

**B.Sc. Semester-VI
Group-A / DSE-4
Organic Synthesis**



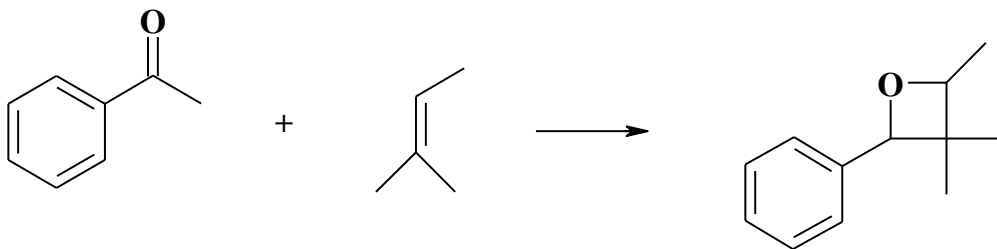
**III. Photochemistry
4. Paternò-Büchi Reaction**



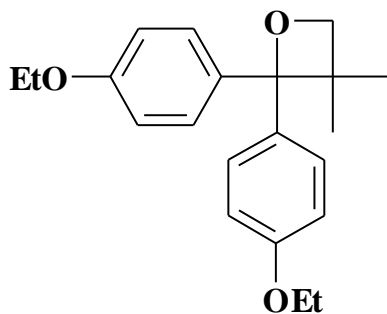
**Dr. Rajeev Ranjan
University Department of Chemistry
Dr. Shyama Prasad Mukherjee University, Ranchi**

Photochemical synthesis of oxetanes

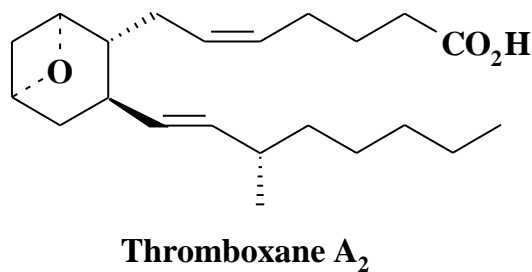
Paternò-Büchi Reaction



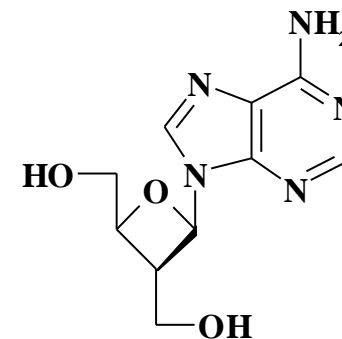
Paterno and Chieffi (1909), Buchi in 1954 mechanistic analysis



