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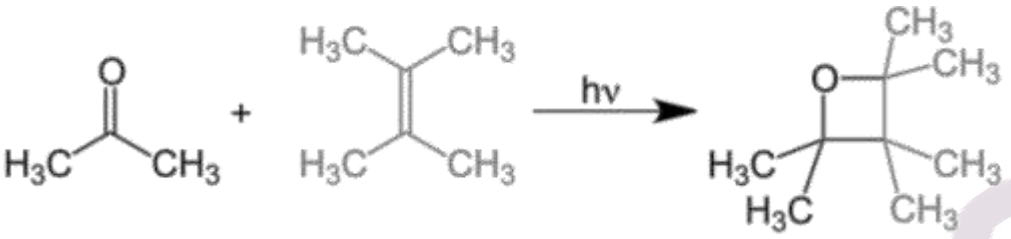
Study Notes On Patterno Buchi Reaction

PATERNO BUCHI REACTION

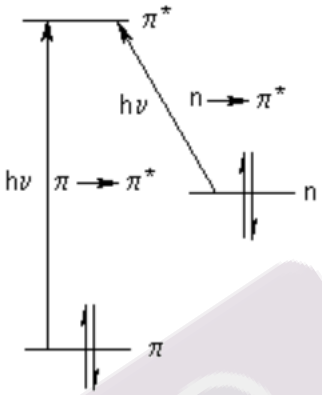
It is an [2+2] cycloaddition reaction with an excited carbonyl and an alkene in which four membered oxetane ring is formed.

General reaction-

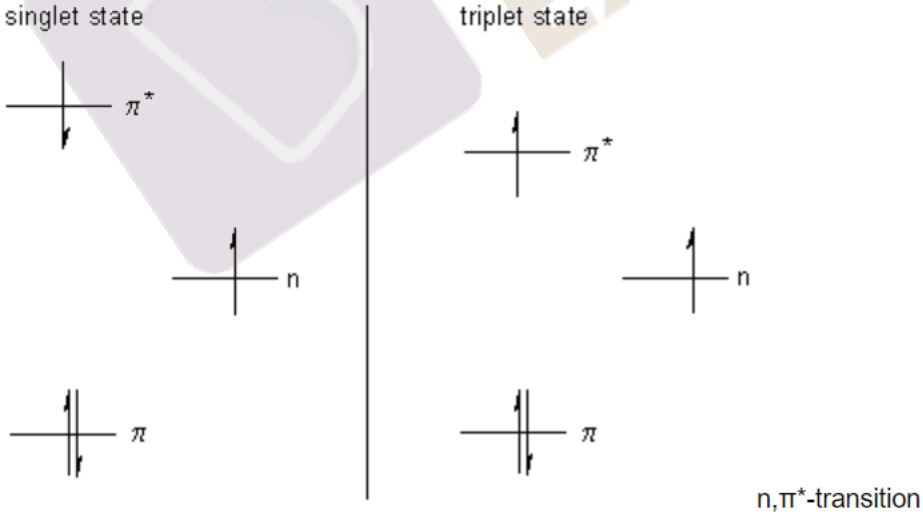


General Mechanism-

The possible transition in C=O is as follows-

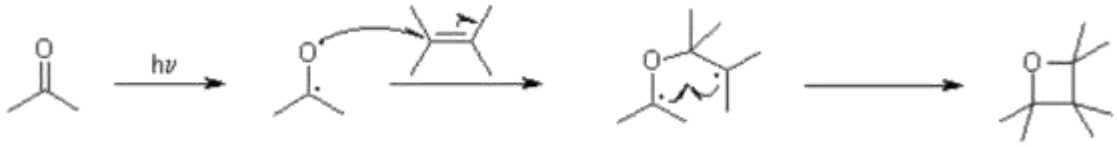


And once the C=O ground state is photoexcited, either a singlet or a triplet state is formed, as follows-



NOTE: For aromatic carbonyl compounds, the reaction occurs through a triplet excited state of the carbonyl compound.
For aliphatic carbonyl compounds, the reaction occurs through both, the singlet, and the triplet state of the carbonyl compound.

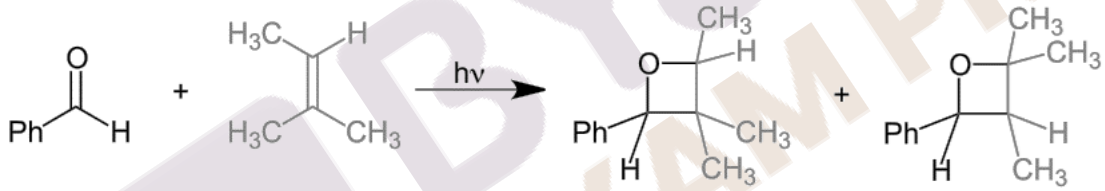
Any kind of transition (n,π* and π,π*) and electronic state (singlet, triplet) may participate in the first stage of this reaction, and an diradical intermediate is formed, as follows-



Regioselectivity-
For aliphatic carbonyl compounds, the reaction is stereospecific and yields a syn product.
For cyclic alkenes, the kinetically controlled endo isomer is the major product formed in this reaction.

The regioselectivity depends on-
(a) Stability of intermediate formed.
(b) Steric interactions of the intermediate diradical.

Example-



The products formed are structural isomers.

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