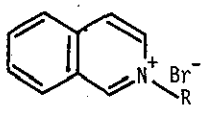
A NEW ELECTROREDUCTIVE ANNELATION REACTION IN HETEROCYCLIC COMPOUNDS

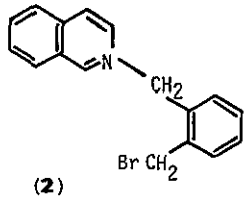
Tatsuya Shono, Hiroshi Hamaguchi, Yoshihiro Usui, and Kaoru Yoshida
Faculty of Engineering, Kyoto University,
Yoshida, Sakyo-ku, Kyoto 606, Japan

Electrochemical reduction of onium salts of nitrogen heterocyclic compounds in the presence of alkyl halides was found to be a new versatile carbon-carbon bond formation method applicable to annelation reactions. The mechanism of this new C-C bond formation involves the reductive transformation of an onium salt to an anion followed by the attack of this anion to an alkyl halide.

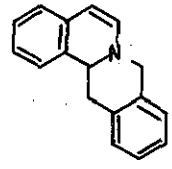
Thus, cathodic reduction of 2-(2-bromomethylbenzyl)isoquinolinium bromide in DMF under the constant potential of 1.8 V vs. SCE gave an isoquinoline derivative through the expected annelation reaction.



(**1**)

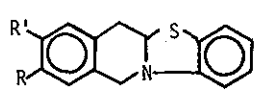


(**2**)

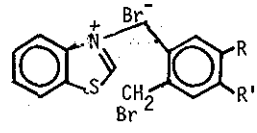


(**3**)

Similarly, 2-(2-bromomethyl-3,4-dimethoxybenzyl)-3,4-dihydro-5,6-dimethoxyisoquinolinium bromide afforded xylopinine upon electroreduction. This electroreductive method could also be applied to syntheses of benzothiazolo[3,2-*b*]-isoquinoline derivatives (**4**) from 3-alkylbenzothiazolium salts (**5**).



(**4**)



(**5**)

The formation of laudanosine from 3,4-dimethoxybenzyl bromide and 2-methyl-3,4-dihydro-5,6-dimethoxyisoquinolinium salt in remarkably good yield clearly demonstrated the usefulness of this electroreductive method in the intermolecular C-C bond formation.