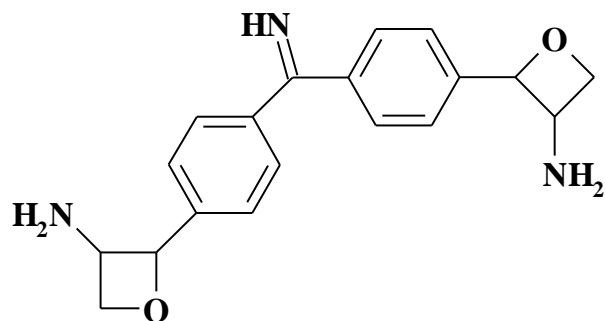
Insecticidal activity



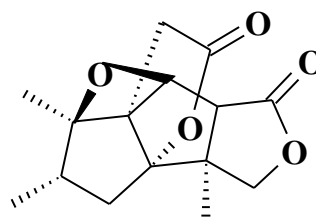
Thromboxane A₂



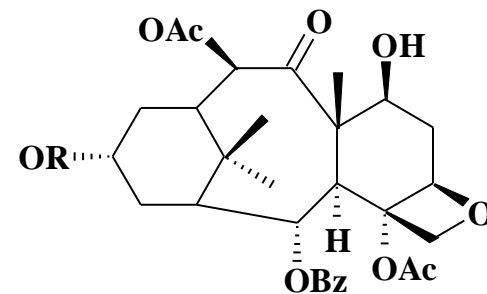
Oxetanocine



Bradyoxetin

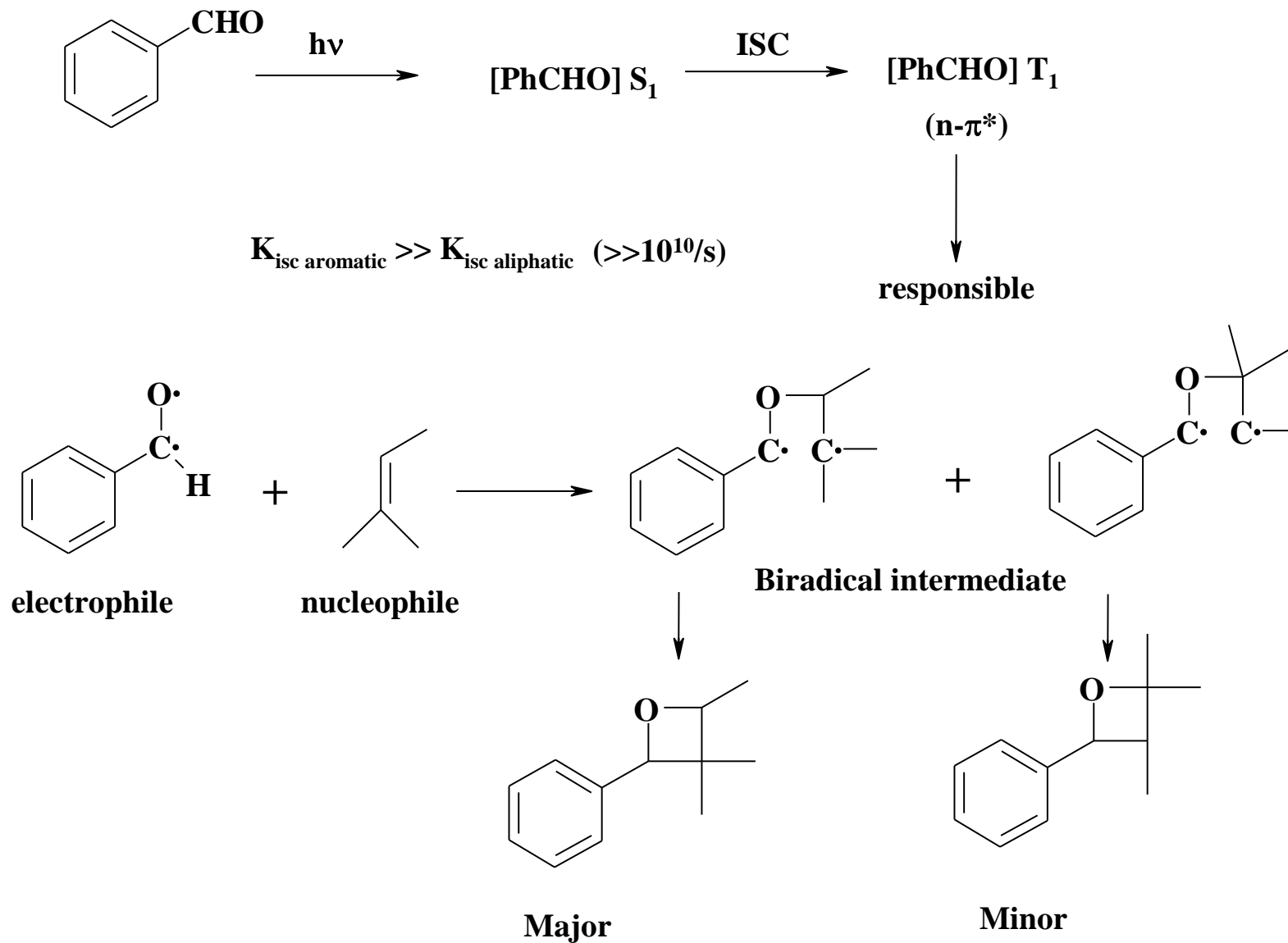


Merrilactone A

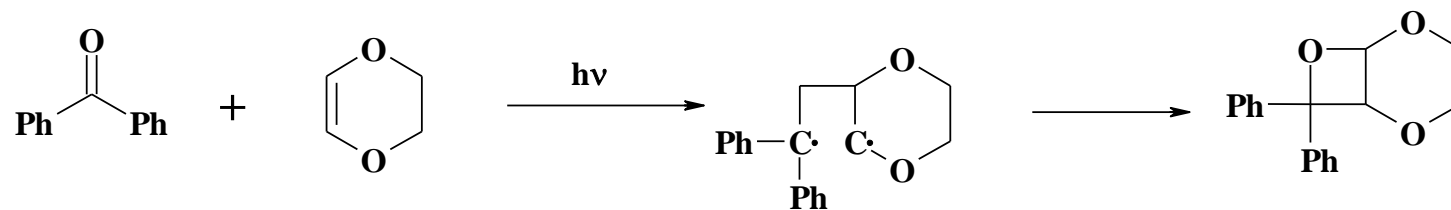
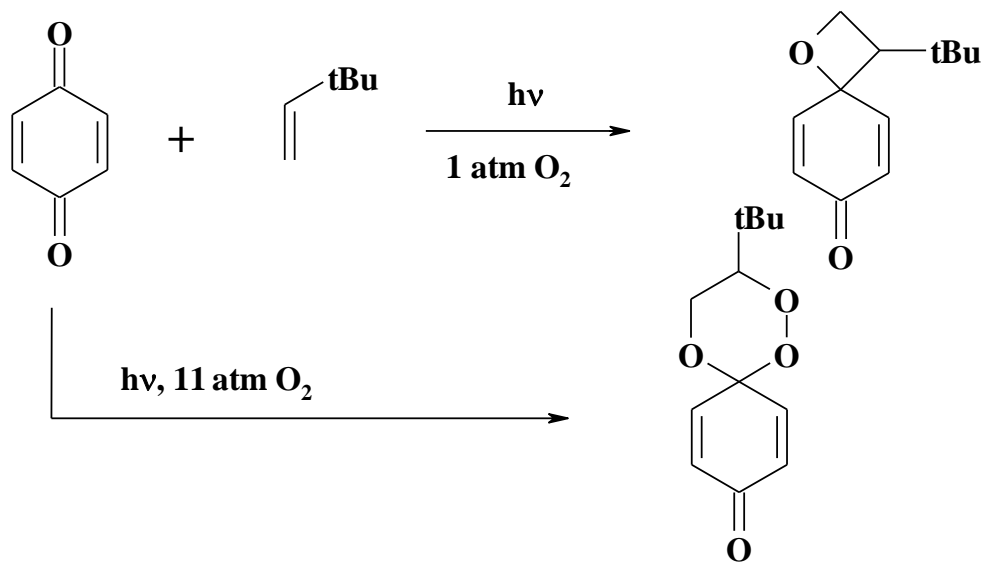
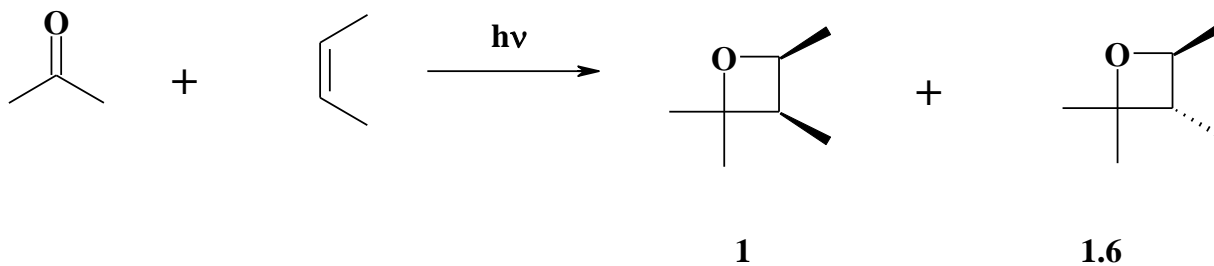


Palitaxel

Reaction mechanism



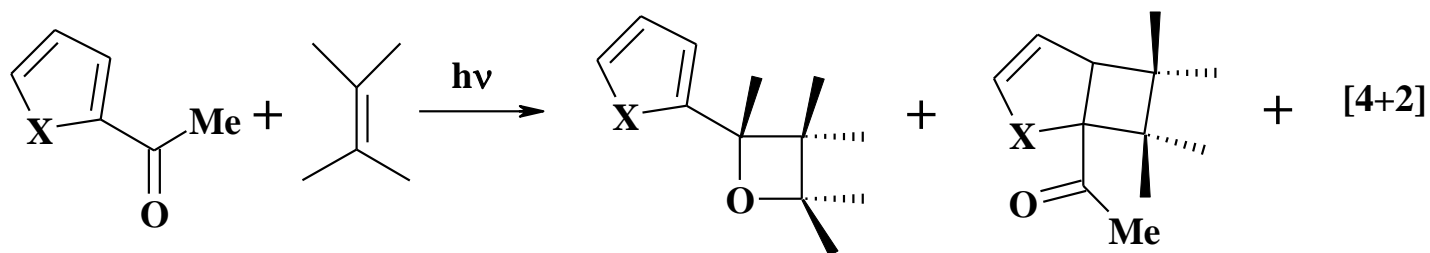
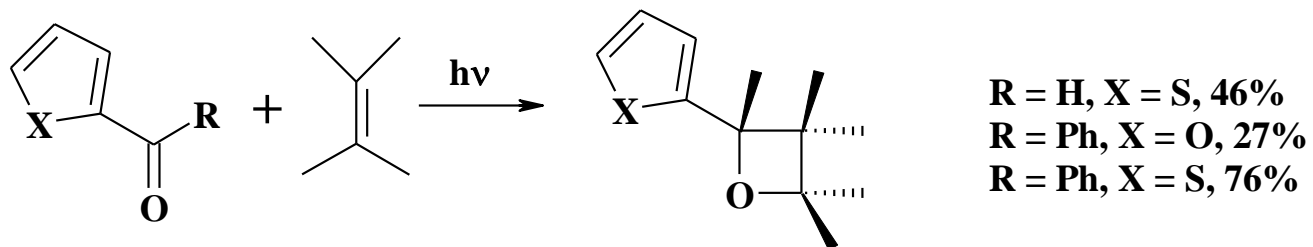
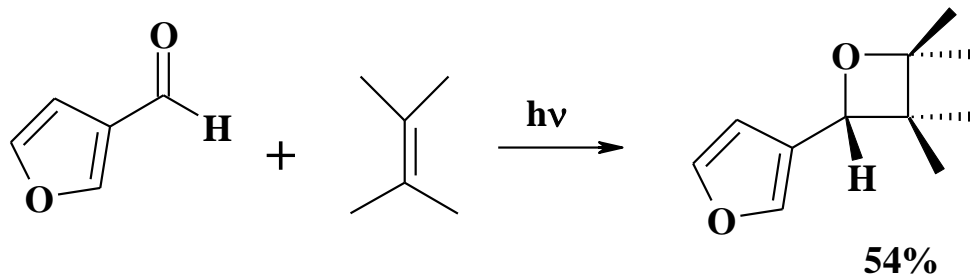
Intermediacy of biradical



