The Investigation of Suspected Animal Poisoning by Q-TOF MS Using an Atmospheric Pressure Solids Analysis Probe (ASAP)

Introduction

The Wildlife Incident Investigation Scheme (WIIS) operated in Scotland by Science and Advice for Scottish Agriculture (SASA) Pesticides & Wildlife Branch investigates suspected poisoning of wildlife, beneficial insects, companion animals and livestock if there is evidence to indicate that pesticides or biocides may be involved.

Usually sample extraction procedures are carried out on a wide range of sample matrix types with subsequent clean-up, chromatographic separation and MS detection. The use of an Atmospheric Solids Analysis Probe (ASAP) coupled to a Q-TOF tandem MS instrument has allowed us to quickly identify cases of animal poisoning without sample extraction or chromatographic separation.

Experimental

ASAP Sample Introduction:
Sample or standard loaded on a glass capillary is quickly inserted into the source, volatilized by heated desolvation gas (N₂, 200°C) and ionized by corona discharge under APCI conditions (2µA corona current).

Mass Spectrometry: TOF MS and QTOF MS
An orthogonal acceleration time-of-flight mass spectrometer with an API interface was used (Xevo QTOF MS, Waters Corporation).
Data acquisition was performed over a mass range m/z 50 to 1000 at nominal instrument resolution 9,500 FWHM. QTOF measurements selected parent ion masses at nominal resolution 0.7 Da FWHM. Leucine-Enkephalin was employed as lock mass.

Results

Results are presented below from the investigation of three cases of suspected poisoning involving a golden eagle (Aquila chrysaetos), a buzzard (Buteo buteo) and a cat (Felis catus).

Conclusions

- Mass accuracy (<5ppm) achieved in both TOF and QTOF mode allows positive identification of suspected poisons in complex biological samples in the absence of any clean-up procedure
- Desorption profiles of complex samples can be analysed using mass spectral data manipulation (CODA) or by targeted post acquisition screening using reconstructed ion chromatograms with narrow mass windows in TOF mode and in QTOF mode