Thermophysical Characterization of Tape Adhesives

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We have been characterizing the relationship between compressive stresses arising during processing of commercial adhesive tape rolls and subsequent relaxation processes that have triggered an edge oozing pattern. This has required extensive mechanical and physical characterization using two main techniques. One technique we have used extensively is dynamic mechanical spectroscopy in bending to generate master curves for compliance. The other is environmental conditioning using mass sorption/desorption measurements to gauge to how sensitive the water based latex acrylic resins are to environmental conditioning both in mass and thermo-mechanical and thermo-physical response. The resins we have used have been tackified commercial latex resins of both ethyl hexyl acrylate and butyl acrylate, cast onto copper foil using a doctor blade and dried for a period of hours. Sandwich structures of the cast tapes were constructing using simple compression and the sandwiches were loaded in a Perkin Elmer DMA-7 operating at frequencies between 1 and 50Hz sequentially at temperatures between -30 and 30^{o}C. We successfully made quality master curves and will present our relative success with each resin system. Separately, we took these films and immersed them in an environmental chamber at controlled temperature and humidity. We measured the sorption/desorption through the use of an on-line balance capturing dynamic mass changes with controlled changes in both temperature and humidity in the chamber. We are combining the approaches by measuring by DMS thermomechanical properties on films conditioned under different sequences.