Synthesis of New Compound N-(4-Nitrobenzyl) 1,10 Phenanthrolinium Bromide from 4-Nitrobenzyl Bromide and 1,10 Phenanthroline Monohydrate with Variation of Moles of 4-Nitrobenzyl Bromide

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Abstract The compound n-(4-nitrobenzyl)-1.10 phenanthrolinium bromide is derivatives of 1.10 phenanthroline. Synthesis of n-(4 -nitrobenzyl)-1.10 phenanthrolinium bromide on this research carried out by reacting the 4 - nitrobenzyl bromide with 1.10 phenanthroline monohydrate. The reaction following the nucleophilic substitution reaction mechanism especially S_N2 reaction. In this study, synthesis is performed by make the variation of the number of moles of 4-nitrobenzyl bromide as starting material. The aim of this study is to determine the optimal number of moles of 4-nitrobenzyl bromide to produce optimal rendemen of 4 - nitrobenzyl - 1,10 phenanthrolinium bromide.
The process of synthesis on this research carried out by mixing 4 - nitrobenzyl bromide with 1.10 phenantrolinium monohydrate and 15 ml acetone as a solvent, then refluxed for 11 hours at a temperature of 55°C, with a stirring speed of 300 rpm. Variations of moles of 4 - nitrobenzyl bromide conducted in this study are 1, 3, 5 and 7 moles.
The results showed that 5 moles of 4-nitrobenzyl bromide as a starting material variation has given the most optimal rendemen of n - (4 - nitrobenzyl) -1.10 phenanthrolinium bromide. Its rendemen average is 0.5401 gram. And it has been proven statistically by using *tukey test* with significantly ($p<0.05$).

Introduction

Malaria is presently endemic in a broad band around the equator included Indonesia. 85–90% of malaria fatalities occur . There are two major factors that inhibit the efforts to eradicate malaria, they are parasites malaria resistant and resistant of current antimalarial. There have been many efforts conducted to find new antimalarial which has an effective and safe . One of them was the development of a derivatives compound of 1,10 phenanthroline [4].
Phenanthroline derivative that has been synthesized previously was n-(4-nitrobenzyl)-1.10 phenanthrolinium iodide. This compound has been proven that has an activity to kill parasites of *Plasmodium falciparum* [5]. And in this research, we develope other derivatives n-(4-nitrobenzyl)-1.10 phenanthrolinium bromide.
The aim of this study is to determine the optimal composition of moles of the starting material in order to obtain optimal rendemen of product . The starting materials are 4-nitrobenzyl bromide and 1,10 phenanthroline monohydrate. Starting material that optimized was 4-nitrobenzyl bromide. The mechanism of reaction is following substitution of nucleophilic, especially S_N2 model [2].

Materials and Methods

1) Materials

The materials are 4-nitrobenzyl bromide, 1,10 phenanthroline monohydrate, $NaBH_4$, ethanol, HCl 2,5M, CH_2Cl_2, Na_2SO_4 anhidrous, H_2SO_4, aquadest, KI, acetone, diklorometane, dietyleter, NaOH 0,2 M, NaOH 0,1 M, silica gel GF_{254}, methanol.

2) Method

Synthesis of 1 - n - (4 - nitrobenzyl) - phenantrolinium -1.10 bromide conducted by mixing 1 mmol of 1.10 phenanthrolinium monohydrate to each of four moles variations of 4 - nitrobenzyl bromide. The variations are 1 mmol, 3 mmol, 5 mmol and 7 mmol of 4 - nitrobenzyl bromide. Then each variation will be added by 15 ml of acetone in a three- neck round bottom flask equipped. The mixture is heated at a temperature of 55°C and stirred at reflux for 11 hours at a speed of 300 rpm [6]. After reflux finished, solid product is cooled at room temperature. The crystals that formed is washed with acetone n, then filtered by a Buchner. Then crystals dried at room temperature, approximately 20 minutes [3]. Purification of the compounds was done by recrystallization with dichloromethane and diethyl ether with ratio (1:1) [6]. After completely dry calculate the rendemen of crystals of every single moles-composition variations.

Results and discussion

Tabel 1. The result of rendemen calculation of every variations

Group	Rendemen (gram)	SD	Sig.
I	0.3547*	0.01304	0.000
II	0.4401*	0.04973	0.036
III	0.5401*	0.01342	0.000
IV	0.4781*	0.02898	0.005

*. The mean difference is significant at the 0.05 level.

Group I : the avarege result of moles-composisiton ratio 1:1 from three replications

Group II : the avarege result of moles-composisiton ratio 1:3 from three replications.

Group III : the avarege result of moles-composisiton ratio 1:5 from three replications.

Group IV : the avarege result of moles-composisiton ratio 1:7 from three replications.

The table above showed that among four moles variations, all of variations gave the significantly different data which less than 0.05 significantly. The results showed the group III (moles-variation 1:5) gave the maximum randemen of product with the mean 0.5401 gram. And also the average values of each variation showed by the grafic below.

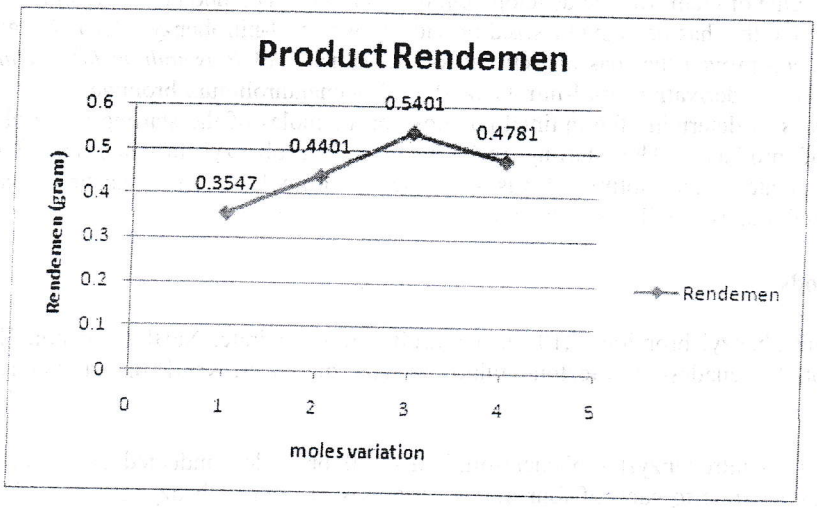

Figure 1 Graphic of rendemen of all product

Based on that result the conclusion is the variation of 1:5 moles of 4- nitrobenzyl bromide as a starting material variation has given the most optimal rendemen of n-(4-nitrobenzyl) -1.10 phenanthrolinium bromide showed by its rendemen value 0.5401 gram which highest than others.

This study should be continued by conducted purification tests of procut, identify characteristic properties of product, determine the structure with chemical structure elucidation (using uv-visible, IR, H-NMR, MS) then we can compare between theoritical and fact of product. And also the main goal of this study to prove is there any pharmacological activities of n-(4-nitrobenzyl) -1.10 phenanthrolinium bromide especially in activity to kill the parasites of *Plasmodium falciparum* by drug design with in vitro – in vivo design, and also determine realated to its safety, efficacy and quality, then in the end we could discover the new drug of antimalarial

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