****Investigation of Surface Free Energy of Palm Oil-Based Offset Printing Ink on Coated Paper****

****G. S. Suryadi1, S. Nikmatin2,3, H. D. Rahmayanti1, Susiani1, D. Setyaningsih3,4, N. Muna3, A. Kristinawati5****

**1** Department of Graphic Engineering, State Polytechnic of Creative Media, Jakarta, Indonesia

2 Department of Physics, IPB University, Bogor, Indonesia

**3** Surfactant and Bioenergy Research Center, IPB University, Bogor, Indonesia

4 Department of Agroindustrial Technology, IPB University, Bogor, Indonesia

5 PT Interstisi Material Maju, Jl. Rawajaha No. 24 16115 Bogor, Indonesia

Email: gema@polimedia.ac.id

**Abstract.** The widely use of petroleum-derived mineral oils for the production of offset printing inks has resulted in several environmental impacts. The suitable approach to develop alternative resources is palm oil fatty acid methyl ester (FAME) as a substitute for petroleum-based solvent. This study aimed to investigate the surface properties of palm oil-based offset ink on gloss-coated paper surfaces in terms of printability. We developed different Cyan color inks with linseed oil (FAME-LO) and soybean oil (FAME-SO) as drying oil. Printing tests were carried out using the IGT-A2 printability tester. Contact angles of water, methanol, and hexane on the surface of printed ink were measured using Contact Angle Analyzer. The surface free energy (SFE) and its components were calculated using Girifalco-Good-Fowkes-Young, Owens-Wendt, and van Oss-Chaudhury-Good methods. The results showed that as the liquid contact angle increased, the surface energy decreased. The surface energy of FAME-SO ink printed samples 36,36 mJ/m2 was higher than the unprinted paper 35,84 mJ/m2. Since high surface energy will affect the bond strength of the ink to the substrate, this will be an advantage for multicolor prints requiring good ink adhesion, which will enlarge the acceptance of other colors to be printed on the previous color.

**Keywords**: palm oil, offset printing ink, varnish, contact angle, surface energy.