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On-line Coupled Extraction and Separation using Superheated Water for the Analysis of Triazine Herbicides

Ruziyati Tajuddin and Roger M. Smith*
Chemistry Department, Loughborough University, Loughborough, LE11 3TU Leicestershire, UK.

INTRODUCTION
Superheated water extraction (SWE) has been coupled on-line with superheated water chromatography (SWC) via a solid phase trap. The extraction, trapping, release and chromatography are all controlled by altering the temperature and no organic solvents are required at any stage of the process. Cold and warm wash aqueous steps were included to remove humic acids and other interfering components of the compost samples.

METHOD
A series of triazines were used as test compounds and were spiked onto either a seed compost (60% peat) or an ericaceous compost (100% peat).

1. Extraction phase
The sample in the extraction cell was first flushed with warm water to wash very polar extractable components to waste. The outlet flow was then switched to the trap column and the sample heated to 170 °C. As the aqueous solution left the extraction cell it was cooled and passed to the X-Terra trap column to collect and focus the components to waste.

2. Clean up
The trap was washed with water at 60 °C to remove medium polar components and these were passed to waste.

3. Separation
The flow of water was then switched to the analytical column and the trap was heated rapidly to 200 °C to release the analytes to the PGC analytical column. The analytical column was programmed from 160 to 200°C to chromatograph the extracts.

RESULTS
Extraction from the ericaceous compost – much more interference even after washing.

EXTRACTION FROM SEED COMPOST

<table>
<thead>
<tr>
<th>Compound</th>
<th>Recovery (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrazine</td>
<td>100</td>
</tr>
<tr>
<td>Propazine</td>
<td>95</td>
</tr>
<tr>
<td>Simazine</td>
<td>98</td>
</tr>
<tr>
<td>Ametryn</td>
<td>90</td>
</tr>
<tr>
<td>Terbutryn</td>
<td>85</td>
</tr>
</tbody>
</table>

CONCLUSION
Recoveries of the chloro-triazines decreased at the higher temperature due to decomposition, however the recoveries of the thiomethyl-triazines increased at the higher temperature because they are more thermally stable. In previous work, McGowin et al [2] reported that the recoveries of chloro-triazines (atrazine and propazine) decreased significantly from 110 °C to 250 °C, but the recovery of ametryn was less affected.

REFERENCES