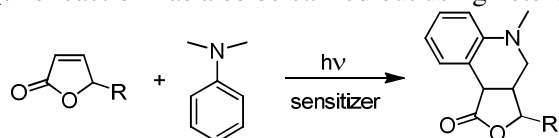


Electron and hydrogen transfer in organic photochemical reactions

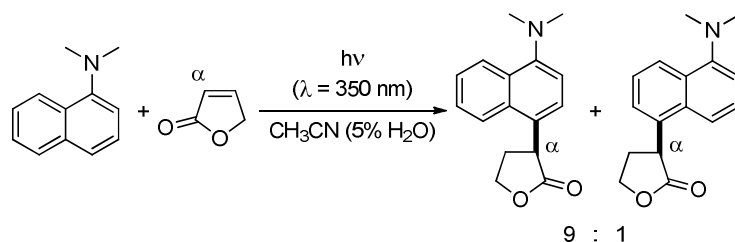
Electron as well as hydrogen transfer steps play a central role in many photochemical reactions of interest for application to organic synthesis. Often, both reactions are linked together, for example, in the sense that a hydrogen atom is transferred in two steps: an electron transfer is followed by a proton transfer. In some cases stereo or regio selectivity depends on how hydrogen is transferred, either in a two step mechanism as outlined or in a one step process in which proton and electron are transferred almost simultaneously. Photochemical electron transfer is also encountered in photocatalytic reactions. These transformations are also applied to organic synthesis. In this regard, mechanisms and application to organic synthesis of three photochemical reactions will be discussed:

The photoinduced radical tandem addition cyclization of aromatic tertiary amines with alkenes [1] (this reaction has also been carried out using heterogeneous photocatalysis. [2]) (Scheme 1)



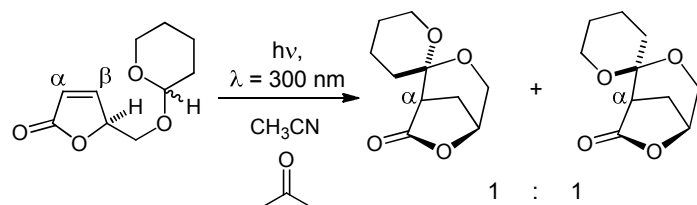
Scheme 1

The addition of naphthylamine derivatives to alkenes which is induced by a photochemical electron transfer (Scheme 2). [3]



Scheme 2

Triplet sensitized intramolecular radical reactions of furanone derivatives (Scheme 3). [4]



Scheme 3

[1] N. Hoffmann, S. Bertrand, S. Marinkovic, J. Pesch, *Pure Appl. Chem.* **2006**, *78*, 2227; A. G. Griesbeck, N. Hoffmann, K. D. Warzecha, *Acc. Chem. Res.* **2007**, *40*, 128.

[2] S. Marinkovic, N. Hoffmann, *Eur. J. Org. Chem.* **2004** 3102

[3] R. Jahjah, A. Gassama, F. Dumur, S. Marinkovic, S. Richert, S. Landgraf, A. Lebrun, C. Cadiou, P. Selles, N. Hoffmann, *J. Org. Chem.* **2011**, *76*, 7104

[4] R. Jahjah, A. Gassama, V. Bulach, C. Suzuki, M. Abe, N. Hoffmann, A. Martinez, J.-M. Nuzillard, *Chem. Eur. J.* **2010**, *16*, 3341