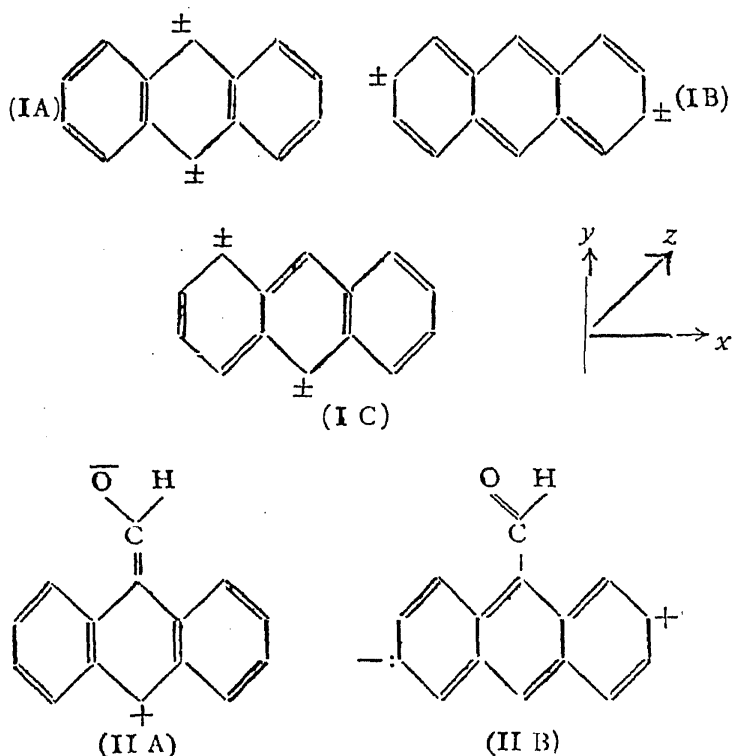


In the absorption spectrum of anthracene there are two well-defined bands: a long-wave, low-intensity band ( $\lambda_{\max}$  3800 Å;  $\log \epsilon_{\max}$  3.8) possessing vibrational fine structure, and a short-wave, high intensity band ( $\lambda_{\max}$  2500 Å;  $\log \epsilon_{\max}$  5.2).<sup>4</sup> The short-wave and the long-wave series of maxima can be respectively associated with electronic activations (cf. structures I A, I B and I C) polarized in two directions perpendicular to each other in the plane of the molecule. Comparing the spectra of anthracene and 9-anthraldehyde (II), in



which the 9-aldehyde group effects a marked bathochromic shift of the long-wave band, together with loss of fine structure, Jones<sup>4</sup> has suggested that the long-wave band is associated with an electrical moment oriented approximately in a vertical direction ( $y$  band). Structure (II A) in which the negative charge is on an oxygen atom should make a much larger contribution to the excited state of 9-anthraldehyde than the corresponding structure (IA) for anthracene; the result should be a larger displacement of an absorption band associated with excitation along the  $y$ -axis than of a band associated with an electric moment oriented in the  $x$  direction.<sup>4</sup> Another consideration which confirms this suggestion of Jones is a comparison of the dipole moments of structures (A) and (B) for anthracene (I), computed as 15.0 D and 34.5 D respectively. Intensities of absorption are related to dipole moments, and the

larger dipole moment of (I B) clearly indicates that  $x$ -polarization gives rise to the short-wave high-intensity band; and  $y$ -polarization which has a smaller dipole moment gives rise to the long-wave low-intensity band. Applying the method of molecular orbitals to the ultraviolet absorption of the polyacene series (naphthalene to pentacene) Coulson<sup>5</sup> has shown that the longest wave-length in an allowed excitation probably arises from a transition between mobile electron levels of symmetry  $A_{1g} \rightarrow B_{2u}$ , and polarized across the width of the molecule; the second wave-length is due to a transition  $A_{1g} \rightarrow B_{1u}$ , polarized along the length of the molecule.

A. C. College of Technology,  
The University, M. A. GOVINDA RAU.  
Madras.

Dept. of Chemical Technology,  
The University, K. VENKATARAMAN.  
Bombay,  
November 16, 1949.

1. *Chem. Revs.*, 1939, 25, 273.
2. Bernal and Crowfoot, *Trans. Farad. Soc.*, 1933, 29, 1032.
3. Calvin, *quoted in ref. (1)*
4. Jones, *Ibid.*, 1945, 67, 2127; *Chem. Revs.*, 1947, 41, 353.
5. *Proc. Phys. Soc.*, 1948, 60, 257.

#### THE EFFECT OF SUPPLEMENTARY ZINC ON THE FAT CONTENT OF LIVERS AND DEVELOPMENT OF THE BONES OF RATS

ALBINO rats fed on a diet containing 30 per cent. fat (hydrogenated groundnut oil), 10 per cent. alcohol-washed casein (choline content 0.15 mg. per cent.) and the necessary salts and vitamins, developed fatty livers during an experimental period of fifteen days. As Table I will show, the fat content was lowered considerably with a supplement of zinc.

It has been reported<sup>1,2</sup> that diets supplemented with zinc at high levels led to anæmia, loss of weight and death of the rats in six weeks. Likewise, diets containing 0.5 and 1.0 per cent. levels of zinc oxide were found to affect bone development adversely whether the basal diet was normal stock ration or a high fat, low protein ration as mentioned above. Tables II and III summarize the results for stock diet and high fat, low protein diet respectively.