*Elutionsmittel.* 40.0 ml Chloroform p.a. und 40.0 ml Dioxan p.a. werden mit 1.5 ml 0.1 *M* wässriger Natriumtetraboratlösung unter kräftigem Umschütteln gemischt. Es wird mit Kammerübersättigung gearbeitet, Raumtemperatur ca. 23°, Laufzeit 20–25 Min., Trennstrecke 100 mm. Aufgetragene Zuckermenge 5–10 $\gamma$ in 2 $\mu$l Lösungsmittel.

Da die gelbe Farbe der Zuckerosazone sehr schnell verblasst, müssen die Flecken nach dem Trocknen der entwickelten Platten bei Zimmertemperatur sofort markiert werden. Für die Resultate siehe Tabelle I und Fig. 1.

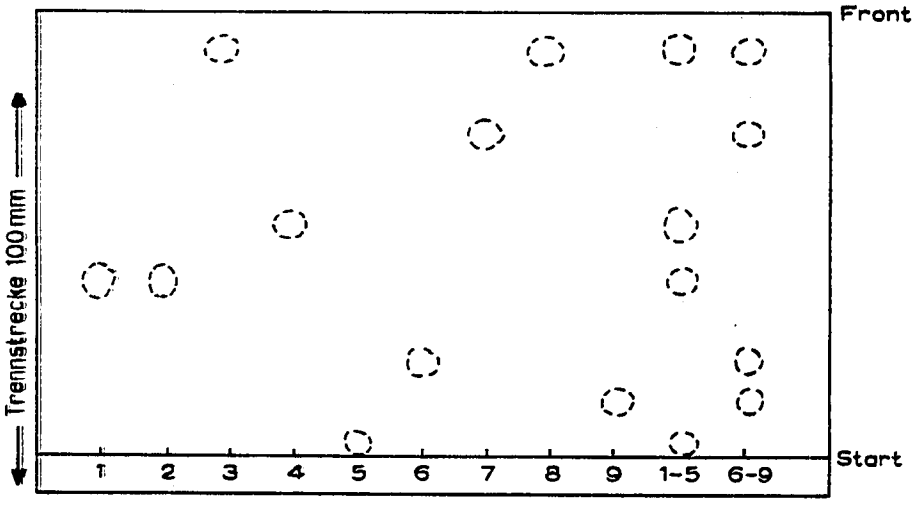


Fig. 1. Schematische Darstellung der getrennten Zuckerphenylosazone. 1 = Glucose; 2 = Fructose; 3 = Arabinose; 4 = Galaktose; 5 = Laktose; 6 = Sorbose; 7 = Xylose; 8 = Ribose; 9 = Maltose.

Glucose und Fructose bzw. Arabinose und Ribose unterscheiden sich nur in den C Atomen 1 und 2; sie geben daher gleiche Phenylosazone.

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## A simple control unit for Lovelock ionisation detectors

The use of Lovelock ionisation detectors in gas chromatography is widespread because of their constructional simplicity and high sensitivity. With the simple type[1] of Lovelock detector the output consists of a standing current of about $10^{-8}$ A plus a current which is proportional to the concentration of the eluted compounds in the carrier gas as it passes through the detector and which ranges from $10^{-11}$ to $10^{-7}$ A. In the most common type of control unit for this detector these currents are passed through a resistor of about 25 kM $\Omega$ and the voltage produced fed into an infinite input and zero output resistance valve voltmeter of the type described by SCROGGIE[2]. This circuit exhibits high linearity and enables the full sensitivity of the detector to be utilised limited only by the noise inherent in these detectors, whilst at the same time

possessing characteristics which are virtually independent of valve ageing. In addition, the control units for such detectors also provide a stabilised supply variable to various extents over the range 0–1500V for connection to the radioactive electrode.

Many applications of gas chromatography do not require such versatile and sophisticated instrumentation. There is little need for an absence of very slow "ageing" effects in the characteristics of the valve voltmeter since gas chromatographic columns age more rapidly than electronic valves. With a single operating voltage between 600 and 1000 V the detector usually has adequate sensitivity to most compounds, and except in special cases the highest sensitivity of the detector is not required.

A simplified amplifier and control unit suitable for feeding a 1 mV potentiometric recorder has been constructed in these laboratories. Fig. 1 shows the circuit