lifetime = 1.6 ns

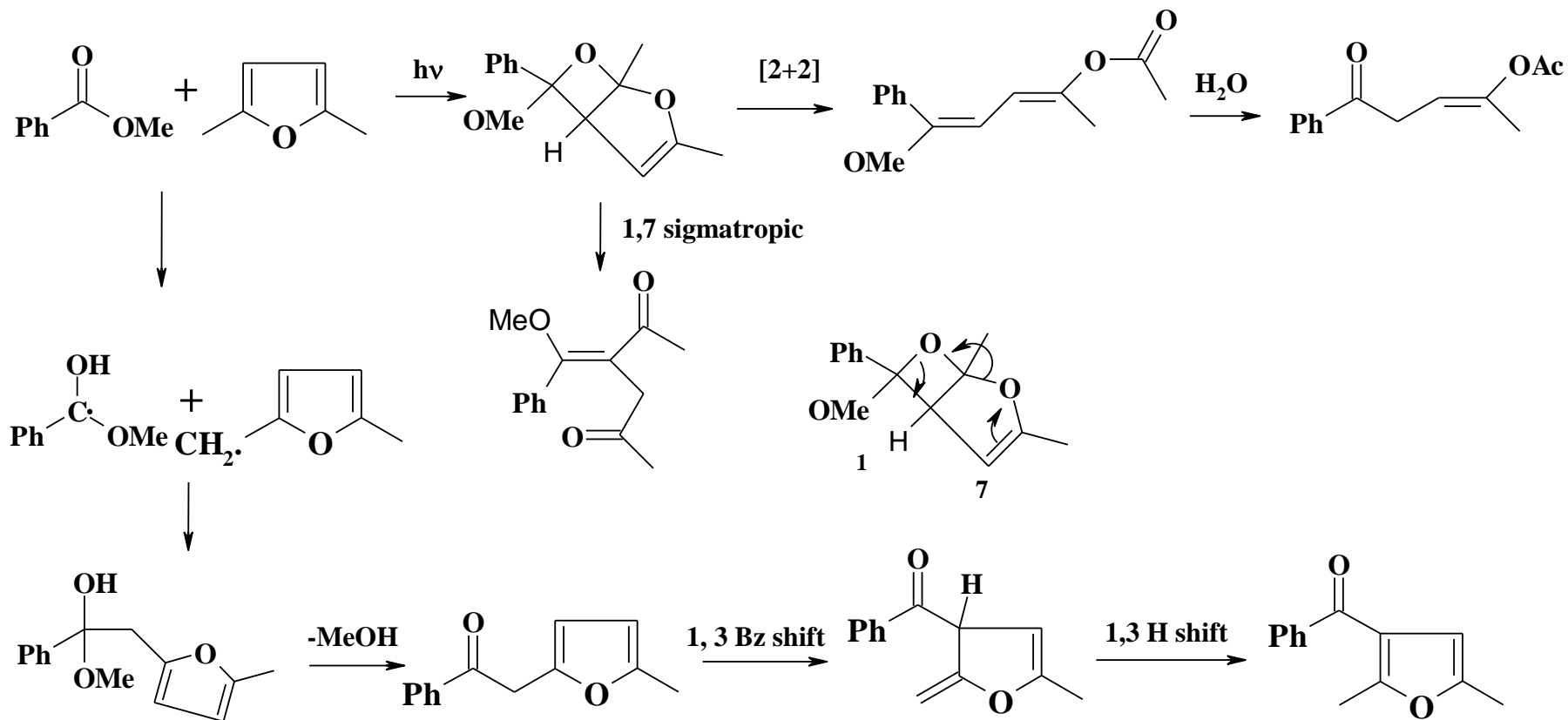
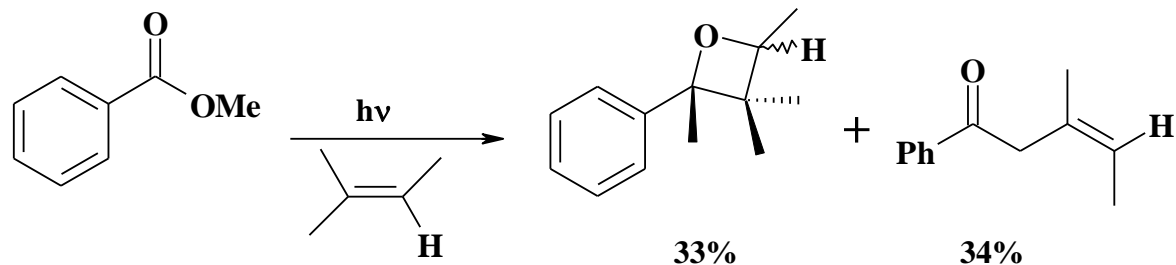
Substrate spectrum of Paterno-Buchi Reaction

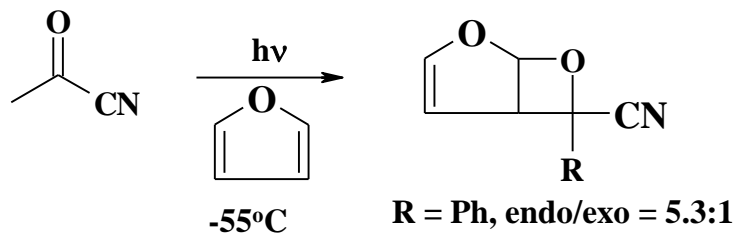
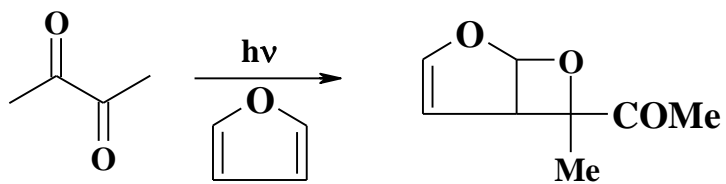
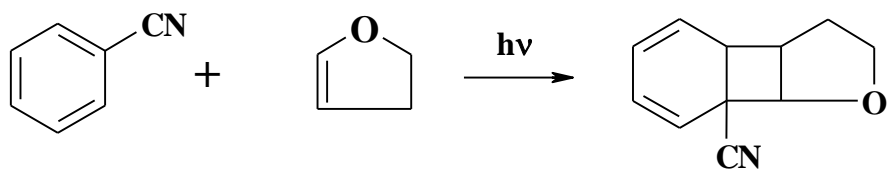
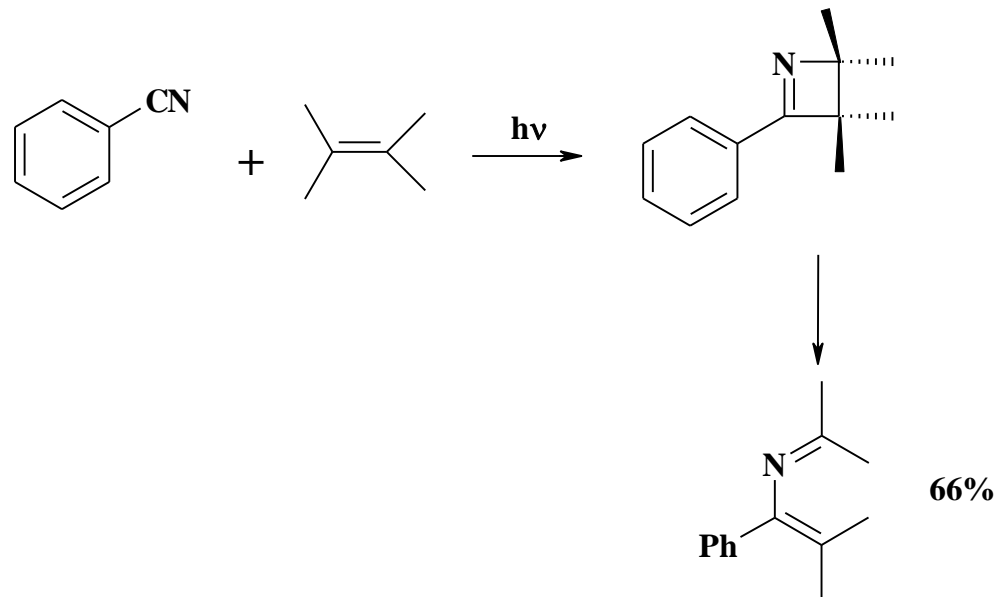
Aromatic ketones and aldehydes



