

Pengaruh Zirconium Akrilat Keatas Pematangan Salutan Akrilat Minyak Sawit Dengan Menggunakan Teknik Ultra Lembang (UV)

The Influence of Zirconium Acrylate on Curable Palm Oil Resin as Coating Material by Using UV Technique.

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INTRODUCTION

Ultra violet (UV) technique is considered as a radiation curing method which initiating a polymerization process to form crosslink network by presence of photoinitiator. Nowadays there are efforts to invent natural polymer as a curable material due to strict legislation for reducing volatile organic compound. Epoxidized Palm oil liquid acrylate (EPOLA) is one of the potential natural polymer to apply in coating industries. The ability to form crosslink network under UV irradiation gift EPOLA good commercial value especially for green material purposed. However low reactivity and poor adhesion properties of EPOLA cured coating contribute to the disadvantage of final product. In order to enhance EPOLA properties Zirconium Acrylate was introduced in EPOLA curable coating formulation. The presence of Zirconium acrylate increase the adhesion and hardness of curable coating due to increment of the rough-ness and polarity of the surface. Meanwhile the zirconium structure and properties contributed to the enhancement of film hardness. However high percentage of zirconium acrylate will reduce gloss properties of cured film which contributed by agglomeration of zirconium acrylate and light reflectance scattering due to surface roughness.

OBJECTIVE

- ✓ To develop new formulation for overprint varnish
- ✓ To replace/ reduce petrol base formulation with natural polymer by using epoxidized palm oil acrylate
- ✓ To enhance adhesion of cured coating film on paper substrate

