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

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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 emphasized 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) and dimethylarsinic acid (DMA). 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. In-house validation</th>
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<tr>
<td>Target level (mg kg⁻¹)</td>
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<td>Observations (N)</td>
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<tr>
<td>Mean recovery (%)</td>
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<td>Reproducibility RSD (%)</td>
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<td>Reproducibility RSD (%)</td>
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SPE HG-AAS vs HPLC-ICP-MS

A comparison of the results from the two methods (Fig. 3) showed good agreement.

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


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