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CHANGES IN THERMAL BEHAVIOUR OF AMINORESINS AT STORAGE

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An important factor with respect to the technical use of aminoresins concerns their long-term storage stability which affects adhesive processability and performance properties. By the structural analysis of aminoresins and rheokinetic studies it has been deduced that resin storage consists of both physical and chemical interactions. It is of practical interest how the changes of chemical structure taking place during storage are reflected in the curing behaviour of aminoresins. In the present work, thermal behaviour of commercial amino¬resins, long-time stored at room temperature, was studied by simultaneous TG-DTA technique, also including the determination of the chemical structure of resins of the same age by 13C NMR spectroscopy. TG-DTA measurements were recorded with a Setaram labsysTM instrument in dynamic heating conditions. 13C NMR spectra were obtained on a Bruker AMX500 NMR spectrometer at 125,77 MHz from DMSO-d6 solutions. On the basis of 13C NMR spectra, the main chemical reaction during resin storage is the formation of methylene and dimethylene ether linkages adjacent to secondary amino groups. The extent of structural changes during storage depends on the content of linear methylol groups and free urea prior to storage, and on pH of the system. Aging of resins results in a decrease of cure rate which is related to lower concentration of active functional groups and decrease in molecular mobility. On DTA curve, the resin with higher content of methylol groups reveals the curing exotherm earlier. With decreasing methylol content during storage, the peak maximum of exotherm is shifted to higher temperature value. Advanced polycondensation and sedimentation processes during storage produce partly locked in macromolecule structure water, and the water evaporation endotherm on DTA curve shifts to considerably higher temperature. The aged MUF resins are chemically less changed than UF resins and the aging process mainly involves noncovalent network formation due to complex molecular structure.