

ARYLATION OF OLEFINS BY PHENYL DERIVATIVES OF NONTRANSITION METALS IN
PRESENCE OF PLATINUM(IV) AND GOLD(III) COMPLEXES

G. V. Nizova and G. B. Shul'pin

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It has recently been found that the reaction between arylmercury compounds and H_2PtCl_6 leads to the formation of anionic σ -aryl complexes of Pt(IV) [1]. With olefins, these complexes react to give derivatives of styrene [2]. In the present work we report that when an aryl derivative of nontransition metal is heated with an olefin in CH_3COOH in the presence of H_2PtCl_6 , arylolefins are also formed. After 6 h of boiling a solution of $C_6H_5HgOCOCF_3$, $CH_2CHCOOH$, and $H_2PtCl_6 \cdot 6H_2O$ in CH_3COOH , followed by chromatography on silica gel and recrystallization from water, $C_6H_5CHCHCOOH$ was formed in a yield of 15%. The same product was obtained in a yield of 86% when $(C_6H_5)_4Sn$, $CH_2CHCOOH$, and H_2PtCl_6 were heated in CH_3COOH for 3 h. Similarly, the reaction with $(C_6H_5)_4Pb$ leads to the formation of cinnamic acid in a yield of 30%. Under these conditions, the reaction between $(C_6H_5)_2SbCl_3$ or $(C_6H_5)_3BiCl_2$ and acrylic acid gave only traces of cinnamic acid. The presence of $HAuCl_4$ also causes arylation of olefins: from $C_6H_5HgOCOCF_3$, $C_6H_5CHCH_2$, and $HAuCl_4$ in CH_3COOH , $C_6H_5CHCHC_6H_5$ was obtained in a yield of 14%. The reaction between $(C_6H_5)_4Sn$, $CH_2CHCOOH$, and $HAuCl_4$ gave a 98% yield of cinnamic acid. It has been assumed that, as in the case of arylation by palladium(II) salts [3], the action of Pt(IV) or Au(III) consists in initial formation of a σ -aryl complex of the metal, followed by the addition of the olefin at the aryl-metal bond and elimination of a hydride derivative of Pt(IV) or Au(III). The hydride then splits off HCl with a decrease of oxidation of the metal. We should note that after the reaction between $C_6H_5HgOCOCF_3$ or $(C_6H_5)_4Sn$ and $CH_2CHCOOH$ in the presence of Na_2OsCl_6 , no significant amounts of cinnamic acid were observed in the reaction mixture. The reaction between the aryl compounds of nontransition metals and olefins in the presence of H_2PtCl_6 or $HAuCl_4$ is thus a convenient preparative method for the preparation of styrene derivatives.

LITERATURE CITED

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