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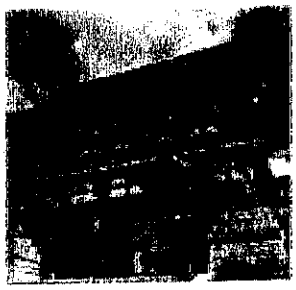
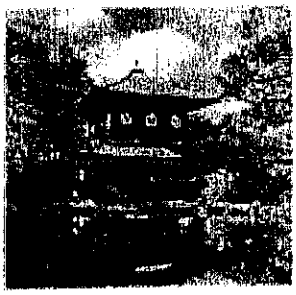

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Tropical Almond Bottom Ash for Stoneware Pottery Glaze

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Abstract

Generally, Tropical almond is a perennial plant commonly found in all provinces of Thailand . Planted for the purpose of providing shade . and a wood core Since there is a large beautiful green especially in the season of leaf development . Often found growing in the government or the public .Therefore, branch and leaves of tropical almond were left and considered as unwanted materials. They were destroyed via the waste combustion process. Then, the tropical almond bottom ash was become residues. In order to protect the environment and to increase the valuable of the bottom ash from tropical almond, the tropical almond ash glaze in Ratchaburi potteries was performed using triaxial diagram table. The clay in this stoneware pottery was chosen from Ratchaburi Province. After that, the glazing formula was then created. The gas kiln was selected. The temperature of reduction fire for glazing was 1,230 degree Celsius. The fifteen testing formula were tested by the variation of tropical almond bottom ash, soda feldspar, and kaolin. The suitable ratio among of glaze formula tropical almond ash : soda feldspar : kaolin was tropical almond ash 5:3:2, respectively. The Stoneware Pottery prototypes were shaped as tea set by the throwing method. The results showed that the glaze of all products was glossy with light-green colour. This developed glazing process was well performed in the Ratchaburi pottery industries. In addition, the mixing between Tropical Almond bottom ash and metal oxides are under investigation to create a variety of color shades.

Keywords: tropical almond ash glaze, soda feldspar, kaolin

1. Introduction

Generally, Tropical almond is a perennial plant commonly found in all provinces of Thailand . Planted for the purpose of providing shade and a wood core. Since there is a large Beautiful green Especially in the season of leaf development. Often found growing in the government or the public. To provide shade from the sun. Tropical Almond or India Almond named by locals as well as the province , such as the base Tar Pae 's (Narathiwat), Tud mua (Trang), Ta Pang (Phitsanulok and Satun) is a medium-sized tree.at a height of 15-20 meters is deciduous. Organized in Combretaceae family type found in the *Terminalia catappa* Linn.
Therefore, branch and leaves of tropical almond were left and considered as unwanted materials. They were destroyed via the waste combustion process. Then, the tropical almond bottom ash was become residues. In order to protect the environment and to increase the valuable of the bottom ash from tropical almond, the tropical almond ash glaze in Ratchaburi potteries was performed using triaxial diagram table. The clay in this stoneware pottery was chosen from Ratchaburi Province.

2. Objective

To study the suitable glazing ratio of tropical almond bottom ash, soda feldspar and kaolin for stoneware pottery glazing.

3. Scope

1. The ingredients for stoneware pottery glazing were tropical almond bottom ash, soda feldspar and kaolin.
2. The Suitable mixing ingredient was obtained from triaxial diagram table with 15 formula using tropical almond bottom ash as the main ingredient.

4. Experimental section

1. The steps of stoneware pottery glazing via the tropical almond bottom ash were shown as follows.
    1.1 The tropical almond bottom ash as agricultural waste disposal was collected.
    1.2 The tropical almond bottom ash was soaked with water and left for 12 hour.
    1.3 The excess water was drained out and water was added into the ash. (repeat for 5 times)
    1.4 The ash was well grind and passed the 100 mesh sieve. The ash was then dried for an overnight.
2. The steps to select the suitable tropical almond ash glazing formula.
    2.1 Each of in ingredients was well-weigh using the digital balance.
    2.2 Each formula was well-grinded for 10 minutes.
    2.3 Testing material was dipped in the prepared solution for 4 sec.
    2.4 The dipped testing material was fired at 1,230 degree Celsius in the reduction atmosphere.
    2.5 The testing material well glaze was chosen as a model for tea set product.

