This modification of the detector was equally useful for analysis of methyl esters of fatty acids. It seemed to possess the same characteristics of response as the ^{90}Sr-detector, with some advantages in the operation.

The response of this detector was studied in a gas-chromatography apparatus made in our laboratory according to James [2], using a 4 feet glass column of 4 mm diameter filled with Celite 545 of 100—120 mesh containing 20 % (w/w) Apiezon L grease as stationary phase. Commercial argon (99.8 %) at an inlet pressure of 0.5 atm was used as carrier gas. The column and the detector were maintained at a temperature of 180°C. The ionization current was amplified by a feedback electrometer amplifier with 5 000 MΩ input resistance and recorded by a Honeywell recorder. Different anode-voltages ranging from 450 V to 2 000 V could be applied. Using a potential of 2 000 V and applying 0.1 μl of a 1:200 000 dilution (w/v) of methyl laurate in chloroform, the detector still gave a well detectable response, which corresponds to 5×10^{-4} μg of methyl laurate.

The sensitivity of this detector is at least of the same order as that of Lovelock's detector. The absence of the strontium plate causes a considerable fall of the basic ionization current and increases stability of the detector at higher anode potentials and gives a low noise level.

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The Mechanism of Inactivation of SH-Enzymes by X-Rays

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Previous work in this laboratory has established [1,2] that the SH-enzymes muscle glyceraldehyde dehydrogenase (GAPDH) and yeast alcohol dehydrogenase (ADH) are inactivated by X-rays with ionic yields which fall in the same range as those of non-SH-enzymes. This finding, which stands in contrast to previous claims [3,4], raises the questions as to the radiosensitivity of protein SH-groups and the role of such groups in the radiation induced inactivation of SH-enzymes. In order to throw light on these questions the X-ray inactivation of GAPDH and ADH in dilute solution has been correlated with the concomitant disappearance of titratable SH-groups.

In the case of GAPDH, the disappearance of the protein SH-groups as well as the enzyme inactivation was found to be a linear function of the radiation dose. Complete inactivation of the enzyme occurred when 3 SH-groups per enzyme molecule had been destroyed. Since GAPDH is completely inactivated by the addition of 3 moles of *p*-chloromercuriphenyl sulphonate [5] the present data strongly indicate that the radiation induced inactivation of the enzyme is entirely due to radiochemical destruction of SH-groups.

The ADH was inactivated by X-ray to a somewhat greater extent than could be expected on the basis of the disappearance of the titratable SH-groups. Thus, from a comparison of the experimentally determined number of SH-groups with the theoretical number calculated on the basis of the remaining enzymatic activity [6], it was estimated that approximately 60—80 % of the enzyme inactivation can be accounted for by the radiochemical destruction of SH-groups.

In both enzymes the disappearance of SH-groups proceeds with a low ionic yield compared with that observed on irradiation of low molecular thiols [7]. This finding indicates that the enzyme SH-groups are protected by the rest of the protein molecule and that the major part of the radiation energy is dissipated in reactions not leading to the loss of thiol-groups. The consequent alterations of the enzyme molecule are apparently of little significance for the enzymatic activity.

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