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Semarang, 24 Maret 2020
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Prof. Dr. Mohammad Djaeni, S.T., M.Eng.
NIP. 197102071995121001
Unit Kerja : Fakultas Teknik Universitas Diponegoro
Bidang Ilmu : Teknik Kimia

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# Document details



Advance Journal of Food Science and Technology
Volume 5, Issue 5, 2013, Pages 565-570

## Derivation of single particle drying kinetics of tapioca flour (Article) (Open Access)

Suherman[a], Berkah Fajar, T.K.[b], Margaretha Praba, A.[a]

[a]Department of Chemical Engineering, University of Diponegoro, Semarang, Indonesia
[b]Department of Mechanical Engineering, University of Diponegoro, Semarang, Indonesia

### Abstract

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The single particle drying kinetics of powdery tapioca flour has been derived from fluidized bed drying experiments which the inlet gas temperatures is varied (40, 50 and 60°C, respectively). The derivation is performed by scale down method from experiment data uses the FLUBED software which the normalized drying curve is adjusted by iterative method. The FLUBED language programming is developed based on fluidized bed drying model usinga two-phase theory. From high moisture content (0.44 kg/kg, wet base) until the product specification i.e., $X_{wb}$ = 0.14 (kg/kg) and in three different conditions of the inlet gas temperatures, the application of the normalized drying curve gives an excellent performance of simulation results intend that the normalization method works well. The drying curve has two drying period namely constant drying rate period and falling drying rate period, where $X_{cr}$ is 0.35. © Maxwell Scientific Organization, 2013.

### SciVal Topic Prominence

Topic: Glass transition | Transition Temperature | Water sorption

Prominence percentile: 89.515

### Author keywords

Drying | Fluid bed | Modeling | Tapioca

### Indexed keywords

Engineering controlled terms: Fluidized bed process; Fluidized beds; Iterative methods; Models

Engineering uncontrolled terms: Constant drying rate period; Falling drying rate period; Fluid-beds; High moisture contents; Inlet gas temperature; Normalization methods; Product specifications; Tapioca

Engineering main heading: Drying

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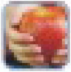


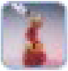
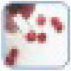


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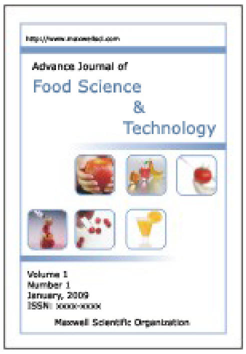


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**Research Article**

# Extraction and Chemical Composition of Seed Kernel Oil from *Irvingia smithii* of Congo Basin

[1, 2]B.W. Loumouamou, [1]J.P.M. Gomoufatan, [1, 2]T. Silou, [3, 4]J.M. Nzikou, [1]G.V. Mbaya Gindo, [5]G. Figueredo and [6]J.P. Chalard
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**Abstract:** This study is part of a wider program on the development of oilseeds in the Congo Basin and its aim was to contribute to the knowledge of *Irvingia smithii* kernel by studying his chemical composition following the example of those of *Irvingia gabonensis* and *Irvingia wombulu*. *Irvingia smithii* kernel, like those of *Irvingia gabonensis* and *Irvingia wombulu* is multipurpose, however, less known than the latter. The assessment of oilseeds of the kernel of *Irvingia smithii* showed that it is oleaginous with fat contents of about 55%. The fatty acid profile established by gas chromatography showed that the lauric acid content is higher than that of myristic acid (% C12: 0>% C14: 0) and both have a percentage of the total fatty acid content of nearly 90%. Palmitic acid (C16: 0), the third major constituent has nearly 5%. Oleic (C18: 1) and capric (C10: 0) acids have significant levels and palmitoleic (C16: 1) and stearic (C18: 0) acids are to trace. Triacylglycerol profile established by liquid chromatography coupled to the Evaporative Light Scattering Detector (ELSD) has three major TAG (% LaLaM >% LAMM >% LaLaLa), one minor TAG (MMM) and two TAG to trace (CLaLa and MMP). Fats of *Irvingia smithii* studied have levels of unsaponifiables ranging from 1.25 to 2.97% with the major components such as beta-sitosterol (36%) and stigmasterol (18%). For macronutrients, the most abundant element is Magnesium While the Iron is the least abundant with the following decreasing profile: Mg>P>Ca>Fe. Spectrometric assessment of color led to the remarkable presence of the peaks relating to the absorption of carotenoids and chlorophyll pigments located between 630 and 670 nm.