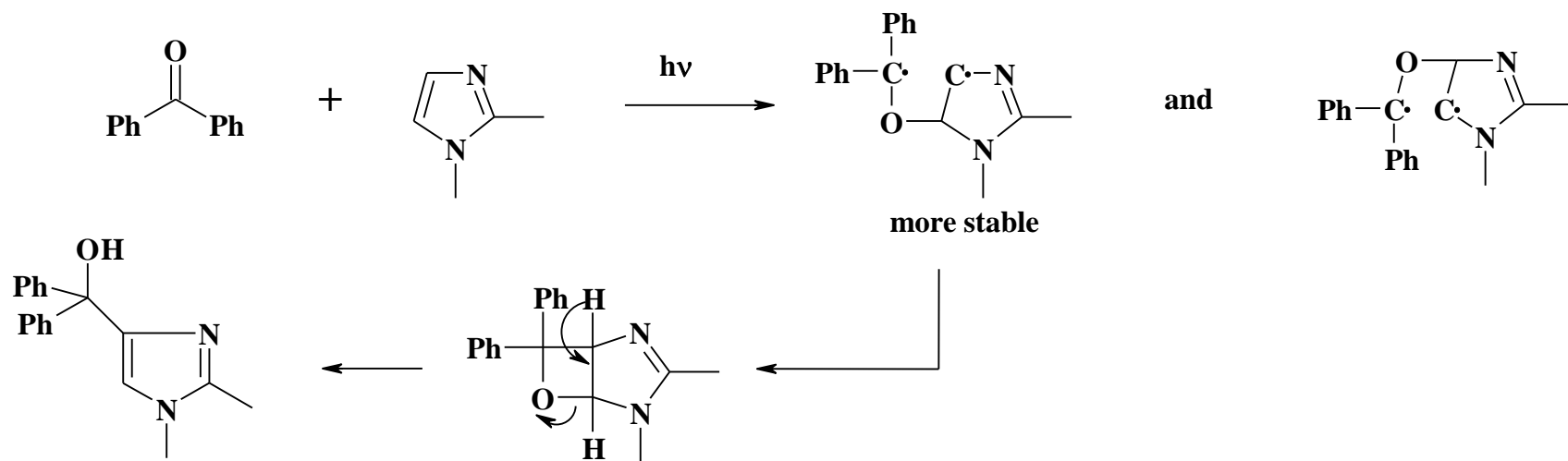
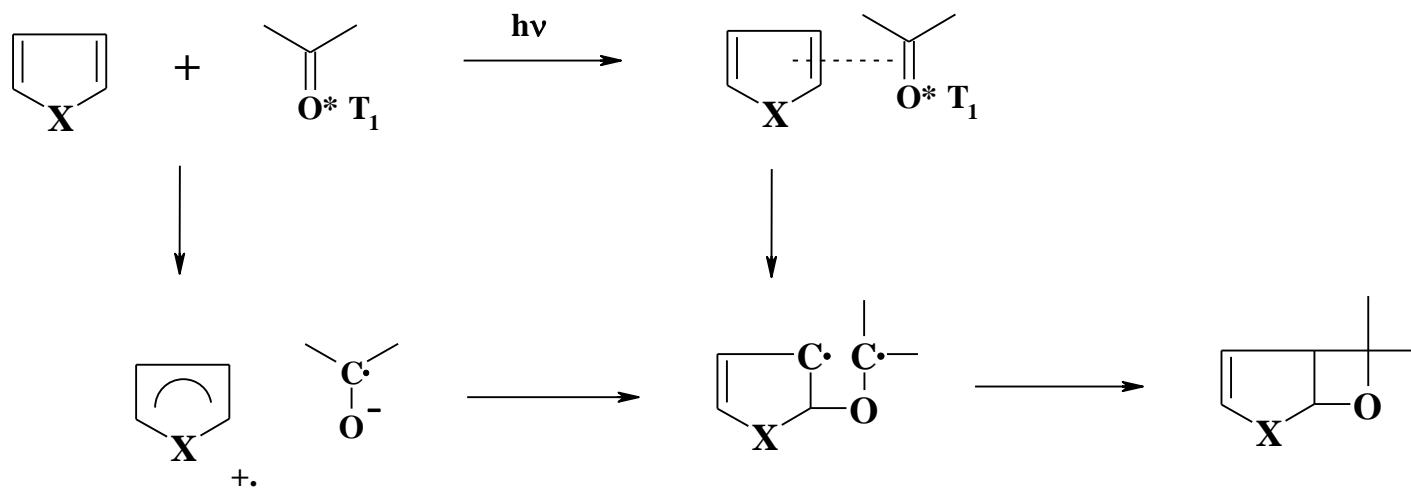
X = O	8%	33%	0%
X = S	11%	10%	38%

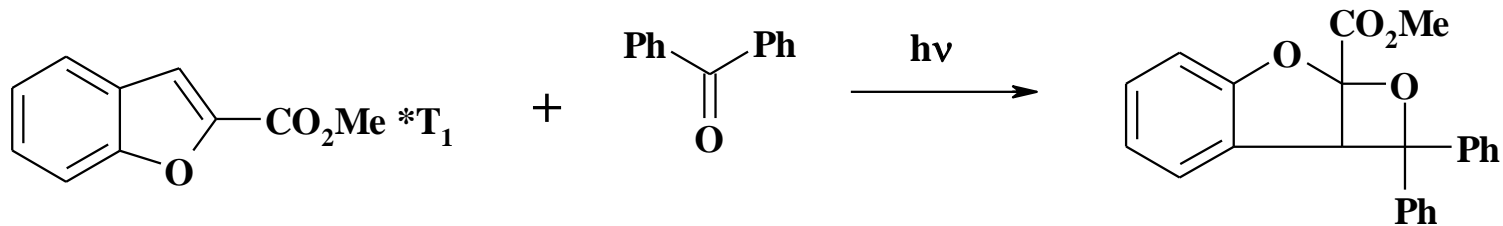
Carboxylic acid derivatives and nitriles



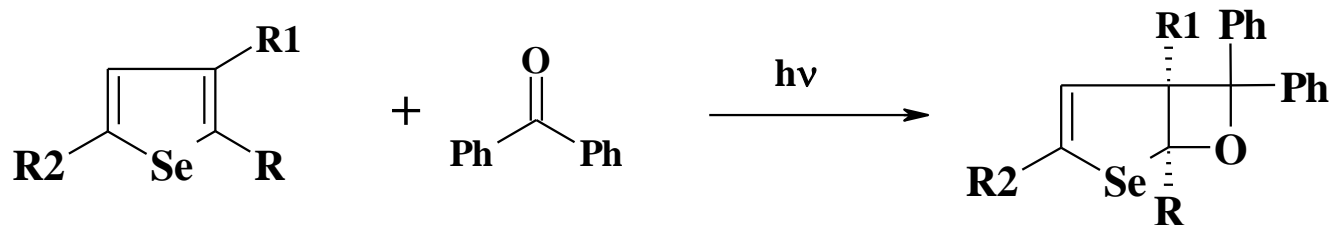
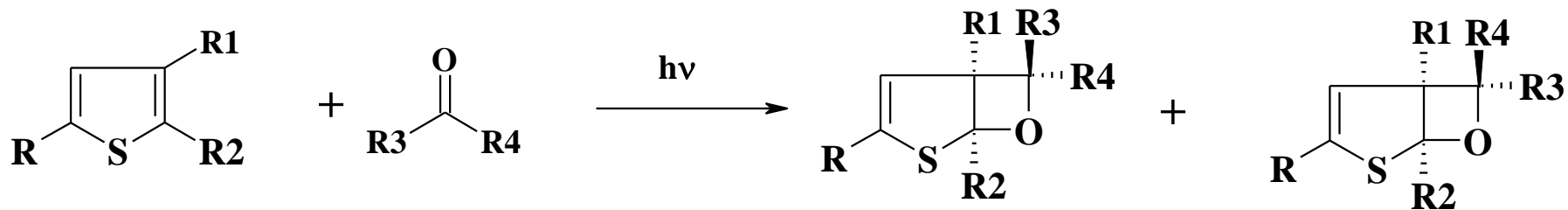


