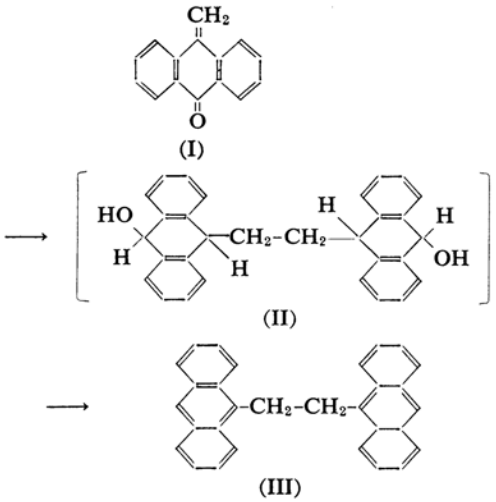
On the Electronic Spectrum of 1, 2-Di-9'-anthrylethane

By Shuzo AKIYAMA and Masazumi NAKAGAWA

(Received November 5, 1962)

The electronic spectrum of 1, 2-di-9'-anthrylethane (III) with unusual low absorption intensity has been reported in a literature[1]. The low absorption intensity is scarcely understandable in view of the presence of two anthracene nuclei in the molecule. The present authors have carried out the synthesis of the hydrocarbon (III) according to the method of Barnett[2] with a modification starting from 10-methyleneanthrone (I)[3], and the spectrum



was measured. Expectedly, the spectrum exhibited much higher absorption intensity as compared with that of the literature value[1] (Fig. 1), and the fact the ε-value of the absorption maximum at the longest wave-length is found to be approximately the double of the corresponding ε-value of 9-methylanthracene[4] is consistent with the additivity principle of absorption intensity of unconjugated chromophores.

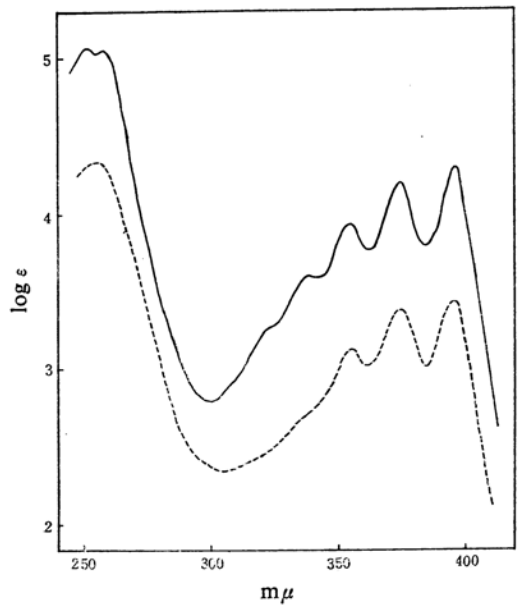


Fig. 1. The electronic spectrum of 1, 2-di-9'-anthrylethane, ——: the result of the present paper, ------: redrawn from Ref. 1).

Experimental*

10-Methyleneanthrone (I). — 10-Methyleneanthrone (I) was prepared according to the procedure of Clar[3] by the reaction of anthrone with formaldehyde. Pale yellow needles, m. p. 148°C (lit. value, m. p. 148°C[3]), 66%.

1, 2-Di-9'-anthrylethane (III).—A mixture of I (3 g., 0.015 mol.), zinc dust (15 g.), 28% aqueous ammonia (35 ml.) and water (35 ml.) was refluxed for 2 hr. After cooling to room temperature, the reaction mixture was washed with water and dried. The dried material (zinc dust, zinc hydroxide and II) was repeatedly digested with boiling ethanol. Five drops of concentrated hydrochloric acid were added to the combined hot alcoholic extract (200 ml.) resulting in the deposition of pale yellow crystals, m. p. 302~307°C (decomp.), 1.4 g., 52%. The crystals were recrystallized three times from toluene yielding pure III, m. p. 314~318°C (decomp.), (lit. values, 310~315°C (decomp.)[1]; 308°C[2]).

Found: C, 93.97; H, 5.97. Calcd. for $C_{30}H_{22}$: C, 94.20; H, 5.80%.

UV spectrum (in chloroform), λ_{max} (log ε); 252.5 (5.07), 259 (5.05), 324 (3.25)†, 339 (3.59), 356 (3.92), 375 (4.20), 397 (4.29). The dagger indicates shoulder.

The infrared spectrum of III was found to be almost identical with that of the reported one[1].

Department of Chemistry
Faculty of Science
Osaka University
Nakanoshima, Osaka

1) I. M. Roitt and W. A. Waters, *J. Chem. Soc.*, 1952, 2695. The spectrum given in this paper was quoted by P. Tardieu without comment on the absorption intensity (*Ann. chim.*, 6, 1445 (1962)).
2) H. Barnett and M. A. Matthews, *Ber.*, 59, 768 (1926).
3) E. Clar, Ber., 69, 1686 (1936).
4) D. D. Phillips and J. Cason, *J. Am. Chem. Soc.*, 74, 2934 (1952).

* All melting points were not corrected. The electronic spectrum was measured with a Hitachi autorecording spectrophotometer, EPS-2. The analysis was performed by Mr. Masakazu Okumiya in the Microanalytical Laboratory of this Department.