

# DETERMINATION OF ARSENIC IN ANIMAL FEED BY MICROWAVE DIGESTION AND GRAPHITE FURNACE ATOMIC ABSORPTION SPECTROMETRY METHOD

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**A**rsenic contamination of palm oil is of great concern due to its carcinogenic effects. Most soils contain some arsenic, generally at low levels of 1 to 50 mg kg<sup>-1</sup>. However, industrial wastes and pesticides may contain more, and their disposal/application will contaminate the environment. Unpublished data obtained from a laboratory in the European Union (EU) showed that Malaysian palm kernel cake (PKC) has 0.5 to 4.5 mg kg<sup>-1</sup> arsenic. Microwave digestion technique is widely used in analytical chemistry. It is simpler than the conventional digestion, uses less reagents and is less prone to contamination and complete digestion. Graphite Furnace Atomic Absorption Spectrometry (GFAAS) was therefore attempted for total determination of arsenic in PKC.

## DETECTION OF ARSENIC BY GRAPHITE FURNACE ATOMIC ABSORPTION SPECTROMETRY

Standard arsenic was used to spike PKC to levels of 1, 2 and 4 mg kg<sup>-1</sup>. The spiked PKC was digested in a closed vessel digestion system using nitric acid and hydrogen peroxide of suprapure quality (Figure 1). The resultant residue was dissolved in water for arsenic determination by GFAAS (Figure 2).

## RECOVERY

The mean recoveries of arsenic for the three spiked levels were 73% to 89% with standard deviations (S.D) of 0.062 to 0.323 and coefficients of variation (%) of 7% to 11%. Based on the good recoveries and low coefficients of variation of <20%, the method is feasible as an alternative digestion to determine arsenic in PKC. The results are summarized in Table 1.



Figure 1. Closed system microwave digester.



Figure 2. Graphite Furnace Atomic Absorption Spectrometry for determination of arsenic in palm kernel cake.

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**TABLE 1. RECOVERY OF ARSENIC FROM PKC SPIKED  
TO 1, 2 AND 4 mg kg<sup>-1</sup>**

| <b>Concentration of arsenic in spiked PKC (mg kg<sup>-1</sup>)</b> | <b>Recovery (%)</b> | <b>Standard deviation</b> | <b>Coefficient of variation (%)</b> |
|--|---------------------|---------------------------|-------------------------------------|
| 1  | 83                  | 0.062                     | 7.469                               |
| 2  | 89                  | 0.154                     | 3.458                               |
| 4  | 73                  | 0.323                     | 10.882                              |

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