LETTERS TO THE EDITOR

FLUORESCENCE SPECTRA OF AQUEOUS SOLUTIONS OF URANYL NITRATE AT ROOM TEMPERATURE

Pringsheim[1] has summarised the situation regarding the fluorescence spectra of aqueous solutions of uranyl salts arising out of the work, notably, of Nichols and Howes,[2] and Levshin.[3] A great variety of spectra of these solutions, observed in the frozen state (where the intensity is considerably larger than at room temperature), is supposed to originate from a correspondingly great variety of complexes formed in the solution. However, no specific attempt has been made so far to investigate how exactly the fluorescence spectra are influenced by specific processes of complex formation. The uranyl nitrate solution is particularly suited for this study on account of its greater solubility in water, and its ability to form anionic complexes as well as to undergo hydrolysis. Further, since the kinetics of chemical reactions is more intimately known in the liquid state than in the frozen state, a study of fluorescence spectra at room temperature should prove more suitable as a first step for understanding the complexity of the frozen state spectra.

While the spectrum of the uranyl nitrate solution in the frozen state showed the most complex behaviour, it is reported that at room temperature it consisted of a few diffuse bands, and that when the concentration was decreased to less than 0·5 molar it showed a completely different character and was quite continuous. More dilute solutions were not examined, presumably due to very low intensity. In the present investigation the spectra have been scanned at room temperature (10° C.) with a photomultiplier tube and a monochromator, using Hg 3650 A.U. group of radiations for excitation. Aqueous solutions of dilution from 1·97 to ·0015 M (pH ranging from 1·0 to 3·6) were used. The results are presented in Fig. 1 A. In Fig. 1 B are shown the fluorescence spectra as obtained by adding various quantities of concentrated HNO_3 to the solution, keeping the

U-conc. fixed at ·085 M, and in Fig. 1 C are shown the spectra obtained for a similar solution with different amounts of NaOH added to it.

