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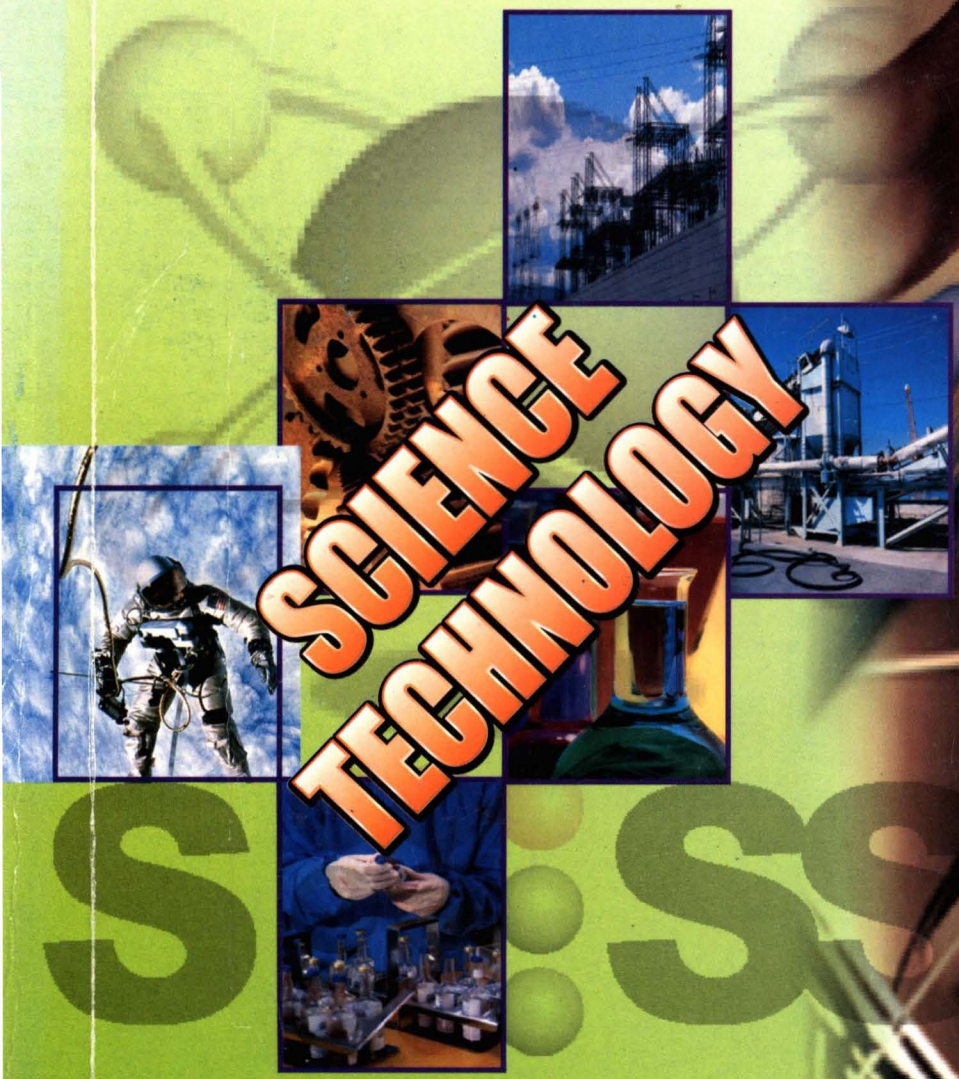

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Colorant from Selected Rocks/Soils

Wan Yunus Wan Ahmad
Hushinaidi Abdul Hamid
Muhammad Ismail Abdul Kadi
Anis Jauharah Abdul Kadir
Mohamad Khalil Imran
Jamil Salleh
Mohd Kahiri Mohd Yusoh.

ABSTRACT

Selected rocks/soils were used as dyes to colour textile silk fabric. The rocks have to be grinded before being used as dyes or pigments. The dyeing techniques applied for the ground colour were exhaustion, brushing or painting method. Wax and non-wax batik resist agents were used to draw the outlines of batik designs by canting. The wax is also used to design batik by block printing. The rocks/soils used were lateritic rocks with different amount of iron oxide contents and shale with aluminium and clay contents. The wash fastness and rubbing fastness properties of rocks/soils dyed and printed fabrics were within the range of fastness of natural dyes from other sources such as plants or animals.The application of rocks/soils dyes could implement the 'waste-to-wealth' principle by converting natural 'waste' to products as the rocks are easy to source, cheap and at the same time less toxic. The rocks/soils can also be used as pigment printing as well as tie and dye technique to form designs.

