



Fig. 1. Formation and decay of electronically excited atomic selenium. (a) 0.1 mm CSe_4 + 50 mm Ar; (b) 0.1 mm CSe_4 + 10 mm N_2 + 40 mm Ar; (c) 0.1 mm CSe_4 + 10 mm O_2 + 40 mm Ar

three J multiplets does not correspond to an ambient temperature Boltzmann distribution; the atomic selenium is produced 'electronically hot'. This was proved conclusively by addition of 10 mm of nitrogen, which rapidly depopulated the (4^3P_0) state. The excitation energy corresponds closely with a single quantum of vibration in nitrogen ($2,359 \text{ cm}^{-1}$), as shown in Table 1.

Oxygen is less effective in relaxing $\text{Se}(4^3P_0)$, because the resonance defect of 954 cm^{-1} must be converted to translation and rotation. The detection of $\text{Se}(4^3P_0)$ at very short time delays is further evidence that it is produced directly in this state, since radiation from $\text{Se}(4^1D_2)$ would populate only the 3P_2 and 3P_1 components.

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Use of Thin Films for Electrophoresis of Coal-tar Food Colours

Most papers published on the separation of food dyes have been based on the paper-chromatographic technique. Few, however, describe the application of electrophoresis to this problem. The supports used in electrophoretic separations have usually been paper^{1,2}, and, recently, the use of cellulose acetate membrane has been described².

Thin film chromatography, having now gained general recognition as a rapid and sensitive method for the separation of a wide variety of substances, has extended the scope for using a range of other materials as supports for electrophoretic separations. An assembly has been described in which thin films of alumina, kieselguhr and silica gel have been successfully used as supporting adsorbents for the electrophoretic separation of amines and amino-acids³. Recently, we have used thin films of these three adsorbents in the course of studies on the electrophoretic behaviour of coal-tar food colours.

The films are prepared from a slurry of the adsorbent with a Shandon 'Unoplan' leveller and spreader in the usual way and then dried. The Baird and Tatlock constant current/constant voltage electrophoresis apparatus is used for the experiments. The horizontal tank supplied with this apparatus conveniently accommodates a thin film plate of $20 \text{ cm} \times 17.5 \text{ cm}$ across the bridge between

the electrolyte compartments. Contact between the film and each electrolyte compartment is made by means of a filter paper wick previously soaked with electrolyte and with one edge resting along the full width of the plate of film. The lid is then placed on the electrophoresis tank when the film becomes saturated with electrolyte by means of capillary action through the wicks. The electrolyte fronts normally take 10–15 min to meet but it is desirable to allow a period of 1 h to elapse before applying the test solution. This ensures that migration due to capillary rise of the electrolyte is minimal. Using thin film plates of suitable size, this procedure can be adapted for horizontal electrophoresis tanks of any commercial electrophoresis apparatus. Where it is desired to carry out electrophoresis on strips of thin films, these are easily provided by scoring the film with a pointed nail.

Table 1. ELECTROPHORETIC MIGRATION DISTANCES OF FOOD COLOURS (MM)

	Whatman			Whatman	
	No. 1 paper	Kieselguhr		No. 1 paper	Kieselguhr
Tartrazine	40	59	Erythrosin	2	37
Yellow RFS	29	50	Red FB	0	52
Red 6B	10	49	Ponceau 4R	11	56
Orange PN	7	40	Black PN	4	50
Red 2G	13	46	Blue VRS	14	24
Orange G	42	46	Indigo carmine	21	52

Proceeding with the electrophoresis in the usual way and using a constant potential of 200 V, thin film electropherograms are obtained with better reproducibility and sharper resolution than similar electropherograms under the same conditions with Whatman No. 1 filter paper. Furthermore, the use of supports with different characteristics has the advantage that changes in relative migration distance can be observed apart from those brought about by a change of electrolyte. Some such changes are illustrated in Table 1 for the case when the electrolyte is 0.05 M borax (pH 9.18), electrophoresis taking place for 1 h.

Except for oil yellow GG, oil yellow XP, naphthol yellow S and ponceau 3R, all the permitted coal-tar food colours⁴ are being examined in six different electrolytes of widely different pH on the three thin film materials named as well as on Whatman No. 1 paper. The complete results will be presented and discussed elsewhere.

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Decomposition of Molybdenum Hexacarbonyl

THE publication of results by Clougherty¹ and by Kaye² of the preparation of face-centred cubic molybdenum monocarbide, and by Goldschmidt³ of the preparation of face-centred cubic ditungsten carbide, have led us to re-examine the face-centred cubic dimolybdenum carbide reported by Lander and Germer⁴. They observed its formation while trying to plate metallic substrates maintained at 300° to 475° C with molybdenum, formed by the pyrolysis of molybdenum hexacarbonyl in the presence of partial pressures of carbon monoxide ranging from 0.02 to 0.22 torr. The deposit had a face-centred cubic structure with a cell edge of 4.14 \AA and was believed to be Mo_2C , although full chemical analyses were not reported. They suggested it was isostructural with the Mo_2N phase reported by Hägg⁵, which is believed to have a rock salt structure with a defective anion sublattice. A phase, identified as face-centred cubic Mo_2C , has been noted by