and PVC), the authors present a study on the influence of strain rate on the longitudinal modulus, failure stress and strain at failure. Using uniaxial tension tests, the main influences are mentioned and their relationship with the macromolecular behavior described in the literature is discussed. The effect of surface roughness is also discussed considering that it is a decisive factor in the reproducibility of the results found.

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