

COMPLEX OF TITANOCENE WITH TOLAN AS A CATALYST FOR THE HOMOGENEOUS  
HYDROGENATION OF UNSATURATED COMPOUNDSV. B. Shur, V. V. Burlakov,  
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636.3:542.941.7

The complex of titanocene with tolan [ $\text{Cp}_2\text{Ti}(\text{C}_2\text{Ph}_2)$ ] (I) synthesized by the reaction of  $\text{Cp}_2\text{TiCl}_2$  with magnesium and tolan in THF [1-3] was found to be an effective catalyst for the homogeneous hydrogenation of olefins and acetylenes at 20°C and atmospheric hydrogen pressure. The reaction was carried out with a substrate: (I) ratio from 40:1 to 50:1 ( $[(\text{I})]$   $2\text{--}8 \cdot 10^{-3}$  M). Under these conditions, tolan as well as cis- and trans-stilbenes are hydrogenated virtually quantitatively in a few minutes to dibenzyl. Similarly, styrene is converted to ethylbenzene, 3-hexyne is converted to hexane, 1-heptene is converted to heptane, cyclohexene is converted to cyclohexane, and trans,trans-1,4-diphenyl-1,3-butadiene is converted to 1,4-diphenylbutane. Complex (I) itself rapidly absorbs hydrogen at 20°C in benzene solution to give dibenzyl in close to quantitative yield. In the absence of solvent, solid (I) reacts with hydrogen but, in addition to dibenzyl, significant amounts of cis- and trans-stilbenes, which are intermediates in the formation of dibenzyl, are also formed in this case. Complex (I) was postulated previously as an intermediate in the catalytic hydrogenation of tolan by molecular hydrogen to dibenzyl by the action of  $\text{Cp}_2\text{Ti}(\text{CO})_2$  [4]. However, our attempts to synthesize this complex by the reaction of  $\text{Cp}_2\text{Ti}(\text{CO})_2$  with tolan were unsuccessful.

## LITERATURE CITED

1. V. B. Shur, S. Z. Bernadyuk, V. V. Burlakov, V. G. Andrianov, A. I. Yanovskii (Yanovsky), Yu. T. Struchkov, and M. E. Vol'pin, *J. Organometal. Chem.*, **243**, 157 (1983).
2. V. B. Shur, V. V. Burlakov, and M. E. Vol'pin, Abstracts of the Fourth International Symposium on Homogeneous Catalysis [in Russian], Leningrad (1984), Vol. 4, p. 144.
3. V. B. Shur, V. V. Burlakov, and M. E. Vol'pin, Summaries of Reports of Third All-Union Conference on Metalloorganic Chemistry [in Russian], Ufa (1985), Part 2, p. 28.
4. K. Sonogashira and N. Hagihara, *Bull. Chem. Soc., Jpn.*, **39**, 1178 (1966).

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