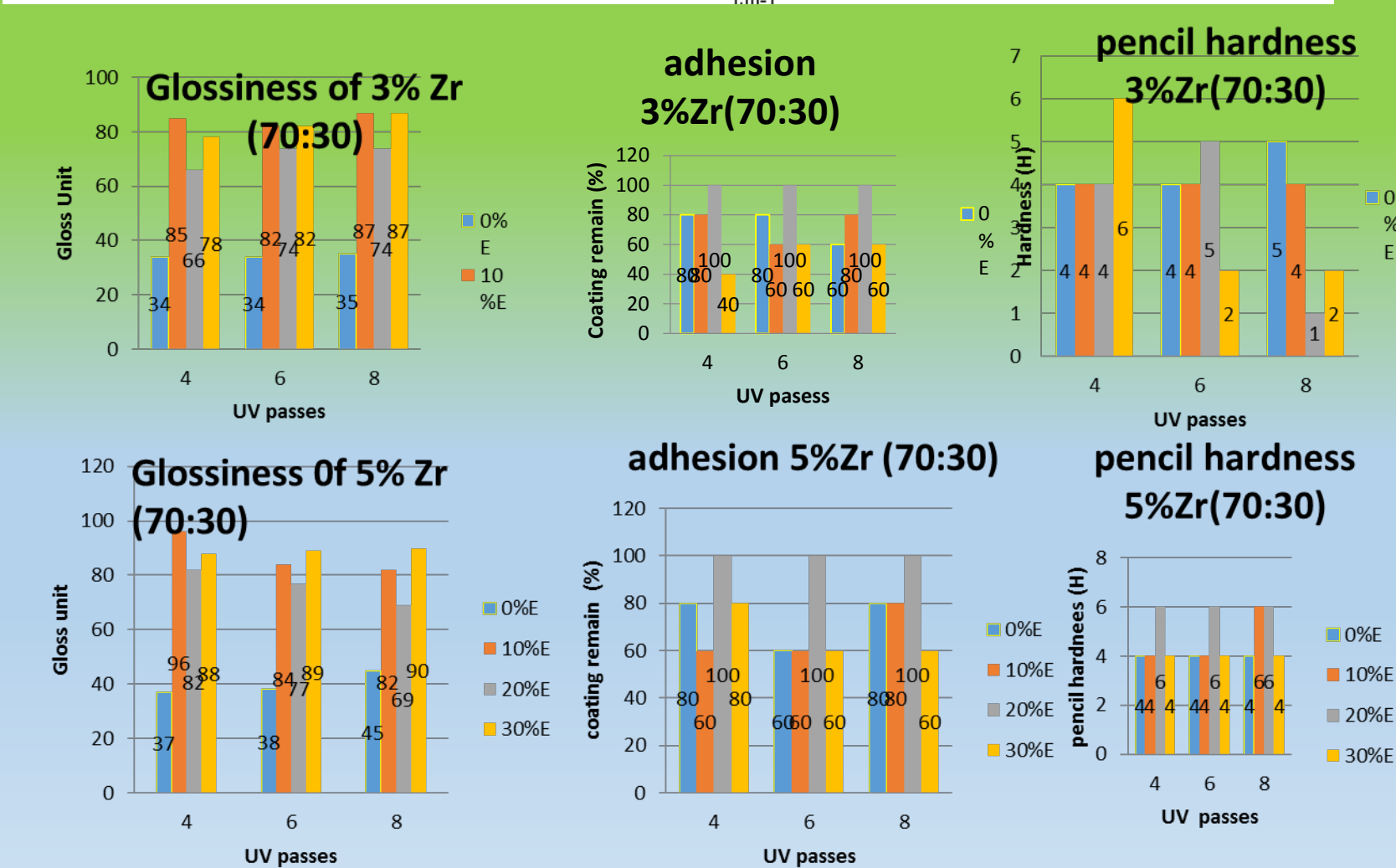
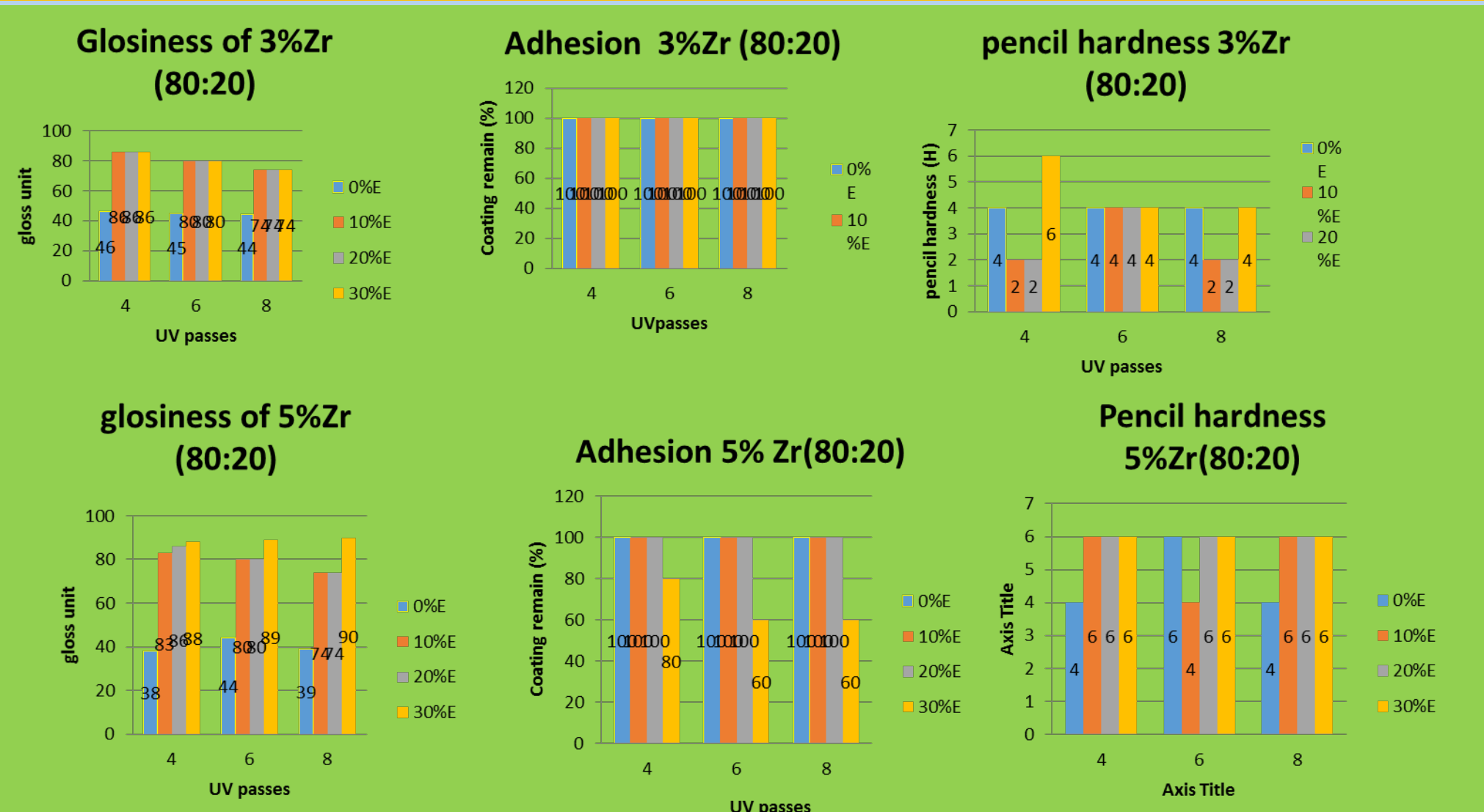
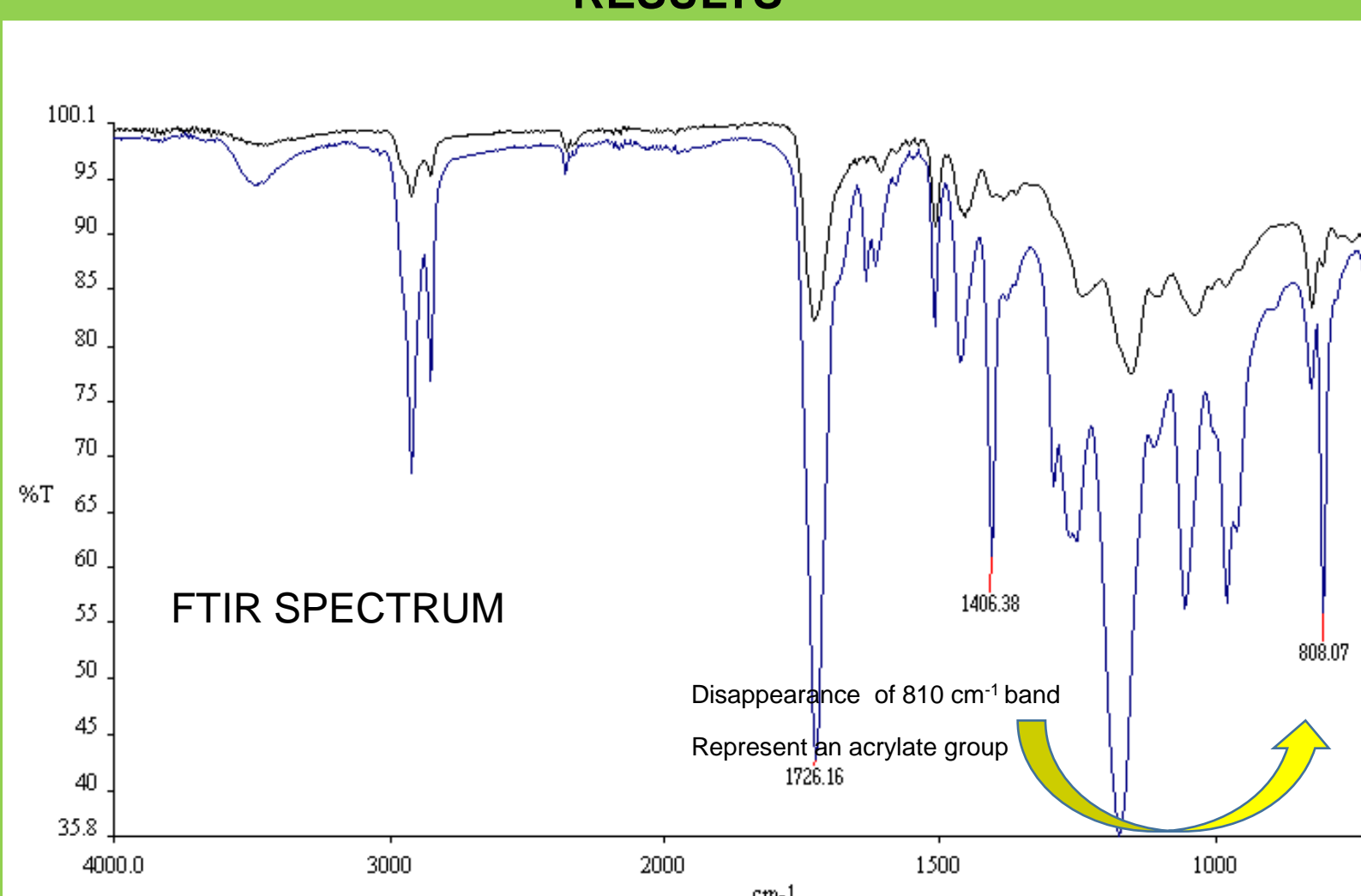
ABSTRACT

