

ON THE SPECTRUM OF FLAME CONTAINING POTASSIUM SALTS

PANAY¹ has reported a continuous spectrum of potassium obtained by introducing into a Mecker burner air carrying atomised KCl solution. He has examined the intensity distribution in this spectrum between λ 5600 and λ 4110 and found a maximum at λ 4430 and a minimum at λ 5400. The continuous spectrum extends farther into the ultra-violet with gradually diminishing intensity and in the visible region, superposed over the continuum are a few lines of potassium, viz., λ 7699-65, λ 4047-44 lines of the principal series, λ 6939-11, λ 5340-23 lines of the sharp series and λ 5360 line of the diffuse series, the D lines of sodium and two feeble lines at λ 4947 and 4637. A band at λ 5650 and another between λ 6180 and λ 6460 spreading possibly to λ 6050 and λ 6730 have also been noted by him.

To understand clearly how the continuum and the different bands and lines noted by Panay arise, the spectrum of flame containing atomised KCl has been photographed in essentially the same manner as by Panay and a continuous spectrum extending from the long wavelength limit of an Ilford panchromatic plate down to about λ 3000 Å (fainter continuum extends to even shorter wavelength) has been obtained. The continuous spectrum in the visible region shows a maximum and a minimum near the regions described by Panay and has superposed over it the D lines, the C₂ bands at λ 5636, λ 5165, λ 4737, λ 4382, and the strong members of the OH bands at λ 3064. The red K lines could be seen visually but were beyond the sensitive region of the plate. The second members of the principal series of potassium appeared but no sharp series or diffuse series lines mentioned by Panay were obtained.

To eliminate the effect of the gas flame, its spectrum uncontaminated by any salt, was photographed. This showed essentially the same features as above (including even the D lines). The inner cone of the flame gave the bands much stronger over the continuum than the outer cone. Further, the continuum was stronger in the flame containing KCl than in the one without it. The spectrum was also photographed with atomised NaCl in the flame. This again showed the same features as the KCl flame; the D lines were stronger.

It thus seems that the continuum refer-

red to by Panay has nothing to do with potassium in particular. It rather belongs to the type of continuum which is ordinarily present in the flame and which has been attributed mainly to continuous electron radiation, i.e., radiation of the electrons in the field of ions formed in the discharge, by Finkelburg.^{2,3} The introduction of easily ionizable atoms like those of Li, Na, or K makes the continuum considerably stronger. Part of the spectrum might also be due to bimolecular association of the type of $\text{NO} + \text{O} = \text{NO}_2$ + yellow green continuum of the flame (see Gaydon⁴). Further, it is also difficult to see how some of the lines can be attributed to the sharp and diffuse series of potassium, as has been done by Panay, when intervening members of the series like the λ 5802 line of sharp series and λ 5832 of the diffuse series are absent. By assuming that the wave-lengths given by Panay are only approximate it is possible to explain some of the radiations as due to C₂ or CH, but it does not appear feasible to explain all of them in any satisfactory manner. In the present case, however, although a continuum similar to Panay's has been observed, no extra radiation which cannot be explained has been found to appear on the plate.

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1. Panay, T. N., *Compt. Rend. Acad. Sci. Paris*, 1937, **204**, 251.
2. Finkelburg, W., *Phys. Rev.*, 1934, **45**, 341.
3. —, *Ibid.*, 1934, **46**, 330.
4. Gaydon, A. G., *Proc. Roy. Soc., A*, 1944, **111**, 183.

NEW BANDS OF COLUMBIUM OXIDE

AN extensive band spectrum consisting of red-degraded bands and attributable to the CbO molecule has been observed in the region 6500-4200 Å.U., in the ordinary Columbium arc in air and in heavy current discharge through CbCl₅ vapour. They could be distinguished as two systems: (1) from λ 6500-5600 and (2) from λ 5600-4200. The first system presents a complex vibrational structure. The second is more open and well defined with band-heads accompanied by partially resolved rotational structure. The prominent heads occur in widely separated regions at ν 19120, 20340, 21320, 22163, 22878, the separations between successive heads being 1220, 980, 843 & 715