HETEROCYCLES, Vol 14, No. 1, 1980

SYNTHESIS OF LARGE MEMBERED HETEROCYCLES BY REGIOSELECTIVE REMOTE PHOTOCYCLIZATION

PHOTOREACTION OF SULFIDE-CONTAINING PHTHALIMIDES

Yasuhiko Sato, Masao Wada and Hideo Nakai
Organic Chemistry Research Laboratory, Tanabe Seiyaku Co., Ltd.,
Toda, Saitama, 335 Japan.
Yasumaru Hatanaka and Yuichi Kanaoka
Faculty of Pharmaceutical Sciences, Hokkaido University,
Sapporo, 060, Japan.

Certain phthalimides possessing a terminal sulfide function in their N-alkyl side chain undergo photocyclization to give azathiacyclols. The present paper reports a large membered heterocycles synthesis on the basis of this unusually regioselective remote photocyclization of the sulfide-containing phthalimides.

(1) The general pattern of the photolysis of N-substituted phthalimides is explained on the basis of formal analogy with the Norrish type II mechanism.
(2) Photolysis of N-ω-methylthioalkylphthalimides led to synthesis of medium to large membered azathiacyclol derivatives.
(3) Photolysis of N-ω-methylthiopolyoxaalkyl phthalimides led to synthesis of medium to large membered heteromeric crown ether analogs.
(4) Phthalimide possessing a ω-sulfide function with ester chain undergo, on irradiation, facile photocyclization to afford nine to twenty seven membered heteromeric lactone derivatives.
(5) A homologous series of phthalimides possessing a methylthio function with peptide chain undergo, on irradiation by high pressure mercury lamp or sunlight, facile photocyclization to afford eight to thirty eight membered heteromeric cyclic peptide analogs.

Tentatively regioselective remote photocyclization may be rationalized by enhanced proton transfer from the methylthio group which would be held close to phthalimide carbonyl by postulated charge transfer complex formation in the excited state.

The photolysis of donor-acceptor pair system is proposed to be a general synthetic method as well as a model of a synthetic control approach.