

Streszczenie rozprawy doktorskiej w języku angielskim

The polyether-polyols are one of an important class of polymers produced on an industrial scale as intermediates for the preparation of polyurethanes. Polyether-diols that is, linear polymers having two hydroxyl groups are obtained mainly in the polymerization of propylene oxide in the presence of potassium hydroxide KOH and 1,2-propylene glycol. The reaction with the diisocyanates obtained from these polyurethane elastomers. A polyether-triols and polyether-tetrols are the polymers containing three and four hydroxyl groups, respectively, they are received in the industry by polymerization of propylene oxide in the presence of potassium hydroxide KOH, glycerol or pentaerythritol. They provide a intermediate for the preparation of crosslinked polyurethanes synthesized by the reaction with diisocyanates. Crosslinked polyurethanes used in the production of mattresses and they are also used in the furniture industry, automotive industry, building industry and for special applications, for example medicine.

This work contains three parts. In the first part, several model reactions were made for the better understanding and optimalization of the process of synthesis star-shaped polyether-polyol, which is a major concern because of its applicability to the preparation of crosslinked polyurethanes. The course of the polymerization of propylene oxide initiated with potassium salts of several selected monohydroxyl alcohols with different chemical structure has been examined and then as initiators potassium salts of selected alcohols with two or three hydroxyl groups were used. The polymers obtained contain unsaturation groups with double bonds (alliloxy, *cis*-propenyloxy, *trans*-propenyloxy and in the one case also vinyloxy). Their presence was due to the deprotonation reaction of monomer or/and 18-crown-6 as well as alcohol added. Unsaturation also depends strongly on kind of the initiator (in the range of 0.2 – 49.1 %-mol).

In the second part of this work the star-shaped polyether-pentols were synthesized. As the initiator for the polymerization of propylene oxide potassium salt of 2,2,6,6-tetrakis (hydroxymethyl) cyclohexanol activated ligand, 18-crown-6 was used, which has not been yet described in the literature. The influence of free hydroxyl groups in molecules of initiators on molar masses and dispersities of polyether-pentols obtained has been examined. The high molar masses (12400-13200) of star-shaped polymers obtained by anionic polymerization in this work, have not been described till now in the literature.

The third part of this work is focused on the application of the synthesized crosslinked polyurethanes on the basis of prepared previously polyether-pentol and, comparatively polyether-diol in the reaction with polymeric diisocyanate, i.e. pMDI. The structure of polyurethanes obtained and their thermal properties have been examined by FTIR, DSC and TGA methods. Polyurethane synthesized with use of polyether-pentol had better thermal stability because of its greater degree of crosslinking.