

Reaction of 2-Aryl-azirines with Rhodium(I) Complexes

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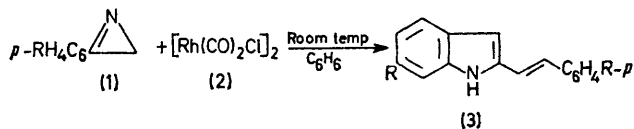
Summary Chlorodicarbonylrhodium(I) dimer, $[\text{Rh}(\text{CO})_2\text{Cl}]_2$, or chlorocarbonylbis(triphenylphosphine)rhodium, $[(\text{Ph}_3\text{P})_2\text{Rh}(\text{CO})\text{Cl}]$, reacts with 2-aryl-azirines under gentle conditions (benzene, room temperature) to afford 2-styryl-indoles.

A RECENT publication has described the Group 6 metal carbonyl-induced dimerization of azirines to pyrazines and dihydropyrazines under gentle conditions.¹ We now report that rhodium(I) carbonyl complexes effect a different, interesting, and useful reaction with 2-aryl-azirines.

Reaction of 2-aryl-azirine (**1**; R = H, Me, OMe, or Br) with chlorodicarbonylrhodium(I) dimer (**2**) or chlorocarbonylbis(triphenylphosphine)rhodium [**2**] is superior for work-up purposes in benzene at room temperature for 24 h affords 2-(2-arylvinyl)-indoles (**3**) in 39–80% yields based on (**2**) (**3**; R = H, 57%;² R = Me, 80%, m.p. 213–214 °C; R = OMe, 76%, m.p. 233–235 °C; R = Br, 39%, m.p. 242–244 °C). The structures of the products were determined on the basis of analytical and spectral data (**3**, R = H, is a known compound³). 2-Arylethylene indoles are important intermediates in alkaloid synthesis.^{2,3}

The reagent concentrations have a significant influence on the reaction. Using a 10:1 mole ratio of azirine to

rhodium carbonyl gave the indole as the only product (e.g., **3**, R = Me). Increasing the proportion of rhodium carbonyl to give a 6–7:1 ratio of (**1**):(**2**) affords (**3**) and a trace amount of 2,5-diarylpyrrole.⁴ Use of a 2:1 mole ratio of (**1**):(**2**) gave the 2,5-diarylpyrrole as the principal product, with (**3**) and an unidentified rhodium complex as by-products.



The following general procedure was used. To 1 mmol of (**2**) in 50 ml of anhydrous benzene was added 7 mmol of (**1**) in 25 ml of benzene. The reaction mixture was stirred at room temperature for 24 h and filtered. The precipitate was washed with benzene (50 ml) and the washings were added to the filtrate. The filtrate was concentrated *in vacuo* and the indole was purified by chromatography on Florisil.

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