Oxetane formation: addition to heterocycles

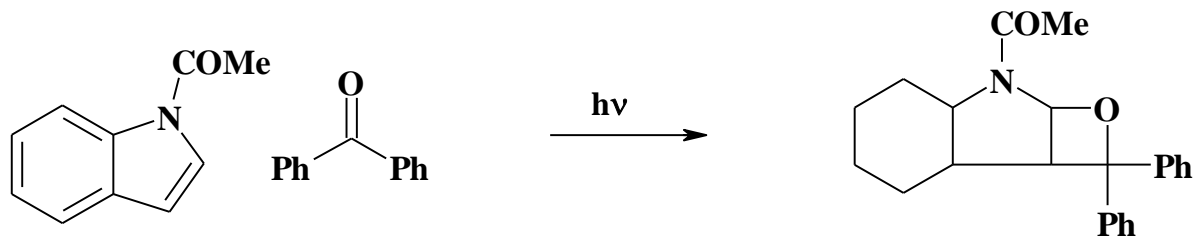
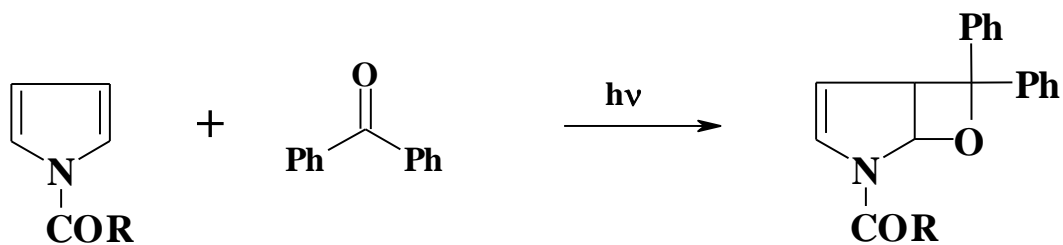
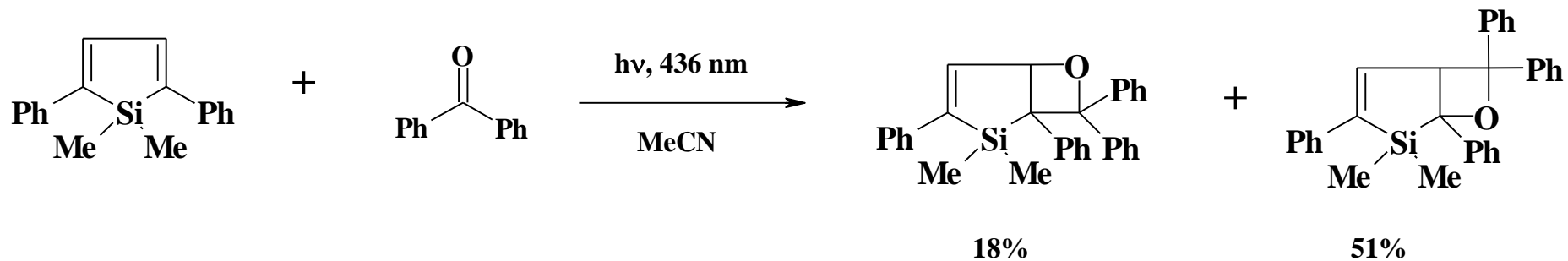




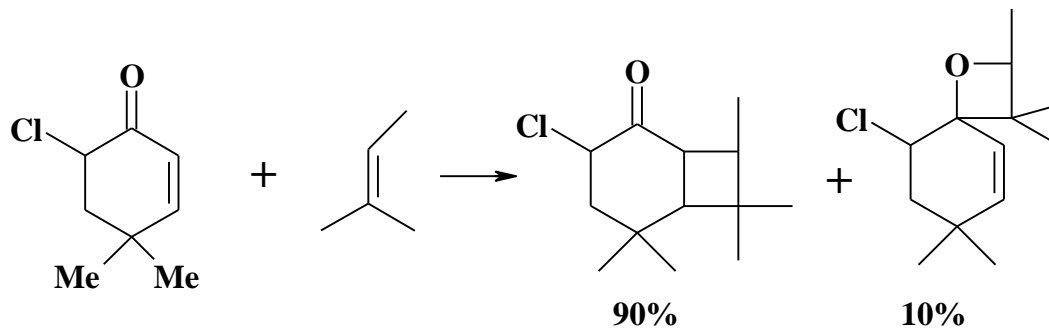
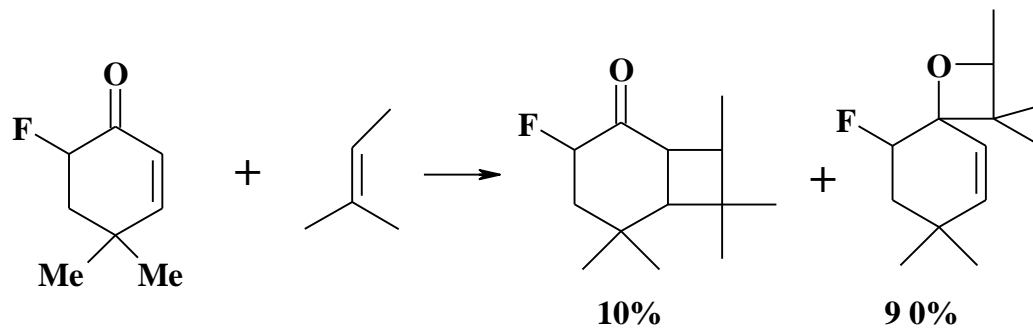
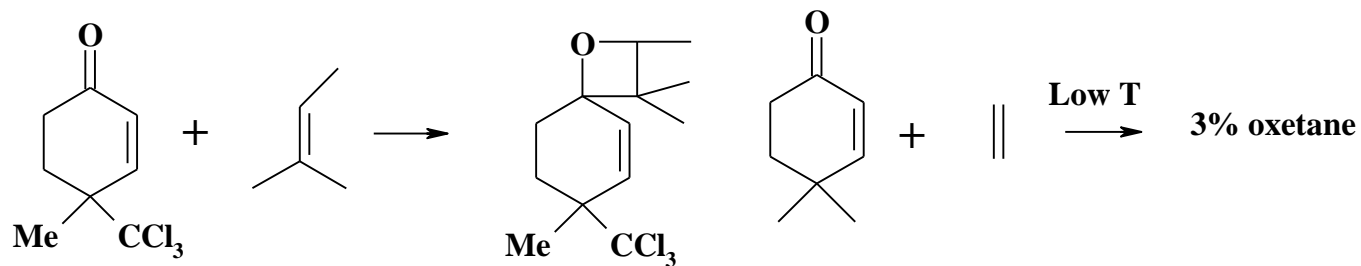
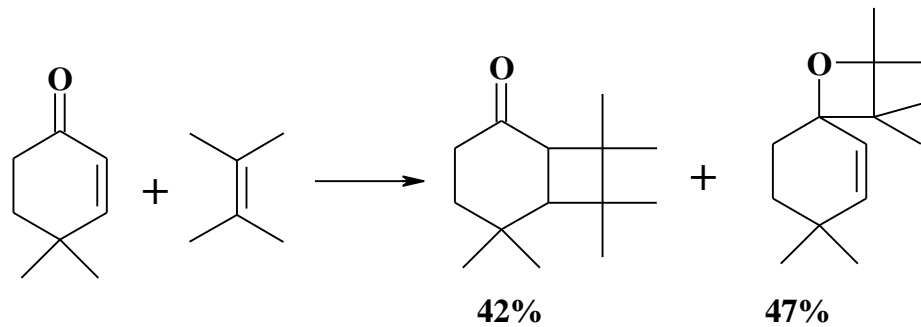
Methyl coumarilate

