

COPAL CLARITY AND TRANSPARENCY ENHANCEMENT

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Introduction

Copal, an organic gemstone, is fossil resin which look similar to amber. Molecular polymerization, resulting from high pressures and temperatures produced by overlying sediment, transforms the resin first into copal. Sustained heat and pressure drives off terpenes and results in the formation of amber [1]. The rough copal is usually translucent. Propose of this study is to improve the copal transparency by heat treatment.

Materials and Methods



Large 7 copals were selected. Each one were cut and polished into 8 small samples, around 1 cm width. The study was done in four cooking oils (olive oil, palm oil, soybean oil and corn oil) under 40-45 ° C and 55-60 ° C for 15 and 20 hours. Basic gemological instruments, Hitachi U-4100 UV-VIS-NIR spectrophotometer and Bruker Optics Alpha portable IR spectrometer were used to analyse the samples both before and after treatment for comparison.

Results

The gemological properties, i.e. specific gravity, refractive index and color, were slightly changed in some samples. The absorption spectra analyzed by using UV-VIS-NIR spectrophotometer showed no difference between before and after treatment. The IR spectrum analysed using portable IR spectrometer show insignificantly change.



Figure 1. Comparison between before (left) and after (right) treatment in olive oil (A) , palm oil (B), soybean oil (C) and corn oil (D) under 55-60 ° C for 20 hours.

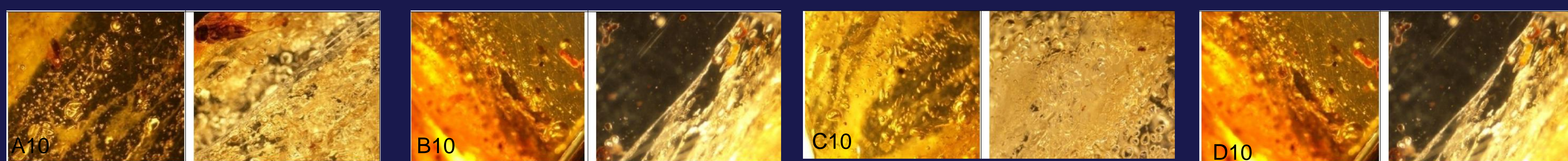


Figure 2. Internal comparison (40x) between before (left) and after (right) treatment in olive oil (A) , palm oil (B), soybean oil (C) and corn oil (D) under 55-60 ° C for 20 hours.

Conclusions

The potential of the copal transparency improvement depends on three conditions, the low viscosity of oils, the temperature and the soaking time. Corn oil is the best because of the viscosity is 65 while soybean oil, olive oil and palm oil are 69, 84, and 88.6, respectively [2]. Comparing between being treated at 40-45 ° C and 55-60 ° C, the higher treatment temperature gives better transparency. The longer soaking time (20 hrs.) also improves the transparency more than the shorter soaking time (15 hrs.). The best transparency improvement in this project is the samples treated in Corn oil under 55-60 ° C for 20 hours.

References

- [1] Rice, Patty C. (2006). Amber: Golden Gem of the Ages. 4th Ed., AuthorHouse.
[2] Pisamai Janwanichpanjakul [online] Bio-desel, <http://www.tistr.or.th/publication/> , 12 January 2012