



Analysis of Conductivity of the PUR/CB composites varying the amounts of polyol and carbon black

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Abstract: Analysis of the conductivity of the composite with polyurethane and carbon black, PUR/CB, for different quantities polyol and CB were performed. Measurements were obtained by impedance spectroscopy and the four point method. Through the experimental results it was observed that the conductivity of the composite PUR/CB decreases with increasing composition of polyol in the polymer matrix for low amounts of CB and the increase of CB the conductivity of all samples became very close. This result indicates that the excess of polyol in PUR/CB composite increases the percolation threshold of this material.

In this work composite of polyurethane of castor oil (PUR) and Carbon Black (CB) were obtained taking the fixed quantities of pre-polymer and varying the polyol and CB and characterized electrically using impedance spectroscopy techniques and four point method. The analysis of the conductivity as a function of alternating electrical field applied in PUR/CB composite sample, it was noticed that the conductivity increases with increasing amount of CB with different compositions of the polymer matrix. Another observation is the polyol influence in the conductivity of composites, which is lower for the composites with greater fraction of pre-polymer in the matrix. The similar behavior was observed for the *dc* conductivity using the four point method. For all the compositions with CB quantities below 4%, the conductivity varied approximately two orders of magnitude. The compositions with amounts above 4% of CB, the magnitude of conductivity decrease with the increase of CB in the polymer matrix. The decrease in conductivity with increasing the amount of polyol to CB quantity below 4%, this is related to the plasticizer effect of the material [1]. However, with 10% of CB the conductivity of the compositions shows little variation. It's observed that the effect plasticizer gives to the composite with quantity of CB below 4% a more isolating characteristic and above this amount this effect vanish. From the results of this work, it is concluded that the excess of polyol in PU/CB composite affects the electrical properties of the material i.e., to achieve the percolation threshold of the composites with an excess of polyol will require larger amounts of CB in the polymer matrix.

[1] D. H. F. Kanda, H. N. Nagashima, J. A. Malmonge, W. K. Sakamoto, G. O. Chierice, J. Matter Sci., 43 (2008), 5436-5400.