A Compact Ion Source for Polar and Non-Polar Compounds

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Introduction
A flowing atmospheric pressure afterglow [1] ionisation source can handle a range of compound chemistries', from polar to non-polar compounds. A prototype ion source developed exhibited excellent quantitative characteristics and, in many cases, the sensitivity in quantitative studies was an order of magnitude greater than electrospray ionisation.

Aim: To develop a compact source capable of ionising polar and non-polar chemistries. To test the afterglow power using an oscilloscope using a metal probe.

Methods

- Instrumentation: Xevo G2-S Tof (Waters Corp, Manchester, UK) fitted with a modified universal source housing. HDO 4104 Oscilloscope (Teledyne LeCroy, Glasgow, UK).
- A glass melting point tube is used to deposit the sample, the glass tube is inserted into the side of the source into the afterglow discharge.
- All analyses was carried out in positive polarity. Data acquisition and processing was achieved using MassLynx 4.1.

Results

Figure 1. Original prototype alongside the new compact source, £1 coin shown for scale (1a). Schematic of discharge cell, samples introduced between anode and MS inlet on a glass melting point tube (1b).

The original prototype source has demonstrated its capability with alkanes [2] such as dodecane (C12H26, MW 170.34), tetradecane (C14H30, MW 198.34), hexadecane (C16H34, MW 226.44), and octadecane (C18H38, MW 254.49). Typically [(M+yO)-xH]+ species were observed most commonly the [(M+O)-3H]+ species.

Figure 2. Mass Spectra of [M + H]+ ion at m/z 130 corresponding to [C8H19N + H]+ (2a). Mass Spectra of [M + H]+ ion at m/z 163 corresponding to [C10H14N2 + H]+ (2b).

Conclusion

- A compact ionisation source design with respect to a larger prototype has been developed.
- Initial characterisation has shown an output current of the afterglow to be sufficient as a potential high sensitivity ionisation source.
- The source has been tested using both polar and non-polar chemistries, generating comparable data to the previous in house design with [M]** and [(M+O)+H]+ species observed non-polar and protonated [M+H]+ species for polar compounds respectively.
- Future work: Investigate the ionisation modes of the compact source. Further adapted this new compact and flexible source for high throughput applications interfacing to GC and LC.

References


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