Keyword: *Lateritic rock, dyeing, printing, colorant*

Introduction

Natural dyes which have been used from plants, animals and mineral have been forgotten for so many years due to the difficulty of application and limited sources. The advancement of dyes manufacturing produce many colours for mankind but at the same time pollute the environment. The back to nature society and environmentally friendly awareness lead to man looking back to nature and one of them is natural dyes.

Normally natural dyes are from plants or animals and to less extent from mineral such as Prussian blue formed from prussite of potash and iron salt (copperas) (Druding 2006), manganese bronze, chrome yellow, antimony orange (Anon 2006). However, rocks/soil in Malaysia which is easily available can be source for light coloured articles as their colours are not bright.

Materials and Methods

Two types of coloured rocks were selected based on their colours. They were red rocks with different range of colours from brick red to dark red and shale which was grey in colour. They are lateritic rocks with red colour rich in iron oxide and grey shale contains aluminium and clay. The rocks were crushed manually into powder and then filtered so that only small size powdered rocks can be used as colorant.

Jacquard silk fabric samples were used throughout the dyeing and printing using dyes from rocks. Figure 1 depicts the application of colorant from rocks/soil to various textile substrates.

Dyeing Method

The selected rocks were boiled in water. The soluble top layers were filtered and used as dyes whilst the insoluble deposits at the bottom were used as pigment. The solution of dyes were measured, calculated and dyed at boil for one (1) hour with the addition 2 %of levelling agent to provide level of dyeing. The fixation stage followed with treatment in 3% mordant at boil for 10 to 15 minutes. They were then washed, rinsed and soap at boil to remove impurities for 10 minutes and hung to dry.

