Radioactivity Detector on GC

The invention of gas chromatography by James and Martin was evoked by their work on the synthesis of fatty acids in plants. To aid in their research, a method was needed to separate the fatty acids extracted from plant tissue and to quantitatively estimate the different fatty acids present. As a consequence, the technique suggested by Martin and Synge in 1941 (26) (GC) was developed into a practical separation procedure. Subsequently, the synthetic pathways for the different fatty acids were examined using $^{13}$C and $^3$H markers. Thus, having established a technique to separate the fatty acids, those that were radioactive needed to be identified and the relative activity of each peak compared and to do this successfully, a proportional radioactive detector was required. James and Piper described a radioactivity detector 1961-3 [27,28] suitable for this purpose is still in use today, although the detector has been fabricated in various different forms by a number of different manufacturers. A diagram of the radioactivity detector based on the device of James and Piper is shown in figure 46.

There are two basic forms of the radioactivity detector, one that measures $^{13}$C only and the other that measures both $^{13}$C and $^3$H. In both systems the carrier gas used must be helium or argon and the column eluent is fed through a furnace packed with copper oxide to oxidize all the solutes to carbon dioxide and water.