4. Indole gave indoxyl sulphate in good yield, identical with the naturally occurring ester.

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A Collimated Windowless Geiger Counter for Scanning Chromatograms

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The scanning of paper chromatograms and electrophoresis strips is a common requirement in biochemical laboratories using isotopes. A number of automatic apparatuses for doing this are available commercially in this country and use the standard E.H.M. (G.E.C. Research Laboratories) end-window counters. Collimation of the E.H.M.2.S. end-window counter to give a slit 5 mm. wide (which is desirable for analysing protein electrophoresis strips) reduces the sensitivity of such a counter by about 60%. A windowless counter with suitable geometry increases the sensitivity about three times. The counter described below was designed to combine the sensitivity of a windowless counter with narrow collimation and a low background.

Although a counter operating in the proportional region will tolerate contamination of counting gas with air, proportional counting necessitates additional expensive equipment which is not always available. A counter operating in the Geiger region (coupled to a standard rate meter) does not tolerate any contamination of counting gas with air, and an effective seal is therefore necessary.

CONSTRUCTION

The dimensions and assembly of the counter are shown in Fig. 1. The counter body is made from drawn brass tubing 1.8 cm. in internal diameter, 2.5 cm. in external diameter and 8 cm. long, milled externally to give a flat surface 1.6 cm. wide; a window 3.0 cm. × 0.5 cm. is cut out in the middle of this flat surface. All surfaces and corners on the inside of the counter are polished smooth. The ends of the counter are of brass plate into which insulating polythene plugs are set. The anode (tungsten wire 0.002 in. in diameter) is shielded by brass sleeves, leaving an effective anode length of 2 cm. in the centre. A lead castle surrounds the upper surface and sides and projects 3 cm. beyond the ends of the counter. The castle is mounted on a brass plate which rests on collars surrounding the four locating studs screwed into the lead base.

An effective air-counting gas seal is achieved by the flat surface around the counter window resting on the paper strip, which is mounted on a Tufnol (Tufnol Ltd., Perry Barr, Birmingham, 22B) strip

resting on a sponge rubber pad covered with polythene. A thin wedge of rubber (not shown in Fig. 1) is inserted between the top of the counter and the castle. The pressure exerted by the counter on the paper can then be controlled by adjusting the two nuts threaded on the two brass rods passing vertically through the castle. The chromatogram strip should be wide enough to cover the whole

of the counter becomes contaminated with dust. Should this happen the counter may be cleaned with compressed air.

The counter is coupled to a probe unit and a standard rate meter which records on a two-channel pen-recording ammeter. The speed of movement of the chromatogram and recording paper and the integrating time of the rate meter

Fig. 1. A, Vertical cross-section of assembly; B, under-surface of counter; C, vertical section of counter.

width of the window. The Tufnol strip (10 cm. wide), on which the paper is mounted, is drawn between the collars and under the counter at 3.8 cm./hr. by a simple roller drive.

The counter operates with helium saturated with dry ethanol at 0° after 2–3 min. flushing. The flow rate thereafter should remain constant at about 1.0 l./hr. The counter has a plateau of 1300–1600 v with a slope of 4%. With an operating potential of 1450 v the counter is stable from day to day, and scans of chromatograms are almost exactly reproducible. The background count is 6 counts/min., but it may rise slightly if the inside

depend on the degree of resolution required: a suitable combination for electrophoresis strips was found to be 3.8 cm./hr., 2.5 cm./hr. and 160 sec. (integrating capacity 8 μ F) respectively.

SUMMARY

A simple windowless helium-ethanol counter which operates in the Geiger region with a standard rate meter is described. It is designed to give narrow collimation and a low background suitable for scanning paper-chromatogram or -electrophoresis strips.