A NEW SYNTHETIC METHOD FOR 2(5H)-FURANONE DERIVATIVES

Kiyoshi IWAI, Mikio KAWAI, Shûichi YAMAGIWA
Hiroshi KOSUGI, and Hisashi UDA
Chemical Research Institute of Non-Aqueous Solutions,
Tohoku University, Katahira-2, Sendai 980

A new and general synthetic method for 2(5H)-furanone derivatives has been investigated.

The dianion (1) of phenylthioacetic acid (2) reacts clearly with mono- and disubstituted terminal epoxides to give γ-mono- and γ,γ-disubstituted α-phenylthio-γ-butyrolactones (3). Oxidation followed by pyrolysis of the resulting sulfoxides (4) leads to 5-mono- and 5,5-disubstituted 2(5H)-furanones in excellent yield. From the reaction of (1) with a symmetrically 1,2-disubstituted epoxide 4,5-disubstituted derivative is obtained. According to the similar procedure, 3,5-disubstituted 2(5H)-furanones are prepared from the dianion of alkylated derivatives of (2) and terminal epoxides.

3-Phenylthio-2(5H)-furanones (5) are synthesized by applying the Pummerer rearrangement to α-phenylsulfinyl-γ-butyrolactones. Conjugate additions of dialkylcopperlithium reagents and enolates to (5) and the sulfoxide derivatives (6) give the corresponding γ-butyrolactones which are transformed into 4-mono- and 4,5-disubstituted 2(5H)-furanones.

3-Mono-, 3,4-di-, and 3,4,5-trisubstituted 2(5H)-furanones are prepared by α-alkylation (C-3 position of furanone) of the intermediary α-phenylthio-γ-butyrolactone derivatives followed by oxidation and pyrolysis.