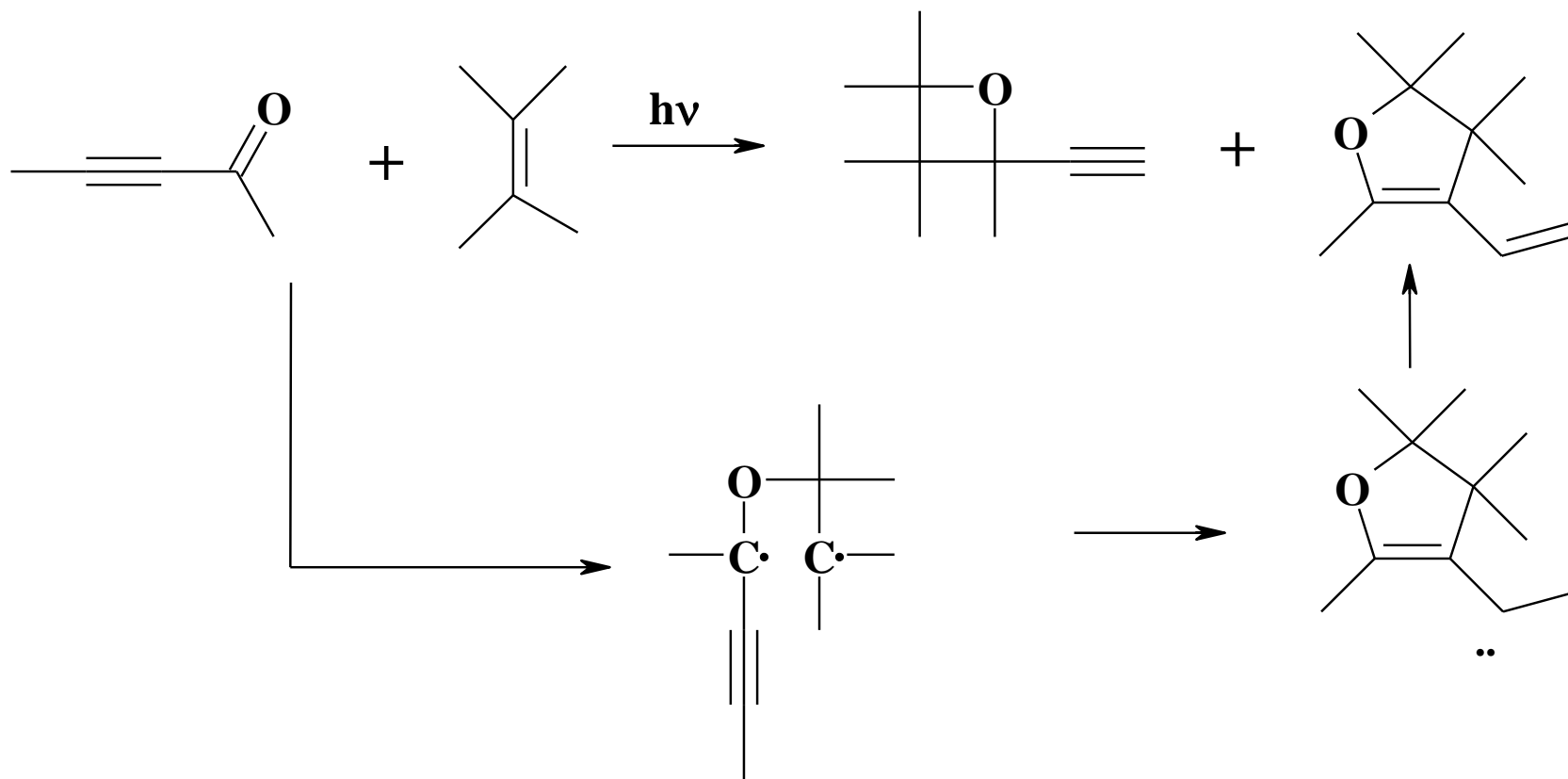
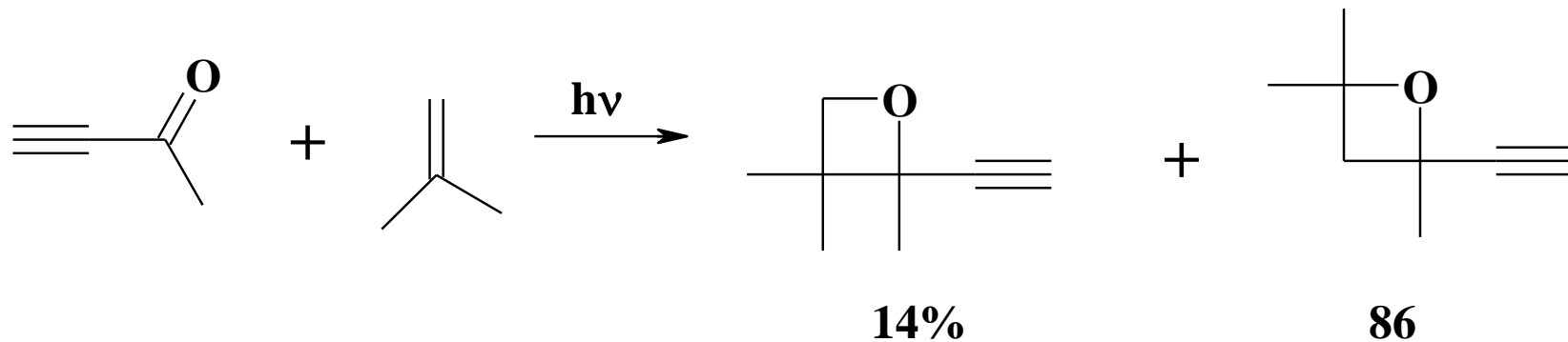


$\text{R}_1 = \text{R}_2 = \text{H}, \text{R} = \text{Me}$
 $\text{R} = \text{R}_2 = \text{H}, \text{R}_1 = \text{Me}$
 $\text{R}_1 = \text{H}, \text{R} = \text{R}_2 = \text{Me}$

