A NEW SYNTHESIS OF PYRROLE DERIVATIVES BY THE USE OF TRIALKYLTHIOCYCLOPROPENIUM ION

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In our series of study on trialkylthiocyclopropenium ion (1), the reaction of 1 with trivalent phosphorus compounds were investigated. When hexamethylphosphorus triamide was used, the pyrrole derivatives were obtained in 26% yield besides the phosphonium salt. This is the first example of the pyrrole ring formation from the cyclopropenium compounds. The reaction is well explained by the reaction route where the nitrogen atom of HMPT might attack at the cyclopropenyl ring carbon followed by the cleavage of P-N bond, the ring opening and the subsequent cyclization, which suggests the more facile preparation of the pyrrole derivatives from 1 and dialkylamines.

Thus the reaction of 1 with dimethylamine was attempted and the N-methylpyrrole derivatives was obtained as expected. Desulfurization reaction of this product with Raney nickel gave N-methylpyrrole. The reactions of 1 with other secondary amines such as diethylamine, pyrrolidine and piperidine were carried out and the corresponding pyrrole derivatives were also obtained. Similar treatment of 1 with primary amines, however, did not give the pyrroles, but thioacrylamide derivatives. In this paper, the feature of reaction behavior in the above reactions are discussed comparing to those already known by our preceding investigations.