

NOTE

Irradiation of 9-Bromo-Fluorene in the Presence of Sensitizers/ Quenchers—An Approach to Determining Triplet Energy of 9-Bromo-Fluorene

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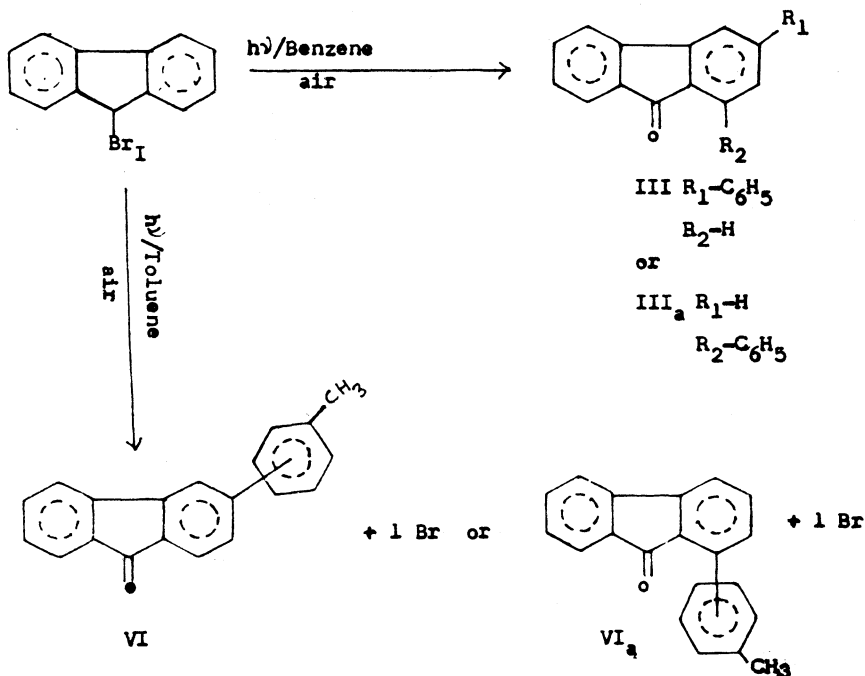
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Irradiation of 9-bromo-fluorene was done in the presence of a number of sensitizers/quenchers. The triplet energy of 9-bromo-fluorene was found to be equal to or greater than that of fluorenone (53.3 kcal/mole).

The electronic excitation of organic molecules is known to occur either by direct absorption of radiation or through transfer of energy by a suitable donor molecule. For the process of transfer of energy (photo-sensitization) to be a rapid and efficient one, the donor excited state should be sufficiently long-lived to be able to transfer its energy to the acceptor before various radiative or non-radiative decays occur and also the energy of the donor be greater than required to excite the acceptor molecule from its ground state to its first excited state. With a view to understand the excited state of 9-bromo fluorene its irradiation was done in the presence of the photo-sensitizers/quenchers.

9-Bromo-fluorene (I) was prepared as a method reported in literature¹, Irradiation of 9-bromo-fluorene (I) in the presence of sensitizers/quenchers were carried out at comparable concentrations of (I) in pyrex glass tubes using a



Merry-Go-Round-500 photoreactor (MGR-500). The MGR-500 assembly consists of a revolving bench of 12 or lesser number of tubes (same size 20×1.6 cm and provided with ground glass joints) which can be fixed in the middle of revolving tables so that it is equidistant from all the tubes. The photo-sensitizers/photo-quenchers used were benzophenone, β -acetonephthone, acetophenone, fluorenone and acetone. The results obtained from these experiments are shown in Tables 1 and 2.

These results appear to suggest that the above said photo reaction of (I) with benzene and toluene occurs atleast in part from its triplet excited state. Further, the observations of slow sensitization reaction of (I) in benzene by fluorenone and of no reaction, in its presence of (I) in toluene elludes to the fact that the transfer of triplet energy from fluorenone ($E_t = 53.3$ kcal/mole) to 9-Bromo-fluorene (I) occurs either extremely slowly or not at all. The triplet energy of 9-Bromo-fluorene (I) is, therefore, might perhaps, thus, be equal to or greater than that of fluorenone ($E_t = 53.3$ kcal/mole). The values for triplet energies in Table 1 and 2 have been adapted from literature² though these are recorded for a bit different conditions, Presently, therefore, only a gross comparison of triplet energies of the sensitizers/quenchers *vis-a-vis* the sensitization reactions has been made.

TABLE-1
IRRADIATION OF 9-BROMO-FLUORENE (I) IN THE PRESENCE OF BENZENE

S. No.	Sensitizer/quencher used	E_t (kcal/mole)	Observations
1.	β -Acenaphthone	59.3	The formation of compound III or IIIa was sensitized
2.	Benzophenone	68.5	„
3.	Acetophenone	73.6	„
4.	Fluorenone	53.3	Sensitized (slightly)
5.	Acetone	80.0	Sensitized

TABLE-2
IRRADIATION OF 9-BROMO-FLUORENE (I) IN THE PRESENCE OF TOLUENE

S. No.	Sensitizer/quencher used	E_t (kcal/mole)	Observations
1.	β -Acenaphthone	59.3	The formation of compound VI or VIa was sensitized
2.	Benzophenone	68.5	„
3.	Acetophenone	73.6	„
4.	Fluorenone	53.3	Not sensitized
5.	Acetone	80.0	Sensitized

REFERENCES

1. A. Schonberg, Preparative Organic Photochemistry, Springer-Verlag, N.Y., p. 344 (1968).
2. J.G. Colvert and J.N. Pitts, Phytochemistry, John Wiley, N.Y., pp. 293, 298 (1967).