Inorganic arsenic - SPEHG-AAS method for RICE tested in-house and collaboratively

Rasmussen, Rie Romme; Qian, Yiting; Sloth, Jens Jørgen

Publication date:
2013

Document Version
Early version, also known as pre-print

Link back to DTU Orbit

Citation (APA):
INORGANIC ARSENIC

SPE HG-AAS RICE METHOD TESTED IN-HOUSE AND COLLABORATIVELY

INTRODUCTION

Internationally accepted validated method(s) are needed for establishment of a maximum level (ML) for inorganic arsenic (iAs) in rice as recently emphasised by the European Food Safety Authority (2009), the World Health Organization (2011) and Codex Alimentarius (2012).

Rice contains most often three forms of the trace element arsenic; iAs and the methylated species monomethylarsonic acid (MA\(^3\)) and dimethylarsinic acid (DMA\(^3\)). Dietary intake of iAs is of special concern due to its carcinogenicity to humans, whereas DMA and MA are generally considered of less toxicological importance.

CONCLUSION

This SPE HG-AAS method enables selective determination of inorganic arsenic in rice and rice products by use of inexpensive instrumentation (HG-AAS) and is a candidate method for future control.

VALIDATION RESULTS

In-house validation was satisfying (Tab 1.) and was in accordance with previous results for marine samples (Rasmussen et al. 2013). The LOD (0.02 mg·kg\(^{-1}\)) was below the proposed maximum levels (0.2-0.3 mg·kg\(^{-1}\)).

Collaborative test of the SPE separation method on a wholemeal rice meal sample gave a satisfactory HorRat value of 1.6 among 10 laboratories.

<table>
<thead>
<tr>
<th>Table 1.</th>
<th>In-house validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiked rice samples</td>
<td>Rice reference materials</td>
</tr>
<tr>
<td>Target level (mg·kg(^{-1}))</td>
<td>0.0, 0.1, 0.2, 0.3</td>
</tr>
<tr>
<td>Observations (N)</td>
<td>3 3 3 3</td>
</tr>
<tr>
<td>Mean recovery (%)</td>
<td>106 110 108 103</td>
</tr>
<tr>
<td>Reproducibility RSD(%)</td>
<td>3 4 5 5</td>
</tr>
<tr>
<td>Reproducibility HorRat(%)</td>
<td>7 9 9 7</td>
</tr>
</tbody>
</table>

1) Consensus mean values: SPEP-107 (de la Calle MB et al., 2011 TCAC 2011-18041-001) and NIST1568a (Klauck et al., 2009 J Environ Monit 11:41-44).
2) One outlier result discarded (0.048 mg·kg\(^{-1}\)).

RICE SAMPLES

The iAs concentration determined by SPE HG-AAS in 36 rice samples purchased on the Danish retail market varied (0.03–0.60 mg·kg\(^{-1}\)), with the highest concentration found in a red rice sample.

References

Rasmussen et al. (2013), ABC, doi 10.1007/s00216-013-6936-8
Codex (2012) Proposed draft maximum levels for arsenic in rice (at step 3).
European Food Safety Authority (2009) EFSA Journal 7(10), 1351:1-199

Funding was received from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 211326 www.confidence.eu