
HYPHENATED GC DETECTION: WHERE HAVE WE COME FROM AND WHERE CAN WE GET TO?

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GC technology revolves around the 3 great enabling tools that comprise the method: Injection, Column developments, and Detection. Each of these plays its own particular role in method development, to hopefully provide a total analysis that is fit-for-purpose. Correct injection delivers to the column a representative subsample of the mixture; the column provides for adequate separation of components of interest from other components and matrix compounds; the detector is the visualisation system that allows each compound to be adequately measured qualitatively and/or quantitatively. It is probably true that almost every conceivable detector that can operate in the gas phase, with real-time analysis capabilities and for which a suitable interface design can be constructed, has either been (i) developed and adopted, (ii) considered at the prototype stage, or (iii) proposed but found to be incapable of hyphenation. This testifies that there is an on-going need for improved detection.

Detection need not be fully incorporated into a total on-line system design; depending on the goals of the analysis, off-line systems can be informative and provide a level of simplicity for the testing of a small number of compounds, if this is all that is required. Alternatively, it is possible to design an interface that might be impractical, but paves the way to demonstrate system capabilities, limitations, and scope for improvements.

In terms of the truly informative detection technologies, it might be claimed that mass spectrometry has both been the great revelation in GC. But also might there now be an over-reliance on MS (possibly also at the expense of the search for greater separation power) in preference to other more appropriate technologies?

Whatever the final need for detection, we cannot escape the fact that there seems to be an insatiable appetite for greater sensitivity, greater selectivity and absolute identification and quantitative certainty, for as many compounds as we can possibly detect in a sample. Our work has employed variously GC with FID, NPD, ECD, FPD, Olfactometry, MS (qMS, TOFMS, HRMS) and more recently both off-line MS and NMR. We will explore the roles and directions that some of this work has taken.