DETECTION OF ARSENIC IN GLYCERINE

by: MOHTAR YUSOF

396

MPOB INFORMATION SERIES • ISSN 1511-7871 • JUNE 2007 MPOB TS No. 21

Regularly drinking water high in arsenic results in chronic health problems. The Food Chemical Codex (FCC) and Cosmetics, Toiletry and Fragrance Association (CTFA) specify the maximum permissible limit of arsenic at 3 mg kg^{-1} while the United States Phamacopoeia (USP) at 1.5 mg kg^{-1}.

ARSENIC TESTING SERVICES

In view of the toxicity of arsenic, its content in glycerine needs to be monitored as glycerine is widely used in food and cosmetics products. The official method for detecting arsenic in glycerine is ISO 2590, *General Method for the Determination of Arsenic – Silver Diethyldithiocarbamate Photometric Method or ISO 2465, Glycerols for Industrial Use – Determination of Arsenic Content – Silver Diethyldithiocarbamate Photometric Method*. The limit of determination by these two methods is 0.1 mg kg^{-1} sample. Wet chemical treatments are employed with arsenic determined by UV-VIS spectrophotometry at 540 nm wavelength. For quicker analysis, there is a need to simplify these ISO methods.

ANALYTICAL AND CONSULTANCY SERVICES

MPOB offers an analytical service for arsenic in glycerine by a new method under the following terms:

- cost of analysis @ RM 65 $sample^{-1}$.
- the client to deliver his samples (about 25 g) with a written request for the test required;
- samples received will be checked to ensure that they are in good conditions for the analysis;
- the results of analysis (in a certificate of analysis) or COA to be ready in three days; and
- the invoice to be sent together with the COA.

The arsenic level in glycerine, is one of the quality parameters required by USP, CTFA and FCC. MPOB can also assist companies to set up the test in-house.

DETECTION OF ARSENIC BY ATOMIC ABSORPTION SPECTROMETER (AAS)

A new method for detecting arsenic in glycerine has been developed in MPOB with, the sample directly injected into a graphite furnace atomic

Figure 1. Graphite furnace atomic absorption spectrometer for determination of arsenic in glycerine.

ISSN 1511-7871
9 771511 787001

Malaysian Palm Oil Board, Ministry of Plantation Industries and Commodities, Malaysia
P. O. Box 10620, 50720 Kuala Lumpur, Malaysia. Tel: 03-87694400 Website: http://mpob.gov.my Telefax: 03-89259446

MPOB

TABLE 1. RECOVERY OF ARSENIC AT 0.1 mg kg^{-1} TO 5.0 mg kg^{-1} IN GLYCERINE

Level of arsenic (mg kg^{-1})	Recovery (%)		
	Mean	s.d.	C.V. (%)
0.01	75.4	4.7	6.3
0.02	72.5	3.4	4.7
0.05	79.4	4.2	5.3
0.1	90.7	1.1	1.2
0.2	92.6	5.0	5.4
0.3	96.4	3.6	3.9
0.5	97.3	3.9	4.2
1.0	110.0	5.1	4.6
3.0	84.2	1.0	1.2
5.0	82.6	3.1	3.8

absorption spectrometer (AAS). This method has several advantages over the ISO method:

- simpler;
- requires less time;
- no chemical treatments required, and
- lower detection limit of < 0.1 mg kg^{-1}.

The sample is first dissolved in distilled water, then injected into a graphite furnace AAS with electrode-less discharge arsenic lamp *(Figure 1)*. A matrix modifier has to be used and should be injected first before the sample.

The method was developed by spiking arsenic at concentrations 0.01 mg kg^{-1} to 5.0 mg kg^{-1} of glycerine. The recovery of arsenic in glycerine ranged from 72.5% to 110.0% with a standard deviation (s.d) of < 5.5% and a coefficient of variation (C.V) of < 7%. The results are summarized in *Table 1*.

For more information kindly contact:

Director-General
MPOB
P. O. Box 10620
50720 Kuala Lumpur, Malaysia.
Tel: 03-87694400
Website: http://mpob.gov.my
Telefax: 03-89259446