

group $C_{2v}^9 (Pna)$, $a=10.53$, $b=9.53$, $c=5.66$ A., where the asymmetric unit consists of one chemical molecule. A quantitative analysis of this compound has now been carried out, and the preliminary results have been refined by a double Fourier synthesis which is shown in Fig. 1.

Although the benzene ring is inclined at a high angle to the plane of this projection, it can be seen to answer the tests of a regular plane hexagon. Now if we assume the usual C-C interatomic distance of 1.41 A., the complete orientation of the molecule in the crystal can be calculated from this diagram. The centres of the OH groups are then found to be situated at 1.35 A. from the benzene nucleus. The line joining the OH groups, lying in the plane of the ring, makes angles of 134° , 46° and 101° with the a , b and c crystal axes, and the line perpendicular to this, also in the plane of the ring, lies at 63° , 77° and 149° to these axes.

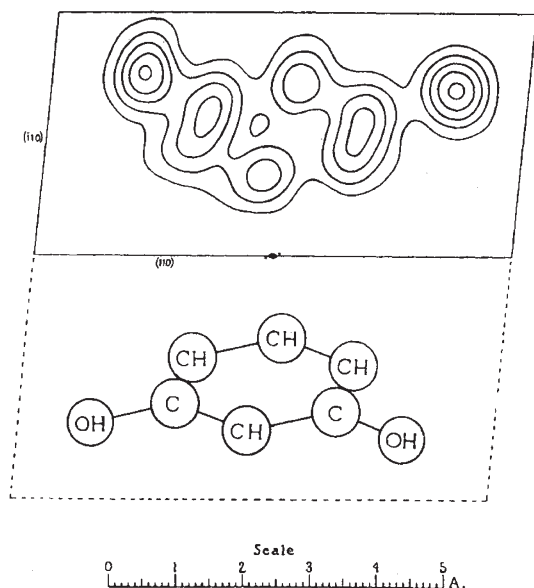


FIG. 1. Resorcinol. c axis projection. Each contour line represents a density increment of two electrons per square A.

Perhaps the most interesting aspect of the structure is the close approach of the hydroxyl groups on adjoining molecules (not shown in Fig. 1). These groups are arranged in spiral formation about the dyad screw axes, and the distances between successive groups belonging to neighbouring molecules are 2.66 A. and 2.76 A. Now these distances are much less than the observed approach distances for molecules of hydrocarbons (3.4–3.8 A.), where only residual or van der Waals' forces are acting. In benzoquinone, the minimum distance between oxygen atoms on neighbouring molecules is 3.62 A. It is evident that some type of secondary valence force must be assumed between the hydroxyl groups of adjacent resorcinol molecules. From the order of the distances this would appear to be either a strong 'hydroxyl bond', or something intermediate between the Huggins and Pauling hydrogen bond and the hydroxyl bond recently discussed by Bernal and Megaw¹.

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¹ *Proc. Roy. Soc., A*, 151, 384; 1935.

Lecithin as a Dispersing Agent for Dibenzanthracene

DURING the course of experimental work in connexion with his study of cancer at this Institute, Dr. M. J. A. des Ligneris expressed a desire to study the effect of dibenzanthracene on tissue cultures *in vitro*, and invited the co-operation of the Biochemical Department in devising a suitable means of introducing this substance into tissue culture media.

Since dibenzanthracene is insoluble in aqueous media, the preparation of a colloidal solution was considered. Orthodox methods of dispersion from alcoholic solution were unsatisfactory because the low solubility of dibenzanthracene in even boiling alcohol necessitated the addition of so much of the alcoholic solution that toxic concentrations of alcohol were attained. Moreover, in physiological salines no dispersion occurred unless protective colloids such as serum proteins were present.

Familiarity with the properties of lecithin suggested the possibility of using it as a protecting agent. As a preliminary experiment, 100 mgm. lecithin (crude acetone-insoluble lipid from egg-yolk) and 50 mgm. dibenzanthracene were ground together in an agate mortar for half an hour, moistening occasionally with distilled water. By means of 50 ml. of Ringer's solution the mixture was then transferred to a bottle and shaken for two hours. The resultant fluid was yellower than a solution of 100 mgm. of lecithin alone in 50 ml. of Ringer and remained so on standing a few days despite the settlement of a yellow deposit.

Although aseptic precautions had not been observed, the fluid proved to be sterile on bacteriological control, and was passed on to Dr. des Ligneris for use. His results will be published shortly.

A similar result has since been obtained by dissolving lecithin in a 0.5 per cent solution of dibenzanthracene in benzene, removing the solvent by causing a jet of air to play on the surface and taking up the mixture in Ringer's solution.

No attempts have been made to determine optimum proportions of lecithin and dibenzanthracene, since the above solution appeared to be sufficiently stable for the purpose intended and the examination of colloidal solutions is not regularly undertaken in this laboratory.

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Chemical Nature of the Amino Acids excreted by Leguminous Root Nodules

SOME years ago we showed conclusive evidence that considerable amounts of nitrogenous compounds appear in the medium in inoculated, but otherwise sterile, cultures of leguminous plants. Since then we have tried to isolate these nitrogenous compounds and to determine their chemical nature. The nitrogen compounds were extracted from the quartz sand with water and found to consist chiefly of amino acids. Amino nitrogen determinations according to van Slyke—the reaction mixture being shaken for 30 minutes—showed that 87–98 per cent of the total nitrogen was amino nitrogen. The amino nitrogen values varied to some extent in different extracts.

Further analysis of the amino acid mixture has now led to the following results. About 50 per cent of the total nitrogen consists of amino nitrogen of aspartic acid. This amino acid has been estimated