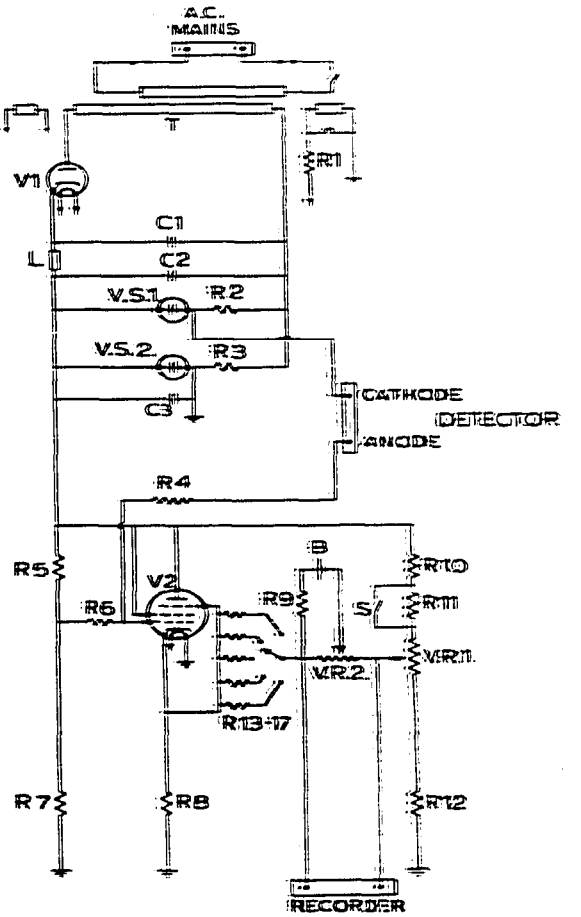


Fig. 1. Circuit diagram of control unit.

employed, the component values used being listed in Table I. In operation the circuit in the upper half of this diagram supplies 600 V, 800 V or 1000 V to the ionisation detector according to whether the V.S. 1. used is type SC1/600, SC1/800 or SC1/1000. For the first two of these corona stabilisers R2 is 1 MΩ, but is reduced to 470 kΩ when a SC1/1000 is used. In addition R3 and V.S. 2. provide the supply voltage for the single stage cathode follower amplifier shown in the lower part of the diagram.

The output current from the detector is fed through the linearising resistance R4 and the grid resistor R6 and drives the grid of V2 negative. In order to operate the

TABLE I

COMPONENTS VALUES FOR THE CIRCUIT SHOWN IN FIG. 1

| | | | |
|---|---|---|---|
| T | Transformer with secondaries giving 6.3 V at 0.3 A, 6.3 V at 0.3 A, 500–0–500 V at 5 mA | V.S.2 | 85A2 |
| L | 20 Henry 20 mA choke | C1,C2 | 1 $\mu$F 1500 V.W. |
| V1 | EY61 | C3 | 32 $\mu$F 250 V.W. |
| V2 | ME1400 | V.R.1 | 50 k $\Omega$ 5 W W.W. potentiometer |
| V.S.1 | G.E.C. Corona stabiliser type SC1/600, SC1/800 or SC1/1000, see text. | V.R.2 | 250 $\Omega$ 5 W W.W. potentiometer |
| | | B | Mallory cell type RM-3 |
| | | S | Push to test switch |
| R1 | 5 $\Omega$ 1 W | R10 | 280 k $\Omega$ $^1/_2$ W |
| R2 | 1 M $\Omega$ $^1/_4$ W (see text) | R11 | 10 k $\Omega$ $^1/_4$ W |
| R3 | 350 k $\Omega$ 2 W | R12 | 120 k $\Omega$ $^1/_2$ W |
| R4 | $10^9$ $\Omega$ Welwyn $\pm$ 20% | R13 | 3 M $\Omega$ $^1/_4$ W |
| R5 | 470 k $\Omega$ $^1/_4$ W | R14 | 1 M $\Omega$ $^1/_4$ W |
| R6 | $10^8$ $\Omega$ Welwyn $\pm$ 20% | R15 | 330 k $\Omega$ $^1/_4$ W |
| R7 | 220 k $\Omega$ $^1/_4$ W | R16 | 100 k $\Omega$ $^1/_4$ W |
| R8 | 100 k $\Omega$ $^1/_4$ W | R17 | 33 k $\Omega$ $^1/_4$ W. |
| R9 | 470 k $\Omega$ $^1/_4$ W | | |

triode connected semi-electrometer pentode type ME1400 on the linear part of its characteristics, R6 is connected to the positive potential appearing at the junction of R5 and R6. Input voltages to the grid of V2 may change by as much as 5 V without peak doubling being shown by the detector, and a voltage of the same order as the input voltage appears at the cathode of V2, in addition to its D.C. potential which is balanced against the voltage provided by V.R.1

An appropriate fraction of the signal voltage appearing at the cathode of V2 is selected and fed to the recorder by R's 13–17 and V.R. 2. which enable the sensitivity to set at 1, 3, 10, 30 and 100 times its lowest value. With potentiometric recorders requiring more than 1 mV for full scale deflection the value of V.R.2. must be increased and with current recorders this resistance must be omitted from the circuit.

When setting up, the voltage produced by the standing current is balanced out and the recorder set to zero by adjustment of V.R.1. Battery B and R9 provide a counter current through V.R.2. to produce a potential which fixes the position of the baseline at any desired level according to the setting of V.R.2., this baseline position being independent of the sensitivity employed. The push switch S and R11 are included in the circuit to enable a mark to be produced on the record when required.

In use, the output of this unit on the most sensitive range drifts 0.1–0.05 mV in the first quarter hour after switching on, and thereafter the drift is less than $\pm$ 0.01 mV per hour, the noise level on this range being equivalent to $\pm$ 0.01 mV. These values are of course reduced when the less sensitive ranges are employed.

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[2] M. G. SCROGGIE, *Wireless World*, 58 (1952) 14.

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