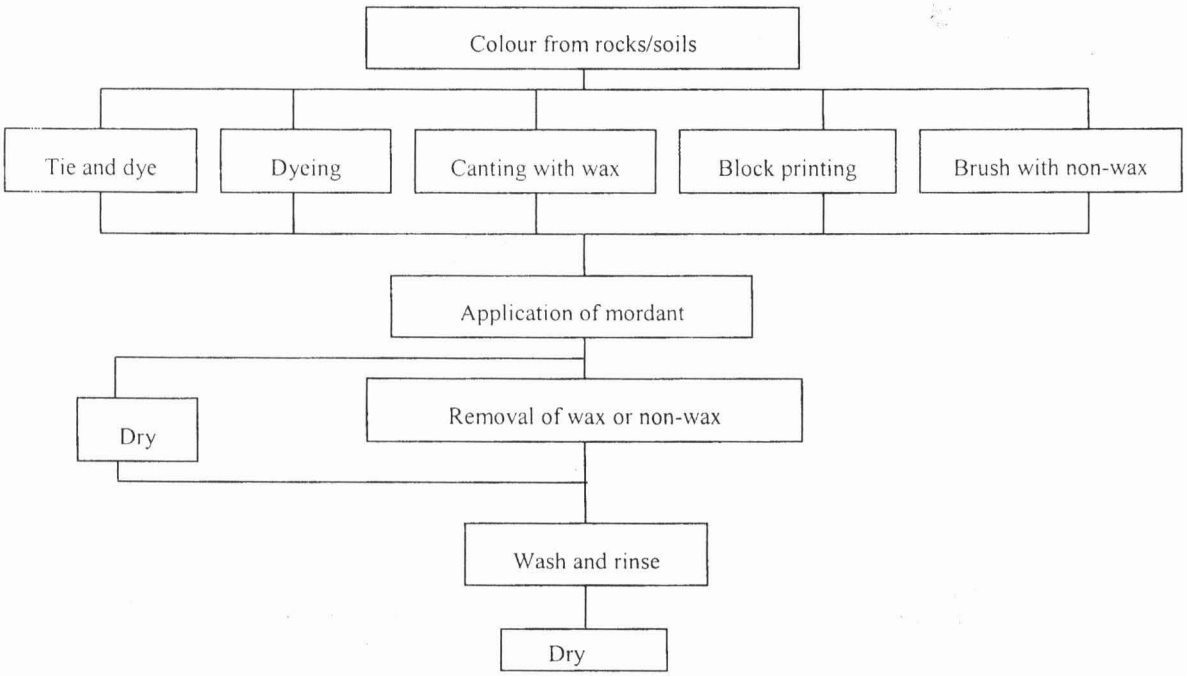

Fig. 1: Application of Rocks Colorant on Textile Substrates

Canting Method

Canting or designing using wax or non-wax resist agent followed by adding colours to the designed areas using brushes. The coloured fabric were left to dry and the next step was to apply mordant to the coloured areas also using brush. The fabric was dried and removal of wax or non-wax resist agent followed. They were then washed rinsed, soap at boil and hung to dry.

Tie and Dye Method

The fabrics were tied with strings and other accessories such as small ball bearings to form the required and anticipated designs. The fabrics were then dyed and treated as in the dyeing method above. After the strings have been removed the designs appeared on the fabrics.

Block Printing Method

The fabrics were stamped with designed block with similar procedure of batik block printing technique and then painted using brush. The painted fabrics were then treated with mordant and followed by removal of wax. They were then washed rinsed, soap at boil and hung to dry.

Brush Method

The design was created with non-wax resist agent using brush. The designed areas were then painted accordingly as above. After treating with mordant and removal of non-wax, the fabrics were then washed rinsed, soap at boil and hung to dry. The deposits from rocks can also be used as pigment and can be printed onto fabrics, T-shirts, etc with the help of thickener and binder and can also be used in artworks such as paintings.

Results and Discussion

Wash fastness

The wash fastness was carried out according to MS ISO 105-C01. The colourfastness rating was from 4/5 to 5 where 5 is no change in colour and 1 is the worst change in colour.

Crocking fastness

The crocking fastness was carried out according to MS ISO 105-X12. In printing such as in canting the colour fastness to crocking (rubbing) change varies from 2 to 5 depending on the type of colours used. Some additives have to be added in order to improve the colour fastness to crocking.

Most of the products are in pastel or light colours but they are compatible with other natural dyes in term of application and processing. It is possible to mix colorants from rocks and plants so they can be used to create varieties of colours for specific purpose of end use.

Dyeing, printing (canting, block printing as in batik, pigment printing), tie and dye, and painting for artworks are some of the products that can be produced from rocks which has to be grinded into powder.

The extended version of this research will probably be the grinding of rocks to micron or nano sizes which the researchers can foresee many other textile substrates can be dyed and printed. The works also will be much finer and the artworks will be more attractive. The characterisation of the rocks and shale will also be carried out to determine their contents, percentage of each component as well as their microscopic structures.

The application of rocks/soil dyes could implement the 'waste-to-wealth' principle as suggested by Prime Minister (The Star 2005) by converting natural 'waste' to products as the rocks/soil is easy to source, cheap and at the same time less toxic.

Conclusion

Dyes from rocks/soils seem to be a unique idea to colour the fabric. It can pave the way for many interesting coloured products/shades from rocks/soils in the days to come. Clay Robinson (Robinson, 2006; Burch, 2006) wrote that the coloring material in bright red soil is oxidized, anhydrous, Fe_2O_3, a hematite mineral; that in bright yellow dirt is oxidized hydrated, $2Fe_2O_3 3H_2O$, a limonite mineral, while most dark soils are coloured by organic materials. The unique products in the form of T-shirts are commercialised by Planet Earth Trading Company in USA (Anon, 2006). However, the intended coloured products and the method of application to the substrates between this work and Planet Earth Trading Company are not the same.

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WAN YUNUS WAN AHMAD, MUHAMMAD ISMAIL ABDUL KADIR, ANIS JAUHARAH ABDUL KADIR, JAMIL SALLEH, MOHD KAHIRI MOHD YUSOH, Faculty of Applied Sciences, Universiti Teknologi MARA Shah Alam.

HUSHINAIDI ABDUL HAMID & MOHAMAD KHALIL IMRAN, Faculty of Arts and Design, Universiti Teknologi MARA Shah Alam.