Fluorescence of Solids

THE following observations may be of interest in view of the present interest in problems of fluorescence of solids. Anthracene (I) in the solid state fluoresces blue with a high efficiency, the absorption band lying at wave-lengths shorter than 3800 A. Solid naphthacene (II) is yellow in colour and fluoresces very faintly, and solid pentacene (III) is dark bluish and does not fluoresce appreciably. In dilute solid solution in anthracene, however, the latter hydrocarbons fluoresce vividly, the former greenish-yellow and the latter red.

I II III

The chief point of interest is that this fluorescence is stimulated by light absorbed by the anthracene, while the blue anthracene fluorescence is almost entirely suppressed. These phenomena closely resemble those observed with a typical inorganic fluorescent solid such as zinc sulphide, the emission of which is completely changed by minute additions of copper, etc.

It seems, one must suppose, that an electron free to move is liberated by absorption of light within the anthracene crystal, and that the positively charged anthracene molecule quickly regains an electron (without emission) by an exchange through the crystal from a distant naphthacene or pentacene molecule. The latter molecule, now minus an electron, emits its characteristic fluorescence when a free electron returns to it. Since the crystal structure of anthracene is well understood, it is possible that these phenomena are capable of theoretical treatment.

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Points from Foregoing Letters

Dr. F. G. Spear, Dr. L. H. Gray and Dr. J. Read report that the relation between the dose and the percentage residual mitosis in *in vitro* cultures of chick embryo fibroblasts after irradiation with D-D neutrons is not the same as the sigmoid relation found for γ-radiation, but is more nearly exponential. An exponential relation would be anticipated in the case of neutron irradiation if inhibition of mitosis resulted from the production of about 1,500 ion pairs in a volume of about 3 μ in diameter.

X-ray study of crystals obtained from 'tomato bushy stunt' virus preparations indicate, according to Prof. J. D. Bernal, I. Fankuchen and D. P. Riley, a particle size of 340 A. diameter and a molecular weight of 24 million, for the wet particle of density 1·286. If the density of 1·35 computed by McFarlane and Kekwick is assumed to be that of the dry crystals, it would give for these a molecular weight of 12·8 million, a substantially larger figure than the value of 8·8 millions derived from experiments with the ultracentrifuge.

The almost instantaneous change of the syrupy alpha form into the crystalline beta form of the 2 : 4-dimethyl 3 : 6-anhydro-methyl-*d*-galactopyranoside in presence of traces of gaseous hydrochloric acid indicates, according to Prof. W. N. Haworth, J. Jackson and Dr. F. Smith, that the usual mechanism assumed for such transformation, namely, initial hydrolysis to the free sugar followed by a mutarotation and the regeneration of the two forms of the methylglycoside, does not apply in this case.

Dr. E. G. V. Percival and I. A. Forbes confirm that the substance recently isolated from agar is a derivative of 3 : 6-anhydro-*l*-galactose. They have synthesized its enantiomorph, 2 : 4-dimethyl 3 : 6-anhydro-β-methyl-*d*-galactoside, which has the same properties but opposite optical rotation.

Various crystalline derivatives of idose have been prepared from galactose derivatives by Dr. G. J. Robertson, W. H. Myers and W. E. Tetlow by employing an anhydro-compound of the ethylene oxide type in which the ring is broken under the influence of alkali. They have further prepared 2-amino α-methylaltroside and 3-amino α-methylaltroside hydrochloride, the latter identical with 'methyl epiglucoseamine hydrochloride'.

Dr. W. A. Waters reports that aromatic arsenic compounds are formed when arsenic powder is warmed with an aryl diazonium chloride under acetone containing chalk. Under the same conditions gold is also attacked and yields auric chloride, but thallium seems to be inert.

Chicken fed upon a diet in which the protein has been very thoroughly extracted by alcohol may develop in the connective tissues large accumulations of transparent fluid, of the same composition as the blood plasma. Dr. H. Dam and J. Glavind consider that this is the effect of a deficiency disease.

It is stated by Dr. H. L. A. Tarr that only certain, and probably a small proportion, of the micro-organisms which are commonly associated with decomposing sea fish muscle are able to reduce the trimethylamine oxide occurring therein to trimethylamine. This fact probably accounts for the finding that there does not always appear to be a close correlation between the viable bacteria count and amount of trimethylamine in this medium.

P. C. de Kock and Prof. W. S. Rapson find that in various species of the South African genus *Thesium* the presence or absence of the easily identifiable chemical constituents phlobatannin and/or glycosidic material, corresponds to the grouping of those species according to the structure of their flowers and other morphological characters.

Prof. I. S. Bowen and Dr. R. Minkowski suggest that Menzel's recent discussion of the effect of collisions on the intensities of nebular lines is based on a special case, in which the apparent increase in intensity of forbidden lines with density is a result of the assumption that the rate of excitation increases with the density. They emphasize that, while forbidden lines take a major role at low densities, de-excitation by collisions prevents them from emitting an appreciable fraction of the available energy at high densities.