Thermochimica Acta. Volume:604. Pages: 52-60. March 2015

Kinetic analysis and characterization of an epoxy/cork adhesive

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Abstract— Epoxy resins are the most common structural adhesives due to their good mechanical, thermal and chemical properties. However, the structure of these thermoset polymers, due to the high crosslinking, also causes brittleness, with a low resistance to the initiation of cracks and their propagation. The inclusion of particles (nano or micro) is a common method to improve the mechanical properties such as toughness of structural adhesives. In the present study, natural micro particles of cork were used to increase the toughness of a brittle epoxy adhesive. The main objective of this research was to investigate the effect of the amount of cork particles in the cure reaction of a brittle epoxy, knowing that the amount present influences the mechanical properties. This study was developed using specimens with 0.5, 1, 2 and 5% (volume) of cork and without cork, as reinforcement material of a brittle resin. In general the cork particles do not influence the curing process, although they slightly change the curing mechanism. Also, cork particles decrease the glass transition temperature (Tg) and have a plasticizer effect in the epoxy resin.

Index Terms— Thermosetting resin; Curing process; Kinetics; Cork micro-particles; Differential scanning calorimetry

Citation:
Barbosa, A.Q.; Da Silva, L.F.M.; Abenojar, J.; del Real-Romero, J.C.; Paiva, R.M.M.; Öchsner, A.; "Kinetic analysis and characterization of an epoxy/cork adhesive", Thermochimica Acta, vol.604, pp.52-60. March, 2015.