

## NCHEM / Novel chemistry

## • Influence of magnetic cork particles on the thermal properties of epoxy resin

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## Abstract content

This research aims to study the influence of magnetic cork particles on the thermal properties of an epoxy resin. For which, natural cork particles and magnetic cork particles, with two different particle size (38-53 µm and 75-125 µm) and percentage (1 and 5 v/v%), were compared as reinforcement material. Magnetic cork was obtained by co-precipitated coating, according to patent number WO2019025651. The epoxy resin was Araldite® LY 1564, with two different hardeners Arardur® 3405 and 5003 by Huntsman (Basel, Switzerland). Knowledge of the thermal properties of this composite material is extremely important, since it can be used as an adhesive where the particles can be placed according to the properties required in the adhesive bond (PAT354/2019). The thermal properties studied were activation energy of curing reaction, glass transition temperature ( $T_a$ ) and thermal conductivity, with these properties and three variables a factorial design  $(2^k \text{ with } k = 3)$  could be carried out. In this way, the variable o variable combination with more influence can be obtained, depended on the hardener. Differential scanning calorimetry (DSC), module DSC 822e by Mettler Toledo GmbH (Greifensee, Switzerland) was used. The samples were around 8 mg and they were deposited in the aluminum crucible of 40 ml with hole in the lid, an equal crucible without sample was used as reference and nitrogen was used as purge gas at 50 ml per min. Rate heating and temperature depended on kind test, for  $T_q$  from -20 to 200 °C at 20 °/min, in the case of activation energy of curing process four scan at different rate heating (5,10, 15 and 20 °/min) from -20 to 200 °C. These four non-isothermal scans allow calculating activation energy by Model Free kinetic (MFK) and simulating isothermal process at different temperature. The rate heating for Thermal conductivity was from 23 to 38 °C at 2 °/min. Results show that the main parameter is the presence of a magnetic coating.