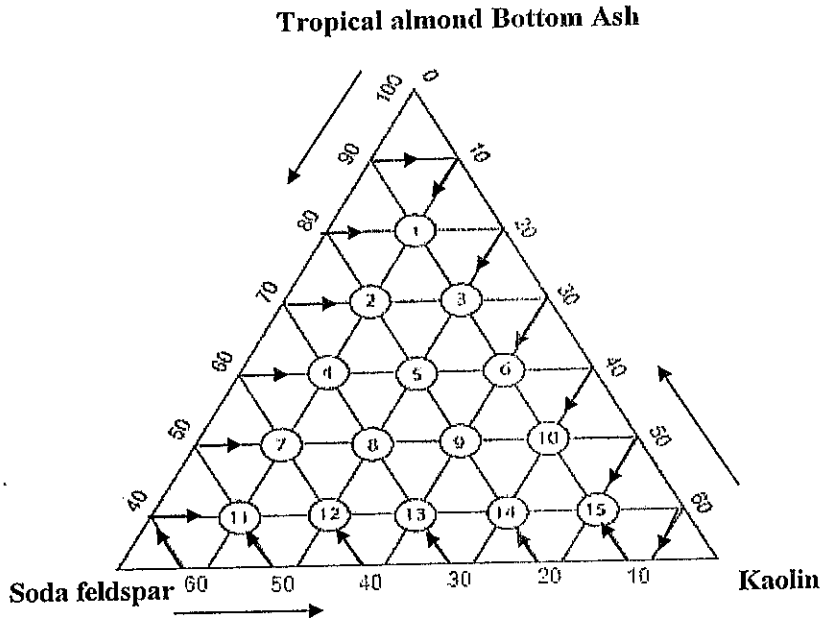

Fig 1. Triaxial diagram table for glazing formula
(Robin Hopper. 2009)

From triaxial diagram table, the 15 formula of tropical almond ash glazing ratio were displayed in Table 1.

Table 1. The 15 formula of tropical almond ash glazing ratio.

Formula	Tropical Almond Bottom Ash (%)	Soda feldspar (%)	Kaolin (%)
1	80	10	10
2	70	20	10
3	70	10	20
4	60	30	10
5	60	20	20
6	60	10	30
7	50	40	10
8	50	30	20
9	50	20	30
10	50	10	40
11	40	50	10
12	40	40	20
13	40	30	30
14	40	20	40
15	40	10	50

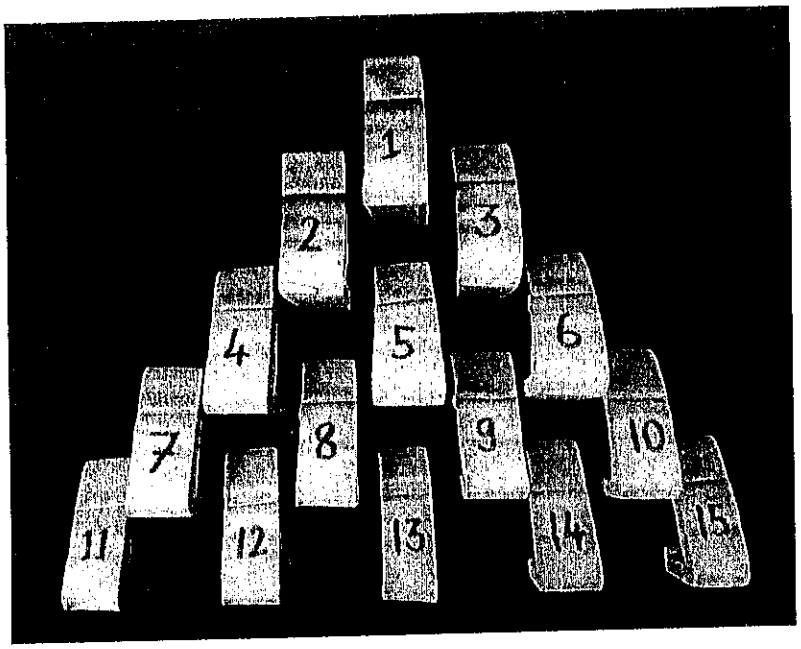

Fig 2. Glazing properties from 15 formula of tropical almond ash glazing ratio.

5. Result and Discussions

The research process was followed as mention in the previous part. The various properties of glaze after firing at 1,230 degree Celsius in reduction atmosphere were discussed. The results were exhibited in Table 2.

Table 2. Physical properties derived from tropical almond bottom ash, soda feldspar and kaolin after firing at 1,230 degree Celsius in reduction atmosphere.

