# PALM-BASED MATERIALS FOR ENCAUSTIC PAINTING MEDIUM

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Painting is the practice of applying paint, pigment, colour or other medium to a surface (support base). The medium is commonly applied to the base with a brush but other implements, such as knives, sponges, and airbrushes can also be used depending on the type of works. Different type of paints (such as oil paint, acrylic paint, watercolour, encaustic paint, pastel, ink, *etc.*) are usually identified by the medium that the pigment is suspended or embedded in, which determines the general working characteristics of the paint.

Encaustic painting, which is also known as hot wax painting, involves using heated wax to which coloured pigments are added (*Figure 1*). The molten wax is then applied to a surface (usually wood, canvas or other absorbent surface) and then reheated in order to fuse the paint. The word 'encaustic' comes from the Greek word 'enkaiein' or 'enkaustikos', meaning to 'burn in', referring to the process of fusing the paint. Although they come from the same root word, 'encaustic' does not refer to a corrosive chemical reaction. There is no such hazard with encaustic.

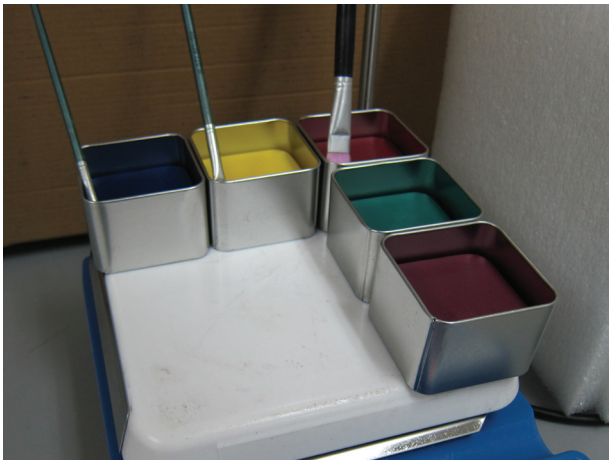

*Figure 1. An example of encaustic painting set-up.*

In fact, as compared to other painting mediums, encaustic are considered as the most beautiful and versatile medium in all artists' paints (*Figure 2*). This is because it is unique whereby it can be polished to a high gloss, carved, scraped, layered, collaged, dipped, cast, modelled, sculpted, textured, and even combined with oil (Rankin, 2010; Mayer, 1991). The molten wax cools immediately, so that there is no drying time, yet it can always be reworked. Encaustic paintings do not have to be varnished or protected by glass like other paintings because encaustic paint is durable and the wax material is impervious to moisture. Moreover, encaustic paint does not require the use of solvents. As a result, a number of health hazards are reduced or eliminated.

*Figure 2. An example of encaustic painting.*

The simplest encaustic mixtures can be made from adding pigments to beeswax, but there are several other recipes that can be used - some containing damar resin or other ingredients (Rankin, 2010). However, in the market, most of the encaustic painting media is made of beeswax. In promoting the utilisation of palm-based materials in different applications, an encaustic medium product containing more than 50% palm-based materials have been developed (*Figure 3*). This medium performs similarly as those encaustic paint products in the market.

*Figure 3. Palm-based encaustic paint in rectangular containers.*

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## PALM-BASED ENCAUSTIC MATERIALS

A series of coloured encaustic paint containing palm-based materials are formulated. The formulated palm-based encaustic material is easy to handle and work with; it also has similar melting temperature range as compared to the commercial encaustic painting materials. *Table 1* shows some specifications of the formulated encaustic materials containing palm-based materials in comparison with commercial encaustic product.

**TABLE 1. PHYSICAL COMPARISON BETWEEN PALM-BASED AND COMMERCIAL ENCAUSTIC PAINTING MATERIALS**

| Parameters | Description | |
|---|---|---|
| | Palm-based encaustic | Commercial encaustic |
| Appearance | Solid | Solid |
| Melting temperature | Below 80°C | 70°C – 90°C |
| Hardness (mm) * | 0.15 – 0.50 | 0.30 – 0.75 |
| Colour | Even and homogenous | Even and homogenous |

Note: * ASTM D217.

## MARKET ANALYSIS

The demand for waxes had reached 4.4 million tonnes in 2010, with mineral waxes accounted for 85% of the global demand, synthetic waxes (11%), and animal and vegetable waxes (4%) (Kline ad Compay, 2011). Global wax consumption is expected to grow at an average annual growth rate of more than 2% from 2010 to 2020. However, export and import values of vegetable waxes (excluding triglycerides) for Malaysian market in 2011 were around USD 3.656 million (2.93% of world market value) and USD 1.239 million (0.99% of world market value), respectively (Parkeer, 2011). The usage of waxes in painting and coating segments especially in the artwork sector is small compared to the usage in pharmaceutical, cosmetic and food segments. The retail price of a commercial encaustic paints generally ranges from RM 60 to RM 150 per 120 ml.

## ECONOMIC ANALYSIS

Palm-based encaustic paint offers an opportunity to interested parties that are eager to venture into the niche product market of artist paints segment. The investment and payback period of the palm-based encaustic products business is given below:

Capital investment = RM 400 380
Operational cost = RM 3 443 174
Production capacity = 14 400 t $yr^{-1}$ @ 100 kg per batch per day
Payback period = 3 years
Net present value (NPV) @ 10% = RM 1 573 913
Internal rate of return (IRR) = 40%
Cost price = RM 182 $kg^{-1}$

## POTENTIAL TAKERS

- Manufacturers of artwork products.
- Artworks shops.

## BENEFITS OF THE PRODUCT/TECHNOLOGY

a) The formulated encaustic paint contains more than 50% palm-based materials. This palm-based encaustic materials exhibit comparable performance to the commercial products.
b) The new encaustic materials offer huge market potentials in the niche products market.

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