Epoxidized Palm oil liquid acrylate (EPOLA) was introduced with commercial monomer and oligomer to produce coating film by using radiation technique. The percentage of EPOLA in curable formulation has varied in order to study the influence of EPOLA on coating film properties. Meanwhile Zirconium Acrylate was added and varied as additive into curable formulation to investigate the influence on film coating. FTIR analysis was used to monitor the crosslinking process by observed the disappearance of acrylate group. The performance of coating film were investigated by doing several mechanical analysis such as pencil hardness and adhesion test. Meanwhile, in order to determine gloss properties for cured film at different dose of radiation, gloss meter was used to measure gloss value. According to mechanical analysis result, an increasing of EPOLA compound in coating formulation will reduce film hardness and adhesion properties. However after additional of zirconium acrylate into resin formulation the properties of coating film were improved due to presence of zirconium in crosslinking network.

MATERIAL/METHOD

Several oligomer and monomer were introduced with EPOLA in small reactor. Meanwhile zirconium acrylate were dissolved in acrylic acid and was added into oligomer/monomer mixture within 30 minutes under heating temperature at 65 – 70 °C. Finally the mixture were dispersed under intensive stirring during 1 hours using a dissolver. The product was immediately cooled to room temperature. 5 wt.% Photoinitiator was added into prepared resin before UV irradiation. Subsequently coating films with different percentage of zirconium acrylate were prepared on paper substrate by using bar coater applicator. After that the wet film were cured with the conventional medium pressure Hg lamp (120Wcm⁻¹) for the polymerization process. All the sample after that were characterized with hardness test, gloss meter, adhesion test and FTIR analysis.

RESULTS



CONCLUSION

- ✓ Epola significantly contributed on gloss properties
- ✓ Adhesion and hardness properties improve with additional of zirconium acrylate
- ✓ Ratio monomer and oligomer influence the final product.
- ✓ Disappearance of 810cm⁻¹ spectrum elucidate polymerization process under UV irradiation.