Formula	Glazing properties		
	color	Gloss / Semi-matt/ Matt	Characteristics
1	Light- green gray	Semi-matt	Transparent/Flowing
2	Light- green gray	Semi-matt	Transparent/Flowing
3	Light- green gray	Semi-matt	Transparent/Flowing
4	Light-green	Semi-matt	Transparent/Flowing
5	Light-green	Gloss	Transparent/Flowing
6	Light-green	Gloss	Transparent/Flowing
7	Light-green	Gloss	Transparent
8	Light-green	Gloss	Transparent
9	Light-green	Gloss	Transparent/Flowing
10	Light-green	Gloss	Transparent
11	Light-green	Gloss	Transparent
12	Light-green	Gloss	Transparent
13	Light-green	Gloss	Transparent
14	Light-green	Gloss	Transparent
15	Light-green	Gloss	Transparent

The 8th formula was chosen due to the gloss. The suitable ratio among of glaze formula tropical almond ash : soda feldspar : kaolin was tropical almond ash 5:3:2, respectively. The Stoneware Pottery prototypes were shaped as tea set by the throwing method. The results showed that the glaze of all products was glossy with light-green colour. This developed glazing process was well performed in the Ratchaburi pottery industries. In addition, the mixing between Tropical almond bottom ash and metal oxides are under investigation to create a variety of colour shades.

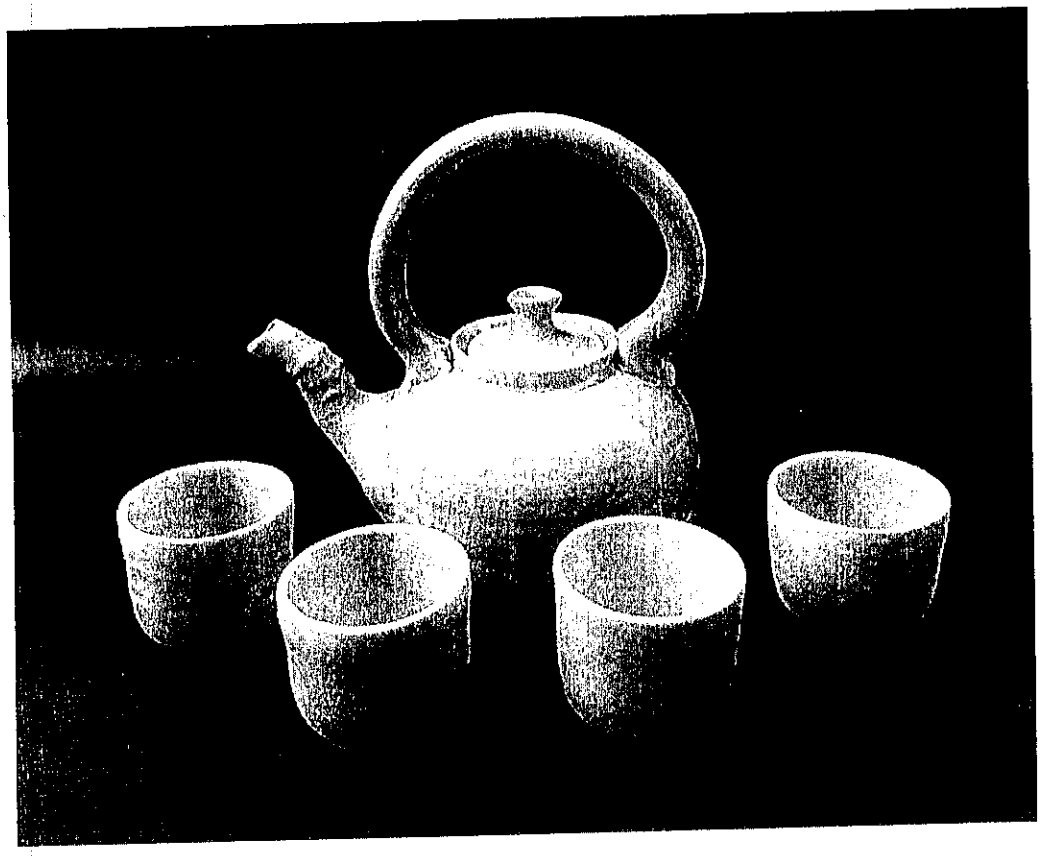

Fig 3. Tea set from the 8th tropical almond ash glaze formula.

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