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Effect of Post-Cure on the Physical and Mechanical Properties of Epoxy Adhesives

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The effects of post-curing and cure temperature on the mechanical and physical properties of epoxy adhesives were studied [1]. Mechanical properties of the adhesives (yield strength, Young´s modulus and ultimate elongation) were measured in bulk specimens and the physical property (glass transition temperature, T_g) was measured by a dynamic mechanical analysis (DMA) apparatus developed in-house. The relationships between the mechanical and physical performance under various post-cure conditions, were investigated [2-3]. The curing process was the same for all tests, consisting of an initial stage performed at different temperatures followed of a cooling at room temperature and remained until the adhesive was completely cured or close to that. Three sets of specimens were considered, sharing the same initial cure process, but with a different post-curing procedure. In the first set, the specimens were only subjected to a curing process; in the second set, the specimens were subjected to a curing process followed by a post-cure performed at a temperature below the glass transition temperature of the fully cured network, $T_{g\infty}$; and in the third set, the specimens were subjected to a curing process followed by a post-cure performed at a temperature above the $T_{g\infty}$. The yield strength, Young's modulus, ultimate elongation and T_g for different cure temperatures were investigated, to understand the adhesive performance as a function of the post-cure conditions. When post-cured at a temperature above $T_{g\infty}$, the mechanical and physical properties tend to have a constant value for any cure temperature.

[1] L.F.M. da Silva, A. Öchsner and R.D. Adams, Handbook of Adhesion Technology, Springer (2011).

[2] S. Ziaee and G.R. Palmese, Journal of Polymer Science: Part B: Polymer Physics, 37, 725 (1999).

[3] C. Wu, Journal of Materials Science, 27, 2982 (1992).