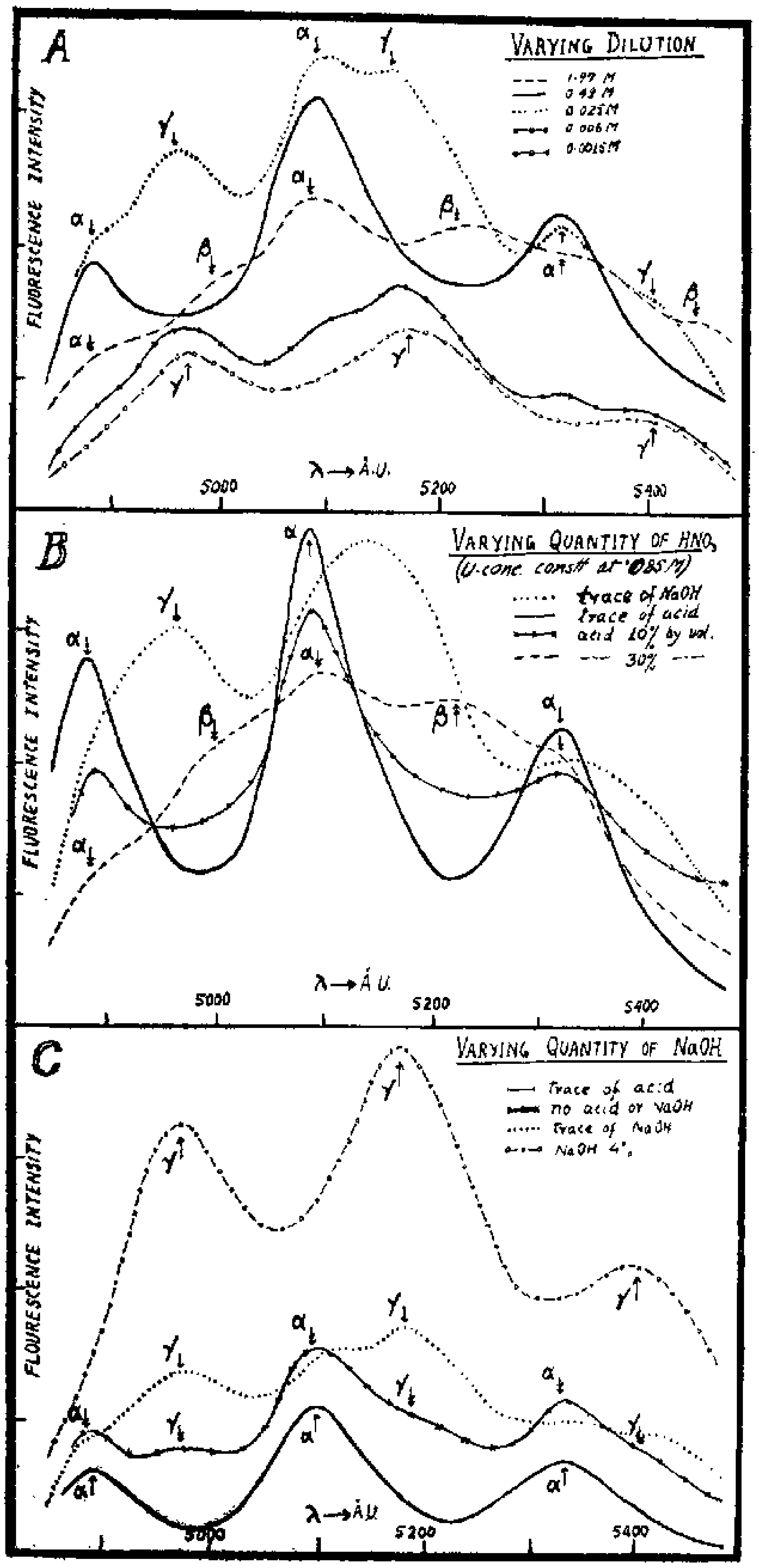

FIG. 1

The bands marked α correspond to those given by the solid, and are the bands reported by earlier workers. The bands marked β (Fig. 1 A) appear only in very concentrated solutions, and have not been reported earlier. They diminish in intensity rapidly on dilution, and are absent in our curve for ·49 M solution (intermediate stages not shown in the figure). These bands regain in intensity on addition of NO_3^- even in dilute solutions (Fig. 1 B). Their appearance is therefore connected with greater molal concentration of NO_3^- and they thus appear to be due to an anionic complex. The disappearance of these bands even on small dilution is apparently associated with the fact that the nitrate solutions behave as strong electrolytes.[4] On further dilution, another new series of bands, marked γ, appears. These bands are towards the violet of the β bands, and are quite intense. They gain in strength with dilution (Fig. 1 A) or on addition of NaOH (Fig. 1 C), so that ultimately only the γ bands are present in the spectrum. With the addition of very small amounts of acid the γ bands disappear, and the α bands appear again (Fig. 1 B). This goes to show conclusively that the appearance of γ bands is linked with the hydrolysis of the uranyl ion.

We have also investigated the spectra of solutions, similar to those mentioned above, at low temperatures, and it appears possible to understand the variations in their nature on lines similar to the above (details to be published elsewhere).

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Naini Tal, *August* 1, 1957.

1. Pringsheim, P., *Fluorescence and Phosphorescence* (Interscience), 1949.
2. Nichols, L. L. and Howes, H. L., *Fluorescence of Uranyl salts*, Carnegie Inst., Washington, 1919.
3. Levshin, V. L., *Acta Physico Chimica*, U.R.S.S., 1937, **36**, 661.
4. Dittrich, C., *Z. Physikal. Chem.*, 1899, **29**, 449; Robinson, R. A., Wilson, J. W. and Ayling, H. S., *J. Am. Chem. Soc.*, 1942, **64**, 1479.

EFFECT OF SOYABEAN INHIBITOR AND VITAMIN B_{12} ON GROWTH OF RICE MOTH LARVA (*CORCYRA CEPHALONICA* ST.)

THE inability of certain insect pests to develop normally on soyabean products was first reported by Mickel and Standish.[1] Earlier, Ham and Sandstedt[2] observed that the soluble fractions of raw soyabean were able to inhibit trypsin and that a concentrate of these induced a retardation of growth of chicks fed on an otherwise normal diet. Further evidence of the growth inhibitory nature of the antitrypsins in the raw soyabean was obtained by Klose *et al.*[3] working with rats, and by Almquist and Merritt[4] with chicks. Recently, Baliga and Rajagopalan[5,6] have found that the growth retardation of rats induced by the presence of the raw soyabean meal extract could be counteracted by Vitamin B_{12}. In view of the great resemblance of the rice moth larva to the rat in its require-