**Keywords:** Congo basin, fatty acid, *Irvingia smithii*, nutrients, oil content, triacylglycerol, unsaponifiable

## INTRODUCTION

With about 235 million ha, the tropical forests of Central Africa, in addition to wood, abound of great potentialities in non-woody forest products. However most of these products are still sold outside official circuits, which do not make it possible to give a sufficient attention to their transformation and quality. However some of these products are subject to a more extensive trade and come to supply international markets in full growth. This is the case of *Irvingia gabonensis* and *Irvingia wombulu* whose market is estimated at approximately 50 million $EU of turnover (Lapido and Boland, 1994). The Irvingiaceae kernels are therefore part of the Non-timber forest products whose economic and food importances appear undeniable. But, despite their importance, the Irvingiaceae do not benefit from a good valorization and exploitation on a large scale. It should be noted that the Irvingia has six species in the Congo Basin, namely: *Irvingia gabonensis*, *Irvingia grandifolia*, *Irvingia smithii*, *Irvingia wombulu*, *Irvingia excelsa*, *Irvingia robur* (Makita-Madzou, 2000), whose only *Irvingia gabonensis* and *Irvingia wombulu* species appear to be

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**Research Article**

# Simulation and Experiment Research of Non-contact Micro-liquid Reagent Dispensing

[1]Yao Yufeng, [1]Lu Shizhou and [1, 2]Liu Yaxin
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**Abstract:** With the development of biological analytical techniques and high throughput screening techniques, a large number of automated biological agents dispensing systems are widely used in the field of life science research. Non-contact dispensing method characterized by its small dispensing volume, high dispensing precision and quick service speed which satisfies the requirements of biological agent's distribution, becomes the mainstream dispensing method used in reagent dispensing systems. However, the difficult control way, complex system of non-contact dispensing method and its vulnerable dispensing process, which can be easily affected by characteristics of the agent, have hindered the application and development of the method. In this study, simulation model of the separation process of micro scale biological reagent are constructed in order to solve the above problems. The prerequisites of the non-contact dispensing method, the relationship between dispensing volume and precision and characteristics of reagents, formation of system and control parameters are researched through theoretical analysis and numerical simulations. The experiment results are quite consistent with the simulation results; therefore it well verifies the reliability of the modeling and simulation method and also lays a firm theoretical foundation for the system design of non-contact micro-liquid reagent distribution and control optimization.

**Keywords:** Micro-liquid dispensing system, micro-liquid reagent, non-contact dispensing, VOF

## INTRODUCTION

In the field of life science, it is often needed to analyze all kinds of liquid reagents. At this point, the volume reduce has great significance to increase the heat exchange rate between different reagents, shorten the time to reach equilibrium of binding reaction and decrease the consumption of expensive biological reagents (Horrocks *et al*., 2012). With the development of bio-analytical techniques, the volume of single reagent used in related life science has been reduced to microliters and even nanoliters (Minh *et al*., 2010). Then the exact distribution of micro-liquid reagent becomes an important factor in the success of experimental study. With the development of automation technology, various types of automated liquid dispensing devices have been widely used in the life sciences. These devices which have the characteristics of small volume of distribution reagent, fast operating speed and high precision allocation have played an important role in life science (Tropmann *et al*., 2012; Liu *et al*., 2007a). However, in different areas of life science, types of reagents used are very different and the range of required dispensing volume is very wide (Minh *et al*., 2010; Li *et al*., 2009), all of these differences have different effects on the dispensing process and make different requirements for structure and control methods for micro liquid dispensing systems. In order to ensure that different types of micro reagent can be distributed precisely and provide theoretical basis for the designing and optimization of control parameters of automatic micro-liquid dispensing system, it is necessary to study the process of micro-liquid distribution.

Currently, there are 2 distribute methods for automatic micro-biological reagents operation: contact and non-contact dispensing (Liu *et al*., 2007b; Sun *et al*., 2008; Yao *et al*., 2011). And the contact dispensing method which rely on the contact between reagent nozzle and substrate to achieve liquid transfer has the problems of slow operation, difficult for micro volume's distribution and has the risk of contact pollution. In the existing liquid distribution systems, this method is used not frequently (Jia *et al*., 2007). Differently the non-contract distribution method relies on the external energy to overcome the liquid's surface tension, viscosity and other effects to push out the liquid from the nozzle with a high-speed. This method overcomes the problems of low dispensing speed and easy polluted occurred in contract method and more

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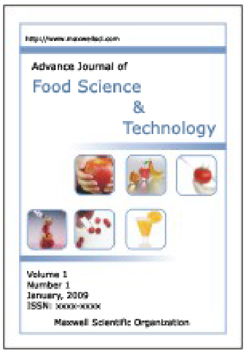


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