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 Assignment title: Jurnal
 Submission title: Method Development and Validation for Lead (Pb) Analysis i...
 File name: Article_Green_Chemistry_Proceeding_Update.pdf
 File size: 608.99K
 Page count: 9
 Word count: 2,629
 Character count: 14,490
 Submission date: 31-Dec-2021 09:15AM (UTC+0700)
 Submission ID: 1736562350

ISBN 978-602-285-049-6 Proceedings of
The 9th Joint Conference on Chemistry

**Method Development and Validation for Lead (Pb) Analysis in Natural
Honey from East Kalimantan**

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Abstract

Analysis method for determining Pb content in natural honey have been developed and validated. Analysis were carried out on one natural honey sample collected from Tereng (Baikpapan) with standard analysis method and three developed analysis methods and their analytical performance were compared. Pb content was determined with atomic absorption spectrometry after dry digestion (method A) or wet digestion (method B (HNO₃-H₂O₂:3:8), C (HNO₃-H₂O₂:2:1) and D (HNO₃)). Analytical performance parameter, such as linearity, working range, limit of detection, limit of quantification, precision and accuracy were tested. Content of Pb in natural honey sample which analysed with method A, B, C and D were found at 0.7923 ± 0.0311 µg/g, 0.7944 ± 0.0216 µg/g, 0.7998 ± 0.0218 µg/g and 0.7912 ± 0.0160 µg/g respectively. gAnalytical performance of four tested analytical method were still acceptable. Significance testing result showed that there were no significance differences in precision and accuracy between developed analysis method and standard analysis method, except for method D. Precision of method D was significantly better than standard analysis method.

Keywords: Honey; Lead; Method Validation

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Introduction

East Kalimantan Province, with land area covered 51% of Indonesia total land area, has vast forest region which covered 70% of its land. Honey is one of main commodity non-woods from forestry. East Kalimantan highest honey production dates back in 1996/1997 was 5039 tons and keep declining until only 25.60 tons in 2008, either harvested from wild honey or beekeeping (BP2HP, 2010). Honey is natural liquid mostly has sweet flavor produced by honey bees from floral nectar or extra floral nectar or insects excretion (ISN, 2004).

Honey mostly used as food source, beside that honey bees and honey could also applied as indicator species of environmental quality. Honey bees are good biological indicators because they reveal the chemical impairment of the environment they live in through two signals: one is more evident, that is high mortality (in the case of pesticides), while the other is less so, consisting of residues present within their bodies or in beehive products (in the case of other contaminants like heavy metals and radionuclides) that may be detected by means of suitable laboratory analyses (Ponris et al., 2003). Have been reported that lead contamination to environment could be monitored with honey bees and its honey (Fahimessah and Idris, 2000; Dewilars and Pham-Delieue, 2002). Figure 1 shows interaction between honey bees and environment (Ponris et al., 2003).

Lead is fifth most used metal after iron, copper, aluminum and zinc (Englab, 2004). Lead exposure could enter human body through breathing and swallowing (ATSDR, 2007) inside the body, Lead has great impact. Iron hypertension and anemia until severely damage the nervous system, immunity system and reproduction, kidneys, and even resulting death (Radosovic and Baskin, 2009; Englab, 2004; ATSDR, 2007).

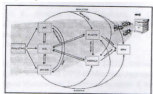


Figure 1. Honey bee interaction with its environment (Ponris et al., 2003)

Application of indicator species, such as honey, can be used to estimate how much lead species have direct impact to living things in certain ecosystem (Nawu, 2008). Analysis of lead content in honey was based on

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This Proceeding@Chemistry Department, FSM, Diponegoro University 2015