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# CHEMISTRY

Corresponding Member of the Academy of Sciences of the USSR  
M. M. Koton, L. F. Dokukina

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## Abstract

## Full Text

### CHEMISTRY

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## ON THE ABILITY OF TIN-CONTAINING MONOMERS TO POLYMERIZE

Previously, M. M. Koton, T. M. Kiseleva, and F. S. Florinskii (1) studied the ability of metal-containing monomers to polymerize. It was shown that the nature of the metal affects the ability to polymerize. In terms of polymerization rate, the monomers studied were arranged in the series: *p*-vinylphenyltriphenyltin > *p*-vinylphenyltriphenyllead > styrene.

It was of interest to study the influence of the nature of the substituent at the metal atom and at the unsaturated group on the ability to polymerize. For this purpose we synthesized new tin-containing monomers: *p*-vinylphenyltricyclohexyltin and *p*-vinylbiphenyltriphenyltin, and studied the kinetics of polymerization of these monomers in comparison with *p*-vinylphenyltriphenyltin. The kinetics of polymerization was studied by the dilatometric method. Polymerization was carried out in toluene solution at monomer concentrations of 0.2-0.3 M in the presence of 0.5 mol.% dinitrile of azoisobutyric acid as initiator. The conversion was 20-25%. For the monomers studied, the values of the rate constants of the polymerization reaction, the activation energy, and the pre-exponential factor were determined. The polymers obtained as a result of the studies are soluble, but of low molecular weight. The results of the study are given in Table 1.

Table 1

Monomer	$K^{80^\circ}$ , $l^{1/2}/mol^{1/2}\cdot sec$	$E$ , kcal/mol	$K_0$ , $l^{1/2}mol^{1/2}\cdot sec$	$[\eta]$ , dl/g
<i>p</i> -Vinylphenyltriphenyltin	$6.9 \cdot 10^{-3}$	11.0	$1.66 \cdot 10^4$	0.46
<i>p</i> -Vinylphenyltricyclohexyltin	$6.7 \cdot 10^{-3}$	16.9	$1.51 \cdot 10^8$	0.14
<i>p</i> -Vinylbiphenyltriphenyltin	$5.7 \cdot 10^{-3}$	21.0	$6.92 \cdot 10^{10}$	0.04

Comparison of the polymerization rate constants of the monomers studied at 80° showed that, in terms of polymerization rate, they can be arranged

in the series: *p*-vinylphenyltriphenyltin > *p*-vinylphenyltricyclohexyltin > *p*-vinylbiphenyltriphenyltin. In this same series the activation energy increases.

The results obtained make it possible to conclude that the nature of the substituent at the metal atom has practically no effect on the rate of polymerization. However, the activation energy upon replacement of the phenyl group by a cyclohexyl group increases, which, apparently, can be explained by a decrease in the degree of conjugation of the double bond with the side chain in the case of *p*-vinylphenyltricyclohexyltin. Lengthening of the side chain in the case of *p*-vinylbiphenyltriphenyltin led to a decrease in reactivity under conditions of radical polymerization.

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## CITED LITERATURE

1. M. M. Koton, T. M. Kiseleva, F. S. Florinskii, *Vysokomolek. soed.*, **2**, 1639 (1960).

*Note: Figure translations are in progress. See original paper for figures.*

*Source: Math-Net.Ru and CyberLeninka. Machine translation. Verify with the original.*