

JURNAL ILMIAH SAINS & TEKNOLOGI

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**JURNAL ILMIAH
SAINS & TEKNOLOGI**

ISSN 0216-1540

Terbit dua kali setahun pada bulan Juni dan Desember. Berisi tulisan yang berasal dari hasil penelitian, kajian atau karya ilmiah di bidang Sains dan Teknologi.

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Universitas Surabaya

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Jurnal Ilmiah Sains dan Teknologi pernah terbit dengan nama Unitas (pertama kali terbit tahun 1992) oleh Lembaga Penelitian Universitas Surabaya.

Isi di luar tanggung jawab Percetakan.

**JURNAL ILMIAH
SAINS & TEKNOLOGI**

ISSN 0216-1540

Volume 5 Nomor 2, Juni 2012
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THE ISOLATION-PURIFICATION OF CAFFEINE USING TWO COMMON METHODS

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Abstract

The aim of this research was to compare which of the two methods: soxhletation-sublimation or reflux-recrystallization with two solvents, more efficient to isolate and purify caffeine from coffea Arabica bean powder. The first method was performed using soxhlet apparatus for continuous solid-liquid extraction followed by sublimation, while the second method was done using reflux with round-bottom flask, followed by recrystallization with two solvents -acetone and petroleum ether-. Identification of isolated substance was conducted by thin layer chromatography (TLC) and Fourier transform- infrared spectrophotometry (FTIR) methods. From the results of this research it could be concluded that soxhletation-sublimation method was more efficient to isolate and purify caffeine from coffea Arabica bean powder than reflux-recrystallization with two solvents.

Keywords- Caffeine, coffea Arabica bean, soxhlet-sublimation, reflux-recrystallization, TLC, FTIR.

INTRODUCTION

Coffea Arabica, known as black coffee, is a very popular coffee in Indonesia. Most people in Indonesia enjoy this kind of coffee because of its fresh taste when consumed. This fresh taste is due to a chemical substance, namely caffeine, contained in it.

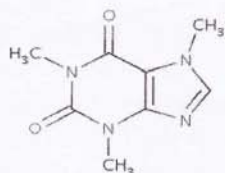


Figure 1 The structure of caffeine

Caffeine is a derivate of xanthine, found in coffee, tea, and chocolate.

Caffeine can be used to remove drowsiness, tiredness, and to increase alertness due to its activity to stimulate central nervous system (Raphael, 1991).

Within human body, caffeine works by competitively inhibit phosphodiesterase, which results in an increase of cyclic adenosine monophosphate followed by a subsequent release of endogen epinephrine. This accounts for a direct relaxation of the smooth muscles of bronchi and pulmonary blood vessels, an

induction of diuresis, an increase in gastric acid secretion, and an inhibition of uterine (Varro et al., 1988).

In this research, the isolation and purification of caffeine was performed using two methods. The first method, soxhletation-sublimation method, used continuous solid-liquid extraction with soxhlet apparatus, followed by sublimation. Meanwhile, the second method, reflux-recrystallization with two solvents, was conducted by refluxing the mixture in a round bottom flask equipped with reflux condensor, followed by recrystallization with two solvents -acetone and petroleum ether- (Anonim, 2007; Anonim, 2008).

The aim of this research was to compare which of the two methods: soxhletation-sublimation or reflux-recrystallization with two solvents, more efficient to isolate and purify caffeine from coffea Arabica bean powder. Identification of caffeine obtained by the methods was performed by TLC and FTIR methods.