

Utilization of palm oil in the alkyd resin synthesis

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The high costs, the environmental impact and the decrease of fossil resources are intensifying the research for alternative raw materials in different industrial fields. The palm oil, extracted from palm tree, is a versatile oil compared with others unsaturated vegetable oils. It's utilized by medical, food, oil chemistry and cosmetic industry. Recently, your production has been intensified due to the possibility of utilization as a biodiesel.

Most of the vegetable oils can be utilized in the alkyd resin formulation, among them the most explored is the soybean oil in the alkyd resins formulation.¹ The resin is the mainly component of the decorative coatings, being formed by vegetable oil, polybasic acid and a polyhydric alcohol. These materials play an important role in physical and chemical properties of the obtained coating. A lot of researches are being developed searching an improvement of the coatings properties and the reduction of the costs, modifying the resin components and the synthetic method. The most utilized process in the alkyd resin synthesis is alcoholysis, which allows the utilization of the vegetable oil in the form of a triglyceride.

In this work we investigated the utilization of palm oil in the obtainment of alkyd resin, changing the oil content.² It was synthesized short oil resins (< 45%), medium oil resins (45-55%) and long oil resins (>55%), as showed in table 1.

Table 1: Recipe for the preparation of the alkyd samples.

Ingredients	Short oil	Medium	Long
Oil content (%)	44.00	53.00	60.00
Polyhydric alcohol (%)	20.00	17.00	15.00
Polybasic acid (%)	36.00	30.00	25.00

In the first step of the resin synthesis, alcoholysis, we reacted palm oil and pentaerythritol using lithium hydroxide as a catalyst. In the next step, polyesterification, we reacted the monoglyceride with pentaerythritol, phthalic anhydride, ethylene glycol and fumaric acid. The reaction was followed by the acid number (AN), which must be around 18 mg KOH/g of resin in the end of reaction.

The obtained resins were characterized by infrared spectroscopy –FTIR, gel permeation chromatography –GPC, drying test and viscosity.³ A preliminary investigation into the utilization of palm oil as alkyd modifier has been carried out. Alkyds prepared from palm oil may be suitable for blending with fast-drying resins to impart gloss and flexibility, and to reduce cost. Moreover we verified that the palm oil content changes the physical and chemical properties of the obtained alkyd resin.

References

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