Molecular Configuration of Benzil and e-Pyridyl

The molecular configuration of benzil has been the object of considerable interest for some time because of unusual physical characteristics, such as its large optical rotatory power. Campbell and Le Fevre measured its dipole moment in several solvents and compared it with that of phenylpyridine, which is planar and contains two cis carbonyl groups. From the lower (3.5 D) dielectric constant of benzil these authors concluded that the molecule must be skew, and that the two C=O—C=C—C=C—O bonds are in two different planes making an angle of 90°–180° with each other.

Kings and Lawford compared this suggestion with their X-ray diffraction results and found that it was quite reasonable. Furthermore, they concluded that neither a planar nor a planar conformation was acceptable for the interpretation of their X-ray data. Finally, Le Fevre et al. have estimated from electronic and Kerr constants that the molecule is tilted about the C—O—C—O—C—O bond.

In connection with some work on 2,2'-diphenyl glyoxal e-pyridyl, we have recorded the infrared spectra of benzil and of the forming substance. Comparison of our results with those in the literature revealed that previous measurements of the infrared spectrum of benzil showed a single band in the carbonyl region (1700 cm⁻¹), and furthermore this was used as evidence for a correct structure for benzil, in contrast with the results quoted above. We find two bands in the carbonyl region for both benzil and e-pyridyl as shown in Fig. 1, A and B. The splitting in benzil is about 14 cm⁻¹ while in e-pyridyl it is 23 cm⁻¹. Our results, together with that of other workers, are presented in Table 1.

The structure of e-pyridyl was worked out in detail by Skoogan and Adams, who found that the molecule is rotated about the O—C=O—C=O—C—O bond by an angle of approximately 35 degrees. Since such a conformation makes the relevant point group of the molecule C₂, one should observe two carbonyl bands for this molecule. Fig. 1, C shows the bands obtained by analysis of e-pyridyl, two carbonyl bands should be seen for a benzil molecule in the above configuration discussed above, and this is shown in Fig. 1, A, so it is true.

BIOPHYSICS

Viscosity of Dextrolysinic Acid Solution in the 'Sub-melting' Temperature Range

Dextrolysinic acid (DNA) melting has been extensively investigated using spectrophotometric and optical rotation techniques. To our knowledge, the viscosity behavior associated with the melting phenomenon has been examined only in the special case of synthetic dextrolysinic acid and phase DNA. DNA: In an investigation of this subject, using DNA preparations from three different sources, it was observed that the changes in intrinsic viscosity parallel the change in transition at 280 m/z for the 'submelting' temperature range. The peculiar behavior found in this region is reported here. Briefly, this is characterized by a fall in viscosity which is completely reproducible on cooling and seems to be caused by the local melting of dextrolysinic acid (DNA) molecules. The data obtained are in agreement with those of other workers. The data obtained are in agreement with those of other workers.

Viscosity was measured using a four-ball viscometer according to Lippincott. The average velocity gradients associated with each ball were calculated using Knudsen's formula; other ranges from 100 to 200 sec⁻¹ were found. Three DNA preparations from calf thymus, chicken erythrocytes, and C. rufus, respectively, obtained essentially according to Kay et al. and displaying intrinsic viscosity close to 40 d.l.g. were used at concentrations of 20 mg/ml in a phosphate buffer 0.1 M, pH 7.6 (the pH of this buffer does not show any significant change within the explored temperature range). The viscosity was equilibrated at several different temperatures and fresh aliquots from stock DNA solutions were measured at each temperature. Ultraviolet measuring studies were obtained in essentially the same DNA concentration as in the viscosity experiments. Fig. 1 shows the behavior of both optical density and viscosity at several different gradients of calf thymus DNA as a function of temperature. Substantially similar results were obtained...
Photoconductivity of Adeninosine in Various Morphological Forms

Photoconduction of adeninosine can be seen in a substance when, a neutral sublimation proceeds, a solution is slowly evaporated at about 60°C. Along the perimeter of the film. white needle-shaped crystals are observed. If the film is exposed afterwards to high humidity, its clear portion will become cloudy. When viewed under the microscope between crossed nichols, this cloudy portion is seen to be entirely opaque as shown in Fig. 1. From these spectra it is evident that the molecular arrangement of adeninosine in these three morphological forms is different. Further work has to be undertaken in order to elucidate the structure of the material in these various forms. In the present work, it is intended to report some results on semi- and photo-conductivity of the three different morphological forms of guanines of various cell walls.

The experimental details for measuring the conductivity of organic materials are similar to those reported previously. The temperature dependence of the resistances of adeninosine is shown in Fig. 2. Except for the deviations towards the lower temperature and, the resistances follow the well-known equation $R = R_0 e^{kT}$, where $R_0$ is a constant and $k_e$ is the activation energy for dark conduction. The activation energy of the pellets is 4.52 eV, in agreement with the values reported by Evelyn and Lewis. The activation energy of the amorphous and non-sublimated films are 4.88 and 5.38 eV respectively. The temperature dependence of photoconductivity of adeninosine shown in Fig. 4 follows the equation $I = I_0 e^{kT}$, where $I_0$ is a constant and $k_e$ is the activation energy for photo-conduction. The values of $k_e$ for the pellets, 1.87 eV for the sublimated film, and 1.57 eV for the non-sublimated film.

The activation energies for dark- and photo-conduction of adeninosine are more than twice the corresponding values of polycrystalline and amorphous DNA in the dry state.