The effect of oil reuses and frying process on lead (Pb) and copper (Cu) in frying oil residue

Indrawati\(^1\)*, Yani Sri Yanti\(^1\), Yefrida\(^1\), Rahmiana Zein\(^1\) Refilda\(^1\)

\(^1\)Department of Chemistry, Faculty of Mathematic and Natural Sciences
Andalas University, Padang, Indonesia

*Corresponding author: loan_indrawati@yahoo.com

Abstract

Research about the effect of oil reuses and frying process on Pb and Cu in frying residue oil has been done. The aimed of this research is to see the effect of oil reuses and frying process on Pb and Cu in frying oil residue. The aluminum and stainless steel frying pan and chicken were used in frying process. The content of Pb and Cu in frying oil residue was determined by using Atomic Absorption Spectrophotometer (AAS Rayleigh WFX-320), destruction method by using HNO\(_3\) concentrate and H\(_2\)O\(_2\) 30%. Statistical tests (F test) was used for the effect of oil reuses for 7 times on Pb and Cu in frying oil residue, the type of frying pan and fried material (chicken) has a significant difference to increase levels of Pb and Cu. Concentration of Pb and Cu in frying oil residue more than 0.1 ppm, this value exceeds the standard quality of cooking oil on the SNI 01-374-2002.

Keywords: Atomic absorption spectrophotometer, copper, lead, frying oil residue, oil reuses

Introduction

Cooking oil comes from various parts of plants. In the most case, cooking oil comes from seeds including sun flower, palm kernel and sesame. Nuts including soybean, almond and peanut. Some cooking oil comes from the flesh of the fruits such as coconut oil come from the coconut’s while meat palm oil from the pulp of the palm fruits, olive oil from the flesh of fresh olive.

Based on the Standard quality (SNI) number 0003-72 about the quality of cooking oil that contain maximum 0.1 ppm of Pb and Cu. In the previous study the concentration of Pb and Cu in the oil will increase after using in many times (Yusuf & Suyani, 2009) Using cooking oil repeatedly will produce the quality of oil is lower than the new cooking oil. Characteristics of used cooking oil are the texture, appearance, taste and smell of the food less tasty. In addition to cooking oil when consumed caused fatty deposition in blood vessels and decrease in fat digestibility values (Santi, 2004).

Based on previous research results that the metal ion Pb and Cu content in the used cooking oil increased after many times of frying. The increased of metal ions has not been studied where it came from. The enhancement contents of Pb and Cu in cooking oil was not known yet. Therefore, in this study attempted to learn the sources of the increase of the metal ions such as frying pan and fried material. In present research will investigate effect of frying tools that assume for giving the effect of contents of Pb and Cu in the cooking oil, two kinds of frying pan made from alluminium and stainless steel were used for frying chicken. Metal ion Pb and Cu content in used cooking oil were determined by flame atomic absorption spectrophotometry method.

Materials and Methods

Material

New cooking oil, used cooking oil, HNO\(_3\) p.a, H\(_2\)O\(_2\) 30 %, standard solution (Pb and Cu) 1000 mg/L (E.Merck, Germany), chicken and aquadest.

Apparatus

Glassware, Kjeldahl, analytical balance XT 220 A Precisa, SSA (Sorption Spectroscopy Atomic) (SSA Rayleigh WFX-320).

Method

Treatment of oil from frying process

In the two frying tools (aluminium and stainless), the cooking oil was prepared. First frying tool was filled by cooking oil 2 L and the second one was filled by cooking oil and chicken with ratio oil and chicken is 2L : 2 Kg. Frying of oil is just until 7 times by 2 type of frying tools. The oil was filtered and continued for destruction process and analysis of Pb and Cu by SSA.