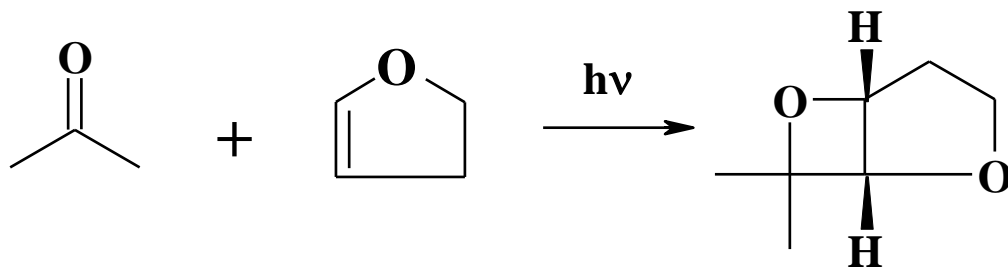
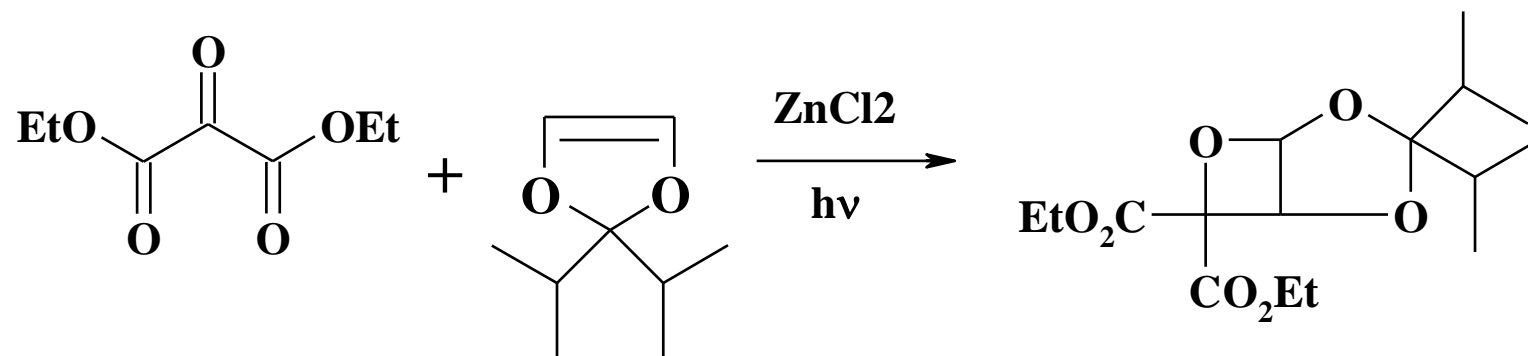
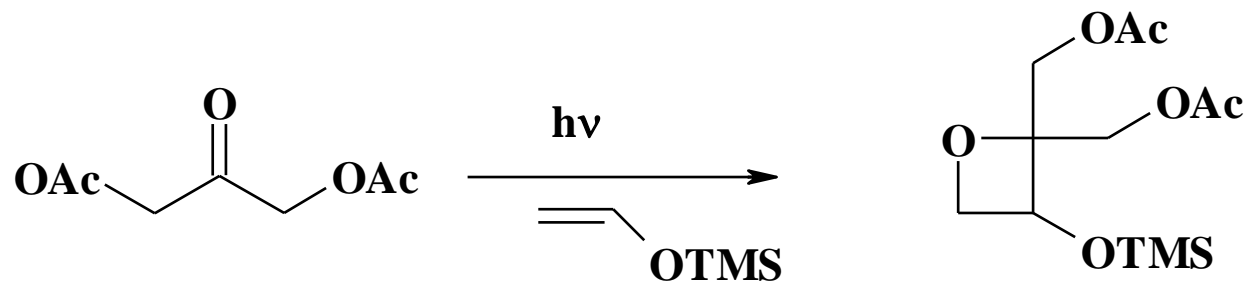


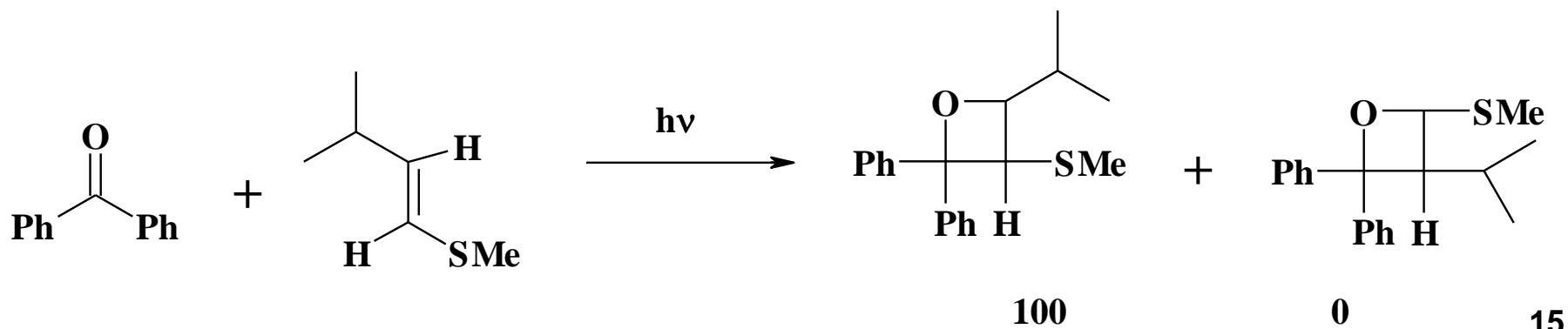
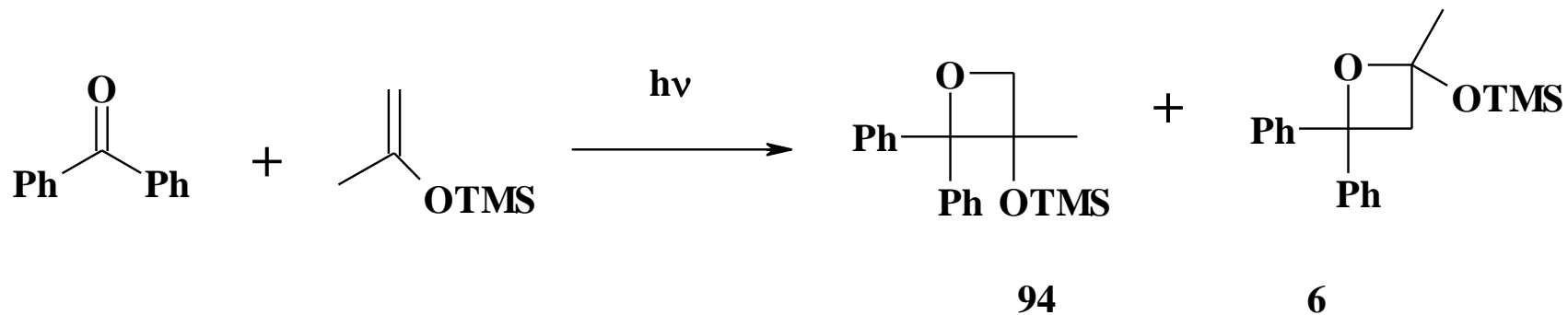
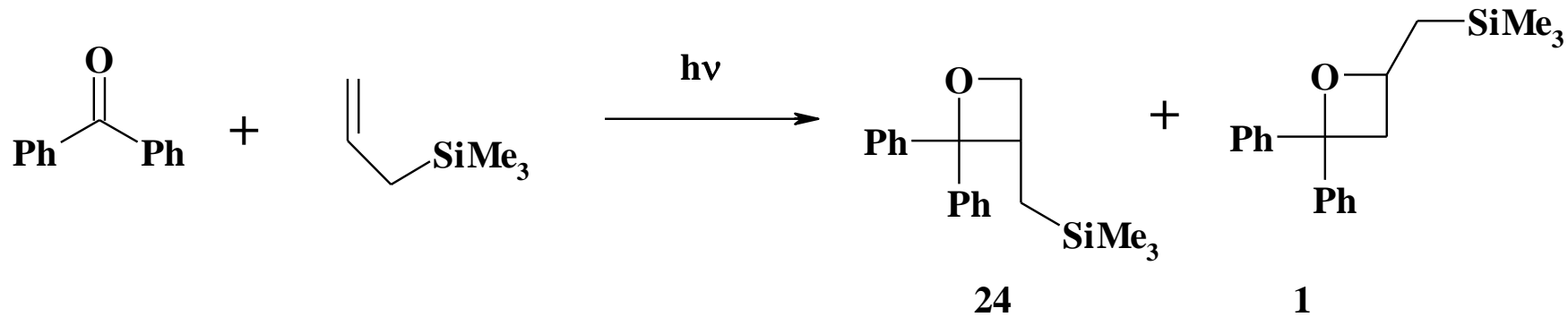
Enones and Ynones



