

PHOTOCHEMICAL DEHYDROGENATION OF CYCLOHEXANE AND ITS  
DERIVATIVES BY THE CYCLOPENTADIENYL COMPLEXES OF  
RUTHENIUM WITH THE FORMATION OF  $\pi$ -ARENE COMPLEXES  
OF RUTHENIUM(II)

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The activation of the C-H bonds in alkanes and their derivatives by the complexes of transition metals is one of the most important tasks of homogeneous catalysis [1]. Earlier it was shown that the  $C_5Me_5Ru^+$  fragment, which is formed in the reaction of  $[C_5Me_5Ru(OMe)]_2$  with  $CF_3SO_3H$ , is capable of dehydrogenating cyclic alkenes, dienes, alcohols, ketones, enones, and dienones with the formation of  $\pi$ -coordinated aromatic compounds [2]. In the present work we found a fundamentally different method for activation of the C-H and C-O bonds in cyclohexane derivatives. Irradiation (here and subsequently for 3 h) of a solution of 2-cyclohexen-1-one (0.21 M) and the complex  $[(\pi-C_5Me_5)Ru(CH_3CN)_3]PF_6$  ( $4.4 \cdot 10^{-2}$  M) in methylene chloride with the full light of a high-pressure mercury lamp (1000 W) in a glass vessel in an atmosphere of argon at 20°C leads to the formation of the derivative  $[(\pi-C_5Me_5)Ru(\pi-C_6H_6)]PF_6$  with a yield of 40% on the Ru. The analogous reaction of 3-methyl-2-cyclohexen-1-one (0.18 M) and  $[(\pi-C_5H_5)Ru(CH_3CN)_3]PF_6$  (1) ( $4 \cdot 10^{-2}$  M) gave the complex  $[(\pi-C_5H_5)Ru(\pi-C_6H_5CH_3)]PF_6$  with a 25% yield, while the reaction of compound 1 with cyclohexene gave 10% of the complex  $[(\pi-C_5H_5)Ru(\pi-C_6H_6)]PF_6$  (2). It is particularly important that unlike the thermal reaction the photochemical method makes it possible to dehydrogenate cyclohexane. From compound 1 ( $4 \cdot 10^{-2}$  M) and cyclohexane (0.92 M) under the described conditions the complex 2 was obtained with a yield of 10%. All the obtained compounds were identified by PMR.

LITERATURE CITED

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