

Correlation between the acoustic and dynamic mechanical properties of natural rubber foam: Effect of foaming temperature

Abstract

Acoustic absorbing foam materials are produced from dry natural rubber (NR) with the addition of sodium bicarbonate as a blowing agent. The acoustical efficiencies of NR foams were studied, and the results show a significant influence of the viscoelastic and damping properties of the base matrix. Both of these properties are governed by the average cell size, relative density, crosslink density and number of cells per unit volume. The lowest foaming temperature, 140 °C, yielded the NR foam (NR 140) with the highest relative density, crosslink density, smallest average cell size and greatest number of cells per unit volume. Consequently, these foam cell characteristics resulted in a superior sound absorption coefficient and a high storage modulus, which indicates that the NR 140 foam exhibits a better elastic behavior. On the other hand, the NR foam that expanded at 160 °C (NR 160) exhibited great potential for insulating sound and possessed good damping properties, which was characterized by its high transmission loss and $\tan \delta$ values.