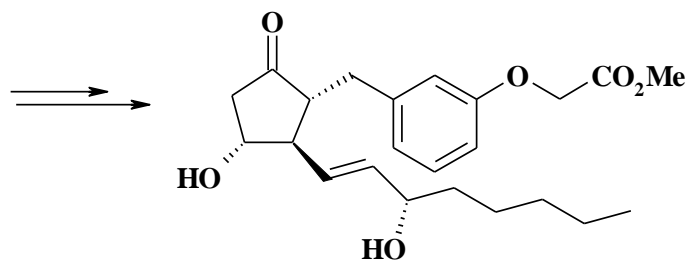
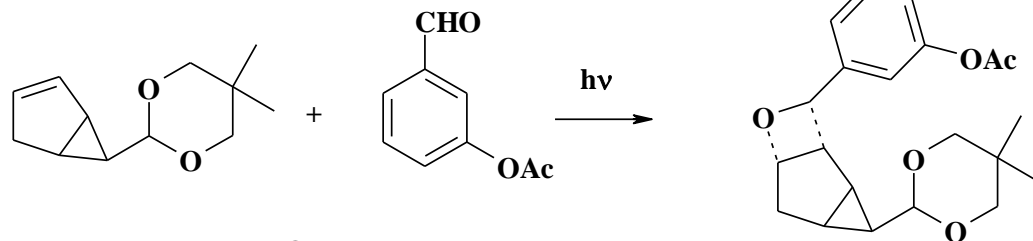
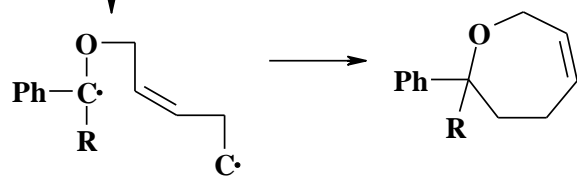
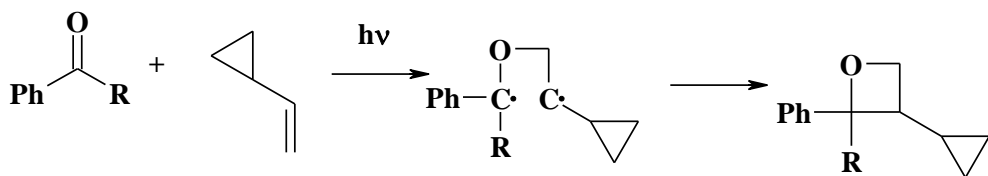
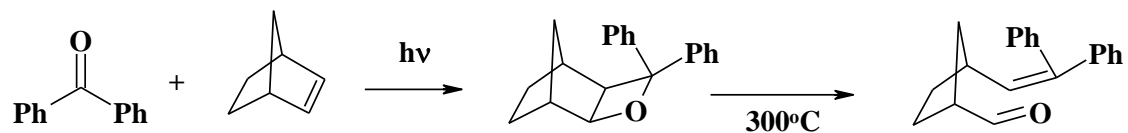
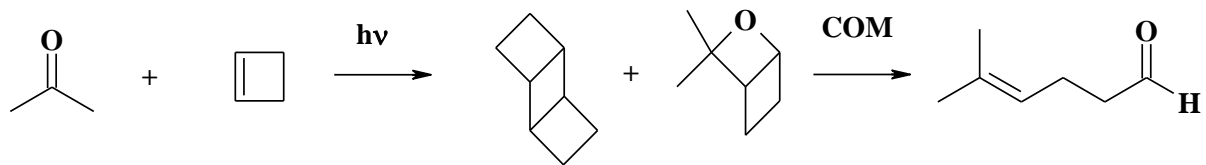


Alkenes substituted with electron donor

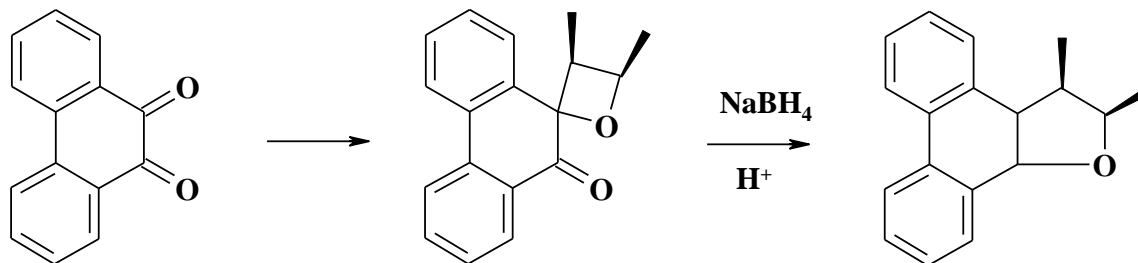
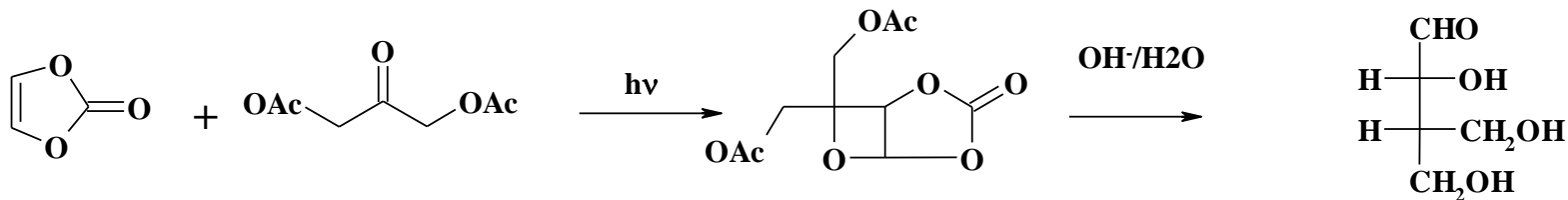
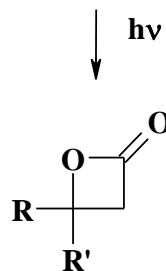
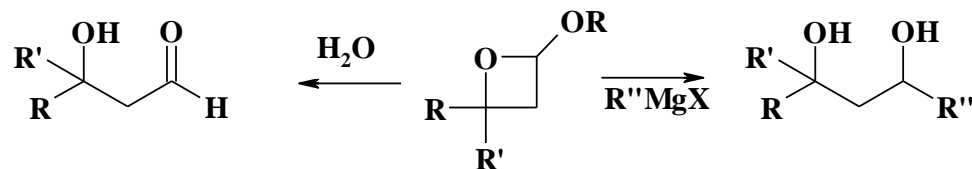
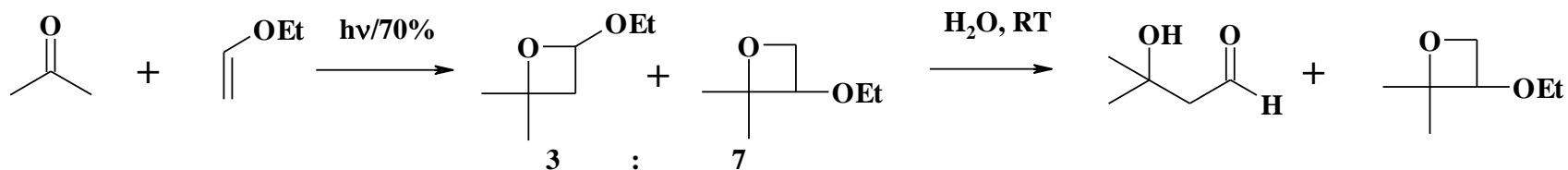




Miscellaneous Paterno-Buchi Reaction



The Paterno-Buchi reaction as a photochemical aldol equivalent



Thank You



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