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Alkyl & Aryl Transfer Reactions of Trialkylborane & Triarylborane in the Presence of Metal Alkoxide to the Carbonyl Compounds Using Various Sacrificial Anodes *via* Electrochemical Method

메탈 알콕사이드 존재 하에서 희생 양극을 이용한 트리알킬보란 및 트리아릴보란의 카르보닐화합물로의 알킬 및 아릴 이동 반응에 대한 전기화학적 방법

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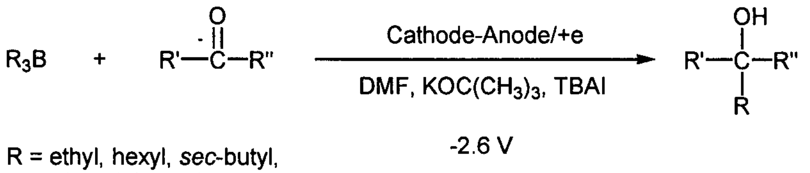
We developed the new method for the alkyl(or aryl) transfer reaction from trialkylborane(or triarylborane) to the carbonyl compounds such as aldehydes and ketones, electrochemically under mild conditions. The alkyl(or aryl) groups of trialkylborane(or triarylborane) utilized in this reaction were ethyl, hexyl, *sec*-butyl, phenyl and benzyl groups.

Alkyl(or aryl) anions or radicals, generated electrochemically from trialkylboranes(or triarylboranes) by use of two cathodes such as platinum and stainless, and the various sacrificial anodes such as copper, magnesium, aluminum and zinc, are transferred to the carbonyl carbon to produce the corresponding alcohols in good yields. Especially, when the metal alkoxide were added to this reaction system, we can decrease the reduction potential to -2.6 V, and increase the chemical & current yield.

Electrochemical synthesis using a variety of trialkylboranes(or triarylboranes) has been achieved in an undivided electrolytic cell under nitrogen atmosphere. The approximate rate and stoichiometry of the reaction of trialkylborane(or triarylborane) with the selected carbonyl compounds containing various functional groups were examined under the optimal condition in order to enlarge the scope of its applicability of electrochemical alkyl(or aryl) transfer reaction. The reactivity and mechanism of this newly devised reaction will be discussed.



R = ethyl, hexyl, *sec*-butyl,
phenyl, benzyl
R' = methyl, pentyl, phenyl
R" = H, methyl, ethyl, iso-propyl,
sec-butyl, phenyl

Cathode = Pt, stainless
Anode = Cu, Zn, Al, Mg