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ELECTRICAL PROPERTIES OF POLYURETHANE METAL COMPLEXES*

I. M. DAVLETBAYEVA, V. V. PARFENOV, V. P. DOROZHKIN and P. A. KIRPICHNIKOV

S. M. Kirov Chemico-technological Institute, Kazan
.V I. Lenin States University. Kazan

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The static and dynamic electrical conductivity of coordination compounds of 2, 4-tolylene diisocyanate with Cu (II) and Fe (II) halides, and also polyurethanes synthesized from them are studied. According to the proposed model, the electrical conductivity of metal coordination polyurethanes is associated with electron exchange bettween metal ions of different valence, and depends on saturation with electrons of hetero-atoms entering into the composition of the flexible parts of the macro-chain.

THE use of elastic polyurethane (PU) materials often requires that they have electrical conductivity, which provides a means of removing static charge from the surfaces of components based on them. The research effort aimed at establishing elastic, electrically conducting polyurethane materials is now concentrated mainly on establishing heterogeneous structures such as pyro-polymers and metal-fielled compositions [1, 2]. It is possible to increase the conductivity of compositions by 5–6 orders of magnitude compared with the original rubber, but in doing this the physico-mechanical properties are unavoidably impaired. The introduction of chemical modifiers into PU also has numerous snags. For example, most chemical additives are low molecular compounds [3, 4] and are generally not thermodynamically soluble in PU, so that the possibility of phase separation of the composite material with time is not excluded. For the above reasons it was of interest to us to obtain PU having increased conductivity, determined by the special features of their structure.

Non-composite metal coordinated PU having organic semiconductor [5] properties have been synthesized previously. The synthesis of these involves the interaction of oligoester diols with the products from the reaction of 2,4-tolylene diisocyanate (TDI) with the halides of certain metals. The latter, in their turn, are obtained by a complex multi-stage process of interaction of TDI with the salts of various metals in certain organic media (acetone, THF, etc.). Moreover, depending on the original molar ratios [TDI] : $MtHal_2$], coordination compounds of different stoichiometric composition but containing identical structural elements are formed. When cupric chloride is used as the coordinating agent at the molar ratio [$CuCl_2$] = 5 : 1, complexes of formula

$$[CH_3C_6H_3XCu]_nCl_{2n},$$
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