FINAL REPORT ON NASA GRANT
No. 202-962-1225

Prepared by: Dr. Ernest F. Silversmith, Principal Investigator

Date: November 6, 1972

Other Professional Personnel Involved: Dr. Robert L. Harrell

Time Work was Carried Out: Summer, 1970

Title of Project: Photochromism of Heterocyclic Systems.

Location of Project: Morgan State College, Baltimore, Md. 21239

Students Involved in Project: Miss Gloria Gray
Mr. Wesley Farmer
Mr. Michael May
Mr. Thomas McPherson
Mr. William Smith
Mr. Ralph Sturdivant

Brief Summary of Research Carried Out:

First, each student prepared a different dimer of a 2-aryl-4,5-di-phenylimidazyl radical and showed that the dimer was photochromic (i.e. it is dissociated by light into colored 2-aryl-4,5-diphenylimidazyl radicals, which regenerate the dimer in the dark).

Then each student attempted to prepare a 2,5-diphenyl-3,4-isobenzopyrrole with different substituents in the homocyclic ring. It was hoped that these compounds would be photochromic or that they could be oxidized to a photochromic 2,5-diphenyl-3,4-isobenzonyrryl dimer. The synthetic route consisted of two steps: (1) a Diels-Alder reaction between a conjugated diene and dibenzoylacetylene and (2) reaction of the resulting 1,2-dibenzoylcyclohexadiene with ammonia or a primary amine.

Of the dienes investigated, only 1,4-diphenyl-1,3-butadiene and 2,3-dimethyl-1,3-butadiene gave isolatable amounts of the Diels-Alder adducts. Time did not permit an investigation of the reaction of these adducts with ammonia or a primary amine. The other dienes reacted with dibenzoylacetylene as follows: isoprene yielded only tar; 2,4-hexadiene yielded mixtures of products, including some 1,2-dibenzoyl-3,6-dimethylbenzene; 2,3-diphenyl-1,3-butadiene yielded a mixture which was converted to 1,2-dibenzoyl-4,5-diphenylbenzene upon attempted purification; 1,2,3,4-tetraphenyl-1,3-butadiene did not react at all. The formation of isobenzofurans was noted in several cases studied.

Patent Status: No patentable inventions were made during this work.

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