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## Thermal Behaviour of Selected Polyurethane Elastomers With Diol Chain Extension

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In the present study, a range of polyurethane elastomers (PUs) based on flexible hard segments was prepared, and their thermal and mechanical properties were compared. PUs were based on the diisocyanates (DII): 4,4'-methylene bis(phenyl isocyanate) (MDI), 1,5-toluilene diisocyanate (TDI), and naphthalene diisocyanate (NDI) as compared to the Romanian 4,4'-dibenzyl diisocyanate (DBDI) which is known to give hard segment flexibility. The conformational mobility of DBDI causes an unusually wide range of mechanical, physical and chemical properties, associated with the possibility of pronounced phase separation into a domain – matrix morphology, and with a higher tendency to crystallization and self-association by hydrogen bonding. The range of polymers was designed to reveal the roles of choice of macrodiol (MD) and of diol chain extender (CE) in determining the thermal performance as an elastomer. The soft segment MD was mainly polytetrahydrofuran (PTHF) or poly(ethylene adipate) (PEA) of molar mass ranging from  $M=650\pm50$  to  $M=2000\pm50$ . The CE used in the synthesis was ethylene glycol (EG), 1,4-butanediol (BG) or diethylene glycol (DEG). PUs thermal behaviour was investigated by means of differential scanning calorimetry (DSC) and thermogravimetry (TGA). PUs thermal creep (TC) was studied and the thermomechanical curves were discussed in terms of material chemistry. Stress–strain data of uniaxial deformation as a function of temperature were performed. As observed in the frame of the TC experiments, a series of DBDI-based PUs with PTHF display an excellent thermal behaviour. Similar observations were made when studying the variation of the PU Shear Modulus as a function of temperature in a field of temperatures ranging from  $-80^{\circ}\text{C}$  to  $+160^{\circ}\text{C}$ .